



MOTOROLA SOLUTIONS

TETRA Terminals Product Information Manual



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GENERAL INFORMATION

Legal and Safety Information

Safety Information

The equipment is restricted to occupational use only to satisfy ICNIRP RF energy exposure requirements. Before using the products, read the RF energy awareness information and operating instructions in the respective Product Safety and RF Exposure booklets to ensure compliance with RF energy exposure limits.

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Open Source Software (OSS) Legal Notices

For details on OSS Legal Notices visit Motorola Online (moleurope.mot.com) or browse the CPS CD.

Service Information

Service for the radio is based on the substitution method; whereby a working part replaces a faulty one, providing quicker service to the customer. For example, if the controller board is faulty, it is replaced.

If the radio requires complete testing or servicing than that is available at field level, it is sent to the Motorola Solutions Service Center where it is serviced, and returned to the Regional Service Center.

Level 1 and Level 2 Maintenance

This manual covers Level 1 and Level 2 Maintenance.

Level 1 Maintenance

You replace the radio and/or accessories and send the faulty radio and/or accessories to a higher level of maintenance.

Level 2 Maintenance

A radio board is replaced.

The radios are programmed at the factory. They cannot be tuned at the field service level.

Level 3 Maintenance

Level 3 maintenance can only be done at the Motorola Solutions Service Center/Depot. To find out more about Motorola Solutions Service Center, visit <https://www.motorolasolutions.com/>.

To perform a boundary scan of the memory ICs on the radios, download the relevant software and working instructions from <http://compass.mot-solutions.com/go/423180884>.

Replacement Parts

Damaged parts are replaced with identical replacement parts. For complete information on ordering required parts and kits, contact your local customer service representative.

Service Information - EMEA

EMEA Technical Support Operations (TSO)

The EMEA Technical Support Operations (TSO) provides a remote Technical Support Service to help customers resolve technical issues and quickly restore networks and systems. This team of highly skilled professionals is available to customers with current service agreements in place that include the Technical Support Service. The TSO technical experts may be accessed through the Service Desk either electronically or using the listed telephone numbers. If you are unsure whether your current service agreement entitles you to benefit from this service, or if you would like more information about the Technical Support Service, contact your local customer support or account manager for further information.

Contact Details

Technical Requests: techsupport.emea@motorolasolutions.com

Repair Support: repair.emea@motorolasolutions.com

Contact Us: https://www.motorolasolutions.com/en_xu/support.html

Parts Identification and Ordering

If you need help in identifying non-referenced spare parts, direct a request to the Customer Care Organization of a local area Motorola Solutions representative. Orders for replacement parts, kits, and assemblies should be placed directly at the local distribution organization of Motorola Solutions or through the Extranet site Motorola Online at <https://emeaonline.motorolasolutions.com>.

However, you cannot order export-controlled products or spare parts such as TEA-related boards through Motorola Online. Send an order form with actual end-customer details by e-mail to your customer care team.

Your Input

Send questions and comments regarding user documentation to documentation@motorolasolutions.com.

Service Information – APAC

This topic contains contact details to service centers in Asia and Pacific region.

Technical Support

Technical support is available to assist the dealer/distributor in resolving any malfunction which may be encountered. Initial contact should be by telephone wherever possible. When contacting Motorola Solutions Technical Support, be prepared to provide the product model number and the serial number.

Further Assistance from Motorola Solutions

You can also contact the Customer Help Desk through the website: http://www.motorolasolutions.com/en_xp/products. If a unit requires further complete testing, knowledge and/or details of component level troubleshooting or service than is customarily performed at the basic level, send the radio to a Motorola Solutions Service Center as listed in the following table:

Service Information – Telephone Numbers and Addresses of the Asia and Pacific Motorola Solutions Centers

Country	Telephone Number	Address
Singapore	+65-6352-6383	Motorola Solutions Singapore Pte. Ltd, c/o Azure Engineering, 49 Jalan Pemimpin, #03-11 APS Industrial Building, Singapore 577203 Contact: Mareen Phua E-mail: mareen@azure.com.sg Enquiry: Goe Engkiet E-mail: eng-kiet.goe@motorolasolutions.com
Malaysia	+603-7809-0000	Motorola Solutions Sdn. Bhd. Level 14, Persoft Tower, No. 68, Pesiaran Tropicana,

Country	Telephone Number	Address
		47410 Petaling Jaya, Selangor Darul Ehsan, Malaysia Contact: Koh Tiong Eng E-mail: A21001@motorolasolutions.com
Indonesia	+62-21-3043-5239	PT. Motorola Solutions Indonesia 30th Floor, Gedung BRI II, Suite 3001, Jl. Jend. Sudirman Kav. 44-46, Jakarta 10210, Indonesia Contact: Eko Haryanto E-mail: Eko.Haryanto@motorolasolutions.com
Thailand	Tel: +662-653-220 Fax: +668-254-5922	Motorola Solutions (Thailand) Ltd. 142 Two Pacific Place Suite 2201, 3220 Sukhumvit Road, Klongtoey, Bangkok 10110 Contact: Nitas Vatanasupapon E-mail: Nitas@motorolasolutions.com
India	+91-9844218850	Motorola Solutions India Pvt. Ltd. C/o Communication Test Design India Private Limited, #4, 5 Maruthi Industrial Estate, Rajapalya, Hoodi Village, Bangalore - 560048, India Contact: K. Umamaheswari E-mail: umamaheshwari@motorolasolutions.com
China	+86-10-8473-5128	Motorola Solutions (China) Co. Ltd. No. 1 Wang Jing East Road, Chao Yang District, Beijing, 100102, P.R. China Contact: Sophy Wang E-mail: C18170@motorolasolutions.com
Hong Kong	852-2966-4823	Motorola Solutions Asia Pacific Ltd. Unit 1807-1812, 18/F, Two Harbourfront, 22 Tak Fung Street, Hung Hom, Kowloon, Hong Kong Contact: Judy Leung E-mail: Judy.Leung@motorolasolutions.com

Country	Telephone Number	Address
Philippines	Tel: +632 858-7500 Fax: +632 841-0681	Motorola Communications Philippines, Inc. Unit 2102, One Global Place Building, 5th Ave., Bonifacio Global City, Taguig, Philippines 1634. Contact: Arthur Nieves E-mail: Arthur.Nieves@motorolasolutions.com
Korea	+822-3497-3649	Motorola Solutions Korea, Inc. 9th Floor, Hibrand Building, 215, Yangjae-Dong, Seocho-Gu, Seoul, 137-924, Korea. Contact: KS Kwak E-mail: r45321@motorolasolutions.com
Taiwan	+886-2-8729 8000	Motorola Solutions Taiwan, Ltd. 8F, No. 9, Songgao Rd., Taipei 110, Taiwan (R.O.C.) Contact: Michael Chou E-mail: ftpe239@motorolasolutions.com
Australia	+613-9847-7725	Motorola Solutions Australia Pty. Ltd. 10 Wesley Court, Tally Ho Business Park, East Burwood Victoria 3151, Australia. E-mail: servicecentre.au@motorolasolutions.com

Piece Parts

Some replacement parts, spare parts, and/or product information can be ordered directly. If a complete Motorola Solutions part number is assigned to the part, it is available from Motorola Solutions Service Organization. If no part number is assigned, the part is not normally available from Motorola Solutions. If a list of parts is not included, that means that no user-serviceable parts are available for that kit or assembly.

Customer Programming Software has no capability to tune the radio. Tuning the radio can only be performed at the factory or at the appropriate Motorola Solutions Repair Center. Component replacement can affect the radio tuning and must only be performed by the appropriate Motorola Solutions Repair Center.

All orders for parts/information should include the complete Motorola Solutions identification number. All part orders should be directed to your local Motorola Solutions Service Organization. See your latest price pages.

Parts Identification and Ordering

Request for help in identification of non-referenced spare parts should be directed to the Customer Care Organization of Motorola Solutions local area representation. Orders for replacement parts, kits, and assemblies should be placed directly on a Motorola Solutions local distribution organization or from the Motorola Solutions Online (Extranet).

Service Information – Americas

This topic contains contact details to service centers in Latin America and Caribbean region.

Technical Support

To request technical support, go to <https://businessonline.motorolasolutions.com>, **Contact Us**.

Some replacement parts, spare parts, and/or product information can be ordered directly. If a complete Motorola Solutions part number is assigned to the part, it is available from Motorola Solutions. If no part number is assigned, the part is not normally available from Motorola Solutions. If the part number is appended with an asterisk, the part is serviceable by Motorola Solutions Depot only. If a list of parts is not included, that means that no user-serviceable parts are available for that kit or assembly.

Warranty and Repairs

Service Information – Telephone Numbers and Addresses of Latin America Radio Support Centers

Country	Telephone Number	Address
Colombia	571- 376-	Motorola Solutions de Colombia Service Centre Torre Banco Ganadero Carrera 7 No. 71-52 Torre B piso 13 Oficina 1301 Bogota
Mexico	5252576700	Motorola Solutions de México Service Centre Bosques de Alisos #125 Col. Bosques de las Lomas CP 05120 Mexico DF

Piece Parts

To order parts in Latin America and the Caribbean contact your local Motorola Solutions CGISS representative.

Service Information – Telephone Numbers and Addresses of Latin America Motorola Solutions Centers

Country	Telephone Number	Address
Argentina	5411-4317-5300	Motorola Solutions Argentina Ave. del Libertador 1855 B1638BGE, Vicente Lopez Buenos Aires

Country	Telephone Number	Address
Brasil	5511-3847-668	Motorola Solutions Ltda Av. Chedid Jafet 222 Bloco D Conjuntos 11,12,21,22 E 41 Condominio Millennium Office Park 04551-065- Vila Olimpia, Sao Paulo
Chile	562-338-9000	Motorola Solutions Chile S.A. Av. Nueva Tajamar 481 Edif. World Trade Center Of. 1702, Torre Norte Las Condes Santiago
Colombia	571-376-6990	Motorola Solutions Colombia LTDA. Carrera 7 #71-52 Torre A, Oficina 1301 Bogotá
Costa Rica	506-201-1480	Motorola Solutions de Costa Rica Parque Empresarial Plaza Roble Edificio El Portico, 1er Piso Centro de Negocios Internacional Guachepelin, Escazu San Jose
Ecuador	5932-264-1627	Motorola Solutions del Ecuador Autopist Gral. Rumiñahui, Puente 2 Conjunto Puerta del Sol Este-Ciudad Jardin Pasa E, Casa 65 Quito
Mexico	52-555-257-6700	Motorola Solutions de México, S.A. Calle Bosques de Alisos #125 Col. Bosques de Las Lomas 05120 México D.F.
Peru	511-211-0700	Motorola Solutions del Peru Ave. República de Panama 3535 Piso 11, San Isidro Lima 27
USA	954-723-8959	Motorola Solutions, Inc. Latin American Countries Region 789 International Parkway Sunrise, FL 33325

Country	Telephone Number	Address
Venezuela	58212-901-4600	Motorola Solutions de Los Andes C.A. Ave. Francisco de Miranda Centro Lido, Torre A Piso 15, El Rosal Caracas, 1060

DOCUMENT HISTORY

The following major changes have been implemented in this manual:

Edition	Description	Chapter, Paragraph	Date
68015000002-A	Initial edition		Nov 2008
68015000002-B	MR5.9 updated edition		May 2009
	New Software Orderable Options	Chapter 1, Section 6	
	New Features, Air Interface Migration Congested Cell Handling Alternating HotMic Secondary Control Channel Dual Control Head Data Box Radio operation	Chapter 2, Section 10.6 Section 10.7 Sections 5.1.5, 6.4.3 Section 10.2 Section 18 Section 19	
	Updated Security Information	Chapter 2, Section 12	
	Updated Codeplug Information	Chapter 4	
	Updated AT Commands	Chapter 5	
	AT Commands scenarios added	Chapter 5, Section 6	
	Data Connection chapter updated	Chapter 6	
68015000002-C	RF Power toggle feature	Chapter 2, Section 10.9 Chapter 4, Section 14.44 Section 34.4.16 Chapter 5, Section 4.18	Jun 2009

Edition	Description	Chapter, Paragraph	Date
68015000002-D	MTM800 related information removed MTP850 S/ FuG information added MTP850 Ex/MTP810 Ex information added CEP400/MTP830 information added		Aug 2009
	PTT Double Push	Chapter 2, Section 2.1.8	
	MS-ISDN feature added	Chapter 2, Section 4.3.1 Section 5.3 Section 7.2.1 Section 7.3.2	
	Man Down feature added	Chapter 2, Section 5.5	
	Updated Call-Out information	Chapter 2, Section 8.2 Section 8.4	
	Updated SDS Outbox information	Chapter 2, Section 7.4	
	GPS over MSPD	Chapter 2, Section 9.14 Section 16.2	
	Subscriber Class by Talkgroup	Chapter 2, Section 10.9	
	Automatic Keypad Lock feature	Chapter 3, Section 5.13	
	Updated Codeplug Information	Chapter 4	
	Updated AT Commands	Chapter 5	

Edition	Description	Chapter, Paragraph	Date
68015000002-E	SDS Remote Control feature added	Chapter 2, Section 7.8	Nov 2009
	Radio Messaging Services feature added	Chapter 2, Section 8	
	WAP Push feature added	Chapter 2, Section 9.2	
	SDS Encryption added	Chapter 2, Section 7.7	
	Updated Registration information	Chapter 2, Section 12.4	
	Updated Roaming information	Chapter 2, Section 12.5	
	Updated Congested Cell Handling information	Chapter 2, Section 12.7	
	Updated Secure DMO information	Chapter 2, Section 14.5	
	Service Page information added	Chapter 2, Section 23	
	Updated Covert Mode information	Chapter 3, Section 5.10	
	Updated CPS menu and codeplug parameters information	Chapter 4	
	Updated AT Commands	Chapter 5	

Edition	Description	Chapter, Paragraph	Date
68015000002-F	Subscriber Class by Group SW Orderable Option	Chapter 1	Jan 2010
	Hot Mic interaction	Chapter 2, Section 20.4.5	
	Supported Languages	Chapter 3, Section 6	
	Import/Remove Audio Template	Chapter 4, Section 6.10	
	Audio Settings updates	Chapter 4, Section 26	
	MTM800 Enhanced External Accessory Types	Chapter 4, Section 32.1	
	One Touch Options for S and FuG terminals	Chapter 4, Section 32.3	
	One Touch Buttons for S and FuG terminal accessories	Chapter 4, Section 32.4	
	LIP Configuration parameters amendments (Minimum Reporting Interval)	Chapter 4, Section 35.2	
68015000002-G	TCR1000 information added		Jun 2010
	Legacy information correction		
68015000002-H	Legacy information correction		Jul 2010
	Immediate Text Messaging	Chapter 2, Section 7.4.6	
	SDS End-to-End Encryption	Chapter 2, Section 7.7.3	
	Rotary Knob functionality updated	Chapter 3, Section 5.3	
	Extended Transmit Automatic Gain Control	Chapter 3, Section 5.19.2.12	
	Updated CPS menu and codeplug parameters information	Chapter 4	

Edition	Description	Chapter, Paragraph	Date
68015000002-J	MTM5400 and MTM800 FuG information added		Nov 2010
	Legacy information correction	Chapter 4	
	MR9.12 information update	Chapter 3, Section 2	
	SDS E2E Encryption for TCR1000 location reports	Chapter 2, Sections 7, 18	
	New Audio Tones	Chapter 3, Section 3	
	Audio Routing	Chapter 3, Section 5.20 Chapter 4, Section 24.6.19	
	New Talk Permit Tone Option	Chapter 4, Section 22.2.5	
	New Tones configuration	Chapter 4, Section 24.6.18	
	LIP and LRRP Report Requests configuration	Chapter 4, Sections 33.2.10, 33.3.2	
	USB Driver Installation	Appendix A	
68015000002-K	MTP830 S and MTP830 FuG information added		Dec 2010
	DMO Repeater Mode (Operation)	Chapter 2, Section 6.7	
	Auto Power On	Chapter 2, Section 17.5	
	DMO Repeater Parameters	Chapter 4, Section 22	
	Minor updates on CPS parameters	Chapter 4	
	Updated AT Commands	Chapter 5	
68015000002-L	MTM5400/MTM800 FuG Packet Data related information updated		Jan 2011
68015000002-M	TMO/DMO Gateway Mode (Operation)	Chapter 1, Sections 2.2, 7.2 Chapter 2, Section 6.8 Chapter 3, Section 5.21 Chapter 4, Section 21	Apr 2011
	Minor updates for MR10.2 added		

Edition	Description	Chapter, Paragraph	Date
68015000002-NA	Removed "Mode of Operation	Chapter 1	May 2020

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Appendix A USB Driver Installation

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Appendix B Acronyms

MANUAL OVERVIEW

Product Information Manual

This Product Information Manual is a reference manual that describes all the features, functionality of the Motorola TETRA Terminals and the Customer Programming Software (CPS) used for programming the terminals.

This manual is for use by trained service technicians, radio engineers, and technical operation support staff familiar with the equipment.

This manual complements the available TETRA product sales and technical training and should be used in conjunction with the terminals on a live system.

What Is Covered In This Manual?

The Product Information Manual describes the following:

- Available features
- User interface
- Available accessories
- Product ordering details
- Features designed for special business needs/requirements
- The Customer Programming Software (CPS)
- AT commands reference

The Product Information Manual is divided into the following chapters:

- Chapter 1** This chapter is an overview of the Motorola TETRA Terminal and detailing the specifications of the terminal. It also provides information on how to order the products and software.
- Chapter 2** This chapter is generic and not only describes the Features and Services of the products but also explains how some of these features can be used for the benefit of customers.
- Chapter 3** This chapter describes and shows the user interface for each terminal. This explains various user interface features.
- Chapter 4** This chapter describes the Customer Programming Software (CPS). This explains the available feature options, the settings' range and defaults where applicable.
- Chapter 5** This chapter provides a reference guide for the AT Commands used for communication with terminals from external equipment through peripheral interface.
- Chapter 6** This chapter describes the method for connecting a computer to the terminal for data transfer.

Helpful Background Information

You will find this manual most helpful if you have already done the following:

- Attended the respective TETRA Terminal Operator Course
- Attended the TETRA Terminal Programming Course

Icon Conventions

The document set is designed to give the reader more visual cues. The following graphic icons are used throughout the documentation set. These icons and their associated meanings are described below.

**WARNING**

The signal word Warning with the associated safety icon implies information that, if disregarded, could result in death or serious injury, or serious product damage.

**CAUTION**

The signal word Caution with the associated safety icon implies information that, if disregarded, may result in minor or moderate injury, or serious product damage.

CAUTION

The signal word Caution may be used without the safety icon to state potential damage or injury that is not related to the product.

**NOTE**

Notes contain information more important than the surrounding text, such as exceptions or preconditions. They also refer the reader elsewhere for additional information, remind the reader how to complete an action (when it's not part of the current procedure, for instance), or tell the reader where something is located on the screen. There is no warning level associated with a Note.

Chapter 1

PRODUCT OVERVIEW

1 Handportable Terminals

Compact, durable, yet light in weight, our handportable terminals are complemented by an extensive range of accessories designed to handle the myriad of environments encountered by first responders. Handportables include:

- MTH800
- MTP850
- MTP850 S/MTP850 FuG
- MTP830 S/MTP830 FuG
- MTP850 Ex
- MTP810 Ex
- CEP400
- MTP830

1.1 MTH800

Motorola's MTH800 is a compact yet robust terminal which, thanks to its form factor and rubber features, provides a comfortable and user friendly tool you can depend on even in the toughest environments.

The MTH 800 features an extensive set of tools designed to enhance the personal safety, security and efficiency of both mission-critical and commercial users. Incorporating the latest technologies, it includes support for GPS Location Services, high-grade encryption, data services and much more – enhancing user safety and driving efficiencies.

Ensuring full customer flexibility, two GPS protocols are supported including the TETRA Location Information Protocol (LIP), allowing users to:

- Control and reconfigure GPS parameters over-the-air
- Define location and event driven position updates
- Set 'profiles' to enable different location update rules in various scenarios, such as emergency situations
- Ensure location information is only sent to authorised users via innovative authentication processes

Compact and lightweight, the MTH800's advanced microprocessor and Digital Signalling Processor (DSP) support Motorola's latest TETRA innovations including WAP, Multi-Slot Packet Data, Short Data Service (SDS) and Predictive Text Entry (iTAP). Full End-to-End encryption as well as TEA1, TEA2, or TEA3 air encryption may either be factory fitted, provisioned in-country or, alternatively, retro-fitted at a later date.

Furthermore, the MTH800's 65 536 color, 130x130 pixel display provides accurate reproduction of faces and other images. This delivers maximum image definition in a wide range of lighting conditions. The high-resolution display is complemented by an intuitive graphical user interface that encompasses a range of customisable features, including scalable fonts, assignable shortcuts to

menu items and features, access to more than 3,000 Talkgroups and a unified address book facility that can hold 2,000 entries. User safety is further enhanced with the large, easy to use emergency button, as well as the programmable Rotary Knob with push button operation allowing fast access to volume and talk group control. Audio quality is assured by a 1 Watt speaker, as well as a 1 Watt class D audio amplifier, which combine to offer exceptional audio clarity with minimal distortion. Two microphones are also included – a top microphone for dispatcher calls, and a bottom microphone for ‘one-to-one’ calls.

1.1.1 General Technical Specifications

Title	Specifications	
Dimensions HxWxD mm	141 x 55 x 33 (with standard 800 mAh battery) 141 x 55 x 38 (with Extended 1500 mAh battery)	
Weight g	192 Terminal only 222 with 800 mAh battery 247 with 1500 mAh battery	
Battery Operating Life (Time Expected) 05/05/90 05/35/60	800 mAh > 12 hrs > 8 hrs	1500 mAh > 20 hrs > 16 hrs
Talkgroups - TMO	4000 Entries (up to 2048 entries in one folder) 2048 Unique entries	
Talkgroups - DMO	1024 Entries	
Folders - TMO	256	
Folders - DMO	128	
Favorite Groups	3 Favorite Groups with 128 entries each	
Contact List	1000 Contacts Up to 6 entries (numbers) per contact Max. 2000 entries	
Text Message List	100 Short and 20 Long Messages for Outbox 100 Short and 10 Long Messages for Inbox	
Status List	400 Entries	
Country Code/Network Code List	100 Entries	
Scan List	40 Lists of 20 Groups	
Operating Temperature °C	-30 to +60	
Storage Temperature °C	-40 to +85	
Humidity	90 to 95% RH @ +50 °C for 8 hours	
Rain	IPx4 - EN60529 (former IEC 529 class)	
Dust	IP5x (cat.2) - EN60529 (former IEC 529 class)	
Salt Fog	8 hrs exposure to 5% saline solution at 35 °C	
Shock (Mechanical), Drop & Vibration	ETS 300 019-1-7 5M3 (Shock: Type I, 18 shocks total)	
Thermal Shock °C	-40 to +80 (Battery: -20 to +60)	

Table 1-1 MTH800 General Technical Specifications**1.1.2 RF Specifications**

Title	Specifications
Frequency Bands MHz	380 - 430 MHz, or 440 - 470 MHz
RF Channel Bandwidth kHz	25
Switching Bandwidth TMO MHz	50 (380-430 MHz), 20 (440-470 MHz)
Switching Bandwidth DMO MHz	50 (380-430 MHz), 20 (440-470 MHz)
Transmitter/Receiver Separation MHz	10
Transmitter RF Output Power W	1
RF Power Control	3 Steps of 5dB
RF Power Level Accuracy +/-dB	2
Receiver Class	A and B
Receiver Static Sensitivity dBm	-112 minimum (-116 typical)
Receiver Dynamic Sensitivity dBm	-103 minimum (-105 typical)

Table 1-2 MTH800 RF Specifications**1.1.3 GPS Specifications**

Title	Specification
Simultaneous Satellites	12
GPS Antenna	Helical - integrated into TETRA Antenna
Sensitivity	-152 dbm / -182 dbW
Accuracy (Measured at -137dbm)	5 meters - 50% probable 10 meters - 95% probable

Table 1-3 MTH800 GPS Specifications

The information contained on these pages may be subject to change without further notice.

All product features are subject to infrastructure support.

Selected features are subject to optional software upgrade.

1.2 MTP850

At the core of Motorola's Seamless Mobility vision is a simple idea: an organization benefits when its workers are provided with tools that empower them to be more productive. The MTP850 TETRA portable terminal delivers on this vision, with fully-integrated voice and data services that give mission-critical users immediate access to up-to-date intelligence on which they can make truly informed decisions.

The impressive processing power of the MTP850 means that users can take advantage of advanced data applications such as instant access to information databases via the integrated WAP browser and Multi Slot Packet Data-enabled features. Status Messaging lets the user update others on their immediate situation or call for support when needed, allowing the progress of job assignments to be monitored remotely.

The MTP850 incorporates the latest in graphical user interfaces, ensuring intuitive operation. Access to databases, directories or folders will be as simple as using a desktop PC, for timely and dependable communication. In addition, its 130x130 pixel, 65,000 color display provides for high clarity and visibility, offering accurate reproduction of photos, maps and images.

- Dedicated Emergency button
- Color indication of Emergency Mode (Red Display)
- Editable screen saver with logo option
- Talkgroup lock
- Keypad lock

Motorola's patented antenna combining TETRA and GPS signal for optimal positioning of the antenna for GPS coverage ensures that the location of the user can be determined and plotted. This enables dispatch personnel to ascertain exactly where and how resources are deployed, and base the allocation of tasks on live information.

- Low current and high sensitivity GPS
- Location Request / Response Protocol (LRRP) or ETSI LIP for positioning data transportation

When the MTP850's emergency button is activated, it immediately alerts other TETRA users within the group(s) to critical situations, and transmits details of the user's handset location so that assistance may be sent to where it is needed. Secure communications is also an inherent feature of TETRA digital signalling and encrypted communications, with the MTP850 supporting both TETRA Air Interface Encryption and an End-to-End encryption module that is available as an option for those with enhanced security needs.

1.2.1 General Technical Specifications

Title	Specifications	
Dimensions HxWxD mm	125 x 50 x 37.5 with Standard Battery 1850 mAh	
Weight g	170 Terminal only 250 Terminal with 1850 mAh battery	
Battery Operating Life (Time Expected)	Class 4 (1 W)	Class 3L (1.8 W) (for 380-430 MHz only)
05/05/90	> 23 hrs	> 20.5 hrs
05/35/60	> 17 hrs	> 15.5 hrs
Talk Time	3.5 hrs	2.5 hrs

Title	Specifications
Color Display	130 x 130 pixel screen size with 65,536 vivid colors flip screen and large text options
Talkgroups - TMO	4000 Entries (up to 2048 entries in one folder) 2048 Unique entries
Talkgroups - DMO	1024 Entries
Folders - TMO	256
Folders - DMO	128
Favorite Groups	3 Favorite Groups with 128 entries each
Contact List	1000 Contacts Up to 6 entries (numbers) per contact Max. 2000 entries
Text Message List	100 Short and 20 Long Messages for Outbox 100 Short and 10 Long Messages for Inbox
Status List	400 Entries
Country Code/Network Code List	100 Entries
Scan List	40 Lists of 20 Groups
Operating Temperature °C	-25 to +60 <u>Exception:</u> a) Display degradation below -20 °C b) Battery charge 0 to +45 °C at battery cell c) Battery discharge -10 to +60 °C
Storage Temperature °C	-40 to +85
Humidity	90 to 95% R.H. @ 50 °C for 8 hours
Rain	IPx4 - EN60529 (former IEC 529 class) IPx5 - IEC60529 (260 - 275 MHz)
Dust	IP5x (cat.2) - EN60529 (former IEC529 class)
Salt Fog	8 hrs exposure to 5% saline solution at 35 °C
Shock (Mechanical), Drop & Vibration	ETS 300 019-1-7 5M3 (Shock: Type I, 18 shocks total)
Thermal Shock °C	-40 to +80

Table 1-4 MTP850 General Technical Specifications**1.2.2 RF Specifications**

Title	Specifications
Frequency Bands MHz	260 - 275 MHz, <i>or</i> 380 - 430 MHz, <i>or</i> 806 - 870 MHz
RF Channel Bandwidth kHz	25

Title	Specifications
Switching Bandwidth TMO MHz	6 (260 - 275 MHz), 19 (806 - 870 MHz), 50 (380 - 430 MHz)
Switching Bandwidth DMO MHz	6 (260 - 275 MHz), 19 (806 - 870 MHz), 50 (380 - 430 MHz)
Transmitter/Receiver Separation MHz	9 (260 - 275 MHz), 10 (380 - 430 MHz), 45 (806 - 870 MHz),
RF Power Control	3 steps of 5 dB
Transmitter RF Output Power W	1 (Class 4) and 1.8 (Class 3L 1.8 W) 1 (Class 4) for 260 - 275 MHz and 806 - 870 MHz terminals
RF Power Level Accuracy +/-dB	2
Receiver Class	A and B
Receiver Static Sensitivity dBm	-112 minimum (-115 typical)
Receiver Dynamic Sensitivity dBm	-103 minimum (-107 typical)

Table 1-5 MTP850 RF Specifications

1.2.3 GPS Specifications

Title	Specification
Simultaneous Satellites	12
GPS Antenna	Helical - integrated into TETRA antenna
Sensitivity	-152 dbm / -182 dbW
Accuracy	5 meters - 50% probable *) 10 meters - 95% probable *)

Table 1-6 MTP850 GPS Specifications

*) Measured at -137 dBm

The information contained on these pages may be subject to change without further notice.

All product features are subject to infrastructure support.

Selected features are subject to optional software upgrade.

1.3 MTP850 S/MTP850 FuG

The MTP850 S/MTP850 FuG is Motorola's TETRA portable terminal for mission critical communications. Incorporating all of the features of the MTP850, this terminal includes an advanced Man Down sensor for exceptional user safety together with a new side connector for increased ruggedness.

Providing higher power increases range and in-building performance, and so Motorola has added Class 3L (1.8W) power output option. Taken together with high receive sensitivity the MTP850 S/ MTP850 FuG has the capability for maintain communications in the most demanding situations.

The MTP850 S/MTP850 FuG has an improved operational effectiveness through:

- Access to information databases through integrated WAP browser - make decisions based on the latest information.
- Update your availability and situation using Status Messaging - monitor the progress of job assignments, or call for support when needed.
- Integrated GPS. Knowing where your resources are enables you to allocate tasks based on up to date information.

The MTP850 S/MTP850 FuG has an improved safety through:

- Improved coverage in DMO operations. This ensures that users can communicate over a wider area or in buildings or built-up areas.
- Man Down feature sends an alert to the console operator if the terminal does not move in a given period of time or if the terminal tilts more than the programmed angle.
- Silent emergency, hitting the emergency button alerts colleagues to critical situations but sends and updates your location, without showing any indication on the terminal screen.
- Rugged side connector. This new side connector with the range of available accessories ensures that connection is maintained even in the most violent of situations.

1.3.1 General Technical Specifications

Title	Specifications	
Dimensions HxWxD mm	125 x 59 x 36 with Standard Battery 1850 mAh	
Weight g	174 Terminal only 234 Terminal with 1850 mAh battery	
Battery Operating Life (Time Expected) 05/05/90 05/35/60 Talk Time	Class 4 (1 W) > 23 hrs > 17 hrs 3.5 hrs	Class 3L (1.8 W) > 20.5 hrs > 15.5 hrs 2.5 hrs
Color Display	130 x 130 pixel screen size with 65,536 vivid colors flip screen and large text options	
Talkgroups - TMO	4000 Entries (up to 2048 entries in one folder) 2048 Unique entries	
Talkgroups - DMO	1024 Entries	
Folders - TMO	256	
Folders - DMO	128	
Favorite Groups	3 Favorite Groups with 128 entries each	
Contact List	1000 Contacts Up to 6 entries (numbers) per contact Max. 2000 entries	
Text Message List	100 Short and 20 Long Messages for Outbox 100 Short and 10 Long Messages for Inbox	
Status List	400 Entries	

Title	Specifications
Country Code/Network Code List	100 Entries
Scan List	40 Lists of 20 Groups
Operating Temperature °C	-30 to +60
Storage Temperature °C	-40 to +85
Humidity	ETSI 300 019-1-7 class 7.3E
Dust and Water	IP54 per IEC 60529
Shock (Mechanical), Drop & Vibration	ETSI 300-019 1-7 class 5M3 (Shock: Type I, 18 shocks total)

Table 1-7 MTP850 S/MTP850 FuG General Technical Specifications**1.3.2 RF Specifications**

Title	Specifications
Frequency Bands MHz	380 - 430 MHz
RF Channel Bandwidth kHz	25
Transmitter RF Output Power W	1 (Class 4) and 1.8 (Class 3L 1.8 W)
RF Power Level Accuracy +/-dB	2
Adaptive Power Control	A and B
Receiver Class	A and B
Receiver Static Sensitivity dBm	-112 minimum (-115 typical)
Receiver Dynamic Sensitivity dBm	-103 minimum (-107 typical)

Table 1-8 MTP850 S/MTP850 FuG RF Specifications**1.3.3 GPS Specifications**

Title	Specification
Simultaneous Satellites	12
GPS Antenna	Helical - integrated into TETRA antenna
Sensitivity	-152 dbm / -182 dbW
Accuracy	5 meters - 50% probable *) 10 meters - 95% probable *)
Protocols	ETSI LIP & Motorola LRRP

Table 1-9 MTP850 S/MTP850 FuG GPS Specifications

*) Measured at -137 dBm

The information contained on these pages may be subject to change without further notice.

All product features are subject to infrastructure support.

Selected features are subject to optional software upgrade.

1.4 MTP830 S/MTP830 FuG

Motorola MTP830 S/MTP830 FuG TETRA portable terminals are the ideal choice when working in extreme conditions. These terminals deliver premium performance, whilst combining louder audio and enhanced ergonomics with simplified controls, allowing fire fighters and other first responders to focus on the task at hand.

Enlarged rotary knob allows better terminal glove-friendly functionality, thus allowing easier control talk-group and volume settings.

Operating a terminal under protective clothing can be challenging. The MTP830 S/MTP830 FuG can safely inter-operate with a wide range of specialist audio and push-to-talk equipment.

Man Down detector allows an emergency alert signal to be triggered at your control room when the terminal exceeds preset motion timer and tilt angle thresholds.

The MTP830 S/MTP830 FuG can be configured to send location reports when the emergency button is pressed – helping control room staff coordinate a response more efficiently.

The MTP830 S/MTP830 FuG automatically adjust audio settings based on pre-loaded profiles for detected accessories. It also enables to select the best audio profile for different working environments.

The combination of a highly sensitive RF receiver and transmission power that is adjustable to 1.8W provides extended operational range.

1.4.1 General Technical Specifications

Title	Specifications	
Dimensions HxWxD mm	125 x 59 x 36 with Standard Battery	
Weight g	174 Terminal only 234 Terminal with Standard Battery	
Battery Operating Life (Time Expected) 05/05/90 05/35/60 Talk Time	Class 4 (1 W) > 23 hrs > 17 hrs 3.5 hrs	Class 3L (1.8 W) > 20.5 hrs > 15.5 hrs 2.5 hrs
Color Display	130 x 130 pixel screen size with 65,536 vivid colors flip screen and large text options	
Talkgroups - TMO	4000 Entries (up to 2048 entries in one folder) 2048 Unique entries	
Talkgroups - DMO	1024 Entries	
Folders - TMO	256	
Folders - DMO	128	
Favorite Groups	3 Favorite Groups with 128 entries each	
Contact List	1000 Contacts Up to 6 entries (numbers) per contact Max. 2000 entries	
Text Message List	100 Short and 20 Long Messages for Outbox 100 Short and 10 Long Messages for Inbox	
Status List	400 Entries	

Title	Specifications
Country Code/Network Code List	100 Entries
Scan List	40 Lists of 20 Groups
Operating Temperature °C	-30 to +60
Storage Temperature °C	-40 to +85
Humidity	ETSI 300 019-1-7 class 7.3E
Dust and Water	IP54 per IEC 60529
Shock (Mechanical), Drop & Vibration	ETSI 300-019 1-7 class 5M3

Table 1-10 MTP830 S/MTP830 FuG General Technical Specifications**1.4.2 RF Specifications**

Title	Specifications
Frequency Bands MHz	380 - 430 MHz
RF Channel Bandwidth kHz	25
Transmitter RF Output Power W	1 (Class 4) and 1.8 (Class 3L 1.8 W)
RF Power Level Accuracy +/-dB	2
Adaptive Power Control	Per EN 300 392-2
Receiver Class	A and B
Receiver Static Sensitivity dBm	-112 minimum (-115 typical)
Receiver Dynamic Sensitivity dBm	-103 minimum (-107 typical)

Table 1-11 MTP830 S/MTP830 FuG RF Specifications**1.4.3 GPS Specifications**

Title	Specification
Simultaneous Satellites	12
GPS Antenna	Helical - integrated into TETRA antenna
Sensitivity	-152 dbm / -182 dbW
Accuracy	5 meters - 50% probable *) 10 meters - 95% probable *)
Protocols	ETSI LIP & Motorola LRRP

Table 1-12 MTP830 S/MTP830 FuG GPS Specifications

*) Measured at -137 dBm

The information contained on these pages may be subject to change without further notice.

All product features are subject to infrastructure support.

Selected features are subject to optional software upgrade.

1.5 MTP850 Ex and MTP810 Ex

Motorola's MTP850 Ex and MTP810 Ex TETRA portable terminals provide high quality communication with comprehensive user safety and class leading ATEX specifications allowing use when in environments containing potentially explosive gas and dust.

Motorola is a world leader in the development and deployment of TETRA communication solutions, and the MTP850 Ex and MTP810 Ex ATEX TETRA terminals deliver safe and reliable communications for users with a powerful set of features to harness the capability of TETRA.

The MTP850 Ex and MTP810 Ex deliver best in class audio performance in the typical noisy environments where specialist users from industry or public safety operate.

The MTP850 Ex can be used in explosive gas and dust environments due to its high level of protection – including dust Zone 21 and 22. The MTP810Ex is a similar but low tier solution for use in explosive gas and dust environments – dust Zone 22.

Operational safety is further enhanced with a range of features including:

- state of the art integrated GPS receiver providing the ability to locate personnel through the terminal, improving user safety and resource management.
- internal “Man Down” alert - this fully integrated solution triggers an emergency procedure when the carrier of the terminal remains motionless for a set period or falls down.

The simplified keypad with large button surface makes the MTP850 Ex and MTP810 Ex easy to use with gloves. Combined with the large scalable display fonts and icons, the MTP850 Ex and MTP810 Ex facilitate operation in difficult environments with limited visibility.

The integrated WAP browser and Multi-Slot packet data enables rapid access to critical information in the field. Applications are further enhanced with ability to have simultaneous Short Data Service (SDS) and Multi-Slot packet data services via TNP1 protocol.

1.5.1 General Specifications

Title	Specifications
Dimensions HxWxD mm	135 x 55 x 38
Weight g	400 (including battery and antenna)
Battery Operating Life (Time Expected) 05/05/90 duty cycle	725 mAh, 7.2 V 12 hours
Color Display	130 x 130 pixel screen size with 65,536 vivid colors flip screen and large text options
Talkgroups - TMO	4000 Entries (up to 2048 entries in one folder) 2048 Unique entries
Talkgroups - DMO	1024 Entries
Folders - TMO	256
Folders - DMO	128
Favorite Groups	128 Entries
Contact List	1000 Contacts Up to 6 entries (numbers) per contact Max. 2000 entries
Text Message List - incoming	20 Entries

Title	Specifications
Text Message List - outgoing	max. 100 Entries depending on mail's length
Status List	100 Entries
Country Code/Network Code List	100 Entries
Scan List	40 Lists of 20 Groups
TMO Services	Group Call Private Call Telephony DGNA Late entry Half / Full Duplex Full Duplex up to 2047 groups
DMO Services	Group Call Private Call Compatibility Late entry Gateway and Repeater
Operating Temperature ° C	-20 to +50 (Hazardous Environments) -20 to +60 (Non-Hazardous Environments)
Storage Temperature ° C	-40 to +85
Humidity	ETS 300 019-1-5 Class 5.1 and 5.2
Dust and Water	IP64 (Cat. 2)
Shock (Mechanical), Drop & Vibration	ETS 300 019-1-5 Class 5M2

Table 1-13 MTP850 Ex and MTP810 Ex General Technical Specifications

1.5.2 ATEX Specifications

The terminals have the following ATEX ratings.

Terminal	Rating	Specifications
MTP850 Ex - 2D	ATEX	<ul style="list-style-type: none"> Gas: II 2G Ex ib IIC T4 Category 2, Approved for Zone 1, Equipment group II, Gas group C, Temperature class T4, T_{amb} -20° C to +50° C Dust: II 2D Ex ibD 21 IP6x T90°C Category 2, Approved for Zone 21, 22, Equipment group II
	IECEx	<ul style="list-style-type: none"> Gas: Ex ib IIC T4 Category 2, Approved for Zone 1, Equipment group II, Gas group C, Temperature class T4, T_{amb} -20° C to +50° C Dust: Ex tD [ibD] A21 IP6x T90°C Category 2, Approved for Zone 21, Equipment group II
MTP850 Ex - 3D	ATEX	<ul style="list-style-type: none"> Gas: II 2G Ex ib IIC T4 Category 2, Approved for Zone 1, Equipment group II, Gas group C, Temperature class T4, T_{amb} -20° C to +50° C Dust: II 3D Ex ibD 22 IP5x T90°C Category 3, Approved for Zone 22, Equipment group II

Terminal	Rating	Specifications
MTP810 Ex	ATEX	<ul style="list-style-type: none"> Gas: II 2G Ex ib IIA T3 Category 2, Approved for Zone 1, Equipment group II, Gas group A, Temperature class T3, T_{amb} -20° C to +50° C Dust: II 3D Ex ibD 22 IP5x T90°C Category 3, Approved for Zone 22, Equipment group II
	IECEX	<ul style="list-style-type: none"> Gas: Ex ib IIA T3 Category 2, Approved for Zone 1, Equipment group II, Gas group A, Temperature class T3, T_{amb} -20° C to +50° C Dust: Ex tD [ibD] A22 IP6x T90°C Category 3, Approved for Zone 22, Equipment group II

Table 1-14 MTP850 Ex and MTP810 Ex ATEX Ratings**1.5.3 RF Specifications**

Title	Specifications
Frequency Bands MHz	380 - 430 MHz 806 - 870 MHz
RF Channel Bandwidth kHz	25
Switching Bandwidth TMO MHz	50 (380 - 430 MHz) 19 (806 - 825, 851 - 870 MHz)
Switching Bandwidth DMO MHz	50 (380 - 430 MHz) 19 (851 - 870 MHz)
RF Power Control	3 steps of 5 dB
Transmitter RF Output Power W	1
RF Power Level Accuracy +/- dB	2
Receiver Class	A and B
Receiver Static Sensitivity dBm	-112 minimum (-115 typical)
Receiver Dynamic Sensitivity dBm	-103 minimum (-107 typical)

Table 1-15 MTP850 Ex and MTP810 Ex RF Specifications**1.5.4 GPS Specifications**

Title	Specification
Simultaneous Satellites	12
GPS Antenna	Integrated in TETRA antenna
Sensitivity	-152 dBm / -182 dBW

Title	Specification
Accuracy	5 meters - 50% probable 10 meters - 95% probable
Location Protocols	ETSI LIP Motorola LRRP

Table 1-16 MTP850 Ex and MTP810 Ex GPS Specifications

The information contained on these pages may be subject to change without further notice.

All product features are subject to infrastructure support.

Selected features are subject to optional software upgrade.

1.6 CEP400 and MTP830

Commercial TETRA portable terminals deliver the high performance and dependability required for enhanced workforce productivity and assured user safety. Leveraging the best features of a two-way terminal and a cellular phone, the lightweight and robust Commercial portable terminals have been engineered to ensure loud and clear communications even in high noise work environments.

Commercial portable terminals have been made to the highest quality levels and exceeds all 11 categories in the MIL-810 standard. Further, like all Motorola TETRA terminals, CEP400 and MTP830 have been designed to pass an Accelerated Life Test simulating over 5 years use; these tests ensure they will stand up to the toughest conditions and provide durability that helps to drive down life cycle support costs.

Commercial portable terminals take advantage of all the benefits of TETRA digital technology to drive workforce productivity and safety. These include exceptional audio quality with duplex voice services, PABX and PSTN interconnection, individual and group calls, priority and emergency calls, Short Data Services and Localization Services. CEP400 and MTP830 also benefit from the inherent protection of TETRA digital signaling. Coupled with the Mutual Authentication feature, CEP400 provides a secure communications platform.

To minimize staff training costs, the commercial portable terminals leverages an instantly familiar cellular phone style user interface. It also includes a large color (or greyscale) display that supports 65, 536 vivid colors and large scalable fonts. Usability is further enhanced through a customisable menu and simplified keypad that combine to make device interaction fast and intuitive.

Commercial portable terminals are complemented by a complete terminal solutions portfolio designed for efficient operations:

- Remote programming to ensure cost effective rollout of new services and simplified terminal management
- Commercial portable terminals leverage the same wide range of accessories as the flagship MTP850 terminal to increase investment security. This range includes audio, power, carry and in vehicle solutions

1.6.1 General Technical Specifications

Title	Specifications	
Dimensions HxWxD mm	125 x 50 x 33.5 with Slim Battery 950 mAh 125 x 50 x 37.5 with Standard Battery 1850 mAh	
Weight g	170 Terminal only 225 Terminal with 950 mAh battery 240 Terminal with 1850 mAh battery	
Battery Operating Life (Time Expected) 05/05/90 05/35/60 Talk Time	950 mAh > 12.5 hrs > 9 hrs 1.9 hrs	1850 mAh > 23 hrs > 17 hrs 3.5 hrs
Color Display	130 x 130 pixel screen size with 65,536 vivid colors (or greyscale) flip screen and large text options	
Talkgroups - TMO	4000 Entries (up to 2048 entries in one folder) 2048 Unique entries	
Talkgroups - DMO	1024 Entries	
Folders - TMO	256	

Title	Specifications
Folders - DMO	128
Favorite Groups	3 Favorite Groups with 128 entries each
Contact List	1000 Contacts Up to 6 entries (numbers) per contact Max. 2000 entries
Text Message List Inbox	20 Entries
Status List	100 Entries (alias messages)
Country Code/Network Code List	100 Entries
Scan List	40 Lists of 20 Groups
Operating Temperature °C	-30 to +60 <u>Exception:</u> a) Display degradation below -20 °C b) Battery charge 0 to +45 °C at battery cell c) Battery discharge -10 to +60 °C
Storage Temperature °C	-40 to +85
Humidity	ETS 300 019-1-7 class 7.3E
Dust and Water Ingress Protection	IP54 per IEC 60529
Shock (Mechanical), Drop & Vibration	ETS 300 019-1-7 5M3 (Shock: Type I, 18 shocks total)

Table 1-17 CEP400 and MTP830 General Technical Specifications

1.6.2 RF Specifications

Title	Specifications
Frequency Bands MHz	380 - 430 MHz (CEP400) 350 - 390 MHz (MTP830)
Transmitter RF Output Power W	1 (Class 4)
RF Power Level Accuracy +/- dB	2
Adaptive Power Control	A and B
Receiver Class	A and B
Receiver Static Sensitivity dBm	-112 minimum (-115 typical)
Receiver Dynamic Sensitivity dBm	-103 minimum (-107 typical)

Table 1-18 CEP400 and MTP830 RF Specifications

1.6.3 GPS Specifications

Title	Specification
Simultaneous Satellites	12
GPS Antenna	Helical - integrated into TETRA antenna
Sensitivity	-152 dbm / -182 dbW
Accuracy	5 meters - 50% probable *) 10 meters - 95% probable *)

Table 1-19 CEP400 and MTP830 GPS Specifications

*) Measured at -137 dBm

The information contained on these pages may be subject to change without further notice.

All product features are subject to infrastructure support.

Selected features are subject to optional software upgrade.

2 Mobile Terminals

If you need to communicate clearly and reliably on the move, Motorola mobile terminals offer flexible configuration and vehicle installation options – standard patrol cars, police vans / transports, fire engines / ambulances and even river patrol boats:

- MTM800 Enhanced
- MTM5400/MTM800 FuG

2.1 MTM800 Enhanced

Discerning professionals demand high-quality voice communications with fast access to mobile applications. The MTM800 Enhanced delivers on both, with SDS, Multislot Packet Data and WAP options.

Developed for organizations where rugged and versatile mobile terminals are essential, Motorola's MTM800 Enhanced is ideal for use where the application, location and / or circumstances demand fast, reliable, no-nonsense solutions.

- Ease-of-operation in the most demanding situations – unsurpassed audio quality, intuitive keypad and high-definition, color display combined with a sleek yet durable design
- Dust and water resistant to IP 54. rain, salt, fog, and dust protection tested to MIL 810 C/D/E/F for the standard control head
- Motorcycle control head rated IP67 for dust and water resistance

The MTM800 Enhanced also supports the full suite of TETRA security functions, including air interface encryption, and End-to-End encryption. Users can request assistance by simply hitting the emergency button, which not only alerts colleagues to critical situations, but also sends an update dispatch on the user's location. It also provides the ability to switch to covert mode at the press of a button, and features an integrated GPS receiver that enables users to locate their mobiles, and provides location-based services and mapping capabilities.

The terminal offers various installation possibilities from typical Dashboard installation to Dual Control Head installation using an additional junction box. Currently the following options are supported:

- Trunnion Installation
- Dashboard Installation
- Desktop Installation
- Remote Mount Installation
- Motorcycle Installation
- Dual Control Head Installation
- Data Box Radio Installation

2.1.1 General Specifications

Title	Specifications
Dimensions H x W x D	49 x 170 x 155 mm Terminal only 60 x 185 x 175 mm with Next Generation Control Head
Weight	1350 g Terminal only 1470 g Terminal with Next Generation Control Head
Talkgroups - TMO	4000 Entries (up to 2048 entries in one folder) 2048 Unique entries
Talkgroups - DMO	1024
Folders - TMO	256
Folders - DMO	128
Favorite Groups	3 Favorite Groups with 128 entries each
Contact List	1000 Contacts Up to 6 entries (numbers) per contact Max. 2000 entries
Text Message List	100 Short and 20 Long Messages for Outbox 100 Short and 10 Long Messages for Inbox
Text Message List - outgoing	max. 100 Entries depending on mail's length
Status List	400
Country Code/Network Code List	100
Scan Lists	40 Lists of 20 Groups
Operating Temperature	-30 to +60 °C
Storage Temperature	-40 to +85 °C
Humidity	ETS 300 019-1-5 Class 5.1 and 5.2, up to 95% R.H.@50 °C EIA/TIA 603 (95%) MIL810 95% RH 50 deg.
Dust & Water - Standard Control Head	IP54 (dust - cat. 1) for Next Gen. Control Head
Dust & Water - Motorcycle Control Head (M/C)	IP67 (dust - cat. 1) for M/C Next Gen. Control Head
Shock, Drop & Vibration	ETS 300019-1-5 class 5M2 and class 5M3 MIL 810 C - F
Thermal Shock	-40 °C to +80 °C
SB9600 Support	No

Table 1-20 MTM800 Enhanced General Technical Specifications

2.1.2 RF Specifications

Title	Specifications
Frequency Bands	260 - 275 MHz, <i>or</i> 350 - 390 MHz, <i>or</i> 380 - 430 MHz, <i>or</i> 410 - 470 MHz, <i>or</i> 806 - 870 MHz
RF Channel Bandwidth	25 kHz
Transmit/Receive Separation	9 MHz (260 - 275 MHz), 10 MHz (350 - 390 MHz), 10 MHz (380 - 430 MHz), 10 MHz (410 - 470 MHz), 45 MHz (806 - 870 MHz)
Switching Bandwidth (TMO)	6 (260 - 275 MHz), 40 MHz (350 - 390 MHz), 50 MHz (380 - 430 MHz), 60 MHz (410 - 470 MHz), 19 MHz (806 - 870 MHz)
Switching Bandwidth (DMO)	6 (260 - 275 MHz), 40 MHz (350 - 390 MHz), 50 MHz (380 - 430 MHz), 60 MHz (410 - 470 MHz), 19 MHz (806 - 870 MHz)
Transmitter RF Power Output	3 W, Class 3, (all bands)
RF Power Control	4 Steps of 5 dB
RF Power Level Accuracy	± 2 dB
Receiver Class	A & B
Receiver Static Sensitivity dBm	-112 minimum (-114 Typical)
Receiver Dynamic Sensitivity dBm	-103 minimum (-105 Typical)

Table 1-21 MTM800 Enhanced RF Specifications

2.1.3 GPS Specifications

Title	Specification
Simultaneous Satellites	12
GPS Antenna	Supports active antenna (5V, 25mA supply) via FME male connector
Sensitivity	-152 dbm / -182dbW
Accuracy (Measured at -137dbm)	5 meters - 50% probable. 10 meters - 95% probable

Table 1-22 MTM800 Enhanced GPS Specifications

The information contained on these pages may be subject to change without further notice.

All product features are subject to infrastructure support.

Selected features are subject to optional software upgrade.

2.2 MTM5400/MTM800 FuG

The new MTM5400/MTM800 FuG is a TETRA mobile terminal that addresses both your current and future critical communication needs. The MTM5400/MTM800 FuG leverages the market proven rugged design of the MTM800 Enhanced terminal, while introducing many advanced capabilities that set new standards for performance and usability.

The MTM5400/MTM800 FuG is compatible with all MTM800 Enhanced and their associated accessories.

In addition to supporting all the common TETRA data services including Short Data, Packet Data and Multi Slot Packet Data, the MTM5400/MTM800 FuG with its TEDS capability can increase workforce productivity with much faster data connectivity compared to TETRA Single Slot Packet Data. Mobile users can utilize existing data services and migrate to TEDS as service is rolled out across TETRA networks.

With its best in class RF sensitivity and 10 W transmit power capability the MTM5400/MTM800 FuG sets a new landmark for TETRA RF performance.

The MTM5400/MTM800 FuG supports multiple modes of operation that enable enhanced workflow management and improved communications in areas where network coverage is weak or unpredictable. The integrated DMO Repeater is Type 1A compliant, operating on just a single RF carrier for efficient spectrum usage.

The MTM5400/MTM800 FuG features an integrated gateway that connects users operating in Direct Mode with control room staff and other colleagues on the trunked radio network. A comprehensive set of gateway services are supported, including configurable handling of individual and group calls.

Advanced Remote Terminal Management enabled through software, this ground-breaking capability allows the MTM5400/MTM800 FuG to stay live while being programmed and software upgraded. This feature works to maximize productivity and eliminate radio downtime.

The MTM5400/MTM800 FuG mobile offers comprehensive and flexible installation options. The terminal is fully DIN-A compatible, ideal for vehicle dash mount installations. It also supports a wide range of configurations including customized multiple control head, desk, and motorcycle install variants.

2.2.1 General Specifications

Title	Specifications
Dimensions H x W x D	45 x 170 x 169 mm Terminal only 60 x 188 x 198 mm with Control Head
Weight	1500 g Terminal with Control Head
Talkgroups - TMO	4000 Entries (up to 2048 entries in one folder) 2048 Unique entries
Talkgroups - DMO	1024
Folders - TMO	256
Folders - DMO	128
Favorite Groups	3 Favorite Groups with 128 entries each
Contact List	1000 Contacts Up to 6 entries (numbers) per contact Max. 2000 entries
Text Message List	100 Short and 20 Long Messages for Outbox 100 Short and 10 Long Messages for Inbox
Text Message List - outgoing	max. 100 Entries depending on mail's length
Status List	400
Country Code/Network Code List	100
Scan Lists	40 Lists of 20 Groups

Table 1-23 MTM5400/MTM800 FuG General Technical Specifications

2.2.2 Gateway and Repeater Services

Service	Details
DMO/TMO Gateway	Group calls from DMO to TMO Group calls from TMO to DMO Emergency group call from DMO to TMO Emergency group call from TMO to DMO Transmission of Gateway Presence Signal Automatic detection of co-located Gateways Call Pre-emption (in either direction)
DMO Repeater	Repeats DMO voice and tone signalling on selected talkgroup ETSI type 1A DMO Repeater for channel efficient operation Transmission of Repeater Presence Signal Priority Call Emergency Call (Pre-emptive Priority Call) E2EE Encrypted DMO traffic Monitoring of and participation in calls whilst in Repeater mode Configurable Repeater Power Levels

Table 1-24 MTM5400/MTM800 FuG Gateway and Repeater Services

2.2.3 Environmental Specifications

Title	Specifications	
Operating Temperature	-30 to +60 °C	
Storage Temperature	-40 to +85 °C	
Not in use - Storage	ETSI 300 019-1-1 CLASS 1.3	Non-Weather Protected Storage Locations
Not in use - Transportation	ETSI 300 019-1-2 CLASS 2.3	Public Transportation
Stationary use - Weather Protected Locations	ETSI 300 019-1-3 CLASS 3.2	Partly Temperature Controlled Locations
Mobile use - Ground Vehicle Installation	ETSI 300 019-1-5 CLASS 5.2	Climatic Tests
Mobile use - Ground Vehicle Installation	ETSI 300 019-1-5 CLASS 5M3	Mechanical Tests
MIL STD	810 C/D/E/F Specifications All 11 categories met (or exceeded)	
Dust and Water Ingress Protection	IP54 (dust cat. 2)	Dash/Desk/Remote models
	IP67	Motorcycle model (only control head is IP67; transceiver is IP54)

Table 1-25 MTM5400/MTM800 FuG Environmental Specifications

2.2.4 RF Specifications

Title	Specifications
Frequency Bands	380 - 430 MHz
RF Channel Bandwidth	25 kHz
Transmit/Receive Separation	10 MHz
Switching Bandwidth (TMO)	50 MHz (380 - 430 MHz)
Switching Bandwidth (DMO)	50 MHz (380 - 430 MHz)
Transmitter RF Power Output	TETRA Release 1 10W, Class 2 (MSPD limited to 5.6W, Class 2L) TETRA Release 2 (TEDS) 3W, Class 3
RF Power Control	6 Steps of 5 dBm (15–40 dBm)
RF Power Level Accuracy	± 2 dB
Receiver Class	A & B
Receiver Static Sensitivity dBm	-114 minimum (-116 Typical)
Receiver Dynamic Sensitivity dBm	-105 minimum (-107 Typical)

Table 1-26 MTM5400/MTM800 FuG RF Specifications

2.2.5 GPS Specifications

Title	Specification
Simultaneous Satellites	12
GPS Antenna	Supports active antenna (5 V, 25 mA supply)
Autonomous Acquisition Sensitivity	-143 dbm / -173dbW
Tracking Sensitivity	-159 dbm / -189dbW
Accuracy (Measured at -137dbm)	5 meters - 50% probable. 10 meters - 95% probable

Table 1-27 MTM5400/MTM800 FuG GPS Specifications

The information contained on these pages may be subject to change without further notice.

All product features are subject to infrastructure support.

Selected features are subject to optional software upgrade.

3 Other TETRA Devices

Motorola's TCR1000 Covert TETRA terminal provides undercover officers with a communications tool specially designed for their security, comfort and intuitive use in all situations.

3.1 TCR1000

Motorola is a world leader in the development and deployment of TETRA communication solutions, and the TCR1000 Covert TETRA Terminal from Motorola is the smallest, body worn TETRA terminal available.

The Motorola TCR1000 Covert terminal is the ideal solution to ensure secure communications in surveillance covert type operations allowing officers to blend right into the crowd. Motorola's TCR1000 Covert TETRA terminal delivers high quality communication in a light and discrete package for those critical undercover applications.

There are no compromises in the design of the TCR1000. Motorola worked closely with police forces to ensure that it will be intuitive and simple to operate, truly Technology that's Second Nature. The TCR1000 incorporates control features specifically matched to the needs of officers in covert operations, and is engineered to be easily hidden inside of light clothing. A unique portfolio of Covert accessories complement the TCR1000 and offer additional flexible options for undercover officers. This terminal operates at 1 watt and the option for a body mounted antenna ensures excellent coverage and maintains the discreetness of the terminal.

The terminal is controlled by a very small Remote Control Unit (RCU) which can be concealed in a number of ways including in the hand, pocket or sleeve. The RCU allows the user to answer or make calls, change talk groups and volume, and to use special surveillance features such as whisper mode or communication tones (similar to PTT Double Push feature). A connector is provided on the RCU to attach a remote PTT unit.

3.1.1 General Specifications

Title	Specifications
Dimensions HxWxD mm	96 x 64 x 16.9
Weight g	<180 including BK-60 Li-Ion Battery
Battery Operating Life (Time Expected) 05/35/60	> 8 hrs
Talkgroups - TMO	4000 Entries (up to 2048 entries in one folder) 2048 Unique entries
Talkgroups - DMO	1024 Entries
Folders - TMO	256
Folders - DMO	128
Favorite Groups - Talkgroups accessible via RCU	1 Favorite Group with 10 Entries
Operating Temperature	-30° C to +60° C <u>Note:</u> Li-Ion battery performance degrades at -10° C
Storage Temperature	-40° C to +85° C

Title	Specifications
Humidity	ETS300 019-1-7 class 7.3E, up to 95% R.H @ 50° C for 8 Hours
Dust and Water	IP54 (cat.2)
Shock (Mechanical), Drop & Vibration	ETS 300 019-1-7 class 5M3

Table 1-28 TCR1000 General Technical Specifications**3.1.2 RF Specifications**

Title	Specifications
Frequency Bands	380 – 430 MHz
RF Channel Bandwidth	25 kHz
Transmitter RF Power	1 W
RF Power Control	3 steps of 5 dB
RF Power Level Accuracy	+/- 2 dB
Receiver Class	A and B
Receiver Static Sensitivity	-112 dBm minimum (-116 dBm typical)
Receiver Dynamic Sensitivity	-103 dBm minimum (-106 dBm typical)

Table 1-29 TCR1000 RF Specifications**3.1.3 GPS Specifications**

Title	Specification
Simultaneous Satellites	12
GPS Antenna	Body worn folded monopole (semi-rigid) integrated into TETRA antenna Body worn folded monopole (dribble) integrated into TETRA antenna Integrated into patch connected to TETRA body-worn antenna
Sensitivity	-152 dbm / -182 dbW
Accuracy	5 meters - 50% probable *) 10 meters - 95% probable *)

Table 1-30 TCR1000 GPS Specifications

*) Measured at -137 dBm

The information contained on these pages may be subject to change without further notice.

All product features are subject to infrastructure support.

Selected features are subject to optional software upgrade.

4 Terminal Software Upgrades

Motorola realizes that as customer communication requirements evolve, it is necessary to be able to offer solutions, to meet these changing requirements, that do not force customers to replace existing terminals.

All the Motorola TETRA terminals will have common software features and use a common CPS. Terminal software upgrades will be available on all future releases of CPS and will allow new functionality to be added quickly and easily to the products.

Thanks to the upgrades customers can upgrade their stock quickly and efficiently, end users benefit from new functionality without the cost and inconvenience of buying new terminals and finally this provides the ability to offer a changing range of terminal feature benefits to meet the evolving needs of customers.

5 Quality Assurance

Motorola realizes that as customer communication requirements evolve, it is necessary to be able to offer solutions, to meet these changing requirements, that do not force customers to replace existing terminals.

5.1 Accelerated Life Testing

Motorola Accelerated Life Test (ALT), this testing simulates 5 years hard use in the field and all Motorola terminal products must pass this rigorous testing prior to shipping.

5.2 Environmental Protection

The Terminal has been designed and tested by Motorola to meet the required European and American Standards specifications.

5.3 IP54 & ETS 300-019-1-7

These standards demonstrate the terminals's ability to withstand rain and dust.

5.4 European Specifications

The terminals also meet the following European Specifications.

Specification	Type
EN3003 05	RF Specifications
EN301_489 - 18	EMC
EN60950	Product Electrical Safety
EN50360	Humane Exposure Safety
EN303 035 - 1:2000	Radio Parameters
EN303 035 - 2:2001	Radio Parameters

Table 1-31 European Specifications Met

6 Ordering Options

6.1 General Information

TETRA Subscribers are only available to Accredited Channel Partners who will be advised of the discount structure that will be applied to these products.

6.2 Ordering Requirements

1. Order the main model
2. Order one option from each of the following categories
 - Order either clear or encryption software option (one and only one selection per model)
 - Order antenna option (one and only one selection per model)
 - Order battery option (one and only one selection per model)
 - Order charger option (one and only one selection per model)

**NOTE**

Export controls apply when ordering encryption.

6.3 Models, Options, Accessories

The up-to-date list of models, available options and accessories is available through Electronic Catalog (ECAT): <http://ecat.comm.mot.com/ecat/pricebooks/eceee/>.

7 Ordering the Software Enablement Kits

Each kit number ordered will provide one dongle for the customer with a certain number of counters set according to the number of software option ordered.

This kit number is applicable to both new orders or existing fielded terminals which require software enablement.

7.1 Software Selling - Tools and Mechanisms

The chosen approach is a dongle with counters for each one of the features. The features are enabled at the same time the customer programs the terminal. This will happen in one operation.

7.2 How to Place an Order for a Software Enablement Kit

To place an order for a Software Enablement Kit:

1. Order the Main Kit. Check the following tables for respective Main Kit numbers.

Name	Model Number
MTH800	GM0127
MTP850	GM0127
MTP850 S/MTP850 FuG	GM0127
MTP830 S/MTP830 FuG	GM0127
MTP850 Ex	GM0194
MTP810 Ex	GM0194
CEP400	GM0127
MTP830	GM0210
MTM800 Enhanced	GM0127
MTM5400/MTM800 FuG	GM0127
TCR1000	GM0193

Table 1-32 Main Kit Numbers

2. Select the software feature option from the following. Order quantity equaling number of models requiring an option. You can select more than 1 feature for each Main Kit:
 - QA00175AA - Option to enable WAP Feature
 - QA00176AA - Option to enable MSPD Feature
 - QA00177AA - Option to enable GPS Feature
 - QA00771AA - Option to enable Enhanced Security Feature
 - QA00772AA - Option to enable Permanent Disable Feature
 - QA01003AA - Option to enable Permanent Disable V2 Feature
 - QA01089AA - Option to enable Call Out Feature
 - QA01090AA - Option to enable RUA/RUI Feature
 - QA01261AA - Option to enable Secondary Control Channel
 - QA01275AA - Option to enable Dual Control Head
 - QA01276AA - Option to enable Air Interface Migration
 - QA01403AA - Option to enable RF Power Class
 - QA00993AA - Option to enable Man Down
 - QA01397AA - Option to enable Color Display
 - QA01628AA - Option to enable RMS/FMS
 - QA01629AA - Option to enable SDS Remote Control
 - QA01746AA - Option to enable WAP Push
 - QA01652AA - Option to enable Subscriber Class by Group
 - QA01848AA - Option to enable Immediate Text Messaging
 - QA01847AA - Option to enable SDS E2E Encryption

- QA01961AA - Option to enable Gateway and Repeater
- QA01962AA - Option to enable Gateway
- QA01963AA - Option to enable Repeater

Check the following tables for feature availability by model.

Feature	MTH800	MTP850	MTP850 S MTP850 FuG	MTP830 S MTP830 FuG	MTM800 Enhanced	MTM5400 MTM800 FuG	MTP850 Ex MTP810 Ex	CEP400 MTP830	TCR1000
WAP	X	X	X	X	X	X	X	-	-
MSPD	X	X	X	X	X	X	X	-	-
GPS	X	X	X	X	See note below	X	X	X	X
Enhanced Security	X	X	X	X	X	X	X	-	X
Permanent Disable	X	X	X	X	X	X	X	X	X
Permanent Disable V2	X	X	X	X	X	X	X	-	X
Call Out	X	X	X	X	X	X	X	X	-
RUA/RUI	X	X	X	-	X	X	-	-	-
Secondary Control Channel	X	X	X	X	X	X	X	X	-
Dual Control Head	-	-	-	-	X	-	-	-	-
Air Interface Migration	X	X	X	X	X	X	X	-	X
RF Power Class	-	X (Class 3 model only)	X	X	-	-	-	-	-
Man Down	-	-	X	X	-	-	X	-	-
Color Display Toggle	N/A	N/A	N/A	X	N/A	N/A	N/A	X	N/A
RMS/FMS	X	X	X	-	X	X	-	-	-
SDS Remote Control	X	X	X	X	X	X	X	X	-
WAP Push	X	X	X	X	X	X	X	-	-
Subscriber Class by Group	X	X	X	X	X	X	X	-	X
Immediate Text Messag- ing	X	X	X	X	X	X	X	X	-
SDS E2E Encryption	X	X	X	X	X	-	-	X	X (location reporting only)
Gateway	-	-	-	-	-	X	-	-	-
Repeater	-	-	X	-	-	X	-	-	-

Table 1-33 Feature Availability

**NOTE**

GPS: For MTM800 Enhanced the GPS Feature is a Hardware option. If GPS is required select the appropriate configuration (Example ADD: ENH 380-430 GPS CLEAR GA00044AA). The terminal is shipped with an integrated GPS module, and the software is enabled for use. GPS upgrade kits can be purchased at a later stage.

**NOTE**

Feature availability: Some features are subject to future Software Release, check release notes for the latest information.

7.3 Example Order

The following order is required:

- 20 terminals
- 10 GPS software enables
- 20 Permanent Disable software enables

To accompany the 20 terminals (ordered according to relevant price page) the following Software Enhancement Kit should be ordered

- 1 dongle (1 x GM0193)
- 10 GPS (10 x QA00177)
- 20 Permanent Disable (20 x QA00772)

**NOTE**

The CPS will not allow additional terminals to be enabled with GPS, Enhanced Security nor Permanent Disable (unless further Software options are ordered).

Chapter 2

SERVICES AND FEATURE DESCRIPTION

1 Introduction

This chapter specifies the agreed services and functionality of the Motorola terminals release.

The functionality is described in enough detail to ensure that both the customer and developer are clear what is being delivered, taking into account customer need as well as implementation considerations and constraints.

This chapter contains a high level description of the agreed services and functionality of the terminals, also specifies the functionality required to operate on the Dimetra IP SwMI, as well as the functionality required to operate on other TETRA SwMI's that comply with the MoU interoperability documents [Ref 10] through [Ref 16].

1.1 Features Overview

1.1.1 Trunk Mode Operation (TMO)



NOTE

The feature availability of specific features is dependent on the infrastructure system the terminal is used on. Refer to the system documentation for further details.

- Group call
- Talkgroup Scanning & Priority monitor
- DGNA (Individually addressed + group addressed)
- Emergency group call
- Hot Mic and Alternating Hot Mic
- Simplex private call
- Duplex private call
- Telephone call (PSTN /PABX)
- SwMI Authentication of terminal, and made mutual by terminal
- Air Interface Encryption - SCK, CCK, DCK, GCK
- OTAR (Over The Air Re-keying)
- Temporary/Permanently Enable/Disable
- AT commands
- Short Data Services (Status, Text Message)
- SDS Remote Control
- Radio Messaging Services
- WAP Push
- Targeted SDS Status (to SSI)
- Multi-Network Operation
- Air Interface Migration

- Congested Cell Handling
- Packet Data (Multi Slot)
- Secondary Control Channel
- RUA/RUI
- Call-Out
- SDS Store & Forward
- Transmit Inhibit (RF Sensitive Area Mode)
- PTT Double Push
- Ambience Listening
- BUP & RL
- Pre-emptive Priority Call
- Dynamic Key Encryption
- Broadcast Call
- TNP1
- Announced Type 2 hand over
- Gateway Mode

1.1.2 Direct Mode Operation (DMO)

- DMO Group Call
- DMO Private Call
- DMO Repeater Compatibility
- DMO Group Emergency Call
- DMO Static Key Encryption (DMO SCK)
- Short Data Services (Status, Text Message)
- AT commands
- Targeted SDS Status (to SSI)
- DMO/TMO Emergency Switching
- DMO Inter-MNI (including open group and open MNI)
- Transmit Inhibit (RF Sensitive Area Mode)
- PTT Double Push
- Repeater Mode

Also covered by this document are mobility, security, group management and MMI services which support and enhance the above user services.

1.1.3 Platform Specific Features

- Built-in GPS receiver
- GPS over Multi Slot Packet Data
- Flashing via USB
- High resolution colour display
- 4-way navigation key
- Dual-function rotary (Volume, list selection) with push button

- Energy Economy
- Dual Control Head operation
- Data Box Radio operation
- RF Power toggle
- Man Down
- Gateway Mode
- Repeater Mode

1.1.4 General Features

- High Assurance Boot (HAB) memory access protection
- GPS location reports and display
- Favorite talkgroups
- 4000 TMO talkgroups (2048 unique TMO talkgroups); 1024 DMO talkgroups
- Flexible size talkgroup folders
- 1000 contacts
- Super groups of scan groups
- Covert Mode

1.1.5 IOP Features

- DCK Forwarding
- CCK per LA
- Background scanning
- Emergency Private call
- Call modifications
- SwMI Initiated attachments
- SwMI controlled groups
- SDS via PSTN Gateway (SDS to PABX is not possible)

1.2 References

The following documents may be referred to in this document:

1.2.1 TETRA Standard Documents

- | | |
|---------|--|
| [Ref 1] | TETRA: AI
ETSI EN 300 392-2 TETRA V+D - Part 2: Air Interface, ver 2.5.2, Nov 2005 |
| [Ref 2] | SDSTL draft 0.13 |
| [Ref 3] | TETRA: Security
ETS 300 392-7, TETRA V+D - Part 7: Security, ver 2.4.1, Oct 2006 |
| [Ref 4] | TETRA: PEI
ETS 300 392-5 TETRA V+D - Part 5: PEI, ver 1.2.1, Nov 2003 |
| [Ref 5] | TETRA: SS-DGNA S3
ETS EN 300 392-12-22 TETRA V+D - Part 12 SS Stage 3; Subpart 22: DGNA,
ver 1.4.0, Dec 2004 |

- [Ref 6] TETRA: SS-AL S3
ETS EN 300 392-12-21 TETRA V+D - Part 12: SS Stage 3; Subpart 21: AL,
ver 1.2.1, Nov 2004
- [Ref 7] TETRA: Address-guide
TR 102 300-5 Designers Guide - Part 5: Guidance on numbering and addressing,
ver 1.2.1, Jan 2003
- [Ref 8] TETRA: DMO
ETS EN 300 396-1 - Part 1: General Network Design, Mar 1998
- [Ref 9] DMO P3
ETS EN 300 396-3 - Part 3: MS-MS Air Interface protocol, ver 1.3.1, Aug 2006

1.2.2 MoU TIP Documents

- [Ref 10] TIP-Core
TTR 001-01, TIP - Part 1: Core, ver 5.0.0, Jan 2006
- [Ref 11] TIP SDS
TTR 001-02, TIP - Part 2: Short Data Service, ver 2.0.1, Mar 2006
- [Ref 12] TIP Auth
TTR 001-04 TIP - Part 4 - Authentication, ver 3.0.0, Jan 2006
- [Ref 13] TIP PD
TTR 001-05 TIP - Part 5: Packet Data, ver 2.0.0, Nov 2004
- [Ref 14] TIP-SS-AL
TTR 001-09 TIP - Part 9 - Ambience Listening, ver 1.0.3, Jan 2006
- [Ref 15] TIP AIE
TTR 001-11 TIP - Part 11 - Air Interface Encryption, ver 3.0.0, Sep 2006
- [Ref 16] TIP Disable
TTR 001-13 TIP - Part 13 - Enable/Disable, ver 2.0.0, Apr 2006

1.2.3 Other Standards

- [Ref 17] RFC: IP
Internet STD 5, RFC 791, Internet working Protocol (IP)
see <http://www.isi.edu/in-notes/rfc791.txt>
- [Ref 18] RFC: PPP
Internet RFC 1661, Point-to-Point Protocol (PPP)
see <http://www.isi.edu/in-notes/rfc1661.txt>
- [Ref 19] RFC: HDLC
Internet RFC 1662, PPP in HDLC-like Framing"
see <http://www.isi.edu/in-notes/rfc1662.txt>
- [Ref 20] RFC: UDP
Internet RFC 768 User Datagram Protocol. J. Postel. Aug-28-1980
see <http://www.isi.edu/in-notes/rfc768.txt>
- [Ref 21] RFC: PAP/CHAP
Internet RFC 1334 "PPP Authentication Protocols"
see <http://www.isi.edu/in-notes/rfc1334.txt>
- [Ref 22] RS 232 Standard - "EIA232E - Interface Between Data Terminal Equipment and
Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange"
published by the Electronic Industries Association,
see <http://www.eia.org>

1.2.4 Miscellaneous

[Ref 23] Cleartone GW Spec
Call protocol/procedure for DM-GATEWAY and DM-REPEATER by Cleartone Telecoms; Issue 1.1 Jan-2001

1.3 System Support

The terminal operates on the Dimetra IP 5.x, 6.x, and 7.x releases and Dimetra IP Compact. It will also operate on previous versions of Dimetra-P - from Release 3.8 and on.

The terminal is designed to operate optimally on the Dimetra IP system, but will also operate properly on all SwMIs that comply with IOP TIP documents [Ref 10] through [Ref 16].

2 Group Call (TMO)

The TMO Group Call service enables the terminal to communicate with a group of other TETRA terminals using 'point to multi-point' operation.

The terminal supports "Normal Group Call" as described in the Air Interface standard [Ref 1], clause 14.5.2, and the TIP [Ref 10] clause 9. Acknowledged group call is not supported.

The terminal is capable of monitoring multiple groups at one time, by adding the group identities to the list of identities which 'belong to' this terminal. Signalling received from any of these identities will be processed by the terminal.



NOTE

For the TCR1000, before the terminal can be used for making group calls the TCR1000 RCU must be initialised. Initialization is performed by pressing one of the RCU buttons other than the PTT or by rotating the rotary switch to another position.

2.1 Terminal Ergonomic features

2.1.1 Programmable Talkgroups

The terminal offers a talkgroup list facility. Each talkgroup entry contains a TETRA group address and may be associated with a name tag. Up to 2048 TMO talkgroups can be defined in the codeplug.



NOTE

Neither the group name nor the corresponding group address are editable by the terminal user via the MMI.

2.1.2 Talkgroup Folders

The talkgroups are organized in folders. A talkgroup can be chosen by first choosing a folder and then a talkgroup within the folder. Up to 256 folders can be provisioned. The size of each folder is flexible and can be defined via provisioning.

TMO talkgroup folders are organized in a 2 level tree-structure:

- Level 1 folders
 - Placed at the root of the folder structure
 - Can contain both level 2 folders and TMO talkgroups at the same time

- Can contain up to 2048 unique TMO talkgroups and the terminal supports storage of up to 4000 instances of TMO talkgroups
- Can contain any number of level 2 folders
- Level 2 folders
 - Placed in level 1 folders
 - Can contain up to 2048 unique TMO talkgroups and the terminal supports storage of up to 4000 instances of TMO talkgroups
 - Any given level 2 folder can only be sub folder to one level 1 folder

**NOTE**

The folder definitions cannot be altered by the terminal user via the MMI.

2.1.3 Talkgroup Selection

Talkgroup selection from the stored list of talkgroups in Idle Mode can be performed by scrolling through the list using the scroll keys or using the Rotary Knob if it is so provisioned as described in Paragraph 5.3 "Rotary Knob". talkgroup scrolling can be provisioned to scroll within a folder only or continuously through the folders acting as one continuous list of groups.

There is no ability to directly dial a group SSI, nor view a group SSI.

**NOTE**

The following part of this section refers to TCR1000 only.

Selecting a talkgroup, from the stored list of talkgroups in the favorite folder, is performed by rotating the Rotary Knob to the corresponding position of the talkgroup in the favorite list.

This is not possible for a user to directly dial a group SSI nor select a talkgroup from outside the favorite talkgroups list.

2.1.4 Favorite Talkgroups

This feature gives the terminal user a quick access to frequently used talk groups by including such groups into up to three favorite talk groups ranges.

These ranges of Favorite Talkgroups are separately stored in the data storage. The Favorite Talkgroups feature operates in both TMO and DMO modes. The favorite talk groups ranges are shared for TMO and DMO talk groups.

The terminal user is able to select, view and edit "My Groups" ranges.

Once a group in a "My Groups" range is selected the user is able to select any of favorite talk groups within that range using normal procedure.

The name of the favorite talkgroup range replaces a talk group range name on the terminal display whenever a favorite talk group is either selected or in use for appropriate operation. The ranges of Favorite Talkgroups with their talkgroup assignments are kept through MS power down.

The maximum number of talk groups in Favorite Talkgroups in each of the ranges is 128 by default.

**NOTE**

The following part of this section refers to TCR1000 only.

The terminal user can access up to 10 favorite talkgroups programmed in the list.

The favorite talkgroup list is stored in non-volatile memory.

The favorite talkgroup list can be a combined list of TMO and DMO groups; When a TMO group is selected in DMO mode, the terminal automatically switches to TMO mode and select that group. Similarly, when a DMO group is selected in TMO mode, the terminal automatically switches to DMO mode and selects that group.

2.1.5 Talkgroup Blind Operation

The terminal can be provisioned with a virtual rotary 'end-stop' option for use in blind operation. If this option is provisioned, when the user has scrolled to the beginning or end of the list using the Rotary Knob, a tone is sounded and the first/last talkgroup in the list continues to be the displayed group even if the user continues to scroll in that direction with the Rotary Knob.



NOTE

The following part of this section refers to TCR1000 only.

TCR1000's Remote Control Unit has a physical 'end-stop' for use in blind operation. Tones are sounded in the earpiece corresponding to the position to which the rotary control has been scrolled.

2.1.6 Receive-only Talkgroups

It is possible to provision a group to be receive-only. The group can be selected, but the terminal does not allow the user to initiate a call to this group.



NOTE

Currently this is done on a per-folder basis. This approach will be changed in the future releases.

2.1.7 Non-Selectable Talkgroups



NOTE

The following section is not applicable to TCR1000.

It is possible to provision a group to be non-selectable. Such groups are not seen by the user when scrolling through the talkgroup list, and thus the user will not be able to select the group. The user will see the group name only upon receiving a call for the group (for instance if it is an Announcement group associated with the selected group).

2.1.8 Audio Input and Output



NOTE

The following section is not applicable to TCR1000.

Incoming group call audio is routed to the built-in speaker by default. It is also possible for the user to cause the audio to be routed to the built-in earpiece or to an external accessory.

Outgoing group call audio is processed from the internal 'dispatch' microphone (located on the top part of the unit) by default. It is possible for the user to cause the audio to be processed from an external accessory.

2.1.9 One Touch Group Call Access

On the idle display the user can start a group call to the currently selected talk group, using a single PTT press.

2.1.10 Talk Time Limit

The terminal will limit the amount of time the user can continuously talk in a group call without interruption, according to a provisioned value. The user will be warned a short time before the talk time expires. The timer is provisioned per talkgroup folder.

2.1.11 Receiving a Group Call

In most situations, the terminal receives group calls without any user intervention.

When the terminal receives an incoming group call, the user may be alerted by a short alert tone from the loudspeaker. This will be followed by the speech.

No user action is needed to clear the call which is cleared by the call owner (normally the SwMI). However, the user has the ability to leave a group call (The call will continue to other users, but this terminal will not participate).

2.1.12 Emergency Group Call

Emergency Group call is described in Paragraph 5 "Emergency Operation (TMO)".

2.1.13 Talkgroup Scanning



NOTE

The following section is not applicable to TCR1000.

The user can choose a user scan list - a list of groups for the terminal to monitor. When this list is activated, the terminal will begin to monitor traffic for these groups in addition to the traffic for the selected group. Up to 40 user scan lists can be defined, and there can be up to 20 talkgroups in each scan list. However, only one user scan list will be active at a time. The terminal can be provisioned to allow the user to create and edit the scan list, or to not allow the user to do so.

If the SwMI instructs the terminal to detach one of the scanned groups, that terminal stops monitoring the group, but the group will remain in the user scan list. Subsequent attachment by the SwMI will cause the terminal to begin to monitor that group again.

The SwMI may also instruct the terminal to attach groups that is not in the user scan list (see Paragraph 2.2.10 "SwMI Initiated Group Attach/Detach" and Paragraph 17.1.1 "Adding a Talkgroup"). If the group attachment is accepted, the terminal monitors the group, and up to 10 such 'SwMI controlled' groups, in addition to the groups in the user scan list.

2.1.14 Priority Monitor



NOTE

The following section is not applicable to TCR1000.

While the terminal is active in a group call, it may receive a group call setup for a different group. The terminal needs to decide whether to ignore the new call or accept it basing on priority of the current call and the new call. If the new call has the higher priority than the current one, the new call may be joined and the current call dropped.

There are the following priority types:

- Call priority (indicated in the call setup signaling)
- Priority of the group (indicated by the Class of Usage - CoU - negotiated upon attachment)

If the old call and new call have different call priorities, the terminal will follow the call with the higher call priority (See Paragraph 17.6 "Pre-emptive Priority Call (PPC)"). If the calls have the same call priority the CoU priority of the group will be used.

If the terminal is active in a group call, and detects a call setup for a different group call with the same call priority, and the new call is for a group with a higher group priority (CoU), if the user is not currently the talking party the terminal will join the new call.

The terminal can be provisioned to not immediately join the new higher priority call but to present the new call to the user before joining it. If so provisioned, the user is given a choice of following the new higher priority call or staying with the present call.

The terminal can be provisioned to treat a selected group call as a higher priority than an scan group call regardless of the priority of the calls or the groups.

2.1.15 Announcement Talkgroup (ATG)



NOTE

The following section is not applicable to TCR1000.

The terminal supports the concept of a group hierarchy, such that a special group, an announcement group, in addition to being a group in and of itself, logically contains up to 20 subgroups. When the user selects an announcement group as the selected group, the terminal will monitor traffic received for the announcement group as well as the traffic received for any of the associated subgroups. However, the terminal will not monitor the active scan list groups when an announcement group is selected.

When the user selects one of the subgroups of the announcement group, the traffic for the subgroup will be monitored as well as the traffic for its announcement group (but not other subgroups).

The terminal can be provisioned to not allow the user to initiate a call or talk back on announcement talk groups.

2.1.16 Super Groups

See Paragraph 17.1.4 "Group Addressed DGNA".

2.1.17 Broadcast Call

The terminal will join calls received with Communication Type "Broadcast" and will display to the user that this is a broadcast call. This call will normally be addressed to the 'broadcast address' (0xFFFFFFFF), but will be accepted by the terminal on any address the terminal is monitoring.

A Broadcast call will take precedence over any other call that has the same or lower call priority.

The terminal does not allow the user to transmit in a broadcast call.

Limitations

The terminal does not have the ability to initiate a broadcast call.

2.1.18 PTT Double Push



NOTE

The following section is not applicable to TCR1000.

The PTT Double Push (D-PTT) feature enables user with a possibility to indicate importance for a group call with a specific tone send to the other terminals in the group. In order to send the tone

(when the feature is enabled), the user presses the PTT button twice in a time period defined in CPS (by default 1 second). The D-PTT is triggered only when the terminal is in Idle or Group Call mode. Notice that upon the second PTT press triggering the D-PTT tone, the Permission to Talk tone is not played as the D-PTT tone is played instead. The D-PTT tone is not played on the sending terminal.

If the PTT button is kept pressed after second press and the terminal finishes sending the D-PTT tone and allows starting group call as if PTT was pressed once. The user is notified of the behavior by Permission to Talk tone after D-PTT Tone ends. If PTT button is not kept pressed after the second press then the terminal finishes sending the D-PTT tone (PTT button is handled normally).

**NOTE**

The D-PTT tone is sent as voice, hence the receiving terminal plays the sound no matter if the feature is enabled on the terminal.

After D-PTT tone is sent keeping the PTT button pressed results in permission to talk.

The D-PTT tone volume level in the speaker/earpiece of the sourcing terminal can be adjusted by speaker/earpiece volume settings. Disabling all the tones does not affect the sent tone volume. This only prevents the D-PTT tone from being heard on the sending terminal.

From the MMI the user can change the D-PTT tone to be Single, Double or Triple. This is configurable also in the CPS.

2.2 Air Interface Aspects

2.2.1 Group Call

The terminal is able to make and receive group calls to and from other TETRA terminals with simplex speech capability. Group call uses TETRA group call signalling as described in [Ref 1] and [Ref 10] using direct set-up for incoming and outgoing calls.

Group calls are normally owned and cleared down by the infrastructure. However, group ownership is supported by the terminal - see section 2.2.3 "Call Ownership" on page 2-10.

2.2.2 Talking Party Identification

**NOTE**

The following section is not applicable to TCR1000.

The Talking Party is displayed as specified in section 3.2.4 "Calling Party Identification Presentation" on page 2-14.

2.2.3 Call Ownership

The terminal accepts call ownership of a group call. When the terminal is the call owner it will send an appropriate TETRA signalling when the user ends the call.

2.2.4 Transmit Request Queueing

Whilst another user is talking during an ongoing group call and "PTT during received Group Call" codeplug is enabled, a user may request to transmit by pressing and holding the PTT button. The system will see this action and inform the user that the request has been queued.

While the MS is in Emergency Mode the transmission request is not ignored and the queueing is ignored.

If the user releases the PTT button, the terminal sends a message to the system withdrawing the request.

2.2.5 Transmission during the Group Call

Whilst another user is talking during an ongoing group call and "PTT during received Group Call" codeplug is disabled, a user cannot transmit by pressing and holding the PTT button.

The MS ignores the request to transmit without any indication. The user has to release and then press again the PTT button to re-initiate a transmission request.

While the MS is in Emergency Mode the transmission request is not ignored.

2.2.6 Call Restoration in Group Call

If the terminal roams to a new cell during a group call, it will attempt to continue the call on the new cell, using TETRA cell reselection and call restoration procedures.

If the terminal roams while the user is the transmitting party in the group call, and it is possible to perform announced cell reselection, announced cell reselection will be employed as described in section 12.5 "Roaming" on page 2-54 and call restoration procedures will be performed in the new cell.

If the user is not the transmitting party, Unannounced cell reselection will be employed, followed by call restoration procedures.

2.2.7 Temporary Group Address

The terminal supports a temporary group address assigned by the SwMI which is only valid for the lifetime of the call. Thus, if the terminal initiates a group call on the selected group, and the SwMI assigns the call to a temporary group, the terminal will monitor all signalling addressed to this temporary group as long as the call is active.

The terminal supports assignment of an incoming group call to a temporary group address.

2.2.8 Late Entry

The terminal assumes that the SwMI sends repeated setup messages ('late entry') on the main control channel. Thus, in certain circumstances (such as when receiving a priority monitor call if provisioned as 'Presented' - See Paragraph 2.1.14 "Priority Monitor") it will ignore a group call on the assumption that it can join the call at a later time.

The terminal will join a group call setup which contains an SS-LE notification element indicating Late Entry Broadcast. However, it will not differentiate between this and a regular call setup in any way.



NOTE

Acknowledged Late Entry, and Late Entry Paging is not supported.

2.2.9 User initiated Group Attachment

When the user changes the selected talkgroup, the terminal will initiate an attachment to the SwMI, detaching the old group and attaching the new Talkgroup.

All group attachments sent by the terminal are sent with 'attachment mode' of 'amendment' or 'detach all...' on a case-to-case basis depending on which form will cause less bits to be sent over the air interface.

When the user selects a scan list and turns scanning on, the terminal will send a group attachment request to attach the scan groups in addition to the selected group. Similarly, when the user selects

an ATG, the terminal will send an attachment of the ATG as the selected group along with the attachment of the associated groups as scan groups. If a group associated with an ATG is selected, the terminal will send an attachment of the associated group as the selected group along with the attachment of the ATG as a scan group in addition to other scan groups it is scanning.

The TETRA TIP provides a facility by which the terminal can send a status message to the SwMI to turn scanning off and on rather than detaching and re-attaching the groups in order to save air interface signalling.

If the terminal is provisioned with this option, when the user turns scanning off the terminal sends an appropriate TETRA signalling (Status Uplink set to 0x20, and Scanning On/Off set to OFF (1)). In this state the terminal does not monitor any groups other than the selected group (this includes user scan groups, super groups of scan groups, SwMI scan groups, ATG when an associated group is selected and associated groups when an ATG is selected). If the user subsequently turns scanning on, the terminal will send an appropriate TETRA signalling (Status Uplink set to 0x20, and Scanning On/ Off set to ON (0)). and the terminal will begin again monitoring all attached groups.

If the terminal is not provisioned with this option, the user will only have an option to deselect the active user scan list, but will not be able to turn (all) scanning off. Deselection of the user scan list will cause a group detachment of the user scan list groups to be sent to the SwMI; but the terminal will continue to scan all other groups (such as ATG associations).



NOTE

The following part of this section refers to TCR1000 only.

In order for a terminal to use a group, the group needs to be attached by the terminal. The terminal initiates a group attachment request to the SwMI after the RCU initialization, whenever the user initiates a group change and when the terminal registers on a new site.

When the user changes the selected talkgroup, the terminal will initiate an attachment to the SwMI, detaching the old group and attaching the new Talkgroup.

2.2.10 SwMI Initiated Group Attach/Detach

If the terminal receives a SwMI initiated attachment for the group which is already currently selected the terminal will accept the attachment and keep the group selected. If the Class of Usage (CoU) received is not "selected", that CoU will be applied when the group is deselected.

If the terminal receives a SwMI initiated attachment for a group in the currently active user scan list, the attachment will be accepted. If it is for a group that is not in the currently active scan list, the attachment will be rejected. If it is for a group that is not in the currently active user scan list, the attachment will be rejected.

SwMI initiated detachment is always accepted by the terminal. If the detachment is for the selected group, the display will indicate to the user that no group is currently selected. If the detachment is for a group that is in the user scan list, the group will remain in the list, but will not be monitored. If the detachment is for a group that is in the 'SwMI controlled' list, it will be removed from that list.

3 Private Call (TMO)

**NOTE**

The following section is not applicable to TCR1000.

The Private call service enables the terminal to communicate one-on-one with another TETRA terminal when in TMO mode.

The terminal supports Individual call service to a TETRA identity as described in the Air Interface standard [Ref 1], clause 14.5.1, and the TIP [Ref 10] clause 7.

3.1 Terminal Ergonomic Features

3.1.1 Private Call Address Book

See Paragraph 5.18 "Unified Address Book (Contacts)".

3.1.2 Terminal TETRA ID Display

The user is able to view his name and/or his own ISSI address. This information is read from the codeplug. This information is used for display purposes only and has no affect on the terminal operation.

3.1.3 Dialing Methods

The terminal supports the following methods for selecting a number for an outgoing private call:

- Direct dialing from the idle display using the numeric keys
- Via Contact list
- One Touch Button
- Via Call History list

The detailed description of the different dialing methods is shown in the Paragraph 5.15 "Dialing Methods".

3.1.4 Initiating a Private Call

After selecting or entering a target address, the user may press PTT to initiate a simplex private call, or may press the <Send> key to initiate a Mobile to Mobile (or Mobile to Console) duplex call.

When the user is involved in a simplex or duplex call, the <End/Cancel> key will end the call.

If the user initiates a simplex private call, the terminal will respond either with a talk permit tone to indicate that the call is through-connected or an alerting tone indicating that the called terminal is ringing.

3.1.5 Receiving a Private Call

3.1.5.1 Simplex/Duplex Operation

Incoming private calls can be either simplex or duplex. On receipt of a simplex call with on/off hook setup, or a duplex call setup, the terminal rings. In a simplex call, the user then presses and holds PTT to talk. On a duplex call, the user accepts the call by pressing <Send>, and the duplex call is established.

3.1.6 Talk Time Limit

In a simplex call, the terminal limits the amount of time the user can continuously talk without interruption according to a provisioned value. The user will be warned a short time before the talk time expires.

3.1.7 Terminating a Private Call

The user is given the ability to terminate a simplex or duplex private call by pressing the <End/Cancel> key.

3.2 Air Interface Aspects

3.2.1 Simplex Private Call

The terminal is able to make and receive private calls to and from other TETRA terminals with simplex speech capability. This call type will use TETRA individual call signalling.

All private calls are initiated using the 'On-off hook' method. For incoming calls, both direct and on-off hook setup will be accepted by the terminal.

3.2.2 Duplex Private Call

The terminal is able to make and receive private calls to and from other TETRA terminals with duplex speech capability. It is possible to provision the terminal to not allow the user to initiate duplex private calls.

The terminal always initiates duplex private calls using on/off hook signalling with the traffic channel allocated by the SwMI only after the called party has answered the call. Therefore, all progress tones during call setup will be generated by the terminal. In addition, the terminal will allow the SwMI to modify the call setup to 'direct', thereby enabling the infrastructure to generate the progress tones.

3.2.3 Call Restoration in Private Call

If the terminal roams while the user is the transmitting party in the private call, and it is possible to perform announced cell reselection, announced cell reselection will be employed as described in section 12.5 "Roaming" on page 2-54 and call restoration procedures will be performed in the new cell

If the user is not the transmitting party, Unannounced cell reselection will be employed, followed by call restoration procedures.

3.2.4 Calling Party Identification Presentation

The calling party TETRA identity may be transported as part of the incoming individual call set-up signalling (as described in [Ref 1]). If the identity can be interpreted as a short number (see Paragraph 15.1 "Short Addressing Schemes"), the short number is displayed to the user. In addition, if the number is programmed in the terminal address book, the name associated with that number is displayed as well. If the calling party identity is not present in the call set-up signalling, the terminal displays a blank line in place of the missing identity.

3.2.5 Private Call Modification

If a private duplex call is initiated by the terminal, and the SwMI modifies the call to a Group call, or a simplex private call, the terminal will accept the modification and present it to the user. In addition,

if a simplex private call is initiated as a direct call, the terminal will accept modification to an on-off hook call, and vice-versa.

If the SwMI modifies a call from hook to direct the terminal will accept the modification.

4 Phone Call (TMO)



NOTE

The following section is not applicable to TCR1000.

The Telephone call service enables the terminal to communicate in a one-on-one simplex or duplex conversation with another terminal (TETRA or non-TETRA) via a telephone switch when in TMO mode.

The terminal supports Individual call service to an external identity as described in the Air Interface standard [Ref 1], clause 14.5.1 (and in particular clause 14.5.1.2.6), and the TIP [Ref 10] clause 12.

4.1 Phone Call Types

There are two phone number call types - a full phone number, which is addressed to the defined PSTN gateway address, or a PABX phone number, for internal calls, where the numbers dialed will be addressed to the defined PABX gateway address.



NOTE

The PSTN phone call is supported when PSTN feature is enabled in the CPS and the SwMI supports this functionality (the PSTN Gateway needs to be configured properly).

No more than one PSTN gateway ID and one PABX gateway ID is available in the terminal.

4.2 Telephone Ergonomic Features

4.2.1 Telephone Address Books

See Paragraph 5.18 "Unified Address Book (Contacts)".

4.2.2 Dialing Methods

The terminal supports the following methods for selecting a number for an outgoing telephone call:

- Direct dialing from the idle display using the numeric keys
- Via Contact List
- One Touch button
- Via Call History list

For the different dialing methods description see Paragraph 5.15 "Dialing Methods".

4.2.3 Ring Styles

The ring style and volume for incoming phone calls are pre-programmed in the terminal and can be modified by the user via the menu.

The following ring styles are available for alerting the user about incoming Phone, PABX or Duplex calls:

- British
- Style2
- Style3
- French

- German
- Bravo
- Three Ring
- Quick
- Standard

Additionally there can be a separate ring style chosen for alerting about incoming Simplex calls:

- British
- Style2
- Style3
- French
- German
- Bravo
- Three Ring
- Quick
- Standard
- Private - Default setting

4.3 Air Interface Aspects

The terminal supports the telephone-related functions listed below.

4.3.1 Initiating a Telephone Call

The terminal is able to initiate phone calls to a PSTN/PABX with duplex speech capability. This call type uses TETRA individual call signalling as described in [Ref 1] and [Ref 10] using single stage dialing and hook set-up for outgoing calls.

Using hook signalling for Phone calls, implies that until a traffic channel is allocated, all feedback tones are generated internally by the terminal. In addition, the terminal will accept SwMI modification of the call setup to 'direct', thereby enabling the infrastructure to generate the progress tones.

Telephone calls can also be made between TETRA terminals using the MS-ISDN number as the called party number. MS-ISDN calls share the same Gateway as Phone calls that is PSTN Gateway configured in the CPS. If MS-ISDN call is placed, two terminals can have a simplex or duplex call based on assigned ISDN number.



NOTE

The Private Call and SDS via MS-ISDN are not supported by Dimetra Infrastructure.

4.3.2 Receiving a Telephone Call

Incoming Telephone calls (Land Gateway to Mobile) will use on/off hook signalling. The terminal will extract the gateway ID from the call set-up signalling, to determine whether to start Phone or PABX call.

4.3.3 Call Restoration in Phone Call

If the terminal roams while the user is in an active phone call, and it is possible to perform announced cell reselection, announced cell reselection will be employed as described in Paragraph 12.5 "Roaming" and call restoration procedures will be performed.

4.3.4 Calling Line Identification Presentation (CLIP)

If the terminal is provisioned to display the calling party, the calling party number will be transported as part of the incoming call set-up signalling (as described in [Ref 1]) and shown on the terminal display to the user. If the calling party ID is programmed in the terminal with a corresponding name, the name will be displayed to the user in addition to the number.



NOTE

This is expected that the number sent by the SwMI will be in a form that can be used by the called user to call back the calling party at some other time. Thus, for instance, the number can be stored by the user as-is in the address book.

If the calling party number is not present in the incoming call set-up signalling, a blank line is displayed to the user in its place.

5 Emergency Operation (TMO)

This section describes Emergency Operation in TMO Mode.

The terminal has a dedicated emergency button which can be provisioned to start either an emergency group call or an emergency private call (simplex or duplex). It is also possible to invoke emergency by an emergency button on the RSM.

5.1 Emergency Group Operation

5.1.1 Emergency Group Mode

If Emergency Call is provisioned as a group call, upon pressing of the dedicated emergency key (or RSM button or emergency foot switch if connected) the terminal will enter a special emergency mode.

Upon entry into Emergency Mode any existing voice call will be aborted or cleared down. Packet data in progress will be aborted, however the session will be kept open.

In Emergency Mode, the terminal will automatically reject phone, PABX and private calls, and will not monitor the groups in the user selected scan list. If an ATG is the selected group, however, the terminal will monitor the sub-groups associated with the ATG.

The terminal will remain in Emergency Mode until the user explicitly exits.

5.1.2 Emergency Alarm

If the terminal is provisioned with the emergency alarm feature, upon entry into emergency mode, the terminal will send an emergency alarm. This alarm is sent by sending a specially designated SDS status message to the address of the selected group. In addition, once the terminal is in emergency mode (and the terminal is provisioned with the emergency alarm feature), whenever the user presses the designated emergency button, an additional emergency alarm will be sent. The message can be dispatched both in TMO and DMO.

5.1.3 Emergency Group Call

While in the Emergency Mode, the terminal user is able to initiate an emergency group call and to participate in an emergency call (initiated by others).

If a terminal receives an incoming group call with emergency priority, the display will show that an Emergency call has been received, and a special audio alert will be sounded. The terminal automatically switches to the Emergency Mode upon receiving an emergency call.

The audio for an emergency group call will always sound through the speaker (high audio), even if the low audio is selected.

An Emergency Group Call is configured as **non-tactical** or **tactical**:

- A non-tactical call initiates on a talkgroup designated by the codeplug setting. After exiting from non-tactical emergency mode the terminal will be attached to the group that was selected before initiating the non-tactical call. When in non-tactical emergency mode, the user will not be able to switch talkgroups.
DGNA messages have no impact during non-tactical emergency mode but only after exiting the non-tactical emergency mode.
- A tactical call initiates on the currently selected talkgroup.

If the terminal (operating in TMO) enters Emergency Mode while emergency broadcast call is active the terminal continues on emergency broadcast call without initiating any calls (for instance, Hot Mic, Emergency Private Call) and sends an Emergency Alarm (according to the codeplug configuration).

5.1.4 Hot Mic

If the terminal is provisioned with the Hot Mic feature, upon entry into emergency mode the terminal sets up an Emergency Group Call, and when granted transmission permission opens the microphone automatically, allowing the user to transmit voice without pressing or holding any PTT button. The transmission continues for a provisioned amount of time. Subsequent presses on the emergency button within emergency mode initiate Hot Mic transmission again.

Pressing the PTT during hot mic transmission stops the hot mic operation, and normal PTT operation takes over (that is, when the PTT is released the transmission stops).

5.1.5 Alternating Hot Mic

The Alternating Hot Mic is an enhancement of the Hot Mic feature. The Alternating Hot Mic allows the user to have alternately On and Off HotMic, that is as per a timer settings the Hot Mic is switched on and off alternately.

If this feature is enabled, the user can initiate the Alternating Hot Mic by pressing the Emergency Button. The Alternating Hot Mic operation stops when one of the following conditions is met.

- The user presses an **End** softkey and the Hot Mic transmission stops
- The user exits the Emergency Mode and the Hot Mic transmission stops
- The PTT button is pressed and normal PTT operation takes over (that is, when the PTT is released the Hot Mic transmission stops)
- The Alternating Hot Mic timer expires and the Hot Mic transmission stops
- In TMO, when the terminal goes out of the service, the Hot Mic transmission stops. However the Alternative Hot Mic is still active for a period set in the CPS. If the terminal is back to the service during the period then the HotMic transmission starts again.

5.2 Emergency Private Call



NOTE

The following section is not applicable to TCR1000.

Emergency Call feature enables placing a simplex or duplex private call. If the Emergency Call is placed as private call, when the user presses the emergency button/key, the terminal will initiate a private call with emergency call priority to the provisioned address. No emergency alarm is sent and there is no emergency mode; the emergency state (all user indication and rejection of other services) ends as soon as the call ends.

5.3 Emergency MS-ISDN Call



NOTE

The following section is not applicable to TCR1000.

If the Emergency MS-ISDN Call is enabled in the terminal, then by pressing the Emergency button the user initiates an Emergency MS-ISDN call to the predefined MS-ISDN. The MS-ISDN call (simplex or duplex) type is predefined in the terminal.

A simplex call is originated with the direct setup. A duplex individual call is setup as on/off hook. If the SwMI modifies a MS-ISDN call, the terminal automatically complies to this modification.

5.4 Silent Emergency Mode



NOTE

The following section is not applicable to TCR1000.

The Silent Emergency is a mode where a terminal operating in TMO initiates silent emergency alarm and keeps waiting for the ambience listening request.

The terminal enters silent emergency mode on pressing the emergency button. After entering the silent emergency mode, the terminal guarantees itself to be in TMO (that is, it stays in TMO or switches to TMO, depending on the actual state) and then it sends a priority one silent emergency alarm. The terminal keeps re-sending the alarm until successful sending is confirmed. After the alarm is successfully delivered, the terminal stays in silent emergency mode and waits for the ambience listening.

The terminal may leave the Silent Emergency mode, when any of the following conditions appear:

- The terminal user exits from Silent Emergency mode.
- No success in sending the silent emergency alarm while alarm retries reach 0.
- The control room terminates the silent ambience listening.
- The ambience listening is disconnected by other reason.

In the Silent Emergency mode, all the services are blocked except the following:

- Receiving ambience listening
- Sending silent emergency alarm
- Sending GPS signal based on SDS application

There are not any indication to the user that certain features are blocked while the user initiates the feature.

5.5 Man Down



NOTE

This section is applicable only to MTP850 Ex, MTP810 Ex, MTP850 S/ MTP850 FuG, and MTP830 S/MTP830 FuG.

The Man Down feature allows alerting other terminal users and the console dispatcher that an unfortunate event affecting the terminal user takes place.

An emergency call and a status are generated after a programmable period of time that has passed since the terminal entered adverse conditions.

The terminal alerts when:

- its tilt exceeds a predefined angle value.
- it remains static for a predefined period of time.

Only these Man Down settings that are enabled in the CPS may be activated or deactivated using the terminal menu or by One Touch Button.

If the Man Down feature is deactivated with One Touch Button, the terminal plays an audio tone once. If the feature is deactivated using the menu, the terminal does not play the tone.

The Man Down feature is based on a small sensor with low power current consumption. The sensor is interfacing directly to the terminals processor.

If any of Man Down settings is enabled the sensor performs a self test during powering on the terminal. If the test fails, the terminal notifies its user with a specific audio tone and status icon.

The user is also notified by the specific audio tone and status icon when the Man Down device detects a failure during the activation of the feature.

If user deactivates the feature after the sensor failure is detected, then the icon disappears and the tone is no longer played.



NOTE

The remaining part of this section is applicable only to MTP850 S/MTP850 FuG and MTP830 S/MTP830 FuG.

Depending on the CPS settings additional audio and/or visual indications are available in order to help an user with locating the terminal. Then if Man Down alarm has been activated (Emergency Alarm is started), the terminal starts additional audio indication playing high and low frequency sounds continuously, with highest possible volume and/or its display and keypad starts blinking, until alarm deactivation. The additional audio indication is not played if the Emergency Hot Mic is on.

5.6 Invisible Emergency



NOTE

The following section is not applicable to TCR1000.

Invisible Emergency mode is a type of emergency mode that provides no audible indications and the display corresponding to the idle state for any Emergency operations.

In this mode, only the user knows that the terminal is in the Emergency mode. After entering the Invisible Emergency the terminal sends out an Emergency alarm. All the settings are restored when the user exits this mode.

The terminal may leave the Invisible Emergency mode, when the user presses the Exit softkey.

5.7 Air Interface Aspects



NOTE

The following section is not applicable to TCR1000.

5.7.1 Emergency Identity and Call Type Modification

The terminal supports initiation of an Emergency call to a designated TETRA ID. If the SwMI modifies the call type to another call type, the terminal will follow the new call.

If emergency call is provisioned as a private call, and the SwMI modifies it to a group call the terminal will accept this modification and convert the call to a group call in emergency mode. In this case, the terminal will automatically leave Emergency Mode as soon as the group call ends.

6 Direct Mode Operation (DMO)

TETRA DMO enables the terminal to directly communicate with another TETRA terminal or group of terminals directly, without the need of an intervening base station.

The terminal supports Direct Mode Operation service identity as described in the Air Interface standard [Ref 8].

6.1 DMO Mode

To communicate directly with another terminal not through a SwMI, the user enters into a special mode that allows Direct Mode (DMO) communication. To return to normal operation, the user switches back to Trunking (TMO) mode.

In DMO mode, the user is able to place Group and Simplex Private calls, and send Status and SDS messages. All menu items are available, although some functions from the menu are restricted (for instance group scanning).

In DMO mode, the RSSI level is displayed to the user only when the terminal is receiving.

6.2 DMO Group Call

The user can initiate a DMO group call and participate as a listener of a DMO group call.

The user can select one of up to 1024 groups, each of which has an associated DMO frequency. There will be a mapping between DMO and TMO talkgroups, such that when moving from TMO to DMO or vice-versa the appropriate group will be selected. Calls initiated by the terminal will be to the selected group. Only incoming calls to the selected group and the open group (See Paragraph 6.5 "DMO Inter-MNI Calls") on the selected frequency will be joined by the terminal. talkgroup scanning is not supported. PTT Double Push is supported (See Paragraph 2.1.18 "PTT Double Push").

The terminal supports call initiation and acceptance of call changeover, enabling the talker ("DMO master") to change within a DMO group call.

If Talking Party ID (TPNI) is received in an incoming group call transaction (or received in DM-INFO) it will be displayed to the user. It will also be sent by the terminal in outgoing group transactions.

The terminal sends late entry signals ("occupation messages") periodically while transmitting in a DMO group call. The terminal detects late entry signals sent out by other DMO terminals.

6.3 DMO Private Call



NOTE

The following section is not applicable to TCR1000.

Private Call in DMO (a.n.a. Direct Mode Individual Call) allows the user to dial a selected TETRA terminal rather than currently selected talkgroup. Only terminal to terminal communication is supported. Repeater and Gateway are not supported. When a DMO Private Call takes place, terminals not involved in this call receive the channel busy indication.

Current implementation does not support the presence check. This implies that the calling party does not know if the called party is available when the call is originating.

The Terminals are identified by Short Subscriber Identities. DMO Private Call is a simplex call.

6.4 DMO Emergency

The terminal supports initiation and acceptance of DMO Emergency group calls, this includes support of call pre-emption. Emergency calls via gateway will also be supported. If Emergency Call is provisioned in the terminal, upon pressing the Emergency key/button in DMO, the terminal will go into Emergency Mode and allow the user to initiate an emergency call.

6.4.1 DMO Emergency Alarm

If the terminal is provisioned with the emergency alarm feature, upon entry into emergency mode, the terminal sends an emergency alarm. This alarm is sent by sending a specially designated SDS status message to the address of the selected group. The alarm status is received by all the terminals attached to the same talkgroup.

If DMO Emergency Alarm sending has failed and the failure is caused by pre-emption rejection, then the terminal will re-send the emergency alarm. If the failure is caused by any other mean, the terminal will not re-send the emergency alarm.

6.4.2 DMO Hot Mic

If the terminal is provisioned with the Hot Mic feature, upon entry into emergency mode, the terminal will set up an Emergency Group Call, and when granted transmission permission will open the microphone automatically, allowing the user to transmit voice without pressing or holding any PTT button. Transmission will continue for a provisioned amount of time. Subsequent presses on the emergency button within emergency mode will initiate Hot Mic transmission again.

Pressing of PTT during hot mic transmission will stop hot mic operation, and normal PTT operation will take over (that is when PTT is released transmission will stop).

6.4.3 Alternating Hot Mic

The Alternating Hot Mic is an enhancement of the Hot Mic feature. The Alternating Hot Mic allows the user to have alternately On and Off HotMic, that is as per a timer settings the Hot Mic is switched on and off alternately.

If this feature is enabled, the user can initiate the Alternating Hot Mic by pressing the Emergency Button. The Alternating Hot Mic operation stops when one of the following conditions is met.

- The user presses an **End** softkey and the Hot Mic transmission stops
- The user exits the Emergency Mode and the Hot Mic transmission stops
- The PTT button is pressed and normal PTT operation takes over (that is, when the PTT is released the Hot Mic transmission stops)
- The Alternating Hot Mic timer expires and the Hot Mic transmission stops

6.4.4 Man Down

See Paragraph 5.5 "Man Down".

6.5 DMO Inter-MNI Calls

The terminal supports receipt of DMO group calls addressed to the "Open MNI" (MNI and SSI all '1's), and those addressed to the "Open Group" (SSI is all '1's) with the home MNI or the MNI of the currently selected group.

The terminal has a list of partnership DMO networks. If a call is received to the SSI of the selected group and an MNI that is in the partnership list, the terminal will join the call if the selected group is provisioned to enable partnership.

The terminal supports initiation of a DMO group call to any provisioned GTSI. The MNI does not have to be in the partnership list.

6.6 DMO Gateway/Repeater Communication

The terminal provides the capability of communicating in DMO mode with a TMO group via the IOP certified gateways as defined in [Ref 23].

A DMO repeater re-transmits information received from one DM-MS to other DM-MS(s) over the DMO air interface.

The terminal allows the user to operate for each DMO talkgroup in one of the following modes. The user can choose which mode to operate in:

- **DM-MS to DM-MS only:** In this mode, the terminal will only initiate calls on this talkgroup directly - not via a gateway or repeater.
- **Specific gateway:** In this mode, the terminal can initiate calls on this group directly DM-MS to DM-MS or via a specific gateway address that is specified for this specific talkgroup. This gateway address will be editable by the user.
- **Auto gateway:** In this mode, the terminal can initiate calls on the selected group directly with another terminal or via any usable gateway that is detected as present.
- **Repeater:** In this mode, the talkgroup should link to a repeater and by that to enhanced it's coverage area.
- **Specific gateway and repeater:** In this mode, the terminal will use only the gateway with the specified gateway address for that talkgroup and/or a DMO repeater.
- **Automatic gateway and repeater:** In this mode, the terminal will use the first available gateway for that talkgroup and/or a DMO repeater.

If either 'Specific gateway' or 'auto gateway' mode is chosen, and a suitable gateway is found, all outgoing calls will be made via the gateway. If a suitable gateway is not found, or a call setup via the gateway fails, the terminal will attempt to set up the call directly DM-MS to DM-MS.

If the terminal is idle (not involved in a call), it will follow incoming calls from either MS-MS or from a suitable gateway no matter which gateway mode is chosen.



NOTE

The following part of this section is not applicable to TCR1000.

When the user is operating on a gateway and/or repeater, the terminal will indicate this to the user.

6.7 DMO Repeater Mode (Operation)



NOTE

The following section is applicable to MTM5400, MTM800 FuG, MTP850 S, and MTP850 FuG only.

A DMO repeater is used to extend the DMO range by retransmitting received information from one terminal to another.

A channel is a specific grouping of time slots in the multiplexing structure related to a specific RF carrier or pair or duplex spaced RF carriers. The DMO repeater uses the channel structure and transmits on.

A channel can be considered as being free, occupied or reserved. A channel is free if there is no activity on the channel or if the Repeater is transmitting a presence signal and indicating that the channel is free. A channel is occupied if there is a call or data transaction in progress. A channel is reserved if a channel reservation signal is present on the channel.

The procedures used by a terminal wishing to make a call and by a DMO repeater repeating a call depend on the state of the channel.

The communication between terminals and the DMO repeater is logically divided in two links. The term master link is used for all communication taking place between the Master terminal and the DMO repeater. The term slave link is used for all communication taking place between slave terminal and the DMO repeater, where a master is the terminal initiating and transmitting the voice or data and the slave is the terminal receiving the voice or data.

6.7.1 Repeater Types

A DMO repeater primarily uses Layer 1 (Physical layer) and Layer 2 (Data Link Layer) in order to retransmit data and voice:

- Type 1A - The repeater conducts transmission and reception operations on a single RF carrier, by receiving transmission from a terminal in one time slot and re-transmitting to another terminal in a different time slot.
- Type 1B - This type of repeater is similar to a type 1A repeater except for it uses a pair of duplex-spaced RF carriers, one as an uplink from terminals to the repeater and the other as the downlink from the Repeater to terminals.



NOTE

The type 1B is not supported by MTM5400, MTM800 FuG, MTP850 S, and MTP850 FuG terminals.

6.7.2 Usage Restriction

In order to restrict the usage of repeater service, the DMO repeater can use the URT (Usage Restriction Type) element in the presence signal. The following URTs are available:

- The DMO repeater may allow any user to initiate transactions through the repeater itself (that is, no restrictions apply).
- The DMO repeater may allow only terminals with a specific MNI to initiate transactions through the repeater (that is, all terminals belonging to the indicated DMO network).
- The DMO repeater may restrict its own usage to a specified 48-bit TSI. This is the TSI of a group of terminals (for a group TSI) or an individual terminal (for an individual TSI) that is allowed to initiate transactions through the repeater.

- The DMO repeater may restrict its own usage to one TSI and one SSI. All terminals with an address corresponding to one of these (either an individual or group address) are permitted to initiate transactions through the repeater.
- The DMO repeater may restrict its own usage to three SSIs and all terminals with an address corresponding to one of these three SSIs (either an individual or group address) are permitted to initiate transactions through the repeater.
- The DMO repeater may restrict its own usage according to a prearranged policy.
- The DMO repeater must be able to store the amount of TSI/SSIs and the MNI required for the different URTs.

6.7.3 Feature Interactions

The TXI mode is available when a terminal is in the repeater mode. If the TXI mode is activated during the repeater mode, the terminal switches to DMO mode. After the TXI mode is deactivated, the terminal switches back to the repeater mode. When a terminal is already in TXI mode, an user cannot enable the repeater mode.

When a terminal is powered off and the last mode before power down was the repeater mode, then if the emergency button is pressed depending on the codeplug settings, the terminal powers up in the repeater emergency mode or normal repeater mode. During the repeater emergency mode, the terminal does not modify the priority of the calls going through it, restricts the user to access the “Call Monitor” menu, and initiates an emergency group call, if the PTT button is pressed.

If the terminal is in the DMO emergency mode and switches to the repeater mode, depending on the codeplug settings, it switches to repeater emergency mode or stay in DMO emergency mode.

If the terminal is in the TMO/Gateway emergency mode and switches to the repeater mode, depending on the codeplug settings, it restricts the user to go to the repeater mode (that is, stays in the TMO emergency mode), or switches to the repeater emergency mode, or switches to normal repeater mode (idle state).

If during the repeater mode and the user presses the emergency button to enter the silent emergency, the enters the silent emergency in DMO. After the silent emergency is terminated, the terminal switches back to the repeater mode.

6.8 DMO/TMO Gateway Mode (Operation)



NOTE

The following section is applicable to MTM5400 and MTM800 FuG only.

A DMO/TMO Gateway is used to provide gateway connectivity between terminal operation in the DMO and the TETRA TMO network. In other words the DMO/TMO Gateway mode provides the interface between TETRA DMO and TMO modes. With a DMO/TMO Gateway, terminals operating in DMO have the voice/data communication with TETRA TMO network enabled.

The DMO/TMO Gateway has two air interfaces.

- On the connection to the TMO network, the DMO/TMO Gateway operates as normal TMO terminal. It registers and authenticates to the SwMI using its own ITSI and own security keys when applicable. Similarly the DMO/TMO Gateway uses its own identity in all signaling exchanges with the SwMI in the same way as for a normal TMO terminal.
- On the DMO side, the DMO/TMO Gateway uses the air interface specified in ETSI DMO Gateway Air Interface. On the DMO side, the DMO/TMO Gateway uses the frequency specified for currently selected DMO talkgroup. The DMO/TMO Gateway generates presence signal on the DM RF carrier after it has successfully registered and authenticated to the

SwMI. This signal informs any DMO terminal monitoring the RF carrier that the gateway is now present and available for service, and provides frame and slot numbering.

While in the DMO/TMO Gateway mode, any individual call from both DMO and TMO cannot be answered. If the call is incoming from TMO, it is rejected with disconnect cause as the called party is busy. The missed call is added to the missed call list. If the call is incoming from DMO, it is ignored.

While in the DMO/TMO Gateway mode, group calls are supported. When the gateway receives a group call addressed to its current selected TMO talkgroup, it forwards the call on to the respective mapped DMO talkgroup (if the DMO channel is not free, then preemption request is sent). When the gateway receives a group call addressed to its current selected DMO talkgroup, it forwards the call on to the respective mapped TMO talkgroup, if the DMO terminal that initiated the call is correctly set up for gateway calls (otherwise the call is rejected).

**NOTE**

While in the DMO/TMO Gateway mode, individual and group calls cannot be initiated.

6.8.1 Group Mapping

The DMO/TMO Gateway provide gateway connectivity between currently selected TMO talkgroup and a DMO talkgroup. Each TMO talkgroup has only one DMO talkgroup mapped.

If a TMO talkgroup is changed in the gateway, the gateway changes the corresponding DMO talkgroup according to TMO-DMO talkgroup mapping list configured in the codeplug.

If a DMO talkgroup is changed in the gateway, the gateway changes the corresponding TMO talkgroup according to DMO-TMO talkgroup mapping list configured in the codeplug.

**NOTE**

TMO talkgroup can be changed by DGNA and DMO talkgroup can be changed through MMI, AT command, or remote control.

6.8.2 Entering DMO/TMO Gateway Mode

At the entrance to the DMO/TMO Gateway mode or when the gateway switches to another frequency, the gateway starts gateway monitoring, that is, it checks whether another active gateway is present on the same channel.

If the gateway receives presence signal from another gateway while monitoring, the gateway enters standby mode and the gateway acts as regular terminal operating in DMO.

If the gateway does not receive presence signal from another gateway while monitoring, the gateway enters the DMO/TMO Gateway Mode.

6.8.3 Emergency and DMO/TMO Gateway Mode

The gateway transmits emergency calls on and notifies the user with audible and visible indication. However, the gateway does not change its operation mode, that is, it stays in DMO/TMO Gateway mode.

7 SDS - Short Data Services

**NOTE**

For the TCR1000 Short Data Services apply to location reporting short data messages only.

The terminal supports the following Short Data Service (SDS) message types:

- SDS status
- SDS User Defined Data Types 1,2, 3
- SDS User Defined Data Type 4 (with or without SDS-TL)

The feature supports the following addressing modes:

- MS to MS
- MS to Group
- MS to External subscriber number (Gateway address)
- For SDS-TL, the message can be sent via Service Centre

7.1 Short Data Bearer Service

The terminal provides a short data bearer service for both internal and external applications.

7.1.1 Transport Layer Services

The terminal supports SDS Transport Layer services which provide end-to-end acknowledgments, delivery report requests, message numbering, and so forth for SDS User Defined Data type 4 messages. The TL also provides SDS access for applications that do not request these transport layer services, but use a Protocol Identifier.

The terminal can be provisioned to always send the delivery report by using an appropriate TETRA signalling, even if the originator requested a short report.

The terminal can be provisioned to support the old SDS-TL standard (as described in [Ref 2]) for operation on legacy systems, or as defined in [Ref 1] clause 29 for operation on other SwMIs.

7.1.2 External SDS Application Support

An externally connected device may access the SDS services in the terminal via AT commands and TNP1 protocol. An external application may use this service to send and receive SDS status, SDS user defined data types 1, 2, 3 and 4.

7.1.3 Downlink SDS Routing

Downlink SDS messages type 4 are presumed to contain a Protocol Identifier in order to identify the target application. If an external application has registered with the terminal for that PI, the terminal will deliver the message to the target application

The terminal may receive downlink SDS messages that are successive retransmissions of a message already received and acknowledged by the terminal. The terminal will not display these messages to the user, nor store in them in the inbox, nor send them to an external application.

7.2 SDS Addressing

The terminal accepts SDS messages sent to any of the following addresses:

- The terminals TETRA individual address
- Any group address that the terminal is monitoring
- The TETRA broadcast address

The terminal allows the user to send an SDS messages to any TETRA address (see section 15 "Numbering and Addressing" on page 2-75) and this address will be used as called user address.

7.2.1 MS-ISDN SDS

With this feature enabled, users can choose between MS-ISDN (an ISDN number assigned to a TETRA terminal) and ISSI when addressing SDS to another TETRA terminal. The terminals support sending text messages and statuses based on MS-ISDN. The MS-ISDN SDS is addressed to a PSTN gateway ISSI. The terminals do not support other SDS applications (for example, Call Out, RUA/RUI, GPS) over MS-ISDN.



NOTE

The Private Call and SDS via MS-ISDN are not supported by Dimetra Infrastructure.

7.3 Pre-Defined Status

7.3.1 Sending Status

The mobile status service is provided using SDS Status [Ref 1], clause 13. The terminal user can select from a list of up to 100 pre-programmed alphanumeric aliases each of which corresponds to a status value. The valid range of uplink status values is a set of provisioned parameters (min/max).

If the terminal is not provisioned for targeted status, the status value will be sent over the air interface to the address of the selected group.

The terminal recognizes the General status ack sent by the SwMI, as well as negative acknowledge as defined in [Ref 10].

In TMO if no status ack or negative ack is received, the terminal will retry sending the message. The number of retries and amount of time to wait before retrying are provisioned parameters. The user will be notified regarding the delivery status.

As there is no ack for DMO status messages, the user will be notified only of sending the status message.

The terminal should not initiate sending of status messages on a traffic channel.

7.3.2 Targeted SDS Status

If the terminal is provisioned for targeted status, the status value is sent over the air interface by default to the target last sent to. The user also has an option to specify a different individual user or group to send the message to. In other words the user is able to send an SDS Status message to a directly entered ID (for example, ISSI, GSSI, MS-ISDN).

If the terminal is not provisioned for targeted status and the user wants to send an SDS Status message, the following possible actions apply:

- When the default address type of targeted SDS Status is set to Private or Phone, then the default status target address is set and this address is used as either ISSI or ISDN, depending on the type configured.
- When the default address type of targeted SDS Status is set to Group, the selected talkgroup address is used.

7.3.3 Receiving Status

The terminal accepts status messages on any address it is monitoring. The terminal can be pre programmed with the appropriate text associated with each status value.

The user is notified when a new status message has been received.

Upon receiving an incoming status message, the stored text corresponding to the status value will be extracted and placed in the text message buffer as a text message. Receiving a status will cause the terminal to display the message mail screen, allowing the user quick access to read the message. A received status can be stored in the terminal text message buffer.

7.3.4 PEI Access to Status

The PEI provides access for external applications to send and receive status messages (See Paragraph 7.1.2 "External SDS Application Support").

7.4 Text Message Service

The terminal supports an internal text messaging application using the TETRA SDS Transport Layer (see Paragraph 7.1.1 "Transport Layer Services").

The terminal is capable of sending and receiving up to 140 bytes of payload data (which can be up to 160 characters if 7-bit encoding is used).

7.4.1 Inbox

Depending on terminal settings, for each Inbox information the following options are available from the MMI:

- Store - used to save the message as a template.
- Delete - used to remove the message from the list.
- Delete All - used to remove all the messages from the list.
- Reply - used to send a reply to the message originator with the option to edit the text (where available).
- Forward - used to send the current message to an another recipient with the option to edit the text.
- Refresh - used to re-order the messages list and see the newest at the top. When the user is in the Inbox and the new message comes, this is required to Refresh the list to see the new message.

7.4.2 Sending a Text Message

The terminal provides an edit facility for composing and editing a text message.

The message can be sent to a target TETRA terminal using SSI addressing, and will be sent with a request for a received delivery report.

7.4.3 Outbox

All the outgoing text messages (Short or Long) are stored in Outbox, when the Store & Forward mechanism is not in place. When the Store & Forward feature is enabled and the messages go through the Store & Forward server, the short messages are stored regardless the delivery status (that is, Failed or Successful), whereas Long messages only if delivered (even if only to the Store & Forward server).

Depending on terminal settings, for each Outbox information the following options are available from the MMI:

- Store - used to save the message as a template.
- Delete - used to remove the message from the list.
- Delete All - used to remove all the messages from the list.
- Resend - used to send the message again to the same recipients with the option to edit the text.
- Forward - used to send the message to the other recipient with the option to edit the text.
- Refresh - used to re-order the messages list and see the newest at the top.
- Delivery Status - used to check the time and the date of Msg Sent, Msg Delivered, Msg Read, Msg Expired or was not delivered. Every status change is communicated to the user with a related new message.

Delivery report is saved in Inbox and in the associated message in Outbox. However, the report is deleted from the Inbox after viewing it.

7.4.4 Outbox Capacity

Outbox and Inbox share the same memory area, hence their capacity depends on the combination of stored short and long messages in each of these folders.

If Inbox is empty, Outbox is capable of containing up to 100 short messages or at least 20 full size long messages.

If Outbox is empty, Inbox is capable of containing up to 100 short messages or at least 10 full size long messages.

When the user enters Message submenu, the number on the right side of Inbox and Outbox is indicating how many message are in.

If the Outbox is empty, then the terminal displays “No Messages” notification.

7.4.5 Receiving a Text Message

Upon receiving a text message, the terminal will place the text into a circular buffer. The user will be notified when a new text message has been received and quick access to read the message will be provided.

If a delivery report is requested, it will be sent by the terminal upon receipt of the message by SDS-TL.

If a consumed report is requested, it will be sent when the user reads the message.



NOTE

If the user reads the message when the terminal is out of service, the report may not be sent.

7.4.6 Immediate Text Messaging

Immediate Text Messaging is a selling feature which enables displaying the text message immediately on the terminal display. This feature is used for sending high important information to users from console.

When the terminal has the feature enabled and receives an immediate text message then:

- the immediate text message is stored in the inbox

- the content of the immediate text message is displayed
- relevant audio tone is played
- additionally if Periodic Alert feature is enabled, periodic alerting is active until the user closes/ skips the immediate text message

**NOTE**

When the feature is disabled in the terminal, then it treats immediate text messages as normal text message.

When user replies or forwards an immediate text message, the message is sent as a normal text message.

When the terminal receives more than one immediate text message, then just the latest received immediate message is displayed. All the previous immediate messages in the inbox are not prompted.

7.4.7 Saved Text Messages

The user is given the ability to save incoming or edited (outgoing) text messages. These messages can be edited and sent and will be only capable of being erased by explicit action from the user.

7.4.8 Timestamp

The timestamp displayed to the user will be extracted from the SDS TL PDU (as specified in the TETRA SDS Transport Layer Standard - see [Ref 11]). The timestamp will be generated and inserted into the message by the SwMI.

7.5 SDS Type 4 (Other than Text Message)

7.5.1 Home Mode Display

This feature provides the ability to configure over-the-air, text that will be shown by default on the terminal's display.

If this feature is enabled, the terminal displays a text string to the user on the idle display as specified in Paragraph 5.1.1 "Idle Display". This text can be provisioned in the codeplug.

Upon receipt of an SDS User Defined Type 4 message with a predefined Protocol Identifier for Home Mode Display (this PI will be provisioned in the codeplug), the terminal will replace the previous string with the string received in the SDS message. This new text will be used until power down, or until another is received. On restart, the terminal will revert to the text provisioned in the codeplug.

7.5.2 Predefined Templates (ATS Entry Prompt)

This feature assists the terminal in sending correctly formatted messages that are intended for computer applications to a pre-defined destination address (MS-ISDN, SSI or TSI).

The terminal user is provided with the ability to select a predefined entry prompt which will define a message format to assist in the construction of an SDS message. The prompt definition can be provisioned in the codeplug. The definition defines areas that are 'read-only' and areas that can be editable, as well as the type of characters that can be entered (numeric, alpha-numeric or phone digits). Along with the message definition, the address to send the message to will be available.

When the user sends the message it is sent via SDS-TL with Protocol Identifier that is provisioned in the codeplug, and a received report will be requested.

7.6 Air Interface Aspects

7.6.1 SDS-TL Short Form Report

The terminal can be provisioned to send a 'short-form' SDS-TL receive report when the originator of the message allows short-form report. 'Short-form report' uses specially designated SDS status values instead of SDS-REPORT.

7.6.2 Text Message Addressing

In addition to support of targeting text messages to a TETRA individual address, the terminal can be configured to support addressing of a text message to a TETRA group or to a telephone number. Addressing an SDS message to a phone number is implemented by using it's MS-ISDN number as an External Subscriber Number and the telephone gateway ID as the called user.

7.6.3 Text Message Coding Scheme

The terminal supports the following coding schemes for text messages when:

- receiving a message
 - 7 bit/8 bit Latin 1 (ISO 8859-1)
 - UCS2 (ISO 10646)
 - ISO 8859-5 Latin/Cyrillic (8-bit)
 - ISO 8859-7 Latin/Greek
 - ISO 8859-15
- sending a message
 - 7 bit/8 bit Latin 1 (ISO 8859-1)
 - UCS2 (ISO 10646)
 - ISO 8859-5 Latin/Cyrillic (8-bit)
 - ISO 8859-15 (depends on provided terminal software)

The terminal will decode downlink messages that use any of the above coding schemes, irrespective of the source.

7.6.4 Service Center

The terminal support SwMIs that employ store-and-forward service as indicated in the cell's broadcast information.

The terminal supports use of a service center, whose address is provisioned in the terminal. Store and forward operation is supported. However, the terminal will only notify the user upon successful sending of the message, and not wait for the report from the service center. This is due to deficiencies in the air interface that do not account for long lifetime of messages (for example: The Message Reference provides a very short range of values).

7.6.5 User Defined Data Types 1, 2 and 3

Downlink SDS messages types 1, 2 and 3 are always routed to the PEI when an AT application is registered.

If no external application is registered, the message will be discarded.



NOTE

Type 1,2, and 3 user defined short messages are not supported by DMO SDS.

7.7 SDS Encryption

Short data messages stored in a terminal are protected against any unauthorized access. The stored data includes messages in the Inbox, Outbox, and stored Call Out messages.

The required protection against any unauthorized access via the MMI, PEI or unintentional access by other means (such as copying the entire flash memory) is carried out through the following mechanisms - the encryption of stored messages preventing from access by reading the memory directly and the user authentication, so that messages cannot be read on the terminal MMI unless a valid user is authenticated. For the user authentication the existing terminal PIN is used.

SDS messages received by the terminal are encrypted prior to being stored in the Inbox. Store and Forward messages are encrypted prior to being saved in the Outbox. Received Call Out messages are encrypted prior to being stored in the CO Box.

7.7.1 User Access to Protected SDS Data

If the feature is enabled, then the terminal prompts the user to enter the PIN if any of the following menu items are selected from the MMI:

- Messages > Inbox
- Messages > Outbox
- Messages > CO Box

Following successful PIN entry and access to the required messages, the terminal does not require further PIN entries to access messages unless one of the following conditions has been met:

- Exit from the terminal Menu
- Power Off
- PIN changed from the MMI

7.7.2 Feature Interactions

If the terminal user disables the PIN lock through the MMI or changes the PIN, the protected messages will be deleted. Prior to deleting the messages, the user is prompted to ensure that the operation should proceed.

If the PIN lock is changed through the PEI all the protected messages stored in the Inbox, Outbox and CO box will be deleted.

On terminal permanent disable the access to the protected messages is lost.

7.7.3 SDS End-to-End Encryption



NOTE

The following section is not applicable to CEP400, MTP830, and 260–275 MHz terminals.

The TETRA standard supports Air Interface Security that provides protection of the air interface. As the information flow inside the infrastructure is not secured, users who require their data protected while going through the infrastructure need their entire transport path to be encrypted.

This method is called End-to-End Encryption (E2EE). The source and the destination(s) are supplied with the mechanism for encrypting and decrypting.

E2EE is a selling feature which provides customers with a higher degree of confidentiality than existing TETRA Air Interface data encryption. In Air Interface Encryption, the receiving Base Station decrypts data which travels clear within the system domain. For E2EE, the transmitting terminal encrypts the data and the receiving terminal or an E2E terminator located in the infrastructure decrypts the data.

E2EE protects the SDS/SDS-TL data services both in TMO and DMO. The following TETRA data types are protected:

- SDS type 4 with SDS-TL
- SDS type 4 without TL

For Short Data applications, the source data may come from an external application or from a task internal to the terminal, such as text messages or GPS. The terminal passes only the internal text messages and GPS data for encryption by its crypto module.

The encrypted short data service is established between two end points. One end point is terminated in the terminal, and the other end-point is terminated in a Short Data Encryption Gateway (SDEG) or another terminal. The destination address specifies the encryption type, that is, whether the packets are transmitted as encrypted, clear or dropped.

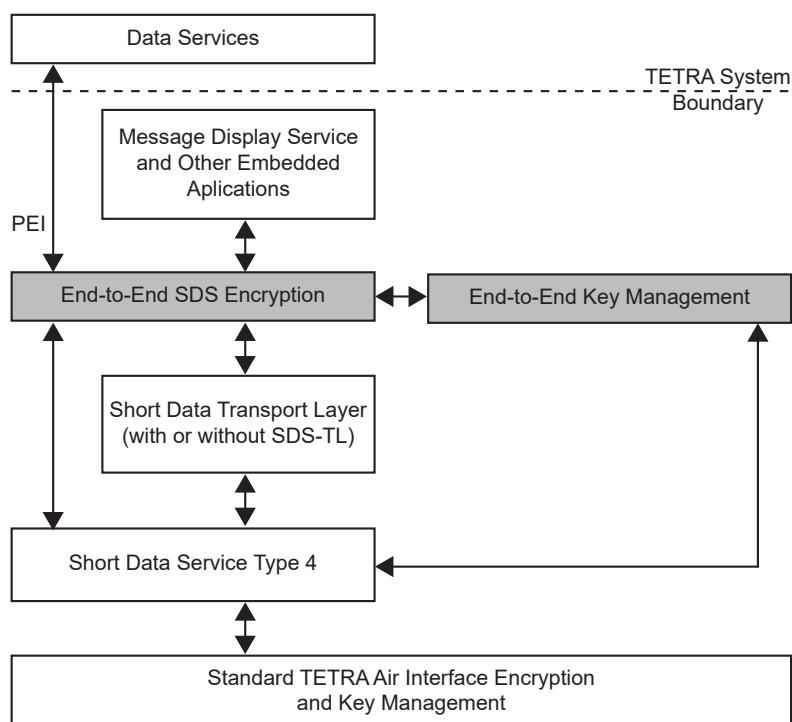


Figure 2-1 E2E SDS Architecture



NOTE

Key Management Facility (KMF) can manage and support only one short data association and a key at the same time.

The terminal selects the E2E Mode for the outgoing text message in accordance to the address association and requirements for E2E High Security Mode. Depending on CPS settings (High Security inactive, association set to changeable, and association does not conflict) users can override the address association and select via the MMI menu whether an SDS is sent to Clear or E2E Encrypted contact (Group or Private Number).

The terminals support the High Security mode configurable using the CPS. In this mode the association that binds the address to a given cryptogroup is always mandatory.

If no cryptogroup associations exist, this means that the keys are not loaded. In such situation any outgoing or incoming message that is E2E Encrypted, shall be discarded by the terminal. The user shall be alerted when this situation occurs.

7.8 SDS Remote Control

The SDS Remote Control feature enables controlling a terminal via Air Interface using SDS-TL bearer service. The Remote Control messages are sent by a Controlling Terminal (for instance, Controlling Mobile Terminal or SwMI Controlling Terminal as illustrated).

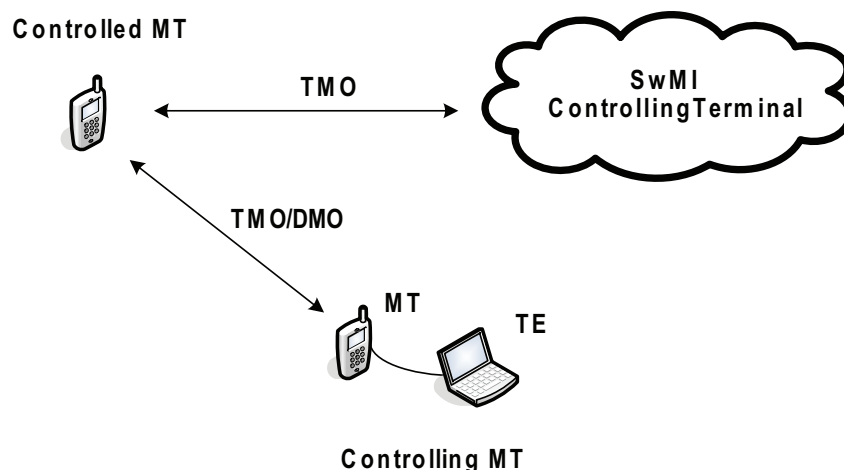


Figure 2-2 Remote Control Overview

The SDS Remote Control functionality works in both TMO and DMO and the Remote Control PDUs are sent using TE.

The user is allowed to use the feature only after a successful user authorisation, which requires entering a valid Remote Control PIN number.

The Remote Control messages can be sent to a group or individual terminals.

A controlled terminal receives over the air control information via SDS type 4 with TL on the specific PID number defined in the codeplug. If the received control message is originated from one of ISSIs present on the terminal authorized ISSI list located in the codeplug, then the terminal executes received command and sends a response.

The SDS Remote Control feature enables to:

- Switch between TMO/DMO modes (read, change, notify) for individual terminal and group (using +CTOM AT command)
- Select talkgroup (read, change, notify) for individual terminal and group (using +CTGS AT command)

- Collect Network Information from individual terminal (Network Registration Status and Cell Signal Quality using respectively the +CREG and +CSQ AT commands)
- Read individual terminal's GPS position (using +GPSPOS AT command)
- Set volume level for individual MT (using +CLVL AT command)

The Remote Control protocol used for sending the Remote Control commands is based on the existing AT commands protocol. For the list of commands available for the Remote Control see Chapter 5, Paragraph Table 5-8 "Remote Control Commands Set".

7.9 Store & Forward



NOTE

This section does not apply to MTP850 Ex and MTP810 Ex terminals.

This feature enables users to communicate with each other without being available at the same time. If the destination is not online, the message will be stored by the system (if supported) until it is available or the expiration time was exceeded (the system is configured to delete the message after a pre-configured time and this cannot be configured using the terminal).

7.9.1 Addressing of Store and Forward Message

User is able to send the Store and Forward message to an individual address. If the user chooses to send it to the group, the message status is switched from Store and Forward to Immediate.

7.9.2 Outbox

See Chapter 2, Paragraph 7.4.3 "Outbox".

7.10 Concatenation

This feature enables users to send a long text message up to 1000 characters. All the messages that are longer than 140 characters are going to be divided and sent separately one after another. When the user receives all the parts of the message it will be displayed as one on the screen.

7.10.1 Buffer Full, Overwrite Policy

When the terminal receives SDS message and the Inbox/Outbox is full it will act according to the settings in the CPS. See Chapter 4, Paragraph 30.4.14 "Buffer Full, Overwrite Policy" for more information.

7.10.2 Timestamp for Received Text and Status Message

When the text or status message is received and accepted, the terminal retrieves actual time information from its internal clock.

7.10.3 Receiving Long Text Message

Terminals are able to reconstruct a Long Text Message consisting of up to 10 short messages. The maximum length of the message is 141-1000 and it can be defined in the CPS. It recombines the text segments independently of the order they have been received to the correct order of the original message. The message can be combined only if all the Message Reference Number are correct and Segmented Receiver Timer is still valid.

7.10.4 Addressing of Long Text Message

The user is able to send the Long Text Messages to Individual destination. Sending the Long Text Messages to Group is not possible.

7.10.5 SDS Interactions

- Receiving the Message during Group/Broadcast Call - terminal allows receipt of the text message during ongoing group call and broadcast call. Group/Broadcast call is displayed with the "new mail arrived" icon and tone 'Mail Rcdv' is played.
- Emergency Mode - user is able to receive SDS messages. To read the SDS messages the terminal needs to leave the Emergency Mode. Sending the SDS messages in Emergency Mode is prohibited.

8 Radio Messaging System (TMO)



NOTE

The following section is not applicable to TCR1000.

The Radio Messaging System (RMS) feature enables terminals to receive and send RMS messages through the TETRA network using the Short Data Service (SDS) Transport Layer (TL).

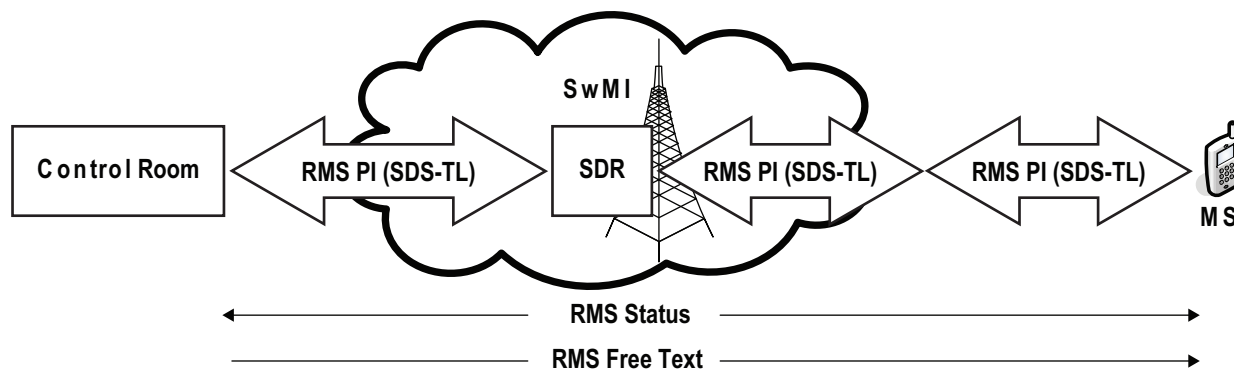


Figure 2-3 RMS Flow Model

To receive and send RMS messages the feature needs to be enabled in the CPS. The terminal accepts received RMS messages only from the Calling Party Address defined in CPS. Any Outgoing RMS Status is sent to the RMS Status Target Address defined in CPS.

8.1 RMS Status

The RMS Status is a bidirectional messaging (from the Control Room to a terminal and conversely). Sending RMS Status is possible if RMS mode is enabled in the terminal. In such case the terminal user can send one of ten predefined RMS Statuses to an address predefined in CPS. The user selects the particular RMS Status using assigned one-touch buttons on the numeric keypad. Received RMS Status is displayed in blue color on 4th line of the idle display. The latest received or sent RMS Status is kept on the display (idle display) until the next power cycle.

8.2 RMS Free Text

The RMS Free Text is an unidirectional message (from the Control Room to a terminal). Received RMS Free Texts are displayed in blue color on 5th line of the idle display. The latest RMS Free Text is kept on the display (idle display) until the next power cycle.

8.3 Requesting latest sent RMS Status

This is an unidirectional message (from the Control Room to a terminal). Upon receiving the request, the terminal sends the latest sent RMS Status to the control room without any user interaction or notification.

8.4 RMS Box

Incoming and outgoing RMS Status and RMS Free Text messages (with the exception for RMS Status sent) are stored in the RMS Box. The RMS Box capacity is maximum 10 entries for incoming and outgoing RMS messages.

If the RMS Box is full, storing a new incoming or outgoing RMS message overwrites the oldest message (received or sent) in the RMS Box.

9 WAP Service and Feature



NOTE

The following section is not applicable to TCR1000.

Wireless Application Protocol (WAP) is a standard for application layer network communications in a wireless communication environment such as TETRA network. The protocol is mainly used to access the mobile web from a terminal through a WAP browser.

9.1 WAP Browser

The Openwave Mobile Browser is a WAP-complaint user agent, which resides in the flash memory of a terminal. The WAP browser provides all of the basic services of a computer based web browser. The WAP Browser may be in either one of the following states:

- Closed - The Browser was not activated ever since the terminal was powered-on.
- Active - The Browser is operating in foreground.
PD service may be available or not during this state.
- Inactive - The Browser was at least once in Active state since the terminal was powered-on but currently is not in focus (in terms of keys and display).

Whenever users were interrupted by one of preemptive displays, they need to reactivate WAP manually if they wish to return. The following displays are defined as pre-emptive:

- DGNA notifications
- Incoming Phone, Private, or PABX calls
- Registration failure
- Battery flat - Portables only
- External Alarm Key (Horn & Lights Alarm) - MTM800 Enhanced and MTM5400/MTM800 FuG only
- Backlight Key - MTM800 Enhanced only

9.1.1 WAP Coexisting Services

The following service events leave the WAP Browser staying in focus while the terminal handles the events in background:

- Receiving non-emergency Group Call
- AL call setup
- Explicit authentication
- Change of cipher key
- ETE encryption
- ETE key provisioning
- Registration:
 - Terminal initiated registration request
 - SwMI initiated registration request
 - Receiving notification about successful registration
- Radio link maintenance
- Group attachment / Detachment (Receiving SwMI initiated Group attach/detach request)

- AT commands
- TNP1
- SDS:
 - Initiating SDS via PEI
 - Receiving SDS in PEI
 - Receiving Status in MMI
 - Receiving text message in MMI
- PD registration request
- Downlink PD reception
- PD de-registration request
- GPS (via SDS)

9.1.2 WAP Excluding Services

The following service events deactivate the WAP Browser while the terminal handles the events in foreground:

- Initiating outgoing Group Call
- Receiving emergency Group Call
- Receiving Simplex Private Call setup (direct signalling)
- Receiving Simplex Private Call setup (hook on/off signalling)
- Receiving Duplex Private Call setup
- Incoming TIC setup
- Incoming PABX setup
- DGNA
- Change of security class
- Registration:
 - Receiving notification about failed registration
 - MS initiated deregistration request (upon TMO to DMO switching)
- Emergency button press
- Incoming callout
- Incoming high priority WAP Push SI message

9.1.3 WAP Terminating Services

The following service events deactivate the WAP Browser and the terminal handles the events:

- Terminal disable
- Terminal initiated deregistration request
- Power off switch/Pseudo power off (in Ambience Listening)
- Battery out - Portables only

9.1.4 WAP Browser Language Limitations

The WAP Browser does not support Right-To-Left languages (as Arabic and Hebrew), English is used instead. For the content in these languages, the characters are not displayed.

9.2 WAP Push

WAP Push allows WAP content to be pushed to a terminal. This is carried out by sending a specially formatted (Push Access Protocol, PAP) XML document to the Push Proxy Gateway (PPG), that in turn forwards the document to the terminal.

A WAP Push message is an encoded message including a link to a WAP address. On receiving a WAP Push, a WAP enabled terminal automatically gives the user the option to access the WAP content.

The implemented WAP Push is compliant to WAP 2.0 standard.

9.2.1 Push Framework

A push operation in WAP is carried out by allowing a Push Initiator (PI) to transmit push content and delivery instructions to a Push Proxy Gateway (PPG). The PPG delivers the push content to the terminal as per to the delivery instructions.

The PI is an application running on a web server and communicating with the PPG using the Push Access Protocol (PAP). The PPG uses the Push Over-The-Air (OTA) Protocol to deliver the push content to the terminal.

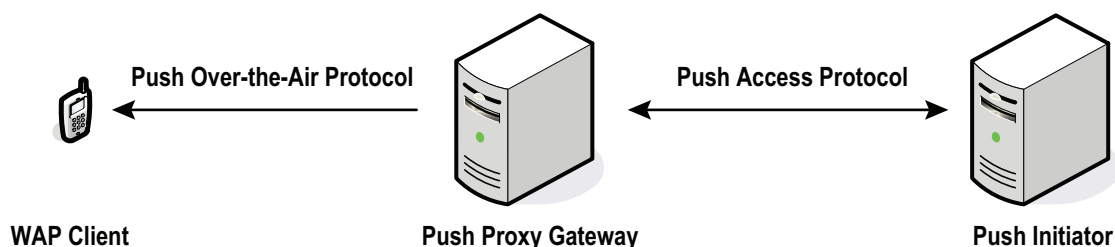


Figure 2-4 Push Framework

9.2.2 Push Services

9.2.2.2 Service Indication

The Service Indication presents the terminal user with a notification and an associated URL with a prompt to enter the URL. The notification is displayed and stored in the WAP Box for subsequent presentation.

The SI can be valid only for a certain amount of time, therefore the SI will indicate void content after that time. This is carried out by allowing the author of an SI to set the expiration date and time, that is when the SI will be automatically deleted from a terminal.

The Service Provider can remotely delete SIs that become invalid. This is carried out by sending a special SI to delete the invalid SI.

A new SI is indicated by a respective status icon, tone, and a pop-up. The pop-up occurrence depends on the SI priority (high and medium) and the terminal conditions (for instance, if the terminal is in a call the pop-up will not appear). Depending on the Periodic Alert feature availability, notification on unread SI can be indicated with periodic alerting, as for an SDS message.

9.2.2.3 Service Load

Service Loads (SL) differ from the Service Indication by the fact the user may not interfere with accessing of the associated URL. The user is not prompted to enter the URL whereas the browser is automatically activated. The SL contains a URI indicating the service to be loaded.

A new SL is indicated by a respective status icon, tone, and browser activation. The browser activation depends on the SL priority (high) and the terminal conditions (for instance, if the terminal is in a call the browser display will not be shown).

SL messages sent with urgency cache can be not indicated directly to the user. Such SL messages load content and store it in the cache (the process works in the background only the PD icon is visible to the user).

10 Call-Out



NOTE

The following section is not applicable to TCR1000.

10.1 Feature Overview

Call-Out is an alert that sent to one or many users when the incident requires immediate attention. (The Call-Out message can include an instruction to use a different talkgroup for the duration of the Call-Out or remain on the attached talkgroup).

Only the Emergency Mode has higher priority than the Call-Out. When the user receives the alert, three responses are available:

1. **Accept** - additional information from the dispatcher will be displayed
2. **Stand by** - voice and message communication will be the same as in **Accept**
3. **Reject** - display will return to the home display and the talkgroup will be selected to the one before the Call-Out.

10.1.1 Addressing Call-Out

Call-out alert can be addressed to:

- ISSI - individual
- ISSI - to a group via serial individual messages
- GSSI - group of users

10.1.2 CO Box (Call-Out Box)

All incoming and outgoing Call-Out messages are stored in CO Box and can be managed by the user. There is a two-level structure for the alerts. First level is the main alert list, as the second one are all the messages associated with the alerts. Both lists are displayed chronologically with the newest on top. The capacity of the CO Box is 10 Call-Out alerts and 100 messages (incoming/outgoing). It has also the overwrite policy which will delete the oldest one upon receipt of an additional Call-Out message.

In normal mode, the user can browse the CO Box and read all the Call-Out messages.

In Call-Out mode, user can only read the ongoing Call-Out messages.

10.1.3 New Call-Out

When a new Call-Out is received by the terminal, the old Call-Out (even if has not been responded) will be overridden by the new one. An ongoing Call-Out overrides the old one in any phase of the Call-Out alert.

10.2 Phases

Call-Out service has 2 main phases:

1. **Alert Phase**
Users receive the alert with the associated messages and they are able to respond. These messages provide the user with all the important information about an incident. A special tone is played by the terminal when the alert is coming in. The tone volume range is configured in the CPS and cannot be adjusted by the user. The conditions for stopping this tone are configured in the CPS (for example, upon pressing any key). Additionally, an ongoing alert tone is paused upon incoming Call-Out group call. This alert is resumed once the call ends (if not stopped before).
2. **Information Phase**
User is in Call-Out mode and is able to receive more messages about the incident with the text or voice. User can also query for more information using voice group call or Call-Out text function which enables to send a text message to the dispatcher host application. Voice message can be sent with the high priority as a group call. Users can answer back to the group or to the dispatcher using voice group call.

10.3 Exception Handling

10.3.1 Emergency mode

When user received Call-out alert while in Emergency Mode, message will be ignored.

10.3.2 Transmit Inhibit Mode (TXI)

The user is able to receive the message but it is not able to respond to it until TXI mode is deactivated. When the user decides to leave the TXI mode after viewing the message, the terminal will prompt to accept, standby or reject the call-out.

10.3.3 Direct Mode Operation (DMO)

Call-Out feature is not supported in DMO.

10.3.4 Fallback Mode

This mode is available when users are in Local Site Trunking. In case of the Fallback mode an MS user is able to initiate a Call-Out call. The receiver-MS enters the Call-Out Fallback mode, which includes only voice communication, upon receiving the Call-Out call. The user can clear the Fallback mode only manually.

10.3.5 Call-Out Test

Dispatcher is able to test this feature by using Call-out test. Terminal will display 'Call-Out Test' and generate the alert tone. Only one soft key is available for the user with the label Test OK. After responding the display will return to its previous mode.

10.3.6 Storm Plan Alert

This is a special case of Call-Out.

- This alert is sent out to the larger group of people
- The user is able to respond with any key stroke and after that is moved to the information phase

The Storm Plan Alert is sent several times to raise reliability.

10.4 Call-Out Templates

**NOTE**

This section applies to Limited Keypad terminals only.

Call-Out template is a special type of User Defined Template. Call-Out templates enables user to respond to additional Call-Out messages. These templates can be defined using the CPS. The user is not capable of creating or editing templates from the terminal's MMI level.

A target ISSI of a template cannot be selected, as the template is always sent to the Call-Out initiator.

11 Packet Data (TMO)

**NOTE**

The following section is not applicable to TCR1000.

The terminal provides, in TMO Mode, a TETRA bearer service for applications that use the IP protocol, as described in the TETRA standard [Ref 1] clause 28, and the Packet Data TIP [Ref 13].

External applications will be able to use this service by connecting via the PEI interface, as described in Paragraph 16 "PEI Characteristics".

11.1 General

The terminal supports TETRA standard multi slot packet data using the IP network layer protocol [Ref 17] via PPP [Ref 18], and TETRA SMDCP protocol as defined in [Ref 1], clause 28.

An IP connection is established between TE2 and MT2, allowing external applications to communicate with TE2 using predefined IP addresses.

**NOTE**

This will be referred to as the 'local link'. The link established between the terminal and the SwMI will be referred to as the 'wide link'. When a wide link has been established, the terminal will be considered to be in **Wide Mode**.

Packet data applications reside internally, over UDP, or in an externally connected device connected via an 8-wire RS232 data port in the terminal. Communication to the external terminal are initialized using AT commands as defined in the TETRA PEI standard [Ref 4]. Once the connection is established, the external application may request PPP mode, and will then operate in PPP mode until the data connection is terminated.

The terminals can operate both on single slot packet data channel and multi-slot packet data channel.

11.2 Connectivity

The system provides point to point IP connectivity, which means that the following datagram exchanges are possible:

- Terminal <-> External Equipment (TE2) - PC and so forth.
- External Equipment (TE2) <-> Network (via Terminal)

11.3 Packet Data Terminal Interface

The terminal supports only IP version 4 packets.

The terminal routes datagrams independent of the protocol sitting on top of IP.

The terminal supports an MTU of 1500 bytes.

The terminal provides a best effort delivery service. However, if delivery fails, the originating user application will be informed by sending back to TE2 an ICMP message, if possible.

11.4 Voice + Data Feature Support

The terminal is capable of alternating voice and packet data service, but voice and data in parallel is not supported. According to [Ref 1], this corresponds to Packet Data Type B - IP dual mode. If the SwMI rejects the context activation due to 'PD MS type not supported', then the terminal reinitiates context activation indicating that supports 'Type C' (This is to accommodate legacy SwMIs that use the older definition of these types).

The terminal supports transmission and receipt of SDS on the packet data channel. Thus these services may be conducted in parallel.

The terminal can be in one of the following Voice-Data interaction modes:

11.4.1 Voice Only Mode

The user has the option of selecting "Voice Only mode", in which Packet Data service is disabled. If an external application attempts to start up in this mode, packet data registration for a 'wide link' (see Paragraph 11.1 "General") will be rejected. If packet data service is active when this mode is selected the packet data will be deactivated by the MT. The PEI will operate in 'local mode' only.

11.4.2 Data Only Mode

The user has the option of selecting "Data only mode", in which normal voice calls are not permitted. Incoming non-emergency voice calls will be rejected, and the user will not be able to initiate non-emergency voice calls. Incoming and outgoing Emergency calls are allowed.

11.4.3 Voice & Data Mode

In "Voice & Data mode" any voice call activity that occurs during a data session will have priority over packet data.

Once the data session was interrupted by a voice call, the PD session will be suspended, until the voice activity has ended, when the session will be resumed.

Voice Priority mode is the default mode. If the user has never explicitly selected an interaction mode, the mode will be voice priority.

Service and feature interaction in the defined above modes is described in Paragraph 11.13 "Voice + Data Service and Feature Interaction".

11.4.4 Data Interaction User Menu

The user is given the ability to choose one of the above interaction modes. The choice of interaction mode will be stored in non-volatile memory and remembered at power up.

11.5 Packet Data MMI Operation

Depending on the codeplug settings, the terminal shows an indication to the user whenever the PD context is active and it shows the amount of used slots. The terminal has a separate indication to the user to indicate when data transfer is in progress.

11.6 Priority of Packet Data

The packet data service PDCH access signalling has the same priority as circuit mode setup related signalling. Interaction between Packet Data and Voice calls is shown in Paragraph 11.13 "Voice + Data Service and Feature Interaction".

11.7 Terminal Generated ICMP Messages

The terminal will generate ICMP messages addressed to the TE2 in case of non-delivery caused by the terminal environment. The non-delivery causes will include for example:

- No radio coverage
- Failed transmission
- Service interaction

11.8 IP Addressing

11.8.1 Wide IP Address

An IP address may be assigned to the terminal by the SwMI during the PD context activation. When assigned, this address is used by both TE2 (and MT2) applications as the source address in IP packets to be delivered to the infrastructure, and received as a destination address of the IP datagrams received from the infrastructure.

11.8.2 Local IP Address

By default both TE and MT have their own IP addresses as specified in [Ref 4] clause 4.10.2. These addresses are used by TE2 and MT2 for local datagram transmissions between TE2 and MT2 only and are not passed to the SwMI.

11.8.3 Static or Dynamic IP Address Assignment

The terminals support static and dynamic IP address assignment. The following table shows terminals behavior when the terminal PD context (a unique data session) is not activated and a PD application requests an IP address.

PD Application Type	Request a Dynamic IP Address	
	Set to Static	Set to Dynamic
Terminal Internal PD Application	Terminal requests a static IP address	Terminal requests a dynamic IP address
PEI PD Application requesting static IP address	Terminal requests a static IP address	Terminal requests a static IP address
PEI PD Application requesting dynamic IP address	Terminal requests a static IP address	Terminal requests a dynamic IP address

Table 2-4 IP Address Assignment

The 'Request for a Dynamic IP Address' is toggled between static and dynamic using the CPS.

11.9 Advanced Link

Advanced Link is used for PD transmission.

Advanced link flow control is supported by the terminal.

Advanced Link Roaming, where the Advanced link is not disconnected between cells, is supported (assuming support in the SwMI).

11.10 IP Compression

The terminal does not support data compression. If an application attempts to negotiate data compression during context activation it will be rejected. If a data compressed IP packet is received from the SwMI, it will be silently discarded.

The terminal does support IP header compression negotiation received from TE2 during PDP context activation, and will transparently transfer IP packets with header compression between TE2 and the SwMI.

11.11 Terminal Roaming

The packet data service employs the TETRA standard cell selection and re-selection, in other words "undeclared" both when the terminal is not involved in packet data transfers and when the terminal is on the PDCH. The packet data service is suspended (in 'break' state) while the reselection is occurring, and resumes when the cell reselection procedure is complete.



NOTE

The cell re-selection is "undeclared" in a strict TETRA sense. However, the SNDCP protocol defines a procedure for reconnecting the packet data service on the new cell. In this sense, the cell re-selection procedure resembles the "unannounced" cell re-selection procedure.

11.12 PD User Authentication

PD User authentication is a method of authenticating the TE2 user before allowing activation of the packet data link. The actual authentication is performed by an authentication center connected to the SwMI. The terminal only relays the messages between the TE2 and the SwMI.

In 'wide mode', the terminal will offer PPP user authentication between MT2 and TE2 using PAP or CHAP (as described in [Ref 21]) before the IP link is established. The terminal will always attempt to negotiate usage of the CHAP method, but will agree to PAP if the TE2 application insists. If the terminal is provisioned to not require PD user authentication, it will operate without any user authentication if the TE2 application refuses to accept CHAP or PAP. However, if the terminal is provisioned to require PD user authentication, it will reject the PDP context activation.



NOTE

If the SwMI does not agree to the authentication method (for example: PAP), the SwMI can reject it.

11.13 Voice + Data Service and Feature Interaction

11.13.1 Voice Service Interaction

In Voice & Data Mode, if a voice service causes the terminal to move to the traffic channel, the terminal will terminate any active packet data transmission or reception, and suspend packet data service. The data service will resume when the voice service ends.

11.13.2 SDS Interaction

A terminal will accept any downlink SDS message received on the PDCH.

A terminal is capable of sending uplink SDS messages on the PDCH.

11.14 GPS, WAP and PEI

A terminal allows PEI, GPS and WAP PD applications to activate and use the PD context simultaneously. The first application initiates PD context activation. The next PD context activation from another PD application results in sending a reply indicating that the PD context is active.

When both WAP, GPS and PEI PD applications are using the active PD Context, the terminal is able to filter the downlink IP Packets based on their TCP/UDP port and:

- route UDP packets addressed to the WAP port (configured in the CPS) to the WAP Internal Application.
- route UDP packets addressed to the GPS port (configured in the CPS) to the GPS Internal Application.

Otherwise the packets are sent to the PEI (via PPP).

12 Mobility Services

12.1 Main Control Channel Frequencies

The terminal is capable of finding a wide range of main control channels. This is done by maintaining stored lists of carrier frequencies which are scanned in order.

1. A dynamic list of up to 32 discrete entries that is maintained only by the terminal software.
2. A static list of up to 32 discrete frequencies specified by the operator that can be pre provisioned. The system operator can modify this list via the programming tool.
3. A frequency range specification, using a specific offset, that can be preprogrammed in the factory. The system operator can modify this range via the programming tool. The terminal will scan all frequencies in 25kHz intervals in the specified range.
4. An additional frequency range specification as above. Having 2 separate range specifications allows for 2 non-contiguous blocks of frequencies or 2 different offsets.

12.2 Control Channel Selection

Each TDMA frame on a given carrier is comprised of 4 time slots, of which any can be used as a physical channel.

The following types of physical channels are available:

1. A Traffic physical (TP) channel, which is used primarily for circuit call traffic
2. A Control physical (CP) channel, which is dedicated only for signalling
3. Unallocated physical (UP) channel

The following types of control channels are available:

1. The Main Control Channel (MCCH) which occupies the first slot of the main carrier
2. A Secondary Control Channel (SCCH) which can be used to extend control channel capacity

The following types of SCCH are available:

1. Common SCCH
2. Assigned SCCH

In addition to the MCCH which occupies slot 1 of the main carrier, a cell can have up to 3 Common Secondary Control Channels, which could occupy slots 2, 3 and 4 in the main carrier. This provides the ability to distribute the terminal population amongst up to 4 channels and thereby increase control channel capacity (at the expense of traffic channel capacity).

Until having received a specific parameter on a cell, the terminal uses the MCCH. When the signal is received, each terminal maps itself to a particular Common SCCH, and that SCCH operates as the MCCH for the terminal.

12.3 Multi-System Operation

In this release full migration is not supported. However, multi system operation is supported as described below.

12.3.1 List of Allowed Networks

The terminal holds a list of up to 100 allowed network identities (MCC/MNC combinations) that are considered 'friendly' networks. The first network in this list must be the terminal's home network. Each network can have an associated name that can indicate to the user which network it is.

The terminal will be capable of performing initial cell selection and registration on these Networks - and only these Networks. Registration on any of these networks will be performed using the terminal's ISSI and without migration signalling. The same ISSI will be used on all networks.

The user is given an option to limit registration to the home network only, or to a selected network only, and to ignore the other allowed networks. This is described below.

12.3.2 Home-Only Mode

In Home Only mode the terminal will only recognize the first system in the Allowed list. As a result, the terminal will only register on its home network, even if a foreign network is in range and is found first.

12.3.3 Selected Network Mode

In Selected Network mode the terminal will only recognize the system in the Allowed list that has been selected by the user. As a result, the terminal will only register on this selected network, even if a foreign network is in range and is found first.

12.3.4 Switching Between Network Modes



NOTE

The following section is not applicable to TCR1000.

The user is given the ability via the MMI to switch between Home Only mode, and Selected Network mode. If the terminal chooses Selected Network mode, the user will be shown the list of allowed networks from which to choose from.

If the terminal is in a foreign network and the user switches chooses a network that is different from the current network, the terminal will force initial cell selection to find a cell that belongs to the Home or the selected network.

12.3.5 Services

The terminal will operate in all networks as it does in its home network. All calls will be made using SSI addresses, and it is the SwMI responsibility to reject calls for subscribers or groups that cannot be reached in the local system.



NOTE

It is assumed that telephone numbers with the country code of the local country will be understood by the telephony gateway and dialed to the local number without the country code (for example: if the user dials the number +44-1256-48-4566 in the UK, it will be treated as if the user dialed 01256-48-4566).

12.3.6 MMI Operation



NOTE

The following section is not applicable to TCR1000.

The user can change the network mode via the menu system. A top level menu item called 'Net Select' is provided which when selected will give the user a choice between 'Home Only', or 'Selected Network'. When the user chooses a new mode, if initial cell selection is needed (as described above in 12.3.4) the terminal will leave the current cell and begin scanning from the beginning of its frequency lists.

In the selected network option, the user is shown a list of network names where each network name corresponds to one of the MNIs in the list. The network names are provisioned in the terminal as part of provisioning of the MNI list.

The network alias or MNI of the current network is displayed on the first line of the idle display.

12.4 Registration



NOTE

Security aspects of registration is covered in Paragraph 14 "Security Services".

Upon camping on a cell, the terminal will send a registration request PDU to the SwMI, which includes a request to attach to the terminal's selected group. If the registration and attachment succeeded, the terminal will begin normal operation on the cell.

If the registration attempt times out, or the registration is rejected by the SwMI for a temporary reason, another registration attempt should be made. If this fails as well, the terminal will attempt to camp on a different cell.

If the registration is rejected by the SwMI with a rejection cause that indicates that the terminal cannot operate in this system, and there are other systems in the terminal's MNI list, the terminal will attempt to find a cell that has a different MNI than the rejected system.

If the registration request is denied by the SwMI due to Location Area Rejection, the terminal will not attempt to register again at that cell until the next power on.

The terminal supports the modification of its subscriber class upon receipt of a new subscriber class from the SwMI in the registration acknowledgement PDU. This subscriber class will be used until power down or next ITSI attach, it is not saved in non-volatile memory.

A terminal uses Avoiding Unnecessary Registration mechanism when only one of the events listed below occurs:



NOTE

When two or more scenarios occur at the same time, the terminal registers with signalling.

- roaming and registration fails before the terminal receives Random Access acknowledgement and MS decides to go back to the last serving cell
- the terminal is sent to Traffic Channel with no traffic ongoing due to any SwMI issue or BTS hardware problem
- the terminal discovers a link failure on the serving cell and is not in TXI
- the terminal discovers a link failure on the serving cell and is in TXI
In that case the terminal always avoids unnecessary registration to go back to the serving cell and stays in TXI until TXI is turned off.

If the terminal discovers a link failure on the serving cell, a specific timer starts counting. If the link failure remains after the timer expires, then the terminal acts as during a normal link failure. If the link failure ends before timer expires, then the terminal goes back to the serving cell without registration. This mechanism ensures that unnecessary registration is avoided.

When a terminal is out of the serving cell range for a time period shorter than this is configured in the codeplug, then the terminal does not perform the registration when going back in the range.

12.5 Roaming

The terminal will continually monitor neighbor cells and will background scan the highest ranked neighbor cell. When the state of the highest ranked neighbor cell is sufficiently better than the

serving cell, or when the terminal has totally lost the serving cell, the terminal will employ cell reselection procedures employing the following methods as described in [Ref 1] clause 18.3.4.7.1

1. If not in a call:
 - Undeclared Cell reselection
2. If in a call and not transmitting or link failure occurs:
 - Unannounced Cell-reselection
3. If transmitting in a call, and a neighbor has been scanned, and the cells are synchronized:
 - Announced Type-2 cell reselection
4. If transmitting in a call and no neighbor has been scanned or the cells are not synchronized:
 - Announced Type-3 cell reselection

For compatibility with systems that do not support an appropriate TETRA signalling containing a cell ID parameter, the terminal can be provisioned to never perform Type 2 cell reselection.

The terminal will decide the need for cell reselection, based on comparison of the signal strength and the service level between the serving cell and neighbor cells. The service level criteria are based on the following criteria which are listed in priority order:

- System Wide Services available (Local/Wide Trunking)
- Security Class
- Subscriber Class
- Location Area (Home Location area)
- Cell Load

The terminal always prefers a cell that has a higher service level to one with a lower service level. If the terminal is operating on a serving cell that has a lower service level than a neighbor cell, the terminal will roam to the neighbor, even during a call.

During network reconfiguration a significant number of terminals registered on one cell may roam. This can cause major congestion on a specific cell(s). In order to avoid the congestion on control channels for the specific cell(s), the specified terminals roaming needs to be distributed in time.

As the operation cannot be performed immediately for all the terminals some of them need to wait longer to roam. The time cannot be programmed not to cause any of the terminals to have inferior roaming capabilities. Thus the roaming time for the terminals is randomized.

By randomization is meant, that after roaming scenario starts, a terminal is not sending registration parameters to other cells at once but waits random time prior to sending registration PDUs to other cells (that is, before roaming). Link failures and other related scenarios are not randomized not to cause any unwanted delays in restoring the link,

12.6 Air Interface Migration

The Air Interface Migration (AIM) feature enables the terminal to migrate to a foreign SwMI, that is, the terminal registration in a foreign SwMI is allowed. This also enables the terminal to attach the groups in a foreign SwMI and to make and receive calls and SDS.

The AIM services cover individual call, group call and individually addressed SDS or Status. In order to receive group calls or group addressed SDS and Status from a group of the current network, the terminal has to attach the nominated group. In this release the terminal cannot migrate to a foreign network while it is in an active call. The terminal also cannot attach a foreign group on the current network hence no group-addressed status/SDS messages can be sent to home network of the migrated terminal. The AIM is also not supported when the MS is in a foreign SwMI.

12.7 Congested Cell Handling

This feature is only used during initial registration and when roaming between sites (not when camped on a site that has become busy or congested due to no free traffic channel to make or receive calls).

When the cell that the terminal is trying to register is congested, a special level based algorithm is in the place. Depending on the level of congestion the terminal is waiting for the registration or is rejected on that cell.

The terminal recognizes whether the cell is congested (Control Channel Congestion). The terminal tries to roam to not congested cells first, ranking congested ones as secondary.

The cell congestion is one of the service level criteria.

The following cells are never marked as congested:

- Last suitable cell - if there are no other suitable cells (during roaming or initial cell selection)
- Serving cell

The feature is configurable using the CPS.

12.8 Subscriber Class

When the terminal powers up, or whenever it performs ITSI attach or migration registration, it always uses its provisioned Subscriber Class (SC).

When the terminal registers on a cell that does not support any of its SCs, it will only participate in services that have emergency priority.

Whenever the terminal SC does not match the cell SC, then depending on the CPS settings the terminal will use normal ranking procedures or will not roam to the cell at all.

12.9 Subscriber Class by Talkgroup

The Subscriber Class by Talkgroup feature forces all the terminals attached to the same talkgroup to have the same Subscriber Class.

The Subscriber Class by Group feature helps to avoid issues as presented in the following scenarios.

- Preserving traffic channel capacity.
For two cells having the same coverage and placed together to multiply traffic capacity a number of terminals is attached to Talkgroup 1 on the first cell and only one terminal is attached to Talkgroup 1 on the second cell. A group call uses 2 traffic channels (one on the first cell and one on the second). In this scenario multiplying traffic capacity would not work without the feature. However, as terminals on the same talkgroup are forced (by Subscriber Class mismatch) to roam to one cell, all the terminals should use only the first cell.
- Spreading terminals population across cells and prohibit them from roaming.
A large number of terminals used on a small area with multiple BTS coverage causes huge roaming traffic. A congestion occurs and as a result users would not be able to communicate. However with the feature, terminals do not roam to a cell with mismatched Subscriber Class, what stops the traffic roaming.

A terminal Subscriber Class changes when the user changes between talkgroups which are assigned to another Subscriber Class.

Up to 16 Subscriber Classes can be configured (in the CPS) and talkgroups assigned to them. The assignment is carried out by talkgroup GSSI or by folder (except Favorite) which the talkgroup was chosen from.

Talkgroup may be assigned to more than one Subscriber Class (either by folder or Talkgroup range). The first assigned Subscriber Class is used.

Upon receiving Subscriber Class from the SwMI terminals change their Subscriber Class to the received one. The Subscriber Class received from the SwMI over the air has always higher priority than Subscriber Class by Group. If a terminal already uses the same Subscriber Class as the one received from the SwMI, the current Subscriber Class will not be changed. Subscriber Class received over the air is maintained after powering down the terminal. On powering the terminal on the default Subscriber Class or Subscriber Class assigned to an attached talkgroup is set.

12.9.1 Feature Interactions

Favorite folders cannot be assigned to any Subscriber Class.

None DGNA talkgroup can be assigned to Subscriber Class. Any activity (assignment, changing, and so forth) on Talkgroups from DGNA range (GSSI above 13999999) does not cause Subscriber Class change.

12.10 RF Power Toggle



NOTE

This section applies only to terminals supporting TX Power Class 3L (1.8 W).

The RF Power toggle is a terminal specific hardware feature enabling the terminal to transmit with Class 3L (1.8 W) power. Using the CPS the power class can be set for the terminal to transmit with Class 3L (1.8 W) or Class 4.

Depending on the codeplug settings the terminal user is able to toggle, through the interface, between High RF Power and Normal RF Power (respectively Class 3L (1.8 W) and Class 4).

Depending on the codeplug settings the terminal can be configured to switch automatically to Class 3L (1.8 W) upon entering DMO and to automatically switch to Class 4 (1 W) upon entering TMO.

Changing RF Power Class takes immediate effect, that is the change can be done during a call. This may result in dropping the call, as the selected power class setting can be insufficient to sustain the transmission.

12.11 Local Site Trunking (LST)

Local Site Trunking (LST) is a feature that allows a base station to operate as stand-alone when the link from the local cell to the central switch has gone down. The terminal will limit functionality when the cell is in this mode.



NOTE

Whether a terminal can register on cells in LST depends on the codeplug settings.

If system broadcasts indicate that system-wide services are not available (LST) on a cell, the terminal will register on this cell only if there are no system-wide cells available.

When the terminal is operating on a LST cell, the terminal will prevent the user from invoking the following services:

- Private Call
- Phone Call
- PABX Call
- Packet data
- SDS data (for example: Status, Text message)

12.12 More Air Interface Aspects

12.12.1 Multi-Cell Location Areas

If the terminal roams to a new cell that is in the same location area as the old cell, the terminal will not perform registration.

12.12.2 ASSI Support

The terminal will accept an ASSI assignment sent by the SwMI in response to the terminal's registration request. This address will be used by Layer 2 layer and below only and will not be visible to the user application. If the system is one of the allowed networks (as specified in Paragraph 12.3.1 "List of Allowed Networks"), the terminal's ISSI will also be monitored on the downlink.

13 TETRA Network Protocol 1 (TMO)



NOTE

The following section is not applicable to TCR1000.

TETRA Network Protocol type 1 (TNP1) is a bridge protocol based on the TETRA layer 3 over the air protocol and is therefore capable of supporting all TETRA dispatch functionality.

In TMO the TNP1 specifies a protocol to be used over the PEI that allows Terminal Equipment (TE2) to have control over the TETRA services: mobility management, call control, short data service and supplementary services. In addition there are commands to access the terminal configuration and storage parameters.

13.1 General

The terminal supports TETRA standard multi-slot packet data using the IP network layer protocol.

The terminals can operate both on single slot packet data channel and multi-slot packet data channel.

Packet data applications will reside internally, over UDP, or in an external device connected to the 8 wire RS232 data port on the terminal. Communication to the external device is initialized using AT commands.

13.2 Connectivity

The system provides point to point IP connectivity allowing the following datagram exchanges:

- Terminal <-> External Equipment (TE2) - PC and so forth.
- External Equipment (TE2) <-> Network (via Terminal)

The terminal supports IP version 4 and IP version 6 packets.

TNP1 services can use one of two PPP methods to connect from the TE to the MT, local mode, and wide mode. TNP1 should be used in wide-mode wherever possible, so as to allow the parallel operation of TNP1-SDS services and Packet data services over a common PPP link.

13.2.1 IP Addressing

13.2.1.5 Wide Mode

In this mode, all TNP1 services are available including packet data transfer towards the SwMI. The address used is the dynamic address MS IP.

13.2.1.6 Local Mode

In this mode, all TNP1 services are available except packet data transfer. The address used are the two static addresses TE IP: "10.0.0.100" and MT IP: "10.0.0.101".

13.2.2 Port Addressing

The terminal uses a fixed port address for reception and transmission of TNP1 packets. The port number is 4024.

13.3 Service and Feature Interactions

13.3.1 TXI Mode

TNP1 is available in local mode when TXI is enabled although all SDS messages will be blocked. The terminal will drop the wide mode connection if TXI is entered, thus the PEI would go back to AT mode. It is then up to the TNP1 client to detect this and reinitiate the PPP session in local mode (This is the choice of the TNP1 client).

13.3.2 DMO Mode

The terminal disables the TNP1 session while in DMO.

13.3.3 SDS and Packet Data

TNP1 implementation allows SDS and Packet Data transmission simultaneously.

13.3.4 AT Commands

AT commands are used to initiate the PPP service in order for TNP1 to operate. Once the PPP session is running all AT commands are blocked. When the PPP session is closed then AT commands are available to the programmer.

14 Security Services

The terminal provides TETRA security features as described in the TETRA standard [Ref 3] clause 28, and the TIPs [Ref 15], [Ref 16].

Unless stated otherwise, this chapter describes security services in TMO Mode only.

14.1 Terminal Equipment Identifier

The TEI is programmed into the terminal at the factory and cannot be subsequently modified.

14.2 PIN/PUK User Authentication



NOTE

The following section is not applicable to TCR1000.

In order to authenticate a terminal user the terminal supports a Personal Identification Number (PIN) and PIN Unlocking Key (PUK) mechanism which prevents from an unauthorized access to the terminal. The PIN/PUK operations are available from both MMI and PEI (using AT commands).

For the authentication purpose the terminal prompts the user to enter a valid 4-digit PIN, before the terminal allows to access all the available services. The PIN is defined in the codeplug.

If the maximum number of consecutive failed attempts is reached, the terminal becomes blocked and remains in this state until unblocking. The permissible number of consecutive failed attempts is defined in the codeplug. The blocked status is sustained regardless of powering off or battery removal.

When the terminal is PIN locked, the user has no or limited access to the terminal services. The PIN Unlocking Key (PUK) is defined in the codeplug.

The terminal is unblocked either by entering the PUK or by CPS reprogramming. The PUK can be entered via the MMI or via the PEI. The PUK is defined in the codeplug.

14.3 Authentication

Authentication establishes a level of trust between a terminal and SwMI. This is a challenge-response-result protocol between two parties based on their common knowledge of a secret key (K) to verify each other's identity.

The SwMI authentication centre (AuC) provides a single K for the purpose of authentication, which is shared only with the terminal. The terminal is considered, for the authentication purpose, to represent the user as defined by the ITSI. The TETRA authentication process only authenticates the relationship between ITSI and K, that is, a relationship between the terminal and the SwMI, but not the terminal user.

14.3.1 Implicit Authentication

Implicit Authentication involves encrypted signalling and traffic using SCK on Security Class 2 Systems or DCK established between a terminal and SwMI on Security Class 3 Systems. Implicit authentication involving SCK allows any terminal to easily impersonate someone else as everyone shares the same SCK.

14.3.2 Explicit Authentication

Explicit Authentication is a signalling exchange between a terminal and SwMI using the challenge-response-result protocol with a session authentication key derived from the secret key (K). The K is stored in the terminal. The types of explicit authentication are followed.

14.3.2.7 Authentication Initiated by SwMI

Authentication initiated by SwMI during location updating - SwMI send the successful authentication results indicated by location data with cause of an authentication failure in case of the failure.

14.3.2.8 Authentication Initiated by MS

Authentication initiated by a terminal, when the terminal generates random challenge RAND2 and sends it to the SwMI. The SwMI generates the actual number RES2 and simultaneously the terminal generates XRES2. The terminal compares RES2 and XRES2 to determine the authentication result.



NOTE

Terminal initiated authentication of the SwMI is not supported.

14.3.2.9 Mutual Authentication

When authentication is initiated by SwMI and made mutual by a terminal (in the case when it is pre-defined in the terminal) the mutual authentication of user and infrastructure is achieved using a confirmed three-pass mechanism. Therefore, mutual authentication is started as a one-way authentication by the first challenging party (SwMI), and then is made mutual by the responding party (the terminal). Afterwards the SwMI sends random challenge RAND1 to the terminal together with random seed (RS). The terminal sends its response RES1 back to the SwMI. However, the terminal sends its mutual challenge RAND2 to the SwMI at the same time. The SwMI compares the response from the terminal RES1 with its expected response XRES1, generates RES2 and send to the terminal (due to received a mutual challenge).

On the other side the terminal runs TA22 algorithm to produce expected response XRES2, then compares RES2 with XRES2 and if they are the same, mutual authentication is achieved. Algorithms TA12 and TA22 produce DCK1 and DCK2 respectively. In case of the terminal supporting Security Class 3, the DCK1 and DCK2 are combined with TB4 algorithm by both the terminal and SwMI. As the outcome a DCK is created as a result of challenges by both parties.

When authentication is initiated by a terminal and made mutual by SwMI, the authentication algorithms TA11, TA12, TA21 and TA22 and algorithm TB4 may exist either discretely or combined within the SIM. In Dimetra terminals, these TAA algorithms exist in DSP.

Lifetime of the terminal authentication key is typically the same length as that for the ITSI which it is assigned to. However, nothing stops an user renewing an ITSI's K, for example, in case of suspected compromise.

14.3.3 User Authentication

User authentication provides the basic protection mechanism against unauthorized terminal operation on the network. It is based on a common authentication key (K) shared by the terminal and the SwMI and used in a challenge-response-result protocol initiated by the SwMI during the registration process.

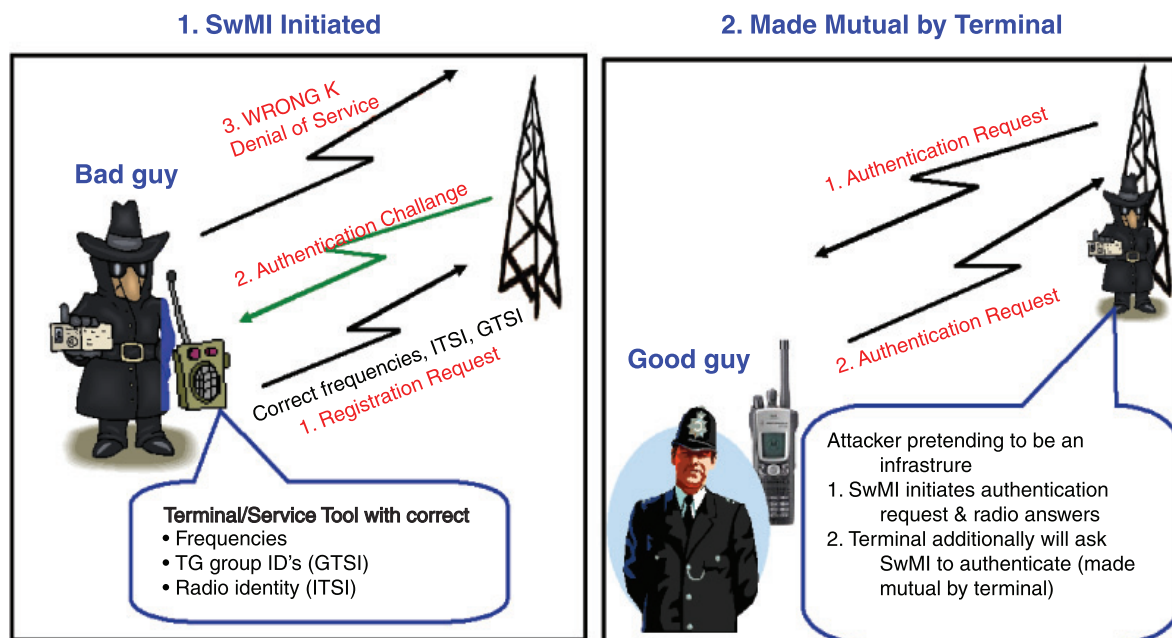
The terminal supports SwMI initiated user authentication as defined in [Ref 3] Clause 4, using the TA11 algorithm to derive the Session Key (KS) and the TA12 algorithm to derive the expected result (XRES1) expected in the SwMI response.

If the terminal is provisioned for mutual authentication, whenever the terminal is authenticated by the SwMI it will authenticate the SwMI. Mutual authentication can be configured as mandatory.



NOTE

Terminal initiated authentication of the SwMI is not supported.



ITSI - Individual TETRA Subscriber Identity
 K - Authentication key – unique for each terminal
 GTSI - Group TETRA Subscriber Identity

Figure 2-5 User Authentication

14.4 Air Interface Encryption (AIE)

The terminal supports TETRA Air Interface Encryption AIE by using the Standard TETRA Public Encryption algorithms, as defined in [Ref 3] Clause 6, TEA1 and TEA2.

The Focus of Cryptography in TETRA is the Encryption Key:

TETRA AIE provides 12 000 000 000 000 000 000 000 000 key combinations

Benefits:

- The number of key combinations makes unauthorized deciphering almost impossible.

TETRA has 3 Classes of Encryption:

- Class 1 - Clear (None)
- Class 2 - Static Key Encryption
- Class 3 - Derived Key Encryption (sometimes called Dynamic key), Common Cipher Key and Group Cipher Key

In Direct Mode only the Static Cipher Key (SCK) type is defined.

The security features supported in the terminal depend on the security mode.

Security Feature	Mode			
	Security Class 1	Security Class 2	Security Class 3	Security Class 3G
MS Initiated Authentication	Not allowed	Not allowed	Not allowed	Not allowed
SwMI Initiated Authentication	Optional	Optional	Mandatory	Mandatory
Mutual Authentication	Optional	Optional	Optional	Optional
OTAR	N/A	Optional	Mandatory	Mandatory
SCK AIE	N/A	Mandatory	N/A	N/A
DCK AIE	N/A	N/A	Mandatory	Mandatory
GCK AIE	N/A	N/A	N/A	Mandatory

Table 2-10 Security Features required per Security Class



NOTE

In the current release the following security features are not supported by the terminals:

- Terminal initiated Authentication
- Support for TEA4
- Explicit Authentication during DGNA

14.4.1 Clear Terminals (Class 1)

A terminal can be configured as a “clear” terminal, in which case it will identify itself in registration as a “Security Class 1” terminal and not support encryption. A Security Class 1 terminal will not contain any encryption algorithms in its software.

14.4.2 Static Cipher Key Encryption (Class 2)

The terminal supports static air interface encryption, using a set of up to 32 static cipher keys (SCK) which is shared by the SwMI and all authorized terminals. The terminal will determine which static key to use based on the SCK Number (SCKN) and SCK version number (SCK-VN) broadcast by the SwMI.

A terminal can be configured to support static key encryption, in which case it will identify itself in registration as a ‘Security Class 2’ terminal, and attempt to negotiate Security Class 2 encryption. Each terminal will use either the TEA1 or the TEA2 (TEA 3 - AsiaPac) Key Stream Generator (KSG) algorithm, and contain only one of those algorithms in its software.

When Security Class 2 Encryption has been negotiated, encrypted PDUs will be encrypted using SCK.

In Direct Mode the SCK can be chosen by the system manager and may be distributed from the TMO SwMI using the OTAR mechanism or provided manually (see Chapter 2, Paragraph 25.2 “Key Variable Loader (KVL)”).

14.4.3 Derived Cipher Key Encryption Common Cipher Keys (Class 3)

Background:

DCK/CCK/GCK required to prevent over-exposure of key material.

Existing encryption systems use Static Cipher Keys (SCK), one key is used for all terminals and all calls:

Key material is often exposed

SCK logistics of changing keys = reprogram all terminals & Base Stations

Feature description:

DCK is used for individually-addressed TM-SDU (Service Data Unit).

DCK/CCK encryption provides DCK (Derived Cipher Key) for “uplink” (from terminal to BTS) communication and CCK (Common Cipher Key) for “downlink” (from BTS to terminals) group communication. The DCK is derived from either the one way or mutual authentication process and the CCK is received during registry.

Functionality:

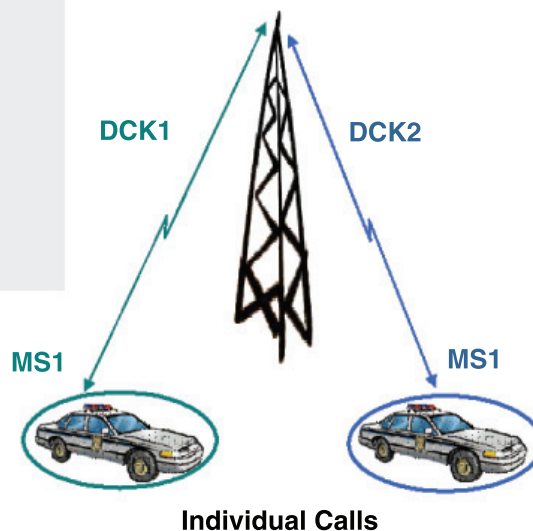
The terminals supporting Dynamic Key Encryption identify themselves to the system as Class 3 terminals during registry and attempt to negotiate Class 3 encryption.

A Class 3 terminal supports group addressed signalling and group call traffic encryption using Common Cipher Keys (CCK) as well as encryption of uplink and down link individually addressed signalling messages and individual call traffic (private or phone) using its Derived Cipher Key (DCK). The terminals support ‘Over the Air Rekeying’ (OTAR) of the CCK by the system.

A ‘Clear’ terminal is able set up calls to and receive calls from encrypted terminals. The system informs the encrypted terminals that the call is with a Clear Terminal and they switch to clear operation. Class 2 & 3 terminals can only do this if they are allowed to operate in a lower class.

DCK: Derived Cipher Key:

- Different for each user
- Protects:
 - Individual Call Payload (Voice & Data)
 - Signalling
- New Key at each Authentication (Logon)
- Key based upon a secret (K) known only to Individual MS and System
- Key never sent “over the air”



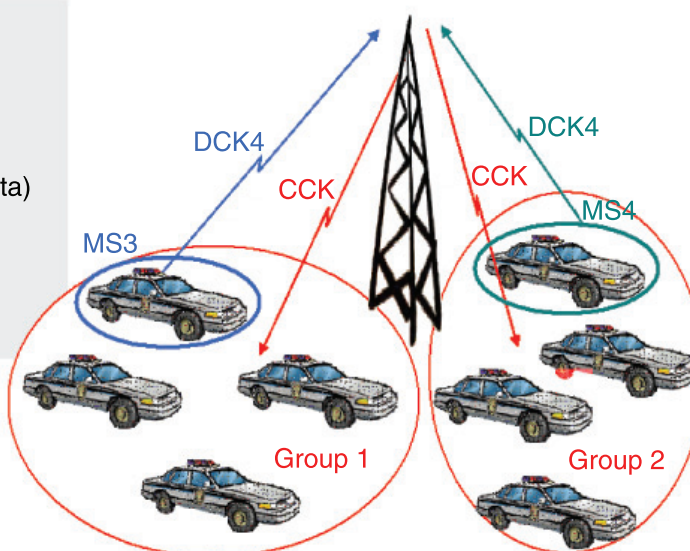
Class 3 DCK: Strong Individual Protection for Each User

Figure 2-6 Security Class 3 - Derived Cipher Keys

Individual DCK cannot be used for Group Calls (only known to individual)

CCK: Common Cipher Key

- Known to all Group Members
- Delivered to MS immediately after Authentication (Logon)
- Protects:
 - Group Call Payload (Voice & Data)
 - Identities
- Changed “Daily”



Class 3 CCK:
Strong Protection for Groups

Figure 2-7 Security Class 3 - Common Cipher Keys

Benefits:

- Increased security, better protection of sensitive voice, data, identities and signalling information.
- Regularly changing the keys makes the TETRA services more difficult to crack by potential attackers.
- DCK is a new Key at each Authentication (Logon), and is never send “over air”.
- CCK is known to all Group members, and is changed daily.
- GCK is known to dedicated Group members, and is changed every 3 months by default.

14.4.4 Group Cipher Keys (Class 3G)

For the Security Class 3G, in addition to the functionality of the Security Class 3, the system allows grouping addressed signalling and dedicated group call traffic encryption using Group Cipher Keys (GCK) to cryptographically isolate talk groups. The downlink signalling is encrypted using MGCK that is cryptographically derived from the CCK associated with the serving cell and the GCK associated with a given talkgroup. The SwMI does not change GCK and CCK simultaneously. Whenever a GCK change occurs, CCK changes are frozen for this time period.

The DCK is derived from either the one way or mutual authentication process and the CCK is received during registry, whereas the GCK is received through OTAR mechanism only.

The terminal supports over-the-air and manual provisioning of key associations that link a GCK to one or more TMO talkgroups, and a KAG to one or more DMO talkgroups.

The system is capable of providing the ability for the operator to group contiguous ranges of TMO SSI, where any talkgroup residing within the address range is assigned using the same GCK association. These ranges, referred to as Key Association Ranges (KAR), are used to convey the TMO talkgroup-GCK relationships to the relevant SwMI and terminals responsible for GCK functions.

14.4.5 Over The Air Rekeying (OTAR)

TETRA systems support GCK encryption for specific talkgroups, group OTAR of GCK, group OTAR of fallback TM-SCK, group OTAR of DM-SCK, including management of the cryptographic schedule of DM-SCKs. The group OTAR mechanisms require a use of the group session key for OTAR (GSKO). The GSKO is delivered to the MS only by using individual OTAR and the session key for OTAR (KSO).

For the systems utilizing group OTAR, the fundamental system operation (with respect to SCK/GCK OTAR) relies on the sites' regular transmission, in other words the sites are regularly broadcasting information regarding which security class and associated keys are in use. The sites transmit future versions of the respective keys to groups of terminals belonging to the same cryptographic management group (CMG). The terminals acquire the keys before they are activated by the SwMI and used by the air interface encryption service. The sites also broadcast the current key that is in use which can be sent using OTAR mechanism to the terminal on request.

**NOTE**

When a terminal has not received a new key prior to activation by the SwMI, the terminal has to request the missing key(s) and wait (default period 7200 seconds) until the SwMI can provide (where relevant) the previous, the current and the future key versions.

Some systems adopt only individual OTAR methods for delivery of SCK and GCK to the terminal. In such cases GSKO is not used. Some systems employ a mix of individual and group OTAR methods. The terminal supports the complement to functionality required for supporting the superset of different SwMI behaviors, for example:

- Individual OTAR (using KSO) of SCK and GCK
- Group OTAR (using GSKO) of SCK and GCK
- Individual OTAR (using KSO) of GSKO
- Secure DMO Key Management (via SwMI)
- Crypto Management Group
- Storage of 10 KAG (equivalent to 30 DM-SCK)
- Storage of 16 GCK (includes current/future versions)
- Storage of 2 TM-SCK
- Storage of Group Association attribute per Talkgroup
- GCK Air Interface Encryption
- Seamless key changes of GCK
- Seamless security class changes to SC3G

The SwMI is capable of supporting the Group OTAR feature. Where supported, terminals that share the same set of cryptographic key material are grouped by the SwMI into a specific crypto management group (CMG). Any terminal belonging to the same CMG is addressed using a CMG GTSI. The primary purpose of the addressing is to transmit group OTAR messages conveying TM-SCK, DM-SCK and/or GCK. Any terminal that supports TM-SCK group OTAR, DM-SCK group OTAR or GCK group OTAR is assigned to a specific CMG.

Each CMG has a designated specific GSKO. The system deploy over the air a CMG's GSKO (and CMG's GTSI) to each terminal belonging to the CMG. The GSKO is used as the sealing key for TM-SCK, DM-SCK and GCK, when sent across the air interface.

The SwMI is capable of performing scheduled transmissions of the future TM-SCK addressed to each CMG. The terminal requesting for a TM-SCK triggers the site to schedule additional transmissions of the requested TM-SCK(s) (addressed to either the CMG GTSI that the terminal belongs to or its ITSi).

The SwMI is capable of performing scheduled background transmissions of the future GCKs addressed to each CMG. The terminal requesting for a given GCK triggers the site to schedule additional transmissions of the current and the future versions associated of the requested GCK (addressed to either the CMG GTSI that the MS belongs to or its ITSi).

The SwMI is capable of performing scheduled background transmissions of the current and the future DM-SCK addressed to each CMG. The terminal requesting for a DM-SCK triggers the site to schedule additional transmissions of the requested DM-SCK(s) (addressed to either the CMG GTSI that the MS belongs to or its ITSi).

14.4.6 Encryption Mobility

A Class 2 or Class 3 terminal will also be able to operate on a lower class SwMI if it is provisioned to allow this. A terminal that is provisioned to not allow operation on a lower class SwMI, will not register on such a cell.

A Class 2 or Class 3 terminal upon camping on a cell that supports an SCK/CCK/GCK that the terminal possesses, will apply AI Encryption to the registration PDU. If no acknowledgement is received, the terminal will then send the registration in clear.

14.4.7 Encryption MMI

A Class 2 or Class 3 terminal that is involved in a clear call, will provide a visual as well as an audible indication to the user that the call is not encrypted.

14.4.8 AIE Key Storage

The terminal stores all the keys, SCK/CCK/DCK/GCK, in a sealed manner in non-volatile memory of the terminal - but not in the codeplug.

The terminal supports loading of the keys via a Key Variable Loader (KVL) tool.

By using a special secret key combination it is possible for a user to delete the cipher keys in the terminal. This can be provisioned to erase either all keys or only the long-term keys.

14.4.9 User Key Deletion

If the user key deletion is enabled in the terminal codeplug, the terminal user can delete Encryption and/or Authentication keys using a special key sequence.

The key deletion key sequence is:

- *, *, 0, 0, #, # - for full keypad terminals
- **Side Key 1, Side Key 1, Side Key 1, Side Key 2, Side Key 2, Side Key 2** - for limited keypad terminals.
- **Encryption Keys Button** (press and hold; the default hold time is 5 seconds) - for TCR1000.

CAUTION

The key deletion takes up to 30 seconds.

For portable terminals, during the period the battery must not be removed. Removing the battery during the period may lead the terminal to malfunction.

Benefits:

- This allows user to clear the keys for example for transit.

14.5 Secure DMO

The Secure DMO feature guarantees key ciphered transmission in the Direct Mode Operation.

The user is informed when the terminal contains the complete set of SDMO keys, in order to provide confidence to the user that they may leave TMO safely in the knowledge that SDMO will work successfully.

The terminal may receive security related information indicating which SDMO key subset is currently active. The terminal requests any missing DM-SCK required to decrypt SCK-encrypted DMO talkgroups.

If DMO SCK is enabled according to the codeplug settings, the terminal provides SDMO status information to the user via the MMI.

Whenever the terminal enters DMO and the terminal does not possess past and present DM-SCKs for all provisioned KAG and/or it has not yet successfully received SCK Subset Grouping Type, SCK Subset Number and SCK-VN information from the SwMI, then the terminal:

- Sounds a special reject tone;
- Prompts a message indicating "Key update incomplete".
- Provide a "DMOSCK Validity" sub-menu inside the Security menu (present only when configured in the CPS) which indicates:
 - "DMO SCK is Valid" if DMO SCK OTAR is disabled and all DM-SCKs are provided via KVL
 - "DMO SCK is Valid" if DMO SCK OTAR is enabled and the MS knows the current SCK information and has all the corresponding past and present DM-SCKs

- “DMO SCK is Invalid” in all other cases.

The terminal supports system management of SDMO keys. The structure of DM-SCKs used for SDMO, the current active SCK Subset Number, and Version Number information is required by the terminal using system managed SDMO to coordinate key schedules. The terminal considers the last received variant of this information PDU as the most accurate indication of SDMO key configuration.

14.6 End-to-End Encryption



NOTE

The following section is not applicable to CEP400, MTP830, and 260–275 MHz terminals.

The TETRA standard supports air encryption. The terminal creates the PDU (Protocol Data Unit) and the PDU is encrypted before transmission. The base station receives this PDU and needs to decrypt it, to know what to do with it and where to send it. Thus, if a PDU contains voice information, the voice part of the message has been decrypted and is now unprotected, until it is transmitted out to the caller.

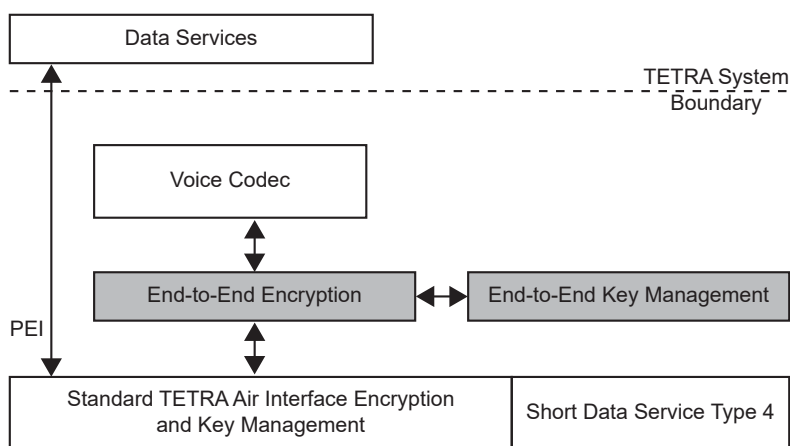


Figure 2-8 E2E Encryption

The End-to-End Encryption (E2E) feature resolves this issue by encrypting the voice information before it is packed into the PDU. This message is also encrypted according to the over-the-air encryption of the TETRA standard. Thus, when the base station decrypts the PDU containing voice information, the voice part remains protected by encryption until the called terminal receives the voice and decrypts it. The Universal Crypto Module (UCM), located in the terminal, carries out voice encryption. The UCM takes the voice stream and encrypts this stream using a set of keys. Likewise, the UCM takes encrypted voice stream and using the same keys decrypts back into clear voice.

In the end-to-end encryption feature, the terminal notifies and informs the user whether the call, being made or received, is voice-encrypted. The terminal also provides the user with means to select a different key, delete keys, request new keys and change the encryption mode of non-defined private calls.

This feature is relevant for Group Calls and Private Calls in TMO and DMO.

14.7 Terminal Disable/Enable

Terminal disable using TETRA Temporary Disable is supported.

Upon reception of an appropriate TETRA signalling for "Subscription Disable" with the correct SSI and MNI of the terminal, the terminal will be disabled. Also if the encryption keys are erased, the terminal will put itself in the disabled state.

When disabled, the terminal will not participate in any voice call, SDS nor packet data activity and will ignore all Supplementary Services sent on the downlink. All visible and audible indications will be disabled, and the terminal will appear to be powered off. All user inputs (key presses, knob operation) will be ignored, and the PEI interface will be closed.

The terminal can be provisioned to show the user a message upon becoming disabled.

The terminal will continue to perform Mobility Management functions, such as roaming, in order to facilitate subsequent enabling (or further disabling) of the terminal.

The terminal will store the disabled/enabled state in the codeplug, such that if the unit is powered down and subsequently powered up it will remain in that state.

If the terminal is in the disabled state, and receives an appropriate TETRA signalling with the correct SSI and MNI of the terminal, the terminal will be restored to its normal operative state.

Upon reception of an appropriate TETRA signalling for "Equipment Disable" with the correct TEI for this terminal, the terminal will be disabled.

If the terminal is in the equipment disabled state, and receives an appropriate TETRA signalling with the correct TEI (in the case of equipment disable), the terminal will be restored to its normal operative state (provided that the subscription is also in the enabled state).

14.8 Terminal Permanent Disable

Permanent disabling is intended to protect a network from attack from a compromised or faulty terminal. It can be used when the terminal is known to have been compromised, or has been suspected of compromise for a long time.

It is a one way function, there is no equivalent enable. The terminal would need to be recovered and reprogrammed before it could be used again.

When the terminal is permanently disabled, it becomes inoperable:

- All its security key material, that is GCK, GSKO, DMO SCKs, Ks, DCK, CCK, TMO SCKs are deleted.
- All its Codeplug is deleted.
- All its Software is deleted.
- All its MMI interfaces on the terminal are disabled.

The Permanent Disable is recommended to be invoked when it has been determined that a terminal is absolutely unrecoverable. When a terminal has been lost or stolen, the first step always is to stun (Temporary Disable) the terminal.

Permanent Disable is recommended to be used in conjunction with the deletion of the user's Radio Record in the UCS and the deletion of the K-Ref association of the disabled terminal in the PrC and the AuC that lies within the cluster where the terminal's home zone is located. This ensures that subscriber information is not downloaded into the HLR if a restore of the UCS is performed.

The system operator has to also ensure that the terminal's K-Ref association is also removed from the other AuCs in the network, in cases where the K-Ref pairs are duplicated across the network.

Note that if this is not performed, the terminal could be assigned a new home zone that lies in a cluster where the K-Ref association has not been deleted.

Benefits:

- Immediate and complete disabling of the subscriber by the dispatcher via the air interface if the terminal is not expected to be recovered.

14.9 Terminal Permanent Disable V2



NOTE

The following section is not applicable to TCR1000.

Similarly to Permanent Disable, once the terminal is disabled by Permanent Disable v2, it cannot be recovered over the air. When the terminal accepts a Permanent Disable command, and if the Permanent Disable v2 flag is enabled in the codeplug, the terminal appears to be completely inoperable:

- All its MMI interfaces on the terminal appear to be disabled.
- All its security key material, that is GCK, GSKO, DMO SCKs, Ks, DCK, CCK, TMO SCKs, and End-to-End key material are deleted.
- The terminal automatically turns off on powering attempts without any audible/visible indications to the end users.
- The permanent disable flag is set in the codeplug.

Unlike the Permanent Disable, a Permanent Disabled v2 terminal can be re-enabled by the customer provided with the software selling dongle. If customers have the software selling dongle, they can read the codeplug and clear the permanent disable flag.



NOTE

When a terminal has been disabled by Permanent Disable v2, be advised the entering programming mode procedure is different. For the details refer to TETRA Terminals CPS Start-up User Guide (Motorola Part Number: 6802974C10).

Benefits:

- Immediate and complete disabling of the subscriber by the dispatcher via the air interface if the terminal is not expected to be recovered.
- Possibility to recover the terminal once regained.

14.10 RUA/RUI



NOTE

The following section is not applicable to TCR1000.

14.10.1 General Overview

Radio User Assignment (RUA) and Radio User Identity (RUI) provide users with two useful options to:

- be authenticated before getting full access to the infrastructure
- User is required to provide his User ID with the PIN to check his identity. Only the successful logon gives the full access. A logon failure results in limited service.

- have full access with the permanent terminal

Users that logged in with the permanent terminal can still be reached (called, SDS, and so forth) at their permanent terminal number.

14.10.2 Interface Additional Information

The user can differentiate the state by the interface color, that is blue for logged on and grey for logged off. No additional icon indicates whether the user is logged on or off.

Besides the logged on and logged off states the user can also be in the pseudo log on state indicated by the relevant icon (see Chapter 3, Section 4.1).

The user ID is stored in the RUI List. To verify the user logged on the terminal, see the second line in the RUI list (the first line is 'New User ID').

14.10.3 Scenario Description

It is possible for the user to logon himself and for the dispatcher to logon the user.

14.10.3.1 Success logon process

After the User powers on the terminal, request from the terminal is checked by the infrastructure if it supports the RUA/RUI and if the feature is enabled in CPS. The infrastructure sends D-Location Update Accept with RUA request, then the user is asked for RUI and RU-PIN. After providing correct information, full access is granted for specified period of time.

14.10.3.2 Logon failure

RUI and RU-PIN are incorrect. The infrastructure sends the RUA reject signal to the terminal. Limited service access is granted when it is set in CPS to enable. When it is disabled, full service is granted.

14.10.3.3 Successful book on

Dispatcher is sending the RUA accept signal to the terminal with the period that the full service is granted for.

14.10.4 Terminal Behavior

14.10.4.1 Deactivate and Disable

- RUA/RUI deactivated and disabled - timer is stopped and the terminal gains the full access
- RUA/RUI deactivated, terminal receives RUA request - if the specific request is received by the terminal it shall activate RUA/RUI and ask for logon information (RUI and RU-PIN)

14.10.4.2 Book On

When the terminal is logged off and receives RUA accept without sending logon information, it will indicate book on with assigned Logon Period Timer. It sends automatically book on response according to the terminal settings

- Book on Reject - rejecting all the book on
- Book on Accept - accepting all the book on.

14.10.4.3 Log off and Force off

To log off the user can use the terminal menu. The dispatcher has also the option to log off the user using Force Off setting.

14.10.4.4 Pseudo log on

The pseudo log on is a state which occurs when the logged on terminal goes to LST or receives PDU with the empty granted assignment period or the period equals 0. In this state the terminal has the full functionality available except some services as forwarding calls. This state is signaled to the user with specific icon.

14.10.4.5 Timers

For this feature we can specify three timers:

- Logon Process Timer - defines the amount of time during which the terminal awaits log on response from infrastructure
- Time Out Warning Timer - defines the amount of time after which the terminal displays the warning
- Logon Period Timer - defines the amount of time during which the terminal is logged on.

14.10.5 Service & Feature Interactions

14.10.5.1 Switch between DMO and TMO

When the user is switching from TMO to DMO, the terminal logs off if the **Logoff when deregistered** is enabled in CPS. On the other hand when the user goes from DMO to TMO the terminal initiates the log on process.

14.10.5.2 RUI when out of coverage

This situation can occur in the following conditions:

- A user is logged on and is out of reception. The terminal is in pseudo logged on status. All the timers are the same as for the logged on user with the coverage.
- In the second case when the logged off user is out of coverage, the terminal is provided with the limited service access.

In both circumstances, if the terminal is back in the coverage area and receives RUA request from SwMI, it will prompt the user to log on.

14.10.5.3 Force Off During Emergency Mode

The User receives force off during Emergency Mode, it logs the user off without exiting the Emergency Mode. Until terminal is in Emergency Mode, display does not indicate any change on the display.

14.10.5.4 RUI & Local Site Trunking (LST)

When the terminal powers on in the LST, it prompts for the PIN. If the correct PIN is entered, the terminal switches to Pseudo Logged On state.

When the log on/off user moves to the LST, the terminal switches to Pseudo Logged On state, but no prompt for the PIN occurs.

14.10.5.5 RUI and Store and Forward

- If an SDS consumer report is requested, this is recommended that the receiver sends an explicit separate SDS message to confirm the message has been received and read.

When a user changes to a different physical terminal, the Store and Forward report will be routed to the terminal where the user is currently logged on. When the terminal receives Store and Forward report, it will not display the report to the user, because the reports have to be matched with the sent SDS. The report is stored together with the sent SDS (Outbox).

- When the user logs off, this is recommended to delete the messages in Outbox.

When a user changes to different physical terminal, the Store and Forward report will be routed to the terminal where the user is currently logged on. The previous terminal the user was logged on will not receive the report. The status of Store and Forward message in the Outbox can not be updated.

14.11 SIM Security (BSI)

The SIM security consists of the following security functionality groups:

- Voice E2EE and related key management
- Network access parameters and authentication
- Key management for AIE
- OPTA, modification, encryption and transfer
- AES for E2EE of SIM Interface and SIM - Terminal Authentication.

The SIM is an Integrated Circuit Card, which holds a file system and an application.

The application performs: generation of key stream segments (KSS) and synchronisation for E2EE, TETRA authentication algorithm based on K which is on the SIM and key management for E2EE keys, SIM interface encryption and authentication using the AES.

The file system holds: network access parameters as ITSI, Security Class definition and authentication definition, the Integrated Circuit Card Identifier, the SIM version number, and the Operative Tactical Address.

The E2EE keys are also kept on the SIM. However, they can be accessed only by the SIM application, thus E2EE key management is completely transparent for the terminal.

The keys for Air Interface Encryption (AIE) remain on the terminal. The SIM application handles AIE key management using TA41 algorithm for generating the session key for OTAR.

14.12 High Assurance Boot (HAB)

The terminal has a facility that ensures that the code and data flashed in the terminal is authentic and has not been altered. The HAB module is forced by hardware to run at boot time and check that all software comes from a trusted source by checking the signature of the code and data segments present in the terminal using a public/private key mechanism. The keys are downloaded using the provisioning tool.

If HAB authentication of the flashed software fails, it will not allow the terminal software to run.

15 Numbering and Addressing



NOTE

The following section is not applicable to TCR1000.

Each terminal has a TETRA ITSI which is used for addressing the terminal over the air interface. However, it is undesirable to require the user to enter a long number to address another terminal. To this end, a number of short number schemes can be used.

15.1 Short Addressing Schemes

Alternatively, the subscriber can be provisioned to treat a short number as an SSI. This scheme can be refined to allow short dialing within a fleet by combining the ID entered with the terminal's own SSI.

15.1.1 Short Number Dialing using ISSI

If the terminal is provisioned to treat a short number as a TETRA Short Subscriber Identity, and the number entered is less than 7 digits, the terminal's own identity will be combined with the number entered by the user to produce the actual ISSI. Using this scheme, an ISSI can be comprised of a fleet number part and a member part.

The terminal's own ISSI will be used as 'leading digits' for the digits omitted by the user. Thus, if for instance:

Terminal's own ID:	1234567
User Enters:	890
SSI sent will be:	1234890

The following call types will be capable of utilizing short SSI for identifying users:

- Duplex Private Call: called party and calling party identification
- Simplex Private Call: called party and calling party identification
- Group Call: calling party identification and talking party identification
- Mobile Status: called party and calling party identification
- Short Data Bearer Service: called party and calling party identification
- Text Message Service: called party and calling party identification

15.2 Direct TETRA ID Addressing

15.2.1 ISSI

Regardless of the short addressing scheme used, if the user is provisioned with the capability of entering a real TETRA ISSI, and the user enters an ID of 7 digits, the number will be interpreted as a real TETRA ISSI.

16 PEI Characteristics

The terminal supports a four-wire serial RS232 interface via the optional data cable, and a pre-defined set of the AT commands.



NOTE

The set of AT commands is not compliant with the TETRA PEI standard [Ref 4]. See Chapter 5, Paragraph 3 "Supported AT Commands & Functionality".

16.1 Physical Layer

The terminal PEI physical layer is the RS232 interface and supports the following circuits as specified in [Ref 22]:

- Transmit Data (TD)
- Receive Data (RD)
- Request To Send (RTS)
- Clear To Send (CTS)
- DCE Ready (DSR)
- DTE Ready (DTR)
- Carrier Detect (CD) (Received Line Signal Detector)
- Ring Indicator (RI) (Never Asserted)

The connection with the data device and opening of the PEI port is done when the user turns the external device option on from the menu.

16.1.1 Baud Rate

The terminal supports the standard PEI baud rates specified in [Ref 22] from 300 bps to 115 200 bps.

The auto baud rate detection mechanism is not supported.

16.1.2 PEI Flow Control

The terminal provides hardware flow control when the data traffic flows in the direction TE2 to MT2. The flow control will use the RS232 request to send (RTS) and clear to send (CTS) lines.

16.2 PEI Link Layer

The terminal supports AT commands and PPP [Ref 18] as a link layer between the TE2 and MT2. PPP negotiation will use unnumbered mode only.

The AT phase is compatible with the Windows® operating system standard modem type.

17 Supplementary Services

Following is the description of the TETRA Supplementary Services (SS) that the terminal should support in TMO Mode.

17.1 Dynamic Group Number Assignment (DGNA)

The terminal supports dynamic addition and removal of talkgroups in its talkgroup list via TETRA Dynamic Group Number Assignment and De-assignment signalling (SS-DGNA). The terminal will respond to DGNA directed to it or to DGNA directed to a group it is attached to.

17.1.1 Adding a Talkgroup

When a dynamic group number assignment to add a new talkgroup is received, the terminal will add the group in the first available spot in the talkgroup list in the codeplug. The user can then scroll to the talkgroup to select the group.

The codeplug determines which DGNA Operations are allowed for a group. If a group is:

- Static - only selection is allowed
- Semi-Static - selection and re-assignment are allowed
- Dynamic - selection, de-assignment and re-assignment are allowed

The groups can be assigned as not attached, attached as scanned or attached as selected. Assignment of the group through DGNA with attached as selected will make it the selected group of the terminal. If the group is assigned with attached as scanned, if it is not already in the currently active scan list, the terminal will add this group to a SwMI Controlled scan list and will begin monitoring downlink signalling addressed to this group. The SwMI controlled list will hold up to 10 groups, and the terminal will monitor these groups as well as groups in the user scan list.

If the talkgroup list is full when adding a new group, the assignment operation will be rejected by the terminal. If the SwMI controlled list is full and the assignment is with attached as scanned, the attachment will be rejected.



NOTE

The following part of this section refers to TCR1000 only.

When a dynamic group number assignment to add a new talkgroup is received, the terminal will add the group into the rotary position 9 or 10 of the Favorite Talkgroup list.

The terminal will assign the newest received group to the rotary position containing the oldest assigned group. If any of the previously assigned groups has been deassigned and an additional DGNA group is received, the terminal will assign the newest received group to the smallest free rotary valid position (that is position 9 or 10).

The user can then scroll to the talkgroup to select the group. The groups are assigned as not attached and they are attached once selected using the Rotary Knob.

17.1.2 Removing a Talkgroup

When a talkgroup de-assignment is received, depending on the codeplug settings (DGNA Operations field in the Talkgroup List) the terminal behavior is as follows.

- If the DGNA Operations field is set to Static or Semi-Static, the terminal:
 - leaves the talkgroup and the parameters assignments to folders unchanged.

- sends an acknowledgement PDU with notification the group definition has been removed.
- If the DGNA Operations field is set to Dynamic or if the group is not in the talkgroup list, the terminal:
 - removes the talkgroup from the talkgroup list (if the talkgroup is in the list).
 - removes all the occurrences of the talkgroup from the folder list.
 - sends an acknowledgement PDU with notification the group definition has been removed (also if the talkgroup has been deleted, or the talkgroup does not exist in the terminal).

In all the cases, the talkgroup is removed from all the scan lists as no matter if they are active or inactive.

If the de-assignment is for the selected group, the terminal notifies the user that there is no group attached (when in the group mode), and does not attach to another talkgroup automatically.

If the de-assignment is for an announcement group, the talkgroup is removed from the talkgroup list. Additionally, all the groups that are associated with this announcement group do not have an associated announcement group. If the currently selected talkgroup is associated with this announcement group, the terminal stops scanning the associated announcement group.



NOTE

The following part of this section refers to TCR1000 only.

If the selected talkgroup is de-assigned, the group that was programmed on that rotary position will be restored.

17.1.3 DGNA Notification to the User



NOTE

The following section is not applicable to TCR1000.

When DGNA operation is successful, if the terminal is provisioned for DGNA user notification, the user will be notified about the operation (for example group added, group deleted). The notification to the user will be displayed until it is confirmed by the user. In case the user receives a call, the message will continue to be displayed until the user confirms it. (The motivation is to make sure that user could see the notification).

Upon viewing an assigned talkgroup notification, the terminal will provide the ability for the user to make that group the selected group.

17.1.4 Group Addressed DGNA

The terminal supports Group Addressed DGNA mechanisms.

The terminal supports the reception of a DGNA Assignment that is addressed to its selected talkgroup as a **SuperGroup** of the selected group. All signalling addressed to the SuperGroup will be monitored in addition to signalling addressed to the selected group, any announcement or associated groups, and groups in the active scan lists.

When the selected group is unselected, the terminal will cease processing signalling to the SuperGroup that was associated with that selected group.

The lifetime of the SuperGroup is received by the terminal as part of the assignment signalling. If a subsequent assignment to the same group is not received within that lifetime, the terminal will cease monitoring that supergroup.

The terminal also supports SuperGroups of scanned groups, such that a group addressed DGNA assignment received on one of the user scan group addresses, will cause the terminal to monitor all signalling addressed to that supergroup as long as the scan group is being monitored, and as long as the SuperGroup lifetime lasts.

17.1.5 DGNA Limitations

The following DGNA functionality is not supported:

- Call-related DGNA is not supported.
- The terminal does not support functionality of the “authorized user”.
- The terminal does not perform any network authentication before accepting DGNA.

17.2 Ambience Listening (AL)

Ambience Listening allows a console operator or dispatcher to monitor audio activity in the vicinity of a specific terminal without giving any indication to the affected terminal.

17.2.1 SS-AL Setup

When the terminal receives a call setup message with an Ambience Listening call, the terminal accepts the call, opens the microphone and begins transmitting, without showing any indication of the call to the user. Call acceptance and rejection while active in another call follows the PPC rules (see Paragraph 17.6 "Pre-emptive Priority Call (PPC)").

17.2.2 Call Maintenance and Termination

The terminal will impose no time limit on the transmission (T311 will be disabled), and will continue to transmit until the SwMI ends the call or the user performs an action that causes the call to be released.

17.2.3 User Interactions

If the user attempts to start a service while the SS-AL call is in progress, the terminal will disconnect the call and initiate the service that the user has requested.

The terminal will allow the user to perform all actions that can be performed by the terminal without releasing the SS-AL call. This includes access of most menu items, changing modes, activating and deactivating scan lists and changing talkgroups. When the user changes talkgroups, the terminal will appear as if it is performing an attachment and appear that the attachment has succeeded, but the actual attachment signalling will be performed only after the SS-AL call terminates. When performing the attachment after the call, no indication will be shown to the user unless the attachment fails.

17.3 Pseudo Power-Down

If the user attempts to power down the terminal, the terminal will appear to power down, but remain fully operational from layer 3 and below. The terminal will show the user a blank screen, and all LEDs will be extinguished.

When the SS-AL call ends in this Pseudo power-down state, the terminal will power down.

If the user attempts to power up the terminal from the Pseudo power-down state, the terminal will behave to the user as if it is really powering up.

17.4 Hibernation (Pseudo On/Off)



NOTE

The following section is applicable to TCR1000 only.

The TCR1000 can be powered up or down completely only using the dedicated power button on the Radio Unit. However there is a possibility for the user to pseudo power up or down (that is, to switch to stand by mode) the terminal using the RCU buttons.

In stand by mode, the terminal has all the signalling, all the audio, GPS, RF and everything other than the PEI port for AT commands shut down. The terminal is not registered to the network and does not stay on the cell. The terminal consumes minimal power in this mode.

To switch into the standby mode the user needs to simultaneously press the Volume Up and Volume Down buttons on the RCU for a minimum of 2 seconds. Switching back on into normal operation requires the same sequence. After this the terminal will perform its power up and self test sequence.

17.5 Auto Power On



NOTE

The following section is applicable to MTP850 S and MTP850 FuG only.

The terminal can be configured to power-on after inserting battery. This functionality is configurable using CPS.

The terminal enters the emergency mode, if this mode was active before removing the battery, when the power-off period is shorter than approximately 3 s. This applies to normal and silent emergency modes. (The 3 second period is approximate and determined by the discharge rate of capacitors in the terminal and may take from 3 up to 6 s.)

17.6 Pre-emptive Priority Call (PPC)

If during a call, a call setup is received for a call that has a higher priority than the present call, and the call priority of the new call is "Pre-emptive Priority 3" (value 14 in the codeplug) or "Pre-emptive Priority 4 (Emergency)" (value 15 in the codeplug) the terminal will disconnect from the present call and join the new high priority call.

If the call priority of the new call is "Pre-emptive Priority 1" (value 12 in the codeplug) or "Pre-emptive Priority 2" (value 13 in the codeplug), the terminal will either accept or reject the new call, based on a provisioned setting.

When the new call is accepted, a special tone will be sounded to the user, and the user will be given an indication that this is a high priority call.

If the terminal is provisioned to be able to initiate a pre-emptive priority call, and the user initiates a private call or phone call to another party and receives a rejection with the reason 'called party busy', the terminal will provide the user with an option to initiate a new call but this time with pre-emptive priority. If the user initiates a new call it will be identical to the previous call setup, with the exception that the call priority be a high priority. The exact priority value that will be sent will be provisioned.

17.7 RF Sensitive Area Mode (Transmit Inhibit Mode TXI)

RF Sensitive Area Mode, also known as Transmit Inhibit (TXI) Mode, is a mode the terminal can enter where no radio transmissions will be sent by the terminal.

The RF SA mode is activated by the terminal user in RF sensitive areas, for example hospitals, airplanes, and so forth, where safety can be jeopardized due to terminal uplink radiation. Once in RF SA mode, the terminal will not transmit under any circumstances, which means no call setup initiation, no linearization, and so forth will be possible.

RF SA mode is deactivated explicitly by the user, or is implicitly deactivated when the user initiates an Emergency call.

The user enters TXI mode and exits TXI mode via a menu sequence or an assigned button.

Upon entry into or exit from TXI mode, if the terminal is camped on a cell, it will send a specially designated SDS Status message to indicate to the SwMI that it is entering or exiting TXI mode.

When the terminal is in TXI mode, the user is informed about the state with the displayed indication and/or specific tone (depends on the terminal capabilities and settings).

In TXI mode the user is prevented from initiating any non-emergency call or service, and the terminal will not send any low layer initiated transmission. While in the TXI, all the menu entries and buttons, which cause the terminal to transmit, are disabled.

Mobility procedures that do not require the terminal to send an uplink transmission will be performed - with the exception of cell reselection which will not be performed even if no registration is required.

In TXI mode the terminal joins group calls for any group that the terminal is monitoring, but will prevent the user from transmitting on that call. The terminal also displays any incoming SDS messages to the user (where applicable).

The missed call feature is active in the TXI mode and allows the user to check what calls were missed. However, the terminal attempts to prevent call setup retransmission from being recorded as separate calls.

If the user initiates an Emergency call, the terminal will immediately leave TXI mode and attempt to start the Emergency Call if the terminal is in service.

If the user powers off the terminal in TXI mode, upon power up the terminal will ask the user whether or not the user wishes to exit TXI mode. If the user answers "No" the terminal will power down.



NOTE

For the TCR1000 the TXI Mode is deactivated at power on.

17.8 Other Supplementary Services

17.8.1 Calling Line Identification Presentation (CLIP)



NOTE

The following section is not applicable to TCR1000.

The PDUs and facility elements for this SS are not supported. However, Identification Presentation functionality is supported in most cases using the information found in the call setup messages, as specified in Paragraph 3.2.4 "Calling Party Identification Presentation", and Paragraph 4.3.4 "Calling Line Identification Presentation (CLIP)".

17.8.2 Late Entry (LE)

The PDUs and facility elements for this SS are not supported, but the functionality will be supported for Group Calls if late entry an appropriate PDUs are received. See Paragraph 2.2.8 "Late Entry".

17.8.3 Talking Party Identification (TPI)



NOTE

The following section is not applicable to TCR1000.

The PDUs and facility elements for this SS are not supported. However, Identification Presentation functionality is supported in most cases using the information found in the call setup messages, as specified in Paragraph 2.2.2 "Talking Party Identification".

17.8.4 Calling Line Identification Restriction (CLIR)



NOTE

The following section is not applicable to TCR1000.

CLIR is currently not supported in the terminal.

17.8.5 DTMF Over Dial



NOTE

The following section is not applicable to MTP850 Ex, MTP810 Ex, and TCR1000 terminals.

This supplementary service allows the terminal to send DTMF tones to both internal and the external network during the call (conversation).

17.9 Universal Time Display



NOTE

The following section is not applicable to TCR1000.

The terminal is capable of presenting time information to the user. The time is derived from an internal clock. The terminal maintains the clock both when the terminal is powered on and powered off.



NOTE

In case of power loss (for example flat battery) the internal clock will not be maintained.

The time is received from the SwMI and is updated if the maximal deviation between time on the internal clock and the time received is less than a value set during terminal programming via the CPS interface.

In order to ensure the time displayed is accurate, the time will only be displayed to the user, if within the last 48 hours either of the following events have occurred:

- The terminal has received a network time update from the system.
- The user has manually updated the time.

If neither of the events have occurred within a 48 hour period the time will no longer be displayed to the user.

As the internal clock is not maintained, after a power loss event such as battery removal, the time will not be displayed to the user until either of the following events occurs:

- The terminal has received a network time update from the system.
- The user has manually updated the time.

The feature is enabled or disabled and the default configuration set for the terminal via the CPS interface (for details see Paragraph 17 "Clock System Broadcast Information").

The terminal display supports:

- Twenty-four-hour and twelve-hour formats
- DD/MM/YY, MM/DD/YY and DD-MON-YY date formats
- Adjustable time offset

The time information can be changed by the user via MMI, if enabled in codeplug.

System broadcast information has higher priority than data entered manually. Hence time, date and offset information entered via MMI is overwritten, when data is received from the SwMI.

The terminal provides user indications upon crossing to another time zone, when new MCC broadcast received.

Benefits:

- Time displayed can be synchronized for a number of terminals

18 GPS Support

The terminal is equipped with a GPS receiver which enables it to ascertain its own location.

The terminal provides Location Reports in various circumstances:

- On request;
- Triggered by specific events (for example status transmissions, emergency, power on/off);
- At specified time intervals;
- At specified distance intervals.

The reports are sent using a protocol which is based on existing standards, using SDS as a transport layer, therefore they can be sent both in TMO and DMO. SDS User Defined Data Type 4 can provision the terminal to either use SDS-TL (for added reliability) or no SDS-TL (for saving air interface resources). The TETRA standard Protocol Identifiers for GPS are used - 3 for simple GPS (no SDS-TL) or 131 if SDS-TL is used.

The location reports sent using SDS as a transport layer can use E2E Encryption. This feature availability depends on the terminal configuration. For the feature availability see Table 1-33.

The location data are stored in the non-volatile memory of the terminal, for later retrieval.

If the terminal is provisioned to provide user indications, the user is notified of the feature's operational status.

If the terminal is provisioned with to provide the terminal user with position information, the user will be able to view the terminal's position (longitude and latitude, UK eastings and northings, or Irish grid coordinates) and the status of the satellites that are in view.

The GPS feature can be enabled or disabled as a whole by the CPS. Also, the parameters of the feature can be configured by the CPS, or over the air. CPS configuration provides a default profile, which can be overridden by commands received over the air. The profile assigned to the terminal will determine when to send location data, what data to send with what accuracy and to what address to send the data.

All data requests and configuration commands received over the air are checked to confirm they have come from a trusted source. Only ISSIs in a specified range may send location commands.



NOTE

Both the terminal and application receiving location messages from the terminal have to be configured with the same protocol ID otherwise the terminal will report a failure when requested to send an Immediate Location Report.

If configured in the codeplug a terminal may run GPS application in the background with the GPS functionality available only for the dispatcher. In the GPS pseudo disable state besides Emergency Entry trigger, all the other triggers settings and received Location report requests are ignored.



NOTE

While the GPS pseudo disable is on, the GPS mode keeps unchanged upon entering and exiting emergency mode.

18.1 GPS Accuracy

In good GPS coverage (at least -137 dBm or in open sky), the location accuracy presents as follows:

In high accuracy mode:

- 5m for 50% of location reports

- 10m for 95% of location reports

In power optimized/normal mode:

- 20m for 50% of location reports
- 50m for 95% of location reports

**NOTE**

The presented values depend on variety of factors, for example the view on the sky.

In order to optimize the GPS performance the terminal should have the clearest possible view of the open sky.

**NOTE**

The use of the high capacity battery should be recommended, especially when high accuracy mode is used.

18.2 GPS over Packet Data

**NOTE**

The following section is not applicable to TCR1000.

When the GPS feature is enabled in the CPS, and a terminal user turns on the GPS services via MMI, the terminal requests for PD context activation.

**NOTE**

If the PD has not been activated the terminal is not able to send or receive the GPS data.

When the terminal user turns off the GPS via MMI, Packet Data service closes. The ongoing PD session is deregistered.

For GPS over Packet Data (both LIP and LRRP), triggers and location information (for example, basic location parameters, immediate location request) are sent or received while Packet Data is activated in comparable way as standard GPS over SDS.

Sending or receiving triggers and location information during DMO, TXI or Emergency mode is not possible if the GPS over Packet Data is enabled.

19 GPIO

**NOTE**

This section is applicable only to MTM800 Enhanced.

In total there are three General Purpose Input Output (GPIO) ports on the transceiver device and four GPIOs on the New Generation Control Head (NGCH). The GPIOs on the NGCH are accessible in remote mount configuration only.

The following default functionality is available through the transceiver GPIOs:

- Transceiver GPIO1 is associated with “External Alarm”
- Transceiver GPIO2 is associated with “Audio PA Enable”
- Transceiver GPIO3 is associated with “Hook”

The following default functionality is available through the GPIOs located on the NGCH device:

- NGCH GPIO1 is disabled
- NGCH GPIO2 is disabled
- NGCH GPIO3 is associated with "PTT CH Rear"
- NGCH GPIO4 is disabled

The General Purpose Input ports can be associated with the following functions:

- Send Predefined Message
- Send Status

If the "Send Status" is configured as an input on GPIO1/GPIO2, upon triggering of GPIO1/GPIO2 the terminal sends a status message to the GISSI on which the terminal is currently attached.

If a terminal user is sending SDS via MMI and SDS via GPIO at the same time, the SDS sent via GPIO will be rejected by the terminal without any notification to the user.

The General Purpose Output ports can be associated with the following functions:

- Specific Message Received Indication
- Rx/Tx Indication

**NOTE**

GPIO1/GPIO2 is activated when any SDS is received on selected Protocol Identifier (PI), except SDS and Long SDS PI.

If "Rx/Tx indication" function is configured as an output function on any of the NGCH GPIO1/GPIO2, whenever the terminal is opening up a microphone/speaker for voice, independent of the call type NGCH GPIO1/GPIO2 is activated.

For the configuration of GPIO in the CPS, see Chapter 4, Paragraph 33.2.1 "Configuring GPIO".

20 Dual Control Head



NOTE

This section is applicable only to terminals equipped with Next Generation Control Head.

The Dual Control Head feature enables the use of two Next Generation Control Heads (in Master-Slave configuration) with one transceiver.

The Master CH is connected to the transceiver and both control-heads are connected to each other and synchronized. All key-press are processed by the Master CH-Transceiver. The Slave CH key presses are sent to the Master CH. The Slave CH display receives signals from the Master CH whenever its display changes.

The Master CH keeps the full functionality of the NGCH. The Slave CH supports NGCH basic features, that is advanced features as WAP and Integrated Terminal Management are only supported by Master.

Voice and Data are separated to a certain extent. The Master microphone with PTT button is connected via GCAI MMP connector on the CH and it operates the similar way as for the Remote Mount configurations. The Slave microphone is connected via Junction Box. Both Master and Slave speakers are connected via Junction Box. The Slave microphone and speaker are active no matter whether the Slave CH is enabled.

20.1 Master Single Control Head Mode

This mode activates when the connection between the Master and Slave has not established on the Master CH power up. The mode is signaled by:

- the relevant audio tone (see Chapter 3, Paragraph 3.2 "Feature & Terminal Specific Audio Tones")
- the "Slave Powered OFF" notification
- the relevant icon (see Chapter 3, Paragraph 4.1 "Status Icons")

The Master CH and Transceiver operate as in the Remote Mount configuration, that is the full functionality except the Dual CH is available.

20.2 Slave Standalone Mode

This mode activates when the Master Control Head is turned off. The mode is signaled by the "Master Powered OFF" notification. In this mode no radio functionality is available, except powering off.

20.3 Dual Control Head Link

If the Dual Control Head link is established between Master and Slave Control Head, the relevant icon is displayed. When the link is broken or lost, another icon is displayed and only the Master Control Head is functional (for the icon details see Chapter 3, Paragraph 4.1 "Status Icons"). The link error can occur due to:

- CH to CH cable has been disconnected from the CHs (one or both)
- loss of power supply connection on the CHs (one or both)

20.4 Feature Interactions

20.4.1 Emergency Mode

If any key except Emergency button is pressed on any CH, the token icon is displayed and all the keys are blocked, except the Emergency button, on the other CH. The time that the keypad is blocked on the other CH is adjustable via CPS. The Emergency button can be pressed on both Control Heads at any time.

20.4.2 WAP

Initiating and ending WAP session can be done from both Control Heads. However ongoing WAP session is only available on the Master CH. In such case a notification is displayed on the Slave CH.

20.4.3 Voice and PTT

During any call, voice can be heard in both Master and Slave speakers simultaneously. The Master and Slave PTTs have equal access to a line, that is both microphones can be opened at a time.

20.4.4 Integrated Terminal Management

The iTM is supported on the Master CH only.

20.4.5 Hot Mic

When the Hot Mic is initiated, the preferred accessory for Hot Mic (as well as Silent Emergency, Emergency Duplex Call, and Emergency Duplex MS-ISDN) operation is configured in the codeplug (for details see Chapter 4, Paragraph 32.1.8 "Preferred Emergency Accry - Control Head").

21 Data Box Radio



NOTE

This section is applicable only to MTM800 Enhanced and MTM5400/MTM800 FuG.

This feature allows transceiver to work without NGCH in a special Data Box mode. In this mode Data Box Radio is controlled via PEI with AT commands or TNP1 commands.

The Data Box Radio is a feature supporting users who want to use the transceiver with 3rd Party Control Terminals.

For the terminal functionality via AT commands see Chapter 5, Paragraph 3 "Supported AT Commands & Functionality".

The Data Box Radio feature allows setting CH mode for transceiver operations using the CPS (NGCH, DataBox or Automatic mode - see Chapter 4, Paragraph 15.1 "Control Head Mode").



NOTE

The Data Box Radio is a fully functional mobile terminal without a control head connected. Depending on the CPS settings, when the New Generation Control Head is connected, the terminal switches from Data Box Mode to standard terminal.

21.1 Powering On/Off

To power the terminal on use the Accessory Connector and Expansion Head Enhanced connector pins dedicated either to Ignition (high level) or Emergency (low level).

To power off the terminal use the Ignition available on the Accessory Connector and Expansion Head Enhanced connector.

For the Accessory Connector details, see the “MTM800 Enhanced Installation Manual”, Motorola part number: 6866539D30.

21.2 Feature Interactions

The terminal operating in DataBox mode supports all the features which apply for the terminal with NGCH except for these which require interface interactions.

21.2.1 Selling Features

The terminal in Data Box mode supports the following Software Selling Features:

- GPS
- Multi Slot Packet Data
- Enhanced Security
- Permanent Disable
- Permanent Disable v2
- SCCH

22 Test Page / Test Mode



NOTE

The following section is not applicable to TCR1000.



NOTE

The Test Mode option must be enabled in the terminal via CPS programming and selecting the “Test Page” option. The Test Mode is only for use by authorized persons, and not by users.

Use the following terminal key sequence, by pressing each button in turn, to access the Test Mode:

- ***, #, Menu, Right** - for full keypad terminals
- **Left, Right, Left, Menu** - for limited keypad terminals.



NOTE

If the Test Mode option is not enabled via CPS programming you have only access to the KVL Mode options **KVL On** or **KVL Off**.

The following are the services offered by test page:

22.1 Version Information

Displays software/hardware version information:

- Build Date

- CodePlug version
- DSP Software version
- Host Software version
- Hardware ID
- Equip ID
- LLS version
- NGCH Software Version - Next Generation Control Head terminals only

22.2 Addresses

Displays the following:

- Home MNI
- Group ID
- Own ISSI
- ASSI

22.3 Error Logs

Displays information about software errors:

- Error log
- Fatal
- Reset

22.4 Cell Information

This option displays information about the foreground and Background cells. This menu will display the RSSI levels of the cells.

22.5 Cell Lists

Displays frequency lists:

- Frequency list 1 (32 variable frequencies)
- Frequency list 2 (32 fixed frequencies)
- Frequency list 3
- Frequency list 4

22.6 Data Services

This allows access to Airtracer enable, Conformance tests and KVL Mode:

- Air Tracer
- Conform Test

- KVL mode (for Air Interface Encryption - AIE)

**NOTE**

The terminal software was changed to have a new display content in the KVL mode for distributing AIE keys.

The KVL mode for AIE keys is entered as before. The new behavior is that the display is immediately dark and empty, but the **green** LED is ON.

During data exchange with the AIE KVL the **orange** LED will be ON. On successful key exchange the **green** LED will be ON again.

In any error situation the **red** LED will be ON. You can leave the KVL mode by pressing the power button.

22.7 Key Information

This option allows displaying the security information for the following conditions.

- For Serving Cell:
 - Security class of the serving cell, that is Security Class 1, Security Class 2, Security Class 3, Security Class 3 with GCK
- For Group OTAR:
 - CMG GSSI
- For SDMO and TM-SCK OTAR:
 - SDMO SCK Subset Grouping Type
 - Current SDMO SCK Subset Number and SCK-VN
 - Current Fallback TMO SCK, that is SCKN and SCK-VN attributes
 - List all SCKs stored in the MS, that is SCKN and SCK-VN attributes

**NOTE**

When checking the SDMO key information in the terminal be advised that the SDMO KAG range in the AuC is from 0 to 9 and the range in the terminal is from 1 to 10.

- For GCK:
 - Current Full GCK-VN
 - List all GCKs stored in the MS, that is GCKN and GCK-VN attributes

22.8 Memory (if Enabled in Codeplug)

Contains the following options:

- Host Memory
- DSP P-Memory
- DSP X-Memory
- DSP Y-Memory

23 Service Page



NOTE

The following section is not applicable to TCR1000.

Depending on the CPS settings the Manufacturer, Type and Serial Number information is available. The information is available through the Service Page accessible from the MMI.

The Service Page provide the following data:

- Manufacturer
- Product Type



NOTE

Manufacturer and Product Type information is displayed only on terminals distributed under Motorola trademark.

- ISSI
This is the ISSI which is currently in use. If a SIM Card is present the ISSI is read from the card, otherwise it is taken from the codeplug.
- TEI
The TEI is displayed as a hexadecimal number.
- Serial number
Motorola serial number is displayed only on terminals distributed under Motorola trademark.
- OPTA
If BSI SIM Support is disabled no OPTA information is displayed.

24 Hardware Test



NOTE

The Hardware Test Mode is only for use by authorized persons, and not by users.



NOTE

The following section is not applicable to TCR1000.

Use the following terminal key combinations to access the Hardware Test:

- hold **1, 2, 3 (all simultaneously)** and then press **On/Off Key** - for full keypad terminals
- hold **Left, Speaker Control Key (all simultaneously)** and then press **On/Off Key** - for limited keypad terminals.

25 Tool Interface Support

The terminal supports interfaces with external diagnostic and testing software.

25.1 Software and Codeplug Flashing Tool Support

Equipment specific parameters, and other data that is required to be retained through power cycling will be stored in non-volatile memory - known as the 'codeplug'. The terminal will support an interface with an external tool (such as CPS) that is capable of reading from and writing to the codeplug and flashing the terminal software via serial and USB interface.

25.2 Key Variable Loader (KVL)

The KVL is a battery-powered portable unit used to create, store, and transfer encryption keys used by Motorola's secure communications products, such as terminals. The KVL is comprised of a keypad, multiple I/O ports for connecting to external equipment, a rechargeable battery, and sophisticated internal electronics and software. The KVL is equipped with a bit mapped Liquid Crystal Display (LCD).



Figure 2-9 Key Variable Loader

The KVL stores two basic types of encryption keys:

- Traffic Encryption Keys (TEK) – Used by subscriber units to encrypt/decrypt voice and data communications
- Key Encryption Keys (KEK) – Used by the KMF to provide an additional level of encryption to the encryption keys when transferring keys to secure subscriber devices (over the air) or indirectly via the KVL (using Store and Forward).

The KVL tool enables loading of encryption traffic keys (Static Cipher Key - SCK) as well as authentication key (K) into terminal in a secure manner. These keys (for AIE) can be loaded into the TETRA terminal when the KVL is connected to the terminal and the KVL mode in the terminal is enabled. Refer to Paragraph 22 "Test Page / Test Mode".

**NOTE**

If the terminal loses connection with KVL during key provisioning, it will not respond to any key or other input from the terminal user. The only way to restore the terminal back to operational state is detach and re-attach the power.

The End-to-End Encryption KVL (EtE-KVL) tool enables End-to-End Encryption (E2EE) key provisioning.

Features and Benefits:

- Simultaneous K+SCK loading: Simplifies provisioning process, optimizing security
- Secure Key (SCK & K) provisioning in the field: Key loading can be done at user's premises, rather than centralized facility – the customer is in control of security
- K provisioning tools available to Service Provider/End Users: No need to return unit to manufacturer if key's erased
- Dial-up connection for Key provisioning tools: Fast, efficient and secure transport of data between field and central database

25.2.1 Loading Keys to a Terminal

To load any encryption traffic keys to the terminal proceed as follows:

1. Turn the terminal on
2. Turn the KVL tool on
3. Connect the KVL and the terminal using appropriate programming cable (for example PMLN5237A or PMKN4077A)
4. Put the terminal into KVL Mode (see Paragraph 22.6 "Data Services" for terminals with a display; for TCR1000 press and hold the Encryption Keys Button for 2 seconds)
5. Wait for green light to appear on the terminal LED indicator
6. Following standard KVL process load desired Security Key (for example K) into the terminal

Chapter 3

MAN-MACHINE INTERFACE

1 Controls and Indicators

1.1 MTH800



Figure 3-1 MTH800 Portable Terminal Controls and Indicators

1.2 MTP850



Figure 3-2 MTP850 Portable Terminal Controls and Indicators

1.3 MTP850 S/MTP850 FuG



Figure 3-3 MTP850 S/MTP850 FuG Portable Terminal Controls and Indicators

1.4 MTP830 S/MTP830 FuG



Figure 3-4 MTP830 S/MTP830 FuG Portable Terminal Controls and Indicators

1.5 MTP850 Ex and MTP810 Ex



Figure 3-5 MTP850 Ex/MTP810 Ex Portable Terminals Controls and Indicators

1.6 CEP400 Ex and MTP830



Figure 3-6 CEP400/MTP830 Portable Terminals Controls and Indicators

1.7 TCR1000

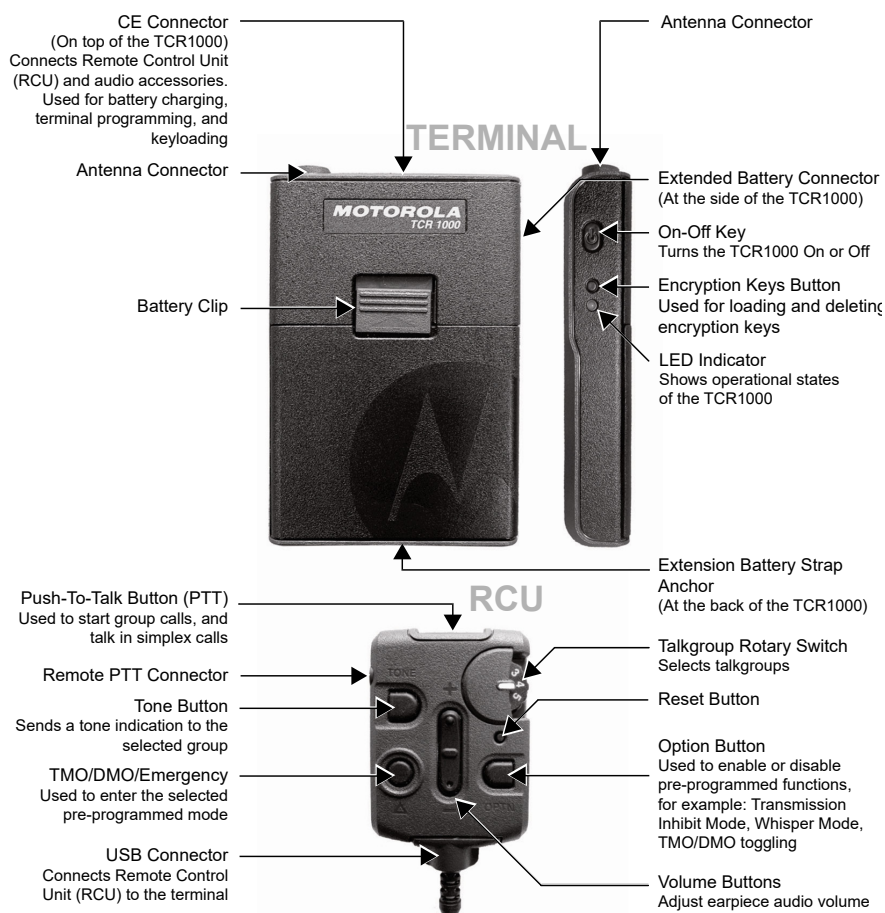


Figure 3-7 TCR1000 Covert Terminal Controls and Indicators

1.8 MTM800 Enhanced and MTM5400/MTM800 FuG

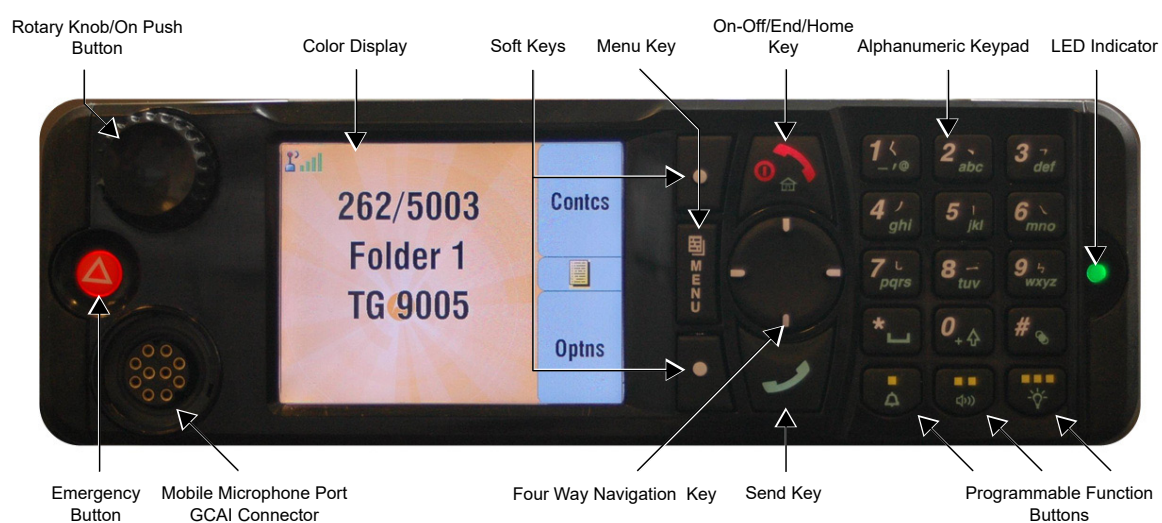


Figure 3-8 MTM800 Enhanced and MTM5400/MTM800 FuG Mobile Terminal Controls and Indicators

2 LED Indications

2.1 Common LED Indications

LED Indications	Terminal Status
Solid Green	In Use Repeating call
Blinking Green	In Service
Solid Red	Out of Service
Blinking Red	Connecting to Network Entering DMO
Solid Orange	Transmit Inhibit (TXI) Enable Channel Busy in DMO Channel occupied by another call
Blinking Orange	Incoming Call
No Indication	Terminal Powered Down Idle

Table 3-1 Terminal LED Indications



NOTE

For TCR1000 the LED indications can be enabled or disabled using the Customer Programming Software. By default the LED indicator is set to inactive.

2.2 Alternative TCR1000 LED Indications

Indicator	Status
Battery Charging	
Solid green	Battery charging finished and charger connected
Solid orange	Battery charging ongoing
Blinking orange	Detecting/diagnostics in progress
Solid red	Battery charging will not start or was stopped (for example, an invalid charger has been connected, the battery is completely discharged)
Power On Self Test	
Solid red	Self-check fails
Encryption Keys Erasure	
Blinking green	Encryption key erasure succeeded
KVL Mode	
Solid green	KVL Mode enabled

Table 3-2 Alternative TCR1000 LED Indications

2.3 Feature Related LED Indications

Indicator	Status
Periodic Tone - Not applicable to TCR1000	
Blinking Orange	Periodic Alert Mode




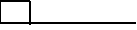


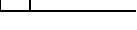
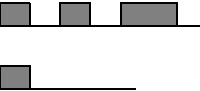
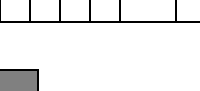
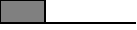

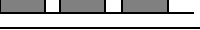

Table 3-3 Alternative LED Indications

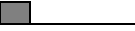
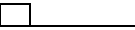









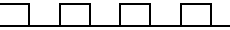
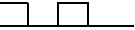






3 Audio Signal Tones

3.1 Common Audio Tones


NOTE

The following section is not applicable to MTM5400 and MTM800 FuG.

□ = High Tone; ■ = Low Tone		
Description	Type	Repeated
Idle		
Back to Home display *** Back to Rotary volume use when Rotary scroll timer expires *** Back to coverage Back to full service		Once
Clear to send		Once
Bad key press		Once
Good key press terminal self-test fails at power up From out-of-service to in-service		Once
In Call		
Call clear warning Call modified		Once
Call waiting tone while Phone or Private Call are pending ***		Every 6 seconds, until a call is terminated
Data Connected or Data Disconnected. ***		Once
Talk Permit sounds upon pressing the PTT.		Once (Normal Tone)
		Once (Short Tone)
Talk Permit without gateway sounds upon pressing PTT. The tone indicates the gateway is no longer available.		Twice
		Once
Double PTT - Single tone		Once
Double PTT - Double tone		Once
Double PTT - Triple tone		Once
Talk Prohibit System busy Time-out timer expire Called terminal not available or busy.		Until you release the PTT

□ = High Tone; ■ = Low Tone		
Description	Type	Repeated
Call disconnected or failed due to network		Once
Wrong number dialled. ***		No tone
DMO Entering		Once
DMO Exiting		Once
Local site trunking – Entering/Exiting		Once
Phone ring back (sending) ***		Every three seconds, until the called user answers or call is rejected
Phone busy ***		Every 0.5 seconds
Pressing the key to send the status to the dispatcher ***		Once
Status message sent to the dispatcher ***		Once
Status message acknowledged by the dispatcher and timer expires ***		Once
Status message is acknowledged ***		Once
Incoming Calls		
Your terminal received a Group Call without gateway. (setup only)		Once
High Priority Group Call received		Once
Emergency Alarm sent or received ** ***		Twice
Emergency Alarm failed ***		Four times
Emergency Call received ** ***		Once
Phone ring (reception) *** Duplex Private Call	According to the Ring Style sub-menu setting.	Until you answer or the call is rejected
Private Call received ***	According to the Ring Style sub-menu setting.	Until you answer or the call is rejected
Private Call ringing to the caller ***		Until the call is answered
Simplex Private Pre-emptive Priority Call (PPC) ring.		Every 4 seconds until the call is answered or rejected
Duplex Private PPC ring. ***		Every 4 seconds until the call is answered or rejected
Limited Service		Once upon entering limited service




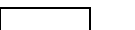



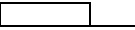

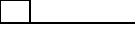
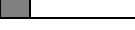
□ = High Tone; ■ = Low Tone		
Description	Type	Repeated
New Mail Received ***		Once
New Group Call		Once
General		
Volume setting (earpiece, keypad, speaker)		Continuous
Volume setting (Ringer)		While setting the volume
Transmit Inhibit (TXI) ***		Once
Rotary Knob tone ***		Once, when toggling from List to Volume
Low battery alert ***		Repeated
DTMF (0-9, #, *) during the call ***	DTMF 	Continuous, until the user releases the key
Periodic Alert ***		Repeated
GPS		
GPS in coverage		Once
GPS out of coverage		Once

Table 3-4 Common Audio Tones

**NOTE**

*) Only for portable terminals.


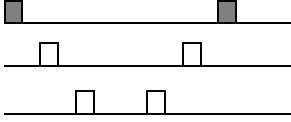
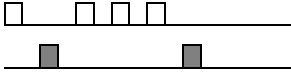
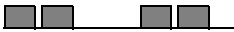
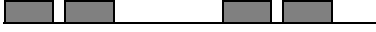

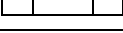

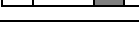
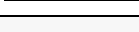

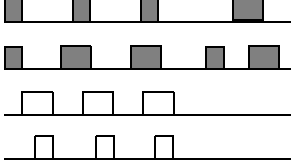
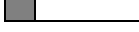
**NOTE**

**) Incoming Emergency Tones while an earpiece is connected are louder. The loudness is configurable in the codeplug.

**NOTE**

***) For TCR1000 the tone is not applicable or differs, see Paragraph 3.2 "Feature & Terminal Specific Audio Tones".

3.2 Feature & Terminal Specific Audio Tones

□ = High Tone; ■ = Low Tone		
Description	Type	Repeated
Call Out - Where available		
Call-Out Storm Plan		Repeated after 0.4 second delay
Call-Out Test		Repeated
Call-Out Fallback		Repeated
Dual Control Head - Generation Control Head terminals		
Single Control Head mode		Once
Dual Control Head mode		Once
Dual Control Head error		Once
Man Down - MTP850 Ex, MTP810 Ex, MTP850 S/MTP850 FuG, MTP830 S/MTP830 FuG		
Man Down feature is on		Once
Man Down feature is off		Once or Repeated
Man Down pre-alert		Once
Man Down device failure		Until you disable the feature
WAP Push - Where available		
New WAP Message		Once
Alternative Emergency Tones - Where available*		
Incoming Emergency Call**		Repeated
TCR1000		
Talkgroup selected	<p>Rotary Switch position determines how many times the following sequence is repeated:</p>  <p>After each sequence of 3 tones, the silence is longer.</p>	Once


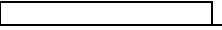

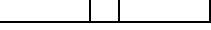

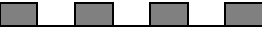


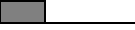



□ = High Tone; ■ = Low Tone		
Description	Type	Repeated
In Emergency		Continuously when in Emergency Mode
Emergency exiting		Once
In DMO		Repeated periodically
Transmit Inhibit (TXI)		Once
Transmit Inhibit (TXI) exiting		Once
Out of TMO (Trunked Mode) coverage		Once
Low battery alert		Repeated
Remote Control Unit not initialized		Once
Whisper Mode - TCR1000		
In Whisper Mode		On pressing the PTT when in Whisper Mode
Whisper Mode enabled		Once
Whisper Mode disabled		Once
Tone Button - TCR1000		
Tone button being pressed		Until you release the Tone button.

Table 3-5 Feature & Terminal Specific Audio Tones

*) Applicable to terminals with 2.5mm jack connector.

**NOTE****NOTE**

**) Incoming Emergency Tones while an earpiece is connected are louder. The loudness is configurable in the codeplug.

**NOTE**



















The remainder of this section is applicable to MTM5400 and MTM800 FuG terminals only.

Below interactive animations are included.

If necessary, you can download the latest Flash® Player from <http://www.adobe.com/>.

Click on inside an image to play the respective sound.

Depending on the settings of your Adobe® Reader®, a Manage Trust dialog may open when you click an image. Select one of the options in the dialog and double-click the Play Tone button to listen to the sound.

Tone Name	Description	Play Tone
Default Beep	indicates a key press.	
Invalid/Illegal Action	indicates an invalid key press, invalid number, talk prohibit, and related actions.	
Device Connect	is played when a device as a car kit or a secondary control head has been connected.	
Device Disconnect	is played when a device has been disconnected.	
Device Error/Failed to Connect	indicates device connection error, for example, when Dual Control Head link fails.	
Sys Notification	is played when the terminal operational status changes, for example, when going from 'Out of range' to 'In service', toggling between TMO and DMO, the system is busy, going back to home network.	
Sys Error	is played when a service has been limited, for example, when going from 'In service' to 'Out of range' or when a call has been disconnected.	
General Notification	supports general indications such as entering Local Site Trunking or entering Transmit Inhibit mode.	
Positive Notification	supports positive indications, for example, when a message has been successfully sent.	
Negative Notification	supports negative indications, for example, when a message sending has failed.	
Item Received	is played upon reception of an item, for example, when a message has been received.	
Talk Permit	sounds upon pressing the PTT button.	
Clear To Send	sounds if the transmission can proceed.	
Emergency Init and Emergency Call Rcvd	is played when the Emergency Mode has been initiated and an Emergency Call has been received.	
DTMF 0	is played when the respective DTMF key has been pressed.	
DTMF 1	is played when the respective DTMF key has been pressed.	
DTMF 2	is played when the respective DTMF key has been pressed.	
DTMF 3	is played when the respective DTMF key has been pressed.	
























Tone Name	Description	Play Tone
DTMF 4	is played when the respective DTMF key has been pressed.	
DTMF 5	is played when the respective DTMF key has been pressed.	
DTMF 6	is played when the respective DTMF key has been pressed.	
DTMF 7	is played when the respective DTMF key has been pressed.	
DTMF 8	is played when the respective DTMF key has been pressed.	
DTMF 9	is played when the respective DTMF key has been pressed.	
DTMF Asterisk	is played when the respective DTMF key has been pressed.	
DTMF Hash	is played when the respective DTMF key has been pressed.	
Over The Air 1	is played for example with D-PTT (single tone).	
Over The Air 2	is played for example with D-PTT (double tone).	
Over The Air 3	is played for example with D-PTT (triple tone).	
Call-Out Alert 1	is played when the respective Call-Out has been received.	
Call-Out Alert 2	is played when the respective Call-Out has been received.	
Call-Out Alert 3	is played when the respective Call-Out has been received.	
Call-Out Alert 4	is played when the respective Call-Out has been received.	
Call-Out Alert 5	is played when the respective Call-Out has been received.	
Call-Out Alert 6	is played when the respective Call-Out has been received.	
Call-Out Alert 7	is played when the respective Call-Out has been received.	
Call-Out Alert 8	is played when the respective Call-Out has been received.	
Call-Out Volume Set	is played when adjusting Call-Out volume.	
Private Ring Back	is played when a private call is being set up.	
Phone Ring Back	is played when a phone call is being set up.	
Phone Busy	is played when a phone is busy.	
Ring Tone 1	is played when the respective ring tone is selected.	
Ring Tone 2	is played when the respective ring tone is selected.	
Ring Tone 3	is played when the respective ring tone is selected.	
Ring Tone 4	is played when the respective ring tone is selected.	
Ring Tone 5	is played when the respective ring tone is selected.	
Duplex Volume Set	is used when adjusting duplex call volume.	
Simplex Volume Set	is used when adjusting simplex call volume.	

Table 3-6 MTM5400 and MTM800 FuG Audio Tones

4 Display Icons
























NOTE

The following section is not applicable to TCR1000.

4.1 Status Icons

These appear either when the phone is engaged in certain activities, or when certain features have been activated.

Status Icon	Description
Trunked Mode Operation (TMO)	
	Signal Strength Allows you to check signal strength. More bars indicate a stronger signal.
	No Service
	Scan Indicates scanning is activated in the terminal.
	Data Connected Displayed when the terminal is successfully connected to an external device and ready for data transfer.
	Data Transmit/Receive Displayed when the terminal is transferring data to/receiving data from the external device (laptop or desktop PC). No number — standby data session. Number 1, 2, 3, or 4 — indicates active data session with 25%, 50%, 75%, or 100% bandwidth.
Direct Mode Operation (DMO)	
	Signal Strength Indicates an incoming Direct Mode Group Call.
	Direct Mode Displayed when the terminal is in Direct Mode.
	DMO Gateway Communication Indicates that gateway is selected. The icon has three states: Solid — while the terminal is synchronised with the gateway. Blinking — while the terminal is not synchronised or during attachment. No icon — during a terminal to terminal and repeater call.
	DMO Repeater Communication Displayed when the repeater option in DMO is selected. This icon has three states: Solid — while the terminal has detected the repeater (that is, when the terminal receives a presence signal). Blinking — while the terminal has not detected the repeater or during attachment. No icon — during a terminal to terminal and gateway call.
	DMO Repeater Mode Indicates that the repeater mode is enabled.
	DMO/TMO Gateway Mode Indicates that the DMO/TMO gateway mode is enabled. (When the icon is blinking the gateway is connecting to TMO and no DMO-TMO transmission is possible.)
General Icons	
	All Tones Off/Duplex & Simplex Ring Muted Indicates that all alert tones are off in the terminal or both Simplex Ring volume is set to 0 and Duplex Ring volume is set to 0.

Status Icon	Description
	Simplex Ring Muted Indicates that Simplex Ring volume is set to 0 and Duplex Ring volume is set to more than 0.
	Duplex Ring Muted Indicates that Duplex Ring volume is set to 0 and Simplex Ring volume is set to more than 0.
	Vibrate On – MTH800, MTP850 Indicates that the terminal will vibrate to alert you of an incoming call.
	Vibrate and Ring – MTP850 / Vibrate then Ring – MTP850 Indicates that the terminal will vibrate and/then ring to alert you of an incoming call.
	Speaker Off (Low Audio) Indicates that the audio will sound through the earpiece. (See detailed explanation of Speaker Control key.)
	Low Audio Indicates that the audio mode is changed to low.
	High Audio Indicates that the audio mode is changed to high.
	Earpiece Connected Indicates that the earpiece is connected.
	RUI Pseudo Log On Indicates that the user is pseudo logged on.
	Battery Strength Shows the charge in your battery. Full icon is full charge.
	Hi RF Power Indicates the High RF Power is enabled. Shows the signal strength. More bars indicate a stronger signal.
	Emergency Appears while the terminal is in Emergency Mode.
	List Scrolling Displayed to indicate that the Rotary Knob use is list scrolling, as long as this use is selected.
	New Message Has Arrived Indicates a new message just arrived.
	New Message(s) in Inbox Indicates that you have unread messages in your inbox.
	Dual Control Head Mode Indicates that Master and Slave Control Head are powered on and connected.
	Single Control Head Mode Indicates that Slave Control Head is switched off.
	Dual Control Head Link Error Indicates that Slave Control Head is unavailable as a result of connection error or powered off.
	Dual Control Head Key Press Token Indicates by blinking that key press token is reserved by one of the Control Heads.
	Man Down Active (Blue) Indicates that the Man Down feature is active.
	Man Down Alert (Red) Displayed when the Man Down feature is active. This icon has two states: Blinking – pre-Alert; the terminal signals Man Down conditions. To exit the pre-Alert state, change the conditions or press the PTT button. Solid – the terminal entered the Alert mode.



Status Icon	Description
	Man Down Failure Indicates the Man Down device failed.
	End-to-End encryption (E2E) Solid - E2E encryption mode is On <ul style="list-style-type: none"> • for the selected talkgroup, • for the highlighted talkgroup in the talkgroup list, • for the highlighted private number, • for the manually entered private number, • when transmitting voice in Group Calls, • when transmitting voice in Simplex Private Calls. Blinking - E2E encryption mode is On <ul style="list-style-type: none"> • when receiving voice in Group Calls, • when receiving voice in Simplex Private Calls, • during encrypted Duplex Private Calls. No Icon - Icon is cleared <ul style="list-style-type: none"> • when E2E encryption mode of the call, highlighted group or private number is Off.

Table 3-7 Status Icons

4.2 Menu Icons











Menu Icon	Description
	Main Menu Items/Context Sensitive Menu Appears if the main menu items/context sensitive menu are active.
	Messages <ul style="list-style-type: none"> • Send status messages • Send short text messages (free text or according to user defined or predefined templates) • Receive messages in inbox
	Contacts Add, search, edit, or erase entries in the contact list.
	Security Lets you turn On/Off and verify security features, and change passwords.
	Setup Allows you to customise your terminal.
	More... Contains more customisable menu items.
	Scroll Bar Indicates navigation among items that occupy more than one screen. If all items appear in one screen, the scroll bar is empty.

Table 3-8 Menu Icons

4.3 Inbox Icons

Inbox Icon	Description
	Unread (New) Message Indicates that you have not read the message yet.
	Read (Old) Message Indicates that you have read the message.
	Sender Information in Message View Indicates sender information (name or number).



Inbox Icon	Description
	Time and Date Stamp in Message View Indicates the time and date of message arrival.
	Delivery Status Received Indicates delivery status for Store & Forward messages.

Table 3-9 Inbox Icons

4.4 Outbox Icons




Outbox Icon	Description
	Delivery in Progress
	Delivery Accomplished
	Delivery Failed

Table 3-10 Outbox Icons

4.5 WAP Box Icons







Contact Icon	Description
	New SI Message
	New SL Message
	WAP Message
	WAP Message Title
	WAP Message Created
	WAP Message Expiration

Table 3-11 Contact Icons

4.6 Contact Icons








Contact Icon	Description
	Private ID Number
	Mobile Phone Number
	Home Phone Number
	Work Phone Number
	PABX Number
	Other Phone Number
	Pickers Indicate more than one number is stored with the contact.

Table 3-12 Contact Icons**4.7 Text Entry Icons**







Primary Icons	Secondary Icons	Description
abc 1	abc 2	TAP—no capitals
Abc 1 ↑	Abc 2 ↑	TAP—capitalise next letter only
ABC 1 ↑	ABC 2 ↑	TAP—all capitals
abc 	abc 	iTAP—no capitals
Abc 	Abc 	iTAP—capitalise next letter only
ABC 	ABC 	iTAP—all capitals

Table 3-13 TAP/iTAP Icons

Numeric Icon	Description
123	Enter numbers

Table 3-14 Numeric Entry Icons


Symbolic Icon	Description
	Enter punctuation and symbols

Table 3-15 Symbolic Entry Icons

5 MMI Features

The Man-Machine Interface (MMI) requirements are specified in this document in general terms.

5.1 Modeless Operation



NOTE

The following section is not applicable to TCR1000.

The terminals provide access to all services from the main idle display. There is no need to select a mode before making a call.

5.1.1 Idle Display

The idle display contains:

- Icons on the top line
 - Many status icons are displayed at one time
 - Portable Terminals - The battery level icon is displayed at all times.



NOTE

The terminal periodically repeats the audible and visible indication of low battery.

- The signal level icon is displayed in:
 - TMO at all times
 - DMO only when voice is received in a group call
- Portable Terminals - Up to 5 lines of text:
 - Line 1: Network status or network identification ('No Service' or MCC/MNC or MCC/MNC alias)
 - Line 2: Selected Group Folder
 - Line 3: Selected Group
 - Lines 4,5: Home Mode Display (if available) (see Paragraph 7.5.1 "Home Mode Display")
 - Line 5: Time and Date (if available)



NOTE

In case the Time and Date information for a specific language can not be displayed in one line in Zoom or Standard mode, the Time and Date is displayed in two lines and overwrites the second line of Home Mode Display if any.

- Softkey labels and optional menu icon on the bottom or right-side line
- An optional wallpaper background

5.1.2 Stored Number Access

The user is able to select any target destination from the idle display quickly and easily.

5.1.2.1 Talkgroup Scrolling

Pressing **Left** or **Right** or scrolling via the rotary in list scroll mode (see section 5.3 "Rotary Knob" on page 4-23) on the idle display scrolls through the talkgroups and allows the user to choose a new selected group.

5.1.2.2 List Access

On the idle display, the user will have easy access to stored target lists:

- Pressing **Up** accesses the favorite talkgroups list,
- Pressing **Down** accesses the recent calls lists
- Pressing **Send** accesses the last dialed numbers list
- Pressing the **Contacts** softkey accesses the address book

5.2 Navigation Key



NOTE

The following section is not applicable to TCR1000.

The multi-function navigation key enables moving around the menu hierarchy, scrolling lists, scrolling groups, can be used for alphanumeric text editing. Depending on the terminal model (that is, Limited Keypad terminals) can be used for the One-Touch Button feature.

5.3 Rotary Knob



NOTE

The following section is not applicable to TCR1000.

The terminal has the Talkgroup Rotary Switch which is used only for the talkgroup selection.

5.3.1 Knob Physical Characteristics

The multi-function Rotary Knob has fixed positions where the user can feel a click on each position change, but it has no barrier to stop the user from rotating the knob more than one revolution ('end-stop'). On top of the rotary is a clickable push-button.

5.3.2 Knob Operation

The Rotary Knob can operate in one of the following 3 modes:

- Volume only
- List scroll only
- Dual mode - Volume/List scroll

Users can select the mode from the menu.

In volume only operation, the rotary will be used for setting the volume level and will not be used for list scrolling.

In list scroll only operation, the rotary will be dedicated for list scrolling only and will not be used for setting the volume level. In this case, the programmable side-buttons will be used for volume control.

In dual mode operation, the rotary will be used primarily as a volume control, but can be temporarily put into list scroll mode by pressing on the rotary push-button. The rotary will remain in list scroll

mode while the user scrolls and will then return automatically to volume control mode after being inactive for a provisioned amount of time.

A list scroll icon will appear while list scroll mode is active, so that the user can know which mode the rotary is in. In addition, when the rotary returns automatically to volume control, a tone will be heard.

5.3.3 Blind Talkgroup Operation ('End-Stop' Simulation)

The Rotary Knob can be configured to operate with non-continuous scrolling for blind Talkgroup selection.



NOTE

The following settings are applicable also to the Navigation Keys talkgroup scrolling.

Users can select the operation mode from the menu. The available options for the Range Scroll Type are:

- Stay In Range
- Scroll To Next

If the mode is set to Stay In Range after reaching end of range, scrolling stops.

If the mode is set to Scroll To Next, scrolling will cyclically go through all talkgroups in range.

5.3.4 Rotary Knob Scrolling and Wrap Around

Scrolling behavior for the Rotary Knob is dependent on range scroll type and wrap around settings. The wrap around defines whether the scrolling stops at the bottom of the talkgroup list, whereas scroll type defines whether scrolling should stay in range or go to the next range.

For example, with the wrap around enabled and the scroll type set to scrolling to the next range, the scrolling returns to the first talkgroup in the first folder, when the user reaches the very last talkgroup in the last folder.

5.3.5 Rotary Lock

The purpose of this feature is to prevent any unwanted effects of an accidental rotation of the knob.

The Rotary Lock can be configured from the menu. The available settings are:

- Locked
- Unlocked
- Disabled

If the Rotary Lock is set to locked, the rotation of the knob will cause no effect on volume or list scrolling. The user can change the lock state either from menu or by a long press on the Rotary Knob.

If the Rotary Lock is set to unlocked, the rotation of the knob sets the volume or starts list scrolling depending on the knob operation (see "Knob Operation" on page 3-23). The user can change the lock state either from menu or by a long press on the Rotary Knob.

If the Rotary Lock is set to disabled, thus the Rotary Knob is unlocked. As the Rotary Lock is disabled the user cannot change the lock state.

5.3.6 Talkgroup Select Confirm

When using the rotary to scroll through groups, users can choose using the menu whether a group is automatically selected after the knob is inactive for a number of seconds.

The Confirm Talkgroup Selection menu enables to turn on or off this automatic selection.

If Confirm Talkgroup Selection is set to On the user explicitly confirms the selection.

If Confirm Talkgroup Selection is set to Off the group is selected automatically.

5.3.7 Rotary Knob Interaction

5.3.7.1 Function Keys

Function Keys can take over the volume adjustment functionality from the Rotary Knob. This behavior is set via the Function Keys sub-menu. The following options are available:

- Auto
- Volume Adjustment
- OTB Feature

When the Auto setting is chosen the Function Keys behavior depends on the Rotary Knob mode set. If the mode is set to Dual or Volume then the Function Keys switch to the OTB functionality assigned and if the mode is set to Scrolling then the Function Keys switch to the volume adjustment.

When the Volume Adjustment setting is chosen the Function Keys adjust the volume.

When the OTB Feature setting is chosen the Function Keys have the OTB functionality assigned.

5.3.7.2 Keypad Lock



NOTE

The following section is not applicable to MTM5400 and MTM800 FuG terminals.

The Rotary Knob lock state is set independently from the other keys. Users can decide on how the Keypad Lock (see “Keypad Lock” on page 3-30) should influence on the Rotary Knob. This behavior is set via the Rotary Knob In Keypad Lock sub-menu. The following options are available:

- Lock None
- Lock Volume
- Lock Scroll
- Lock Both

If the Lock None option is set the Rotary Knob is not locked with the other keys when the Keypad Lock is activated.

If the Lock Volume option is set then volume adjustment using the Rotary Knob is disabled when the Keypad Lock is activated whereas talkgroup scrolling using the Rotary Knob is enabled.

If the Lock Scroll option is set then talkgroup scrolling using the Rotary Knob is disabled when the Keypad Lock is activated whereas volume adjustment using the Rotary Knob is enabled.

If the Lock Both option is set then the Rotary Knob is locked with the other keys when the Keypad Lock is activated.

5.4 Speaker/Earpiece



NOTE

This section refers to Portable Terminals only.



NOTE

The following section is not applicable to TCR1000.

Each terminal has two separate microphones. One located at the top of the unit for dispatch (simplex) operation, and the second located on the bottom of the unit for full duplex calls.

The terminal provides a special proprietary feature that allows the user that is using the speaker phone to interrupt the talking party.

The terminal has a dedicated speaker control key for the user to listen to simplex (group and private) calls via the earpiece and to switch between earpiece and speaker.

Type of Call	Menu Setting	Key Use
Simplex call (Group*/ Private)	Menu > Setup > Audio > Audio Toggle > Spkr Cntrl	Speaker On/Off for Group and Private Calls
	Menu > Setup > Audio > Audio Toggle > Always Loud	Speaker On/Off for Private Call
Duplex call (Private/Phone/ PABX)	-	Controls speaker/earpiece of the on-going call

* In an Emergency Group Call, the voice sounds from the speaker regardless of the speaker setting.

Table 3-16 Speaker Control Key Behavior

While Ambience Listening is active or while being in the Covert mode the user cannot switch to the high audio mode by pressing the Speaker Control Key.

5.5 Volume Control



NOTE

The following section is not applicable to TCR1000.

If the Volume Control Mode is set to Individually Controlled, the terminal user is able to adjust the following volumes individually:

- Duplex (Alerting volume at incoming Phone/PABX- or Duplex Private call)
- Simplex (Alerting volume at incoming Simplex Private call)
- Earpiece (Voice audio volume in the internal or external earpiece)
- Speaker (Voice audio volume in the speaker)
- Keypad (Keypad tones volume)

The adjustments are made for the volumes within the ranges defined in the audio mode. Simplex and Duplex calls use the same range. All other volumes are fixed for each audio mode.

If the Volume Control Mode is set to Commonly Controlled the terminal user is able to adjust only all volumes at the same time.

When the Rotary Knob is in the Volume Mode the terminal adjusts the value of the commonly controlled volume along with the audio volume according to the rotation of the knob.

For MTM5400 and MTM800 FuG additionally the volume of the control head accessory earpiece and the external speaker can be adjusted individually. When only the speaker is active, using the rotary knob users control the volume for the speaker. When only the earpiece is active, using the rotary knob users control the volume for the earpiece.

The adjustments are made for the individually volumes within the ranges defined in the audio mode. Simplex and Duplex calls use the same range.

5.6 VOX Control



NOTE

This section refers to MTM800 Enhanced only.

Voice Operating Transmission (VOX) allows a terminal user to transmit voice in a hands-free condition. The feature enables the terminal to automatically key-up upon detecting audio and automatically de-key when audio is no longer present. The VOX control of audio is used when a duplex private call or telephone call uses the fist microphone.

5.7 Whisper Mode



NOTE

This section refers to TCR1000 only.

In situations where talking at normal volumes may be an issue the terminal supports a high sensitivity microphone mode that can be toggled by the user as required. The sensitivity can be set in the CPS to allow users to tailor the feature to their specific requirements.

The covert terminal has a single audio input via the CE connector. The microphone can be fed from the inductive loop or the inductive patch. Although these devices have different audio characteristics the Whisper mode microphone gain delta will be constant.

Whisper Mode can be activated from the TCR1000 RCU Option Button.

5.8 Full and Limited Keypad



NOTE

The following section is not applicable to TCR1000.

The terminals depending on their model are equipped with the Full or Limited Keypad. The Full Keypad models have the alphanumeric keys available. The difference in the feature availability between Full and Limited Keypad models appears when entering numbers or text is considered. Only the Full Keypad models cover all the related features. For the Limited Keypad models some of the related features are limited or restricted (for example, creating a new SDS or editing an existing one is not available but you can send a predefined SDS).

5.9 Soft Keypad

**NOTE**

This section applies to Limited Keypad terminals.

The Soft Keypad is an alternative entry method for PIN, PUK, numbers to call, SDS destination number, and contact names. When the feature is enabled users are able to select small letters, capital letters, digits, and special characters while being in the aforementioned editors (for example, PIN editor). Additionally they are able to create messages, templates, edit contact names, and numbers in stored contacts.

**NOTE**

iTap and autocompletion are not available in this entry mode.

The character selection is available using the navigation key (up and down) and/or by rotating the Rotary Knob. Using left/right navigation keys users are able to highlight character to be edited. Adding new character at the end of the string is triggered by the right navigation key or by pressing the Rotary Knob. To toggle the characters set (A–Z and space or a–z and space or 0–9, punctuation marks and space) users need to press and hold the right navigation key or press and hold the Rotary Knob.

**NOTE**

When the feature is disabled, English capital letters, digits, small letters and set of punctuation characters can be entered using the soft keypad. This enables user to enter PIN, PUK, numbers to call, SDS destination number, and contact names.

5.10 Display Features

**NOTE**

The following section is not applicable to TCR1000.

5.10.1 Colors

**NOTE**

For the CEP400, MTP830, MTP830 S, and MTP830 FuG the color display is an option. By default these terminals are equipped with the greyscale display.

The terminal utilizes colors to highlight certain special situations:

- When the battery is low
- When signal strength is low
- When the terminal is in an Emergency Mode/Call
- When terminal is camped on a cell that is in LST
- When in the Call-Out mode (alert received state, standby state, accept state)

5.10.2 Display Flip



NOTE

This section is not applicable to MTM800 Enhanced and MTM5400/MTM800 FuG.

If this option is provisioned, the terminal provides the user with the ability to reverse the direction of the display, so that the display can be read when holding the terminal upside down. This is sometimes useful for users that wear the terminal on their belt.

5.10.3 Fonts

The terminal has enlarged zoom fonts that the user is able to choose via the menu (Zoom and Extra Zoom, where available).

5.10.4 Backlight

The backlight can be provisioned to operate in one of the following modes:

- Disabled: The backlight does not operate at all.
- Semi-Auto: Pressing a provisioned one-touch button will toggle the on/off state of the backlight. The backlight is also turned off automatically when the backlight timer runs out.
- Auto: Pressing any key will automatically turn the backlight on. The backlight will remain on until the backlight timer runs out, or if a provisioned one-touch button is pressed to turn it off

The user can also toggle between the modes via the menu.

5.10.5 Screen Saver

The terminal supports a provisioned option to display a screen saver when the terminal has been idle for a provisioned period of time, or when the user explicitly activates it.

The screen saver consists of an image, which can be provisioned from any GIF image, and a text string which can also be provisioned.

When the screen saver is being displayed, any key input by the user or incoming service will cause the screen saver to be deactivated.

5.11 Covert Mode



NOTE

The following section is not applicable to TCR1000.

The Covert Mode feature is designed to give to the user ability to completely shut down all visible and audible alerts and notifications effectively making the terminal unnoticeable even in a silent and dark environment.

When the terminal is in the Covert Mode, the user cannot enter the following submenus of the Setup menu:

- Vibrate
- Set Volume
- Tones
 - Backlight (in Display submenu)

For portable terminals, when the Covert Mode is turned on

- all tones are set to off (corresponding to All Tones menu entry)
- group audio is set to Speaker Controlled (corresponding to Audio Toggle menu entry)
- the private speaker is set to Off (this causes all the calls are routed via Earpiece)
- backlight is set to Disabled (corresponding to Backlight menu entry)
- the LED indicator switches off

For mobile terminals, when the Covert Mode is turned on

- all tones are set to off (corresponding to All Tones menu entry)
- group audio is set to Speaker Controlled (corresponding to Audio Toggle menu entry)
- the private speaker is set to Off
- the dimmer state is set to covert (this state is not selectable using the Dimmer Button)
- the wallpaper is disabled
- the screen saver is disabled
- the covert mode color palette is activated

The terminal powers up in the mode set prior to powering down, hence the terminal powers up in the Covert Mode if this was set before the power down.

When the Covert Mode is turned off all the changed settings are reverted to the previous state (that is, before entering the Covert Mode).



NOTE

The following settings apply to MTM800 Enhanced, MTM5400, and MTM800 FuG only.

If covert mode is used with the mobile terminal, then a 'low audio' accessory should be connected to the terminal. The correct low audio accessory is the GCAI Handset if connected to the control head, or the older style handset connected by the junction box via the rear accessory connector.

5.12 Configurable Menu Tree



NOTE

The following section is not applicable to TCR1000.

The Configurable Menu Tree feature allows the user to define which menu entries should be visible in the terminal menu when in operation to ensure easy access to critical or needed features.

The CPS displays the terminal menu tree with a check box for each item. The menu item is visible in the terminal menu if the respective check box is enabled in the CPS as described in section 27.4 "Menu Configuration" on page 4-163.

5.13 Keypad Lock



NOTE

The following section is not applicable to TCR1000.

The user is able to lock the keypad to prevent accidental pressing of keys. The keypad Lock and Unlock can be invoked via the menu or via a predefined menu shortcut (by default **Menu**, * for full keypad terminals, **and Menu**, **Left** for limited keypad terminals).

By default, while the keypad is locked, all front and side keys (including **PTT**) are inoperative with the exception of the **Power** and **Emergency** buttons. The behavior of the **PTT** button (that is, whether it should be locked by the keypad lock) can be changed via the CPS.

When an incoming Emergency call is received, the **PTT** button automatically unlocks for the period of the call duration.

When the keypad is locked one of the following is displayed:

- Nothing - no notification is displayed.
- Notification Only - "Keys Locked" is displayed.
- Notification and Instruction - "Press Menu and * to unlock" is displayed.

The displayed option can be chosen in the codeplug. By default this is Notification and Instruction.

5.14 Automatic Keypad Lock



NOTE

The following section is not applicable to TCR1000.

The Automatic Keypad Lock is the feature enabling the terminal to lock its keypad automatically after a defined period of time. The terminal provides a user with an option to activate or deactivate the feature from the MMI.

If the feature is enabled, after a defined amount of time with no action from the user, the keypad locks automatically. (Any user activity restarts the Automatic Keypad Lock timer.)

When keypad locks automatically, the following notification is displayed „Keypad auto locked.”

The user is able to change the time value required for the terminal to lock automatically via the MMI.

5.15 Dialing Methods



NOTE

The following section is not applicable to TCR1000.

The terminal supports multiple methods for selecting a number for an outgoing call.

5.15.1 Direct Dialing

The direct dialing provides the terminal user with a possibility to dial a number prior to entering the mode (modeless operation for all types of calls). The user starts dialing from the idle display. The default call type is suggested to the user. The user is provided with a possibility to change call type.

5.15.2 Talkgroup Dialing by Index



NOTE

This section does not apply to Limited Keypad terminals.

The talkgroup dialing by index allows to make a call from a terminal to a Talkgroup by using a Talkgroup's Speed Dial number (in other words the Talkgroup ID or Index). Usually, a terminal user would scroll through a list of Talkgroups to find the one and make a call. With the Talk Group Dialing by Index option enabled, a terminal user can use the keypad and enter the Talkgroup's Speed Dial number followed by the star (*) key.

For example, to call a Talkgroup which ID is 19, a terminal user enters **1, 9**, and * from the keypad and then presses the PTT button.

5.15.3 Scroll Method

Scrolling keys are used to scroll back and forth through the contact list or talkgroup/folder names.

If the rotary is provisioned for list scrolling, the user will be able to scroll through the currently focused list using the rotary.

5.15.4 One-Touch Button Method

If one-touch button method is provisioned, the user can call an individual by pressing and holding down one of the programmable buttons, as described in Paragraph 5.21 "One Touch Buttons".

5.15.5 Call History Re-dial

The user can re-dial numbers from the Call History Stack (see Paragraph 5.16 "Call History").

5.15.6 Dialing Scheme

The private ID number is a number with up to 16 digits. If the user enters less than 16 digits, the ISSI (Individual Short Subscriber Identity) part is padded to full ITSI (Individual TETRA Subscriber Identity) with leading zeros. The private ID number consists of MCC (Mobile Country Code), MNC (Mobile Network Code) and ISSI.

MCC	MNC	ISSI
16-14	13-9	8-1



NOTE

For the MNC of a Private ID (digits 13-9) values from 00000 to 16383 are accepted.

Two options are given to the user:

- Fixed - user may provide up to 16 digits which include the MCC, MNC and ISSI numbers or if less than 16 digits are entered, it will be filled with the digits that are set by the service provider.
- Automatic - you need to provide up to 8 digits. If the user provides more it will switch to fixed mode. If the user provides less than 8 digits, the terminal fills the rest of the number with its own ISSI. The rest of the 16 digit number is automatically given by the terminal.

If the users try to enter more than 16 digits, they will be warned about an incorrect input.

5.16 Call History



NOTE

The following section is not applicable to TCR1000.

A Call History stack is provided which consists of the following.

- Last dialled numbers
- Missed call numbers
- Answered (Received) call numbers

Additionally for the recent calls the time when a call was established and the call duration is available.

The Call History stack holds private TETRA IDs as well as phone and PABX numbers.

Numbers from the stack may be viewed, selected and called. However, outgoing duplex calls from Recent Calls list display during DMO are not allowed.

When the user scrolls through the lists the entries will appear to the user in the opposite order from which they were received (most recent shown first). When a call is made to a number that already exists in the last dialed list, that number will not be duplicated in the list, but it will be moved to the beginning of the list. However, 'missed call' and 'received' entries will be duplicated in the missed/received calls list.

The call history lists are stored in the terminal's non-volatile memory and will be available to the user after next power up.

The user is provided with the ability to save a number in the call history stack to the address book.

When a call is received and is unanswered, the user will be shown that a call was missed.

5.17 Periodic Alert



NOTE

The following section is not applicable to TCR1000.

The periodic alert feature periodically notifies (using an audio tone, or vibration, and LED indication) the terminal user of: missed calls, unread messages (including WAP messages), low battery level. The alerts can be switched on and off by the user via MMI. The period time between the indications can be set by the user via MMI.

5.18 Unified Address Book (Contacts)



NOTE

The following section is not applicable to TCR1000.

The terminal offers an address book facility, where multiple numbers are associated with a single name tag. This presents an interface to the address book and provides a natural way to call an individual who can be contacted in different ways.

Each individual can have up to 6 associated numbers:

- Private (a TETRA ISSI)
- Home (phone number)
- Mobile (phone number)
- Work (phone number)
- PABX (local short number)
- Other (phone number)

The Contact List has a maximum capacity of 1000 Contacts, with up to 1000 associated Private and up to 1000 associated either Phone or PABX numbers distributed amongst the contacts.

The terminals provide editing capabilities to the address book to allow the user to add or delete entries.

The terminal provides the user with the ability to view the number of used and free address book entries.

The Address Book is also accessible via PEI allowing the user to read, write and modify contact list entries using AT commands.

5.19 Audio Features



NOTE

This section is applicable only to MTP850, MTP850 S/MTP850 FuG, MTP830 S/MTP830 FuG, MTP850Ex, MTP810Ex, TCR1000, MTP830, and CEP400.

5.19.1 Feature Overview

There are many situations where the demand of audio quality changes according to the working environment. For example, an airport worker, who works partly in the field where there is lots of noise coming from the surrounding environment and partly inside the airport where there is relatively less noise, may experience different audio quality. In the working environments like this, there is a need of different audio quality and subsequently adaptive audio parameters which can be configured according to the working environment.



NOTE

The following part of this section does not refer to TCR1000.

When accessing the main menu and selecting the Audio item the following three fields will show up: **Audio Profiles**, **Howling Supr** (Howling Suppression), and **Audio Toggle**.

By selecting Audio Profiles, the user will have a choice to select an audio profile among the available ones.

5.19.2 Audio Profiles

An audio profile is a profile that adjusts the audio parameters of the terminal so that it can be changed to fit its current operating environment. The following parameters can be changed in an audio profile according to a particular working environment:

- Receive and transmit gains
- Receive and transmit EQ filters
- AGC, Echo Canceller and RX/TX Noise suppressor
- Tone volume

The Audio Profiles are created from the templates provided by Motorola. Several audio profiles can be created based on the same template to serve the different purposes.

5.19.2.1 Templates and Profiles



NOTE

The following section is not applicable to TCR1000.

There is a clear distinction between an audio template and an audio profile. Audio templates are provided by Motorola with each template have a range of default values which customers can adjust. The customer can use the audio template in order to create audio profiles for their own use.

5.19.2.2 Templates Provided by Motorola



NOTE

The following section is not applicable to TCR1000.

Generic audio templates and customer specific templates are provided by Motorola. Each template has different ranges of audio parameters. These five generic Motorola templates shall always be available.



NOTE

Several Audio Profiles can be created based on the same template to cater to different use cases for example:

- Outdoor, handheld
- Outdoor, shoulder worn

5.19.2.3 Audio Templates Names and Availability



NOTE

The TCR1000 uses only two audio profiles named: Normal and Whisper (respectively for Normal operation and Whisper mode).

Template Name	MTP850	MTP850 Ex MTP810 Ex	MTP850 S MTP850 FuG MTP830 S MTP830 FuG	CEP400 MTP830
General Purpose	X	X	X	X
Indoor	X	X	X	X
Outdoor, Noisy type 1	-	X	-	-
Outdoor, Street use	X	-	X	X
Outdoor, Harsh type 1	X	X	X	X
Outdoor, Harsh type 2	X	X	X	X
Outdoor, Noisy type 2	-	X	-	-
Outdoor, Noisy type 3	-	X	-	-
Extended Gen Use 1	-	-	X	-
Extended Gen Use 2	-	-	X	-

Table 3-17 Audio Templates Names and Availability



NOTE

Audio templates “Extended Gen Use 1” and “Extended Gen Use 2” use the extended TX AGC range (from -15 dB to + 8dB) whereas the remaining audio templates use the existing TX AGC range (from -7 dB to +8 dB).

When the user selects a profile based on audio templates “Extended Gen Use 1” or “Extended Gen Use 2”, the terminal uses the extended TX AGC range.

When the user switches to any other profile, the terminal uses the existing TX AGC range.

5.19.2.4 Maximum Number of Customer Specific Templates



NOTE

The following section is not applicable to TCR1000.

There can only be one customer specific template enabled at a time. The CPS user can create a maximum of five audio profiles.

5.19.2.5 Creating an Audio Profile Based on the Template



NOTE

The following section is not applicable to TCR1000.

The CPS user has the ability to create an audio profile from one of the five available templates provided by Motorola. If the customer-specific template is enabled, then the available templates are six.

5.19.2.6 Enabling/Disabling an Audio Profile



NOTE

The following section is not applicable to TCR1000.

The CPS user has the ability to enable/disable an audio profile in the CPS.

5.19.2.7 Assigning the Aliases to Audio Profile



NOTE

The following section is not applicable to TCR1000.

The CPS user gives an alias/name to a particular profile configured in the CPS.

5.19.2.8 Maintaining Independent Audio Profiles



NOTE

The following section is not applicable to TCR1000.

The audio profiles are created and maintained independent of each other. Creating or modifying one audio profile does not have any impact on the others.

5.19.2.9 Switching From One Audio Profile to Another

The terminal provides the user the ability to switch from one audio profile to another through the menu or using a dedicated button (One Touch Button or Option Button for TCR1000). Once the terminal user has selected an audio profile, all the audio parameters of previous profile shall be overwritten by that of the current one.

5.19.2.10 Modifying an Audio Profile

The CPS user has the ability to modify an audio profile by changing some of the audio parameters in CPS.

5.19.2.11 Modifying the Audio Parameters of an Audio Profile

The CPS user has the ability to change the audio parameters in order to modify an audio profile in the CPS. The subject to the change are for example: Mic Gain, Speech Volume, AGC, Voice Filters,

and Alert Tones Volume. The full list of the parameters specific to particular terminal is available in the Audio Parameters node of the audio profile.

5.19.2.12 Extended Transmit Automatic Gain Control (TX-AGC)

The following section is not applicable to TCR1000.



NOTE

The Extended Transmit Automatic Gain Control (TX-AGC) provides users with more flexibility in terms of operating environment. The extended TX-AGC allows to transmit from a terminal both indoor (for instance, in an office environment) and outdoor (for instance, in a busy street) without having to change profile and still providing normalized sound levels to the receiving party.

The following audio templates make usage of the Extended Tx-AGC feature: Extended Gen Use 1 and Extended Gen Use 2. The Extended Gen Use 1 is designed to be used in normal user environments, for example in a noisy street and indoor, whereas the Extended Gen Use 2 is designed to be used in very harsh environments, as for example at a production facility. The templates still guarantee to work in a quiet street.

5.19.2.13 Audio Profile on Power Up

The following part of this section does not refer to TCR1000.



NOTE

Once the terminal has been switched OFF, it remembers the last selected audio profile upon switching ON again.



NOTE

The following part of this section refers to TCR1000 only.

Once the terminal has been switched OFF, the settings are restored to default (Normal Profile) on switching ON again.

5.19.2.14 Selecting an Audio Profile

The terminal provides the user the ability to select an audio profile from the Audio Profiles section of the menu or using a dedicated button (One Touch Button or Option Button for TCR1000).

5.19.2.15 Using Default Audio Parameters in an Audio Profile

An editable check box is implemented in the CPS. By default, it remains unchecked, that greys out some of the audio parameters which means the customers are not allowed to modify them. Checking this box unlocks the locked audio parameters and opens them up for the customer to modify.

5.19.3 Howling Suppression

The following section is not applicable to TCR1000.



NOTE

The Howling Suppression is a mode of operation that increases the stability of the acoustic feed back loop from receiving terminals to the sending terminal in simplex calls so as to avoid howling. The terminal eliminates howling and this may (even preferable) be done either by the menu or via an OTB to enable a special anti-howling function.

5.19.3.1 Howling Suppression Enabled/Disabled



NOTE

The following section is not applicable to TCR1000.

When the howling suppression is enabled, a profile dependant transmit and receive gain offsets is used to minimise the loop gain.



NOTE

The remaining part of this section is applicable only to MTP850 Ex/ MTP810 Ex.

Upon power-up, howling suppression is enabled or disabled depending on the CPS settings.

5.19.3.2 Service and Feature Interaction

If the users are in an active call, then they can change the audio profile.

5.19.3.3 Howling Suppression During an Active Call



NOTE

The following section is not applicable to TCR1000.

If the users are in an active call, then they have the ability to enable/disable the howling suppression.

5.19.3.4 Audio Toggle



NOTE

The following section is not applicable to TCR1000.

The Audio setting shows the following three fields: **Audio Profiles**, **Howling Supr** (Howling Suppression) and **Audio Toggle**. The two options for **Audio Toggle** are **Always Loud** and **Speaker Control**.

5.20 Audio Routing



NOTE

The following section is applicable to MTM5400 only.

The terminal diverts the audio to different connected audio accessories for the incoming and outgoing audio. The audio routing is configured using the CPS (for example, to divert the audio to the call recorder output). Various events, as for example placing an accessory on-hook, affect the audio routing.

5.21 One Touch Buttons

The function buttons (that is programmable side buttons and programmable keypad keys: **0–9**, ***** and **#** where available) provide a possibility to initiate one of the preprogrammed operations when any of the following buttons is pressed for an extended time.

Buttons	MTH800	MTP850 MTP850 S MTP850 FuG	MTM800 Enhanced Accessory	MTM800 Enhanced MTM5400 MTM800 FuG	MTP850 Ex MTP810 Ex MTP830 S MTP830 FuG	CEP400 MTP830
Keys assignable to one-touch functions	0–9 , * and #	0–9 , * and #	Accessory 1-dot and 2-dot	0–9 , * and #	Navigation Key	Navigation Key
Predefined function keys	F1 and F2	F1 and F2	AB1 and AB2	F1 , F2 and F3	F1 and F2	F1 and F2

Table 3-18 Valid One-Touch Buttons

The programming is provisioned in the terminal and is not changeable by end users. The functions that are programmable to these buttons are as follows.

Feature	MTH800	MTP850	MTP850 S MTP850 FuG MTP830 S MTP830 FuG	MTM800 Enhanced MTM5400 MTM800 FuG	MTP850 Ex MTP810 Ex	CEP400 MTP830
Backlight Adjustment	X	X	X	X	X	X
BSI Encryption	-	X	X	X	X	-
Call-Out Fallback Alert Initialization	X	X	X	X	X	X
Change Audio Profile	-	X	X	-	X	X
Change Talkgroup	X	X	X	X	X	X
Change Talkgroup to the Previously Selected Talkgroup	X	X	X	X	X	X
Connect/Disconnect RSM	-	-	X	-	-	-
Covert Mode Toggle	X	X	X	X	X	X
Default Settings	-	-	-	X	-	-
Direct Private Number Dialing (Editor)	-	-	-	-	X	X
Display Mode (Zoom)	-	-	-	-	X	-
Display OPTA	-	X	X	X	X	-
Enter/Exit TXI	X	X	X	X	X	X
Flip Display	X	X	X	-	X	X

Feature	MTH800	MTP850	MTP850 S MTP850 FuG MTP830 S MTP830 FuG	MTM800 Enhanced MTM5400 MTM800 FuG	MTP850 Ex MTP810 Ex	CEP400 MTP830
Gateway Mode	-	-	-	X ⁴	-	-
GPS Report	-	X	X ²	X	-	-
Hi/Lo Audio Toggle	X	X	X	X	X	X
Horn and Light Toggle	-	-	-	X	-	-
Howling Suppression Toggle	-	X	X	-	X	X
Man Down Toggle	-	-	X	-	X	-
Repeater Mode	-	-	X ¹	X ⁴	-	-
Reset to Default Settings	-	X	X ²	-	-	-
RF Power Toggle	-	X ³	X	-	-	-
RMS Mode Enable/Disable	X	X	X	X	X	-
RUI Logon/Logoff	X	X	X	X	-	-
RSM Earpiece Connect/Disconnect	-	-	X	-	-	-
Screen Saver Activation	X	X	X	X	X	X
Scroll Audio Profiles	-	X	X	-	X	X
Sending Status	X	X	X	X	X	X
Sending Targeted Status	X	X	X	X	X	X
Sending User Defined Message (to a designated ID)	X	X	X	X	X	X
Show Universal Time	X	X	X	X	X	X
Speaker Enable/Disable per call	-	-	-	X	-	-
Start a call to a designated Private ID, Phone or PABX number	X	X	X	X	X	X
TMO Talkgroup Scan Toggle	X	X	X	X	X	X
TMO/DMO Switch	X	X	X	X	X	X

Table 3-19 Supported One Touch Button Functions

**NOTE**

- 1) MTP850 S/MTP850 FuG with repeater enabled only.
- 2) MTP850 S/MTP850 FuG only.
- 3) The function is available only for terminals supporting TX Power Class 3L (1.8 W).
- 4) Does not apply to MTM800 Enhanced.

**NOTE**

The TCR1000 uses two predefined function keys, that is the TMO/DMO/Emergency Button and the Option button. These keys depending on the settings enable to toggle:

- TMO/DMO Switch
- Emergency Mode
- TXI Mode
- Whisper Mode

6 Languages Supported



NOTE

The following section is not applicable to TCR1000 due to the lack of the display.

Language	MTH800	MTP850	MTP850 S MTP850 FuG MTP830 S MTP830 FuG	MTM800 Enhanced MTM5400 MTM800 FuG	MTP850 Ex MTP810 Ex	CEP400 MTP830
English	X	X	X	X	X	X
Arabic	X	X	X	X	X	X
Chinese (Simplified)	X	X	X	X	X	X
Chinese (Traditional)	X	X	X	X	X	X
Croatian	X	X	X	X		X
Danish	X	X	X	X	X	X
Dutch	X	X	X	X	X	X
French	X	X	X	X	X	X
German	X	X	X	X	X	X
Greek	X	X	X	X	X	X
Hebrew			X ^a	X	X ^b	
Hungarian	X	X	X	X	X	X
Italian	X	X	X	X	X	X
Japanese		X		X		
Korean	X	X	X	X	X	X
Lithuanian	X	X	X	X	X	X
Macedonian	X	X	X	X		X
Mongolian	X	X	X	X	X	X
Norwegian	X	X	X	X	X	X
Portuguese	X	X	X	X		X
Russian	X	X	X	X	X	X
Spanish	X	X	X	X	X	X
Swedish	X	X	X	X	X	X
User Defined	X	X	X	X	X	X

a. Hebrew is supported by MTP850 S terminals only.

b. Hebrew is supported by the 380 MHz terminals only.

Table 3-20 Supported Languages

In addition to these languages, the terminal provides an option to use a local language where each text string used by the terminal is defined in the codeplug.

CUSTOMER PROGRAMMING SOFTWARE (CPS)

1 Introduction

The TETRA CPS is a Motorola software tool that runs on PCs, Laptop and Desktop computers from **Dell** and **Hewlett Packard** using the following operating systems:

- Windows XP® Professional x32 Edition Service Pack 2 and Service Pack 3
- Windows Vista® Business x32 Edition Service Pack 1
- Windows Vista® Ultimate x32 Edition Service Pack 1
- Windows 7® Professional x32 Edition (for MR10.1 and above, MR9.12 and above; all the older releases do not support Windows 7®)

This tool is used for programming TETRA terminals. Existing users will be familiar with the structure and layout of this CPS version.

The structure of the CPS has been designed so that PC users who are familiar with Windows® will be more comfortable when first using the CPS.

The available menus and the editable option fields will vary by terminal type and how the CPS was opened. There are 2 ways of opening the software, as a User or as an Administrator.

The CPS work screen contains a reset column and if there is a reset button against a Field Value box, the user is able to reset the entered value to the factory default.



NOTE

- A terminal is designed to work on all available TETRA systems and all the features explained in this chapter may either not be available in this software release, or not work on every system.
- Use only Dell or Hewlett Packard PCs, Laptop or Desktop computers.
- Before starting the CPS close all other open software applications.
- Do not try to load a codeplug into a terminal which is not compatible. Use the Copy Wizard which allows to copy codeplug data from one terminal (or from a codeplug or call list data file) into another compatible terminal.

2 Starting the CPS Application

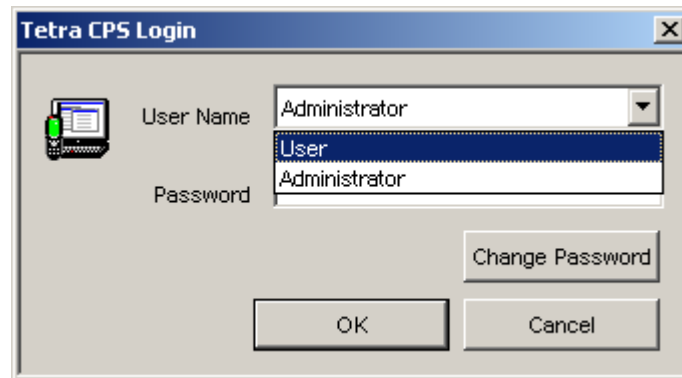


NOTE

Prior to starting the application familiarize with TETRA Terminals CPS Start-up User Guide (Motorola Part Number: 6802974C10).

To start the CPS, either double click on the CPS desktop icon or select through the Start menu.

As the program starts, the password prompt is displayed. Two login options are available as illustrated.



Option 1.

User Name: **User**

Password: **user**

If this login option is used several submenus and entry fields of the terminal's codeplug are not editable.

Option 2.

User Name: **Administrator**

Password: **admin**



NOTE

When this login option is used, only a few factory preset options of the terminal's codeplug are not editable and all other menus options are available.

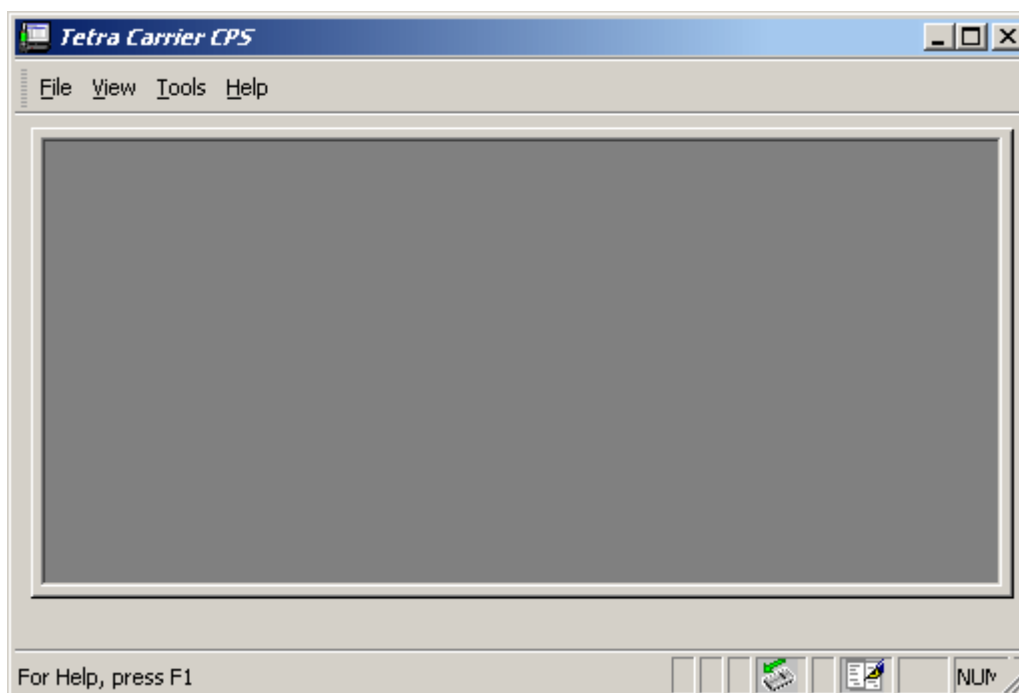
It is possible to change both passwords using the Change Password option before logging in.

After selecting the 'OK' button of the login box, the main window will be displayed and inside of which will be displayed the Motorola TETRA CPS Logo.

'Greyed Out' icons are options that are not available until a terminal's codeplug has been read.

For the purpose of this manual, all the available codeplug fields are described as for the Administrator's login.

2.1 Administrator Opening Window



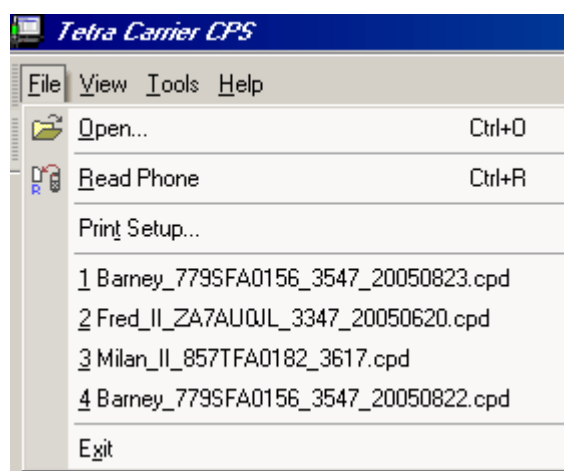
This window shows the title bar with the minimise, restore and close icons at the top. Below this bar the File, View, Tools and Help bar are available, each of which when selected will open to display option menus.

Below the menus, two icon bars on the same line are displayed.

The Main and Phone icon bars are displayed on this line and are selectable, deselectable via the View option menu. Placing the cursor over an icon will cause the icon description to be displayed directly below the icon.

The dark and larger portion of the screen is the main work area and at the bottom of the window is the Status bar, which again is also selectable, deselectable via the View option menu.

2.2 File Menu - with No Codeplug Opened

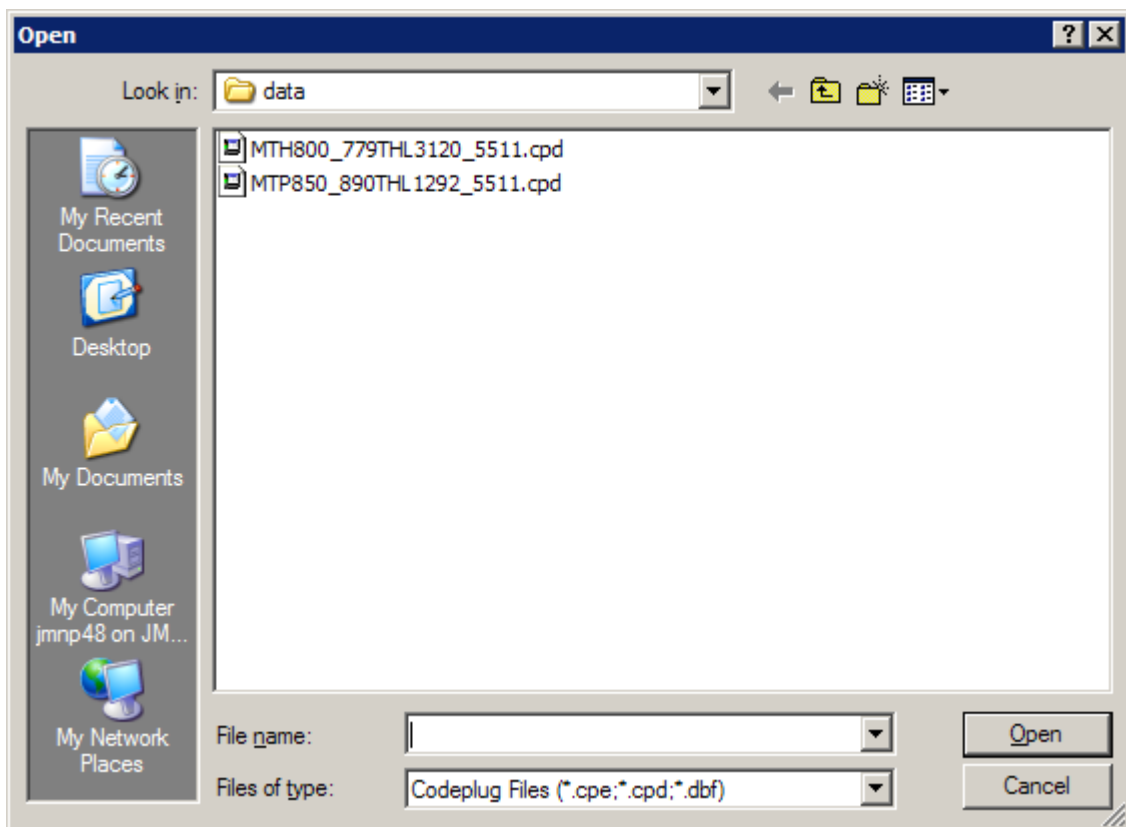


There are 2 submenus associated with the File Menu. The first is shown above and is displayed when no terminal codeplug has been read, or loaded from archive. The options are:

2.2.1 Open

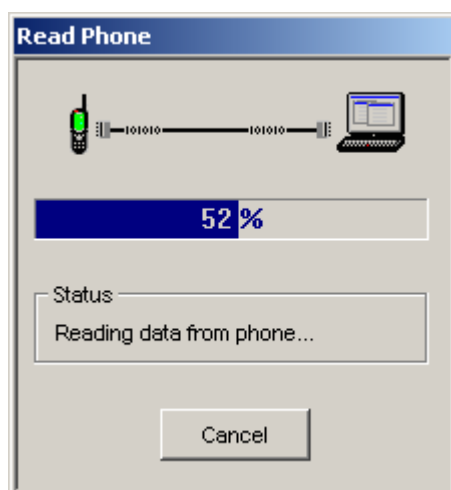
This option allows the user to select a previously archived codeplug.

1. In the File Open dialogue box, navigate to the drive and folder (or directory) where the codeplug file is located.
2. Then double-click the desired file name, or highlight the file name and click OK to complete the task. The codeplug contents will then be displayed in the CPS.
3. If the codeplug file is password protected, the CPS will display the password prompt to allow the correct password to be entered and the file to be opened.



2.2.2 Read Phone

Selecting this option will cause the CPS to read the codeplug of the connected terminal.

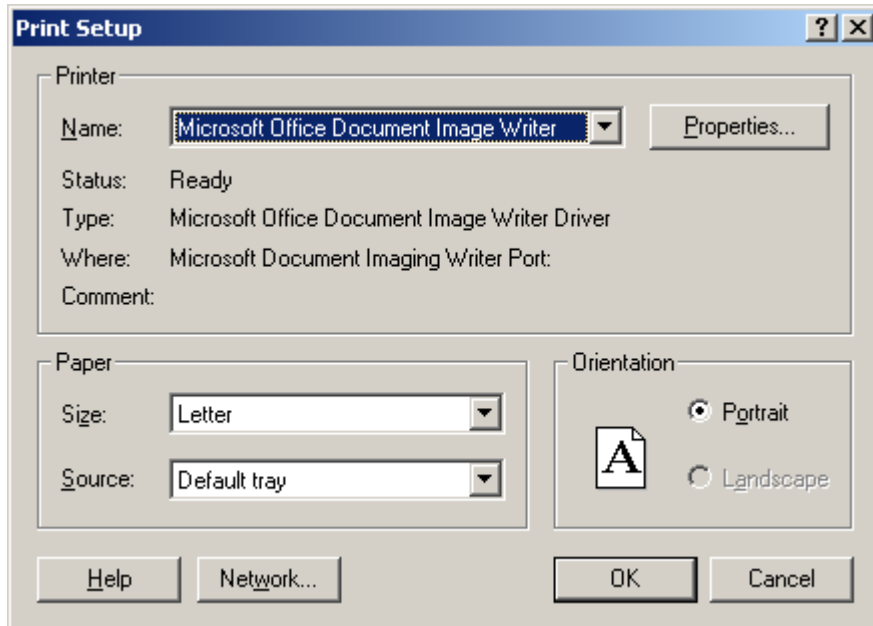


During this process the CPS will establish communications with the terminal (Initializing), verify the codeplug is compatible with this version of CPS (an older version of CPS will not read a newer version of the codeplug) and read it for display in the CPS window work area.

The codeplug is displayed in the 'Tree' format on the left of the screen. The trunk is made up of the available main menu items and as each is selected, it opens its submenus as branches towards the screen centre. The submenus may in turn have submenus that also open to the right of the screen.

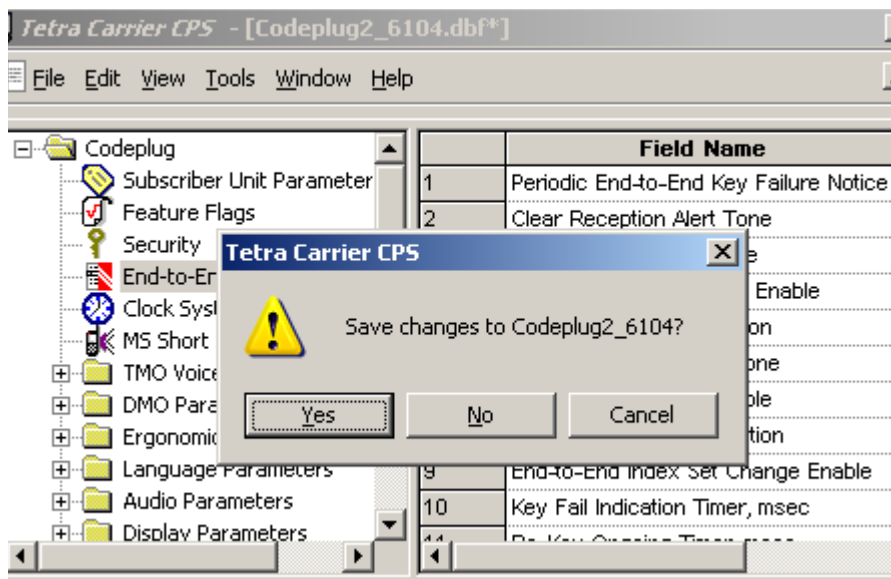
2.2.3 Print Setup

Selecting this option displays the 'Standard' PC print screen option window used for setting the printer parameters.

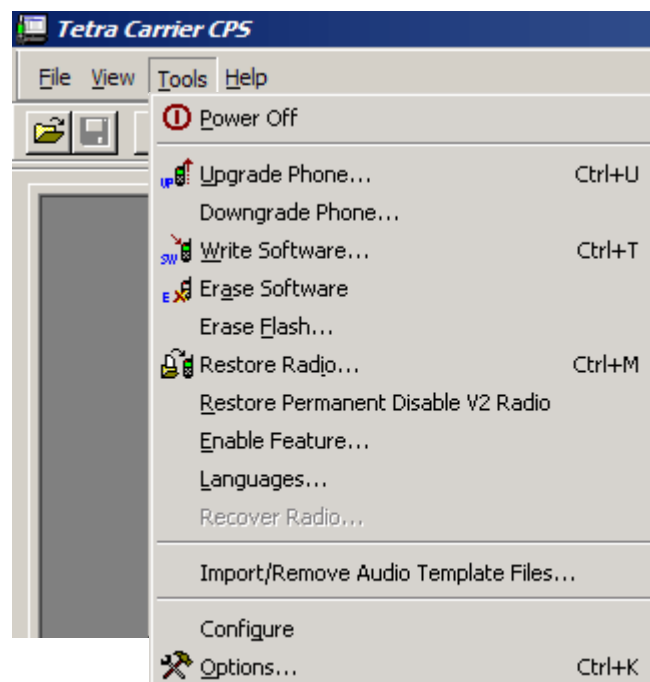


2.2.4 Exit

Selecting this option will close the CPS. If a codeplug is displayed in the work box and has been edited, the user is given three options about saving it.



2.3 Tools Menu - with No Codeplug Displayed



There is one submenu which is only visible with no codeplug displayed:

2.3.1 Enable Feature

Whenever a feature paid flag is disabled, the CPS disables access to the fields belonging to separately priced features.

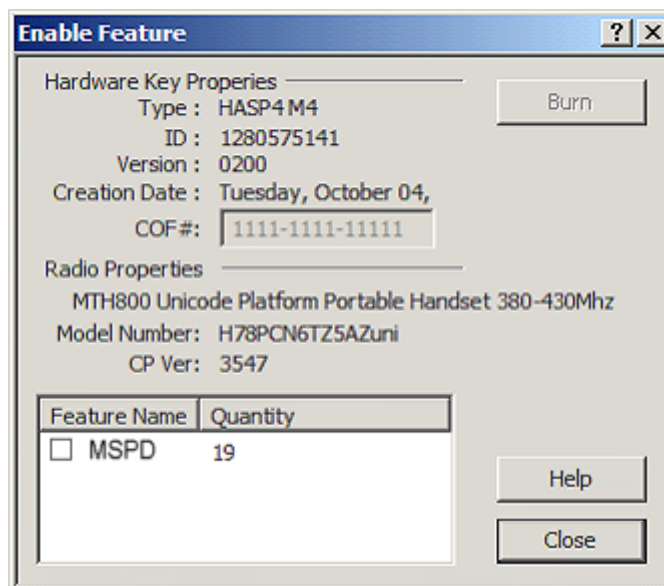
The customer who has paid either for a single feature or for a number of features receives the Feature Enable kit, that is the Customer CPS and an USB dongle ("Feature Enable Dongle") that contains information about the total number of enables per feature.

Feature enabling can be performed on one or more terminals simultaneously – all in one operation.

Proceed as follows:

1. Connect the terminal to the PC as described in the terminal's hardware set-up. The terminal's codeplug contains special block for keeping the list of feature paid flags, each of which corresponds to a separately paid feature.
2. Connect the Feature Enable dongle to the PC.
3. Run the CPS.
4. Enter the Administrator password.
5. Do not read the terminal now!

Select Tools/Enable Feature. The Enable Feature dialogue opens up and displays information related to the dongle and the terminal attached to the currently active port.



6. Enable the check box next to the feature you have paid.
7. Click Burn. Each counter will be decreased each time you enable one of the features you have ordered.
8. The CPS scans communication ports and detects the terminal that is connected to the port. The Operation Results message appears and displays the result of operations per each port. Click Continue button.
9. The CPS will display the operation result for each terminal.

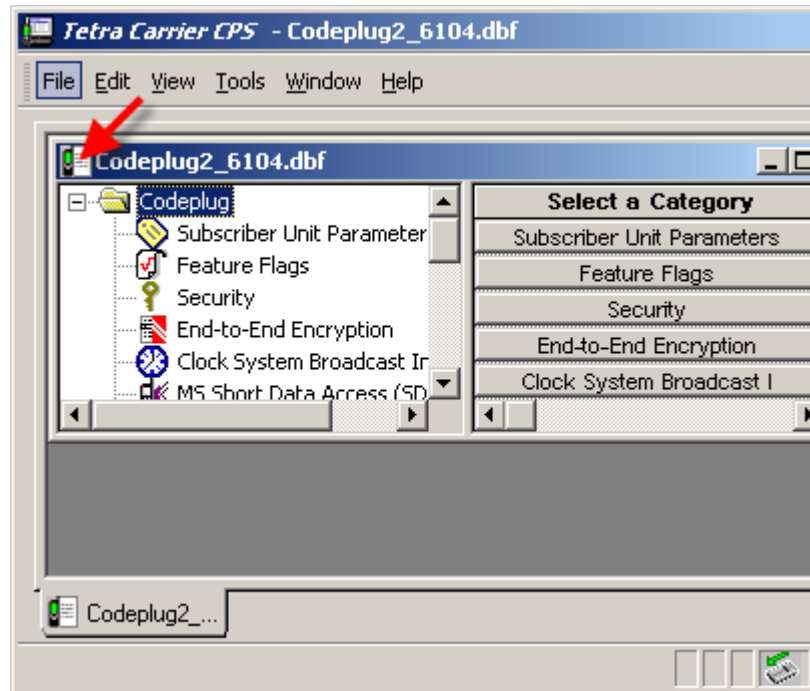


NOTE

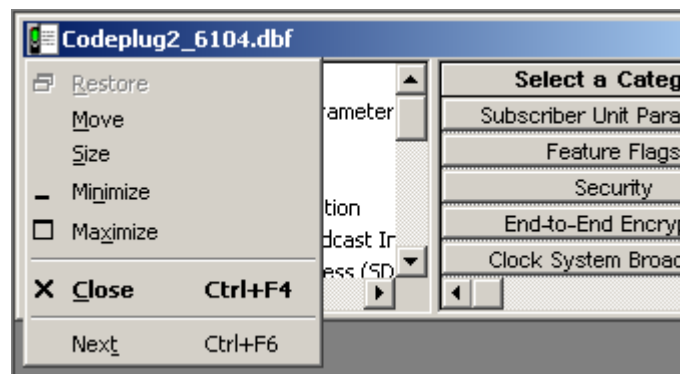
If all paid features are enabled in a dongle and several terminals are connected for simultaneous feature enabling. Some features may not have been paid for some of the terminals or may already have been enabled. The Customer CPS will automatically detect which features were paid or enabled for each terminal and will not decrease the counter.

2.4 Displayed Codeplug File

A new icon is now displayed with the codeplug and if the codeplug is maximized in the work screen, the icon will move to the left of the File option.



This icon, when selected, gives the following options:

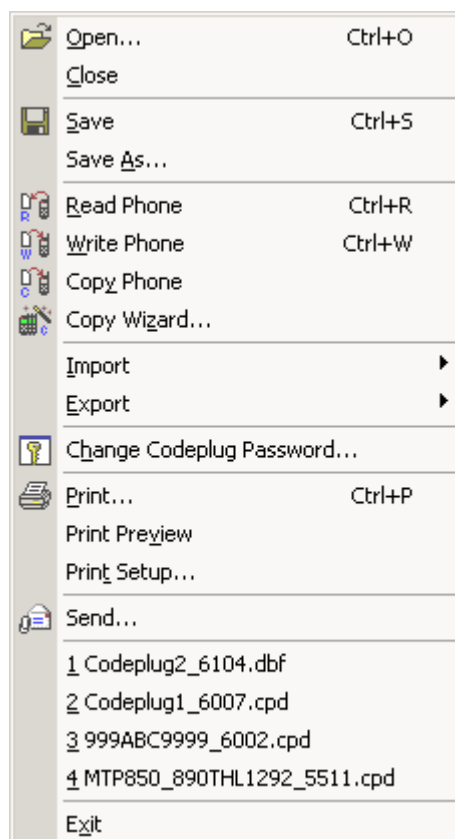


The Restore, Move, Size, Minimize, and Maximize options are used to position or alter the size of the viewed codeplug window. In other words if the window has been maximized, selecting restore will return it to the size it was when first opened.

If two or more codeplugs are displayed on the work screen, selecting the 'Next' option will highlight the next codeplug and make it the current active (for editing) codeplug.

3 File Menu

All the available options with displayed codeplug are displayed below and only additional options will be explained.



3.1 Open

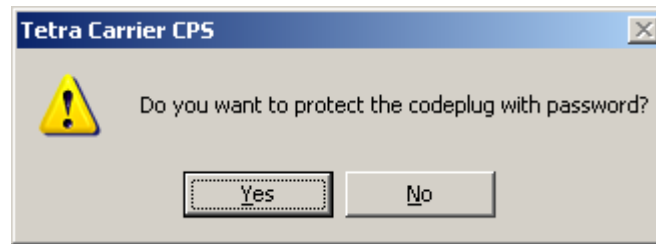
For details see Chapter 4, Paragraph 2.2.1 "Open".

3.2 Close

Selecting this option will close the active codeplug and the user is given the option to save any changes made.

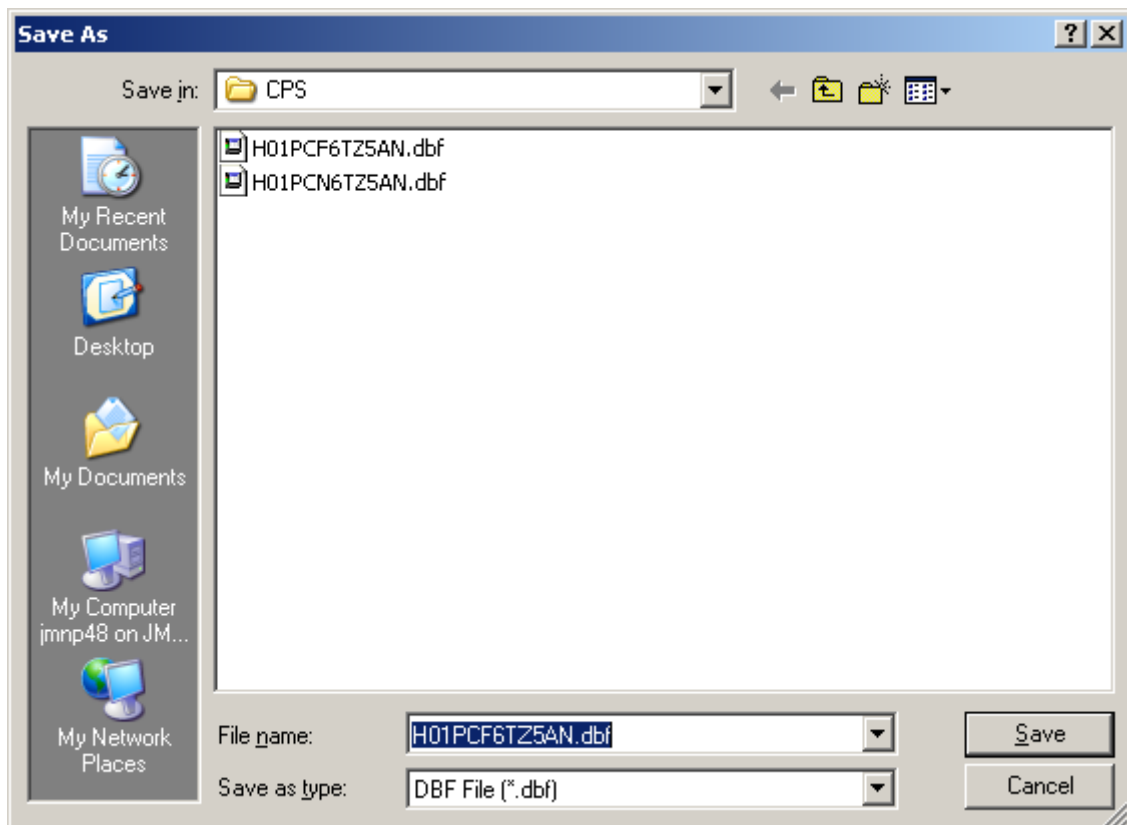
3.3 Save

If the codeplug is already stored in the data folder, then selecting the save option will save changes that are made to the codeplug file on the work screen in the stored file. The CPS will then offer password protection for the stored file.



3.4 Save As

The Save As command enables user to rename a file or change the location of where you save the file. The user can save the file to a new location by using the Save in list or locations saved in My Places bar. To choose a folder, user can use the Save in list. To quickly see most often used locations, the user can use the My Places bar. In order to see more file types, user needs to click the arrow in the Save as type drop-down list.



3.5 Read Phone

For details see Chapter 4, Paragraph 2.2.2 "Read Phone".

3.6 Write Phone

This option is used to Write codeplug data to the terminal. Use this function only to write a codeplug that was originally read from the same terminal, the source and target terminals must be one and the same (else the writing operation will fail with an appropriate message).

The CPS will display a progress bar and status messages as necessary.

CAUTION

Do not disconnect the programming cable from the terminal during the write operation. This will destroy the terminal.

3.7 Copy Phone

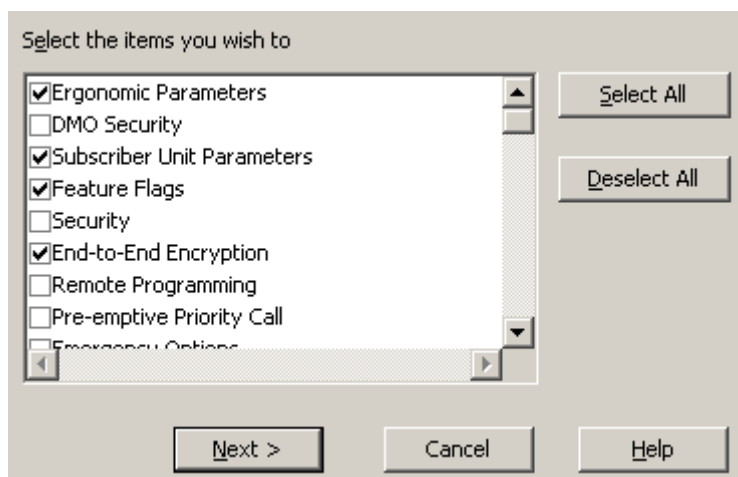
This option will copy the displayed codeplug to a connected terminal of the same model.

3.8 Copy Wizard

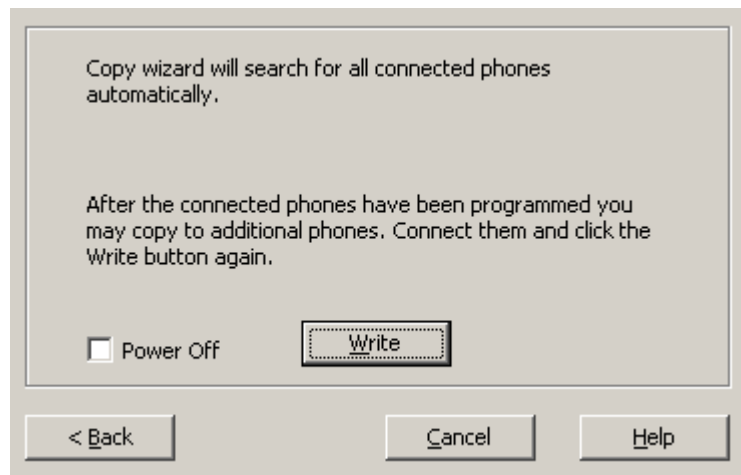
This is a 2 step feature that enables cloning of codeplug data from a master codeplug to one or more terminals of the same model.

Select the codeplug blocks (up to 55) to be copied and write the codeplug data to one or more terminals - all in one operation.

This function is used only for compatible terminal models - that is terminals belonging to the same frequency range and operating in the same network.

**NOTE**

Use Copy Wizard to clone multiple terminals with the same set of codeplug data. The master codeplug is read from the master terminals and activated in the CPS window. Connect the next terminal(s) and click the Write button.

**CAUTION**

Never disconnect the programming cable from the terminal during the programming process, or power off the PC while the codeplug file is in memory. This will cause codeplug data to be corrupted.

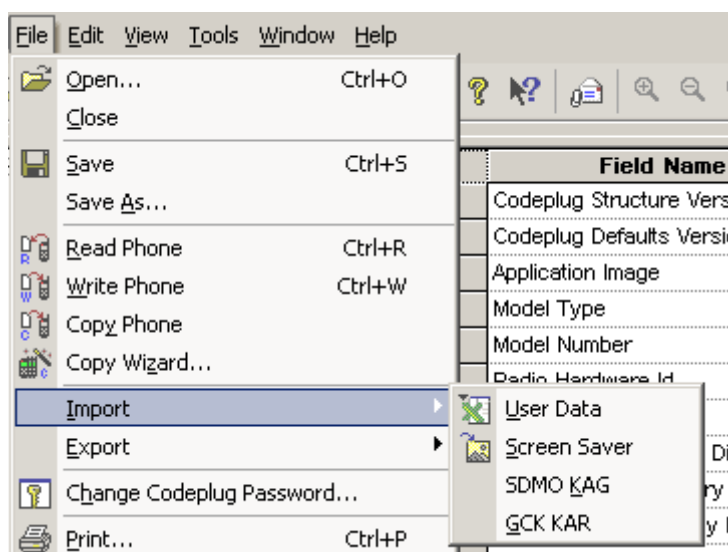
1. Read the master codeplug from the master terminal, or open the master codeplug file from archive.
2. Select File/Copy Wizard. The first Copy Wizard dialogue box will be displayed.
3. Click the appropriate check box to select the items to be copied, or click Select All option.
4. Select the 'Power Off' option, this will automatically reset the terminal after copying.
5. The CPS will automatically search for the connected terminals and will display the connect operation results. Check the connection results and click Ok to start the cloning. The CPS will show the progress of this task per connected serial port(s).

**NOTE**

If task progress is not shown or an error occurs, go through the checklist in Unable to Copy Phone.

6. When the process is complete, click Done to exit the Copy Wizard.

3.9 Import Menu



This option is only available if the 'Administrator' password has been used to open the CPS.

3.9.1 Import User Data

This option is used to import data from a user data file into the active or current codeplug file and importing user data into a codeplug will REPLACE the existing entries.

In the Open User Data dialogue box, select the desired file name and click OK. The application will place the user data in the appropriate fields (for example, phone list entries will appear in the Phone List table).

When reading a user data file, the application will ignore entries and lists that are not valid for the active terminal model.

This is not recommended to use question marks in the alias/name fields of any file.



NOTE

- To create a user data file, open the codeplug file from which to copy the desired data. Then use the Export User Data function to create the file.
- Use the Export and Import User Data functions when you want several terminals to have the same call list data.

3.9.2 Screen Saver

This option is used to import screen saver from a graphic file format to the terminal.

3.9.3 Manual Provisioning of SDMO KAG and GCK KAR

The CPS supports file import of provisioning data describing Secure DMO Key Association Group (SDMO KAG) and GCK Key Association Range (GCK KAR).

Regarding the SDMO KAG, when using the manual data provisioning the CPS modifies the following:

- The existing Key Grouping Method existing CPS DMO parameter according to the SCK Subset Grouping Type value

**NOTE**

A Key Grouping Type of '3 Subsets of 10 keys' is equivalent to a Key Grouping Method of '10K, 3E'.

- The existing Key Group CPS parameter for each corresponding DMO Talkgroup according to the primary SCKN value

Regarding the GCK KAR, when using the manual data provisioning the CPS modifies a new CPS TMO parameter referred in GCK Number for each corresponding TMO Talkgroup according to the GCKN value.

To ensure that non GCK talkgroups are set to default when importing a GCK KAR file, clearing the GCK number for all TMO Talkgroups in the codeplug is required in the first instance. (The default value can be cleared by selecting the from the Codeplug >TMO > Talkgroups > TMO > TMO Talkgroups > GCK number and then selecting Edit and Clear.)

The GCK KAR file(s) can be imported afterwards without clearing the GCK number in the consecutive files (where more than one imported file contains the GCK data).

To import the SDMO KAG, select the Import SDMO_KAG option from the menu and browse for the correct file (for example, SCKN_TO_GTSI.mou). To import the GCK KAR select the Import GCK KAR option from the menu and browse for the correct file (for example, GCKN_TO_GTSI.mou).

3.10 Export Menu

These 3 options are only available if the 'Administrator' password has been used to open the CPS:

3.10.1 User Data

This option is used to save user data to a file by bringing up the Save dialogue box.

Select the types of data to be saved and click the Save button. If no types are selected, the save button is disabled and the file will not be saved, otherwise specify the desired file name, hard drive and directory location and click OK.

**NOTE**

- Make sure the call lists have entries in them before exporting the data. Otherwise, the user data file will be empty.
- If a user extension is not provide to the file name, the application will automatically add this file name extension when it saves the file.
- Use the Export and Import User Data functions when several terminals are required to have the same Call List data.

3.10.2 User Report

This is used to generate a customized user report of codeplug data. The customized report is saved as an *.html file.

3.10.3 Screen Saver

This feature is used to save the screen saver to the hard disk for use in another single terminal or for further graphic processing.

Proceed as follows:

1. Read master codeplug from master terminal, or open master codeplug file.

2. Select File/ Export/ Screen Saver. The Save As dialogue box will appear. You can save the graphic file with the current name displayed, or you can type a new name in the file name field and save the file under this name. In addition, you can select the place of the file on the hard disk. Click Save to confirm your choice.
3. The CPS displays an appropriate message to let you know whether or not the export operation was successful.

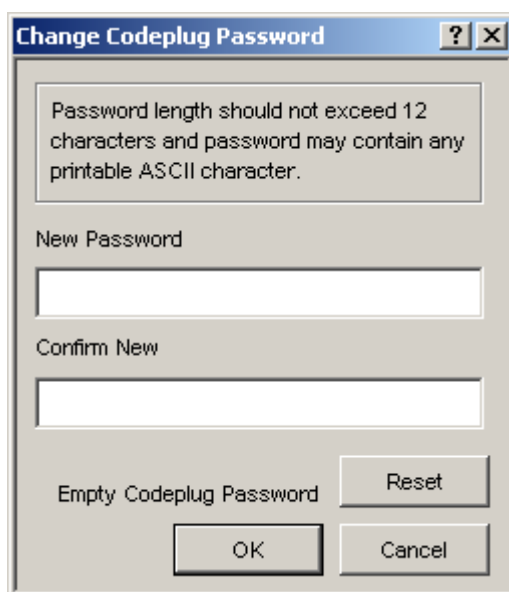
3.11 Change Codeplug Password

If the codeplug is protected by a password, this menu enables the codeplug password to be changed.

To prevent an unauthorised user from viewing or editing the codeplug file, it can be protected with a password.

To set a codeplug file password:

1. If there is more than one open codeplug file, make the required codeplug file active by clicking on its title bar.
2. Select File/Change Codeplug Password. The following screen will pop up. Enter the password (case sensitive), re-confirm, and click OK. Keep the codeplug password in a safe place.



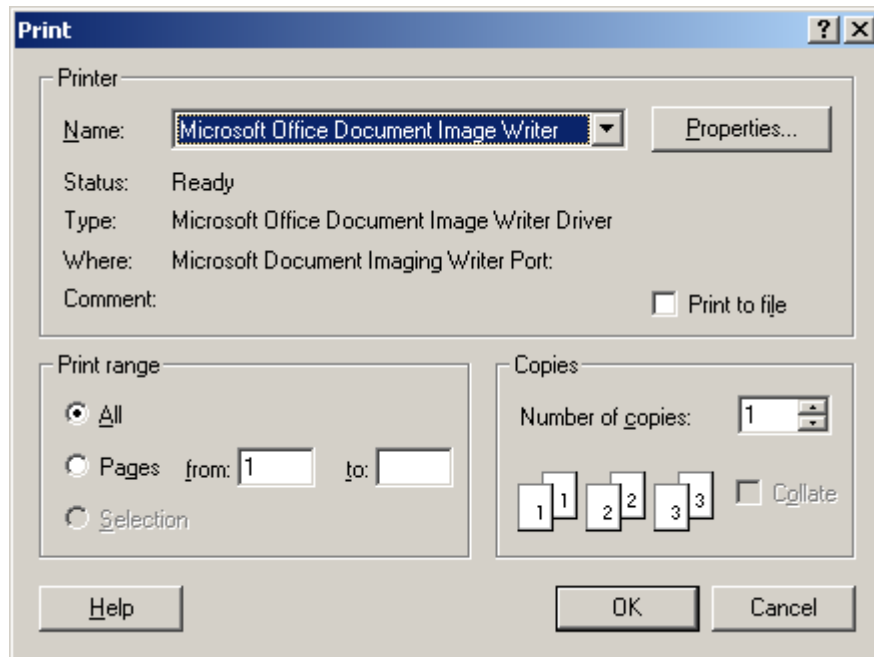
Follow the same procedure to change a password.

To remove the codeplug password, click Reset. All settings will be saved during write/save operations.

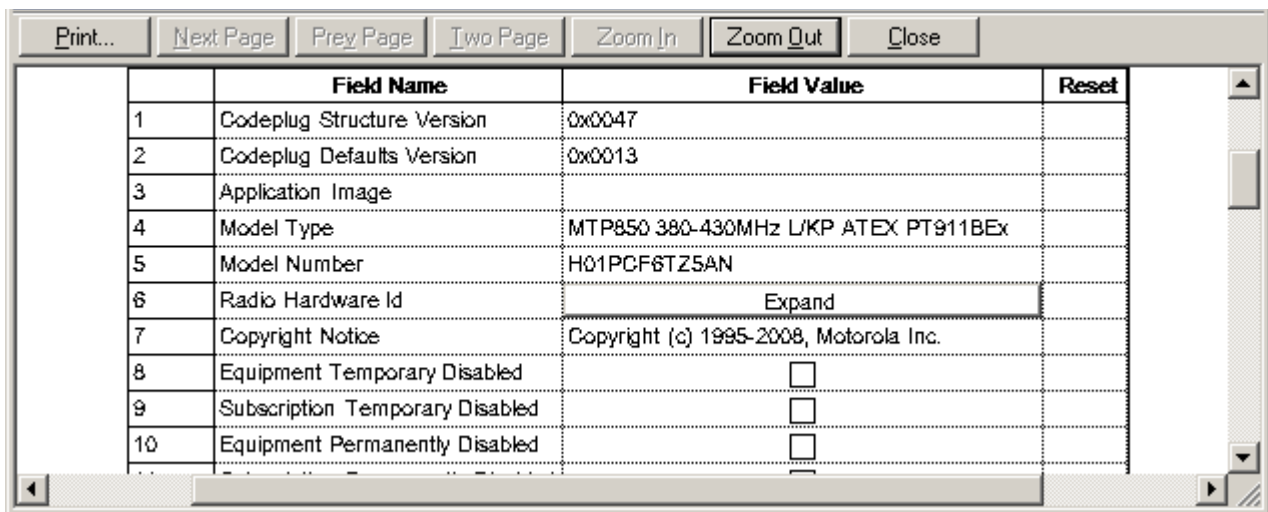
If the codeplug is not password protected, but “Protect Codeplug Saving” check box is enabled in Tools/Options/General, the CPS will ask the user to protect the codeplug for Save, Save As, and Write codeplug tasks.

3.12 Print

Selecting this option will display the standard Windows® print screen and is used for making a paper copy of the codeplug.



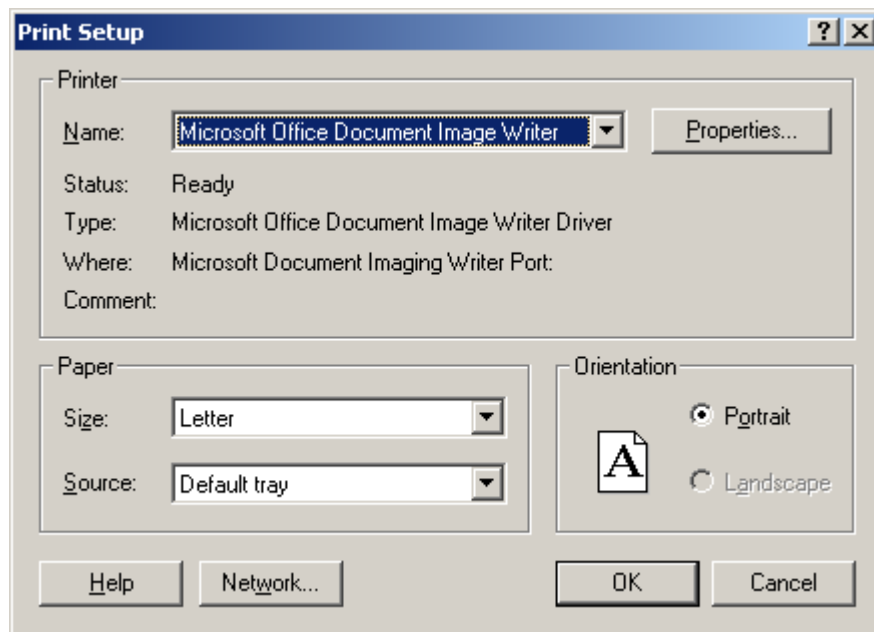
3.13 Print Preview



This displays the options of the selected menu that will be printed.

3.14 Print Setup

Selecting this option displays the 'Standard' PC print screen option window used for setting the printer parameters.



3.15 Send

Microsoft Outlook® must be installed in the user's computer.

This option allows the user to send an E-mail containing, as an attachment, the Codeplug from the current window.

The standard Microsoft Outlook® message screen will appear. The message title and the Subject field will display the name of the Codeplug file from the active window. The Codeplug file itself will be attached to the message. Type the name of the message recipient in the 'To Field' and press the Send button. The message will be sent to the recipient and the message screen will disappear.

3.16 Most Recently Opened File

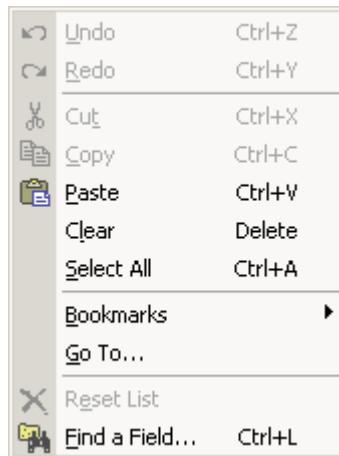
If a codeplug has been opened in the CPS, this option allows to access up to four most recently opened codeplugs. If the codeplugs have been stored and closed (and they have not been deleted or moved since then), selecting a displayed codeplug identity will re-open the codeplug.

3.17 Exit

For details see Chapter 4, Paragraph 2.2.4 "Exit".

4 Edit Menu

This menu is only available after a codeplug has been read.

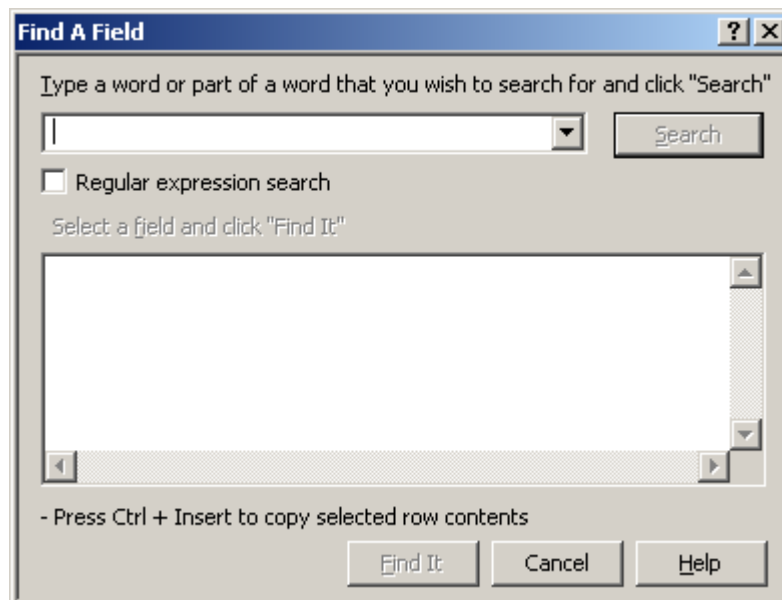


The available submenu options are self explanatory and most will remain 'greyed out' until a codeplug has been opened and a submenu or an option of a submenu has been opened.

4.1 Find A Field

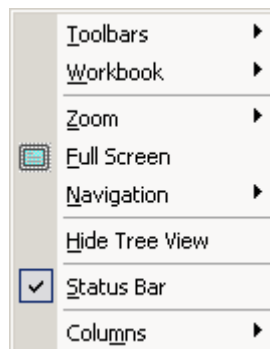
This option is used to find a field in the application.

Its selection brings up the Find a Field dialogue box where the user is prompted to type a search keyword. The application will display a list of fields whose names contain the search keyword. Select the required field name and the codeplug will open at the correct menu with the selected field displayed in the right hand editing window.



5 View Menu

This contains several options for customisation of the layout of the displayed CPS windows.

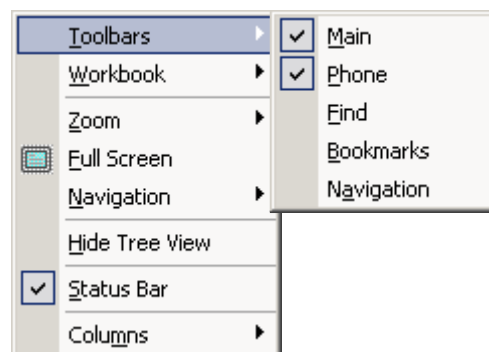


The available submenus are:

- Toolbars
- Workbook
- Zoom
- Full Screen
- Navigation
- Hide Tree View
- Status Bar
- Columns

5.1 Toolbars

This is used to toggle the displayed toolbars on or off. The toolbars are located below the menu bar. They provide easy access to frequently used functions such as opening and saving codeplug files, editing call list data, and copying data from the terminal.



The available options are:

- Main
- Phone
- Find
- Bookmarks
- Navigation

5.1.1 Main

This is used to toggle the Main toolbar display on or off. This toolbar provides easy access, by icon selection, to standard functions such as save file, open file, print file, cut, copy, and paste.

5.1.2 Phone

This is used to toggle the Phone toolbar display on or off. This toolbar provides easy access by icon selection to phone-related functions such as Read Phone and Copy Phone.

5.1.3 Find

This function is used to find certain text string in the active codeplug window pane (tree view or content view).



The binocular icons are used for selection purposes. To display an icon's function, place the pointer over the icon.

5.1.4 Bookmarks

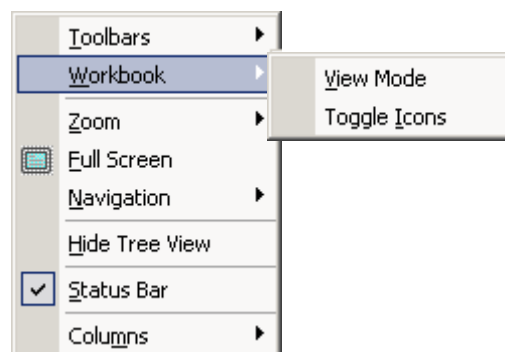
This is used to display the Bookmarks icon options on the tool bar.

5.1.5 Navigation

This is used to display the Forward, Previous, Next and Back navigation buttons on the tool bar.

5.2 Workbook

The workbook is located at the bottom of the document window and displays the name of the open codeplug file and can be toggled on/off.

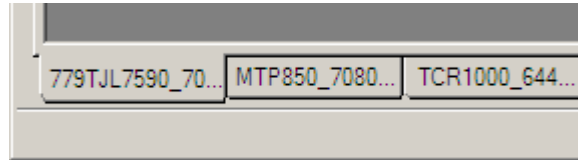


The Workbook menu has the following 2 options:

- View Mode
- Toggle Icons

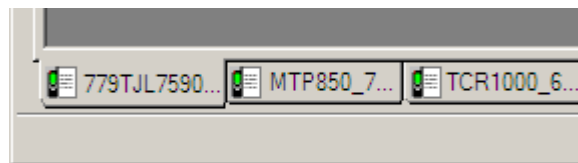
5.2.1 View Mode

Selecting this option enables tabs displaying codeplug name at the bottom left side of the window. If multiple codeplugs are on the work screen the user is able to toggle quickly between codeplugs by clicking on the required tab.

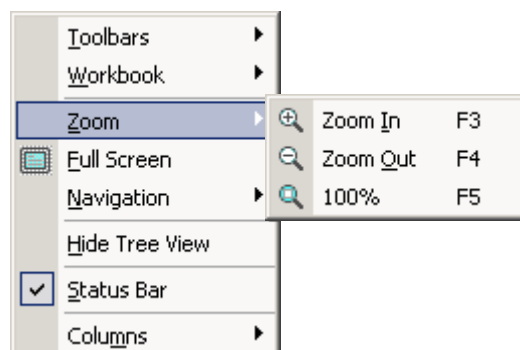


5.2.2 Toggle Icons

This option is used with the View Mode option. If the View Mode is active, enabling this option adds icons to the tabs.



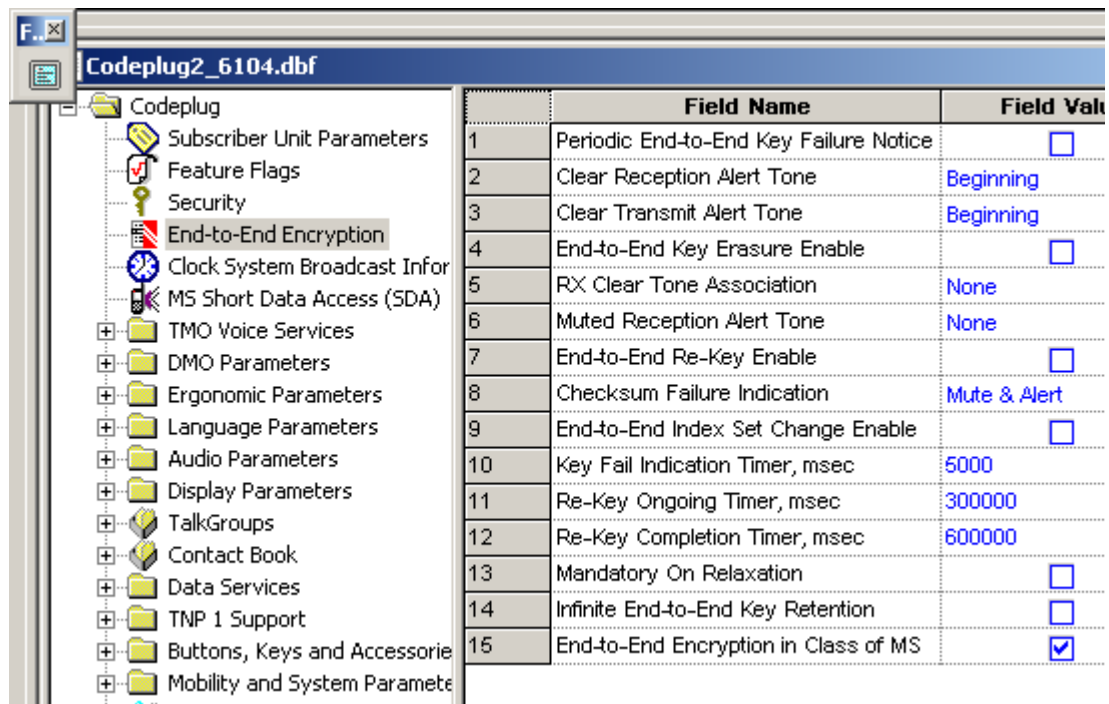
5.3 Zoom



This option enables to change the magnification level of a codeplug file page. Choosing the 100% option restores to the default magnification.

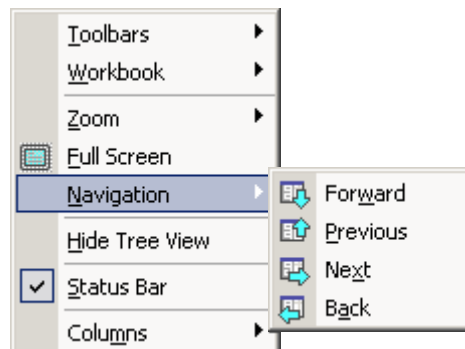
5.4 Full Screen

Selecting this option will fill the PC screen with the CPS work area. Press the Esc key to return to the normal view, or select the icon option displayed in the top left corner of the screen.



	Field Name	Field Value
1	Periodic End-to-End Key Failure Notice	<input type="checkbox"/>
2	Clear Reception Alert Tone	Beginning
3	Clear Transmit Alert Tone	Beginning
4	End-to-End Key Erasure Enable	<input type="checkbox"/>
5	RX Clear Tone Association	None
6	Muted Reception Alert Tone	None
7	End-to-End Re-Key Enable	<input type="checkbox"/>
8	Checksum Failure Indication	Mute & Alert
9	End-to-End Index Set Change Enable	<input type="checkbox"/>
10	Key Fail Indication Timer, msec	5000
11	Re-Key Ongoing Timer, msec	300000
12	Re-Key Completion Timer, msec	600000
13	Mandatory On Relaxation	<input type="checkbox"/>
14	Infinite End-to-End Key Retention	<input type="checkbox"/>
15	End-to-End Encryption in Class of MS	<input checked="" type="checkbox"/>

5.5 Navigation



It is possible to navigate through the codeplug tree using Forward, Previous, Next and Back options.

5.6 Hide Tree View

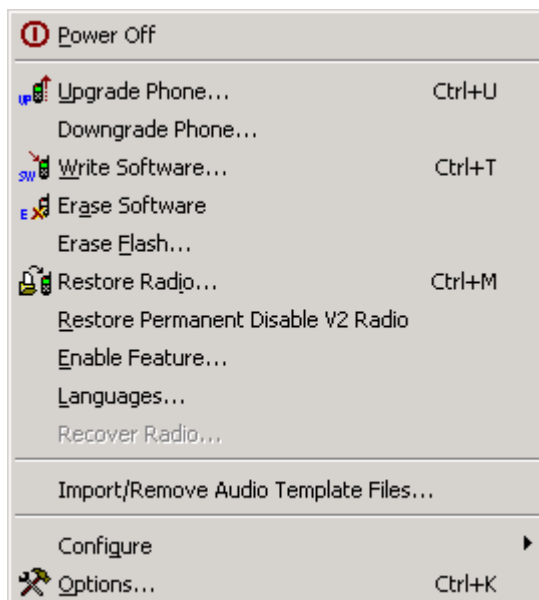
This option is used to toggle the tree view on or off.

5.7 Status Bar

This option is used to toggle the status bar display on or off. The status bar is located at the bottom of the work window and displays information about a command, toolbar button or an operation in progress.

6 Tools Menu (Administrator Login)

The following options/submenus are available when the CPS is opened using the administrative login.



The Tools menu provides menu access to all of the tools described in the remainder of this section.

6.1 Power Off

After operations on terminal are finished (for instance upgrading, reading codeplug), click Power Off option to switch off the terminal and take it out of the programming 'Flash Mode'.

It is also possible to restore the terminal's to its normal mode of operation by disconnecting the terminal from the programming cable, removing and then replacing the battery.

Either way will take the terminal out of the 'Flash Mode' that is required for CPS programming. The Power Off option is recommended.

6.2 Upgrade Phone

This option is used to upgrade one, or several terminals simultaneously.

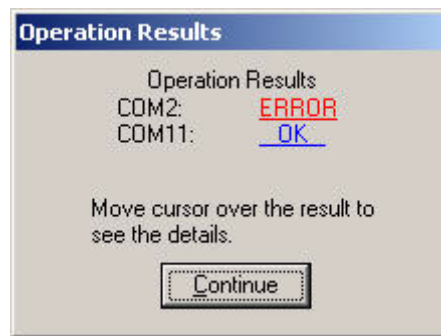
It is possible to activate this operation by selecting either the "Upgrade Phone" option in the Tools menu, or use the shortcut Ctrl+U.

CAUTION

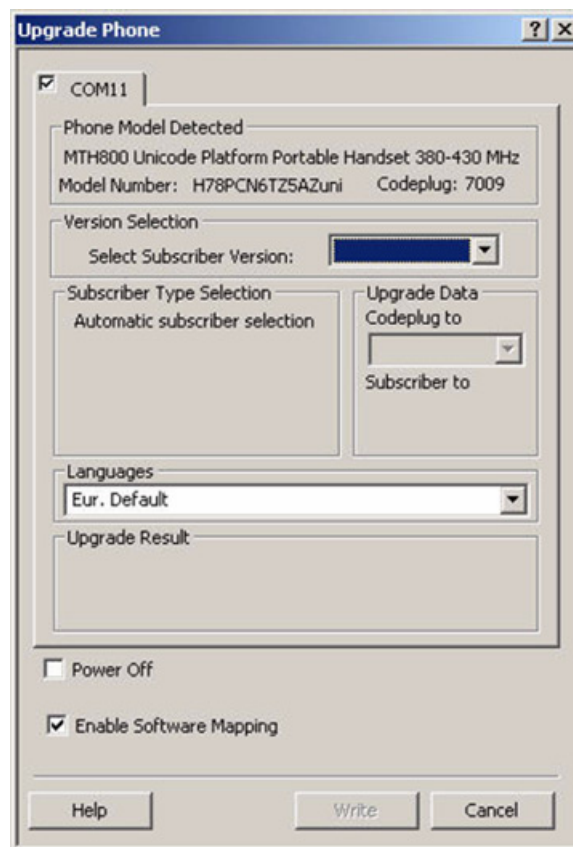
Do not disconnect the programming cable from the terminal during the write operation. This will destroy your terminal.

You can decline the upgrade of some attached terminal(s) that are presented in the dialog box in the appropriate tab(s). The header of each tab includes a check box. If a check box is unselected, the CPS does not upgrade the terminal connected to the appropriate port.

After connecting the terminals CPS needs some time to detect them. Wait until all the terminals are detected and listed before clicking **Continue**. Otherwise the upgrading process is not performed correctly.



The CPS determines software type of the attached terminal via **Application Image** field located in the **Subscriber Unit Parameters** feature of the terminal codeplug. This field indicates which software - clear or TEA1/TEA2/TEA3 encrypted - is written in the terminal.



In the Upgrade Phone dialog the language set needs to be chosen and the user should click **Write** to proceed.

After the connection is established CPS reads the terminals information, lists their status and determines whether there is an update available.



NOTE

For more details and the upgrade paths refer to TETRA Terminals CPS Start-up User Guide (Motorola Part Number: 6802974C10).

6.3 Downgrade Phone

You can decline the downgrade of some attached terminal(s) that are presented in the dialog box in the appropriate tab(s). The header of each tab includes a check box. If a check box is unselected, the CPS does not downgrade the terminal connected to the appropriate port.

The CPS determines software type of the attached terminal via **Application Image** field located in the **Subscriber Unit Parameters** feature of the terminal codeplug. This field indicates which software - clear or TEA1/TEA2/TEA3 encrypted - is written in the terminal. The downgrade dialog box displays the list of software versions, which the terminal can be downgraded to.

CAUTION

Do not disconnect the programming cable from the terminal during the write operation. This will destroy your terminal.

**NOTE**

For the downgrade paths refer to TETRA Terminals CPS Start-up User Guide (Motorola Part Number: 6802974C10).

6.4 Write Software

This option is used to write (or flash) software to the terminal.

CAUTION

Do not disconnect the programming cable from the terminal during the write operation. This will destroy your terminal.

**NOTE**

The CPS will display only those fields that are applicable to the CPS programming level.

1. Open the Tools menu and click on the Write Software function. The Write Software function will search for the connected terminal(s) automatically and will display the connect operation results.
2. Check the connection results and click Continue to enter the Write Software dialogue.
3. In the Write Software dialogue check the Power Off box to turn off the terminal automatically after the write software operation.
4. Check the version of Subscriber to write in the Write Software Data area for each port's page.
5. To start flash operation click the Write button. The CPS will show the progress of this task. Operation results for each detected terminal will be displayed in the Write Software result area of the Write Software dialogue.

6.5 Erase Software

This option is used to erase software.

1. Open the Tools menu and click on the Erase Software function.
2. Confirm the software erasure.
3. The CPS continues the erasure operation till successful completion.

6.6 Restore Radio

The CPS is able to restore the attached terminal if its codeplug has been saved as backup file if the Write Software function or Upgrade by Software operation failed.

Required inputs are:

- Attached terminal
- Backup codeplug file.

Processing

1. Launch this function either from the Menu bar, or by using the keyboard shortcut (Ctrl+D).
2. The CPS will read the codeplug from the attached terminal and determine its Serial Number.
3. The reading in progress will be displayed. It is possible to cancelling the read operation.
4. The CPS will look for the backup codeplug file according to the Radio Serial Number, at the path indicated in the Default Backup Path field in the Directories Options dialogue box.
5. When the backup codeplug file is found, the CPS will read the name of the Software file from the Application Image<Application_Image>fieldhlp field of the codeplug, and the user prompt will ask for confirmation to write the codeplug and software to the terminal, or cancel the operation.
6. If confirmed, the Restore Radio function will proceed in the following order:
 - The software application will be written
 - Then the codeplug is written.

The writing progress for both the software and codeplug will be displayed on screen.

7. An appropriate message will be displayed, notifying the success or failure of this operation.



NOTE

If the backup file does not exist in the Backup directory, or if the software application file has not been found in the SW directory, then an error message will be displayed to indicate the problem and the operation will be aborted. The operation will also be impossible if the 'Application Image' field of the codeplug is empty.

Outputs

Restored terminal.

6.7 Restore Permanent Disable V2 Radio

The CPS is able to restore the attached terminal that has been stunned using the Permanent Disable V2 feature.

Choose this option to restore the disabled terminal and write codeplug back to the terminal.

See Chapter 4, Paragraph 6.6 "Restore Radio" for reference.

6.8 Languages

Determines which languages are enabled in the terminal.



NOTE

The CPS displays only these codeplug blocks and programming options that are applicable to the active terminal model.

The **Default Software Path** must point to a folder containing the z19 files containing language information. Refer to Paragraph 6.12.4 "Directories"

One of the following options can be selected.

- Eur. Default (German, French, Dutch, Italian, Russian)
- Eur. 1 (German, French, Dutch, Swedish, Norwegian, Danish)
- Eur. 2 (Portuguese, Greek, Spanish, French, Italian, Macedonian)
- Eur. 3 (Russian, Hungarian, Lithuanian, Croatian, Mongolian)
- Arabic (Arabic, French)
- Korean (Korean only)
- Chinese (Chinese, Portuguese)
- Hebrew (Hebrew only)
- Japanese (Japanese only)

For language availability per terminal see Chapter 3, Table 3-20 "Supported Languages".

When you press the Write button, the selected software is flashed to the terminal. All software packs that existed on the terminal before are overwritten, except for the local language pack (this pack remains on the terminal).



NOTE

English language is always present on the terminal regardless the language pack loaded.

6.9 Recover Radio

The CPS is able to recover the attached terminal. Choose this option to recover codeplug, software and language packs for the attached terminal.

6.10 Import/Remove Audio Template



NOTE

This function is only available when no codeplug is opened in the CPS.

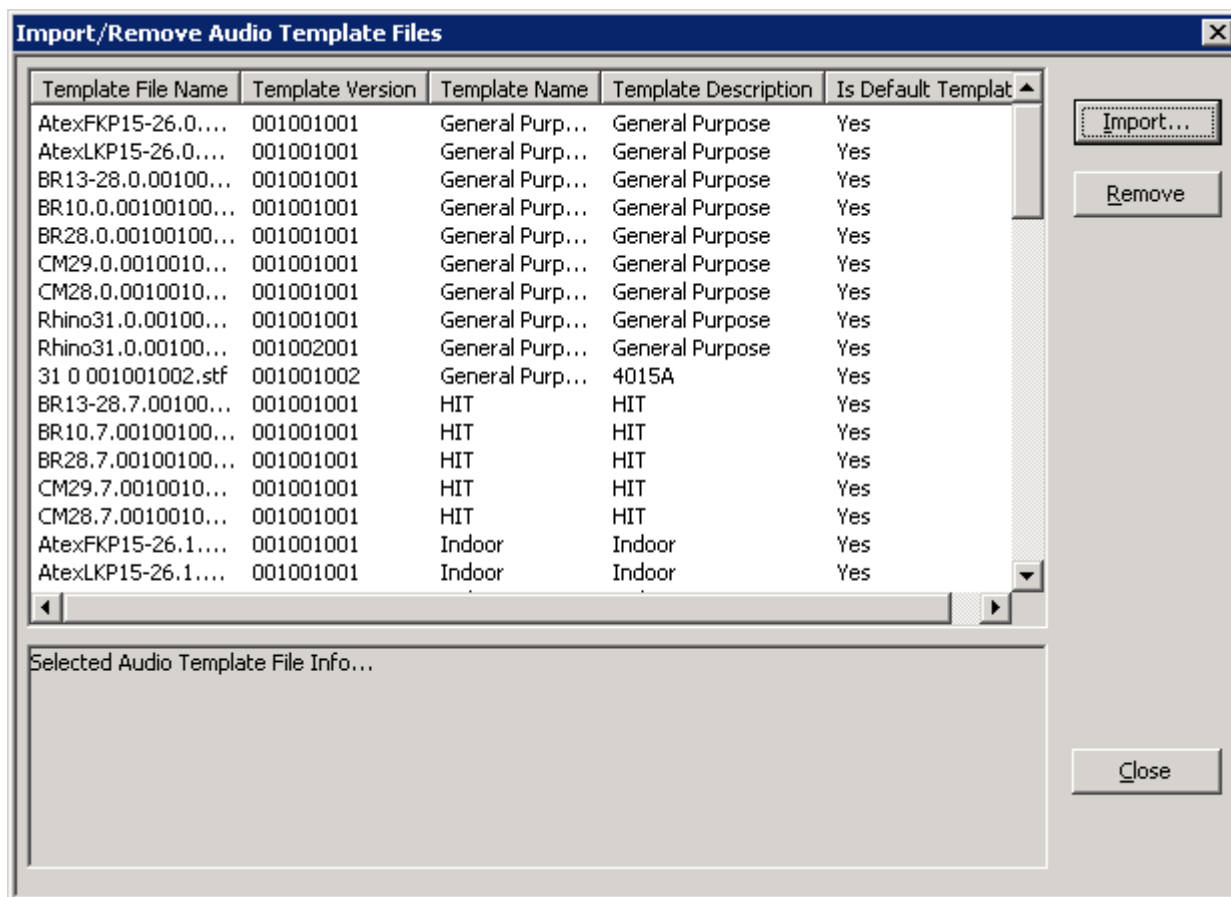
Importing audio templates functionality is available only to the terminals supporting specific audio profiles.

A terminal can by default support only one specific accessory per accessory type, that is if the terminal supports one type of RSM, the audio settings may not be valid for another type of RSM. If a customer chooses to use an RSM other than the one that was originally configured to be used with the terminal, then the optimal performance cannot be ensured.

Using the Import/Remove Audio Template feature, audio template files provide specific settings for all the accessories that can be supported by a given terminal platform. This feature enables to use accessory specific audio templates, so that a user can configure an audio profile based on these templates for a specific accessory.

To import an accessory audio template, proceed as follows:

1. From the menu click Tools > Import /Remove Audio Template Files.
2. Click on the Import in the dialog box.



3. Select a particular audio template file (.stf, .stfs) to be imported and click Open.
4. The file is imported and ready to be used.

After importing a profile, user sees this imported template as one of the added options in the templates list (the file name appears in the Template File Name column). In this way, each particular

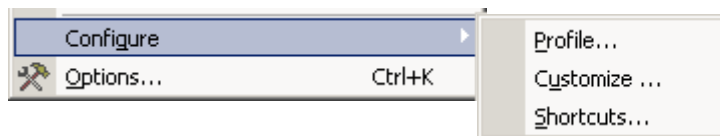
accessory can have its own audio profile. For example, User profile 1 can be for a RSM while User profile 2 can be for a PHF.

To remove an accessory audio template, proceed as follows:

1. From the menu click Tools > Import /Remove Audio Template Files.
2. Highlight the template to be removed and click Remove.
3. Click OK to confirm.

6.11 Configure

This menu enables to customize the CPS preferences.



6.11.1 Profile

This menu option enables storing, resetting values to default, and restoring a CPS configuration. The configuration concerns flags, options and related items defined in the Options submenu (for example, the toolbar look settings). For details on the settings available, see Chapter 4, Paragraph 6.12 "Options".

To create a new profile, from the Profile window click the New button, type the profile name, and press Enter. The new profile is created.

To save your CPS settings to a profile, in the Profile window select a profile from the profile list, and click the Save button. The current settings are stored in the selected profile.

To load your CPS settings from a profile, in the Profile window select a profile from the profile list, and click the Load button. The settings from the profile are restored.

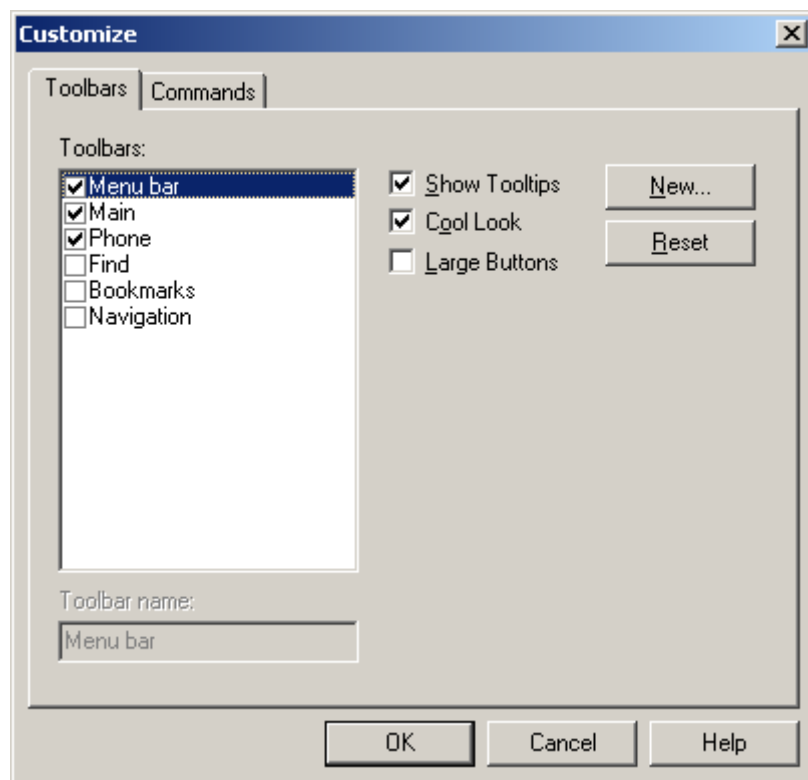
6.11.2 Customize

This menu option enables creating new toolbars as well as customize existing ones. This makes work with the CPS quicker and more convenient to the users.

The following two tabs are available: Toolbars and Commands.

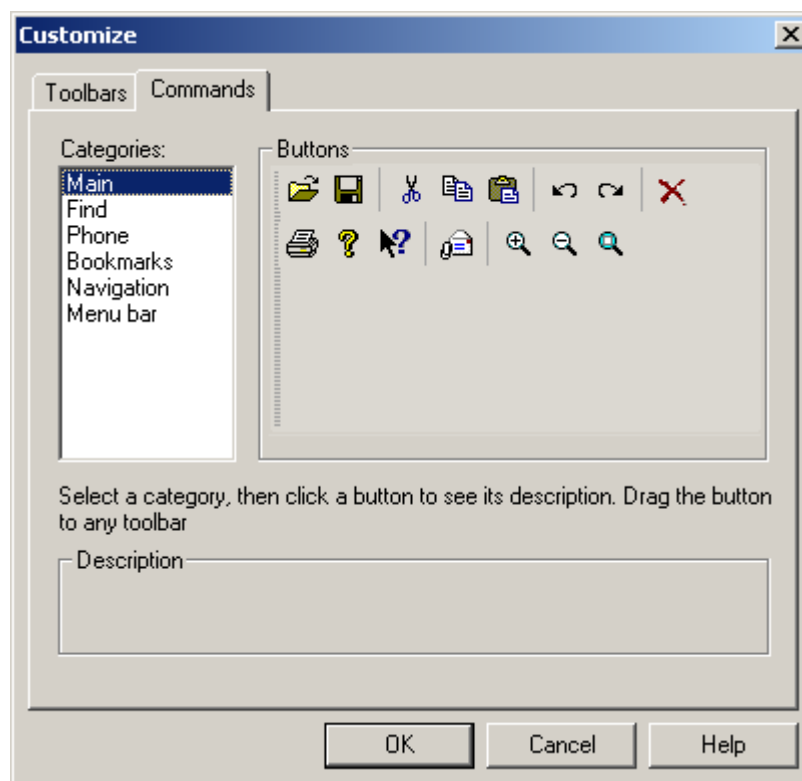
6.11.2.1 Toolbars

This sets the viewed Icons and Tool Bars for display.



6.11.2.2 Commands

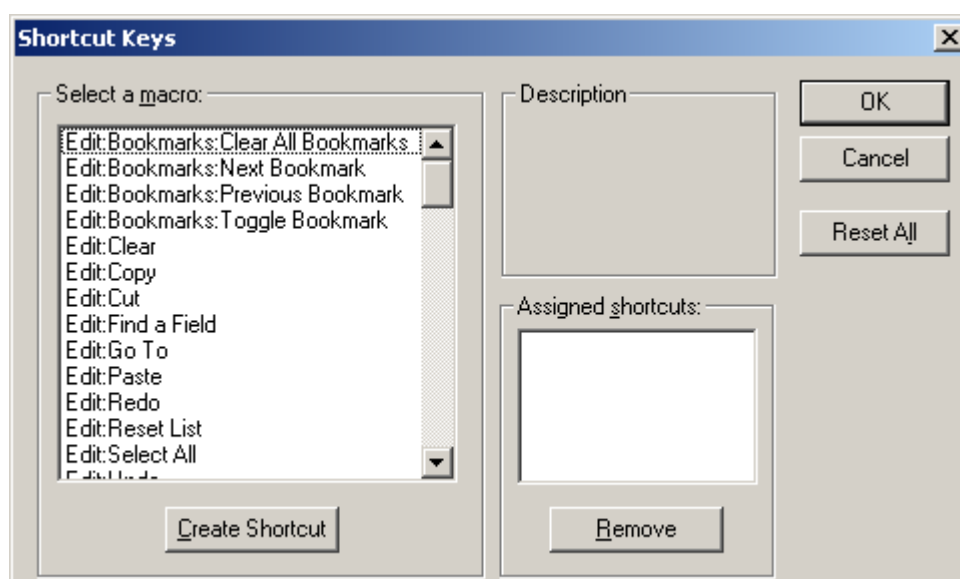
Choose a category to show its available buttons, select the required button and drag it onto a toolbar.



6.11.3 Shortcuts

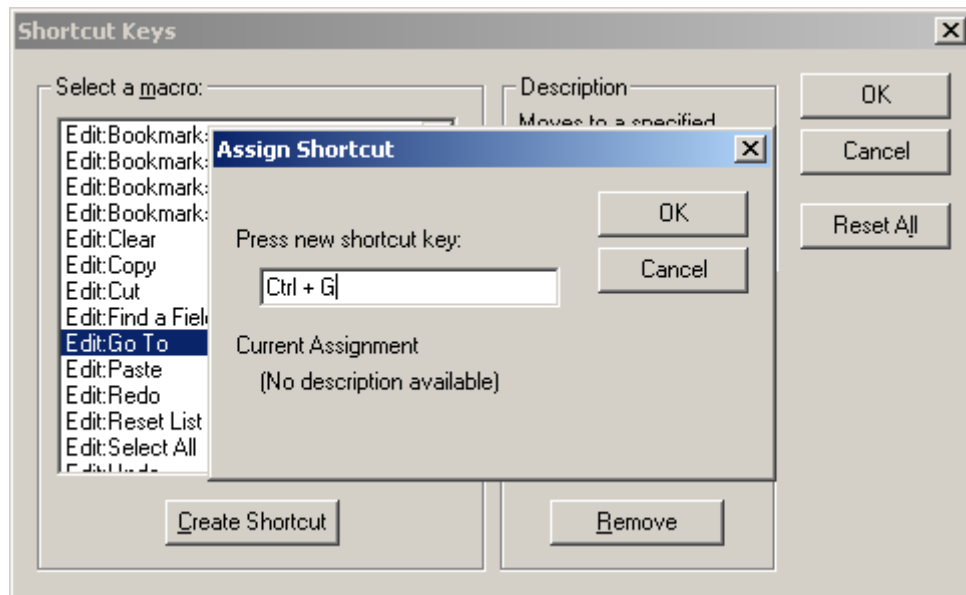
This option is used to create computer keypad shortcuts for the CPS.

For example: Ctrl + P = Print.



Selecting this option will display the above box

From the “Select a macro” list chose the desired operation for shortcut creation, click the Create Shortcut button and the Assigned Shortcuts message box appears. Then assign new shortcuts, using such functional keys as Ctrl and Alt, plus any other key, including a numeric one. A warning prompt will appear if the shortcut already exists for that operation.



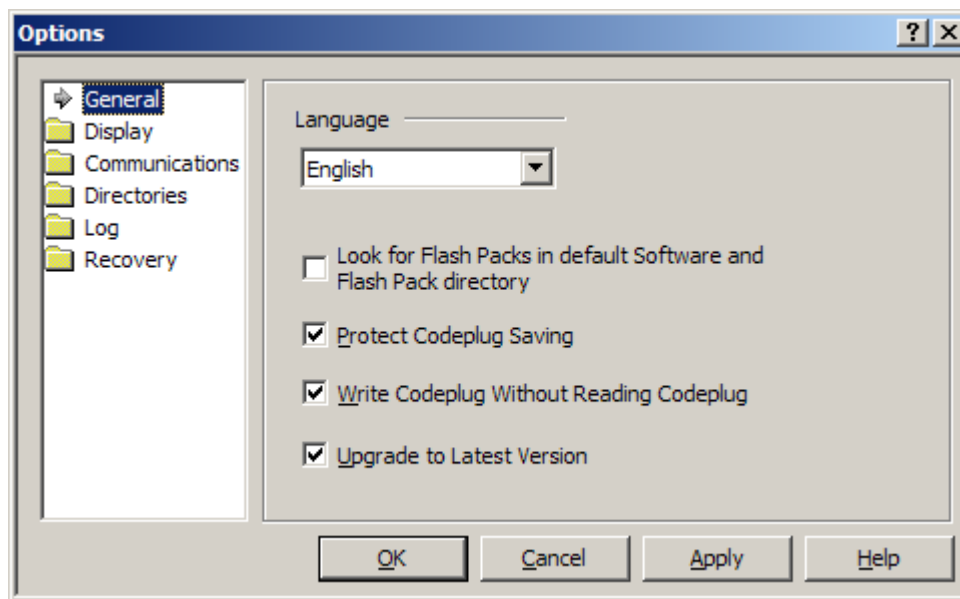
6.12 Options

This menu is used to define the appearance, communication port and speed, the default directories and logging of the CPS.

It has the following submenus:

- General
- Display
- Communications
- Directories
- Log
- Recovery

6.12.1 General



Language

The Language drop-down list is used to select the working language of the CPS and it has the following options:

- English
- Chinese (Simplified)
- Chinese (Traditional)
- German
- Hungarian
- Italian
- Korean
- Japanese

Look for Flash Packs in default Software and Flash Pack directory

If enabled, the CPS will scan following three folders: temp folder, Default Software path and Default Flash Pack Path during upgrade or downgrade the terminal. However, if it is disabled, the CPS will scan temp folder during upgrade or downgrade.



NOTE

The CPS scans all files with z19 and s19 extensions in the Flash Pack and the default Software folders. Storing large number of these files in the provided folders is not recommended as this may affect upgrade and downgrade operations performance.

Protect Codeplug Saving

If your codeplug is not password protected and the Protect Codeplug Saving check box is enabled, the CPS will ask the user if to protect the codeplug for Save and Save As tasks.

Write Codeplug without Reading Codeplug

This option allows you to improve the CPS application performance.

Mark the check box (enable) to skip reading the entire codeplug from a terminal prior to writing a new codeplug to this terminal. Only the sensitive data from the terminal is read and compared with the new codeplug. If the data is mismatched then the user will be notified that the CPS cannot perform the operation.

Upgrade to Latest Version

This option allows you to improve the CPS application performance.

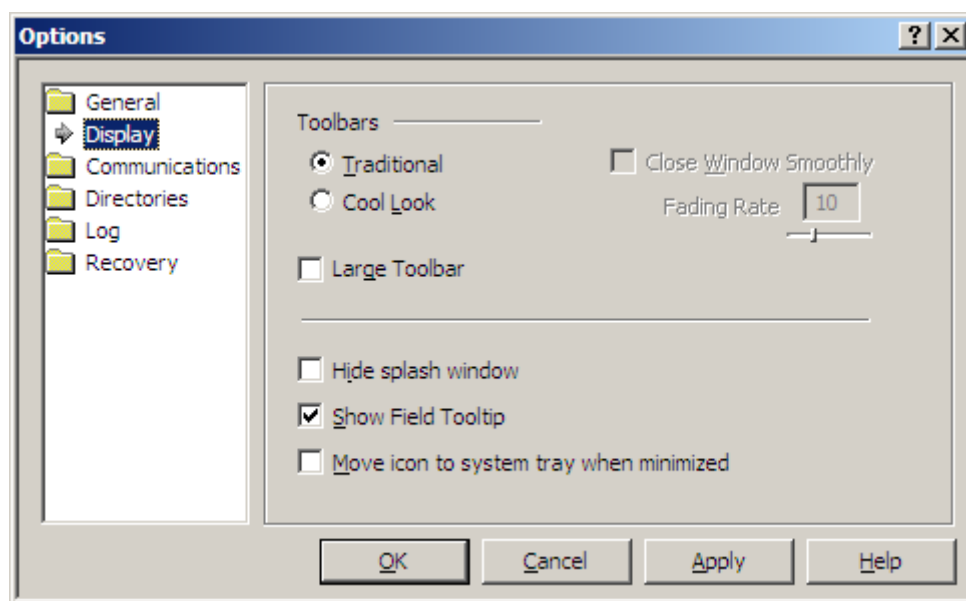


NOTE

If this option is enabled and no newer software is available in the directory, then the upgrade fails without a notice indicating the lack of software for the current terminal.

Mark the check box (enable) to automatically upgrade the connected terminal to the latest software version.

6.12.2 Display



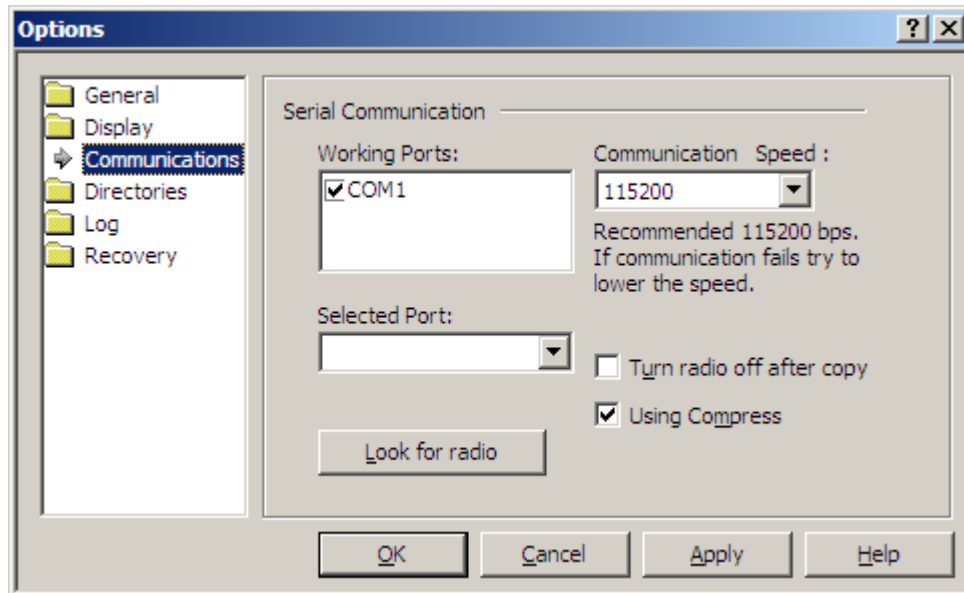
These options allow:

1. Switching between “Cool Look” interface and “Traditional” interface as well as offering some additional options for each one:
 - Cool interface: the toolbar buttons are flat and pop into an etched state as you move the cursor over them. It contains grippers to facilitate moving and docking.
 - Traditional interface: the toolbar buttons are raised.
2. Setting the toolbar size.
3. Hiding splash window that appears when the program starts.
4. Enabling showing tooltips.
5. Enabling application window minimization to system tray.

6.12.3 Communications

Enables the serial ports to be used in CPS-to-terminal communication.

To define the working port and the communication speed, use the pointer to select an appropriate port from the "Selected Port" and a required speed from the "Communication Speed" drop-down lists. To access available values please click the respective drop-down list."



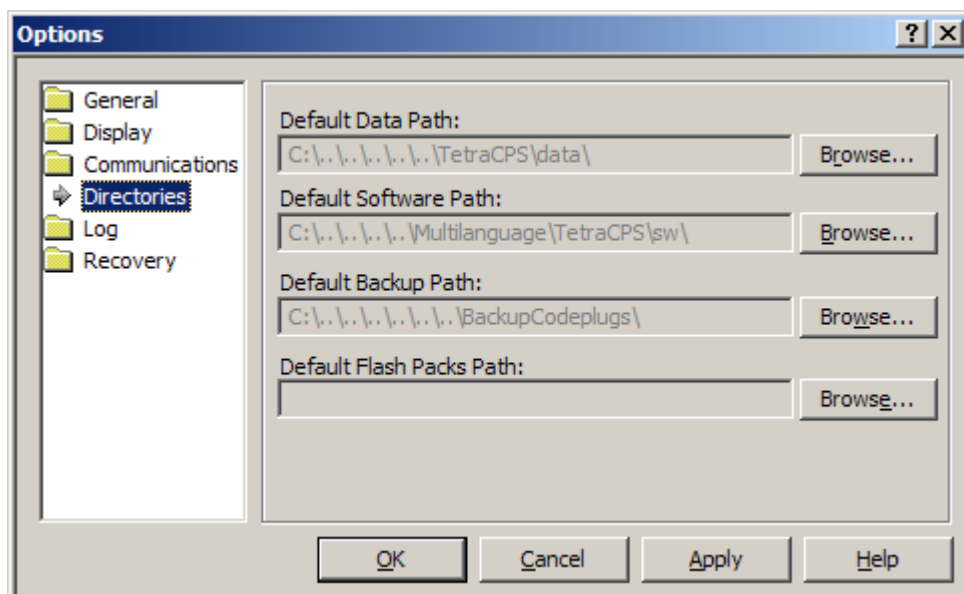
To accelerate the programming speed, enabling the "Using Compress" option (to compress the communication data) is recommended.



NOTE

- Refer to your computer User Manual for a complete description of serial and parallel ports.
- The CPS converts any USB port to a virtual serial port.

6.12.4 Directories



This is used to specify the default paths of the directories for codeplug, software and backup files.



NOTE

If there are several versions of Tetra CPS installed on the PC, these paths **MUST** be configured as soon as the CPS is first launched, as the paths may default to existing directories.

This page lists three fields displaying the last selected path:

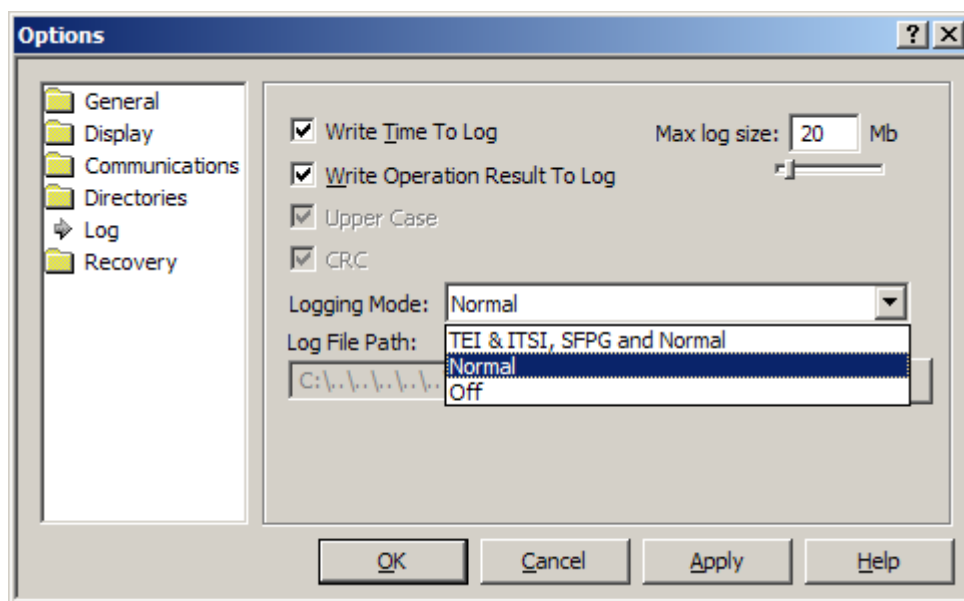
- **Default Data Path** — specifies the default path to the drive and folder (or directory) where the codeplug file is located.
- **Default Software Path** — specifies the default path to the drive and folder (or directory) where the terminal firmware/software is located.
- **Default Backup Path** — specifies the default path to the drive and folder (or directory) where the codeplug backup files are located.
- **Default Flash Packs Path** — specifies the default path to the drive and folder (or directory) where the Flash Packs files are located.

Each field has its accompanying Browse button.

Click any Browse button to bring up the Browse dialogue box, open the drivers/folders and select the path to the directory where the desired file(s) will be stored/located.

To confirm the selection press OK. The path will be displayed in the relevant field of the Directories page.

6.12.5 Log



Logging Options

Allows the logging feature to be enabled/disabled and to set up options for the Log file.

To enable the logging, from Logging Mode drop down list select Normal or TEI & ITSI, SFPG and Normal. To disable the logging, from Logging Mode drop down list select Off.

Enable logging:

If logging is enabled, the CPS will write to the log file basic statistical information such as date, time, operation name, operation data and operation result for main CPS functions activated by user during CPS sessions.

Logging Mode:

Position the cursor into the combo box, then drag it to the required mode for the log file:

- TEI & ITSI, SFPG and Normal
- Normal
- Off

If the **Normal** or **TEI & ITSI, SFPG and Normal** modes are selected, the CPS checks whether or not the log file exists in the directory specified in the Log File Path field. If the file does not exist, the CPS creates it with the name cps_user.log. If the log file exists, new information will be recorded into it.

If the **Off** mode is selected, the logging of all operations will be disabled. If the log file already exists, no operation will be recorded into it.

Normal. If the Normal mode is selected for communication operations through one port only, then the recording of all log operations through the default port will be written into the cps_user.log file. The logging of all operations will be enabled and performed according to the other logging page settings.

TEI & ITSI, SFPG and Normal. If the TEI & ITSI, SFPG and Normal mode is selected, then logging is similar to the one in Normal mode and the CPS will also log any operation (through all ports related to the TEI, ITSI and SFPG codeplug fields). The logging of all operations will be enabled and performed according to the other logging page settings.

Log Options:

The following two options will be enabled if the user turns on the proper check boxes:

- Write Time To Log
- Write Operation Result To Log file

If these options are enabled, the time of the function start and the operation result (pass or fail) will be appended to the new information recorded in the Log file.

Maximum Log Size:

This entry defines the maximum log file size. Click the slider to change the setting. The maximum size is 200 MB.

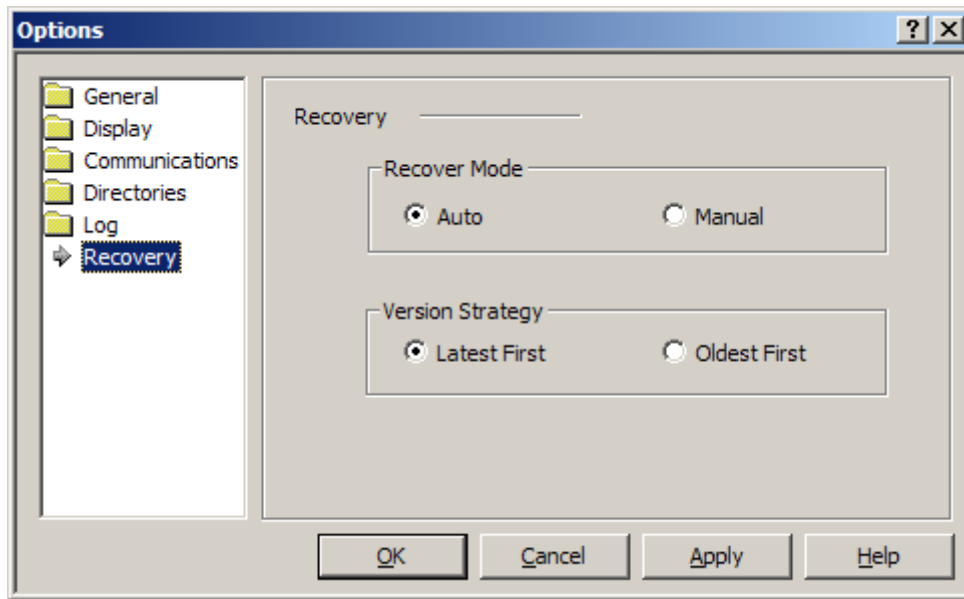
Over write Log Info as Needed: The "enabled" setting means that all new events will be written to the log, even when the log is full. When the log is full, each new event replaces the oldest one. The "disabled" setting means that existing events will be retained when the log is full. If the maximum log file size is reached, new events are discarded. This setting requires you to clear the log manually. Select this setting only if you must retain all events.

Log File Path:

The CPS allows a directory to be set up for the Log file location through the Browse dialogue box, which appears when clicking the Browse button. When the desired directory has been selected, click the OK button and the path to the directory will be written to the Log file path field in the Logging page. However, this path setting will be applied only in the next CPS session. Re-start the CPS if the Log file path has been changed in the current session.

See Paragraph 6.12.4 "Directories".

6.12.6 Recovery



Gives additional option during recovery.

Recovery Mode

You can select the automatic or manual Recovery Mode.

Version Strategy

You can select recovery strategy for finding backup files when CPS starts to recover terminal.

- **Latest First**

CPS selects files according to Latest First method during terminal recovery when this parameter is enabled.

- **Oldest First**

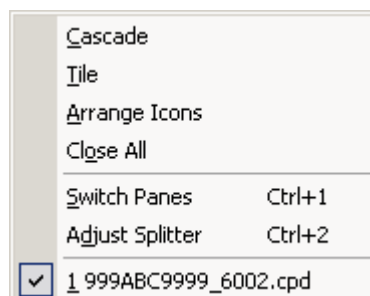
CPS selects files according to Oldest First method during terminal recovery when this parameter is enabled.

7 Window Menu



NOTE

This menu will be visible only if a file is already open in the application.



This menu is similar to that in other Windows® applications. From this menu, it is possible to access the following functions:

7.1 Cascade

This option is used to arrange open codeplug windows so that they overlap and each title bar is seen. This option does not affect minimized windows.

7.2 Tile

This option is used to arrange open applications into windows that do not overlap. It does not affect applications reduced to icons.

7.3 Arrange Icons

This is used to arrange the icons of all minimized applications across the bottom of the screen.

7.4 Close All

Selecting this option can be used to close all open file windows. This function is only available if two or more file windows are open in the application.

7.5 Switch Panes

This is used to switch the cursor from tree view to content view and vice-versa.

7.6 Adjust Splitter

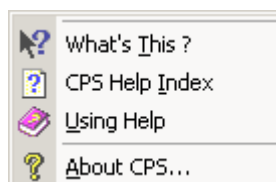
This is used to adjust the width of tree view and content view areas or the width of columns in the content view using the arrow keys on the keyboard.

Tip: This feature is useful when a mouse cannot be used (for example while programming a terminal in the field).

7.7 1, 2, 3, 4... (List of Open Codeplug Windows)

This is an alphabetical listing of all open documents which appears at the bottom of the Window menu. When selecting a document name, it will become the active document.

8 Help Menu



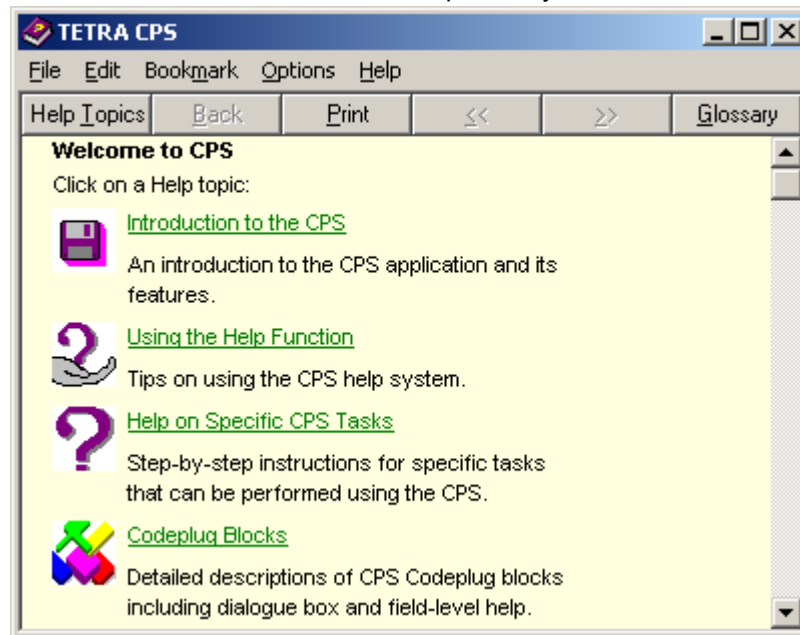
The Help Menu is similar to other Windows® based applications and has the following options:

8.1 What's This

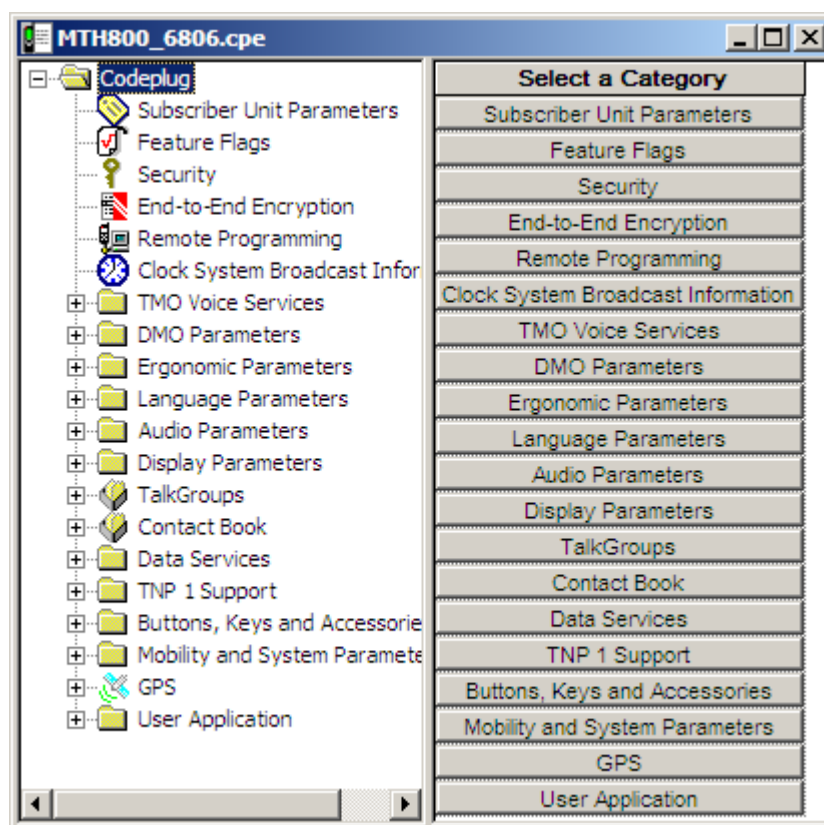
Choosing this option selects the Question Mark/Arrow Tool which now becomes the cursor. Placing it over a field in the CPS and using the left mouse button to select the field, will display the associated help text

8.2 CPS Help Index

Selecting this menu item will open the CPS Help Index window. This window displays the available submenus in a file card format which are self explanatory.



9 Codeplug



The top of the work screen shows codeplug name (which can be a temporary name consisting of terminal serial number, codeplug structure version and codeplug defaults version).

The main body of the work screen is divided into 2 parts, on the left are nodes of the codeplug and on the right is the 'Select a Category' option. Once a node has been selected the 'Select a Category' screen may change into 3 or more columns and may have the following options: Field Name, Field Value and Reset.

	Field Name	Field Value	Reset
1	Originating PPC Private Call	<input checked="" type="checkbox"/>	
2	Call Priority for Outgoing Priv	14	
3	PPC PTPC Priority 12 13	Accept	
4	Scan Group Priority Behavior	Accept	
5	Audio Shock Delay Timer , m	Reject	Reset



NOTE

Clicking the Field Value entry may open drop-down list with the values available for the selected field.

The following codeplug nodes are available:

- Subscriber Unit Parameters
- Service History
- Feature Flags
- Security
- End-to-End Encryption
- Remote Programming
- NGCH Interface - MTM800 Enhanced only
- Dual CH - New Generation Control Head only
- Clock System Broadcast Information - not available to TCR1000
- Man-Down - MTP850 S/MTP850 FuG, MTP830 S/MTP830 FuG, MTP850 Ex, MTP810 Ex only
- TMO Voice Services
- NGCH Parameters - MTM800 Enhanced only
- DMO Parameters
- Ergonomic Parameters
- Language Parameters - not available to TCR1000
- Audio Settings
- Display Parameters - not available to TCR1000
- Talkgroups
- Contact Book - not available to TCR1000
- Data Services
- TNP1 Support - not available to TCR1000
- Buttons, Keys and Accessories
- Inputs, Outputs, GPIOs - MTM800 Enhanced only
- Mobility and System Parameters
- GPS
- User Application - not available to TCR1000
- SIM

When programming a terminal the minimum requirements to enable a terminal to log onto a system are:

- A valid identity (ISSI) for the terminal
- A valid Group identity (GSSI)
- Valid Country and System codes
- Valid frequencies

Everything else programmed into the terminal will make the terminal operation more flexible and friendly to the user.

9.1 Setting Codeplug Parameters



NOTE

To avoid loss of data, the CPS automatically backs up all the codeplugs read from a terminal. The backup files are located in the default path (configurable via Tools/Options/Directories) and are named with the terminal serial number. The serial number is a unique identification of a terminal.

A terminal with the unique serial number may have several different backup files with different version numbers of the terminal codeplug. Backup files are extremely useful in restoring codeplugs that get corrupted or are inadvertently changed or erased.

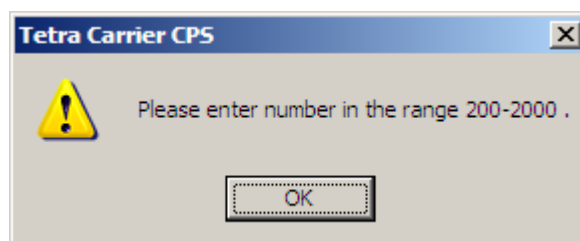
To set a parameter either type in or select from a drop-down list the required value.

Periodic Alerting Period	5 min	Reset
Periodic Alert Settings in MMI	30 sec	
Audio Toggle Menu	1 min	
Audio Toggle Softkeys	2 min	
Audio Toggle	5 min	Reset
D-PTT Mode	15 min	
D-PTT Activation Time, msec	2345	Reset
D-PTT Tone Output Volume	0	Reset

For the typed-in values, the value range is displayed in a hover box when the mouse pointer is over the parameter value.

D-PTT Tone Output Volume	0	Range 200-2000
--------------------------	---	----------------

If the value typed in exceeds the range the CPS will not let to set the value and it will provide the correct range for the parameter.



NOTE

The CPS enables the typed-in and selectable parameters to be reverted to their default values. To reset a parameter to the default value, click the Reset button next to the respective parameter.

10 Subscriber Unit Parameters

	Field Name	Field Value
Codeplug	1 Codeplug Structure Version	0x0065
Subscriber Unit Parameters	2 Codeplug Defaults Version	0x0070
Service History	3 Application Image	
Feature Flags	4 Model Type	MTP850 Unicode Platform Portable Handset 380-430 MHz
Security	5 Model Number	H60PCN6T25AN
End-to-End Encryption	6 Country Identification	Unicode
Remote Programming	7 Network Identification Code	0
Clock System Broadcast Information	8 Radio Hardware Id	Expand
TMO Voice Services	9 Copyright Notice	Copyright (c) 1995-2008, Motorola Inc.
DMO Parameters	10 Equipment Temporary Disabled	<input type="checkbox"/>
Ergonomic Parameters	11 Subscription Temporary Disabled	<input type="checkbox"/>
Language Parameters	12 Equipment Permanently Disabled	<input type="checkbox"/>
Audio Settings	13 Subscription Permanently Disabled	<input type="checkbox"/>
Display Parameters	14 Serial Number	890TJL8442
TalkGroups	15 Radio TEI	000129280794440
Contact Book	16 Radio ISSI	9352
Data Services	17 Organization	
TNP 1 Support	18 Person	
Buttons, Keys and Accessories	19 This Radio Phone Number	
Mobility and System Parameters	20 This Radio Private Number	
GPS	21 Last Modification Date	October 28, 2008 10:42
User Application	22 Programming Source	Factory(PATS)
	23 Comment	

By selecting this item the codeplug window displays its information in the right side of the screen. Not all the fields are editable. Some of the fields are informational only.

The **first 8** fields provide information about the terminal's codeplug, software and application image versions, its model type, number, hardware ID, country and identification number.

Field 9 is a copyright notice.

Equipment Temporary Disabled, Subscription Temporary Disabled. When a terminal has been disabled over the air (stunned), this field will be 'checked'. It can be unchecked over the air or via the CPS. If the terminal is stunned it will no longer be usable on the system (TMO) or off the system (DMO).

Equipment Permanently Disabled, Subscription Permanently Disabled. The feature allows to disable only the Terminal's Equipment Identity (TEI). The equipment will not function. The disable operation may be performed during codeplug programming or by SwMi transmitting the disable command via air interface. User or TETRA protocol intervention cannot reverse the disable state.

Serial Number show the terminal's serial number

Radio TEI show the terminal's Terminal Equipment Identity (TEI)

Radio ISSI. This is where the terminal's own Individual Short Subscriber Identity (ISSI) is entered. It is the terminal's unique system ID and it acts like a normal telephone number. The ISSI can contain numbers in the range 1 - 13999999. Without a valid ISSI the terminal will not log on to a system.

Organization. The name of the organization where the terminal was programmed can be entered here for reference.

Person. The name of the person programming the terminal can be entered in this field.

This terminal Phone Number. Dependent upon the system telephone interconnect, it may be necessary for a subscriber terminal to have a separate telephone number and not use its ISSI. This field displays the subscriber phone number, it is also possible to view this number via the menu

functionality. The subscriber can change the number without modifying the phone number in the system. Up to 24 digits can be entered.

This Radio Private Number. Displays the subscriber private number. This is an 8 digit number that can be changed by the subscriber without modifying the phone number held in the system.

Last Modification Date. This non-editable field displays the date and time that the active Codeplug was last programmed. The CPS automatically updates this data every time the Codeplug is saved, or programmed into the terminal.

Programming Source. This non-editable field displays the source that was last used to program the active Codeplug. This may be: Factory, CPS, OTAP, or Other. The CPS automatically updates this data every time the Codeplug is saved or programmed into the terminal.

Comment. Comments can be entered about the last programming session and will be stored in the Codeplug. Enter the information, up to 59 characters, before writing the Codeplug to the terminal.

11 Feature Flags

Feature flags availability and ability to set them depend on terminals capabilities and provider settings (for the feature availability see Chapter 2, "Services and Feature Description"). Some of the features can be enabled only with a special dongle. These features are orderable, see Chapter 1, Table 1-33 "Feature Availability". The fundamental features, as Group for all the terminals or Favorite Groups for TCR1000, cannot be disabled.

	Field Name	Field Value	Reset
Codeplug			
Subscriber Unit Parameters	1 Group	<input checked="" type="checkbox"/>	
Feature Flags	2 Status	<input checked="" type="checkbox"/>	
Security	3 Targeted Status Support	<input checked="" type="checkbox"/>	
End-to-End Encryption	4 Semi-Duplex Private Call	<input checked="" type="checkbox"/>	
Remote Programming	5 Private Duplex	<input checked="" type="checkbox"/>	
NGCH Interface	6 Direct Mode (DMO)	<input checked="" type="checkbox"/>	
Clock System Broadcast Infor	7 Direct Mode (DMO) Reservation	<input checked="" type="checkbox"/>	
TMO Voice Services	8 Telephone Interconnect	<input checked="" type="checkbox"/>	
NGCH Parameters	9 MS User Application Support Pre-defined Template	<input checked="" type="checkbox"/>	
DMO Parameters	10 Mail In	<input checked="" type="checkbox"/>	
Ergonomic Parameters	11 Mail Out	<input checked="" type="checkbox"/>	
Language Parameters	12 External Device	<input checked="" type="checkbox"/>	
Audio Parameters	13 Test Page	<input checked="" type="checkbox"/>	
Display Parameters	14 Horn and Light	<input checked="" type="checkbox"/>	
TalkGroups	15 PABX	<input checked="" type="checkbox"/>	
Contact Book	16 Talkgroup Scan	<input checked="" type="checkbox"/>	
Data Services	17 Packet Data	<input checked="" type="checkbox"/>	
TNP 1 Support	18 Home Mode Display	<input checked="" type="checkbox"/>	
Buttons, Keys and Accessorie	19 DMO Gateway	<input checked="" type="checkbox"/>	
Inputs, Outputs, GPIOs	20 One-Touch Feature	<input checked="" type="checkbox"/>	
Mobility and System Paramete	21 My Favorite Groups	<input checked="" type="checkbox"/>	
GPS	22 Speed Dialing	<input checked="" type="checkbox"/>	
User Application	23 GPS	<input type="checkbox"/>	
SIM	24 Tx Audio High Pass Filter	<input type="checkbox"/>	
	25 TNP1 Support	<input checked="" type="checkbox"/>	
	26 Selected Network Enabled	<input checked="" type="checkbox"/>	
	27 Address Book Restrictions	<input type="checkbox"/>	
	28 Talk Group Dialing by Index	<input checked="" type="checkbox"/>	
	29 WAP	<input checked="" type="checkbox"/>	
	30 Direct Mode (DMO) Semi-Duplex Private Call	<input checked="" type="checkbox"/>	
	31 Packet Data Page Enable	<input type="checkbox"/>	
	32 Multislot Packet Data	<input checked="" type="checkbox"/>	
	33 DMO Repeater	<input checked="" type="checkbox"/>	
	34 Clear LA Blacklist on Talk Group Change	<input type="checkbox"/>	
	35 Remote Programming	<input checked="" type="checkbox"/>	
	36 Toggle RF Power Class	<input type="checkbox"/>	
	37 Congested Cells	<input type="checkbox"/>	
	38 Call-Out	<input checked="" type="checkbox"/>	
	39 RUA/RUI	<input checked="" type="checkbox"/>	
	40 Air Interface Migration	<input checked="" type="checkbox"/>	
	41 Dual CH	<input checked="" type="checkbox"/>	
	42 Subscriber Class by Group	<input checked="" type="checkbox"/>	

**NOTE**

For the CEP400 and MTP830 terminals, basing on their Mobile Country Code (MCC taken from Codeplug for both TMO and DMO) some features are disabled. Refer to the following list.

Feature	CEP400	MTP830
TNP1	Unavailable	Available
Packet Data	Unavailable	Available
AT Commands (Full Set)	Unavailable	Available
AT Command (Limited Set)	Available	N/A

11.1 Group

This refers to group call and is the main communication tool of TETRA and is a factory preset.

11.2 Status

This messaging feature enables the user to send and receive status. A status is a number corresponding to a pre-programmed message in the terminal's programmable status list. On reception of the status number, the terminal will look the number up in its status list and display the text associated with the number.

Related fields are:

Paragraph 30.2 "Status ID List"

Paragraph 30.4 "Short Data Service (SDS)"

Paragraph 32.4 "One Touch Buttons"

Paragraph 32.4.18 "Sending Status"

11.3 Targeted Status Support

**NOTE**

The following section is not applicable to TCR1000.

This option is used to enable/disable the Targeted Status Support feature in the terminal. If enabled, the user is able to send a predefined Status Message to an individual (ISSI) via a button programmed with this feature.

See the following:

Paragraph 30.2 "Status ID List"

Paragraph 30.4 "Short Data Service (SDS)"

Paragraph 32.4 "One Touch Buttons"

11.4 Semi-Duplex Private Call



NOTE

The following section is not applicable to TCR1000.

This option is used to enable/disable the Simplex Private Call feature in the terminal. Also called Private Call or Express Connect Call. In this type of one-way call, the user presses and holds the PTT while talking, and releases the PTT while listening.



NOTE

This is the only method of keying the terminal for call set up of Group Calls and keying during the call.

11.5 Private Duplex



NOTE

The following section is not applicable to TCR1000.

This option is used to enable/disable the Private Duplex feature in the terminal. Also called Private Net Phone Call. If this method is used for Private Call set up, the terminals involved in the call will behave as normal telephones with 2-way conversation - users will not have to press the PTT button. Received calls are accepted by pressing the send key and disconnected by pressing end key.

11.6 Direct Mode (DMO)

This option is used to enable/disable the Direct Mode (DMO) feature in the terminal. This feature enables the terminal to work as a 2-way terminal and communicate directly with another subscriber(s) of the talkgroup without the need for system infrastructure. Particularly useful when the terminal is out of coverage. In this mode the terminal can not receive or make Duplex Private Calls. The terminal will not receive system error and maintenance messages.



NOTE

DMO Emergency Calls are supported by the terminal.

See the following:

Paragraph 21 "DMO Parameters"

Paragraph 28.2.2 "DMO Talkgroup List"

Paragraph 32.3 "One-Touch Options"

Paragraph 32.4 "One Touch Buttons"

11.7 Direct Mode (DMO) Reservation

This field specifies whether the terminal will employ a channel reservation timer. If DMO reservation is enabled, during the reservation time, other terminals that want to talk do not require a new call to be set up. Instead, the current channel reservation may be used until the end of the timeout. If channel reservation is Disabled, a new call always needs to be set up when a user wants to talk.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

11.8 Telephone Interconnect



NOTE

The following section is not applicable to TCR1000.

This option is used to enable/disable the Phone Call feature on the terminal. If this field is enabled, the subscriber can call a landline telephone number or a mobile phone number. For more details, see Chapter 2, Paragraph 4 "Phone Call (TMO)".

Related fields are:

Paragraph 19.5.5 "PSTN Gateway ID"

Paragraph 29 "Contact Book"

Paragraph 32.3 "One-Touch Options"

Paragraph 32.4 "One Touch Buttons"

11.9 MS User Application Support Pre-defined Template



NOTE

The following section is not applicable to TCR1000.

This option enables/disables pre-defined templates feature in the terminal.

11.10 Mail In



NOTE

The following section is not applicable to TCR1000.

This is a factory preset feature indicating that the Mail In feature (text messaging) is enabled in the terminal. The Mail In feature enables Reception, Reading and Deletion of Messages.

11.11 Mail Out



NOTE

The following section is not applicable to TCR1000.

This option is used to enable/disable the Mail Out feature (text messaging) in the terminal. The Mail Out features allows the user to Create, Store, Send, Reply, and Delete Messages.

Related Fields:

Paragraph 30.1.1 "Outgoing Mail Options"

Paragraph 30.1.2 "Outgoing Mail List"

Paragraph 32.3 "One-Touch Options"

Paragraph 32.4 "One Touch Buttons"

11.12 External Device



NOTE

The following section is not applicable to TCR1000.

Selecting this feature enables the user to connect an external device (also called peripheral equipment) to the terminal, such as a laptop or desktop PC. The terminal then operates then as a wireless modem, sending or receiving data from another subscriber.

11.13 Test Page



NOTE

The following section is not applicable to TCR1000.

Selecting this option enables field engineers to access various internal data via the test page submenu.

11.14 Horn and Lights



NOTE

This section applies to MTM800 Enhanced only.

Indicates whether the horn and light feature is disabled or enabled in the mobile terminal. If this feature is enabled, the vehicle's horn will sound and the lights will flash to announce an incoming private/phone call. Requires the installation of a buzzer kit.

Enable or Disable the feature by clicking in the check box.

11.15 PABX



NOTE

The following section is not applicable to TCR1000.

This option is used to enable/disable the PABX functionality.
For more details, see Chapter 2, Paragraph 4 "Phone Call (TMO)".

Related fields are:

Paragraph 19.5.6 "PABX Gateway ID"

Paragraph 29 "Contact Book"

Paragraph 32.3 "One-Touch Options"

Paragraph 32.4 "One Touch Buttons"

11.16 Talkgroup Scan



NOTE

The following section is not applicable to TCR1000.

Specifies whether the terminal's Talkgroup Scan feature is enabled or disabled.

If this field is enabled, the terminal, instead of just monitoring its selected talkgroup will monitor (scan) more than one talkgroup sequentially.

The talkgroups are organized into scan lists that are user selectable. Only one scan list can be active and the terminal continuously monitors the talkgroups of the scan list for activity. The terminal will also monitor the group on which scan was started, this may be an 'Announcement Talkgroup' (ATG).

By assigning priorities to the talkgroups defined in the scan list, the handset is capable of accepting calls that have higher priority than the on-going call.

Enable or Disable the feature by clicking in the check box.

Related fields are:

Paragraph 19.4 "Scanning Parameters"

Paragraph 28.1.4 "TMO Scan Lists"

Paragraph 32.3 "One-Touch Options"

Paragraph 32.4 "One Touch Buttons"

11.17 Packet Data



NOTE

The following section is not applicable to TCR1000.

If connected to an external device (such as a laptop or desktop PC), the terminal acts as modem and allows the transfer of data packets.

This feature has three programmable settings that when enabled are user selectable options via the terminal's menu functionality. The settings are: Data Only Enable, Voice & Data Enable, and Voice Only Enable.

Related field is:

Paragraph 30.3 "Packet Data Parameters"

11.18 Home Mode Display



NOTE

The following section is not applicable to TCR1000.

Enabling this feature will allow the terminal to display pre-programmed information when the terminal is inactive.

11.19 DMO Gateway

This feature allows the terminal to work with DMO Gateway(s).

The DMO Gateway is a device that provides connectivity between terminal and the TETRA Voice and Data (V+D) network. The gateway provides the interface between the TETRA DMO and TETRA V+D modes. A gateway may provide only the gateway function or may provide the functions of both a DMO repeater and a DMO gateway during a call.

This feature can be enabled/disabled by clicking in the check box.

11.20 One-Touch Feature



NOTE

The following section is not applicable to TCR1000.

This feature enables often used functions to be assigned to a single button press on the respective button.

Related fields are:

Paragraph 32.3 "One-Touch Options"

Paragraph 32.4 "One Touch Buttons"

11.21 My Favorite Groups

Enabling this feature allows the user to create a 'Personal' range of groups from those held in both the TMO and DMO Talkgroup lists of the terminals memory.

Related field is:

Paragraph 28.3 "My Favorite Groups"

11.22 Speed Dialing



NOTE

The following part of this section is not applicable to TCR1000.

If this feature is enabled, the user will have the possibility to assign a speed dial number to any phone number in the contacts list.

This feature can be enabled/disabled by clicking in the check box.

11.23 GPS

Select this option to enable the GPS (Global Positioning System) feature of the terminal.

Paragraph 35 "GPS"

11.24 Flip Display



NOTE

This section does not apply to MTM800 Enhanced and TCR1000 terminals.

This function flips the display by 180 degrees.

If the flip display feature is disabled in the codeplug, the "Flip Display" cannot be assigned as one-touch function.

If the user disables the flip display feature, all the one-touch keys that include flip display become unassigned keys. An appropriate message alerts the user.

If the user has already assigned this function to another one-touch key, a message informs the user about it.

11.25 Inbound High Pass Filter

The terminal has a High-pass Filter module for all microphone connections. When enabled, the High-pass Filter module reduces the frequencies at the lower end of the frequency

This feature is used to ensure audio clarity in a noisy environment. (This filter is used for certain terminal models. Please consult with your Service Provider.)

This is applicable in TMO and DMO.

Check box to enable this feature.

11.26 Tx Audio High Pass Filter



NOTE

The following section is not applicable to TCR1000.

Enable this parameter to assist speech intelligibility in a noisy environment. (This filter is used for certain terminal models. Please consult with your Service Provider.)

The terminal has a High-pass Filter module for all microphone connections. When enabled, the High-pass Filter module reduces the frequencies at the lower end of the frequency range (300Hz up to 1000Hz), which is similar to increasing the frequencies in the higher range.

This is applicable in TMO/DMO.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

The functional entities are:

- Power-up/down module (FE1)
- High-pass Filter module (FE2)

The power up/down module is responsible for reading the configuration parameters out of the codeplug and communicating them to the High pass filter module. This functional entity resides in the Host.

The High pass Filter module is responsible for implementing/applying the coefficients to the TX audio stream. The High pass Filter module resides within the DSP and listens for configuration commands from the Host.

Upon power-up, FE1 enables or disables the High-pass Filter module in the DSP according to the parameter value.

Upon receipt of an "enable" AUDIO FILTER message, FE2 will apply the coefficients in the High-pass Filter module to all transmitted audio.

Upon receipt of a "disable" AUDIO FILTER message, FE2 will allow the transmitted audio to bypass the High-pass Filter module.

FE2 will store the coefficients of the High-pass Filter module in non-volatile memory. External entities cannot modify the coefficients of the High-pass Filter module.

11.27 Energy Economy Mode

When the check box is enabled, the terminal attempts to operate in Energy Economy mode.

Energy Economy (EE) is a mode of operation where in order to save battery life the MS should not monitor all downlink slots of the MCCH. The MS may enter the mode only after negotiation with the SwMI. In some situations user can prohibit or permit Energy Economy via user interface that IUA shall provide in this case. If terminal is in charger, Energy Economy mode is not needed.

11.28 TNP1 Support



NOTE

The following section is not applicable to TCR1000.

The TNP1 feature will operate only if Packet Data or External Device is enabled in the codeplug (for example a PPP session with MT2 can be established).

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

11.29 Selected Network Enabled



NOTE

The following section is not applicable to TCR1000.

If this feature flag is enabled, the Networks Selection menu item will be available in the Networks menu. The option allows the terminal user to register to a network of choice from an allowed Network List.

Check box to enable this feature.

11.30 Address Book Restriction



NOTE

The following section is not applicable to TCR1000.

When the Address Book Restriction feature is enabled, the user will be allowed to initiate a private/phone/PABX call if a number stored in the list of received calls exists in the address book.

This feature can be enabled/disabled by clicking in the check box.

11.31 Talk Group dialing by Index



NOTE

This section does not apply to Limited Keypad terminals and TCR1000.

If this field is enabled, the terminal allows the user to make a call from a radio to a Talkgroup by using a Talkgroup's Speed Dial number (in other words the Talkgroup ID or Index). Terminal users can view the unique talkgroup SpeedNum associated with a Talkgroup, by using a terminal menu.

This feature can be enabled/disabled by clicking in the check box.

11.32 WAP



NOTE

The following section is not applicable to TCR1000.

If enabled, WAP (Wireless Application Protocol) allows terminal (or device) accessing the internet.

11.33 Mail Out To Group

**NOTE**

The following section is not applicable to TCR1000.

If enabled, allows the user to send a mail to a group.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

11.34 Direct Mode (DMO) Simplex Private Call

**NOTE**

The following section is not applicable to TCR1000.

This option indicates whether the Direct Mode (DMO) Simplex Private Call feature is enabled or disabled in the terminal. Also called DMO Private Call.

In this type of one-way call, the user presses and holds the PTT while talking, and releases the PTT while listening.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

11.35 Packet Data Page Enable

**NOTE**

The following section is not applicable to TCR1000.

Enabling this feature will allow the terminal to display the packet data page.

11.36 Multislot Packet Data

**NOTE**

The following section is not applicable to TCR1000.

Specifies whether the Multislot Packet Data is supported or not.

When enabled on the terminal and the network, the Multislot Packet Data allows for faster Packet Data transfer.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

11.37 DMO Repeater

This option indicates whether the terminal supports the repeater feature or not.

The repeater enables to support Direct Mode communications over an enhanced coverage area as compared to that typically achieved in direct MS-MS operation. Note that an MS will not join a call initiated via a DMO repeater if it was received directly from the calling Direct Mode MS.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

11.38 Clear LA Blacklist on Talkgroup Change

The Blacklist list stores sites that rejected the Mobile Station (MS) previously. If this feature is enabled, the list will be cleared each time a new talkgroup is selected.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

11.39 Remote Programming

If enabled, allows programming a mobile terminal via a wired network without the need of bringing it manually into programming mode.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

11.40 BSI SIM Support

This option allows enabling or disabling the Crypto Menu items.
(The items can be configured using the Configurable Menu Tree.)

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

11.41 Congested Cells

This option indicates whether Congested Cells feature is enabled or disabled in the terminal. With this feature enabled the terminal recognizes whether the cell is congested (Control Channel Congestion). The terminal tries to roam to not congested cells first, ranking congested ones as secondary.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

11.42 Call-Out



NOTE

The following section is not applicable to TCR1000.

Enabling this feature will allow the terminal to use the Call-Out feature.

11.43 RUA/RUI



NOTE

The following section is not applicable to TCR1000.

This option indicates if the terminal supports RUA/RUI feature.

This feature can be enabled/disabled by clicking in the check box.

11.44 Air Interface Migration

This option indicates if the terminal supports the Air Interface Migration feature.

This feature can be enabled/disabled by clicking in the check box.

11.45 RF Power Class



NOTE

This section applies only to terminals supporting TX Power Class 3L (1.8 W).

Codeplug		Field Name	Field Value
	Subscriber Unit Parameters	34	RUA/RUI
	Feature Flags	35	Toggle RF Power Class
	Security	36	Air Interface Migration

This option indicates if the terminal supports the RF Power Toggle feature. When enabled, the user can toggle between high or normal RF power.

This feature can be enabled/disabled by clicking in the check box.

11.46 Dual CH



NOTE

This section applies to MTM800 Enhanced only.

This option indicates if the terminal supports the Dual Control Head feature.

This feature can be enabled/disabled by clicking in the check box.

11.47 Subscriber Class by Group

This option indicates if the terminal supports the Subscriber Class by Group feature.

The Subscriber Class by Talkgroup feature forces all the terminals attached to the same talkgroup to have the same Subscriber Class.

This feature can be enabled/disabled by clicking in the check box.

11.48 Color Display



NOTE

This section applies to CEP400 and MTP830 only.

Allows the user to select the display type for the terminal color or greyscale.

Turn the check box on (color) or off (greyscale) by clicking in the check box.

11.49 WAP Push



NOTE

The following section is not applicable to TCR1000.

Indicates whether the WAP Push feature is enabled or not.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

11.50 Radio Messaging System



NOTE

The following section is not applicable to TCR1000.

Indicates whether the Radio Messaging System feature is enabled or not.

When enabled on the terminal the RMS bi-directional messaging between a control room and terminals is allowed.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

11.51 SDS Remote Control



NOTE

The following section is not applicable to TCR1000.

Indicates whether SDS Remote Control feature is enabled/disabled.

When this feature is enabled, the terminal supports Remote Control related SDSs.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

11.52 Service Page



NOTE

The following section is not applicable to TCR1000.

Indicates if the terminal have the option in menu to display the Service Page information.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

11.53 Recent Calls List



NOTE

The following section is not applicable to TCR1000.

Indicates whether the information about the recent calls are accessible.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

11.54 Secure SDS Storage



NOTE

The following section is not applicable to TCR1000.

Indicates whether stored SDS messages are encrypted. It includes Inbox, Outbox and CO Box messages.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

11.55 Soft Keypad Support for Editor



NOTE

The following section is not applicable to TCR1000.

This option enables the soft keypad with selectable characters in multiple types of editors.

Mark the check box to enable the soft keypad for creating messages, entries to the address book, and templates.

11.56 Whisper Mode Enable



NOTE

This section refers to TCR1000 only.

This option enables or disables the Whisper Mode feature.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

11.57 DMO Repeater Mode



NOTE

This section refers to MTP850 S, MTP850 FuG, MTM5400, and MTM800 FuG only.

This field allows you to enable the DMO Repeater feature.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

11.58 DMO Gateway Mode



NOTE

This section refers to MTM5400 and MTM800 FuG only.

This field allows you to enable the DMO/TMO Gateway feature.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

12 Security

Codeplug			
Subscriber Unit Parameters			
Service History			
Feature Flags			
Security			
End-to-End Encryption			
Remote Programming			
Clock System Broadcast Information			
TMO Voice Services			
DMO Parameters			
Ergonomic Parameters			
Language Parameters			
Audio Settings			
Display Parameters			
TalkGroups			
Contact Book			
Data Services			
TNP 1 Support			
Buttons, Keys and Accessories			
Mobility and System Parameters			
GPS			
User Application			

	Field Name	Field Value	Reset
1	MS Authentication	<input checked="" type="checkbox"/>	
2	MS Mutual Authentication	<input checked="" type="checkbox"/>	
3	Mandatory Mutual Authentication	<input type="checkbox"/>	
4	SCK Air If Encryption	<input checked="" type="checkbox"/>	
5	DMO SCK	<input type="checkbox"/>	
6	DMO SCK OTAR	<input type="checkbox"/>	
7	DCK Air If Encryption	<input checked="" type="checkbox"/>	
8	GCK Air If Encryption and OTAR	<input type="checkbox"/>	
9	Permanent Disable	<input type="checkbox"/>	
10	Permanent Disable V2	<input type="checkbox"/>	
11	Permanent Disable Policy	No Security	
12	Temporary Enable/Disable Policy	No Security	
13	Non Secured Call Indication	<input checked="" type="checkbox"/>	
14	Encrypted Only	May Be Clear	
15	Class 3 Cell Ranks Higher than Class 2 Cell	Cell 3 Is Equal	
16	Key Erasure Mode	Erase All Keys Except K	
17	Key Erasure Occurred	<input type="checkbox"/>	
18	Maximum Retries Due Timeout T351-354	1	Reset
19	Max Password Attempts	3	Reset
20	PIN Flag	<input type="checkbox"/>	
21	MS Change PIN Number	<input checked="" type="checkbox"/>	
22	PIN Number	0000	
23	MS Change PIN Options	<input checked="" type="checkbox"/>	
24	PIN Unblocking Key	00000000	
25	Activate Always Encryption	<input type="checkbox"/>	
26	Covert Mode	Off	
27	Covert Vibrate	<input checked="" type="checkbox"/>	
28	Enter Pinlock-Menu Tone	<input checked="" type="checkbox"/>	

12.1 MS Authentication

This feature may be required for several different reasons, see Chapter 2 Paragraph 9.2.

Checking the box enables/disables the MS Authentication Feature.

During normal operation the Switching and Management Infrastructure (SwMi) of the system may require the terminal (mobile subscriber - MS) to authenticate, to allow access to the system services. The terminal may also require SwMi to authenticate, thus making the authentication mutual.

The authentication centre (AuC) manages the assignment, control and distribution of encryption key information to the (SwMi), and manages keys for Air Interface Encryption and Authentication services for the Dimetra infrastructure entities.



NOTE

Authentication and encryption require key storage/provisioning to be functional, to make these features operational.

12.2 MS Mutual Authentication

Enables/disables authentication initiated by SwMi and made mutual by terminal.

The SwMi initiates the process by challenging the terminal to prove its authenticity ("authentication of the MS..."). The terminal responds with its proof of authenticity and a challenge of its own to the SwMi ("...made mutual by the MS").

The authentication centre (AuC) manages the assignment, control and distribution of encryption key information to the Switching and Management Infrastructure (SwMI), and manages keys for Air Interface Encryption and Authentication services for the Dimetra infrastructure entities.

**NOTE**

Authentication and encryption require key storage/provisioning to be functional, to make these features operational.

12.3 Mandatory Mutual Authentication

If this feature is enabled, it indicates that SwMI authentication is mandatory.

12.4 SCK Air If Encryption

This field contains the Class of MS and the all MS information elements to indicate the infrastructure the characteristics of the MS terminal support (Authentication-flag, SCK-AI).

This field shall be enabled only for the terminals supporting SCK encryption. If set incorrectly can cause the registration request to be rejected (depending on the system configuration).

12.5 DMO SCK

This option indicates if the MS supports DMO SCK feature. DMO SCK is to represent SCKs designated for secure DMO.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

12.6 DMO SCK OTAR

This option indicates whether DMO SCK Keys can be delivered to the MS by OTAR.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

12.7 DCK Air If Encryption

This field contains the Class of MS and the all MS information elements to indicate the infrastructure the characteristics of the MS terminal support.

This field shall be enabled only for the terminals supporting DCK encryption. If set incorrectly can cause the registration request to be rejected (depending on the system configuration).

12.8 GCK Air If Encryption and OTAR

This option indicates if MS shall support GCK AIE and OTAR feature.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

12.9 Permanent Disable

If enabled, the terminal will be permanently killed when it receives the Permanent Disable command. The terminal software, codeplug and security key material are deleted. Unlike the Temporary Disable, the terminal cannot be recovered over the air but needs to be reprogrammed by the Service center personnel.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

12.10 Permanent Disable V2

If enabled, the terminal appears dead to the end user when it receives the Permanent Disable command. The terminal's security key material is deleted and the terminal cannot be recovered over the air.

Unlike Permanent Disable, for Permanent Disabled V2 the terminal can be re-enabled by the customer provided he/she has the software selling dongle.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

12.11 Permanent Disable Policy

Defines the security policy for accepting a Permanent Disable command over the air.

The options are:

- No Security - No security is checked when terminal is processing the Permanent Disable command.
- Encryption required – Permanent Disable command must be encrypted for it to be processed.
- Authentication required – Permanent Disable command must contain an Authentication Challenge flag, otherwise it will be rejected. For this, a valid K key must be loaded into the terminal.
- Mutual authentication required – Permanent Disable command must contain an Authentication Challenge flag, otherwise it will be rejected. In addition the terminal will initiate mutual authentication prior to processing the command. For this, a valid K key must be loaded into the terminal.
- Encryption and Authentication required – Permanent Disable command must be encrypted and contain an Authentication Challenge flag, otherwise it will be rejected. For this, a valid K key must be loaded into the terminal.
- Encryption and Mutual Authentication required – Permanent Disable command must be encrypted and contain an Authentication Challenge flag, otherwise it will be rejected. In addition the terminal will initiate mutual authentication prior to processing the command. For this, a valid K key must be loaded into the terminal.

To select the option, put the pointer into the field value, click the drop-down list and select the required value.



NOTE

An authentication flag causes the start of authentication communication flow between the terminal and the infrastructure.

12.12 Temporary Enable/Disable Policy

This feature is used to accept or reject Temporary Enable / Disable commands sent by the Switching and Management Infrastructure (SwMI) of the system when the command had not been implicitly authenticated using AI (Air Interface) encryption.

The options are:

- No Security
- Encryption Required
- Authentication Required

- Mutual Authentication Required (This option does not apply to Dimetra infrastructure)
- Encryption and Authentication Required
- Encryption and Mutual Authentication Required (This option does not apply to Dimetra infrastructure)

**NOTE**

An authentication flag causes the start of authentication communication flow between the terminal and the infrastructure.

12.13 Non Secured Call Indication

Specifies whether or not the Non Secured Call Indication feature is enabled in the terminal. When enabled, this feature warns the user about unencrypted incoming calls.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

12.14 Encrypted Only

Enabling this option will cause the terminal to only search for cells supporting encryption at power on or each cell reselection. The terminal will not register in any cell using ciphering off, in case the flag is set to encrypted-only.

The options are:

- Encrypted Only.
- May Be Clear.

12.15 Class 3 Cell Ranks Higher than Class 2 Cell

If this feature is set to "Cell 3 is better", it means that a cell operating in Security Class 3 will be ranked higher than a cell operating in Class 2

If this feature is set to "Cell 3 is equal", it means that a cell operating in Security Class 3 will be ranked equal to a cell operating in Class 2.

It is only relevant to terminals supporting Static Cypher Key (SCK) and Dynamic Cypher Key (DCK).

The options are:

- Cell 3 is Better.
- Cell 3 is Equal.

12.16 Key Erasure Mode

This option is used to erase the encryption keys prior to the terminal going for service, or when the vehicle in which a (mobile) terminal is mounted is sent for service. This mode may also be used to remove all key material from a terminal in emergency situations.

An terminal that supports air interface encryption will initiate erasure of cipher keys (SCK) stored in the terminal on detection of a unique terminal front panel key sequence. This sequence will only be processed when the terminal is in the idle or emergency states.

On detection of an emergency key-erase operation, the terminal operational state will be Temporary MS Disable (Equipment). The terminal will send an unsolicited PDU to the SwMi (if the terminal is currently registered), to indicate that it has gone into this state. As this PDU must be sent encrypted, it will be sent prior to performing the key erasure (if terminal is registered).

Select one of the following options:

- **Erase All Keys Except K** – when the key erase key sequence is entered on the terminal it will erase only SCKs, not Authentication Ks.
- **Delete All Keys** – when the key erase key sequence is entered on the terminal it will erase SCKs and K.
- **Key Erasure Sequence Disable** (not applicable to TCR1000) – the key erase key sequence is disabled.

Provisioning of K and the SCK into the terminal will be done using the KVL.

To select the option, put the pointer into the field value, click the drop-down list and select the required value.



NOTE

Authentication and encryption require key storage/provisioning to be functional, to make these features operational.

The terminal, and SwMI encryption and authentication support are classified into 3 classes:

- Class 1 – no encryption, may use authentication
- Class 2 – SCK encryption, ESI with SCK, may use authentication
- Class 3 – DCK encryption, ESI with CCK, authentication
- Class 3G – DCK and GCK encryption, ESI with CCK, authentication

Related field is:

Paragraph 12.17 "Key Erasure Occurred"

12.17 Key Erasure Occurred

If enabled the terminal will store an indication in the codeplug that key Erasure occurred. This flag will only be set on successful erasure of the encryption keys.

This flag can only be cleared by re-provisioning a new codeplug into the terminal, using the depot CPS, or re-enabling the terminal over air (where possible).

This feature is Enabled/Disabled by clicking in the check box.

Related field is:

Paragraph 12.16 "Key Erasure Mode"

12.18 Maximum Retries Due Time Out T351- 354

The number in the editable field indicates the maximum number of times the terminal is allowed to send U-LOCATION UPDATE DEMANDs due to time out of the timers T351-354.

Where authentication occurs embedded within a registration procedure, timer T351 (registration timer) shall be treated as T354 (authentication timer) and as such only one timer needs to be invoked. The terminal uses the registration timer T351 value for the terminal authentication timer during explicit authentication.

The terminal starts the T351_354 timer on receiving the D-AUTHENTICATION DEMAND from the SwMI.

The terminal will terminate T351_354 under the following conditions:

- Terminal Link Loss

- On receipt of D-AUTHENTICATION UPDATE ACCEPT containing the type-3 element "Authentication downlink"
- On receipt of D-LOCATION REJECT
- On sending U-AUTHENTICATION RESULT for authentication initiated by the SwMI and made mutual by terminal

If the authentication timer T351_354 expires, the terminal will again attempt to send the location update demand before reverting to its previous mobility management state, prior to the authentication attempt. The range of the timer is 1 - 255 seconds and the default setting is 1 second.

12.19 Max Password Attempts

Prevents a non-authorised user from guessing the password of a locked terminal. If an incorrect password is entered more than this many times (for example: 3), the terminal will not allow any more attempts. Only entry of the (longer PIN Unlock Key (PUK) code can unlock the terminal.

12.20 PIN Flag

The terminal has PIN1 facility option that may be enabled or disabled in the Data Storage. Default value of this option is "enabled". Upon power on, the terminal shall instruct the user to enter valid 4 digits PIN1 value before accessing any of the services available from the network or features of the terminal. Following three consecutive failed attempts the user application and all layers above layer 3 shall be temporarily blocked and remain in this state even through a power reset. PIN1 can be changed via CPS and user menu.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

12.21 MS Change PIN Number



NOTE

The following section is not applicable to TCR1000.

This option indicates whether the terminal user is allowed or not allowed to change PIN value.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

12.22 PIN Number



NOTE

The following section is not applicable to TCR1000.

Displays the passcode that can be used to unlock the terminal if it has been locked. To protect from indiscretion, asterisks are displayed instead of the passcode.

12.23 MS Change PIN Options



NOTE

The following section is not applicable to TCR1000.

Indicates whether the terminal user is allowed or no allowed to change PIN option.

12.24 PIN Unblocking Key



NOTE

The following section is not applicable to TCR1000.

Displays the eight-digit code used to unlock the terminal if there were attempts to enter the passcode too many times. Also called PUK.

12.25 Activate Always Encryption

If enabled, the terminal will block any unexpected clear outgoing PDUs.

Use carefully as this feature, if enabled, will prevent the terminal from operating on any clear system.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

12.26 Covert Mode



NOTE

The following section is not applicable to TCR1000.

This option indicates whether the Covert Mode is On or Off.

To select the option, put the pointer into the field value, click the drop-down list and select the required value.

12.27 Covert Vibrate



NOTE

The following section is not applicable to TCR1000.

This option indicates whether vibrations are allowed in Covert Mode.

The options are:

- Off - vibrations are not allowed
- On - vibrations are allowed

To select the option, put the pointer into the field value, click the drop-down list and select the required value.

12.28 Enter Pinlock-Menu Tone



NOTE

The following section is not applicable to TCR1000.

This option indicates whether a periodic tone is generated when the terminal enters the Pinlock state.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

13 End-to-End Encryption



NOTE

The following section is not applicable to 260–275 MHz terminals.



NOTE

Not all the parameters from this section are available for TCR1000.
Refer to the codeplug for details.

	Field Name	Field Value	Reset
1	Periodic End-to-End Key Failure Notice	<input type="checkbox"/>	
2	Clear Reception Alert Tone	Beginning	
3	Clear Transmit Alert Tone	Beginning	
4	End-to-End Key Erasure Enable	<input type="checkbox"/>	
5	Clear Reception Alert Tone Condition	None	
6	Muted Reception Alert Tone	None	
7	End-to-End Re-Key Enable	<input type="checkbox"/>	
8	User Prompt on Checksum Failure	<input checked="" type="checkbox"/>	
9	Checksum Failure Indication	Mute & Alert	
10	End-to-End Index Set Change Enable	<input type="checkbox"/>	
11	Key Fail Indication Timer, msec	5000	Reset
12	Re-Key Ongoing Timer, min	5	Reset
13	Re-Key Completion Timer, min	10	Reset
14	Mandatory On Relaxation	<input type="checkbox"/>	
15	Infinite End-to-End Key Retention	<input type="checkbox"/>	
16	Low Power Mode Timer, msec	2000	Reset
17	End-to-End Encryption in Class of MS	<input checked="" type="checkbox"/>	
18	U-Plane-Enable	<input checked="" type="checkbox"/>	

13.1 Periodic End-to-End Key Failure Notice

If enabled, the terminal will repeatedly post a key failure message whenever a key failure happens.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

13.2 Clear Reception Alert Tone

This feature describes the tone alert the terminal uses upon receiving a clear call:

- Beginning - tone sounded at the beginning of the call.
- Continuous - tone sounded repeatedly during the entire call.

To change the setting, select the field value, then select desired setting.

13.3 Clear Transmit Alert Tone

It describes the tone alert the terminal sounds upon transmitting in clear:

- None - no tone sounded.
- Beginning - tone sounded at the beginning of the call.
- Continuous - tone sounded repeatedly during the entire call.

To change the setting, select the field value, then select desired setting.

13.4 End-to-End Key Erasure Enable

If enabled, the user is allowed to erase all keys from the terminal (except the Key Encryption Key).
Turn the check box on (Enable) or off (Disable) by clicking in the check box.

13.5 Clear Reception Alert Tone Condition

This option indicates the condition for sounding a clear reception alert tone:

- None - no tone sounded.
- Always - any clear received speech tone will be played.
- Association - clear received speech with association of "ON but changeable" or "MANDATORY ON" (for group calls and Mandatory On Relaxation Enabled) tone will be played.

To change the setting, select the field value, then select desired setting.

13.6 Muted Reception Alert Tone

This option indicates whether to sound an alert tone when an incoming call is muted in the terminal:

None - no tone sounded.

Beginning - tone sounded at the beginning of the call.

Continuous - tone sounded repeatedly during the entire call.

To change the setting, select the field value, then select desired setting.

13.7 End-to-End Re-Key Enable

This parameter indicates whether sending a re-key request is enabled.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

13.8 User Prompt on Checksum Failure



NOTE

The following section is not applicable to TCR1000.

Specifies whether a user prompt is displayed on an End-to-End synchronization frame checksum failure. The message prompt indicates that a checksum failure has occurred.

Turn the check box on (Enable) or off (Disable) by clicking in the check box. Authentication and encryption require key storage/provisioning to be functional, to make these features operational.



NOTE

The user may attempt to resynchronize the real time clock (RTC) manually or over the air (by switching to TMO if in DMO) on the CCSUM failure indication. This may not clear the error depending on the cause of the checksum failure.

13.9 Checksum Failure Indication

This option indicates how the terminal should behave when receiving a sync frame failure due to checksum error:

- Mute

- Mute & Alert
- Un-mute Alert
- Un-mute & Overtone
- Un-mute

To change the setting, select the field value, then select desired setting.

13.10 End-to-End Index Set Change Enable



NOTE

The following section is not applicable to TCR1000.

If enabled, the user is allowed to change the indexset name of the active key in the terminal.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

13.11 Key Fail Indication Timer, msec

This option indicates the period of time between key fail posted messages.

Type in the required value in ms.

13.12 Re-Key Ongoing Timer, min

This option indicates the time of period elapsed between sending a re-key request to RCS (Remote Communication Service) and receiving a re-key ongoing message from the RCS.

Type in the required value in ms.

13.13 Re-Key Completion Timer, min

This option indicates the period of time elapsed between receiving a re-key ongoing message from RCS to receiving a re-key completion message from TCS.

Type in the required value in ms.

13.14 Mandatory On Relaxation

Determines whether an incoming clear call will be un-muted (YES or muted (NO) when the DEFAULT MODE of the association is MANDATORY ON.

This field is relevant for Group Calls.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

13.15 Infinite End-to-End Key Retention

If this feature changes its state (from enabled - ON to disabled - OFF, or from disabled - OFF to enabled - ON), the terminal will erase the SEK (Signalling Encryption Key), KEK (Key Encryption Key), and GEK (Group Encryption Key) in addition to all TEKs (Traffic Encryption Keys) and associations.

If this feature is disabled (OFF), the terminal will be capable of maintaining all keys stored in it for a minimum of 30 seconds after battery removal, and for a maximum of 6 minutes. The terminal will erase the keys within 6 minutes.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

13.16 Low Power Mode Timer, msec



NOTE

This section applies to portable terminals only.

This option indicates the period of time after which the terminal will switch the UCM (Universal Crypto Module) into low-power mode if no call/status, OTAK (Over-The-Air Keying), or KVL (Key Variable Loader) activity is detected.

Type in the required value in ms.

13.17 End-to-End Encryption in Class of MS

This option indicates whether the terminal is E2E capable or not. This is a sub-element of Class of terminal information element.

This field is set to Enabled in power-up if the terminal is equipped with the UCM.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

13.18 U-Plane-Enable

Controls the U-plane audio in the terminal DSP. If this field is disabled, no audio will be heard. If this is enabled, the audio will be heard.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

14 Remote Programming

	Field Name	Field Value	Reset
1	Good / Bad Battery Threshold	50	
2	Good / Bad Battery Hysteresis	10	
3	Communication Timeout Timer	5	

14.1 Good / Bad Battery Threshold



NOTE

This section applies to portable terminals only.

Allows the user to set a level at which the Remote Programming feature will deactivate if the battery level goes below it. For the Remote Programming feature to work, the terminal needs to always have a good battery condition.

Example 1:

Assume the default value and battery condition is at 55%. The terminal starts Remote Programming. While programming of a new firmware takes place, the battery level drops below this threshold. Programming will continue.

Example 2:

Assume the default values (50% threshold, 10% hysteresis) and the battery condition is at 52%. The terminal starts Remote Programming. The battery level then drops below this threshold, Remote Programming is disabled until the battery level reaches this threshold + Remote Programming Good / Bad Battery Hysteresis value (in this example, it would be $50 + 10 = 60\%$), after which Remote Programming is activated again.

Type in the required value.

14.2 Good / Bad Battery Hysteresis



NOTE

This section applies to portable terminals only.

This is the value that needs to be added with the Remote Programming Good / Bad Threshold value to determine the battery level that disables the Remote Programming feature.

Assume the default values (50% threshold, 10% hysteresis) and the battery condition is at 52%. When terminal is in bad battery condition, Remote Programming is disabled until battery level reaches Remote Programming Good / Bad Battery Threshold + this value (in this example, it would be $50 + 10 = 60\%$), after which Remote Programming is activated again.

Type in the required value.

14.3 Communication Timeout Timer

Defines the timeout duration until a loss of communication between the terminal and PC or between control head and transceiver is notified to the user on the display of the terminal.

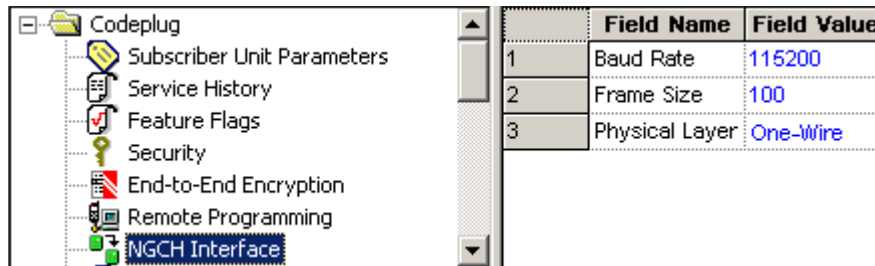
Type in the required value.

15 NGCH Interface



NOTE

This section applies to MTM800 Enhanced only.



15.1 Control Head Mode

	Field Name	Field Value	Reset
1	Control Head Mode	NGCH	Reset
2	Physical Layer	NGCH	

DataBox
Automatic

This parameter decides if MTM800 Enhanced operates with NGCH, without NGCH or use auto NGCH detection mechanism.

The available options are respectively:

- NGCH
- DataBox
- Automatic

The default value is Automatic.

15.2 Baud Rate

Defines the used baud rate for the NGCH - transceiver interface.

Range is 9600 - 115200.

15.3 Frame Size

Defines the used frame size for the NGCH - transceiver interface.

Range is 10 - 2000.

15.4 Physical Layer

Defines which physical interface is used to connect the terminals.

There are 2 interfaces to choose from:

- One-wire - a one wire digital interface for exchanging data between control head and terminal.
- Two-wire - a two-wire digital interface for exchanging data between control head and terminal.

To choose the setting, put the pointer into the field value, click on the arrow, and drag the pointer to the desired selection.



NOTE

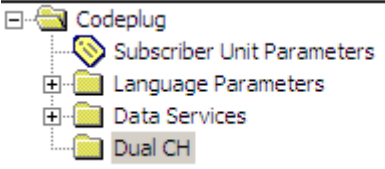
This is important to configure NGCH and the connected terminal in the same way, that is, both needs to support the same physical interface. Otherwise no communication is possible.

16 Dual CH



NOTE

This section applies to New Generation Control Head only.

	Field Name	Field Value	Reset
	1	Default Language	BRITISH ENGLISH
	2	Control Head Role	Master
		Master	
		Slave	

16.1 Default Language

Defines the default language for the control head.



NOTE

This is important to configure Master and Slave control heads in the same way, that is, both needs to support the same language set. Otherwise no communication is possible.

16.2 Control Head Role

Defines the role for the programmed control head, whether this should be Master or Slave.

17 Clock System Broadcast Information



NOTE

The following section is not applicable to TCR1000.

	Field Name	Field Value	Reset
1	Time Displayed	<input checked="" type="checkbox"/>	
2	Date Displayed	<input checked="" type="checkbox"/>	
3	Time Format	24-hour scale	
4	Date Format	dd-mon-yy	
5	Time Display by MMI	<input checked="" type="checkbox"/>	
6	Setting Time by User	<input checked="" type="checkbox"/>	
7	Local Time Synchronized to Network Time	Local Time & Local Time Offset	Reset
8	Local Time Offset, quarters	+0:00	
9	RTC Update User Intervention	<input checked="" type="checkbox"/>	

The System Broadcast Information is sent over the air interface to provide the parameters that the MS needs in order to access the SwMI system.

As a part of the system synchronisation information, TETRA network time information element in an appropriate PDU is sent to the MS. The MS uses this element for the Time Received & Displayed feature.

The Time Received & Displayed feature allows to:

- Automatically update time according to the current time zone when in TMO mode or if Dual Watch is on and use of MS internal clock when in DMO mode or in DMO base mode if Dual Watch is off or out of service.
- Display time-of-day and date on the MS screen.
- Time-stamp text messages and status received by the MS. The SDS (Short data Services) feature will include date stamp information the MS received from the network's broadcast of Time & Date.

17.1 Time Displayed

Defines whether time is displayed to the MS user.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

The setting of this parameter can also be changed via the MS MMI.

17.2 Date Displayed

Determines if date should be visible on home screen and one-touch button Time-Display action.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

The setting of this parameter can also be changed via the MS MMI.

17.3 Time Format

Defines the time format to be displayed to the MS user.

The possible values are "24-h clock" or "12-h clock".

To change the setting, select the field value, and select desired setting.

The setting of this parameter can also be changed via MS MMI.

17.4 Date Format

Sets the date format (DD - day number, MM - month number, MON - month abbreviation, YY - year number).

The options are:

- dd/mm/yy
- mm/dd/yy
- dd-mon-yy
- yy/mm/dd

To select the option, put the pointer into the field value, click the drop-down list and select the required value.

The setting of this parameter can also be changed via the terminal MMI.

17.5 Time Display by MMI

The field defines whether the user is given the possibility to enable/disable displaying time and date information in the MS and changing the displayed time and date format.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

17.6 Setting Time by User

The field defines whether the user is given the possibility to set time and date.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

17.7 Local Time Synchronized to Network Time

6	Setting Time by User	<input checked="" type="checkbox"/>	
7	Local Time Synchronized to Network Time	Local Time & Local Time Offset	Reset
8	Local Time Offset, quarters	None	
9	RTC Update User Intervention	Local Time	
		Local Time & Local Time Offset	

This field allows the terminal user to synchronize the terminal local time to the network time.

To change this setting, put the pointer into the field value, click the drop-down list and select the required value. The following options are available:

- None - The terminal ignores the time in the broadcasted PDUs, and uses its internal clock and internal offset.
- Local Time - The terminal updates its time when receives a broadcasted PDU containing the system time, but the offset is not updated (that is, the terminal uses the internally configured offset).
- Local Time & Local Time Offset - The terminal updates its time and offset when receives a broadcasted PDU containing the system time.

17.8 Local Time Offset, quarters

Determines how many quarters the local time is shifted in comparison to UTC time. The range is from -14:00 to +14:00.

To select the option, put the pointer into the field value, click the drop-down list and select the required value.

17.9 RTC Update User Intervention

Determines if the user should be asked to accept changing the terminal internal clock. (This setting concerns also terminals with E2EE enabled.)

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

18 Man Down



NOTE

This section applies to MTP850 Ex, MTP810 Ex, MTP850 S/MTP850 FuG, and MTP830 S/MTP830 FuG only.

	Field Name	Field Value
1	Man Down Radio Enable	<input checked="" type="checkbox"/>
2	Angle Feature Enable	<input type="checkbox"/>
3	No-movement Feature Enable	<input type="checkbox"/>
4	Time to Pre-alert for Angle	100
5	Time to Pre-alert for No-movement	300
6	Time to Alert for Angle	10
7	Time to Alert for No-movement	60
8	Activation Angle	45
9	No-movement Sensitivity	Min
10	Pre-alert Repeat Enable	<input checked="" type="checkbox"/>
11	Pre-alert Repeat Period	5
12	MD Feature Disabled Tone Repeat	<input checked="" type="checkbox"/>
13	MD Feature Disabled Tone Repeat Time	10
14	Additional Visual Indication	<input checked="" type="checkbox"/>
15	Additional_Sound_Indication	<input checked="" type="checkbox"/>

18.1 Man Down Radio Enable

To activate the Man Down feature, check the box. To deactivate, uncheck the box.

18.2 Angle Feature Enable

If enabled, the terminal will be monitored for the duration it is horizontal or below the Activation Angle to decide if it will enter into Man-Down mode.

The terminal will enter into the Man-Down mode if it is still horizontal or below the Activation Angle after some pre-programmed timers expire, an indication that the terminal user has fallen down.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

**NOTE**

- The timers are restarted anytime when the terminal is moved above the Activation Angle before Man-Down mode is entered or when the PTT button is pressed.
- The Angle Feature functionality may be used together with the No-Movement Feature functionality but not the Movement Alarm functionality. Both the No-Movement Feature and Angle Feature functionality may be possibly active at the same time and trigger independent pre-alert tone.

18.3 No-movement Feature Enable

If enabled, the terminal will be monitored for the duration it is still to decide if it will enter into Man-Down mode.

The terminal will enter into the Man-Down mode when the vibration that the terminal perceives is below the sensitivity which has been selected after some pre-programmed timers expire, an indication that the terminal user does not move any more.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

**NOTE**

- The timers are restarted anytime when the terminal is moved before the Man-Down mode is entered or when the PTT button is pressed.
- The No-Movement Feature functionality may be used together with the Angle Feature functionality but not the Movement Feature functionality. Both the No-Movement Feature and Angle Feature functionality may be possibly active at the same time and trigger independent pre-alert tone.

18.4 Time to Pre-alert for Angle

This parameter sets the duration before playing an alert tone when used in the Angle Feature functionality.

Type the required value in the field. The range is 5-600 seconds. The default is 100 seconds.

18.5 Time to Pre-alert for No-movement

This parameter sets the duration before playing an alert tone when used in the No-movement Feature functionality.

Type the required value in the field. The range is 5-600 seconds. The default is 300 seconds.

18.6 Time to Alert for Angle

This parameter sets the duration the terminal waits to enter into Man Down mode after the pre-alert sounded when used in the Angle Feature functionality.

Type the required value in the field. The range is 1-99 seconds. The default is 10 seconds.

18.7 Time to Alert for No-movement

This parameter sets the duration the terminal waits to enter into Man Down mode after the pre-alert sounded when used in the No-movement Feature functionality.

Type the required value in the field. The range is 1-99 seconds. The default is 60 seconds.

18.8 Activation Angle

This parameter defines the angle in degrees at which to trigger the Man Down timers to countdown to enter the Man Down mode.

To change the value, choose from a drop down list.

18.9 No-movement Sensitivity

This parameter sets the sensitivity of the movement sensor which is used for either the No-Movement or Movement Feature functionality.

The sensitivity levels are:

- Min - Minimum vibration/movement will activate the functionality
- Med - Medium vibration will activate the functionality
- Max - Maximum vibration will activate the functionality

To change the value, choose from a drop down list.

18.10 Pre-alert Repeat Enable

If enabled, the pre-alert tone is repeated once per Pre-alert Period.

If disabled, the pre-alert tone will be played only once.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

18.11 Pre-alert Repeat Period

This parameter defines the time period after which the pre-alert tone is repeated when the Pre-alert Repeat Enable is enabled.

Type the required value in the field.

18.12 MD Feature Disabled Tone Repeat

If the parameter is enabled, the Man-Down feature can be enabled or disabled by Side Key 1 or 2 (depending on One-Touch Button feature settings). When the key is pressed, a tone is played.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

18.13 MD Feature Disabled Tone Repeat Time

This parameter defines the time period between tone repetitions when the MD Feature Disabled Tone Repeat is enabled.

Type the required value in the field. The range is 1-10 seconds.

18.14 Additional Visual Indication

This parameter defines whether the additional visual indication is enabled.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

18.15 Additional Sound Indication

This parameter defines whether the additional sound indication is enabled.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

19 TMO Voice Services



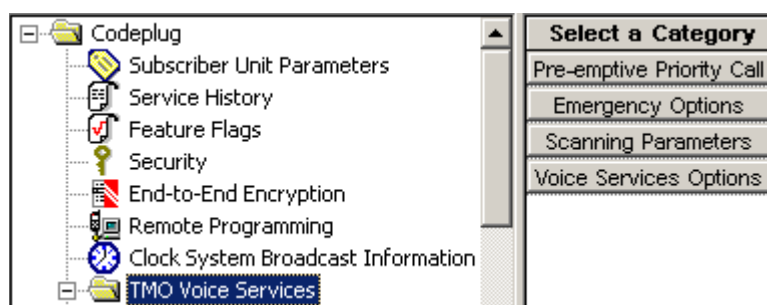
NOTE

Not all the parameters from this section are available for TCR1000.

Refer to the codeplug for details.

This menu has the following submenus

- Pre-emptive Private Call
- Emergency Options
- Scanning Parameters
- Voices Services Options



19.1 Pre-emptive Priority Call (PPC)

	Field Name	Field Value
1	Originating PPC Private Call	<input checked="" type="checkbox"/>
2	Call Priority for Outgoing Private PPC PTPC	14
3	PPC PTPC Priority 12 13	Accept
4	Scan Group Priority Behaviour	Inferior Priority
5	Audio Shock Delay Timer , msec	3000

There are five editable options in this menu.

A Pre-emptive Call is not a call that enables a user to go to the top of a queue. If two people, A & B, are in a call and a user C, with pre-emption wishes to talk to B, then the call set up for user C will interrupt (drop) the A/B call to set the call up with B.

User A has been pre-empted.

19.1.1 Originating PPC Private Call

Selecting this check box allows PPC Private Calls to be made using this terminal.

19.1.2 Call Priority for Outgoing Private PPC PTPC

This option is used to define the PPC priority used when initiating a PPC PTPC.

PPC - Pre-emptive Priority Call.

PTPC - Point to Point Call.

The range is 12-15. Priority 15 is also the emergency call priority, but pre-emption will not interrupt an emergency call.

- If the call priority of the incoming PPC call is set to 12 or 13, the terminal will either allow the call or reject it without any intervention by the user.
- If the call priority of the incoming PPC call is 14 or 15, the active non-emergency call will be pre-empted.
- In Data mode, the terminal will only accept a PPC call with Emergency priority 15.

The following fields below must be enabled for this feature to work:

- Simplex Private Call
- Private Duplex

Related field is:

Paragraph 19.1.3 "PPC PTPC Priority 12 13"

19.1.3 PPC PTPC Priority 12 13

This option indicates whether or not a PPC with call priority 12, 13 is accepted during a normal call.

PPC - Pre-emptive Priority Call.

PTPC - Point to Point Call.

There are two options:

- Accept – the PPC call will interrupt the ongoing call.
- Reject – the PPC call will not interrupt the ongoing call.

The option is selected by clicking the drop-down list and selecting the required value.

Requirements for the terminal to accept a PPC PTPC call during a non-emergency call are:

1. The active call is one of the following:
 - PTPC
 - Selected/ATG/Broadcast Group Call
 - Scan Group Call, and the terminal is configured to Scan Group Equal Priority.

The terminal will accept the PPC PTPC call during a non-emergency call:

- If the incoming PPC PTPC priority is 14 or 15 and higher than the priority of the active call.
 - If the incoming call priority is 12 or 13 and higher than the priority of the active call, and "Accept/Reject PPC PTPC priority 12,13 is set to "Accept".
2. The active call is a Scan Group Call and the terminal is configured to Scan Group with lower Priority.

The terminal will accept the PPC PTPC call during a non-emergency call:

- If the call priority of the incoming PPC PTPC is 14 or 15.
- If the call priority of the incoming PPC PTPC is 12 or 13 and "Accept/Reject PPC PTPC priority 12,13 is set to "Accept".

19.1.4 Scan Group Priority Behaviour

This field has 2 options and defines whether or not the terminals active scan group priority is less than or equal to that of an incoming PPC group call

This option indicates whether or not a PPC with call priority 12, 13 is accepted during normal call.

The two options are:

- **Inferior Priority** – the PPC group call will interrupt an on going group call.
- **Equal Priority** – if this option is chosen, the user will be given the choice of dropping the on going call and accepting the new PPC group call, or rejecting the new PPC group call and continuing with the on going group call.

The option is selected by clicking the drop-down list and selecting the required value.

19.1.5 Audio Shock Delay Timer

Period of time in milliseconds. Defines time delay required to eliminate audio shock.

Audio shock occurs when the user receives the audio of the old call in the earpiece and the audio of the new call is sent immediately to the speaker that may be very close to the user's ear.

19.2 Emergency Options

	Field Name	Field Value
1	Emergency Alarm	<input checked="" type="checkbox"/>
2	Emergency Call	<input checked="" type="checkbox"/>
3	TMO Group HotMic	<input checked="" type="checkbox"/>
4	TMO Emergency Services	Emergency Call/Alarm
5	Emergency MS-ISDN	
6	Emergency Alarm Address	Address List 1
7	Emergency Call Address	Address List 1
8	Emergency Console Acknowledge	<input checked="" type="checkbox"/>
9	Emergency Switch Power Up	<input checked="" type="checkbox"/>
10	Emergency Started Timer, msec	600
11	Emergency Cancel Timer, msec	2000
12	Emergency Wait Ack Timer, sec	5
13	Emergency Alarm Retries	7
14	Emergency Individual Call Type	Full-Duplex
15	Emergency SDS Status Destination	0
16	Emergency SDS Status Value	0
17	Emergency SDS Alias	Emgcy status
18	Disable Visible/Audible Indication	<input type="checkbox"/>
19	Colored Emergency	<input checked="" type="checkbox"/>
20	Emergency DMO to TMO	Stay in DMO Emergency
21	Emergency Alarm on Service Recovery	Always
22	Enter HotMic on Service Recovery	Never

Related fields are:

Paragraph 21.1.3 "DMO Group HotMic"

Paragraph 26.2 "Hot Mic"

19.2.1 Emergency Alarm

If Emergency Alarm is enabled in the terminal and upon entry into emergency mode, the terminal will send an emergency alarm. Any subsequent pressing of the emergency button will resend the alarm.

To initiate an emergency alarm, the user presses the emergency key for a period of time determined by the Emergency Started Timer, the terminal will play an Emergency Start tone to indicate that the terminal has successfully entered Emergency mode and has sent an Emergency Alarm.



NOTE

The terminal is able to enter emergency mode directly from the powered off state by pressing and holding down the emergency button if set up in the CPS, refer to Paragraph 19.2.9 "Emergency Switch Power Up".

19.2.2 Emergency Call

This option is used to enable/disable the emergency call feature in the terminal.

Also called PPC Group Call, which is an outgoing group call with emergency call priority made from Emergency mode only.

To send an emergency call, the user enters Emergency mode to initiate an Emergency Call and presses the PTT, unless the Hot Mic feature is enabled.

Related fields is:

Paragraph 26.2 "Hot Mic"

19.2.3 TMO Group HotMic

This option is used to enable/disable the Group HotMic in TMO feature in the terminal.

The feature is enabled/disabled by clicking in the check box.

19.2.4 TMO Emergency Services

There are two TMO Emergency Services options:

- Emergency SDS (Short Data Service) Status
- Emergency Call/Emergency Alarm

To change the setting, select the field value, then select desired setting.

The following occurs:

- If you select Emergency SDS Status, Emergency Call and Emergency Alarm fields will be "greyed out".
- If you select Emergency Call/Emergency Alarm, Emergency SDS Status Destination, Emergency SDS Status Value, and Emergency SDS Alias will be "greyed out".

19.2.5 Emergency MS-ISDN

This option defines the predefined emergency MS-ISDN number for outgoing Emergency MS-ISDN calls.

Type in the desired number in the text box. The range for this parameter is a number up to 24 digits.

19.2.6 Emergency Alarm Address

This option indicates whether 'Address list 1' or 'Address list2' is used as the destination address in the event of an Emergency alarm.

To change the address list, put the pointer into the field value, click the drop-down list and select the required value. (For detailed setup go to respectively to Address List 1 or Address List 2 - see section 19.3.)

19.2.7 Emergency Call Address

This option indicates whether 'Address list 1' or 'Address list2' is used as the destination address in the event of an Emergency call.

To change the address list, put the pointer into the field value, click the drop-down list and select the required value. (For detailed setup go to respectively to Address List 1 or Address List 2 - see section 19.3.)

19.2.8 Emergency Console Acknowledge

This feature determines whether or not the terminal should expect an acknowledgement to an Emergency Alarm or Priority Dialing (Priority Dispatch Number) from the RCM (Radio Control Manager)/Dispatcher.

The feature is enabled/disabled by clicking in the check box.

19.2.9 Emergency Switch Power Up

This feature enables the terminal to be powered up and enter emergency mode by an external source that provides the necessary emergency input.

19.2.10 Emergency Started Timer

This defines the period of time in milliseconds that the user must keep the emergency button pressed for the terminal to enter emergency mode.

Type in the value.

Related field is:

Paragraph 19.2.1 "Emergency Alarm"

19.2.11 Emergency Cancel Timer

This defines the period of time in milliseconds that the user must keep the relevant button pressed for the terminal to exit emergency mode.



NOTE

Ensure that Emergency Alarm or Emergency Call is enabled to activate this timer.

The range for this option is 250 - 3750 msecs. The default is 2000 msecs.

19.2.12 Emergency Wait Ack Timer

This entry defines the period of time in seconds that the terminal will wait for an acknowledgment, between retries, after sending an emergency alarm.



NOTE

The number of retries is dependent on the Emergency Alarm Retries parameter.

The range for this option is 2 - 60 seconds and the default is 5 seconds.

19.2.13 Emergency Alarm Retries

The entry in this field defines the number of times that the terminal will transmit the emergency alarm in an attempt to receive an acknowledgement to the emergency call.

The range for this option is 0 - 255 and the default is 7.

19.2.14 Emergency Individual Call Type

This field determines the call type of the initiated Emergency Private Call or Emergency MS-ISDN Call. This assures all the Emergency Private Calls or Emergency MS-ISDN Calls to start as set in this codeplug, even if the user switches the type during the call from Duplex to Simplex or the other way round. The call type of the terminal initiated Emergency Individual Call can be set to:

- Simplex (If simplex is selected, the call setup hook method is direct)
- Duplex



NOTE

The Emergency Individual Call Type field will only be available if Emergency Call is enabled and Emergency Address Type is set to Private.

To change the setting, select the field value, then select desired setting.

Related field:

Paragraph 19.2.2 "Emergency Call"

Paragraph 19.3.1 "Emergency Address Type"

19.2.15 Emergency SDS Status Destination

This field defines the destination address for the SDS status. The address is either GSSI or ISSI. Type in the required value.

Applicable if TMO Emergency Services is set to Emergency SDS Status.

19.2.16 Emergency SDS Status Value

This field defines the SDS status value to be sent upon pressing the emergency button/footswitch.

Applicable if TMO Emergency Services is set to Emergency SDS Status.

19.2.17 Emergency SDS Alias

This field defines the SDS status alias displayed on the user's terminal upon pressing the emergency button/footswitch.

Applicable if TMO Emergency Services is set to Emergency SDS Status.

19.2.18 Disable Visible/Audible Indication

This field is for enabling or disabling audible and visible indication upon pressing the emergency button/footswitch. This field is not applicable to an outgoing Emergency Private call.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

19.2.19 Colored Emergency

When an Emergency Call is initiated, the red color screen provides an extra emphasis to alert the initiating user that the call has been initiated and the receiving users that an Emergency Call is in progress. The feature can be disabled for a more discreet form of emergency where the display will be in normal color.

19.2.20 Emergency DMO to TMO

Sets the behavior of the MS when user enters Emergency Mode in DMO:

- The MS will stay in DMO Emergency.
- The MS will go into TMO Emergency after attaching to preselected TMO group: "Default TMO talkgroup Index Emergency DMO to TMO".

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

19.2.21 Emergency Alarm on Service Recovery

This field defines the number of times the terminal sends emergency alarm when the terminal returns to RF coverage; for cases where the emergency button was pressed when the terminal was out of coverage and the emergency alarm could not be sent.

- Once - Upon the terminal returning to RF coverage, an emergency alarm is sent once. On subsequent loss and recovery of service, no emergency alarm will be sent.
- Always - Emergency alarm is sent every time the service is recovered.

To change the setting, select the field value, and select the desired setting.

19.2.22 Enter Hot Mic on Service Recovery

This field indicates whether the terminal consistently enters into Hot Mic every time the terminal returns to RF coverage. For cases where the emergency button was pressed when the terminal was out of coverage.

19.3 Address List 1 and 2

	Field Name	Field Value	Reset
1	Emergency Address Type	Group	Reset
2	Emergency Group Type	Tactical	Reset
3	Non-Tactical Alias		
4	Emergency ISSI/GSSI	16777214	

Depending on the values set in the following fields of the Emergency Options:

- Emergency Alarm Address (see section 19.2.6)
- Emergency Call Address (see section 19.2.7)

the address lists set the details of respectively Emergency Alarm Address or Emergency Call Address.

19.3.1 Emergency Address Type

Defines the type of destination address for the Emergency Call or Alarm initiated by the terminal.

The options are:

- Group - If Group Address Type is 'Tactical', the terminal sends emergency call/alarm to attached talkgroup. If Group Address Type is 'Non-Tactical', the terminal sends emergency call/alarm to predefined group address.
- Private - The terminal sends emergency call/alarm to a predefined individual address.

To select an option, put the pointer into the field value, click the drop-down list and select the required value.

**NOTE**

If the Emergency Address Type is changed to Private, then Emergency Private Call Type is editable. For more info please see Paragraph 19.2.14 "Emergency Individual Call Type"

19.3.2 Emergency Group Type

Defines if Emergency Group Call is initiated on the selected Group (Tactical) or on a predefined Group (Non-Tactical).

An Emergency Group Call can be configured as non-tactical or tactical:

- Non-tactical call initiates on the configured talkgroup. The group might be different than the one displayed on the terminal screen when the user starts the call. When in non-tactical, the user will not be able to switch talkgroups.
- Tactical (normal) call allows the user to initiate the call on the currently selected talkgroup.

To select an option, put the pointer into the field value, click the drop-down list and select the required value.

19.3.3 Non-Tactical Alias

If the non tactical emergency call option is chosen, a name alias can be entered in this field.

19.3.4 Emergency ISSI/GSSI

This option defines where the emergency call is sent, this feature is not supported on all systems.

The address to which emergency calls will be sent, is entered in this field and can be either a group or private address (GSSI or ISSI).

The default group address is 0.

**NOTE**

For terminal configured for Non-Tactical Emergency, the Non-Tactical Emergency GSSI is added to TMO Talkgroup list (if not already present) before enabling the Enhanced Security license.

19.4 Scanning Parameters

	Field Name	Field Value	Reset
1	Active List		
2	Scan Status	<input type="checkbox"/>	
3	User List Editing	<input checked="" type="checkbox"/>	
4	Priority Editing Enabled	<input checked="" type="checkbox"/>	
5	PTT Operation	Talk Back	
6	Presentation Mode	Force	
7	On/Off via MMI	<input checked="" type="checkbox"/>	
8	Block Group Enabled	<input type="checkbox"/>	
9	Priority Presentation Timer, msec	8000	Reset
10	Scan Hold Timer, msec	6000	Reset
11	Rx Hold Timer, msec	1000	Reset
12	Scan On/Off over the Air	<input type="checkbox"/>	

This menu has 12 options some of which are dependent on other programmable fields.

Related fields are:

Paragraph 11.16 "Talkgroup Scan"

Paragraph 28.1.4 "TMO Scan Lists"

Paragraph 32.3 "One-Touch Options"

Paragraph 32.4.20 "TMO Talkgroup Scan"

19.4.1 Active List

This option is dependent upon the scan list(s) being populated, otherwise the down arrow in the Field Value box will not display. If a scan list is displayed in this field, the user is able to enable/disable scanning via the terminal's menu functionality.

19.4.2 Scan Status

Selecting this option will enable Talkgroup Scanning and is dependent on there being an entry in the Active List.

19.4.3 User List Editing

If this option is enabled, the user is able to add or delete talkgroups from scan lists via the terminal's menu functionality.

19.4.4 Priority Editing Enabled

If this feature is enabled, the user is able to edit the priorities of the talkgroups in the scan lists.

19.4.5 PTT Operation

There are 2 options for this field value and are selected by clicking the pointer in the field value box and selecting an option. The options defines the PTT operational functionality during scan.

If Talkback has been selected and the terminal 'lands on' a talkgroup in the scan list, the user is able to take an active part (PTT).

If the Selected Only option is chosen and the terminal 'lands on' a talkgroup in the scan list, the user is only able to listen. PTT is only available on the talkgroup selected via the Talkgroup Select button/terminal menu functionality.

19.4.6 Presentation Mode

There are 2 options for this field value and are selected by clicking the pointer in the field value box and selecting an option. These options define how received calls, from the selected talkgroup or from the associated ATG, will be presented to the user during an on going call.

Force: If this option is chosen the received call is forced upon the user and interrupts the on-going call (if the incoming call has higher priority than the on-going call).

Presented: This option 'presents' the incoming call to the user who is then able to accept or reject the new call.

19.4.7 On/Off Via MMI

If selected, this features enables the terminal's menu option that allows the user to turn scan on or off.

19.4.8 Block Group Enabled

When enabled, this allows the user to temporarily block the terminal from scanning a particular talkgroup. When the terminal lands on a channel, a soft button option is displayed to the user. Once a talkgroup has been blocked, it will no longer be scanned for activity until the user:

- Stops and restarts the scan.
- Selects another scan list.
- Cycles the terminal's power.

This feature is enabled/disabled by clicking in the check box.

19.4.9 Priority Presentation Timer

The entry in this field determines how long the priority call should be presented to the user, if the user receives this call in presentation mode. See Presentation Mode above. To activate this timer, the following options must be selected:

- The Talkgroup Scan flag is enabled
- The Presentation Mode flag is set to "Presented".

The default is 8000 msec

19.4.10 Scan Hold Timer

This entry determines the time period, in msec, for how long the scan is disabled while the user sets up a call to a selected group.

The default is 5000 msec

19.4.11 Rx Hold Timer

This entry determines the time period, in msec, for how long the call will be monitored after it was released by system in order for the user to hear the answer to a question. During this period of time, a group call with lower priority than the on-going call will be rejected.

To activate this timer ensure the Presentation Mode option is set to "Force".

The default is 5000 msec.

Related fields are:

Paragraph 11.16 "Talkgroup Scan"

Paragraph 32.3 "One-Touch Options"

Paragraph 32.4.20 "TMO Talkgroup Scan"

19.4.12 Scan List On/Off Over the Air

If enabled the terminal is able to send its scan list to the system.

19.5 Voice Services Options

Codeplug	Field Name	Field Value
Subscriber Unit Parameters	1 MS-ISDN Simplex Call	<input type="checkbox"/>
Feature Flags	2 Default Call Priority	Priority Not Defined
Security	3 Transmit Demand Priority	Pre-emptive Demand Priority
End-to-End Encryption	4 Transmit Demand Private Priority	Pre-emptive Demand Priority
Remote Programming	5 PSTN Gateway ID	16777184
Clock System Broadcast Info	6 PABX Gateway ID	16767000
TMO Voice Services	7 PTT ID	Group & Private
Pre-emptive Priority Call	8 Busy Override	<input type="checkbox"/>
Emergency Options	9 Announcement Talkgroup Enable	<input checked="" type="checkbox"/>
Scanning Parameters	10 Embedded Number Enabled	<input type="checkbox"/>
Voice Services Options	11 Transmission Timeout Timer, sec	60
DMO Parameters	12 Transmission Timeout Warning Timer, sec	50
Ergonomic Parameters	13 PTT Call Back Timer (msec)	3000
Language Parameters	14 PTT Call Back Timer Enabled	<input checked="" type="checkbox"/>
Audio Settings	15 PTT During Received Group Call	<input checked="" type="checkbox"/>
Display Parameters	16 Hook method for outgoing simplex individual call	Hook
TalkGroups	17 Preferred hook method for incoming simplex individual call	Hook
Contact Book		
Data Services		

This menu has the following options:

19.5.1 MS-ISDN Simplex Call

This option determines whether the terminal user is able to initiate MS-ISDN Simplex Call.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

19.5.2 Default Call Priority

This option indicates the priority level of a call (before transmission begins). This field is non-editable.

19.5.3 Transmit Demand Priority

	Field Name	Field Value	Reset
1	Default Call Priority	Priority Not Defined	
2	Transmit Demand Priority	Pre-emptive Demand Priority	
3	Transmit Demand Private Priority	Low Demand Priority	
4	PSTN Gateway ID	High Demand Priority	
5	PABX Gateway ID	Pre-emptive Demand Priority	
6	PTT ID	Emergency Pre-emptive Demand Priority	

There are 4 options associated with this field entry and are selected by clicking the pointer in the field value box and selecting an option using the down arrow.

The selected entry defines the level of priority used by the terminal to send transmit requests (Group Call or Express Group Call only).



NOTE

This parameter may be ignored by the system.

The available levels are:

- Low Demand Priority.
- High Demand Priority.
- Pre-emptive Demand Priority.
- Emergency Pre-emptive Demand Priority (This is priority 15 and will not interrupt emergency calls).

Selecting “Pre-emptive Demand Priority” enables the pre-emption (interrupt) of a user on another call that has a lower priority.

19.5.4 Transmit Demand Private Priority

This entry determines the level of priority that the terminal will use for call set up of Simplex Private Calls.

There are 3 options associated with this field entry and are selected by clicking the pointer in the field value box and selecting an option using the down arrow.

The available levels are:

- Low Demand Priority
- High Demand Priority
- Pre-emptive Demand Priority

Selecting “Pre-emptive Demand Priority” enables the pre-emption (interrupt) of a user on another call.



NOTE

This parameter may be ignored by the system.

19.5.5 PSTN Gateway ID

This field displays the System Identity (ISSI) of the PSTN Gateway that is used to access the telephone interface for telephone call set up to a PSTN. Selecting the reset option will display the TETRA Standard ISSI.

19.5.6 PABX Gateway ID

This field displays the System Identity (ISSI) of the PABX Gateway that is used to access the telephone interface for telephone call set up to a PABX. Selecting the reset option will display the TETRA Standard ISSI.

19.5.7 PTT ID

Selecting this feature allows the ID of the terminal to be displayed at receiving terminals during Group Calls (Express Group Call) and Private Calls (Express Connect Call).

19.5.8 Busy Override

During group call set up, the user may receive a busy indication from the system and although the critical sites are busy and cannot support the Group Call, the user is allowed to request to transmit the Group Call in the available sites.

To enable this option check the box.

19.5.9 Announcement Talkgroup Enable

An announcement call (also called multi-group call) is a special type of group call. It provides the capability for the dispatcher or a terminal user to communicate with more than one talkgroup at the same time.

A number of talkgroups are associated with an announcement talkgroup (ATG) so that when a call is initiated to the ATG, all members of the associated talkgroups can receive the call. Each talkgroup may have one associated ATG that it monitors (in addition to the selected talkgroup and the scan list if activated).

An ATG has the highest priority level, thus enabling broadcast of the call to all these talkgroups.

Activation and deactivation of talkgroup scanning has no effect on the ATG scan list. The terminal will always monitor the ATG scan list.

This feature is Enabled/Disabled by clicking in the check box.

19.5.10 Embedded Number Enabled

Also called PTT Calls back Displayed Party. If enabled, the MS user will be capable of returning a voice call to the sender of a message or to any number that is embedded in the message text.

There are three possible choices:

- Disable PTT - when PTT is pressed radio makes no action. This is the default.
- Embedded Number Enabled - when PTT is pressed, provides to the user all the numbers to call that are stored in the message.
- Start Group Call - when PTT is pressed, a group call is initiated.

To select the option, put the pointer into the field value, click on the arrow, and drag the pointer to the desired option.

19.5.11 Transmission Timeout Timer, sec

The entry in this field defines the period of time in seconds, that the user can PTT and talk during a Private call. After this time the terminal will stop transmitting even though the PTT button is still pressed.

The range for this option is 1 - 300 seconds and the default is 60 seconds.

19.5.12 Transmission Timeout Warning Timer, sec

This field is a none editable and is related to the value set in the Transmission Time Out Timer field. It defines the time in seconds, after which the terminal will alert the user prior to the expiry of the Transmission Time Out Timer.

19.5.13 PTT Call Back Timer (msec)

Upon initiating a call, if the terminal's user is not holding down the PTT when the network grants transmit permission, the user shall be given this much time to begin transmitting before transmit permission is rescinded.

The range for this option is 1000 - 3000 milliseconds and the default is 3000 milliseconds.

19.5.14 PTT Call Back Timer Enabled

This feature is Enabled/Disabled by clicking in the check box.

19.5.15 PTT During Received Group Call

The parameter enables or disables the PTT when receiving Group Call. When disabled, a PTT press is ignored during Group Call voice reception.

This feature is Enabled/Disabled by clicking in the check box.

19.5.16 Hook Method for Outgoing Simplex Individual Call

Defines the hook method setting when initiating a simplex individual call.

There are 2 types of hook method:

- Direct - an individual call is initiated with direct setup.
- Hook - an individual call is initiated with hook setup.

To select the option, put the pointer into the field value, click the drop-down list and select the required value.

**NOTE**

Some infrastructures may not support direct signaling for individual calls.

19.5.17 Preferred Hook Method for Incoming Simplex Individual Call

Defines the hook method with which the MS prefers to receive simplex individual calls. If the MS receives a call with a different hook method, it will try to modify the call to its preferred hook method.

There are 2 types of hook method:

- Direct - MS is configured to receive individual call with direct setup. The call goes through directly without needing the recipient to accept the call, like in the case of group call.
- Hook - MS is configured to receive individual call with hook setup. The recipient needs to accept the individual call before a call can go through.

To select the option, put the pointer into the field value, click the drop-down list and select the required value.

19.5.18 TMO Coverage Tone Enabled

**NOTE**

This section applies to TCR1000 only.

This option enables the alert tone that sounds when the terminal goes out of TMO coverage. Tone can be single or repeating as defined by TMO Coverage Tone Type. The time between loss of TMO signal and start of tone is configurable by TMO Coverage Lost Time.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

19.5.19 TMO Coverage Tone Type

**NOTE**

This section applies to TCR1000 only.

If the TMO coverage tone is enabled by TMO Coverage Tone Enabled, then this field defines the number of times that this tone is sounded during lost of TMO coverage.

The available options are:

- Single - The TMO coverage tone sounds once when TMO coverage is lost.
- Repeating - The TMO coverage tone sounds repeatedly while TMO coverage is lost.

In noisy environment, the user may consider setting this field to repeating tone type.

19.5.20 TMO Coverage Lost Time

**NOTE**

This section applies to TCR1000 only.

If the TMO coverage tone is enabled by TMO Coverage Tone Enabled, then this field specifies the duration that the terminal waits to generate the TMO Coverage tone after loss of TMO signal.

19.5.21 In DMO Tone Enabled

**NOTE**

This section applies to TCR1000 only.

If this option is enabled, an alert tone triggers when a terminal enters in to the DMO mode.

Mark the check box to enable this option.

19.5.22 In Emergency Tone Enabled

**NOTE**

This section applies to TCR1000 only.

If this option is enabled, an alert tone triggers when a terminal enters in to the Emergency mode.

Mark the check box to enable this option.

19.5.23 In Whisper Mode Tone Enabled



NOTE

This section applies to TCR1000 only.

If this option is enabled, an alert tone triggers when a terminal enters in to the Whisper mode.

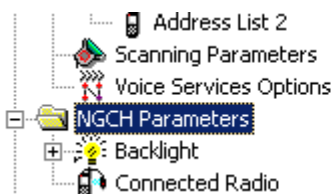
Mark the check box to enable this option.

20 NGCH Parameters



NOTE

This section applies to MTM800 Enhanced only.



	Field Name	Field Value	Reset
1	Audio Path Selection Priority	Front GCAI	
2	External Display Timeout	0	
3	Factory Test Enabled	<input checked="" type="checkbox"/>	
4	User Test Enabled	<input checked="" type="checkbox"/>	

Click to expand/collapse pages listing the NGCH parameters which are necessary to configure the control head.

The Next Generation Control Head (NGCH) is a control head that provides an interface between the user and terminal, consistent with other Motorola portable terminals. In addition, it introduces a number of new features like GCAI accessories, GPIO on the control head and USB connectivity.

20.1 Audio Path Selection Priority

Determines which audio path takes precedence in case that both PTT are pressed.

There are 2 options to choose from:

- Front GCAI - the audio coming from the device connected to the front GCAI will take precedence.
- Rear GCAI - the audio coming from the device connected to the rear GCAI will take precedence.

To choose the setting, put the pointer into the field value, click the drop-down list and select the required value.

20.2 External Display Timeout

Determines how long the notifications are displayed on the external display.

20.3 Factory Test Enabled

Defines if the factory test mode is available in NGCH device.

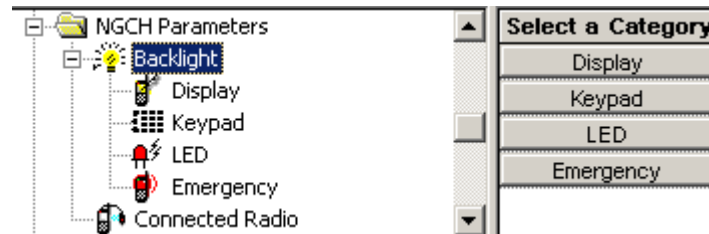
Turn the check box on (Enable) or off (Disable) by clicking in the check box.

20.4 User Test Enabled

Defines if the user test mode is available in the NGCH device.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

20.5 Backlight



20.5.1 Display, Keypad, LED, Emergency

	Field Name	Field Value	Reset
1	Intensity High	100	
2	Intensity Below High	75	
3	Intensity Above Low	50	
4	Intensity Low	25	
5	Intensity Off	0	
6	Intensity Covert Mode	21	Reset

To change the intensity level for the display backlight for dimmer set to high.

Type the required value.

The range is 0 - 100.

20.6 Connected Radio

	Field Name	Field Value	Reset
1	Available	<input type="checkbox"/>	
2	Address	Expand	
3	Class	Motorola Mobile	

20.6.1 Available

Defines if the terminals are connected to the control head.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

20.6.2 Address

Defines the address of all connected terminals.

Click on the Expand/Collapse button to see or hide the address.

20.6.3 Class

Defines the device class of all connected terminals.

There are 3 classes to choose from:

- Motorola Portable - refers to devices like MTH800 or MTP850 containing software that supports NGCH.
- Motorola Mobile - refers to devices like MTM800 Enhanced containing software that supports NGCH.
- 3rd party - refers to device from another vendor which supports NGCH.

To choose the setting, put the pointer into the field value, click the drop-down list and select the required value.

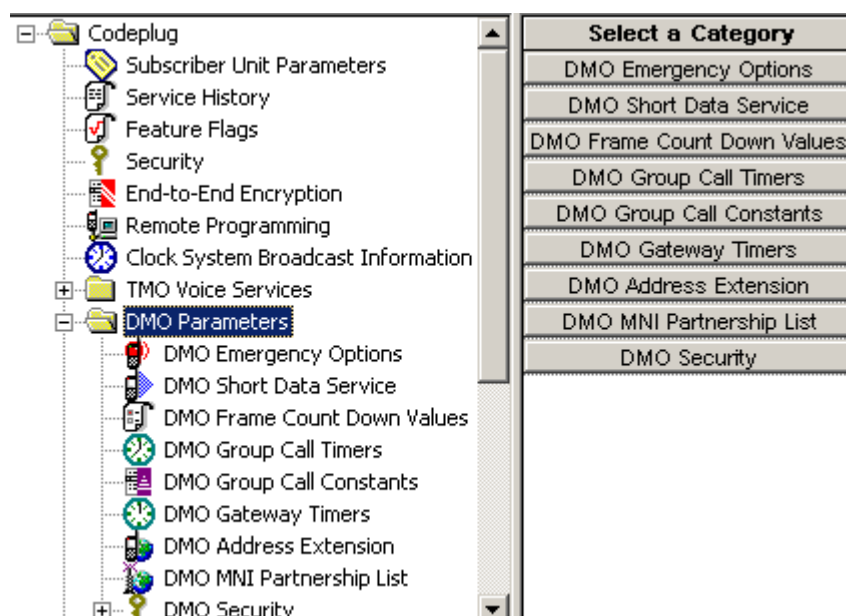
21 DMO Parameters



NOTE

Not all the parameters from this section are available for TCR1000.

Refer to the codeplug for details.



Related field are:

Paragraph 11.6 "Direct Mode (DMO)"

Paragraph 11.7 "Direct Mode (DMO) Reservation"

Paragraph 32.3 "One-Touch Options"

Paragraph 32.4.19 "TMO <=> DMO Switch"

This menu is used to set the parameters for Direct Mode Operation (DMO). When in DMO, the terminal acts like a normal 2 way terminal and is not logged on to the system.

When selecting this menu the following option is displayed:

21.1 DMO Emergency Options

DMO Parameters		
DMO Emergency Options		
DMO Short Data Service		
DMO Frame Count Down Values		
DMO Group Call Timers		

	Field Name	Field Value
1	Emergency Alarm	<input checked="" type="checkbox"/>
2	DMO Emergency Call	<input checked="" type="checkbox"/>
3	DMO Group HotMic	<input checked="" type="checkbox"/>

21.1.1 Emergency Alarm

This option indicates whether the emergency alarm feature is enabled or disabled in the terminal in Direct Mode Operation only.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

21.1.2 DMO Emergency Call

This option is used to enable/disable the emergency call feature in the terminal.

Also called PPC Group Call, which is an outgoing group call with emergency call priority made from Emergency mode only.

To send an emergency call, the user enters Emergency mode to initiate an Emergency Call and presses the PTT, unless the Hot Mic feature is enabled.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

21.1.3 DMO Group HotMic

This option indicates whether Group Hot Microphone feature is enabled or disabled in DMO.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

21.2 DMO Short Data Service



NOTE

The following section is not applicable to TCR1000.

DMO Parameters		Field Name	Field Value
DMO Emergency Options	1	DT314, msec	500
DMO Short Data Service	2	DN314	3
DMO Frame Count Down Values	3	Pre-emption Timer, msec	1000
DMO Group Call Timers	4	DMO Voice Priority over SDS	Voice has more priority than SDS
DMO Group Call Constants			

The feature offers TETRA Short Data Service (SDS) supporting transfer of short data messages and pre-coded status transfer called Status Transfer Service (STS) as well. For short data text messages all four types of data bearer service (SDS type 1|2|3|4) are supported. SDS Type 4 can be sent directly to the end user or via Service Centre (if provide by infrastructure).

21.2.1 DT314, Msec

This timer defines time-out for reporting SDS failure after sending DM-PRE ACCEPT.

The range for this timer is 0 - 1000 msecs.

21.2.2 DT314

This constant defines number of transmissions of unacknowledged DM-SDS UDATA packet data units.

The range for the constant is 1 - 6 times.

21.2.3 Pre-emption Timer, msec

This timer defines the maximum time to wait for pre-emption response (DM-PRE ACCEPT or DM-REJECT).

The range for the timer is 0 - 5000 msecs.

21.2.4 DMO Voice Priority over SDS

Determines if DMO Voice has more or equal priority compared to DMO SDS and Status.

The options are:

- Voice has more priority than SDS
- Voice has equal priority as SDS

To select the option, put the pointer into the field value, click the drop-down list and select the required value.

21.3 DMO Frame Count Down Values

DMO Parameters		Field Name	Field Value
DMO Emergency Options	1	DM Info Interval	10
DMO Short Data Service	2	G Setup FCD	3
DMO Frame Count Down Values	3	Resets FCD	2
DMO Group Call Timers	4	Common FCD	2
DMO Group Call Constants	5	Reject FCD	2
DMO Gateway Timers	6	Disconnect FCD	2
DMO Address Extension	7	Occupation Timing Ack FCD	2
DMO MNI Partnership List	8	Reservation Rejection Timing Ack FCD	2
DMO Security	9	Reservation Acceptance Timing Ack FCD	2
Ergonomic Parameters			

The "frame countdown" element indicates the number of frames in which the message may be repeated (the number of frames until the final transmission).

Air interface messages to be sent will be repeated for reliability. The number of transmissions is according to the following table.

Frame Countdown Group Name	PDUs in Group
New setup	DM-SETUP and DM-GSETUP transmitted on a free channel
Re-setup	DM-SETUP transmitted during a call
Common	DM-TX CEASED, DM-RELEASE, DM-PRE ACCEPT, DM-TX ACCEPT, DM-GTX REQUEST
Reject	DM-REJECT
Disconnect	DM-DISCONNECT

Table 4-1 DMO Frame Count Down Values



NOTE

The entry for DM-GTX REQUEST applies only when the message is sent after pre-emption of another DM-MS. At other times the DM-GTX REQUEST is sent using the random access protocol in which case the frame countdown mechanism is not used.

21.3.1 DM Info Interval

Enter number of multiframe between transmissions of DM-INFO.

This Protocol Data Unit (PDU) within the protocol will be sent to indicate address and any other details that are not available at call set-up.

21.3.2 G Setup FCD

The DM-MS supports a group call. A group call is a complete sequence of related call transactions involving two or more DM-MSs. Each transaction constitutes of a separate transmission, with a designated master for each call transaction. Participants may join (late entry) and leave an ongoing group call.

The “frame countdown” (FCD) element indicates the number of frames in which the message may be repeated (that is, the number of frames until the final transmission). Enter the required value.

21.3.3 Resetup FCD

The “frame countdown” (FCD) element indicates the number of frames in which the message may be repeated (that is, the number of frames until the final transmission). Enter the required value.

21.3.4 Common FCD

The “frame countdown” (FCD) element indicates the number of frames in which the message may be repeated (that is, the number of frames until the final transmission). Enter the required value.

21.3.5 Reject FCD

The “frame countdown” (FCD) element indicates the number of frames in which the message may be repeated (that is, the number of frames until the final transmission). Enter the required value.

21.3.6 Disconnect FCD

The “frame countdown” (FCD) element indicates the number of frames in which the message may be repeated (that is, the number of frames until the final transmission). Enter the required value.

21.3.7 Occupation Timing Ack FCD

Enter the required value for frame count down of occupation timing acknowledge.

A DM-MS perceives a DM channel may generally as free, occupied or reserved.

A DM channel is free when there is no activity detected on that channel. Any DM-MS capable of tuning to that RF carrier can use a free channel.

A DM channel used for a call can either be:

- occupied - a call transaction is in progress on the channel.
- reserved - a channel reservation signal is present on the channel.

When a DM channel is occupied, it is in active use for a call transaction in a group call. A master DM-MS transmits signalling in Direct Mode Synchronization Bursts (DSBs) in frames 6, 12 and 18, and transmits traffic in Direct Mode Normal Bursts (DNBs) in frames 1 to 17.

When a DM channel is reserved, it has been in use for a call transaction in a group call. The master DM-MS for that call transaction transmits DSBs in frames 6, 12 and 18 with parameters indicating the fact that the channel is reserved, for which group it is being reserved, and for how long the channel may continue to be reserved. A DM channel may become reserved after the conclusion of each call transaction. Thus, it should stay reserved until a master changeover has occurred or until the channel reservation timer of the master DM-MS has expired.

21.3.8 Reservation Rejection Timing Ack FCD

The “frame countdown” (FCD) element indicates the number of frames in which the message may be repeated (that is, the number of frames until the final transmission). Enter the required value.

21.3.9 Reservation Acceptance Timing Ack FCD

The “frame countdown” (FCD) element indicates the number of frames in which the message may be repeated (that is, the number of frames until the final transmission). Enter the required value.

21.4 DMO Group Call Timers

	Field Name	Field Value	Reset
1	DT205	18	Reset
2	DT207	90	Reset
3	DT211	3	Reset
4	DT213	90	Reset
5	DT215	180	
6	DT214	36	Reset
7	DT221	90	Reset
8	DT226	170	Reset
9	DMO Reservation Time, sec	5	Reset
10	DT211_R	7	
11	DT225	90	

21.4.1 DT205

This option indicates the time period after channel becomes free when randomization is required to setup a call.

The range for this timer is 18 - 90 seconds.

The default is 18 seconds.

21.4.2 DT207

This option indicates the time without reception of signalling from the other call during idle-occupation.

The range for this timer is 18 - 90 seconds.

The default is 90 seconds.

21.4.3 DT211

This option indicates maximum time to wait for response to a single random access attempt.

The range for this timer is 2 - 4 seconds.

The default is 3 seconds.

21.4.4 DT213

This option indicates maximum time for all random access attempts.

The range for this timer is 54 - 180 seconds.

The default is 90 seconds.

21.4.5 DT215

This option indicates maximum time for emergency random access attempts.

The default is 90 seconds and it is non-editable.

21.4.6 DT214

This option indicates time without reception of messages from the master that indicates valid access slots for random access.

The range for this timer is 18 - 90 seconds.

The default is 18 seconds.

21.4.7 DT221

This option indicates time without reception of DM-OCCUPIED by the terminal receiving traffic.

The range for this timer is 54 - 180 seconds.

The default is 90 seconds.

21.4.8 DT226

This option indicates time without reception of presence signal during master occupation.

The range for this timer is 54 - 180 seconds.

The default is 170 seconds.

21.4.9 DMO Reservation Time, sec

Specifies the length of channel reservation for DMO calls in calls that the terminal initiates. During the reservation time other terminals that want to talk do not need to set up a new reservation. Instead, the current channel reservation may be used until the end of the timeout.

This field is only available if the DMO Reservation feature is enabled.

Related field is:

Paragraph 11.7 "Direct Mode (DMO) Reservation"

21.4.10 DT211_R

Maximum time to wait for response to a single random access attempt in a call via repeater.

The range for this timer is 5 - 7 seconds.

The default is 7 seconds.

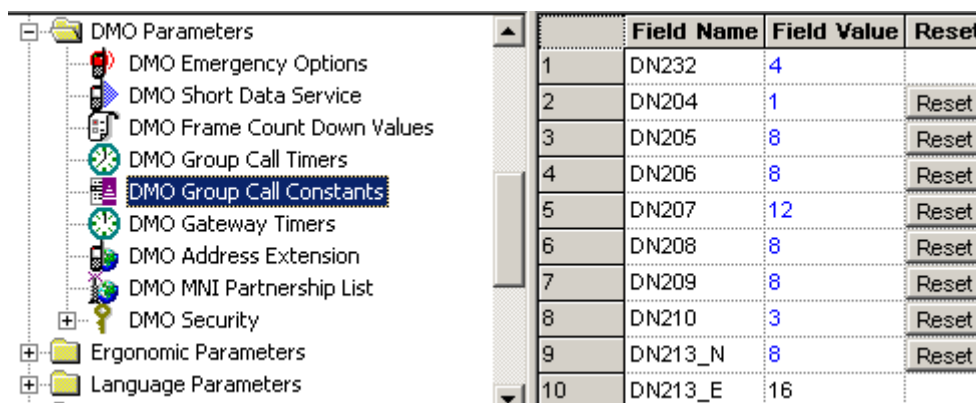
21.4.11 DT225

Inactivity time-out on the link from DM repeater for the Master DM MS in circuit mode call.

The range for this timer is 54 - 180 seconds.

The default is 90 seconds.

21.5 DMO Group Call Constants



	Field Name	Field Value	Reset
1	DN232	4	
2	DN204	1	Reset
3	DN205	8	Reset
4	DN206	8	Reset
5	DN207	12	Reset
6	DN208	8	Reset
7	DN209	8	Reset
8	DN210	3	Reset
9	DN213_N	8	Reset
10	DN213_E	16	

During the occupation and reservation periods, another DM-MS that wishes to transmit traffic or short data must first request and be granted permission by the current master before performing a set-up procedure and becoming master of the channel itself.

The DM-MS requests permission by sending the pre-emption or change over message. Since more than one DM-MS may be attempting to request use of the channel, a random access protocol is used. The random access protocol is also used if the DM-MS wishes to send a timing change request to the master DM-MS.

Pre-emption requests may be sent during short data occupation.

Pre-emption and timing change requests may be sent while the channel is in circuit mode occupation.

Pre-emption, timing change and changeover requests may be sent during channel reservation periods.

21.5.1 DN232

Number of frames for the Master DM MS, during which it expects the DM repeater to re-transmit its DM setup messages, in case the DM repeater presence signal was not received previously.

The range for this parameter is 2 - 4.

The default value is 4.

21.5.2 DN204

This option indicates minimum randomization after channel becomes free.

The range for this timer is 1 - 7 seconds.

The default is 1 seconds.

21.5.3 DN205

This option indicates maximum randomization after channel becomes free.

The range for this timer is 2 - 8 seconds.

The default is 8 seconds.

21.5.4 DN206

This option indicates minimum randomization for non-immediate retransmission of call set-up.

The range for this timer is 1- 11 seconds.

The default is 8 seconds.

21.5.5 DN207

This option indicates maximum randomization for non-immediate retransmission of call set-up.

The range for this timer is 9 - 12 seconds.

The default is 12 seconds.

21.5.6 DN208

This option indicates a number of messages from other users for master in reservation to leave the call.

The range for this parameter is 9 - 12.

The default value is 12.

21.5.7 DN209

This option indicates number of messages from other users for slave (in reservation or occupation) to leave the call.

The range for this parameter is 1 - 8.

The default value is 8.

21.5.8 DN210

This option indicates maximum number of frames containing slave's response to reception of DM-SETUP PRES.

The range for this parameter is 1 - 3.

The default value is 3.

21.5.9 DN213_N

This option indicates maximum number of non-emergency random access transmissions.

The range for this timer is 1 - 8 seconds.







The default is 8 seconds.

21.5.10 DN213_E

This option indicates maximum number of emergency random access transmissions.

The default is 16 seconds and it is non-editable.

21.6 DMO Gateway Timers

 DMO Group Call Timers  DMO Group Call Constants  DMO Gateway Timers  DMO Address Extension  DMO MNI Partnership List  DMO Security	Field Name	Field Value	Reset
	1 DT301,sec	1	Reset
	2 DT302,sec	10	Reset
	3 DT309,sec	5	Reset
	4 Preemption via Gateway Timer (DT308), sec	30	Reset

A DMO Gateway is equipment that can fulfil two roles:

1. It acts as a repeater allowing calls between terminals from both the same and different systems.
2. It also enables system access to terminals in DMO.

A gateway may be installed at a site outside of a cell coverage area to provide extended coverage for that cell in a particular direction.

This submenu has the following 4 options:

21.6.1 DT301, sec

This entry defines the time that the terminal will wait for a response from a DMO Gateway to a DMO Gateway set up (BM-GSETUP) request message before timing out.

The range for this timer is 0 - 30 seconds.

The default is 1 second.

Related fields are:

Paragraph 11.20 "One-Touch Feature"

Paragraph 11.7 "Direct Mode (DMO) Reservation"

Paragraph 21.6.2 "DT302, sec"

Paragraph 21.6.4 "DT308, Pre-emption via Gateway Timer (DT308), sec"

Paragraph 21.6.3 "DT309, sec"

21.6.2 DT302, sec

The entry in this field defines the time in seconds that the terminal will wait to be connected after receiving a Gateway acknowledgement (DM-GACK) to a call set up request before timing out.

The range for this timer is 10 - 60 seconds. The default is 10 seconds.

Related fields are:

Paragraph 11.20 "One-Touch Feature"

Paragraph 11.7 "Direct Mode (DMO) Reservation"

Paragraph 21.6.1 "DT301, sec"

Paragraph 21.6.4 "DT308, Pre-emption via Gateway Timer (DT308), sec"

Paragraph 21.6.3 "DT309, sec"

21.6.3 DT309, sec

The entry in this field defines the time in seconds that the terminal will wait, after receiving a DM_GACK, for a Gateway Transmit Accept (DM-GTXACCEPT) message before timing out.

The range for this timer is 5- 30 seconds. The default is 5 seconds.

Related fields are:

Paragraph 11.20 "One-Touch Feature"

Paragraph 11.7 "Direct Mode (DMO) Reservation"

Paragraph 21.6.1 "DT301, sec"

Paragraph 21.6.2 "DT302, sec"

Paragraph 21.6.4 "DT308, Pre-emption via Gateway Timer (DT308), sec"

21.6.4 DT308, Pre-emption via Gateway Timer (DT308), sec

The entry in this field defines the time in seconds that the terminal will wait, after receiving a DM_GACK, for a Gateway Pre-emption Accept message (DM-GPRE ACCEPT) before timing out.

Pre-requisite for this option is that "Initiate pre-emption in ongoing call" is supported by the terminal.

The range for this timer is 10 - 60 seconds.

The default is 30 seconds.

Related fields are:

Paragraph 11.20 "One-Touch Feature"

Paragraph 11.7 "Direct Mode (DMO) Reservation"

Paragraph 19.4.9 "Priority Presentation Timer"

Paragraph 21.6.1 "DT301, sec"

Paragraph 21.6.2 "DT302, sec"

Paragraph 21.6.3 "DT309, sec"



NOTE

Selecting the reset option for each of the above timers will enter the factory default setting in the Field Value box.

21.7 DMO Address Extension



	Field Name	Field Value	Reset
1	MCC	701	
2	MNC	1867	

The 2 entries in this submenu are used to identify the DMO Gateway on which the terminal can operate. As an example, adjacent regional police forces have their own separate TETRA systems and are using Gateways. By having the same entries for these fields in all the gateways, subscribers from both systems are then able to communicate with each other.

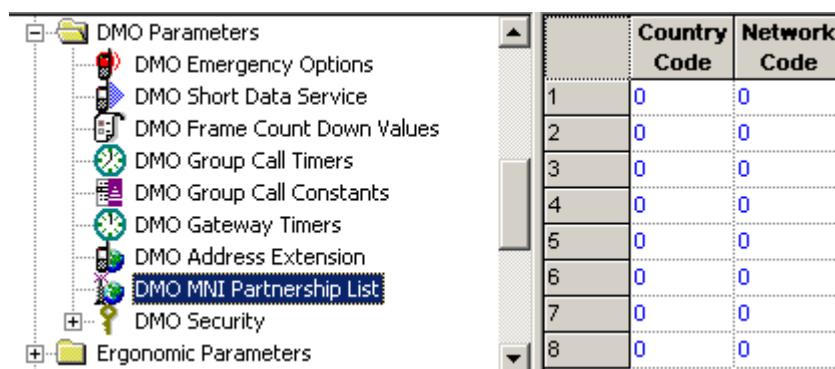
21.7.1 MCC

The entry in this field defines the country code for the country in which the gateway is operating.

21.7.2 MNC

The entry in this field defines the system operating (licence number) number obtained from the in country licensing authority.

21.8 DMO MNI Partnership List



	Country Code	Network Code
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0
8	0	0

DMO MNI Partnership List.

This is basically an inter-operability table that provides backward compatibility allowing generation one terminals to talk to generation two (and upwards) terminals. Without this table, call would be receive only.

The list can contain up to 8 home MNIs that can be used when the terminal is in DMO. The Country Code entries must be in the range of 0-999.

The Network Code entries must be in the range of 0 -16383.

Gateways that are shared by networks enable terminals to call terminals from another network if the terminals are in DMO.

Inter-MNI, Intra-MNI: A call is intra-MNI if the MNIs of the calling and called party are the same. Otherwise it is inter-MNI.

The terminal conducts an inter-MNI call if:

- The terminal initiates of a call to a foreign MNI
- The terminal joins a call addressed to a foreign MNI (for example open MNI).

That is, reception of a call from a terminal of a foreign network addressed to the home network of the terminal is not an inter-MNI call for the called party. Such a call, though inter-MNI for the calling party, is considered intra-MNI by the called party.

21.9 DMO Security

	Field Name	Field Value
1	Key Grouping Method	<10K,3E>
2	Default Key Group	NO_KG
3	Default Incoming Minimum Security Class	Security Class 1
4	Default Outgoing Security Class	Security Class 1
5	Gateway Capabilities Class 2A	<input checked="" type="checkbox"/>
6	Gateway Capabilities Class 2B	<input checked="" type="checkbox"/>
7	Gateway Capabilities Class 2C	<input checked="" type="checkbox"/>
8	Repeater Capabilities Class 2A	<input checked="" type="checkbox"/>
9	Repeater Capabilities Class 2B	<input checked="" type="checkbox"/>
10	Repeater Capabilities Class 2C	<input checked="" type="checkbox"/>
11	Permit Clear Preemption in 2A / 2B	<input type="checkbox"/>
12	Active SCK Subset Number flag with OTAR	<input type="checkbox"/>

21.9.1 Key Grouping Method

Stores the key group method currently in use.

The notation <K,E> specifies that out of the 30 static cipher keys (SCKs) stored in the terminal, SCK#1 to SCK#K*E are usable.

For example, the notation <10K,3E> is equivalent to key grouping type of 10 subsets of 3 keys and all the 30 keys are usable.

The SCKs are split to K key-groups, each with E key-editions. Key-groups are labelled KG#1 to KG#K, and KG# j is composed of SCKs $j, j+K, j+2K, \dots, j+(E-1)*K$.

For example, for the <10K,3E> notation the KG#1 consists of the following SCKs: SCK#1, SCK#11, SCK#21.

The possible 10 values are: <30K,1E> <15K,2E> <10K,3E> <7K,4E> <6K,5E> <5K,6E> <4K,7E> <3K,10E> <2K,15E> <1K,30E>.



NOTE

Verify the Key Grouping Method value with the infrastructure capabilities.

21.9.2 Default Key Group

This parameter is the default Key Group which applies for Individual communications. When key grouping method is <K, E>, the available values that can be selected are one of KGj(j=1 ... K) or NO_KG.

21.9.3 Default Incoming Minimum Security Class

This is an additional parameter to DMO talkgroups. It is the default minimum security class for calls and SDS messages reception. It applies to individually addressed communications as well as group addressed communications that are not covered in Incoming Minimum Security Class.

- Security Class 1 - no encryption applied.

- Security Class 2A - the DM-SDU and any related traffic are AI encrypted.
- Security Class 2B - the destination address (SSI), DM-SDU and any related traffic are AI encrypted.
- Security Class 2C - PDU encrypted from destination address element and onwards except for source address type element, and any related traffic are AI encrypted.

To change the setting, select the field value, and select desired setting.

**NOTE**

The Default Incoming Minimum Security Class cannot be set higher than the Default Outgoing Security Class.

21.9.4 Default Outgoing Security Class

This is an additional parameter to DMO talkgroups. It is the default security class for calls and sending SDS messages initiation. It applies to individually addressed destinations as well as group addressed destinations that are not covered in Outgoing Security Class.

The security classes are the same as for Default Incoming Minimum Security Class.

To change the setting, select the field value, and select desired setting.

**NOTE**

The Default Outgoing Security Class cannot be set lower than the Default Incoming Minimum Security Class.

21.9.5 Gateway Capabilities Class 2A - 2C

Click to activate/deactivate Boolean flag indicating if the terminal shall assume that the relevant security class is supported by the gateway(s) in operation, or not supported by them.

21.9.6 Repeater Capabilities Class 2A - 2C

Click to activate/deactivate Boolean flag indicating if the terminal shall assume that the relevant security class is supported by the repeater(s) in operation, or not supported by them.

21.9.7 Permit Clear Preemption in 2A / 2B

Click to activate/deactivate Boolean flag indicating if calls in security classes 2A/2B may be preempted in clear.

21.9.8 Active SCK Subset Number Flag with OTAR

Indicates if the user is allowed to set the active SCK Subset Number (used to set the present key for each DMO Talkgroup) while the DM-SCKs are managed by system via the Over-The-Air-Rekeying (OTAR).

When the flag is checked user can set the active SCK Subset Number via the MMI.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

21.9.9 Open MNI Security Settings

Click to display a table that provides security settings for open group calls which are identified by the MNI value.

Network MCC	Network MNC	Status	Key Group	Incoming Call Minimum Security Class	Outgoing Call Security Class
1023	16383	<input checked="" type="checkbox"/>	NO_KG	Security Class 1	Security Class 1
753	2361	<input checked="" type="checkbox"/>	NO_KG	Security Class 1	Security Class 1
0	0	<input type="checkbox"/>	NO_KG	Security Class 1	Security Class 1
0	0	<input type="checkbox"/>	NO_KG	Security Class 1	Security Class 1
0	0	<input type="checkbox"/>	NO_KG	Security Class 1	Security Class 1
0	0	<input type="checkbox"/>	NO_KG	Security Class 1	Security Class 1
0	0	<input type="checkbox"/>	NO_KG	Security Class 1	Security Class 1
0	0	<input type="checkbox"/>	NO_KG	Security Class 1	Security Class 1

21.9.10 Present Keys

Click to display a table that stores for every key-group one SCKN which is the present key edition of that key group.



	Field Name	Field Value	Reset
1	Present Keys 1	SCK 1	
2	Present Keys 2	SCK 2	
3	Present Keys 3	SCK 3	
4	Present Keys 4	SCK 4	

When key grouping methods is <K,E> (except for <30K,1E>) the table shall contain exactly K entries and each entry represents a key-group KGj j=1...K. For each key-group KGj (j=1...K) one of the E SCKNs of this key group can be selected. The list of SCKNs for each key-group is preset (the SCKN number cannot be typed). Each key-group is composed of SCKs j, j+K, j+2K, ..., j+(E – 1)*K.

When the current pattern is <30K, 1E> every key group KGj has a single edition SCKj which is the present edition. Therefore the table may not exist (or shall not be editable).

For example - when the current pattern is <10K,3E>, the present key of KG7 can be one of SCK7, SCK17 or SCK27, and similarly for all key groups KG1 KG2 ... KG10.

Related field is:

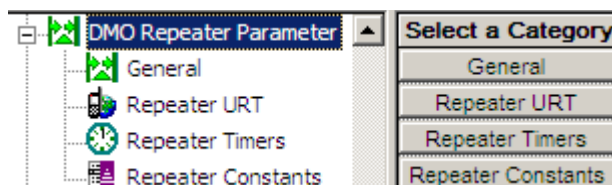
Paragraph 21.9.1 "Key Grouping Method"

22 DMO Repeater Parameters



NOTE

This section is applicable only to the terminals with enabled DMO Repeater Mode functionality.



22.1 General

22.1.1 Call Monitor

This field allows you to enable audio monitoring via speakers.

If set to Transmit, it also enables the PTT pressing for monitored calls.

- Off
- Monitor Only – User can only listen to the conversation via speakers.
- Monitor and Transmit – User can listen and participate (transmit voice) in the conversation.

From the drop-down list, select the value.

22.1.2 Repeater Address

This field allows you to set a 10-bit address for the Repeater.

Enter the value.

22.1.3 Repeater Address Type

This field allows you to determine how the Repeater's address is created.

- Manual – users manually enter the 10-bit address in to the Repeater Address field
- Auto – the 10-bit address is automatically generated, based on the Repeater's SSI

22.2 Repeater URT

22.2.1 Repeater URT

This field allows you to set usage restrictions for the device.

- No Restrictions – The device allows any terminal to initiate new and continue ongoing transactions.
- Single MNI – The device allows only terminals with a certain MNI to initiate new and continue ongoing transactions.
- Single TSI (MNI + SSI) – The device allows only terminals with a certain MNI and SSI to initiate new and continue ongoing transactions.
- Two Addresses (MNI+SSI1&MNI+SSI2) – The device allows terminals with addresses matching a certain pair of TSI, to initiate new and continue ongoing transactions.

- Two Addresses (MNI+SSI1&Repeater MNI+SSI2) – The device allows terminals with addresses matching a certain pair of TSI, to initiate new and continue ongoing transactions.
- Three SSIs (Repeater MNI+SSI1/SSI2/SSI3) – The device allows terminals with addressed matching a certain triple of TSI, to initiate new and continue ongoing transactions.

From the drop-down list, select the value.

22.2.2 Type of MNI

This field allows you to set the type of network identification used for URT.

- REP MNI – Use Repeater's MNI to determine the Repeater URT
- DMO TG MNI – Use the currently selected talkgroup's MNI to determine the Repeater URT.
- Specific MNI –. Use MCC of Specific MNI and MNC of Specific MNI values to determine the Repeater URT.

From the drop-down list, select the value.

22.2.3 MCC of Specific MNI

This field allows you to assign value to the Mobile Country Code as Specific MNI.



NOTE

This field is editable only if the Type of MNI is set to Specific MNI.

Enter the value.

22.2.4 MNC of Specific MNI

This field allows you to assign value to the Mobile Network Code as Specific MNI.



NOTE

This field is editable only if the Type of MNI is set to Specific MNI.

Enter the value.

22.2.5 Type of SSI

This field allows you to set the type of SSI used for URT.

- Specific SSI – Use Repeater's MNI to determine the Repeater URT
- SSI of Selected Talkgroup – Use the currently selected talkgroup's MNI to determine the Repeater URT.

From the drop-down list, select the value.

22.2.6 Specific SSI

This field allows you to assign value to the SSI1 as Specific SSI.



NOTE

This field is editable only if the Type of SSI1 is set to Specific SSI.

Enter the value.

22.2.7 Type of SSI2

This field allows you to set the type of SSI used for URT.

- Specific SSI – Use Repeater's MNI to determine the Repeater URT
- SSI of Selected Talkgroup – Use the currently selected talkgroup's MNI to determine the Repeater URT.

From the drop-down list, select the value.

22.2.8 Specific SSI2

This field allows you to assign value to the SSI2 as Specific SSI.



NOTE

This field is editable only if the Type of SSI2 is set to Specific SSI.

Enter the value.

22.2.9 Specific SSI3

This field allows you to assign value to the SSI3 as Specific SSI.



NOTE

This field is editable only if the Repeater URT is set to Three SSIs (Repeater MNI+SSI1/SSI2/SSI3).

Enter the value.

22.3 Repeater Timers

22.3.1 DT250

DM-REP time-out during call set-up with presence check.

This timer is based on frame duration. Enter the number of frames to elapse.

22.3.2 DT251

DM-REP time-out waiting for response to DM-SDS DATA on slave link.

This timer is based on frame duration. Enter the number of frames to elapse.

22.3.3 DT252

DM-REP time-out waiting for call set-up signaling after pre-emption or changeover.

This timer is based on frame duration. Enter the number of frames to elapse.

22.3.4 DT253

Minimum interval between transmissions of DM-REP presence signal on a free carrier.

This timer is based on frame duration. Enter the number of frames to elapse.

22.3.5 DT254

Maximum interval between transmissions of DM-REP presence signal on a free carrier.

A value of 0 indicates that the DM-REP does not transmit the presence signal periodically on a free carrier.

From the drop-down list, select the value.

22.3.6 DT255

Time when randomization is required for transmission by DM-REP after channel becomes free.

This timer is based on frame duration. Enter the number of frames to elapse.

22.3.7 DT256

Inactivity time-out for active DM-REP in channel occupation.

This timer is based on frame duration. Enter the number of frames to elapse.

22.3.8 DT257

Inactivity time-out for idle DM-REP in channel occupation or reservation.

This timer is based on frame duration. Enter the number of frames to elapse.

22.3.9 DT258

Inactivity time-out for active DM-REP in channel reservation.

This timer is based on frame duration. Enter the number of frames to elapse.

22.3.10 DT259

Time when longer randomization is required for transmission after new call pre-emption acceptance.

This timer is based on frame duration. Enter the number of frames to elapse.

22.4 Repeater Constants

22.4.1 DN253

Number of frames in which the DM-REP transmits the free-channel presence signal.

Enter the value.

22.4.2 DN254

Minimum randomization by DM-REP for transmission after channel becomes free.

Enter the value.

22.4.3 DN255

Maximum randomization by DM-REP for transmission after channel becomes free.

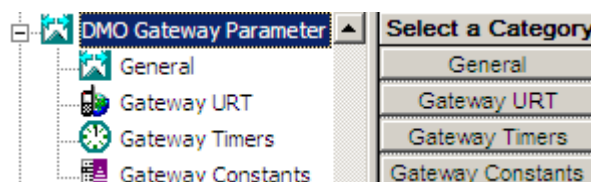
Enter the value.

23 DMO Gateway Parameters



NOTE

This section is applicable only to the terminals with enabled DMO/TMO Gateway Mode functionality.



23.1 General

23.1.1 Gateway State

This field informs whether the DMO Gateway Mode is enabled.

This is a non-editable field.

23.1.2 Default Mode

The terminal will switch to the selected mode after the Gateway is deactivated.

From the drop-down list, select the value.

23.1.3 Gateway Address Type

This field allows you to determine how the Gateway's address is created.

- Manual – users manually enter the 10-bit address in to the Gateway Address field.
- Auto – the 10-bit address is automatically generated, based on the Gateway's SSI.

23.1.4 Gateway Address

This field allows you to set a 10-bit address for the DMO Gateway.

23.1.5 Gateway Monitor Timer

This field allows you to set duration for monitoring the DM channel for other active Gateways.

If the Gateway detects another active Gateway during the monitoring time, it will switch to the Standby mode.

If the Gateway does not detect another Gateway during the monitoring time, it remains in the Gateway mode.



NOTE

Set the monitoring timer at least twice longer than the DT264 Gateway Timer.

Enter the value.

23.1.6 Call Monitor

This field allows you to enable audio monitoring through speakers.

- Off
- Monitor Only – User can only listen to the conversation through speakers.

23.1.7 Encrypted to Clear

If this field is enabled, the Gateway retransmits encrypted voice as clear.



NOTE

It is recommended to disable this field; leave the check box empty.

23.2 Gateway URT

23.2.1 Gateway URT

This field allows you to set usage restrictions for the device.

- No Restrictions – The device allows any terminal to initiate new and continue ongoing transactions.
- Single MNI – The device allows only terminals with a certain MNI to initiate new and continue ongoing transactions.
- Single TSI (MNI + SSI) – The device allows only terminals with a certain MNI and SSI to initiate new and continue ongoing transactions.
- Two Addresses (MNI+SSI1&MNI+SSI2) – The device allows terminals with addresses matching a certain pair of TSI, to initiate new and continue ongoing transactions.
- Two Addresses (MNI+SSI1&Gateway MNI+SSI2) – The device allows terminals with addresses matching a certain pair of TSI, to initiate new and continue ongoing transactions.
- Three SSIs (Gateway MNI+SSI1/SSI2/SSI3) – The device allows terminals with addressed matching a certain triple of TSI, to initiate new and continue ongoing transactions.

From the drop-down list, select the value.

23.2.2 Type of MNI

This field allows you to set the type of network identification used for URT.

- GW MNI – Use Gateway's MNI to determine the Gateway URT
- DMO TG MNI – Use the currently selected talkgroup's MNI to determine the Gateway URT.
- Specific MNI – Use MCC of Specific MNI and MNC of Specific MNI values to determine the Gateway URT.

From the drop-down list, select the value.

23.2.3 MCC of Specific MNI

This field allows you to assign value to the Mobile Country Code as Specific MNI.



NOTE

This field is editable only if the Type of MNI is set to Specific MNI.

Enter the value.

23.2.4 MNC of Specific MNI

This field allows you to assign value to the Mobile Network Code as Specific MNI.

**NOTE**

This field is editable only if the Type of MNI is set to Specific MNI.

Enter the value.

23.2.5 Type of SSI1

This field allows you to set the type of SSI used for URT.

- Specific SSI – Use Gateway's MNI to determine the Gateway URT
- SSI of Selected Talkgroup – Use the currently selected talkgroup's MNI to determine the Gateway URT.

From the drop-down list, select the value.

23.2.6 Specific SSI1

This field allows you to assign value to the SSI1 as Specific SSI.

**NOTE**

This field is editable only if the Type of SSI1 is set to Specific SSI.

Enter the value.

23.2.7 Type of SSI2

This field allows you to set the type of SSI used for URT.

- Specific SSI – Use Gateway's MNI to determine the Gateway URT
- SSI of Selected Talkgroup – Use the currently selected talkgroup's MNI to determine the Gateway URT.

From the drop-down list, select the value.

23.2.8 Specific SSI2

This field allows you to assign value to the SSI2 as Specific SSI.

**NOTE**

This field is editable only if the Type of SSI2 is set to Specific SSI.

Enter the value.

23.2.9 Specific SSI3

This field allows you to assign value to the SSI3 as Specific SSI.

**NOTE**

This field is editable only if the Gateway URT is set to Three SSIs (Gateway MNI+SSI1/SSI2/SSI3).

Enter the value.

23.3 Gateway Timers

23.3.1 DT363

Time-out waiting for response to DM-GCONNECT

Enter the value in milliseconds.

23.3.2 DT365

Time-out waiting for response to DM-GPRE ACCEPT sent during occupation.

Enter the value in milliseconds.

23.3.3 DT366

Time-out waiting for response to DM-PRE ACCEPT sent during occupation.

Enter the value in seconds.

23.3.4 DT367

Time-out waiting for response to DM-GTX ACCEPT (or DM-GPRE ACCEPT sent in reservation).

Enter the value in milliseconds.

23.3.5 DT368

Time-out waiting for response to DM-TX ACCEPT (or DM-PRE ACCEPT sent in reservation).

Enter the value in seconds.

23.3.6 DT263

Minimum interval between transmissions of gateway presence signal on a free carrier.

Enter the value.

23.3.7 DT264

Maximum interval between transmissions of gateway presence signal on a free carrier.

A value of 0 indicates that the gateway does not transmit the presence signal periodically on a free carrier.

Enter the value.

23.3.8 DT265

Time when randomization is required for transmission by gateway after channel becomes free.

This timer is based on frame duration. Enter the number of frames to elapse.

23.3.9 DT266

Inactivity time-out for slave gateway in channel occupation.

This timer is based on frame duration. Enter the number of frames to elapse.

23.3.10 DT267

Inactivity time-out for idle gateway in channel occupation or reservation.

This timer is based on frame duration. Enter the number of frames to elapse.

23.3.11 DT268

Time-out waiting for DM-GTX REQUEST after DM-MS pre-emption of master DM-MS.

This timer is based on frame duration. Enter the number of frames to elapse.

23.3.12 DT269

Time-out waiting for short data DSB after DM-MS pre-emption of master DM-MS.

This timer is based on frame duration. Enter the number of frames to elapse.

23.3.13 DT273

Gateway access time-out.

This timer is based on multiframe duration. Enter the number of multiframes to elapse.

23.4 Gateway Constants

23.4.1 DN367

This field allows you to set value for the following Gateway constant:

Number of transmissions of DM-SDS UDATA.

Enter the value.

23.4.2 DN263

Number of frames in which the gateway transmits the free-channel presence signal.

Enter the value.

23.4.3 DN264

Minimum randomization by gateway for transmission after channel becomes free.

Enter the value.

23.4.4 DN265

Maximum randomization by gateway for transmission after channel becomes free.

Enter the value.

23.4.5 DN266

Minimum randomization by gateway for non-immediate retransmission of call set-up.

Enter the value.

23.4.6 DN267

Maximum randomization by gateway for non-immediate retransmission of call set-up.

Enter the value.

23.4.7 DN270

Maximum number of frames containing slave gateway's response DSB.

Enter the value.

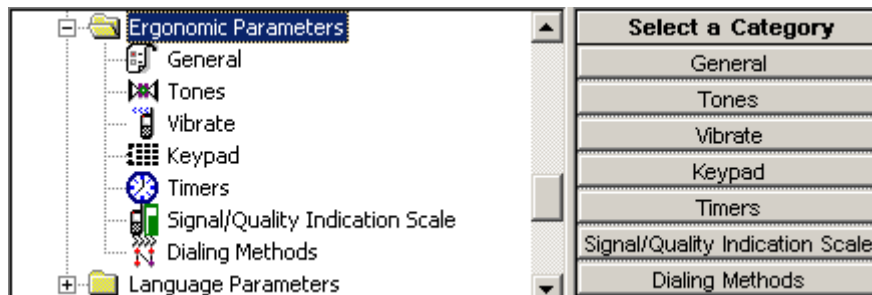
24 Ergonomic Parameters



NOTE

Not all the parameters from this section are available for TCR1000.

Refer to the codeplug for details.



This has the following submenus:

- General
- Tones
- Vibrate - portable terminals only
- Keypad
- Timers
- Signal/Quality Indication Scale
- Dialing Methods

24.1 General

	Field Name	Field Value	Reset
1	Ring Style	British	
2	Speaker Phone	<input checked="" type="checkbox"/>	
3	Range Scroll Type	Scroll To Next Folder	
4	Energy Economy Mode via MMI	<input type="checkbox"/>	
5	Group Call Notification During Menu Viewing	<input checked="" type="checkbox"/>	
6	Low Battery Indication Threshold	Low	
7	Idle Screen Configuration	Network	Reset

The options in this submenu are the following.

24.1.1 Control Head Dim

Specifies the backlight brightness level for the mobile display.

Choices are Off, Low, Medium, High or Highest.

24.1.2 Test Mode

Specifies whether the terminal is in a special RF test mode. Only Motorola field engineers use this mode.

This feature is Enabled/Disabled by clicking in the check box.

24.1.3 Ring Style

	Field Name	Field Value	Reset
1	Test Mode	<input type="checkbox"/>	
2	Ring Style	British	
3	Speaker Phone	British	
4	Range Scroll Type	Style 2	
5	Energy Economy Mode via MMI	Style 3	
6	Group Call Notification During Menu Viewing	French	
		German	
		Bravo	
		Three Ring	

This field is used to set the ring style of the terminal. There are 9 available options, selectable by clicking the pointer in the field value box, clicking on the down arrow to display the options, use the scroll bar to scroll the options list and select an option by clicking the pointer on the required option.

24.1.4 Speaker Phone

The user may select if the received voice is routed to the speaker during duplex private or phone calls.

This feature is Enabled/Disabled by clicking in the check box.

24.1.5 Range Scroll Type

	Field Name	Field Value	Reset
1	Test Mode	<input type="checkbox"/>	
2	Ring Style	British	
3	Speaker Phone	<input checked="" type="checkbox"/>	
4	Range Scroll Type	Scroll To Next Fold	
5	Energy Economy Mode via MMI	Scroll Stay In Folder	
6	Group Call Notification During Menu Viewing	Scroll To Next Folder	

This option determines the operation of scrolling within ranges:

- Scroll Stay In Folder - the terminal loops back within the same folder when at the endpoints. To change folders the user needs to select the required folder via the terminal's menu manually or using a pre-programmed button option.
- Scroll To Next Folder - the terminal continually scrolls the talkgroups from all the folders (jumps to the start of the next/previous folder when at the endpoint of the current one).

To choose the level, put the pointer into the field value, click the drop-down list, and choose the desired level.

Related field are:

Paragraph 32.5 "Rotary Knob Options"

Paragraph 32.5.7 "Wrap Around Rotary Group Scrolling"

24.1.6 Energy Economy Mode Via MMI

**NOTE**

This setting applies to portable terminals only.

When the check box is enabled, the user can enable or disable Energy Economy Mode via the terminal's display.

Energy Economy (EE) is a mode of operation where in order to save battery life the terminal should not monitor all downlink slots of the MCCH. The terminal may enter the mode only after negotiation with the SwMI. In some situations user can prohibit or permit Energy Economy via user interface that IUA shall provide in this case. If terminal is in charger, Energy Economy mode is not needed.

24.1.7 Group Call Notification During Menu Viewing

Indicates if incoming group call display should be posted to user during menu viewing.

If this field is disabled, the group call will only be heard without display notification.

24.1.8 Low Battery Indication

Sets the level at which the terminal generates periodic indication of low battery if the battery level goes below it.

The options are:

- Low - The indication starts when the battery level is less than 5% of the maximum capacity
- Medium - The indication starts when the battery level is less than 10% of the maximum capacity.
- High - The indication starts when the battery level is less than 20% of the maximum capacity

The actual amount of power left depends on some factors like the battery type, temperature and age. To select an option, put the pointer into the field value, click the drop-down list and select the required value.

24.1.9 Idle Screen Configuration

The parameter indicates the behavior of the idle screen first two lines.

The options are:

- Network - The first line displays the Network MNI or Network alias. The second line displays the Folder or Range.
- OPTA - The first line displays the OPTA part 1. The second line displays the OPTA part 2.
- ISSI - The first line displays the ISSI number. The second line displays the TG Folder or Range.

To select an option, put the pointer into the field value, click on the arrow, and drag the pointer to the desired option.

24.1.10 Power On Battery Insertion

**NOTE**

The following section is applicable to MTP850 S and MTP850 FuG only.

This parameter determines whether the terminal powers on when a charged battery is inserted.

Mark the checkbox to enable.

24.2 Tones

	Field Name	Field Value
1	Periodic Tone	<input checked="" type="checkbox"/>
2	DTMF	<input checked="" type="checkbox"/>
3	Group Call Received Tone	<input type="checkbox"/>
4	Ring Style	British
5	Simplex Call	Private Simplex
6	Periodic Alerting	<input type="checkbox"/>
7	Periodic Alerting Period	5 min
8	Periodic Alert Settings in MMI	<input checked="" type="checkbox"/>
9	Audio Toggle Menu	<input checked="" type="checkbox"/>
10	Audio Toggle Softkeys	<input checked="" type="checkbox"/>
11	Audio Toggle	Spkr Cntrl
12	D-PTT Mode	<input type="checkbox"/>
13	D-PTT Activation Time, msec	1000
14	D-PTT Tone Output Volume	0
15	D-PTT Tone Style	Single
16	Incoming Emergency Tone Selection	Default Emergency Tone

The tones relate to specific terminal actions undertaken as part of the MMI.

Related fields are:

Paragraph 26.6.9 "Alert Tones Volume"

Paragraph 26.6.10 "Ring Tones Volumes"

24.2.1 Clear To Send Tone

Specifies if the called person will hear a short beep during a Group Call or a Private Call when the caller ends the transmission by releasing the PTT.

This feature is Enabled/Disabled by clicking in the check box.

24.2.2 Periodic Tone

If enabled, the terminal will sound a tone periodically when in a non-operational state (in other words no service).

This feature is Enabled/Disabled by clicking in the check box.

24.2.3 DTMF

If enabled, the keypad will change from an alphanumeric keypad to a DTMF keypad when the terminal is in either Phone or PABX call. The user is then able to send DTMF tones, an option required for over dialing.

This feature is Enabled/Disabled by clicking in the check box.

24.2.4 Group Call Received Tone

If enable the received Group Call Alert will sound.

This feature is Enabled/Disabled by clicking in the check box.

24.2.5 Talk Permit Tone Option

This field defines the duration of the Talk Permit Tone when the user presses the PTT button.

There are 3 settings:

- No Tone - Disabling the talk-permit tone could be dangerous. When there is heavy system traffic (like during a large-scale emergency situation) the unit may receive the permission to talk a number of seconds later than usual. If the user is accustomed to speak immediately without waiting for a tone, the user may begin talking before anyone can hear what s/he is saying - and the first few words - which may be critical - will not be heard - while the talker thinks s/he has been heard. The CPS will warn you that setting this value may be dangerous. Please confirm before setting this value.
- Short tone (a single tone heard upon pressing the PTT).
- Normal tone (the factory-default tone heard upon pressing the PTT).

To select the option, put the pointer into the field value, click the drop-down list and select the required value.



NOTE

The following settings apply to MTM5400, and MTM800 FuG only.

This field defines whether the Talk Permit Tone is enabled or disabled when the user presses the PTT button.

There are 2 settings:

- disabled - Disabling the talk-permit tone could be dangerous. When there is heavy system traffic (like during a large-scale emergency situation) the unit may receive the permission to talk a number of seconds later than usual. If the user is accustomed to speak immediately without waiting for a tone, the user may begin talking before anyone can hear what s/he is saying - and the first few words - which may be critical - will not be heard - while the talker thinks s/he has been heard. The CPS will warn you that setting this value may be dangerous. Please confirm before setting this value.
- enabled

Mark the check box to enable.

24.2.6 Ring Style

	Field Name	Field Value	Reset
1	Periodic Tone	<input checked="" type="checkbox"/>	
2	DTMF	<input checked="" type="checkbox"/>	
3	Group Call Received Tone	<input type="checkbox"/>	
4	Ring Style	British	Reset
5	Simplex Call	British	Reset
6	Periodic Alerting	Style 2	
7	Periodic Alerting Period	Style 3	Reset
8	Periodic Alert Settings in MMI	French	
9	Audio Toggle Menu	German	
10	Audio Toggle Sofkeys	Bravo	
11	Audio Toggle	Always Loud	Reset

Determines what the terminal ringing sounds are like.

To choose the style, put the pointer into the field value, click the drop-down list and select the required style.

24.2.7 Simplex Call

Determines which tone is played for alerting at incoming Simplex Call.

24.2.8 Periodic Alerting

This option indicates if the periodic alerting is enabled/disabled when the notification for the missed call or incoming message is displayed.

24.2.9 Periodic Alerting Period

This option determines the period between periodic audible alerts when the notification for missed call or incoming message is displayed.

24.2.10 Periodic Alert Settings in MMI

This option indicates whether the periodic audible alert can be configured by the user through the terminal MMI. When this option is disabled the configuration is possible only using the CPS.

24.2.11 Audio Toggle Menu

This option indicates whether the Audio Toggle menu is displayed on the terminal screen.

24.2.12 Audio Toggle Softkeys

This option indicates whether the Audio Toggle softkeys are displayed on the terminal screen during a Private call.

24.2.13 Audio Toggle

	Field Name	Field Value	Reset
1	Periodic Tone	<input checked="" type="checkbox"/>	
2	DTMF	<input checked="" type="checkbox"/>	
3	Group Call Received Tone	<input type="checkbox"/>	
4	Ring Style	British	Reset
5	Simplex Call	Private Simplex	Reset
6	Periodic Alerting	<input type="checkbox"/>	
7	Periodic Alerting Period	5 min	Reset
8	Periodic Alert Settings in MMI	<input checked="" type="checkbox"/>	
9	Audio Toggle Menu	<input checked="" type="checkbox"/>	
10	Audio Toggle Softkeys	<input checked="" type="checkbox"/>	
11	Audio Toggle	Always Loud Always Loud Spkr Cntrl	Reset

This field defines whether or not the “Loud/Low” audio soft key is displayed on the terminal screen during an active private call.

Selecting ‘Always Loud’ directs the audio to the speaker for the call duration and the soft key will not be visible.

Selecting ‘Spkr Cntrl’ displays the soft key for user control, allowing the user to direct the audio to either the earpiece or the main speaker for the duration of call.

24.2.14 D-PTT Mode

This field indicates whether the PTT Double Push feature is enabled or disabled in the terminal.
Turn the check box on (Enable) or off (Disable) by clicking in the check box.

24.2.15 D-PTT Activation Time, msec

This parameter defines the period of time in which pressing PTT twice triggers the D-PTT tone.
Type in desired amount of time in milliseconds. The range for this parameter is 200–2000 msec.
The default is 1000 msec.

24.2.16 D-PTT Tone Output Volume

This parameter defines the output volume of the D-PTT tone that is sent over the air interface (compared to the maximal possible amplitude). This parameter does not affect the volume of the tone heard on the terminal while transmitting.

Type in the desired number in the text box. The range for this parameter is 0 (maximum)– -100(minimum) dB. The default is 0 dB.

24.2.17 Communication Tone Output Volume



NOTE

This section applies to TCR1000 only.

This parameter defines the attenuation level in volume of a communication tone, which is sent over the air interface.

When set to 0 dB, the communication tone volume equals the maximum volume level that can be set on a terminal.

When set to -20 dB, the communication tone volume is 100 times softer than the maximum volume level on the terminal.

The attenuation value ranges from 0 to -100 dB.



NOTE

This parameter neither depends nor impacts the volume level set locally on a transmitting terminal.

24.2.18 D-PTT Tone Style

D-PTT Tone Output Volume	0	Reset
D-PTT Tone Style	Single	Reset

Single
 Double
 Triple

This field indicates currently selected D-PTT Tone Style.
There are three possible options to select:

- Single - the tone is played one time only
- Double - the tone is played two times separated by a pause
- Triple - the tone is played three times separated by pauses

24.2.19 Incoming Emergency Tone Selection

This option allows you to specify a tone sequence for an incoming emergency call.

From a drop-down list, select the tone sequence.

24.3 Vibrate

Ergonomic Parameters			
General			
Tones			
Vibrate			
Keypad			
Timers			
Signal/Quality Indication Scale			

	Field Name	Field Value	Reset
1	Vibrate Mode	Individually Set	
2	Ring Calls	Vibe Only	Reset
3	Simplex Calls	Ring Only	Reset
4	Group Calls	Vibe Only	Reset
5	Messages	Vibe Only	Reset

24.3.1 Vibrate Mode

	Field Name	Field Value	Reset
1	Vibrate Mode	Individually Set	
2	Ring Calls	Vibe then Ring	Reset
3	Simplex Calls	Ring Only	Reset
4	Group Calls	Vibe Only	Reset
5	Messages	Individually Set	Reset

In this field you can use three different setting for all the calls and messages. Those are:

- Vibe then Ring (Vibe & Ring available for MTH800)
- Ring Only
- Vibe only

If the user chooses the Individually Set, then Ring Calls, Simplex Calls, Group Calls, and Messages become editable.

24.3.2 Ring Calls, Simplex Calls, Group Calls and Messages

	Field Name	Field Value	Reset
1	Vibrate Mode	Individually Set	
2	Ring Calls	Vibe then Ring	Reset
3	Simplex Calls	Vibe then Ring	Reset
4	Group Calls	Ring Only	Reset
5	Messages	Vibe Only	Reset

You can set those options to

- Vibe then Ring (Vibe & Ring for MTH800) - portable terminals only
- Ring Only
- Vibe Only - portable terminals only



NOTE

This option is non-editable if the user choose Vibe then Ring (Vibe & Ring for MTH800), Ring Only or Vibe Only in the Vibrate mode.

24.4 Keypad

Ergonomic Parameters		Field Name	Field Value
General		1 Keypad Lock Notification	Notification and Instruction
Tones		2 Lock PTT	<input checked="" type="checkbox"/>
Vibrate		3 Lock Volume Control	<input type="checkbox"/>
Keypad		4 Lock Talk Group Selection	<input type="checkbox"/>
Timers		5 Lock Side Buttons	<input type="checkbox"/>
Signal/Quality Indication		6 Keypad Auto Lock	<input type="checkbox"/>
Dialing Methods		7 Keypad Autolock Time, min	5
Language Parameters			

24.4.1 Keypad Lock Notification

	Field Name	Field Value	Reset
1	Keypad Lock Notification	Notification and Instruction	Reset
2	Lock PTT	<div> None Notification Only Notification and Instruction </div>	

This option determines what message on the screen is displayed when the user locks his keypad.

Three options are available:

None - no message is displayed.

Notification Only - **Keys Locked** is displayed.

Notification and Instruction - **Keys Locked, Press Menu and * to unlock** (or another respective message) is displayed.

24.4.2 Lock PTT

This option indicates whether PTT is blocked with the keypad. If the option is enabled, then the PTT, End and Send keys are disabled for handling any call interactions during the keypad lock.



NOTE

- When there is an incoming emergency call and the keypad with PTT are locked, you can still use the PTT.
- The Emergency button is not locked. Entering Emergency Operation, unlocks all keys.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

24.4.3 Lock Volume Control

This option indicates if the volume selection by Rotary Knob is locked with the keypad lock.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

24.4.4 Lock Talkgroup Selection

This option indicates if talk group selection by Rotary Knob are locked with the keypad lock.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

24.4.5 Lock Side Buttons

This option indicates whether side buttons are locked with the keypad lock.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

24.4.6 Keypad Auto Lock

This option indicates whether the keypad lock functionality is enabled in the terminal. If so the user is provided with a possibility to turn on and off the Auto Key Lock via MMI.

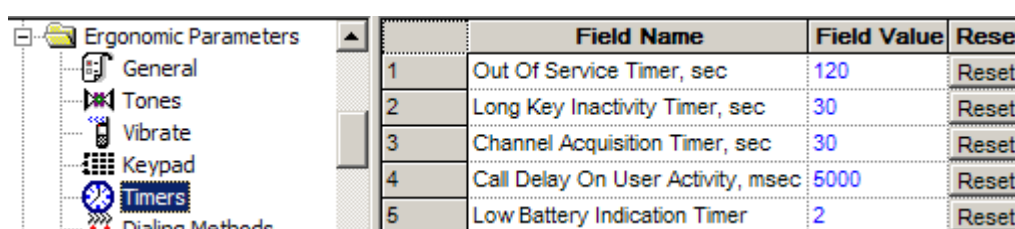
Turn the check box on (Enable) or off (Disable) by clicking in the check box.

24.4.7 Keypad Auto Lock Time, min

This parameter defines the period of idle time after which the terminal keypad becomes locked.

Type in desired amount of time in minutes. The range for this parameter is 1–20 minutes. The default is 5 minutes.

24.5 Timers



	Field Name	Field Value	Reset
1	Out Of Service Timer, sec	120	Reset
2	Long Key Inactivity Timer, sec	30	Reset
3	Channel Acquisition Timer, sec	30	Reset
4	Call Delay On User Activity, msec	5000	Reset
5	Low Battery Indication Timer	2	Reset

The timers can be set to the factory default by selecting 'Reset' or the user can enter a time in seconds.

24.5.1 Out of Service Timer, sec

This entry defines the period of time in seconds in which the terminal may go out of service without notifying the user that it has re-entered service. If the timer value is elapsed then the terminal will alert the user with a tone when the terminal re-enters service.

The range of this time period is 0–900 seconds, the default setting is 120 seconds.

The timer is disabled when set to zero.

24.5.2 Long Key Inactivity Timer, sec

This timer defines the time duration of no user input/activity, for example a button press, after which the terminal will return to its default mode.

The range setting for this timer is from 0–60 seconds and is disabled when the field entry is set to 0 (zero). The default setting is 30 seconds,

24.5.3 Channel Acquisition Timer, sec

This is the period of time the terminal waits before it advises the user it is out of service, not attached, or is in local area service.

The range for this timer is 0–300 seconds, the default setting is 30 seconds.

24.5.4 Call Delay on User Activity, msec

This field defines the amount of time after a user action during which all incoming (non-emergency) group calls are ignored (not joined).

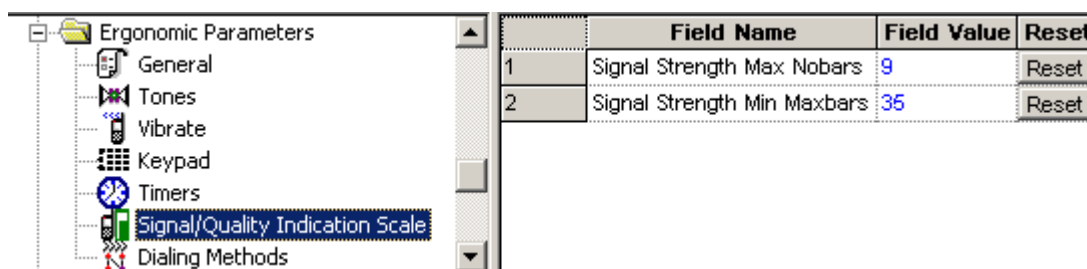
The range for this timer is 100–5000 msec, the default setting is 5000 msec.

24.5.5 Low Battery Indication Timer

This field defines the time between periodic warnings of the low battery level.

The range for this timer is 1–20 minutes, the default setting is 2 minutes.

24.6 Signal/Quality Indication Scale



These two fields are used for setting the number of bars that will be displayed to represent received signal strength.

24.6.1 Signal Strength Maximum Nobars

This field defines the maximum signal strength for showing no bars indicating the **QUALITY** of the received signal in **TMO**.

This field also defines the maximum signal strength for showing no bars indicating the **STRENGTH** of the received signal in **DMO**.

The range is from 0 - 127, the default being 9.

24.6.2 Signal Strength Minimum Maxbars

This field defines the minimum signal strength for showing maximum number of bars that are displayed to indicate the quality/strength of the received signal. These bars are displayed to the right of the 'mast' received signal strength icon.

The range is from 0 - 127, the default being 35.

24.6.3 Low RSSI Notice

This field allows you to enable a notification for a low signal strength level.

24.6.4 Low RSSI Warning Delay, sec

This field allows you to set time that must elapse between the event detection (low signal strength) and a notification on a terminal display.

Enter the value in seconds.

24.6.5 Low RSSI Warning Threshold

This field allows you to set the signal strength level (represented by signal bars on a display) below which a terminal will trigger a notification.

- High – between three and four bars
- Medium – between two and three bars

- Low – between one and two bars
- Very Low – between one and none bar

From the drop-down list, select the value.

24.7 Dialing Methods

Ergonomic Parameters			
General			
Tones			
Vibrate			
Keypad			
Timers			
Signal/Quality Indication Scale			
Dialing Methods			

	Field Name	Field Value	Reset
1	Dialing Scheme Option	<input type="checkbox"/>	
2	Default Call Type	First In Type Order	Reset
3	Type Order	Private-Phone-PABX	Reset

This menu sets the dialing method parameters. These are a set of options that control the way the Terminal behaves when the user dials a number.

24.7.1 Default Call Type

	Field Name	Field Value	Reset
1	Default Call Type	First in Type Order	Reset
2	Type Order	Last Active	Reset
		First in Type Order	

This option defines the first call type that will appear on the idle display when the user starts dialing. The call type is one of the following: Private/Phone/PABX.

First in Type Order: If this option is chosen, the first Call Type defined in the Type Order field will always be the first type offered to the user when he/she begins to dial.

Last Active: If this option is chosen, the Call Type of the last active call will be the first type offered to the user when dialing.

24.7.2 Type Order

	Field Name	Field Value	Reset
1	Default Call Type	First in Type Order	Reset
2	Type Order	Private-Phone-PABX	Reset
		Private-Phone-PABX	
		Phone-PABX-Private	
		PABX-Private-Phone	
		Private-PABX-Phone	
		Phone-Private-PABX	
		PABX-Phone-Private	

Indicates the sequence in which the call types appear to the user when the user presses the 'Call Type' soft key.

To change the setting, select the field value, then select the desired option.

24.8 Default Setting

This is the database of settings which support the Reset to Default functionality. When the Reset to Default is triggered, the following settings are set to the values kept in this database.

24.8.1 Periodic Alerting

This field defines if the terminal plays a periodic audible alert, when the notification for missed call or incoming message is displayed.

24.8.2 Periodic Alerting Period

This field defines the period between periodic audible alert, when the notification for missed call or incoming message is displayed.

24.8.3 Keypad Auto Lock

This parameter enables/disables keypad auto lock functionality.

24.8.4 Keypad Lock On Start-Up

This parameter decides if the terminal locks the keypad automatically on powering on.

24.8.5 Keypad Tone

This field enables/disables keypad tone.

24.8.6 Keypad Autolock Time, sec

This parameter defines the amount of inactivity time after which the terminal keypad is locked.

24.8.7 Clear to Send Tone

This field enables/disables clear to send tone.

24.8.8 All Tones

This field enables/disables all tones.

24.8.9 Covert Mode

This field enables/disables covert mode.

24.8.10 Covert Vibrate

This field enables/disables vibration during covert mode.

24.8.11 Talk Permit Tone Option

This field defines the talk permit tone when the PTT button is pressed.

24.8.12 TXI Activated

This field enables/disables the TXI mode.

24.8.13 Default TG

This field defines the default talkgroup which the terminal is switched to when the reset to default is triggered.

24.8.14 Volume Settings

This is the database of settings which support the Reset to Default functionality. When the Reset to Default is triggered, the following volume settings are set to the values kept in this database:

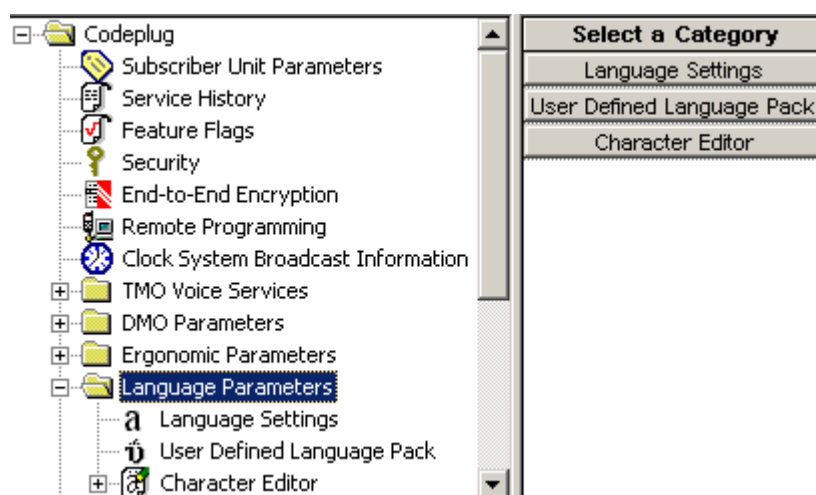
- Duplex
- Earpiece
- General
- Simplex
- Speaker

25 Language Parameters



NOTE

The following section is not applicable to TCR1000.



This menu has 3 options that set the language used for the terminal's prompts, the first gives a choice from the standard options and the remaining options allow user entry for the prompts.

25.1 Language Settings

	Field Name	Field Value	Reset
1	Default Language Choice	BRITISH ENGLISH	Reset
2	ARABIC	<input checked="" type="checkbox"/>	
3	BRITISH ENGLISH	<input checked="" type="checkbox"/>	
4	CHINESE COMPLEX	<input checked="" type="checkbox"/>	
5	CHINESE SIMPLE	<input checked="" type="checkbox"/>	
6	CROATIAN	<input checked="" type="checkbox"/>	
7	DANISH	<input checked="" type="checkbox"/>	
8	DUTCH	<input checked="" type="checkbox"/>	
9	FRENCH	<input checked="" type="checkbox"/>	
10	GERMAN	<input checked="" type="checkbox"/>	
11	GREEK	<input checked="" type="checkbox"/>	
12	HEBREW	<input type="checkbox"/>	
13	HUNGARIAN	<input checked="" type="checkbox"/>	
14	ITALIAN	<input checked="" type="checkbox"/>	
15	KOREAN	<input checked="" type="checkbox"/>	
16	LITHUANIAN	<input checked="" type="checkbox"/>	
17	MACEDONIAN	<input type="checkbox"/>	
18	MONGOLIAN	<input type="checkbox"/>	
19	NORWEGIAN	<input type="checkbox"/>	
20	PORTUGUESE	<input type="checkbox"/>	
21	RUSSIAN	<input type="checkbox"/>	
22	SPANISH	<input checked="" type="checkbox"/>	
23	SWEDISH	<input type="checkbox"/>	
24	USER DEFINED LANGUAGE	<input type="checkbox"/>	

Select the check box for the required language.



NOTE

The options are restricted if the CPS is opened using the 'User Login'.

25.2 User Defined Language

	Message ID	Default Mes	User Mess	Default Abb	User Abbre
1	SHORTCUTS	Shortcuts	Shortcuts	Shortcuts	Shortcuts
2	DELETE_COLON	Delete :	Delete :	Delete :	Delete :
3	QUESTION_MARK	?	?	?	?
4	COMM_24_HR	24hr	24hr	24hr	24hr
5	COMM_ALARM	Alarm	Alarm	Alarm	Alarm
6	COMM_APRIL	Apr	Apr	Apr	Apr
7	COMM_BACKLIGHT	Backlight	Backlight	Backlight	Backlight
8	COMM_CALL_FORWARD	Call Forward	Call Forward	Call Forward	Call Forward
9	COMM_COLON	:	:	:	:
10	COMM_DELETE	Delete	Delete	Delete	Delete

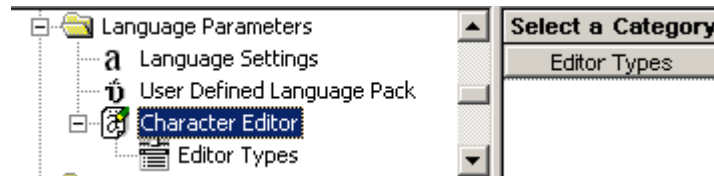
These are user editable fields available in this option. Not all languages are fully supported.

25.2.1 User Message

Default Messages/prompts are edited in the User Message Field.

Enter the language equivalent of the Default Message in the adjacent User Message field.

25.3 Character Editor



The Character Editor is the feature used to create different types of editors in the terminal.

The iTAP feature is a feature within the Character Editor that when enabled, the terminal will pre-empt user character entry with a suggested whole word.

The TAP entry method is the normal user character entry method in the character editor.

The default entry methods and languages of the different applications using the Character Editor dialogue are stored in the codeplug.

When the Character Editor screen is created by an application, the character type, which the application uses, is supplied.

For each group of character types, there is a respective parameter in the codeplug, in which the default entry method is saved.

This group of character types forms an editor type.

Abbreviations and Acronyms:

Editor Type - The Character Editor can appear in different specialized forms (types): number editor, message editor, name editor.

Character Type - A parameter used in the actual code – the character type determines the editor type (relevant for developers only).

Entry Mode - One of four: Either primary (chosen primary text entry method, see below), numeric (numbers only), symbol (symbols only) or secondary (chosen secondary text entry method, see below).

Entry Method - Text entry method and language used in the character editor. It can be either TAP or iTAP for each language enabled in the terminal (for example: TAP English, iTAP English, TAP Spanish, iTAP Spanish, and so forth)

Primary Entry Method - Main text entry method in the character editor. Also used as the default method for the editor type.

Secondary Entry Method - Additional text entry method in the character editor.

TAP - Standard entry method in editors.

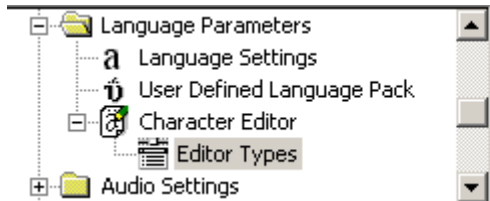
iTAP - Intelligent TAP – an advanced predictive text entry method developed by Lexicus.



NOTE

When the default parameter in the codeplug is changed, all the features using the same editor type, will be affected.

25.3.1 Editor Types

	Field Name	Field Value	Reset
	1	Primary Message Method	Tap British English
	2	Secondary Message Method	None
	3	Primary Name Method	Tap British English
	4	Secondary Name Method	None

The Character Editor can appear in different specialized forms (types): number editor, message editor, name editor.

There are options with a choice of either TAP or iTAP for text entry and an option to select 'TAP of Current Phone Language'.

26 Audio Settings



NOTE

The Audio Settings menu is available for MTP850, MTP850 S/MTP850 FuG, MTP830 S/MTP830 FuG, MTP850Ex, MTP810Ex, TCR1000, MTP830, and CEP400.

For the remaining terminals the entry is replaced with the Audio Parameters (see section 26.6).

This node has the following parameters available:

- Default Profile - indicates the audio profile that the terminal loads when powering on
- Volume Control Mode - indicates whether the volume levels in the terminal are controlled separately (Individual Volume Control) or all together (Common Volume Control). This parameter is not available for MTP850Ex/MTP810Ex.
- Volume Control Mode Selectable via MMI - indicates whether the volume control mode can be changed using the MMI This parameter is not available for MTP850Ex /MTP810Ex.
- Manual Accessory Selection - selects the audio profile to be used depending on whether a Throat Mic or Light Weight Headset is to be used (MTP850 Ex/MTP810 Ex only)
- Keep howling suppression during power cycle - indicates whether the Howling Suppression feature should be enabled on powering up the terminal (MTP850, MTP850 Ex/MTP810 Ex, MTP850 S/MTP850, and MTP830 S/MTP830 FuG FuG only)
- RSM With Earpiece Connected - determines if the user is using RSM with earpiece connected (MTP850 S/MTP850 FuG and MTP830 S/MTP830 FuG only)
- Default GCAI CORE RSM/PHF - determines which Core RSM or PHF accessory parameters should be used (MTP850 S/MTP850 FuG and MTP830 S/MTP830 FuG only)
- Default GCAI CORE Earpiece only - determines which GCAI Core Earpiece parameters should be used (MTP850 S/MTP850 FuG and MTP830 S/MTP830 FuG only)



NOTE

Not all the parameters from this section are available for TCR1000.

Refer to the codeplug for details.

26.1 Secondary Accessory Assignment



NOTE

This section applies to MTP850 S/MTP850 FuG and MTP830 S/MTP830 FuG only.

	Field Name	Model Number	Supported Earpiece
1	Accessory 1	PMMN4040	
2	Accessory 2	PMMN4046	
3	Accessory 3	PMMN4050	
4	Accessory 4	PMMN4062	

SA (Secondary Accessory) Assignment displays accessory Model Numbers in ASCII mapped for the respective Accessories. This column is read only.

For the respective accessories user is able to select using drop down menu Model Number of Earpiece they want to use with particular RSM. In this column only rows containing RSM are editable, that is a particular earpiece can be assigned to be supported by a particular RSM.

Once an earpiece is assigned to an RSM, the user can set up the terminal to let the RSM be used with the earpiece. To use the RSM without an earpiece, the user needs to disconnect the earpiece using the terminal MMI.



NOTE

Once an accessory is connected a notification with information on the accessory is displayed.

If the model number displayed is incorrect, the user should choose the correct appliance from the menu. (If no correct option is available the user should contact their provider).

If just "RSM connected" notification displays, then the connected accessory does not require any additional configuration.

Related information:

Paragraph 26.7 "Side Accessories"

26.2 Hot Mic

	Field Name	Field Value	Reset
1	TMO HotMic Pending Timer, sec	30	Reset
2	TMO HotMic On Timer, sec	300	Reset
3	TMO HotMic Off Timer, sec	10	Reset
4	TMO Alternative HotMic Timer, min	10	Reset
5	Hot Mic Gain Delta	0	
6	DMO HotMic On Timer, sec	300	Reset
7	DMO HotMic Pending Timer, sec	30	Reset
8	DMO HotMic Off Timer, sec	10	Reset
9	DMO Alternative HotMic Timer, min	10	Reset

Related fields are:

Paragraph 19.2.1 "Emergency Alarm"

Paragraph 19.2.2 "Emergency Call"

Paragraph 21.1.3 "DMO Group HotMic"

Paragraph 19.2 "Emergency Options"

26.2.1 TMO Hot Mic Pending Timer, sec

This option is used to set the time during which the terminal will try to get talk permit after entering Emergency Mode.

Timer range is 0 and 10–30 seconds, and the default setting is 30 seconds

26.2.2 TMO Hot Mic On and Off Timers, sec

These options are used to set the time period during which the terminal has talk permission after entering Emergency Mode and the user is able to initiate an emergency group call without using the PTT button.

Timer range for the Hot Mic On is 30–1800 seconds, and the default setting is 300 seconds.

Timer range for the Hot Mic Off is 1–30 seconds, and the default setting is 10 seconds.

26.2.3 TMO Alternation HotMic Timer, min

This options is used to set the time period during which the terminal has the Alternating Hot Mic enabled in TMO, that is for how long the TMO Hot Mic On and Off cycle is on-going.

Timer range is 0–15 minutes, and the default setting is 10 minutes.



NOTE

Alternative HotMic in TMO can be disabled by setting the TMO Alternative HotMic Timer to 0.

26.2.4 Hot Mic Gain Delta

This option is used to set the mic gain when the terminal enters emergency mode.

The levels are in dB referenced to the normal mic gain setting

The selectable levels are:

-3 – the gain is lower than the default gain of the microphone.

0 – the gain is the default gain of the microphone.

3 – the gain is higher than the default gain of the microphone.

6 – the highest gain value possible.

26.2.5 DMO HotMic On and Off Timers, sec

These options are used to set the time period during which the terminal has talk permission after entering Emergency Mode and the user is able to initiate an emergency group call without using the PTT button.

Timer range for the Hot Mic On is 30–1800 seconds, and the default setting is 300 seconds.

Timer range for the Hot Mic Off is 1–30 seconds, and the default setting is 10 seconds.

26.2.6 DMO HotMic Pending Timer, sec

Timer that determines how long the terminal will wait before reattempting to request permission to transmit for DMO Hot Microphone while the other user is speaking.

26.2.7 DMO Alternation HotMic Timer, min

This options is used to set the time period during which the terminal has the Alternating Hot Mic enabled in DMO, that is for how long the DMO Hot Mic On and Off cycle is on-going.

Timer range is 0–15 minutes, and the default setting is 10 minutes.



NOTE

Alternative HotMic in DMO can be disabled by setting the DMO Alternative HotMic Timer to 0.

26.2.8 Ambience Listening As Hot Mic



NOTE

This setting applies to portable terminals only.


If enabled, the flag defines that the gain for all microphones will be the same as it is defined for Hot Mic feature. That is, upon receipt of a transmission grant, the MS shall set the mic gain as per the programmed value specified in HotMic mic gain delta, open the microphone, sound the talk-permit tone (unless "all-tones" are set to off via menu), light the TX LED, and begin to transmit. Transmission shall continue for the amount of time provisioned in HotMic Pending Timer.

If disabled, the flag defines that the gain will be defined for every microphone separately. See SS-AL IGM Gain, SS-AL EMG Gain, and SS-AL VMG Gain.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

26.3 Emergency Tones

The Emergency Tones node contains parameters for tones alarming about incoming emergency calls.



	Field Name	Field Value
1	Emergency Tone Min Volume Offset, dB	0
2	Emergency Tone Max Volume Offset, dB	0

26.3.1 Emergency Tone Max Volume Offset, dB



NOTE

This option applies to the earpiece volume level only.

This option specifies how much louder the Emergency Tone will be compared to the other alert tones.

The maximum volume level of alert tones, specified in the Alert Tone Volume, will be lower than the Emergency Tone volume by a certain amount of decibels specified in this field.

The total volume level is limited by hardware capabilities. In other words, the maximum volume for the Emergency Tone can not exceed the maximum possible volume for alert tones.

26.3.2 Emergency Tone Min Volume Offset, dB



NOTE

This option applies to the earpiece volume level only.

This option specifies how much louder the Emergency Tone will be compared to the other alert tones.

The minimum volume level of alert tones, specified in the Alert Tone Volume, will be lower than the Emergency Tone volume by a certain amount of decibels specified in this field.

26.4 Customer Templates



NOTE

This section does not apply to MTM5400 and MTM800 FuG terminals.

	Field Name	Field Value	Reset
1	Type	Customer	
2	Enable	<input type="checkbox"/>	
3	Name	Yan Tian	

26.5 Audio Profiles



NOTE

The TCR1000 uses two audio profiles named: Normal and Whisper (respectively for Normal operation and Whisper mode. For these profiles the following audio parameters can be set: Mic Gain, Speech Volume, AGC, Voice Filter, and Alert Tones Volume. See "26.6 Audio Parameters".

Audio profiles are provided in order to allow users to adapt the audio performance of the terminal to a specific operating environment.



NOTE

The following settings apply to MTP850, MTP850 S/MTP850 FuG, MTP830 S/MTP830 FuG, MTP850Ex, MTP810Ex, MTP830, and CEP400.

	Field Name	Field Value	Reset
1	Enable Audio Profile	<input checked="" type="checkbox"/>	
2	Profile Alias/Name	Out, Street	
3	Select Template	Outdoor, Street use:Outdoor, Street use	Reset
4	Template Name	Outdoor, Street use	
5	Template Description	Outdoor, Street use	
6	Editable	<input type="checkbox"/>	

26.5.1 Enable Audio Profile

To enable any of the 5 audio profiles available, named "User Profile 1" to "User Profile 5", check the box next to the Enable Audio Profile field. Depending on provider's settings the terminal user can choose the enabled audio profiles via MMI.

26.5.2 Profile Alias/Name

This parameter allows the user to set a name or alias for an audio profile.

The Audio Profiles are created basing on Audio Templates provided by Motorola. Several Audio Profiles can be created based on the same template.

Enter value in the text box with a choice of any characters.

26.5.3 Select Template

To change the template assigned to an Audio Profile, choose from the “Select Template” drop-down list.

26.5.4 Template Name

This parameter indicates the name of the template.

26.5.5 Template Description

This parameter indicates the description of the template.

26.5.6 Editable

If enabled, the user can modify some of the previously locked audio parameters in the audio profiles.

If disabled, any user defined audio changes within this user profile are lost and set back to the default value in the template.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.



NOTE

The following settings apply to MTM800 Enhanced only.

There are two Audio Templates available for MTM800 Enhanced (one default and one customer specific). The following audio templates are available in the CPS:

- Default
- Asia

In addition to the Default Audio Template which is enabled by default, the Asia Audio Template can be enabled by Depot CPS (Lab CPS) and then only used as a template when creating Asia specific Audio Profile.

26.6 Audio Parameters

Each profile controls gain settings in receive and transmit paths as well as filters. Audio parameters are already stored in the codeplug for each audio mode that the terminal can operate in.

The following submenus are available:

- Mic Gain
- Speech volume
- Howling Suppression - MTP850, MTP850 S/MTP850 FuG, MTP830 S/MTP830 FuG, MTP850Ex, MTP810Ex, MTP830, and CEP400 only
- AGC
- Voice Filters

- Ambience Listening
- Alert Tones Volumes
- Ring Tones Volumes - Not available for TCR1000
- Key Clicks Tones Volumes - Not available for TCR1000
- DTMF Tones Volumes - Not available for TCR1000
- Call-Out Alert Volumes - Not available for TCR1000
- Tones - Not available for TCR1000

**NOTE**

The following settings apply to mobile terminals only.

- Hot Mic - see section 26.2
- AGC - MTM800 Enhanced only
- Ambience Listening
- Tones - MTM5400 and MTM 800 FuG only
- Volume Settings
- Mic Settings - MTM800 Enhanced only
- Voice Filters
- Routing - MTM5400 and MTM 800 FuG only
- GCAI Handset Side Tone - MTM5400 and MTM 800 FuG only
- Handsfree Mic Gain - MTM5400 and MTM 800 FuG only

26.6.1 Mic Gain

**NOTE**

This section does not apply to MTM5400 and MTM800 FuG terminals.

The following screen shot shows the features available on the terminal.

	Field Name	Field Value
1	High Audio Group/Private Audio Mode	4
2	Low Audio Group/Private Audio Mode	11
3	PHF Group/Private Audio Mode	9
4	PHF Private Full-Duplex Audio Mode	14
5	PHF Phone Audio Mode	14
6	PHF (Earpiece only) Group/Private Audio Mode	16
7	DCK Group/Private Audio Mode	42
8	Side-RSM Group/Private Audio Mode	-9
9	Side-RSM Group/Private Audio Mode with TOP MIC	4
10	Side-RSM Private Full-Duplex Audio Mode	-9
11	Side-RSM Phone Audio Mode	-9
12	Side-RSM Idle Audio Mode	0
13	RSM-CE Group/Private Audio Mode	0
14	RSM-CE Group/Private Audio Mode with TOP MIC	4
15	RSM-CE Private Full-Duplex Audio Mode	0
16	RSM-CE Phone Audio Mode	0
17	RSM-CE Idle Audio Mode	0

This submenu is used to set the microphone volume for the front microphone or an external microphone connected to the accessory connector.



NOTE

The following part of this section refers to TCR1000 only.

This submenu is used to set the inductive loop and/or inductive patch microphone gain in the respective audio profile (Normal or Whisper).

Different gain settings can be applied to different accessories.

		Field Name	Field Value	Reset
	1	Inductive loop Group/Private	0	
	2	Inductive Patch Group/Private	2	
	3	Phonak loop Group/Private	0	
	4	Phonak Patch Group/Private	2	
	5	PHF Group/Private	5	
	6	Sonic Loop Group/Private	0	
	7	Sonic Patch Group/Private	0	
	8	3rd party accessory Group/Private	0	

26.6.1.1 Recommended Settings

For portable terminals the following fields are subject to a change.

- Side-RSM Group/Private Audio Mode for Simplex Calls
- Side-RSM Private Full-Duplex Audio Mode for Duplex Calls
- Side-RSM Phone Audio Mode for Phone Calls

For mobile terminals the following fields are subject to a change.

- Simplex Group/Private Call Mode for Simplex Calls
- Duplex Private/Phone Call for Duplex Calls
- Duplex Private/Phone Call for Phone Calls

The following operational values are recommended as a starting point for the mentioned Motorola products.

**NOTE**

The values apply to all Audio Templates.

Motorola Part Number(s)	Description	Simplex Calls Gain	Duplex Calls Gain	Phone Calls Gain
GMMN4067ASP01	Covert Inductive Loop Microphone & PTT Side Jack MTP850 with Earpiece (Sonic or Otto)	6	11	11
WALN4561ASP01	Communications Headset with Flex Boom Microphone for SCHUBERT Helmet (P 100)	-6	-6	-6
WALN4564ASP01	Communications Headset with Voice Tube Microphone for Fire Brigade Helmet	15	15	15
WALN4563ASP01 WALN4564ASP01	Voice Tube Headset for Fire Brigade Helmet	8	8	8
WALN4562ASP01 WALN4564ASP01	Flex Boom Headset for Fire Brigade Helmet	20	20	20
WALN4553ASP01	Earpieces for Open Face Helmet with Fischer connector	12	22	22
WALN4545ASP01	Earpieces with Helmet Adapter - Fischer Connector	3	12	12
WALN4556ASP01	Black Piezoelectric Earpieces with Fischer Connector and PTT Velcro	19	19	19
WALN4546ASP01	Throat Microphone with Body PTT and D-Shell Earpieces	30	30	30
WALN4555ASP01	Explorer Headset	1	4	4
WALN4543ASP01 WALN5044ASP01	Motorcycle Kit (with Headset from Viper 2 Bundle)	24	24	24
WALN4543ASP01 WALN4545ASP01	Motorcycle Kit (with WALN4545A Headset)	27	27	27
WALN4543ASP01 WALN4540ASP01	Motorcycle Kit (with WALN4540A Headset)	27	27	27
WALN4554ASP01 WALN5044ASP01	Wireless PTT Solution for Motorcycles (with Headset from Viper 2 Bundle)	13	13	13
WALN4554ASP01 WALN4545ASP01	Wireless PTT Solution for Motorcycles (with WALN4545A Headset)	6	6	6
WALN4554ASP01 WALN4540ASP01	Wireless PTT Solution for Motorcycles (with WALN4540A Headset)	13	13	13

Motorola Part Number(s)	Description	Simplex Calls Gain	Duplex Calls Gain	Phone Calls Gain
WALN5044ASP01	Single Earpiece with Velcro PTT (Viper 2 Bundle)	9	19	19
GMSN4069A	MTM800 with Desk Tray and Headset	8	14	14
PMLN5520ASP01 PMLN5521ASP01	MTP850 Profilo Covert Earpiece PTT Kit and MTP850 Phonak Bottom Connector	22	22	22
PMMN4015 PMMN4057	MTP850 Remote Speaker Microphone	-9 (4 when using the top microphone)	-9	-9
GMMN4066ASP01 GMMN4068ASP01	Viper 2 headset with Drop Lead for Motorcycle Section	9	17	17
GMMN4066ASP01 WALN5067ASP01	Viper 2 headset with Extender and Wrist Attached PTT	9	17	17

Table 4-2 Recommended Gain Settings for Audio Accessories**NOTE**

Increasing gain parameters above the recommended values can result in sound distortion or undesirable volume level fluctuations.

26.6.2 Speech Volume

This submenu is used to set the terminal speech volume.

26.6.3 Howling Suppression**NOTE**

The following settings apply to MTP850, MTP850 S/MTP850 FuG, MTP850Ex, MTP830 S/MTP830 FuG, MTP810Ex, MTP830, and CEP400.

This submenu is used to set the Howling Speaker and Microphone Gain Reduction.

26.6.4 AGC (for Mobiles)**NOTE**

This section applies to mobile terminals only.

26.6.4.1 AGC Enable Register**NOTE**

This section does not apply to MTM5400 and MTM800 FuG terminals.

This parameter enables selection of the parameters for the AGC (Automatic Gain Control) Enable Register. The parameter is editable only if the External Accessory Type is set to 'Fist Mic' or 'Visor Mic & Fist Mic'.

The following options are available:

- External Microphone 12 dB attenuator - When this feature is enabled, an Automatic Gain Control (AGC) is implemented in the microphone path in order to keep the active speech level at a certain reference power level.
- Digital receiving AGC - When this feature is enabled, an Automatic Gain Control (AGC) is implemented in the receiver path in order to keep the active speech level at a certain reference power level.

To choose the setting, put the pointer into the field value, click the drop-down list and select the required value.



NOTE

This feature is only activated when the "External Accessory Type" is set as "Fist mic" or "Visor Mic & Fist Mic"

26.6.4.2 TX-AGC

To activate/deactivate Transmit Automatic Gain Control, turn the check box on (Enable) or off (Disable) by clicking in the check box.

Extended TX-AGC

To use the extended Tx-AGC feature, an audio profile based on the following audio templates, Extended Gen Use 1 or Extended Gen Use 2 needs to be configured. When the user selects the profile based on the templates Extended Gen Use 1 or Extended Gen Use 2, the terminal automatically selects the extended TX-AGC without user intervention. In this case, the Audio TX AGC parameter controls the extended TX-AGC. When the user selects any other profile, the terminal selects the standard TX-AGC. In such case, the Audio TX AGC parameter controls the standard TX-AGC.

26.6.5 AGC (for Portables)



NOTE

This section applies to portable terminals only.

To activate/deactivate Audio Transmit Automatic Gain Control, turn the check box on (Enable) or off (Disable) by clicking in the check box.



NOTE

For an audio profile configured with either "Extended Gen Use 1" or "Extended Gen Use 2":

- If the Audio Transmit Automatic Gain Control is enabled, then the respective profile uses the extended range of TX AGC (from minimum gain -15dB to maximum gain + 8dB).
- If the Audio Transmit Automatic Gain Control is disabled, then the respective profile is not using the TX AGC at all.

26.6.6 Voice Filters

The parameters are responsible for transmission and reception Noise Suppression and Echo Cancelling to further enhance the audio quality of the terminal.

Echo Canceller

This parameter enhances audio quality. It activates a filter that reduces sound reflections (echo) during a call.

Mark the check box to enable.

RX Noise Suppressor



NOTE

This sub-section does not apply to MTM5400 and MTM800 FuG terminals.

This parameter enhances audio quality. It activates a filter that reduces noises in the speaker.

Mark the check box to enable.

TX Noise Suppressor

This parameter enhances audio quality. It activates a filter that reduces noises in the microphone.

Mark the check box to enable.

Howling Cancellation



NOTE

This sub-section does not apply to MTM5400 and MTM800 FuG terminals.

This parameter enhances audio quality. It activates a filter that reduces the feedback effect that may occur between a microphone and a speaker, in other words, the howling effect.

Mark the check box to enable.

26.6.7 Ambience Listening



NOTE

This section does not apply to MTM5400 and MTM800 FuG terminals.

	Field Name	Field Value
1	AL Handset	31
2	AL Heavy	10
3	AL Light	12
4	AL Hurricane	20
5	AL Skull	25
6	AL RSM	31
7	AL Throat	25

These parameters set the volume heard in the respective accessory during the Ambience Listening.



NOTE

The following part of this section applies to TCR1000 only.

The SS-AL EMG Gain parameter indicates the microphone gain during AL TX transmission for external microphone.

Voice Filters				
Ambience Listening				
		Field Name	Field Value	Reset
1		SS-AL EMG Gain	16	

Depending on the accessory selected in the codeplug, the value of SS-AL EMG Gain field changes to a value which corresponds to this accessory. This value can be changed manually in the codeplug as well.

26.6.8 Control Head AL Status

**NOTE**

This section does not apply to MTM5400 and MTM800 FuG terminals.

Control Head gets AL Status (uses SB9600 commands for AL call status notification):

- Never: the terminal will not send notifications to the control head.
- Entering/Leaving AL Call: the terminal will notify the control head when entering/leaving AL.
- Entering/Leaving Pseudo power Off: the terminal will notify the control head when entering/leaving Pseudo Power On/Off state.
- Every AL Status Change: the terminal will notify the control head at every AL status change.

To choose the level, put the pointer into the field value, click the drop-down list and select the required level.

26.6.9 Alert Tones Volume

An alert is a tone the terminal sounds to alert the user of various events. This page allows changing codeplug values of the alert tone volumes for the various alert tone modes listed in the window.

The value displayed by a field is a relative number showing how loud that particular parameter is set to.

The bigger the number, the greater is the value of that parameter.

To set the required audio level, first select the Field Value box to display the down arrow, selecting the down arrow will display the available options.

26.6.10 Ring Tones Volumes

The ring tone is the sound made when a call arrives. This page allows changing the codeplug values of the maximum ring tone volumes for the various speakers listed in the window.

The value displayed by a field is a relative number showing how loud that particular parameter is set to.

The bigger the number, the greater is the value of that parameter.

To choose the level, put the pointer into the field value, click the drop-down list and select the required level.

26.6.11 Key Clicks Tones Volume

The key clicks tone is the sound made when a key is pressed. This page allows changing the codeplug values of the maximum key clicks tone volumes for the various speakers listed in the window.

The value displayed by a field is a relative number showing how loud that particular parameter is set to.

The bigger the number, the greater is the value of that parameter.

To choose the level, put the pointer into the field value, click the drop-down list and select the required level.

26.6.12 DTMF Tones Volume

The DTMF tone is the sound made when a DTMF is sent. This page allows changing the codeplug values of the maximum DTMF tone volumes for the various speakers listed in the window.

The value displayed by a field is a relative number showing how loud that particular parameter is set to.

The bigger the number, the greater is the value of that parameter.

To choose the level, put the pointer into the field value, click the drop-down list and select the required level.

26.6.13 Volume Settings



NOTE

This section applies to MTM800 Enhanced, MTM5400, and MTM800 FuG only.

All the volume settings for the Mobiles can be managed by Volume Settings tab.

	Field Name	Field Value	Reset
1	Loudspeaker Volume Min	0	Reset
2	Loudspeaker Volume Max	31	Reset
3	Handset Volume Min	0	Reset
4	Handset Volume Max	31	Reset
5	Alert Tone Volume Min	0	Reset
6	Alert Tone Volume Max	10	Reset
7	Ring Tone Volume Min	0	Reset
8	Ring Tone Volume Max	10	Reset
9	Key Click Volume Min	0	Reset
10	Key Click Volume Max	10	Reset
11	Call-Out Volume Min	0	Reset
12	Call-Out Volume Max	10	Reset
13	GCAI Handset Volume Min Simplex	0	Reset
14	GCAI Handset Volume Min Duplex	0	Reset
15	GCAI Handset Volume Min Phone	0	Reset
16	GCAI Handset Volume Max Simplex	10	Reset
17	GCAI Handset Volume Max Duplex	10	Reset
18	GCAI Handset Volume Max Phone	10	Reset
19	Volume Control Mode	Individual Volume Controlled	Reset
20	Volume Control Mode Selectable via Radio MMI	<input checked="" type="checkbox"/>	

Volume Settings display the volume range for the speakers and various kinds of audio devices connected to the terminal.

CAUTION

5 W speaker (GMSN4078B) cannot sustain the maximum audio output power of 13 W coming from the terminal when the volume is set to the maximum. This causes the speaker cone to dislocate. The default value for Loudspeaker Volume Max should be changed to 21 when the 5 W speaker is to be used.

The following settings are available:

- Volume Control Mode - Indicates if the volume levels are controlled in the terminal separately or all together

- Volume Control Mode Selectable via Radio MMI - Indicates whether the option is enabled

**NOTE**

The minimum value must be less than the maximum value. The maximum value must be greater than the minimum value.

- Loudspeaker - Displays the volume range of the alert tone heard in the external speaker
- Handset - Displays the volume range of the speech heard in the handset
- Alert Tone - Displays the volume range of the alert tone heard
- Ring Tone - Displays the volume range of the ringing heard when a telephone call arrives
- Key Click - Displays the volume range of the sound when the user presses a key
- Call-Out - Displays the volume range of the call-out alert tones
- GCAI Handset - Displays the volume range of the speech heard in the GCAI handset during Simplex, Duplex and Phone calls - MTM800 Enhanced only

26.6.14 Mic Settings**NOTE**

This section applies to MTM800 Enhanced only.

This branch allows to configure gain settings for the connected accessories.

The following settings are available:

- GCAI Handset On Hook Gain
- GCAI Handset Off Hook Gain
- GCAI Fist Mic
- Control Head Rear Mic 2
- External Handset
- External Visor
- External Fist Mic

GCAI (Global Core Accessory Interface) refers to the accessory connector on the front of the Control Head - Mobile Microphone Port (MMP) and corresponding port on the rear side of the Control Head.

26.6.14.1 GCAI Handset On Hook Gain

GCAI Handset On Hook Gain allows to set Ambience Listening and Hot Mic gains for the scenario when the GCAI handset is on the hook.

26.6.14.2 GCAI Handset Off Hook Gain

GCAI Handset Off Hook Gain allows to set Simplex Group/Private Call, Duplex Private/Phone Call, Ambience Listening, Hot Mic gains for the scenario when the GCAI handset is off the hook.

26.6.14.3 GCAI Fist Mic

GCAI Fist Mic allows to set Simplex Group/Private Call, Duplex Private/Phone Call, Ambience Listening, Hot Mic gains for the GCAI fist microphone.

26.6.14.4 Control Head Rear Mic 2

Control Head Rear Mic 2 allows to set Simplex Group/Private Call, Duplex Private/Phone Call, Ambience Listening, Hot Mic gains for the rear microphone.

Control Head Rear Mic 2 refers to the GCAI connector on the rear side of the Control Head if the Accessories Expansion Cable (PMKN4029/PMKN4056) is in use.

26.6.14.5 External Handset

External Handset allows to set Simplex Group/Private Call, Duplex Private/Phone Call, Ambience Listening, Hot Mic gains for the external handset.

External Handset refers to the telephone style handset connected to a Data Junction Box (GMLN3002).

26.6.14.6 External Visor

External Visor allows to set Simplex Group/Private Call, Duplex Private/Phone Call, Ambience Listening, Hot Mic gains for the external visor microphone.

External Visor refers to the Visor Mic Connector at a Data Junction Box.

26.6.14.7 External Fist Mic

External Fist Mic allows to set Simplex Group/Private Call, Duplex Private/Phone Call, Ambience Listening, Hot Mic gains for the external fist microphone.

External Fist Mic refers to the fist microphone connected to a Data Junction Box (GMLN3002).

26.6.15 DTMF Tones Volumes

	Field Name	Field Value	Reset
1	Handset Earpiece Max Volume	0	Reset
2	Handset Earpiece Min Volume	-21	Reset
3	Handset Speaker Max Volume	0	Reset
4	Handset Speaker Min Volume	-39	Reset
5	PHF Earpiece Max Volume	0	Reset
6	PHF Earpiece Min Volume	-21	Reset
7	PHF Earpiece Only Max	0	Reset
8	PHF Earpiece Only Min	-21	Reset
9	RSM-CE connector Max	0	Reset
10	RSM-CE connector Min	-21	Reset
11	RSM-Side Connector Max	0	Reset
12	RSM-Side Connector Min	-21	Reset
13	DCK Max	-18	Reset
14	DCK Min	-39	Reset

The DTMF tone is the sound made when a DTMF is sent. This page allows changing the codeplug values of the maximum DTMF tone volumes for various speakers listed.

- Handset Speaker Max and Min Volume - displays the volume level of the DTMF tone heard in the handset speaker.
- Handset Earpiece Max and Min Volume - displays the volume level of the DTMF tone heard in the handset earpiece.

- Audio Accessory Max and Min Volume - displays the volume level of the DTMF tone heard in the audio accessory.
- PHF Earpiece Max and Min Volume - displays the volume level of the DTMF tone heard in the PHF earpiece.
- PHF Earpiece Only Max and Min Volume - displays the volume level of the DTMF tone heard in the PHF earpiece only.
- RSM-CE connector Max and Min Volume - displays the volume level of the DTMF tone heard in the RSM-CE connector.
- RSM-Side connector Max and Min Volume - displays the volume level of the DTMF tone heard in the RSM-Side connector.
- DCK Max and Min - displays the volume level of the DTMF tone heard in the DCK.

The value displayed in a field is a relative number showing how loud that particular parameter is set to. To choose the level, put the pointer into the field value, click the drop-down list and select the required level.



NOTE

Certain accessories like PHF, RSM and DCK are available in certain terminal models only.

26.6.16 Call-Out Alert Volumes

	Field Name	Field Value	Reset
1	Handset Earpiece Max Volume	0	Reset
2	Handset Earpiece Min Volume	-21	Reset
3	Handset Speaker Max Volume	0	Reset
4	Handset Speaker Min Volume	-39	Reset
5	PHF Earpiece Max Volume	0	Reset
6	PHF Earpiece Min Volume	-21	Reset
7	PHF Earpiece Only Max	0	Reset
8	PHF Earpiece Only Min	-21	Reset
9	RSM-CE connector Max	0	Reset
10	RSM-CE connector Min	-21	Reset
11	RSM-Side Connector Max	0	Reset
12	RSM-Side Connector Min	-21	Reset
13	DCK Max	-18	Reset
14	DCK Min	-39	Reset

The Call-Out Alert is a tone the terminal sounds to alert a user of Call-Out events.

- Handset Speaker Max and Min Volume - displays the volume level of the Call-Out alert tone heard in the handset speaker.
- Handset Earpiece Max and Min Volume - displays the volume level of the Call-Out alert tone heard in the handset earpiece.
- PHF Earpiece Max and Min Volume - displays the volume level of the Call-Out alert tone heard in the PHF earpiece.
- PHF Earpiece only Max and Min Volume - displays the volume level of the Call-Out alert tone heard in the PHF earpiece only.
- RSM-CE connector Max and Min Volume - displays the volume level of the Call-Out alert tone heard in the RSM-CE connector.

- RSM-Side connector Max and Min Volume - displays the volume level of the Call-Out alert tone heard in the RSM-Side connector.
- DCK Max and Min - displays the volume level of the Call-Out alert tone heard in the DCK.

The value displayed in a field is a relative number showing how loud that particular parameter is set to. To choose the level, put the pointer into the field value, click the drop-down list and select the required level.

26.6.17 Tones



NOTE

This section does not apply to MTM5400 and MTM800 FuG terminals.

	Field Name	Field Value	Reset
1	Clear to Send Tone	<input checked="" type="checkbox"/>	
2	Talk Permit Tone Option	Normal Tone	

26.6.17.1 Clear to Send Tone

See Chapter 4, Paragraph 24.2.1 "Clear To Send Tone".

26.6.17.2 Talk Permit Tone Option

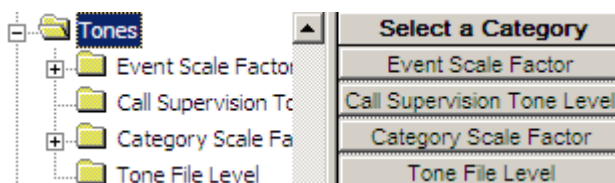
See Chapter 4, Paragraph 24.2.5 "Talk Permit Tone Option".

26.6.18 Tones

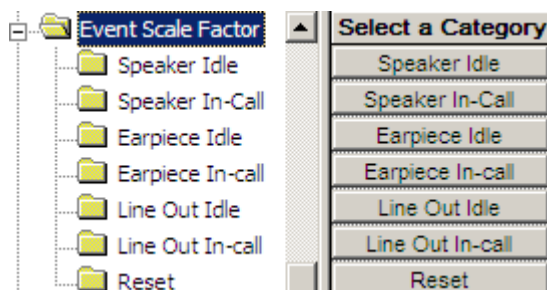


NOTE

This section applies to MTM5400 and MTM800 FuG only.



26.6.18.1 Event Scale Factor



This node contains a database of tones and events for audio devices.

The Event Scale Factor is a parameter that allows you to set an offset level (dB) for tones triggered after related events.

Although the same tones are assigned to various events, with a different Scale Factor, the tones will relatively differ in volume.

The device is **Idle**, when not receiving a call; no sound is coming out of the audio device.

The device is **In-call**, when receiving a call; sound is coming out of the audio device.

- **Device Idle**
These nodes contain a database of tones and events for a device that is not receiving a call. The Event Scale Factor is a parameter that allows you to set an offset level (dB) for tones triggered after related events.
Although the same tones are assigned to various events, with a different Scale Factor, the tones will relatively differ in volume.
- **Device In-Call**
These node contain a database of tones and events for a device that is receiving a call. The Event Scale Factor is a parameter that allows you to set an offset level (dB) for tones triggered after related events.
Although the same tones are assigned to various events, with a different Scale Factor, the tones will relatively differ in volume.
- **Reset**
This node allows to reset the particular Scale Factor to its default and optimal values.

Tone Name

This column contains a list of tones that are related to a specific event or a number of events.

Event

This column contains a list of events that are sonically represented by specific tones.

Category

All tones are classified in to the following categories: Alert, Call-Out, Keypad, Ring, and Voice.

In this column the category for individual tones is displayed.

Scale Factor

The Scale Factor is a parameter that allows you to set an offset level in decibels (dB).

Although the same tones are assigned to various events, with a different Scale Factor, the tones will relatively differ in volume.

From the drop-down list, select the value.

Total Level

This parameter is a sum of the following level factors: Tone File Level, Event Scale Factor, and Category Scale Factor.

If equals 0, the tone level is the same as the original .WAV file.

This is a non-editable field.

26.6.18.2 Call Supervision Tone Level

This field allows you to set loudness level (dBm0) for the tone.

The Call Supervision Tone notifies about events related to ongoing calls, for example it warns users that the limited time for this call is about to expire.

This tone is triggered by the terminal itself, without user interaction.

From the drop-down list, select the value.

26.6.18.3 Category Scale Factor

This node contains a database of tone categories for audio devices.

The Category Scale Factor is a parameter that allows you to set an offset level (dB) for tones triggered after related events and classified in the same category (Alert, Call-Out, Keypad, Ring, and Voice).

The device is **Idle**, when not receiving a call; no sound is coming out of the audio device.

The device is **In-call**, when receiving a call; sound is coming out of the audio device.

Although the same tones are assigned to various events, with a different Scale Factor, the tones will relatively differ in volume.

- **Device Idle**
These nodes contain a database of tone categories for a device that is not receiving a call. The Category Scale Factor is a parameter that allows you to set an offset level (dB) for tones triggered after related events and classified in the same category. Although the same tones are assigned to various events, with a different Scale Factor, the tones will relatively differ in volume.
- **Device In-Call**
These node contain a database of tone categories for a device that is receiving a call. The Category Scale Factor is a parameter that allows you to set an offset level (dB) for tones triggered after related events and classified in the same category. Although the same tones are assigned to various events, with a different Scale Factor, the tones will relatively differ in volume.

Keypad

This field contains the tone category and its adjustable offset level (dB).

Although the same tones are assigned to various events, with a different Scale Factor, the tones will relatively differ in volume.

Enter the value.

Alert

This field contains the tone category and its adjustable offset level (dB).

Although the same tones are assigned to various events, with a different Scale Factor, the tones will relatively differ in volume.

Enter the value.

Ring

This field contains the tone category and its adjustable offset level (dB).

Although the same tones are assigned to various events, with a different Scale Factor, the tones will relatively differ in volume.

Enter the value.

Call-Out

This field contains the tone category and its adjustable offset level (dB).

Although the same tones are assigned to various events, with a different Scale Factor, the tones will relatively differ in volume.

Enter the value.

26.6.18.4 Tone File Level

This node contains a database of tones and their loudness level (dBm0).



NOTE

Changing the Tone File Level affects the Total Level of loudness in the Event Scale Factor.

Ensure that you select the appropriate values. Setting values incorrectly will result in a poor tone quality.

26.6.19 Routing



NOTE

This section applies to MTM5400 and MTM800 FuG only.

This node contains parameters that allow you to set an audio route and send voice to and from specific output and input devices.

26.6.19.1 ICCS Interface

If this field is enabled, the terminal routes all audio to and from analogue lines.

If this field is enabled, the terminal uses relevant audio modes for the certain line type or accessory.

From the drop-down list, select the value.

26.6.19.2 Call Recorder Output

If this field is enabled, the terminal routes voice to the analogue line.



NOTE

The ICCS has priority over the Call Recorder. If the ICCS Interface is enabled, the Call Recorder Output configuration has no effect.

From the drop-down list, select the value.

26.6.19.3 GCAI Handset Call Monitoring

This field allows you to route audio to the Telephone style Handset.

- Rx+Tx –user can receive and transmit voice using the handset
- Rx – user can only receive voice using the handset

From the drop-down list, select the value.

26.6.20 GCAI Handset Side Tone



NOTE

This section applies to MTM5400 and MTM800 FuG only.

This node contains parameters that allow you to activate side tones for Telephone style Handset.

26.6.20.1 Side Tone Enabled

This field allows you to enable a tone notifying users that an active channel is available.

Mark the check-box to enable.

26.6.20.2 Side Tone Constant Loudness Enabled

If this field is enabled, the side tone loudness is dynamically adjusted to the terminal's volume settings.

Mark the check-box to enable.

26.6.21 Handsfree Mic Gain



NOTE

This section applies to MTM5400 and MTM800 FuG only.

This node contains parameters that allow you to adjust signal gain for a handsfree microphone. Microphone gain is a ratio of the output signal to the input signal measured in decibels (dB). In other words, you set gain to amplify voice so even a soft voice or whisper may be heard.

26.7 Side Accessories



NOTE

This section applies to MTP850 S/MTP850 FuG and MTP830 S/MTP830 FuG only.

Side Accessories folder shows the accessories assignment.

Related field is:

Paragraph 26.1 "Secondary Accessory Assignment"

26.7.1 Accessory



Each Accessory tab contains Mic Gain and Speech Volume settings for the respective accessory.

26.7.1.1 Mic Gain

If the current User Profile is editable this page allows changing the codeplug values of the microphone gain settings for the respective accessory. The following screen shot shows the settings available for adjustment.

	Field Name	Field Value
1	Group/Private Audio Mode	3
2	Group/Private Audio Mode with TOP MIC	4
3	Private Full-Duplex Audio Mode	3
4	Phone Audio Mode	3
5	Idle Audio Mode	0

- Group/Private Audio Mode - indicates the default value of microphone gain in Group/Private Audio Mode.
- Group/Private Audio Mode with TOP MIC - indicates the default value of microphone gain in Group/Private Audio Mode with TOP MIC.
- Private Full-Duplex Audio Mode - indicates the default value of microphone gain in Private Full-Duplex Audio Mode.

- Phone Audio Mode - indicates the default value of microphone gain in Phone Audio Mode.
- Idle Audio Mode- indicates the default value of microphone gain in Idle Audio Mode.

26.7.1.2 Speech Volume

If the current User Profile is editable this page allows changing the codeplug values of the speech volume settings for the respective accessory. The following screen shot shows the settings available for adjustment.

	Field Name	Field Value
1	Group/Private Max Volume	14
2	Group/Private Min Volume	-25
3	Group/Private Audio Mode with TOP MIC Max Volume	14
4	Group/Private Audio Mode with TOP MIC Min Volume	-25
5	Private Full-Duplex Max Volume	14
6	Private Full-Duplex Min Volume	-25
7	Phone Max Volume	14
8	Phone Min Volume	-25
9	Idle Max Volume	0
10	Idle Min Volume	-39
11	Ambience Listening Max Volume	-48
12	Ambience Listening Min Volume	-50

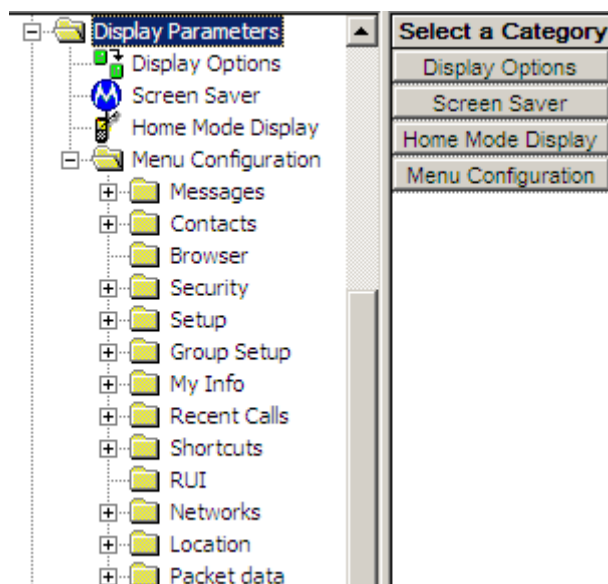
- Group/Private Max Volume - indicates the maximum value of speaker volume range in Group/Private Audio Mode.
- Group/Private Min Volume - indicates the minimum value of speaker volume range in Group/Private Audio Mode.
- Group/Private Audio Mode with TOP MIC Max Volume - indicates the maximum value of speaker volume range in Group/Private Audio Mode with TOP MIC.
- Group/Private Audio Mode with TOP MIC Min Volume - indicates the minimum value of speaker volume range in Group/Private Audio Mode with TOP MIC.
- Private Full-Duplex Max Volume - indicates the maximum value of speaker volume range in Private Full-Duplex Audio Mode.
- Private Full-Duplex Min Volume - indicates the minimum value of speaker volume range in Private Full-Duplex Audio Mode.
- Phone Max Volume - indicates the maximum value of speaker volume range in Phone Audio Mode.
- Phone Min Volume - indicates the minimum value of speaker volume range in Phone Audio Mode.
- Idle Max Volume - indicates the maximum value of speaker volume range in Idle Audio Mode.
- Idle Min Volume - indicates the minimum value of speaker volume range in Idle Audio Mode.
- Ambience Listening Max Volume - indicates the maximum value of speaker volume range in Ambience Listening Audio Mode.
- Ambience Listening Min Volume - indicates the minimum value of speaker volume range in Ambience Listening Audio Mode.

27 Display Parameters



NOTE

The following section is not applicable to TCR1000.



The options available within these submenus are used for the terminal's display configuration.

27.1 Display Options

	Field Name	Field Value
1	Display Status	Normal Side
2	Display Contrast	3
3	Font Size	Standard
4	Wallpaper On/Off	<input checked="" type="checkbox"/>
5	Backlight Toggling	Auto
6	Backlight Timer, sec	10

The available 6 options in this submenu are used to configure the appearance of the display.

27.1.1 Display Status

	Field Name	Field Value	Reset
1	Display Status	Normal Side	
2	Display Contrast	Normal Side	
3	Font Size	Flip Side	
4	Wallpaper On/Off	<input checked="" type="checkbox"/>	
5	Backlight Toggling	Auto	
6	Backlight Timer, sec	10	Reset

This feature has two options and which ever is chosen will determine the default view of the display. The view options are Normal Side and Flip Side. The Flip Side feature is particularly useful for a

user who has to wear the terminal on the shoulder, a belt, or lapel and wishes to read the display upside down.

This function to be enabled/disabled by one press on a programmable terminal button.

Related fields are:

Paragraph 32.3 "One-Touch Options"

Paragraph 32.4.17 "Flip Display"

27.1.2 Display Contrast



NOTE

This setting applies to portable terminals only.

This option is used to set the contrast of the terminal's display. This setting will improve the clarity of the information displayed and improve viewing in bright conditions.

The contrast level of the display can be set from 1 to 6 in steps of 1.

27.1.3 Font Size

	Field Name	Field Value	Reset
1	Display Status	Normal Side	
2	Display Contrast	3	
3	Font Size	Standard	
4	Wallpaper On/Off	Standard	
5	Backlight Toggling	Zoomed	
6	Backlight Timer, sec	Extra Zoomed	Reset

Selecting the Field Value down arrow will display the Standard, Zoomed, or Extra Zoomed (where available) options.

If Zoomed or Extra Zoomed is chosen as the default, the size of the font is increased but the amount of information displayed is reduced.

27.1.4 Wallpaper On/Off

This option is used to enable/disable a predefined display background.

Related fields are:

Paragraph 32.3 "One-Touch Options"

Paragraph 32.4.21 "Backlight Adjustment"

27.1.5 Backlight Toggling

	Field Name	Field Value	Reset
1	Display Status	Normal Side	
2	Display Contrast	3	
3	Font Size	Standard	
4	Wallpaper On/Off	<input checked="" type="checkbox"/>	
5	Backlight Toggling	Auto	
6	Backlight Timer, sec	Disabled	Reset

Selecting the Field Value down arrow will display the following three options:

Disabled - Selecting this option disables the display backlight.

Semi-Auto - If this feature is enabled, the backlight works both manually and automatically. A button must be programmed for backlight control. The user is able to turn the backlight on or off and if turned on manually the terminal will turn the backlight off after the backlight timer expires.

Auto - If this option is selected, the terminal will automatically turn the backlight on for button press and call reception and turn it off when the backlight timer expires.

27.1.6 Backlight Timer

This is the 'Auto' option timer and it defines how long the backlight will remain on, when the terminal has gone back to its normal standby state.

The range setting is from 1 to 30 seconds, the default setting is 10 seconds.

27.2 Screen Saver

	Field Name	Field Value	Reset
1	Screen Saver Text		
2	Timer Screen Saver Activation, msec	35000	Reset
3	Screen Saver Enabled	<input checked="" type="checkbox"/>	
4	Screen Saver Text User Editable	<input checked="" type="checkbox"/>	
5	Auto Screen Saver	<input checked="" type="checkbox"/>	

Some models have 'screen saver' functionality. If enabled, it will consist of 2 elements, for example:

- A Police Force Logo, or similar graphics.
- An identifier

This enhances:

- Security by hiding sensitive information when the terminal is worn high on the chest at the lapel.
- Ease of identification by screen saver ID.

If configured, the user is able to edit the screen saver text.

Refer to the CPS help text on screen saver conversion.

27.2.1 Screen Saver Text

An alphanumeric text string of up to 12 characters can be entered in this field and will be displayed when the terminal is in its idle state.

27.2.2 Time Screen Saver Activation

This field is used to set the time, in msec, after which the screen saver text message will be displayed. The range is 1000 - 216,000,000 msec and the default is 35,000 msec.

27.2.3 Screen Saver Enabled

This is a simple check box entry field that defines whether or not the screen saver is enabled. Use the mouse pointer and select the check box by pressing the left mouse button to enable/disable this option.

27.2.4 Screen Saver Text User Editable

This field indicates whether the user has the capability of entering screen saver text.

Turn the check box on (Enable) or off (Disable) by clicking in the box.

27.2.5 Auto Screen Saver

If enabled, the screen saver will automatically be displayed after a default period of terminal inactivity.

27.3 Home Mode Display



	Field Name	Field Value	Reset
1	Home Mode Display Text		
2	Home Mode Display Protocol Identifier	220	Reset
3	Welcome Screen		

This submenu has the following options that define the text displayed during the various stages of the terminal's power up and idle state.

27.3.1 Home Mode Display Text

An alphanumeric text string of up to 24 characters can be entered in this field and will be displayed when ever the terminal is in Home Mode.

27.3.2 Home Mode Display Protocol Identifier

The number in this field defines the message protocol used by the terminal to transmit and receive messages on the control channel when in Home Mode and enables the terminal to identify the type of received message as a Home Mode Display message and take any necessary action.



NOTE

Protocol Identifiers. These define the action a terminal must take when a message is received. Some messages are displayed and others are actioned by the terminal, for example DGNA updates.

The range is from 0 to 255, the default is 220.

For more information see: ETSI EN300 392 - 2 Paragraph 29.4.3.9 Table 439.

27.3.3 Welcome Screen

An alphanumeric text string of up to 36 characters can be entered in this field and will be displayed as the terminal powers up.

27.4 Menu Configuration

Menu Configuration			Field Name	Field Value
+	Messages	1	Messages	<input checked="" type="checkbox"/>
+	Contacts	2	Contacts	<input checked="" type="checkbox"/>
+	Man Down	3	Browser	<input checked="" type="checkbox"/>
+	Browser	4	Security	<input checked="" type="checkbox"/>
+	Security	5	Setup	<input checked="" type="checkbox"/>
+	Setup	6	Group Setup	<input checked="" type="checkbox"/>
+	Group Setup	7	My Info	<input checked="" type="checkbox"/>
+	My Info	8	Recent Calls	<input checked="" type="checkbox"/>
+	Recent Calls	9	Shortcuts	<input checked="" type="checkbox"/>
+	Shortcuts	10	RUI	<input checked="" type="checkbox"/>
+	RUI	11	Networks	<input checked="" type="checkbox"/>
+	Networks	12	Location	<input checked="" type="checkbox"/>
+	Location	13	Packet Data	<input checked="" type="checkbox"/>
+	Packet data	14	Crypto Menu	<input checked="" type="checkbox"/>
+	Crypto Menu	15	Man Down	<input checked="" type="checkbox"/>
+	TalkGroups			
+	Contact Book			

The Configurable Menu Tree (CMT) feature allows the user to define which menu entries to be visible on the terminal menu when in operation to ensure easy access to critical or needed features. The menu item will only be visible on the terminal menu if the check box is switched on (enabled).



NOTE

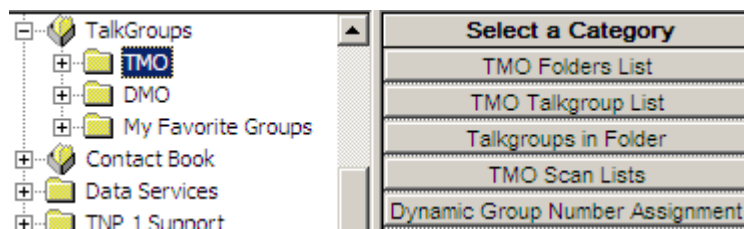
If the main menu item is disabled, all submenu items under it are automatically disabled.

28 Talkgroups



This menu contains the TMO, DMO and My Favorite Groups submenus that have the following options.

28.1 TMO (Trunked Mode Operation)



TMO has the following submenu options:

- TMO Folders List
- TMO Talkgroup List
- Talkgroups in Folder
- TMO Scan Lists
- Dynamic group Number Assignment

Related fields are:

Paragraph 26.2 "Hot Mic"

Paragraph 19 "TMO Voice Services"

28.1.1 TMO Folders List

The TMO Folders List is a list of all TMO Folders that can contain TMO talkgroups. Listed on the same line as the TMO folders are the properties of each folder.

TMO Folders can also be listed as a parent in another TMO Folder known as the parent folder and as such are shown in the TMO Folders with the name of their parent folder on the same line.

Name	Status	Parent Folder	Transmission Timeout Timer, sec	Transmission Timeout Warning Timer, sec	Number of Talkgroups in the Range	Receive Only
Folder 1	<input checked="" type="checkbox"/>	Folder 2	60	50	16	<input type="checkbox"/>
Folder 2	<input checked="" type="checkbox"/>		0	0	0	<input type="checkbox"/>

1. Name
This field can be programmed with up to 12 alphanumeric digits for the name/alias of the range.
2. Status
Select the check box to make an entry active. If an entry is not checked, it will not be displayed. A list can either be created manually or imported.

3. **Parent Folder**
This field Indicates the valid index pointing to a Level 1 Folder in the table.
4. **Number of Talkgroups in the Range**
This field value is used to define the number of available Talkgroup entries for an individual range and is programmable from 0 to 2048, in other words there can be one range list with 2048 entries.
5. **Transmission Timeout Timer, sec**
The entry in this field is the per range allowed call talk time. The time range is from 0 to 300 seconds.
6. **Transmission Timeout Warning Timer, sec**
Parameter controlling, per range, the time for generating <TOT Warning Tone> prior to <TOT> expires. The <TOT warning tone timer> shall be less than <TOT> setting.
The terminal can continuously transmit until the <TOT Warning Tone timer> expired, then the terminal will generate <TOT Warning Tone> to alert the user that transmission will soon be stopped.
The time can be set between 0 - 299 seconds.
7. **Receive Only**
This is a per range setting and if the check box is selected, the user will be able to hear the calls, but will not be able to set up group calls to any of the talkgroups in the range, or PTT when listening to a call.

When operating the terminal, the selected folder can be changed by pressing the Options soft key and selecting Folders. Folders that have a parent folder can then be chosen by selecting 'browse level 2'.

Related fields are:

Paragraph 19.4 "Scanning Parameters"

Paragraph 28.1.4 "TMO Scan Lists"

28.1.1.1 Deleting a Level 1 Folder

In order to delete a Level 1 Folder all the groups in the TMO Folders List need to have their Parent Folder empty (that is, no Parent Folder may be set).

28.1.2 TMO Talkgroup List



NOTE

At least one entry field must remain empty if DGNA is to be used, see Chapter 2 of the Product Information Manual, Paragraph "Dynamic Group Number Assignment (DGNA)".

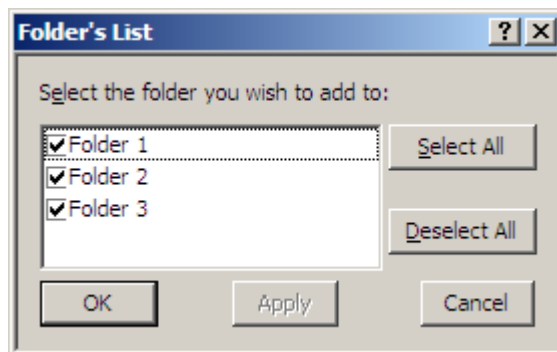
The TMO Talkgroups List is a list of all TMO Talkgroups and their properties.

A TMO Talkgroup must be added to the TMO Talkgroup list before it can be added to a folder.

Listed against each TMO Talkgroup is the name of the Default Folder. The 'Default Folder' can be selected from the any of the folders in which the Talkgroup appears but defaults to the first folder in which the Talkgroup was selected during populating the Talkgroups in Folder list.

28.1.2.1 Adding Talkgroups to Folders

To add a Talkgroup to a folder or folders, right click on the respective Talkgroup and from the context menu click on Add to Folder.



Select the required folders by ticking them and confirm the changes by clicking OK.

28.1.2.2 Name

This field can be programmed with up to 12 alphanumeric digits for the name/alias of the group.

28.1.2.3 Status

Select a box to display the down arrow and choose from the available options. An entry can be enabled by selecting the 'Programmed' option, disabled and not seen by the user when the 'Not Programmed option' is selected, or if the 'Invisible' option is selected it will not be seen or be selectable by the user, but it can be added to a scan list via CPS programming.

28.1.2.4 Default Folder

This field shows the default folder for the Talkgroup. This is used to choose a folder when the Talkgroup is selected using abc search.

To select the folder, put the pointer into the field value, click the drop-down list and select the required value.

28.1.2.5 Announce Group

The setting indicates whether or not the talkgroup is an announcement talkgroup (ATG).

28.1.2.6 Start Announce Call

This field indicates whether the user can initiate an Announcement Call through the Talkgroup.

The Announce Group needs to be enabled to edit this field.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

28.1.2.7 Associated Announcement Group

If the talkgroup is not an ATG, this field indicates to which ATG the talkgroup is assigned.

The Announcement Talkgroup Enable should be enabled.

28.1.2.8 Group Priority

This field determines the scanning priority for the Talkgroup.

The priorities available are:

- Low
- Medium
- High
- Always Scanned

28.1.2.9 DGNA Operations

This field determines which DGNA Operations are allowed for the Talkgroup.

The DGNA Operations available are:

- Static - Only selection allowed.
- Semi-Static - Selection and reassignment allowed.
- Dynamic - Selection, de-assignment, and reassignment allowed.

28.1.2.10 GCK Number

This field stores the association between a TMO Talkgroup and a GCK.

This parameter is repeated for every TMO talkgroup entry in the codeplug.

Type in the required value.

28.1.2.11 DMO Mapping

GCK Number	DMO Mapping
65536	1: D-TG05-SUBS : DMO Range 1
65536	
65536	1: D-TG05-SUBS : DMO Range 1
65536	2: D-TG06-SUBS : DMO Range 1
65536	17: D-TG07-SUBS : DMO Range 2
65536	18: D-TG08-SUBS : DMO Range 2
65536	33: D-TG01-SUBS : DMO Range S
65536	34: D-TG02-SUBS : DMO Range S

This field associates a Direct Mode Operation (DMO) group with a TMO group, so that if DMO is selected when active on this TMO talkgroup, the associated DMO talkgroup is automatically selected to be the active talkgroup on entering DMO.

28.1.3 Talkgroups in Folder

	Name	Status	Folder	One touch button
1	Test Group:3000	Programmed	Folder 1	<input type="checkbox"/>
2	TG3000:3001	Programmed	Folder 1	<input type="checkbox"/>
3		Not Programmed	Folder 1	<input type="checkbox"/>

This submenu describes talkgroups in the folder database. Each talkgroup has four parameters:

- Name - name of the talkgroup, this is valid index that points to the group from the TMO Unique Talkgroup List
- Status - indicates whether the talkgroup is programmed (available)
- Folder - indicates in which folder the talkgroup entry is stored

- **One Touch Button** - indicates if the talkgroup selection by One Touch Button is assigned
- Each TMO Talkgroup may be added to one or several folders when the codeplug is edited in the CPS.

When users are operating the terminal, they need to press the Options soft key and select Folders to select from the list of folders. The TMO Talkgroups within the selected folder are then selectable using scroll keys.

28.1.4 TMO Scan Lists



This submenu contains 40 scan lists and each list may contain up to 20 entries. The lists can have identical entries if required.

28.1.4.1 Scan List 1

- **Attributes**

	Field Name	Field Value	Reset
1	Name	Scan List1	
2	Status	<input checked="" type="checkbox"/>	

- **Name** - a name or alias of up to 12 alphanumeric digits can be entered in the Field Value box of this category.
- **Status** - Selecting the check box in the Field Value for the Status category will make the scan list active and selectable by user action.

- **Contents**

	Talkgroup	priority
1	1: Test Group : Folder 1	
2		
3	1: Test Group : Folder 1	

This has the following two options:

- **Talkgroup**

Using the mouse and clicking on a field will display a down arrow. Selected the arrow to display all the available talk group entries in the Talkgroup list, again using the mouse click on the required entry to add it to the scan list.

- **Priority**

This displays the talkgroup's priority level. An ongoing call, with a low priority, will be interrupted by a call from a high priority talkgroup. A call from a medium/low priority talkgroup will not interrupt the on-going call. After entering the Talkgroup field value, check the Priority field, select the now displayed down arrow to display the available groups and select the required option.

The available options are:

- **None**
- **Low**
- **Medium**

- **High**

28.1.5 Dynamic Group Number Assignment

	Field Name	Field Value	Reset
1	DGNA Notification	<input checked="" type="checkbox"/>	
2	SuperGroup of ScannedGroups Enabled	<input checked="" type="checkbox"/>	
3	Auto-Select Single Assigned Group	<input type="checkbox"/>	
4	DGNA Folder Size	16	
5	DGNA Folder Name		
6	DGNA to Folder	Any Folder	Reset

This has the following 6 options:

28.1.5.1 DGNA Notification

Check the box to enable this feature. Enabling this feature allows the user to see messages related to DGNA operation, for example Group added or Group deleted.

28.1.5.2 Super Group of Scanned Groups Enabled

If enabled by checking the box, the terminal will scan the super group.

A super group has one GSSI, but is made up of several other groups. A call setup sequence addressed to the super group will also set the call up to the other groups within the super group.

Super groups are setup by system dispatchers/administrators and are part of the DGNA feature.

See Chapter 2 of the Product Information Manual, Paragraph "Group Addressed DGNA" for more information.

28.1.5.3 Auto Select Single Assigned Group

Indicates whether or not the terminal should automatically select a single assigned DGNA group.

Check the check box to enable/disable this option.

Using SS-DGNA, the SwMI may send a group assignment:

- to add a group or a number of groups to the terminal's data base.
- to change the parameters or the attachment state of an existing group or groups in the terminal.

The assignment may require the terminal to immediately attach the group, change its Alias or Class of Usage or to just add it to the talkgroup list allowing it to be attached later.

The following requirements apply to each group element in the SS-DGNA Assign PDU. If there are multiple groups in the PDU, the acknowledge for all groups is sent together in one PDU.

For each assigned group, there is an assignment that is a command to add the group to the terminal's group list, and may contain instructions to attach the group. The terminal can accept or reject the assignment. On accepting the assignment the terminal can either accept or reject the attachment.

Assignment with Auto-select

If Auto-Select Single Assigned Group is enabled, upon receipt of an individually addressed DFACILITY PDU containing a DGNA assignment which contains a single group assignment without an attachment (that is, the Attachment Mode is set to Not Attached, MS user allowed to request attachment), the terminal processes the assignment as described above, and then automatically

makes that group the selected group (that is 'auto-select'). Specifically, if this group had not already been the selected group before the assignment was received, the terminal shall send the group attachment for this group as if the user had manually chosen this group to be the selected group. The group shall remain the selected group until the user or the SwMI subsequently change the selected group.

Auto Reselect of Previous Group

When a group is auto-selected, and is then subsequently de-assigned or detached by the SwMI while the auto-select group is still currently the selected group, the terminal shall automatically reselect the group previously selected explicitly by the user. However, if the user manually changed the selected group after auto-select and then subsequently reselects the auto-select group, or if there was never a user-selected group, the behavior on de-assign of the group shall be as the behavior with any other group.

No Auto-select with Multiple Groups

If the terminal receives an appropriate PDU containing DGNA assignments for more than one group, it shall be treated as a normal DGNA assignment, and the auto-select parameter shall have no effect on any of the groups.

No Select of Non-selectable

If the single assigned group already exists in the talkgroup list and is defined as non-selectable as defined, the terminal shall not auto-select the group.

Assign of Non-tactical Emergency Group

If an assignment for the group that is already defined in the codeplug as the non-tactical Emergency group is received, the terminal shall update the name of the non-tactical group with the group name received in the assignment. The terminal shall also treat this as a normal assignment and add the group to the talkgroup list or modify the parameters of the group if already in that list.

De-assign of Non-tactical Emergency Group

If a de-assignment for the group that is defined as the non-tactical Emergency group is received, the terminal shall remove it from the talkgroup list if it is also defined there, but it shall remain as valid for use for non-tactical Emergency group calls.

Auto-select in Non-tactical Emergency Mode

If an assignment is received with Auto-Select Single Assigned Group (enabled) in Non-tactical Emergency Mode, the assignment shall be accepted as normal, but auto-select shall not be performed. Upon exiting from Emergency Mode, the terminal shall select (and attach to) the last auto-select group received.

Auto-select Display

There shall be a visible and audible notification to the user when auto select group is assigned or de-assigned, even if DGNA is disabled.

28.1.5.4 DGNA Folder Size

This defines how many entries can be placed into the folder. It can contain from 1 to 2048 entries.

28.1.5.5 DGNA Folder Prefix

This can contain up to 8 digits as a prefix (name) for the folder.

28.1.5.6 DGNA to Folder

Indicates whether the terminal stores new talkgroups received via DGNA in the first free position in the folder table, in the DGNA folder, or in the current folder.

28.2 DMO (Direct Mode Operation)



Related fields are:

Paragraph 26.2 "Hot Mic"

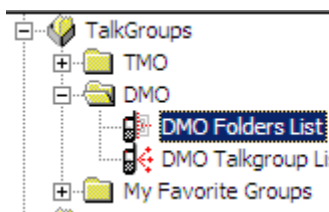
Paragraph 21 "DMO Parameters"

Direct Mode Operation (DMO). When the terminal enters DMO it is no longer attached to a system and cannot receive calls (private, group, phone, Emergency or status and text messages) via the system.

The terminal is now acting as a 2 way terminal, emergency and group calls can be made to other terminals that are also in DMO mode, on the same group and within range.

This has the following two submenus:

28.2.1 DMO Folders List



	Name	Status	Transmission Timeout Timer, sec	Transmission Timeout Warning Timer, sec	Number of Talkgroups in the Range	Receive Only
1	DMO Range 1	<input checked="" type="checkbox"/>	60	50	16	<input type="checkbox"/>
2	DMO Range 2	<input checked="" type="checkbox"/>	60	50	16	<input type="checkbox"/>
3	DMO Range S	<input checked="" type="checkbox"/>	60	50	16	<input type="checkbox"/>

The DMO Folders List and the TMO range list have the same functionality.

The DMO Folders List can have up to 128 entries.

28.2.1.1 Number of Talkgroups in the Range

This Field Value is used to define the number of available Talkgroup entries for an individual range and is programmable from 0 to 1024, in other words there can be one range list with 1024 entries, or 256 ranges each with 4 Talkgroup entries.

For more information see:

Paragraph 28.1.1 "TMO Folders List"

28.2.1.2 Receive only

This Field Value is used to define if the range is in receive only mode.

28.2.2 DMO Talkgroup List

The list can contain up to 1024 entries and each entry has up to 12 options.



NOTE

DO NOT duplicate DMO talkgroups in the terminal.

The columns Name, ID, Status, DMO Range List and TMO Mapping are similar to those in the TMO Talkgroup List, see Paragraph 28.1.2 "TMO Talkgroup List" for more information.

The other column options are:

Name	ID	Status	DMO Folders List	Communication Type	Gateway Selection	Gateway Address	Frequency Channel	Receive Call to DMO Partnership Networks
DMO TG 1	8388609	<input checked="" type="checkbox"/>	1: DMO Folder	Direct	None		420.12500	User Defin
	0	<input type="checkbox"/>	1: DMO Folder	Direct	None		390.00000	User Defin
	0	<input type="checkbox"/>	1: DMO Folder	Direct	None		390.00000	User Defin

Receive Call to DMO Partnership Networks	Network MCC	Network MNC	TMO Mapping	Key Group	Incoming Call Minimum Security Class	Outgoing Call Security Class
User Defin	753	2361	1: Test Group : Fo	NO_KG	Security Class 1	Security Class 1
User Defin	0	0		NO_KG	Security Class 1	Security Class 1
User Defin	0	0		NO_KG	Security Class 1	Security Class 1

28.2.2.1 Communication Type

	ID	Status	DMO Folders List	Communication Type	Gateway Selection	Gateway Address	Frequency Channel
1	8388609	<input checked="" type="checkbox"/>	1: DMO Folder	Direct	None		420.12500
2	0	<input type="checkbox"/>	1: DMO Folder	Direct			390.00000
3	0	<input type="checkbox"/>	1: DMO Folder	Repeater			390.00000
4	0	<input type="checkbox"/>	1: DMO Folder	Gateway			390.00000
5	0	<input type="checkbox"/>	1: DMO Folder	Gateway & Repeater			390.00000

This has four options, selectable by first clicking in the field to display the down arrow and then selecting the down arrow to display the following options:

- **Direct** - this enables the user to communicate with other terminals operating in Direct Mode that are on the same frequency and talkgroup as the user.
- **Repeater** - this enables to support Direct Mode communications over a repeater.
- **Gateway** - the terminal is able to communicate with its trunking system (and vice-versa) if this option has been enabled, the system has Gateway connectivity and the terminal is able to communicate with the Gateway. A Gateway is used to extend the coverage of a cell by allowing users to move out of the system's cell coverage area and use the gateway to remain in contact. Gateways are only used with terminals in DMO.
- **Repeater & Gateway** - depending on signal received the terminal uses the first available gateway or a DMO repeater.

28.2.2.2 Gateway Selection

DMO Folders List	Communication Type	Gateway Selection	Gateway Address	Frequency Channel
1: DMO Folder1	Gateway	Automatic		420.12500
1: DMO Folder1	Direct	None		390.00000
1: DMO Folder1	Direct	Specific		390.00000
1: DMO Folder1	Direct	Automatic		390.00000

This defaults to 'None' unless the Feature Flags/DMO Gateway option is selected, see Paragraph 11.20 "One-Touch Feature" and Paragraph 28.2.2.1 "Communication Type".

It has the following 3 options:

- **None** - The terminal cannot use a Gateway
- **Specific** - the terminal will use a Gateway with the Gateway Address specified for this Talkgroup.
- **Automatic** - the terminal will use any Gateway it can find and to which it can connect.

28.2.2.3 Gateway Address

This is the specific address of the Gateway that the terminal will use, the MNI (Mobile Network Identity). The Gateways now have standard MCC & MNC codes and to prevent terminals accessing a different system, a specific address used for an own system gateway is entered in this field.



NOTE

Generation 1 terminals are not able to set up calls on a gateway, but if called by a terminal of at least Generation 2 build, the Generation 1 terminals are able to take an active part in the call, that is Tx & Rx.

28.2.2.4 Frequency Channel

This field specifies the frequency to be used for this DMO group, if no frequency is specified, the group will not be enabled.

28.2.2.5 Receive Call to DMO Partnership Networks

It is possible that different network providers will share Gateway access, thus allowing terminals of one system to access terminals of another system via a Gateway. These calls are referred to as Inter-MNI or Intra-MNI calls and are dependent upon the direction of the call.

- Inter-MNI (Mobile Network Identity - made up of the Country Code & ISSI) calls are calls between own system terminals via own system Gateway, or received calls, on own system Gateway, from a terminal of another system.
- Intra-MNI calls are calls to another system terminal via the other system Gateway.



NOTE

A terminal on its own Gateway is making Inter-MNI calls, a terminal using another system's gateway is making Intra-MNI calls.

An incoming group call addressed to MNIRCVD and SSIRCVD will be accepted by the terminal if:

- SSIRCVD (Short Subscriber Identity Received) equals the selected GSSI, and:
 - SSIRCVD equals the group MNI, or
 - If SIM is not supported, the received call to partnership networks is YES and MNIRCVD

exists in the DMO Partnership List.

- SSIRCVD = 11 ... 112 and:
 - i. MNIRCVD = 11 ... 112, or
 - ii. MNIRCVD = the Home MNI, or
 - iii. MNIRCVD = selected group MNI, or
 - iv. If SIM is not supported, the received call to partnership networks is YES and MNIRCVD exists in the DMO Partnership List.

28.2.2.6 Network MCC

This field defines the country code of the DMO Gateway.

28.2.2.7 Network NMC

This field defines the network code of the DMO Gateway.

28.2.2.8 TMO Mapping

Mapping between DMO and TMO talkgroups. The mapped TMO talkgroup is selectable and derived from the Talkgroup list.

It's possible to associate a DMO talkgroup configuration to a TMO talkgroup configuration. This means that if you are on TMO talkgroup 3, for example, then you are not bound to use DMO talkgroup 3 should the user switch to DMO. In your DMO fleetmap, it's possible to associate any TMO talkgroup to ANY DMO talkgroup, so in this example you could make DMO talkgroup number 23 the relevant DMO talkgroup for TMO talkgroup number 3.

When copying DMO or TMO talkgroup list to another new codeplug, mapping will be lost. Use cloning to keep values.

You cannot map a DMO talkgroup to an unprogrammed TMO talkgroup.

To select the correspondent TMO talkgroup, put the pointer into the field value, click the drop-down list and select the required talk group.

28.2.2.9 Key Group

This is an additional parameter to DMO talkgroups. It specifies the key group associated with the destination address. This parameter should represent the same settings as these provided by the Authentication Center.

For each DMO group, when key grouping method is <K, E>, the available values that can be selected are one of KGj (j=1...K) or NO_KG.



NOTE

Once the KAG file has been imported into the terminal, the parameter should not be changed as this may prevent the terminal from functioning in Secure DMO.

28.2.2.10 Incoming Call Minimum Security Class

Specifies the minimum security class for call reception.

- Security Class 1 - no encryption applied.
- Security Class 2A - the DM-SDU and any related traffic are AI encrypted.

- Security Class 2B - the destination address (SSI), DM-SDU and any related traffic are AI encrypted.
- Security Class 2C - PDU encrypted from destination address element and onwards except for source address type element, and any related traffic are AI encrypted.

To change the setting, select the field value, and select desired setting.

28.2.2.11 Incoming Call Minimum Security Class

Specifies the minimum security class for call initiation.

See “Incoming Call Minimum Security Class” on page 174.

28.3 My Favorite Groups



This menu has the following two submenus:

28.3.1 My Favorite Groups Options

	Field Name	Field Value	Reset
1	My Favorite Groups Edit	<input checked="" type="checkbox"/>	
2	My Favorite Groups Erase All	<input checked="" type="checkbox"/>	

This has the following options:

28.3.1.1 My Favorite Groups Edit

Selecting this option allows user to add groups to the list.

28.3.1.2 My Favorite Groups Erase All

Selecting this option allows the user to remove groups from the list.

28.3.2 My Favorite Groups1

	Field Name	Field Value	Reset
1	Name	My Groups	
2	Status	<input checked="" type="checkbox"/>	
3	Max Number of Talkgroups	128	

28.3.2.1 Field Name and Value

A name or alias of up to 11 characters, used to identify this group range, is entered in the 'Field Value' window.

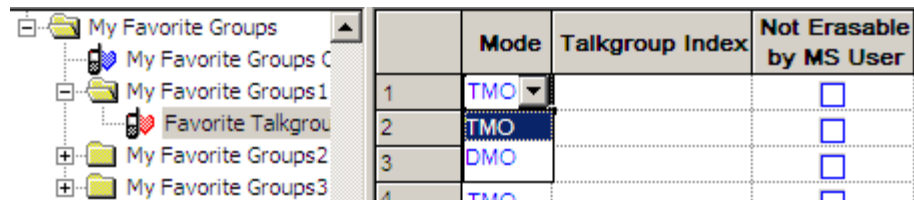
28.3.2.2 Maximum Number of Talkgroups

This option defines the number of entries allowed in this list, up to 128 entries can be specified.

28.3.3 Favorite Talkgroups List

This list can have up to 128 entries with the following three options:

28.3.3.1 Favorite Talkgroups List



The screenshot shows a software interface for managing favorite talkgroups. On the left is a tree view with folders like 'My Favorite Groups' and 'My Favorite Groups1'. On the right is a table with columns: an index column, a 'Mode' dropdown menu, a 'Talkgroup Index' column, and a 'Not Erasable by MS User' checkbox column.

	Mode	Talkgroup Index	Not Erasable by MS User
1	TMO		<input type="checkbox"/>
2	TMO		<input type="checkbox"/>
3	DMO		<input type="checkbox"/>
4	TMO		<input type="checkbox"/>

This field defines from which talk group list the entry is taken, the options are either TMO or DMO.

28.3.3.2 Talkgroup Index

	Mode	Talkgroup Index	Not Erasable by MS User
1	TMO	1: Test Group : F	<input type="checkbox"/>
2	TMO		<input type="checkbox"/>
3	TMO	1: Test Group : Folder 1	<input type="checkbox"/>
4	TMO		<input type="checkbox"/>

This option is used to define the talk group for this entry by clicking on its window, selecting the down arrow and choosing the entry from the displayed list of talk groups.

The displayed list is dependent upon the previously selected option for the Mode entry, it will be either the TMO or DMO talk group list.

28.3.3.3 Not Erasable by MS User

Checking the box in this field prevents the user from erasing the entry.

29 Contact Book



NOTE

The following section is not applicable to TCR1000.



This has the following two submenus:

- Dialing Scheme
- Contact List

29.1 Contact List

	Name	Status	Private	End-to-End Encryption Mode	Home	Speed Dial	Mobile	Speed Dial	Work	Speed Dial	PABX	Speed Dial	Other	Speed Dial
1	Ngch	<input checked="" type="checkbox"/>	9433	<input type="checkbox"/>		0		0		0		0		0
2	Fred	<input checked="" type="checkbox"/>	9245	<input type="checkbox"/>		0		0		0		0		0
3		<input type="checkbox"/>		<input type="checkbox"/>		0		0		0		0		0

This is a comprehensive list that may contain up to 1000 contacts. Each list entry can have multiple entries for private, phone (PSTN, PABX & mobile) numbers. Entries can either be entered manually or a predefined list can be imported using the 'File\Import\ User Data option'.



NOTE

Both the Simplex Private Call and Duplex Private Call options in 'Feature Flags' must be enabled, otherwise not all the feature options will be available to the user.

The list is numbered 1 to 1000 and has the following editable columns:

29.1.1 Name

This field can contain a 12 digit alphanumeric name or alias identity of the 'Contact'.

29.1.2 Status

Select the check box to make an entry active. If an entry is not checked, it will not be displayed. This makes programming easier when the list is imported. Instead of manually entering the ISSIs and leaving out the terminal's own ID, the list can be imported and the terminal's own ISSI can be left unchecked.

29.1.3 Private

This entry is for the ISSI of the contacts terminal

29.1.4 Home, Mobile, Work, PABX and Other

These self explanatory list fields are used for storing all numbers associated with each contact. A number of up to 24 digits in the range 0 to 9, *, # can be entered in this field.

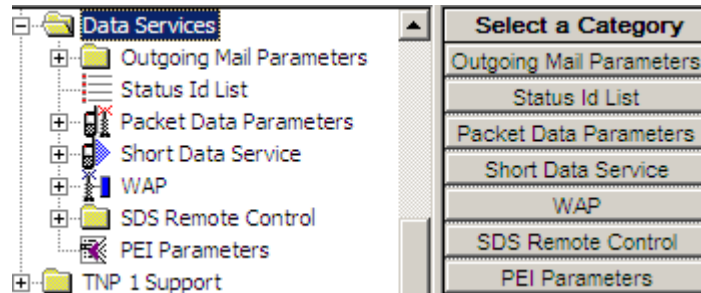
30 Data Services



NOTE

Not all the parameters from this section are available for TCR1000.

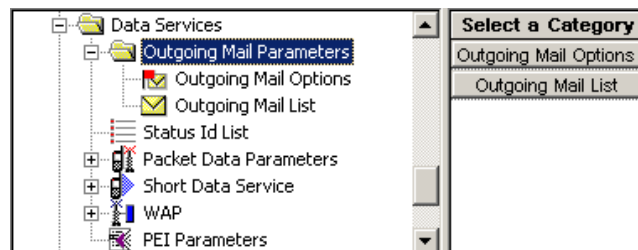
Refer to the codeplug for details.



This menu is used to set up the

- Outgoing Mail Parameters,
- Status ID list,
- Packet Data Parameters,
- Short Data Service,
- WAP,
- SDS Remote Control,
- PEI parameters.

30.1 Outgoing Mail Parameters



Related field is:

Paragraph 11.11 "Mail Out"

30.1.1 Outgoing Mail Options

30.1.1.1 Mail Received Tone in Active State

This feature is enabled/disabled by selecting the check box in this field and defines whether or not the Mail Received (MLRCV) Tone In Active State feature is enabled. If enabled, the terminal will play a single beep every time a mail message is received, even when the user is reading, writing, editing or sending a mail message.

30.1.1.2 Predefined Template Protocol Identifier

Gives identification to the Predefined Template protocol. The number given in the Field Value is transmitted into the terminal, together with the Predefined Template message, and enables the terminal to identify the type of message as Predefined Template message.



NOTE

Predefined Templates are specifically formatted as their intended path for information sending is MS to SwMI/Application. Sending Predefined Template from MS to MS with Protocol Identifier set to 130 (SDS message) causes the received template to display incorrectly.

30.1.1.3 Display Order

This field indicates the order of the UDT and PDT messages in the list on the terminal display.

If it is set to Alphabetic, UDT and PDT messages list in "Template" Menu are listed in the alphabetical order. If it is set to "CPS order", UDT and PDT messages list in the "Template" Menu will be listed in the same order as they listed in CPS.

30.1.2 Outgoing Mail List

This list may contain up to 100 entries made up of the following options:

30.1.2.1 Template Type

This field allows the user to select between UserDefined and PreDefined template types.

The PreDefined template is a message sent using the protocol identifier as set in the Codeplug -> Data Services -> Outgoing Mail Parameters -> Outgoing Mail Options. It is not possible to send pre-defined messages from phone display to phone display. This type of messages is intended for database applications connected to the PEI of the receiving phone, or for a short data router on the infrastructure.

The User Defined template is a text message enabling the user to save the time by using a pre-typed or saved message. To choose the message type, place the pointer inside the field, click the drop-down list and select the required value, the options are:

- **User Defined**
- **Pre Defined**

30.1.2.2 Edit Type

Allows the user to select the type of characters that he can use in the Editable Text field. The field is enabled only if PreDefined is selected in the Type field. If UserDefined is selected in the Type field, alphanumeric characters are the default that cannot be changed.



NOTE

When selecting the pre-defined text in the menu, characters can be only deleted.

Three types of characters are available:

- **Numeric** - enables writing of numeric characters only (0 to 9).
- **Alphanumeric** - enables writing of all available characters.
- **Mixed** - enables writing the following characters only: 0 to 9, * and #.

To choose the characters type, put the pointer inside the field, click on the arrow, and drag the pointer to desired selection.

30.1.2.3 Template Name

This field allows to enter a title for the template.

On a terminal, it displays in a list of available templates.

30.1.2.4 Prompt ID

This is a reference number, allowing multiple messages to be sent to the same address. The remote application works out what to do with each message as it is received (in other words routes it to some other destination). The field is enabled only if PreDefined is selected in the Type field.

30.1.2.5 Prompt Text

This field allows to enter a short text that begins a PreDefined template.

On a terminal, the Editable Text follows the read-only Prompt Text.

30.1.2.6 Editable Text

This field allows to enter the actual text of a message template.

For the PreDefined templates, the number of characters is determined by the Edit Size field.

For the UserDefined templates, the number of characters is limited by the range: up to 140 8-bit characters or 70 16-bit characters.

On a terminal, users can edit the message for both template types.

30.1.2.7 Address Type

This field determines whether Predefined Templates are private or phone type. When set to Private all the private templates are visible in the terminal MMI. When set to Phone all the phone templates are visible. Second condition is that SDS to Phone or SDS to Private is enabled/disabled. Default: Private.



NOTE

Only available when the Template Type codeplug is set to PreDefined.

30.1.2.8 Address

This field is only enabled by selecting the 'PreDefined' option in the Type field and it contains the address to which the message will be sent, usually to an ISSI.

30.1.2.9 MS-ISDN Address

This field determines MS-ISDN address of the template.



NOTE

Only available when the Template Type codeplug is set to PreDefined and the Address Type is set to Phone.

30.1.2.10 Edit Size

This field allows you to set the maximum number of characters in a PreDefined template.

On a terminal, users can edit the message only within this range.

30.1.2.11 Code Scheme

Edit	Code	Indexed
Size	Scheme	
0	UC2	0
0	LATIN1_8_BITS	
0	UC2	
0	UC2	0

There are two available options:

ASCII coding (LATIN1_8_BITS) scheme which is used by most western european languages.

UNICODE standard (UC2) which defines a consistent method of encoding/decoding multilingual text such as Chinese and Korean characters.

30.1.2.12 Indexed

This field indicates whether or not this entry is mapped to a button in the 'One Touch Buttons' menu options. If it is, the user is able to quickly recall the text message and send it.

30.2 Status ID List

Data Services				
Outgoing Mail Parameters				
Outgoing Mail Options				
Outgoing Mail List				
Status Id List				
Packet Data Parameters				
Short Data Service				
WAP				
PEI Parameters				

	Name	ID	Status	Indexed
1	Status 1	32768	<input checked="" type="checkbox"/>	0
2	Status 2	32769	<input checked="" type="checkbox"/>	0
3	Status 3	32770	<input checked="" type="checkbox"/>	0
4		36868	<input type="checkbox"/>	0
5		36869	<input type="checkbox"/>	0
6		36870	<input type="checkbox"/>	0
7		36871	<input type="checkbox"/>	0

The Status List is used for sending and receiving short data messages via the control channel. These are short cryptic messages of up to 12 alphanumeric characters.

The list can have a maximum of 100 entries and each entry is associated with the following four column entry fields:

30.2.1 Name

This field contains the alphanumeric message.

30.2.2 ID

The entries in this column contain the ID's of the messages in the range 32768 - 61439. All numbers prior to 32768 are used by the system for internal addressing. When a short data message is sent, it is the ID and not the message that is transmitted, the received ID is then 'looked up' in the list and the corresponding text is displayed.

30.2.3 Status

Selecting the check box in this field will validate the message, allowing the user to see it when scrolling the list and send it.

30.2.4 Indexed

This field indicates whether or not this entry is mapped to a button in the 'One Touch Buttons' menu options. If it is, the user is able to quickly recall the text message and send it.

30.3 Packet Data Parameters



NOTE

The following section is not applicable to TCR1000.

	Field Name	Field Value
1	User Authentication	<input checked="" type="checkbox"/>
2	Authenticator Name	DIMETRA_P
3	Data Only	<input checked="" type="checkbox"/>
4	Voice&Data	<input checked="" type="checkbox"/>
5	Voice Only	<input checked="" type="checkbox"/>
6	Default Packet Data Mode	2: Voice&Data
7	PD Page Period Updates, msec	1000
8	IP Queue Timeout	<input type="checkbox"/>
9	IP Maximum Queuing Time, sec	5
10	Request a Dynamic IP address	<input checked="" type="checkbox"/>
11	Static IP address	0. 0. 0. 0

The following entries define the operation of the terminal's packet data feature.

30.3.1 User Authentication

This is a method for authenticating the application user prior to allowing activation of the packet data link and indicates whether or not the customer is configured with mandatory User Authentication. Select the check box in this field to enable this option.

See Chapter 2 of the Product Information Manual, Paragraph "PD User Authentication"

30.3.2 Authenticator Name

Authenticator name is a 15 digit alphanumeric name/alias that has been set up on the system, for the Mobile Terminal, that will allow the system to authenticate the user. According to this name, the data Terminal Equipment user application defines which pair "username/password" is suitable for this authenticator. The system must support user authentication, otherwise this feature if enabled in the terminal will be ignored by the system.

30.3.3 Data Only

Specifies whether or not the Data Only feature will be enabled as part of the Packet Data features that allows connection to an external device (such as a laptop PC). When set to Data Only Enable and except for emergency calls, the terminal will reject incoming and outgoing voice calls, status and text messages. The terminal will transmit and receive data via the external device. Select the check box in this field to enable this option.

30.3.4 Voice & Data

Specifies whether or not Voice & Data feature will be enabled as part of the Packet Data features that allows connection to an external device (such as a laptop PC). When set to Voice & Data Enable, the terminal will transmit and receive data using the external device. As voice calls have priority over data calls, any received voice call will interrupt an on going data call. Select the check box in this field to enable this option.

30.3.5 Voice Only

Specifies whether or not the Voice Only feature will be enabled as part of the Packet Data features that allows connection to an external device (such as a laptop PC). When set to Voice Only Enable, the terminal will only transmit and receive voice calls. Select the check box in this field to enable this option.

30.3.6 Default Packet Data Mode

This field defines the default Packet Data mode after power up and can be

- **Data Only,**
- **Voice & Data,** or
- **Voice Only.**

These options are only available if enabled in 3, 4 & 5 above.

Place the mouse arrow in the entry field and press the left mouse button to display the 'Down Arrow'. Select the down arrow to display the available options, using the left mouse button select the required option.

Related field is:

Paragraph 11.17 "Packet Data"

30.3.7 PD Page Period Updates

Indicates the period of time for terminal to update the information on Packet Data (PD) page.

The range is from 500 to 10,000 msecs, the default value is 1,000 msecs.

30.3.8 IP Queue Timeout

When the parameter is enabled, the terminal supports configurable outgoing IP queuing timeout mechanism for discarding obsolete IP datagrams.

Select the check box in this field to enable this option.

30.3.9 IP Maximum Queuing Time, sec

This parameter defines the maximum duration that an IP datagram is queued in the terminal prior to starting transmission on the air interface. If transmission of the datagram is not started upon timeout, the terminal discards the datagram.

30.3.10 Request a Dynamic IP address

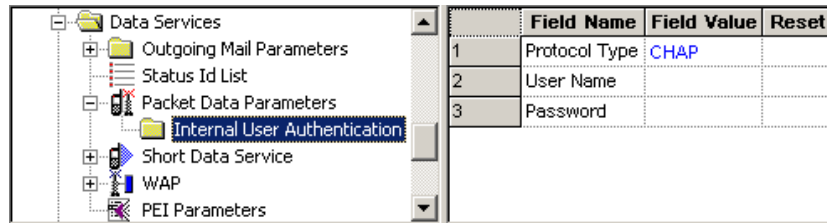
This parameter indicates whether the terminal will obtain the IP address automatically unless a PEI application requests a static IP address.

Select the check box in this field to enable this option.

30.3.11 Static IP address

This parameter defines the static IP address for the terminal when the terminal internal application is configured to request a static IP address.

30.3.11.1 Internal User Authentication



	Field Name	Field Value	Reset
1	Protocol Type	CHAP	
2	User Name		
3	Password		

- **Protocol Type**

Specifies the packet data user authentication type that this application should use during context activation. There are 2 protocol types supported:

PAP

CHAP

To select the option, put the pointer into the field value, click the drop-down list and select the required value.

Please contact the service provider to obtain the protocol type. It is only relevant for internal multi slot packet data applications like the WAP application. For external applications, like dial-up, the packet data user authentication is supported automatically by the terminal.

- **User Name**

This user name is used to authenticate the terminal user during PPP connection setup.

Enter the user name in the text box with a choice of any characters.

- **Password**

This password is used to authenticate the terminal user during PPP connection setup.

Enter password in the text box with a choice of any characters.

30.4 Short Data Service (SDS)

	Field Name	Field Value
Codeplug		
Subscriber Unit Parameters	1	SDS to Private <input checked="" type="checkbox"/>
Feature Flags	2	SDS to Phone <input type="checkbox"/>
Security	3	Mail Out to Group <input checked="" type="checkbox"/>
End-to-End Encryption	4	Individual SDS L3 Status Ack <input checked="" type="checkbox"/>
Remote Programming	5	Group SDS L3 Status Ack <input checked="" type="checkbox"/>
Clock System Broadcast Infor	6	SDS Status Number of Retry 4
TMO Voice Services	7	Status Max 61439
DMO Parameters	8	Status Min 32768
Ergonomic Parameters	9	Send Short Form Report <input type="checkbox"/>
Language Parameters	10	Access Priority Low
Audio Settings	11	Traffic Stealing <input type="checkbox"/>
Display Parameters	12	AT Commands SDS-TL Access Priority High
TalkGroups	13	AT Commands SDS-TL Traffic Stealing <input type="checkbox"/>
Contact Book	14	Buffer Full, Overwrite Policy Overwrite Only O
Data Services	15	DTR Link Down Indication Time, sec 1
Outgoing Mail Parameters	16	PI Concatenated Messages 138
Status Id List	17	Support of Concatenated Text Messages <input checked="" type="checkbox"/>
Packet Data Parameters	18	Segmented Receive Timer, sec 120
Short Data Service	19	The Long Text Message Sent Timer, sec 120
Store and Forward Op	20	Long Text Message Length 1000
WAP	21	Service Center MS-ISDN
SDS Remote Control	22	Filter Successive Duplicate Text Messages Timer, sec 10
PEI Parameters	23	Mail Out During Group Call Allowed
TNP 1 Support	24	Status During Group Call Allowed
Buttons, Keys and Accessorie	25	Default Data Russian Encoding Scheme ISO-8895-5 Latin
Mobility and System Paramete	26	Support of Concatenated Text Messages Sending <input checked="" type="checkbox"/>
GPS	27	Default Targeted Status Address Type Group
User Application	28	Return to Idle upon Message Delivered <input type="checkbox"/>
SIM	29	Back to Idle upon Expiry of Long Key Inactivity Timer <input type="checkbox"/>
	30	Reply With Original Message Attached <input checked="" type="checkbox"/>
	31	Delete Inbox/Outbox when MS is Disabled <input checked="" type="checkbox"/>
	32	EtE High Security Mode <input type="checkbox"/>
	33	Send TL-REPORT for EtE SDS <input type="checkbox"/>
	34	Immediate Text Messaging <input type="checkbox"/>

The following menu options are used to set the terminal's configuration for sending Status Messages.

30.4.1 SDS to Private

This parameter indicates whether SDS to Private feature is enabled or disabled in the terminal. Turn the check box on (Enable) or off (Disable) by clicking in the check box.

30.4.2 SDS to Phone

This parameter indicates whether SDS to Phone feature is enabled or disabled in the terminal. Turn the check box on (Enable) or off (Disable) by clicking in the check box.

30.4.3 Mail Out to Group

This parameter indicates whether Mail Out to Group feature is enabled or disabled in the terminal.
Turn the check box on (Enable) or off (Disable) by clicking in the check box.

30.4.4 Individual SDS L3 Status ACK

If this option is enabled, by selecting the check box, the terminal will receive an acknowledgement when a status message is sent to an individual ISSI.

The sending terminal does not receive the acknowledgement from the receiving terminal, but from the system. If the receiving terminal is contactable by the system, the system will 'Ack' the message.

30.4.5 Group SDS L3 Status ACK

If this option is enabled, by selecting the check box, the terminal will receive an acknowledgement when a status message is sent to a Group.

The sending terminal does not receive the acknowledgement from the receiving group terminals, but from the system. If any of the receiving group members are contactable by the system, the system will 'Ack' the message.

30.4.6 SDS Status Number of Retry

The Field Value entry for this option defines how many times the terminal will attempt to send a status message.

The range is from 0 to 10.

30.4.7 Status Maximum

The TETRA standard defines the number range of status messages as 32768 to 65535.

The number entered in this field will be the highest number that the terminal user can see and send.

The default is 61439.

30.4.8 Status Minimum

The TETRA standard defines the number range of status messages as 32768 to 61439.

The number entered in this field will be the lowest number that the terminal user can see and send.

The default is 32768.

30.4.9 Send Short form Report

When this feature is enabled, upon received SDS text message the terminal sends a short form report if the following additional conditions are fulfilled:

- Short form report (in TLSDS-TRANSFER) is requested
- ESN address (in TLSDS-TRANSFER) is not present

In any other case the terminal sends a full report.

30.4.10 Access Priority

This field is used to set the access priority of the SDS-TL reject report when no application is registered to service.

Select the Field Value window to display the down arrow and the following available options:

- **Low**
- **High**

The default value is Low.

30.4.11 Traffic Stealing

When this field is enabled and the terminal is a transmitting party in a circuit mode call, the SDS message will be sent on the traffic channel by stealing frames from the audio if the message is short enough to be sent this way.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

30.4.12 AT Commands SDS-TL Access Priority

This field is used to set the access priority for call set up using this data connection method.

When a computer is connected to a terminal and is being used as a 'Hyper Terminal', the user is able to use the 'AT' command set for data communication.

Select the Field Value window to display the down arrow and the following available options:

- **Low**
- **High**

The default value is Low.

See Chapter 4 of the Product Information Manual.

30.4.13 AT Commands SDS-TL Traffic Stealing

This field defines whether traffic stealing is allowed for AT application.

30.4.14 Buffer Full, Overwrite Policy

Defines how the MS shall handle received messages when the inbox is full.

Upon receiving a new SDS message and the buffer of the received messages is full, the terminal acts according to the Buffer full overwrite policy.

- **None** - The terminal does not overwrite messages in the buffer; puts a message in the buffer only in free place (free place is the case when no message is written to it or message is deleted).
- **Overwrite Old + New** - If the buffer contains at least one old message (message that was read by the User) then new received SDS message shall overwrite the oldest read message in the buffer.
- **Overwrite only Old** - First the terminal tries to overwrite old messages. If all the messages are new (messages that the User have not read yet), overwrite the oldest unread message with the new one.

To select an option, put the pointer into the field value, click the drop-down list to choose the desired option.

30.4.15 DTR Link Down Indication Time

When the terminal is in data mode, this is the time after which it will indicate, to the user, that the down link has been lost.

The range of this timer is 0 to 255 seconds.

30.4.16 PI for Concatenated Messages

The Protocol Identifier (PI) is the information element the MS uses when receiving text messages.

The MS will only accept concatenated text messages with the Protocol Identifier set to the indicated value.

The concatenated text messages function enables the MS to receive text messages longer than 140 bytes using a special protocol called UDH (User Data Header).

Type the required value in the field.

30.4.17 Support of Concatenated Text Messages

Defines whether there is a support of concatenated messaging (receiving long SDS messages greater than 140 bytes).

A concatenated text message is a chunk of a segmented Long Text Message.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

30.4.18 Segmented Receiver Timer

At the indicated time, the segmented receiver timer shall expire when not all concatenated text messages belonging to the same long text message (same Message Reference Number) have been received.

The operating value depends on the load profile of the customer.

Type the required value in the field.

30.4.19 The Long Text Message Timer, sec

At the indicated time, the Long Text Message Sent timer expires when not all Delivery Status belonging to the same Long Text Message (same Message Reference Number) have been received.

Type the required value in the field.

The range of this timer is 0 to 255 seconds.

30.4.20 Long Text Message Length

This field defines the maximum length of long text messages in characters.

Long Text Messages are short data messages with up to 1000 8-bit coded characters (ASCII) or 500 16-bit coded characters (Unicode). This length refers to message text only without Protocol Identifier (PI) information.

Type the required value in the field.

30.4.21 Number of Service Centre

The number (address) of the Message Service Centre that is responsible for storing and forwarding the subscriber's outgoing messages is entered into this field. The address can be up to 25 digits.

30.4.22 Service Center MS-ISDN

This parameter defines Service Center MS-ISDN. If the user initiate Store and Forward message, the Forward Address Type takes ESN. ESN (External Subscriber Number) is specified by this field. If this field is empty server address is configured as Service Center SSI. Otherwise it is configured as PSTN Gateway SSI.

The range is from empty up to 24 digit number. By default the field is empty.

**NOTE**

For Dimetra Infrastructure with Store & Forward feature running this field needs to stay empty. Otherwise the value of the Service Center MS-ISDN is used as the Gateway SSI.

**NOTE**

The Private Call and SDS via MS-ISDN are not supported by Dimetra Infrastructure.

30.4.23 Filter Successive Duplicate Text Messages Timer, sec

The Service Provider sends the same SDS message more than once. Duplicated message (messages that are fully equal), received one after the other during a pre-defined period of time, are filtered.

The range of this timer is 0 to 255 seconds.

An operational value of 10 seconds is recommended as a starting point.

30.4.24 Mail Out During Group Call

Defines option for sending a text message during active group or broadcast call.

The options are:

- **Not Allowed** - Not allowed to send text message while there is an active group call.
- **Leave Call to send Mail** - The call will be disconnected and the text message will be sent.
- **Allowed** - Text message will be sent without disconnect the call.

The default is set to 'Allowed'.

To select the option, put the pointer into the field value, click on the arrow.

30.4.25 Status During Group Call

Defines option for sending a status during active group or broadcast call.

The options are:

- **Not Allowed** - Not allowed to send Status while there is an active group call.
- **Leave Call to send Status** - The call will be disconnected and the Status will be sent.
- **Allowed** - Status will be sent without disconnect the call.

The default is set to 'Allowed'.

To select the option, put the pointer into the field value, click on the arrow.

30.4.26 Default Data Russian Encoding Scheme

This option indicates which Russian SDS encoding scheme will be used.

There are 2 encoding schemes available to encode the SDS message:

ISO-8895-5 Latin / Cyrillic (8-bit)

Unicode (16-bit)

To select the option, put the pointer into the field value, click the drop-down list and select the required value.

When the flag is set to ISO/IEC 8859-5 (0x05), the terminal will transmit a SDS message at most 140 characters long. When the flag is set to Unicode (0x1A), the terminal will transmit a SDS message at most 70 characters long.

30.4.27 Support of Concatenated Text Messages Sending

This parameter defines whether there is a support of concatenated messaging (sending long SDS messages greater than 140 bytes).

A concatenated text message is a chunk of a segmented Long Text Message.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

30.4.28 Default Targeted Status Address Type

This parameter describes which type of the status target address is used, when the Targeted Status codeplug field is disabled. There are three options available to select:

- Private - Default status target address is set by 8 digits in Default Targeted SDS Status Destination address
- Phone - Default status target address is set by 24 digits in Default Targeted SDS Status Destination address
- Group - Default Targeted SDS Status Destination address is greyed and selected talkgroup address is used

30.4.29 Default Targeted SDS Status Destination Address

This parameter indicates the default Targeted Short Data Services (SDS) Status Destination Address.

To change the address, type in the desired address.

Range: 0 - 15999999, 16777215

30.4.30 Return to Idle upon Message Delivered

This parameter indicates whether Return to Idle upon Message Delivered is enabled or disabled in the terminal. If enabled, the terminal returns to idle display upon receiving message delivered status.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

30.4.31 Return to Idle upon expiry of Long Key Inactivity Timer

This parameter indicates whether Return to Idle upon expiry of Long Key Inactivity Timer is enabled or disabled in the terminal. If enabled, the terminal returns to idle display upon expiry of the long key inactivity timer.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

30.4.32 Delete Inbox/Outbox when MS is Disabled

This parameter enables to delete all messages in Inbox, Outbox, CO Box, and RMS Box when the terminal enters the "disable" state.

30.4.33 E2E High Security Mode

This option enables the High Security Mode on a terminal (the selling feature - requires a license).

Mark the check box to enable.



NOTE

Once this option is enabled, you can not disable the High Security Mode using the CPS application. In order to reset the HSM, the Key Encryption Key (KEK) must be provisioned from the KVL.

30.4.34 Send TL-REPORT for E2E SDS

This option enables sending a TL-REPORT on a dropping TL-DATA packet.

Related field is:

Paragraph 30.4.33 "E2E High Security Mode"

30.4.35 Immediate Text Messaging

If this option is enabled, the highly important messages received on a terminal will be immediately displayed on the screen (no need to manually open them from the Inbox).

If this option is disabled, you can open all the messages (including those with the high importance) only from the Inbox.

30.4.36 Limited Keypad Text Msg Reply



NOTE

This section applies to Limited Keypad terminals only.

This option determines whether user replies to a message with a template or with a standard editable text message.

Select the value from a drop-down list.



NOTE

In order to set an editable message, the Soft Keypad Support For Editor flag must be enabled.

30.5 Store and Forward Options

	Field Name	Field Value
1	Support of Store and Forward	<input type="checkbox"/>
2	Default Validity Period	10 day
3	Delivery Report Request	Received
4	Received Delivery Status Notification	<input checked="" type="checkbox"/>
5	Store and Forward Server Address	16777184
6	Delete Inbox/Outbox when MS is Disabled	<input checked="" type="checkbox"/>

30.5.1 Support of Store and Forward

If the check box is enabled this feature will be available to the users.

30.5.2 Default Validity Period

It indicates how long the outgoing message should be held.

To choose the period, click the drop-down list and select the required period (range: 0-10 days)

**NOTE**

Selecting "No validity" means that the Message Service Centre will not hold the undelivered message.

30.5.3 Delivery Report Request

Specifies the circumstances/condition in which the terminal will send a Delivery Report Reply.

The options are:

- **None** - no message delivery report is sent to the sender when a message is received by the recipient.
- **Received** - message delivery report is sent automatically to the sender when a message is received by the recipient.
- **Consumed** - message delivery report is sent automatically to the sender when a message is read by the recipient.
- **Received and Consumed** – message delivery report is sent automatically to the sender when a message is received and read by the recipient.

**NOTE**

The terminal does not send a report when the received destination address is Group or Broadcast.

To select the option, put the pointer into the field value, click the drop-down list and select the required value.

30.5.4 Received Delivery Status Notification

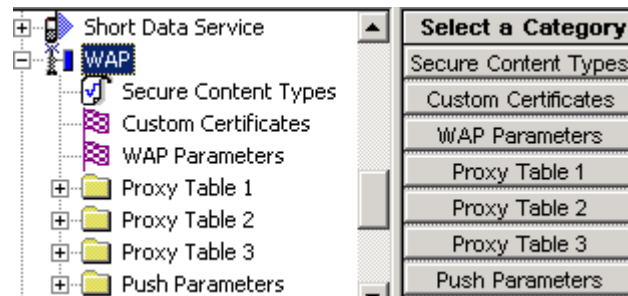
This option indicates if the Store and Forward Delivery Status Notification is enabled or disabled. If this field is unchecked, user is not notified when the Delivery Status is received.

30.5.5 Store and Forward Server Address

This parameter indicates the Store and Forward Server Address in the SDS-layer. This parameter should be configured as Service Center SSI.

The parameter range is: 1 - 16777214. The default is 16777214.

30.6 WAP

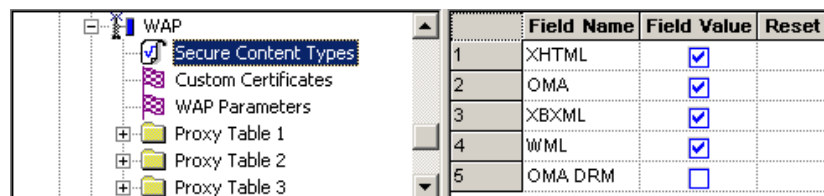


Related field is:

Paragraph 11.32 "WAP"

This feature has the following options:

30.6.1 Secure Content Types

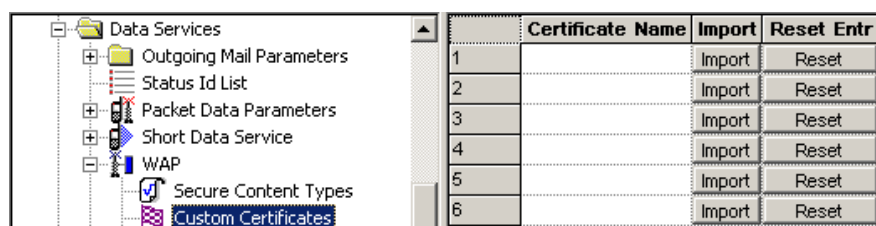


If the check box is enabled, the terminal will advertise to the WAP Gateway its willingness to accept the following MIME (Multipurpose Internet Mail Extensions) media type of the application category:

- **XHTML** (eXtensible HyperText Markup Language).
- **OMA** (Open Mobile Alliance).
- **WBXML** (WAP Binary XML).
- **WML** (Wireless Markup Language) Script.
- **OMA DRM** (Open Mobile Alliance - Digital Right Management)

By default all boxes are checked.

30.6.2 Custom Certificates



A terminal will be able to store up to TEN custom root certificates in the codeplug memory area, and add them to the terminal's set of built-in (default) root certificates.

A terminal will display readable information in the root certificates (default plus custom) stored in them.

The page shows:

- **Certificate Name:** enter the certificate name

- **Import** button: click this button to import the certificate.
- **Reset Entry** button: click this button to reset the Certificate Name field.

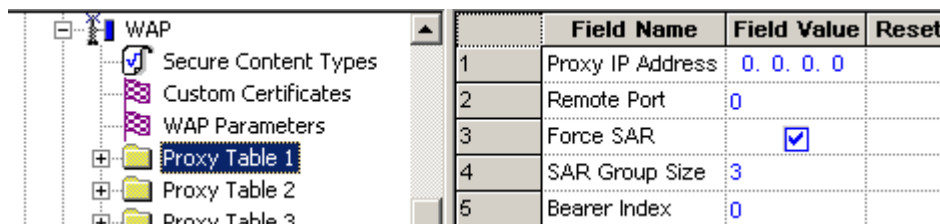
30.6.3 WAP Parameters

Field Name		Field Value
1	Cache Enabled	<input checked="" type="checkbox"/>
2	Max Time Allow User The WAP Session Not To Be Interup	0
3	Home Page Address	
4	UAProf Address	
5	Trusted Domain URL	
6	Imposer Client ID	
7	Client ID Style	OpenWav

Below is a list of the WAP parameters.

- **Cache Enabled:**
If enabled, the following will be saved in the codeplug upon terminal's power down: cache, history, cookies, BAW (Basic Authentication Wallet) entries. Turn the check box on (Enable) or off (Disable) by clicking in the check box.
Default value: checked.
- **Maximum time allow user the WAP session not to be interrupted by calls:**
This option indicates the period of time during which the user allows the terminal to be in data mode only, to let the browser fetch information without Group Call interruption. Type in the required value in seconds.
Default value: 0.
- **Home Page Address:**
Type in the URL of the Home Page for this terminal.
Range: 128 ASCII.
- **UAProf (User Agent Profile) Address:**
The UAProf contains fields describing capabilities such as screen size, colour support, and so forth. The WAP Proxy may keep a scripted profile for a specific terminal. Type in the UAProf address for this terminal.
Range: 128 ASCII.
- **Trusted Domain URL:**
Type in the URL of the trusted domain for this terminal.
Range: 128 ASCII.
- **Imposer Client ID:**
The Client ID provides a means to identify a WAP client to the WAP Proxy. The Client ID may be assigned by the operator of a WAP proxy if the WAP Proxy does not support the WAP-TETRA Standard. The Client ID is provisioned into the terminal. Type in the required ID.
- **Client ID style:**
Defines the Client ID format. To change the setting, select the field value, then select desired setting.
Default value: OpenWave.

30.6.4 Proxy Tables 1 to 3



	Field Name	Field Value	Reset
1	Proxy IP Address	0. 0. 0. 0	
2	Remote Port	0	
3	Force SAR	<input checked="" type="checkbox"/>	
4	SAR Group Size	3	
5	Bearer Index	0	

A Proxy is also called a Gateway.

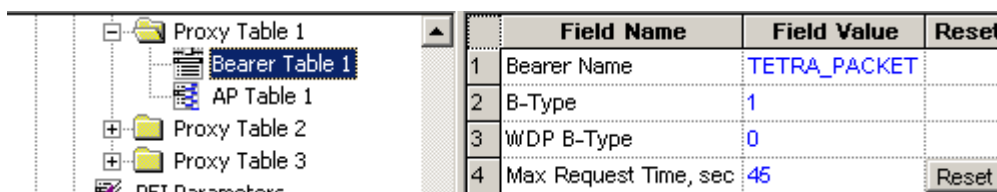
The terminal must connect to the Internet via the Proxy.

To enable WAP operation, the operator should provide at least one Proxy.

Below is a list of Proxy parameters.

- Proxy IP Address:**
 This is the IP address for the WAP Gateway. The terminal provides the user with means to select a Proxy from a list of Proxies. This enables users to change (if required) the active Proxy from secure to non-secure, or vice-versa, or choose different Proxies for various navigation purposes.
- Remote Port:**
 Type the relevant port number.
 - 9201 is non-secured.
 - 9203 is secured.
- Force SAR:**
 If enabled, the terminal will be capable of forcing the SAR (Segmentation and Reassembly) on the WAP Proxy. Turn the check box on (Enable) or off (Disable) by clicking in the check box.
 Default value: checked.
- SAR Group Size:**
 Type in the required SAR group size.
 Default value: 3.
- Bearer Index:**
 The bearer interfaces between the terminal and the WAP Proxy. To change the setting, select the field value, then select desired setting.
 Default value: 0. Do **NOT** change the default value.

30.6.4.1 Bearer Tables



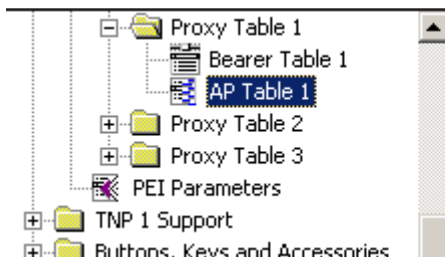
	Field Name	Field Value	Reset
1	Bearer Name	TETRA_PACKET	
2	B-Type	1	
3	WDP B-Type	0	
4	Max Request Time, sec	45	Reset

The terminal stores Proxy information. This information includes: the address of each Proxy, the bearer (or network) each Proxy uses, and the data connection (or Access Point) information for each bearer. The network uses this information to establish communication with the Proxy.

The terminal also creates a bearer (or network) table that contains information about the bearer for each Proxy: name, type, and maximum request time. The Client requires this information before initiating data communication.

Please consult with the Service Provider before filling up these tables.

30.6.4.2 AP (Access Point) Tables




	Field Name	Field Value	Reset
1	AP Access Type		
2	AP Address		
3	AP Authentication Type		
4	AP User Name		
5	AP Password		
6	AP Script		

The terminal stores Proxy information. This information includes: the address of each Proxy, the bearer (or network) each Proxy uses, and the data connection (or Access Point) information for each bearer. The network uses this information to establish communication with the Proxy.

Please consult with the Service Provider before filling up these tables.

30.7 Push Parameters



	Field Name	Field Value	Reset
1	SL Message handling	On	Reset
2	SI Allowed	<input checked="" type="checkbox"/>	Reset
3	Accept only trusted parties	<input checked="" type="checkbox"/>	

30.7.1 SL Message handling

This parameter provides information on how a Service Load (SL) message is handled.

The available options are:

- Convert - the messages are converted to SI
- On - the message is accepted
- Off - the message is rejected

To select the option, put the pointer into the field value, click the drop-down list and select the required value.

30.7.2 SI Allowed

This parameter specifies whether Service Indication (SI) processing is allowed.

The available options are:

- True - the processing is allowed
- False - the processing is disallowed

To select the option, put the pointer into the field value, click the drop-down list and select the required value.

30.7.3 Accept only trusted parties

This parameter specifies whether to allow all incoming push messages or only these with SSIs specified in the Trusted SSI list.

The available options are:

- True - source SSI of incoming WAP Push message must match one of specified in the 'Trusted SSI List'. If not the message will be silently discarded.
- False - incoming WAP Push message from all SSI will be accepted.

To select the option, put the pointer into the field value, click the drop-down list and select the required value.

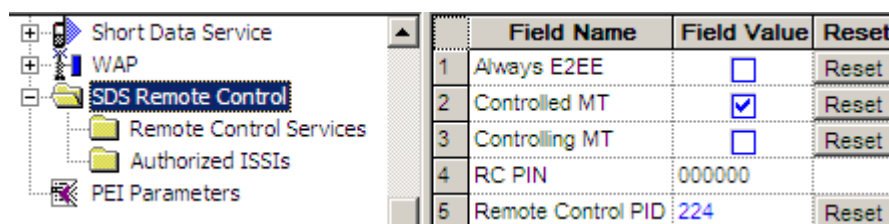
30.7.4 Trusted SSI Lists



	Field Name	Field Value
1	Trusted SSI 1	0
2	Trusted SSI 2	0
3	Trusted SSI 3	0

If 'Accept only trusted parties' parameter is set to True, WAP Push messages sent from source addresses not specified on any of these lists are discarded.

30.8 SDS Remote Control



	Field Name	Field Value	Reset
1	Always E2EE	<input type="checkbox"/>	Reset
2	Controlled MT	<input checked="" type="checkbox"/>	Reset
3	Controlling MT	<input type="checkbox"/>	Reset
4	RC PIN	000000	
5	Remote Control PID	224	Reset

30.8.1 Always E2EE

Indicates whether End-2-End Encryption is used for Remote Control Messages. If the parameter is set to on, the terminal rejects any received non encrypted request sent from the Controlling Terminal.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

30.8.2 Controlled MT

Indicates whether SDS Remote Control feature is enabled/disabled on the controlled terminal.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

30.8.3 Controlling MT

Indicates whether SDS Remote Control feature is enabled/disabled on the terminal that can be used to remotely control other.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

30.8.4 RC PIN

Determines the PIN number that is required to grant the remote control privileges.

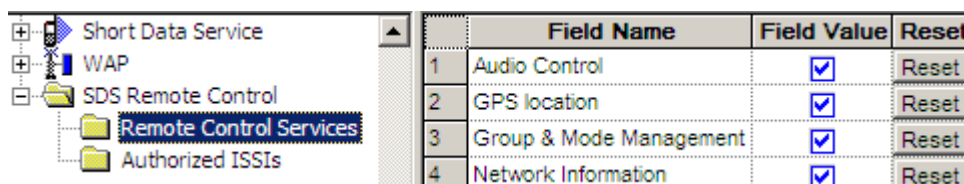
Type in the desired value.

30.8.5 Remote Control PID

Determines the Remote Control PID (Protocol Identifier). The same identifier cannot be used by another application.

Type in the desired value.

30.8.6 Remote Control Services



	Field Name	Field Value	Reset
1	Audio Control	<input checked="" type="checkbox"/>	Reset
2	GPS location	<input checked="" type="checkbox"/>	Reset
3	Group & Mode Management	<input checked="" type="checkbox"/>	Reset
4	Network Information	<input checked="" type="checkbox"/>	Reset

30.8.6.1 Audio Control

Indicates whether Controlling Terminal is allowed to change the audio settings.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

30.8.6.2 GPS Location

Indicates whether GPS location information is available for Controlling Terminal.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

30.8.6.3 Group & Mode Management

Indicates whether Controlling Terminal is allowed to control operating mode and selected talkgroup of the Controlled Terminal.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

30.8.6.4 Network Information

Indicates whether Network Information is available for Controlling Terminal.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

30.8.7 Authorized ISSIs

Indicates which ISSI can control remotely the terminal.

30.9 PEI Parameter

Lists the parameters related to the Peripheral Equipment Interface (PEI) feature.

30.9.1 Baud Rate

Selects the transmission rate at which data flows between DTE (for example computer) and DCE (that is this TETRA terminal). Baud rate is the number of bits of information, including "control" bits that are transmitted per second.

The possible values are 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 bps. The value chosen here will be the default value at terminal power-up. The default value is 9600 bps.

To select the option, put the pointer into the field value, click the drop-down list and select the required value.

30.9.2 Parity Bit

Determines whether an optional Parity Bit is used on serial communication between DTE (for example computer) and DCE (that is this TETRA terminal).

The parity bit indicates whether the number of 1 bits in the preceding data was even or odd. If a single bit is changed in transmission, the message will change parity and error can be detected at this point. This bit is meant for simple error checking.

There are 4 parity schemes available:

- **PARITY_ODD** - asserts or un-asserts a parity bit to set the total number of 1 bits to be odd in the data.
- **PARITY_EVEN** - asserts or un-asserts a parity bit to set the total number of 1 bits to be even in the data.
- **PARITY_MARK** - asserts a parity bit in the data. The parity scheme is programmed to odd.
- **PARITY_SPACE** - un-asserts the parity bit in the data.

The option chosen here will be the default value at terminal power-up.

To select the option, put the pointer into the field value, click the drop-down list and select the required value.

30.9.3 Flow Control

This field allows you to set the default transmit flow control mode for Peripheral Entity Interface (PEI) port.

In addition, terminal users may toggle between the flow control modes each time after turning on a terminal.

- No Flow Control – Flow control not supported by the terminal.
- Xon/Xoff – Software Flow Control.
- RTS/CTS – Hardware Flow Control.

From the drop-down list, select the value.

30.9.4 Stop Bits

This field allows you to set the length of stop bits. In other words, a minimum period of time for the line to be idle at the end of the each transmitted data word.

- 1 – For all data word sizes.
- 2 – For longer words only.

From the drop-down list, select the value.

30.9.5 Data Bits

This field allows you to set the length of transmitted frames.

30.10 AT Commands

30.10.1 ETSI Group Setup Format

This field allows you to change the format of the +CTGS command from the ETSI syntax to the Motorola Proprietary syntax.

If enabled, the AT command +CTGS has the Motorola Proprietary syntax.

Mark the check box to enable.

30.10.2 ETSI AT SDS/Status Format

This flag indicates whether ETSI or Motorola AT Commands syntax is used for sending and receiving Status or SDS messages using the PEI.

By default the parameter is enabled (ETSI Syntax is in use).

31 TNP1 Support



NOTE

The following section is not applicable to TCR1000.



The TETRA Network Protocol type 1 (TNP1) allows the user of a Terminal Equipment (such as a PC) to control TETRA services at the Mobile Terminal via the TETRA Peripheral Equipment Interface (PEI).

The TETRA services include: Mobility Management, Call Control, Short Data Service (SDS), and Supplementary Services. In addition, there are commands to access the MT2 configuration and storage parameters.

To handle the TNP1 interface, the TNP1 application must run on TE2.

The TE2 has to be connected via the RS232 serial communication cable and its application has to be registered on the MT2.

SDS is available to the TNP1 application running on TE2. The TE2 application can access SDS via AT commands, or TNP1 on UDP/PPP protocol. This means either AT commands or UDP/PPP, not both at the same time.

The following menu options are used to configure the terminal's configuration for TETRA Network Protocol type 1 (TNP1) Support:

31.1 Default Service Profile

TNP 1 Support			
Default Service Profile			
User Defined Service Profile			
TNP1 Options			

	Field Name	Field Value	Reset
1	SDS Control [0]	Neither	
2	SDS Control [1]	MT-controlled	
3	SDS Control [2]	MT-controlled	

This is a list of 256 read-only cells to store in each cell the Default Service Profile for each Protocol Identifier (PI). The values of the cells are used only while the Point-to-Point (PPP) link is up (for example AT ON-line). The position of each cell within the list determines its PI. For example, PI for the first cell is 0 and for the last cell is 255.

Each cell has the structure of information element “SDS (Short Data Service) Control”.

The field values may be as follows:

- **MT-controlled** - only the application in MT will transmit requests or receive responses when it controls the services.
- **TE-controlled** - only the application in TE will transmit requests or receive responses when it controls the services.
- **Neither**

Values of some PIs cannot be changed, as they are reserved for the future use or restricted by internal MT application.

31.2 Default Service Profile

TNP 1 Support			
Default Service Profile			
User Defined Service Profile			
TNP1 Options			

	Field Name	Field Value	Reset
1	SDS Control [0]	Neither	
2	SDS Control [1]	MT-controlled	
3	SDS Control [2]	MT-controlled	

This is a list of 256 read-only cells to store in each cell the User-Defined Service Profile for each PI. The values of the cells are used only while the PPP link is up. The position of each cell within the list determines its PI.

Each cell has the structure of information element “SDS (Short Data Service) Control”.

31.3 TNP1 Options

TNP 1 Support			
Default Service Profile			
User Defined Service Profile			
TNP1 Options			

	Field Name	Field Value
1	TNP1 Support	<input checked="" type="checkbox"/>
2	NO TE TEMTA-REPORT IND Counter Limit	20
3	TE TEMTA-REPORT IND Timer	120

31.3.1 TNP1 Support

The TNP1 feature operates only when Packet Data or External Device is enabled in the codeplug (for example: a PPP session with MT2 can be established).

Turn the check box (Enable) or off (Disable) by clicking in the check box.

31.3.2 NO TE TEMTA-REPORT IND Counter Limit

This is a Service Profile timer. MT2 terminates its PPP link with TE2 and resets to zero the NO TEMTA-REPORT IND counter when the counter reaches its maximum value.

The range of this timer is 1 to 100.

31.3.3 TE TEMTA-REPORT IND Timer

This is a Service Profile timer. MT2 uses TE TEMTA-REPORT IND timer in combination with NO TEMTA-REPORT IND counter over limit to decide when to terminate the PPP link

The range of this timer is 1 to 300.

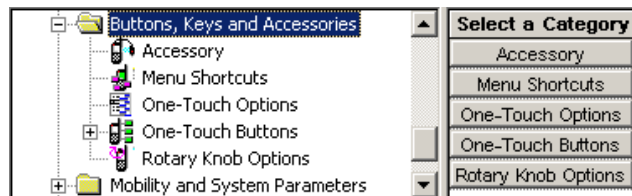
32 Buttons, Keys and Accessories



NOTE

Not all the parameters from this section are available for TCR1000.

Refer to the codeplug for details.



This menu defines:

- The type of accessory that can be used with the terminal.
- The one touch functionality of any button/key programmed with this feature.

The available options are:

32.1 Accessory

This menu has the following features:

32.1.1 Accessory Selection (Active Accessory Selection)

	Field Name	Field Value	Reset
1	Accessory Sele	Headset/Cov	
2	Ring Source	Speaker Mic	
3	Tones Path Sele	Headset/Covert	
		Earpiece	

This field defines the type of accessory that will be used with the terminal, the options are:

- **Speaker Microphone**
- **Headset/Covert**
- **Earpiece**

Related fields are:

Paragraph 11.12 "External Device"

Paragraph 24 "Ergonomic Parameters"

**NOTE**

The following settings apply to MTM800 Enhanced, MTM5400, and MTM800 FuG only.

This field defines the type of accessory that will be used with the terminal, the options are:

- **Standard**
- **Handset**
- **External**

**NOTE**

The following part of this section applies to TCR1000 only.

This field allows you to choose one accessory for a terminal.

After programming, the terminal will support only the selected accessory. In other words, the connected accessories are not automatically detected by the terminal.

All values assigned to the selected accessory, for example microphone gain or voice volumes, apply to the connected accessory.

From the drop-down list, select the value. The options are:

- **Inductive Loop**
- **Inductive Patch**
- **Phonak Loop**
- **Phonak Patch**
- **PHF**
- **Sonic Loop**
- **Sonic Patch**
- ***Template name of imported accessory***

**NOTE**

If you can not find a particular accessory on the list, import a relevant accessory template with additional 3rd party accessories and try the selection again.

32.1.2 Ring Source

	Field Name	Field Value	Reset
1	Accessory Sele	Headset/Cov	
2	Ring Source	In Radio	
3	Tones Path Sele	In Radio	
		In Accessory	

The available options with this feature defines where the ring tones will be heard, either from the accessory or from the terminal's internal loudspeaker.

Related fields are:

Paragraph 11.12 "External Device"

Paragraph 26 "Audio Settings"

32.1.3 Tones Path Selection for PHF Accessory in Idle Mode

	Field Name	Field Value	Reset
1	Accessory Selection	Headset/Covert	
2	Ring Source	In Radio	
3	Tones Path Selection for PHF Acc	PHF Earpiece	

INT Speaker
PHF Earpiece

This feature is used to select the active speaker for tone alerts when the terminal's PHF accessory (Personal Hands-free) is in idle mode.

By default the tones are heard in the PHF earpiece (speaker). However, it is possible to rout the tones to the internal speaker.

To select an option, put the pointer into the field value, click the drop-down list and select the required value.

32.1.4 External Accessory Type (Tranceiver Accessory Type)



NOTE

This setting applies to MTM800 Enhanced, MTM5400, and MTM800 FuG only.

Enables the selection of the external accessory type that will be connected to the terminal.

Depending on the terminal models, the available accessory types are:

- None
- Handset
- Fist Mic
- Visor Mic
- Visor Mic & Fist Mic
- Visor Mic & Handset
- Line In

To select an option, put the pointer into the field value, click the drop-down list and select the required value.

32.1.5 Control Head Rear Alternative Accessory Connected



NOTE

This setting applies to MTM800 Enhanced only.

Specifies whether or not the alternative accessory connected to the rear of the control head is enabled.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

32.1.6 Telephone Handset Enable External Speaker on Hook for Group Mode



NOTE

This setting applies to MTM800 Enhanced only.

If the feature is enabled, the terminal switches the audio to external speaker for an incoming group call when an audio accessory placed on hook blocks the operation of the high/low audio softkey.

This feature only works with specific audio accessories installed/selected.

Select if the feature is disabled, or when enabled, if the accessory is connected via a junction box or directly plugged into the control head.

32.1.7 Telephone Handset Enable External Speaker on Hook for Private Mode



NOTE

This setting applies to MTM800 Enhanced only.

If the feature is enabled, the terminal switches the audio to external speaker for an incoming Simplex, Duplex, PSTN, PABX call when an audio accessory is placed on hook. If it is disabled, the terminal terminates Simplex, Duplex, PSTN, PABX calls when the audio accessory is placed on hook.

This feature only works with specific audio accessories installed/selected.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

32.1.8 Preferred Emergency Accry - Control Head



NOTE

This setting applies to MTM800 Enhanced only.

This parameter indicates which preferred accessory is used for the Hot Mic, Silent Emergency, Emergency Duplex Call, and Emergency Duplex MS-ISDN services when initiated from Master Control Head.

The available options are:

- Control Head Mic - if no PTT has been pressed and the connected accessories are on hook then accessory that is configured in the codeplug Audio Path Selection Priority has the priority for activation. If no PTT has been pressed and one of the accessories is off hook then this accessory is activated.
- Transceiver Mic - accessory that is connected to the rear accessory connector is activated using the settings from the codeplug External Accessory Type field (see Paragraph 32.1.4 "External Accessory Type (Tranceiver Accessory Type)").



NOTE

If the External Accessory Type is set to None, CPS user cannot set this field to this option.

For the External Accessory Type set to Visor Mic & Fist Mic or Visor Mic & Handset accessory activation is dependent on the hook state of the accessory connected to Telco connector of the Junction Box. If the accessory is on hook then the Visor Mic is active. If the accessory is off hook then the Telco accessory is active.

- Last Active Mic - accessory is configured in the codeplug Active Accessory Selection that is used after the power cycle and before any PTT is pressed. If any PTT has been pressed since the power cycle, the accessory which the PTT was pressed on is activated.

32.1.9 Preferred Emergency Accry - Slave Control Head

**NOTE**

This setting applies to MTM800 Enhanced only.

This field is editable if the Dual Control Head feature flag is enabled.

This parameter indicates which preferred accessory is used for the Hot Mic and Silent Emergency services when initiated from Slave Control Head.

For the available options see:

Paragraph 32.1.8 "Preferred Emergency Accry - Control Head"

32.1.10 Preferred Emergency Accry - Transceiver

**NOTE**

This setting applies to MTM800 Enhanced only.

This parameter indicates which preferred accessory is used for the Hot Mic and Silent Emergency services when initiated from the external emergency (from either Rear Accessory Connector or Junction box).

For the available options see:

Paragraph 32.1.8 "Preferred Emergency Accry - Control Head"

32.1.11 Preferred Non- Emergency Accry - Control Head

**NOTE**

This setting applies to MTM800 Enhanced only.

This parameter indicates which preferred accessory is used for the Duplex Private Call services when initiated from Master Control Head.

For the available options see:

Paragraph 32.1.8 "Preferred Emergency Accry - Control Head"

32.1.12 Preferred Non- Emergency Accry - Slave Control Head

**NOTE**

This setting applies to MTM800 Enhanced only.

This field is editable if the Dual Control Head feature flag is enabled.

This parameter indicates which preferred accessory is used for the Duplex Private Call services when initiated from Slave Control Head.

For the available options see:

Paragraph 32.1.8 "Preferred Emergency Accry - Control Head"

32.1.13 Front (10-pin MMP) GCAI Core Accessory Type

**NOTE**

This setting applies to MTM5400 and MTM800 FuG only.

This field specifies the core accessory for the Front 10-pin MMP connector.
From the drop-down list, select the value.

32.1.14 Rear (25-pin MMP) GCAI Core Accessory Type

**NOTE**

This setting applies to MTM5400 and MTM800 FuG only.

This field specifies the core accessory for the Rear 25-pin MMP connector.
From the drop-down list, select the value.

32.1.15 Transceiver IMPRES Visor Mic Connected

**NOTE**

This setting applies to MTM5400 and MTM800 FuG only.

This field enables a certain accessory that can be connected to the Transceiver.
If this field is enabled, the terminal uses relevant audio modes for the certain line type or accessory.
Mark the check-box to enable.

**NOTE**

The Transceiver supports only one accessory at the same time.

32.1.16 Transceiver Hands Free Mic Connected

**NOTE**

This setting applies to MTM5400 and MTM800 FuG only.

This field enables a certain accessory that can be connected to the Transceiver.
If this field is enabled, the terminal uses relevant audio modes for the certain line type or accessory.
Mark the check-box to enable.

**NOTE**

The Transceiver supports only one accessory at the same time.

32.1.17 Rx Audio Line Output Type

**NOTE**

This setting applies to MTM5400 and MTM800 FuG only.

This field allows you to adjust the relative power gain for the analogue audio output.

From the drop-down list, select the value.

32.1.18 Supply 5V to 3rd Party Accessories



NOTE

The following settings apply to MTP830 S/MTP830 FuG only.

This field allows you to increase the output voltage for the accessory connector from regular 3.6 V to 5 V.

CAUTION

Make sure that your accessory requires 5 V power supply. Connecting a regular 3.6 V accessory to a higher voltage connector may permanently damage the accessory.

Mark the check-box to enable.

32.2 Menu Shortcut

	Field Name	Field Value
1	Maximal Number of Menu Shortcuts	20
2	Shortcut [1]	SETUP
3	Shortcut [2]	VIBRATE
4	Shortcut [3]	KEY LOCK

Shortcuts are a way for the user to "mark" locations in the menu that are frequently used in order to access them quickly. For example, if the user changes the ringer style often, marking the "Tones" setting menu as a shortcut would allow the user to quickly navigate to that menu.

The Menu shortcuts feature processes user key presses to recognize and display/perform the action of the corresponding item.

32.2.1 Maximal Number of Menu Shortcuts

Indicates the maximum allowed number of a menu shortcuts. Restricts the possible value of records in the shortcut list. This value does not include Pre-Defined shortcuts.

32.2.2 Shortcut

Shows a list of all the assigned menu shortcuts.

To assign a shortcut to a menu item, select the corresponding field value, and select the desired menu item.

32.3 One-Touch Options

	Field Name	Field Value	Reset
1	One-Touch Keypad Keypress Timer, msec	1000	Reset
2	One-Touch Function Button Keypress Timer, msec	100	Reset
3	Option Buttons Support in Non-Motorola	<input checked="" type="checkbox"/>	

This menu is used to set the button/key functionality and it has the following options:

Related field is:

Paragraph 11.20 "One-Touch Feature"

32.3.1 One Touch Keypad Keypress Timer

The entry in this field sets the time duration that a **Keypad Button** must remain pressed before the one-touch functionality is activated.

It has a range of 1000 to 5000 msecs, the default being 1000 msecs.

32.3.2 One Touch Function Button Keypress Timer



NOTE

This setting applies to portable terminals only.

The entry in this field sets the time duration that a programmable **Side Button** must remain pressed before the one-touch functionality is activated.

It has a range of 10 to 5000 msecs, the default being 100 msecs.

32.3.3 Option Buttons Support in Non-Motorola



NOTE

This setting applies to mobile terminals only.

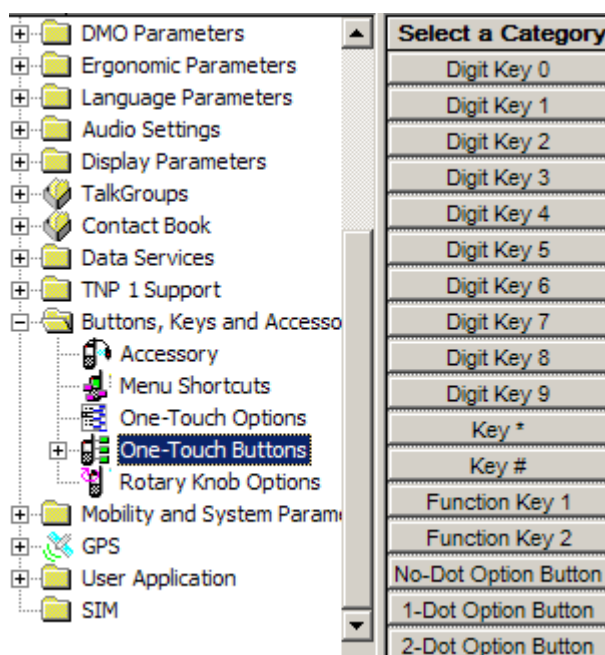
This field indicates whether option buttons operate on non-Motorola accessories.

GPIOs are configured as follows:

- GPIO1 - option button defined by 1-Dot Option Button parameter
- GPIO2 - option button defined by 2-Dot Option Button parameter
- GPIO4 - as Emergency

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

32.4 One Touch Buttons



Related field is:

Paragraph 11.20 "One-Touch Feature"

This feature allows often used terminal features/options to be programmed to a button as a one touch button feature. The 'Feature Flag' menu options must be selected to see all available options.

To select the required button option, place the pointer into the 'Field Value', click on the down arrow, place the pointer on the required option and select the option by clicking the left mouse button. Once the option has been selected, more Field Names and Field Value entries will be displayed requiring more information for the selected option.

**NOTE**

The same option, but with different parameters, may be repeatedly assigned to different buttons, for example Sending Predefined Message - a different message would be assigned.

Apart from 'Unassigned', there are the following available options:

32.4.1 Change Talkgroup to the Previously Selected Talkgroup

This function changes the selected talkgroup of the terminal to the talkgroup that was selected previously.

32.4.2 LOG ON <-> LOG OFF RUI

This function gives the log on and log off option to user when the assigned button is pressed.

32.4.3 Init Call-Out Fallback Alert

This option gives the option to initiate Call-Out Fallback Alert when the assigned button is pressed.

32.4.4 Horn & Lights**NOTE**

This setting applies to MTM800 Enhanced only.

32.4.5 Enable/Disable Howling Suppression

If enabled, this will enable the terminal user to toggle the Howling Suppression.

32.4.6 Change Audio Profile

If enabled, the terminal user can toggle through Audio Profiles via a one touch button press.

32.4.7 Screen Saver Activation

If enabled, this will enable the terminal user to enter the screen saver mode, via a one touch button press, to hide displayed terminal information.

32.4.8 Covert Mode

If enabled, this will enabled the terminal to enter Covert Mode, via a one touch button press.

32.4.9 Display Time

Once this option has been selected, the display time is displayed.

32.4.10 PABX Call

Once this option has been selected, the 'PABX Call To' Field Name is displayed.

Place the pointer into the 'Field Value', click on the down arrow to display the Contact Book/PABX List. Place the pointer on the required option and select the option by clicking the left mouse button. The selected phone number will now be entered into this field.

32.4.11 Phone Call

Once this option has been selected, the 'Phone Call To' Field Name is displayed.

Place the pointer into the 'Field Value', click on the down arrow to display the Contact Book/Phone List. Place the pointer on the required option and select the option by clicking the left mouse button. The selected phone number will now be entered into this field.

32.4.12 Private Call

Once this option has been selected, the 'Private Call To' and 'Private Call Type' Field Names are displayed, both of which are editable.

32.4.13 TXI (Transmit Inhibit)

When this option is chosen, the following fields are enabled:

32.4.13.1 Activate

This field allows entering the status message id value for the transmission inhibited activation status message. The MS will send the TXI status message to the dispatcher upon activation of the transmission inhibited mode.

32.4.13.2 Deactivate

This field allows entering the status message id value for the transmission inhibited deactivation status message. The MS will send the TXI status message to the dispatcher upon deactivation of the transmission inhibited mode.

32.4.13.3 TXI Mode Started Timer, msec

This field will contain the time, for which the user will keep a one-touch button pressed to activate the transmission inhibited mode.

TXI (Transmit-Inhibit) mode is a special terminal mode when uplink transmission of any type is forbidden except an Emergency call.

The transmission inhibited mode is activated by the terminal user in RF sensitive areas (for example, hospitals, airplanes), where safety can be jeopardized due to MS uplink high radiation. When no danger to safety exists anymore (for instance if user leaves RF sensitive area), the user can de-activate transmission inhibited mode and return back to normal operation.

32.4.13.4 TXI Mode Cancel Timer, msec

This field will contain the time, for which the user will keep a one-touch button pressed to deactivate the transmission inhibited mode.

TXI (Transmit-Inhibit) mode is a special terminal mode when uplink transmission of any type is forbidden except an Emergency call.

The transmission inhibited mode is activated by the terminal user in RF sensitive areas (for example, hospitals, airplanes), where safety can be jeopardized due to MS uplink high radiation.

When no danger to safety exists anymore (for instance if user leaves RF sensitive area), the user can de-activate transmission inhibited mode and return back to normal operation.

32.4.13.5 TXI Activation Timer, sec

This field will contain the timeout for the transmission inhibited activation timer, used to allow all ongoing procedures to finish before TX will be blocked in transmission inhibited mode

TXI (Transmit-Inhibit) mode is a special terminal mode when uplink transmission of any type is forbidden except an Emergency call.

The transmission inhibited mode is activated by the terminal user in RF sensitive areas (for example, hospitals, airplanes), where safety can be jeopardized due to MS uplink high radiation. When no danger to safety exists anymore (for instance if user leaves RF sensitive area), the user can de-activate transmission inhibited mode and return back to normal operation.

32.4.14 Sending User Defined Message

This function sends a message the user chose from the Templates list in the terminal.



NOTE

Sending User Defined Message is only available if the appropriate values are set in the Outgoing Mail List.

32.4.14.1 Select Message

Choose a message from a list. The list will include all the user defined messages that appear in the message list in the CPS.

Related field is:

Paragraph 30.1.2 "Outgoing Mail List"

32.4.14.2 Send to

This field contains the destination address for the user defined template message.

The value range varies depending on the Address type parameter setting:

- 0 - user is prompted for address
- If Address type is Private: 0-16777215 Target ISSI
- If Address type is Group: talkgroup stored in talkgroup list
- If Address type is Phone: 1 to 24 digits Target ISDN (includes 0-9, *, # and +)

32.4.14.3 Address Type

This field contains the destination address type for user defined template.

The available options are:

- Group
- Private
- Phone

32.4.15 Hi/Lo Audio

This function changes the speaker between Speaker: On/Speaker: Off.

32.4.16 Change Talkgroup

This option enables fast selection of a predefined talkgroup and different talkgroups may be assigned to different buttons.

32.4.17 Flip Display

This option enables the contents of the display to be flipped upside down. The feature is particularly useful for a user who has to wear the terminal on shoulder, belt, or lapel and at the same time wishes to read the display upside down.

32.4.18 Sending Status

This option allows the user to send a specific status message to a specific talkgroup. This option has the following two editable fields:

Related field is:

Paragraph 11.2 "Status"

32.4.18.1 Send To

This is the GSSI for the group to which the status message will be sent. Place the pointer into the 'Field Value', click on the down arrow to display the Contact Book \ TMO \ TMO Talkgroup List. Place the pointer on the required option and select it by clicking the left mouse button. The selected talkgroup with its associated ID and list position will now be entered into this field.

32.4.18.2 Status ID

Place the pointer into the 'Field Value', click on the down arrow to display the Data Services \ Status ID List. Place the pointer on the required option and select it by clicking the left mouse button. The selected message with its associated ID and list position will now be entered into this field.

32.4.19 TMO <=> DMO Switch

When this option is assigned to a button, the user is able to change the terminal's operational mode between TMO and DMO via a single button press.

32.4.20 TMO Talkgroup Scan

This one touch option is used to enable/disable talkgroup scan.

Related field is:

Paragraph 11.16 "Talkgroup Scan"

32.4.21 Backlight Adjustment

This option allows different backlight functionality to be programmed to different buttons. This option has the same available parameters as the Display Parameters \ Display Options.

Related field is:

Paragraph 27.1 "Display Options".

32.5 Rotary Knob Options

The menu has the following programmable features that cater for the dual functionality of the rotary switch. The rotary switch can be used to scroll talkgroups in the idle mode or lists in the menu and, or to adjust the audio volume.

Normal rotation will adjust the volume, this is also the default in dual mode. Pressing the switch knob down will select the 'List Mode', release the knob, then rotate it to scroll the list. The button will scroll the available talkgroups in the range.

There are two methods for returning to the normal volume operation mode and this is dependent upon the Rotary Switch Knob Timer. If set to zero, the user must manually switch back to normal volume operation by again pressing the Rotary Control Knob, otherwise with a time set, the terminal will automatically return to normal volume operation after this time period.

There are 3 choices associated with this option, click on the down arrow and select the required option.

32.5.1 Rotary Knob Mode

This has the following selectable options:

32.5.1.1 Dual

In this mode the rotary control has dual functionality:

- Rotate the control to set the required audio level (volume), this is the default operation.
- Press the control down, then rotate the control to scroll the list associated with the terminal's current operational mode.

32.5.1.2 Volume

If this option is chosen, the rotary control will have only this 1 function for setting the required audio level (volume).

32.5.1.3 List

If this option is chosen, the rotary control will have only this 1 function and is used for scrolling any list.

32.5.2 Rotary Switch Lock

This option indicates whether the user can lock the rotary knob.

Locking the knob prevents unwanted knob actions. To lock, the user will press and hold the knob. To unlock, the user will press and hold again. Powering Off, then On unlocks a previously locked knob. The user can lock/unlock the knob in any of the functioning (Dual, Volume, List).

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

32.5.3 Rotary Switch Confirm Group Selection

When selecting a group using the rotary switch, this option indicates whether the user should manually confirm the group selection (True) or the group is selected automatically when the Rotary Knob Switch Timer expires.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

32.5.4 Rotary Knob Switch Timer, msec

This defines the time after no activity, when the terminal will action the selected option. If set correctly, it will allow the user to visually check that the correct option has been chosen.

The range for this timer is 0 & 1000 - 60,000 msecs and the default setting is 7,000 msecs.

32.5.5 Rotary Knob Speed Timer, msec

Indicates the time to change the position while scrolling a list, when the Rotary Knob is rotated quickly.

32.5.6 Push Button Long Timer, msec

This option indicates the minimum period of time after which pushing the push button of the Rotary Knob is considered as a long push. Long Push is used only for locking and unlocking the knob, and knob release always moves to the default mode.

The range for this timer is 1,000 to 5,000 msec and the default value is 1,000 msec.

32.5.7 Wrap Around Rotary Group Scrolling



NOTE

The following section refers to portable terminals only.

This field determines the scrolling behavior for the Rotary Knob. Whether this option is enabled or disabled, it results in a scrolling modes in the terminal.

- Enabled (mark the check box) – after you reach the last talkgroup in a folder, you can continue scrolling down. See "24.1.5 Range Scroll Type". The scrolling wraps around the items.
- Disabled – after you reach the last talkgroup in a folder, scrolling ends. To scroll up the list, turn the Rotary Knob counter-clockwise.

32.5.8 Function Keys Mode



NOTE

The following section refers to portable terminals only.

This parameter allows to assign specific roles to function keys, depending or regardless of the Rotary Knob setup. The following modes are available:

- Auto – the function keys role is determined by the current Rotary Knob role. If the Rotary Knob is set to scrolling, the function keys mode turns to adjust the volume.
- Volume Adjustment – the function keys are always the volume buttons.
- One-Touch Button (OTB) Feature – the function keys act as specifically programmed.

32.5.9 Wrap Around Rotary Group Scrolling



NOTE

The following section refers to mobile terminals only.

If this field is enabled, talk group scrolling via the rotary knob will stay in range when the last talk group (scrolling clockwise) or the first talk group (scrolling counter-clockwise) is reached in the range.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

33 Inputs, Outputs, GPIOs



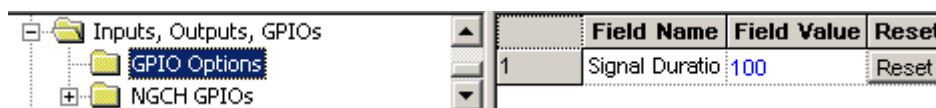
NOTE

This section applies to MTM800 Enhanced only.



These menus are used for Control head's input, output, and general programmable input output GPIO settings.

33.1 GPIO Options



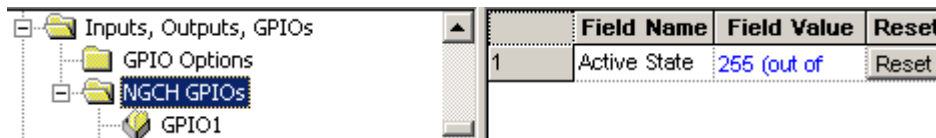
Signal Duration, msec - defines duration of the output of the signal given on the certain output port.

33.2 NGCH GPIOs



NOTE

This section applies to MTM800 Enhanced only.



Defines which level (low or high) is to be regarded as a signal on certain GPIO.

33.2.1 Configuring GPIO

To configure GPIO in the codeplug, proceed with the following steps:

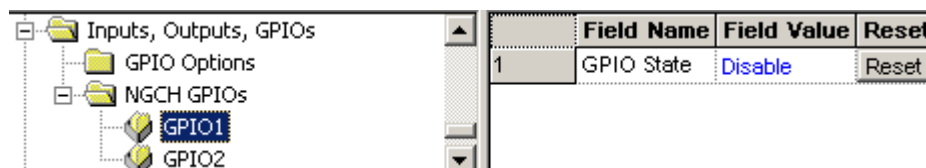
1. In GPIO Options set the duration of the signal produced
2. In NGCH GPIOs configure the signal active state (High or Low)
3. For each GPIOs (GPIO1 and GPIO2) select the relevant GPIO state and configure the parameters

The GPIO State states whether the GPIO is used as input or output. The GPIO function selects what should trigger the IO, an SDS message (Specific message) or TX/RX indication.

For the Selected PI (Protocol Identifier) using the Specific message function you define the PI to receive the SDS on. Use only free PIs, that is, you cannot choose PIs that are used by other internal applications (for example, 130 for text application).

For security reasons you can enable the Validation. The terminal validates on ISSI, SDS message string or both. In the Valid ISSI insert the ISSI of the terminal that you expect to receive the message from. In the Valid String insert the text string that you expect to receive in the SDS message.

33.2.2 GPIO1



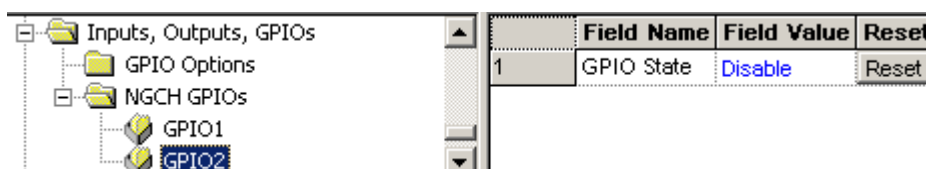
33.2.2.1 GPIO State

Selects the GPIO1 state.

The options are:

- Disable - GPIO1 is deactivated.
- Input - the user can setup GPIO1 to work as input pin, in this case, Send predefined message.
- Output – the user can setup GPIO1 to work as output pin, in this case, Send specific message indication.

33.2.3 GPIO2



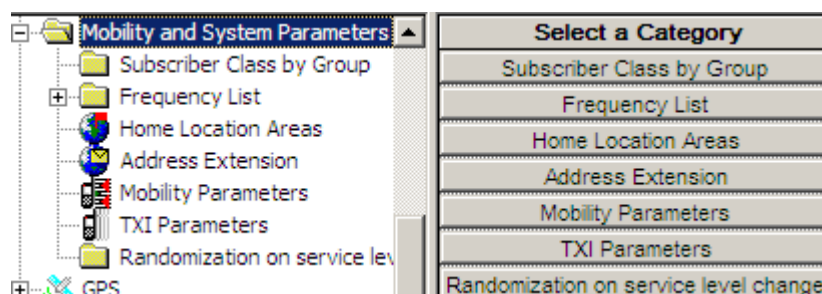
33.2.3.1 GPIO State

Selects the GPIO2 state.

The options are:

- Disable - GPIO2 is deactivated.
- Input - the user can setup GPIO2 to work as input pin, in this case, Send predefined message.
- Output – the user can setup GPIO2 to work as output pin, in this case, Send specific message indication.

34 Mobility and System Parameters




These menus are used for programming the terminal with the necessary system parameters that will enable the terminal to work on the system.

This contains the following menus, of which the Frequency List menu has several submenus.

34.1 Subscriber Class by Group

This node displays the Subscriber Class by Group tables. This option is available only, if the Subscriber Class by Group is enabled.



	Subscriber Cla	Talkgroup Assoc	First GSSI	Last GSSI	TG Fold
1	0xFFFF	TG Range	0	0	No Folder
2	0xFFFF	TG Range	0	0	No Folder
3	0xFFFF	TG Range	0	0	No Folder
4	0xFFFF	TG Range	0	0	No Folder
5	0xFFFF	TG Range	0	0	No Folder
6	0xFFFF	TG Range	0	0	No Folder
7	0xFFFF	TG Range	0	0	No Folder
8	0xFFFF	TG Range	0	0	No Folder
9	0xFFFF	TG Range	0	0	No Folder
10	0xFFFF	TG Range	0	0	No Folder
11	0xFFFF	TG Range	0	0	No Folder
12	0xFFFF	TG Range	0	0	No Folder
13	0xFFFF	TG Range	0	0	No Folder

34.1.1 Subscriber Class of Talkgroup

This field defines Subscriber Class by Talkgroup. Each row represents one Subscriber Class in the table. This option is available only if the Subscriber Class by Group feature is enabled.

Type in the desired value. The range for this parameter is 0x0000 - 0xFFFF. The default is 0xFFFF.

34.1.2 Talkgroup Association Type

This field indicates whether Talkgroup Association Type is set to talkgroup Range or talkgroup Folder.

When the talkgroup Range is selected then if the user chooses between the first and the last GSSI that is specified in the codeplug, the Subscriber Class changes. When the talkgroup Folder is selected then if the user chooses the talkgroup from the talkgroup Folder the SC assigned to that folder changes to that talkgroup.

This option is available only, if the Subscriber Class by Group is enabled.

Select the desired option. The default is talkgroup Range.

34.1.3 First GSSI

This field indicates the first GSSI of the Talkgroup range. This option is available only if Subscriber Class of Talkgroup is set to talkgroup Range, and when Subscriber Class by Group is enabled.

Type in the desired value. The range for this parameter is 0 - 13999999. The default is 0.

34.1.4 Last GSSI

This field indicates the last GSSI of the Talkgroup range. This option is available only if Subscriber Class of Talkgroup is set to talkgroup Range, and when Subscriber Class by Group is enabled.

Type in the desired value. The range for this parameter is First GSSI - 13999999. The default is 0.

34.1.5 Talkgroup Folder

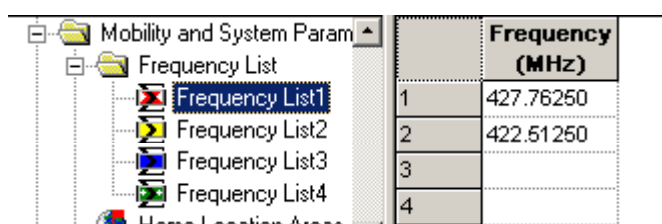
This field indicates the name of the Talkgroup Folder Name. If the terminal user switches the Talkgroup to the folder name that is specified, the Subscriber Class is changed as well. This option is available only if Subscriber Class of Talkgroup is set to talkgroup Folder and the Subscriber Class by Group is enabled

Select the desired folder. The range for this parameter is any valid folder name, except My Groups. By default No Folder is selected.

34.2 Frequency List

This contains the following four frequency lists:

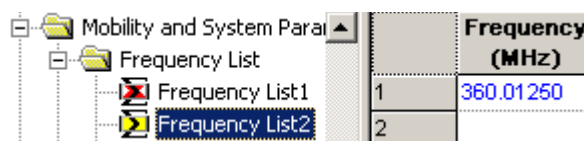
34.2.1 Frequency List 1



	Frequency (MHz)
1	427.76250
2	422.51250
3	
4	

Displays a dynamic list of discrete frequencies that the terminal scans to find a valid TETRA system. This list is maintained internally by the unit's embedded software only.

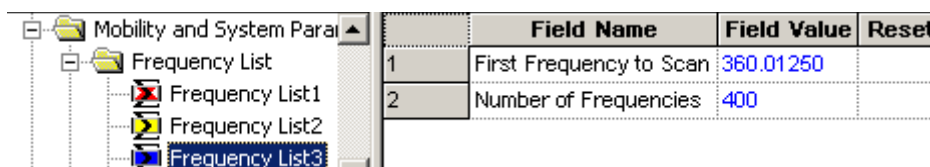
34.2.2 Frequency List 2



	Frequency (MHz)
1	360.01250
2	

This list contains up to 32 valid cell frequencies for the system(s) to which the terminal has access. Frequencies must be entered here to enable first time rapid access to a system. If no frequencies were entered, the terminal would use the comprehensive hunt feature of lists 3 & 4 if enabled.

34.2.3 Frequency List 3



	Field Name	Field Value	Reset
1	First Frequency to Scan	360.01250	
2	Number of Frequencies	400	

Lists 3 & 4 allow flexibility in the comprehensive hunt, both have the same options but the field values should be different to allow for the different system frequencies.

34.2.3.1 First Frequency to Scan

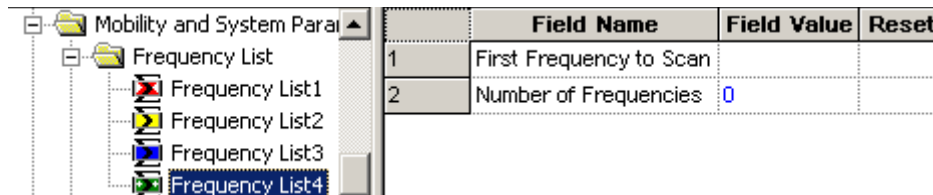
This might appear to be a straight forward entry of the base frequency of the system(s), but the terminal checks frequencies in 25kHz steps and systems may be using 25kHz, 12.5kHz or 6.25kHz offsets. In the above picture the base frequency has a 12.5kHz offset.

34.2.3.2 Number of Frequencies

The entry in this field defines how many frequencies, upwards from the base frequency, the terminal will check.

As shown above, the terminal will check 399 frequencies and as there is a step size of 25kHz, all frequencies from 420.01250MHz to 429.975MHz inclusive will be checked.

34.2.4 Frequency List 4



	Field Name	Field Value	Reset
1	First Frequency to Scan		
2	Number of Frequencies	0	

It may not be necessary to use this list, in which case ensure there are no entries in the field values.

Using both tables adds flexibility to the comprehensive hunt if it is required for multiple system access that use different frequencies offsets. In the above picture the base frequency has a 6.25kHz offset and the frequencies scanned will be from 420.00625MHz to 429.98125MHz inclusive.



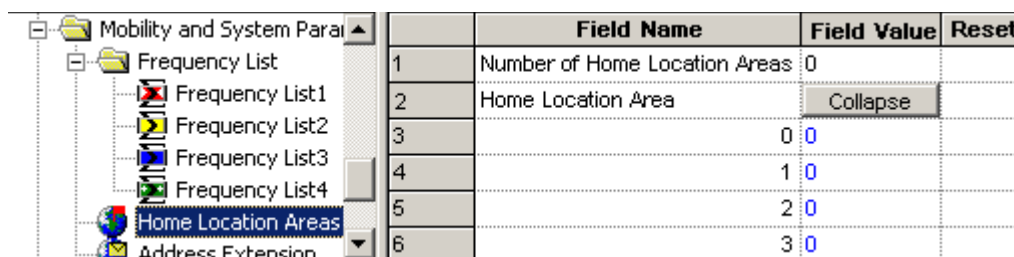
NOTE

This is more likely that lists 3 & 4 will have 25kHz and 12.5kHz offsets.

Comprehensive Hunt - is used when the terminal cannot log on to a system using the frequencies in lists 1 & 2. The terminal will search a predefined number (block) of frequencies in List 3, then check the frequencies in lists 1 & 2 before returning to List 3 and searching the next block of frequencies. This procedure is repeated until the frequencies of both lists 3 & 4 have been checked.

The terminal will repeat this procedure until a system is found on which it can register.

34.3 Home Location Areas



	Field Name	Field Value	Reset
1	Number of Home Location Areas	0	
2	Home Location Area	Collapse	
3		0	
4		1	
5		2	
6		3	

These two has two options that define the system cells to which the terminal may roam and operate.

34.3.1 Number of Home Location Areas

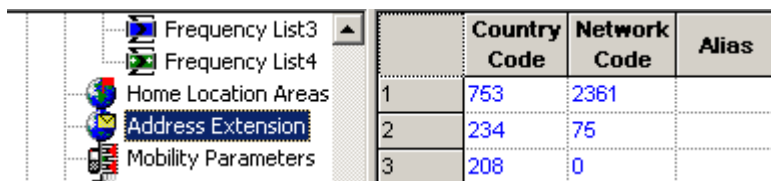
The number in this field is automatically entered by the CPS after the Home Location Areas have been defined.

34.3.2 Home Location Area

This is a collapsible table that can have up to 34 entries and contains the cell numbers of the cells which are the preferred cells on which the terminal should work.

Select the 'Expand' option to open the table and enter the cells to which the terminal can register. Afterwards 'Collapse' the table and the number of cells to which the terminal can roam will be displayed on line 1.

34.4 Address Extension



	Country Code	Network Code	Alias
1	753	2361	
2	234	75	
3	208	0	

This is a list can have up to 100 entries of systems to which the terminal has access. As the terminal does not have multiple personalities, its ISSI and groups must also be in the data bases of each system for it to work on those systems.



NOTE

The first entry is the default or 'Home' system and is the first system that the terminal will attempt registry.

The list has the following fields:

34.4.1 Country Code (MCC)

This is the country code of the system

34.4.2 Network Code (MNC)

This is the systems unique ID.



NOTE

The MCC and MNC are provided by the in country licensing authority.

34.4.3 Alias

This is the name or alias of the system and can be a maximum of 11 characters.

34.5 Mobility Parameters

	Field Name	Field Value
1	Min RSSI Threshold Delta	-110
2	Start Monitoring Threshold Delta	10
3	Stop Monitoring Delta	10
4	Subscriber Class	0xFFFF
5	Behaviour on SC Mismatch	Normal ranking
6	SC Acquisition Timer, sec	30
7	Never Register on LST	<input type="checkbox"/>
8	MLE Sleep Timer, sec	5
9	Type 2 Reselection Enabled	<input checked="" type="checkbox"/>
10	RSSI Scan Frequency Block Size	32
11	Common SCCH Allocation Number (MS_SCCH)	0
12	Minor Congestion Timeout	3
13	Major Congestion Timeout	15
14	Randomization Congestion Timer, sec	20
15	Cell No Longer Congested Timeout	10
16	Avoid Registration on Link Failure Timeout, sec	1
17	Max Time Out of Serving Cell	30
18	Full Band Scan	<input type="checkbox"/>
19	Loc Update Type on Returning Home	ITSI attach permitted
20	RF Power Class Selected	Normal RF Power

The entries in this field help the terminal to determine a valid control channel when searching for a 'new cell' on which to attach and also enable the system SwMI to allocate resources to the terminal.

34.5.1 Min RSSI Threshold Data

The entry in this Field Value defines the received minimum average signal strength that will be considered by the terminal as a viable control channel.

The range is 0 to -127, the default being -110.

34.5.2 Start Monitoring Threshold Delta

This Field Value is used to set the tolerance threshold above the Slow Reselect Threshold.

The Slow reselect Threshold parameter is one of several system parameters settings used to set for setting a cells coverage area and the defined RSSI of these parameters is used by the terminal to determine cell reselection.

If the RSSI of a cell is above this Field Value setting, the signal strength of the cell's control channel is considered strong enough so that the terminal will not normally scan other neighbor cells,

34.5.3 Stop Monitoring Delta

The entry in this Field Value defines the value of the received signal above that set in the Start Monitoring Threshold Delta Field Value after which the terminal will stop monitoring the received control channel RSSI.

34.5.4 Subscriber Class

Systems may be able to divide their subscriber population into different 'Classes' and allocate certain resources to specific 'Classes'.

If set to '0', the terminal will not work normally on any system, set this field accordingly, the default is displayed above.

34.5.5 SC Acquisition Timer

If the Subscriber Class (SC) of the terminal has been set, the terminal will always attempt to log onto a cell that supports this class.

The Field Value determines the period of time that the terminal will search for a cell that support this class, after which it will register on the best cell even though there is no SC match.

The range is 0 to 300 seconds, the default is 30 seconds.

34.5.6 Never Register on LST

This option determines whether a terminal is permitted or forbidden to register on LST.

Mark the check box (enable) to prevent the terminal from registering on LST.

34.5.7 MLE Sleep Timer

The Field Value entry for the Mobile Link Entity (MLE) defines the period of time the terminal waits between iterations of frequency list scanning.

Upon power up, or whenever the terminal is not attached to any cell and there are no known suitable neighbor cells, the terminal begins to scan the frequencies.

After having exhausted all the lists, the terminal waits a provisioned amount of time before beginning the process again from the first list. This time needs to be carefully balanced between the need to save battery life and the need to find a system quickly after having lost coverage.

The range is 0 to 60 seconds, the default being 5 seconds.

34.5.8 Type 2 Reselection Enabled

This field needs to always be enabled except for terminals that are working on legacy Dimetra-P releases.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

34.5.9 RSSI Scan Frequency Block Size

Sets the number of frequencies in List 3 that are scanned when the MS is searching for a signal.

Upon power up or whenever the MS is not attached to any cell or there are no known suitable neighbor cells, or in other words, there is a lost of signal, the MS starts scanning the frequencies from the stored lists to search for a signal. There are 4 lists altogether (List 1, List 2, List 3 and List 4). The sequence of scanning is illustrated below.

There are 4 block sizes to choose from:

- 4
- 8
- 16
- 32

To select the option, put the pointer into the field value, click the drop-down list and select the required value.

34.5.10 Common SCCH Allocation Number (MS_SCCH)

This parameter is used by the terminal along with a parameter broadcasted by the SwMI to determine the common control channel to be used by this terminal.



NOTE

- To be effective, the allocation numbers should be evenly distributed amongst the subscriber population.
- If support of common SCCH is changed from enabled back to disabled, then the terminal should not be switched on and used again on an operational system until the system's inactivity time has passed (many hours).

34.5.11 Minor Congestion Timeout

This parameter is used to set the timeout for the cells recognized as congested for the second time (that is with minor congestion, or level 3 congestion).

The range is 1 to 240 times the value of Randomization Congestion Timer (in seconds). The default value is 3. (For the default values this equals 3*20 sec, that is 1 minute.)

34.5.12 Major Congestion Timeout

This parameter is used to set the timeout for the cells recognized as congested for the third time or more (that is with major congestion, or level 4 congestion).

The range is from Minor Congestion Timeout value to 250 times the value of Randomization Congestion Timer (in seconds). The default value is 15. (For the default values this equals 15*20 sec, that is 5 minutes.)

34.5.13 Randomization Congestion Timer, sec

This parameter is used to add randomization into terminal population roaming on congested cells.

The range is from 1 to 240 seconds. The default value is 20 seconds.

34.5.14 Cell No Longer Congested Timeout

This timer defines when a cell is no longer congested and is removed from the congestion list.

The range is from 1 to 240 minutes. The default value is 10 minutes.

34.5.15 Avoid Registration On Link Failure Timeout, sec

This timer indicates whether the terminal can avoid registration on serving cell during a link failure.

The range is from 0.1 to 30 seconds. The default value is 1 second.

34.5.16 Full Band Scan

This parameter indicates, whether the terminal uses the full band scan on initial cell selection.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

34.5.17 Max time out of serving cell

This parameter is a timer indicating how long a terminal can be out of serving cell, and when it uses re-registration while going back to a serving cell.

34.5.18 Behavior on SC mismatch

This parameter describes terminal behavior on cells with Subscriber Class (SC) mismatch.

The available options are:

- Never register - when the SC mismatch occurs, the terminal removes the mismatched cell from the ranking list
- Normal ranking - when the SC mismatch occurs, the terminal uses normal ranking procedures

To select the option, put the pointer into the field value, click the drop-down list and select the required value.

34.5.19 Loc Update type on returning home

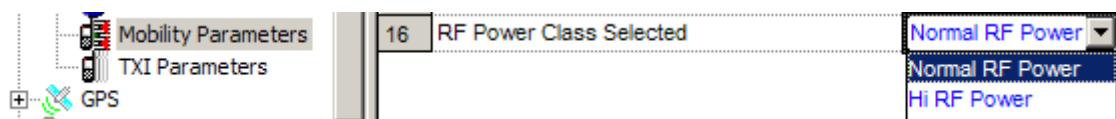
This parameter defines how the terminal fills Location Update Type field during returning to home SwMI.

The available options are:

- ITSI attach permitted
- ETSI compliant

This option is available only if the Air Interface Migration feature is enabled.

34.5.20 RF Power Class Selected



NOTE

This section applies only to terminals supporting TX Power Class 3L (1.8 W).

Selects the current setting of the terminal's RF power class.

The selectable options are:

- Hi RF Power - The terminal transmits with Power Class 3L (1.8 W)
- Normal RF Power - The terminal transmits with Power Class 4 (1 W)

To select an option, put the pointer into the field value, click on the arrow, and click the desired option.

34.5.21 High Power Activation Upon Entering DMO

This option enables a terminal to automatically switch its RF power to a high level, each time the terminal enters DMO.

In other words, each time a terminal transitions from TMO to DMO or powers up in DMO, it activates the Hi RF Power Class.

34.5.22 Low Power Activation Upon Entering TMO

This option enables a terminal to automatically switch its RF power to a low level, each time the terminal enters TMO.

In other words, each time a terminal transitions from DMO to TMO or powers up in TMO, it activates the Low RF Power Class.

34.5.23 AIM Network Selection



NOTE

This section applies to TCR1000 only.

This parameter allows to select a network to which a terminal is allowed to register.

34.5.24 AIM Tones



NOTE

This section applies to TCR1000 only.

If this parameter is enabled, an alert tone triggers when a terminal migrates from and to Home and Foreign networks.

34.5.25 Overwrite MSCCH Over The Air

This field determines a terminal's behavior on receiving a new MSCCH value from SwMI.

If this field is enabled, the terminal overwrites the currently stored Common SCCH Allocation Number with the new value received over the air.

Mark the check box to enable.

34.5.26 Maximum RF Transmit Level



NOTE

This section applies to MTM5400 and MTM800 FuG terminals only.

This field determines RF Power Class for the terminal, where the power classes equal the respective powers:

- Class 2 = 10 W
- Class 2L = 5.6 W
- Class 3 = 3 W

The Maximum RF Transmit Level settings apply to both the TMO and DMO.

34.6 TXI Parameters (Transmit Inhibit)

	Field Name	Field Value	Reset
1	Activate	65264	Reset
2	Deactivate	65265	Reset
3	TXI Activation Timer, sec	15	Reset
4	TXI Mode Started Timer, msec	500	Reset
5	TXI Mode Cancel Timer, msec	2000	Reset

Allows setting up parameters of TXI status messages the terminal will send to the dispatcher upon activation/de-activation of the TXI (Transmit Inhibit) mode.

TXI mode, also called terminal RF (Radio Frequency) SA (Sensitive Area) Mode, is a special terminal mode where uplink transmission of any type is forbidden except an Emergency call.

The TXI mode is activated by the terminal user in RF sensitive areas, (for example hospitals, airplanes, and so forth), where safety can be jeopardized due to terminal uplink high radiation.

When no danger to safety exists anymore (for instance if user leaves RF sensitive area), the user can de-activate TXI mode and return back to normal operation.

**NOTE**

If an emergency call caused TXI mode de-activation, no status message will be sent about TXI deactivation.

These are the same options available for the TXI One Touch Button option, see Paragraph 32.4.13 "TXI (Transmit Inhibit)". Both menus are linked and if a field value is changed in either menu, it will automatically be changed at the other. It has the following options:

34.6.1 Activate

When TXI is enabled, the terminal can send a status message informing the dispatcher that it is in TXI mode and is receive only. The status message number is manually entered into this field and is not selectable from the Status List entries.

34.6.2 Deactivate

When TXI is disabled, the terminal can send a status message informing the dispatcher that it is in now in normal operating mode. The status message number is manually entered into this field and is not selectable from the Status List entries.

34.6.3 TXI Activation Timer

This is the time delay between TXI being selected and TXI actually starting, it allows time for all on going procedures to be completed before transmission is actually blocked.

The range is from 1 to 30 seconds and the default is 15 seconds.

34.6.4 TXI Mode Started Timer

The entry in this field sets the time that the button must remain pressed before the TXI mode is started.

The range is from 1 to 5000 msecs and the default is 500 msecs.

34.6.5 TXI Mode Cancel Timer

The entry in this field sets the time that the button must remain pressed before the TXI mode is cancelled and the terminal reverts to normal operation.

The range is from 1000 to 5000 msecs and the default is 2000 msecs.

34.7 Randomization on Service Level Change

- TNP 1 Support
 - Buttons, Keys and Accessories
 - Mobility and System Parameters
 - Subscriber Class by Group
 - Frequency List
 - Home Location Areas
 - Address Extension
 - Mobility Parameters
 - TXI Parameters
 - Randomization on service level change
- GPS

	Field Name	Field Value	Reset
1	Reselection randomization timer	1	
2	Randomize on going to WST	<input type="checkbox"/>	
3	Randomize on security drop	<input type="checkbox"/>	
4	Randomize on SC	<input checked="" type="checkbox"/>	
5	Randomize on HLA	<input checked="" type="checkbox"/>	
6	Randomize on LA boundary	<input checked="" type="checkbox"/>	
7	Randomize on Cell Load	<input type="checkbox"/>	
8	Randomize on security gain	<input type="checkbox"/>	
9	Randomize on going to LST	<input type="checkbox"/>	

34.7.1 Reselection randomization timer

This is randomization timer value for the cell reselection.

34.7.2 Randomize on going to WST

This parameter indicates if cell reselection randomization due to the cell going from Local Site Trunking (LST) to Wide Site Trunking (WST) is enabled.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

34.7.3 Randomize on security drop

This parameter indicates if cell reselection randomization due to the security level drop is enabled.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

34.7.4 Randomize on SC

This parameter indicates if cell reselection randomization due to the Subscriber Class change is enabled.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

34.7.5 Randomize on HLA

This parameter indicates if cell reselection randomization due to the Home Location Area change is enabled.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

34.7.6 Randomize on LA boundary

This parameter indicates if cell reselection randomization due to the Location Area Boundary change is enabled.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

34.7.7 Randomize on Cell Load

This parameter indicates if the cell reselection randomization due to a Cell Load change is enabled.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

34.7.8 Randomize on security gain

This parameter indicates if cell reselection randomization due to the security level gain is enabled.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

34.7.9 Randomize on going to LST

This parameter Indicates if cell reselection randomization due to the serving cell going from WST to LST is enabled.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

35 GPS

Not only can the reports be sent to meet customer requirements, but they can also be triggered by events occurring through terminal us, such as emergency call initiation and power on/off and so forth.

The GPS menus define the parameters that are used by and when these events (such as selecting DMO) are triggered.

Other situations are:

- On Request.
- Specific events.
- Triggered after a time interval.
- Triggered at specific distance intervals.

The reports are sent using a proprietary protocol, via the SDS transport layer, that also flags error conditions.

The user's involvement with the operation of this feature is minimal, although the terminal does provide indications of the operational status of the GPS feature.

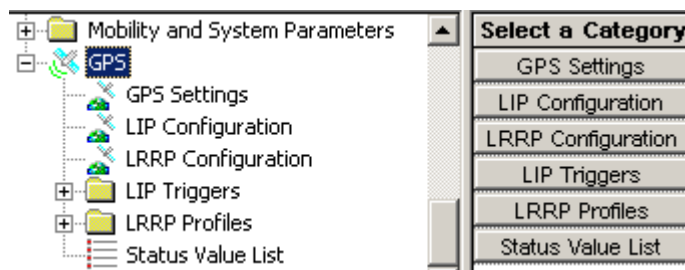
The GPS feature can be enabled/disabled via the CPS and its event times/responses can be configured in the GPS menu options. Configuration can also be done 'Over the Air' and this new information will overwrite the CPS configuration.

All data requests and configuration commands received over the air are authenticated by checking the ISSI of the sender of the source file, if the ISSI is wrong, the file will be rejected.



NOTE

Under the worst possible scenario of non emergency use, this feature will drain the battery by up to 10%.



35.1 GPS Settings

	Field Name	Field Value
1	Current GPS Cycle	1
2	Leap Seconds	14
3	Enable GPS via MMI	<input type="checkbox"/>
4	Testpage on the MMI Enable	<input type="checkbox"/>
5	Beep for GPS Coverage	<input checked="" type="checkbox"/>
6	Icon for GPS Coverage	<input checked="" type="checkbox"/>
7	GPS Bearer	SDS
8	GPS Authorised ISSI Base	0
9	GPS Authorised ISSI Range	0
10	GPS Authorised IP Base	0. 0. 0. 0
11	GPS Authorised IP Network Mask	255.255.255.254
12	MMI Accuracy Menu Enabled	<input checked="" type="checkbox"/>
13	GPS Coverage Poll Period	180
14	Preferred Position Calculation Mode if DCK is Off	Power Optimized
15	Accuracy Mode Switching Enabled	<input type="checkbox"/>
16	High Accuracy Mode On Emergency	<input type="checkbox"/>
17	GPS Location Protocol	LRRP
18	GPS Coordinates	Latitude/Longitude
19	GPS in DMO	Disabled

35.1.1 Current GPS Cycle

This parameter Indicates the current GPS cycle.

Each 1024 weeks (starting from 1980/01/06) the GPS Week number rolls-over the 1024 border and re-starts again with 0. That means that around each approximately 19,85 years a roll-over appears. The first GPS cycle was from 1980/01/06 to 1999/08/21. The second GPS cycle starts on 1999/08/22 and runs currently until 2019.

For the current time from 22.Aug.1999 until 2019 the GPS cycle "1" would be typed in.

35.1.2 Leap Seconds

This parameter specifies the difference between GPS time and UTC Time. The parameter is used to synchronize both time systems in the terminal.

35.1.3 Enable GPS via MMI



NOTE

The following section is not applicable to TCR1000.

This parameter enables/disables GPS MMI (Man Machine Interface):

- If enabled, the terminal provides an MMI interface by means of which the user can change the GPS settings (disabling/enabling Location Services).
- If disabled, the terminal does NOT provide any means by which the user can change the GPS settings. The user cannot disable or enable Location Services.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

35.1.4 Test Page on the MMI Enable



NOTE

The following section is not applicable to TCR1000.

This parameter enables/disables the test page availability through MMI (Man Machine Interface).

- If enabled, the terminal provides an MMI by means of which the terminal's user can view the detailed GPS information.
- If disabled, the terminal does NOT provide any means by which the terminal's user can view the detailed GPS information.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

35.1.5 Beep for GPS Coverage

If the parameter is enabled, the GPS Coverage audio indications are enabled in the terminal.

If the parameter is disabled, the GPS Coverage audio indications are disabled in the terminal.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

35.1.6 Icon for GPS Coverage

If the parameter is enabled, the GPS Coverage visual indications are enabled in the terminal.

If the parameter is disabled, the GPS Coverage visual indications are disabled in the terminal.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

35.1.7 GPS Bearer

This parameter indicates whether GPS service is based on the SDS or PD.

There are two options available to select:

- Packet Data - GPS services use the Packet Data for sending information
- SDS - GPS services use the SDS for sending information

To select an option, put the pointer into the field value, click the drop-down list and select the required value.

35.1.8 GPS Authorised ISSI Base

This ISSI is the first in the range of ISSIs acceptable as authorized. (When receiving location service requests, the terminal checks the calling party ISSI of downlink location service requests.)

The range is any valid ISSI, or the NO ISSI reserved value. (NO_ISSI is a reserved value outside the range of possible ISSIs, and only used to indicate that no ISSI has been assigned to the field in question.)

Type in the first valid ISSI.

35.1.9 GPS Authorised ISSI Range

This parameter defines the range (or offset) of authorised ISSIs - start from "GPS Authorized ISSI Base".

Type in the range/offset for the last valid ISSI.

35.1.10 GPS Authorised IP Base

This parameter describes the Base IP in conjunction with network mask from codeplug GPS Authorized IP network mask which defines the range of authorized IP addresses.

The range for this parameter is 0.0.0.0-255.255.255.255. The default is 0.0.0.0.

35.1.11 GPS Authorised IP Network Mask

This parameter indicates the authorized network address in conjunction with the IP address from the codeplug GPS Authorised IP base.

The range for this parameter is 128.0.0.0-255.255.255.254. The default is 255.255.255.254.

35.1.12 GPS Coverage Poll Period

This number is the period (in seconds) in which the GPS Coverage is checked when out of GPS coverage and the GPS icon is updated accordingly.

The GPS Coverage Poll Period is the value used to instruct the GPS device to periodically update its location when 'Power Optimized' is the codeplug selection for the Preferred Position Calculation. A value of less than the default 180 seconds is recommended when the window formed by Max data age and Max Acquisition Delay is narrow. In fact, a value in the region of 15 to 25 seconds is recommended.

Selection of 'Power Optimized' has the advantage of reducing the battery drain of the terminal over that of when 'Accuracy Optimised' is selected.

Type in (in seconds) how often the GPS Coverage should be checked.

35.1.13 Preferred Position Calculation Mode if DCK is Off

When DCK (Digital Car Kit) is off, the terminal has only its own battery as power source. This means normally all hardware works in power save mode if possible. But, it is also possible to get more exact position data, even when DCK is off.

This leads to high power consuming of the GPS related hardware, because it then works in the same mode as it would be in "DCK on" status.

The battery will then be empty earlier when this mode is active.

This parameter allows user to configure the terminal to deliver more (and more exact) position data even when DCK is off.

Therefore, the terminal works in a mode that is normally not used when DCK is off.

35.1.14 MMI Accuracy Menu



NOTE

The following section is not applicable to TCR1000.

This field is used to store information on whether the terminal's user can see and use the GPS Accuracy menu or if it is hidden from him.

If this field is set to Enabled (field checked off), the terminal will show the GPS Accuracy menu to the user. The user can choose between two GPS tracking modes outside of a digital car kit (DCK) with their own advantages (better position accuracy, less power optimised) and disadvantages (power optimised but less accuracy).

35.1.15 Accuracy Mode Switching Enabled

If this parameter is enabled, the terminal is able to switch to the High Accuracy mode on emergency and/or outgoing Status messages.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

35.1.16 High Accuracy Mode on Emergency

If this parameter is enabled, the terminal automatically switches to the High Accuracy Mode on emergency. The field "Accuracy Mode Switching Enabled" must also be checked.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

35.1.17 GPS Location Protocol

In this field you select the over-the air location protocol used for location requests and location reports.

There are 2 possible choices:

- LIP - Location Information Protocol (ETSI standard)
- LRRP - Location Request Response Protocol (Motorola Proprietary standard)

To select the option, put the pointer into the field value, click the drop-down list and select the required value.

35.1.18 GPS Coordinates

Determines the coordinates to be displayed in the GPS Menu.



NOTE

- The default setting (box checked) is recommended because of the shorter message over the air.
- GPS Coordinates does not affect the coordinates sent over the Air Interface.

Three types of characters are available:

- Latitude/Longitude - displays the Latitude and Longitude.
- Position with UK Coordinates - displays the UK Easting/Northing Coordinates.
- Position with Irish Coordinates - displays the Irish Grid Coordinates.

To choose the GPS Coordinates type, put the pointer inside the field, click the drop-down list and select the required value.

35.1.19 GPS in DMO

Indicates whether GPS is reporting in DMO is disabled, enabled in Gateway mode, or enabled in any DMO mode.

35.2 LIP Configuration

	Field Name	Field Value
1	Send Initialization Request	<input checked="" type="checkbox"/>
2	Destination ISSI	0
3	Destination IP Address	0. 0. 0. 0
4	Remote Port	1
5	Minimum Reporting Interval	10 s
6	Enable/disable Temporary Minimum Repo	<input type="checkbox"/>
7	Temporary Minimum Reporting Interval	Two Times Normal Minimum
8	Max Data Age	1 s
9	Max Response Time	120 s
10	Delete All OTA LIP Report Requests	

To configure the LIP properly in the terminal, proceed with the following steps.

1. In the Feature Flags enable the **GPS** feature

	Field Name	Field Value
22	Speed Dialing	<input checked="" type="checkbox"/>
23	GPS	<input checked="" type="checkbox"/>
24	Tx Audio High Pass Filter	<input type="checkbox"/>

2. In GPS Settings from the GPS branch, set the following parameters

	Field Name	Field Value
	Beep for GPS Coverage	<input checked="" type="checkbox"/>
	Notification for GPS Coverage	<input checked="" type="checkbox"/>
	GPS Authorised ISSI Base	0
	GPS Authorised ISSI Range	0

- a. In the **GPS Authorised ISSI Base** insert the ISSI of the LIP application that is expected to send requests to the terminal.
- b. In the **GPS Authorised ISSI Range** insert the ISSI of the LIP application that is expected to send requests to the terminal. If more than one application is expected to send requests to the terminal then insert the last ISSI in the range.

3. In the LIP Configuration from the GPS branch, set the following parameters

	Field Name	Field Value
1	Send Initialization Request	<input checked="" type="checkbox"/>
2	Destination ISSI	0
3	Minimum Reporting Interval	10 s

- a. In Destination ISSI insert the ISSI of the LIP application that shall receive the LIP messages.

The LIP service is now configured. For triggers configuration, see the respective sections in this chapter. Triggers can be also configured and controlled via the third party LIP application.

35.2.1 Send Initialization Request

If enabled, the terminal will send an Initialization Request after it is powered up and registered in the network. After the terminal has sent the Initialization Request it expects a LOCATION REPORTING

ENABLE/DISABLE REQUEST from the Location Server to configure its initial LIP settings (for example whether the terminal is globally disabled or enabled for sending location reports). In case it does not receive an answer from the location server, the terminal considers itself disabled for location reporting.

If this field is disabled the terminal will not send an Initialization Request and considers itself enabled for location reporting.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

35.2.2 Destination ISSI

This is the destination Individual Short Subscriber Identity (ISSI) for Location Information Protocol (LIP) reports. Usually this is the address of the LIP Location Server.

Type in the required value.

35.2.3 Destination IP Address

This parameter indicates destination IP address for LIP reports. This option is available only if the GPS Location Protocol is set to LIP and GPS Bearer is set to Packet Data.

The range for this parameter is 0.0.0.0-255.255.255.255. The default is 0.0.0.0.

35.2.4 Remote Port

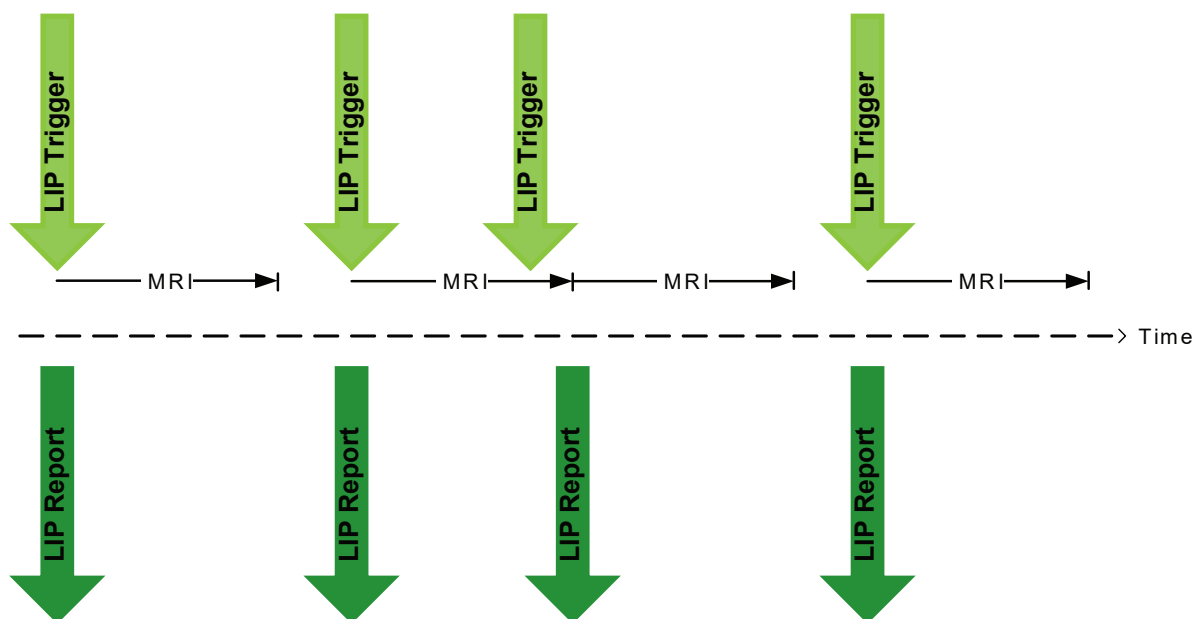
This parameter defines the remote port (UDP port) number for Unsolicited Location Reports when the GPS over Pack Data is enabled.

The range for this parameter is 1-65536. The default is 1.

35.2.5 Minimum Reporting Interval

Minimum Reporting Interval is a timer that is run after a GPS report has been transmitted. Any further reports that arrive at the radio air interface before the timer expires are discarded. The purpose of this timer is to prevent congestion of the radio air interface, and of course the channel on which GPS signalling is transmitted. The Minimum Reporting Interval sets the lower limit for the time

at which a location report is transmitted from the terminal to the next triggered or unsolicited location report that may be transmitted from the terminal.



The Minimum Reporting Interval does not apply to:

- Location reports for the following triggers: Emergency, Power-down, DMO On and TXI On
- Immediate location reports such as: Basic Location Parameter Response, Report Basic Location Parameters Response, Add/Modify Trigger Response, Remove Trigger Response, Report Trigger Response, Location Reporting Enable/Disable Response

If the user desires to receive all location reports as soon as the reports are triggered, this duration should be set to a low value. The minimum period of 10 seconds is recommended.

Type in the required value.

35.2.6 Enable/disable Call Temporary Minimum Reporting Interval

Indicates whether Call Temporary Minimum Reporting Interval feature is enabled or disabled.

The Call Temporary Minimum Reporting Interval feature can be enabled only if the GPS Location Protocol is set to LIP.

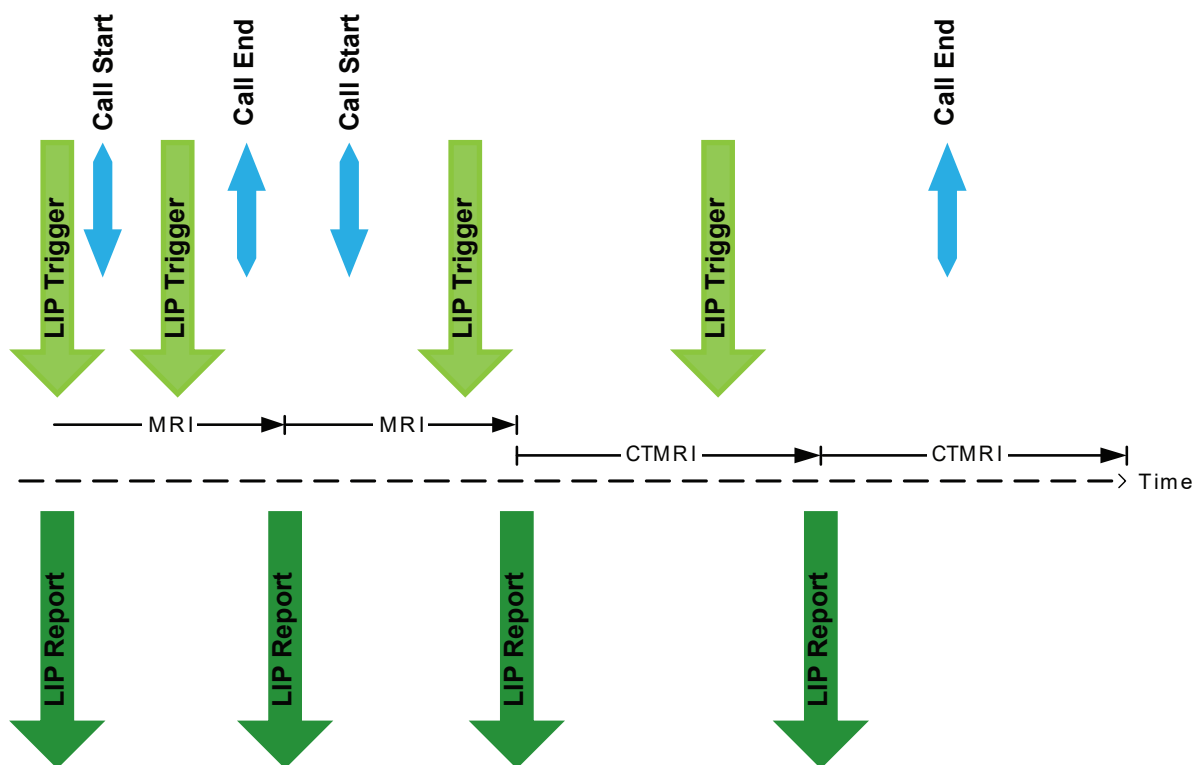
35.2.7 Call Temporary Minimum Reporting Interval

Call Temporary Minimum reporting interval is a feature which increases the 'Minimum Reporting Interval' by the multiplier defined in 'Call Temporary Minimum Reporting interval'.

The Call Temporary Minimum reporting interval feature is recommended for use where a large congregation of users in a small area, using few (for example, only one) TETRA Base Station.

When a Voice Call is in progress, that is the TETRA terminal uses a traffic channel, sending GPS reports has fewer opportunities to occur as compared with the terminal in idle state on the control channel. Only in the case of a voice call the 'Call Temporary Minimum Reporting Interval' reduces

the sending of GPS reports in order to reduce the possibility of collisions during high voice traffic (for example, missed calls).



Ensure a minimum interval elapses between location reports to avoid flooding the Air Interface at Critical Times.

35.2.8 Max Data Age

This field specifies the acceptable maximum age for immediate location requests.

When the terminal detects a trigger event or receives an immediate location report, then if the last known fix is older than the Maximum Data Age the terminal acquires a new position.

The Max Data Age timer is used to determine if a location report is current at the time a trigger was activated. After a trigger is activated the terminal will first wait for a time for the GPS device to get new GPS information. If adequate new GPS information is unavailable within the allocated time, then the terminal will look backwards in time to see if adequate GPS information to form a report had been present within the 'Max Data Age'. If this is true then a location report will be transmitted with its error set to a known value. If this is untrue then, the last known GPS location to the terminal will be transmitted but with the error value set to unknown.

Some location servers discard location reports where the error value is unknown and others mark the location report as being unreliable. However even when a report is transmitted with the error is unknown, it marks a point where the terminal was once located and this information could be of some value.

Max Data Age and Max Response Time effectively create a time window in which a location is determined. One should consider how far one could move over the interval of the Max Data Age when choosing what value should be programmed. If the acceptable distance can be traversed in 30 seconds then the value for Max Data Age = 29. The recommended value is between 19 to 29, corresponding to 20 to 30 seconds.

An operational value of 20 seconds is recommended as a starting point.

Related fields is:

Paragraph 35.2.9 "Max Response Time"

35.2.9 Max Response Time

This field specifies the maximum response time for acquiring new location data.

The time required to acquire the new data when the terminal detects a trigger event or receives an immediate location report is not longer than the Max Response Time. The terminal acquires the new location data until the Max Response Time expires.

After a trigger is activated the terminal will first wait for a time for its GPS device to get new GPS information and the maximum time interval that it will wait in the 'Max Response Time'. If adequate new GPS information is available within the Max Response Time then the terminal transmits the location information. Since it will always take a few seconds to get new data from the GPS device in the terminal then a reasonable time should be programmed for the terminal codeplug for Max Response Time. The recommended range is a value of 15 to 23 which correspond to a value of 30 to 45 seconds.

An operational value of 44 seconds is recommended as a starting point.

Related fields is:

Paragraph 35.2.8 "Max Data Age"

35.2.10 Delete All OTA LIP Report Requests

This field allows to clear obsolete LIP configuration data that the terminal received and stored as OTA Report Requests.

If this option has been used before writing the codeplug to the terminal, the new LIP configuration will be exactly as set in the codeplug.

If this option has not been used before writing the codeplug to the terminal, the LIP configuration will remain as per the old OTA reports.

To erase the OTA LIP configuration, click **Reset** and again click **Yes** to the warning message.

35.2.11 Enable LIP Emergency Entry trigger when GPS is Off



NOTE

Before you use this feature, enable the flag for LIP Emergency Trigger:

Codeplug > GPS > LIP Triggers > Emergency > Enabled

If this field is enabled a terminal sends a LIP Report, when entering the Emergency mode, even if the GPS feature is disabled.

Mark the check box to enable.

35.3 LRRP Configuration

	Field Name	Field Value	Reset
1	GPS SDS TL Disable	<input checked="" type="checkbox"/>	
2	Delete All OTA LRRP Location Report Requests		Reset
3	GPS General Remote Port	1	

35.3.1 GPS SDS TL Disable

This field refers to location data transmissions via SDS (Short Data Services).

All location data transmissions will use SDS type 4, and no other transport mechanism.

If SDS TL Disable is checked, the PI for SDS GPS without TL header will be used. Otherwise, the PI configured for SDS GPS with TL header will be used.



NOTE

The default setting (box checked) is recommended because of the shorter message over the air.

35.3.2 Delete All OTA LRRP Report Requests

This field allows to clear obsolete LRRP configuration data that the terminal received and stored as OTA Report Requests.

If this option has been used before writing the codeplug to the terminal, the new LRRP configuration will be exactly as set in the codeplug.

If this option has not been used before writing the codeplug to the terminal, the LRRP configuration will remain as per the old OTA reports.

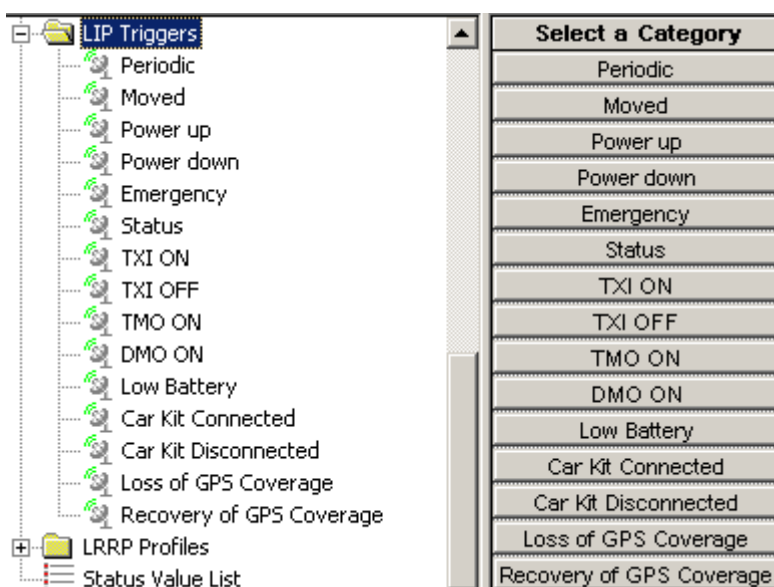
To erase the OTA LRRP configuration, click **Reset** and again click **Yes** to the warning message.

35.3.3 GPS General Remote Port

This parameter defines the GPS General Remote Port for LRRP other than unsolicited triggers.

The parameter range is: 1 - 65536. The default is 1.

35.4 LIP Triggers



Triggering of location reports can be caused by various different reasons, and for each such reason there will be a corresponding set of values for the related parameters (called the corresponding LIP Triggers).

If a triggered request has been received over the air, the report will be using the parameters sent over the air, so the pre-programmed values in CPS will not apply.

The triggers have some of the following settings:

Enabled

This parameter enables/disables the respective GPS Event Location.

The options are:

- Enabled - Location reporting on occurrence of this event is enabled (subject to other codeplug settings).
- Disabled - Location reporting on occurrence of this event is disabled.
- Not initialized - Location reporting on occurrence of this event is not initialized by the user nor over the air.

To assign a setting, put the pointer into the field value, click the drop-down list and select the required value.

Max Reporting Interval

This is the interval at which periodic Location Reports are sent. The interval should fit to the values allocated in the standard.

Provided that no other triggers are activated, Max Reporting Interval is the time interval between periodic reports. The Max Reporting Interval timer is always restarted, when any another trigger is activated.

A value from the table should be entered to represent the appropriated time interval. For example Max Reporting Interval = 19 will result in periodic reports being sent at intervals of 10 minutes.

Type in the value. This value will be mapped to an actual value as shown in the second column of the mapping table.

Max Data Age

This option indicates the default maximum age allowed for data in Location Report message for triggered reports.

When the terminal detects a trigger event or receives an immediate location report, then if the last known fix is older than the Maximum Data Age the terminal acquires a new position.

Type in the value. This value is mapped to an actual value as shown in the second column of the mapping table.

Max Response Time

Specifies the maximum duration the GPS system has to acquire location data.

If after a trigger is activated and the terminal has checked and found that there was no valid information within the GPS Max Data Age then the terminal will wait for its GPS device to get new GPS information and the maximum time interval that it will wait is the 'Max Response Time'. If valid new GPS information becomes within the Max Response Time then the terminal transmits the location information. Since it could take some time get new data from the GPS device then a reasonable time should be programmed.

Max data age and Max Response time effectively create a time window in which a valid location is determined.

The recommended time range for GPS Max Response Time is 30 to 45 seconds.

Type in the required value.

Max Report Distance

Defines the distance interval at which distance-based Location Reports are sent when not inserted in a Digital Car Kit.

The least distance at which Moved reports can be transmitted is 100m distance. The distance chosen will be determined by the mode of transport and it often chosen to fill in the gaps between periodic reports.

For vehicles a distance of 1 km is recommended and for walking a distance of 100 or 200 metres is recommended. The value appropriate to these distances should be chosen as follows:

- 100m = 0 (pedestrian)
- 200m = 1 (pedestrian)
- 1km = 9 (Mobile)

Moved location reports are not transmitted when the portable terminal is inserted into a car kit.

Select the required value from the drop down list.

Distance Check Interval

Maximum interval (in seconds) at which MS checks its position for position-based Location Reports when not inserted in a Digital Car Kit.

The geographical location is examined periodically at intervals determined by the distance check interval. A less frequent distance check interval will decrease the nearness to distance intervals but will reduce the number of reports transmitted when a normally walking terminal is used in a vehicle. 60 to 100 seconds is recommended and this value is programmed in seconds.

Low Battery Level

This option indicates the percentage of battery level triggering the "Low Battery" condition.

Select the required value.

35.4.1 Periodic

This is a periodic Location Reports sent by the terminal outside Emergency Mode.

While the terminal is not in Emergency Mode, and depending on the "Periodic" Trigger Enable settings, it will acquire its position and send periodic Location Reports at intervals defined by the GPS Idle Report Period (unless reports of that nature are inhibited, in which case it will do nothing).

Normal GPS periodic location reports are inhibited when the terminal is in Emergency Mode. If GPS periodic location reports are required during Emergency Mode, then it is necessary to enable the Emergency Periodic reports.

35.4.2 Moved

At defined time intervals, the terminal checks its location against the last reported position, and sends a Location Report whenever the check shows the position has changed by the specified distance.



NOTE

A distance based location report is only sent if the distance between the measurement and the last reported position is higher than the distance threshold. The real moved distance could be higher (for example: coming back or going around the first point); also the change will not be reported when its time elapsed is less than the preset time period.

35.4.3 Powered up

When the terminal is powered up, and subject to the "Powered up" Trigger Enable settings, it will acquire its location and send a Location Report after performing the power up sequence.

35.4.4 Powered down

When the terminal is powered down, and subject to the "Powered down" Trigger Enable settings, it will acquire its location and send a Location Report before performing the power down sequence.



NOTE

The terminal will not necessarily succeed in transmitting the Location Report before it has to power off.

35.4.5 Emergency

Upon entry into the Emergency Mode, and depending on the "Emergency" Trigger Enable settings, the terminal will acquire its position and send a Location Report.



NOTE

This requirement does not imply that any other reports are inhibited during Emergency, so any other reports caused by other requirements will still be sent, including immediate requests over the air, delta distance, and so forth.

35.4.6 Status

If sending an outgoing Status message via the menu, the terminal shall acquire its location and send a Location Report, provided that some additional settings in Status Id List and GPS Status Value List are configured accordingly.

35.4.7 TXI ON

Immediately before entering Transmit Inhibit Mode, and subject to the "Transmit Inhibit Mode ON" Trigger Enable settings, the terminal will acquire its location and send a Location Report.



NOTE

- This requirement will not cause an indefinite delay in entering Transmit Inhibit Mode, since the maximum acquisition time is specified
- The lower layers of the protocol stack may lose the report, due to Transmit Inhibit Mode activation

35.4.8 TXI OFF

Immediately after leaving Transmit Inhibit Mode, and subject to the "Transmit Inhibit Mode OFF" Trigger Enable settings, the terminal will acquire its location and send a Location Report.

35.4.9 TMO ON

Immediately after entering TMO, and subject to the "TMO ON" Trigger Enable settings, the terminal will acquire its location and send a Location Report.

35.4.10 DMO ON

Immediately before entering DMO, and subject to the "DMO ON" Trigger Enable settings, the terminal will acquire its location and send a Location Report.

35.4.11 Low Battery

When the terminal battery level is low, and subject to the "Low Battery" Trigger Enable settings, it will acquire the location of the terminal and send a Location Report.

35.4.12 Car Kit Connected

Immediately after connection to the Digital Car Kit (DCK), and subject to the "Car Kit Connected" Trigger Enable settings, the terminal will acquire its location and send a Location Report.

35.4.13 Car Kit Disconnected

Immediately after disconnection from the Digital Car Kit (DCK), and subject to the "Car Kit Disconnected" Trigger Enable settings, the terminal will acquire its location and send a Location Report.

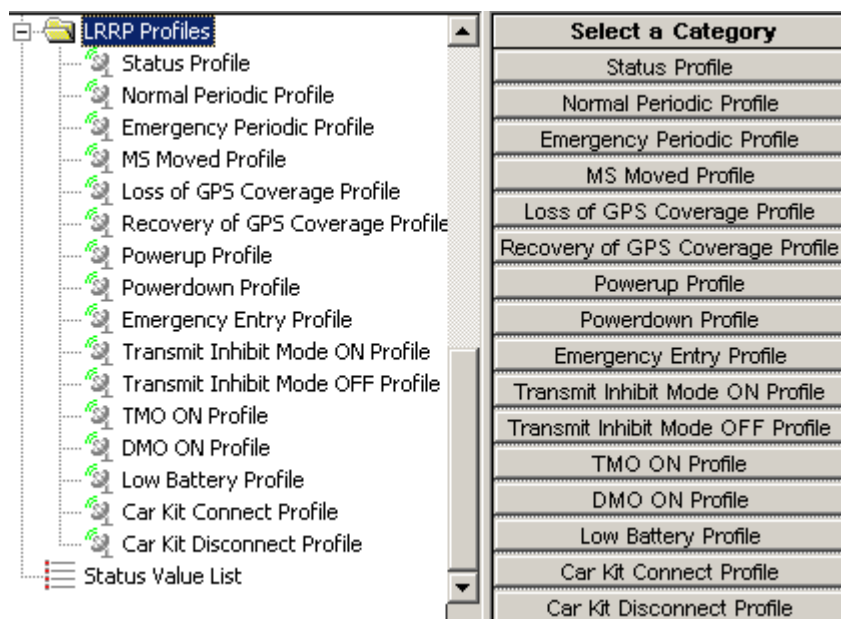
35.4.14 Loss of GPS Coverage

If the terminal detects loss of GPS coverage, and subject to the "Loss of GPS coverage" Trigger Enable settings, the terminal sends its last known location using a Location Report.

35.4.15 Recovery of GPS Coverage

If the terminal had previously detected loss of GPS coverage and then detects that it has gone back into GPS coverage, and subject to the "Recovery of GPS coverage" Trigger Enable settings, the terminal will acquire its location and send a Location Report.

35.5 LRRP Profiles



Unsolicited location reports can be caused by various different reasons, and for each such reason there will be a corresponding set of values for the related parameters (which we call the corresponding Profile).

If a corresponding triggered request has been received over the air, the report will be the triggered report (using the parameters sent over the air), not the unsolicited report (so the Profile will not apply).

The triggers have some of the following settings:

GPS Event Location Enable

Enables/disables the GPS Event Location.

- If Enabled, the Unsolicited Location Report on occurrence of this event is enabled (subject to other codeplug settings).
- If Disabled, the Unsolicited Location Report on occurrence of this event is disabled.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

This field is an element in the codeplug structure for the Unsolicited Report Profiles. The actual value depends on the particular Profile.

GPS Event Timestamp Enable

Enables/disables the GPS Event Timestamp.

- If Enabled, Unsolicited Location Reports on occurrence of this event shall have timestamps.
- If Disabled, Unsolicited Location Reports on occurrence of this event shall NOT have timestamps.

This field is an element in the codeplug structure for Unsolicited Report Profiles; the actual value depends on the particular Profile.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

GPS LRRP Destination ISSI

This is the destination ISSI for Unsolicited Location Reports.

This field is an element in the codeplug structure for Unsolicited Report Profiles; the actual value depends on the particular Profile.

The range is any valid ISSI or NO_ISSI. (NO_ISSI is a reserved value outside the range of possible ISSIs, and only used to indicate that no ISSI has been assigned to the field in question.)

Type in the required value.

GPS LRRP Destination IP Address

This parameter indicates destination IP address for Unsolicited Location Reports.

The range for this parameter is 0.0.0.0-255.255.255.255. The default is 0.0.0.0.

GPS LRRP Remote Port

This parameter indicates the Remote Port for LRRP other than unsolicited triggers.

The range for this parameter is 1-65536. The default is 1.

Related fields are:

- Paragraph 35.2.4 "Remote Port"
- Paragraph 35.3.3 "GPS General Remote Port"

GPS LRRP Unsolicited Shape

GPS Location reports can include information about the type of shape within which the GPS device thinks the terminal is located. The shape types are point, circle, or ellipse. The transmitted GPS location report will contain dimensions of the shape.

The Shape used for Unsolicited Location Reports:

- SHAPE_2d: a two-dimensional (latitude and longitude) position.
- SHAPE_3d: a three-dimensional (latitude, longitude and height) position.

The default shape is an ellipse, provided that the Unsolicited Uncertainty is greater than zero. Should Unsolicited Uncertainty be set to zero then, accuracy information is not included in location reports.

It is recommended that a 2-dimensional shape is selected. A three dimensional shape will request that altitude is also included as part of the location report. Although a three dimensional shape is possible, the selection of a three dimensional shape is not recommended, because this requires more visible satellites to produce a report than for a 2-dimensional shape.

To assign a setting, put the pointer into the field value, click the drop-down list and select the required value.

GPS LRRP Unsolicited Velocity Type

This is the Velocity Type to use for Unsolicited Location Reports:

- No speed reported
- Horizontal speed: gives the magnitude of the horizontal component of the velocity of a target entity.
- Horizontal speed with high accuracy
- Vertical speed: gives the magnitude of the vertical component of the velocity of a target entity.
- Vertical speed with high accuracy
- Horizontal and vertical speed
- Horizontal and vertical speed with high accuracy

To assign a setting, put the pointer into the field value, click the drop-down list and select the required value.

This field is an element in the codeplug structure for Unsolicited Report Profiles; the actual value depends on the particular Profile.

GPS Unsolicited Uncertainty

This is the requested horizontal uncertainty to use for Unsolicited Location Reports. The value is a measure for the accuracy of the location determination.

This field is an element in the codeplug structure for Unsolicited Report Profiles; the actual value depends on the particular Profile. Type in the required value in meters.

'GPS Unsolicited Uncertainty' is a value sent to the GPS device in the terminal that it attempts to achieve before it returns a location to be transmitted by the terminal in a GPS location report. If the GPS device fails achieve the requested uncertainty within the time window defined by the Maximum Response Time and Maximum Data age, then the accuracy that the GPS device thinks it has achieved appears in the GPS location report.

If the requested uncertainty/accuracy is achieved from the GPS system, the report will be sent with the requested uncertainty/accuracy. If the requested uncertainty/accuracy is not achieved, the uncertainty/accuracy, which has been achieved is reported after expiration of the GPS Max Acquisition Delay.

If an uncertainty value of 0 is defined, then no accuracy information is requested and the unsolicited location report will not contain any accuracy information (shape type is point_2d or point_3d). If an uncertainty value not equals to 0 is defined, then an accuracy information is provided within the unsolicited location report (shape type is ellipse_2d or ellipse_3d).

GPS Maximum Data Age

This option indicates the default maximum age (in seconds) allowed for data in Location Report message for triggered reports.

The 'GPS Max Data Age' timer is used to determine if a valid location report is current at the time a trigger was activated. When the trigger is activated the terminal will look backwards in time to see if adequate GPS information to form a valid report had been present within the 'Max Data Age' period. If this is true then a location report will be transmitted. The recommended value for GPS Max Data Age is 30 seconds

Type in the required value.

GPS Maximum Acquisition Delay

This option indicates the default maximum time (in seconds) allowed for the acquisition of the current location.

Type in the value. This value will be mapped to an actual value as shown in the second column of the mapping table.

At the end of the specified acquisition period, the following will happen:

- If the terminal has a signal, the terminal will get the LRRP report with Location Data.
- If the terminal has not acquired a fix to the requested accuracy, the terminal will get the LRRP report without location data and with an error indication plus the reason.

GPS Idle Report Period

This is the interval (in seconds) at which periodic Location Reports are sent outside Emergency Mode (0 means never).

The GPS Idle Report Period is the minimum time between the transmissions of successive Normal Periodic Location reports.

There will be a slight variation in the time between successive reports if the GPS device needs to run the Maximum Response Timer in order to obtain a new GPS location.

Type in the required value.

GPS Emergency Report Period

This is the interval at which periodic Location Reports are sent in Emergency Mode.

Type in the required value.

GPS Report Distance

Defines the distance interval at which distance-based Location Reports are sent.

Type in the required value.

Distance Check Interval

Maximum interval (in seconds) at which MS checks its position for position-based Location Reports.

Type in the required value.

GPS Low Battery Level

This option indicates the percentage of battery level triggering the "Low Battery" condition.

Type in the required value.

35.5.1 Status Profile

If sending an outgoing Status message via the terminal menu, the terminal shall acquire its location and send an UNSOLICITED-LOCATION-REPORT, provided that some additional settings in Status Id List and GPS Status Value List are configured accordingly.

35.5.2 Normal Periodic Profile

These are unsolicited Periodic Location Reports sent by the MS outside Emergency Mode.

While the terminal is not in Emergency Mode, and depending on the "Normal Periodic" Profile Enable settings, it will acquire its position and send periodic Location Reports at intervals defined by the GPS Idle Report Period (unless unsolicited reports of that nature are inhibited, in which case it will do nothing). Each such periodic report will be an UNSOLICITED-LOCATION.

Normal GPS periodic location reports are inhibited when the terminal is in Emergency Mode. If GPS periodic location reports are required during Emergency Mode, then it is necessary to enable the Emergency Periodic reports.

35.5.3 Emergency Periodic Profile

While the terminal is in Emergency Mode, and depending on the "Emergency" Profile Enable settings, it will acquire its position and send periodic Location Reports at defined intervals after the first Location Report sent on entry to Emergency Mode.



NOTE

This requirement does not imply that any other reports are inhibited during Emergency, so any other reports caused by other requirements will still be sent, including immediate requests over the air, delta distance, and so forth.

35.5.4 MS Moved Profile

At defined time intervals, the MS will check its location against the last reported position, and send an UNSOLICITED-LOCATION-REPORT whenever the check shows the position has changed by the specified distance.

A distance based location report is only sent if the distance between the measurement and the last reported position is higher than the distance threshold. The real moved distance could be higher (for example: coming back or going around the first point); also the change will not be reported when its time elapsed is less than the preset time period.

35.5.5 Loss of GPS Coverage Profile

If the terminal detects loss of GPS coverage, and subject to the "Loss of GPS coverage" Profile Enable settings, the MS shall send its last known location using an UNSOLICITED-LOCATION-REPORT.

35.5.6 Recovery of GPS Coverage Profile

If the MS had previously detected loss of GPS coverage and then detects that it has gone back into GPS coverage, and subject to the "Recovery of GPS coverage" Profile Enable settings, the MS will acquire its location and send an UNSOLICITED-LOCATION-REPORT.

35.5.7 Powerup Profile

When the terminal is powered up, and subject to the "Power Up" Profile Enable settings, it will acquire its location and send an UNSOLICITED-LOCATION-REPORT after performing the power up sequence.

35.5.8 Powerdown Profile

When the terminal is powered down, and subject to the "Power Down" Profile Enable settings, it will acquire its location and send an UNSOLICITED-LOCATION-REPORT before performing the power down sequence.

35.5.9 Emergency Entry

While the terminal is in Emergency Mode, and depending on the "Emergency" Profile Enable settings, it will acquire its position and send a Location Report.



NOTE

This requirement does not imply that any other reports are inhibited during Emergency, so any other reports caused by other requirements will still be sent, including immediate requests over the air, delta distance, and so forth.

35.5.10 Transmit Inhibit Mode ON Profile

Immediately before entering Transmit Inhibit Mode, and subject to the "Transmit Inhibit Mode ON" Profile Enable settings, the terminal will acquire its location and send an UNSOLICITED-LOCATION-REPORT.

35.5.11 Transmit Inhibit Mode OFF Profile

Immediately after leaving Transmit Inhibit Mode, and subject to the "Transmit Inhibit Mode OFF" Profile Enable settings, the terminal will acquire its location and send an UNSOLICITED-LOCATION-REPORT.

35.5.12 TMO ON Profile

Immediately after entering TMO, and subject to the "TMO ON" Profile Enable settings, the terminal will acquire its location and send an UNSOLICITED-LOCATION-REPORT.

35.5.13 DMO ON Profile

Immediately before entering DMO, and subject to the "DMO ON" Profile Enable settings, the terminal will acquire its location and send an UNSOLICITED-LOCATION-REPORT.

35.5.14 Low Battery Profile

When the terminal has a Low Battery, and subject to the "Low Battery" Profile Enable settings, it will acquire the location of the terminal and send an UNSOLICITED-LOCATION-REPORT.

35.5.15 Car Kit Connect Profile

Immediately after connection to the Digital Car Kit (DCK), and subject to the "Car Kit Connect" Profile Enable settings, the terminal will acquire its location and send an UNSOLICITED-LOCATION-REPORT.

35.5.16 Car Kit Disconnect Profile

Immediately after disconnection from the Digital Car Kit (DCK), and subject to the "Car Kit Disconnect" Profile Enable settings, the terminal will acquire its location and send an UNSOLICITED-LOCATION-REPORT.

35.6 Status Value List

	ID	Enable Send Location Report	High Accuracy Mode	High Accuracy Mode Timeout (sec)
1	0 (out of range)	<input type="checkbox"/>	No Change	0
2	0 (out of range)	<input type="checkbox"/>	No Change	0
3	0 (out of range)	<input type="checkbox"/>	No Change	0
4	0 (out of range)	<input type="checkbox"/>	No Change	0
5	0 (out of range)	<input type="checkbox"/>	No Change	0
6	0 (out of range)	<input type="checkbox"/>	No Change	0
7	0 (out of range)	<input type="checkbox"/>	No Change	0
8	0 (out of range)	<input type="checkbox"/>	No Change	0
9	0 (out of range)	<input type="checkbox"/>	No Change	0
10	0 (out of range)	<input type="checkbox"/>	No Change	0
11	0 (out of range)	<input type="checkbox"/>	No Change	0
12	0 (out of range)	<input type="checkbox"/>	No Change	0
13	0 (out of range)	<input type="checkbox"/>	No Change	0
14	0 (out of range)	<input type="checkbox"/>	No Change	0
15	0 (out of range)	<input type="checkbox"/>	No Change	0
16	0 (out of range)	<input type="checkbox"/>	No Change	0
17	0 (out of range)	<input type="checkbox"/>	No Change	0
18	0 (out of range)	<input type="checkbox"/>	No Change	0
19	0 (out of range)	<input type="checkbox"/>	No Change	0
20	0 (out of range)	<input type="checkbox"/>	No Change	0

The Status Value List contains Status values, which (when sent by the user menu) can lead to transmissions of location reports and/or to automatic switching between GPS accuracy modes.

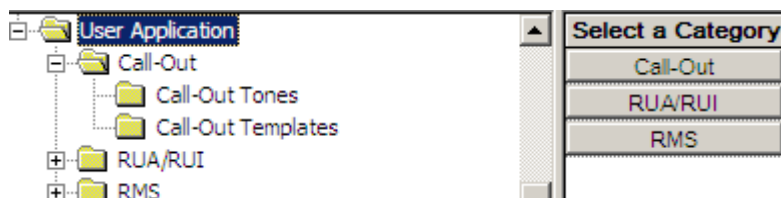
The Status values configured in the ID column of this list must also be registered in the general list of outgoing Status values.

36 User Application



NOTE

The following section is not applicable to TCR1000.



36.1 Call-Out

The purpose of a Call-Out message is to alert one or many users when an important incident requires their immediate attention. This feature has second highest priority after Emergency Call so all other calls are going to be ignored by the terminal.

The alert message can be sent either to addressed by an (Individual Short Subscriber Identity) ISSI or sent to a group addressed by a Group Short Subscriber Identity (GSSI).

When the user receives a Call-Out alert, this means that the Call-Out has started and the terminal will interrupt current services to attend to the Call-Out alert without any further delay.

We can list four types of the Call-Out alerts:

- Normal call-out
- Storm plan - it is sent to a group several time to raise reliability. User can only accept the Call-Out by pressing any button and is moved to information phase (soft keys are not labelled).
- Fallback Mode - it includes only voice communication. It can be cleared manually
- Test Call-Out - dispatcher has the ability to test this feature. terminal is generating the tone with "Call-Out Test" on the display. Only one softkey is enabled "Test OK" to confirm and to clear the test.

36.2 Call-Out - General

	Field Name	Field Value	Reset
1	Call-Out Fallback TG	Test Group:Folder 1:3000	
2	Enable CO Fallback TG	<input type="checkbox"/>	
3	CO initiating in LST	<input type="checkbox"/>	
4	Response Retries Number	2	Reset
5	Protocol Identifier	195	Reset
6	Fallback PTT blocked Duration, sec	3	Reset
7	Call-Out Fallback Validity, min	5	Reset
8	Call-Out Response Retries, sec	5	Reset
9	Call-Out Tone Duration, min	5	Reset
10	Call-Out Validity, min	5	Reset
11	Ignore Call-Out, min	30	Reset
12	Stopping Alert Tone Conditions	Upon any key	Reset

36.2.1 Call-Out Fallback Talkgroup

Choose the talkgroup for the Call-Out in Fallback Mode.

To select the option, put the pointer into the field value, click the drop-down list and select the required value.

36.2.2 Enable CO Fallback Talkgroup

If enabled, talkgroup can be choose for the Fallback Mode. If this field is disabled, the associated talkgroup will be selected.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

36.2.3 CO initiating in LST

If enabled, user can send Call-Out alerts in Local Site Trunking.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

36.2.4 Response retries number

Defines how many times terminal is going to redeliver a failed Alert Response Message.

Type the number in the text box (range 0-4).

36.2.5 Protocol Identifier

This is unique ID that specifies Call-Out service. It is the same for all the alerts.

Type the number in the text box (range 195-254).

36.2.6 Fallback PTT blocked duration, sec

It defines time which the user is not allowed to use PTT after initiating the Call-Out Mode.

Type the desired number in the text box. Default value for this option is 3 (range 0-30).

36.2.7 Call-Out Fallback Validity, min

Defines the period of time within which an ongoing Call-Out alert will be automatically cleared. Timer will restart upon transmitting or receiving voice.

Type the desired number in the text box. Default value is 5 minutes (range 0-10).

36.2.8 Call-Out Response Retries, sec

Defines the time between each sending attempt upon Alert Response Message failed delivery.

Type the desired number in the text box. Default value is 5 minutes (range 0-16).

36.2.9 Call-Out Tone Duration, min

Defines how long the tone is on for the Call-Out alerts. After this period even if the tone is off the visual display is still on.

Type the desired number in the text box.

36.2.10 Call-Out Validity, min

Defines the time period of time that the Call-Out alert is valid. When the time is out Call-Out alert is cleared automatically. Timer will restart upon transmitting or receiving voice.

Type the desired number in the text box. The default value is 5 minutes (range 0-10).

36.2.11 Ignore Call-Out, min

Defines the period of time when the will ignore the messages related to the alert that was rejected or exited before.

Type the desired number in the text box. Default value is 5 minutes (range 0-30).

36.2.12 Stopping Alert Tone Conditions

This parameter describes the Stopping Alert Tone Conditions. There are two options available to select:

- Upon user response - the terminal user needs to press appropriate soft key to stop the alert tone
- Upon any key - the alert tone can be stopped when the user presses any key during the screen prompts for pressing a soft key

Select the desired value. The default is Upon any key.

36.2.13 Auto Disabling Keys Locked

This parameters defines whether Keys Locked is automatically disabled when receiving Call-Out alerts.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

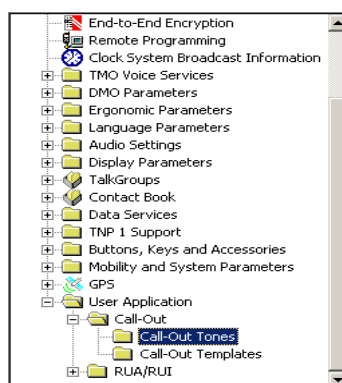
36.2.14 Audio Shock Delay in CO

This parameter indicates whether Audio Shock Delay is applied upon receiving Call-Out alerts.

If Audio Shock Delay is enabled and a Call-Out alert is received during Duplex Private Call, Phone, PABX or low audio Simplex Private or Group Call, the Call-Out alert tone is played from the internal earpiece for the time specified in the Audio Shock Delay Timer. When the timer has expired, the alert tone is played from the internal speaker.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

36.2.15 Call-Out Tones



	Call-Out Modes and Severities	Tone Code	Volume	Remarks
1	Storm plan	CO_TONE_1	14	Alert PDU with 'Call-Out severity' = 0000
2	Severity-1	CO_TONE_2	14	Alert PDU with 'Call-Out severity' = 0001
3	Severity-2	CO_TONE_3	14	Alert PDU with 'Call-Out severity' = 0010
4	Severity-3	CO_TONE_4	14	Alert PDU with 'Call-Out severity' = 0011
5	Severity-4	CO_TONE_5	14	Alert PDU with 'Call-Out severity' = 0100
6	Severity-5	CO_TONE_6	14	Alert PDU with 'Call-Out severity' = 0101
7	Severity-6	NO_TONE	14	Alert PDU with 'Call-Out severity' = 0110
8	Severity-7	NO_TONE	14	Alert PDU with 'Call-Out severity' = 0111
9	Severity-8	NO_TONE	14	Alert PDU with 'Call-Out severity' = 1000
10	Severity-9	NO_TONE	14	Alert PDU with 'Call-Out severity' = 1001
11	Severity-10	NO_TONE	14	Alert PDU with 'Call-Out severity' = 1010
12	Severity-11	NO_TONE	14	Alert PDU with 'Call-Out severity' = 1011
13	Severity-12	NO_TONE	14	Alert PDU with 'Call-Out severity' = 1100
14	Severity-13	NO_TONE	14	Alert PDU with 'Call-Out severity' = 1101
15	Severity-14	NO_TONE	14	Alert PDU with 'Call-Out severity' = 1110
16	Severity-15	NO_TONE	14	Alert PDU with 'Call-Out severity' = 1111
17	Test CO	CO_TONE_7	14	Test PDU
18	Fallback	CO_TONE_8	14	Call with 'Call Priority' = 1110

As for every message or call, Call-Out has its own defined tones. There are 8 different Call-Out alert tones which can be assigned to 8 Call-Out Modes or Severities (that is, one tone per Mode/Severity).

36.2.16 Call-Out Templates

	Template Type	Editable Text	Code Scheme
1	Accept Message Template	Accept	8bits
2	Reject Message Template	Reject	8bits
3	Standby Message Template	Standby	8bits
4	Test CO Acknowledgment	Test OK	8bits

Call-Out templates feature allows the user to customize the Call-Out alert message that appears on the terminal screen.

The options are:

- Accept message template - Defines the message that appears on the terminal screen when a Call-out alert is accepted.
- Reject message template - Defines the message that appears on the terminal screen when a Call-Out alert is rejected.
- Standby message template - Defines the message that appears on the terminal screen when a Call-Out alert is put on Standby mode.
- Text CO Acknowledgement - Defines the message that appears on the terminal screen when a Test Call-Out alert is acknowledged.

36.3 RUA/RUI

Radio User Assignment (RUA) & Radio User Identity (RUI)

This feature allows the user to login to the infrastructure using the RUI identity and an associated PIN code. Successful logon gives the full service to the terminal (all the calls and messages are forwarded to the terminal). The following three state are available:

- Full Service - User Log On/Book On Was Successful. The terminal has full functionality.
- Limited Service - User Not Logged On. Specified by the service provider.
- Pseudo Log On - the terminal has some restriction on the services that are specified in CPS

Any terminal can be assigned to one person by the service provider. It is called Book On. This option can be disabled by the user via the terminal MMI.

	Field Name	Field Value
1	Book On Configuration	Automatic
2	Book On Response	Accept
3	Logoff When Deregister	<input type="checkbox"/>
4	Limited Service	<input checked="" type="checkbox"/>
5	RUI List	10
6	Logon Process Timer	60
7	Warning Minutes	30
8	Book on Audio Notification	<input checked="" type="checkbox"/>
9	Force off Audio Notification	<input checked="" type="checkbox"/>
10	Logon Audio Notification	<input checked="" type="checkbox"/>
11	Timeout Audio Notification	<input checked="" type="checkbox"/>
12	Auto Logon	<input checked="" type="checkbox"/>

36.3.1 Book on Configuration

Two state are available for this option: Automatic and User Defined. The first one means that all the bookons are going to be Accepted without any interference. If you select User Defined, each

terminal has the ability to enable or disable bookons. User can change it via the terminal MMI to accept or to reject all requests.

36.3.2 Book on Response

This option is available only if the Book on Configuration is set to Automatic. If so, dispatcher set the bookons to be Accepted or Rejected automatically.

36.3.3 Logged off Deregister

Defines whether user can log off before deregister by choosing enable or disable this option.

36.3.4 Limited Service

This option defines if the terminal has Limited Service enabled/disabled.

36.3.5 RUI List

Indicates the number of user ID stored in the User ID list.

Type the desired number in the text box (range 0-10).

36.3.6 Logon Process Timer

Defines the time that the user is waiting for the log on response.

Type the desired number in the text box.

36.3.7 Warning Minutes

Defines the time the information timeout is shown.

Type the desired number in the text box. The default value is 30 minutes (range 15-60).

36.3.8 Book on audio notification

Defines if the audio tone is played by the terminal when it is book on.

36.3.9 Force Off Audio Notification

Defines if the audio tone is played by the terminal when it is force off.

36.3.10 Logon Audio Notification

Defines if the audio tone is played by the terminal when it is log on.

36.3.11 Timeout Audio Notification

Defines if the audio tone is played by the terminal when the timeout warning timer expires or when the terminal receives timeout pending PDU warning.

36.3.12 Auto Logon

If this option is enabled, a terminal gets automatically logged on to the network after it has been successfully registered with the network.



NOTE

In order to set this parameter, the RUA/RUI feature flag needs to be enabled.

36.3.13 Limited Service Feature

<div> <div>TalkGroups</div> <div>Contact Book</div> <div>Data Services</div> <div>TNP 1 Support</div> <div>Buttons, Keys and Accessories</div> <div>Mobility and System Parameters</div> <div>GPS</div> <div>User Application</div> <div>Call-Out</div> <div>RUA/RUI</div> <div>Limited Service Feature List</div> </div>	Field Name	Field Value	Reset
1	Group	<input type="checkbox"/>	
2	PABX	<input type="checkbox"/>	
3	PEI	<input type="checkbox"/>	
4	Private Call	<input checked="" type="checkbox"/>	
5	SDS Applications	<input checked="" type="checkbox"/>	
6	Direct Mode (DMO)	<input checked="" type="checkbox"/>	
7	Status	<input checked="" type="checkbox"/>	
8	Telephone Interconnect	<input type="checkbox"/>	
9	Talkgroup Scan	<input type="checkbox"/>	

Using this tab you can define which features are available while the terminal is in Limited Service. By checking in the Field Value column you are enabling or disabling listed feature:

- Group
- PABX
- PEI
- Private call
- SDS Applications
- Direct Mode (DMO) - the terminal can switch the Direct Mode
- Status - let the user send and receive status of the message
- Telephone Interconnect - subscriber can call a land line telephone number or a mobile phone number
- Talkgroup Scan

36.4 RMS



36.4.1 RMS Settings

<div> <div>RMS</div> <div>RMS Settings</div> <div>RMS Buttons</div> </div>	Field Name	Field Value
1	RMS PI	242
2	RMS Status Target Address	0
3	Calling Party Address	0

36.4.1.1 RMS PI

This parameter defines the Protocol Identifier for the RMS application.

When the RMS PI is registered at the PEI application, the terminal allows routing downlink RMS messages to the PEI application.

The default value is 242. The value range is 131–192, 194–255.

36.4.1.2 RMS Status Target Address

This parameter defines the target ISSI for RMS Statuses.

36.4.1.3 Calling Party Address

This parameter defines the calling party ISSI for RMS messages.

36.4.2 RMS Buttons



36.4.2.1 RMS Status

This column contains the aliases of the RMS messages associated with the specified button.

Up to 10 RMS Status messages can be programmed

Sending RMS Status is possible if RMS mode is enabled in the terminal.

The terminal user can use the numeric keypad for sending a predefined RMS Status to an address predefined in the RMS Status Target Address.

37 SIM



NOTE

Not all the parameters from this section are available for TCR1000.

Refer to the codeplug for details.

	Field Name	Field Value
1	DMO Mode	DMO 1
2	OPTA Display Filter	
3	Default OPTA Display Filter	
4	SIM Application ID	DEBOS01
5	SIM Application ID Vendor	DEBOS01
6	SIM Application Provider ID	Expand
7	SIM Application Provider ID Vendor	Expand
8	Clear Call Alarm Tone Enabled	<input checked="" type="checkbox"/>
9	Encrypted Audio Enabled	<input checked="" type="checkbox"/>
10	ATR Wait Timer	500 ms
11	Poll Response Wait Timer	500 ms
12	OPTA Pattern	optpat
13	Group SDS Encryption Key	TK-SM
14	Individual SDS Encryption Key	TK-SM
15	OPTA Contact Addition Mode	Ask
16	OPTA Contact Update Mode	Ask

37.1 DMO Mode

This parameter determines the End-to-End Encryption mode to be used in DMO.

The options are:

- DMO1
- DMO2

To select an option, put the pointer into the field value, click the drop-down list and select the required value.

37.2 OPTA Display Filter

This parameter specifies which out of the 24 bytes of the Operational Tactical Address (OPTA) shall be displayed. The first character in the field value represents the first byte of the OPTA string.

Enter 'Y' for bytes that should be visible and 'N' for hidden bytes.

Only the selected bytes are displayed.

37.3 Default OPTA Display Filter

This parameter defines the default value of the OPTA Filter and specifies which out of the 24 bytes of the OPTA shall be displayed.

Enter 'Y' for bytes that should be visible and 'N' for hidden bytes.

Related field is:

Paragraph 37.2 "OPTA Display Filter"

37.4 SIM Application ID

This parameter specifies the ID of the SIM application held on the terminal card (Type E Card), which is supported by the terminal.

Type in the desired alphanumeric character.

37.5 SIM Application ID Vendor

This parameter specifies the ID of the SIM application held on the vendor card (Type H Card), which is supported by the terminal.

Type in the desired alphanumeric character.

37.6 SIM Application Provider ID

This parameter specifies the ID of the SIM application provider held on the terminal card (Type E Card), which is accepted by the terminal.

Type in the desired alphanumeric character.

37.7 SIM Application Provider ID Vendor

This parameter specifies the ID of the SIM application provider held on the vendor card (Type H Card), which is accepted by the terminal.

Type in the desired alphanumeric character.

37.8 Clear Call Alarm Tone Enabled

This parameter indicates whether an audible notification at the beginning of a Clear Call is played.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

37.9 Encrypted Audio Enabled

This parameter indicates whether the user can hear encrypted (distorted) audio when the decryption does not function properly.

Turn the check box on (Enable) or off (Disable) by clicking in the check box.

37.10 ATR Wait Timer

This timer defines the additional duration between resetting the SIM card and answer to reset (ATR) from the external SIM card reader. This timer is added to the original wait timer of 11.2ms (for internal SIM card reader).

If the total time expires, the terminal indicates that the external SIM card is not operational.

Type in the desired value.

37.11 Poll Response Wait Timer

This timer defines the additional duration the terminal waits for an alive poll response from the SIM card at the external SIM card reader. This timer is added to the original wait time indicated by the SIM card in an ATR.

If the total timer expires, the terminal indicates that the external SIM card is not alive.

Type in the desired value.

37.12 OPTA Pattern

This parameter indicates the OPTA pattern used to determine the OPTA Name inside the SDS.

The OPTA pattern consists of 24 Unicode characters.

Type in the desired value.

37.13 Group SDS Encryption Key

This parameter indicates the encryption key used for group addressed SDS.

The options are:

- TK-SM - Key dedicated to short data messages encryption (default value).
- TK-TMO - Unique encryption key for E2E encrypted group calls and messages.

To select an option, put the pointer into the field value, click the drop-down list and select the required value.

37.14 Individual SDS Encryption Key

This parameter indicates the encryption key used for individually addressed SDS.

The options are:

- TK-SM - Key dedicated to short data messages encryption (default value).
- TK-TMO - Unique encryption key for E2E encrypted group calls and messages.

To select an option, put the pointer into the field value, click the drop-down list and select the required value.

37.15 OPTA Contact Addition Mode

This parameter indicates whether the terminal adds a new contact to the contacts list when it receives a call from the ISSI that does not exist in the contact list.

There are three possible choices:

- Always - If this ISSI is not saved in the internal Contact Reject List the terminal adds it.
- Ask - If this ISSI is not saved in the internal Contact Reject List, the user has the option to choose to add this contact to its list. This is the default value.
- Never - Calling ISSI is not added to the terminal contact list.

To select an option, put the pointer into the field value, click the drop-down list and select the required value.

37.16 OPTA Contact Update Mode

This parameter indicates whether the terminal updates contact information on receiving a call from the ISSI that exists in the contact list with the status field set to OPTA.

There are three possible choices:

- Always - If this ISSI is not saved in the internal Contact Reject List the terminal updates it.
- Ask - If this ISSI is not saved in the internal Contact Reject List, the user has the option to choose to update this contact to its list. This is the default value.
- Never - Calling ISSI is not updated.

To select an option, put the pointer into the field value, click the drop-down list and select the required value.

37.17 Automatic Crypto Registration

If this parameter is enabled, the Crypto Registration starts automatically when no keys or wrong keys are detected in a SIM card.

37.18 Crypto Registration Audio Notification

If this parameter is enabled, an audio alert triggers for an ongoing Crypto Registration.

37.19 E2E Encryption

This parameter allows you to enable or disable the E2E Encryption.

37.20 Startup Info Screen Text



NOTE

For the terminal supporting BSI SIM, the text appears after a successful SIM card authentication.

This field allows you to enter a 12-character text that appears on the display after the terminal is turned on.

37.21 Startup Info Screen Duration

This field allows you to set duration time for the short text to appear on the terminal display.

Enter the value in seconds.

AT COMMANDS REFERENCE

1 Introduction to AT

The main purpose of AT commands is to allow a Computer (called Data Terminal Equipment or DTE) to control a Modem (called Data Circuit termination Equipment or DCE) over a data communication link (RS232, USB).



NOTE

USB 2.0 interface is applicable only for MTM5400 and MTM800FuG.

In TETRA, the DCE is a TETRA Terminal and is called an MT.

The MT provides to the DTE Application access to its internal resources as well as to the TETRA Protocol Stack for various services.

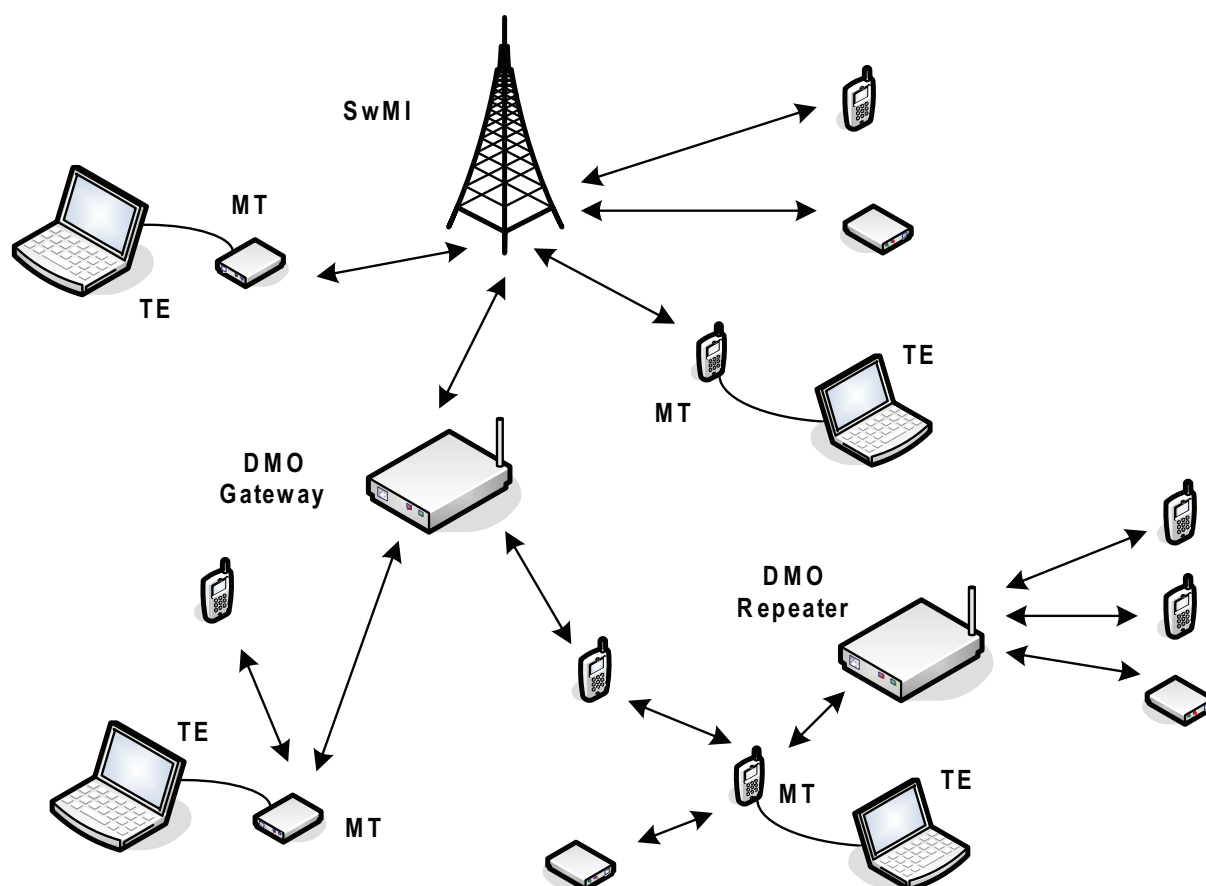


Figure 5-1 Example of AT

1.1 AT Syntax

The AT Syntax for TETRA Terminals is defined in ETSI TS 100 392-5 Peripheral Equipment Interface (PEI), Version 2.1.1 2008-07 (Section 6.4).

AT commands are processed as a command line containing ASCII decimal text with the following structure: <Prefix><Body><Terminator>

For Motorola TETRA terminals the following values are supported:

- <Prefix> must be either AT or at
- <Body> is variable per command
- <Terminator> must be <CR> unless specified otherwise.

The Motorola MT supports the AT command syntax with the following restrictions:

- Only one AT command must be present per line, that is, command concatenation by use of ';' is not supported.
- No control characters like <CR>, <Ctrl-Z> or <ESC> must be present in the data portion of any AT command (implies that the data portion of an AT command is kept on one line).

1.1.1 AT Command Types & Operators

The Motorola MT supports all types of AT commands specified by ETSI TS 100 392-5 Peripheral Equipment Interface (PEI), Version 2.1.1 2008-07, section 6.4.3, which are indicated by use of an operator within the command body:

- **Set** - a command body containing the operator "=" is used in two ways. It can either be used to "set" a parameter by storing a value or values for later use. Alternatively it can be used as an execution; that is to invoke a particular function of the equipment together with parameters needed as part of that function.
- **Test** - a command body containing the operator "?=" is used to determine if the MT supports the command form the TE. The MT will return "OK" if the command is supported. If there are supported parameters associated with this command the range of values will be returned as well.
- **Read** - a command body containing the operator "?" will return the value or values of any stored parameters related to that command.
- **Execution** - a command that has no parameters will have a body containing no operator at all. The MT will execute the command and any response returned. Some basic commands have no operator but nonetheless perform a "set" operation.

1.1.2 AT Special Characters

The following special characters are used by the MT.

Name	Code	Decimal value (default)
Carriage Return	<CR>	13
Linefeed	<LF>	10
End of file	<Ctrl-Z>	26
Escape	<ESC>	27
Backspace	<BS>	8
Space	—	32

Table 5-1 Special AT characters

1.2 AT Default Settings

The following table lists the default constant AT settings which cannot be changed.

Command	Meaning
+CSCS="IRA"	Alphabet used is ITU-T T.50
S3=13	Carriage return value is 13
S4=10	Linefeed value is 10
S5=8	Backspace value is 8
+ICF=3, 3	1 start, 8 data, 1 stop bits
Q0	Result codes on
V1	Verbose mode enabled
+CMEE=1	Numeric extended error result codes
+CMGF=0	TETRA PDU mode

Table 5-2 Non-changeable Default AT settings



NOTE

V0 AT command is not supported.

1.3 MT Error Reporting

When the MT receives an erroneous command, it will indicate this to the TE by use of the +CME ERROR unsolicited message described below.

Syntax

Command type	Possible responses
Unsolicited	<CR><LF>+CME_ERROR: _<error report code><CR><LF>

For each command, the supported error report codes are detailed. The following table lists supported error report codes.

Parameter	Value	Meaning	Usage (Examples)
<error report code>	0	MT Failure	MT failed to send message over the Air (in TMO or DMO)
	3	Operations Not Allowed	MT can not obey the command under the current (MT and/or Cell) conditions. The TE should retry later
	4	Operation Not Supported	MT does not support the command or a mode of the command
	9	Incorrect MS PUK	Wrong password was provided by the previous command
	10	SIM not inserted	When operating with SIM card and SIM card has not been inserted.
	11	MS PIN required	Incorrect PIN provided to MS before the last command
	12	MS PUK required	MS is in PUK-locked state
	13	SIM failure	Failed access to SIM
	14	SIM busy	SIM card is busy processing
	15	SIM wrong	A terminal does not recognize the SIM card
	16	Incorrect MS PIN	Wrong password was provided by the previous command
	19	SIM blocked	SIM card has been permanently blocked due to exceeding the maximum number of PUK tries
	20	Memory full	MT stack is full (for example, when writing phone book entries)
	24	Text string too long	Length of <user data> is exceeding what is indicated by length or the supported limit by the MT
	25	Invalid characters in text string	Invalid characters in +CTSDS
	26	Dial string too long	Dial string in ATD command too long
	27	Invalid characters in dial string	Invalid string in ATD command
	30	No network service	MT is out of coverage
	33	Parameter wrong type	Numeric instead of text or vice-versa
	34	Parameter value out of range	At least one parameter out of range
	35	Syntax error	Too many or too few parameters
	40	Service not supported in DMO	MT is in DMO
	41	Transmissions are inhibited	MT is in TXI
	42	Service temporarily not available	MT is busy in a signalling transaction. Please try again
	43	Service not supported in TMO	MT is busy in a signalling transaction. Please try again
	50	Service temporarily not available	MT is busy in a signalling transaction. Please try again
	505	RC PIN required	PID registration for RC requested prior to entering valid RC PIN number
	506	Incorrect RC PIN	Wrong RC PIN provided

Table 5-3 Possible Error Report Codes

1.4 Recommendations for PEI Applications

To have a robust and flexible PEI Application able to cope with future AT implementations on the MT, it is strongly recommended for the PEI Application:

-
- To ignore unrecognized AT unsolicited notifications
 - To ignore unrecognized AT error codes
 - To accept and handle supported AT responses and notifications with unexpected extra parameters by ignoring the unsupported parameters

2 Multiplexer

The MT provides AT Multiplexer functionality that allows for simultaneous sessions over a normal serial asynchronous interface between the MT and a TE. The multiplexer provides possibility for SDS, Calls and Packet Data to work in parallel.

The multiplexer enable a user to run up to 4 separate PC applications that communicate parallel with MT. Each application uses different virtual communication port associated with one of four Data Link Connections (DLC).



NOTE

Multiplexer Data Link Connections are created after activating GSM 07.10 multiplexing protocol (ETSI TS 101 369 v7.2.0 (2002-03)).

To use multiplexer functionality on the MT, TE is required to have driver supporting multiplexer protocol as defined in ETSI TS 100 916 v7.8.0 (2003-03), AT Command set for GSM Mobile Equipment (ME), 3GPP TS 07.07 version 7.8.0 Release 1998. Drivers start communication with Motorola Terminal by sending +CMUX command.

In order to communicate with Motorola MT, TE Multiplexer drivers are required to support:

- Basic Option for Multiplexer Transparency Mechanism
- DLC in Non-ERM
- Simultaneous transmission of AT Commands and Packet Data
- Parallel AT commands services dynamically associable with all DLCI in AT command state

3 Supported AT Commands & Functionality

3.1 List of AT Commands



NOTE

The following section is not applicable to TCR1000.

The following table summarizes the AT commands supported by the terminals.

Any command not listed here is not supported.

Feature	Command	Purpose	USB PEI	TMO	DMO	REP	GW	Direction of message
Network and Mobility Information	+CREG	Network Registration Status	X	X		-	X	MT <-> TE
	+CTBCT	Serving Cell Broadcast Information	X	X		-	X	MT <-> TE
	+CSQ	Signal Quality (RSSI) of Serving Cell	X	X		-	X	TE -> MT
	+GCLI	Neighbor Cells Information	X	X		-	X	TE -> MT
	+CTURUA	Radio User Assignment indication	X	X		-	X	MT -> TE
	+TXI	Transmit Inhibit mode	X	X	X	X	X	TE <-> MT
Identity Management	+GMI	Request MT Manufacturer Identification	X	X	X	X	X	TE -> MT
	+GMM	Request MT Model Identification	X	X	X	X	X	TE -> MT
	+GMR	Request MT Version Identification	X	X	X	X	X	TE -> MT
	+GSN	Request MT Serial Number	X	X	X	X	X	TE -> MT
	+CNUM	Obtain TETRA Identities	X	X	X	X	X	TE -> MT
	+CNUMF	Request Fixed Identities	X	X	X	X	X	TE -> MT
	+CNUMS	Request Static Identities	X	X	X	X	X	TE -> MT
	+CUNMD	Request Dynamic Identities and unsolicited DGNA notification	X	X		-	X	TE <-> MT
Group Management	+CTGL	Read Talkgroup List by Folder and unsolicited DGNA notification	X	X	X	X	X	TE <-> MT
	+CTGS	Talkgroup Selection for Selected and 20 Scan Groups	X	X	X	X	X	TE <-> MT
Service Profiles & Capabilities	+CTSCAN	Scanning On/Off	X	X		-	-	TE -> MT
	+CTSP	Service Profiles	X	X	X	X	X	TE -> MT
	+GCAP	MT Capabilities	X	X		-	X	TE -> MT

Call Control	+CTSDC	Defining Call Parameters	X	X	X	-	-	TE -> MT
	D	Dial a call	X	X	X	-	-	TE -> MT
	A	Answer on-off hook call	X	X		-	-	TE -> MT
	H	Hang-up or reject incoming call	X	X	X	-	-	TE -> MT
	+CTXD	Call Transmit Demand	X	X	X	-	-	TE -> MT
	+CUTXC	Call Transmit Cease	X	X	X	-	-	TE -> MT
	+CTCC	Call Connect Notification	X	X	X	X	X	MT -> TE
	+CTXG	Call Transmission Grant	X	X	X	X	X	MT -> TE
	+CTCR	Call Release Notification	X	X	X	X	X	MT -> TE
	+CTICN	Incoming Call Notification	X	X	X	X	X	MT -> TE
	+CTOCP	Call Progress Notification	X	X	X	X	X	MT -> TE
	+CDTXC	Call Transmit Cease Notification	X	X	X	X	X	MT -> TE
	+CTXI	Call Transmission Interrupted Notification	X	X	X	X	X	MT -> TE
	+CTXW	Call Transmission Wait Notification	X	X		-	X	MT -> TE
Audio Control	+CLVL	Speaker Volume Control	X	X	X	X	X	TE <-> MT
	+CTONE	Tone Control	X	X	X	-	X	MT -> TE
Accessory Control	+HHD	Handset on/off hook detection	X	X		-	-	MT -> TE
Status and Short Data Service in TMO & DMO	+CTSDS *)	Defining SDS Parameters (set, read, test)	X	X	X	-	-	TE -> MT
	+CMGS *)	Sending SDS, Status, Alarm and layer2 acknowledgement	X	X	X	-	-	TE -> MT
	+CTSDSR *)	Receive SDS, Status and Alarm (unsolicited)	X	X	X	X	X	MT -> TE
	+CNMI	Message mode	X	X	X	-	-	TE -> MT
	+CSDS	Supported SDS types	X	X	X	-	-	TE -> MT
Emergency Mode	+EMER	Emergency Mode entry/exit	X	X	X	X	X	MT <-> TE
Packet Data and/or TNP1	+WS45	DTE Stack selection	X	X		-	X	TE -> MT
	+WS46	WDS-side stack selection	X	X		-	X	TE -> MT
	D	Set-up PPP mode	X	X		-	X	TE -> MT
	O	Set-up PPP mode	X	X		-	X	TE -> MT
DMO	+CTOM	TMO/DMO Operating mode	X	X	X	X	X	TE <-> MT
	+CTDGR	Visible DMO Gateway or Repeater	X		X	-	X	MT -> TE
	+CTDCT	DMO communication type	X		X	-	-	MT <-> TE
AT Multiplexer	+CMUX	Activate the Multiplexer for simultaneous PD, CC and SDS		X	X	X	X	TE -> MT
Security	+CPIN	PIN operations	X	X	X	X	X	TE <-> MT
	+RCPIN	Remote Control PIN	X	X	X	X	X	TE -> MT
GPS	+GPSPOS	GPS location request	X	X	X	X	X	TE -> MT
Phone Book	+CPBR	Read phone book entries	X	X	X	X	X	TE -> MT
	+CPBW	Write phone book entry	X	X	X	X	X	TE -> MT
Power Off	+CFUN	Power Off MT	X	X	X	X	X	TE -> MT

PEI Link Management	R	Reboot the MS	X	X	X	X	X	TE -> MT
	Z	Restoration of AT defaults	X	X	X	X	X	TE -> MT
	&F	Restoration of Factory Serial Port Parameters		X	X	X	X	TE -> MT
	+IPR	Baud Rate		X	X	X	X	TE -> MT
	E	Echo	X	X	X	X	X	TE -> MT
	+IFC	Flow Control		X	X	X	X	TE -> MT
	&C	Configuration of circuit 109		X	X	X	X	TE -> MT
	&D	Configuration of circuit 108		X	X	X	X	TE -> MT
	+ICF	Framing and Parity		X	X	X	X	TE -> MT
	+CSCS	TE character set	X	X	X	X	X	TE -> MT
Special Modes	+FCLASS	Mode Selection	X	X	X	X	X	TE -> MT
Power Class	+CPWC	Power Class Toggling	X	X	X	X	X	TE <-> MT
BSI Security	+SIM	Access to SIM Card	X	X	X	X	X	TE <-> MT
	+ENCR	BSI E2EE Function	X	X	X	X	X	TE <-> MT

Table 5-4 List of AT Commands Supported**NOTE**

ETSI Syntax (only applicable to TMO).

3.2 Events Mapped to AT Commands

The table below summarizes the possible AT commands associated with MT events (depending on CP and AT configuration).

Event	Possible AT Commands	Conditions or Comments
Power-up in TMO	+CTOM	Indicating TMO mode
	+CREG	<reg unsolic> is different from 0
	+CTBCT	Serving Cell Broadcast Information
	+CPIN	MT is in PIN/PUK locked
	+TXI	TXI is switched on
Power-up in DMO	+CTOM	Indicating DMO mode
	+CTDGR	Indication of GW and/or REP detection
	+CPIN	MT is in PIN/PUK locked
	+TXI	TXI is switched on
Power-up in Repeater Mode	+CTOM	Indicating DMO mode
	+CTDGR	Indication of GW and/or REP detection
	+CPIN	MT is in PIN/PUK locked
	+TXI	TXI is switched on
Power-up in Gateway Mode	+CTOM	Indicating DMO mode
	+CREG	Contains Selected talkgroup in DMO
	+CTBCT	Serving Cell Broadcast Information
	+CTDGR	Indication of GW and/or REP detection
	+CPIN	MT is in PIN/PUK locked
	+TXI	TXI is switched on
Registration or Authentication Failure	+CREG	Received once per failed attempt on a cell if <reg unsolic> is different from 0. <reg stat> will indicate a failed attempt
Successful Registration	+CREG	Received if <reg unsolic> is different from 0. <reg stat> will indicate MS is now successfully registered
	+CTBCT	-
	+CTRUA	Radio User Assignment request received from SwMI

Cell reselection	+CREG	<reg unsolic> is different from 0
	+CTBCT	-
	+CTGS	Change of attach/detach status of Selected or Scan Groups and MM Group Management Service Profile is different from "MT only"
Out of Service	+CREG	<reg unsolic> is different from 0. <reg stat> will indicate that MS is out of coverage
Cell goes to Fallback (LST) or back to Normal (Wide Area)	+CTBCT	One bit indicates whether cell is in Fallback or Normal mode
Cell no longer supports PD or resumes supporting PD	+CTBCT	Support for PD is indicated by SNDCP and AL bits
Cell changes security class	+CTBCT	One bit indicates new security class
DGNA assignment (without attachment)	+CTGL	<ident unsolic> was set to 1
	+CNUMD	<ident unsolic> was set to 1
DGNA deassignment	+CTGL	<ident unsolic> was set to 1
	+CTGS	Deassignment is for an attached talkgroup (Selected or Scan)
	+CNUMD	<ident unsolic> was set to 1
DGNA assignment with attachment	+CTGL	MS will indicate new number of talkgroup entries and Folders
	+CTGS	New group will be included in the list
	+CNUMD	<ident unsolic> was set to 1
SwMI initiated attachment or detachment or group report	+CTGS	<group type> will indicate attach/detach status of Groups
Incoming call	+CTICN	Voice Call Control Service Profile is different from "MT only"
Call in progress or queued	+CTOCP	Voice Call Control Service Profile is different from "MT only"
Call Connected	+CTCC	Voice Call Control Service Profile is different from "MT only"
Transmission granted	+CTXG	Voice Call Control Service Profile is different from "MT only"
Transmission ceased (in simplex call)	+CDTXC	Voice Call Control Service Profile is different from "MT only"
Transmission withdrawn in simplex call (and given to other party)	+CTXI	Voice Call Control Service Profile is different from "MT only"
Transmission interrupted (in simplex call)	+CTXW	Voice Call Control Service Profile is different from "MT only"
Call Ended for any reason (for example, pre-emption, party busy)	+CTCR	Voice Call Control Service Profile is different from "MT only" <disconnect cause> indicates reason for end of call
Received SDS or Status message (in TMO)	+CTSDSR	Service Profile for SDS or Status is different from "MT only" and MS is configured for ETSI syntax for SDS/Status
Received SDS or Status message (in TMO or DMO)	+CMT	Service Profile for SDS or Status is different from "MT only" and MS is configured for Motorola syntax for SDS/Status
Received layer2 acknowledgement for transmitted SDS (or Status) or lack of such acknowledgement (in TMO)	+CMGS	<SDS status> indicates success or failure of layer2 transmission and MS is configured for ETSI syntax for SDS/Status
MS enters Emergency Mode due to Emergency button press	+EMER	<emergency unsolic> is set to 1
MS leaves Emergency Mode due to MMI action	+EMER	<emergency unsolic> is set to 1
External handset hook on/off is detected	+HHD	<handset unsolic> is set to 1
Volume is changed by the MMI	+CLVL	<volume> indicates new value of volume
MT switched to DMO from MMI	+CTOM	<state> indicates new state of DMO
MT switched to TMO from MMI	+CTOM	<state> indicates new state of TMO
MT switched to REP from MMI	+CTOM	<state> indicates new state of Repeater
MT switched to GW from MMI	+CTOM	<state> indicates new state of TMO
MT in DMO detects GW or REP or loses sync with GW or REP	+CTDGR	Command content indicates GW and/or REP information

MT enter/exit TXI	+TXI	<TXI unsolicited> enabled. Indicates current TXI state
DMO communication type changed	+CTDCT	Communication type set to "Any" and changed via MMI
MT PIN/PUK locked	+CPIN	MT PIN/PUK locked. Current PIN lock state returned

Table 5-5 Events Mapped to Possible AT Commands

3.3 Limited AT Commands Set

**NOTE**

This section applies to CEP400 and MTP830 only.

If Commercial Full AT commands Enable flag is disabled only limited set of AT commands is available. The following table summarizes the limited AT commands set supported by the terminals.

**NOTE**

AT+CTSP command is not supported if Commercial Full AT commands Enable flag is disabled. The default service profile for status signalling messages allows only for receiving these messages by MT. SDS type 1,2,3 are not received by neither MT or TE.

Functionality	Command	Purpose	TMO	DMO	Direction of message
Network and Mobility Information	+CREG	Network Registration Status	X		MT <-> TE
	+CTBCT	Serving Cell Broadcast Information	X		MT <-> TE
	+CSQ	Signal Quality (RSSI) of Serving Cell	X		TE -> MT
	+GCLI	Neighbor Cells Information	X		TE -> MT
Identity Management	+GMI	Request MT Manufacturer Identification	X	X	TE -> MT
	+GMM	Request MT Model Identification	X	X	TE -> MT
	+GMR	Request MT Version Identification	X	X	TE -> MT
	+GSN	Request MT Serial Number	X	X	TE -> MT
	+CNUMF	Request Fixed Identities	X	X	TE -> MT
Audio Control	+CLVL	Speaker Volume Control	X	X	TE <-> MT
DMO	+CTOM	TMO/DMO Operating mode	X	X	TE <-> MT
Security	+CPIN	PIN operations	X	X	TE <-> MT
GPS	+GPSPOS	GPS location request	X	X	TE -> MT
Power Off	+CFUN	Power Off MT	X	X	TE -> MT
PEI Link Management	R	Reboot the MS	X	X	TE -> MT
	Z	Restoration of AT defaults	X	X	TE -> MT
	&L	Restoration of Factory Default Serial Port Parameters	X	X	TE -> MT
	+IPR	Baud Rate	X	X	TE -> MT
	+IFC	Flow Control	X	X	TE -> MT
	&C	Configuration of circuit 109	X	X	TE -> MT
	&D	Configuration of circuit 108	X	X	TE -> MT
	+ICF	Framing and Parity	X	X	TE -> MT
Testing	+FCLASS	Mode Selection	X	X	TE -> MT
	E	Echo	X	X	TE -> MT

Table 5-6 Limited AT Commands Set

3.4 TCR1000 AT Commands Set


NOTE

This section applies to TCR1000 only.

Functionality	Command	Purpose	TMO	DMO	Direction of message
RCU Interface	+K	RCU Interface	X	X	TE -> MT
Find Talkgroup	+Ftg	Find Talkgroup	X	X	TE -> MT
Find Folder	+FF	Find Folder	X	X	TE -> MT
Write Talkgroup	+Wtg	Write Talkgroup	X	X	TE -> MT
Group Management	+CTGS	Talkgroup Selection for Selected and Scan groups	X	X	TE <-> MT
AT Multiplexer	+CMUX	Activate the Multiplexer for simultaneous CC and SDS	X	X	TE -> MT
DMO operation	+CTOM	TMO/DMO Operating mode	X	X	TE <-> MT
	+CTDGR	Visible DMO Gateway or Repeater		X	TE <-> MT
Serial Link Management	Z	Restoration of AT defaults	X	X	TE -> MT
	+IPR	Baud Rate	X	X	TE -> MT
	E	Echo	X	X	TE -> MT
	+IFC	Flow Control	X	X	TE -> MT
	&C	Configuration of circuit 109	X	X	TE -> MT
	&D	Configuration of circuit 108	X	X	TE -> MT
	+ICF	Framing and Parity	X	X	TE -> MT
Testing	+FCLASS	Special Mode activation	X	X	TE -> MT
Response Format	V	Response Format	X	X	TE -> MT

Table 5-7 TCR1000 AT Commands Set

3.5 Remote Control Services

Controlled terminals support all the following commands providing that relevant flags are enabled in the codeplug.

Functionality	Remote Control Command	Purpose	TMO	DMO	ISSI	GSSI
Group & Modes Management	+CTOM	TMO/DMO Operating mode	X	X	X	X
	+CTGS	Talkgroup Selection	X	X	X	X
Network Information	+CREG	Network Registration Status	X		X	
	+CSQ	Cell Signal Quality	X		X	
GPS	+GPSPOS	Location Information	X	X	X	
Audio Control	+CLVL	Volume Control	X	X	X	

Table 5-8 Remote Control Commands Set

Controlled terminals send response only if a received command is individually addressed (destination address type is ISSI). The response is sent to sourced ISSI (a controlling ISSI which the message arrived from).

If a Remote Control command is sent to destination type GSSI then controlled terminals do not send any response, that is the controlled terminals execute received command or silently reject the command (for instance, when it comes from an unauthorized ISSI).

3.5.1 Remote Control Commands

The information for regular AT Commands is applicable for the Remote Control Commands. Any additional notes and differences are described in following sections.

3.5.1.1 +CTOM

The AT+CTOM command supports controlling TMO/DMO Operating Modes of the controlled terminal.

- If <unsolicited> notification is enabled, the notification is sent on a result of changing Operating Mode from MMI or PEI by a controlled terminal. The notification is not sent if it was requested by Remote Control Service.
- Unsolicited notification is sent before exiting current operating mode and after coming back to current operation mode. The unsolicited notification is aimed to notify the controlling terminal about leaving and coming back to the current operation mode in which the controlling terminal is operating.
- <unsolicited> by default is disabled. If the parameter is not present, then the syntax shall remain unchanged.
- Response is sent on the operation mode on which received the request (current).

3.5.1.2 +CTGS

The AT+CTGS command supports selecting talkgroup operation of the controlled terminal.

- AT+CTGS operates only on the selected talkgroup and does not impact any scanning talkgroups.
- <unsolicited> by default is disabled. If the parameter is not present, then the syntax shall remain unchanged.
- If <unsolicited> notification is enabled, the notification is sent on a result of changing Talkgroup from MMI or PEI on the controlled terminal. The notification is not sent if it was requested by Remote Control Service.

3.5.1.3 +CREG

The AT+CREG command supports only reading network registration information of a controlled terminal in TMO.

3.5.1.4 +CSQ

The AT+CSQ command supports only reading the RSSI of the Current Cell of a controlled terminal in TMO.

3.5.1.5 +GPSPOS

The AT+GPS command supports reading the Location Information of a controlled terminal.

3.5.1.6 +CLVL

The AT+CLVL command supports controlling the volume level of the loudspeaker and earpiece for calls on the controlled terminal.

4 Description of AT Commands

4.1 Network and Mobility Management

4.1.1 +CREG - Network Registration



NOTE

The command operates in TMO and Gateway Mode only.

Purpose

- Registration status indication (for example: registered or out of coverage)
- Receiving unsolicited notification of change of cell or registration status

Syntax

Command type	Syntax	MT Response
Set	AT+CREG=<Reg unsolic><CR>	<CR><LF>OK<CR><LF> <CR><LF>+CME_ERROR: _<error report code><CR><LF>
Read	AT+CREG?<CR>	<CR><LF>+CREG: _<Reg stat>[,<LA>,[<MNI>]]<CR><LF> <CR><LF>OK<CR><LF> <CR><LF>+CME_ERROR: _<error report code><CR><LF>
Test	AT+CREG=?<CR>	<CR><LF>+CREG: _ (0,1,3,5), (0-16383), <0000000-9999999><CR><LF> <CR><LF>OK<CR><LF>
Unsolicited	Not Applicable	<CR><LF>+CREG: _<Reg stat>[,<LA>,[<MNI>]]<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<Reg unsolic>	0	No unsolicited reports are provided
	1	A report is provided on the completion of every successful registration attempt (that is, ITSI Attach and roaming location updates), as well as when the MT loses contact with the network. The report shall only contain the registration state
	2 (default)	A report is provided on the outcome of every registration attempt, as well as when the MT loses contact with the network. The report shall contain the registration state, as well as (if successfully registered) the LA and the MNI of the cell
<Reg stat>	0	Registering or searching for a network (currently out of coverage) or just before switching modes
	1	Registered on home Network (first MNI in the Network Codeplug List)
	3	System reject, no other network available
	5	Registered on visited Network
<LA>	0-16383	Location Area
<MNI>	0000000-9999999	MCC (3 digits) + MNC (5 digits)

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	33	Parameter wrong type	In set command
	34	Parameter value out of range	In set command
	35	Syntax error (for example, invalid number of parameters)	Syntax error with set command
	40	Service not supported in DMO	MT is in DMO

4.1.2 +CTBCT - TETRA Cell Broadcast Information**NOTE**

The command operates in TMO and Gateway Mode only.

Purpose

- Reading information about the current cell such as LA, Wide/LST state, SDS-TL addressing method
- Receiving unsolicited notification of change of cell or of any parameter of the current cell

Syntax

Command type	Syntax	MT Response
Read	AT+CTBCT?<CR>	<CR><LF>+CTBCT: _<LA>, <BS service>, <Security information>, <SDS-TL addressing><CR><LF>
		<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>
Unsolicited	Not Applicable	<CR><LF>+CTBCT: _<LA>, <BS service>, <Security information>, <SDS-TL addressing><CR><LF>

Parameters & Values

Parameters		Value	Meaning
<LA>		0-16383	Location Area
<BS service>		0-FFF	Hexadecimal value representing the bit values of the BS service information elements. "Registration" is the MSB.
BS Service information elements	Registration	0	Registration is not required on current cell
		1	Registration is required on current cell
	De-registration	0	De-registration is not required on current cell
		1	De-registration is required on current cell
	Priority Cell	0	Current cell is not a priority cell
		1	Current cell is a priority cell
	Minimum mode	0	Cell will never use minimum mode service
		1	Cell may use minimum mode service
	Migration	0	Cell does not support migration
		1	Cell supports migrations
	System Wide Services	0	Cell is in LST
		1	Cell is in Wide Area Trunking
	TETRA Voice Service	0	Cell does not support Voice calls
		1	Cell supports Voice calls
	Circuit mode data Service	0	Cell does not support circuit mode data
		1	Cell supports circuit mode data
	Reserved	0	Reserved for future use
	SND CP Service	0	Cell does not support SND CP
		1	Cell supports SND CP
	AI Encryption Service	0	Cell does not support Air Interface Encryption
		1	Cell supports Air Interface Encryption
	Advanced Link Supported	0	Cell does not support Advanced Link
		1	Cell supports Advanced Link
<Security Information>		0	Current cell is operating in Security Class 1 (Clear)
		1	Current cell is operating in Security Class 2 (SCK)
		2	Current cell is operating in Security Class 3 (DCK/CCK)
<SDS-TL addressing>		0	Invalid
		1	SDS-TL Service centre addressing is preferred
		2	Never use SDS-TL Service centre addressing
		3	MS choice to use SDS-TL Service centre addressing

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	3	Operations Not Allowed	MT is in a state where it can not respond to the read command
	30	No network service	MT is not registered on a cell
	40	Service not supported in DMO	MT is in DMO

4.1.3 +CSQ - Cell Signal Quality



NOTE

The command operates in TMO only.

Purpose

Read the RSSI of the Current Cell

Syntax

Command type	Syntax	MT Response
Read	AT+CSQ?<CR>	<CR><LF>+CSQ: _<RSSI>, <BER><CR><LF>
		<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>

**NOTE**

When the MS is out of coverage, it returns value 99 for the <RSSI> to the read command.

Parameters & Values

Parameters	Value	Meaning
<RSSI>	0	-113 dBm or less
	1	-111 or -112 dBm
	2-30	-109 (or -110) dBm to -53 (or -54) dBm in steps of 2 dBm
	31	-51 dBm or greater
	99	Unknown or undetectable (MS is out of coverage)
<BER>	99	Unknown or undetectable

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	40	Service not supported in DMO	MT is in DMO

4.1.4 +GCLI - Neighbor Cells Information**NOTE**

The command operates in TMO and Gateway Mode only.

If the number of cells is different from 0, the first Cell is always the Serving Cell

Purpose

Reading Neighbor Cell Information

Syntax

Command type	Syntax	MT Response
Read	AT+GCLI?<CR>	<CR><LF>+GCLI: _<number of cells><CR><LF>
		[<LA>, <carrier>, <RSSI>, <Cx><CR><LF>]
		... [<LA>, <carrier>, <RSSI>, <Cx><CR><LF>] <CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<number of cells>	0-33	Number of Cells, equal to 1 for the Serving Cell (Cell 1) + Number of Neighbor Cells
<LA>	0-16383	Location Area of Cell
<carrier>	22-bit hex	Frequency pattern of Cell. Reverse Operation is the MSB

	Reverse Operation (1 bit)	0	Normal
		1	Reverse
	Duplex Spacing (3 bits)	3 bits	
	Offset (2 bits)	2 bits	
	Frequency Band (4 bits)	4 bits	
	Carrier Number (12 bits)	000-FFF	Carrier Number of the Cell
<RSSI>		0	-113 dBm or less
		1	-111 or -112 dBm
		2-30	-109 (or -110) dBm to -53 (or -54) dBm in steps of 2 dBm
		31	-51 dBm or greater
		99	Unknown or undetectable
<Cx>		-50 to 100	Cx of Cell (C1 of Serving Cell and C2 of Neighbor Cells)

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	40	Service not supported in DMO	MT is in DMO

4.1.5 +CTRUA - Radio User Assignment



NOTE

The command operates in TMO and Gateway Mode only.

Purpose

Unsolicited notification of RUA request received from the SwMI

Syntax

Command type	Syntax	MT Response
Unsolicited	Not Applicable	<CR><LF>+CTRUA: _<RUA request><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<RUA request>	0	Assignment not required or current assignment still valid
	1	Assignment requested, RUN type
	2	Assignment requested, SSI type
	3	Assignment requested, MS-ISDN type
	4	Assignment requested, alpha-tag type
	5	Permanent deassignment
	6	Reserved
	7	Reserved

4.1.6 +TXI - Transmit Inhibit Mode



NOTE

When TXI is enabled the following AT commands are prohibited:

- +CMGS
- +CTGS (in TMO and Gateway Mode)
- +CTSCAN
- Call Control with exception of Emergency: +CTXD, D, A, O, and +CTSDC

Purpose

- Setting, reading and testing TXI mode of the MT
- Receiving unsolicited notifications when TXI mode changed from MMI



NOTE

When a terminal is in Emergency Mode it will be not possible to go to TXI mode using +TXI command.

After initiating Emergency Mode, the terminal leaves TXI mode and regular AT command set is available.

When a terminal turns on in TXI mode in TMO and Gateway Mode, TXI unsolicited message will be sent to MT (even though by default unsolicited messages are disabled) and the terminal will stay in TXI mode with limited AT commands set waiting for commands for leaving TXI mode (+TXI).

Syntax

Command type	Syntax	MT Response
Set	AT+TXI=[<TXI mode>], [<TXI unsolic>]<CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _error report code<CR><LF>
Read	AT+TXI?<CR>	<CR><LF>+TXI: _<TXI mode>, <TXI unsolic><CR><LF> <CR><LF>OK<CR><LF>
Unsolicited	Not Applicable	<CR><LF>+TXI: _<TXI mode><CR><LF>
Test	AT+TXI=?<CR>	<CR><LF>+TXI: _ (0,1), (0,1)<CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<TXI mode>	0	TXI switched off
	1	TXI switched on
<TXI unsolic>	0	Disable unsolicited notification of TXI change
	1	Enable unsolicited notification of TXI change

4.2 Identity Management

4.2.1 +GMI - MT Manufacturer Identification

Purpose

Reading the MT manufacturer

Syntax

Command type	Syntax	MT Response
Read	AT+GMI?<CR>	<CR><LF>+GMI:_MOTOROLA<CR><LF> <CR><LF>OK<CR><LF>

4.2.2 +GMR - MT Revision

Purpose

Reading the MT Software Version

Syntax

Command type	Syntax	MT Response
Read	AT+GMR?<CR>	<CR><LF>+GMR:_<version><CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<version>	Xpp.xyz.abcd	X: represents the type of version (R is for official Customer Release) pp: number which represents the Platform, that is, Hardware model x: number which represents the End-to-End Encryption support y: number which represents the TEA version z: number which represents Unicode support ab: numbers which represent a major release number cd: numbers which represent a minor release number e: a lower-case letter which represents a sub-release (optional)

4.2.3 +GSN - MT Serial Number

Purpose

Reading the Serial Number of the MT

Syntax

Command type	Syntax	MT Response
Read	AT+GSN?<CR>	<CR><LF>+GSN:_<serial number><CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<serial number>	Up to 10 ASCII characters	Serial Number of the MS

4.2.4 +GMM - MT Hardware Model

Purpose

Reading the Hardware Model of the MT

Syntax

Command type	Syntax	MT Response
Read	AT+GMM?<CR>	<CR><LF>+GMM: _<model type>, <model number>, <Hardware ID><CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<model type>	0-65535	Represents the HW model (see Examples below)
	131	MTM800 Enhanced 380 MHz
	133	MTM800 Enhanced 800 MHz
	65055	380-430 MHz Full Band
	65065	MTH800 380-430 MHz Unicode platform
<model number>	Up to 16 ASCII characters	Model number (for example, H78PCN6TZ5AZ)
<Hardware ID>	0.0.0.0 to 255.255.255.255	Represents the HW ID of the model

4.2.5 +CNUM - TETRA Identities

Purpose

Reading MT identities applicable to the current primary operating mode

Syntax

Command type	Syntax	MT Response
Read	AT+CNUM?<CR>	<CR><LF>+CNUM: _<num type>, <called party identity>, [<alpha>]<CR><LF> [<num type>, <called party identity>, [<alpha>]<CR><LF> ... [<num type>, <called party identity>, [<alpha>]<CR><LF> <CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>
Test	AT+CNUM=?<CR>	<CR><LF>+CNUM: _ (0-5), (0-10231638316777215), [(Alpha)]<CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<num type>	0	Individual Address (ITSI)
	1	Group address: GSSI or GTSI (GTSI shall be returned only in DMO for non Home MNI)
	2	PSTN Gateway SSI
	3	PABX Gateway SSI
	4	Service Centre ITSI
	5	Service Centre (E.164 number)

<called party identity>	0-10231638316777215	GSSI/GTSI in the MT in DMO
<alpha>	12-character Text	Alphanumeric name of the GSSI as programmed in the Codeplug. Omitted if empty string.

Mapping <called party identity> for a <num types>

<num type>	<called party identity>	Meaning
0	0000000000000000-9991638316777214	Individual TETRA Subscriber Identity composed of: - First 3 Mobile Country Code (MCC) - Followed by 5 digits for Mobile Network Code - Followed by 8 digits for ISSI The MCC and MNC are those of the MT's Home MNI
1	0-16777215	GSSI
	0000000000000001-9991638316777214, 1023000000000001-10231638316777215	GTSI address is used for the Talkgroup identities programmed in the MT DMO Talkgroup list with non Home MNI. - First 3 or 4 is Mobile Country Code (4 digits are used only to support Open MNI TG =1023) - Followed by 5 digits for Mobile Network Code - Followed by 8 digits for ISSI
2	00000000-16777214	PSTN Gateway ISSI composed of 8 digits
3	00000000-16777214	PABX Gateway ISSI composed of 8 digits
4	0000000000000000-9991638316777214	ITSI of the Store & Forward Server Address. This element will be present when Store & Forward is enabled in the Codeplug. The MNI shall be the Home MNI
5	-	Not used

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	3	Operation Not Allowed	MT is not ready or is unable to proceed with the request at the moment, the TE should retry again
	4	Operation Not Supported	TE enters the set command
	33	Parameter wrong type	Parameter is a not numeric
	34	Parameter value out of range	At least one of the set parameters is out of their range
	35	Syntax error	Invalid number of parameters

4.2.6 +CNUMF - Fixed TETRA Identities

Purpose

Reading fixed TETRA Identities (ITSI, PABX, PSTN, Store & Forward Service centre addresses) and setting ISSI (dependent on CPS settings)

Syntax

Command type	Syntax	MT Response
Set	AT+CNUMF?<CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:<_error report code><CR><LF>

Read	AT+CNUMF?<CR>	<CR><LF>+CNUMF: _<num type>, <ITSI><CR><LF> <num type>, <PSTN Gateway><CR><LF> <num type>, <PABX Gateway><CR><LF> [<num type>, <Service Centre ITSI><CR><LF>] <CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>
Test	AT+CNUMF=?<CR>	<CR><LF>+CNUMF: _ (0,2,3,4), (0000000000000000-999999916777214)<CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<num type>	0	- ITSI - ISSI (for the set command only)
	2	PSTN Gateway SSI
	3	PABX Gateway SSI
	4	Service Centre ITSI
<ITSI>	0000000000000000-999999916777214	Individual TETRA Subscriber Identity composed of: - First 3 digits for Mobile Country Code (MCC) - Followed by 5 digits for Mobile Network Code (MNC) - Followed by 8 digits for ISSI The MCC and MNC are those of the MT's Home MNI
<PSTN Gateway>	00000000-16777214	PSTN Gateway ISSI composed of 8 digits
<PABX Gateway>	00000000-16777214	PABX Gateway ISSI composed of 8 digits
<Service Centre ITSI>	0000000000000000-999999916777214	ITSI of the Store & Forward Server Address. This element will be present when Store & Forward is enabled in the Codeplug. Same format as <ITSI>
<ISSI>	1-13999999	Terminal ISSI (applicable to the set command only)

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	3	Operation Not Allowed	MT is in a state where it can not respond to the read command (for example powering up or down)

4.2.7 +CNUMS - Static TETRA Identities

Purpose

- Reading static TETRA Group Identities programmed in the MT or the number of groups in the list for current mode (TMO, DMO, Repeater, or Gateway Mode)
- Setting range of the requested GSSI/GTSI
- Testing command for a set of available parameters and ranges of values

Syntax

Command type	Syntax	MT Response
Set	AT+CNUMS=<ident unsolic>, [<lower range limit>], [<upper range limit>]<CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>

Read	AT+CNUMS?<CR>	<CR><LF>+CNUMS:_[<number of groups><CR><LF>] [<num type>,<called party identity>,<alpha>]<CR><LF> [<num type>,<called party identity>,<alpha>]<CR><LF> ... [<num type>,<called party identity>,<alpha>]<CR><LF> <CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:_[<error report code><CR><LF>
Test	AT+CNUMS=?<CR>	<CR><LF>+CNUMS:_(0),(1-<lower range limit>),(1-<upper range limit>),(1),(0-10231638316777215)<CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<ident unsolic>	0	Disable TETRA identity unsolicited result
<lower range limit>	1-2048	First index of the GSSI to read the list from in TMO
	1-1024	First index of the GSSI to read the list from in DMO
<upper range limit>	1-2048	Last index (inclusive) of the GSSI to read to in TMO
	1-1024	Last index (inclusive) of the GSSI to read to in DMO
<num type>	1	<called party identity> is a GSSI/GTSI (GTSI shall be returned only in DMO for non Home MNI)
<called party identity>	0-10231638316777215	GSSI/GTSI in the MT
<alpha>	text, 12 characters	Alphanumeric name of the GSSI as per the Codeplug settings. Omitted if the string is empty

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	3	Operation Not Allowed	MT is not ready or is unable to proceed with the request at the moment, the TE should retry again
	4	Operation Not Supported	Only one of the following parameters, <lower range limit> and <upper range limit>, is present
	33	Parameter wrong type	Parameter is a not numeric
	34	Parameter value out of range	At least one of the set parameters is out of their range
	35	Syntax error	Invalid number of parameters, <lower_range> is greater than <upper_range>

**NOTE**

- The read command returns a unique list of dynamic and semi-static GSSIs. (Semi-Static GSSIs are these for which only selection and re-assignment is allowed. Dynamic GSSIs are these for which selection, deassignment and reassignment is allowed)
- The read command returns all visible and invisible GSSIs
- The <lower range limit> and <upper range limit> should be both present or absent
- When both <lower range limit> and <upper range limit> are missing, the MT returns only the <number of groups>. When the both parameters, <lower range limit> and <upper range limit>, are present, the <number of groups> is not returned
- If <ident unsolic> is set to 1, and the MT receives a DGNA command affecting the Talkgroup list, the MT sends then an unsolicited notification with the whole DGNA Talkgroup list. Unsolicited notification is sent every time a dynamic or a semi-static talkgroup list is changed
- If the <ident unsolic> is set to 0, then the MT does not send any +CNUMD unsolicited notification on reception of DGNA command

4.2.8 +CTGL - Talkgroup List by Folder and DGNA Notification

Purpose

- Reading all programmed TMO or DMO Talkgroups in the MT (Folder by Folder or in one go)
- Receiving unsolicited notification when an individual DGNA command is received

Syntax

Command type	Syntax	MT Response
Set	AT+CTGL=<ident unsolic>, [<folder number>] [<folder number>] <CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>
Read	AT+CTGL?<CR>	<CR><LF>+CTGL: _<number of folders>, <number of talkgroups>, <folder structure><CR><LF> <CR><LF>OK<CR><LF>
		<CR><LF>+CTGL: _[[<folder number>, <folder name><CR><LF> [<folder number>, <GSSI_1>, [<GSSI_1 name>]<CR><LF> ... [<folder number>, <GSSI_N>, [<GSSI_N name>]<CR><LF>]] ... [[<folder number>, <folder name><CR><LF> [<folder number>, <GSSI_1>, [<GSSI_1 name>]<CR><LF> ... [<folder number>, <GSSI_N>, [<GSSI_N name>]<CR><LF>]] ... [[<parent-folder number>, <parent-folder name>\<folder number>, <folder name>\<CR><LF> [<folder number>, <GSSI_1>, [<GSSI_1 name>]<CR><LF> ... [<folder number>, <GSSI_N>, [<GSSI_N name>]<CR><LF>]]
		<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>
Unsolicited	Not Applicable	<CR><LF>+CTGL: _<number of folders>, <number of talkgroups><CR><LF>
Test	AT+CTGL=?<CR>	<CR><LF>+CTGL: _ (0,1) , (0-256) <CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<ident unsolic>	0 (default)	Disable DGNA unsolicited notification affecting the Talkgroup list
	1	Enable DGNA unsolicited notification affecting the Talkgroup list
<number of folders>	1-256	Number of programmed Folders in the MT CP
<number of talkgroups>	1-2048	Number of programmed Talkgroups in the MT CP
<folder number> <parent-folder number>	0	Only in set command: TE wishes to read all folders in one go
	1-256	Index of programmed Folder that TE wishes to read
	257	TE wishes to read the Folder and Alias of the currently selected TG in set command only
<GSSI_1> to <GSSI_N>	0-16777215	GSSI address composed of 8 digits, of the Talkgroup identities programmed in the MT Talkgroup list. These can be repeated in the CP.

<GTSI_1> to <GTSI_N>	0000000000000001-9991638316777214, 1023000000000001-10231638316777215	GTSI address of the Talkgroup identities programmed in the MT DMO Talkgroup list with non Home MNI
<folder name> <parent-folder number>	12-character Text	Alphanumeric name of the Folder as programmed in the Codeplug. Absent if empty string.
<GSSI name>	12-character Text	Alphanumeric name of the GSSI as programmed in the Codeplug. Omitted if empty string.
<folder structure>	0,1	0 (default) - plain as in MR5.9 and previous releases 1 – folder hierarchy

**NOTE**

- The read command can be aborted by entering any character followed by <CR>
- The command does not return Invisible (that is non-selectable) Groups such as Always Scanned Groups, but those Groups will be present in +CTGS if the SwMI accepts their attachment.
- When the set command only contains <ident unsolic> (that is <folder number> is omitted), the read command will only return the number of non-empty folders and the number of Talkgroups (which could be repeated).
- When a folder number is present in the set command and is set to 0, the read command will return all the Talkgroups in the Talkgroup list (which could contain repetitions).
- When a valid folder number is present in the set command and is different from 0, the read command will only return the Talkgroups present in the Folder identified by the folder number.
- The Folder numbers are a continuous set, even though in the MT Codeplug, some Folders in-between may not be programmed.
- When the MT receives an individually-addressed DGNA command and <ident unsolic> was set to 1 by the TE, the MT will send an unsolicited notification indicating the new number of non-empty Folders and the new number of Talkgroups (which could contain repeats). The TE can then re-apply the read command to see if there are any changes.
- When the MT is out of the coverage, it returns the last selected group and its folder.
- This command does not allow to read favorite folders. However, if a selected talkgroup is placed in a favorite folder, then the terminal will return the favorite folder on the end of the folder list.

Error Report Codes

Parameters	Value	Meaning	Usage (Examples)
<error report code>	3	Operation Not Allowed	MT is not ready/able to proceed with the request at this moment, the TE should retry again
	33	Parameter wrong type	Parameter is a not numeric
	34	Parameter value out of range	Out of range folder number, starting/ending talkgroup number
	35	Syntax error	Invalid number of parameters
	40	Command not supported in DMO	The MS is in DMO

4.3 Group Management

4.3.1 +CTGS - Talkgroup Selection

Purpose

In TMO, the command is used to:

- Request attachment of the Selected Group and define Scan List maximum length (up to 20 Scanned Groups)
- Receive unsolicited notification of change of Selected Group (by the MMI or the SwMI)
- Receive unsolicited notification of change of the attach/detach status of Selected Group or any of the Scanned Groups when the scanning is switched on (by +CTSCAN)

In DMO, the command is used to:

- Request attachment of the Selected Group
- Receive unsolicited notification of change of Selected Group (by the MMI)

Syntax

Command type	Syntax	Possible Responses	
Set	AT+CTGS=[<group type>],<selected GSSI/GTSI> [,<group type>,<scan GSSI/GTSI>] ... [,<group type>,<scan GSSI/GTSI>]<CR>	<CR><LF>OK<CR><LF>	
		<CR><LF>+CME_ERROR:_<error report code><CR><LF>	
Read	AT+CTGS?<CR>	ETSI Group Setup Format disabled <CR><LF>+CTGS:_<group type>,<selected GSSI/GTSI> [,<group type>,<scan GSSI>] ... [,<group type>,<scan GSSI>]<CR><LF> <CR><LF>OK<CR><LF>	ETSI Group Setup Format enabled <CR><LF>+CTGS:_[<group type>],<selected GSSI/GTSI><CR><LF> [, [<group type>],<scan GSSI><CR><LF>] ... [, [<group type>],<scan GSSI>]<CR><LF> <CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:_<error report code><CR><LF>	
Test	AT+CTGS=?<CR>	<CR><LF>+CTGS:_(0-2),(0-16777215,0000000000000001-1023163831677215),(3-7),(0-16777214)<CR><LF> <CR><LF>OK<CR><LF>	

Unsolicited notification	Not Applicable	ETSI Group Setup Format disabled <CR><LF>+CTGS:_[<group type>,<selected GSSI/GTSI> [,<group type>,<scan GSSI> ... [,<group type>,<scan GSSI>]<CR><LF>	ETSI Group Setup Format enabled <CR><LF>+CTGS:_[<group type>],<selected GSSI/GTSI><CR><LF> [,<group type>],<scan GSSI><CR><LF> ... [,<group type>],<scan GSSI>]<CR><LF>]
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Parameters & Values

Parameters	Value	Meaning
<group type>	1	Selected Group is Attached (CoU5: Selected Group) Value always used in DMO
	2 (value not allowed for the set command, only for read and unsolicited)	Scan Priority 1 (CoU2: Not Scanned): TMO Selected or Scan Group is Not Attached. This group type is not supported in DMO and is read-only (i.e. not supported in set command) This type can be used because the group is invalid on the SwMI or the attach status is not known (e.g. Attachment is in progress or MT is Out of Service)
	3	Scan Priority 2 (CoU3: Low Priority): Low priority scan group (not supported in DMO)
	4	Scan Priority 3 (CoU4: Normal Priority): Normal priority scan group (not supported in DMO)
	5	Scan Priority 4 (CoU6: High Priority): High priority scan group (takes priority over selected Group, and not supported in DMO)
	6 (value not allowed for the set command, only for read and unsolicited)	Scan Priority 5 (CoU7: SwMI Locked) SwMI locked group is attached by SwMI (read-only group type and not supported in DMO). (Currently not supported)
	7 (values not allowed for the set command, only for read and unsolicited)	Scan Priority 6 (CoU8): Always Scanned group (read-only group type and not supported in DMO)
<Selected GSSI/GTSI>	0-16777215, 0000000000000001- 9991638316777214, 1023000000000001- 10231638316777215	GSSI of the selected Group which shall exist in the Codeplug Talkgroup list (in the TMO list while in TMO, and the DMO list while in DMO) (16777215 is always a valid selection in TMO and 0 is an invalid selection in TMO) GTSI format (MNI+GSSI) is only valid in both TMO and DMO. For GSSI address home MNI will be used. In TMO, if MS is provided with non Home MNI and interMNI calls are not supported then "Operation not allowed" shall be returned. I.e. GSSI =16777215 is "Open TG", GTSI= 10231638316777215 is "Open MNI".
<Scan GSSI>	1-16777214	GSSI of a scan group which shall be present in the Codeplug TMO Talkgroup list. For the set command, it has to be a group programmed in the Codeplug. For the read command, it can be a group programmed or invisible in the Codeplug.

Error Report Codes

Parameters	Value	Meaning	Usage (Examples)
<error report code>	3	Operation Not Allowed	MT is not ready/able to proceed with the request at this moment, the TE should retry again
			No TE Service Profile access to MM service layer
	4	Operation Not Supported	Request contains more than one Selected talkgroup
			Request contains a repeat of GSSIs
			Request contains the Selected talkgroup but not the first in the list
	30	No network service	MT out of service
	33	Parameter wrong type	Parameter is a not numeric
	34	Parameter value out of range	Invalid group type or GSSI, or GSSI does not belong to MT Codeplug Talkgroup list
	35	Syntax error	Invalid number of parameters
	40	Service not supported in DMO	TE requests Scan group attachment in DMO
	41	Transmissions are inhibited	MT is in TXI mode and in TMO

**NOTE**

- The +CTGS command works for selected and scan group if AT+CTSP=1,1,11<CR> is applied first, that is the TE shall set the Service Profile for Group Management to "TE Only" to use the set and read commands and to receive an unsolicited notification. When the Talkgroup Scanning feature is enabled in the Codeplug, this applies to Scan Groups, and causes the MS to disable the MMI Scan Options menu and prevent MMI changes that will be out of control of the TE such as Scan on/off. When the talkgroup Scan feature is disabled, the Service Profile has only an effect on the Selected talkgroup and the TE will not be allowed to attach Scan Groups.
- When the Service Profile for MM Group Management is set to "TE only", the MMI user will still be allowed to change the Selected talkgroup, but not view or change the User Scan List.
- The MT will reject the set command if there is more than one selected group type present.
- The MT will reject the command if the selected Group is not present as the first group in the +CTGS command. If the TE does not wish to attach any selected Group in TMO, it shall include the NULL group (16777215) as the selected Group.
- The MT supports a maximum of 20 Scan Groups. It will reject a TE request to attach more than 20 Scan Groups.
- The MT will reject a +CTGS set command containing more than once the same GSSI (that is the list of groups shall be unique).
- The MT will only obey attachment/detachment of Groups following a valid +CTGS command (that is when the MT returns an error report code, it does not obey the set command).
- The MT in DMO will reject the set command if it contains Scan Groups.
- The MT will send the +CTGS command unsolicited on TMO to DMO switch after the +CTOM command.
- The MT will send the +CTGS command unsolicited on DMO to TMO switch after the +CTOM command if the Service Profile for MM Group Management is "TE only".
- The optional parameter <group type> is obligatory for TMO. However the parameter is obligatory for DMO. In DMO the MT ignores its value, if present, and treat it as the DMO Selected Group.
- While in DMO a selected talkgroup is a GSSI address then MS assumes that this is a talkgroup from Home MNI. To choose a talkgroup with different MNI (existing in CP) GTSI address should be used.
- Once an MS has attached a group as "Always Scanned" (that is CoU8) the MS is not permitted to explicitly detach that group.
- In the Gateway Mode, +CTGS command is used to set selected talkgroups in DMO. When DMO selected talkgroup is set, its TMO mapping is updated as well.
- In the Repeater Mode, +CTGS command is used the same way as in DMO.

4.3.2 +CTSCAN - Scanning On/Off

Purpose

- Setting scanning to on or off state
- Reading scanning state

Syntax

Command type	Syntax	Possible Responses
Set	AT+CTSCAN=<scanning state><CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:<error report code><CR><LF>
Read	AT+CTSCAN?<CR>	<CR><LF>+CTSCAN:<scanning state><CR><LF>
		<CR><LF>OK<CR><LF>
Test	AT+CTSCAN=?<CR>	<CR><LF>+CME_ERROR:<error report code><CR><LF>
		<CR><LF>+CTSCAN:<_ (0,1)><CR><LF>
		<CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<scanning state>	0	Scanning off
	1	Scanning on



NOTE

- This command will work only when the Service Profile for Group Management is set to "TE Only" (AT+CTSP=1,1,11<CR>),
- The set command applies only when the Talkgroup Scanning feature is enabled. Otherwise MS will report error "Operation Not Allowed".
- Change of scanning state causes the MT to send U-MM-STATUS indicating the new scanning state to the SwMI.
- The command will be rejected in DMO.
- When the Service Profile for Group Management is set to "TE Only", the MT will not allow the MMI user to change the scanning state i.e. scanning on/off will no longer be available from the MMI of the MT.
- When CP field "Scan on/off over the air" is disabled (Dimetra setting), then +CTSCAN will not change the scanning status but will detaches or re-attaches the scan groups, i.e. scanning will be always ON with this setting.

Error Report Codes

Parameters	Value	Meaning	Usage (Examples)
<error report code>	3	Operation Not Allowed	MT is not ready/able to proceed with the request at this moment, the TE should retry again
	33	Parameter wrong type	Parameter is a not numeric
	34	Parameter value out of range	Invalid group type or GSSI, or GSSI does not belong to MT Codeplug Talkgroup list
	35	Syntax error	Invalid number of parameters
	40	Service not supported in DMO	TE requests Scan group attachment in DMO

4.4 Service Profiles & Capabilities

4.4.1 +CTSP - Services Profiles

Purpose

Reading, setting and testing services that the TE wishes to control and receive signalling for

Syntax

Command type	Syntax	MT Response
Set	AT+CTSP=<service profile>,<service layer 1>[,<service layer 2>]<CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:<error report code><CR><LF>
Read	AT+CTSP?<CR>	<CR><LF>+CTSP:<service profile>,<service layer 1>,<service layer 2><CR><LF> [<service profile>,<service layer 1>,<service layer 2><CR><LF>] <CR><LF>OK<CR><LF>
Test	AT+CTSP=?<CR>	<CR><LF>+CTSP:<_ (0-3) , (0-4) , (0-255)><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<service profile>	0	"MT Only" controlled
	1	"TE Only" controlled
	2	"Both MT & TE" controlled
	3	"Neither TE & MT" controlled
<service layer 1>	0	Call Control
	1	Mobility Management
	2	Short Data Service and Status
	3	Short Data Service with Transport Layer
	4	Packet Data
<service layer 2>	0	Voice
	11	Group Management
	20	Status
	21	SDS type 1
	22	SDS type 2
	23	SDS type 3
	24	SDS type 4, PID values 0 to 127
	25	SDS type 4, PID values 128 to 255
	30	IP version 4
	0-255	PID when service layer 1 is SDS-TL.

Supported Parameters & Values Combinations

Service Layer 1	Service Layer 2	Supported Service Profiles
0 - Call Control (CC)	0 - Voice	0 - MT only (default) 2 - Both TE & MT
1 - Mobility Management (MM)	11 - Group Management	0 - MT only (default) 1 - TE only

2 - Short Data Service (SDS)	20 - Status	0 - MT only (default when MUX is active) 1 - TE only 2 - Both TE & MT (default)
	21 - SDS type 1 22 - SDS type 2 23 - SDS type 3	0 - MT only 1 - TE only (default) 3 - Neither TE & MT (default when MUX is active))
	24 - SDS type 4 PID 0-127 25 - SDS type 4 PID 128-255	0 - MT only 1 - TE only (default) 3 - Neither TE & MT (default)
3 - Short Data Service Transport Layer (SDS-TL)	0-255	0 - MT only 1 - TE only 3 - Neither TE & MT (default, see Note)
4- Packet Data	30 - IPv4	0 - MT only (default) 1 - TE only 2 - Both TE & MT

**NOTE**

For SDS-TL, the default Service Profile is "Neither" except for PIDs enabled in the Codeplug (for example Text, Call-Out, Concatenated Text, LIP or LRRP) for which it will be "MT only".

**NOTE**

- The command operates in TMO, DMO, Gateway and Repeater modes.
- Upon power-up, the MT will always revert to its default service profiles. The default profiles can then be modified using the +CTSP command.
- The MT will use the latest Service Profiles until power-off, that is, PEI link disconnections and reconnections will not affect the Service Profile settings of the MT (with the exception of SDS-TL Service Profiles for PIDs enabled in the codeplug).
- It is required for the TE to set the Service Profile for CC Voice to "both TE & MT" controlled to be able to initiate and receive calls.
- It is required for the TE to set the Service Profile for MM Group Management to "TE only" controlled to be able to attach/detach Selected and Scan Groups. The MMI will still be able to change the selected talkgroup but not the Scan List. Control of Scan Groups is only possible when the Talkgroup Scanning feature is enabled in the Codeplug.

**NOTE**

- When the Talkgroup Scanning feature is enabled in the Codeplug, setting the Service Profile for MM Group Management to "TE only" causes that setting is only possible only using the +CTSCAN command. The MS will display "Service Restricted" when the user tries to change the scanning status using the MMI.
- When the MS receives a Status, SDS type 1, 2, 3 or 4 message, it will send the message to the TE if the respective Service Profile for Status, SDS type 1, 2, 3 or type 4 PID is set to "TE only" or "Both TE & MT" according to the allowed Service Profile values.
- The MS will reject a request from the TE to send Status and SDS type 1, 2, 3 or 4 if the Service Profile for the respective service or PID is set to "MT only" or "Neither TE & MT".
- Setting the Service Profile for Packet Data IPv4 is optional, that is, ATO and ATD*99# commands will always activate Packet Data, regardless of Packet Data IPv4 Service Profile setting.
- To register for an SDS type 4 PID, the TE shall use SDS-TL (value 3) as <service layer1> and the PID value as <service layer2>.
- The MS accepts only the Service Profile for Status to be set to "TE only" if the Emergency Alarm is disabled for both DMO and TMO in the Codeplug.
- The MS rejects a +CTSP set command where <service layer1> is Call Control, MM, or Packet Data, and <service layer2> is omitted and the Service Profile is "TE only".
- When the Motorola Proprietary format is used (according to Codeplug setting), the MS will not accept this command for <service layer1> set to SDS or SDS-TL.
- When Status service is set to "TE only" or "Both TE & MT", only values defined in Table 5-7 will be sent or received via AT.
- The read command only returns the Service Layers for which the Service Profile is different from "Neither TE & MT".
- Setting Service Profiles "SDS type 4 PID 0-127" or "SDS type 4 PID 128-255" overrides all existing SDS-TL service profiles respectively PID 0-127 and PIDs 128-255 to MT, TE or Neither registered on current DLCI.
- When Multiplexer is enabled, the default values for Service Profiles are set to "MT only" or "Neither".
- When Multiplexer is enabled, AT command for reading Service Profiles (+CTSP?) on a DLCI will return all unregistered to any TE Service Profiles (returns only "MT only" Service Profiles) and all registered Service Profiles for current DLCI. Service Profiles registered on different DLCI (set to "TE only" or "Both") will not be returned.
- When Multiplexer is enabled and a Service Profile is registered ("TE only" or "Both") on one DLCI, it cannot be registered on different DLCI. Unregistration by setting to "MT only" or "Neither" is required first.

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	3	Operation Not Allowed	Invalid Service Profile set
	33	Parameter wrong type	Non-numeric values
	34	Parameter value out of range	Values or combinations not supported
	35	Syntax error	Invalid number of parameters

4.4.2 +GCAP - MT Capabilities



NOTE

The command operates in TMO and Gateway Mode only.

Purpose

Reading the services that the MT is able and configured to support.

Syntax

Command type	Syntax	MT Response
Read	AT+GCAP?<CR>	<CR><LF>+GCAP:_TETRA,<class of MS>,<stack present><CR><LF> <CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:_<error report code><CR><LF>
Test	AT+GCAP=?<CR>	<CR><LF>+GCAP:_(TETRA),(0-FFFFFF),(0)<CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<stack present>	0	Message Stack not supported for SDS
<class of MS>	0-FFFFFF	Hexadecimal value representing the bit values of the class of MS information elements. The MSB is the frequency simplex/duplex information element.

Class of MS information elements	Frequency simplex/duplex	0	Frequency simplex supported
	Single/multi-slot	0	Single-slot Packet Data is supported
		1	Multi-slot Packet Data is supported
	Concurrent multi-carrier operation	0	Single carrier operation supported
	Voice	1	Voice calls are supported
	End to end encryption	0	End to end encryption supported
		1	End to end encryption not supported
	Circuit mode data	0	Circuit mode data not supported
	TETRA Packet Data	0	Packet Data is not supported
		1	Packet Data is supported
	Fast switching	0	Fast switching not supported
		1	Fast switching supported
	DCK Air Interface Encryption	0	DCK Air Interface Encryption not supported
		1	DCK Air Interface Encryption supported
	CLCH needed on carrier change	0	No CLCH needed on carrier change
	Concurrent channels	0	Concurrent channels not supported
	Advanced Link Supported	0	Advanced Link not supported
		1	Advanced Link supported
	Minimum mode supported	0	Minimum mode not supported
		1	Minimum mode supported
	Carrier specific signalling channel	0	Carrier specific signalling channel not supported
		1	Carrier specific signalling channel supported
	Authentication	0	Authentication not supported
		1	Authentication supported
	SCK Air Interface Encryption	0	SCK Air Interface Encryption not supported
		1	SCK Air Interface Encryption supported
	TETRA AI Standard version number	001	EN 300 392-2 V2.3.2 to TS 300 392-2 V2.6.1 and EN 300 392-7 V2.1.1 to TS 100 392-7 V2.4.1
	Common SCCH	0	Common SCCH not supported
		1	Common SCCH supported
	Reserved	0	Reserved for future
	Reserved	0	Reserved for future
	Reserved	0	Reserved for future
	Reserved	0	Reserved for future

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	40	Command not supported in DMO	MT is in DMO

Examples

MT supports MSPD, SCK and DCK encryption and common SCCH:

```
AT+GCAP?<CR>
<CR><LF>+GCAP:_TETRA,529350,0<CR><LF>
<CR><LF>OK<CR><LF>
```

MT supports Single-slot PD and End-to-End encryption:

```
AT+GCAP?<CR>
<CR><LF>+GCAP:_TETRA,1A0040,0<CR><LF>
<CR><LF>OK<CR><LF>
```

4.5 Call Control



NOTE

In Gateway/Repeater Mode, initiating calls using AT commands is not possible.

In Gateway/Repeater Mode, AT commands related to displaying calls are supported. For Gateway Mode only the incoming call are displayed.

4.5.1 +CTSDC - TETRA Service Definition for Calls

Purpose

Defining the Call Setup Parameters used to initiate the next Call

Syntax in TMO

Command type	Syntax	MT Response
Set	AT+CTSDC=<AI service>, <called party identity type>, [<area>], [<hook>], [<simplex>], [<end to end encryption>], [<comms type>], [<slots/codec>], [<RqTx>], [<priority>], [<CLIR control>]<CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:<error report code><CR><LF>
Read	AT+CTSDC?<CR>	<CR><LF>+CTSDC: <AI service>, <called party identity type>, [<area>], [<hook>], [<simplex>], [<end to end encryption>], [<comms type>], [<slots/codec>], [<RqTx>], [<priority>], [<CLIR control>]<CR><LF> <CR><LF>OK<CR><LF>
Test	AT+CTSDC=?<CR>	<CR><LF>+CTSDC: _ (0), (0,1,3,4), (0), (0,1), (0,1), (0,1), (0,1), (0), (0,1), (0-15), (0) <CR><LF> <CR><LF>OK<CR><LF>

Syntax in DMO

Command type	Syntax	MT Response
Set	AT+CTSDC=<AI service>, <called party identity type>, [<area>], [<hook>], [<simplex>], [<end to end encryption>], [<comms type>], [<slots/codec>], [<RqTx>], [<priority level>], [<CLIR control>]<CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:<error report code><CR><LF>
Read	AT+CTSDC?<CR>	<CR><LF>+CTSDC: <AI service>, <called party identity type>, [<area>], [<hook>], [<simplex>], [<end to end encryption>], [<comms type>], [<slots/codec>], [<RqTx>], [<priority level>], [<CLIR control>]<CR><LF> <CR><LF>OK<CR><LF>

Test	AT+CTSDC=?<CR>	<CR><LF>+CTSDC: (0), (0,1,3,4), (0), (1), (1), (0,1), (0,1), (1), (0), (0-3), (0) <CR><LF> <CR><LF>OK<CR><LF>
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Parameters & Values

Parameters	Value	Meaning
<AI service>	0	TETRA Speech
<Called party identity type>	0 (default)	SSI
	1	TSI
	3	PABX ESN
	4	PSTN ESN
<area>	0	Area not selected
<hook>	0 (default in TMO)	Hook signalling (required for duplex individual call and can be used for simplex individual call)
	1 (default in DMO)	Direct signalling (required for group calls and can be used for simplex individual call)
<simplex>	0 (default in TMO)	Duplex (can only be used for individual call)
	1 (default in DMO)	Simplex (required for group calls and can be used for individual calls)
<end to end encryption>	0 (default)	Clear (MT ignores setting for Group Calls and uses own rule)
	1	Encrypted (MT ignores setting for Group Calls and uses own rule)
<comms type>	0 (default)	Point to Point Call (Private, PSTN or PABX call)
	1	Point to Multipoint Call (Group Call)
	4	Individual call without presence check for DMO
<slots/codec>	1	TETRA Encoded Speech
<RqTx>	0 (default)	Request to Transmit (required for simplex direct calls and for duplex individual calls)
	1	No Request to Transmit (required for simplex hook individual call)
<priority>	0 (default)	Priority not defined (that is, normal priority)
	1-11	Call Priority 1 to 11
	12	Pre-emptive priority 1
	13	Pre-emptive priority 2
	14	Pre-emptive priority 3
	15	Emergency priority
<CLIR control>	0	Not implemented or use default
<priority level>	0 (default)	Normal priority
	1	High priority
	2	Pre-emptive priority
	3	Emergency priority



NOTE

This command is accepted even when the MT is out of coverage or in TXI, as it only defines the call parameters for the next call the TE wishes to make. The dial command will be rejected while out of coverage or in TXI

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	3	Operations Not Allowed	MT is not ready to respond to the command or the end-to-end setting can not be accepted. Please try again.
	33	Parameter wrong type	
	34	Parameter value out of range	
	35	Syntax error	Invalid number of parameters

4.5.2 D - Initiate a Call or PPP connection

Purpose

Initiating a Voice Call or setting up a PPP link for Packet Data and/or TNP1 session

Syntax

Command type	Syntax	Possible MT Responses
Execution	ATD[<dial string>]<CR>	MT response for a call request: <CR><LF>OK<CR><LF>
		MT response for a PPP connection request (ATD*99#): <CR><LF>CARRIER 7200<CR><LF> <CR><LF>PROTOCOL: ALT<CR><LF> <CR><LF>COMPRESSION: NONE<CR><LF> <CR><LF>CONNECT<CR><LF>
		MT response for wrong call or PPP request: <CR><LF>+CME_ERROR: _<error report code><CR><LF>
Test	ATD=?<CR>	<CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<dial string>	If the dial string is missing, the MT will initiate a call to the last TE called number.	
	*99#	Initiation of PPP connection
	(or T*99#, P*99#)	(required for backward compatibility with Windows default syntax for Tone/Pulse dialing)
	0-16777214	For an SSI
	15 digits	For a TSI
	Up to 24 digits	PSTN/PABX ESN



NOTE

- This command, when accepted, causes the MT to attempt sending the U-SETUP in TMO or the DM-SETUP in DMO if the channel is free. If the MS requests pre-emption then DM-PREEMPT is sent.
- For Packet Data, the command is accepted regardless of the Service Profile for Packet Data
- Once the MT sends CONNECT, the TE and MT are expected to negotiate a PPP link by transmitting LCP datagrams on logical circuits TD and RD.

Error Report Codes

Parameter	Value	Meaning	Usage
<error report code>	0	MT failure	MT failed to transmit message over the air
	3	Operations Not Allowed	MT is not in a state where it can accept the command, for example, there is an ongoing Emergency call or the MT is in Emergency Mode.
	26	Dial string too long	
	27	Invalid characters in dial string	
	30	No network service	
	40	Service not supported in DMO	MT is in DMO
	41	Transmissions are inhibited	MT is in TXI
	42	Service temporarily not available	MT is busy in a signalling transaction. Please try again

4.5.3 A - Answer Hook Call**NOTE**

The command operates in TMO only.

Purpose

Answering simplex or duplex individual call with hook signalling (that does not apply to group calls)

Syntax

Command type	Syntax	Possible MT Responses
Execution	ATA<CR>	<CR><LF>OK<CR><LF>
		<CR><LF>CME_ERROR: _<error report code><CR><LF>

**NOTE**

This command (when accepted) causes the MT to try to send a U-CONNECT PDU.

Error Report Codes

Parameter	Value	Meaning	Usage
<error report code>	0	MT failure	MT failed to transmit message over the air
	3	Operations Not Allowed	There is no incoming call
	35	Syntax error	Invalid number of parameters
	40	Service not supported in DMO	MT is in DMO
	41	Transmissions are inhibited	MT is in TXI

4.5.4 H - Terminate Call

Purpose

Hang-up an ongoing Call or reject an incoming call

Syntax

Command type	Syntax	Possible MT Responses
Execution	ATH[<value>]<CR>	<CR><LF>OK<CR><LF>
		<CR><LF>CME_ERROR: _<error report code><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<value>	0	Disconnect line and Terminate Call



NOTE

- In case of group call where the MT is not call owner, the MT will leave the call but may receive Late Entry signalling. The MT will block the late entry until expiry of the hold timer defined in the Codeplug.
- The call termination request applies in any call phase (for example, call setup, call queued, call in progress or call restoration).
- When the MT accepts the command and is allowed to transmit, it sends a U-DISCONNECT PDU if it is an individual call or if the MT is the call owner of a Group Call. Otherwise, the MS will leave the call without sending any PDU over the Air.

Error Report Codes

Parameter	Value	Meaning	Usage
<error report code>	0	MT failure	MT failed to transmit message over the air
	3	Operations Not Allowed	MT is not ready to respond to the command. Please try again.
	33	Parameter wrong type	
	34	Parameter value out of range	
	35	Syntax error	Invalid number of parameters

4.5.5 +CTCC - Call Connect

Purpose

Indicating that an outgoing (from PEI or MMI) or incoming call is now connected

Syntax

Command type	Syntax	MT Response
Unsolicited notification	Not applicable	<CR><LF>+CTCC: _<CC instance>, [<hook>], <simplex>, [<AI service>], [<end to end encryption>], [<comms type>], [<slots/codec>], [proprietary]<CR><LF>
Test	AT+CTCC=?<CR>	<CR><LF>+CTCC: _ (0-999), (0,1), (0,1), (0), (0,1), (0,4), (1)<CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<CC instance>	0-999	Call Instance (PEI Call identifier)
<hook>	0	Hook signalling (only in TMO)
	1	Direct signalling (default)
<simplex>	0	Duplex
	1	Simplex
<AI service>	0	TETRA Speech
<end to end encryption>	0	Clear End-to-End
	1	Encrypted End-to-End
<comms type>	0	Point to Point Call (Private, PSTN or PABX call)
	1	Group Call
<slots/codec>	1	TETRA encoded speech (just comma will be present)

**NOTE**

In TMO/Gateway Mode the MT sends the +CTCC notification when a call is connected, that is on reception of:

- D-SETUP for an incoming direct setup Call (Group, Individual, or Broadcast), but after the +CTICN notification
- D-CONNECT for an initiated call
- D-CONNECT ACK for an accepted individual call.

In DMO/Gateway/Repeater Mode the MT sends the +CTCC notification when a call is connected even though there is no directly corresponding message on the air interface.

4.5.6 +CTXG - Transmission Grant**Purpose**

- Indicating that Transmission Grant has been received for an ongoing call (incoming or outgoing)
- TPI present when Transmission is granted to another and it is present in D-TX GRANTED PDU

Syntax

Command type	Syntax	MT Response
Unsolicited notification	Not applicable	<CR><LF>+CTXG: <CC instance>,<TxGrant>,<TxRqPrmsn>,<end to end encryption>[,<TPI type>[,<TPI>]]<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<CC instance>	0-999	Call Instance of a call initiated by the MT
<TxGrant>	0	Transmission Granted
	1	Transmission not granted
	2	Transmission queued
	3	Transmission granted to other
<TxRqPrmsn>	0	Allowed to request Transmission
	1	Not Allowed to request Transmission
<end to end encryption>	0	Clear (MT ignores setting and uses own rule)
	1	Encrypted (MT ignores setting and uses own rule)

<TPI type>	0	SSI
	1	TSI
	2	ESN
<TPI>	0-16777214	If TPI type is SSI
	15 digits	If TPI type is TSI
	Up to 24 digits	If TPI type is ESN

**NOTE**

In all modes the MT sends a +CTXG notification when a call is connected following a +CTCC indication:

- On reception of D-TX GRANTED PDU
- On reception of D-CALL RESTORE PDU.
- On reception of D-TX CONTINUE (this will be changed in a future release in which +CTXN will be sent on reception of D-TX CONTINUE)

In DMO or Repeater transmission grant information is derived from other call set-up messages. The command communicates to the TE the end of the call set-up phase for incoming and outgoing calls, following the +CTCC command, and who is allowed to transmit in a simplex call.

4.5.7 +CTXD - Transmit Demand

Purpose

Requesting to talk in an ongoing simplex call (group or individual)

Syntax

Command type	Syntax	MT Response
Set	AT+CTXD=<CC instance>,<TXDemandPriority>,[<end to end encryption>]<CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:_<error report code><CR><LF>
Test	AT+CTXD=?<CR>	<CR><LF>+CTXD:_ (0-999) , (0-3) , (0,1) <CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<CC instance>	0-999	Call Instance (PEI Call identifier)
<TXDemandPriority>	0	Low
	1	High
	2	Pre-emptive
	3	Emergency
<end to end encryption>	0	End-to-End Clear
	1	End-to-End Encrypted

**NOTE**

In TMO the command (when accepted) causes the MT to try sending a U-TX DEMAND PDU.

In DMO the command may be replied with changeover requests:

- DM-TX REQUEST - transmit request when slave in reservation
- DM-GTX REQUEST- transmit request via GW when slave in reservation

Or pre-emption requests:

- DM-PRE EMPT - pre-emptive transmit request when slave in reservation
- DM-GPRE EMPT - pre-emptive transmit request via GW when slave in reservation

Sending of any demand priority will not cause the MT to enter or leave Emergency mode.

This command never causes initiation of a new call, only requests to talk back on the ongoing call. If the call has been ended by the SwMI or the other party, the call needs to be started again using the Dial command.

When a call is made using AT commands, audio routing does not change and audio is routed basing on the last used accessory (PTT pressed, if any) or according to the audio mode set through MMI (after power up).

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	0	MT failure	MT failed to transmit message over the air
	3	Operations Not Allowed	MT is not ready to respond to the command. Please try again.
	33	Parameter wrong type	
	34	Parameter value out of range	
	35	Syntax error	Invalid number of parameters
	41	Transmissions are inhibited	MT is in TXI mode

4.5.8 +CUTXC - Uplink Transmit Cease

Purpose

Request to stop talking in an ongoing simplex call (group or individual)

Syntax

Command type	Syntax	MT Response
Set	AT+CUTXC=<CC instance><CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>
Test	AT+CUTXC=?<CR>	<CR><LF>+CUTXC: _ (0-999) <CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<CC instance>	0-999	Call Instance (PEI Call identifier)



NOTE

This command, when accepted, causes the MT attempts to send the U-TX CEASED PDU in TMO or DM-TX CEASED in DMO.

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	0	MT failure	MT failed to transmit message over the air
	3	Operations Not Allowed	MT is not ready to respond to the command. Please try again.
	33	Parameter wrong type	
	34	Parameter value out of range	
	35	Syntax error	Invalid number of parameters

4.5.9 +CTICN - Incoming Call Notification

Purpose

Incoming call indication

Syntax in TMO

Command type	MT Response
Unsolicited notification	<CR><LF>+CTICN: _<CC instance> ,<call status>,<AI service>[,<calling party identity type>],<calling party identity>[,<hook>[,<simplex>[,<end to end encryption>[,<comms type>[,<slots/codec>[,<called party identity type>],<called party identity>[,<priority>]]]]]]]]<CR><LF>

Syntax in DMO

Command type	MT Response
Unsolicited notification	<CR><LF>+CTICN: <CC instance>, <call status>, <AI service>, [<calling party identity type>], [<calling party identity>], [<hook>], [<simplex>], [<end to end encryption>], [<comms type>], [<slots/codec>], [<called party identity type>], [<called party identity>], [<priority level>]<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<CC instance>	0-999	Call Instance (PEI call identifier)
<call status>	0	Call progressing
	1	Call queued
	2	Called party paged
	3	Call continue
	4	Hang time expired
<AI service>	0	TETRA Speech
<Calling party identity type>	0	SSI
	1	TSI
	3	PABX ESN
	4	PSTN ESN
<Calling party identity>	0-16777214	If <Calling party identity type> is SSI
	15 digits	If <Calling party identity type> is TSI
	Up to 24 digits	If <Calling party identity type> is PSTN or PABX ESN
<hook>	0	Hook signalling
	1	Direct signalling
<simplex>	0	Duplex
	1	Simplex
<end to end encryption>	0	End-to-End Clear
	1	End-to-End Encrypted
<comms type>	0	Point to Point Call (Private, PSTN or PABX call)
	1	Point to Multipoint Call (Group Call)
	3	Broadcast (TMO only)
	4	Individual call without presence check
<slots/codec>	1	TETRA encoded speech
<Called party identity type>	Only present for Group Calls	
	0 (default)	SSI
	1	TSI
	3	PABX ESN
	4	PSTN ESN
<Called party identity>	Only present for Group Calls	
	0-16777214	If <Called party identity type> is SSI
	15 digits	If <Called party identity type> is TSI
	Up to 24 digits	If <Called party identity type> is PSTN or PABX ESN
<priority>	0	Normal priority
	1-11	Priority 1-11
	12	Pre-emptive priority 12
	13	Pre-emptive priority 13
	14	Pre-emptive priority 14
	15	Emergency priority

<priority level>	0 (default)	Normal priority
	1	High priority
	2	Pre-emptive priority
	3	Emergency priority

**NOTE**

In TMO the MT sends the +CTICN notification on reception of D-SETUP PDU for an accepted call or a call with hook setup while in idle.

In DMO, the MT sends the +CTICN notification basing on DM-SETUP and DM-SETUP PRES messages.

In Gateway mode, if the incoming call is from TMO, the TMO syntax is used for the call. If the incoming call is from DMO, the DMO syntax is used for the call.

4.5.10 +CTCR - Call Release**Purpose**

Indicating end of a call and the reason for disconnection (as received from the SwMI)

Syntax

Command type	MT Response
Unsolicited notification	<CR><LF>+CTCR: _<CC instance>, <disconnect cause><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<CC instance>	0-999	Call Instance (PEI call identifier)

<disconnect cause>	0	Not defined or unknown
	1	User request
	2	Called party busy
	3	Called party not reachable
	4	Called party does not support encryption
	5	Network congestion
	6	Not allowed traffic
	7	Incompatible traffic
	8	Service not available
	9	Pre-emption
	10	Invalid call identifier
	11	Called party rejection
	12	No CC entity
	13	Timer expiry
	14	SwMI disconnect
	15	No acknowledgement
	16	Unknown TETRA identity
	17	Supplementary Service dependent
	18	Unknown external subscriber number
	19	Call restoration failed
	20	Called party requires encryption
	21	Concurrent set-up not supported
	22	Called party is under the same DM-GATE as the calling party
	23–30	Reserved
	31	Called party offered unacceptable service
	32	Pre-emption by late entering gateway
	33	Link to DM-REP not established or failed
	34	Link to gateway failed
	35	Call rejected by gateway
<disconnect cause>	36	Voice+Data call set-up failure
	37	Voice+Data resource lost or call timer expired
	38	Transmit authorization lost
	39	Channel has become occupied by other users
	40	Security parameter mismatch

**NOTE**

- In TMO, the MT sends the +CTCR notification on reception of a D-RELEASE. The MT sends the notification also if the call is terminated internally (for example, call setup expiry).
- In DMO the command can be a result of local release, receipt of DM-DISCONNECT message, or pre-emption for a new call.

4.5.11 +CTOCP - Outgoing Call Progress

Purpose

Indicates that a call is in progress or queued or that a called party is ringing

Syntax

Command type	MT Response
Unsolicited notification	<CR><LF>+CTOCP:<CC instance>,<call status>,<AI service>,<hook>,<simplex>,<end to end encryption>,<comms type>,<slots/codec><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<CC instance>	0-999	Call Instance (PEI call identifier)
<call status>	0	Call progressing
	1	Call queued
	2	Called party paged
	3	Call continue
	4	Hang time expired
<AI service>	0	TETRA Speech
<hook>	0	Hook signalling
	1	Direct signalling
<simplex>	0	Duplex
	1	Simplex
<end to end encryption>	0	End-to-End Clear
	1	End-to-End Encrypted
<comms type>	0	Point to Point Call (Private, PSTN or PABX call)
	1	Point to Multipoint Call (Group Call)
	4	Individual call without presence check
<slots/codecs>	1	TETRA encoded speech

**NOTE**

In TMO the MT sends the +CTOCP notification on reception of:

- D-CALL-PROCEEDING PDU and set the <call status> according to the PDU content.
- D-ALERT PDU and set the <call status> to 2 (Called Party paged).

In DMO, the MT sends the +CTOCP notification on base of DM-GACK message.

4.5.12 +CDTXC - Call Transmission Ceased**Purpose**

Indicating that a terminal stopped talking

Indication is sent on reception of D-TX CEASED

Syntax

Command type	MT Response
Unsolicited notification	<CR><LF>+CDTXC: _<CC instance>, <TxRqPrmsn><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<CC instance>	0-999	Call Instance (PEI call identifier)
<TxRqPrmsn>	0	Allowed to request Transmission
	1	Not Allowed to request Transmission

**NOTE**

The MT sends the +CDTXC notification on reception of D-TX CEASED in TMO and DM-TX CEASED in DMO.

4.5.13 +CTXN - Call Transmission Continue


NOTE

The command operates in TMO only.

Purpose

Indicating to the TE that an interrupted call transmission is resuming

Syntax

Command type	MT Response
Unsolicited notification	<CR><LF>+CTXN: _<CC instance>, <TxCont>, <TxRqPrmsn><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<CC instance>	0-999	Call Instance (PEI call identifier)
<TxRqPrmsn>	0	Allowed to request Transmission
	1	Not Allowed to request Transmission
<TxCont>	0	Do not continue
	1	Continue

4.5.14 +CTXW - Call Transmission Wait


NOTE

The command operates in TMO only.

Purpose

- Indicating that a call transmission has been interrupted temporarily by the SwMI
- Indication is sent on reception of D-TX WAIT PDU

Syntax

Command type	MT Response
Unsolicited notification	<CR><LF>+CTXW: _<CC instance>, <TxRqPrmsn><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<CC instance>	0-999	Call Instance (PEI call identifier)
<TxRqPrmsn>	0	Allowed to request Transmission
	1	Not Allowed to request Transmission

4.5.15 +CTXI - Call Transmission Interrupted

Purpose

Indicating that a call transmission request has been withdrawn from the MT and granted to another party

Indication is sent on reception of D-TX INTERRUPT

Syntax

Command type	MT Response
Unsolicited notification	<CR><LF>+CTXI: <CC instance>, <TxGrant>, <TxRqPrmsn>, <end to end encryption>, [<TPI type>], [<TPI>]<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<CC instance>	0-999	Call Instance (PEI call identifier)
<TxGrant>	0	Transmission Granted
	1	Transmission not granted
	2	Transmission queued
	3	Transmission granted to other
<TxRqPrmsn>	0	Allowed to request Transmission
	1	Not Allowed to request Transmission
<end to end encryption>	0	Clear (MT ignores setting and uses own rule)
	1	Encrypted (MT ignores setting and uses own rule)
<TPI type>	0	SSI
	1	TSI
	2	ESN
<TPI>	0-16777215	If TPI type is SSI
	16 digits	If TPI type is TSI
	24 digits	If TPI type is ESN

**NOTE**

The MT sends the +CTXI notification on reception of D-TX INTERRUPT in TMO and DM-PREEMPT message in DMO.

4.6 Audio and Accessory Control

4.6.1 +CLVL - Volume Control

Purpose

- Setting, reading and testing the volume of the current audio mode (loudspeaker, earpiece, remote earpiece)
- Receiving unsolicited notification of volume change by the MMI (3 seconds after the last MMI change)

Syntax

Command type	Syntax	MT Response
Set	AT+CLVL=<volume><CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>
Read	AT+CLVL?<CR>	<CR><LF>+CLVL: _<volume><CR><LF> <CR><LF>OK<CR><LF>
Test	AT+CLVL=?<CR>	<CR><LF>+CLVL: _ (1-14) <CR><LF> <CR><LF>OK<CR><LF>
Unsolicited notification	Not applicable	<CR><LF>+CLVL: _<volume><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<volume>	1-14	Volume level from low (1) to high (14)

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	3	Operation Not Allowed	The MMI is changing the volume
	33	Parameter wrong type	Hex or ASCII instead of numbers
	34	Parameter value out of range	Volume or volume type outside range
	35	Syntax error	Invalid number of parameters

4.6.2 +CTONE - Tone Control**Purpose**

Activating and deactivating tones, changing tones volume, and reading tones settings

Syntax

Command type	Syntax	MT Response
Set	AT+CTONE=[<ring tones>], [<tones>], [<talk permit tone>], [<ring volume>], [<speaker volume>], <CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:<error report code><CR><LF>
Read	AT+CTONE?<CR>	+CTONE:<ring tones>,<tones>,<talk permit tone>,<ring volume>,<speaker volume><CR><LF> 0<CR><CR><LF>OK<CR><LF>
Test	AT+CTONE=?<CR>	<CR><LF>+CTONE:(0-1),(0,1),(0-2),(0-14),(0-14)<CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<ring tones>	0	All rings are OFF (both call and message rings are off)
	1	All rings are ON (call and message rings are activated)
<tones>	0	All tones are OFF
	1	All tones are ON
<talk permit tone>	0	No tone
	1	Short tone
	2	Normal tone
<ring volume>	0	All rings are OFF
	1-14	Sets ringer volume (for both simplex and duplex calls)
<speaker volume>	0	Speaker is OFF (not possible to set using MMI)
	1-14	Sets speaker and earpiece volume

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	3	Operation Not Allowed	The MMI is changing the volume
	33	Parameter wrong type	Hex or ASCII instead of numbers
	34	Parameter value out of range	Volume or volume type outside range
	35	Syntax error	Invalid number of parameters

4.6.3 +HHD - Handset On/Off Hook Detection


NOTE

The command operates in TMO only.

Purpose

Receiving and enabling/disabling indication that external handset is on/off hook

Syntax

Command type	Syntax	MT Response
Set	AT+HHD=<handset unsolic><CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:<_error report code><CR><LF>
Read	AT+HHD?<CR>	<CR><LF>+HHD:<_handset unsolic>,<hook state><CR><LF> <CR><LF>OK<CR><LF>
Test	AT+HHD=?<CR>	<CR><LF>+HHD:<_ (0,1)><CR><LF> <CR><LF>OK<CR><LF>
Unsolicited notification	Not applicable	<CR><LF>+HHD:<_hook state><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<handset unsolic>	0 (default)	Disable unsolicited notification of handset hook state
	1	Enable unsolicited notification of handset hook state
<hook state>	0	Hook OFF
	1	Hook ON

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	33	Parameter wrong type	
	34	Parameter value out of range	
	35	Syntax error	Invalid number of parameters

4.7 Short Data Service and Status

The MS supports 2 different AT syntaxes for SDS and Status messaging (one at a time depending on Codeplug setting):

- ETSI Syntax (as used from MR5.7 in TMO and MR5.9 in DMO)
- Motorola Syntax (as used prior to MR5.7)


NOTE

The usage of ETSI syntax for any new implementation for SDS/Status functionality is recommended.

If the Codeplug setting ETSI AT SDS/Status Format is disabled (Motorola Syntax):

- When the multiplexer is disabled, Status, SDS type 1, 2 and 3 are automatically sent to the TE if TE presence is detected (that is, the DTR is set)
- The TE is required to register for a SDS type 4 PID using the +CMGS command (see 4.7.4)
- To send SDS or Status, the MS will support the +CMGS command (see 4.7.4)

- To receive SDS or Status, the MS will support the +CMT command (see 4.7.5)

If the Codeplug setting ETSI AT SDS/Status Format is enabled (ETSI Syntax):

- When the multiplexer is disabled Status, SDS type 1, 2 and 3 are automatically sent to the TE if TE presence is detected (that is, the DTR is set)
- The TE is required to register for Status, SDS type 1, 2, 3 and for SDS type 4 PID using the +CTSP command (see 4.4.1)
- To send SDS or Status, the MS will support the +CTSDS and +CMGS commands (see 4.7.1 and 4.7.2)
- To receive SDS or Status, the MS will support the +CTSDSR command (see 4.7.3).

4.7.1 +CTSDS - TETRA Service Definition for SDS/Status (ETSI Syntax)

Purpose

Defining the parameters the terminal will use to send a Status (including Alarm) or SDS message

Syntax in TMO

Command type	Syntax	MT Response
Set	AT+CTSDS=<AI service>,<called party identity type>,<area>,<access priority>,<end to end encryption><CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:<error report code><CR><LF>
Read	AT+CTSDS?<CR>	<CR><LF>+CTSDS:<AI service>,<called party identity type>,<area>,<access priority>,<end to end encryption><CR><LF> <CR><LF>OK<CR><LF>
Test	AT+CTSDS=?<CR>	<CR><LF>+CTSDS:_(9-13),(0-4),(0-15),(0-2),(0)<CR><LF> <CR><LF>OK<CR><LF>

Syntax in DMO

Command type	Syntax	MT Response
Set	AT+CTSDS=<AI service>,<called party identity type>,<area>,<priority level>,<end to end encryption>,<comms type>,<importance factor><CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:<error report code><CR><LF>
Read	AT+CTSDS?<CR>	<CR><LF>+CTSDS:<AI service>,<called party identity type>,<area>,<priority level>,<end to end encryption>,<comms type>,<importance factor><CR><LF> <CR><LF>OK<CR><LF>
Test	AT+CTSDS=?<CR>	<CR><LF>+CTSDS:_(9-13),(0-4),(0-15),(0-3),(6),(1-6)<CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<AI service>	9	SDS type 1
	10	SDS type 2
	11	SDS type 3
	12 (default)	SDS type 4
	13	Status
<Called party identity type>	0 (default)	SSI
	2	SNA
<area>	0 (default)	Area not defined
	1-14	Specific Area
	15	All areas
<access priority>	0 (default)	Low
	1	High
	2	Emergency

<SDS Status>	4	Outgoing message successfully sent (Layer 2 ack received)
	5	Outgoing message transmission failed (no Layer 2 ack)
<length>	Bit length of <data>	
	16	Status (including Alarm)
	16	SDS type 1
	32	SDS type 2
	64	SDS type 3
	8–1184	SDS type 4 For SDS type 4 without TL, the maximum length of <user data> is 1128 bits. For SDS type 4 with TL the maximum supported length of 'User data' in SDS-TRANSE PDU is 141 Bytes (1 B is for Coding Scheme and 140B for Text) for Text Messaging Pls(e.g. PI=130) and 140 for other Pls.

**NOTE**

- The command applies if the Codeplug setting ETSI AT SDS/Status Format is enabled
- When the MS receives an LLC BL-ACK PDU for a SDS or Status message that it sent, the MS will send an unsolicited notification indicating that the transmission of the message was successful (<SDS Status> will be set to 4).
- When the MS times out waiting for an LLC BL-ACK PDU for a SDS or Status message that it sent, the MS shall send an unsolicited notification indicating that the transmission of the message failed (<SDS Status> will be set to 5).
- In the unsolicited notification, the <message reference> will only be included if the message sent was an SDS type 4.
- If Store and Forward is enabled in the Codeplug and the TE wants to send an SDS-TL message to the Service Centre, it shall send the SDS-TL message to the <Service Centre ISSI> (which can be obtained from the +CNUMF read command) and include the forwarding address inside the <data> element. The MS will only send the message if allowed on the Cell according to the SDS-TL addressing method (which can be obtained from the +CTBCT command).

Parameters & Values

Parameters	Value	Meaning
<AI service>	9	SDS type 1
	10	SDS type 2
	11	SDS type 3
	12	SDS type 4
	13	Status
<called party identity type>	0	SSI
	1	TSI
	3	PABX ESN
	4	PSTN ESN
<called party identity>	0–16777214	For an SSI
	00000001–9991638316777214	For a TSI
	Up to 24 digits	PABX/PSTN ESN
<calling party identity type>	0	SSI
	1	TSI
	3	PABX ESN
	4	PSTN ESN
<calling party identity>	0–16777214	For an SSI
	00000001–9991638316777214	For a TSI
	Up to 24 digits	PABX/PSTN ESN
<length>	16-bit value	Bit length of data
	16	Length of Status (including Alarm)
	16	Length of SDS type 1
	32	Length of SDS type 2
	64	Length of SDS type 3
	8–1144	Possible length of SDS type 4

**NOTE**

- The command applies both for Motorola and ETSI AT SDS/Status Format is enabled
- When the Service Profile for Status is set to TE only or Both TE & MT, the MS will support sending and receiving via AT the Status values in Table 5-7. TE is not allowed to send any other values than values in Table 5-7.
- For Gateway:
 - If 'Audio monitor' in GW CPS is enabled, forwarding Status, Alarm, SDS type 1, 2 and 3 messages to the TE is allowed.
 - If 'Audio monitor' in GW CPS is disabled, forwarding Status, Alarm, SDS type 1, 2 and 3 messages to the TE is not allowed.
- For Repeater:
 - If 'Call monitor' in REP CPS is enabled, forwarding Status, Alarm, SDS type 1, 2 and 3 messages to the TE is allowed.
 - If 'Call monitor' in REP CPS is disabled, forwarding Status, Alarm, SDS type 1, 2 and 3 messages to the TE is not allowed.

Error Report Codes

Parameter	Value	Meaning	Usage
<error report code>	3	Operations Not Allowed	MT is not in a state where it can accept the command

Name of Status	Hex value	Usage
Callback Request	FEFF	
Emergency Callback request	FEFC	
Selective Alert	FEFD	
Entry Request	FEFA	
Status value out of range	FE08	Error code
Destination busy	FE07	Error code
Destination not authorised	FE06	Error code
Destination not reachable	FE05	Error code
Destination does not exist	FE04	Error code
Unrecognized address	FE03	Error code
Not authorised	FE02	Error code
General status negative acknowledgement	FE01	Error code
General status acknowledgement	FE00	Acknowledgement (status message delivered)
User status values	8000 to EFFF	For user application definition
Emergency Status (Alarm)	0000	TETRA Standard value

Table 5-7 Status Values Supported via AT**4.7.4 +CMGS - PID Registration & Sending SDS & Status (Motorola Syntax)****Purpose**

- PID Registration to allow PEI Application to receive SDS messages with given PID
- PID Deregistration to allow PEI Application to cancel reception of SDS messages with given PID
- Sending Status, Alarm, SDS type 1, 2, 3 and 4 messages to ISSI or GSSI destination
- Aborting Transmission of Status/SDS (only possible if transmission has not already started)

Set Syntax

Purpose	Syntax
PID Registration	AT+CMGS=0,1,0,8<CR><protocol identifier><Ctrl-Z>
PID Deregistration	AT+CMGS=0,0,0,8<CR><protocol identifier><Ctrl-Z>
Sending Status, SDS in TMO	AT+CMGS=<destination address>,[<type of destination address>],[<area>],[<length>],[<data type>],[<short form report>]<CR><data><Ctrl-Z>

Sending Status, SDS in TMO	AT+CMGS=[<destination address>],[<type of destination address>],[<area>],[<length>],[<data type>],[<short form report>],[<mcc>,<mnc>]<CR><data><Ctrl-Z>
Aborting transmission of Status/SDS	AT+CMGS=[<destination address>],[<type of destination address>],[<area>],[<length>],[<data type>],[<mcc>,<mnc>]<CR><data><ESC>

Response

Purpose	Possible responses
PID Registration or Deregistration	<CR><LF>OK<CR><LF><CR> <CR><LF>+CME_ERROR:<error report code><CR><LF>
Sending Status, SDS	<CR><LF>+CMGS:<_0><CR><LF> <CR><LF>OK<CR><LF><CR> <CR><LF>+CME_ERROR:<error report code><CR><LF>
Aborting Transmission of Status, SDS	<CR><LF>OK<CR><LF><CR> <CR><LF>+CME_ERROR:<error report code><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<protocol identifier>	8-bit hexadecimal value (00–FF)	
<destination address>	Parameter is required in TMO, and optional in DMO (default destination in DMO is the selected GSSI) 1–255 1–16777215	SNA value of <type of destination address> equals 0 SSI value if <type of destination address> equals 1 (SSI) or 2 (TSI).
<type of destination address>	0 1 2	SNA (only valid in TMO) SSI (default for TMO and DMO) TSI (only valid in DMO for inter-MNI SDS)
<area>	0–15	0 - Area not defined (default value) 1 - Area 1 2 - Area 2 ...etc... 14 - Area 14 15 - All Areas
<length>	Bit length of <data> 16 16 32 64 8-1184	Status (including Alarm) SDS type 1 SDS type 2 SDS type 3 SDS type 4 For SDS type 4 without TL, the maximum length of <data> is 1128 bits. For SDS type 4 with TL the supported max length of 'User data' in SDS-TRANSE PDU is 141 Bytes (1B is for Coding Scheme and 140B for Text) for Text Messaging PIs (for example, PI=130) and 140 for other PIs.
<data type>	0 1 2 3 4	Status message SDS type 1 SDS type 2 SDS type 3 SDS type 4 (default when parameter not present)

<mcc>	0–1023	Only present in DMO when <type of destination address> is 2 (TSI) and supported only in MR5.6 and subsequent releases
<mnc>	0–16383	Only present in DMO when <type of destination address> is 2 (TSI) and supported only in MR5.6 and subsequent releases
<data>	Maximum of 140 bytes	User data in hexadecimal format (contains SDS-TL header for PID greater than 128)

**NOTE**

- This command applies if the Codeplug setting ETSI AT SDS/Status Format is disabled
- If Store and Forward is enabled in the Codeplug and the TE wants to send an SDS-TL message to the Service Centre, it shall send the SDS-TL message to the <Service Centre ISSI> (which can be obtained from the +CNUMF read command) and include the forwarding address inside the <data> element. The MS will only send the message if allowed on the Cell according to the SDS-TL addressing method (which can be obtained from the +CTBCT command).

Timers

Timer	Duration (seconds)	Usage
T_WaitForData	90	Timer started on reception of AT+CMGS=...<CR> from TE. Timer stopped on reception of <Ctrl-Z>
T_WaitForReport	40	Timer for waiting Layer 2 acknowledgement from the SwMI. Started after sending SDS to TETRA Protocol Stack by AT Application and stopped when acknowledgement is received.
T_WaitForReg	5	Timer waiting for response from Transport Layer within the MT after sending PID Registration request
T_WaitForDereg	5	Timer waiting for response from Transport Layer within the MT after sending PID Deregistration request

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	0	MT Failure	MT failed to send SDS or Status over the TETRA Air Interface
	3	Operations Not Allowed	MT supports the command but not in its current state. The TE should retry later
	24	Text string too long	Length of at least one string representing parameters of the command is out of range
	26	Invalid character in text string	At least one string representing parameters of the command contains a non-expected character
	30	No processing	MT processing for this PID is disabled
	31	Network Timeout	Expiry of T_WaitForReport Timer
	604	Invalid PDU mode	<data> value does not allow to build a valid SDS-TL PDU
	605	Invalid Text mode parameter	At least one parameter out of range
	606	Syntax error	Syntax of the command is incorrect (for example, invalid number of parameters).
	607	Data without request	MS replies with this code when <data> is received and AT+CMGS=...<CR> is missing
	640	Data Timeout	Expiry of T_WaitForData Timer
	641	Registration Timeout	Expiry of T_WaitForReg Timer
	642	Deregistration Timeout	Expiry of T_WaitForDereg Timer
	650	Other Application registered	PID already registered
	651	Registration table full	MT capacity for PID registration is full
	652	Registration disabled	PID is disabled by MT
	660	Deregistration illegal	MT Internal Application is registered
	662	Deregistration not possible	PID is not registered

4.7.5 +CMT - Receiving SDS & Status (Motorola Syntax)**Purpose**

Receiving Status, Alarm, SDS type 1, 2, 3 and 4 messages (also covers SDS-TL and UDH).

Syntax

Command type	MT Response
Unsolicited	<CR><LF>+CMT:<originating address>,<type of originating address>,<length>,[<data type>],[<mcc>,<mnc>]<CR><LF> <data><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<originating address>	1-16777215	SSI address
<type of originating address>	1	SSI
	2	TSI (only possible for inter-MNI SDS in DMO)
<length>	16-bit value	Bit length of <data> (same values as for +CMGS)
<data type>	Only present when data type is different from SDS type 4. When not present, data type is SDS type 4.	
	0	Status message
	1	SDS type 1
	2	SDS type 2
	3	SDS type 3
<mcc>	0-1023	Only present in DMO when <type of originating address> is TSI (inter-MNI SDS)

<mnc>	0-16383	Only present in DMO when <type of destination address> is TSI (inter-MNI SDS)
<data>	Maximum of 140 bytes	User data in hexadecimal format (may contain SDS-TL header)

**NOTE**

- For SDS type 4, the PEI Application will only receive SDS and SDS-TL messages with the PID for which the Application has registered beforehand using +CMGS command.
- This command applies if the Codeplug setting "ETSI AT SDS/Status Format" is disabled

4.7.6 +CNMI - Message mode (Motorola Syntax)

Purpose

Reading Message mode (use of message stack is not supported)

Syntax

Command type	Syntax	MT Response
Set	AT+CNMI=<message mode><CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>
Read	AT+CNMI?<CR>	<CR><LF>+CNMI: _<message mode>, 0, 0, 0, 0<CR><LF> <CR><LF>OK<CR><LF>
Test	AT+CNMI=?<CR>	<CR><LF>+CNMI: _ (1-3) , (0) , (0) , (0) , (0) <CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<message mode>	3	Forward new message from AI to TE

**NOTE**

- The command operates in TMO and DMO
- The command applies if the Codeplug setting ETSI AT SDS/Status Format is disabled

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	605	Invalid Text mode parameter	Parameter out of range
	606	Syntax error	Syntax of the command is incorrect (for example invalid number of parameters)

4.7.7 +CSDS - Supported SDS type (Motorola Syntax)

Purpose

Setting, reading and testing the supported SDS type

Syntax

Command type	Syntax	MT Response
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Set	AT+CSDS=<SDS type><CR>	<CR><LF>+CSDS: _<TE to MT service>, <MT to TE service><CR><LF> <CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>
Read	AT+CSDS?<CR>	<CR><LF>+CSDS: _<SDS type>, <TE to MT service>, <MT to TE service><CR><LF> <CR><LF>OK<CR><LF>
Test	AT+CSDS=?<CR>	<CR><LF>+CSDS: _ (0) <CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<SDS type>	0	Status
<TE to MT service>	1	MT will accept messages from TE
<MT to TE service>	1	MT will forward messages to TE



NOTE

The command applies if the Codeplug setting ETSI AT SDS/Status Format is disabled

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	605	Invalid Text mode parameter	At least one parameter out of range
	606	Syntax error	Syntax of the command is incorrect (for example invalid number of parameters)

4.8 Emergency

4.8.1 +EMER - Emergency Mode

Purpose

- Entering/Leaving Emergency Mode (pressing on Emergency button simulation)
- Receiving unsolicited notification of Entrance/Exit from Emergency mode caused by the MMI

Syntax

Command type	Syntax	MT Response
Set	AT+EMER=[<emergency unsolic>], [<emergency mode>]<CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>
Read	AT+EMER?<CR>	<CR><LF>+EMER: _<emergency mode><CR><LF> <CR><LF>OK<CR><LF>
Test	AT+EMER=?<CR>	<CR><LF>+EMER: _ (0,1), (0,1) <CR><LF> <CR><LF>OK<CR><LF>
Unsolicited notification	Not applicable	<CR><LF>+EMER: _<emergency mode><CR><LF>

Parameters & Values

Parameters	Value	Meaning
------------	-------	---------

<emergency mode>	If parameter is omitted in set command, then the MT will not enter or leave Emergency mode	
	0	Leave (set) or leaving (unsolicited) Emergency Mode
	1	Enter (set) or entering (unsolicited) Emergency Mode
<emergency unsolic>	If parameter is omitted in set command, then the MT will not change its current notification setting	
	0 (default)	Disable Emergency Mode entry/exit notification
	1	Enable Emergency Mode entry/exit notification

**NOTE**

- By default at power up, the notification of Emergency mode entrance/exit is disabled.
- If the TE commands the MT to enter the Emergency mode, the MT will follow its Codeplug settings for automatically initiating Emergency Alarm and/or Emergency Call (to its selected or to a Non-Tactical talkgroup) upon entrance of Emergency mode.
- If the MT is configured in the Codeplug to initiate Emergency Private Call on pressing the Emergency button, then the TE command to enter Emergency Mode will cause the MT to initiate an Emergency Private Call as provisioned in the Codeplug.
- The unsolicited notification will not be sent when the Emergency Private Call is enabled.

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	33	Parameter wrong type	
	34	Parameter value out of range	
	35	Syntax error	Invalid number of parameters

4.9 Packet Data**4.9.1 +WS45 - DTE side Protocol Stack****NOTE**

The command operates in TMO only.

Purpose

Reading DTE side protocol Stack Selection (only PPP mode is supported)

Syntax

Command type	Syntax	MT Response
Set	AT+WS45=<DTE side protocol stack><CR>	<CR><LF>+WS45:_<DTE side protocol stack><CR><LF>
		<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:_<error report code><CR><LF>
Read	AT+WS45?<CR>	<CR><LF>+WS45:_<DTE side protocol stack><CR><LF> <CR><LF>OK<CR><LF>
Test	AT+WS45=?<CR>	<CR><LF>+WS45:_ (4) <CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<DTE side protocol stack>	4	PPP mode

**NOTE**

The command is obeyed regardless of the Service Profile for Packet Data

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	3	Operations Not Allowed	MT can not support command in its current state
	34	Parameter out of range	Parameter different than 4
	35	Syntax error	Syntax of the command is incorrect (for example, invalid number of parameters)
	40	Service not supported in DMO	MT is currently in DMO

4.9.2 +WS46 - WDS-Stack side Selection for TNP1**NOTE**

The command operates in TMO only.

Purpose & Scope

Setting, reading and testing the Wireless Data Service stack (local or wide mode)

Syntax

Command type	Syntax	Possible MT Responses
Set	AT+WS46=<WDS mode><CR>	<CR><LF>+WS46: _<WDS mode><CR><LF> <CR><LF>OK<CR><LF> <CR><LF>+CME_ERROR: _<error report code><CR><LF>
Read	AT+WS46?<CR>	<CR><LF>+WS46: _<WDS mode><CR><LF> <CR><LF>OK<CR><LF>
Test	AT+WS46=?<CR>	<CR><LF>+WS46: _ (14, 252) <CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<WDS mode>	14	Wide mode (default value)
	252	Local mode

**NOTE**

- The command is obeyed regardless of the Service Profile for Packet Data.
- When the MUX is active then this command is rejected and the "Operations Not Allowed" error is returned.

Error Report Codes

Parameters	Value	Meaning	Usage
------------	-------	---------	-------

<error report code>	3	Operations Not Allowed	MT can not support command in its current state
	34	Parameter out of range	Parameter different than 4
	35	Syntax error	Syntax of the command is incorrect (for example, invalid number of parameters)
	40	Service not supported in DMO	MT is currently in DMO

4.9.3 O - Setup PPP Connection



NOTE

The command operates in TMO only.

Purpose

Setup a PPP link for Packet Data and/or TNP1 session

Syntax

Command type	Syntax	Possible MT Responses
Execution	ATO<CR>	<CR><LF>CARRIER 7200<CR><LF> <CR><LF>PROTOCOL: ALT<CR><LF> <CR><LF>COMPRESSION: NONE<CR><LF> <CR><LF>CONNECT<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>
Test	ATO=?<CR>	<CR><LF>OK<CR><LF>

Error Report Codes

Parameter	Value	Meaning	Usage
<error report code>	3	Operations Not Allowed	MT is not in a state where it can accept the command, for example, there is an ongoing Emergency call or the MT is in Emergency Mode
	30	No network service	MT is in TMO and is out of coverage
	40	Service not supported in DMO	MT is in DMO
	41	Transmissions are inhibited	MT is in TXI
	42	Service temporarily not available	MT is busy in a signalling transaction. Please try again



NOTE

- The command is obeyed regardless of the Service Profile for Packet Data.
- Once the MT sends CONNECT, the TE and MT are expected to negotiate a PPP link by transmitting LCP datagrams on logical circuits TD and RD.
- ATO does not set up the TNP1 session when MUX is active. The TNP1 protocol is not supported over the MUX.

4.10 DMO

4.10.1 +CTOM - TMO/DMO/GW/REP Operating Mode

Purpose

- Setting, reading and testing the TMO/DMO/Gateway/Repeater Operating mode of the MT
- Receiving unsolicited notifications of change of MT operating mode from MMI

Syntax

Command type	Syntax	Possible MT Responses
Set	AT+CTOM=<AI mode><CR>	<CR><LF>+CTOM: _<AI mode>, [<Gateway/Repeater type>]<CR><LF> <CR><LF>OK<CR><LF> <CR><LF>+CME_ERROR: _<error report code><CR><LF>
Read	AT+CTOM?<CR>	<CR><LF>+CTOM: _<AI mode>, [<Gateway/Repeater type>]<CR><LF> <CR><LF>OK<CR><LF>
Test	AT+CTOM=?<CR>	<CR><LF>+CTOM: _ (0,1,5,6), (<Gateway/Repeater type>)<CR><LF> <CR><LF>OK<CR><LF>
Unsolicited	Not Applicable	<CR><LF>+CTOM: _<AI mode>, [<Gateway/Repeater type>]<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<AI mode>	0	TMO
	1	DMO
	5	DM-GATEWAY
	6	DM-REPEATER
<Gateway/Repeater type>	0	Type 1A repeater
	3	Normal gateway

Error Report Codes

Parameter	Value	Meaning
<error report code>	33	Parameter wrong type (for example, parameter is a string)
	34	Parameter value out of range (for example, AI mode is set to 2 in set command)
	35	Syntax error (for example, AI mode is missing in set command)
	3	Operation Not Allowed (MT is not ready/able to proceed with the request at this moment, the TE should retry again)



NOTE

Changing the mode to “DM-GATE” operation takes several seconds due to gateway monitoring function.

If GW feature flag is disabled, Test command returns:

```
<CR><LF>+CTOM: _ (0,1,6), (0) <CR><LF><CR><LF>OK<CR><LF>
```

If REP feature flag is disabled, Test command returns:

```
<CR><LF>+CTOM: _ (0,1,5), (3) <CR><LF><CR><LF>OK<CR><LF>
```

If REP and GW feature flag are disabled, Test command returns:

```
<CR><LF>+CTOM: _ (0,1) <CR><LF><CR><LF>OK<CR><LF>
```

4.10.2 +CTDCT - DMO communication type



NOTE

The command operates in DMO only.

Purpose

- Selecting direct MS-MS connection
- Selecting DMO communication routed via a gateway or repeater
- Receiving notification on the changes of DM communication type
- Reading currently set communication type in DMO

Syntax

Command type	Syntax	Possible Responses
Set	AT+CTDCT=<DM communication type>,[<gateway address>],[<MNI>],[<served GSSI>] <CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:<error report code><CR><LF>
Read	AT+CTDCT?<CR>	<CR><LF>+CTDCT:<DM communication type>,[<gateway address>],[<MNI>],[<served GSSI>] <CR><LF>
		<CR><LF>OK<CR><LF>
Test	AT+CTDCT=?<CR>	<CR><LF>+CTDCT:_(0,4),(0-1023),(00000000-99916383),(0-16777215)<CR><LF>
		<CR><LF>OK<CR><LF>
Unsolicited	Not Applicable	<CR><LF>+CTDCT:<DM communication type>,[<gateway address>],[<MNI>],[<served GSSI>]<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<gateway address>	0–1023	10-bit Gateway Address
<DM communication type>	0	Any, MT decides
	1	Direct MS-MS
	2	Via Repeater
	3	Via Gateway
	4	Via Gateway/Repeater
<MNI>	00000000–99916383, 102316383	MCC (3 or 4 digits) and MNC (5 digits)
<served GSSI>	0–16777215	8-digit GSSI address of the Talkgroup identities programmed in the MT's TMO Talkgroup list

Error Report Codes

Parameters	Value	Meaning
<error report code>	3	Operation not allowed
	33	Parameter wrong type
	34	Parameter value out of range
	35	Syntax error
	43	Service not supported in TMO

**NOTE**

- The <serviced GSSI> is not supported. The terminal accepts the command when the <serviced GSSI> is present but ignores the value.
- Setting communication type (+CTDCT) precedes sending the +CTSDC command and only needs doing it if any change is required.
- When a DMO call is controlled by MMI, the communication type for selected talkgroup is taken from CP, with exception when the communication type is set via +CTDCT to type different than "Any". Then all subsequent outgoing DMO calls initiated by MMI are set up basing on <communication type> set with +CTDCT.
- When call is initiated from TE, +CTDCT command is used to define communication type for subsequent outgoing DMO calls and SDS with exception to the <DM communication type> set to 0 ("Any, MT decides") - then subsequent outgoing DMO calls and SDS are set up according to the CP settings.
- When the communication type is set by +CTDCT to a type different than "Any", the MMI DMO Config menu is blocked.
- Unsolicited notifications are sent to TE when the communication type is set only to "Any" and the communication type is changed through MMI.

4.10.3 +CTDGR - Synchronisation with DMO Gateway and/or Repeater

**NOTE**

The command operates in DMO only.

Purpose

- Enable/Disable unsolicited notification of the presence of a DMO Gateway or Repeater
- Receive unsolicited notification of the change of DM communication type
- Receive unsolicited notification of the presence of a DMO Gateway or Repeater

Syntax

Command type	Syntax	Possible Responses
Set	AT+CTDGR=<GR unsolic><CR>	<CR><LF>OK<CR><LF> <CR><LF>+CME_ERROR:<error report code><CR><LF>
Read	AT+CTDGR?<CR>	<CR><LF>+CTDGR: [<DM communication type>,<address>,<MNI>,<presence information><CR><LF> [,<DM communication type>,<address>,<MNI>,<presence information>]]<CR><LF> <CR><LF>OK<CR><LF> <CR><LF>+CME_ERROR:<error report code><CR><LF>
Unsolicited	Not Applicable	<CR><LF>+CTDGR: [<DM communication type>,<address>,<MNI>,<presence information><CR><LF> [,<DM communication type>,<address>,<MNI>,<presence information>]]<CR><LF>
Test	AT+CTDGR=?<CR>	<CR><LF>+CTDGR: (0,1) <CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<Address>	0–1023	10-bit Gateway or Repeater Address
<DM communication type>	2	Via Repeater
	3	Via Gateway
<GR unsolic>	0	Disable unsolicited reporting of GW and REP presence
	1	Enable unsolicited reporting of GW and REP presence (default value)
<MNI>	24-bit decimal	First 10 bits represent the MCC, the remaining 14 bits represent the MNC
<Presence information>	0	Gateway and Repeater not available
	1	Gateway available without restriction
	2	Repeater available without restriction
	3	Not supported (Gateway/Repeater available without restriction)
	4	Not supported (irrelevant value)
	5	Gateway available with restriction
	6	Repeater available with restriction
	7	Not supported (Gateway/Repeater available with restriction)

Error Report Codes

Parameters	Value	Meaning
<error report code>	33	Parameter wrong type
	34	Parameter value out of range
	35	Syntax error
	43	Service not supported in TMO

**NOTE**

- The MT only indicates the presence of a GW if it is in GW or GW/REP mode
- The MT only indicates the presence of a REP if it is in REP or GW/REP mode
- The MT can be synchronised at the same time at most with:
 - One GW in GW mode
 - One REP in REP mode
 - One GW and one REP in GW/REP mode

4.11 Security**4.11.1 +CPIN - PIN/PUK Operations****Purpose**

- Entering PIN and PUK
- Reading current PIN lock status
- Changing PIN number

Syntax

Command type	Syntax	Possible Responses
Set	AT+CPIN=<pin>,[<new pin>]<CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:<_error report code><CR><LF>

Read	AT+CPIN?<CR>	<CR><LF>+CPIN: _<pin status>, [<PIN/PUK retries number>]<CR><LF> <CR><LF>OK<CR><LF>
Test	AT+CPIN=?<CR>	When PIN is stored in CP: <CR><LF>+CPIN: _ (0000-9999, 00000000-99999999), (0000-9999)<CR><LF> <CR><LF>OK<CR><LF> When PIN is stored on a BSI SIM card: <CR><LF>+CPIN: _ (0-99999999)<CR><LF> <CR><LF>OK<CR><LF>
Unsolicited	Not Applicable	<CR><LF>+CPIN: _<pin status>, [<PIN/PUK retries number>]<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<number>	0000-9999	PIN Number (when MT is PIN-UNLOCKED or PIN-LOCKED)
	00000000-99999999	PUK Number (when MT is PUK-LOCKED)
	0-99999999	PIN or PUK number when stored on the SIM card.
<new number> When operating with a BSI SIM card this parameter is NOT allowed.	0000-9999	A new PIN: <ul style="list-style-type: none"> Required when MT is PIN-UNLOCKED or PUK-LOCKED (if not present, MT responds with the "Syntax Error" error) Forbidden when MT is PIN-LOCKED (if present, MT responds with the "Operation Not Allowed" error). <p>If MT receives any AT command, other than commands allowed in PIN locked state, while MT is PIN-LOCKED or PUK-LOCKED, the MT responses with an appropriate error (that is "MT PIN required" for PIN-LOCKED and "MT PUK required" for PUK-LOCKED).</p>
<pin status>	MT_PIN-UNLOCKED	MT/SIM is PIN-UNLOCKED
	MT_PIN-LOCKED	MT/SIM is PIN-LOCKED
	MT_PUK-LOCKED	MT/SIM is PUK-LOCKED
	SIM-BLOCKED	SIM card is blocked because of 10 failed tries unblocking the PUK. The card cannot be ublocked via AT command.
<PIN/PUK retries number>	0-99	Number of available retries for PIN/PUK verification. When operating with BSI SIM card, the number of retries for PIN is 3 and for PUK is 10.

Error Report Codes

Parameters	Value	Meaning
<error report code>	3	Operation Not Allowed (MT is not ready or able to proceed with the request at this moment, the TE should retry again)
	9	Incorrect MT PUK (MT replies with this code when wrong password was provided by the previous command)
	11	MT PIN required (MT replies with this code when incorrect PIN was provided to MT before the last command)
	12	MT PUK required (MT replies with this code when incorrect PUK was provided to MT before the last command)
	13	SIM failure (General error for problems with SIM card. Details can be achieved by +SIM command)
	16	Incorrect MT PIN (MT replies with this code when incorrect password was provided by the previous command)
	19	SIM Blocked permanently. SIM card has to be repersonalized.
	33	Parameter wrong type
	34	Parameter value out of range
	35	Syntax error



NOTE

When a terminal turns on in PIN or PUK locked state and MUX is enabled, unsolicited message indicating current PIN/PUK lock state will be sent to all DLCI. If PIN is disabled, unsolicited message will not be sent.

4.11.2 +RCPIN - Remote Control PIN Entering



NOTE

This command works only if the SDS Remote Control feature flag is enabled in the codeplug.

Purpose

Entering Remote Control PIN

Syntax

Command type	Syntax	Possible Responses
Set	AT+RCPIN=<rcpin>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:<error report code><CR><LF>
Test	AT+RCPIN=?<CR>	<CR><LF>+RCPIN:_(000000-999999)<CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<pin>	000000–999999	Remote Control PIN needs to be entered prior to sending SDS Remote Control message

Error Report Codes

Parameters	Value	Meaning
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<error report code>	3	Operation Not Allowed (MT has no controlling privilege)
	4	Operation Not Supported (for instance, Remote Control feature flag is disabled)
	33	Parameter wrong type
	34	Parameter value out of range
	35	Syntax error
	506	Incorrect RC PIN

**NOTE**

After 3 unsuccessful attempts to enter RC PIN, the terminal switches to PIN lock state (if enabled).

4.12 BSI Security

4.12.1 +SIM - Access to SIM Card

Purpose

- Checking the current state of the SIM card and SIM application
- Accessing data stored on the SIM card
- Showing status or problems with the SIM card

Syntax

Command type	Syntax	Possible Responses
Set	AT+SIM=<SIM_Data><CR>	<CR><LF>+SIM: _<SIM_Data>, <value><CR><LF> [<SIM_Data>, <value><CR><LF>] ... <CR><LF>OK<CR><LF>
		<CR><LF>+SIM_ERROR: _<error code><CR><LF>
Read	AT+SIM?<CR>	<CR><LF>+SIM: _<SIM_Status><CR><LF> <CR><LF>OK<CR><LF>
		<CR><LF>+SIM_ERROR: _<error code><CR><LF>
Test	AT+SIM=?<CR>	<CR><LF>+SIM: _ (0-3) , (0-24) <CR><LF>
		<CR><LF>+SIM_ERROR: _<error code><CR><LF>
Unsolicited	Not Applicable	<CR><LF>+SIM:<SIM_Status><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<SIM_Status>	0	SIM ready to use (that is, successful PPS sequence has finished)
	1	SIM not inserted (In this state it shall not accept any other command than +CFUN for power-off the radio)
	2	SIM not supported (a card type is different than 'H' or 'E' or not the right version)
	3	SIM communication problem
	4	SIM application not started (also a Unsolicited Notification of PIN Verification Request has to be issued if PIN / PUK lock is enabled. This "SIM application not started" message should be issued before the terminal starts activation procedure of the SIM application (ADF = application dedicated file)
	5	SIM application running (Application is running after the ADF has been successfully activated. This has to happen before the EFs on ADF level can be accessed)
	6	SIM authentication failure (MT detects "Failure of SIM-ME Authentication failure")
<SIM_Data>	0	Read all <SIM_Data> (ITSI, ICCID, OPTA) from SIM
	1	Read ITSI
	2	Read ICCID
	3	Read OPTA
<value>	20 ASCII characters	Length of ICCID Identification Number
	16 digits	Length of ITSI
	24 Bytes	Length of OPTA

Error Report Codes

Parameters	Value	Meaning
<error report code>	4	Operation not supported
	10	SIM not inserted
	13	SIM failure (failed access to SIM)
	14	SIM busy
	15	SIM wrong (MT doesn't recognize SIM card)
	33	Parameter wrong type
	34	Parameter value out of range
	35	Syntax error

**NOTE**

The following BSI functions are covered using this command:

- Read OPTA from SIM
- Read ITSI from SIM
- Read ICCID from SIM
- Unsolicited Notification of Remote OPTA Change
- Unsolicited Notification of SIM Authentication Failure
- Unsolicited Notification of Not Supported SIM
- Unsolicited Notification of SIM Communication Problem
- Unsolicited Notification the SIM Application is not Starting
- Unsolicited Notification of Missing SIM
- Unsolicited Notification of Running SIM Application
- Unsolicited Notification for "SIM ready to use" (sent when a terminal has finished PPS sequence. In this case the SIM OS is operational. Anything further depends on E2E application and is handled context related for example, PIN/PUK handling)

4.12.2 +ENCR - BSI End-to-End Encryption Function

Purpose

- Accessing BSI functionality by selecting appropriate <Item>

Syntax

Command type	Syntax	Possible Responses
Set	AT+ENCR=<Item>, [<Value>], [<Param1>], [<Param2>]<CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:<error code><CR><LF>
Read	AT+ENCR?<CR>	<CR><LF>+ENCR:<Item>,<Value><CR><LF>
		[<Item>,<Value><CR><LF>]
		...<CR><LF>OK<CR><LF>
Test	AT+ENCR=?<CR>	<CR><LF>+ENCR_(0-15),(0-FFFFFF,*,#,+),(0-9,*,#+)<CR><LF>
		<CR><LF>+CME_ERROR:<errorcode><CR><LF>
Unsolicited	Not Applicable	<CR><LF>+SIM:<SIM_Status><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<Encryption>	0	Encryption Off
	1	Encryption On
	2*	Decryption Wrong
<Clear Call Alarm>	0	Alarm Tone Off during clear calls
	1	Alarm Tone On during clear calls
<OPTA>	0	Load default <OPTA_Filter>
	1	Modify the current <OPTA_Filter>
	2*	OPTA has been changed
	3*	<OPTA_Filter> has been changed

<OPTA filter>	000000-FFFFF	Operational Tactical Address (TID – Tactical ID) Filter
<Key Management>	0	Reserved (not used currently)
	1*	Automatic Registration
<Crypto Registration>	0	Stop Crypto Registration
	1	Start Crypto Registration
<Garbled Audio>	0	Audio Off
	1	Audio On
<ITSI status>	0*	ITSI is temporary Disabled
	1*	ITSI Enabled
<Key Provisioning>	0*	Key provisioning, Requesting Keys
	1*	Key provisioning Successful
	2*	Key provisioning Failed
<Play Tone>	(01-14)*	Tone is a 8 bit value coming from SIM. It is coded as per ETSI TS 102 223, section 8.16. '01' Dial tone; '02' Called subscriber busy; '03' Congestion; '04' Radio path acknowledge; '05' Radio path not available/Call dropped; '06' Error/Special information; '07' Call waiting tone; '08' Ringing tone. '10' General beep; '11' Positive acknowledgement tone; '12' Negative acknowledgement or error tone; '13' Ringing tone as selected by the user for incoming speech call; '14' Alert tone as selected by the user for incoming SMS. All other values are reserved.
<Digit Input>	Digit or ASCII string*(in unsolicited only)	Works in set and unsolicited mode. Digit is a character: 0 to 9, *,# and +.
<Display Text>	ASCII string*	Text String is coded as one Latin 9 (ISO8859-15) coded text string
<DMO Encryption>	0	DMO3 Master
	1	DMO1
	2	DMO2
	3	DMO3 Slave
<Individual SDS Encryption>	0	Global Key
	1	Group Key
<Group SDS Encryption>	0	Global Key
	1	Group Key
<Peer OPTA>	24 bytes	This is OPTA a radio gets from its peer during a call.
<Param1>	000000-FFFFF	Applies only when modifying the <OPTA Filter> by set command
	Digit (0-9, *, #, +)	Applies only for setting <Input Keys>
<Param2>	Digit (0-9, *, #, +)	Applies only for setting <Input Keys>

<Item>	0	All (used to read values for all <Items> at once)
	1	<Encryption>
	2	<Clear Call Alarm>
	3	<ITSI status>
	4	- <OPTA> in the unsolicited notification of the OPTA change - <OPTA filter> in the set/read/unsolicited command to load/modify or read OPTA filter
	5	<Crypto Registration>
	6	<Key Management>
	7	<Garbled_Audio>
	8	<Key Provisioning>
	9	<Play Tone>
	10	<Digit Input>
	11	<Display Text>
	12	<DMO Encryption>
	13	<Individual SDS Encryption>
	14	<Group SDS Encryption>
	15*	<Peer OPTA>

Error Report Codes

Parameters	Value	Meaning
<error report code>	3	Operation not allowed (for example, switching E2EE during a call, User attempts to read the currently set <item> but the read command is not allowed for the <item>)
	4	Operation not supported
	13	SIM failure (A general error for problems with accessing SIM, details can be seen by +SIM command)
	33	Parameter wrong type
	34	Parameter value out of range
	35	Syntax error



NOTE

The following BSI functions are covered using this command:

- Read OPTA from SIM
- Read ITSI from SIM
- Read ICCID from SIM
- Unsolicited Notification of Remote OPTA Change
- Unsolicited Notification of SIM Authentication Failure
- Unsolicited Notification of Not Supported SIM
- Unsolicited Notification of SIM Communication Problem
- Unsolicited Notification the SIM Application is not Starting
- Unsolicited Notification of Missing SIM
- Unsolicited Notification of Running SIM Application
- Unsolicited Notification for "SIM ready to use" (sent when a terminal has finished PPS sequence. In this case the SIM OS is operational. Anything further depends on E2E application and is handled context related for example, PIN/PUK handling)

4.13 Phone Book

4.13.1 +CPBR - Read Phone Book Entries

Purpose

- Setting the range of Phone Book entries
- Reading Phone Book entries
- Checking the set of available parameters and value ranges

Syntax

Command type	Syntax	Possible Responses
Set	AT+CPBR=<index1> , [<index2>] <CR>	[<CR><LF>+CPBR: _<index1>,<number>,<type>,<text><CR><LF>] [...] [<CR><LF>+CPBR: _<index2>,<number>,<type>,<text><CR><LF>] <CR><LF>OK<CR><LF> <CR><LF>+CME_ERROR: _<error report code><CR><LF>
Test	AT+CPBR=?<CR>	<CR><LF>+CPBR: _ (1-1000) , (<nlength>) , (0,1,3,4,5,6,7) , (<tlength>) <CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<index1>	1–1000	Phone entry index (starting index, where <index2> is present)
<index2>	1–1000	Phone entry index (ending index), has to be greater than or equal to <index1>
<number>	Call number string	Phone number in the MS: ISSI (up to 8 digits), ITSI (up to 16 digits), PSTN (up to 24 digits), PABX (up to 24 digits)
<type>	0	ISSI (for Number Type "Private")
	1	ITSI (MCC+MNC+ISS, 3+5+(1 to 8) decimal digits) for Number Type "Private"
	3	PABX ESN external number for Number Type: "PABX"
	4	PSTN ESN external number for Number Type: "Other"
<text>	Alias string	Contact Name, may be empty
<nlength>	24	Maximum length of <number>
<tlength>	12 (for MTM800 Enhanced)	Maximum length of <text>

Error Report Codes

Parameters	Value	Meaning
<error report code>	3	Operation Not Allowed (MT is not ready or able to proceed with the request at this moment, the TE should retry again)
	33	Parameter wrong type
	34	Parameter value out of range
	35	Syntax error

**NOTE**

- When <index2> is present, all non-empty entries from <index1> to <index2> are returned
- Values in the range from 1 to 1000 in the test command represent the list of the supported index parameters
- To read all phone book entries, set <index1> to 1 and <index2> to 1000
- MT aborts the read command when the TE sends <CR>, <ESC> or <Ctrl-Z> character during read execution. Successful abortion of the command is indicated by the "OK" transmission from MT to TE

4.13.2 +CPBW - Write Phone Book Entries. Purpose

- Adding new contacts or numbers to Phone Book
- Changing existing numbers
- Deleting contacts from Phone Book

Syntax

Command type	Syntax	Possible Responses
Set	AT+CPBW=[<index>][,<number>[,<type>[,<text>]]]<CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:<error report code><CR><LF>
Test	AT+CPBW=?<CR>	<CR><LF>+CPBW: (1-1000), (<nlength>), (0,1,3,4,5,6,7), (<tlength>)<CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<index>	1-1000	Phone entry index
<number>	Call number string	Phone Number like SSI, ITSI, PSTN, PABX
<type>	0	ISSI (for Number Type "Private")
	1	ITSI (MCC+MNC+ISS, 3+5+(1 to 8) decimal digits) for Number Type "Private"
	3	PABX ESN external number for Number Type: "PABX"
	4	PSTN ESN external number for Number Type: "Other"
<text>	Alias string	Contact Name, may be empty
list of supported <index>	1-1000	Range of supported values for <index>
<nlength>	MS dependent	Maximum length of <number>
list of supported <type>	0, 1, 3, 4	Range of supported values for <type>
<tlength>	MS dependent	Maximum length of <text>

Error Report Codes

Parameters	Value	Meaning
<error report code>	3	Operation Not Allowed (MT is not ready or able to proceed with the request at this moment, the TE should retry again)
	20	Memory full (Used when <index> is omitted and no space is available)
	33	Parameter wrong type
	34	Parameter value out of range
	35	Syntax error

**NOTE**

- When the <index> parameter already has a set value, the command overwrites the parameter
- If <index> is missing, the MT adds an entry at the first free position. When no entry is available, then the command returns error code 20
- When setting <index> without any other parameters present, the respective entry at <index> is erased (if was non-empty)
- If <type> and <text> parameter are omitted in the command, by default they <type> is set to 0 and the <text> is empty what causes deleting the existing name
- The +CPBW operation is compliant to Address Book Restriction flag

4.14 GPS

4.14.1 +GPSPOS - Location Request

Purpose

Reading current PS location

Syntax

Command type	Syntax	Possible Responses
Set	AT+GPSPOS=<gps unsolicited><CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:<error code><CR><LF>
Read	AT+GPSPOS?<CR>	<CR><LF>+GPSPOS:<time>,<latitude>,<longitude>,<sats><CR><LF>
		<CR><LF>OK<CR><LF>
		<CR><LF>+GPSPOS:<time>,<2-letter_code>,<E>,<N>,<sats><CR><LF>
		<CR><LF>OK<CR><LF>
		<CR><LF>+GPSPOS:<time>,<letter_code>,<E>,<N>,<sats><CR><LF>
Unsolicited	Not Applicable	<CR><LF>+CME_ERROR:<error code><CR><LF>
		<CR><LF>+GPSPOS:<GPS convergence>,<sats><CR><LF> Sent upon the <GPS convergence> status changed.

Parameters & Values

Parameters	Value	Meaning
<time>	hh:mm:ss	Current time
<latitude>	S: dd_dd.dddd	Current latitude presentation (d - decimal digit, S- letter)
<longitude>	S: ddd_dd.dddd	Current longitude
<2-letter_code>	AA–ZZ	Represents a square on the UK map
<letter_code>	A–Z	Represents a square on the Irish map
<E>	00000–99999	5-digit decimal Easting coordinate
<N>	00000–99999	5-digit decimal Northing coordinate
<sats>	2 digit	Number of visible satellites
<gps unsolicited>	0	Disables <gps unsolic> unsolicited notification of GPS coverage
	1	Enables unsolicited notification of GPS coverage.

<GPS coverage>	0	GPS receiver in the MT is out of GPS coverage area or the GPS receiver does not receive signals from enough number satellite to calculate valid position data.
	1	GPS receiver in the MT is in GPS coverage area and the GPS receiver receives signals from enough number satellite to calculate valid position data.

Error Report Codes

Parameters	Value	Meaning
<error report code>	3	Operation Not Allowed (GPS disabled)
	35	Syntax error
	50	No GPS network service (GPS enabled but not operational)



NOTE

The response format of GPS location report depends on Codeplug setting for GPS coordinates.

4.15 Power Control

+CFUN - Terminal Functionality Purpose

Powering the terminal off

Syntax

Command type	Syntax	Possible Responses
Set	AT+CFUN=<fun><CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>
Test	AT+CFUN=?<CR>	<CR><LF>+CFUN: _ (0) <CR><LF>
		<CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<new pin>	0	Power off the MT

Error Report Codes

Parameters	Value	Meaning
<error report code>	33	Parameter wrong type
	34	Parameter value out of range
	35	Syntax error

4.16 PEI Link Management

4.16.1 Z - Default AT Parameters

Purpose

Restoring default AT parameters:

- PEI port parameters
- Service Profiles

Syntax

Command type	Syntax	Possible Responses
Execute	ATZ<CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>

**NOTE**

- This command also causes any ongoing service (for example, Call or SDS/Status) whose Service Profile is "TE only" or "Both TE & MT") to be terminated.
- This command does not work when MUX is active

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	3	Operation Not Allowed	Invalid while MUX is active
	35	Syntax error	Syntax of the command is incorrect

4.16.2 R - Reboot**Purpose**

Rebooting the terminal

Syntax

Command type	Syntax	Possible Responses
Execute	ATR<CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>

**NOTE**

- Prior to reboot, this command also causes any ongoing service (for example, Call or SDS/Status) to be terminated
- Following a reboot, the MT will power up in the same mode as before powering down and in the same TXI mode (on or off)

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	35	Syntax error	Syntax of the command is incorrect

4.16.3 &F - Restoration of Factory Default Serial Port Parameters**Purpose**

Restoring Baud Rate settings for the RS232 serial link between the TE and MT:

Syntax

Command type	Syntax	Possible Responses
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Execute	AT&F<CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	3	Operation Not Allowed	The command sent while MUX is active
	35	Syntax error	Syntax of the command is incorrect



NOTE

This command does not work when MUX is active.

4.16.4 +IPR - Baud Rate

Purpose

Setting and reading the Baud Rate of the PEI serial link between the TE and MT

Syntax

Command type	Syntax	Possible Responses
Set	AT+IPR=<baud rate><CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>
Read	AT+IPR?<CR>	<CR><LF>+IPR: _<baud rate><CR><LF> <CR><LF>OK<CR><LF>
Test	AT+IPR=?<CR>	<CR><LF>+IPR: _ (0,300,1200,2400,4800,9600,19200,38400,57600,115200,230400,460800,921600) <CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<baud rate>	0	Auto baud rate - Not supported by the MT
	300	Baud rate is 300 bps
	600	Baud rate is 600 bps
	1200	Baud rate is 1200 bps
	2400	Baud rate is 2400 bps
	4800	Baud rate is 4800 bps
	9600	Baud rate is 9600 bps
	19200	Baud rate is 19200 bps
	38400	Baud rate is 38400 bps
	57600	Baud rate is 57600 bps
	115200	Baud rate is 115200 bps
	230400	Baud rate is 230400 bps
	460800	Baud rate is 460800 bps
	921600	Baud rate is 921600 bps



NOTE

- The default setting for the baud rate at power-up can be defined in the Codeplug
- When MUX is active, the set command does not work as MUX driver control baud rate setting

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	3	Operations Not Allowed	In MUX active mode this is the response to a set command
	33	Parameter wrong type	Numeric instead of text or conversely
	34	Parameter out of range	Parameter out of range
	35	Syntax error	Syntax of the command is incorrect (for example invalid number of parameters)

4.16.5 +IFC - Flow Control

Purpose

Reading Flow Control (only Hardware Flow Control supported)

Syntax

Command type	Syntax	MT Response
Set	AT+IFC=<MT to TE>,<TE to MT><CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:_<error report code><CR><LF>
Read	AT+IFC?<CR>	<CR><LF>+IFC:_<MT to TE>,<TE to MT><CR><LF> <CR><LF>OK<CR><LF>
Test (MUX Inactive)	AT+IFC=?<CR>	<CR><LF>+IFC:_ (2) , (2) <CR><LF> <CR><LF>OK<CR><LF>
Test (MUX Active)	AT+IFC=?<CR>	<CR><LF>+IFC:_ (0-2) , (0-2) <CR><LF>

Parameters & Values

Parameters	Value	Meaning
<MT to TE>	0	No flow control
	1	Software flow control is automatically selected on MUX activation. Hardware flow control is automatically selected on MUX deactivation
	2	Hardware Flow Control (RTS/CTS)
<TE to MT>	0	No flow control
	1	Software flow control is automatically selected on MUX activation. Hardware flow control is automatically selected on MUX deactivation
	2	Hardware Flow Control (RTS/CTS)

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	3	Operation not allowed	TE attempts to set different values for <MT to TE> and <TE to MT>
	33	Parameter wrong type	Numeric instead of text or conversely
	34	Parameter out of range	Parameters have values different than 1 or 2
	35	Syntax error	Syntax of the command is incorrect (for example invalid number of parameters)

4.16.6 E - Echo

Purpose

Setting Echo

Syntax

Command type	Syntax	MT Response
Set	ATE<echo status><CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<echo status>	0	Echo disabled
	1	Echo enabled

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	33	Parameter wrong type	Numeric instead of text or conversely
	34	Parameter out of range	
	35	Syntax error	Syntax of the command is incorrect (for example invalid number of parameters)

4.16.7 +ICF - Framing and Parity

Purpose

Reading Framing and Parity

Syntax

Command type	Syntax	MT Response
Set	AT+ICF=<framing>,<parity><CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>
Read	AT+ICF?<CR>	<CR><LF>+ICF: _<framing>,<parity><CR><LF> <CR><LF>OK<CR><LF>
Test	AT+ICF=?<CR>	<CR><LF>+ICF: _ (3) , (3) <CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<framing>	3	8 DATA bits and 1 STOP bit
<parity>	3	No Parity

Error Report Codes

Parameters	Value	Meaning	Usage
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<error report code>	3	Operations Not Allowed	In MUX active mode this is the response to set command
	33	Parameter wrong type	Numeric instead of text or conversely
	34	Parameter out of range	
	35	Syntax error	Syntax of the command is incorrect (for example invalid number of parameters)

4.16.8 &C - DCD Behavior

Purpose

Setting DCD behavior (only default value supported)

Syntax

Command type	Syntax	MT Response
Set	AT&C<DCD status><CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<DCD status>	0	DCD is maintained by MT at logical level 1

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	33	Parameter wrong type	Numeric instead of text or conversely
	34	Parameter out of range	
	35	Syntax error	Syntax of the command is incorrect (for example invalid number of parameters)

4.16.9 &D - DTR behavior

Purpose

Setting DTR behavior (only default value supported)

Syntax

Command type	Syntax	MT Response
Set	AT&D<DTR status><CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<DTR status>	1	MT requires the DTR to be a logical level 1 to communicate with TE. When DTR goes from logical level 1 to 0: - The MT leaves TNP1 or Packet Data state and goes to AT command state - The MT stops communicating with the TE

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	33	Parameter wrong type	Numeric instead of text or conversely
	34	Parameter out of range	
	35	Syntax error	Syntax of the command is incorrect (for example invalid number of parameters)

4.16.10 V - Response Format**Purpose**

Defining the MT response format (numeric or textual)

Syntax

Command type	Syntax	MT Response
Set	ATV=<value><CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>
Read	ATV?<CR>	<CR><LF>V: _1<CR><LF> <CR><LF>OK<CR><LF>
Test	ATV=?<CR>	<CR><LF>V: _ (1) <CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<value>	1	Verbose response format

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	33	Parameter wrong type	Numeric instead of text or conversely
	34	Parameter out of range	ATV0
	35	Syntax error	

4.16.11 +CSCS - TE character set**Purpose**

Setting character set to different than ASCII for the following AT commands:

- +CTGL, +CNUMS, +CNUMD (folder names and talkgroup names)
- +CPBR, +CPBW (contact names)

Syntax

Command type	Syntax	MT Response
Set	AT+CSCS=<chset><CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>
Read	AT+CSCS?<CR>	<CR><LF>+CSCS: _<chset><CR><LF> <CR><LF>OK<CR><LF>
Test	AT+CSCS=?<CR>	<CR><LF>+CSCS: _ ("IRA", "UCS2", "8859-1") <CR><LF>

Parameters & Values

Parameters	Value	Meaning
<chset>	IRA	ASCII (default)
	UCS2	Unicode-16 (in UCS-2 format are kept characters in CP)
	8859-1	ISO 8859 Latin 1 character set (only the second byte of UCS2)

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	33	Parameter wrong type	Numeric instead of text or conversely
	34	Parameter out of range	
	35	Syntax error	Invalid number of parameters

4.17 AT Multiplexer

4.17.1 +CMUX - AT Multiplexer Activation

Purpose

Activates AT multiplexer for using parallel services such as: Call Control, SDS, Packet Data

Syntax

Command type	Syntax	MT Response
Set	AT+CMUX=<mode>[,<subset>[,<port speed>[,<N1>[,<T1>[,<N2>[,<T2>[,<T3>[,<k>]]]]]]] <CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR:<error report code><CR><LF>
Read	AT+CMUX?<CR>	<CR><LF>+CMUX:<mode>,<subset>,<port speed>,<N1>,<T1>,<N2>,<T2>,<T3>[,<k>]<CR><LF> <CR><LF>OK<CR><LF>
Test	AT+CMUX=?<CR>	<CR><LF>+CMUX:<mode>,<subset>,<port speed>,<N1>,<T1>,<N2>,<T2>,<T3>[,<k>]<CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<mode>	0	Basic Option for Multiplexer Transparency Mechanism
	1	Not supported
<subset> *)	0	UIH frames used only
	1	Not supported
	2	Not supported
<port speed>	1	9600 bps
	2	19200 bps
	3	38400 bps
	4	57600 bps
	5	115200 bps
	6	230400 bps
<N1>	1500	Maximum frame size. The only option supported is 1500
<T1>	10	Acknowledgement timer in units of ten milliseconds. The only option supported is 10 (100 ms)
<N2>	3	Maximum number of re-transmissions. The only option supported is 3
<T2> **)	30	Response timer for the multiplexer control channel in units of ten milliseconds. The only option supported is 30 (300 ms)
<T3>	10	Wake up response timer in seconds. The only option supported is 10
<k>	2	Not supported



NOTE

*) This parameter defines the way in which the multiplexer control channel is set up. A virtual channel may subsequently be set up differently but in the absence of any negotiation for the settings of a virtual channel, the virtual channel will be set up according to the control channel <subset> setting.

**) $\langle T_2 \rangle$ must be greater than $\langle T_1 \rangle$

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	3	Operations Not Allowed	Values different than the default are requested for the optional parameters. If the +CMUX command is issued whilst in multiplexer mode, then the command is ignored and the MS responds with the "Operation Not allowed" error
	4	Operation not supported	The MT does not support this command as there is no AT MUX functionality on MT
	33	Parameter wrong type	
	34	Parameter out of range	
	35	Syntax error	Syntax of the command is incorrect (for example invalid number of parameters)



NOTE

- On the power up, the MUX is disabled on MT by default
- On activating the MUX by +CMUX the MS creates 4 DLCs (that is, MUX virtual ports or channels)
- The baud rate specified in the +CMUX command applies to physical serial connection and the baud rate is shared among DLC0-DLC3.
- Each DLC is in the "AT Command" state and the MS allows independent processing of AT commands on each DLC
- When physical connection is broken down, MUX goes back to "AT Command" state. MUX drivers keep virtual connections active through PEI disconnections and reconnections
- Only one DLC can be changed to "TNP1 or Packet Data" state providing PPP connection
- TNP1 is not supported when MUX is enabled
- MT multiplexer is deactivated 30 seconds after the last DLC is disconnected
- Upon MUX deactivation, PEI link configuration parameters are restored to the previous settings

4.18 Testing

4.18.1 +FCLASS - Mode Selection

Purpose

Activating special modes for test tools or KVL mode

Syntax

Command type	Syntax	Possible MT Responses
Set	AT+FCLASS=<mode><CR>	No response
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>
Test	AT+FCLASS=?<CR>	<CR><LF>+FCLASS: _ (83,83949) <CR><LF> <CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
<mode>	0	Data Application (PPP)
	83	Test Tool Application (for example, Air Tracer, Scout)
	1000	Programming Mode
	83949	Test Mode
	83949	KVL Mode

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	3	Operations Not Allowed	MT is not in a state where it can accept the command
	33	Parameter wrong type	Numeric instead of text or conversely
	34	Parameter out of range	
	35	Syntax error	For example invalid number of parameters

4.19 Power Class

4.19.1 +CPWC - Power Class Toggling



NOTE

The command is applicable only to TX Power Class 3L (1.8 W) with the RF Power feature flag enabled.

Purpose

Toggling RF Power Class

Syntax

Command type	Syntax	Possible MT Responses
Set	AT+CPWC=<class><CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>
Read	AT+CPWC?<CR>	<CR><LF>+CPWC: _<class><CR><LF> <CR><LF>OK<CR><LF>
Test	AT+CPWC=?<CR>	<CR><LF>+CPWC: _ ("3L", "4") <CR><LF> <CR><LF>OK<CR><LF>
Unsolicited	Not Applicable	<CR><LF>+CPWC: _<class><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<class>	"3L"	RF Power Class
	"4"	

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	3	Operations Not Allowed	All parameters are correct but the toggle Power Class functionality is not allowed. For example the RF Power feature flag is disabled.
	33	Parameter wrong type	Wrong parameter type entered. For example 4 instead of "4"
	34	Parameter out of range	
	35	Syntax error	For example invalid number of parameters

4.20 TCR1000 Specific Commands

4.20.1 +FF - Find Folder

Purpose

This command returns the folder entry for which the folder name starts with a specific string from the TMO or DMO folders list.

Syntax

Command type	Syntax	Possible MT Responses
Set	AT+FF=<findtext>,<start folder number>,<list><CR>	<CR><LF>,<folder_name>,<folder_number>,<folder_size>,<number_of_programmed_talk_groups>,<first_tg_index><CR><LF> <CR><LF>+CME_ERROR:<error report code><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<findtext>	"ASCII string"	ASCII string type field (which must be enclosed in quotation marks), representing talk group alias beginning. The text should be entirely coded as Unicode.
<number>	0–15999999	Optional decimal value that represents the actual GSSI of the talk group
<list>	1 byte hex	Value indicating the list to search (TMO = 0/DMO = 1/Favorites = 2).
<start_index>	1–2048 1–1024 1–10	Decimal value; talkgroup position in the range for TMO, DMO, Favorites
<index>	1–2048 TMO 1–1024 DMO 1–10 Favorite	Decimal value representing a talkgroup position in the range
<gssi>	0–15999999	Decimal value representing the GSSI of the talkgroup
<alias>	"ASCII string"	ASCII string type field (enclosed in quotation marks), representing talk group alias
<type>	1 byte hex	Value indicating the talkgroup type (TMO = 0/DMO = 1)
<mappex_index>	1–2048 TMO 1–1024 DMO	Decimal value representing the index of the other type (TMO/DMO) talkgroup which is mapped to the listed talkgroup (if any).
<mapped_alias>	"ASCII string"	ASCII string type field (enclosed in quotation marks), representing talk group alias

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	3	Operations Not Allowed	All parameters are correct but the toggle Power Class functionality is not allowed. For example no matching folder is found.

4.20.2 +Ftg - Find Talkgroup

Purpose

This command returns the group entry which alphanumeric alias field starts with a specific string or which GSSI matches a position digits in the TMO, DMO or Favorites list.

Syntax

Command type	Syntax	Possible MT Responses
Set	AT+Ftg=<findtext>,<number>,<start_index>,<list><CR>	<CR><LF><index>,<gssi>,<alias>,<type>,<mapped_index>,<mapped_alias><CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<findtext>	"ASCII string"	ASCII string type field (which must be enclosed in quotation marks), representing talk group alias beginning. The text should be entirely coded as Unicode.
<number>	0–15999999	Optional decimal value that represents the actual GSSI of the talk group
<list>	1 byte hex	Value indicating the list to search (TMO = 0/DMO = 1/Favorites = 2).
<start_index>	1–2048 TMO 1–1024 DMO 1–10 Favorite	Decimal value representing a talkgroup position in the range
<index>	1–2048 TMO 1–1024 DMO 1–10 Favorite	Decimal value representing a talkgroup position in the range
<gssi>	0–15999999	Decimal value representing the GSSI of the talkgroup
<alias>	"ASCII string"	ASCII string type field (enclosed in quotation marks), representing talk group alias
<type>	1 byte hex	Value indicating the talkgroup type (TMO = 0/DMO = 1)
<mappex_index>	1–2048 TMO 1–1024 DMO	Decimal value representing the index of the other type (TMO/DMO) talkgroup which is mapped to the listed talkgroup (if any).
<mapped_alias>	"ASCII string"	ASCII string type field (enclosed in quotation marks), representing talk group alias

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	3	Operations Not Allowed	All parameters are correct but the toggle Power Class functionality is not allowed. For example no matching talk group is found.

4.20.3 +K - RCU Interface**Purpose**

This command is generated on the press (or turn for the rotary switch) and release of a key on the Remote Control Unit.

Syntax

Command type	Syntax	Possible MT Responses
Set	AT+K=<KeyID><CR>	<CR><LF>OK<CR><LF>

Parameters & Values

Parameters	Value	Meaning
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<KeyID>	15	Parity check
	14	RFU
	13	Low power standby
	12	Low battery indication
	11–8	Rotary position
	7	RFU
	6	RFU
	5–0	Buttons status field

4.20.4 +Wtg - Write Talkgroup

Purpose

This command programs a talk group entry from the specified list (TMO or DMO) and into specified position in the Favorite list.

Syntax

Command type	Syntax	Possible MT Responses
Set	AT+Wtg=<index>,<list_index>,<list><CR>	<CR><LF>OK<CR><LF>
		<CR><LF>+CME_ERROR: _<error report code><CR><LF>

Parameters & Values

Parameters	Value	Meaning
<index>	1–10	Decimal value representing a talkgroup position in the range
<list>	1 byte hex	Value indicating the talkgroup type (TMO = 0/DMO = 1/Favorites = 2 - only for deleting entries)
<list_index>	1–2048 TMO 1–1024 DMO	Decimal value representing the index of the other type (TMO/DMO) talkgroup which is mapped to the listed talkgroup.

Error Report Codes

Parameters	Value	Meaning	Usage
<error report code>	3	Operations Not Allowed	All parameters are correct but the toggle Power Class functionality is not allowed. For example the terminal failed to program the group.

5 Service & Feature Interaction

The following section describes interaction between different features and between the PEI and the MMI.

5.1 MMI & PEI Call Interaction

Whenever the PEI makes a call request and there is no ongoing call, the request will be accepted regardless of the MMI state. If need be, the MMI state will be returned to idle so that the PEI request is accepted.

When the PEI initiates or receives a call, the MT obeys feature flags provisioning in the Codeplug, but it will obey the supported parameters specified in the AT commands and ignore where applicable

the Codeplug settings for MMI features such as Emergency Call type and destination, Address Book restrictions.

When the PEI initiates or receives a call, the MT acts as if the call was initiated or received by the MMI. For example:

- The MT will deactivate the screen saver if it were active.
- The MT will activate backlight if required.
- Initiated Call will be added to the Last Dialed Lists.
- Received Call will be added to the Recent Call Lists.

When an incoming call is received and the service profile for calls is set to "both TE and MT":

- If it is a hook call, both MT and TE will be notified and can accept the call;
- If it is a direct call (for example, group call), the MT will join the call and the TE will be notified.
- Whichever accepted the call, either MT or TE will be able to terminate the call at any time (the MT using the "End" button and the TE using ATH command). This means that a call termination request (whether from MMI or PEI) will always be obeyed.

Table 5-8 summarizes the interaction between an ongoing call and a newly requested call.

Ongoing Call	New Request			
	PEI normal call request	PEI emergency call request	MMI normal call request	MMI emergency call request
Ongoing MMI normal priority call	PEI request will be rejected	Ongoing MMI call will be cancelled and PEI request will be accepted	Not possible	Ongoing MMI call will be cancelled and MMI Emergency will be accepted
Ongoing MMI Emergency call	PEI request will be rejected	PEI request will be rejected	Not possible	Not possible
Ongoing PEI normal priority call	Not Applicable	PEI has to terminate ongoing call before starting the new emergency one	MMI request will be rejected	MMI request will be accepted
Ongoing PEI Emergency call	Not Applicable	Not Applicable	MMI request will be rejected	MMI request will be rejected

Table 5-8 MMI/PEI Call Interaction

Generally, an Emergency call request (whether from MMI or PEI) preempts a normal priority call (MMI or PEI). Calls of the same priority can not preempt each other, so the ongoing call has to be cancelled before initiating a second call.

The same rules apply when the MMI/PEI try to preempt an ongoing received call.

5.2 Call & SDS Interaction

The TE is allowed to send Status & SDS messages and is able to receive Status or SDS messages during an ongoing TMO call. In the DMO, when +CTSDS has higher priority than ongoing DMO call, sending a message using the +CMGS command causes the MS to request pre-emption of the ongoing DMO call.

5.3 Emergency Mode

While in Emergency Mode, the MT restricts some services.

- The MT rejects TE requests for initiating individual calls (Private, Phone, PABX)
- The MT blocks scan calls
- The MT rejects Transmit Inhibit Mode entry

The MS allows group calls to the selected Talkgroup, but the call priority is automatically upgraded to Emergency.

5.4 Scanning and Scan List Interaction

- Only the TE is allowed to set scanning status to on/off (+CTSCAN)
- The MT deselects the User Scan List and allow the PEI to attach up to 20 Scan Groups using +CTGS (the PEI Scan List is independent of the MMI User Scan List and can contain 20 Groups)
- The MT displays "Service Restricted" if the user tries to enter the MMI Group Setup menu, that is changing or viewing of the User Scan List or Scanning Status is not allowed

When the Service Profile for MM Group Management is set back to "MT only", the MT will deselect the PEI Scan List and reselect the active MMI user scan list (if any), restore the scanning status and allow to view and edit the MMI User Scan list (if this option is enabled in the Codeplug).

5.5 Priority Monitoring

The MT will implement priority monitoring for incoming calls as its existing rules for MMI initiated/received calls.

- Call priority decides which call the MT will join (except that Emergency Scan call can be downgraded to a normal scan call according to Codeplug setting)
- If call priorities are identical between 2 incoming calls, then the MT will join a call in the following order of importance (from most to least important):
 - Broadcast call
 - Scan call received on Group with Always Scan CoU
 - Scan Call received on Group with High Priority CoU
 - Group call received on Selected Group
 - Scan Call received on Group with Medium Priority CoU
 - Scan Call received on Group with Low Priority CoU

When the TE sets the Service profile for CC Voice to TE & MT, the MT will change presentation mode for scan groups (that is, scan calls will always be forced).

5.6 Interaction with Voice & Data Setting

When the MS setting for Voice and Data Setup is set to "Data only", the MS will not accept to make or receive calls from the PEI even if the setting of Voice Call Control Service Profile is set to "Both TE & MT". The Data setup has to be set to "Voice & Data" or "Voice only" for the MS to allow PEI calls to be initiated and received.

5.7 PIN/PUK Lock State

While MT is PIN/PUK locked only the following AT commands are processed.

AT Command
+CPIN
+EMER
+CMUX
+CREG
+CTBCT
+GMR
+GMI
E
&C
+IFC
+IPR
+ICF
Z
R
+CFUN
+CTSP
+CTSDC
D (emergency only)
H
+SIM (read only)

Table 5-9 Allowed AT Commands in PIN Lock State

Terminals access Emergency Services through +EMER or D (only with priority emergency) commands. The PIN lock state is suspended then and the terminal enters the emergency mode.

5.8 Multiplexer interactions

When the multiplexer is active and the PD context is active on a MUX port, the MT allows the TE performing the following actions.

- Sending and receiving Status & SDS messages on different MUX ports.
The SDS or Status is sent on the current channel (MCCH or PDCH)
- Initiating calls, receiving calls, and suspending the PD service, that is, TE-initiated and received calls cause the same MS behavior as the MMI-initiated

5.8.1 TNP1

TNP1 protocol is disabled when MUX is active. The TNP1 operations are not supported via MUX.

5.8.2 PIN/PUK lock state

When the MUX is active and MS enters PIN lock state, all virtual ports switches to AT command PIN Lock state and the Packet Data session is terminated.

In the PIN Lock state MUX is active. However, only limited AT command set is accepted.

5.8.3 KVL mode

In AT command state the TE is able to put an MS into special KVL Mode using +FCLASS from each DLCI. However, this causes that the MS goes to different mode and MUX is terminated.

6 AT Command Example Scenarios

6.1 Network and Mobility Information

This section presents examples of network and mobility information provided by the terminal.

6.1.1 Power-up Sequence

Prerequisites	
LA 1 is operating in Wide Area Trunking, in Security Class 3 and does not support Packet Data (i.e. SDCP and Advanced Link are not supported on current cell)	
Action	Expected Result
MT powers up in TMO and registers successfully onto LA 1	MT unsolicited messages: <CR><LF>+CREG:_0<CR><LF> <CR><LF>+CREG:_1,1<CR><LF> <CR><LF>+CTBCT:_1,C62,2,2<CR><LF>
TE wishes to read RSSI of LA 1: AT+CSQ?<CR>	MT response (RSSI is -83 dBm): <CR><LF>+CSQ:_15,99<CR><LF> <CR><LF>OK<CR><LF>
TE wishes to read Neighbor cell information: AT+GCLI?<CR>	MT response (1 serving cell and 2 neighbors): <CR><LF>+GCLI:_3<CR><LF> 1,0343AC,15,20<CR><LF> 176,03410F,10,12<CR><LF> 12,034116,6,3<CR><LF> <CR><LF>OK<CR><LF>
A minute later, the TE wishes to read again Neighbor cell information: AT+GCLI?<CR>	MT response (1 serving cell and 3 neighbors): <CR><LF>+GCLI:_4<CR><LF> 1,0343AC,16,21<CR><LF> 12,034116,11,14<CR><LF> 10,034237,10,13<CR><LF> 176,03410F,5,2<CR><LF> <CR><LF>OK<CR><LF>
LA 1 goes to LST	MT unsolicited message: <CR><LF>+CTBCT:_1,C22,2,2<CR><LF>
MT performs cell reselection to LA 12 which is in Wide Area Trunking and supports Packet Data	MT unsolicited messages: <CR><LF>+CREG:_1,12<CR><LF> <CR><LF>+CTBCT:_12,C67,2,2<CR><LF>

6.1.2 Registration Failure

Prerequisites	
MT ISSI is invalid on the SwMI	
Action	Expected Result
MT powers up in TMO and performs initial cell selection	MT unsolicited messages: <CR><LF>+CREG:_0<CR><LF>
MT finds LA 1 and tries to register on it but receives system rejection from the SwMI. The same happens on LA 2, 3 and 4.	
4 system rejections cause the MT to give up searching on this Network until power-cycle	MT unsolicited messages: <CR><LF>+CREG:_3<CR><LF>

6.1.3 Cell Reselection

Prerequisites	
MT is camped on LA 1	
Actions	Expected Result
MT performs cell reselection to LA 12	MT unsolicited messages: <CR><LF>+CREG:_1,12<CR><LF> <CR><LF>+CTBCT:_12,C67,2,2<CR><LF>

6.1.4 Cell goes to LST (or Fallback)

Prerequisites	
LA 1 is operating in Wide Area Trunking, in Security Class 3 and does not support Packet Data (i.e. SNDCP and Advanced Link are not supported on current cell)	
Actions	Expected Result
MT powers up in TMO and registers onto LA 1	MT unsolicited messages: <CR><LF>+CTOM:_0<CR><LF> <CR><LF>+CREG:_0<CR><LF> <CR><LF>+CREG:_1,1<CR><LF> <CR><LF>+CTBCT:_1,C62,2,2<CR><LF>
LA 1 goes to LST	MT unsolicited message: <CR><LF>+CTBCT:_1,C22,2,2<CR><LF>
MT performs cell reselection to LA 12 which is in Wide Area Trunking and supports Packet Data	MT unsolicited messages: <CR><LF>+CREG:_1,12<CR><LF> <CR><LF>+CTBCT:_12,C67,2,2<CR><LF>

6.1.5 Change of SDS-TL addressing

Prerequisites	
MT is in TMO. LA 1 indicates support for SDS-TL addressing set to "MS choice to use SDS-TL service centre" LA 2 indicates support for SDS-TL addressing set to "Never use SDS-TL Service centre"	
Actions	Expected Result
MT powers up and registers onto LA 1	MT unsolicited messages: <CR><LF>+CTOM:_0<CR><LF> <CR><LF>+CREG:_0<CR><LF> <CR><LF>+CREG:_1,1<CR><LF> <CR><LF>+CTBCT:_1,C67,2,3<CR><LF>
MT performs cell reselection to LA 2 (due to signal conditions)	MT unsolicited message: <CR><LF>+CREG:_1,2<CR><LF> <CR><LF>+CTBCT:_2,C67,2,2<CR><LF>
SDS-TL addressing method is changed on LA 2 to "MS choice to use SDS-TL service centre"	MT unsolicited message: <CR><LF>+CTBCT:_2,C67,2,3<CR><LF>

6.1.6 MT goes Out of Service

Prerequisites	
MT is camped on LA 1 LA 3 is operating in Security Class 3	
Actions	Expected Result
MT goes out of coverage (i.e. link failure occurs)	MT unsolicited message: <CR><LF>+CREG:_0<CR><LF>
MT finds LA 3 and registers successfully on it	MT unsolicited messages: <CR><LF>+CREG:_1,3<CR><LF> <CR><LF>+CTBCT:_3,C67,2,2<CR><LF>

6.1.7 Transmit Inhibit Mode

Prerequisites	
MT in TMO.	
Actions	Expected Result
TE checks current TXI state: AT+TXI?<CR>	MT response: <CR><LF>+TXI:_0,0<CR><LF> <CR><LF>OK<CR><LF>
TE enables unsolicited notification for TXI mode: AT+TXI=0,1<CR>	MT response: <CR><LF>OK<CR><LF>
MT enables TXI by MMI	MT unsolicited message: <CR><LF>+TXI:_1<CR><LF>
TE wants to enable scanning: AT+CTSCAN=1<CR>	MT response: <CR><LF>+CME_ERROR:_41<CR><LF>
TE disables TXI mode: AT+TXI=0<CR>	MT response: <CR><LF>OK<CR><LF>

6.2 Calls

This section covers examples of Calls.

These examples require the TE to set the Service Profile for Voice Call Control to "Both TE & MT" controlled by executing the following command: AT+CTSP=2,0,0<CR>

6.2.1 Initiating and Receiving a Group Call

Prerequisites	
MT_1 and MT_2 are in TMO, TE_1 is connected to MT_1 and TE_2 is connected to MT_2 MT_1 ISSI is 101 and MT_2 ISSI is 102 The selected GSSI for both is 10205001 and the GSSI is not configured for EtE in both GSSI 10205001 is valid in the SwMI configuration	
Actions	Expected Result
TE_1 sets the call parameters: AT+CTSDC=0,0,0,1,1,0,1,1,0,0<CR>	MT_1 response: <CR><LF>OK<CR><LF>
TE_1 dials the call to its selected group: ATD10205001<CR>	MT_1 response (call setup is sent successfully): <CR><LF>OK<CR><LF>
SwMI sends D-CONNECT to MT_1 and D-SETUP to the GSSI members	MT_1 unsolicited response (call is connected by SwMI and TX is granted): <CR><LF>+CTCC:_3,1,1,0,0,1<CR><LF> <CR><LF>+CTXG:_3,0,0,0<CR><LF> MT_2 unsolicited response to TE_2 after it joins the call: <CR><LF>+CTICN:_2,0,0,0,101,1,1,0,1,0,0,10205001<CR><LF> <CR><LF>+CTCC:_2,1,1,0,0,1<CR><LF> <CR><LF>+CTXG:_2,3,0,0,0,101<CR><LF>

TE_1 requests MT_1 to stop talking: AT+CUTXC=3<CR>	MT_1 response: <CR><LF>OK<CR><LF>
SwMI sends D-TX CEASED to the GSSI	MT_1 unsolicited response to TE_1: <CR><LF>+CDTXC:_3,0<CR><LF> MT_2 unsolicited response to TE_2: <CR><LF>+CDTXC:_2,0<CR><LF>
TE_2 requests MT_2 to talkback: AT+CTXD=2,1,0<CR>	MT_2 response to TE_2: <CR><LF>OK<CR><LF>
SwMI granted TX to MT_2	MT_2 unsolicited response to TE_2: <CR><LF>+CTXG:_2,0,0,0<CR><LF> MT_1 unsolicited response to TE_1: <CR><LF>+CTXG:_3,3,0,0,0,102<CR><LF>
TE_2 requests MT_2 to stop talking: AT+CUTXC=2<CR>	MT_2 response to TE_2: <CR><LF>OK<CR><LF> MT_1 unsolicited response to TE_1 (ISSI 102 stops talking): <CR><LF>+CDTXC:_3,0<CR><LF>
TE_1 requests to talkback: AT+CTXD=3,1,0<CR>	MT_1 response: <CR><LF>OK<CR><LF>
SwMI grants TX to MT_1	MT_1 unsolicited response to TE_1: <CR><LF>+CTXG:_3,0,0,0<CR><LF> MT_2 unsolicited response to TE_2: <CR><LF>+CTXG:_2,3,0,0,0,101<CR><LF>
TE_1 requests to stop talking: AT+CUTXC=3<CR>	MT_1 response: <CR><LF>OK<CR><LF>
SwMI sends D-TX CEASED to the GSSI	MT_1 unsolicited response to TE_1: <CR><LF>+CDTXC:_3,0<CR><LF> MT_2 unsolicited response to TE_2: <CR><LF>+CDTXC:_2,0<CR><LF>
SwMI disconnects the call (due to hang timer expiry)	MT_1 unsolicited response to TE_1: <CR><LF>+CTCR:_3,0<CR><LF> MT_2 unsolicited response to TE_2: <CR><LF>+CTCR:_2,0<CR><LF>

6.2.2 Initiating and Receiving a Private Call

Prerequisites	
MT_1 and MT_2 are in TMO, TE_1 is connected to MT_1 and TE_2 is connected to MT_2 MT_1 ISSI is 101 and MT_2 ISSI is 102	
Actions	Expected Result
TE_1 sets the call parameters: AT+CTSDC=0,0,0,0,0,0,0,1,0,0<CR>	MT_1 response: <CR><LF>OK<CR><LF>
TE_1 dials a duplex call to ISSI 102: ATD102<CR>	MT_1 response (call setup is sent successfully): <CR><LF>OK<CR><LF>
SwMI sends D-SETUP to MT_2 and D-CALL PROCEEDING to MT_1	MT_2 unsolicited response (incoming call): <CR><LF>+CTICN:_1,0,0,0,101,0,0,0,0,0,0<CR><LF> MT_1 unsolicited response (call in progress): <CR><LF>+CTOCP:_3,0,0,0,0,0,0,0,0<CR><LF>
MT_2 sends U-ALERT to the SwMI causing the SwMI to send D-ALERT to MT_1	MT_1 unsolicited response (called party paged): <CR><LF>+CTOCP:_3,2,0,0,0,0,0,0,0<CR><LF>
TE_2 accepts the call: ATA<CR>	MT_2 response (MT_2 sends U-CONNECT to the SwMI): <CR><LF>OK<CR><LF>
SwMI receives U-CONNECT and sends D-CONNECT to MT_1 and D-CONNECT-ACK to MT_2	MT_1 unsolicited response to TE_1: <CR><LF>+CTCC:_3,0,0,0,0,0,0,0<CR><LF> <CR><LF>+CTXG:_3,0,0,0<CR><LF> MT_2 unsolicited response to TE_2: <CR><LF>+CTCC:_1,0,0,0,0,0,0,0<CR><LF> <CR><LF>+CTXG:_1,0,0,0<CR><LF>
TE_1 ends the call: ATH<CR>	MT_1 response: <CR><LF>OK<CR><LF>
SwMI disconnects the call and sends D-RELEASE to MT_1 and MT_2	MT_1 unsolicited response to TE_1: <CR><LF>+CTCR:_3,0<CR><LF> MT_2 unsolicited response to TE_2: <CR><LF>+CTCR:_1,0<CR><LF>

6.3 Sending Text Messages

This section provides examples concerning sending and receiving SDS messages when the Codeplug setting "ETSI AT SDS/Status Format" is enabled.

Prerequisites	
Terminals are in TMO (or in DMO on same frequency and all terminals have the same home MNI) MT_1 with ISSI 101 is connected to TE_1 and its selected talkgroup is 500 MT_2 with ISSI 102 is connected to TE_2 and its selected talkgroup is 500	
Actions	Expected Result
TE_1 registers for Text PID with MT_1: AT+CTSP=1,3,130<CR>	MT_1 response to TE_1: <CR><LF>OK<CR><LF>

TE_2 registers for Text PID with MT_2: AT+CTSP=1,3,130<CR>	MT_2 response to TE_2: <CR><LF>OK<CR><LF>
TE_1 wants to send SDS type 4 to an SSI: AT+CTSDS=12,0<CR>	MT_1 response to TE_1: <CR><LF>OK<CR><LF>
TE_1 sends Text message "HELP ME" to ISSI 102 with delivery report request: AT+CMGS=102,88<CR><LF> 8204E30148454C50204D45<Ctrl-Z>	MT_1 response to TE_1: <CR><LF>+CMGS:_0<CR><LF> <CR><LF>OK<CR><LF>
MT_1 receives Layer2 acknowledgement (LLC BL-ACK) for the sent SDS message	MT_1 unsolicited message to TE_1: <CR><LF>+CMGS:_0,4,E3<CR><LF>
MT_2 receives the Text message from MT_1	MT_2 unsolicited message to TE_2: <CR><LF>+CTSDSR:_12,101,0,102,0,88<CR><LF> 8204E30148454C50204D45<CR><LF>
TE_2 wants to send delivery report: AT+CTSDS=12,0<CR>	MT_2 response to TE_2: <CR><LF>OK<CR><LF>
TE_2 sends delivery report to MT_1: AT+CMGS=101,32<CR><LF> 821000E3<Ctrl-Z>	MT_2 response to TE_2: <CR><LF>+CMGS:_0<CR><LF> <CR><LF>OK<CR><LF>
MT_2 receives Layer2 acknowledgement (LLC BL-ACK) for the sent SDS message	MT_2 unsolicited message to TE_2: <CR><LF>+CMGS:_0,4,E3<CR><LF>
MT_1 receives the delivery report from MT_2	MT_1 unsolicited message to TE_1: <CR><LF>+CTSDSR:_12,102,0,101,0,32<CR><LF> 821000E3<CR><LF>
TE_1 sends Text message "DANGER" to GSSI 500: AT+CMGS=500,80<CR> 8202E40144414E474552<Ctrl-Z>	MT1 response: <CR><LF>+CMGS:_0<CR><LF> <CR><LF>OK<CR><LF>
MT_1 receives Layer2 acknowledgement (LLC BL-ACK) for the sent SDS message	MT_1 unsolicited message to TE_1: <CR><LF>+CMGS:_0,4,E4<CR><LF>
MT_2 receives Text message from MT_1	MT_2 unsolicited message to TE_2: <CR><LF>+CTSDSR:_12,101,0,500,0,80<CR><LF> 8202E40144414E474552<CR><LF>

6.4 Triggering GPIO



NOTE

The scenario applies to MTM800 Enhanced only.

This section provides examples concerning sending SDS messages when the Codeplug setting "ETSI AT SDS/Status Format" is enabled.

Prerequisites
<p>The MT is GPIO1 or GPIO2 are configured with the following settings in the codeplug:</p> <ul style="list-style-type: none"> GPIO state is set to Output GPIO Function is set Specific Message Selected PI is set to 140 Validation is set to Off <p>For details see "33.2.1 Configuring GPIO" on page 216.</p>
Actions
<p>Register PI:</p> <pre>AT+CTSP=1,3,140<CR></pre>
<p>Select SDS type:</p> <pre>AT+CTSDS=12,0<CR></pre>
<p>Send message "GPIO" to ISSI of the MT. In the example below the ISSI is 100 and a report is not requested:</p> <pre>AT+CMGS=100,64<CR> 8C0001014750494F <Ctrl-Z></pre>

6.5 Reading GPS Position

Prerequisites	
<p>GPS is enabled on MT</p> <p>GPS Coordinates set in Codeplug to "Latitude/Longitude"</p>	
Actions	Expected Result
<p>The TE wishes to read current GPS position but has no GPS network service:</p> <pre>AT+GPSPOS=?<CR></pre>	<p>MT response:</p> <pre><CR><LF>+CME_ERROR:_50<CR><LF></pre>
<p>The TE wishes to read current GPS position and has GPS network service:</p> <pre>AT+GPSPOS=?<CR></pre>	<p>MT response:</p> <pre><CR><LF>+GPSPOS:_14:22:50, N:51_29.9974,W:000_06.9965,8<CR><LF> <CR><LF>OK<CR><LF></pre>

6.6 LIP Application

6.6.1 Overview and Configuration

The Figure 5-2 LIP Application Utilizing PEI shows a LIP Location Server using an MT to communicate with terminals to:

- Configure and control terminals for LIP
- Receive LIP Location reports

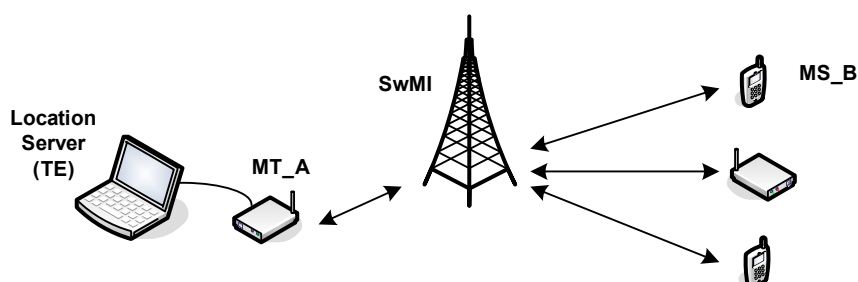


Figure 5-2 LIP Application Utilizing PEI

6.6.2 Example Scenario

Prerequisites	
CPS Configuration of MT_A: <ul style="list-style-type: none"> • ISSI is 786 • LIP (or GPS) is disabled (to allow the TE to register for the LIP PID) • The Codeplug setting “ETSI AT SDS/Status Format” is disabled in MT_A (that is, Motorola Proprietary Syntax is used for SDS AT commands). CPS Configuration of MS_B: <ul style="list-style-type: none"> • ISSI is 101 • Enabled for GPS and LIP • GPS Authorised ISSI Base is set to 700 and GPS Authorised ISSI Range is 100 (that is, MS_B will accept Location Servers with ISSI 700 to 800). 	
Actions	Expected Result
The Location server wishes to receive LIP PDUs and therefore registers with MT_A for the LIP PID: AT+CMGS=0,1,0,8<CR> 0A<Ctrl-Z>	MT_A response: <CR><LF>+CMGS:_0<CR><LF> <CR><LF>OK<CR><LF>
The Location server wishes to send BASIC LOCATION PARAMETERS REQUEST to MS_B: AT+CMGS=101,1,0,64<CR> 0A550391C1000312<Ctrl-Z>	MT_A response: <CR><LF>+CMGS:_0<CR><LF> <CR><LF>OK<CR><LF>
MS_B sends a BASIC LOCATION PARAMETERS RESPONSE PDU to MT_A	MT_A unsolicited message to Location Server: <CR><LF>+CMT:_101,1,40<CR><LF> 0A56310007<CR><LF>

<p>The Location server wishes to program MS_B with the Maximum Reporting Interval Trigger with a period of 1 minute by sending an ADD/MODIFY TRIGGER REQUEST PDU:</p> <pre>AT+CMGS=101,1,0,45<CR> 0A5E6840C08<Ctrl-Z></pre>	<p>MT_A response:</p> <pre><CR><LF>+CMGS:_0<CR><LF> <CR><LF>OK<CR><LF></pre>
<p>MS_B replies with an ADD/MODIFY TRIGGER RESPONSE PDU to MT_A</p>	<p>MT_A unsolicited message to Location Server:</p> <pre><CR><LF>+CMT:_101,1,25<CR><LF> 0A5A318<CR><LF></pre>

6.6.3 Encoding/decoding of example LIP PDUs

Information element	Bit Length	Decimal Value	Binary Value	Meaning
Protocol Identifier	8	10	00001010	LIP
PDU type	2	1	01	Long location message
PDU type extension	4	5	0101	Basic location parameters request/response
Request/response	1	0	0	Request
Acknowledgement request	1	1	1	Acknowledgement requested
Minimum reporting interval	7	1	000 0001	20 seconds
Report type	2	3	11	Short location report preferred
Terminal or location identification	variable			Not present
Direction of travel and its accuracy	variable			Not present
Horizontal position and its accuracy	variable			Not present
Horizontal velocity and its accuracy	variable			Not present
Location information destination	variable			
Type 5 element identifier	5	4	00100	Location information destination
Type 5 element length	6	28	011100	4 + 24
Address or Identification type	4	1	0001	SSI
SSI	24	786	00000000 00000011	Address of MT_A
Location altitude and its accuracy	variable			Not present
Maximum information age	7			Not present
Maximum response time	7			Not present

Start time	22			Not present
Stop time	22			Not present
Vertical velocity and its accuracy	variable			Not present

This results into the following 64-bit LIP PDU:

Binary	0000 1010 0101 0101 0000 0011 1001 0001 1100 0001 0000 0000 0000 0011 0001 0010
Hexadecimal	0A550391C1000312

Chapter 6

DATA CONNECTION

1 Introduction

This chapter will give a guideline on how to connect a PC or desktop computer, running either Windows 2000® or Windows XP®, to a terminal to enable the transfer of packet data.



NOTE

When the computer is being connected to the terminal, **the terminal must be powered off**. Powering up the terminal after connection will initiate the 'Handshake' procedure between the computer and terminal.

2 Status Message

Status messaging is a 'Point to Point' short data service terminal application that enables a user to transmit predefined status messages to either a default location such as a dispatcher, or to a targeted user (Target Status).

The status message sent is actually a number (the status message ID) that is associated with the message. The message and its ID must be preprogrammed in both the sender and receiver equipment for the transfer to work correctly.

To be able to use this feature, it must first be enabled via the CPS - see Chapter 4, Paragraph 11.2 "Status".

3 Mail Message (SMS)

Mail messaging is an application that enables the terminal to send and receive text messages.

To be able to use this feature, it must first be enabled via the CPS - see Chapter 4, Paragraph 11.9 "MS User Application Support Pre-defined Template", Paragraph 11.10 "Mail In", & Paragraph 11.11 "Mail Out".

4 Short Data Service (SDS/PEI)

The Short Data Service (SDS) and the Peripheral Equipment Interface (PEI) is another feature of the terminal's data service. Instead of using the MMI (Man Machine Interface), this uses AT commands to pass data via the terminal's RS232 port.

4.1 SDS/PEI Setup Procedure

4.1.1 Introduction

To use this service, a terminal must be connected to a standard computer via its RS232 port and the appropriate data cable/box. See Chapter 1 for the data accessories associated with the terminal type being used.



NOTE

Ensure no other application is using the computer port.

The computer may be configured to work on the company's LAN and must now be re-configured to work with the terminal on the radio network.

As the computer is normally working on the company LAN it contains security software that:

- Restricts access
- Is anti virus
- Is a fire wall

If the computer is running something like 'BlackICE', the computer will never work with the terminal. This application must be stopped for the duration that the computer is being used with the terminal. It may also be necessary to stop other applications, or change their default settings.

To stop applications follow the path:

Click on Start > Settings > Control Panel > Administrative Tools > Services.

This window displays the applications running on the computer and from which they can be stopped.

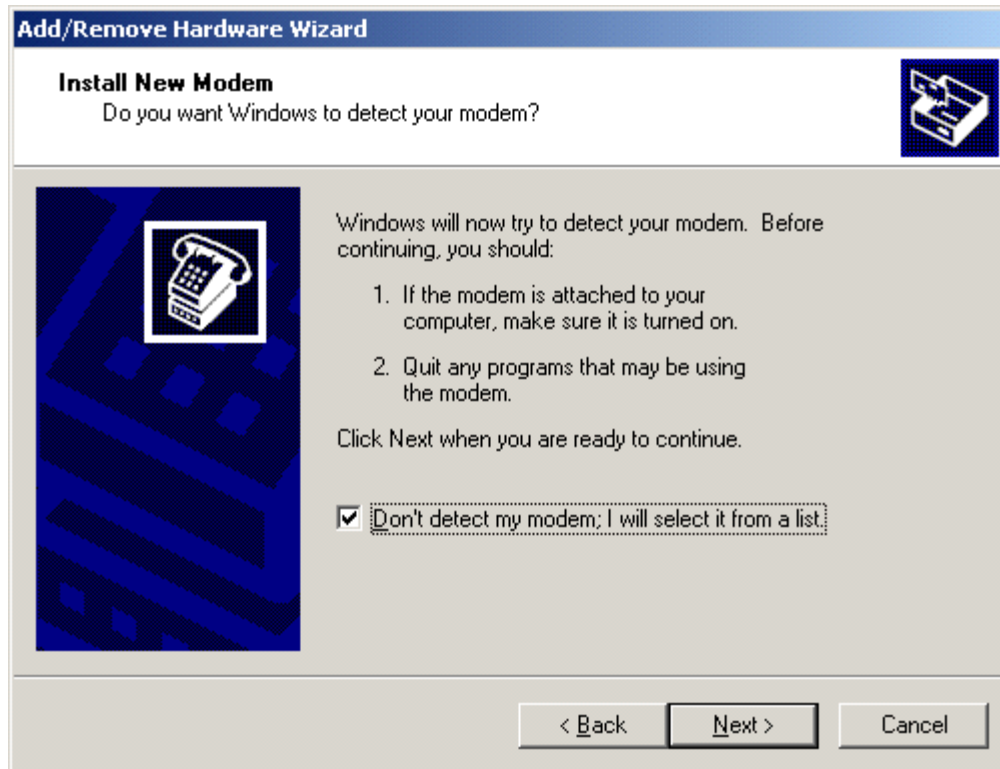
4.1.2 Setting up a new Modem (Windows XP®)

To set up the terminal for a modem connection properly:

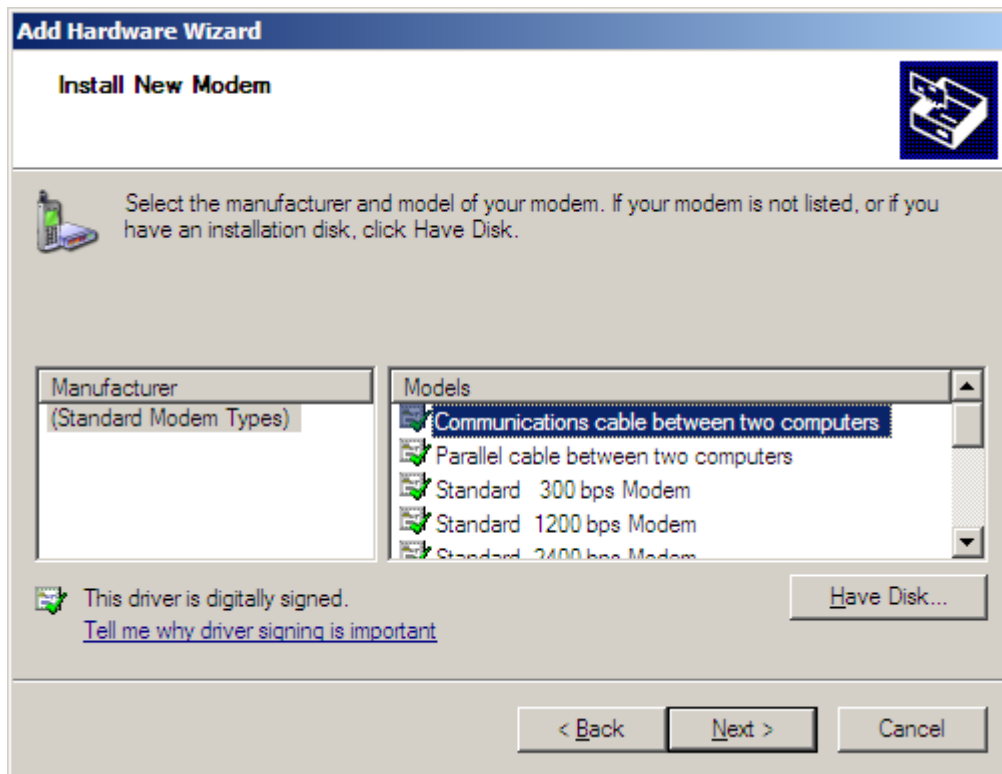
1. Connect the data cable to the terminal's data port.
2. Connect the other end of the data cable to the computer.
3. Power up the terminal
4. From the terminal's menu, select Setup > Data Setup > Voice and Data (or Data) mode option.

To configure the computer properly:

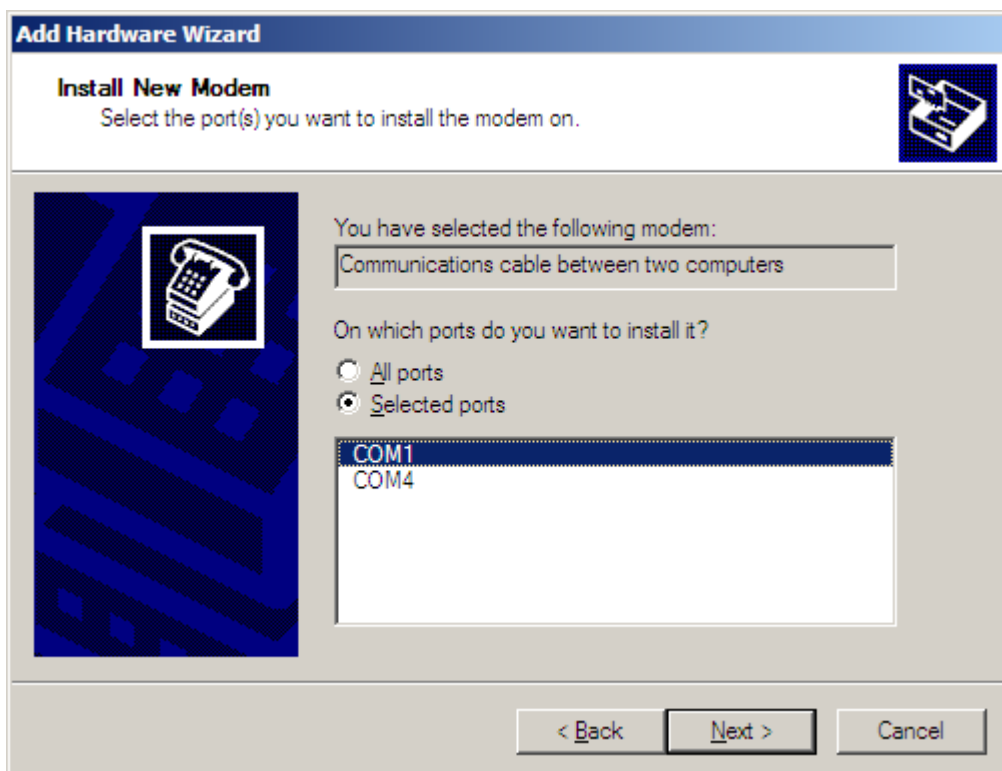
1. Click on Start > Settings > Control Panel > Phone and Modem Options
(You may be asked to enter a dialing code)
2. Select the Modems tab and click Add



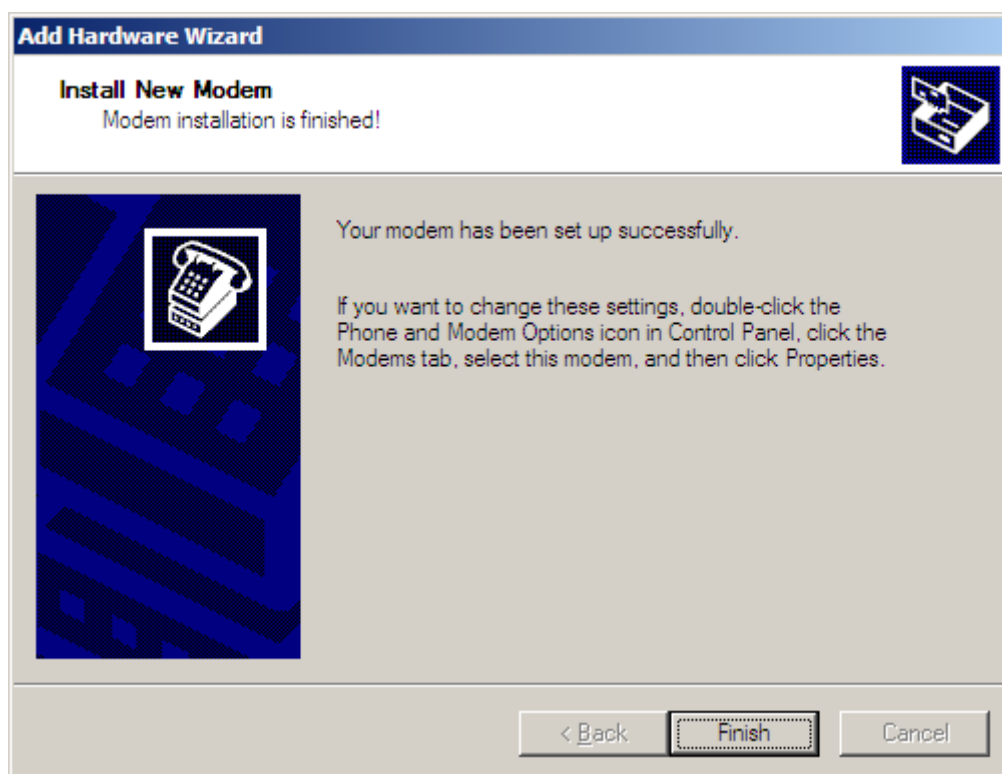
3. Check "Don't Detect Modem" and click Next.
4. Select the communication option 'Communications cable between two computers' and click Next.



5. Select the communication port to be used and click Next.

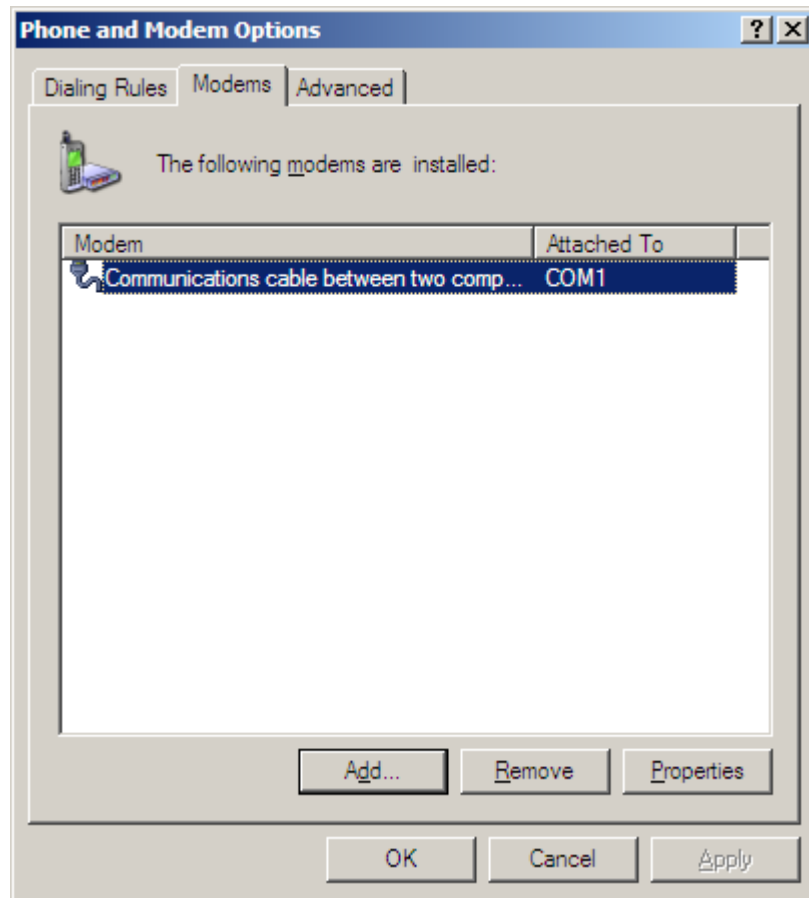


6. Click Finish.

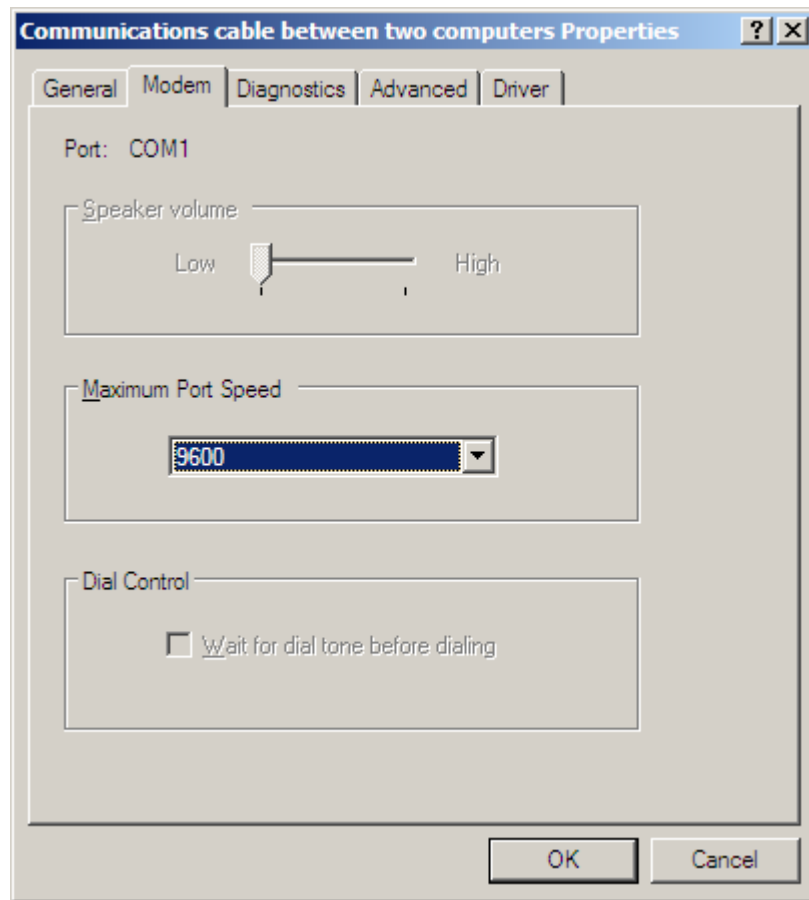


Once the installation is ready you need to set the connection properties:

1. From the Phone and Modem Options window select the new connection and click Properties.



2. In the Modem tab set the Maximum Port Speed to 9600.



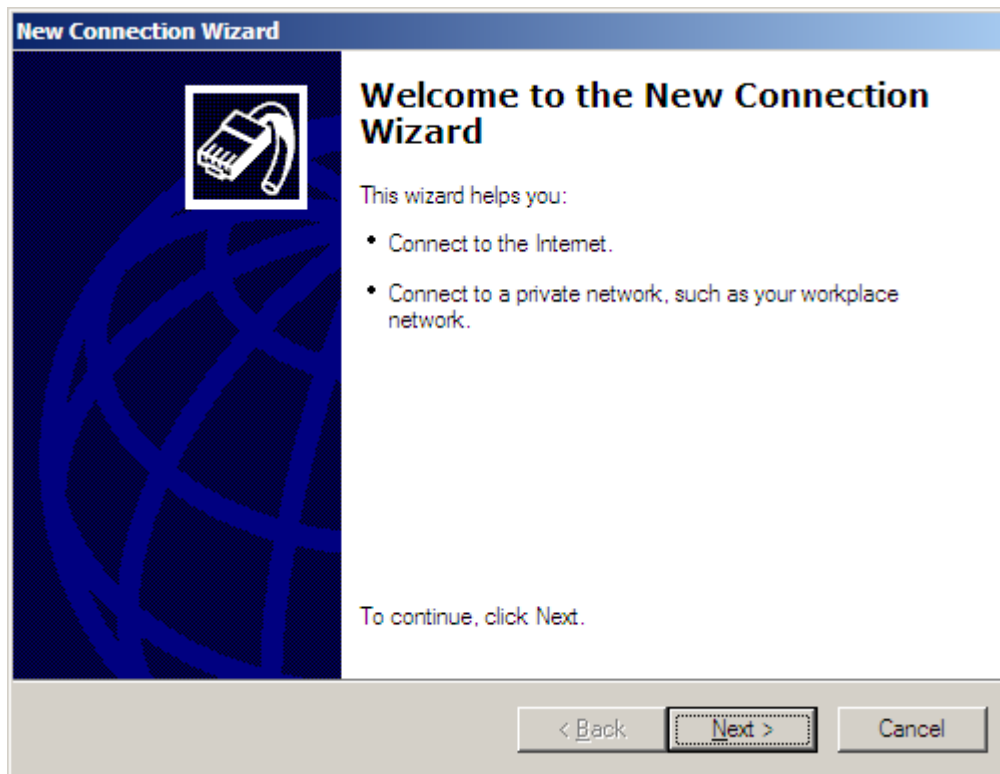
3. Click OK.

4.1.3 Setting up a new Network Connection (Windows XP®)

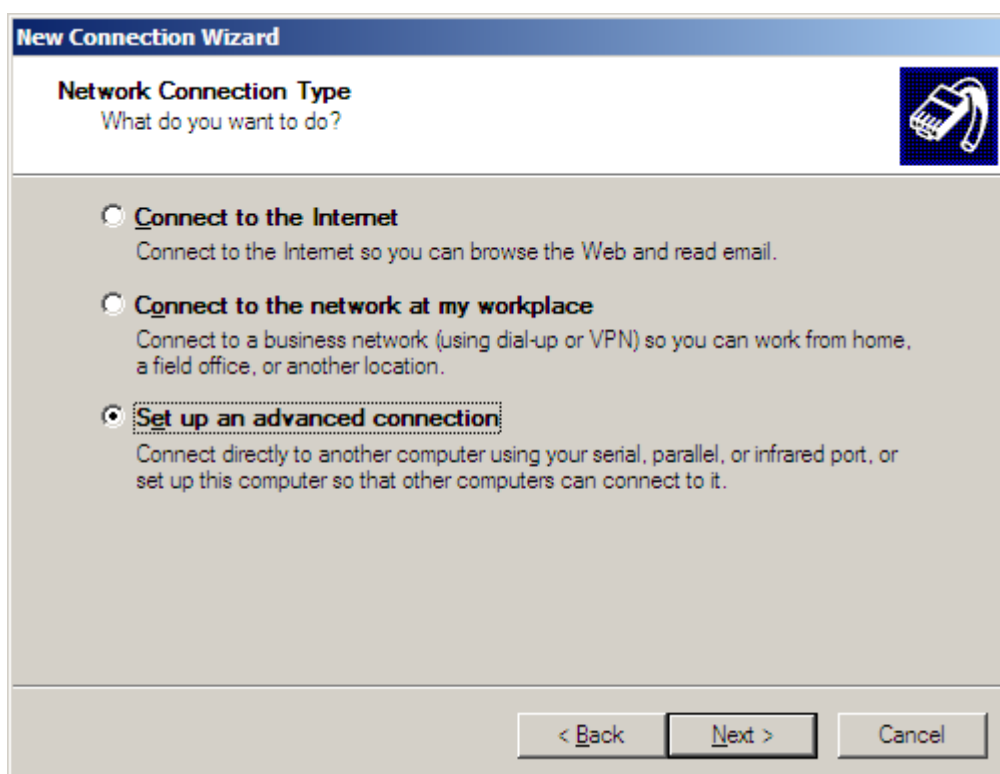
To set up the terminal for a network connection properly:

1. Select Start > Settings > Control Panel > Network Connections.

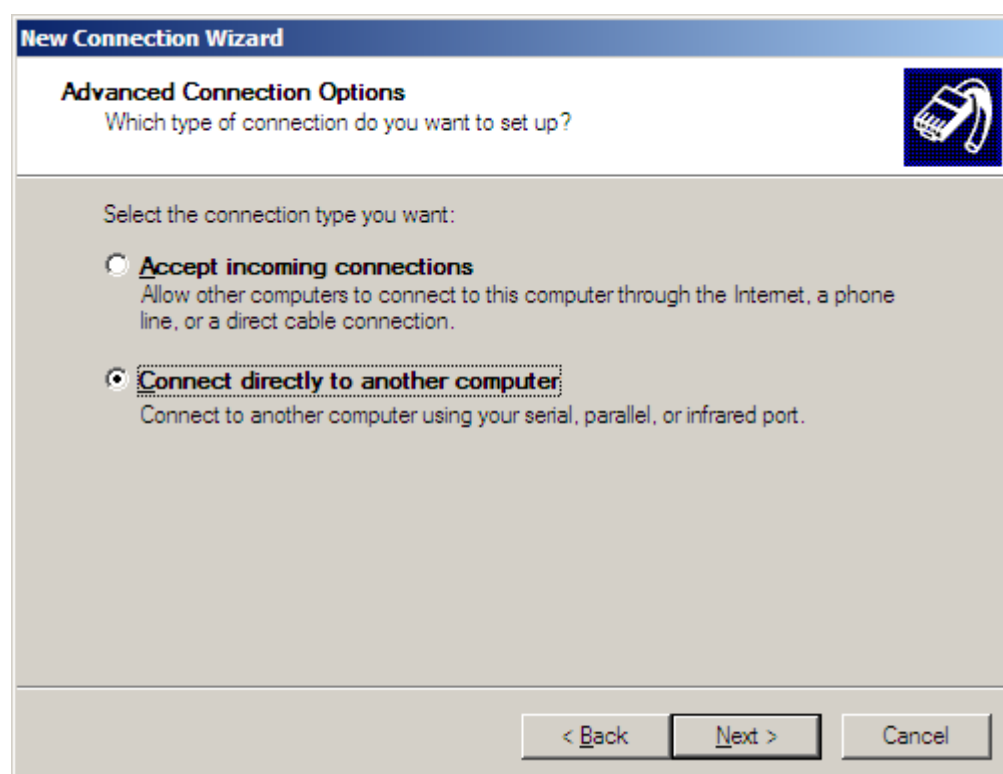
2. Click on New Connection Wizard.



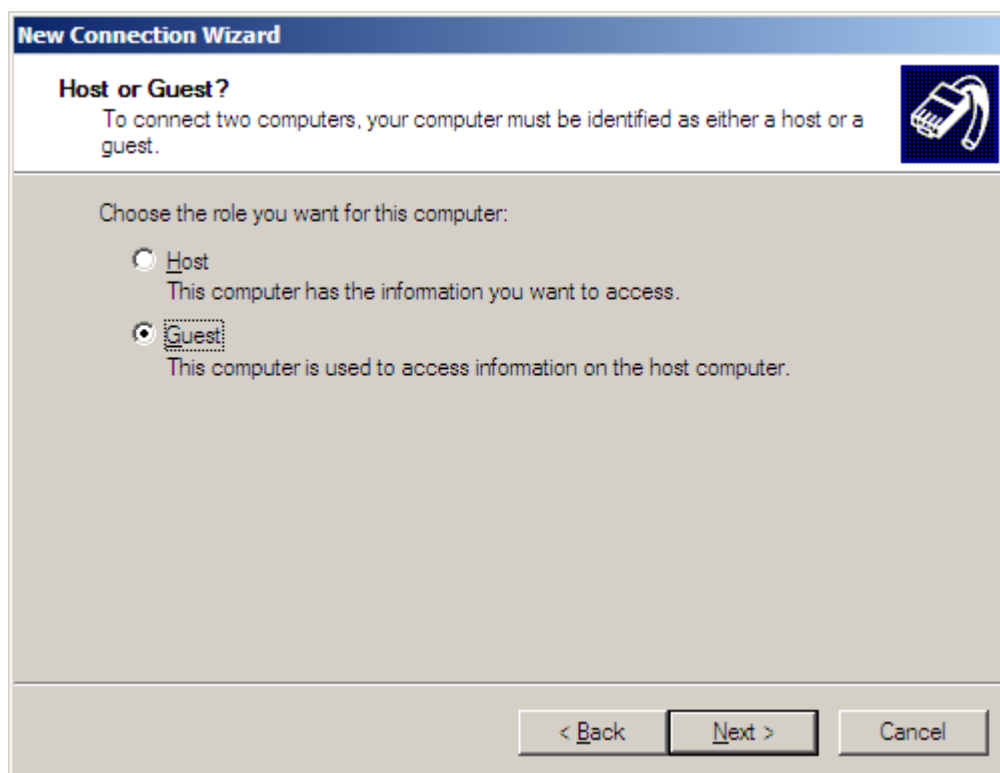
3. Click Next.
4. In the 'New Connection Wizard' window select 'Set up an advanced connection' and click Next.



5. Select 'Connect directly to another computer' and click Next.

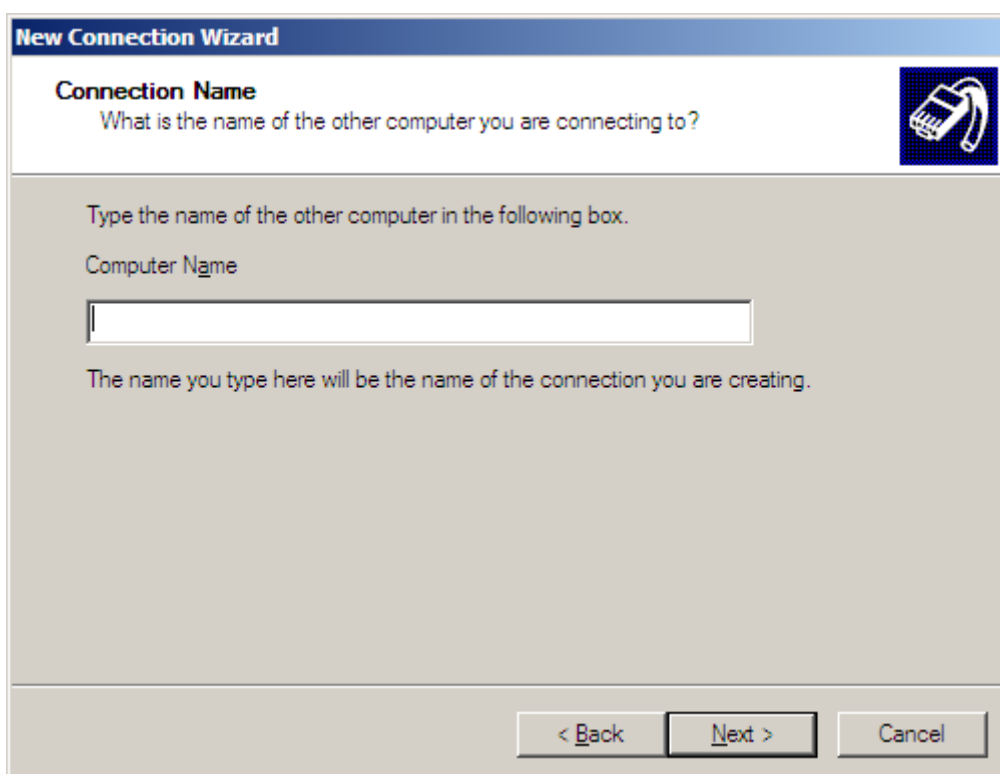


6. In the following window select 'Guest' and click Next.



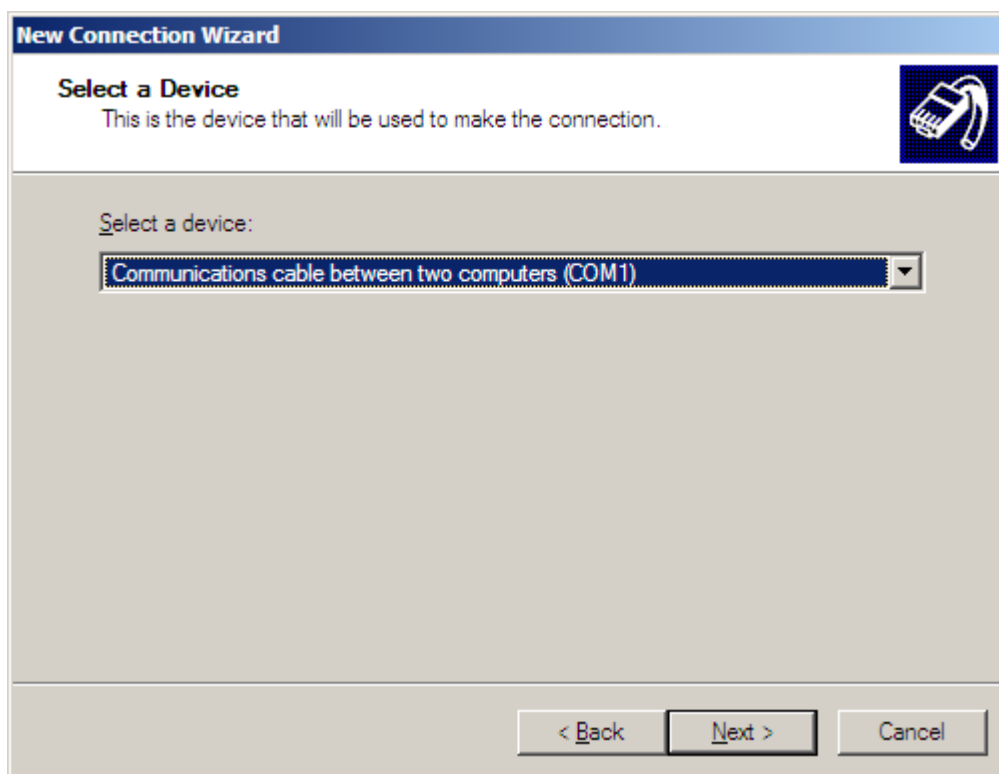
The dialog box is titled "New Connection Wizard" and has a blue header bar. Below the header, the title "Host or Guest?" is displayed in bold. A descriptive text states: "To connect two computers, your computer must be identified as either a host or a guest." To the right of this text is an icon of two computers connected by a cable. Below the text, it says "Choose the role you want for this computer:". There are two radio button options: "Host" with the description "This computer has the information you want to access." and "Guest" with the description "This computer is used to access information on the host computer." The "Guest" option is selected. At the bottom right, there are three buttons: "< Back", "Next >", and "Cancel".

7. In the Computer Name field type in 'TETRA' and click Next.

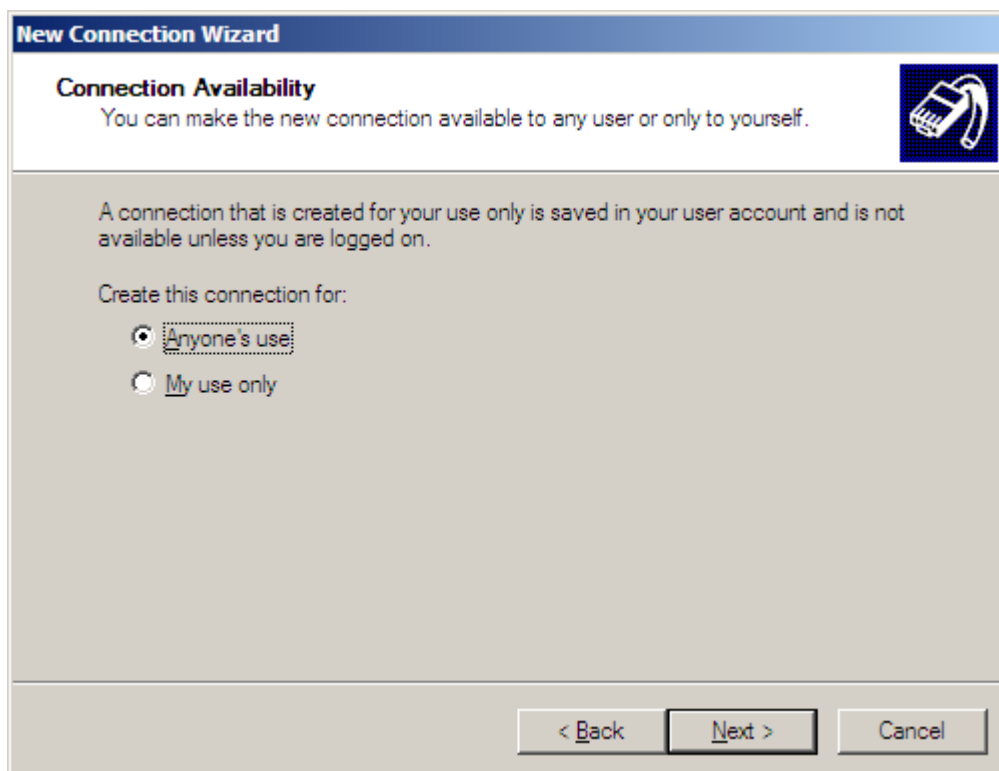


The dialog box is titled "New Connection Wizard" and has a blue header bar. Below the header, the title "Connection Name" is displayed in bold. A descriptive text states: "What is the name of the other computer you are connecting to?" To the right of this text is an icon of two computers connected by a cable. Below the text, it says "Type the name of the other computer in the following box." followed by the label "Computer Name". There is a text input field below the label. Below the input field, it says "The name you type here will be the name of the connection you are creating." At the bottom right, there are three buttons: "< Back", "Next >", and "Cancel".

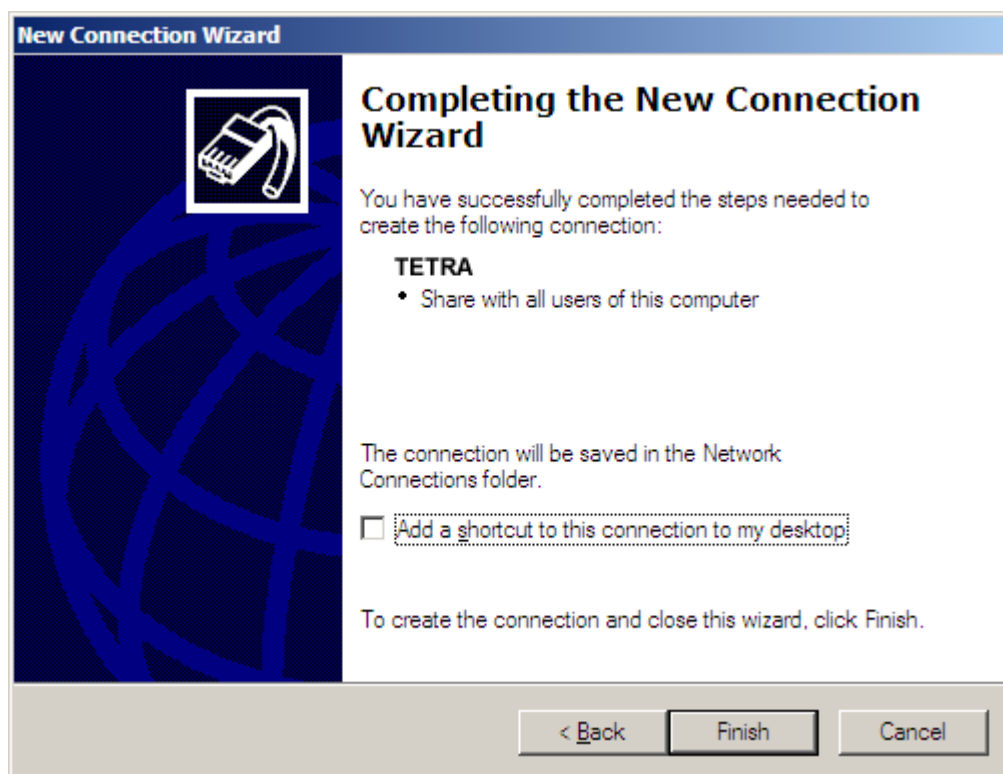
8. Select the device for communication (as illustrated) and click Next.



9. Select the appropriate option and click Next.



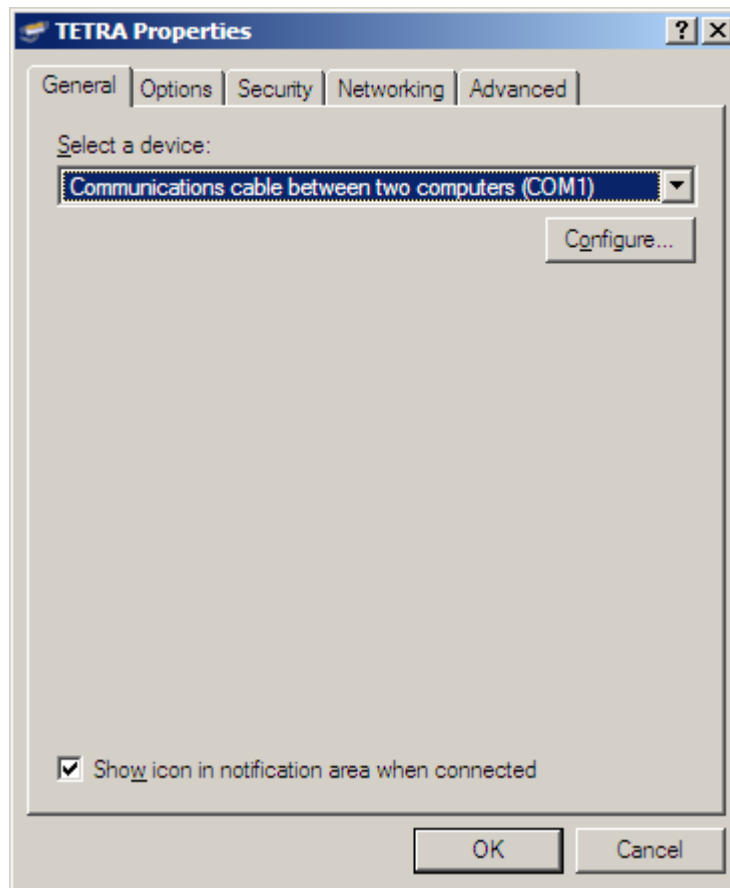
10. Click Finish to finish the configuration.



4.1.4 Dial Up Connection Settings

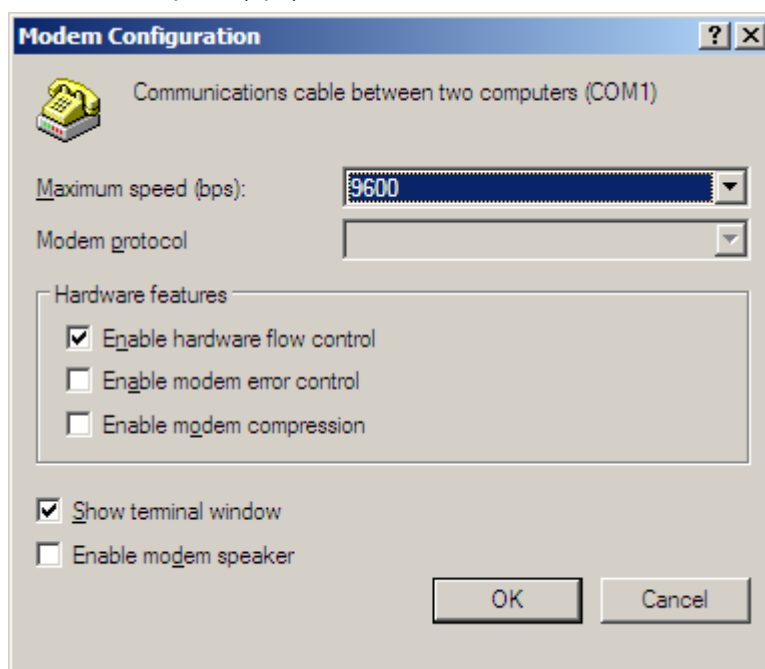
To set up the terminal for a network connection properly:

1. Select Start > Settings > Control Panel > Network Connections > TETRA.
2. Click Right Mouse Button and select Properties.



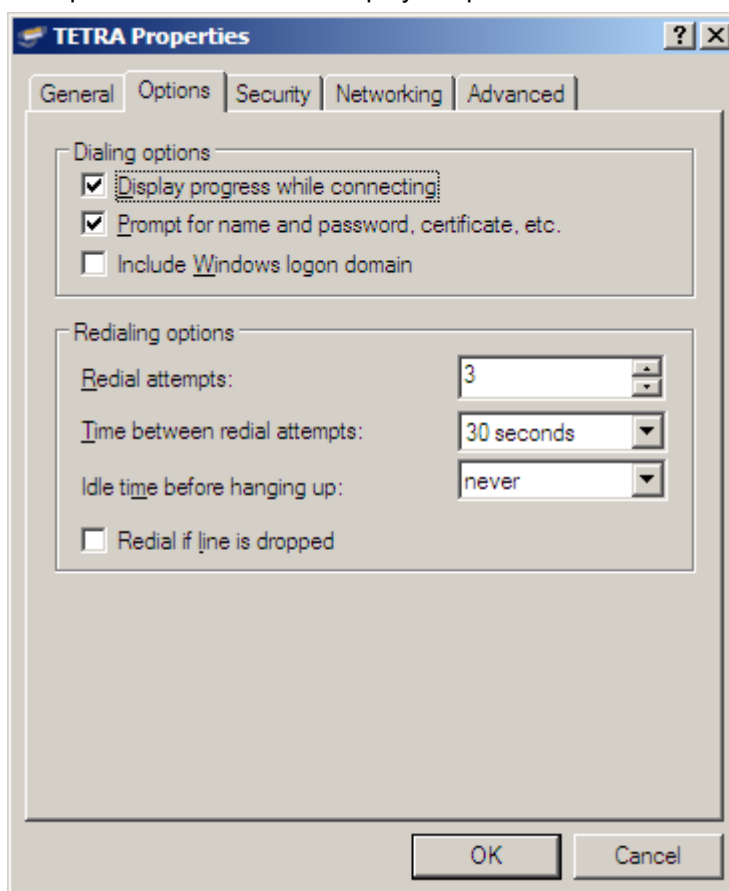
3. Click Configure.

4. Set the 'Maximum speed (bps)' to 9600.

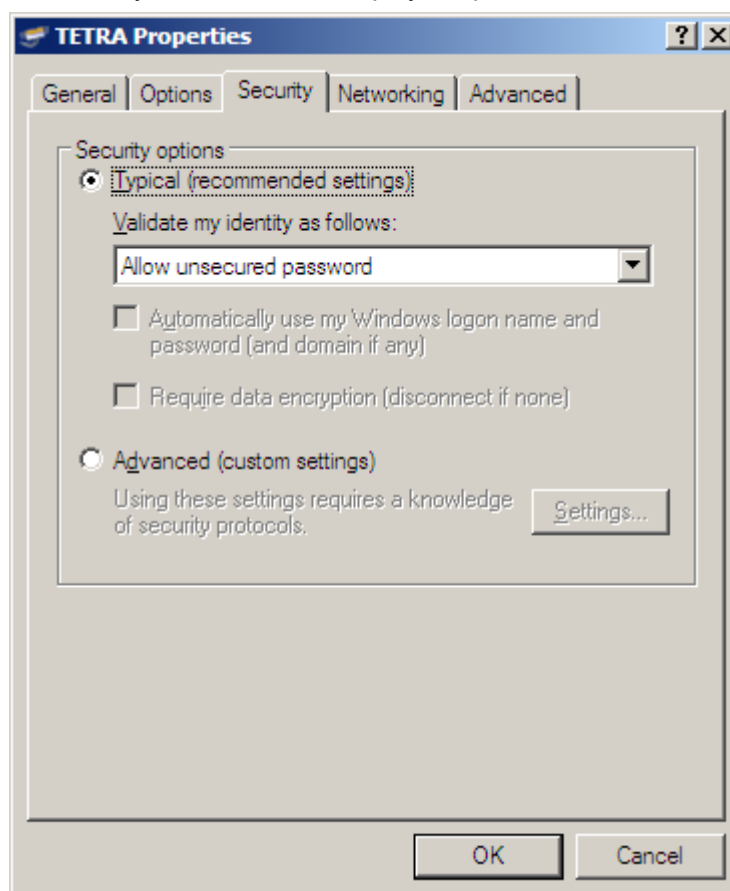


5. Select the 'Enable Hardware Flow Control' and 'Show Terminal Window' options.
6. Click OK.

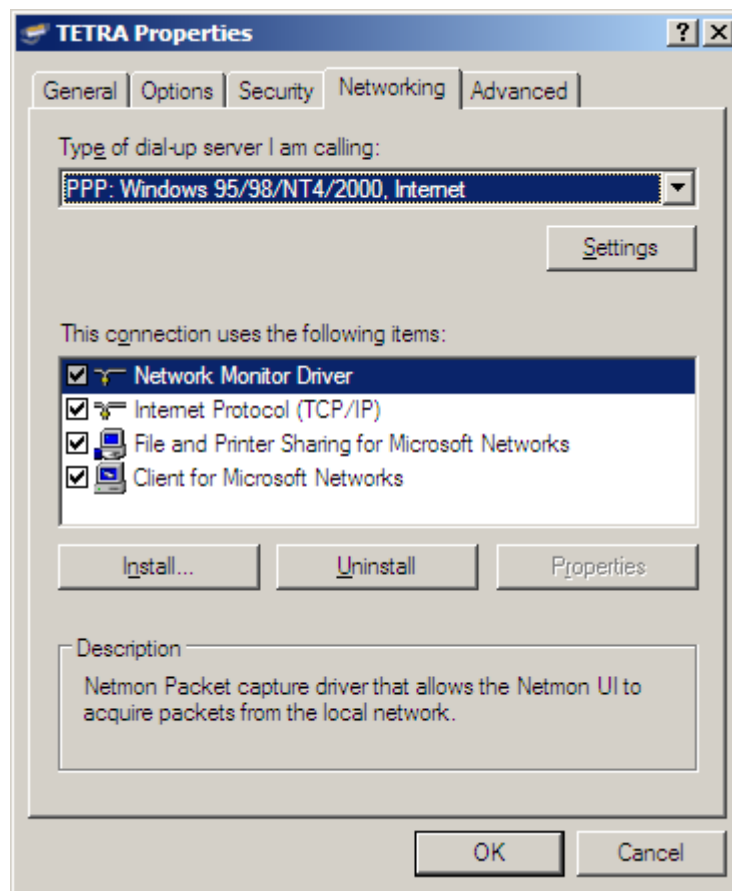
7. Select the Options tab and set the displayed options.



8. Select the Security tab and set the displayed options.

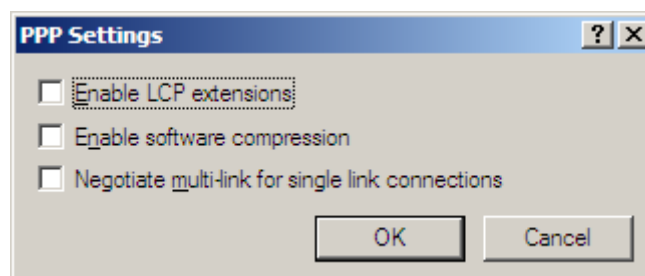


9. Select the Networking tab and set the displayed options.



Ensure PPP: Windows® 95/98/NT4/2000, Internet is displayed.

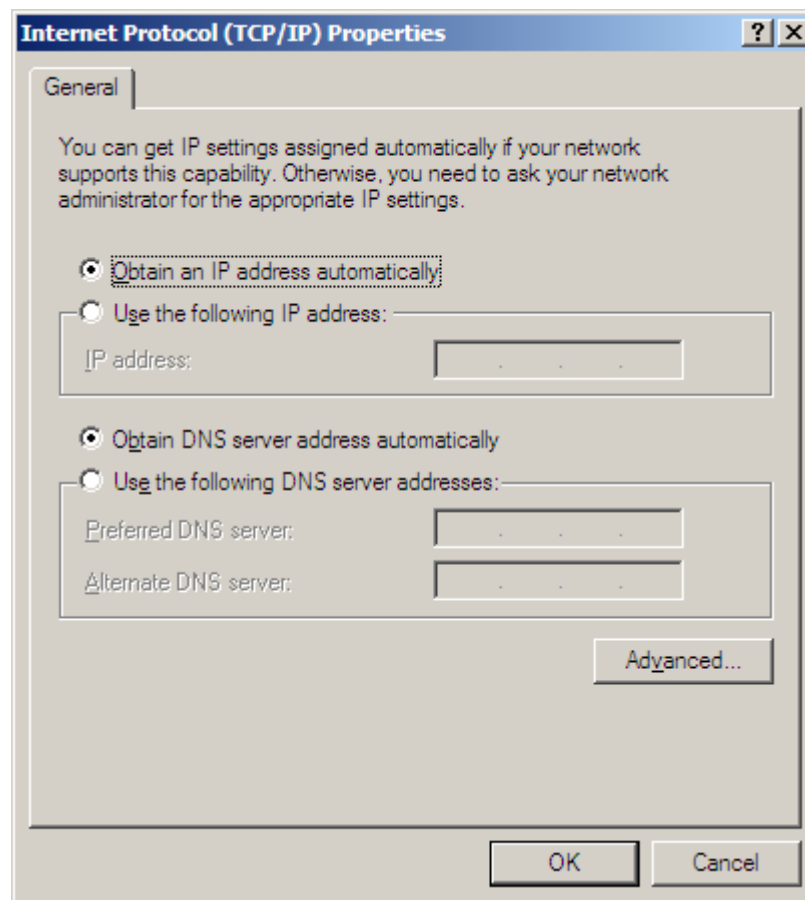
10. Click Settings and in the PPP Settings window set the displayed options.



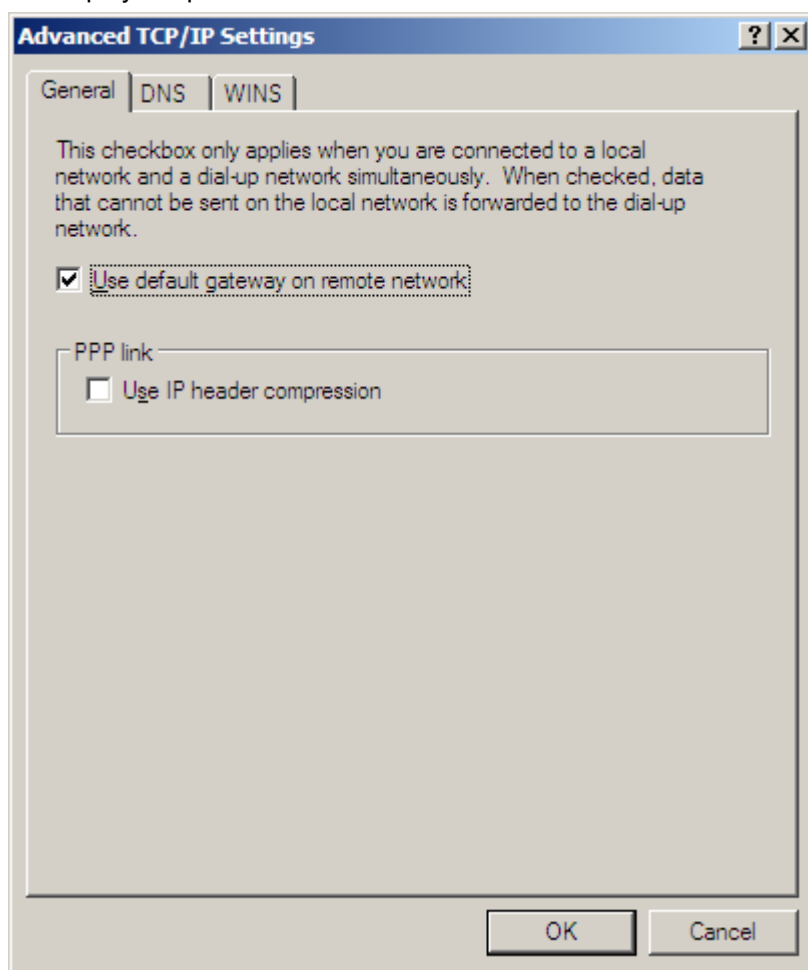
Ensure none of the PPP options are selected.

11. Click OK.
12. Select 'Internet Protocol (TCP/IP)' and click Properties.

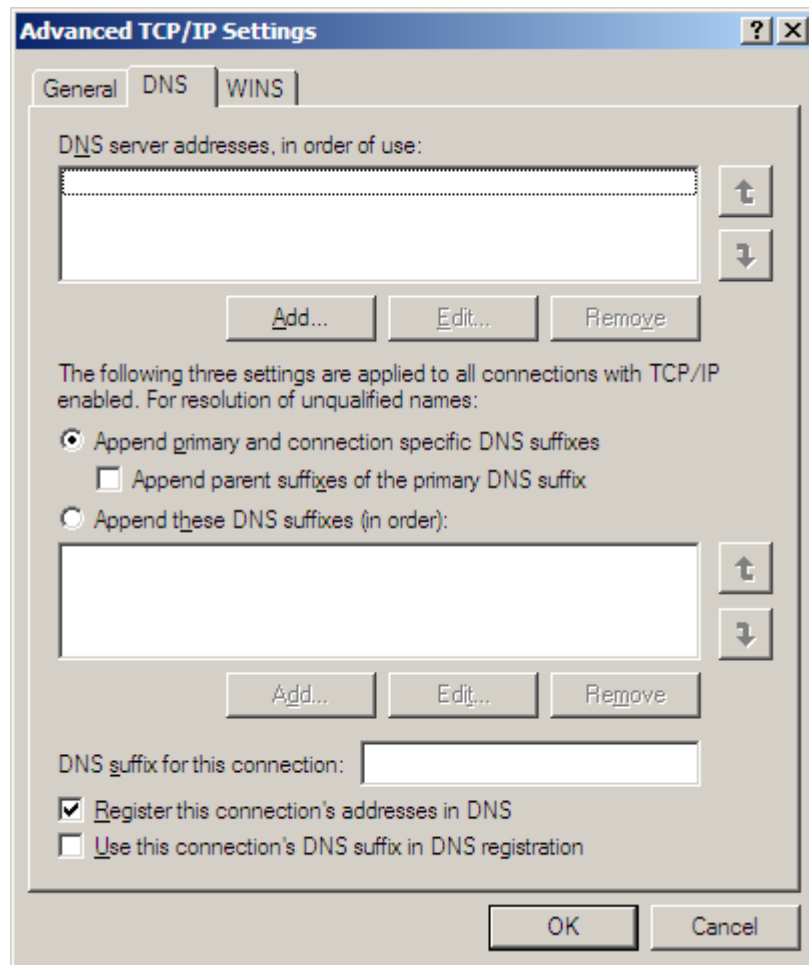
13. Set the displayed options.



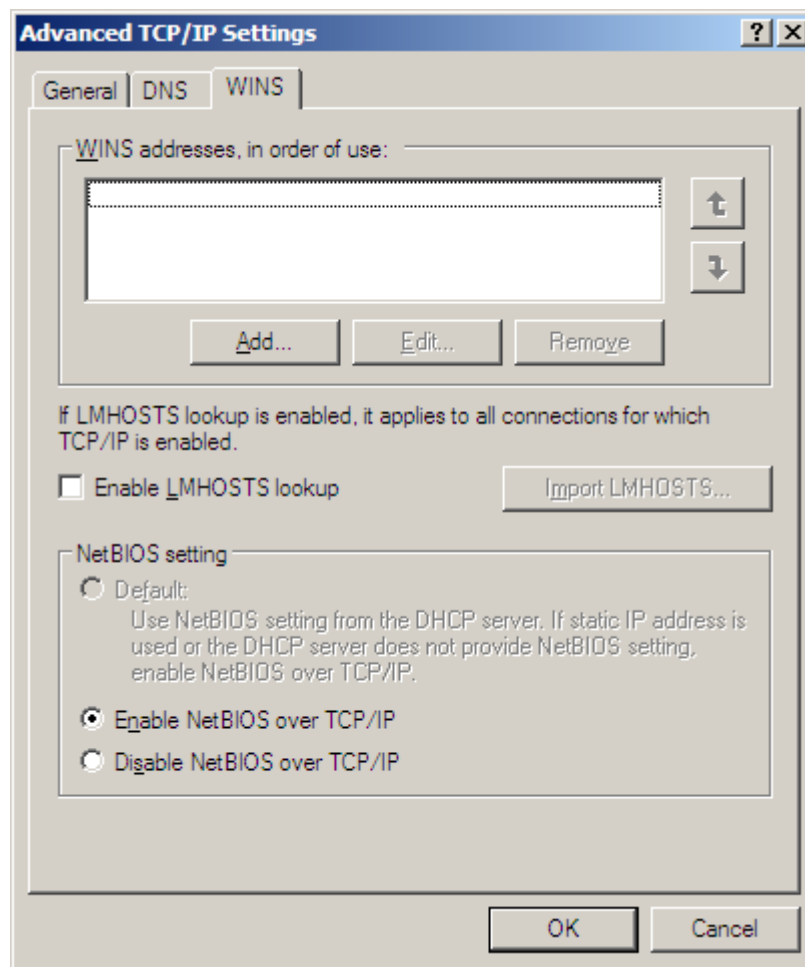
14. Click Advanced.

15. Set the displayed options

16. Select the DNS tab and set the displayed options.



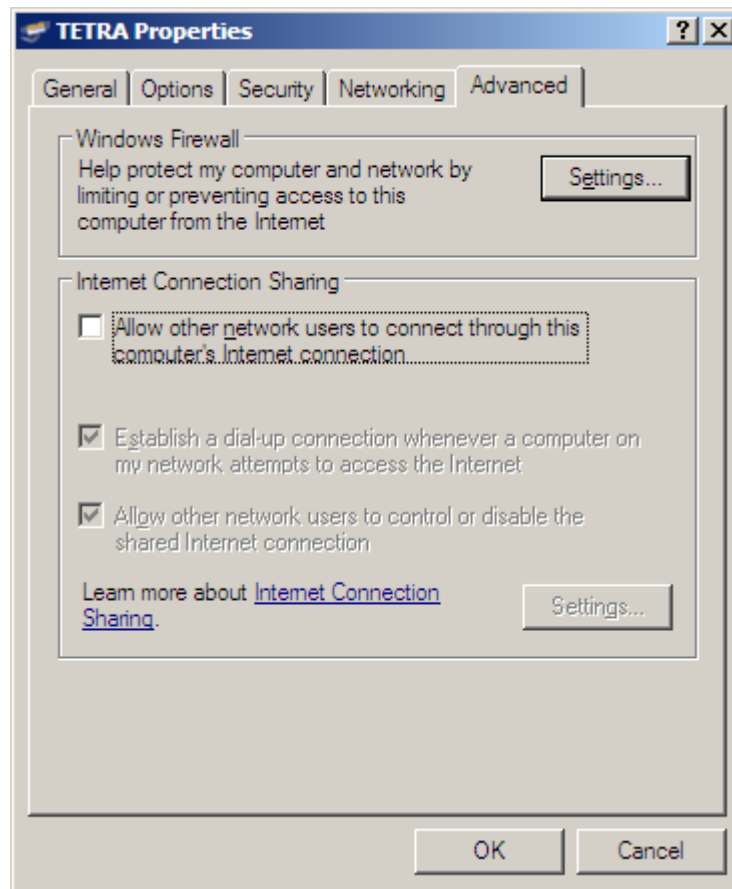
17. Select the WINS tab and set the displayed options.



Ensure nothing is selected in this window.

18. Click OK on each opened window to return to the Networking tab of the Properties window.

19. Select the WINS tab and set the displayed options.



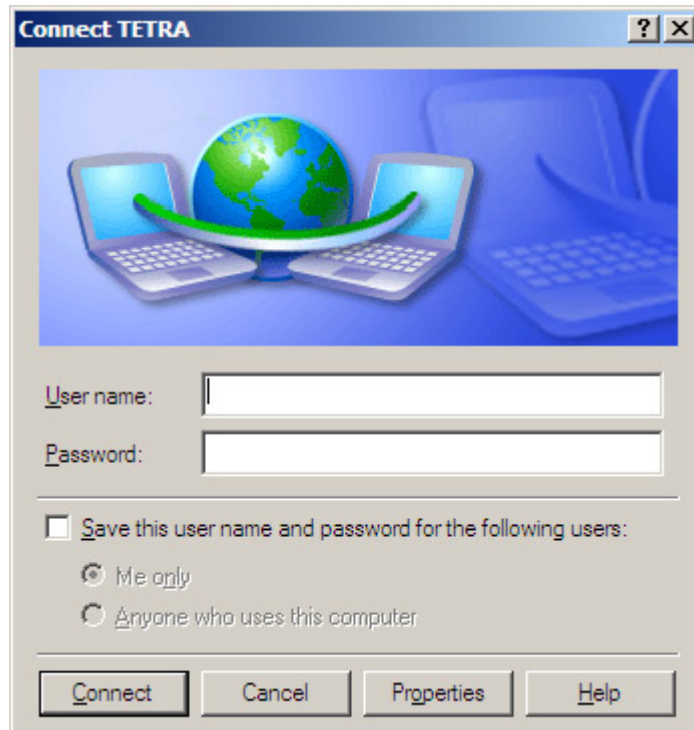
Ensure everything is deselected or greyed out in the window.

20. Click OK to finish the configuration.

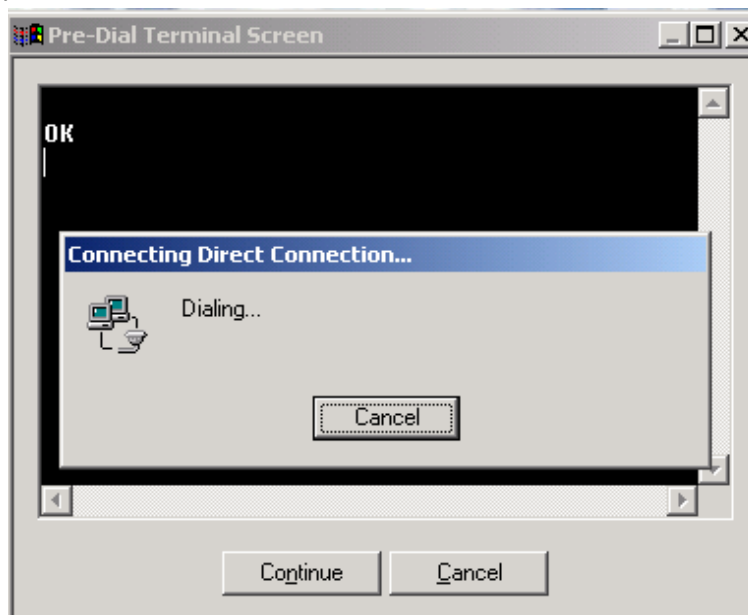
4.2 Registering on the System for Packet Data

To register on the system for Packet Data:

1. Click Start > Settings > Control Panel > Network Connections > TETRA.



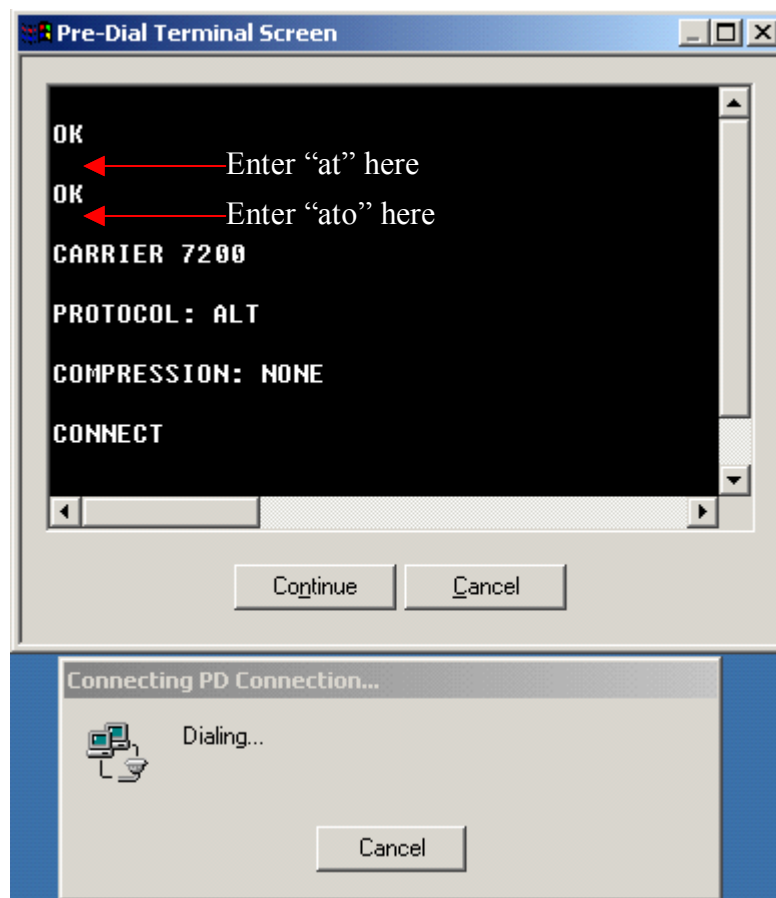
2. Click Connect.
This opens the Pre-Dial Terminal screen.



3. In the Pre-Dial Enter on receiving 'OK' status, type in the following AT commands:

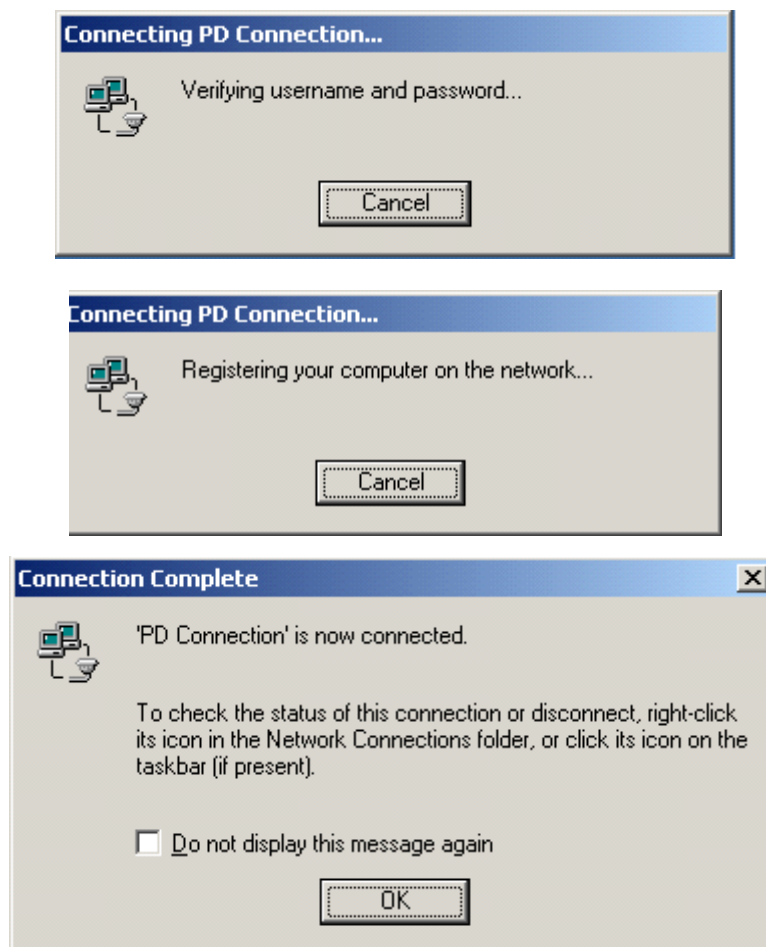
- at<press the Enter key>
- ato<press the Enter key>

The screen displays the following:



4. Click Continue.

The following message sequence should be displayed:



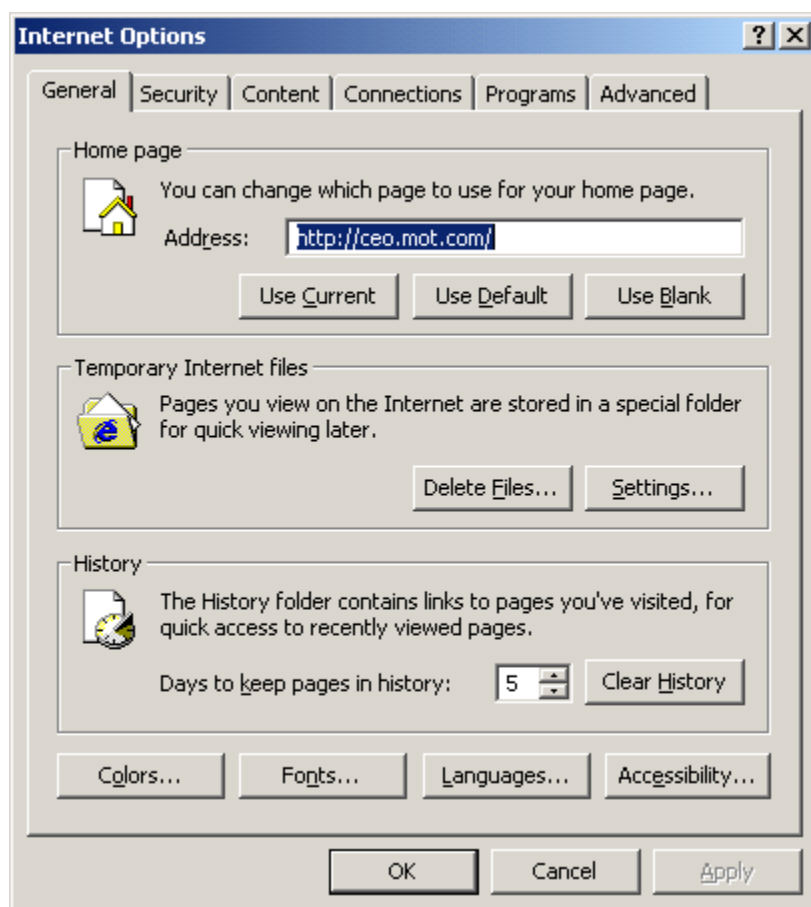
The computer to terminal connection is now working and the system and packet data can now be transmitted and received.

4.2.1 FTP Server

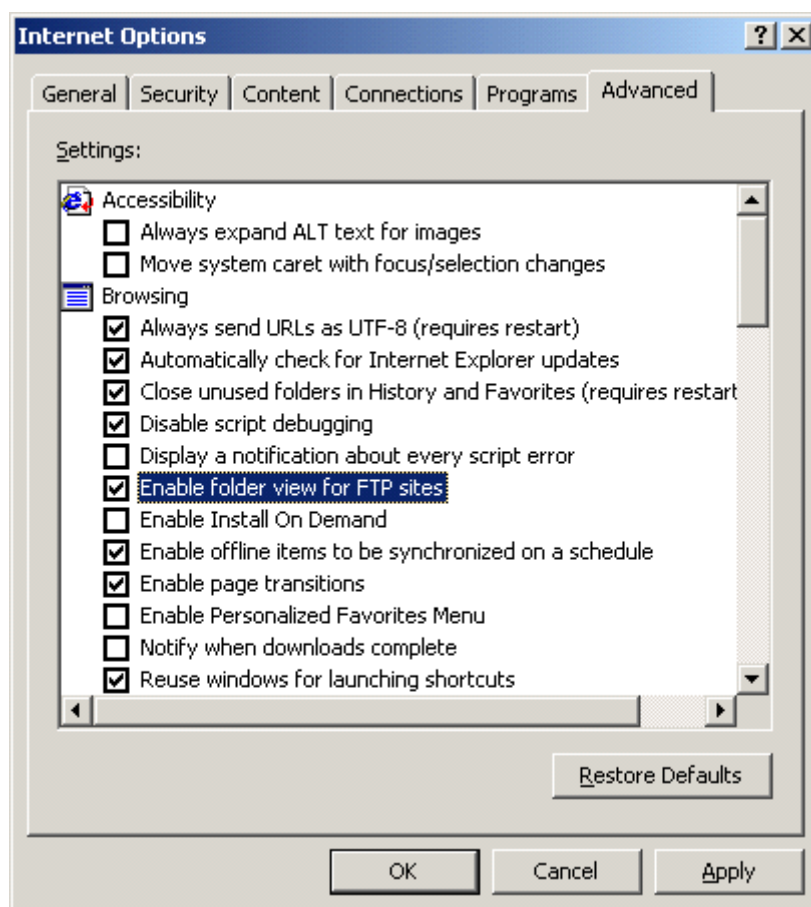
Due to issues with running FTP from Windows®, it is recommended to use the Internet Explorer® FTP option when transferring files greater than 10K.

1. Run the Internet Explorer.

2. From the Tools menu click Internet Options.

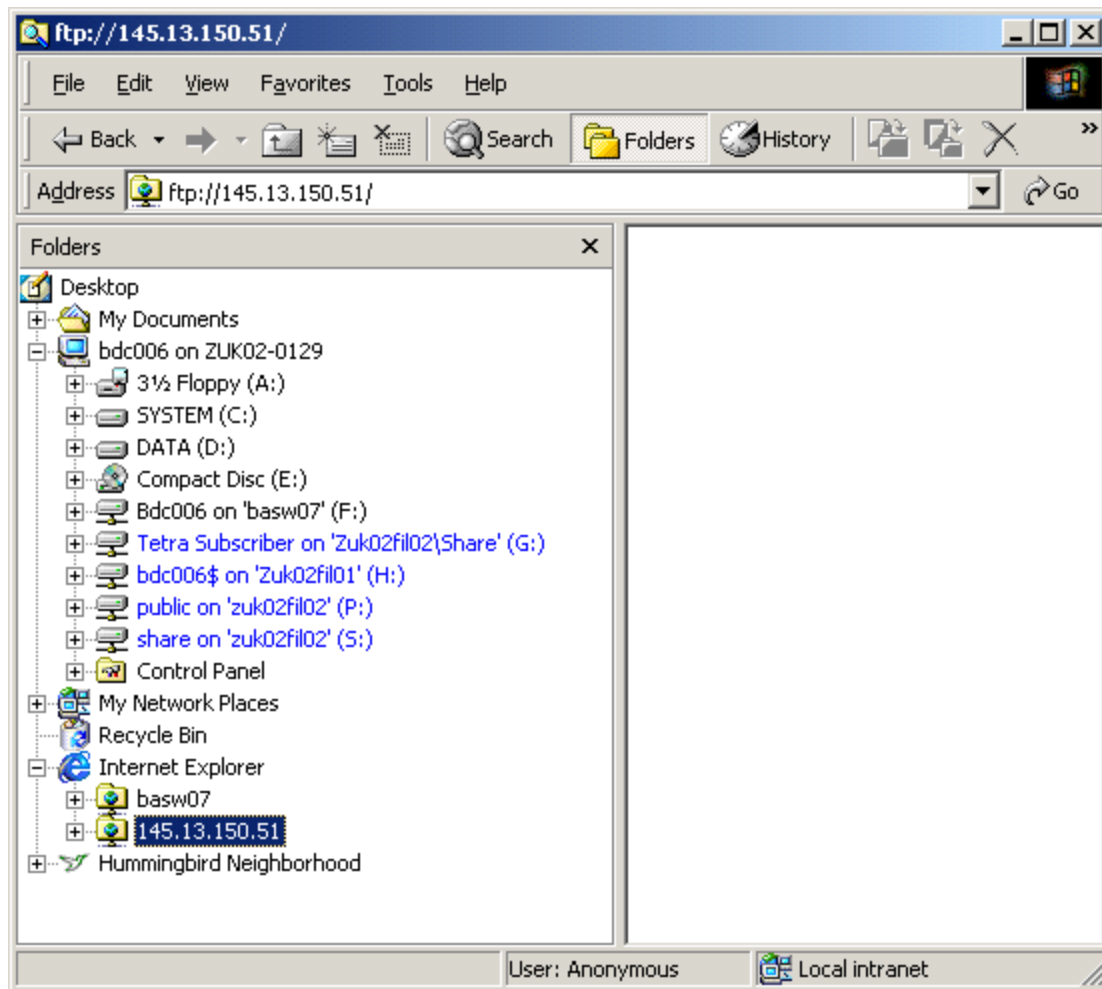


3. Select the Advanced tab.



4. Ensure the 'Enable folder view for FTP sites' is selected and click OK.
5. Close the Internet Explorer.
6. Run Windows Explorer.

7. In the 'Address' box, type in the IP of the terminal connected to the computer.



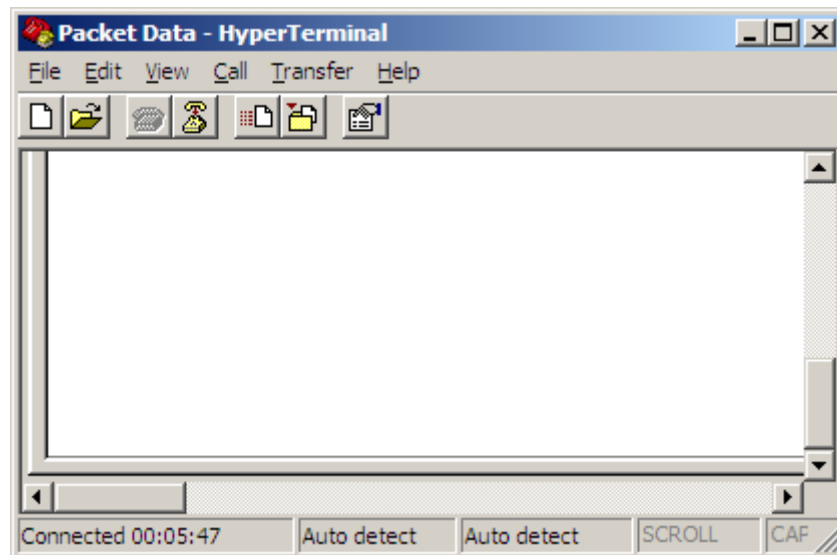
Now files can be transferred.

5 Hyper Terminal

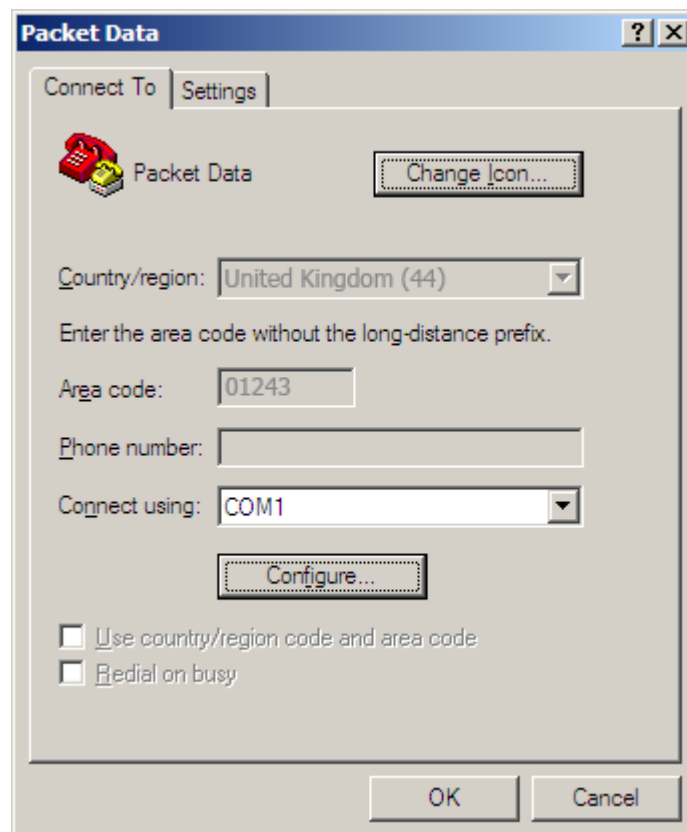
It is also possible to use the 'Hyper Terminal' feature of the computer.

To run Hyper Terminal once the terminal and computer have been connected:

1. Start ->Programs ->Accessories ->Communications ->Hyper Terminal.

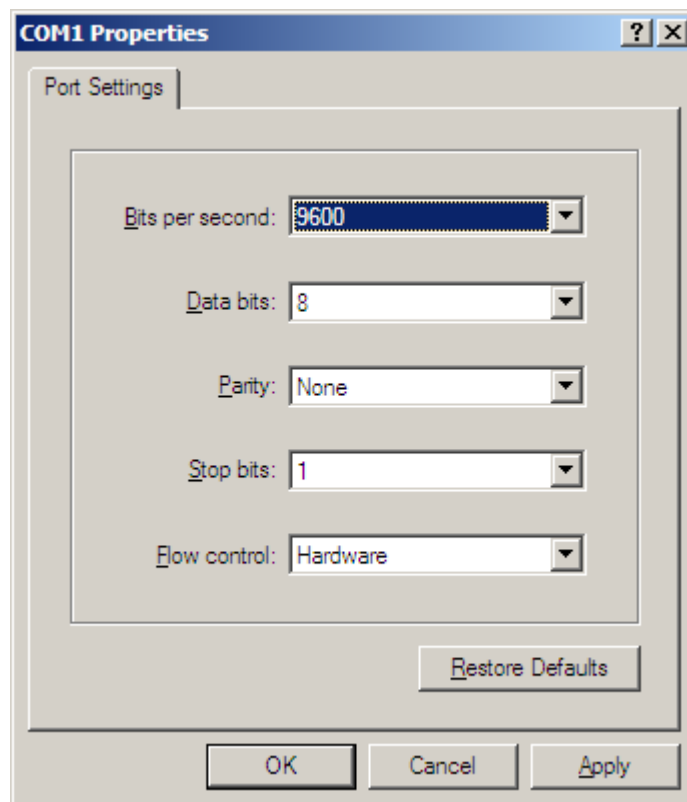


2. From the File menu click Properties.
This displays the Packet Data Properties screen.



3. Uncheck any selected options.

4. Select the required COM port from the 'Connect using' drop down list.
5. Click Configure and in the Properties window set the displayed options.



Now you can use AT commands via the Hyper Terminal.

Appendix A

USB DRIVER INSTALLATION

1 Introduction

This chapter will give a guideline on how to install USB driver for MTM5400 and MTM800 FuG Data box on a PC or desktop computer, running Windows 2000®, Windows XP®, Windows Vista®, and Windows 7® (32-bit Professional editions).

2 Driver Installation

To install the driver:

1. Insert the installation CD with the USB driver to the optical disc drive of your PC.
2. Connect your terminal to the PC USB port using the respective cable.



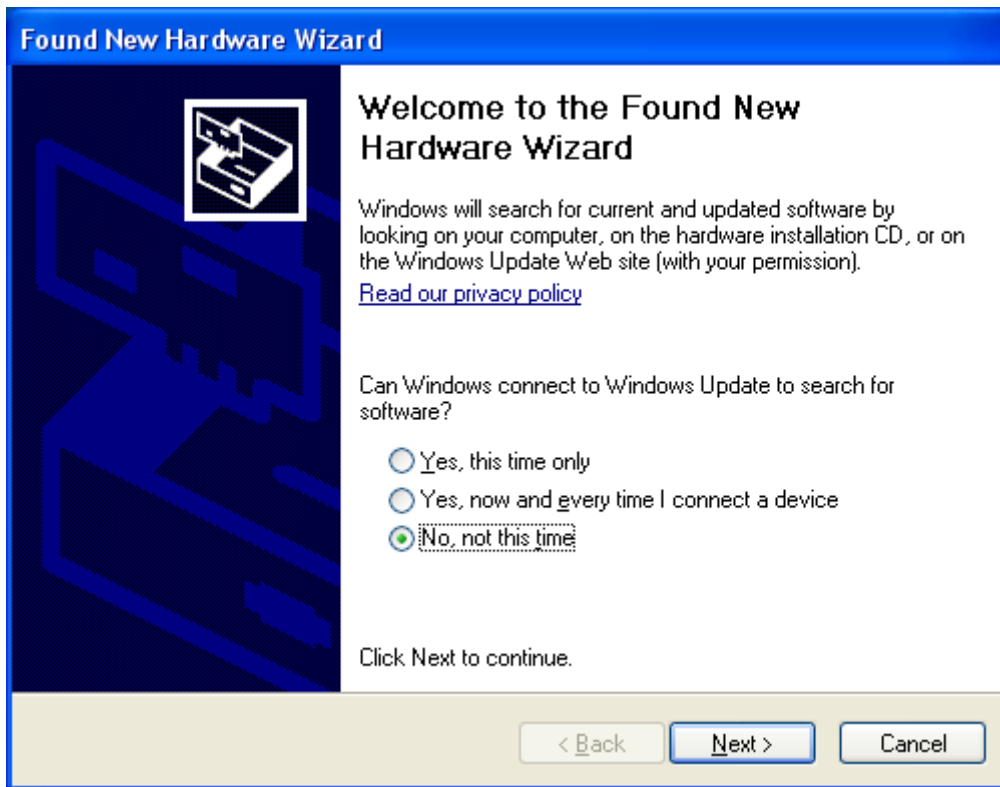
NOTE

For details see TETRA Terminals CPS Start-up User Guide (Motorola Part Number: 6802974C10).

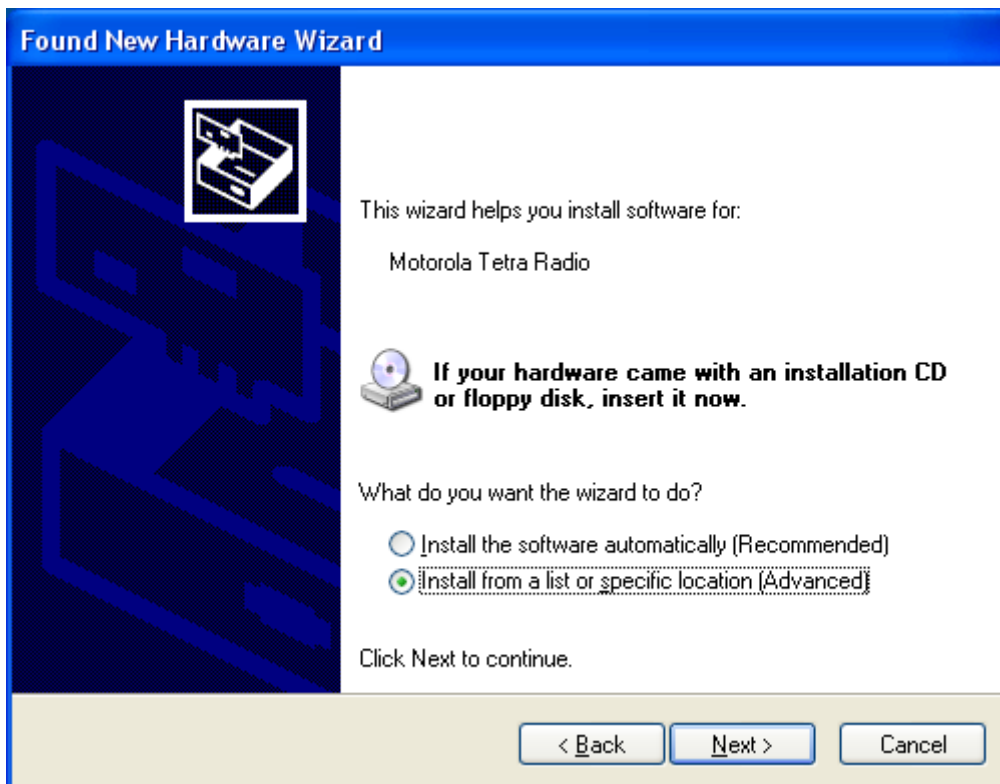
The following pop-up appears and then the Found New Hardware Wizard starts.



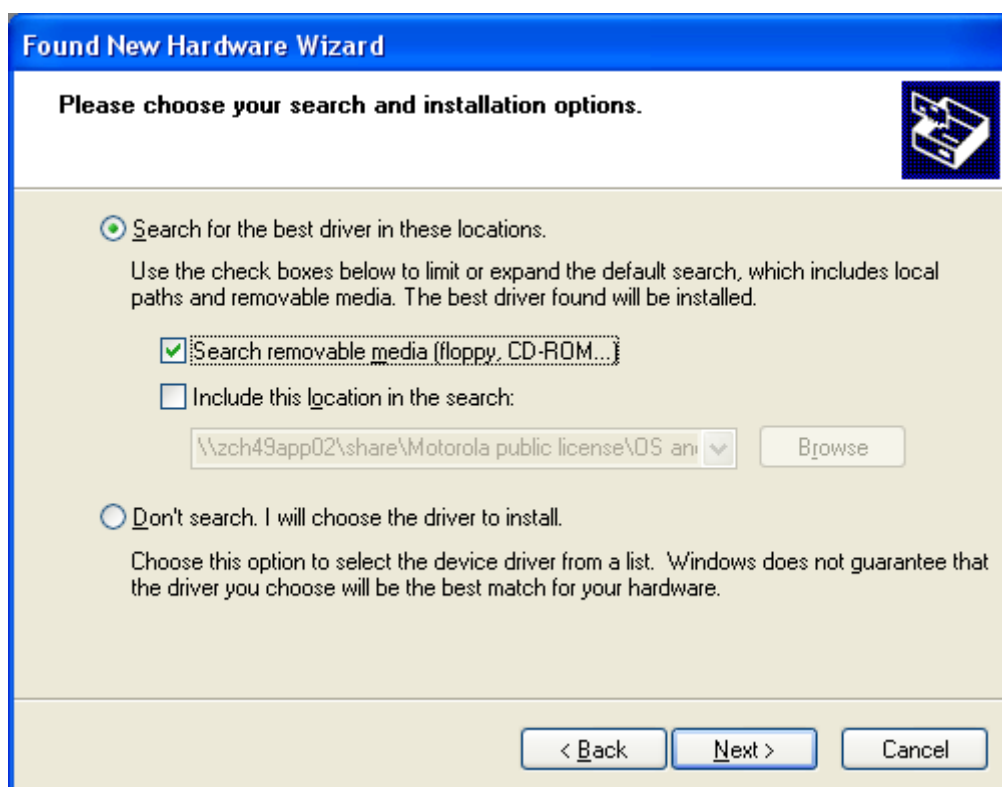
3. In the Found New Hardware Wizard window, select **No, not this time** and click **Next**.



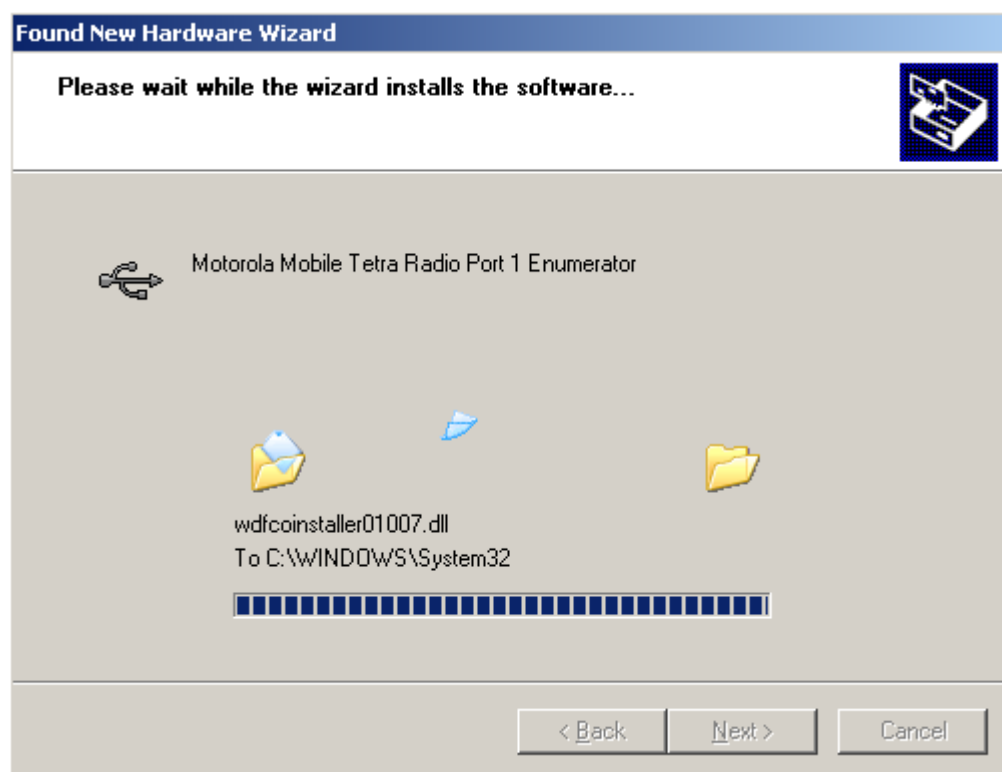
4. Select **Install from a list or specific location (Advanced)** and click **Next**.



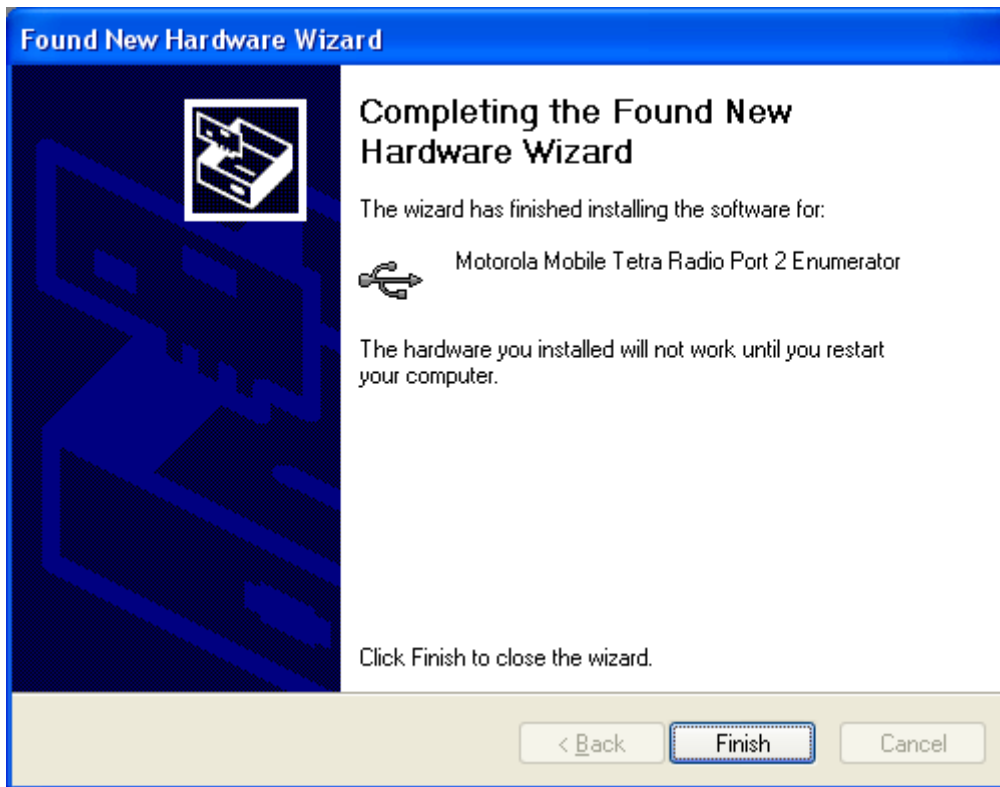
5. Select **Search for the best driver in these locations**, tick **Search removable media (floppy, CD-ROM,...)**, and click **Next**.



The installation starts.



6. Once the driver is installed, click **Finish**.



7. The operating system may prompt to reboot. Follow the system prompt.

Appendix B

ACRONYMS

AES	Advanced Encryption Standard
AGC	Automatic Gain Control
AL	Ambience Listening
ASSI	Alias Short Subscriber Identity
AT	ATtention; this two-character abbreviation is always used to start a command line to be sent from DTE to terminal
Atg	Announcement Talkgroup
BTS	Base Transceiver System
CCK	Common Cipher Keys
CHAP	Challenge-Handshake Authentication Protocol
CLIP	Calling Line Identification Presentation
CLIR	Calling/connected Line Identification Restriction
CMG	Crypto Management Group
CP	Codeplug; Motorola MS non-volatile memory used for configuration
CPS	Customer Programming Software (terminal Provisioning tool)
DCK	Derived Cipher Key
DGNA	Dynamic Group Number Assignment
DMO	Direct Mode Operation
DTE	Data Terminal Equipment (External device attached to terminal)
E2EE	End-to-End Encryption
ESN	External Subscriber Number
GCK	Group Cipher Keys
GCKN	GCK Number
GCVK-VN	GCK Version Number
GSM	Global System for Mobile communications
GSSI	Group Short Subscriber Identity
GTSI	Group TETRA Subscriber Identity
GPS	Global Positioning System
ICMP	Internet Control Message Protocol

IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISDN	Integrated Services Digital Network
ISSI	Individual Short Subscriber Identity
ITSI	Individual TETRA Subscriber Identity
IMSI	International Mobile Subscriber Identity
LIP	Location Information Protocol (ETSI standard)
LMN	Land Mobile Network
LRRP	Location Request Response Protocol (non ETSI standard)
MCC	Mobile Country Code
MM	Mobility Management
MMI	Man Machine Interface
MNC	Mobile Network Code
MNI	Mobile Network Identity
MO	Mobile Originated calls
MS	Mobile Station
MSPD	Multi Slot Packet Data
MT	Mobile Terminal
MT2	Mobile Termination Type 2 (Providing TETRA stack)
MTU	Maximum Transmit Unit
OPTA	Operational Tactical Address
PABX	Private Automatic Branch eXchange
PAP	Password Authentication Protocol
PD	Packet Data
PDP	Packet Data Protocol
PDCH	Packet Data Channel
PDU	Protocol Data Unit
PEI	Peripheral Equipment Interface
PHF	Personal Hands Free
PPC	Pre-Emptive Priority Call
PPP	Point to Point Protocol
PSTN	Public Switched Telephone Network
PTT	Push-To-Talk

PUK	PIN Unblocking Key
RF SA	Radio Frequency Sensitive Area
RFC	Request For Comment (Internet 'standard')
RSM	Remote Speaker Microphone
SCK	Static Cipher Key
SCKN	SCK Number
SCVK-VN	SCK Version Number
SDMO	Secure DMO
SDS	Short Data Service (this includes SDS-Status, and SDS user-defined-data 1,2,3 and 4)
SDTS	Short Data Transport Service
SFD	Service and Feature Description
SIM	Subscriber Identity Module
SMS	Short Message Service
SNDCP	Sub-Network Dependent Protocol
SS	Supplementary Service
SwMI	Switching and Management Infrastructure
TDMA	Time Division Multiple Access
TE2	Terminal Equipment Type 2 (Connected via serial link to MT2)
TEA	TETRA Encryption Algorithm
TEDS	TETRA Enhanced Data Service
TEI	TETRA Equipment Identity
TETRA	TErrestrial TRunked RAdio
TIP	TETRA Interoperability Profile (an agreement between TETRA manufacturers that specifies TETRA signaling options to be used)
TNP1	TETRA Network Protocol 1, terminal control protocol on the PEI
TX	Transmission
TXI	Transmit Inhibit
UDP	User Datagram Protocol
URT	Usage Restriction Type
USSI	Un-exchanged Short Subscriber Identity
(V)ASSI	(Visitor) Alias Short Subscriber Alias Identity
GSSI	Group Short Subscriber Identity
VGSSI	Visitor GSSI

