New Generation DMR Radios
Release Notes

Hytera Communications Corporation Limited

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Documentation Information

This section describes the audience, conventions, and revision history of this document.

Audience

This document is intended primarily for the following audiences:

- Sales and marketing engineers
- Dealers
- Maintenance engineers
- Customer service personnel

Documentation Conventions

Instruction Conventions

Icon	Description
TIP	Indicates information that can help you make better use of your product.
NOTE	Indicates references that can further describe the related topics.
CAUTION	Indicates situations that could cause data loss or equipment damage.
WARNING	Indicates situations that could cause minor personal injury.
DANGER	Indicates situations that could cause major personal injury or even death.

Notation Conventions

Item	Description	Example
Boldface	Denotes menus, tabs, parameter names, window names, dialog names, and hardware buttons.	To save the configuration, click **Apply**.
		The **Log Level Settings** dialog appears.
		Press the **PTT** key.
" "	Denotes messages, directories, file names, folder names, and parameter values.	The screen displays "Invalid Battery!".
		Open "PSS.exe".
		Go to "D:/opt/local".
		In the **Port** text box, enter "22".

Item	Description	Example
>	Directs you to access a multi-level menu.	Go to **File** > **New**.
Italic	Denotes document titles.	For details about using the UNM5800, refer to *UNM5800 Operation Guide*.
`Courier New`	Denotes commands and their execution results.	To set the IP address, run the following command: `vos-cmd -m name IP`

Revision History

Document Version	Application Version	Release Date	Description
01	V3.0	March 2025	● Updated 1 Product Information. ● Added 2 Released Features in V3.0.
00	V3.0	January 2025	● Updated 1 Product Information. ● Added 2 Released Features in V3.0.
01	V2.7	August 2024	● Updated 1 Product Information. ● Added 3 Released Features in V2.7.
03	V2.6	April 2024	● Updated 1 Product Information. ● Updated 4 Released Features in V2.6.
02	V2.6	March 2024	● Updated 1 Product Information. ● Updated 4 Released Features in V2.6.
01	V2.6	January 2024	● Updated 1 Product Information. ● Updated 4 Released Features in V2.6.
00	V2.6	December 2023	Added 4 Released Features in V2.6.
03	V2.5	December 2023	Updated 5 Released Features in V2.5.
02	V2.5	October 2023	Updated 5 Released Features in V2.5.
01	V2.5	September 2023	Updated 5.3 Important Notes.
00	V2.5	August 2023	● Updated 1 Product Information.

Document Version	Application Version	Release Date	Description
			● Added 5 Released Features in V2.5.
00	V2.4	May 2023	● Updated 1 Product Information. ● Added 6 Released Features in V2.4.
00	V2.3	May 2023	Updated 1 Product Information.
02	V2.0	May 2023	Updated 1 Product Information.
01	V2.0	March 2023	● Updated 1 Product Information. ● Updated 8.3 Important Notes. ● Updated 8.4 Resolved Issues.
00	V2.0	September 2022	● Updated 1 Product Information. ● Added 8 Released Features in V2.0.
03	V1.7	June 2022	● Updated 1 Product Information. ● Updated 9.3 Important Notes. ● Updated 9.4 Resolved Issues.
02	V1.7	May 2022	Updated 9.4 Resolved Issues.
01	V1.7	April 2022	Added CPS in 9.2 Applications.
00	V1.7	April 2022	● Updated 1 Product Information. ● Added 9 Released Feature in V1.7.
01	V1.6	March 2022	● Updated 1 Product Information. ● Updated 10.4 Resolved Issues.
00	V1.6	January 2022	● Updated 1 Product Information. ● Added 10 Released Features in V1.6. ● Updated 10.4 Resolved Issues.
00	V1.5	November 2021	Initial release.

1. Product Information

Firmware Version

DMR Series Products		Version
Portable Radio	HP78X	V3.0.12.015
	HP70X	V3.0.12.015
	HP68X	V3.0.12.015
	HP60X	V3.0.12.015
	HP56X	V3.0.12.015
	HP50X	V3.0.12.015
	HP56X UL913	V3.0.12.015
	HP50X UL913	V3.0.12.015
	HP78X UL913	V3.0.12.015
	HP70X UL913	V3.0.12.015
	HP71XEx	V3.0.12.015
	HP79XEx	V3.0.12.015
Mobile Radio	HM78X	V3.0.12.015
	HM68X	V3.0.12.015
	HM65X	V3.0.12.015

Application Version

Application	Version
Customer Programming Software (CPS)	V3.0.11.031
Debugging and Testing Software (Tuner)	V02.0.02.001
CPS Plugin	V3.0.11.031

Application	Version
IDS Plugin	V5.5.05.005
Key Management System Lite (KMS Lite)	V2.5.09.000
HyTool	V4.5.08.008
Over the Air Programming (OTAP)	● Conventional: V3.01.02.014 ● XPT: V2.00.09.004
RCDB	D3.0.11.022

2. Released Features in V3.0

This chapter describes the new features supported by the firmware version V3.0.

2.1 Radio

2.1.1 Common

2.1.1.1 New Features

Audio Feedback Suppressor

Audio Feedback Suppressor adjusts the voice gain of the received audio signal to weaken the feedback howling from multiple radios which are close to each other during transmitting or receiving. This can improve voice quality.

2.1.1.2 Enhancements

User Interface (UI)

- The HM78X, HP79XEx, HP78X UL913, HP78X, and HP68X radios have a redesigned UI that is more intuitive and interactive.
- On the HP60X, HP70X, and HP71XEx radios, the standby screen can show channel alias.

Standby Screen

On the standby screen, the third line can show the custom information you set.

API

The radio can connect to other apps through the following methods, offering more options for developers.

- Portable radio: Serial port or BT
- Mobile radio: IP or BT

Volume

You can separately adjust the voice notification volume on the radio.

2.1.2 Conventional

2.1.2.1 New Features

Work Order

Work Order allows you to send tasks from your dispatch PC to the dispatch console, which then distributes these tasks to specific radios. When radio users finish the task and update the task status on their radios, the updates are automatically sent back to the dispatch console and then to the dispatch PC.

This feature helps you manage tasks efficiently, schedule resources effectively, and assign tasks quickly.

Smart Battery Report

The radio can report smart battery details, such as model, lifespan, charge cycles, and version, to the control console. This helps you check how your battery is performing, and decide whether the battery should be replaced.

Zone Notification When Power-on

In conventional mode, the radio audibly notifies the zone information when power-on.

2.1.2.2 Enhancements

IP Transit

The mobile radio can connect to repeaters in the IP Multi-site Connect network.

Clarity Transmission

The mobile radio can use Clarity Transmission to transmit location information.

Displaying TX Contacts Name When Roaming

The radio can display the alias of the TX contact when roaming.

Programmable Keys

The following features are available for programmable keys:

- BT Pairing: With BT enabled, press the programmable key to automatically connect to an available paired BT device.
- Add Scan Channel: Press the programmable key to add current channel to the scan list. This feature is available when only one scan list exists.
- Remove Scan Channel: Press the programmable key to remove current channel from the scan list. This feature is available when only one scan list exists.

Call

The following call types are available for the radio:

- Unaddressed call: Unaddressed call is a special group call service. You can use specific address (16777184 to 16777199) to make group calls.
- Broadcast call: You can initiate a broadcast call to the group. In such a call, only the calling party can transmit voice.
- OVCM: Open Voice Channel Mode (OVCM) allows other radios on the same channel and timeslot to join your call, even if you are not calling them directly.

Scan

When only one scan list is available on the radio and current channel is included in that list, the standby screen displays "S" before the channel alias.

Telemetry

Telemetry is available on HP5 Series radios.

Air Interface Encryption

Air Interface Encryption (AIE) is available on HP5 Series radios.

2.1.3 Digital Trunking

2.1.3.1 New Features

Subgroup Notification When Power-on

In digital trunking mode, the radio audibly notifies the subgroup information when power-on.

Private Preemption Call

You can initiate a private call to interrupt a group call, and then speak privately with one of its members.

2.1.3.2 Enhancements

Location

The radio can upload location information through the LIP protocol.

Current Group Report

With this feature enabled, the radio can report all members of current group and up to 6 members from its associated scan group list.

Late Entry

When the radio joins a group call through Late Entry, the radio displays "Late Entry".

E2EE

The radio supports private encryption. To use this feature, you must license Full Encrypt-Private first.

Programmable Keys

The BT Pairing feature is available for programmable keys:

BT Pairing: With BT enabled, press the programmable key to automatically connect to an available paired BT device.

Applications

HyTool

You can use the HyTool app to read or write the HP79XEx, which improves your efficiency.

CPS

- The CPS integrates the USB driver of V5.38.20.0 to support Windows 11.
- The CPS of V3.0 is compatible with all earlier versions of CPS.

2.2 Important Notes

- The BP2409 smart battery is available for HP50X and HP56X.
- SM32N2-P RSM is available for non-explosion-proof radios.
- SM24N2P-Ex RSM is available for explosion-proof radios.

2.3 Resolved Issues

None.

No.	Resolved Issues
V3.0.12.015	
1	When the radio was upgraded to V3.0.11.014, the third-party encryption card was automatically disabled.

3. Released Features in V2.7

This chapter describes the new features supported by the firmware version V2.7.

3.1 Radio

Accessory (V2.7.11.018)

Explosion-proof radios support the following explosion-proof accessories:

- POA63P-Ex
- SM24N2P-Ex

3.2 Applications

None.

3.3 Important Notes

V2.7.11.018

The following models are available:

- HP71XEx IIC V1 (136–174 MHz)
- HP71XEx IIC U3 (350–400 MHz)
- HP71XEx IIC U7 (330–400 MHz)
- HP71XEx IIC U9 (400–480 MHz)
- HP71XEx IIA V1 (136–174 MHz)
- HP71XEx IIA U3 (350–400 MHz)
- HP71XEx IIA U7 (330–400 MHz)
- HP71XEx IIA U9 (400–480 MHz)
- HM78X U2 (450–527 MHz)

V2.7.08.012

The following models are available:

- HP79XEx IIC U3 (350–400 MHz)
- HP79XEx IIC U7 (330–400 MHz)
- HP79XEx IIA U3 (350–400 MHz)
- HP79XEx IIA U7 (330–400 MHz)

3.4 Resolved Issues

None.

4. Released Features in V2.6

This chapter describes the new features supported by the firmware version V2.6.

4.1 Radio

Volume (V2.6.08.009/V2.6.11.013)

The volume of HP5 series radio is optimized.

4.2 Applications

None.

4.3 Important Notes

V2.6.09.010

The following models support Flash memory chips from new manufacturers.

- Portable Radio
  - HP78X
  - HP70X
  - HP68X
  - HP60X
  - HP56X
  - HP50X
  - HP78X UL913
  - HP70X UL913
  - HP79XEx
- Mobile Radio
  - HM68X
  - HM65X

2.6.07.008

- The following models are available:
  - HP79XEx IIC V1 (136–174 MHz)
  - HP79XEx IIC U9 (400–480 MHz)
  - HP79XEx IIA V1 (136–174 MHz)

- HP79XEx IIA U9 (400–480 MHz)

- BT firmware

  You can upgrade the BT firmware of radios in V2.6 or later versions through universal upgrade package.

4.4 Resolved Issues

No.	Resolved Issues
V2.6.11.013	
1	Radios with optional board might freeze during reading and programming.
2	Sometimes, the keyboard lock icon might appear on the screen even when you haven't locked the keyboard.
V2.6.07.008	
1	When you upgraded radios through the Multi-Terminal Batch Upgrade Tool in auto mode, you needed to manually restart the radios after the upgrade is complete.
2	The CPS for PD series radio and the CPS for HP series radio could not be installed on the same computer simultaneously.

5. Released Features in V2.5

This chapter describes the new features supported by the firmware version V2.5.

5.1 Radio

5.1.1 Common

5.1.1.2 New Features

Read Protection

For data security, the radio prevents the CPS from reading configuration data, so that you can write the radio only.

VOX

VOX allows you to trigger the voice transmission by speaking directly without holding down the **PTT** key. When the voice detected by the microphone reaches the level to trigger the transmission, the voice will be transmitted automatically.

Telemetry

Telemetry allows you to remotely control or monitor the device connected to the radio. With Telemetry enabled, you can use another radio to remotely control and check the GIPO status of the radio, further to control and monitor the device connected to the radio.

Remote Mount Kit

The HM78X supports single remote control head and dual remote control heads. The dual control heads can monitor each other and can be installed in heavy vehicles such as ambulances, fire engines, and trucks, ensuring efficient communication.

NOTE

At present, the remote control head does not support BT audio accessories.

5.1.1.3 Enhancements

Programmable Key

You can assign the Playback feature to the programmable key, after which you can press the preprogrammed **Playback** key to start or stop playing an audio.

5.1.2 Conventional

5.1.2.2 New Features

DTMF on Analog Channels

The radio can transmit DTMF on analog channels.

GPS Data in TF Card

The radio records and stores its current GPS data in the TF card. The stored GPS data helps you better monitor and manage the radio.

Channel Backup Upon Power-off

After restart, the radio keeps the channel settings same as before power-off. This feature is only available for HP56X and HP50X.

5.1.2.3 Enhancements

Contact

The number of contacts for portable radios and mobile radios has been increased from 1,024 to 2,048.

Clarity Transmission

Clarity Transmission allows the radio to serve as the transparent transmission channel for data exchange between external devices without any additional adjustment.

- Through BT

  The mobile radio obtains data from the external devices connected to the mobile radio through BT, sends the data to the receiving radio through the air interface, and then the receiving radio transmits the data to the third party through BT, UART, or IP network.

- Through IP Network

  The mobile radio obtains data from the external devices connected to the mobile radio through IP network, sends the data to the receiving radio through the air interface, and then the receiving radio transmits the to the third party through BT, UART, or IP network.

XPT

- The maximum number of sites in the XPT Multi-Site system is increased from 16 to 30.
- The number of channels in each voice list of one site is increased from 8 to 12.
- The number of XPT personality in each roam list is increased from 16 to 30.

Quick GPS

You can set the radio to synchronize GPS data through the serial port of the GPS chip.

5.1.3 Digital Trunking

5.1.3.2 New Features

IoT Data Transmission

IoT Data Transmission realizes IoT data exchange between the external device connected to one radio and the external device connected to another radio.

1. Radio A receives the data from the external device connected to radio A through the serial port, and then uses dual time slots to transmit the data to radio B through the air interface. One time slot transmits ordinary data and the other one transmits emergency data.
2. Radio B sends the received data to the external device connected to radio B through the serial port.

During the IoT data transmission, the radios will not encode and decode the data.

5.1.3.3 Enhancements

BT Clarity Transmission

The mobile radio obtains data from the external devices connected to the mobile radio through BT, sends the data to the receiving radio through the air interface, and then the receiving radio transmits the data to the third party through BT or UART.

Auto GPS Report

The radio transmits its GPS information to the system automatically using the NMEA protocol.

Group Contact

When you make a call to the TX group, you can transmit the voice and receive the voice of all other group members.

When any of other members makes a call to the TX group, you can transmit the voice but will not receive the voice from other remembers.

API

API protocol is optimized.

Battery

The pop-up of the certificated battery is optimized.

5.2 Applications

None.

5.3 Important Notes

V2.5.09.015

HM68X U2 (450–527 MHz) is available.

V2.5.08.013

BP3005 battery (3,000 mAh) is available for HP5 series radio. To use the BP3005 battery on HP5 series radio, upgrade the radio to V2.5 or later versions.

5.4 Resolved Issues

No.	Resolved Issues
V2.5.09.015	
1	When you opened the rcdx. file of the radio through OTAP, not all XPT configuration parameters were displayed properly.
2	Adjusting baud was not available for the API protocol.
3	When Auto Add Contacts was enabled, the radio automatically added a contact in conventional mode, but failed to add that contact in XPT mode.

6. Released Features in V2.4

This chapter describes the new features supported by the firmware version V2.4.

6.1 Radio

Battery High Temperature Alarm (V2.4.01.006)

When the temperature of the smart battery is higher than 65°C, the radio will prompt a high temperature alarm but will not automatically shut down.

6.2 Applications

None.

6.3 Important Notes

None.

6.4 Resolved Issues

No.	Resolved Issues
V2.4.02.007	
In the power-off status for long time, the radio may crash when it was turned on again.	
V2.4.01.002	
1	The radio may power off due to a false high temperature alarm from the smart battery.
2	Some radios may automatically enter the factory mode after upgrading the firmware.

7. Released Features in V2.3

No new features are supported in the firmware version V2.3.

8. Released Features in V2.0

This chapter describes the new features supported by the firmware version V2.0.

8.1 Radio

8.1.1 Common

8.1.1.2 New Features

Language

The radio supports Thai, Hebrew, Urdu, Swedish, and Norwegian, so as to meet demands of users from different countries and regions.

Vocoder

The radio supports the SELP vocoder.

Optional Board Encryption

The radio allows the third party to develop encrypted digital board with Hytera Application Development Kit (ADK).

Wireless Programming

Wireless Programming allows you to use the HyTool Radio Manager app (installed on the smartphone) to do the followings:

- Read and write radios.
- Read the radio logs, helping you check the radio status and locate problems.

NOTE
Only available for HP68X and HP60X.

Cross Programming

Cross Programming allows you to use the programming template of one radio to program another radio through the CPS, significantly saving your time.

For details about the matched models and related operations, refer to *Hytera New Generation and Old Generation DMR Radios Cross-Programming Guide*.

8.1.1.3 Enhancements

None.

8.1.2 Conventional

8.1.2.1 New Features

Private Advanced Encryption

Private Advanced Encryption adopts the Hytera encryption mechanism and algorithm to protect your communication from being eavesdropped.

5-Tone Signaling

Five-Tone Signaling is available for the radio in analog mode.

PTT Call Mode

The radio can be configured to initiate a digital call or an analog call by pressing the **PTT** key on a hybrid channel.

8.1.3 Digital Trunking

None.

8.2 Applications

None.

8.3 Important Notes

V2.0.04.003

New positioning module is available for the following models:

- HP78X
- HP70X
- HP68X
- HP60X
- HM78X

V2.0.04.007

- U5 (806–941 MHz) version is available for HM78X.
- Low-power (1–25 W) version is available for HM78X.

8.4 Resolved Issues

No.	Resolved Issues
V2.0.02.007	

1	If the Real-time Transport Protocol (RTP) analog port was set to an odd number when the mobile radio was connected to the dispatch software through the IP, the mobile radio may crash.
V2.0.02.011	
1	The radio failed to recognize the smart battery.
2	The radio may encounter some issues during the GOB-based custom development.
V2.0.03.006	
1	The radio didn't give prompt when the radio is turned on with low battery power.
2	The radio didn't give prompt when the radio is turned on with an aged smart battery attached.

9. Released Feature in V1.7

This chapter describes the new features and enhanced features of the firmware version V1.7.

9.1 Radio

9.1.1 Common

9.1.1.2 New Features

TF Card Encryption

TF Card Encryption allows you to use the TF card to encrypt the voice and data services, strengthening the communication security.

Before using this feature, you need to store the self-defined encryption algorithm and keys to the TF card.

9.1.1.3 Enhancements

Language

The radio supports Polish, Turkish, Italian, Japanese, Indonesian, Czech, Amharic, and Kazakh, so as to meet demands of users from different countries and regions.

9.1.2 Conventional

9.1.2.1 New Features

None.

9.1.2.2 Enhancements

TF Card Recording

TF Card Recording is available for the radio in analog mode.

This feature allows you to use the TF card to record the on-site voice and voice during a call. The generated audio files are stored in the TF card, and you can manage these audio files.

9.1.3 XPT

None.

9.1.4 Digital Trunking

None.

9.2 Applications

CPS

The limit of running the CPS only as an administrator is cancelled. During CPS installation, it is recommended that you select a non-default installation path, after which you can run the CPS as common users. If you have selected the default installation path, it is recommended that you run the CPS as an administrator.

9.3 Important Notes

The RTP only supports even port numbers. Therefore, if the mobile radio is connected to a dispatch software through IP, make sure that the RTP analog port is set to an even number. Otherwise, the radio may crash.

9.4 Resolved Issues

No.	Resolved Issues
1	The radio failed to display the ID and alias of the calling party in an emergency call.
2	The third party failed to receive the ACK message from mobile radios.
3	The radio reported unusable BT location data.
4	The Pin 8 of the DB26 interface on the HM78X failed to output audio signals.
5	The HP68X failed to display the radio alias in the roaming mode.
6	The CPS gave a prompt that the MD5 verification failed after the License was imported into the CPS.
7	The CPS failed to read or program for the radios of old models.
8	The radio occasionally failed to sound tones.
9	The volume could not be adjusted on the radio when the radio was connected to the remote speaker microphone (RSM) through BT.
10	If non-English strings were added to the radio (for example, you have edited a non-English contact alias or received a non-English message) whose system language was not English, and then you changed the radio system language to English, these strings would be garbled.
11	The radio gave an alert prompt if the basic encryption was disabled.

10. Released Features in V1.6

This chapter describes the new features and enhanced features of the firmware version V1.6.

10.1 Radio

10.1.1 Common

10.1.1.1 New Features

BT Location

BT Location realizes precise positioning together with a BT beacon. After picking up a BT low energy (BLE) signal transmitted by the beacon, the radio sends the signal to the BT location data center to analyze the radio's location.

Currently, this feature mainly applies to BT patrolling and BT indoor positioning.

Smart Battery

You can view the battery information (such as remaining battery, software version, alias, and health) and status on the radio for timely battery charging or replacement.

10.1.1.2 Enhancements

Feature Authorization

For HP7 series portable radio, HP6 series portable radio, and HM78X mobile radio, the XPT Multi-Sites feature is enabled by default.

10.1.2 Conventional

None.

10.1.3 XPT

None.

10.1.4 Digital Trunking

None.

10.2 Applications

None.

10.3 Important Notes

None.

10.4 Resolved Issues

No.	Resolved Issues
V1.6.02.003	
1	The HP70X or the HP60X displays abnormally in specific scenarios.
2	Third-party interface commissioning problem.
V1.6.02.002	
1	Voice broadcast problem.
2	Language configuration problem.

11. Released Features in V1.5

This chapter describes all the features supported by the firmware version V1.5.

11.1 Radio

11.1.1 Common

Power-On

- You can configure whether to display the radio alias during power-on through the CPS.
- To secure data on the radio, you can set a password for power-on.
- In power-off mode, after you reattach the battery, the radio is automatically turned on.

Power-Off

- The last channel settings keep unchanged after the radio restarts.
- The last keypad lock settings keep unchanged after the radio restarts.

Keypad Lock

To avoid inadvertent key entry, you can lock the keypad. With the locked keypad, you can enable some keys to keep working properly.

- Auto Lock

  With this feature enabled, if the radio remains idle beyond a certain period, the keypad will be automatically locked.

- Manual Lock

  You can lock the keypad by pressing the key combination.

Key Block

To avoid misoperations, you can disable the following knob and key:

- Channel/Volume Selector Knob: After this knob is disabled, you cannot use it to switch the channel or adjust the volume.
- Push-to-Talk (PTT) key: After this key is disabled, you cannot press it to transmit voice or data.

Automatic Gain Control

Automatic Gain Control (AGC) allows the calling radio to control the voice output gain within a proper range during transmission, so as to provide improved voice with proper volume for the called radio. This ensures stable voice even in noisy environment.

AI-based Noise Cancellation

AI-based Noise Cancellation allows the radio to automatically eliminate ambient noise when receiving or transmitting

voice. This enhances the voice clarity.

Backlight

In low light conditions, you can light up the display and front panel for optimal operation experience.

Day/Night Mode

You can select the day or night mode to adjust the brightness.

Operation Mode Switch

The radio can operate in conventional mode or digital trunking mode. You can switch the operation mode by either of the following:

- Auto Switch

  When the digital trunking network is not available or features weak signal, the radio can automatically switch to the conventional mode for smooth communication. After the trunking signal becomes strong, the radio can automatically switch back to the digital trunking mode again.

- Manual Switch

  You can switch the mode through the radio menu, rotating the **Channel/Subgroup Knob**, or pressing the preprogrammed **One Touch Call/Menu** key.

BT

The radio with built-in BT chip allows you to use the BT accessories.

- BT Audio Switch

  You can configure the **BT Audio Switch** key through the CPS. After a BT accessory is connected to the radio, you can press the key on the radio to switch the speaker type.

- BT-based Data Transfer

  You can receive the data from an external device through the BT, and then upload the data to the dispatch station through the Clarity Transmission feature.

- BT-based Programming

  You can read and write the data from/to radio through the BT.

Battery Check

To ensure the normal usage and safety, it is recommended to use the battery approved by the Company. If you attaches a battery not approved by the Company, the radio will prompt "Non-authentic Battery" upon power-on.

Power Saving Mode

Power Saving Mode enables the radio to reduce power consumption to extend battery life.

Vocoder

The radio supports AMBE+2™.

QR Code

You can scan the QR code to quickly get the radio information.

Profiles

You can set audio, tones, and vibration of the radio in different profiles, and then select a profile to meet the actual work environment.

Covert Mode

In covert mode, the radio will disable all visual and audible indications.

Radio Block

If you enter the incorrect read/write password for more than the preset times, the radio will enter into locked state. You need to obtain a license from the dealer to unblock the radio.

Voice Broadcast

Voice Broadcast allows the radio to broadcast the key information to free hands and eyes. For example, after channel switch, the radio broadcasts the ID or alias of the new channel.

Emergency Erase Data

Emergency Erase Data allows the radio to erase important data (such as keys for voice or data encryption) in case of emergency, so as to prevent unauthorized access.

Ignition Sense

Ignition Sense allows you to turn on or off the mobile radio by the vehicle engine.

Output Audio Limiter

Output Audio Limiter limits the output audio range of the radio. This can avoid distortion of audio from the external audio device due to over-high audio signal level.

Public Address

Public Address allows you to address to the public through the external speaker.

Recorder

The radio can record the voice calls, and save them as the audio files. This helps you track and manage what is important to the organization, and even provide important evidence if necessary.

Enhanced Encryption

To enhance the key safety, the radio support key generation and import through the KMS Lite.

One Touch Call/Menu

One Touch Call/Menu provides shortcuts to make calls or quick menu access. For example, you can make a call or send a message to the associated contact, or quickly access the predefined menu.

This feature allows you to perform frequently used features by pressing shortcut keys, saving time and effort during radio operation. In addition, it allows you to quickly access the predefined menu to enable or disable a feature.

Quick Dial

A specific feature can be assigned to each numeric key through the CPS. After configuration, you can enable a feature by entering the corresponding number (0–9) on the home screen.

Horn and Lights

Horn and Lights allows the radio to alarm through the external alarm devices (speaker or light) in the following scenario:

The radio makes no operation within the preset time after receiving an emergency alert, a call alert or a private call.

Lone Worker

Lone Worker allows the radio to automatically send an emergency alarm to the companion or the dispatcher in either of the following scenarios:

- You do not operate the radio within the preset time.
- The radio does not transmit voice within the preset time.

Man Down

Man Down allows the radio to automatically enter the emergency mode in either of the following scenarios:

- The radio is inclined by an angle greater than the preset angle.
- The radio keeps motionless (including moving at a constant speed) longer than the preset time.

Customized Audio Tone

Customized Audio Tone allows you to set an audio tone for the radio, which is used for reminding or informing the target radio.

Off Hook Monitor

The mobile radio will enable the Monitor feature when you pick up the RSM, or disable the Monitor feature when you put down the RSM.

11.1.2 Conventional

11.1.2.1 Mobile Management

Scan

Scan allows you to listen to activities on other channels, keeping track of the team members. You can enable this feature by pressing the preprogrammed key or through the radio menu.

The radio supports the following scanning modes:

- Normal Scan

  The radio on either digital or analog channel supports this mode.

  You can add the channels to the scanning list through the CPS or the radio menu. The radio will scan channels in this list. When detecting activities on a channel, the radio pauses scanning and stays on this channel. After the preset time is reached, the radio will leave this channel to continue scanning other channels.

- Vote Scan

  The radio only on analog channel supports this mode.

  Vote Scan is suitable for places with abundant spectrum resource and applicable to the multi-frequency simulcast system that is typically composed of a set of scattered base stations (BSs) with the same transmission frequency. In the system, the repeater allows for wide coverage; and the radio is typically configured to transmit at the same frequency, but receive at different frequencies. The radio scans the frequencies of these BSs, and the select the closest BS for communication through the Vote algorithm.

  Vote Scan includes Fast Vote Scan and Normal Vote Scan.

  - Fast Vote Scan

    You can configure the Fast Vote Received Signal Strength Indicator (RSSI) Level through the CPS, and then enable it. When the radio detects a channel with a RSSI level higher than or equal to Fast Vote RSSI Level and satisfying the squelch conditions, the radio will stay on this channel and carry out the Fast Vote Scan.

  - Normal Vote Scan

    If the radio cannot detect a channel to stay during Fast Vote Scan, the radio will start to perform Normal Vote Scan. When the radio detects a channel with a RSSI level higher than or equal to Start Vote RSSI Level and satisfying the squelch conditions, the radio will stay on this channel.

- Priority Digital Channel Scan

  The radio only on digital channel supports this mode.

  The radio selects the channel with better signal to receive a call according to the RSSI threshold of the priority digital channel.

- If the RSSI of the scanned channel is equal to or higher than this threshold, the radio stays on this channel.
- If the RSSI of the scanned channel is lower than the threshold, the radio will continue scanning other channels in the scanning list.
- If the RRIS of all channels in the list is lower than this threshold, the radio stays on the channel with highest RSSI.

Roam

Roam allows you to enjoy seamless communication across sites or networks in IP Multi-site Connect System. In the system, the radio can communicate with each other under any repeater, which is fully automatic to you.

The radio supports the following roaming modes:

- Passive Site Roam

  With this feature enabled, if the RSSI of the current channel is lower than the preset threshold, the radio will keep detecting the RSSI of every channel or site in the roaming list to select the site with the highest RSSI as the master site. Until the RSSI of the master site is lower than the preset threshold, the radio will start detecting and finding a new master site again. Before finding the site with a stronger RSSI, the radio keeps its master site unchanged. If the radio comes across other activity while performing the Passive Site Roam, it will select the current repeater as the master site.

- Active Site Roam

  With this feature enabled, if you press the **PTT** key or the **Emergency** key, or sends a message, the radio will try to wake up the repeater on the current channel. If the repeater does not wake up, the radio will try to wake up other repeaters in the roaming list to find an active repeater or site. Afterwards, the radio will synchronize itself with this active repeater, finish the transmission, and identify it as the master site. If no sites in the roaming list are available, you will receive a failure indication on the radio.

Off-Hook Suspend Scan

The mobile radio stops scanning when the RSM is off hook and starts scanning when the RSM is on hook.

Off-Hook Suspend Roam

The mobile radio stops roaming when the RSM is off hook and starts roaming when the RSM is on hook.

Power Level

You can set the TX power level to high or low.

Auto TX Power

In repeater mode, when the radio detects that the RSSI of the repeater is higher than the preset threshold, the radio automatically reduces the TX power to a lower power level. This can save power consumption.

11.1.2.2 Access Management

Pseudo Trunking

Pseudo Trunking is used to assign two time slots dynamically in direct mode. When one time slot is busy, the radio will automatically select the other time slot for communication. The two time slots can be used respectively for two calls on one channel at the same time. Pseudo Trunking realizes the dual-time-slot work in the conventional system, and supports the dynamic allocation of the time slots for transmission in repeater mode.

Back-to-Back

Back-to-Back realizes across-mode (analog and digital) or across-band (such as UHF and VHF) voice services between two mobile radios or between a mobile radio and a repeater.

IP Transit

IP Transit connects mobile radios in different places through the TCP/IP-based Ethernet. This allows these mobile radios to exchange voices, data, and control packets with each other.

11.1.2.3 Voice Services

Group Call

The radio can make a group call. It is a call from one user to all the other members in the group.

Private Call

The radio can make a private call. It is a call from an individual user to another individual user.

All Call

The radio can make an all call. It is a call from one user to all the other users in the same system. All call is only enabled for users with high privilege.

Private Call Back to an All Call

If missing an all call, you can call back to the all call initiator through the call logs.

Voice Buffer

Voice Buffer allows the radio to turn on the microphone and save the voice data to the buffer area before the call setup. Upon the call is set up, the radio will send the voice by the buffer time. This can reduce voice data loss.

Priority Interrupt

Priority Interrupt allows you to interrupt the ongoing activities (such as calls or other voice services) on the current channel to release the channel. Auto Priority Interrupt includes Emergency Priority Interrupt, Call Back Priority Interrupt, Message Priority Interrupt, Radio Disable Priority Interrupt, and All Call Priority Interrupt.

11.1.2.4 Data Services

Text Message

The radio allows you to send, receive, forward, and save text messages.

Quick Text

The radio allows you to predefine the frequently used text messages, so that you can quickly send the message without repeatedly entering the content.

Clarity Transmission

Clarity Transmission is used to transfer data from one external device to another using the radio. The radio serves as the transparent transmission channel for data exchange between external devices without any additional adjustment.

11.1.2.5 Security Services

Emergency

The Emergency feature allows you to seek help from the companion or the dispatcher in case of emergency. When an emergency system is associated to a channel, you can activate the emergency feature by pressing the preprogrammed key.

Emergency Type

The system provides emergency services of the following types:

- **Siren Only:** The radio emits siren locally.
- **Regular:** The radio gives visible and audible indications during emergency state.
- **Silent:** The radio gives no indication during emergency state.
- **Silent with Voice:** The radio gives no indication during emergency state, but will unmute its speaker once it receives a call.
- **Alarm with Siren**: The radio transmits the emergency signal to the dispatch station, and then emits siren sounds locally with a visible indication.

Emergency Mode

In emergency system, there are three emergency modes:

- **Alarm**

  The radio only transmits the alarm code after you activate Emergency.

  After other users in the system receives and decodes the alarm code, and then reply an ACK to your radio, your radio will exit the alarm status. To arouse the attention of the other users or to avoid transmission failure due to error on the channel, you can set the alarm code to be sent for multiple times.

- **Alarm with Call**

  The radio both sends the alarm code and makes an emergency call upon Emergency activation.

  With this feature enabled, you need to wait for the ACK. After receiving the ACK, the radio enters the emergency status and you can press the **PTT** key to make an emergency call. During waiting for the ACK, you can also press the **PTT** key to make an emergency call, but the radio stops sending the alarm code and directly enters the emergency status.

- **Call Only**

  The radio only makes an emergency call upon Emergency activation.

  With this feature enabled, the radio directly enters the emergency status without waiting for the ACK. You can press the **PTT** key to make an emergency call.

AIE

AIE encrypts the signaling over the air. This can ensure data privacy during transmission.

End-to-End Encryption

End-to-End Encryption (E2EE) provides end-to-end encryption for voice and data to protect you against eavesdropping.

Multi-Key Decryption

Multi-Key Decryption allows you to decrypt the received voices and data with multiple keys in the key list.

Random Key Encryption

Random Key Encryption is available for the digital channels. With this feature enabled, the calling radio will encrypt its transmitted voices or data by an encryption key randomly selected from the key list. Then, the receiving radio needs to decrypt the voices or data through Multi-Key Decryption.

Authentication

Authentication verifies the validity of the radios and dispatch station through the agreed encryption algorithm. When receiving a service request, the radio authenticates the service initiator. Only after the service initiator passes the authentication, the radio responds to the service request.

Authentication prevents unauthenticated users to access important services remotely, such as stun/revive, wireless settings, and remote monitor.

11.1.2.6 Location Services

The radio supports global navigation satellite system. You can view the location information through the radio menu and send the location message to the dispatch station or other radios.

Location System

The radio supports GPS, BDS or GLONASS.

Location Information

The radio allows you to send the location information in text message format to the designated contact.

Location Information Divert Channel

If the dispatch station requires the radio to report its location information based on the LP service protocol after the RRS registration of the radio, the radio will report its location information to the dispatch station regularly.

If no channel is available for uploading the location information, the radio can divert to the Location Information Divert Channel configured by CPS for uploading. After upload, the radio returns to the original channel.

Single GPS

To save air interface resources, the radio adopts Unified Single Block Data to send the GPS data.

Quick GPS

If the dispatch station allocates time slices to different radios under the dispatch station, the radio will upload its location information to the dispatch station according to the sequence of its time slices. This enables more radios to upload location information in the same period, so as to improve the usage of Location Information Divert Channel and the reliability of location information upload.

NOTE

The dispatch station can split the "upload interval" into several equivalent time slices (Number of Time Slices = Upload Interval/Upload Step x Channel Usage Rate).

Location Query

Location Query allows you to query the location information of another radio through the radio menu. The radio with location chip displays the distance, direction, longitude and latitude of the peer radio, while the radio without location chip displays longitude and latitude only.

Voice with Location

Voice with Location enables the radio to transmit voice call with location information. After analyzing the call attached with location information, the called party can obtain the location information of the calling party.

Call Location

After the call is set up and the speaking radio has enabled the Call Location feature, its location information will show on the peer radio.

Location Report During Receiving

Location Report During Receiving allows the radio to report its location during call receiving. If the radio receives the

location report request while receiving a voice, the radio will do the following:

- Divert to the Location Information Divert Channel to report its location, with this feature enabled.
- Report its location after receiving the voice, with this feature disabled.

RSSI Report

To save channel resources and enhance upload efficiency, RSSI Report allows the radio to report the GPS data together with the latest downstream RSSI data to the dispatch station on the dedicated data channel. The dispatch station optimizes the frequency coverage by analyzing the RSSI data.

The radio may report RSSI data either periodically or once.

GPS Message Upon Emergency Alarm

GPS Message Upon Emergency Alarm allows the radio to send the GPS message before sending the digital emergency alarm.

11.1.2.7 Supplementary Services

You can initiate any of the supplementary services through the radio menu or pressing the preprogrammed **One Touch Call** key. Meanwhile, the target radio must feature Decode; otherwise, it is unable to respond to the received command.

Radio Check

Radio Check allows you to check whether the target radio is in use in the system without disturbing it. When receiving the Radio Check command, the target radio gives no visible or tone indication but sends a confirmation message to the initiating radio automatically.

Remote Monitor

Remote Monitor allows you to activate the microphone of the target radio remotely, so that the target radio can transmit the ambient sounds to the initiating radio secretly.

Remote Monitor allows you to check the status of a radio that is already turned on but does not respond, which mainly applies the following scenarios:

- The radio is stolen.
- The radio is not properly used.
- In special situations, hands-free communication is needed.

Call Alert

After receiving a call alert signaling, the radio will give the alert tone or the LED indication, or display the initiating radio's ID or alias on the LCD until you clear these indications. When receiving the call alert, you can press the **PTT** key to make a private call to the alert initiator.

Kill

Kill allows you or the dispatcher to kill the stolen or lost radio remotely, making it unavailable for operational use. This helps prevent potential risks. This feature also allows you to temporarily kill a radio unauthorized or occupying channel resources illegally. In this case, the killed radio will have a blank display and be unable to make or receive calls. The killed radio can be turned on or off only.

Revive

Revive allows you to revive the killed radio remotely.

11.1.2.8 Third-Party Development Services

With the Hytera Application Development Kit (ADK), the radio can be controlled and dispatched by the third-party partner, including online radio status management, text messages, and voice calls. The ADK provides a series of application programming interfaces (APIs) for DMR products, documents such as software/hardware protocol specifications and development guides, and corresponding libraries. Hytera provides the following ADKs for different products to help third-party partners extend product features:

- PC ADK

  The PC ADK applies to those who deploy the dispatch station services on the PC or PC-like devices. Hytera provides specifications, and C++ or C# APIs and libraries based on the Windows operating system. This can improve the efficiency of service development and product release. For non-Windows operating system, refer to the Peripheral ADK.

- Peripheral ADK

  The Peripheral ADK applies to those who develop hardware products on the portable or mobile devices. The hardware products can be incorporated into radios or connected to radios as accessories. Therefore, Hytera provides both protocol specifications and physical interface information such as optional board and accessory interface definitions. The API defined in this ADK can also be used on PCs.

11.1.2.9 Analog Features

Scan

Scan allows you to listen to activities on other channels, keeping track of the team members.

Monitor

Monitor allows the radio to receive more signals including weak signals, and helps you to recognize weak voices in the speaker.

Squelch Level

Squelch Level adjusts the RSSI required by the analog channel during reception. The higher squelch level requires a

stronger RSSI.

Pre-Emp and De-Emp

Pre-Emp is used to filter the TX signal, and DE-Emp is used to filter the RX signal. This enhances audio clarity.

Compandor

Compandor allows the radio to compress the voice signal when transmitting and decompress the voice signal when receiving, as so to improve the voice quality.

CTCSS/CDCSS

Continuous Tone-Coded Squelch System (CTCSS) and Continuous Digital-Coded Squelch System (CDCSS) are signaling lower than audio frequency. Only with the same CTCSS/CDCSS settings, the called radio and calling radio can communicate with each other.

Emergency

The Emergency feature allows you to seek help from the companion or the dispatcher in case of emergency. You can initiate an emergency call with the highest priority even when the radio is transmitting or receiving.

Scrambler

Scrambler protects the voice communication privacy. It inverts and restores the frequency spectrum of a certain frequency point to encrypt the voice.

11.1.3 XPT

11.1.3.1 Mobile Management

Auto TX Power

During transmitting, the radio automatically adjusts TX power according to the RSSI of the Extended Pseudo Trunk (XPT) repeater to reduce power consumption.

Roam

Roam allows you to enjoy seamless communications across all XPT sites in the same IP Multi-site Connect System. Roam includes the following types:

- Active Roam

  If the radio disconnects from the current XPT site when initiating a call or transferring data, it switches to the available XPT site in the adjacent site list or roaming list to initiate the call or transfer the data.

- Passive Roam

  If the radio detects that the RSSI of the current XPT site is lower than the RSSI threshold or disconnects from the current XPT site, it switches to the XPT site with strongest RSSI in the adjacent site list or roaming list.

Multi-Site Handover

When the radio detects the RSSI of the current site is weak and satisfies the conditions for multi-site handover, it automatically switches to the adjacent site with stronger RSSI.

11.1.3.2 Access Management

Follow Free Channel

The idle radio can switch to the channel of the free repeater to monitor calls, during which the radio still initiates the calls on the channel of the master repeater. The Follow Free Channel can reduce the delay in receiving call to avoid missing the important voice.

11.1.3.3 Voice Services

Group Call

A group call is a call from an individual user in a group to all the other members in the group.

Private Call

A private call is a call from an individual user to another individual user.

All Call

An all call is a call from an individual user to all the other users in the XPT system. Generally, all call is only enabled for users with high privilege.

Priority Call

When the radio is involving with an ongoing call with low priority and then detects an incoming call with high priority in the site, it terminates the call with low priority to answer the call with high priority.

Priority Interrupt

You can interrupt the ongoing call on the current channel to release the channel, so as to initiate a new service. This can enhance the utilization of channel resources.

11.1.3.4 Data Services

Short Message

In the XPT system, the radio allows you to receive, send, forward, or store the text short message.

Quick Text

The radio allows you to predefine the frequently used text messages on the radio, so that you can quickly send the message without repeatedly entering the content.

Dedicated Data Channel

In the XPT system, the dedicated data channel ensures the timeliness of the RRS and GPS services for efficient dispatch.

The dispatch station and the third-party application need to obtain the online status of the radio through the RRS and obtain the location through the GPS. This allows the radio to divert to the dedicated data channel to send the RRS or GPS data.

Clarity Transmission

This feature is used to transfer data from one external device to another using the radio. The radio serves as the transparent transmission channel for data exchange between external devices without any additional adjustment.

11.1.3.5 Security Services

Emergency

The Emergency feature allows you to seek help from the companion or the dispatcher in case of emergency. When an emergency system is associated to a channel, you can activate the emergency feature by pressing the preprogrammed key.

Emergency Type

The XPT system provides emergency services of the following types:

- **Siren Only:** The radio emits siren locally.
- **Regular:** The radio gives visible and audible indications during emergency state.
- **Silent:** The radio gives no indication during emergency state.
- **Silent with Voice:** The radio gives no indication during emergency state, but will unmute its speaker once it receives a call.
- **Alarm with Siren**: The radio transmits the emergency signal to the dispatch station, and then emits siren sounds locally with a visible indication.

Emergency Mode

In the XPT emergency system, there are three emergency modes:

- **Alarm**: The radio only transmits the alarm code after you activate Emergency.
- **Alarm with Call**: The radio both sends the alarm code and makes an emergency call upon Emergency activation.
- **Call Only**: The radio only makes an emergency call upon Emergency activation.

E2EE

E2EE allows the radio to encrypt voice and data on the digital channel to prevent eavesdropping and protect the communication privacy.

Random Key Encryption

With this feature enabled, the calling radio will encrypt its transmitted voices or data by an encryption key randomly

selected from the key list. Then, the receiving radio needs to decrypt the voices or data through Multi-Key Decryption.

Multi-Key Encryption

Multi-Key Decryption allows you to decrypt the received voices and data with multiple keys in the key list.

Authentication

Authentication verifies the validity of the radios and repeater through the agreed encryption algorithm. This feature applies only to the voice channel. Two types of Authentication between a radio and a repeater are as follows:

- Static Authentication

  When initiating a call, the radio will calculate the authentication response code using the preset authentication key and random number, and then send the code to the repeater.

- Dynamic Authentication

  When initiating a call, the radio will calculate the authentication response code using the preset authentication key and the random number sent by the repeater. Then, it sends the code to the repeater.

11.1.3.6 Location Services

The radio supports global navigation satellite system. You can view the location information through the radio menu and send the location message to the dispatch station or other radios.

Location System

The radio supports GPS, BDS or GLONASS.

Location Information

The radio allows you to send the location information in text message format to the designated contact.

Single GPS

To save air interface resources, the radio adopts Unified Single Block Data to send the GPS data.

Quick GPS

If the dispatch station allocates time slices to different radios under the dispatch station, the radio will upload its location information to the dispatch station according to the sequence of its time slices. This enables more radios to upload location information in the same period, so as to improve the usage of Location Information Divert Channel and the reliability of location information upload.

NOTE

The dispatch station can split the "upload interval" into several equivalent time slices (Number of Time Slices = Upload Interval/Upload Step x Channel Usage Rate).

Location Query

Location Query allows you to query the location information of another radio through the radio menu. The radio with location chip displays the distance, direction, longitude and latitude of the peer radio, while the radio without location chip displays longitude and latitude only.

The initiating radio must have a display and supports keypad operations; and the queried radio needs to feature Location.

Voice with Location

Voice with Location enables the radio to transmit voice with location information. After analyzing the call attached with location information, the called party can obtain the location information of the calling party.

Call Location

After the call is set up and the speaking radio has enabled the Call Location feature, its location information will show on the peer radio.

Location Report During Receiving

If the radio receives the location report request from the XPT system, the radio will divert to the Location Information Divert Channel to report the location.

RSSI Report

To save channel resources and enhance upload efficiency, RSSI Report allows the radio to report the GPS data together with the latest downstream RSSI data to the dispatch station on the dedicated data channel. The dispatch station optimizes the frequency coverage by analyzing the RSSI data.

The radio may report RSSI data either periodically or once.

GPS Message Upon Emergency Alarm

GPS Message Upon Emergency Alarm allows the radio to send the GPS message before sending the digital emergency alarm.

Data Channel Weakened

In case of disconnection from the dispatch station or when the data repeater is turned off, the radio automatically switches to the voice repeater to transmit GPS or RRS data.

11.1.3.7 Supplementary Services

For details, see 11.1.2.7 Supplementary Services.

11.1.3.8 Third-Party Development Services

For details, see 11.1.2.8 Third-Party Development Services.

11.1.4 Digital Trunking

11.1.4.1 Mobile Management

Last Stored TSCC Hunt

The radio stores the latest 10 TSCCs on which it has registered successfully. Every time when the radio is restarted or de-registered, the radio attempts to register on these TSCCs first. The radio will save and update the 10 TSCCs automatically, and hunt them first during Short Hunt or Comprehensive Hunt.

Fixed TSCC Hunt

The radio provides multiple TSCC hunting strategies for quick registration and has the following hunting modes:

- Short Hunt

  With Short Hunt selected, if the radio has failed to register on the latest 10 TSCCs, the radio will hunt the Fixed TSCC List circularly.

- Comprehensive Hunt

  With Comprehensive Hunt selected, if the radio has failed to register on the latest 10 TSCCs, the radio will hunt the Fixed TSCC List circularly. If the registration still fails, the radio will hunt throughout the Start Channel of Comprehensive Hunt to the End Channel of Comprehensive Hunt to find channels available for registration.

- Team Hunt

  With Team Hunt selected, if the radio has failed to register on the latest 10 TSCCs, the radio will hunt the Team Hunt List circularly.

Flexible TSCC Hunt

Flexible TSCC Hunt can be used in case of dispersed frequencies, different frequency plans in different areas, or other occasions where the Fixed TSCC Hunt is not available. With this hunting mode selected, the radio hunts the channels directly based on the absolute TX/RX frequency configured by the radio or designated by the system.

Regular TSCC Switch

After the system changes the standby channel into the active TSCC at the specified interval, the radio needs to switches to the new TSCC.

Non-Dedicated Control Channels

The radio can operate on the non-dedicated control channel (Non-DCCH), a temporary traffic channel (TCH) switched from control channel. Thus, the BS can provide addition channel for handling more services. This helps make use of the channel resources.

Smart TSCC Update

Smart TSCC Update allows the radio to quickly update the TSCC over the air interface in broadcast manner. With this

feature enabled, after receiving the update command, the radio identifies the zone number and service version number. In case of the same zone number but different version number, the radio will download data through the designated TCH; otherwise, the radio will ignore the command.

Supplementary Registration on Multiple TCHs

When the radio fails to process services on the TSCC such as Resgisteraton, Group Attachment/Report, Auto Select Available Site, this featue allows the radio to automatically switch to the multiple TCHs (broadcasted by the TSCC) to process these services.

Multiple TSCCs

Multiple TSCCs apply to the scenario where many radios are used in the same BS. A BS can be configured with one, two, and four (max.) TSCCs by network management application. You can plan the multiple TSCCs as follows:

- On the carrier board of the TSCC, one time slot is main control channel and two time slots are GPS supplementary control channel.
- On the carrier board of the TSCC, one time slot is main control channel and two time slots are broadcast/group call channel.

Registration

To facilitate the system to record and update the current BS location, the radio will register with the BS in the following scenarios:

- The radio is turned on.
- The radio finds a TSCC again.
- The radio enters the dead area.

Upon registration, the radio hunts available TSCCs and checks their validity, and then sends a registration request on the valid channel.

Each TSCC has a unique network identification code allocated by the system. The radio hunts TSCCs and receives the network identification code allocated on the RX channel according to the hunting strategies. By comparing the network identification code with the code stored on the radio, the system determines whether the radio can access the current network.

Deregistration

The radio sends a request to deregister from the system upon shutdown. For normal operation, the radio must register in the system again after restart.

Periodic Registration

This is a supplementary service to manage the location and status of the radio.

When the system is idle, it sends the conditions and periods of Periodical Registration repeatedly on the TSCC. If meeting these conditions, the radio will start registering according to the designated period to build the location registration.

Background Hunt

The idle radio keeps detecting the RSSI of the BS with which it registers. If the RSSI of the BS meets the preset conditions to start Background Hunt, the radio automatically hunts for an adjacent BS with stronger RSSI and registers with it.

Multi-Site Handover

During a call, when a radio moves away from the registered BS, the signal becomes weak. In this case, Multi-Site Handover enables the radio to automatically register with a BS with a stronger RSSI, as so to ensure a smooth communication.

Home Station Hunt

Home Station Hunt offers the radio the priority to register with a frequently used BS. This helps radios to be allocated to each BS in balance by the system and avoid BS overload that may prolong the system response time.

Manual Site Switch

You can designate the TSCC NO., BS NO., or system code. After that, the radio hunts the corresponding TSCC and registers with the BS.

You can also register the radio with the adjacent BS through the Adjacent List menu.

Auto Select Available Site

If a Participant group under a BS with which the radio registers is restricted, when the radio makes a call to this Participant group, the BS will not allocate TCH for this group call and alert the radio that this Participant group is restricted. The Auto Select Available Site feature allows the radio to solve this restriction problem and ensure the availability of the current group. The feature details are as follows:

- Solving the group call restriction problem

  When the radio makes a call to a restricted group, the radio can register with an adjacent BS under which the group is not restricted. Thus, the radio can make the group call successfully.

- Ensuring the availability of the current group

  If the current group is not restricted under a BS with which the radio registers, this group must not be restricted under the BSs for Background Hunt and Home Station Hunt to ensure the availability of the current group.

Timeout Auto Hunt

When the radio fails to transmit data or set up a call in the specified time, it prompts "Search Station" and automatically

searches for available BSs. If the RSSI of the BS is stronger than the Timeout Auto Hunt Threshold, the radio registers with the BS to continue the service.

TSCC Vote Now

TSCC Vote Now initiated by the system applies to situations when the radio cannot switch to a preferential BS or the radio needs to switch to a particular BS due to emergency. The BS broadcasts TSCC NO, priority level, or other information of an adjacent station.

After receiving the TSCC Vote Now command, the radio will determine whether to register with the adjacent BS according to the priority level and RSSI of the adjacent BS and the current BS.

Roam

Roam allows the radio to register in a non-home network. The system sets the frequently used network as the home network. If registering in a non-home network, the radio will display the roaming icon.

The roaming types are as follows:

- Zone Roam

  You can designate a zone network as the home network. The radio can roam to other zone networks.

- Area Roam

  You can designate an area network in a zone as the home network. The radio can register only in the zone, and roam to other area networks in the zone.

- Site Roam

  You can designate a base sation as the home station. The radio can register only in the area, and roam to other BSs in the area.

Single BS Mode

The BS may disconnect from the dispatch station due to transmission line malfunction in system operation. The disconnected BS will switch to single BS mode automatically. If no networked BS is available, the radio will operate in single BS mode.

Quick Background Hunt

Quick Background Hunt allows the radio to monitor the adjacent time slots of the current TSCC in real time and adaptively adjust the period to detect the RSSI of the adjacent BS. This not only has no impact on radio service, but also helps the radio increase the scan speed and quickly switch to the optimal BS.

Power Control

Power Control allows the radio to automatically adjust the power level according the following requirements by the system:

- When the radio is close to the BS, the system requires the radio to reduce the TX power.
- When the radio is far away from the BS, the system requires the radio to increase the TX power.

This prevents poor TX performance caused by the distance between the radio and BS, and reduces the power consumption of the radio.

Time-Out Timer (TOT)

A call beyond the maximum duration will be ended. Within a certain period, the radio can only receive calls from other members but cannot initiate calls.

11.1.4.2 Voice Services

PSTN/PABX Call

The radio can initiate calls to the Public Switched Telephone Network (PSTN) or Private Automatic Branch Exchange (PABX) terminals.

Secondary Dialing in PSTN/PABX Call

You can dial the extension of the PSTN or PABX terminals.

Private Call

In the digital trunking system, a private call is a call from an individual user to another individual user, including a call between a radio and a radio, a dispatch station and a dispatch station, or a radio and a dispatch station.

To make a private call, the radio should apply for a TCH first. After successful application, you can press the **PTT** key to talk.

Group Call

In the digital trunking system, a group call is a call from an individual user in a group to all the other members in the group. The group members include the dispatch station and the radios with the same group number.

Current Group Report

When the current Participant group monitored by the radio is changed, the radio will report it to the BS.

Hunt Group Attachment

After the current group is attached successfully, the radio attaches to the groups in the hunting list associated with the current group and saves the attachment results for each group. The radio receives and sends calls only to or from the attached groups.

Group Dispatch

To facilitate commutation between members in different groups, Group Dispatch allows the dispatch station to combine different talk groups into one group. In the case, the call you transmit or receive is a group call to all members of the combined group. Conversely, the dispatch station can disband the combined group.

Late Entry Delay Time

If the called radio exits a group call, the called radio does not respond to the group call within a certain period.

Priority Group

The Priority Group is an additional attribute of group. With this feature enabled, the radio participates in a group call according to the group priority level. The feature is only for the voice service.

Late Entry

The Late Entry feature allows group members to join the ongoing group call later. It is very helpful in the following situations:

- When the group call is set up, the radio is in an area beyond the communication coverage. Then, the radio enters in the communication coverage.
- When the group call is set up, the radio is in power-off mode. Then, the radio is turned off.
- When the group call is set up, the radio is in an ongoing private call or group call with higher priority. Then, the radio ends the call.
- When the group call is set up, the radio is in an area with weak signal or interfered by radio. Then, the radio enters an area with strong signal, or is no longer interfered by radio or other items.
- The radio becomes a member only after the group call is set up.

All Call

An all call is a call from an individual user to all the other users in the BS, area, region, or system. Classified by priority, it includes Emergency All Call, Priority All Call, and Normal All Call.

Include Call

An include call means that the radio or dispatch station can add another group call into the ongoing call during the call hang time. An include call has the same Interrupt and Override feature as a group call.

Call Forward

When the radio is malfunctioned, turned off, or you cannot or do not want to answer a call, Call Forward allows you to forward the call to the predefined radio. With the feature enabled, the radio can forward the half-duplex private call to another radio (new called party) unconditionally or conditionally.

Favorite Contacts

The radio allows you to add the frequently used private or group contacts to the Favorite Contact List.

Priority Call

Even when all TCHs are busy, the radio can normally make voice service with higher priority.

Queue/Auto Callback

If all channels are busy during call making, the radio will receive a notification that the call is in the queue. When a channel is available and the call is in front of the queue, the radio will set up the call.

Interrupt/Override

Interrupt or Override allows the dispatch station to control the communications between radios and distribute the resources. This is convenient for dispatch.

- Interrupt allows the dispatch station to interrupt the call it is involved in and get the talk right.
- Override allows the dispatch station to end all calls of a radio and make the radio receive a call from the dispatch station.

Call Logs

The Call Logs menu allows you to view the outgoing calls, incoming calls, missed calls, and other call information.

Voice Buffer

Voice Buffer allows the radio to save the voice data in the buffer area. This reduces the voice data loss and further ensures call quality in following scenarios:

- Press the **PTT** key to talk after a call is set up.
- Press the **PTT** key to apply for talk right during wait time.
- Perform Multi-Site Handover during voice transmitting

One Touch Call Interrupt

During a call, you can press the preprogramed **One Touch Call** key to initiate a new call.

11.1.4.3 Data Services

Private Message

A private message is a message from an individual user to another individual user, including a message between radios or between a radio and a dispatch station.

Group Message

A group message is a message from an individual user in a group to all the other members in the group.

- The radio can send a message to all Participant groups and Response groups but cannot send a message to the Background groups.
- The radio can receive a message from all Response groups and all Background groups. The radio can also receive a message from the Participant group which is selected by the current knob position but cannot receive a message from other Participant groups.

Quick Text

The radio allows you to predefine 10 messages (also named quick text) into the radio through the CPS. Then, you can view, edit, or send these messages quickly through the radio menu.

Status Message

The radio can send the status message that consists of the customable text and status code according to actual needs. When you send a status message, only the status code will be transferred so as to reduce channel occupation duration and ensure communication privacy. After the target radio receives this message, it will display the text corresponding to the status code.

Custom Message

The custom message contains some self-defined characters. When sending a custom message, the radio parses the self-defined characters and converts them into the real text message.

Long Message

The radio can send a message up to 500 characters to other radios or a dispatch station.

Packet Data

To exchange long data between radios or between a radio and an application server (internal and external system network elements that can initiate or receive group services), a narrowband packet data TCH must be built between radios and the system. This channel consists of OTAP and system media channel.

This can transmit all types of media.

Clarity Transmission

Clarity Transmission is used to transfer data from one external device to another using the radio. The radio serves as the transparent transmission channel for data exchange between external devices without any additional adjustment.

Dual-Slot Data Transmission

The radio exchanges the packet data with other devices through the dual-slot. This can accelerate the transmission of the packet data and save time.

11.1.4.4 Location Services

GPS allows the radio to report its current location to the dispatch station or the third-party application in real time. This feature provides visualized dispatch, facilitating resource distribution and enhancing efficiency, especially in case of emergencies. With the GPS feature, you can get the real-time location of the radio, send the location information to another radio, or query the location information of the nearby radios.

Location View

The radio allows you to view the current location information of the radio.

Location Query

Location Query allows you to query the location information of another radio through the radio menu. The radio with location chip displays the distance, direction, longitude and latitude of the peer radio, while the radio without location chip displays longitude and latitude only.

Message with Location

The radio can send shot messages with location to the dispatch station so that the dispatcher knows where the radio is.

Voice with Location

With this feature enabled, the radio transmits the GPS data while making voice services including private call, group call, all call, ambient listening, and emergency call. Then, the system and the called party can get the location of the calling radio by analyzing the GPS data in the call.

Call Location

Call Location is subject to the Voice with Location feature. The called radio gets the location of the calling radio by analyzing the GPS data in voice frames, and further calculates the direction angle, distance, or more parameters with the calling radio. The called radio can display six direction angles and distance, exact direction angles and distance, or exact GPS coordinates of the calling radio.

Invalid GPS Data Response

Whether the GPS data is valid or not, the radio will upload the GPS data to the system.

Auto GPS Report

The radio can automatically upload its location to the system.

Location Report After Releasing the PTT Key

When you release the **PTT** key, the radio will automatically upload the current location.

Nearby Radios Query

The radio can send the command to the dispatch station to query the information of nearby radios.

11.1.4.5 Security Services

Emergency

The Emergency feature allows you to seek help from the companion or the dispatcher in case of emergency. When an emergency system is associated to a channel, you can activate the emergency feature by pressing the preprogrammed key.

Emergency Type

The system provides emergency services of the following types:

- **Siren Only:** The radio emits siren locally.
- **Regular:** The radio gives visible and audible indications during emergency state.
- **Silent:** The radio gives no indication during emergency state.
- **Silent with Voice:** The radio gives no indication during emergency state, but will unmute its speaker once it receives a call.
- **Alarm with Siren**: The radio transmits the emergency signal to the dispatch station, and then emits siren sounds locally with a visible indication.

Emergency Mode

In emergency system, there are three emergency modes:

- **Alarm**: The radio only transmits the alarm code after you activate Emergency.
- **Alarm with Call**: The radio both sends the alarm code and makes an emergency call upon Emergency activation.
- **Call Only**: The radio only makes an emergency call upon Emergency activation.

Ambient Listening

Ambient Listening allows the dispatcher to listen to audio activity around the idle radio, during which the listened radio gives no visual or audible indication. It includes Emergency Ambient Listening and Normal Ambient Listening.

Authentication

Authentication prevents unauthorized users from accessing the network. For registration, the radio will verify the identity with the system through the agreed encryption algorithm.

E2EE

E2EE encrypts the data transferred from one radio to another radio during transmission. The data cannot be decrypted until the peer radio receives it.

OTAR

Over the Air Rekeying (OTAR) manages only the E2EE keys using the encryption method specified by Hytera or DMRA. The radio updates or deletes the keys as required by the Key Distribution and Management Center (KDMC).

11.1.4.6 Supplementary Services

OTAP

OTAP allows you to program the frequently used parameters (such as private contacts, group contacts, and network parameters) of the radio remotely through the network management application. For details, see the OTAP interface in the network management application.

Stun/Revive

Stun allows the authorized network administrator or the dispatcher to stun the lost radio to prevent unauthorized use. The stunned radio is deprived of all functions excluding registration, reviving, authentication, and GPS pulling.

Revive allows the authorized administrator or the dispatcher to revive the stunned radio to normal status and access to the network service.

Kill

Kill allows the authorized network administrator or the dispatcher to kill the lost or stolen radio through the OTA signaling. The killed radio is incapable of any operation permanently, unless it is re-programmed by the dealer.

Radio Check

Radio Check allows the dispatcher to check whether the radio is in use in the system without disturbing it. After receiving the Radio Check command from the dispatch station, the radio gives no other visible or tone indication except the LED indication, but sends a confirmation message to the dispatch station automatically.

Applications

CPS

The CPS is a radio programming software. Only after programming, the radio can be normally used.

Tuner

The Tuner is used to debug and test the radio. It allows you to adjust the radio parameters according to actual needs.

KMS Lite

The KMS Lite is an encryption key management system for radios. It can independently generate and distribute keys.

12. Abbreviations

Abbreviation	Full Name
ADK	Application Development Kit
AGC	Automatic Gain Control
CPS	Customer Programming Software
GPS	Global Position System
OTAP	Over the Air Programming
OTAR	Over the Air Rekeyking
OVCM	Open Voice Channel Mode
PABX	Private Automatic Branch eXchange
PSTN	Public Switched Telephone Network
PTT	Push to Talk
RTP	Reliable Transport Protocol
SIP	Session Initiation Protocol
TSCC	Trunked Station Control Channel

Address: Hytera Tower, Hi-Tech Industrial Park North, 9108# Beihuan Road, Nanshan District, Shenzhen, People's Republic of China

Postcode: 518057

https://www.hytera.com