



DMR Conventional Radio

GPS

Application Notes



Copyright Information

Hytera is the trademark or registered trademark of Hytera Communications Corporation Limited (the Company) in the People's Republic of China (PRC) and/or other countries or areas. The Company retains the ownership of its trademarks and product names. All other trademarks and/or product names that may be used in this manual are properties of their respective owners.

The product described in this manual may include the Company's computer programs stored in memory or other media. Laws in PRC and/or other countries or areas protect the exclusive rights of the Company with respect to its computer programs. The purchase of this product shall not be deemed to grant, either directly or by implication, any rights to the purchaser regarding the Company's computer programs. The Company's computer programs may not be copied, modified, distributed, decompiled, or reverse-engineered in any manner without the prior written consent of the Company.

Disclaimer

The Company endeavors to achieve the accuracy and completeness of this manual, but no warranty of accuracy or reliability is given. All the specifications and designs are subject to change without notice due to continuous technological development. No part of this manual shall be copied, modified, translated, or distributed in any manner without the express written permission of us.

We do not guarantee, for any particular purpose, the accuracy, validity, timeliness, legitimacy or completeness of the third-party products and contents involved in this manual.

If you have any suggestions or would like to receive more information, please visit our website at: <http://www.hytera.com>.

Contents

Documentation Information	1
1. Overview	2
1.1 Definition.....	2
1.2 Applicable Models.....	2
1.3 Principle.....	2
1.4 Version.....	2
1.5 Restriction.....	3
1.6 Related Document.....	3
2. Configuration	4
2.1 Configuration Tool.....	4
2.2 Configuring Common Parameters.....	4
2.3 Configuring Parameters Related to Location Query.....	5
2.4 Configuring Parameters Related to Location Information Report.....	6
3. Application	11
Abbreviation	12

Documentation Information

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

Conventions

Icon 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
" "	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	Date	Description
R1.0	January 2017	Initial Release.

1. Overview

1.1 Definition

Global Positioning System (GPS, which is referred as "Positioning" in this document) facilitates location-based applications, allowing visible dispatch by the dispatch station. With this feature, the radio user can obtain its real-time location information or query that of another radio, and can report location information to another radio or to the dispatch station for efficient dispatch.

1.2 Applicable Models

The Positioning feature is available to the following models.

- DMR conventional radios with positioning chips

The ninth character of the radio model number indicates the type of positioning system the radio supports. "G" indicates that the radio supports the Global Positioning System (GPS) developed by the United State. "C" indicates that the radio supports both the GPS and the BeiDou Navigation Satellite System (COMPASS) developed by China. "R" indicates that the radio supports both the GPS and the Global Navigation Satellite System (GLONASS) developed by Russia. To view the model number, click the "Radio Information" in the Customer Programming Software (CPS) after the radio is connected.

For information about radios, refer to the catalog provided by us or contact your supplier.

- Repeater

Currently, the Positioning feature is available only to RD96X, which can only report location information at the preset interval.

This document takes PD98X as an example.

1.3 Principle

The satellite signal from the positioning system provides the real-time location information of the radio. Then the radio can automatically report the location information to the dispatch station, or the radio user can send the location information to the dispatch station or another radio.

1.4 Version

- R8.0: adds Voice with GPS and Query Location.

- R6.0: supports COMPASS.
- R5.5: supports Quick GPS and GPS Data Compression.
- R5.0: supports GLONASS.
- R4.0: supports Time Zone.
- R3.0: supports Application Programming Interface (API) for GPS-based dispatch and control, GPS Revert Channel, GPS Automatic Update and GPS Active Report.
- R2.0: supports GPS icon, Position View and GPS Msg.

1.5 Restriction

- The Positioning feature is available only to DMR conventional radios with positioning chips.
- The satellite signal reception is subject to the environment in which the radio is located. The signal strength may be low in such unfavorable places as basement, train, or subway.

1.6 Related Document

- Applicable CPS help
- Applicable release notes

2. Configuration

This chapter describes only how to configure the radio, which is also applicable to the repeater. For details on configuration for the dispatch station, refer to relevant documents.

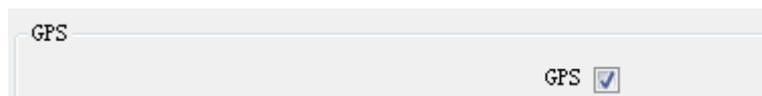
2.1 Configuration Tool

DMR CPS V8.00.09.007 or later must be prepared properly.

2.2 Configuring Common Parameters

Step 1 Enable the Positioning feature.

Go to "Conventional -> General Setting -> Accessories -> GPS" in the CPS, and then select "GPS".

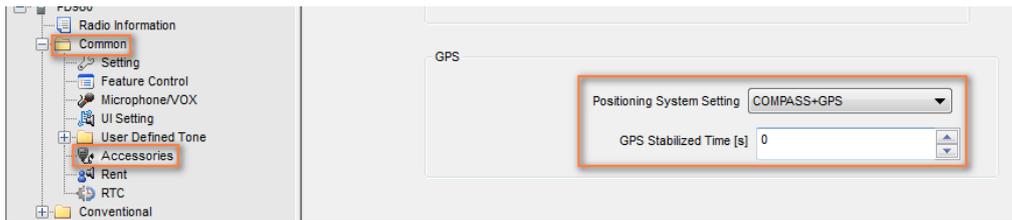


Step 2 Choose the positioning system and set the GPS stabilized time.

If the radio supports both GPS and COMPASS or both GPS and GLONASS, you need to choose the positioning system from which the radio receives the satellite signal.

The location information the radio first receives may not be the actual location information of the radio. You can allow the radio to use the location information obtained after a period as its final location information. To set the period, go to "Common -> Accessories -> GPS -> GPS Stabilized Time" in the CPS.

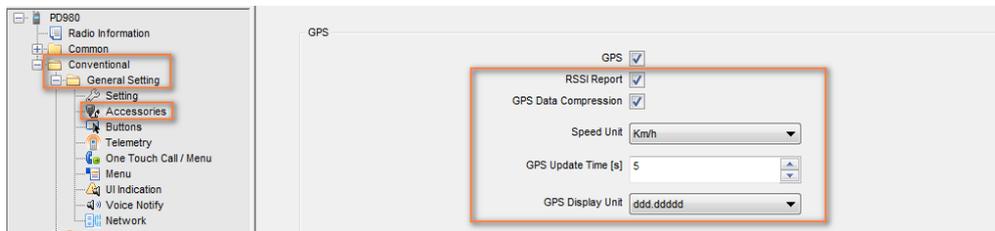
- It is recommended that you set "GPS Stabilized Time[s]" to a value equal to or less than 3 if it is acceptable to quickly obtain less accurate location information.
- It is recommended that you set "GPS Stabilized Time[s]" to a value equal to or greater than 5 if more accurate location information is required.



2.3 Configuring Parameters Related to Location Query

Step 1 Configure the parameters related to location information display, and enable the "RSSI Report" and "GPS Data Compression" feature.

To configure the related parameters, go to "Conventional -> General Setting -> Accessories -> GPS" in the CPS.



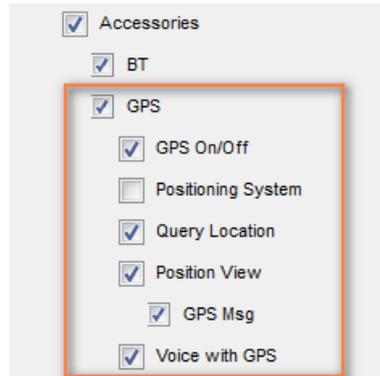
The following table lists the configurable parameters:

Parameter	Description
RSSI Report	Allows you to set whether to enable the RSSI Report feature. With this feature enabled, the radio reports RSSI data together with location information, allowing the dispatch station to assess signal quality in a specific area.
GPS Data Compression	Allows you to set whether to enable the GPS Data Compression feature. With this feature enabled, location information is compressed before transmission, enhancing the chance of successful data transmission.
Speed Unit	Allows you to set the unit of the current movement speed of the radio, including km/h, mile/h, and sea mile/h.
GPS Update Time [s]	Allows you to set the interval at which the radio updates the location information.
GPS Display Unit	Allows you to set the format for location information display, including ddd.dddddd, ddd.mm, and ddd.mm.ss.

Step 2 Include the positioning-related options on the radio menu.

To include the positioning-related options on the radio menu, go to "Conventional -> General Setting -> Menu -> Accessories" in the CPS, and then select GPS and other related parameters.

With all the positioning-related parameters selected, the radio user can perform the positioning-related operations on the radio menu.



2.4 Configuring Parameters Related to Location Information Report

The radio can automatically report its location information to the dispatch station after the following parameters are configured properly.

Step 1 Configure the target ID to which the radio reports location information.

The target ID must be unique and comply with the dial rules of the conventional communication system.

To set the target ID, go to "Conventional -> General Setting -> Network -> Radio Services -> RRS & GPS Radio ID" in the CPS.



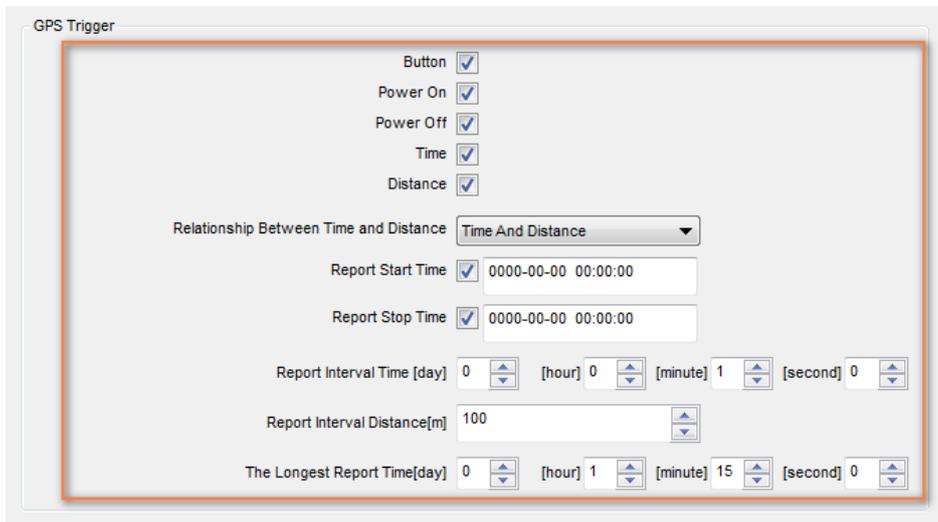
Step 2 Configure the conditions under which the radio automatically reports location information.

To set the related parameters, go to "Conventional -> General Setting -> Accessories -> GPS -> GPS Trigger" in the CPS.

The following table lists the configurable parameters:

Parameter	Description
Button	Allows you to set whether the radio reports the location information when the preprogrammed GPS Report key is pressed.
Power On	Allows you to set whether the radio automatically reports the location information upon power-on.
Power Off	Allows you to set whether the radio automatically reports the location information before being powered off.
Time	<p>Allows you to set whether the radio periodically reports the location information at the preset interval. This feature is subject to the setting of the following parameters.</p> <ul style="list-style-type: none"> ➤ Report Start Time: allows you to set when the radio starts to periodically report the location information. If this parameter is set to "0", the radio immediately reports the location information upon the end of programming. ➤ Report Stop Time: allows you to set when the radio stops reporting the location information. If this parameter is set to "0", the radio continuously reports the location information, until it powers off or the dispatch station instructs it to stop reporting. ➤ Report Interval Time: allows you to set the interval at which the radio reports the location information. If this parameter is set to "0", the radio does not report the location information periodically.
Distance	<p>Allows you to set whether the radio reports the location information when it moves beyond the preset distance from the last reported position.</p> <ul style="list-style-type: none"> ➤ The radio reports the location information it first receives upon the end of programming. ➤ The radio reports the location information as requested by the dispatch station. If no location information is available, the radio will report the location information when the information is

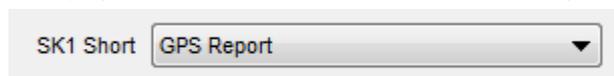
Parameter	Description
	available.
Relationship Between Time and Distance	<p>Allows you to set the conditions under which the radio reports the location information if both "Time" and "Distance" are selected.</p> <ul style="list-style-type: none"> ➤ Time Or Distance: the radio reports the location information when either the time-related or distance-related conditions are satisfied. ➤ Time And Distance: the radio reports the location information only when both the time-related and distance-related conditions are satisfied.
The Longest Report Time	<p>Allows you to set the interval at which the radio automatically reports the location information if neither of the time-related and distance-related conditions is satisfied. This parameter is available only when "Relationship Between Time and Distance" is set to "Time And Distance".</p>



Step 3 (Optional) Set shortcut key for the GPS Report feature.

If one of the programmable keys has been set as the shortcut to the GPS Report feature, the radio user can press the shortcut key to enable or disable this feature.

To set the shortcut key, go to "Conventional -> General Setting -> Buttons" in the CPS.



Step 4 (Optional) enable the Quick GPS feature.

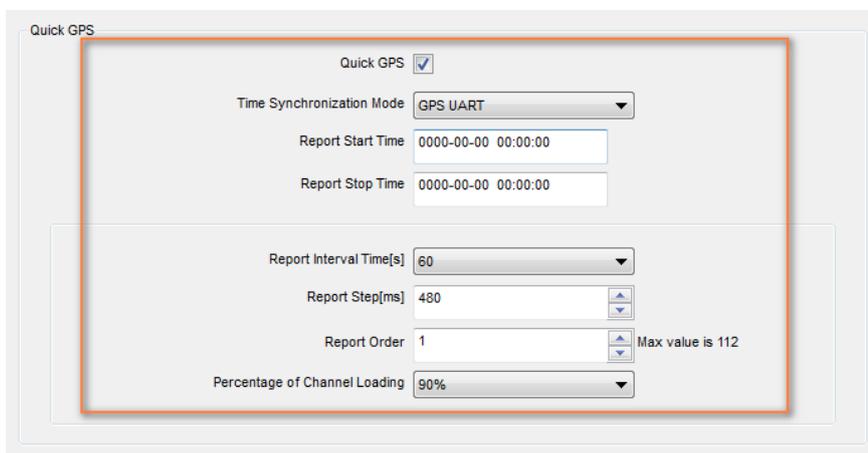
The Quick GPS feature allows all radios of the same dispatch station to transmit location information at specific time slices. To be specific, the Report Interval Time is divided into different time slices with the same time length, and the time slices are allocated to all radios of the dispatch station. In this way, the radios will transmit location information to the dispatch station in order, improving transmission efficiency.

For description of related parameters, refer to CPS help.

 **Note**

The radio user cannot press the shortcut key to report the location information after the Quick GPS feature is enabled.

To enable this feature, go to "Conventional -> General Setting -> Accessories -> GPS -> Quick GPS" in the CPS.



Quick GPS

Quick GPS

Time Synchronization Mode: GPS UART

Report Start Time: 0000-00-00 00:00:00

Report Stop Time: 0000-00-00 00:00:00

Report Interval Time[s]: 60

Report Step[ms]: 480

Report Order: 1 (Max value is 112)

Percentage of Channel Loading: 90%

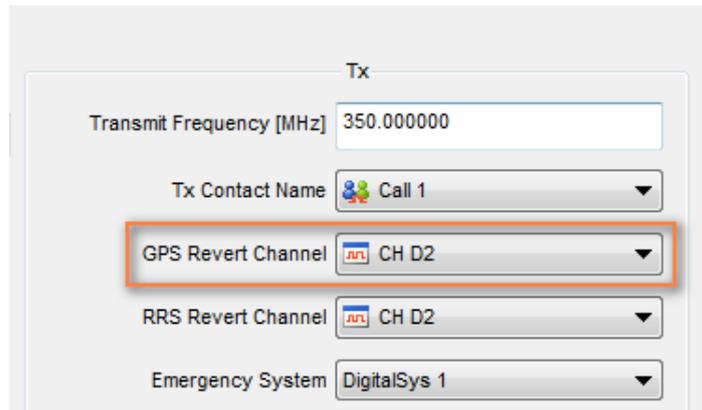
Step 5 (Optional) Configure the GPS Revert Channel.

The radio may fail to report the location information on the current channel if it is occupied by other radios transmitting voice or data signals. This may delay the reporting, thus impairing the dispatch efficiency.

To solve this issue, it is recommended that you choose one channel as the GPS revert channel.

- The radio stays on the current channel if it does not report the location information.
- The radio switches to the GPS revert channel when it transmits the location information. After the transmission, the radio switches back to the previous channel.

To configure the GPS revert channel, go to "Conventional -> Channel -> Digital Channel -> Tx -> GPS Revert Channel" in the CPS.



The screenshot shows a configuration window titled "Tx". It contains several fields and dropdown menus:

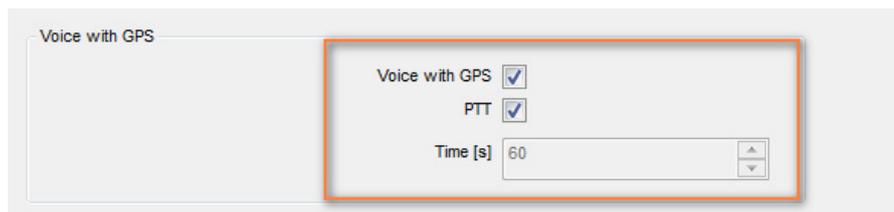
- Transmit Frequency [MHz]: 350.000000
- Tx Contact Name: Call 1
- GPS Revert Channel: CH D2 (highlighted with an orange box)
- RRS Revert Channel: CH D2
- Emergency System: DigitalSys 1

Step 6 (Optional) Enable the Voice with GPS feature.

The Voice with GPS feature allows the radio to report the location information while initiating a call, informing the dispatch station of the real-time location of the radio. It is recommended that you enable the Voice with GPS feature and configure the way the radio reports the location information.

- PTT: The radio reports the location information once immediately after the radio user holds down the **PTT** key to speak.
- Time: The radio reports the location information once after the radio user holds down the **PTT** key to speak. After that, the radio reports the location information at the preset interval, until the radio user releases the key.

To enable the Voice with GPS feature, go to "Conventional -> General Setting -> Accessories -> GPS -> Voice with GPS" in the CPS, and set relevant parameters.



The screenshot shows a configuration window titled "Voice with GPS". It contains the following settings:

- Voice with GPS:
- PTT:
- Time [s]: 60

3. Application

This chapter describes the positioning-related applications on the radio.

- Time synchronization

To allow the radio to keep its time clock synchronized with the satellite time source, go to "Common -> RTC" in the CPS, and set "Priority Time Source" to "GPS Timing".

- Viewing the location information

To view the location information, go to "Menu -> Accessories -> GPS -> Position". The real-time location information includes the longitude, latitude, speed, altitude, time, date and the number of visible satellites.

- Sending the location information

To send the location information, go to "Menu -> Accessories -> GPS -> Position -> GPS Msg". The radio user can view the location information, and then send it to another radio as a message. The receiving radio user can locate the sending radio using the third-party application (for example, map).

In addition, the radio automatically reports location information to the preset target ID when it enters emergency mode or the telemetry feature is activated (the prerequisite is that the "Action" parameter must be set to "Send Status w/ GPS Message Command").

- Query Location

To query the location information of another radio, go to "Menu -> Accessories -> GPS -> Query Location". The radio user can query the location information of another radio supporting the Positioning feature through the menu.

- Reporting location information to the dispatch station

The radio automatically reports location information to the dispatch station when the preset conditions are satisfied, allowing the dispatch station to locate it for dispatch purpose.

Abbreviation

Abbr.	Full Name
COMPASS	BeiDou Navigation Satellite System
CPS	Customer Programming Software
DMR	Digital Mobile Radio
GLONASS	Global Navigation Satellite System
GPS	Global Positioning System



is the trademark or registered trademark of Hytera Communications Corporation Limited.
© 2017 Hytera Communications Corporation Limited. All Rights Reserved.

Address: HYT Tower, Hi-Tech Industrial Park North, Beihuan
RD., Nanshan District, Shenzhen, China

Postcode:518057
<http://www.hytera.com>