



***DMR Conventional Mobile Radio
Clarity Transmission
Application Notes***



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Documentation Information

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

Conventions

Icons

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.

Notations

Item	Description
" "	The quotation marks enclose the name of a software interface element. For example, click "OK".
Bold	The text in boldface denotes the name of a hardware button. For example, press the PTT 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
R2.0	September 2018	<ul style="list-style-type: none"> The mobile radio can receive data from the peripheral device through BT adapter, and then transmit it to the dispatch station through Clarity Transmission. The parameter name BT Clarity Transmission is modified as BT Transmission. The maximum data to be transferred each time is increased to 1.5K. Software version: R9.0.
R1.0	December 2016	Initial Release.

1. Overview

1.1 Definition

Clarity Transmission is a method of transferring data from one external device to another using the mobile radios. The mobile radios serve as the transparent transmission channel for data exchange between external devices without any additional adjustment.

1.2 Applicable Mobile Radio

The Clarity Transmission feature is only available for DMR digital mobile radios including MD78X and MD65X, except those equipped with encryption TF cards. Currently only MD65X meets this requirement. If you want to use the MD78X, it is recommended to purchase the customized MD78X whose accessory port is URAT port.

Clarity transmission requires the use of the Universal Asynchronous Receiver/Transmitter (UART) port.

1.3 Principle

The mobile radio in both direct mode and repeater mode supports clarity transmission. It can receive data from the peripheral device through PC70 data cable or BT adapter, and then transmit the data through Clarity Transmission. The figure below takes direct mode as the example to introduce the principle.

- The device A and B connect to two mobile radios respectively through PC70 data cable.
- The device C (Android device) wirelessly connects to Mobile Radio 200 through a BT adapter.
- The two mobile radios can communicate with each other, and they are the TX contact of each other on current channel and with Forward to PC enabled.
- **Accessory Port Communication** of the two mobile radios is set as below.
 - To transfer UART data: **UART Clarity Transmission** for both.
 - To transfer BT data: **BT Transmission** for transmitting radio, while **UART Clarity Transmission** for receiving radio.

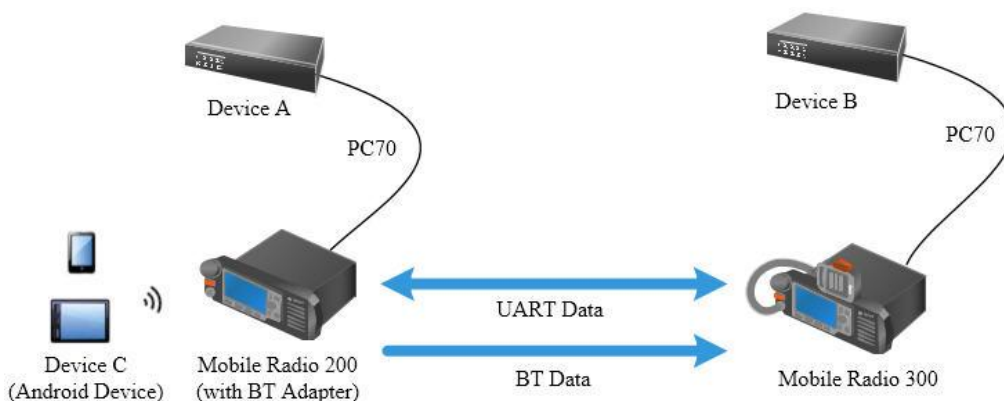


Figure 1-1 Principle of Clarity Transmission

The data is transferred from Device A or Device C to Device B as follows:

1. Device A or Device C starts data transfer.
2. Mobile Radio 200 receives data from Device A via PC70 data cable or from Device C via BT adapter.
3. Mobile Radio 200 transmits data to Mobile Radio 300.
4. Mobile Radio 300 transfers data to Device B through PC70 data cable.

In the figure above, data is transferred from one device to the other. The UART data can be transferred from one device to multiple devices when **TX Contact Name** of the transmitting radio is set to a group contact.



Note

The UART data supports two-way transmission, while the BT data supports one-way transmission.

1.4 Application

Automatic devices are widely used in various industries including petrochemical, power and manufacturing. It is important to monitor the operating status of the automatic devices, especially those in remote areas. The Clarity Transmission feature facilitates real-time data transfer, which is essential for operator to remotely monitor the device status.

The figure below shows how the management center in a factory uses this feature to gather real-time data for device monitoring. The mobile radios connected to devices in the factory transmit the device data to the management center, which immediately arranges for device fixing in case of abnormality or failure.

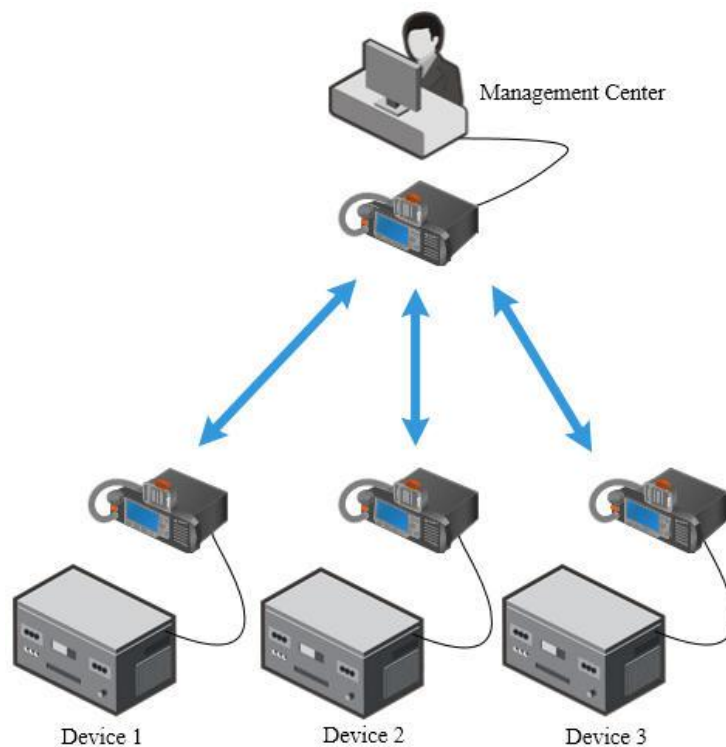


Figure 1-2 Application Example

1.5 Restriction

- Mobile radios used to perform this feature can communicate with each other.
- This feature is supported on digital channel only.
- To avoid data loss, please ensure the digital channel is not occupied by other services (such as voice service) during clarity transmission.
- The data is transmitted to the TX contact of current channel, which cannot be an all call contact.
- The maximum transfer rate over the air is 1.45Kbit/s when the mobile radio uses single slot to transmit data; while 2.79Kbit/s when the mobile radio uses dual slots to transmit data.
- The data to be transferred each time must be less than or equal to 1.5K. The excess data will be discarded.
- The maximum transmission unit is 512 bytes. If the data is more than 512 bytes but less than or equal to 1.5K, the radio will split it as several packets before transmission. For example, the radio splits the 1100 bytes data as three packets (512 bytes, 512 bytes and 76 bytes) for transmission.
- It is recommended that the data transfer interval be set to 4 seconds or longer.
- This feature is not available if the mobile radio is stunned or killed, or the radio rental duration expires.
- The mobile radio with the Clarity Transmission feature enabled can initiate and receive calls, and can receive short data. However, it cannot send short data related to such features as GPS, RRS, Work Order, and Telemetry.
- Currently, the mobile radio can receive BT data from Android device only, and can transfer it to only one mobile radio via clarity transmission. The files to be transferred can be Word, Excel and TXT, and must be less than 100KB. The length of file name shall be less than 72 for higher transfer rate.

1.6 Versions

- R9.0: The parameter name BT Clarity Transmission is modified as BT Transmission.
- R8.6: The mobile radio can receive data of the peripheral device through BT, and then transfer it to the dispatch station through Clarity Transmission.
- R7.7: Clarity Transmission is available for mobile radios.

2. Configuration

This chapter describes how to configure the UART for the external device, and program both the transmitting radio and the receiving radio.

2.1 Configuration Tool

- To transfer UART data: CPS of V7.07.01.009 or above.
- To transfer BT data: CPS of V8.06.01.017 or above.

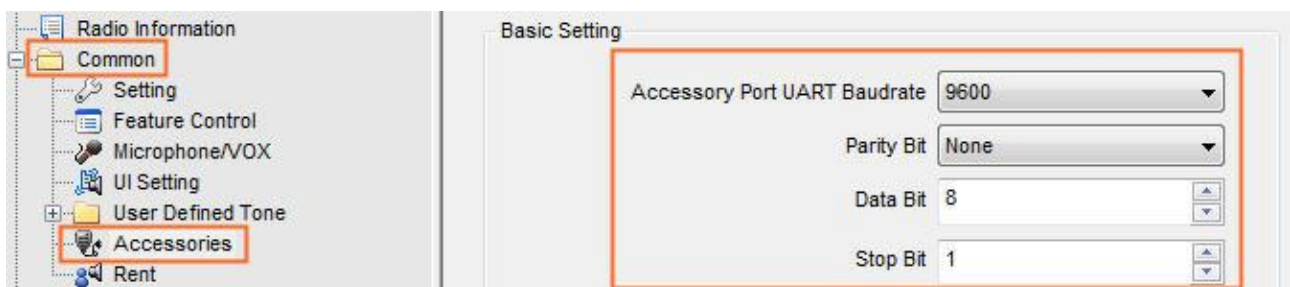
2.2 Procedure

2.2.1 Configuring the External Device

The UART-related parameters of the external device must be the same as those of the mobile radio. Otherwise, they cannot exchange data. The figure below shows the UART-related parameters of the mobile radio.

CPS Path: Common -> Accessories -> Basic Setting

Parameters: Accessory Port UART Baudrate, Parity Bit, Data Bit and Stop Bit. Refer to *CPS Help* for the parameter description.



2.2.2 Configuring the Transmitting Radio

Step 1 Enable the Forward to PC feature, and set the **Accessory Port Communication** accordingly.

- Set Accessory Port Communication as **UART Clarity Transmission** to transfer UART data.
- Set Accessory Port Communication as **BT Transmission** to transfer BT data.

CPS Path: Conventional -> General Setting -> Network -> Radio to PC Network

Parameters: Forward to PC and Accessory Port Communication. Refer to *CPS Help* for the parameter description.



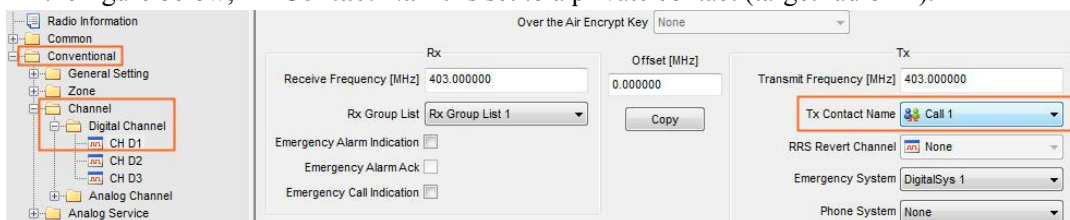
Step 2 Configure the target mobile radio to which the data is transferred.

CPS Path: Conventional -> Channel -> Digital Channel -> CH DX -> Tx.

Parameters: Tx Contact Name. Refer to *CPS Help* for the parameter description.

- Set this parameter to target mobile radio ID if the data is transferred to a mobile radio only. The BT data can be transferred only in this way.
- Set this parameter to target group ID if the data is transferred to multiple mobile radios.

In the figure below, **Tx Contact Name** is set to a private contact (target radio ID).

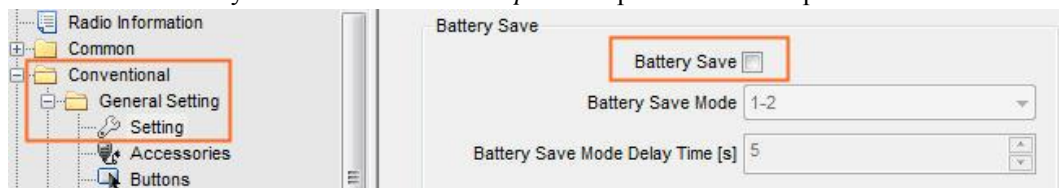


Step 3 (Optional) Disable the Battery Save feature.

To achieve faster data transfer, it is recommended to disable the Battery Save feature.

CPS Path: Conventional -> General Setting -> Setting -> Battery Save.

Parameters: Battery Save. Refer to *CPS Help* for the parameter description.



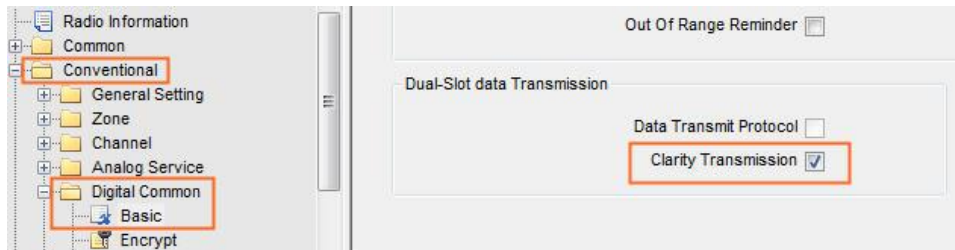
Step 4 (Optional) Enable the Dual-Slot Data Transmission feature if a large amount data is to be transferred.

With this feature enabled, the mobile radio uses two slots with the same frequency to transfer data over the air to increase transmission speed and save channel resources. The firmware version of transmitting radio and receiving radio must be V8.05.06.005 or above.

1. Enable the Dual-Slot Data Transmission feature.

CPS Path: **Conventional** -> Digital Common -> Basic -> Dual-Slot Data Transmission.

Parameters: Clarity Transmission. Refer to *CPS Help* for the parameter description.



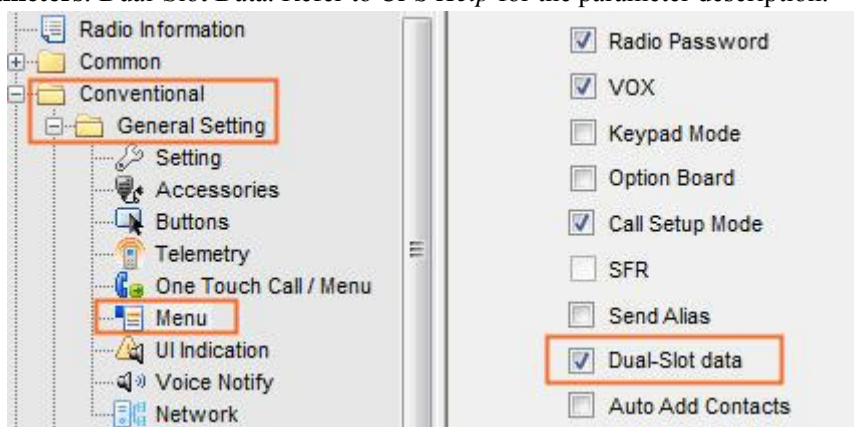
Note

- This feature will be not available on the digital channel with **RX Only**, **Enhanced Channel Access**, or **TDMA Direct Mode** enabled.
- The dual-slot data cannot be transferred through SFR feature.

2. Configure Dual-Slot Data menu if you want to enable or disable the Dual-Slot Data Transmission feature via radio menu.

CPS Path: Conventional -> General Setting -> Menu -> Common Menu -> Settings -> Radio Settings.

Parameters: Dual-Slot Data. Refer to *CPS Help* for the parameter description.



3. If IP multi-site system is used to transfer the dual-slot data, **Digital IP Multi-site Connect** of the repeater must be set as **Slot 1 & Slot 2**.

CPS Path: Conventional -> Channel -> Digital Channel -> CH DX.

Parameters: Digital IP Multi-site Connect. Refer to *CPS Help* for the parameter description.



Note

This parameter will be not available when **Repeater Type** is set as **Single Site**.

2.2.3 Configuring the Receiving Radio

Step 1 Enable the Forward to PC feature, and set **Accessory Port Communication** as **UART Clarity Transmission**.

CPS Path: Conventional -> General Setting -> Network -> Radio to PC Network

Parameters: Forward to PC and Accessory Port Communication. Refer to *CPS Help* for the parameter description.

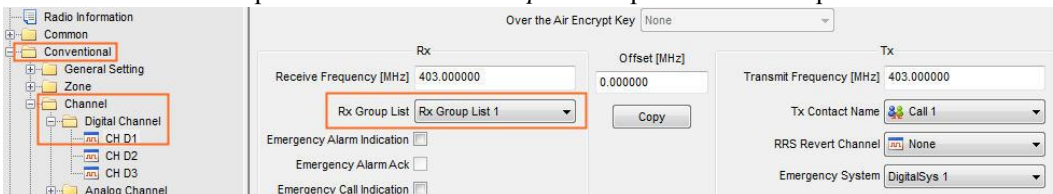


Step 2 (Optional) Configure the Rx Group List.

If the data is transmitted to multiple mobile radios, select the group list where the target group ID is on.

CPS Path: Conventional -> Channel-> Digital Channel -> CH DN -> Rx.

Parameters: Rx Group List. Refer to *CPS Help* for the parameter description.

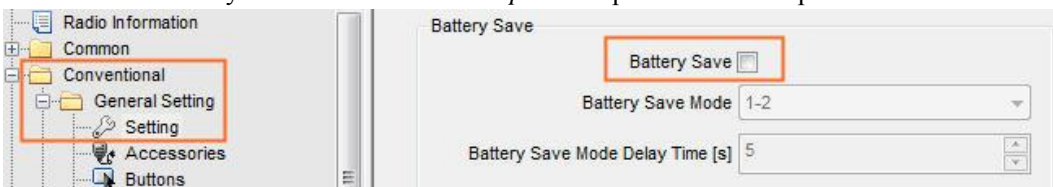


Step 3 (Optional) Disable the Battery Save feature.

To achieve faster data transfer, it is recommended to disable the Battery Save feature.

CPS Path: Conventional -> General Setting -> Setting -> Battery Save.

Parameters: Battery Save. Refer to *CPS Help* for the parameter description.



3. Operation

This chapter describes how to use the Clarity Transmission feature on the mobile radio. For the operation of third-party device, please refer to relevant operation guide.

With this feature configured properly, the mobile radio automatically enters clarity transmission mode upon power-on. Meanwhile the prompt message “Clarity Transmission Enables” appears on the LCD and then disappears automatically.

The transmitting radio transmits the data to the target radio upon receiving data from the external device through the UART port or BT adapter.

The LED indicator glows red during data transmission and glows green during data receiving.

The data transfer is subject to the setting in "Tx Admit".

Abbreviations

Abbreviations	Full Name
CPS	Customer Programming Software
DMR	Digital Mobile Radio
UART	Universal Asynchronous Receiver/Transmitter



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