What's the difference between Sub Master Service and IP Multi-site Connect in settings?

The IP Multi-site Connect settings of repeater are used for communicating with the slave repeaters, and different ports are responsible for different services, but the port and settings of Sub Master Service are used for communicating with the master repeaters.

What's the difference between Sub master and master repeater?

Two master repeaters cannot be connected directly unless one of them is set as Sub master. Please note that the Master IP and Master Port must be consistent with those of master repeater connected to the sub master.

3.11 IP Transit

3.11.1 Overview

3.11.1.1 Definition

IP Transit is a feature that allows mobile radios in dispersed locations to be connected to exchange voices, data and control packets to each other over TCP/IP protocol, extending the communication network. If necessary, IP Transit networks can be connected via the Sub Master feature, so as to further extend the communication coverage.

There are three categories of mobile radios in the IP Transit network:

- Master mobile radio: it is used to manage other mobile radios in the same IP Transit network. Only one Master mobile radio is allowed in an IP Transit network.

- Slave mobile radio: it is connected to and registers with the Master mobile radio, thus forming an IP Transit network with the Master mobile radio. Multiple Slave mobile radios can be supported in an IP Transit network.

- Sub Master: it is a mobile radio used to connect two or more IP Transit networks. A Sub Master plays the role as both the Master mobile radio and the Slave mobile radio.

Currently, a single (small-scale) digital IP Transit network can accommodate a maximum of 30 mobile radios including a Master mobile radio and multiple Slave mobile radios. The Master mobile radio is only allowed to communicate with its Slave mobile radios within the same network rather than other mobile radios in other IP Transit networks, making it difficult to extend communication coverage of the IP Transit network.

To solve the problem, the Sub Master is applied. To be specific, the Sub Master connects multiple small-scale IP Transit networks to make a large-scale one, so as to extend the communication coverage. Moreover, the Sub Master can also connect large-scale IP Transit networks.

The figure below briefly describes how the Sub Master works in the IP Transit networks. As can be seen from the figure, IP Network 1 and IP Network 2 are both the small-scale IP Transit networks, and IP Network 3 is the large-

scale one. IP Network 1 consists of Master mobile radio A and Slave mobile radio 1 and 2; IP Network 2 consists of Master mobile radio B and Slave mobile radio 3 and 4. To extend the communication coverage of both IP Network 1 and 2, Master mobile radio A can be used as the Sub Master to connect Master mobile radio B, in order to combine IP Network 1 and 2 to form a large-scale IP Transit Network (IP Network 3). Then, for IP Network 1, A will still work as the Master mobile radio; while for the large-scale IP Network 3, A will turn to be a Slave mobile radio managed by Master mobile radio B.
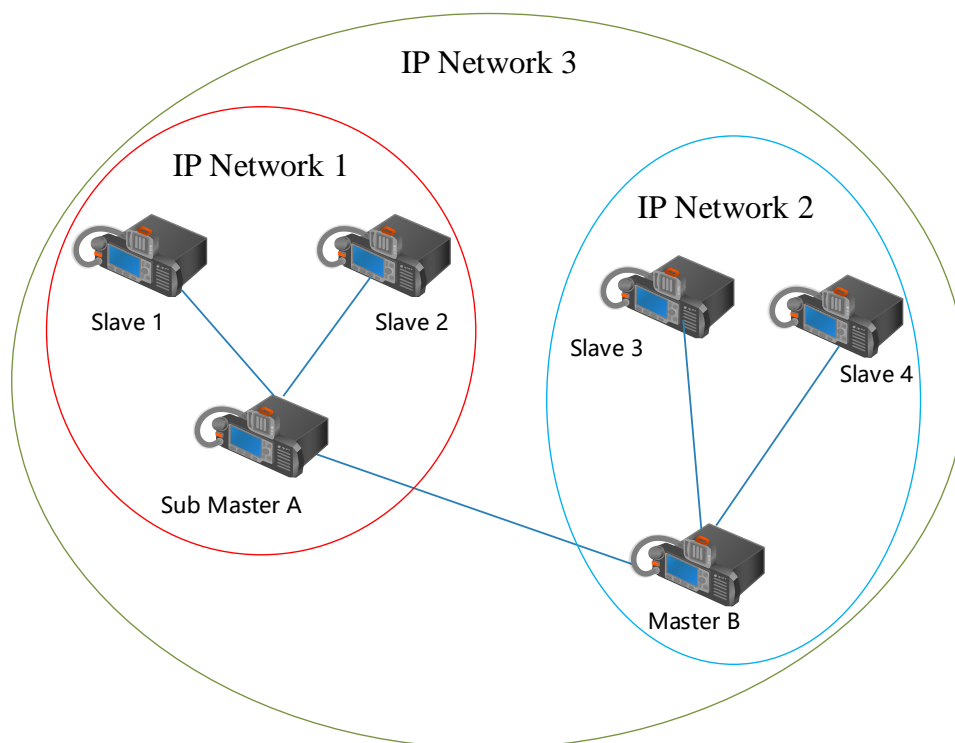

In IP Transit network, portable radio and mobile radio support full services of digital functions in Direct mode, including voice, data and signaling. To get a more detailed list of radio features, please refer to *New Generation DMR Radio_Feature List*.

3.11.1.2 Application

IP Transit can bring users these typical benefits:

● To connect two or more conventional communication systems in different areas

The physical communication range in Direct mode can be expanded with the help of IP network. As shown in the figure below, radio A, B and C originally could not interoperate in Direct mode due to the distance. With the help of HM78X, the intercommunication between A, B and C can be realized.
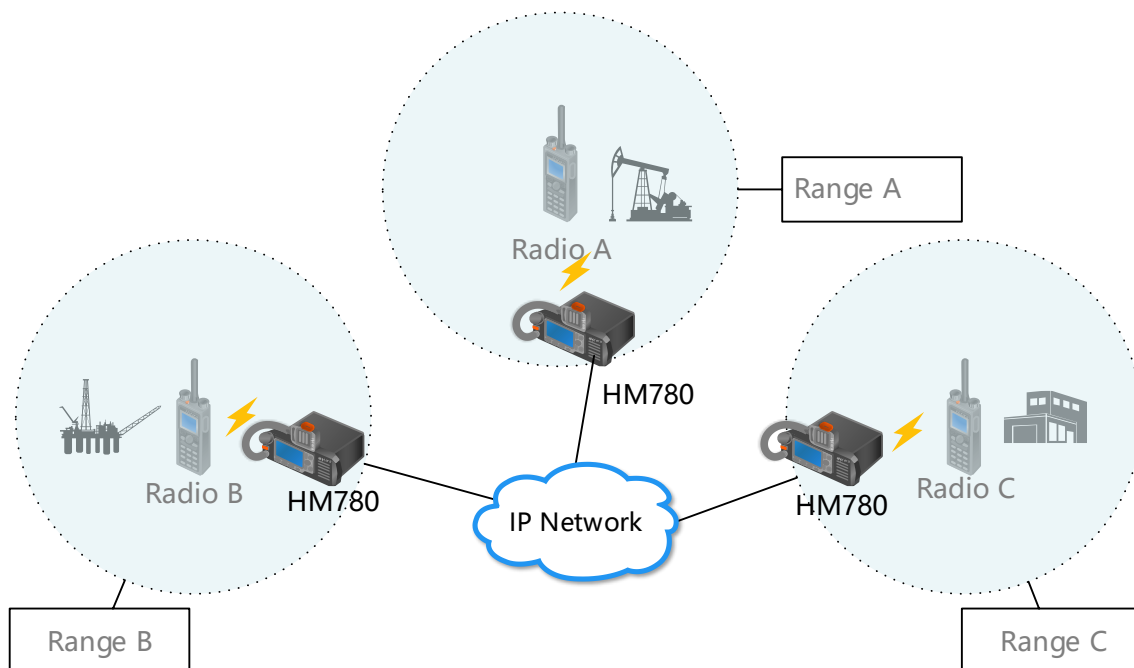
- To Connect mobile radios working with different frequency bands

  As shown in the figure below, radio 1 and radio 2 communicate using frequency 1, and radio 3 and radio 4 communicate using frequency 2. Intercommunication between radio 1, 2, 3 and 4 can be achieved with the help of HM78X.
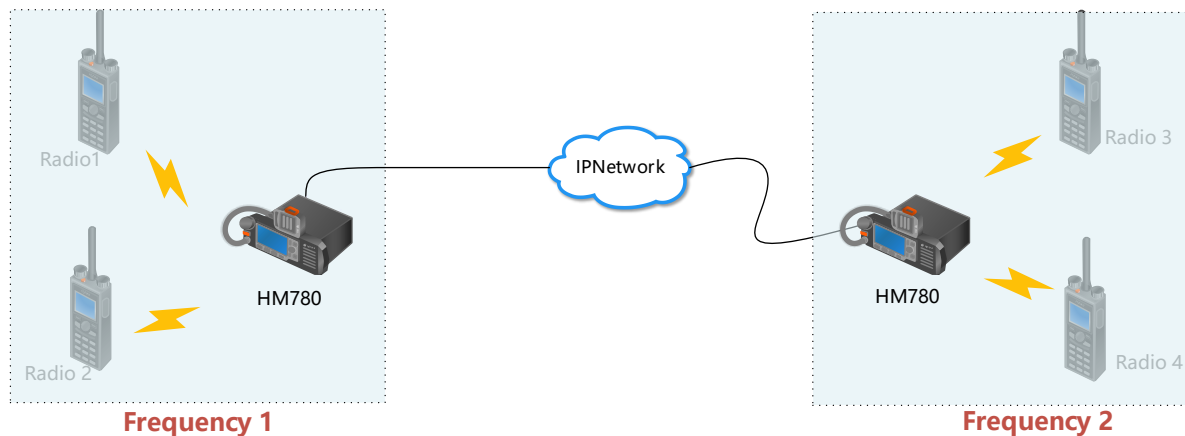

- To use IP-based applications

  HM78X supports secondary development based on IP network port, the API capability is the same as DB26 port based API capability. Based on IP network port is a more convenient way for secondary development. PC applications do not need to be bound in the same area as HM78X, they can be directly connected by network cable.

  The services supported by the secondary development based on the network port include: registration service, location service, text SMS service, auxiliary service, digital transmission, voice, and so on.

  Note: Data transit is only supported by DB26 port, which is a customized function based on DB26 port.

The following is a typical network diagram for developing a scheduling system based on IP network port.
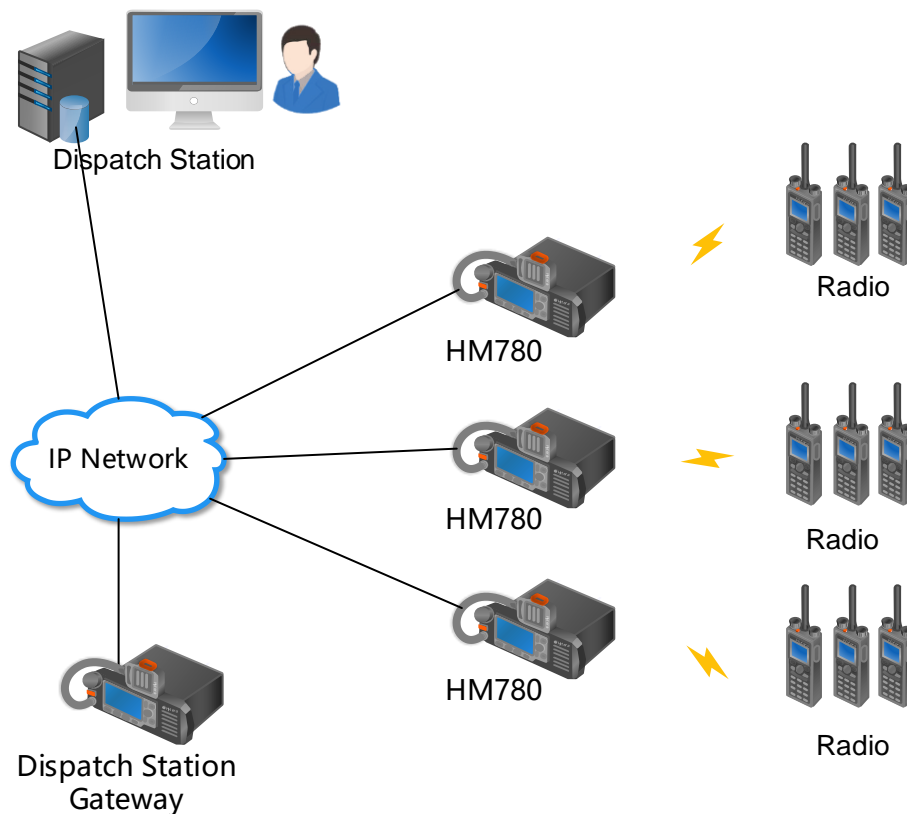
3.11.1.3 Restrictions

● As a paid feature, IP Transit must be authorized to the user to come into use.

● The IP Transit is subject to the network type and the configuration of network devices.

● The IP Transit feature is only available for Direct mode and digital channels.

● It is not recommended to enable the IP Transit feature when "Mix Receive" is enabled in the digital channel.

● After IP transit is enabled, turn off some periodic reporting functions, such as GPS reporting, BT information reporting, RRS online registration, battery information reporting, etc., to avoid periodic jumping to the jump channel for data transmission, thus affecting the voice or data transmission under IP transit network.

3.11.2 Requirements

3.11.2.1 Device Requirements

● Mobile Radio: HM78X

● Radio: see Hytera device list for details. And consult your supplier for specific radio models.

● Switch devices: Consult your supplier for details.

● Routing devices: such as Firewall, NAT, router (e.g. Cisco 1841), etc. Consult your supplier for details.

- Broadband wireless access devices: such as PTP, PMP, etc. Consult your supplier for details.

- Network cables

- Programming cables: choose the cables for HM78X.

3.11.2.2 Network Requirements

- The IP network can be either a private network or an Internet provided by Internet Service Provider (ISP).

- In IP Transit system, the Master mobile radio must have a static IP address. Alternatively, it can use a domain name to reduce the use cost in the Wide Area Network (WAN). The Slave mobile radio can connect to Master mobile radio via IP address or domain name.

  If the Master mobile radio uses the domain name, it is required to specify the domain name of Master mobile radio when the user programs the Slave mobile radio via CPS. The domain name can be used by both the Sub Master and the Master mobile radio, if there is any Sub Master in the IP Transit system.

- Either static IP address or dynamic IP address can be configured for Slave mobile radio through CPS.

  But it is not recommended to use the dynamic IP address. The reason is that the IP address allocated by the DHCP server can be used within the preset time. Once the time expires, DHCP server will assign a new IP address. Accordingly, communication between Slave mobile radio and Master mobile radio will be interrupted temporarily.

- The mobile radio can be located behind the firewall, router or NAT. However, each router can connect to one mobile radio only, and static mapping must be created between Master mobile radio and router. If Slave mobile radio cannot connect to Master mobile radio, be sure to create a static mapping between Slave mobile radio and router.

- The proxy server cannot be used to access the WAN in the IP Transit system.

3.11.2.3 Network Architecture

The network topology of IP Transit depends on the mobile radio location and the network connection. Typically, there are two kinds of network topologies:

- Local area network (LAN)

- Wide area network (WAN)

- In most cases, LAN and WAN together constitute the network topology. The following sections describe how to configure LAN and WAN respectively.

Local Area Network (LAN)

In IP Transit mode, these networks are supported:

- Dedicated LAN

● A company's LAN

● Dedicated radio communication system

Despite variable LAN configurations, the IP Transit system can work properly once all devices are in the same LAN. In order for the system to operate at its best, however, the technicians must have a good knowledge of bandwidth required on each device in this system.

The following figure shows an example of IP Transit operating with LAN.
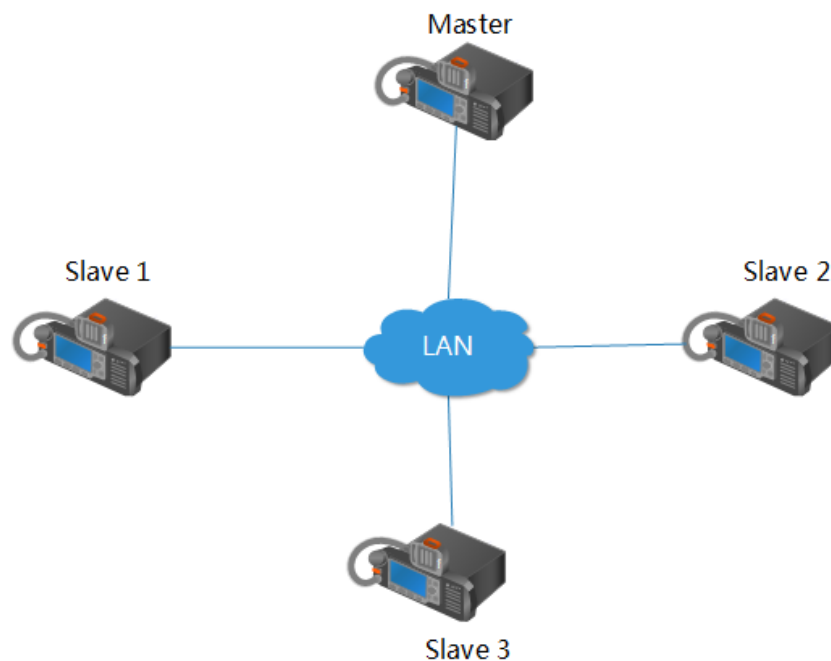
Wide Area Network (WAN)

The biggest advantage of IP Transit lies in that it can connect dispersed sites quickly through the Internet provided by an ISP.

Additionally, it is required to configure the router, NAT or firewall connected to Master mobile radio. The routers must support "HairPinning", a function that sends the source address a message indicating how to reach the destination.

The following figure shows an example of IP Transit operating with WAN.
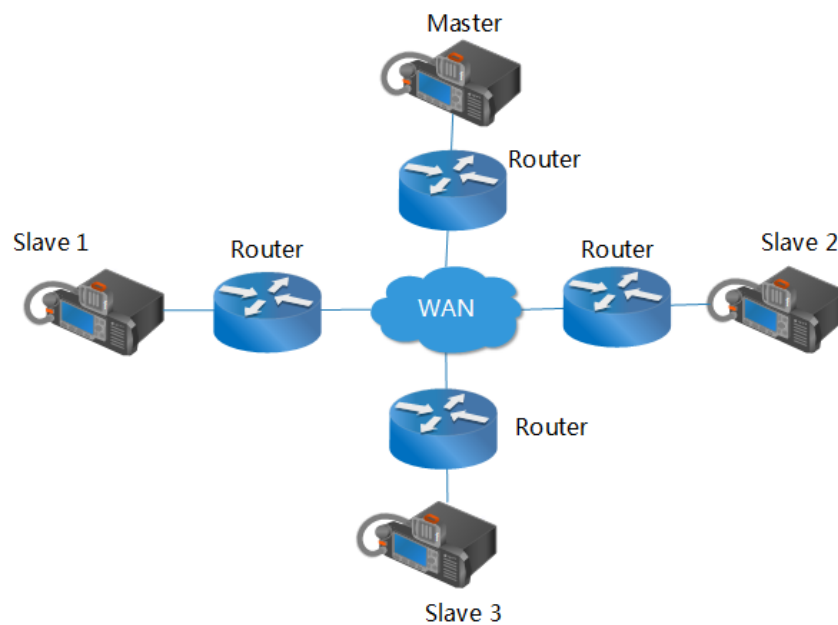
Sub Master

A Sub Master can act as a Master mobile radio and slave mobile radio. It is capable of forwarding the communication request from the current IP Transit network to other network(s), and receiving the request from other network(s), in order to realize inter-system communication. With the Sub Master feature, multiple communication networks will be interconnected together to extend the communication coverage of IP Transit system.

Due to the limited capacity of HM78X, inn a digital Transit network, one Master mobile radio can directly connect to the Slave mobile radios and Sub Master whose quantity cannot exceed 30. And the entire network can accommodate 200 mobile radios at most.
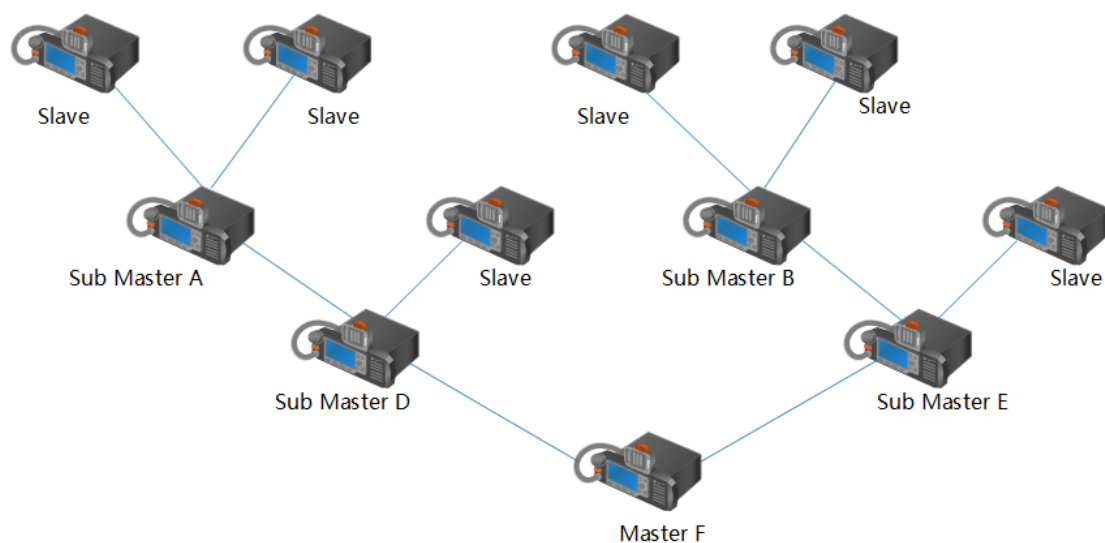
3.11.3 Equipment Connection and Configuration

The radios mentioned in this chapter include portable radios and mobile radios.

3.11.3.1 Configuration Tools

The appropriate IP Transit configuration scheme shall be chosen according to the network topology and the actual application. To make an IP Transit scheme operating with WAN and LAN, the involved parameters generally include:

● Mobile radio parameters (configured via CPS)

● Switch/Router parameters (configured via switch/routing devices)

Switch/Routing devices include switch, firewall, NAT, router and etc. You can contact the device provider for their specific configurations.

● Broadband wireless access parameters (configured via broadband wireless access devices)

Broadband wireless access devices include Canopy and etc. You can contact the device provider for their specific configurations.

3.11.3.2 Ethernet Cable

The simplest IP Transit network can be established by connecting two mobile radios back to back via an Ethernet cable directly. Generally, this network is used for radios to communicate across two bands or for demonstrating the work principles of IP Transit.

Connecting the Hardware

An Ethernet cable is required to connect two mobile radios in this scheme. The disadvantage of the scheme lies in poor expandability.
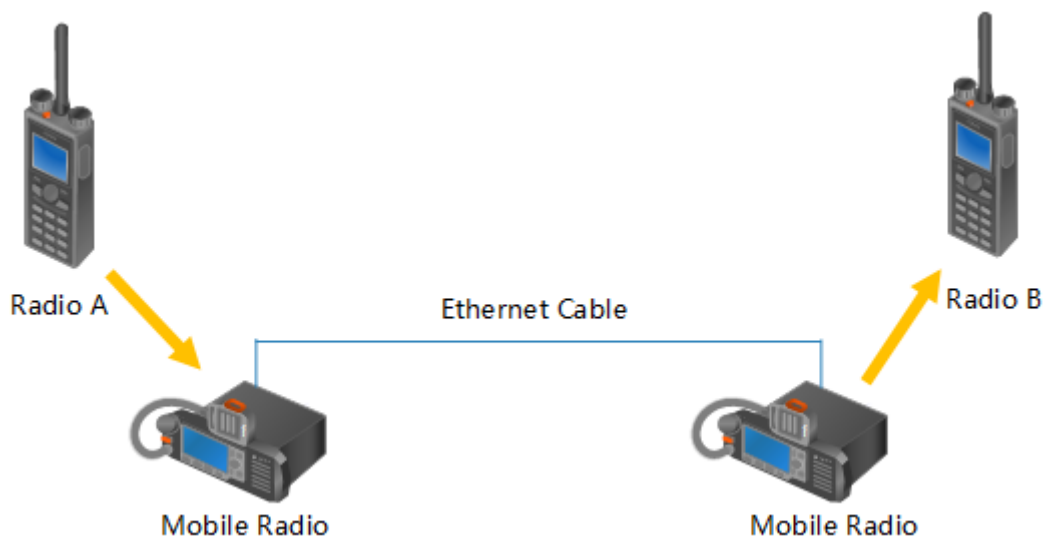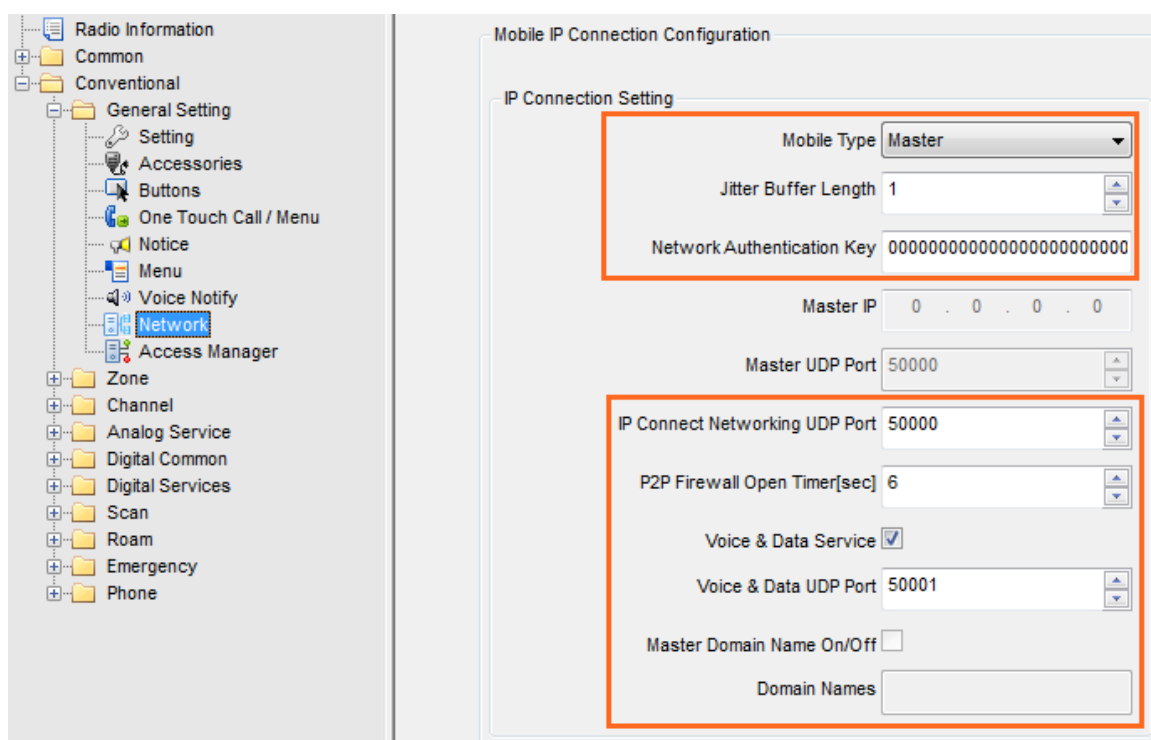
Configuring a Master Mobile Radio

1. Configure the Master mobile radio parameters such as frequency and color code via CPS.

2. Configure the IP address.

    CPS Path: Common-> Accessories -> IP Setting

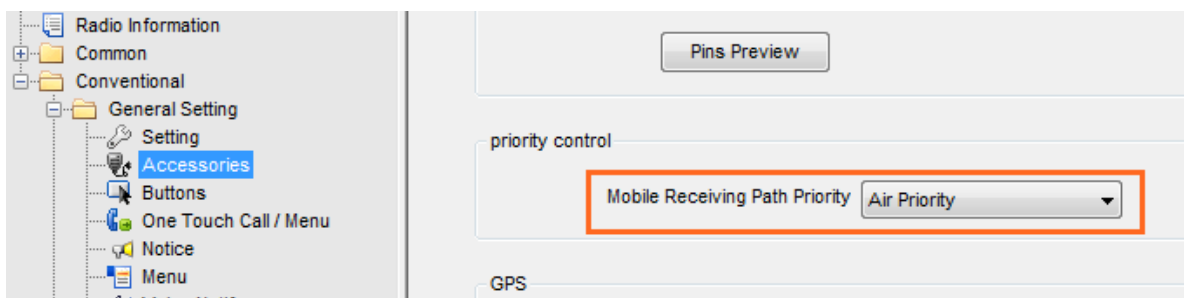| Parameter	Description
DHCP	Unchecked. As the Master mobile radio needs to use a fixed IP address for Slave mobile radio registration, DHCP is not applicable for Master mobile radio IP configuration.
Ethernet IP	The IP address of the mobile radio. When this scheme is employed, the Master mobile radio must use static IP address; otherwise, the Slave mobile radio will not be able to connect to the Master mobile radio. The static IP address of the Master mobile radio must be unique in the network.
Gateway IP	The gateway IP address of the subnet in which the mobile radio operates.
Netmask	The netmask of the subnet in which the mobile radio operates.

3. Configure the IP Transit parameters.

    CPS Path: Conventional -> General Setting -> Network

Parameter	Description
Mobile Type	For Master mobile radio, this parameter shall be set to "Master"; for Sub Master mobile radio, this parameter shall be set to "SubMaster"; for Slave mobile radio, this parameter shall be set to "Slave".
Jitter Buffer Length	The length of buffer area for the mobile radio to process the received voice and data in the IP network. When the network connectivity is poor, that is to say the network jittering is severe, the buffer length can be increased to improve the communication continuity. The voice and data receiving time will be extended by 60ms when the buffer length is increased by 1. Keep its default value unchanged. This parameter shall be modified by technicians only.
Network Authentication Key	The authentication key for accessing IP network. It is used to prevent unauthorized mobile radios of other IP network in the same LAN from accessing the Master mobile radio's IP network. All mobile radios within the same IP Transit network must use this authentication key for authentication.
IP Connect Networking UDP Port	This port is used to establish and maintain the network connection between Master repeater and Slave repeaters. Keep its default value unchanged.

Parameter	Description
P2P Firewall Open Timer	Time interval for sending a "Keep Alive" message. After the router has assigned the public network IP address and port for the specific repeater, the router will automatically recover the public network IP address and port which have not been used for a long time. Therefore, all mobile radios must send a "Keep Alive" message at a regular interval. This interval must be smaller than the time period during which the router can keep the connection alive. Keep its default value unchanged.
Voice & Data Service	This parameter shall be checked for the radio to perform the voice and data services.
Voice & Data UDP Port	This parameter is used to set the port which is used to perform the voice and data services. Keep its default value unchanged.

4. Configure the receiving path priority of the voice services and data services as per actual requirement.

CPS Path: Conventional -> General Setting -> Accessories -> Priority Control

Parameter	Description
Mobile Receiving Path Priority	● Air Priority: When the mobile radio receives both the air single and the IP single, the air signal is processed first. If the mobile radio is forwarding the IP signal, and there is an air signal coming in, the existing IP signal forwarding will be interrupted and the air signal will be forwarded first. ● IP Priority: When the mobile radio receives both the air single and the IP single, the IP signal is processed first. If the mobile radio is forwarding the air signal, and there is an IP signal coming in, the existing air signal forwarding will be interrupted and the IP signal will be forwarded first.

5. Enable the Digital IP Transit feature.

**CPS Path**: Conventional -> Channel -> Digital Channel -> CH DX
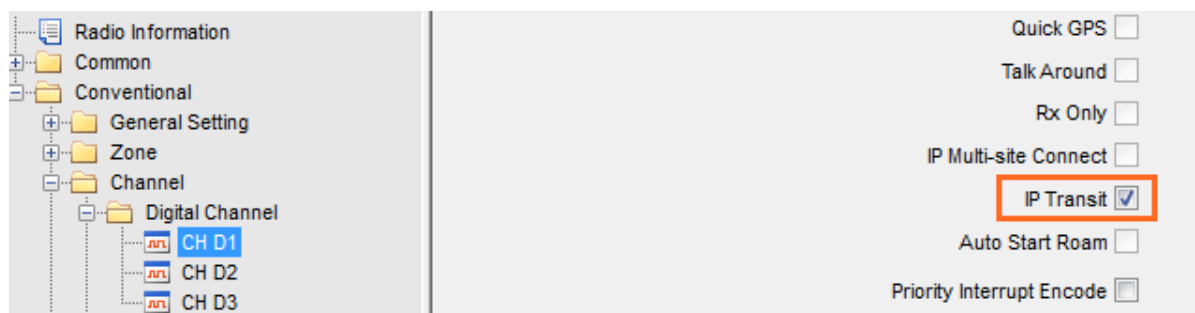
6. Configure the IP Transit access management parameters.

The communication initiated by one radio will be sent to every mobile radio in the network by default. When the network is busy and has plenty of repeaters, there will be a large amount of data transmitted in the network at one time.

To utilize the resource properly and build flexible networking, users can configure the radio ID and group ID of call services which can be repeated in IP Transit network, so as to manage the IP Transit network access of the radios. When the mobile radio receives the data package, it will decode the data package and obtain the call information, then check whether the called radio or group is in the list. If yes, the mobile radio will be allowed to repeat or receive the call; if not, the mobile radio will discard the data package.

CPS Path: Conventional -> General Setting -> Access Manager
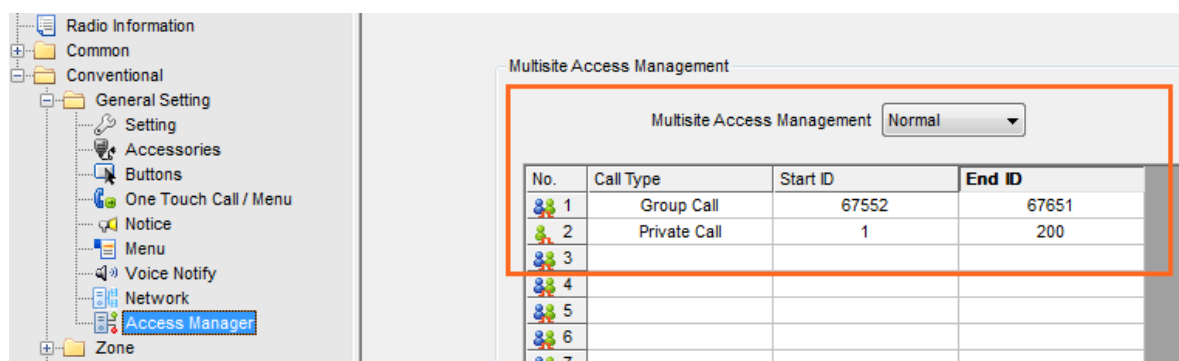
To enable the Multisite Access Management feature, set "Multisite Access Management" to "Normal".

Then configure the "Call Type", "Start ID" and "End ID" as per actual requirement.

Please note that with the Multisite Access Management feature enabled, the network burden can be reduced, but the roaming radio may be adversely affected. When the radio roams to a new zone and it is not listed in the Multisite Access Management list of the mobile radio in this zone, this radio will not be able to receive voice or data from the network via this mobile radio. In this case, the solution is to add the radio ID into the Multisite Access Management list of each mobile radio in advance. It is recommended that the Multisite Access Management feature not be enabled when there are lots of roaming radios.

Configuring a Slave Mobile Radio

1. Configure the Slave mobile radio parameters such as frequency and color code via CPS.

2. Configure the IP address.

> **CPS Path**: Common-> Accessories -> IP Setting
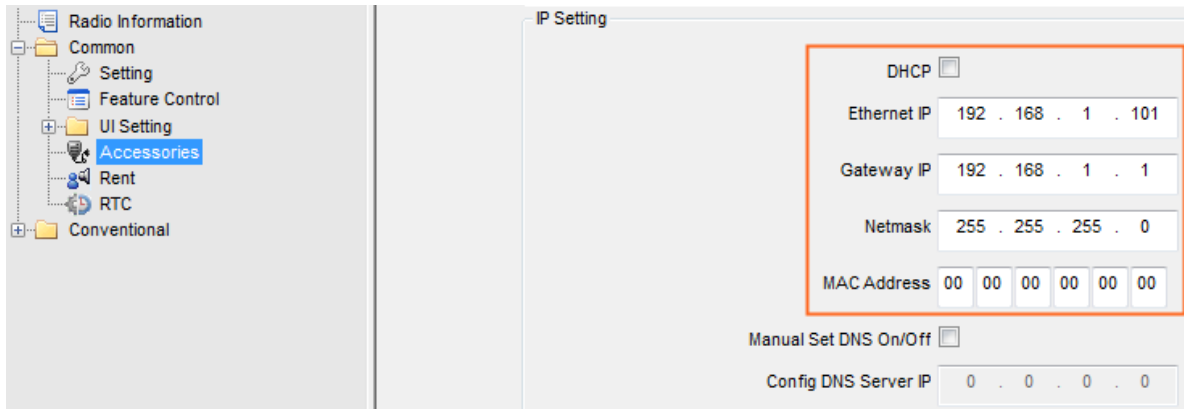
> ➢ DHCP: Unchecked.

> ➢ The Slave mobile radio must be input with an unused static address of the subnet. Make sure that the Slave mobile radio and the Master mobile radio are in the same subnet.

>> ● Ethernet IP (192.168.1.101): The static IP address of the Slave mobile radio must be unique in the network.

>> ● Gateway IP (192.168.1.1): Be consistent with that of the Master mobile radio.

>> ● Netmask (255.255.255.0): Be consistent with that of the Master mobile radio.

3. Configure the IP Transit parameters.

> **CPS Path**: Conventional -> General Setting -> Network
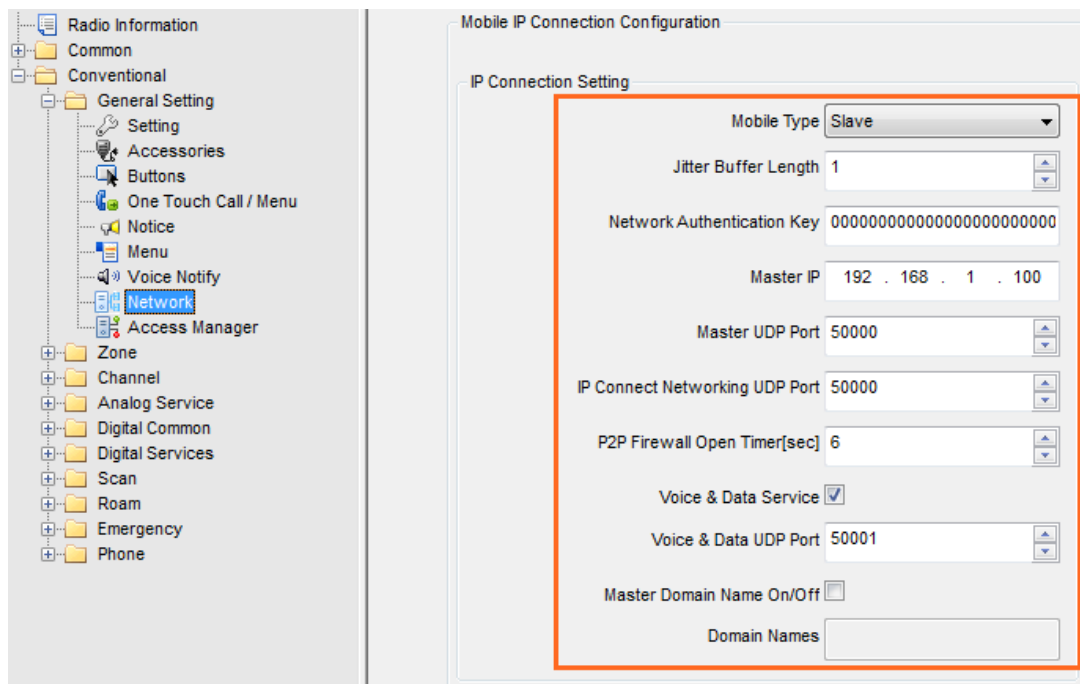
- ➢ Set the "Mobile Type" to "Slave".

- ➢ Input the IP address of the Master mobile radio in "Master IP" and input the IP Connect Networking UDP Port of the Master repeater in "Master UDP Port".

- ➢ "P2P Firewall Timer" and "Voice & Data Service" shall be consistent with the Master mobile radio.

- ➢ Set "IP Connect Networking UDP Port" and "Voice & Data UDP Port" to any unused local port. Range: 1024-65535
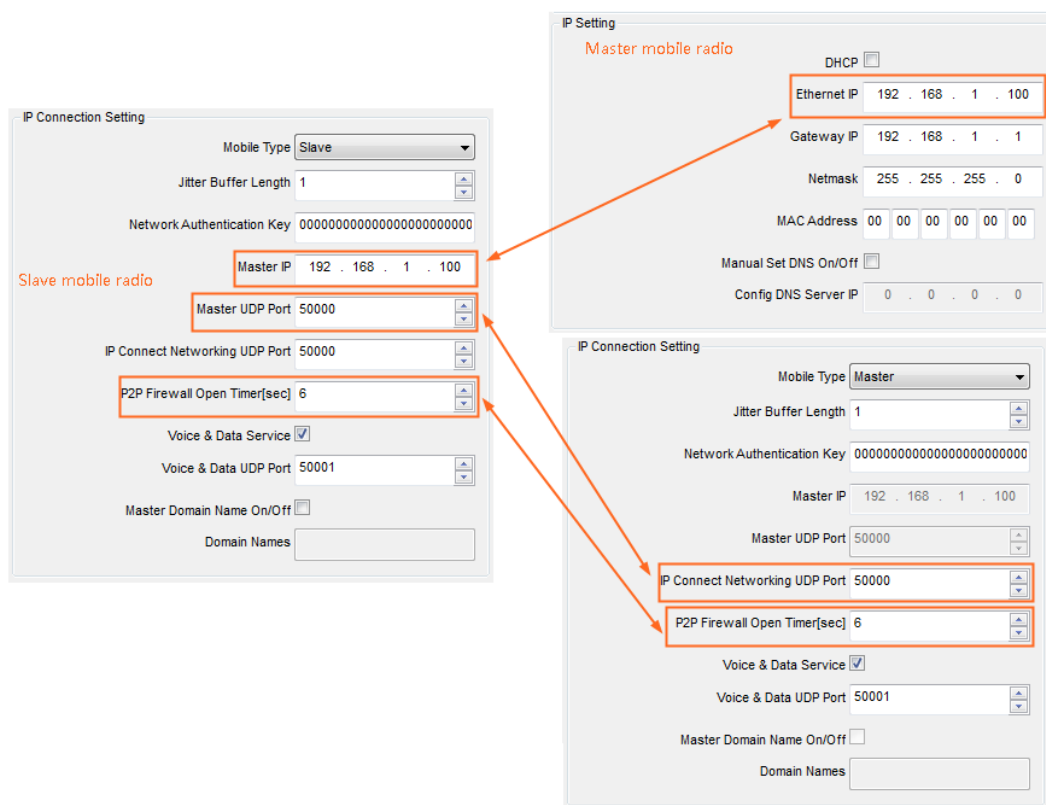
4. Configure the receiving path priority of the voice services and data services as per actual requirement.

   See 4. in section Configuring a Master Mobile Radio.

5. Enable the Digital IP Transit feature.

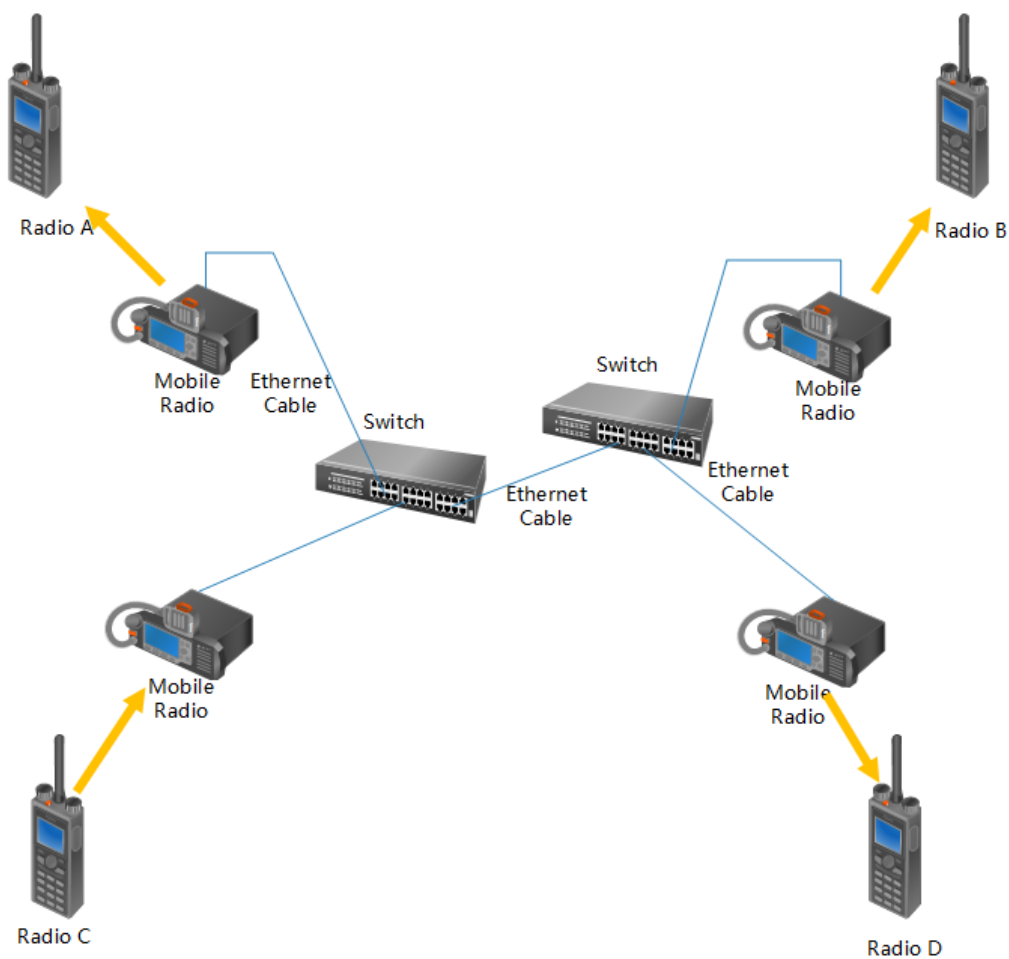   See 5. in section Configuring a Master Mobile Radio.

6. Configure the IP Transit access management parameters.

   See 6. in section Configuring a Master Mobile Radio.

3.11.3.3 Local Area Network (LAN)
Connecting the Hardware

This scheme is used to connect a switch or multiple switches within the LAN, achieving seamless communication in the same area.
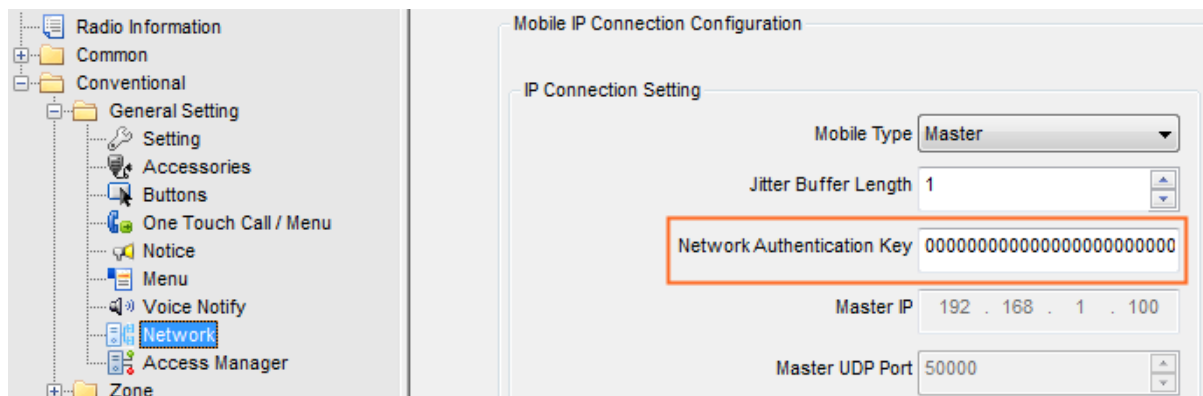
Configuring a Mobile Radio

Configuring a Master Mobile Radio

Under this scheme, the Master mobile radio configurations are the same as Ethernet cable connection. Please refer to Configuring a Master Mobile Radio for detailed configurations and pay attention to the following issues:

● The Master mobile radio shall be configured with **Network Authentication Key**, so as to avoid unauthorized accessing of repeaters from other IP Transit network in the same LAN.

   CPS Path: Conventional -> General Setting -> Network -> Mobile IP Connection Configuration -> IP Connection Setting

- The Master mobile radio can only use the static IP address.

Configuring a Slave Mobile Radio

Under this scheme, the Slave mobile radio configurations are the same as Ethernet cable connection. Please refer to Configuring a Slave Mobile Radio for detailed configurations and pay attention to the following issues:

- The "Network Authentication Keys" of the Master mobile radio and Slave mobile radio must be consistent.

- The Slave mobile radio can use either the static IP address or the IP address automatically allocated by DHCP server. It is recommended that the Slave mobile radio should not use the IP address automatically allocated by DHCP server, since the dynamic IP address may cause communication interruption.

  When the static IP address is used, the Slave mobile radio configurations are the same as that of Ethernet cable connection. "DHCP" must be checked, but "Ethernet IP", "Gateway IP" and "Netmask" need not to be configured when the IP address is automatically allocated to the repeater by DHCP server. See the figure below. Please refer to Configuring a Slave Mobile Radio for the configurations of the rest parameters.

 CPS Path: Common -> Accessories -> IP Setting.
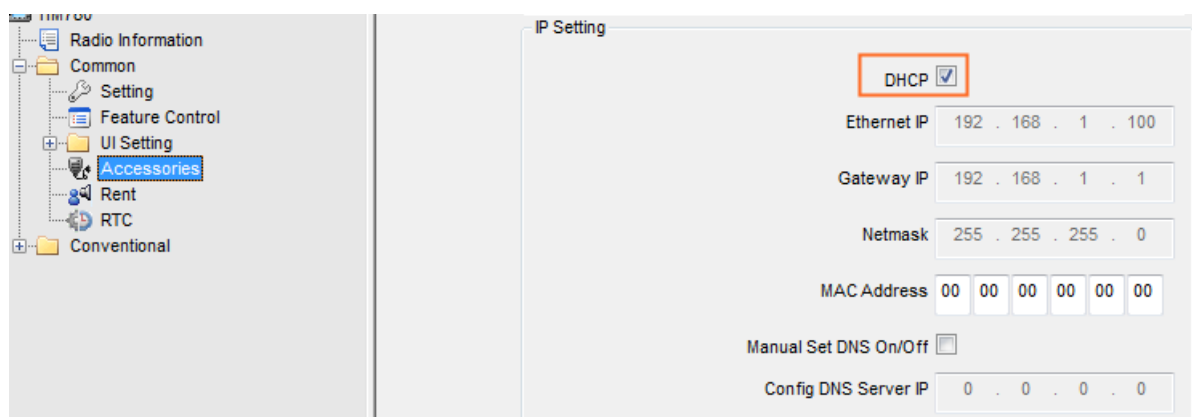
Configuring the Switch Device

Configurations vary with different switch devices. Please contact the device provider for detailed configurations.

3.11.3.4 Wide Area Network (WAN)
Connecting the Hardware

This scheme is used to connect multiple sites across different areas. The key to this scheme is the routing device, which can link with multiple mobile radios in different locations to achieve IP Transit in the WAN.
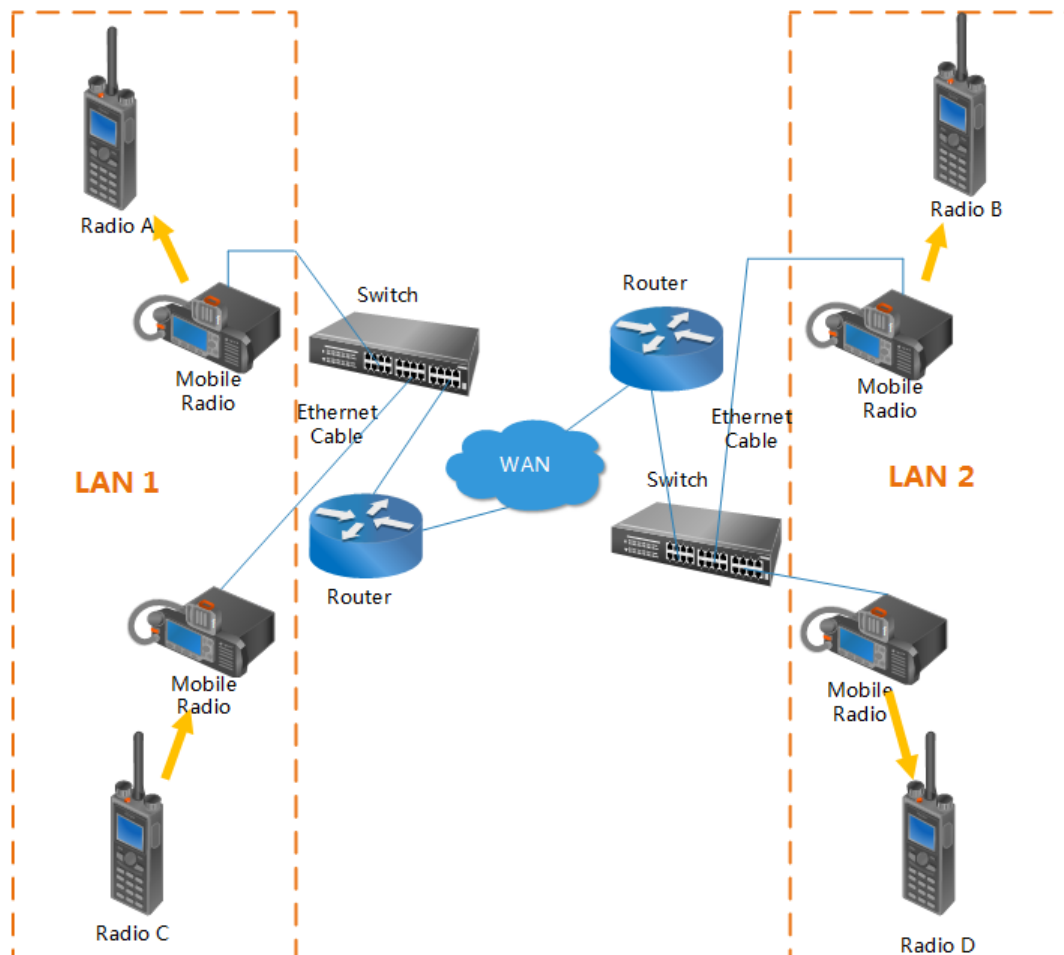
Configuring a Mobile Radio

Generally, the IP Transit network contains many Wide Area Networks and Local Area Networks linked by routers. The public network is a typical example, which is capable of connecting many LANs to the WAN by ADSL. Therefore, the IP Transit network will cause a certain delay in communications.

Configuring a Master Mobile Radio

In the above system, the IP address for the Master mobile radio is set as the static IP address of LAN1, as the following figure shows.

User can apply for and bind a domain name to the Master mobile radio to replace the static IP address, so as to reduce the building cost of the IP Transit network.

The "Ethernet IP" (e.g. the Master mobile radio's IP address) of the mobile radio is beyond the range of IP addresses assigned by the DHCP Server, but still within the range of IP addresses for the subnet (as specified by the Gateway Netmask for the devices on the LAN). Thus the Gateway IP address shall conform to the IP address of the router in the LAN1.

The IP addresses of all devices are configured within the router subnet, so they cannot be identified in the WAN. Thus, "Port Mapping" must be configured for all LAN1 routers, forwarding the incoming packet from the defined port of the WAN to the Master mobile radio.

Configuring a Slave Mobile Radio

All Slave mobile radios can use the static IP address. Also, they can be configured with the IP address assigned by their respective LAN DHCP servers. But the assigned IP address is not recommended.
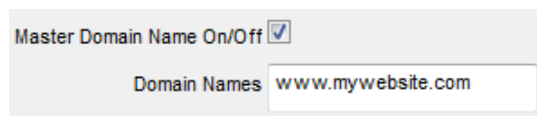

The "Master IP" of all Slave mobile radios must be the WAN address used by the Master mobile radio, which is also the WAN address of routers in the LAN1.
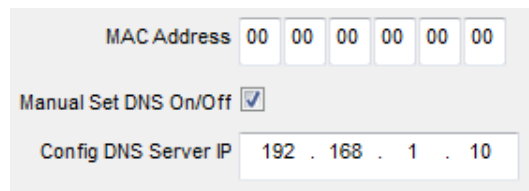

If the Master mobile radio is bound with a domain name, the Master IP of the Slave mobile radio needs not to be set. Instead, select the "Master Domain Name On/Off" option and input the domain name of Master mobile radio in the "Domain Names" field. See the figure below:

Master Domain Name On/Off ☑

Domain Names www.mywebsite.com

After the Master mobile radio is bound with a domain name, the Slave mobile radios can get the Master mobile radio IP address via DNS server in respective LAN, and also can use the specific DNS server. See below:

MAC Address 00 00 00 00 00 00

Manual Set DNS On/Off ☑

Config DNS Server IP 192 . 168 . 1 . 10

In the above settings, the UDP port in the WAN shall be identical with that in the Master mobile radio. If not, modify the **Master UDP Port** of all Slave mobile radios respectively.

Please refer to Configuring a Slave Mobile Radio for the configurations of the rest parameters.

Attentions

● The Slave mobile radios on a certain LAN do not need to be configured with different UDP ports, as the router will distribute a unique port during forwarding.

● As for all the Slave mobile radios which are in the Master mobile radio's LAN, their Master IP must be set to the WAN address rather than the LAN address. Otherwise, they will not be able to connect to the Slave mobile radios from other LANs.

● The routers in the LAN 1 and LAN 2 must support "HairPinning", which ensures that the WAN address cannot be replaced by the subnet address.

● Some private network (such as Intranets) is capable of addressing all devices by their IP addresses. When a device is connected to such network, the DHCP server will assign the IP address to it and adjust the router to map the packet to the appropriate Master mobile radio. Meanwhile, a static IP address is still required for the Master mobile radio.

Configuring the Switch Device

Configurations vary with different switch devices. Please contact the device provider for detailed configurations.

Configuring the Routing Device

Configurations vary with different routing devices. Please contact the device provider for detailed configurations.

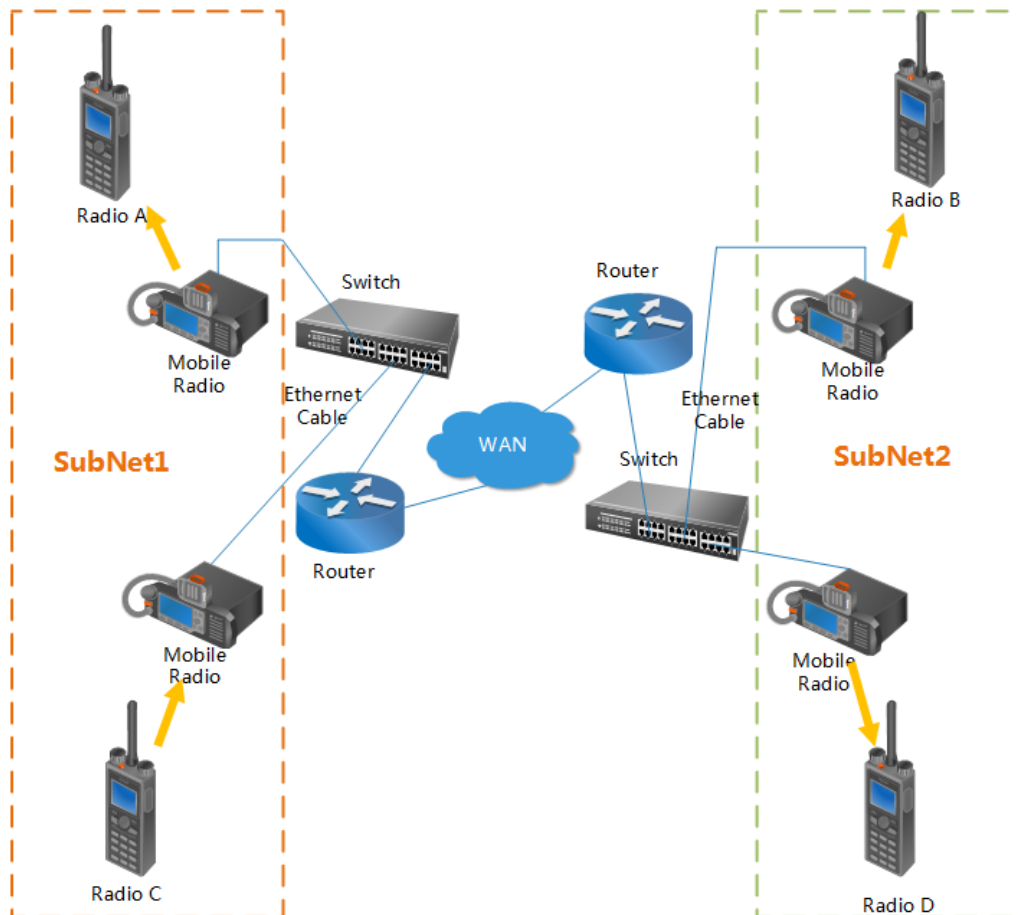## 3.11.3.5 Sub Master
Connecting the Hardware

Connection method of Sub Master scheme is similar to that of WAN scheme.

Sub Master scheme is suitable for cross-network IP Transit network. In this scheme, the key device is a Sub Master

mobile radio, which is responsible for connecting multiple mobile radios in different subnet to realize IP Transit network.

Configuring a Repeater
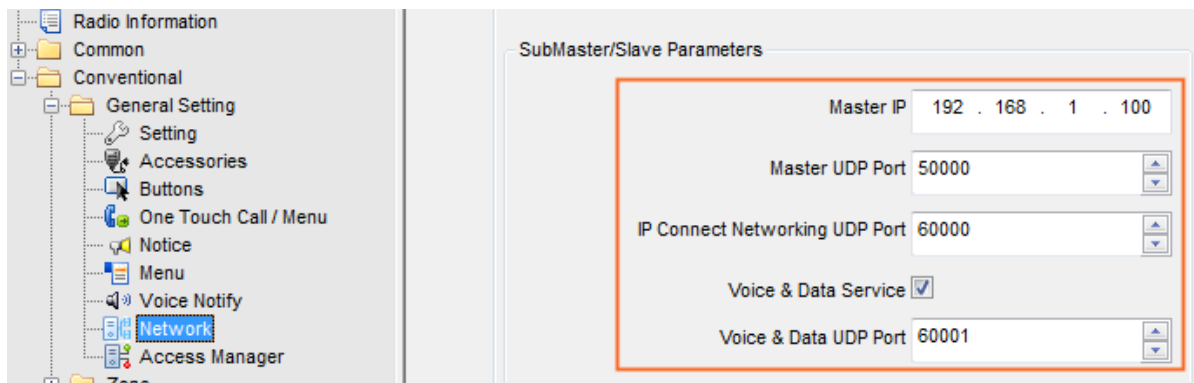
Master Mobile Radio

Please refer to **Configuring a Master Mobile Radio** in Configuring a Mobile Radio for the configurations of the Master mobile radio which is connected to Sub Master mobile radio.

Sub Master Mobile Radio

To configure the Sub Master mobile radio, do as follows:

1. Set the Mobile Type to SubMaster.

2. Configure the master parameters (Excluding the **Repeater Type** parameter) of the Sub Master mobile radio according to the configuration procedures of Master mobile radio. Please Refer to **Configuring a Master Mobile Radio** in Configuring a Mobile Radio.

3. Configure the Sub Master parameters.

   CPS Path: Conventional -> General Setting -> Network -> SubMaster/Slave Parameters

Parameter	Description
Master IP	This parameter defines the IP address of the Master mobile radio to be connected. If the Master mobile radio is bound with a domain name, user can check the "Master Domain Name On/Off" option and input the domain name for connection. The configuration of the Sub Master IP can be skipped.
Master UDP Port	This port is used to address the Master mobile radio connected to the Sub Master mobile radio, and maintain the network as well. The value of this port must be consistent with that of IP Connect Networking UDP Port of the Master mobile radio; otherwise, the Sub Master mobile radio will not be able to connect to the Master mobile radio.
IP Connect Networking UDP Port	This port is used to maintain the connection between the Sub Master mobile radio's IP network and the Master mobile radio's IP network. This port shall be an unused port of the Sub Master mobile radio.
Voice & Data Service	To enable or disable the Sub Master Multi-site Service feature. With this feature enabled, the radios can perform voice services, data services, emergency services and control services in the IP Transit network formed by different Master mobile radios.
Voice & Data UDP Port	This port is used to perform the digital services among the Master mobile radios. This port shall be an unused port of the Sub Master mobile radio.

Slave Mobile Radio

Please refer to **Configuring a Slave Mobile Radio** in Configuring a Mobile Radio for the configurations of the Slave mobile radio.

Configuring the Switch Device

Configurations vary with different switch devices. Please contact the device provider for detailed configurations.

Configuring the Routing Device

When configuring the routing devices, ensure that the communication between the Master mobile radio and the Slave mobile radio as well as between the Sub Master and the connected Master mobile radio is smooth and proper; otherwise, the cross-network communication cannot be established.

Configurations vary with different routing devices. Please contact the device provider for detailed configurations.

3.11.3.6 Broadband Wireless Access
Connecting the Hardware

This scheme is used for cross-regional multi-site broadband wireless access.
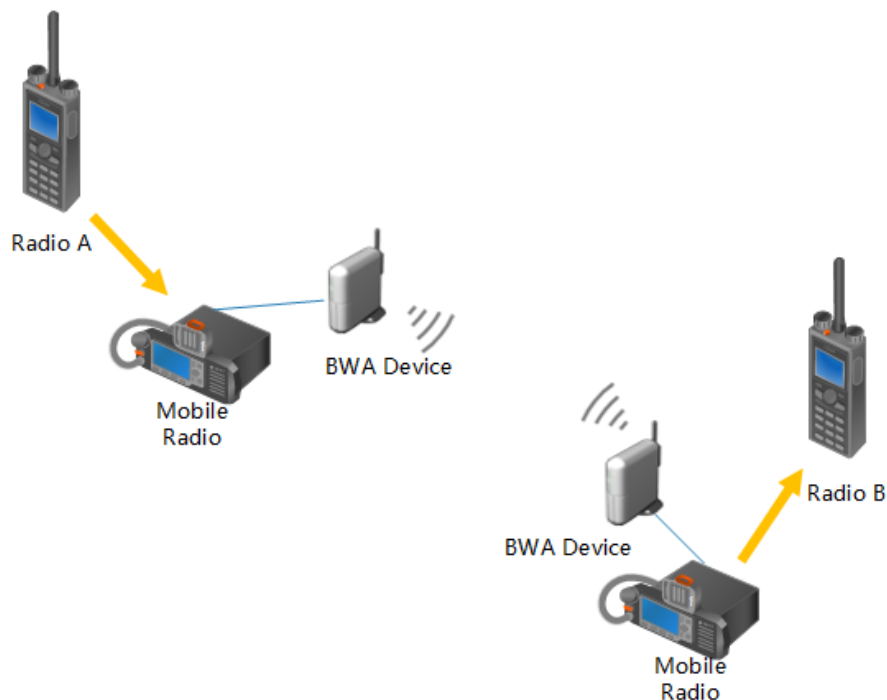
Configuring a Mobile Radio

The mobile radio is configured as per the specific network used in broadband wireless access mode. Please refer to 3.11.3.2Ethernet Cable, 3.11.3.3Local Area Network (LAN), 3.11.3.4Wide Area Network (WAN) and 3.11.3.5Sub Master for detailed configurations.

If you have any question, please contact your dealer.

Configuring the Broadband Wireless Access

Configurations vary with different broadband wireless access devices. Please contact the device provider for detailed configurations.

3.11.4 FAQ

How to select frequency and color code in IP Transit network?

The networking scheme is subject to actual requirements. In the overlapping area, it is recommended to use different frequencies for the mobile radio, but the color code can be the same or varied. For adjacent mobile radios sharing the same frequency, it is better to use different color codes to avoid probable interference.

What factors shall be considered when accessing Internet via LAN?

When port mapping is not needed, an Ethernet IP address is not required in the internal network. For the slave mobile radio, it can obtain the IP address dynamically from DHCP. When port mapping is needed, an Ethernet IP address and port mapping among IP Transit service UDP port and IP Connect networking UDP port are required for the master mobile radio and slave mobile radio.

Whether the port mapping is needed depends on the selected router. When IP Transit networking fails, port mapping will be a must. However, as for our recommended router, neither port mapping nor an Ethernet IP address for the slave mobile radio is required.
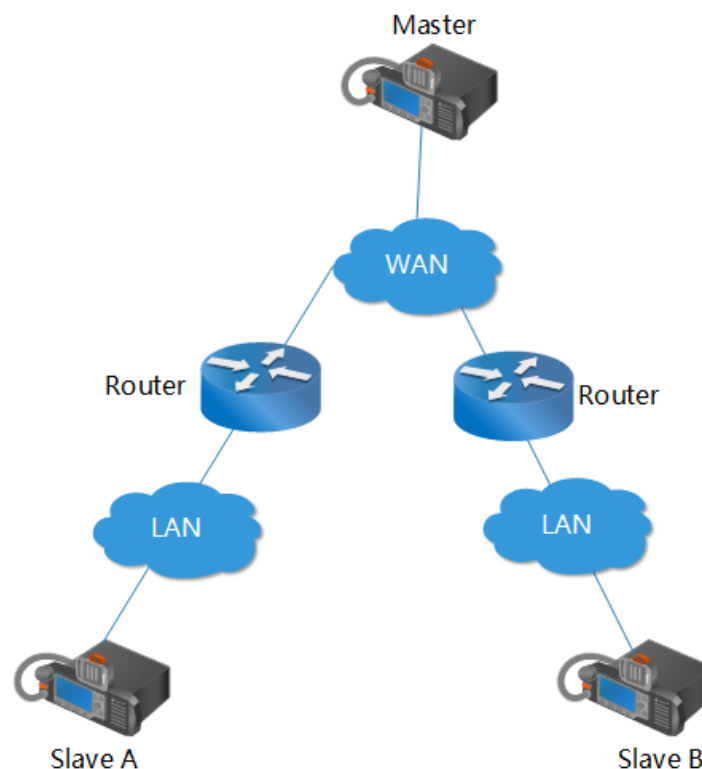
As shown in the figure above, the slave mobile radio A and slave mobile radio B locate in different LANs, which have different network addresses. In this case, the slave mobile radio must have an Ethernet IP address for port mapping via the router, so as to connect to the master mobile radio and other slave mobile radios. Please refer to the appropriate router manual for details.

As the designated IP address may conflict with the IP address of other devices in the LAN, you can use DHCP to

assign an Ethernet IP address dynamically. Such IP address and MAC address must be set in the router. Please refer to the appropriate router manual for details.

What's the function of jitter buffer and How to handle poor communication caused by network transmission delay?

The UPD protocol, used for peer-to-peer service, is adopted for IP Transit feature at the transmission layer. It has no acknowledgements or re-transmissions mechanism from the receiver to the sender. During transmission, as the UDP data packet from the same node goes through different intermediate nodes to reach different destination nodes, the packet jitter and disorder will occur. In addition, the data packet may be lost when the network communication is poor.

The role of Jitter Buffer feature is to re-order the UDP data packet, buffer it and send it later, which has no impact on signal.

A UDP data packet is deemed to be lost if the time gap between it and last UDP data packet arriving at the same node is over the threshold value. The buffer duration shall be over this threshold. You can configure this duration according to the number of jitter buffer.

The buffer duration ranges from 1*60 ms (default) to 8*60 ms.

You shall set the buffer duration according to the actual network transmission quality. Shorter buffer duration means fewer packets to be buffered and less network delay to be tolerated; on the contrary, more packets will be buffered and more network delay will be tolerated, but this causes longer retransmission duration. Judging from this, buffer duration increase is a double-edged sword. On the one hand, it improves UDP data packet loss; on the other hand, it increases network transmission delay, which may affect the digital or analog services with acknowledgement required.

Currently, the network delay is measured by using Ping command. In a LAN or private network where the network delay is generally less than 60ms, it is recommended to use the default duration of jitter buffer. However, in other network where the network delay is greater than 60ms, the duration is subject to actual requirements.

When the IP Transit feature is utilized in a WAN, the jitter buffer may not help a lot due to bandwidth limitation and network resource preemption. Considering this case, it is recommended to use the public network or establish your private network for better communication.

What's the difference between Sub master and master repeater?

Two master mobile radios cannot be connected directly unless one of them is set as Sub master. Please note that the Master IP and Master Port must be consistent with those of master mobile radio connected to the sub master.

IP Will the call be forwarded when it is initiated on the transmitting mobile radio?

Yes. When the HM8X is used as a transiting mobile radio, it is equivalent to adding an IP path, and can use both air interface and IP path for transmitting.

Will the transmitting mobile radio play locally when it receives IP signaling?

Yes. If the received service is a service that the current transmitting mobile radio is involved in, it will be played locally. Other services will only be forwarded.

Will the individual call whose destination address is a transmitting mobile radio be forwarded?

The individual call whose destination address is the transmitting mobile radio will not forward.

The icon of HM78X interface in IP Transit mode.

The HM78X's status bar displays the IP Transit icon when IP Transit feature is enabled.

The networking status can also be displayed visually through the status bar. Networking status is not displayed by default and needs to be configured through CPS.

When IP Transit is active, the interface displays the transit icon and the transmitter alias.
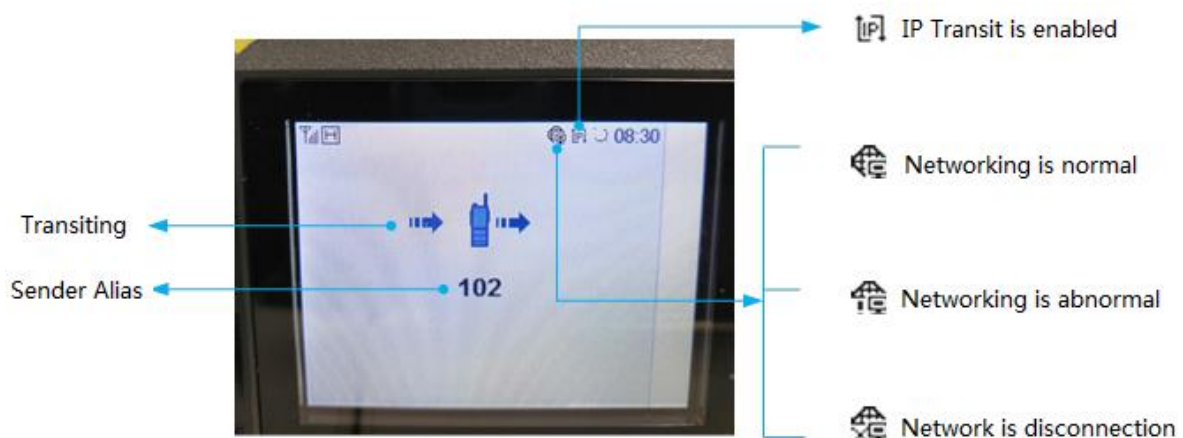
The difference between IP Transit and IP Multi-site Connect

- IP Transit only needs to use one frequency. IP Multi-site Connect needs to use two frequencies.

- IP Transit only supports one way of calling. IP Multi-site Connect can support two ways of calling.

- The signaling received over the air interface by the mobile radio is only forwarded via IP, because the HM78X does not support full duplex and cannot send or receive over the air interface at the same time. The signaling received over the air interface by the repeater is forwarded via IP and is also forwarded locally.

The difference between IP Transit and SFR

The essential difference between them is that SFR is based on the forwarding of wireless link of air interface, which only supports one hop; IP Transit is based on the forwarding of IP network, which can support multi-hop.

In addition, the SFR requires the radio to support full duplex, and the signaling and services received over the air interface are forwarded locally, which uses two slots, one slot for receiving and the other slot for transmitting. IP Transit is the forwarding of signaling and services received over the air interface through the IP port.