



***DMR Repeater  
Fusion System  
Application Notes***



## Copyright Information

Hytera is the trademark or registered trademark of Hytera Communications Corporation Limited (the Company) in 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. Any of 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

Hytera 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 may 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 learn more details, please visit our website at:

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

# Contents






<b>Documentation Information .....</b>	<b>1</b>
<b>1. Overview.....</b>	<b>2</b>
1.1 Function.....	2
1.2 System Internetworking.....	2
1.3 Principle.....	3
1.4 Restrictions .....	3
1.5 Versions .....	4
<b>2. Configuration.....</b>	<b>5</b>
2.1 Tool.....	5
2.2 Procedure .....	5
2.2.1 XPT System .....	5
2.2.2 IP Multisite Connect .....	6
<b>3. Operation.....</b>	<b>8</b>
<b>Abbreviations.....</b>	<b>10</b>

# Documentation Information

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

## Documentation Conventions

### Icon Conventions

Icon	Description
 <b>Tip</b>	Indicates information that can help you make better use of your product.
 <b>Note</b>	Indicates references that can further describe the related topics.
 <b>Caution</b>	Indicates situations that could cause data loss or equipment damage.
 <b>Warning</b>	Indicates situations that could cause minor personal injury.
 <b>Danger</b>	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".
<b>Bold</b>	The text in boldface denotes the name of a hardware button. 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
R1.0	September, 2018	Initial Release.

# 1. Overview

## 1.1 Function

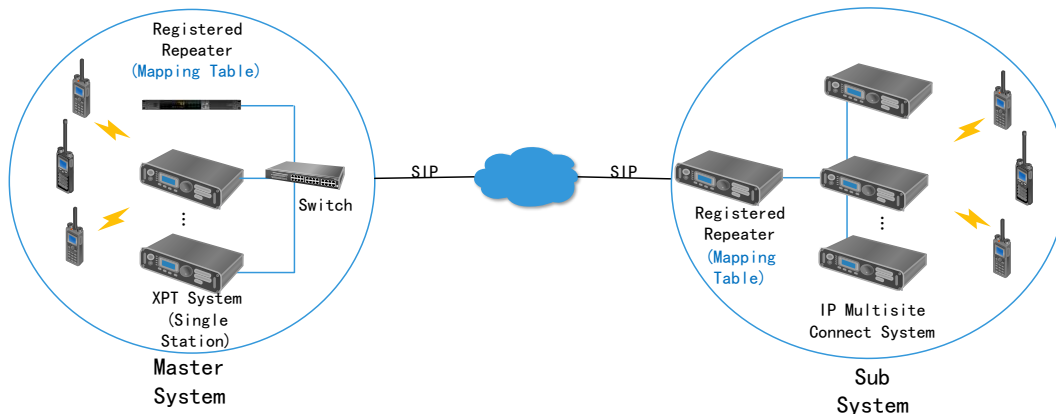
The fusion system achieves internetworking between an IP Multisite Connect system and an XPT system in a simple and flexible way to expand the coverage. The traditional multi-system internetworking schemes require additional central server and distributed gateway. However, the fusion system achieves internetworking simply by establishing a dynamic mapping table between the master system and the subsystem, without additional hardware equipment, thus reducing equipment and labor costs.

The fusion system supports the following features: Private call, group call and all call between two or three systems.

## 1.2 System Internetworking

The fusion system supports internetworking between:

- One XPT system (master system) and one IP Multisite Connect system (subsystem); and



- One XPT system (master system) and two IP Multisite Connect systems (subsystems)



### Note

When the XPT system includes a single station, it is recommended to use a switch for internetworking. If you want to use a router for internetworking, the router must have the ALG (Application Layer Gateway) and the NAT (Network Address Translation) functions.

## 1.3 Principle

The fusion system consists of a master system (XPT system) and subsystems (IP Multisite Connect systems) that communicate through the SIP (Session Initiation Protocol). The master system and the subsystems inform each other of the services that need to be interworked through the mapping table. The user needs to configure the mapping table for the registered repeater of the master system and the subsystems separately. The subsystem automatically sends its mapping table to the registered repeater of the master system.



### Note

Before configuring the mapping table, decide the system ID, radio ID, and call type for the interworked services.

The call flow within the fusion system is as follows.

- A subsystem initiates a call to the master system:
  1. A radio within subsystem 1 initiates a call request.
  2. The registered repeater of the subsystem 1 converts the call request into the corresponding system ID, and then sends the ID to the master system.
  3. Upon reception of the system ID, the master system queries the dynamic mapping table (including the mapping table created by the master system and the mapping table reported by the subsystem) and finds the system ID is included in the mapping table of the subsystem 2. Then the master system sends the system ID to the subsystem 2. At the same time, the master system parses the system ID into a local number according to the mapping table and initiates a call within the local system.
  4. The subsystem 2 receives the system ID and maps it to a local call through the mapping table.
- The master system initiates a call to the subsystems:
  1. A radio within the master system initiates a call request, and the registered repeater of the master system converts the call request into a system ID.
  2. The master system queries the dynamic mapping table. If this system ID is included in the mapping table of both subsystem 1 and subsystem 2, the master system sends the system ID to subsystem 1 and subsystem 2 respectively.
  3. The subsystem 1 and the subsystem 2 receive the system ID and map it to a local call through the mapping table.

## 1.4 Restrictions

- The fusion system cannot be used simultaneously with API dispatcher.

- The fusion system cannot be used simultaneously with SIP phone.
- The mapping tables of both the master system and the subsystems support up to 128 mapping entries, and the master system can fuse up to two subsystems.
- In the fusion system, the private number ranges from 1 to 65535 and the group number ranges from 1 to 255.
- For cross-system communication, the AIS (Application Interface Specification) dispatcher included in the XPT system only supports call services.
- The AIS dispatcher included in the IP Multisite Connect system only supports local dispatching services.
- The emergency services cannot be transmitted through fusion system.

## 1.5 Versions

Repeater with firmware version V9.00.09.002 or later supports the fusion system feature.

## 2. Configuration

### 2.1 Tool

CPS V9.00.07.015 or later is required.

### 2.2 Procedure

The following configuration is based on the typical fusion system consisting of one XPT system as the master system and one IP Multisite Connect system as the subsystem.

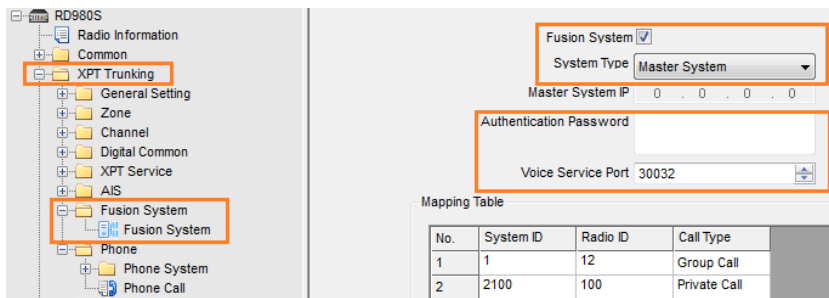
The fusion system parameters are configured for the registered repeater of the master system and the subsystem.

#### 2.2.1 XPT System

**Step 1** Enable the Fusion System feature.

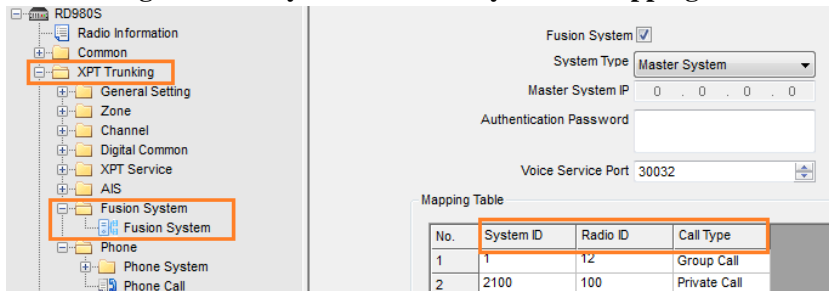
Go to **XPT Trunking > Fusion System > Fusion System**.

1. Select **Fusion System**.
2. Set **System Type** to "Master System".
3. Enter the **Authentication Password** (The master system and the subsystem must have the same authentication password).
4. Set **Voice Service Port** to a unique value.



**Step 2** Configure the mapping table.

Go to **XPT Trunking > Fusion System > Fusion System > Mapping Table**.





When **Call Type** is set to "Group Call", the groups in the master system and the subsystems must have the same **System ID**, so that they can communicate with each other.

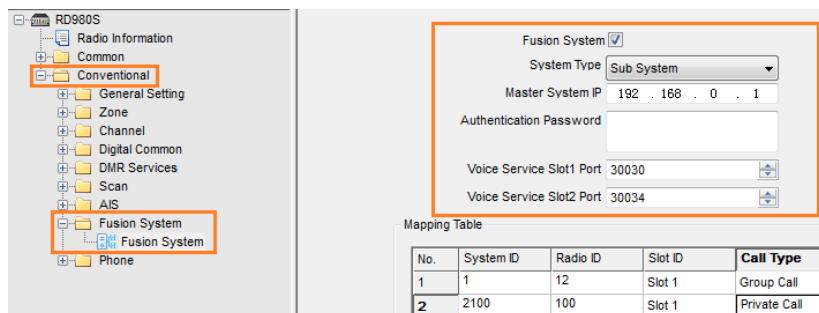
When **Call Type** is set to "Private Call", the system ID must be unique within the fusion system, so that the radios of other systems can communicate with the radios of the local system.

### 2.2.2 IP Multisite Connect

**Step 1** Enable the Fusion System feature.

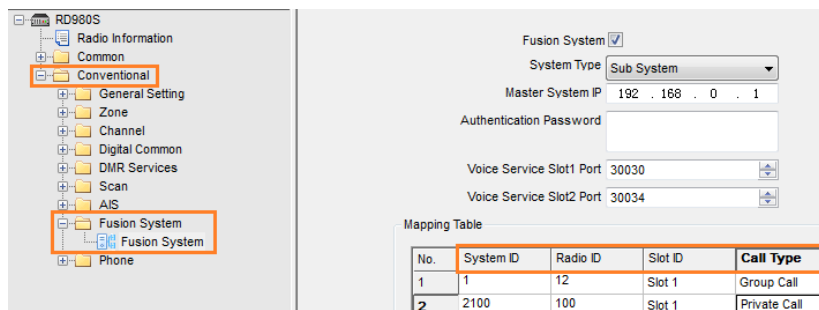
Go to **Conventional > Fusion System > Fusion System**.

1. Select Fusion System.
2. Set **System Type** to "Subsystem".
3. Set **Master System IP** to IP address of the registered repeater of the master system.
4. Enter the **Authentication Password** (The master system and the subsystem must have the same authentication password).
5. Set **Voice Service Slot1 Port** to a unique value.
6. Set **Voice Service Slot2 Port** to a unique value.



**Step 2** Configure the mapping table.

Go to **Conventional > Fusion System > Fusion System > Mapping Table**.



When **Call Type** is set to "Group Call", the groups in the master system and the subsystems must have the same **System ID**, so that they can communicate with each other.

When **Call Type** is set to "Private Call", the system ID must be unique within the fusion system, so that the radios of other systems can communicate with the radios of the local system.

## 3. Operation

This chapter introduces how to make a group call and private call in the fusion system. As an example, here we use the typical fusion system consisting of one XPT system as the master system and one IP Multisite Connect system as the subsystem.

### Group call

The caller calls the target group ID. The registered repeater of the system to which the caller belongs maps the group ID into the corresponding system ID and sends the system ID to the other system. The other system searches for the group corresponding to the system ID and initiates a call to the group. In this way, the intercommunication between groups having the same system ID is achieved.

For example, to achieve intercommunication between group 30 of XPT system and group 200 of IP Multisite Connect system, do as follows:

**Step 1** Configure the mapping table for the XPT system (refer to [2.2.1 XPT System](#)).

Parameter	Value
System ID	12200
Radio ID	30
Call Type	Group Call

**Step 2** Configure the mapping table for the IP Multisite Connect system (refer to [2.2.2 IP Multisite Connect](#)).

Parameter	Value
System ID	12200
Radio ID	200
Slot ID	1
Call Type	Group Call

**Step 3** Dial "30" from a radio in the XPT system.

### Private call

The caller calls the system ID of the target radio. The registered repeater of the system to which the caller belongs sends the system ID to the other system. The registered repeater of the other system searches for the radio corresponding to the system ID and initiates a private call to the radio. In this way, the cross-system private

call is implemented.

For example, to achieve intercommunication between a radio 300 of XPT system and a radio 400 of IP Multisite Connect system, do as follows:

**Step 1** Configure the mapping table for the XPT system (refer to [2.2.1 XPT System](#)).

Parameter	Value
System ID	1300
Radio ID	300
Call Type	Private Call

**Step 2** Configure the mapping table for the IP Multisite Connect system (refer to [2.2.2 IP Multisite Connect](#)).

1. Parameter	2. Value
3. System ID	4. 11400
5. Radio ID	6. 400
7. Slot ID	8. Slot 1
9. Call Type	10. Private Call

**Step 3** Dial "11400" from a radio in the XPT system.

## Abbreviations

Abbreviation	Full Name
AIS	Application Interface Specification
ALG	Application Layer Gateway
API	Application Programming Interface
CPS	Customer Programming Software
NAT	Network Address Translation
SIP	Session Initiation Protocol
XPT	Extended Pseudo Trunk



is the trademark or registered trademark of Hytera Communications Corporation Limited.  
© 2018 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>