

PDR8000[®] Portable Digital Repeater Connectivity Deployment Application Note

MAY 2024

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MN010433A01-AA

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Document History

Version	Description	Date
MN010433A01-AA	Initial converted edition.	May 2024

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About This Manual

This manual provides deployment guidelines for the Portable Digital Repeater PDR8000®.

For details on the APX series Mobile Radios operation, refer to the applicable Manuals available from Motorola Solutions Learning eXperience Portal (LXP) [website](#).

Notations Used in This Manual

This guide is designed to give you more visual cues.

The following graphic icons are used throughout the user guide.



DANGER: The signal word DANGER with the associated safety icon implies information that, if disregarded, will result in death or serious injury.



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 without the associated safety icon implies potential damage to non-MSI equipment, software or data, or injury that is not related to the MSI product.



IMPORTANT: IMPORTANT statements contain information that is crucial to the discussion at hand, but is not a CAUTION or WARNING. There is no warning level associated with the IMPORTANT statement.



NOTE: NOTE contains 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 is not part of the current procedure, for instance), or tell the reader where something is on the screen. There is no warning level associated with a notice.



TIP: TIP contains information that provides the reader a different or quicker method in accomplishing the same task. At times, they also give the reader the best way to proceed or handle the task.

The following special notations highlight certain information:

Table 1: Special Notations

Example	Description
Menu key or PTT button	Bold words indicate a name of a key, button, soft menu item, or programming menu item.
<i>Ordering Guide</i>	Italic word indicates title of a bibliographic resource.
Powering Off	Typewriter words indicate the Human Machine Interface (HMI) strings or messages displayed on your display.
File → Templates (DPD Files) → Load DPD Template	Bold words with the arrow between indicate the navigation structure in the menu items.

Chapter 1

Introduction

Agencies with personnel in the field requiring two-way digital radio (voice and data) communication with the ASTRO® system or cross-agency can now extend the PDR8000® Portable Digital Repeater V.24 interface over telephone or IP communication networks.

Rapid deployment of the PDR8000 for in-building coverage, special events, or incidents can be connected to dispatch centers or other units of PDR8000 wherever they may be.

Applications:

- **Natural Disasters** – Hurricanes, Tornadoes, Earthquakes, Floods
- **Dignitary Protection** – Diplomatic Security, Heads of State, Military Leadership
- **Special Events** – Political Conventions, Sporting Events, Parades
- **In-Building Coverage** – Hotels, Arenas, Convention Centers
- **Interoperability** – Federal, State, and Local Agencies

Figure 1: PDR8000 Portable Digital Repeater Open Case

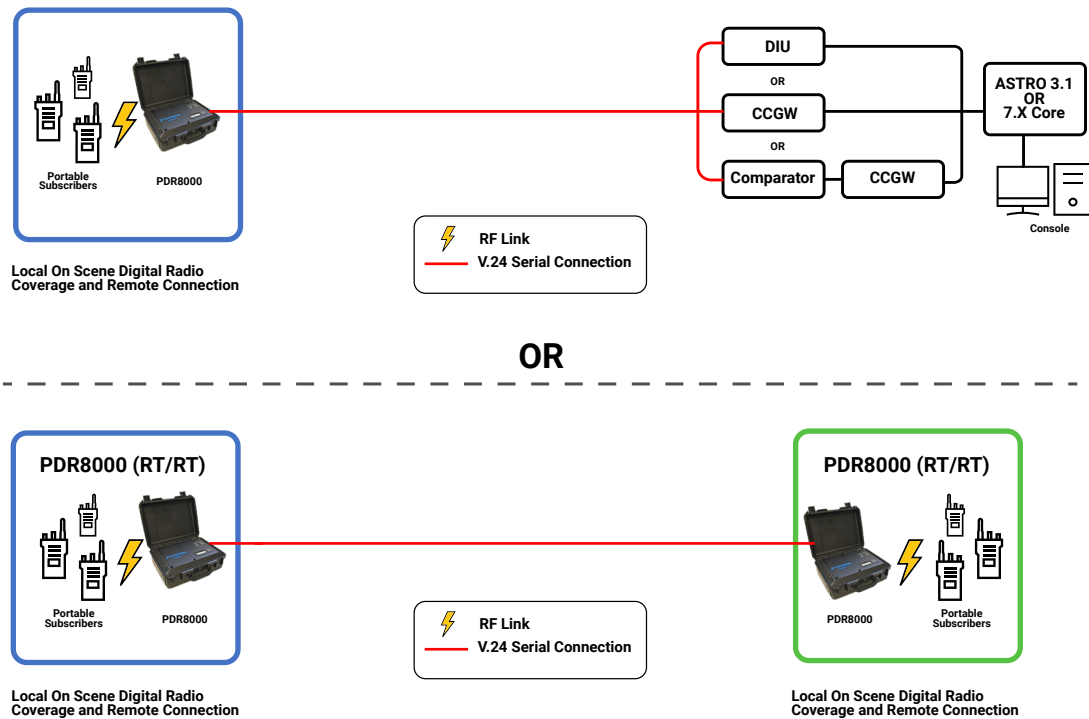


Chapter 2

Background

The PDR8000[®] provides a V.24 serial interface as an option that allows users to connect their PDR8000 to either an ASTRO[®] system infrastructure or another PDR8000 as illustrated in the following figure.

Figure 2: PDR8000 Connectivity Deployment V.24 to ASTRO System or Another PDR8000



Chapter 3

PDR8000® Remote Operations

With each remote connectivity deployment option, agencies can make use of all available Voice, Data, Supplementary Services, and Station Control features on the PDR8000 Portable Digital Repeater remotely.

Examples of these features include:

- Voice Calls (Encrypted and Clear)
- Data
 - Over-The-Air Rekeying (OTAR)
- Supplementary Services
 - Call Alert
 - Emergency Alarm
 - PTT ID
 - Radio Check
 - Radio Enable/Disable
 - Radio Message
 - Radio Status
 - Remote Monitor
 - Status Request
 - Voice Selective Call
- Station Control
 - Channel Select
 - Monitor
 - Repeat Control

Chapter 4

PDR8000® Connectivity Deployment Options

Remote connectivity can be achieved by extending the wireline interface over a variety of wired and wireless networks. As per the customers' needs, a series of use cases that provide remote connectivity are compiled for customers' use. The available connectivity deployment options are listed as follows:

1. V.24 ↔ IP Modems (LTE Network)
2. V.24 ↔ IP Modems (Wired LAN/WAN)
3. V.24 ↔ Serial Modems (PSTN, Leased Line)

The following sections describe the architecture, use cases, and the equipment of each connectivity deployment that were used to test each configuration.



NOTE: All connectivity equipment manufacturers and models mentioned in this document are off-the-shelf products acquired for the sole purpose of testing functions on the PDR8000. Motorola Solutions and Futurecom Systems Group, ULC does not sell any of the connectivity modems or equipment manufactured by third-party vendors. Motorola Solutions and Futurecom Systems Group, ULC is not sponsored by these vendors and does not recommend, sponsor, or promote any of the equipment to the reader of this or any other documents where third-party equipment is mentioned. Motorola Solutions and Futurecom Systems Group, ULC product licensing agreement and warranty are not affected by this app note and are limited to the products manufactured by Motorola Solutions and Futurecom Systems Group, ULC.

The products mentioned here have only been used to test the PDR8000 functions and exclude any required security measures to protect the network and communication links. It is the end user's responsibility to identify their security threats and protect their network against those threats.

4.1

Connectivity Deployment 1: V.24 ↔ IP Modems Over LTE Network

With the continuing growth of commercial LTE network availability in all major urban areas, this connectivity deployment option allows the agencies to connect their PDR8000 without being dependent on a wired network.

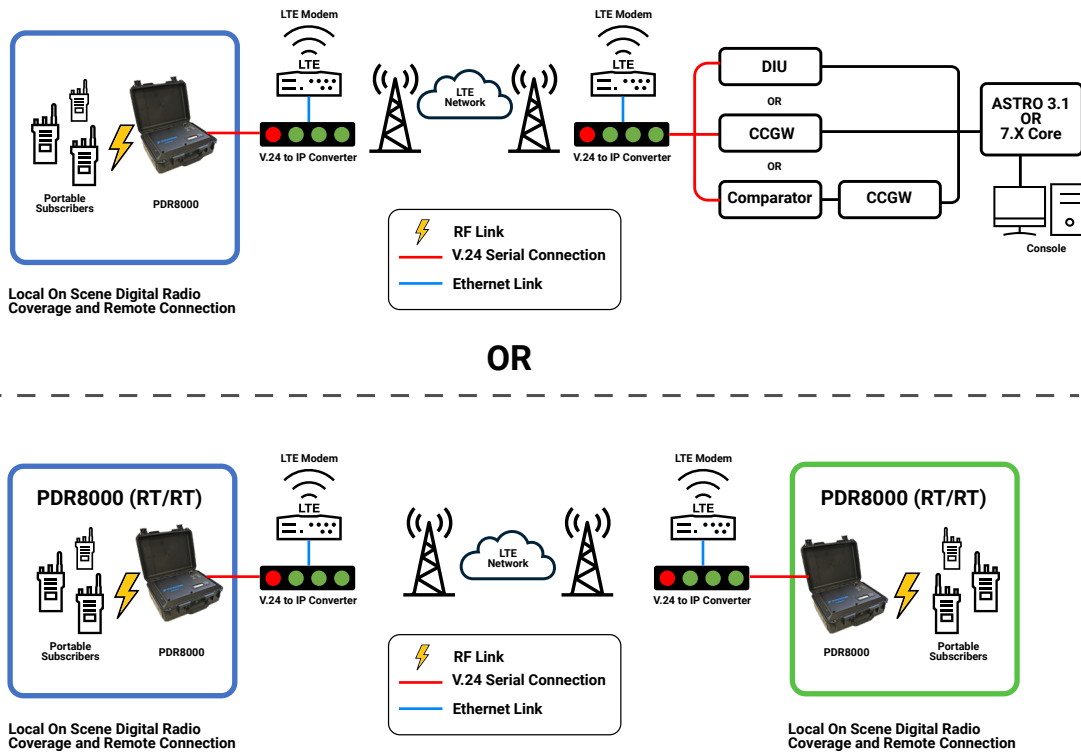
Use Cases

- In field deployments for dignitary protection, incident management, special events, in-building coverage, and interoperability between agencies.
- Extend coverage beyond the range of a single PDR8000 over LTE network.
- Provide means of fixed-end equipment to have access to Digital RF Channels remotely.
- Usage of the PDR8000 as a portable Base Station or Repeater capable of supporting Voice, Data, Station Control, and Supplementary Services.

Architecture

Figure 3: PDR8000 Connectivity Options over LTE Network to ASTRO or Another PDR8000 on page 13 shows the connectivity architectures for extending the PDR8000 wireline interface over the LTE network.

Figure 3: PDR8000 Connectivity Options over LTE Network to ASTRO® or Another PDR8000



All connectivity option networks allow the PDR8000 to connect to either the ASTRO system or another PD8000 for interoperability.

- The PDR8000 V.24 port is connected to a V.24 to IP conversion modem.
- The output of the V.24 to IP conversion modem is used as the input to the LTE modem.
- The V.24 to IP modem and the LTE modems are mirrored on the other side.
- On the other side, the LTE modem receives transmission over the LTE network and sends the output using its wired Ethernet port.
- The output from the LTE modem is used as input to the V.24-to-IP conversion modem to convert from IP to V.24 that can be interfaced to either the ASTRO system or another PDR8000.

Equipment Details

Connectivity	Vendor Equipment ¹
V.24 ↔ IP Modem ↔ LTE ↔ IP Modem ↔ V.24	V.24 to IP modems: 1. Data Comm for Business (EST 9600)

¹ Purchasable from the vendors directly, not sold by Motorola Solutions or Futurecom Systems Group, ULC.

Connectivity	Vendor Equipment ¹
	2. Christine Wireless (RIC-Mz)
	LTE modem: Sierra Wireless GX450

4.2

Connectivity Deployment 2: V.24 ↔ IP Modems Over Wired LAN/WAN

Suitable for in-building coverage for offices, hotels, sports arenas, and many more, the V.24 wireline interface can be extended over a wired IP LAN/WAN connection.

Use Cases

- In field deployments for dignitary protection, special events, in-building coverage, and interoperability between agencies.
- Extending coverage beyond the range of a single PDR8000 over wired LAN/WAN network.
- Provide means of fixed-end equipment to have access to Digital RF Channels remotely.
- Use PDR8000 as a portable Base Station or Repeater capable of supporting Voice, Data, Station Control, and Supplementary Services.

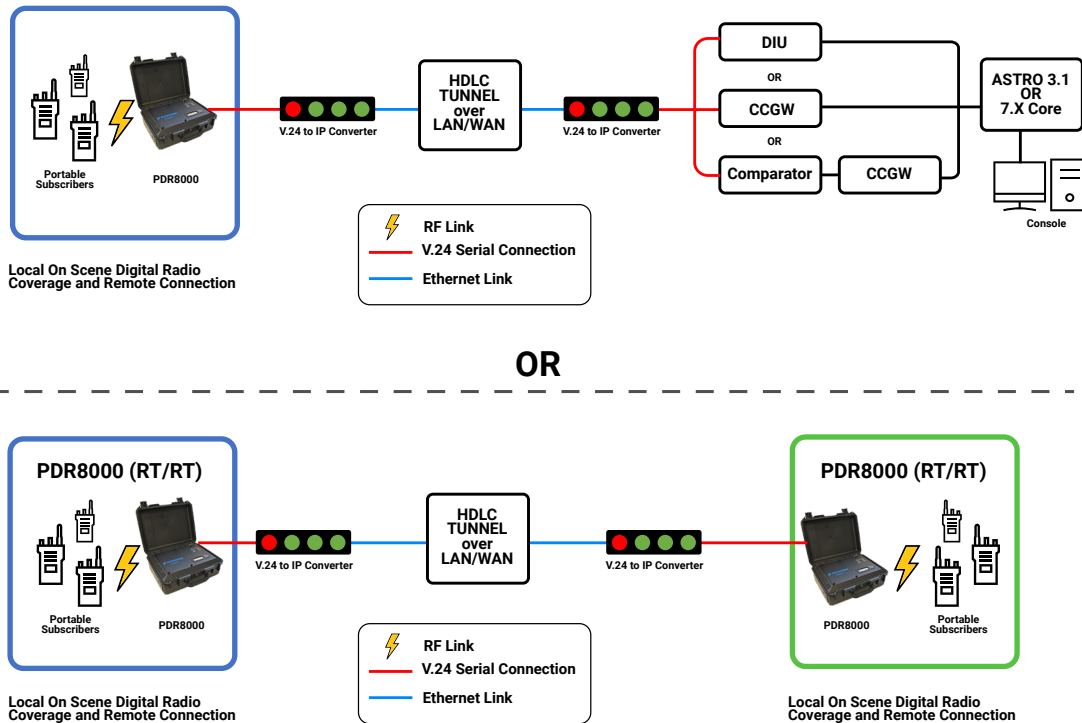
Architecture

[Figure 4: PDR8000 Connectivity Options Over LAN/WAN to ASTRO or Another PDR8000 on page 15](#) show connectivity architectures for extending the PDR8000 wireline interface over the wired IP network (LAN/WAN).

¹ Purchasable from the vendors directly, not sold by Motorola Solutions or Futurecom Systems Group, ULC.

¹ Purchasable from the vendors directly, not sold by Motorola Solutions or Futurecom Systems Group, ULC.

Figure 4: PDR8000 Connectivity Options Over LAN/WAN to ASTRO or Another PDR8000



All connectivity option networks allow the PDR8000 to connect to either the ASTRO system or another PDR8000 for interoperability.

- The PDR8000 V.24 port is connected to a V.24 to IP converter modem.
- Output of the V.24 to IP converter modem is directly connected to a LAN/WAN Ethernet port.
- The V.24 to IP converter modem is mirrored on the other side. Both sides communicate after establishing an HDLC tunnel over a LAN/WAN network.
- The other IP to V.24 converter modem converts voice and data traffic from IP to V.24 that can be interfaced to either the ASTRO system or another PDR8000.

Equipment Details

Connectivity	Vendor Equipment ²
V.24 ↔ IP Modem ↔ LAN/WAN ↔ IP Modem ↔ V.24	V.24 to IP modems: <ol style="list-style-type: none"> 1. Data Comm for Business (EST 9600) 2. Christine Wireless (RIC-Mz)

² Purchasable from the vendors directly, not sold by Motorola Solutions or Futurecom Systems Group, ULC.

4.3

Connectivity Deployment 3: V.24 ⇔ Serial Modems Over Telephone Network

This option is one of the simplest setups that allow users to rapidly deploy connectivity with the PDR8000 over any telephone network. Suitable for in-building coverage for offices, hotels, sports arenas, and others, the V.24 wireline interface can be extended over any available telephone network such as the Packet Switch Telephone Network (PSTN) or Leased Line.

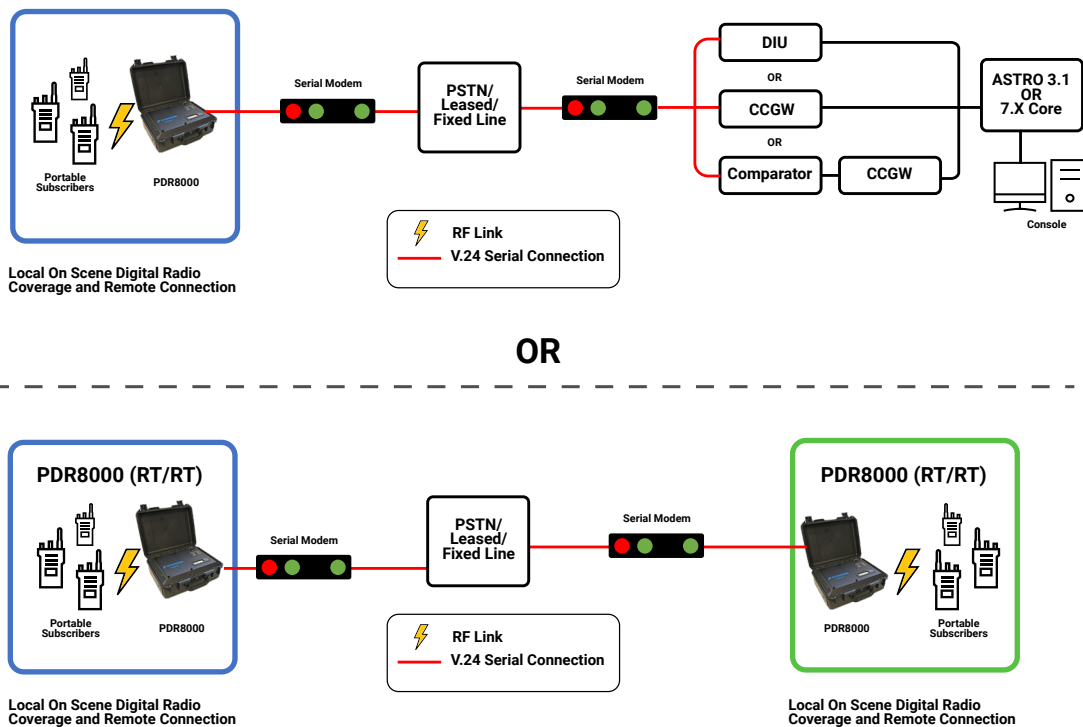
Use Cases

- In field deployments for dignitary protection, special events, in-building coverage, and interoperability between agencies.
- Extending coverage beyond the range of a single PDR8000 over telephone networks.
- Provide means of fixed-end equipment to have access to Digital RF Channels remotely.
- Use PDR8000 as a portable Base Station or Repeater capable of supporting Voice, Data, Station Control, and Supplementary Services.

Architecture

Figure 5: PDR8000 Connectivity Options Over Telephone Link to ASTRO or Another PDR8000 on page 16 shows connectivity architectures for extending the PDR8000 wireline interface over the PSTN of Leased / Fixed line telephone network.

Figure 5: PDR8000 Connectivity Options Over Telephone Link to ASTRO or Another PDR8000



All connectivity option networks allow the PDR8000 to either the ASTRO system or another PDR8000 for interoperability.

- The PDR8000 V.24 port is connected to a serial modem.
- The serial modems are connected to a PSTN or Leased/Fixed Line telephone connection.
- The serial modem is mirrored on the other side that outputs V.24 to either an ASTRO system or another PDR8000.

Equipment Details

Connectivity	Vendor Equipment ³
V.24 ↔ Serial Modem ↔ PSTN/Leased/Fixed Line ↔ Serial Modem ↔ V.24	Serial modems: <ol style="list-style-type: none"> 1. Raymar-Telenetics V.3600 SA Modems 2. Paradyne 325

³ Purchasable from the vendors directly, not sold by Motorola Solutions or Futurecom Systems Group, ULC.