

# DMR Conventional Radio BT User Manual



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# **Documentation Information**

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

## **Conventions**

#### **Icon**

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	Arning Indicates situations that could cause minor personal injury.	
Danger	Indicates situations that could cause major personal injury or even death.	

#### **Notation**

Notation	Description	
Bold	The text in boldface denotes the name of a hardware button or a software interface element.  For example, press the <b>PTT</b> key.	
->	The symbol directs you to access a multi-level menu. For example, to select "New" from the "File" menu, we will describe it as follows: File -> New.	

# **Revision History**

Version	Release Date	Description
R9.0	September 2018	<ul> <li>Added BT Call, BT Programming, BT Positioning, BT Firmware Upgrade and BT API to PD66X.</li> <li>Added BT Transmission to MD65X and MD78X.</li> <li>Separated the operations of wireless finger PTT as a single step.</li> <li>Added MD65X/MD78X section to introduce how to connect the radio with the BT device.</li> <li>Optimized the descriptions in BT Positioning.</li> <li>Modified models of programming cables for BT firmware upgrade.</li> </ul>

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Version	Release Date	Description
R8.5	August 2017	<ul> <li>Added BT Positioning section to introduce the feature configuration and operation.</li> <li>Added BT Firmware Upgrade section to introduce the feature operation.</li> <li>Added manual match feature for PD98X and X1p when using the BT call feature.</li> </ul>
R8.0	October 2016	<ul> <li>Added the sections as follows:</li> <li>PD98X/PD66X/X1p: To introduce how to configure the BT feature and how to connect the radio with the BT device.</li> <li>PD6 and PD7 Series: To introduce how to connect the radio with the BT device.</li> <li>BT Programming: To introduce how to wirelessly program the radio by the BT dongle.</li> <li>BT API: To introduce the BT API for DMR radios.</li> <li>Abbreviations: To explain the abbreviations in this manual.</li> </ul>
R5.0	December 2012	Initial release.

User Manual Overview

# 1. Overview

### 1.1 Introduction

BT is a kind of wireless technology that supports short-distance (generally within 10m) communications between devices. The BT feature enables the radio to wirelessly exchange information with the BT devices, such as wireless finger PTT, wireless earphone, wireless remote speaker microphone, BT beacon, PC etc. The technology effectively simplifies radio operations and greatly enriches radio applications.

The BT feature of DMR radios is mainly applied in the following five aspects:

- BT Call: Transmit or receive the call through BT audio accessory.
- BT Programming: Program the radio wirelessly.
- BT Positioning: Position the radios in real time, and help user timely respond the dispatching order.
- BT API: Provide third party with API for more wireless applications.
- BT Transmission: Provide an easy way to transmit data. The radio can receive data from the peripheral device through BT, and then transmit it to the dispatch station through Clarity Transmission. For configurations, refer to DMR Conventional Mobile Radio\_Clarity Transmission\_Application Notes.

Meanwhile, the BT firmware can be upgraded via third-party software to fix bugs and improve the performance.

# 1.2 Application Scope

Different radios support different BT features.

Feature	Model	
BT Call	<ul> <li>Portable Radio:</li> <li>PD98X, PD66X, X1p and X1e (build-in BT module)</li> <li>PD6 and PD7 Series (through BT adapter)</li> <li>Mobile Radio:</li> <li>MD65X and MD78X (through BT adapter)</li> </ul>	
BT Programming	PD98X and PD66X	
BT Positioning	PD98X and PD66X	
BT Transmission	MD65X and MD78X (through BT adapter)	
BT Firmware Upgrade	PD98X, PD66X, X1p and X1e	
BT API	PD98X and PD66X	

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# **1.3** Application Protocols

The BT module of PD98X, PD66X, X1p and X1e supports following protocols.

- BT Protocol (X1p and X1e: V2.1+ EDR; PD98X and PD66X: V4.0)
- HFP
- SPP

## 1.4 Versions

- R9.0: PD66X supports BT Call, BT Programming, BT Positioning, BT Firmware Upgrade and BT API.
   MD65X and MD78X support BT Transmission.
- R8.5: PD98X supports BT Positioning.
- R8.0: PD98X supports BT Programming.
- R7.8: PD98X supports BT Call, BT Firmware Upgrade and BT API.
- R7.0: MD65X and MD78X support BT Call.
- R5.0: X1p and X1e support BT Call and BT Firmware Upgrade.



For PD6 (except PD66X) and PD7 series, the BT Call is performed through an external BT adapter.

User Manual BT Call

# 2. BT Call

## 2.1 Introduction

With the feature enabled, the radio transmits or receives the call through BT audio accessory. The feature facilitates radio operations, enhances communication imperceptibility and free hands to improve work efficiency.

#### 2.2 Restrictions

- The feature is available only for PD98X/PD66X/X1e/X1p. Other radios need to connect to an external BT adapter to perform BT call.
- After the radio is connected to a BT audio accessory, it inputs or outputs the voice through the audio accessory,
   and is not affected by the configurations of its speaker and microphone.
- When the radio is connected with the BT audio accessory:
  - > Principle of speaker switching: The vioce will be first switched to BT earpiece. You can also press the programmed key of BT Audio Switch to switch the speaker. Only portable radios support this feature.
  - > Principle of microphone switching: follow PTT. When you press **PTT** key of the BT accessory, the BT microphone is enabled. When you press **PTT** key of the radio, the switching principle is subject to the radio configuration.
- To ensure the call quality, the distance between the radio and the BT devices should be:
  - > Wireless earphone
    - ◆ PDD98X and PD66X: within 10 meters
    - ◆ X1p and X1e: within 3 meters
    - ◆ PD6 and PD7 series: within 5 meters
    - ◆ MD65X and MD78X: within 10 meters
  - > Wireless finger PTT, wireless earphone, wireless remote speaker microphone: within 4 meters

# 2.3 Configuration and Operation

Before using the feature, you need to enable the BT feature of the radio. Only after the BT feature is enabled can you connect the radio to the BT audio accessory to transmit or receive the call. The BT feature is enabled through CPS. Different radios require a different version of CPS.

- PD66X: R8.6 (V8.06.01.017) or above
- PD98X: R7.8 (V7.08.04.006) or above
- MD65X and MD78X: R7.0 (V7.00.07.019) or above
- X1p and X1e: R5.0 (V5.00.09.006) or above

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BT feature configuration and pairing method vary from models. This chapter introduces them respectively. For better configuration, you can also refer to the Help for details.



No configuration is required for PD6 (except PD66X) series, PD7 series, MD65X and MD78X. Just connect them to BT device via an external BT adapter. For details, see chapter PD6 and PD7 Series and MD65X/MD78X.

## 2.3.1 PD98X/PD66X/X1p

Operations for PD98X are the same as that for X1p and PD66X. PD98X Conventional (firmware version V8.05.06.005) is taken as the example to introduce how to configure the BT feature and pair with the BT audio accessory. Operations for the XPT Trunking radio are introduced in note.

#### **Configure BT Parameters**

**Step 1** Enable BT feature, and configure related parameters.

**CPS Path**: Common -> Accessories -> BT

**Parameters**: BT, BT Always Discoverable and Device Name. Refer to CPS Help for the parameter description.





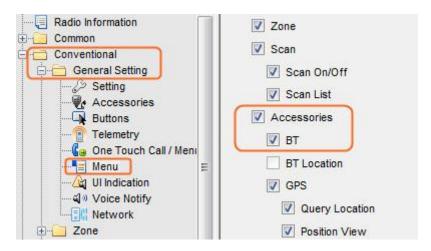
With the BT option checked, the BT feature is automatically enabled when the radio is turned on.

**Step 2** (Optional) Configure BT menu if you want to enable or disable the BT feature through radio menu.

**CPS Path**: Conventional -> General Setting -> Menu -> Common Menu -> Accessories -> BT.

Parameters: Accessories and BT. Refer to CPS Help for the parameter description.

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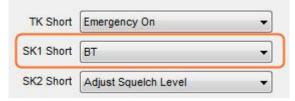


For radios in XPT Trunking mode, the path is XPT Trunking -> General Setting -> Menu -> Common Menu -> Accessories -> BT.

**Step 3** (Optional) Configure the programmable key if you want to enable or disable the BT feature via this key.

**CPS Path**: Conventional -> General Setting -> Buttons.

Parameters: BT. Take SK1 Short as the example.



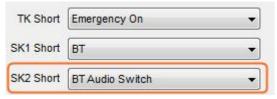


For radios in XPT Trunking mode, the path is XPT Trunking -> General Setting -> Buttons.

**Step 4** (Optional) Configure the programmable key if you want to switch audio output of the portable radio between BT earpiece and radio via the key.

**CPS Path**: Conventional -> General Setting -> Buttons.

Parameters: BT Audio Switch. Take SK2 Short as the example.





For radios in XPT Trunking mode, the path is XPT Trunking -> General Setting -> Buttons.

#### **Connect to BT Device**

Please pare and connect the wireless earphone or wireless remote speaker microphone with the radio before using the wireless finger PTT.

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# **Caution:**

Please ensure the radio and BT device are fully charged to avoid the failure during pairing or connecting.

- **Step 1** Power on the radio.
- **Step 2** Enable the BT feature of the radio.
  - If the BT parameter is configured (Step 1 in section 2.3.1), the BT feature is automatically enabled when the radio is turned on.
  - If the "BT" menu is configured (Step 2 in section 2.3.1), you can enable the BT feature through radio menu by going to "Accessories -> BT -> On/Off".
  - If the programmable key is configured with BT feature (Step 3 in section 2.3.1), you can enable the BT feature through the key.

When the BT feature is enabled, the icon  $\Box$  appears on radio screen.

- **Step 3** Power off other BT device connecting with the radio and wireless earphone or wireless remote speaker microphone.
- **Step 4** Power off wireless earphone or wireless remote speaker microphone.
- **Step 5** Make the wireless earphone or wireless remote speaker microphone enter the pairing status.

Operations for Hytera products are as follows:

- Wireless earphone:
  - > ESW01: Long press **PTT** key until the LED flashes red and blue in turn.
  - > EHW02: Long press **Multi-functional** key until the LED flashes red and blue in turn.
- Wireless remote speaker microphone: Long press **On/Off** key until the LED flashes in blue.
- **Step 6** Connect the radio to BT device.

The following two methods can be used for the connection.

- Automatically
  - 1. Go to "Accessories -> BT -> Paired Devices -> Search BT Devices" on radio menu.

All detected BT devices appear on radio's screen.

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- > For PD98X of R7.8 and X1p, go to "Accessories -> BT -> Paired Devices -> Search PTT" or "Accessories -> BT -> Paired Devices -> Search Headset".
- > For R8.5 or above X1p, if it already connects with a BT audio accessory and searches for the same type of BT accessories, "Device Connected" pops up on the screen.
- 2. Select the BT device to be connected, and then select **Connect**.

The radio prompts "Connect Success" on the screen. When the radio is successfully connected with the BT device, the icon B appears on the status bar.

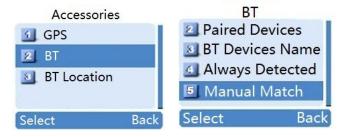
- Wireless Earphone:
  - > ESW01: the LED flashes in blue.
  - > EHW02: the LED flashes in green with an alert tone "Handset connected".
- Wireless remote speaker microphone: the LED flashes in blue with an alert tone.



If the BT device is successfully connected to the radio, when it's turned on next time, it will automatically connect to the radio.

#### Manually

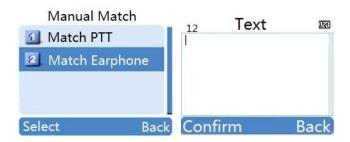
1. Go to "Accessories -> BT -> Manual Match" on radio menu.



Select the BT device to be connected (e.g., earphone), input its MAC address, and then select Confirm.

When the radio is successfully connected with the BT device, the icon B appears on the top left.

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Please input the 12 characters MAC address. For example, if the MAC is XX:XX:XX:XX:XX, please input XXXXXXXXXXXX.

#### **Step 7** (Optional) Pair and connect the wireless finger PTT.

The wireless finger PTT can be worn on the finger to transmit BT call easily.

Long press "+" and "-" keys until the LED stays in blue.
 The wireless finger PTT enters paring mode.

2. Connect the radio with the wireless finger PTT.

See Step 6 in this section. The wireless finger PTT flashes in blue (once every second) when it successfully connects to the radio. User can press **PTT** key on the wireless finger PTT to initiate a call.



If the radio fails to connect with a wireless earphone or wireless remote speaker microphone, the wireless finger PTT cannot transmit the call and flashes in blue twice every three seconds.

#### 2.3.2 X1e

The radio has no display screen. You need to set a programming key with BT feature and pair the radio with BT device via CPS. After the BT feature is enabled (by the programming key), the radio starts to search and connect to the BT device that it has been successfully paired with.

#### Configure the BT Feature via CPS.

- **Step 1** Power on the radio.
- **Step 2** Connect the radio to PC.



During the configuration, do not disconnect the radio and PC, otherwise, data loss or radio damage may occur.

- **Step 3** Run the CPS.
- Step 4 Click Read on the tool bar, or select "Program -> Read from Radio" on the menu bar.

The **Communication Port** dialogue box pops up.

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**Step 5** Select the corresponding USB port for the radio, e.g., USB 1, and click **OK**.

The **Read** dialog box pops up.



**Step 6** Click **OK** to read data from the radio.

After the successful reading, radio model No. appears on the top left of CPS main interface.

**Step 7** Assign a programmable key with BT feature.

**CPS Path**: Conventional -> General Setting -> Buttons

Parameters: BT. Take SK1 Short as the example.



#### Pair the radio and the BT device

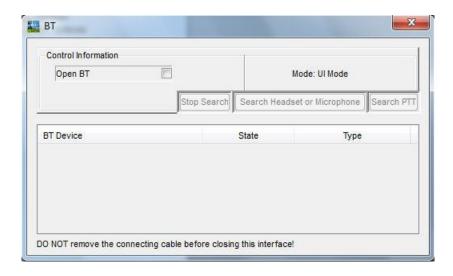
Please ensure the radio and BT device are fully charged to avoid the failure during pairing or connecting.

**Step 1** Select "Tools -> BT Setting" on the menu bar of the CPS.

The **Communication Port** dialogue box pops up.

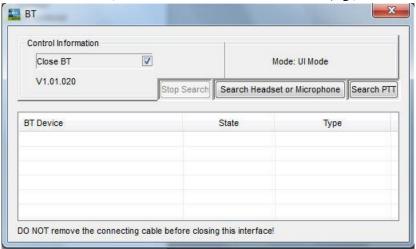
**Step 2** Select the corresponding USB port, and click **OK** to access the BT configuration interface.

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**Step 3** Select **Open BT** to enable the BT feature.

Open BT turns into Close BT, and the current BT firmware version (e.g., V1.01.020) is displayed.



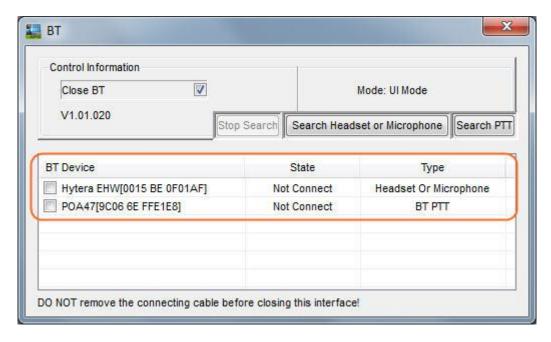
**Step 4** Power on the BT device and make it enter the pairing status.

See Step 5 of Connect to BT Device in section 2.3.1 for operations.

**Step 5** Click **Search PTT** to start search for the PTT device near the radio.

All detected PTT devices are displayed in BT Device list.

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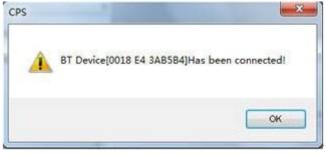




- > The device names above are for reference only.
- When the device to be connected appears in **BT Device** list, you can click **Stop Search**.
- > If you want to pair the radio with other BT devices, such as wireless headset, microphone etc., click **Search Headset or Microphone**.

**Step 6** Select the BT device to be connected in **BT Device** list to pair with the radio one by one.

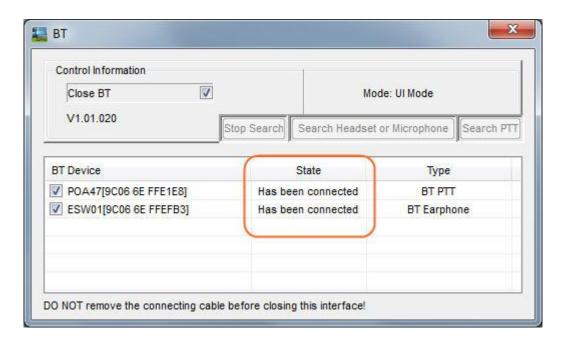
One radio can connect with one wireless finger PTT and one wireless earphone or wireless remote speaker microphone simultaneously. When the paring is successful, the following box (with the actual device name) pops up.



**Step 7** Click **OK** to return to the BT configuration interface.

"Has been connected" is displayed in the State column.

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**Step 8** Uncheck **Close BT** option to disable the BT feature.

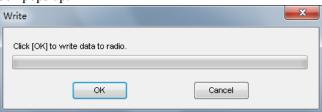
The following dialog box pops up.



**Step 9** Click **OK**, and close the BT configuration interface.

Step 10 Click Write on tool bar of the CPS, or select "Program -> Write to Radio" on the menu bar.

The Write dialog box pops up.



**Step 11** Click **OK** to write the BT configuration into the radio.

The radio restarts automatically to enable the BT configuration.

Step 12 Close the CPS and disconnect the radio from the PC.

#### **Connect to the BT Devices**

After the pairing, please connect the BT device to the radio as follows:

**Step 1** Power on the radio.

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#### **Step 2** Enable the BT feature of the radio.

Short press the **SK1** key (the programmable key with BT feature as configured in Step 7 of section 2.3.2) to enable the BT feature.

When the BT feature is enabled, the LED glows blue and then flashes in blue once every 3s.

#### **Step 3** Power on the BT devices.

The radio automatically starts to search for and connect to the paired BT devices. When the radio is successfully connected to the BT device, the LED flashes in blue every 2s.

- Wireless earphone:
  - > ESW01: the LED flashes in blue.
  - > EHW02: the LED flashes in green with an alert tone "Handset connected".
- Wireless remote speaker microphone: the LED flashes in blue with an alert tone.
- Wireless Finger PTT: LED flashes in blue (once every second). If the radio fails to connect with a
  wireless earphone or wireless remote speaker microphone, the wireless finger PTT cannot transmit
  the call and flashes in blue twice every three seconds.

#### 2.3.3 PD6 and PD7 Series

For PD6 (except PD66X) and PD7 series, an external BT adapter is required to connect with wireless earphone for the BT call. Different radio requires different BT adapters.

- ESW01-N1: PD70X, PD71X, PD75X, PD78X and PD79X
- ESW01-N2: PD60X and PD68X



ESW01-N2 is also applicable for X1e and X1p. In this chapter, PD78X is taken as the example to introduce how to connect the BT adapter with wireless earphone.

- **Step 1** Power on the radio.
- **Step 2** Connect the BT adapter to the radio.

Fix the BT adapter on radio's accessory jack by its bolt.

If successfully connected, "Accessories Connected" appears on radio's screen. The LED of the BT adapter flashes in blue.

**Step 3** Pair and connect the BT adapter to the wireless earphone.

Please ensure the radio and BT device are fully charged to avoid the failure during pairing or connecting.

The following two methods can be used for the pairing and connection.

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#### Automatically

1. Fit the wireless earphone into the BT adapter and push it to the bottom.

The wireless earphone starts to pair and connect with the BT adapter when their LEDs flash blue and red in turn.

2. Take the wireless earphone from the BT adapter.

The connection is completed when LED of the wireless earphone flashes in blue.

#### Manually

- 1. Long press **Multi-function** key on the wireless earphone until the LED flashes blue and red in turn.
- 2. Long press Multi-function key on the BT adapter until the LED flashes blue and red in turn.

The wireless earphone starts to pair and connect with the BT adapter. When LED of the wireless earphone flashes in blue, the connection is completed.



If the BT audio accessory is successfully paired and connected to the radio, when it's turned on next time, it will automatically connect to the radio.

#### 2.3.4 MD65X/MD78X

The mobile radio MD65X or MD78X connects with BT devices through an external BT adapter (ADA-01).

Because the BT adapter automatically exits paring mode after connecting with the wireless finger PTT, it needs to connect to other BT devices first, such as wireless remote speaker microphone, wireless earphone and motorcycle wireless console.



When the BT adapter is used with the motorcycle wireless console, its firmware version must be V2.XX.XXX or above, and that of MD65X/MD78X must be V8.00.06.007 or above.

- **Step 1** Install the BT adapter on the mobile radio.
  - 1. Keep the index mark on the adapter upwards, align the adapter with the mobile radio, and then put the adapter into the microphone connector of the mobile radio.
  - 2. Rotate the lock knob clockwise to lock it.
- **Step 2** Power off the device connecting with the BT adapter and the BT device.
- **Step 3** Power off the BT device.
- **Step 4** Power on the mobile radio.
- **Step 5** Make the BT device enters the paring mode.

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Wireless remote speaker microphone: Long press **On/Off** key until the LED flashes in blue.

- Wireless earphone:
  - > ESW01: Long press **PTT** key until the LED flashes red and blue in turn.
  - > EHW02: Long press **Multi-functional** key until the LED flashes red and blue in turn.
- Motorcycle wireless console: Long press **On-Off** key until the LED flashes red and blue in turn.

Long press **PTT** key on the BT adapter until the LED flashes red and blue in turn.

The BT adapter enters paring mode and automatically connects to the BT device.

- BT adapter: the LED stays in blue (waiting to connect with the wireless finger PTT) and then flashes in blue after about three minutes.
- Wireless remote speaker microphone: the LED flashes in blue with an alert tone.
- Wireless earphone:
  - > ESW01: the LED flashes in blue.
  - > EHW02: the LED flashes in green with an alert tone "Handset connected".
- Motorcycle wireless console: the LED flashes in blue.
- (Optional) Pair and connect with the wireless finger PTT. The wireless finger PTT can be worn on the Step 7 finger to transmit BT call easily.

Long press "+" and "-" keys on the wireless finger PTT until the LED stays in blue.

The wireless finger PTT enters paring mode and automatically connects with the BT adapter. When connecting successfully, the wireless finger PTT flashes in blue (once every second). User can press **PTT** key on the wireless finger PTT to initiate a call.



#### **L**Caution

If the radio fails to connect with a wireless earphone, wireless remote speaker microphone or motorcycle wireless console, the wireless finger PTT cannot transmit the call and flashes in blue twice every three seconds

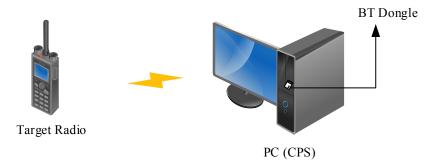
BT Programming User Manual

# 3. BT Programming

## 3.1 Introduction

The BT programming enabled radio can be wirelessly connected to PC to perform programming operations.

A BT dongle is provided to perform the feature. The wireless programming can be realized when the radio is paired with the dongle. The picture below shows how the BT programming works.



## 3.2 Restrictions

- BT programming is applicable for PD98X (firmware R8.0 or above) or PD66X (firmware R8.6 or above).
- For better performance, please keep the distance between the radio and the BT dongle is within 5 meters.
- One PC can perform wireless programming only for one radio at a time.
- When the radio is connected with the BT dongle, it cannot be connected to other BT audio accessory.
- The BT dongle must support virtual serial ports (please confirm it with the supplier).

# 3.3 Configuration and Operation

# 3.3.1 Preparations

Before you start, please prepare the following items.

- PC: Windows XP/Windows Vista/Windows 7, 32/64-bit. Windows 7 is taken as the example.
- CPS:
  - > PD98X: V8.00.09.007 or above
  - > PD66X: V8.06.01.017 or above
- Radio
  - > PD98X: firmware V8.00.06.007 or above
  - > PD66X: firmware V8.06.01.015 or above
- BT Dongle

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BT Driver: Ensure the BT driver has been successfully installed in the PC; otherwise, the PC cannot recognize
the BT dongle. If the BT driver is not installed yet, please refer to the corresponding manual for the
installation.



No matter the PC supports the BT feature or not, a BT dongle is recommended for the BT programming operations. BlueSoleil dongle is recommended for radios overseas. In this chapter, BlueSoleil BT dongle (software 10.0.494.0) is used as the example.

#### **3.3.2** Enable the BT Feature

Before using BT programming, you need to enable the BT feature, and then connect the radio to the dongle.

- If the BT parameter is configured (Step 1 in section 2.3.1), the BT feature is automatically enabled when the radio is turned on.
- If the "BT" menu is configured (Step 2 in section 2.3.1), you can enable the BT feature through radio menu by going to "Accessories -> BT -> On/Off".
- If a programmable key is configured with BT feature (Step 3 in section 2.3.1), you can enable the BT feature through the key.

When the BT feature is enabled, the icon  $\Box$  appears on radio screen.

# 3.3.3 Connect the BT Dongle to the PC

- **Step 1** Install the BT driver on PC.
- **Step 2** Run the BT driver and enter its main interface as follow.



**Step 3** Connect PC and BT dongle

Insert the BT dongle into the USB port on the PC. After successfully connection, the software icon on the PC's taskbar turns into

BT Programming User Manual

## 3.3.4 Connect the Radio to the BT Dongle

The following two methods can be used for paring and connection.

#### By the Radio (Recommended)

- **Step 1** Power off other BT device that is connected with the radio.
- **Step 2** Select "Accessories -> BT-> Paired Devices -> Search BT Devices" on radio menu.

All detected BT devices appear on radio's screen.



**Step 3** Select the hostname of the PC which the BT dongle is connected with, and then select **Connect**.

On the PC, the following dialog box pops up.



**Step 4** Select "Always allow this remote device to use this service in my device" and then click **Yes**.

"Accessories Connected" appears on radio's screen. When the radio has been successfully connected to the BT dongle, the BT icon on radio's screen turns into  ${\sf B}$ .

#### By the BT Dongle

- **Step 1** Power off other BT device that is connected with the radio
- **Step 2** Select "Accessories -> BT -> Always Detected" on radio's screen to set the visibility of the radio.

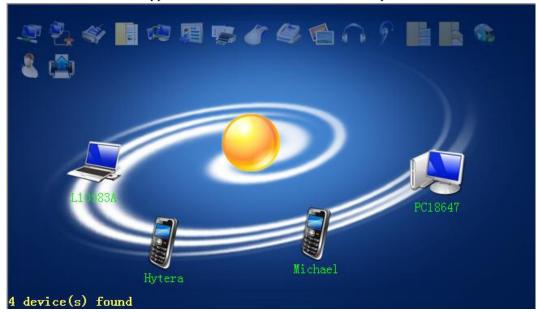
User Manual BT Programming



**Step 3** On main interface of the BT driver, double click yellow button in the middle. Or click the Menu button on the top right corner and select **Search Devices**.



All detected BT devices appear on the main interface as the below picture.



Step 4 Right click the radio icon (BT name of the radio is Hytera by default), and select Pair.

After the paring is completed, "Paired" is shown on the left bottom of the main interface.



To recognize the radio easily, you can set its BT name by going to "Accessories -> BT-> BT Devices Name" on radio menu.

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**Step 5** Right click the radio icon, and select **Connect Booth Serial Port**.

After the connection is completed, "Connected" is shown on the left bottom of the operation interface.



# **3.3.5** Enable BT Programming

- **Step 1** Run the CPS.
- Step 2 Click on the Tool Bar of the CPS.

  When the BT programming is enabled, the icon turns to
- **Step 3** Select "Program -> Communication Port" on the Tool Bar of the CPS.

  The following dialog box pops up.

User Manual BT Programming

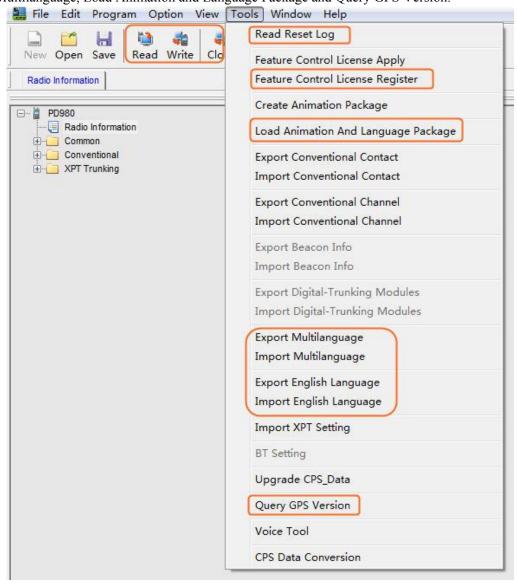




You can right click the radio icon on BT drive interface to view the connected BT COM.

#### **Step 4** Select the BT COM that the radio is connected with, and then click **OK**.

The radio is wirelessly connected to PC. You can wirelessly perform the programming operations, including Read, Write, Clone, Read Reset Log, Feature Control License Register, Import/Export Multilanguage, Load Animation and Language Package and Query GPS Version.



BT Positioning User Manual

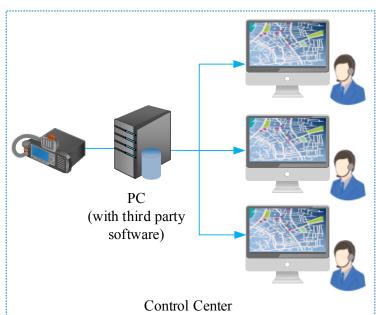
# 4. BT Positioning

## 4.1 Introduction

When the radio cannot be accurately positioned through GPS, you can enable the BT Poitioning to realize the positioning with BT beacons.

The BT beacon is a hardware transmitter developed based on V4.0 BT Low Engergy Technology (BLE). After deployed, it broadcasts data packet to the radios within the communication coverage. The BT beacon is easy to deploy for indoor use and power saving.





The BT Positiong feature is realized as below.

1. Deploy BT beacons.

Please contact BT beacon supplier for the deployment method.

2. Configure BT Positioning parameters for the radio.

See 4.4 Configuration for details.

3. Enable the BT Positioning.

The radio can receive data packet broadcasted by BT beacons, including UUID, Major, Minor, TX Power and RSSI.

> UUID: unique identifier of BT beacon, which is used to distinguish the beasons in other areas.

User Manual BT Positioning

> Major and Minor: mappings of BT beacon locations, which are set through the software provided by the supplier. For example, if one becaon is deployed in the laboratory on the third floor, the Major can be set as "3rd Floor", and the Minor be set as "Laboratory".

- > TX Power: TX power of the BT beacon.
- > RSSI: signal strength of the BT beacon.
- 4. After receiving the data packet from BT beacons, the radio checks the configured Beacon Info List.
  If the beacon UUID is the same as configured, the radio sends the UUID Code (configured in the list), Major,
  Minor, TX Power and RSSI of the beacon with the strongest signal to the dispatch station.
- 5. The dispatch station converts the code to UUID, and then sends the UUID, Major, Minor, TX Power and RSSI to the PC.

Hytera provides third party with BT API (application programming interfaces) to develop software to visualize radio locations on the map. For API descriptions, see *Hytera DMR Application Protocol Specification*.

# 4.2 Application

The BT Positioning makes up the shortage of GPS positioning and can be applied to vavious indoor scenes, such as positioning of factory workers, power plant inspectors, tunnel workers, high-speed train staff, prison staff, warehouse forklifts, smart buildings and robot.

## 4.3 Restrictions

- BT Positioning is applied to PD98X (firmware V8.05.06.005 or above) or PD66X (firmware V8.06.01.015 or above).
- BT Positioning is a paid feature.
- BT firmware version of the radio must be upgraded to V\_2\_01\_011. See BT Firmware Upgrade for operations.
- BT Positioning and BT API features (e.g., BT programming) cannot be used at the same time. During
  programming, debugging or scanning, the radio cannot transmit the BT location data.
- During voice or data transmission, the radio does not respond to the system request to report the BT location data until the transmission is completed.
- In XPT mode, if a radio is used to dispatch services, the BT location data is transmitted through voice repeater; while if a repeater, data repeater or voice repeater.

BT Positioning User Manual

# 4.4 Configuration

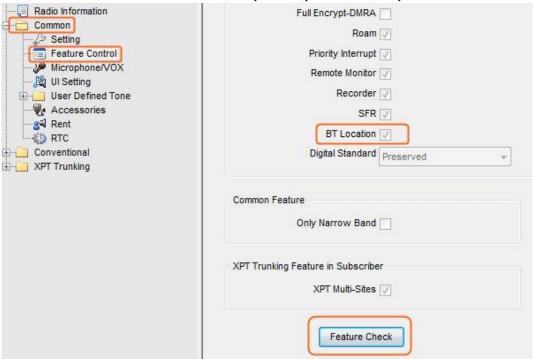
## 4.4.1 Radio Configuration

#### **Step 1** Activate BT Location.

The BT Location is a paid feature. A license is required to activate this feature. For operations, refer to *DMR Radio\_Authorization\_Operation Guide*.

**CPS Path**: Common -> Feature Control -> BT Location.

Parameters: BT Location. Refer to CPS Help for the parameter description.



#### **Step 2** Enable the BT feature.

- If the BT parameter is configured (Step 1 in section 2.3.1), the BT feature is automatically enabled when the radio is turned on.
- If the "BT" menu is configured (Step 2 in section 2.3.1), you can enable the BT feature through radio menu by going to "Accessories -> BT -> On/Off".
- If the programmable key is configured with BT feature (Step 3 in section 2.3.1), you can enable the BT feature through the key.

When the BT feature is enabled, the icon  $\Box$  appears on radio screen.

#### **Step 3** Configure Beacon Info List.

Beacon UUID is configured in this list. Major and Minor parameters are modified through the software provided by the beacon supplier.

User Manual BT Positioning

For example, if UUID of one BT beacon is E2C56DB5-DFFB-4BD2-B060-D0F5A71096E0, you can configure the list as below:

Alias: Beacon 1

• UUID: E2C56DB5DFFB4BD2B060D0F5A71096E0

• UUID Code: 001

**CPS Path**: Common -> Accessories -> BT Location.

Parameters: Alias, UUID and UUID Code. Refer to CPS Help for the parameter description.

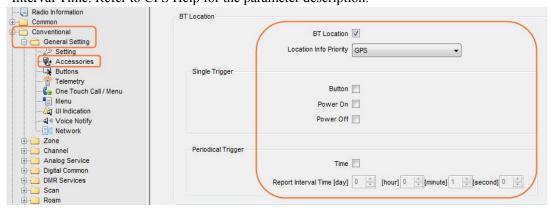




- > You can import or export the beacon information in batch by selecting "Tools -> Import/Export Beacon Info" on the menu bar of CPS.
- > When a radio (portable or mobile) is used to dispatch services, its "Beacon Info" must be configured the same as that of other radios.
- **Step 4** Enable BT location and configure related parameters.

**CPS Path**: Conventional -> General Setting -> Accessories -> BT Location.

**Parameters**: BT Location, Location Info Priority, Button, Power On, Power Off, Time and Report Interval Time. Refer to CPS Help for the parameter description.





For radios in XPT Trunking mode, the path is XPT Trunking -> General Setting -> Accessories -> BT Location.

**Step 5** Enable Voice with Location Info feature.

BT Positioning User Manual

If disable, the radio will not report the location data to the dispatch station when you initiate a call by PTT. As a result, the dispatcher cannot obtain the real-time location of the radio. It is recommended that you enable the Voice with Location Info feature and configure the way the radio reports the location data. To use this feature, **Location Info Priority** (Step 4) must be set as **BT**.

**CPS Path**: Conventional -> General Setting -> Accessories -> Voice with Location Info.

Parameters: Voice with Location Info, PTT or Time. Refer to CPS Help for the parameter description.





For radios in XPT Trunking mode, the path is XPT Trunking -> General Setting -> Accessories -> Voice with Location Info.

#### Step 6 Configure Control Center ID, Location Port and Identifier.

**CPS Path**: Conventional -> General Setting -> Network -> Radio Services.

**Parameters**: Control Center ID, Location Port and Identifier. Refer to CPS Help for the parameter description.





For radios in XPT Trunking mode, the path is XPT Trunking -> General Setting -> Network -> Radio Services.

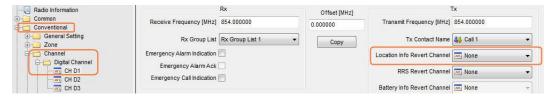
#### **Step 7** Configure Location Info Revert Channel.

The radio may fail to report the location data on the current channel if it is occupied by other radios transmitting voice or data signals. To ensure the timeliness, it is recommended that you choose one dedicated channel to transmit BT location data.

**CPS Path**: Conventional -> Channel -> Digital Channel -> Tx.

Parameters: Location Info Revert Channel. Refer to CPS Help for the parameter description.

User Manual BT Positioning





- > For radios in XPT Trunking mode, **Location Report Type** should be set as "Normal". **CPS Path**: XPT Trunking -> Channel -> XPT Personality -> Per XN -> Miscellaneous.
- > If **RX Only** is selected, the radio will be unable to transmit BT location data.

#### **Step 8** (Optional) Enable In Call Location Revert feature.

With this feature enabled, the radio switches to Location Info Revert Channel to report location when receiving the request during voice receiving. If disabled, the radio reports location only after voice receiving.

**CPS Path**: Conventional -> Digital Common -> Basic -> Miscellaneous.

Parameters: In Call Location Revert. Refer to CPS Help for the parameter description.





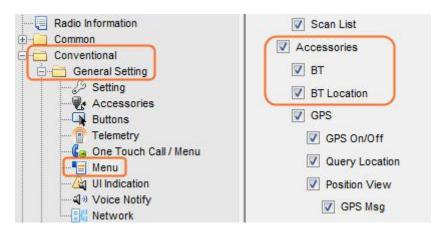
For radios in XPT Trunking mode, the path is XPT Trunking -> Digital Common -> Basic -> Miscellaneous.

**Step 9** (Optional) Configure BT location menu if you want to enable or disable the feature via radio menu.

**CPS Path**: Conventional -> General Setting -> Menu -> Common Menu -> Accessories.

Parameters: Accessories, BT and BT Location. Refer to CPS Help for the parameter description.

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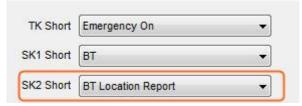
For radios in XPT Trunking mode, the path is XPT Trunking -> General Setting -> Menu -> Common Menu -> Accessories.

**Step 10** (Optional) Configure a programmable key with BT location report feature.

After the configuration, when you press this key, the radio will transmit BT location data to the dispatching center.

**CPS Path**: Conventional -> General Setting -> Buttons.

Parameters: BT Location Report. SK2 Short is taken as the example.





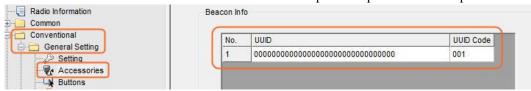
- > For radios in XPT Trunking mode, the path is XPT Trunking -> General Setting -> Buttons.
- > The **BT Location Report** option is available only when **Button** option is selected. See Step 4 in section 4.4.1.

# 4.4.2 Repeater Configuration

**Step 1** Configure Beacon Info list of the repeater if the repeater is used to dispatch service.

**CPS Path**: Conventional -> General Setting -> Accessories -> Beacon Info.

Parameters: UUID and UUID Code. Refer to CPS Help for the parameter description.





> For radios in XPT Trunking mode, the path is XPT Trunking -> General Setting -> Accessories

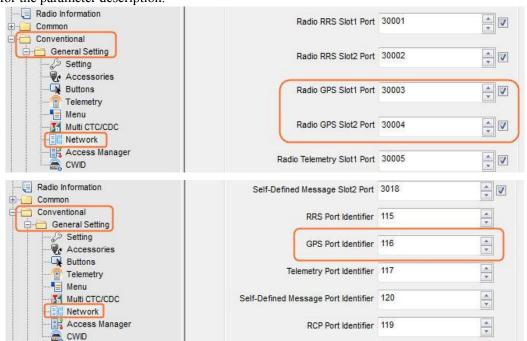
User Manual BT Positioning

- -> Beacon Info.
- > The "Beacon Info" must be configured the same as that of the radio. Otherwise, the repeater will not be able to correctly revert the UUID code to the UUID.

**Step 2** Configure Radio GPS Slot Port and GPS Port Identifier, because the repeater forwards BT location data of the radio through the GPS Slot Port.

**CPS Path**: Conventional -> General Setting -> Network -> Application Programming Interface.

**Parameters**: GPS Port Identifier, Radio GPS Slot1 Port, or Radio GPS Slot2 Port. Refer to CPS Help for the parameter description.





The above parameters are available only when **Forward to PC** is selected.

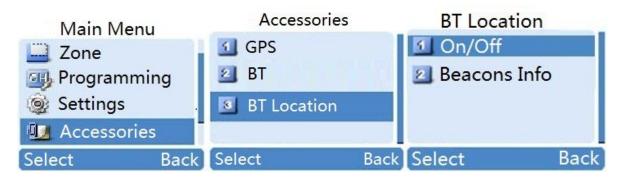
# **4.5** Radio Operation

#### 4.5.1 Radio Menu

If the BT Location menu is configured (Step 9 in section 4.4.1), you can enable or disable BT Location feature and view the beacon information through radio menu:

- Menu -> Accessories -> BT Location -> On/Off
- Menu -> Accessories -> BT Location -> Beacons Info

BT Positioning User Manual





Please enable the BT feature before using the BT location feature.

## **4.5.2** Programmable Key

If a programmable key with BT location feature is configured (Step 10 in section 4.4.1), when you press this key, the radio will transmit the BT location data to the dispatching center.

# 5. BT Firmware Upgrade

## 5.1 Introduction

The BT firmware can be upgraded through third-party software to fixe firmware bugs, improve BT performance and enhance stability.

#### 5.2 Restriction

The upgrade is only applied to the radio with in-built BT module.

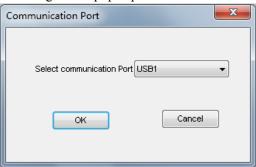
# 5.3 Upgrade and After-upgrade Check

Before the upgrade, please check BT firmware version of the radio. The version information is used to check whether the upgrade is successful. This chapter describes how to upgrade the BT firmware from V2.01.003 to V2.01.008.

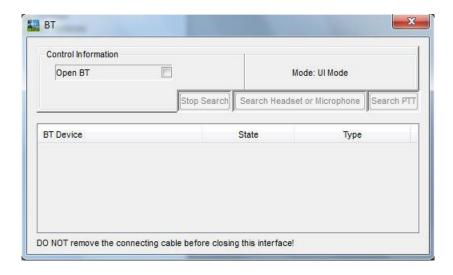
#### **5.3.1** BT Firmware Version Check

- **Step 1** Power on the radio
- **Step 2** Connect the radio to PC.
- **Step 3** Run the CPS.
- **Step 4** Select "Tools -> BT Setting" on the menu bar of the CPS.

The Communication Port dialogue box pops up.

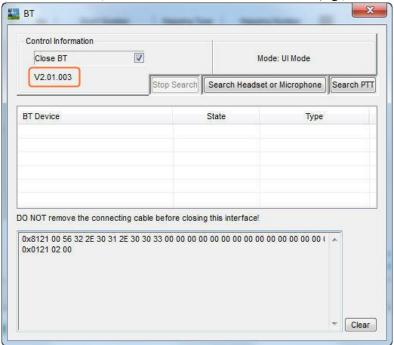


**Step 5** Select the corresponding USB port, and click **OK** to access the BT configuration interface.



**Step 6** Select **Open BT**.

Open BT turns into Close BT, and the current BT firmware version (e.g., V2.01.003) is displayed.



## Step 7 Uncheck Close BT option.

The following dialog box pops up.



Step 8 Click OK, and close the BT configuration interface.

#### **Step 9** Close the CPS and disconnect the radio from the PC.

## **5.3.2** Preparations

Before you start, please prepare the following items.

- PC: Windows XP/Windows Vista/Windows 7, 32/64-bit. Windows 7 is taken as the example.
- BT Driver: Ensure the BT driver has been successfully installed in the PC; otherwise, the PC cannot recognize
  the BT dongle. If the BT driver is not installed yet, please refer to the corresponding manual for the
  installation.
- USB Programming Cable:
  - > PD98X: PC36
  - > PD66X, X1p and X1e: PC66
- USB Driver: Ensure the USB driver has been successfully installed on PC; otherwise, the PC cannot recognize the radio. If not installed yet, please refer to *Digital USB Driver Installation Guide R5.0* for the installation.
- BT firmware upgrade software: Ensure the software has been successfully installed on PC. It's recommended
  to use BlueSuiteSource for the upgrade.

## **5.3.3** Firmware Upgrade

Disable the BT feature and make the radio enter the BT upgrade mode before upgrade.

#### **Step 1** Disable the BT feature.

- If the BT parameter is configured (Step 1 in section 2.3.1), you can disable the BT feature only through CPS.
- If the "BT" menu is configured (Step 2 in section 2.3.1), you can disable the BT feature through radio menu by going to "Accessories -> BT -> On/Off".
- If the programmable key is configured with BT feature (Step 3 in section 2.3.1), you can disable the BT feature through the key.

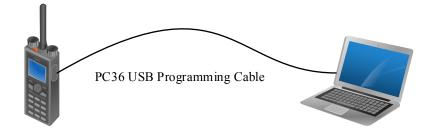
When the BT feature is disabled, the icon  $\Box$  disappears on radio screen.

#### **Step 2** Power off the radio.

#### **Step 3** Connect the radio to PC

PD98X as the example, the connection diagram is shown as below.

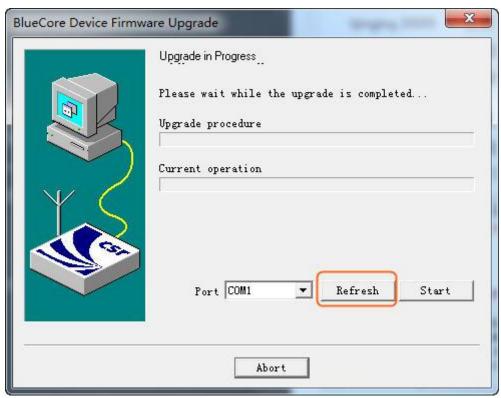
BT Firmware Upgrade User Manual



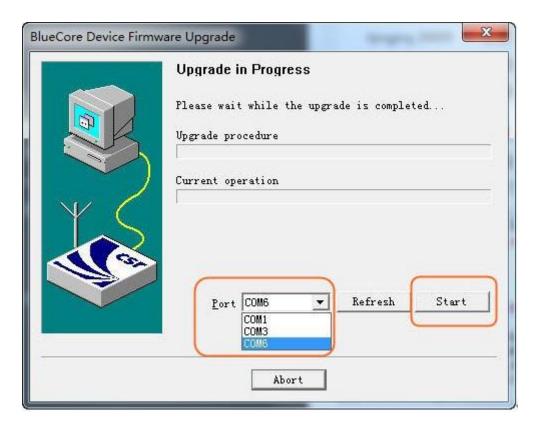
**Step 4** Hold **TK** and **SK1** keys, and then power on the radio.

When the radio enters the BT upgrade mode successfully, "BT Upgrade Mode" displays on radio screen. Otherwise, it fails. In this case, please power off the radio and repeat the above operations.

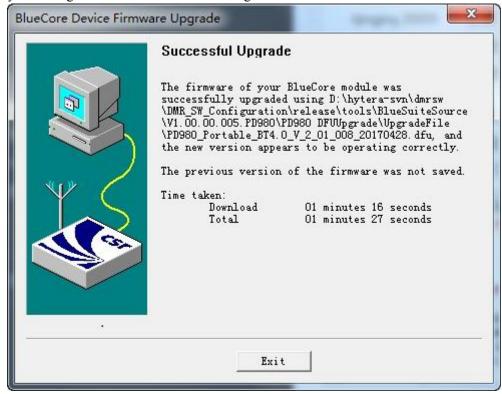
- **Step 5** Run the firmware upgrade software.
- **Step 6** Click **Refresh** to refresh the port information.



**Step 7** Select the corresponding port for the radio, e.g., COM6, and click **Start**.



The upgrade is successful if the following dialog box appears. If it prompts "Upgrade Failed", please retry according to the instructions in the dialog box.



**Step 8** Click **Exit** to exit the software.

**Step 9** Power off the radio to exit BT upgrade mode.

# **5.4** After-upgrade Check

Please check whether the BT firmware has been upgraded to the latest (e.g., V2.01.008) according to 5.3.1 BT Firmware Version. If not, please check whether the version of the software meets the requirements, and if yes, please make radio enter the BT upgrade mode and try again.

User Manual BT API

# 6. BT API

Hytera provides third party with BT API (application programming interfaces) for more applications, including online radio status management, text messages, call controls, radio register service.

The BT API is applicable for PD98X and PD66X. For details, please refer to *Hytera DMR Peripheral Equipment Development Overview*, *Hytera DMR Peripheral Equipment Development Guide* and *Hytera DMR Application Protocol Specification* (BT Positioning).

FAQ User Manual

# **7. FAQ**

**Q**: How to handle the disconnection due to unexpected power-off of the radio or BT device?

**A**: This issue can be solved as below:

> For BT device

Restart the BT device. The device will automatically connect to the last radio it connected.

- > For the radio
  - 1. Restart the radio and enable BT feature.
  - 2. Restart the BT device. The device will automatically connect to the last radio it connected.

**Q**: Why does the radio fail to search the BT device?

**A**: The BT device is not turned on or not in the pairing status.

**Q**: Why does the BT device fail to enter the pairing status?

**A**: The ways to enter the paring status vary from BT devices. Please refer to the corresponding manual for the detailed operations.

**Q**: Why does radio fail to connect to the BT device?

A: The causes may be:

- > The BT device is out of connection range.
- > The BT device was not successfully connected to the radio before. Please retry to pair and connect them.
- > The BT device connects to the last radio or other device that it connected. Refer to the corresponding manual for the operations.
- > If the solutions above don't work, please restart the BT device.

**Q**: When the radio connects to the BT dongle, why does the driver repeatedly prompt "Device Connected" or "Device Disconnected"?

**A**: The PC name is more than 10 characters. Go to "Start -> Control Panel -> System and Security -> System", and modify the name.

User Manual Abbreviations

# **Abbreviations**

Abbreviations	Full Name
API	Application Programming Interface
CPS	Customer Programming Software
DMR	Digital Mobile Radio
EDR	Enhanced Data Rate
GPS	Global Positioning System
HFP	Hands-Free Profile
SPP	Serial Port Profile
UUID	Universally Unique Identifier
XPT	Extended Pseudo Trunk



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