MOTOROLA SOLUTIONS

Over-The-Air-Programming Using Radio Management (RM-OTAP) User Guide

MN010257A01-AA

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Document History

Version	Description	Date
MN010257A01-AA	Initial converted edition.	April 2024

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About This Manual

The Vehicular Repeater (VR) mentioned in this manual applies to any of the following products: DVR, DVR-LX®, and VRX1000.

The VR is designed to interface seamlessly to the following MSU:

● Remote Mount APX Series MSU with or without Control Head

When the VR is interfaced to a Remote Mount Motorola Solutions APX Mobile Radio, the complete equipment package is referred to as Digital Vehicular Repeater System (DVRS).

For requirements on compatible Mobile and Portable radios, refer to the *Compatibility Charts*.

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

For details on how to operate a VR, refer to the *Vehicular Repeater User Guide*.

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.
Ordering Guide	Italic word indicates title of a bibliographic resource.

Example	Description
`Powering Off`	Typewriter words indicate the Human Machine Interface (HMI) strings or messages displayed on your display.
File → Templates (DCD Files) → Load DCD Template	Bold words with the arrow between indicate the navigation structure in the menu items.

Related Publications

User Guides

Part Number	Description
MN010246A01	Vehicular Repeater Functional Description Manual
MN010256A01	Vehicular Repeater User Guide

Programming Guides

Part Number	Description
MN003621A01	APX™ CPS Radio Management User Guide
MN010245A01	Vehicular Repeater Programming Guide

Data Sheets

Data sheets can be retrieved from the Futurecom website. Go to **Support → Documentation and Software → DVR-LX/VRX1000 → Datasheets**.

Model	Data sheets
DVR-LX®	- DVR-LX P25 Digital Vehicular Repeater - DVR-LX P25 Suitcase Repeater - DVR-LX P25 Rackmount Repeater Datasheet
VRX1000	- VRX-1000 Vehicle Radio Extender Datasheet - DVR-LX VRX-1000 Comparison Chart

Others

Publication	Description
Compability Chart	Includes software compability, compatible APX mobile radios, and XTS/APX portable radios. See *Compatibility Chart* from Futurecom website: **Support → Documentation and Software → DVR-LX/VRX1000 → Compatibility Chart**.
Ordering Guides	Include the following guides: - DVR-LX Ordering Guide - VRX1000 Ordering Guide - Supplemental Ordering Form - Interface Selection Kit for APX™ 8500

Publication	Description
	Ordering guides can be retrieved from the Futurecom website. Go to **Support → Documentation and Software → DVR-LX/VRX1000 → Ordering Guide**.

Chapter 1

Overview

Over-The-Air-Programming using Radio Management (RM-OTAP) provides radio technicians the ability to program or upgrade the firmware or features of a DVR-LX®, DVR, or VRX1000 without physically connecting the devices to a computer.
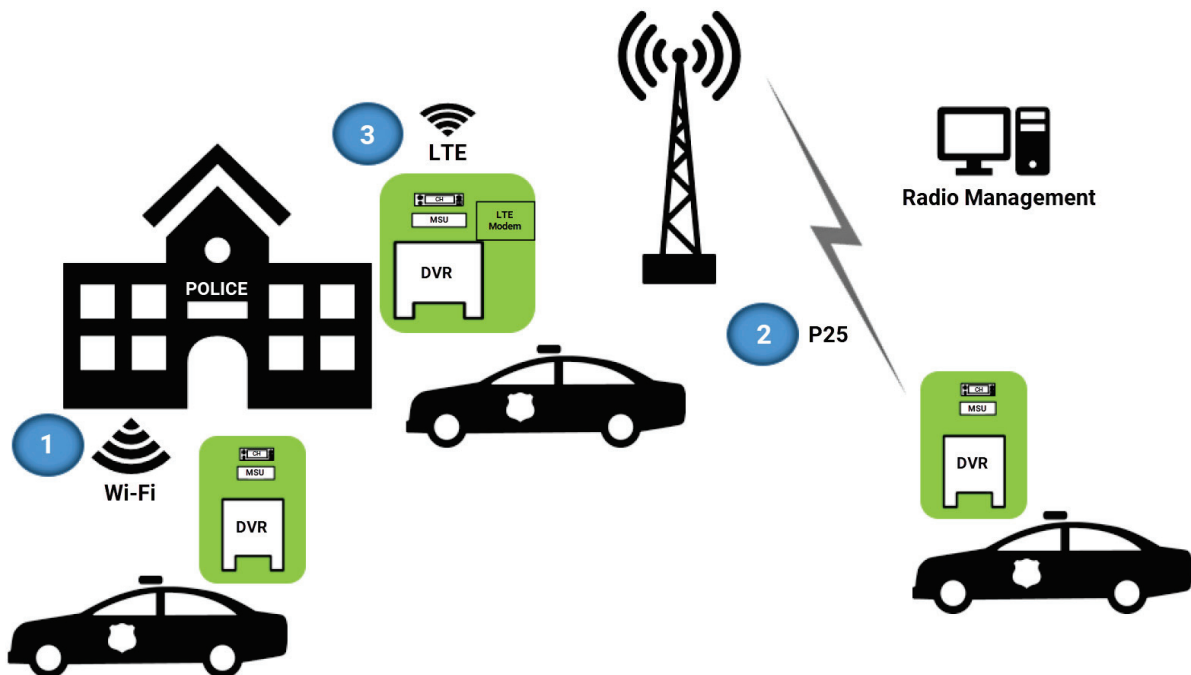
Figure 1: No Physical Connection to VR

The RM-OTAP feature leverages off the APX™ Radio Management application. Firmware and configuration files are pushed to the VR using the Mobile Subscriber Unit (MSU) through any of the following mediums:

- Wi-Fi
- P25 (LMR)
- USB (or USB connected to LTE device/modem)

Figure 2: Delivery Methods for RM-OTAP

RM-OTAP is a licensed feature and can be purchased at either time of order for the VR or purchased as a field upgrade. Refer to the *Ordering Guides*.

Chapter 2

Feature Requirements

Vehicular Repeater (VR)
DVR-LX®, DVR, and VRX1000

VR Configuration Tool

- Tweaker 2.05 or later

- Futurecom Repeater Configurator 1.0 or later

Radio Management (RM)
R21.00.01 or later

VR Firmware
1.60 or later

Mobile Firmware
R21.00.01 or later

VR Feature License
RM-OTAP

Mobile Feature License
DVRS MSU Operation

To verify which mobile models support firmware or configuration updates, see RM-OTAP File Type Support on page 29.

TIP:

- When using RM-OTAP for firmware updates, note that firmware compatibility is always enforced. Compatible MSU and VR firmware versions are bundled together in the MSU firmware. If the MSU is updated with a specific firmware, compatible (bundled) VR firmware is applied to the attached VR. For a list of VR-MSU firmware version bundles, refer to the *Compatibility Charts*.

- Do not mix RM-OTAP configuration with FRC configuration. RM-OTAP and FRC do not communicate and tracking configurations will be confusing. Only one method must be selected.

- After the initial launch of RM-OTAP support for the VR, there have been subsequent enhancements to improve the user experience. See Table 2: Radio Management Enhancement on page 14 for details on the capabilities introduced and respective release dates.

Table 2: Radio Management Enhancement

RM Version	Description
R21.00.01 (Initial Launch)	Linking a DCD file with a mobile radio template is always requried when using RM. • With the RM-OTAP feature license, the linked DCD file is applied to the VR. • Without the RM-OTAP feature license, the linked DCD file is not applied to the VR.
R21.40.00	Linking a DCD file is when working with mobile firmware is no longer needed prior to R21.00.01.

RM Version	Description
	Manage → Templates → DVRS Files field, select **None**. See Linking the Imported DCD File to an MSU Template on page 26.
R23.00.00	VR without an RM-OTAP feature license (regardless of mobile firmware) no longer needs to link a DCD file. **Manage → Templates → DVRS Files** field, select **None**. See Linking the Imported DCD File to an MSU Template on page 26.
R23.00.00	Application for an RM-OTAP license to a VR using RM is supported.
R26.00.00	Support added for VR ID only change in SR2021.4

Chapter 3

VR Firmware Update

When updating the MSU firmware, there is no user action required to update the Vehicular Repeater (VR) firmware. The VR firmware update software (DFB) is bundled with the MSU firmware and automatically updates the VR firmware during an MSU firmware update. Refer to Motorola Solutions Radio Management Training if you have questions regarding an MSU update.

For Motorola Solutions training materials and documentation, go to Motorola Solutions Learning eXperience Portal (LXP) website.

Chapter 4

Updating VR Configuration

A Vehicular Repeater (VR) configuration update using RM-OTAP involves the following procedures.

Procedure:

1. Creating a DCD file from Tweaker or Futurecom Repeater Configurator (FRC).

2. Importing DCD file in the RM server.

3. Linking the imported DCD file to an Mobile Subscriber Unit (MSU) template.

4. Selecting the template to write to MSU.

4.1
DCD File Creation

There are two ways of creating a DCD file, creating a new file, or modifying an existing file.

NOTE: Ensure the Mobile Subscriber Unit (MSU) and Vehicular Repeater (VR) are synchronized. See *VR Communication Setup* in the manual *Vehicular Repeater Programming Guide*.

TIP: It is always recommended to save each DCD file to enable future configuration changes for a particular VR.

4.1.1
Creating a New File

Procedure:

1. Establish communications with the Vehicular Repeater (VR).

2. To read the VR, do one of the following:

   - On the FRC, select **Repeater → Load Data from Repeater**.

   - Press shortcut key **F2**.

   A progress dialog pops up.

3. Make the required configuration changes to the downloaded data.

4. To save the data as a DCD file, select **File → Templates (DCD Files) → Save DCD Template**.

5. In the **Save As** dialog, navigate to the desired location and enter a filename. Click **Save**.

6. In the **DCD Options** window, fill in the following fields and click **OK**.

   Configuration Data Name

   Filename displayed after importing into Radio Management. (The maximum is 23 alphanumeric characters.)

   Description

   Additional text to clarify the content. Displayed in **Preview File Header** section on the **Open File** window. (The maximum is 1024 alphanumeric characters.)

   Load TXT File

Command button that loads and external file that contains a list if the serial numbers. All data imported is placed into the **List of Serial Numbers** field.

List of Serial Numbers

List of serial numbers of the repeater that this DCD file should apply to. If left BLANK, this DCD file is applicable to all repeaters. (The maximum is 65000 alphanumeric characters.)

Applicable when delivered to repeater using FRC or RM-OTAP.

Encryption

Option to encrypt codeplug file. Select between **Default** and **Custom** encryption. If **Custom** is selected, specify a password in the **Password** field and reconfirm the password in the **Confirm** field.

Bundle License File

Command button that selects a License File to be bundled to the DCD file. The text file next to the button displays the License Files to be bundled.

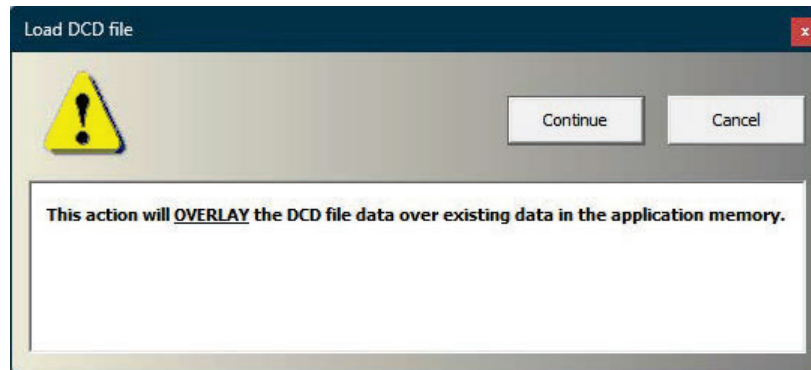**Result:** The DCD file is successfully saved.

4.1.2
Modifying an Existing File

📝 **NOTE:** DPD files are not meant to be used for this purpose. Only DCD files may be modified to create another DCD file.

Procedure:

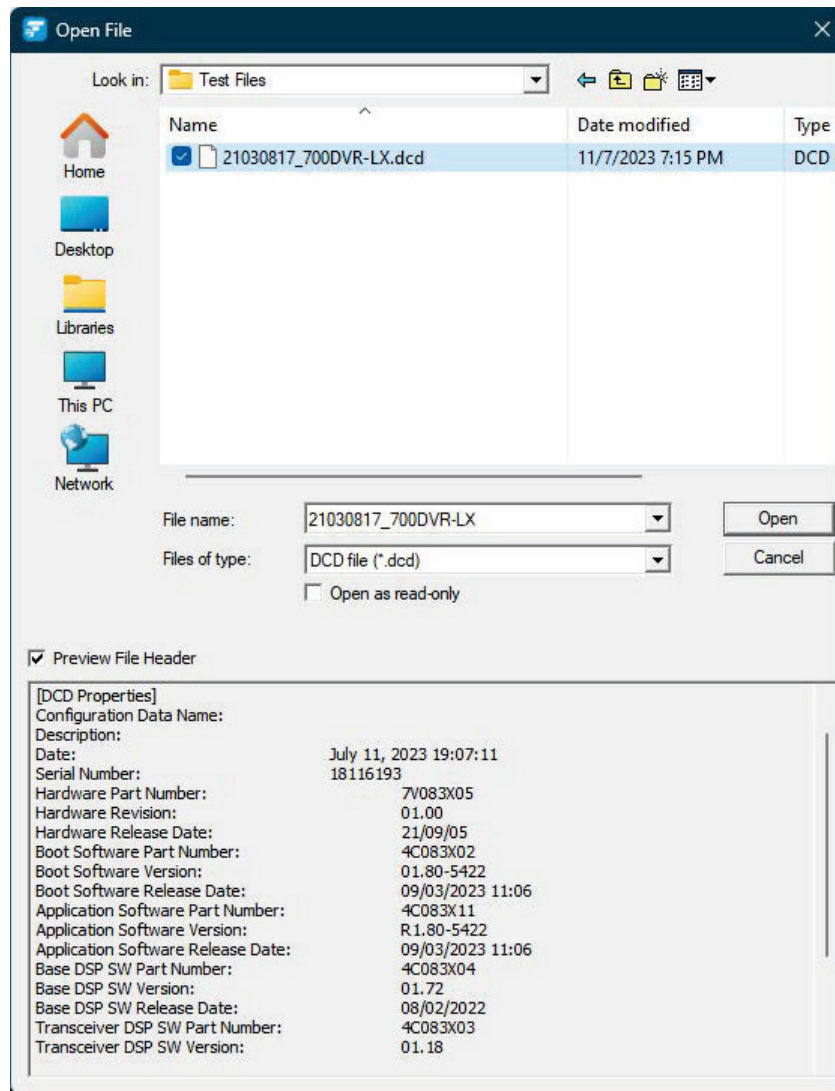1. Select **File → Templates (DCD Files) → Load DCD Template**.

    Load DCD file caution dialog pops up.

2. Click **Continue**.

3. In the **Open File** window, navigate to the DCD file and click **Open**.

> **NOTE:** If the saved DCD file was previously saved with a description, the details are displayed in the **Preview File Header** section.

4. Unselect the undesired options and click **OK**.

5. Make the required configuration changes to the data.

6. To save as a DCD file, select **File → Templates (DCD Files) → Save DCD Template**.

7. In the **Save** dialog, navigate to the desired location and enter a filename. Click **Save**.

8. In the **DCD Options** window, fill in the following fields and click **OK**.

   Configuration Data Name

   Filename displayed after importing into Radio Management. (The maximum is 23 alphanumeric characters.)

   Description

   Additional text to clarify the content. Displayed in **Preview File Header** section on the **Open File** window. (The maximum is 1024 alphanumeric characters.)

   Load TXT File

   Command button that loads and external file that contains a list if the serial numbers. All data imported is placed into the **List of Serial Numbers** field.

   List of Serial Numbers

   List of serial numbers of the repeater that this DCD file should apply to. If left BLANK, this DCD file is applicable to all repeaters. (The maximum is 65000 alphanumeric characters.)
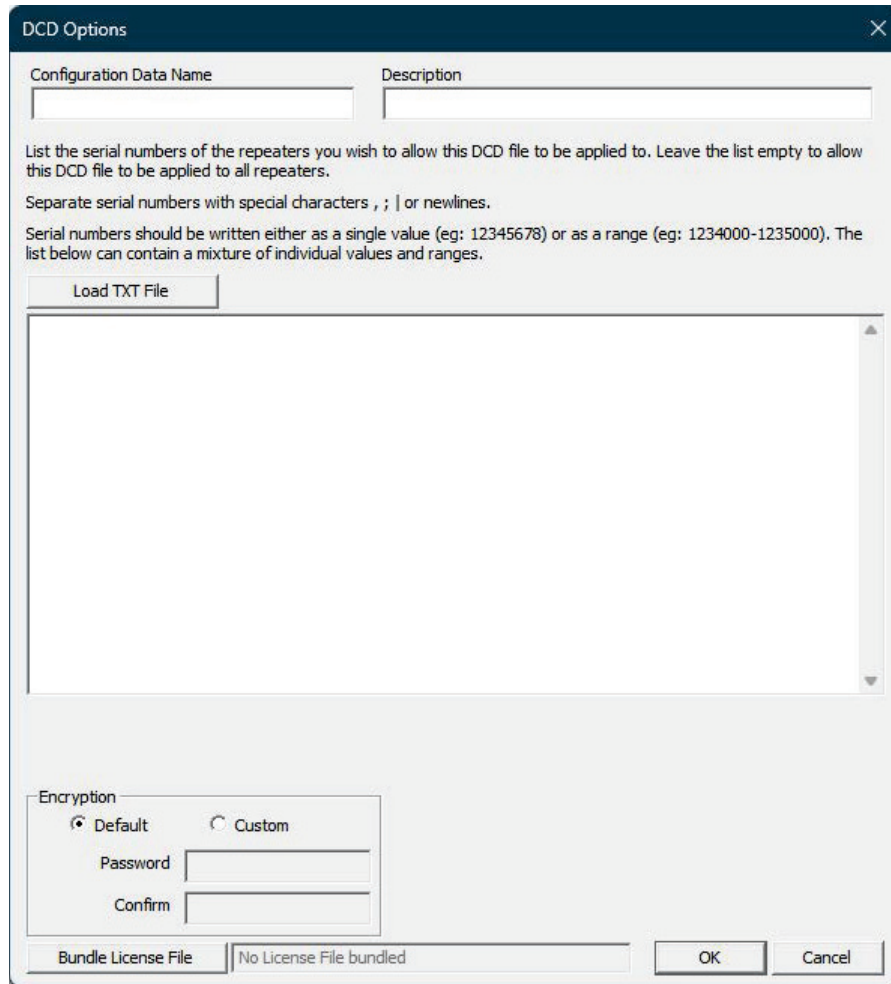   Applicable when delivered to repeater using FRC or RM-OTAP.

   Encryption

   Option to encrypt codeplug file. Select between **Default** and **Custom** encryption. If **Custom** is selected, specify a password in the **Password** field and reconfirm the password in the **Confirm** field.

   Bundle License File

Command button that selects a License File to be bundled to the DCD file. The text file next to the button displays the License Files to be bundled.

4.1.3
License File Application

All feature license files, including the RM-OTAP license file, may be sent using RM-OTAP by bundling with a DCD file.

A license file is bundled in as part of the creation or modification of a DCD file. Note the **Bundle License File** button in the **DCD Options** window.

> 📝 **NOTE:** Outdated versions of Tweaker or FRC have a separate option for saving DCD files with license. Select **File → DCD Files → Save DCD File with License**.

4.1.3.1
Bundle License File to Template File

You can bundle a license file to a template file. This can be delivered to a single repeater or fleet of repeaters using Radio Manager. The serial number of any repeater that matches a serial number in the bundled license file will have that feature enabled and take in the configurations in the corresponding template file.

4.1.3.2
Previewing License Information Bundled to Template File

You can bundle a license file to a DCD file for deployment using Radio Management. FRC shows a preview of information prior to loading the DCD file.

Procedure:

1. Select **File → Templates (DCD Files) → Load DCD Template**.

   Load DCD file caution dialog pops up.
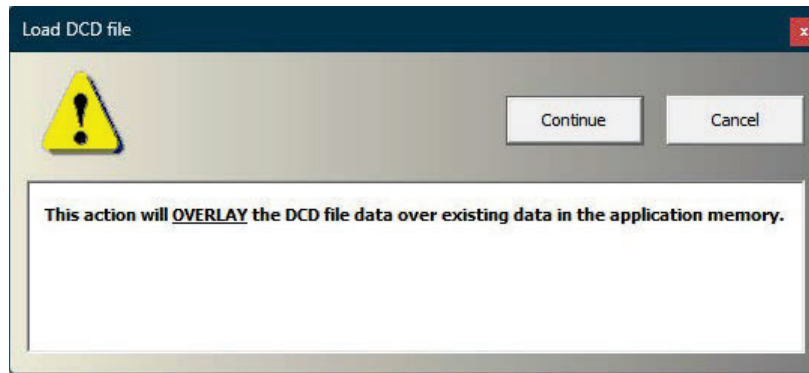
2. Click **Continue**.

3. In the **Open File** window, navigate to the DCD file and enable **Preview File Header**.

Result: Enabled license and corresponding serial numbers are shown.

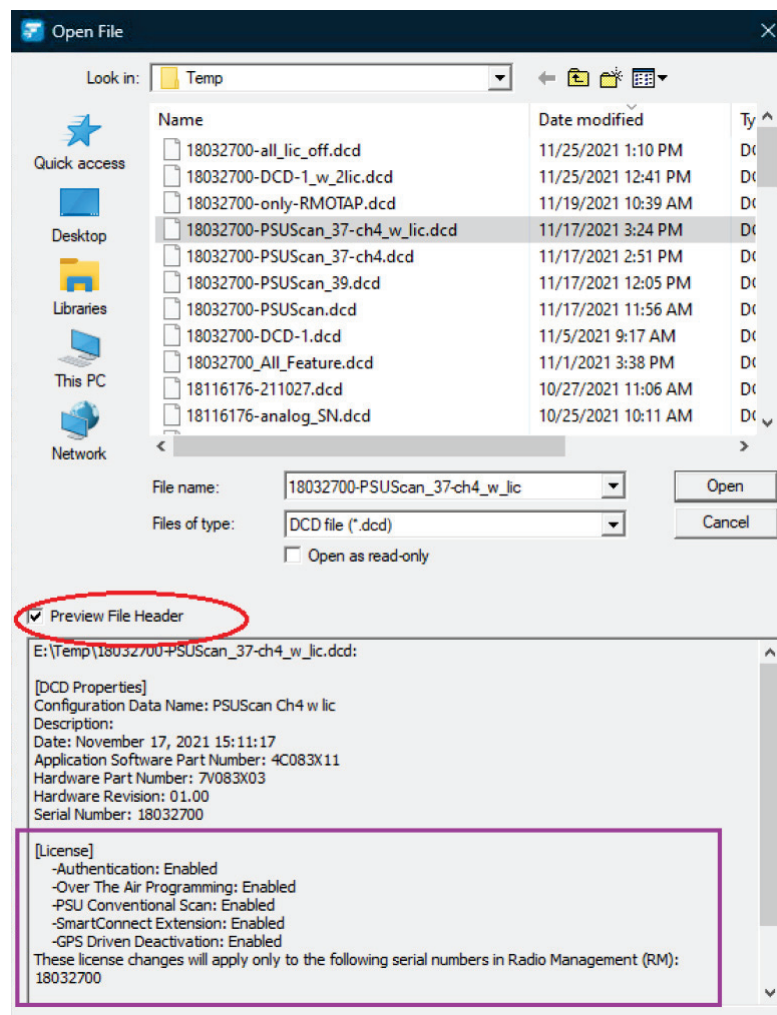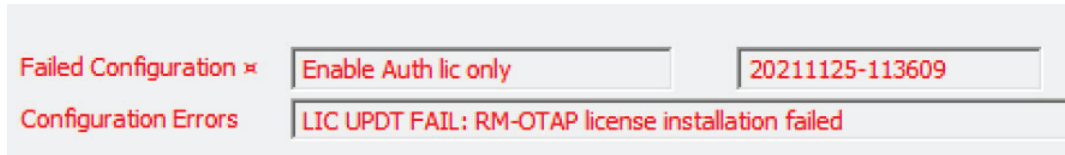### 4.1.3.3
Applying License to Repeater Using Radio Manager

A repeater must have an RM-OTAP license already enabled for it to support DCD updates from Radio Management (RM). One exception is that users can enable RM-OTAP license when using a bundled license file together with a DCD file update.

> **NOTE:** RM-OTAP license must be already enabled or included in the bundled license file before using RM to update another feature license.

| Failed Configuration ≍ | Enable Auth lic only | 20211125-113609 |
| Configuration Errors | LIC UPDT FAIL: RM-OTAP license installation failed | |

Procedure:

1. Create a DCD file on the FRC with a bundled license file.

   > **NOTE:** See Creating a New File on page 17 or Modifying an Existing File on page 19 for detailed procedures.

   a. Select **File → Templates (DCD Files) → Save DCD Template**.

   b. Follow the prompts and specify the DCD filename.

   c. In the **DCD Options** window, enter specifics about the DCD file.

   d. Click **Bundle License File** to pick up the appropriate `.upf` file.

   e. Click **OK** to save the DCD file.

2. Import the newly created DCD file into the Radio Management.

3. Link the DCD file to the corresponding Template of the mobile radio.

4. Schedule a Write job on RM for the mobile radio to push the update.

Result: The MSU and Repeater process the DCD update. Feature licenses specified in the bundled license file will be applied.

4.2
Importing DCD File in RM Server

Prerequisites: Launch Radio Management.

> **TIP:**
> - It is always recommended to use a new DCD filename. When reusing an existing DCD filename, delete the existing DCD file from **DVRS Files** window in RM to ensure the new DCD file will be properly imported.
>
> - Note that a DCD file created prior to FRC 1.18 cannot be used.
>
> - For more information on the Radio Management, see *APX™ CPS Radio Management User Guide*.

Procedure:

1. From Radio Management Client-Radio View, select ⚙ **Actions → Manage → DVRS Files**.

2. In the new window, select ⋮ → **Import**.

3. Navigate to the previously saved DCD file from Tweaker or FRC, and click **Open**.

4. In Radio Management Server-Job View, confirm that the DCD file has been imported successfully.

4.3
Linking the Imported DCD File to an MSU Template

Procedure:

1. To open the **Template View** window, in Radio Management Client-Radio View, select **Actions** → **Manage** → **Templates**.

2. To associate the DCD file with a specific MSU connected to the VR, under the desired template, scroll to the right to find the **DVRS File** column and select the DCD file from the drop-down menu.

   TIP:
   - If the DCD file does not appear as expected in the DVRS File drop-down menu, export mobile xml to FRC, save DCD, and import DCD into RM again.

   - For more information on the Radio Management, see *APX™ CPS Radio Management User Guide*.

4.4
Selecting the Template to Write to MSU

Prerequisites: In the **Radio View** window, ensure that the VR ID is correct in the **VR ID** column.

NOTE:
- The purpose of having the VR ID as a separate column for each radio is that the DCD is a template to be used for multiple radios and does not contain the VR ID.

- The VR ID is displayed in Hexadecimal format. If you enter VR ID in decimal format, it will automatically convert to hexadecimal format.

- VR ID Change Only: To change the VR ID only, a DCD must still be attached to the job even if there are no configuration changes. An attempt to change the VR ID without an attached DCD will have no effect. If **NONE** is selected, RM blocks the change with a pop-up error message and revert the VR ID.

Procedure:

1. Right-click on the row and schedule a write job to complete the configuration update on the VR.

2. Navigate to **Job View** to see the status of the configuration update.

Result: When update is complete, the completion status is shown in the job status column. The MSU control head displays `Updating DVRS` and restarts.

4.5
Initiating Automatic Update for a Replacement VR

Prerequisites: Ensure that RM-OTAP have been successfully used to send firmware and configuration to the VR being replaced. If this is not met, refer to .

Procedure:

1. Remove the previous VR from installation.

2. Prepare the new VR by installing RM-OTAP license using FRC.

   See License File Application on page 22 for more information.

3. Connect the new VR to original MSU.

4. Power up original MSU and the new VR.

5. Observe the DVRS update.

   The following details are displayed:

   - Firmware version bundled inside MSU is pushed to the VR.

   - If the MSU has a previously saved configuration, the saved configuration is pushed to the VR as well.

   - VR ID is updated.

Result: Once the update is completed, the MSU will reset.

4.6
Overwriting a Temporary Configuration or Firmware Update for a VR

Prerequisites:

- Ensure that RM-OTAP have been successfully used to send firmware and configuration to the VR being replaced. If this is not met, refer to Selecting the Template to Write to MSU on page 26 .

- Firmware, and/or configuration, and/or VR ID have been updated using FRC after RM-OTAP was last used.

Procedure:

1. Restore the VR to the last configuration and firmware sent using RM-OTAP.

   a. Connect your laptop to the new VR using a USB programming cable.

   b. Launch FRC.

   c. Load the data from the VR.

   d. In the FRC navigation tree, click on **Update Info**.

   e. In the **Update Info** window, do the following:

      - Click **Reload OTAP Configuration from MSU**.

      - Click **Reload OTAP Firmware from MSU**.

2. Power down the VR.

3. Power up the MSU and VR.

4. Observe the DVRS update. The following details are displayed:

   - Firmware version bundled inside MSU is pushed to the VR.

   - If the MSU has a previously saved configuration, the saved configuration is pushed to the VR as well.

   - VR ID is updated.

Chapter 5

Licensed Feature Upgrade

If you purchased a feature (for example, Authentication), a license file is provided. To bundle this file with a DCD, see License File Application on page 22.

Chapter 6

RM-OTAP File Type Support

VR Configuration and License Files

Table 3: VR Remote Configuration and License File Updates (RM R21.00.00)

MSU Models (AN/BN)	Transport Method (RM to MSU)		
	USB	Wi-Fi	P25 (LMR)
APX 7500AN APX 6500AN APX 4500AN APX 2500AN	Supported	Not Supported	Supported
APX 8500 APX 6500BN APX 4500BN APX 2500BN	Supported	Supported	Supported

VR Firmware

Table 4: VR Remote Firmware Update (RM R21.00.00)

MSU Models (AN/BN)	Transport Method (RM to MSU)		
	USB	Wi-Fi	P25 (LMR)
APX 7500AN APX 6500AN APX 4500AN APX 2500AN	Not Supported	Not Supported	Not Supported
APX 8500 APX 6500BN APX 4500BN APX 2500BN	Supported	Supported	Supported

NOTE: Not all model pairings are offered in all region.