PR900 CS (Conventional System) Dispatch Configuration Guide

Version: V3.5

Revision record

Edition	Date	Remarks
V1.0	2019.05.01	Manual is released for the first time
V1.0	2019.08.30	Add 3.4 section -IE browser check.
V1.0	2019.09.05	1. Modify the description of 5.1.1 and 5.1.2 and the MySQL version. 2. Modify the screenshots of 5-1 and 5-2. 3. Delete the related port notes from the server in Section 5.1.3. 4. Modify the description of 5.1.4, and 5-12,5-13 pictures. 5. Delete the contents related to OMM in Chapter 8. 6. Update the directory.
V1.5	2019.12.24	1.Add chapter 5.1.1 2.Modify the description in chapter 5.1.2, 5.1.4 3. Modify the description of IP connect ID in chapter 5.2.4 4. Modify content of chapter 7.5 and 7.6, delete chapter 7.7
V1.5	2020.02.25	Updated screenshots involving the resource tree on the dispatch console client.
V2.0	2020.07.24	1. Add IP Connect, simulcast scenario configuration description in chapter 1 2. Make the planning based on IP Connect and simulcast scenario in chapter 2 3. Make the planning based on IP Connect and simulcast scenario in chapter 4.5 4. Add configuration description based on IP Connect, simulcast scenario in chapter 5&6
V2.5	2020.12.24	1. Add AIS licensed feature description in chapter4.5 2. Add offline map configuration in chapter5.3
V3.0	2021.07.02	1. Add inter-network IP connect configuration description in chapter2.2, 4.5.3 2. Modify inter-network IP connect planning in chapter2.5, 2.6, 2.7 3. Modify offline map description in chapter5.3 and update figures. 4. Add the system and authorization contents in 5.1 and 5.2.2.
V3.5	2021.12.21	1. Add the relevant configurations of the analog repeater in Section 2.1, 2.5 and 2.7. 2. Add the dispatcher number segment range planning in Section 2.6

		3. Add the content of contact in Section 4.1 and the content of analog channel configuration in Section 4.3. 4. Add the content of dispatcher number segment management in Section 5.3.7. 5. Add the description of customized system name in Section 5.3.8.

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1 Overview

The PD200 dispatching system is a DMR conventional system developed by Caltta. The PD200 can realize command & dispatch services through the PR900 repeater and corresponding DMR radios, build communication network for users, and realize digital conventional dispatch services.

The PD200 dispatching system adopts C/S architecture and modular design, including functional modules such as voice dispatch, positioning, text message and log. It is realized based on the standard SIP protocol.

PD200 can be connected with single site and IP connected sites of analog repeaters and digital repeaters, or only connected to simulcast system.

1.1 IP connect

IP connect can support maximum 64 repeaters through IP connected network for data transmission, to extend the communication coverage and to realize cross region long distance call.

1.2 Simulcast system

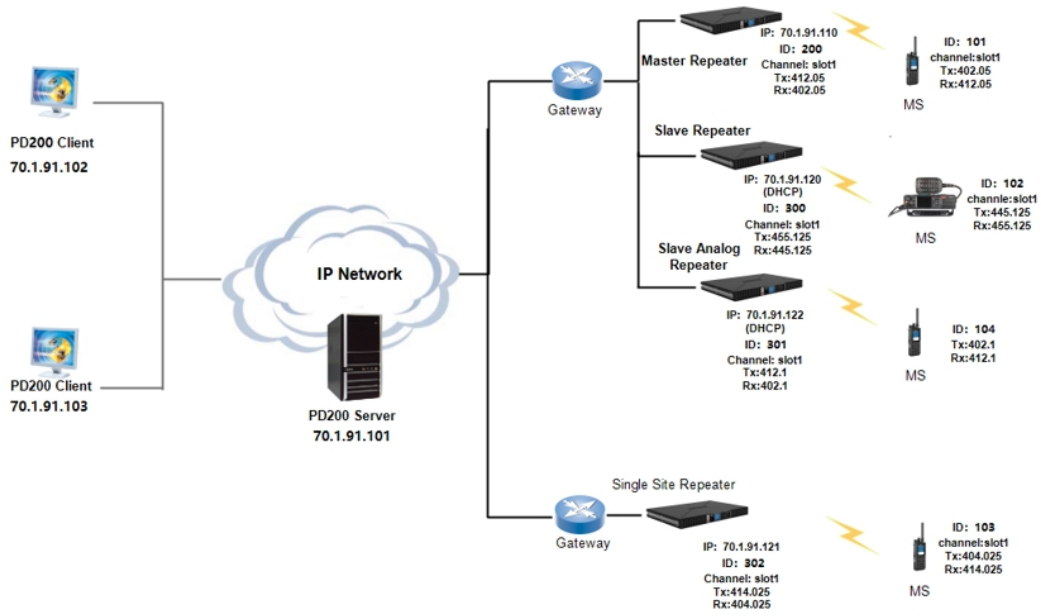
The DMR simulcast system can support one master repeater and up to 15 slave repeaters. The simulcast master repeater is responsible for interaction with the dispatcher. Dispatch services are all handled through the master repeater, and the slave repeaters will not participate in dispatching. The master repeater information is configured in the dispatcher, it is treated as a normal repeater. AIS information is configured on the master repeater.

2 Configuration planning

2.1 IP connect or single site scenario

The following planning data is used as sample data. Please replace it with actual data during configuration.

Figure 2-1 Sample diagram of IP connect or single station configuration



2.1.1 IP planning

The following planning data is used as sample data. Please replace it with actual data during configuration.

Table 2-1 IP connect or single site IP planning

Network Element	IP	Subnet mask
Dispatch sever	70.1.91.101	255.255.255.0
Dispatch client	70.1.91.102/103	255.255.255.0
Repeater 1 (master)	70.1.91.110	255.255.255.0
Repeater 2 (slave)	70.1.91.120 (DHCP)	255.255.255.0
Repeater 3 (single site)	70.1.91.121	255.255.255.0
Repeater 7(analog slave)	70.1.91.122（DHCP）	255.255.255.0

2.1.2 Radio planning

The following planning data is used as sample data. Please replace it with actual data during configuration.

Note: One group can only be bound to time slot 1 or time slot 2 of a repeater, and cannot be bound to two time slots at the same time.

Table 2-2 IP connect or single site radio planning

Network Element	ID	Name	Rx frequency (MHz)	Tx frequency (MHz)	Time slot	Colour code	Tx contact ID
Repeater 1	200	PR900	402.05	412.05	slot1/slot2	1	101/102

							(group)
Repeater 2	300	PR900-1	445.125	455.125	slot1/slot2	1	101/102 (group)
Repeater 3	302	PR900-A	404.025	414.025	slot1/slot2	1	103 (group)
Repeater 7	301	PR900-2	402.1	412.1	/	/	101(Interconnection group)
Radio 1	101	P101	412.05	402.05	slot1	1	101 (group)
Radio 2	102	P102	455.125	445.125	slot1	1	101 (group)
Radio 3	103	P103	414.025	404.025	slot1	1	103 (group)
Radio 4	104	P104	412.1	402.1	/	/	/

2.1.3 Port planning

The following planning data is used as the default data. It is generally not recommended to modify the ports.

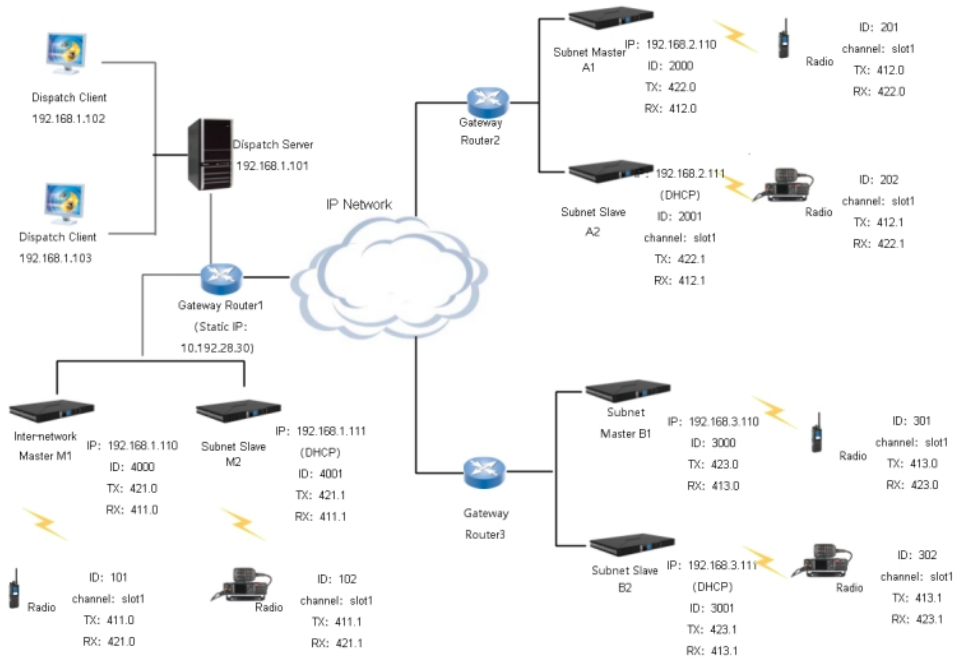
Table 2-3 IP connect or single site port planning

Network Element	Master UDP Port	IP connect UDP Port	IP connect RTP port (slot 1)	IP connect RTP port (slot 2)	Service port	Voice service port (slot 1)	Voice service port (slot 2)
Repeater 1		50000	50002	50003	19888	30000	30001
Repeater 2	50000	50000	50002	50003	19888	30000	30001
Repeater 3	/	/	/	/	19888	30000	30001
Repeater7	50000	50000	50002	50003	19888	30000	30001

2.2 Inter-network IP connect scenario

The following planning data is used as sample data. Please replace it with actual data during configuration.

Figure 2-2 Sample diagram of Inter-network IP connect configuration



2.2.1 IP planning

The following planning data is used as sample data. Please replace it with actual data during configuration.

Table 2-4 Inter-network IP connect IP planning

Network Element	IP	Gateway
Dispatch sever	192.168.1.101/24	192.168.1.1
Dispatch client	192.168.1.102/24 (DHCP)	192.168.1.1
Dispatch client	192.168.1.103/24 (DHCP)	192.168.1.1
Inter-network master M1	192.168.1.110/24	192.168.1.1
Subnet slave M2	DHCP	DHCP
Subnet master A1	192.168.2.110/24	192.168.2.1
Subnet slave A2	DHCP	DHCP
Subnet master B1	192.168.3.110/24	192.168.3.1
Subnet slave B2	DHCP	DHCP
Gateway route 1 WAN	10.192.28.30/24	10.192.28.1
Gateway route 2 WAN	DHCP	DHCP
Gateway route 3 WAN	DHCP	DHCP

Note: The Inter-network master network corresponds to the route gateway 1 WAN port must be a public network static IP.

2.2.2 Radio planning

The following planning data is used as sample data. Please replace it with actual data during configuration.

Note: One group can only be bound to time slot 1 or time slot 2 of a repeater, and cannot be bound to two time slots at the same time.

Table 2-5 Inter-network IP connect radio planning

Network Element	ID	Name	Rx frequency (MHz)	Tx frequency (MHz)	Time slot	Colour code	Tx contact ID
Inter-network master M1	4000	Inter-network master M1	411.0	421.0	slot1/slot2	1	501/502 (group)
Subnet slave M2	4001	Subnet slave M2	411.1	421.1	slot1/slot2	1	501/502 (group)
Subnet master A1	2000	Subnet master A1	412.0	422.0	slot1/slot2	1	501/502 (group)
Subnet slave A2	2001	Subnet slave A2	412.1	422.1	slot1/slot2	1	501/502 (group)
Subnet master B1	3000	Subnet master B1	413.0	423.0	slot1/slot2	1	501/502 (group)
Subnet slave B2	3001	Subnet slave B2	413.1	423.1	slot1/slot2	1	501/502 (group)
Radio 1	101	P101	421.0	411.0	slot1	1	501 (group)
Radio 2	102	P102	421.1	411.1	slot1	1	501 (group)
Radio 3	201	P103	422.0	412.0	slot1	1	501 (group)
Radio 4	202	P104	422.1	412.1	slot1	1	501 (group)
Radio 5	301	P105	423.0	413.0	slot1	1	501 (group)
Radio 6	302	P106	423.1	413.1	slot1	1	501 (group)

2.2.3 Port planning

The following planning data is used as the default data. It is generally not recommended to modify the ports.

Table 2-6 Inter-network IP connect port planning

Network Element	Inter-network master M1	Subnet slave M2	Subnet master A1	Subnet slave A2	Subnet master B1	Subnet slave B2
Inter-network UDP port	/	50000[1]	50000[1]	50000[1]	50000[1]	50000[1]
Inter-network master RTP port (time slot 1)	/	50002[2]	50002[2]	50002[2]	50002[2]	50002[2]
Inter-network master RTP port (time slot 2)	/	50003[3]	50003[3]	50003[3]	50003[3]	50003[3]
Local UDP port	50000[1]	50000	50000	50000	50000	50000

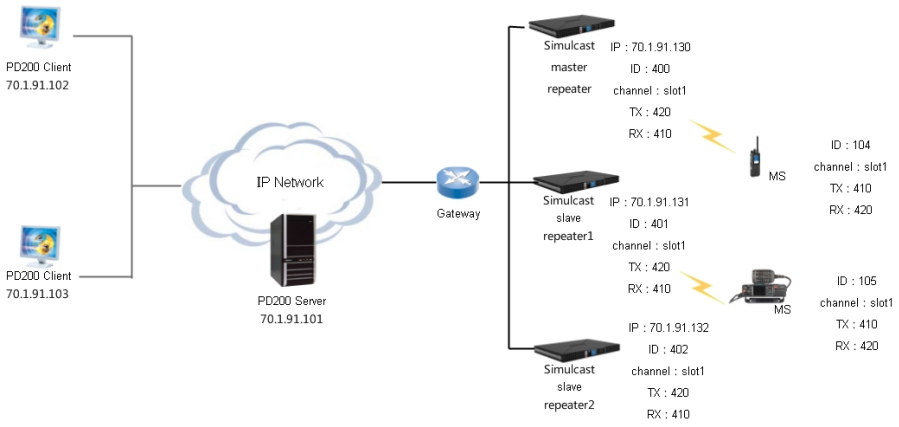
Local RTP port (time slot 1)	50002[2]	50002	50002	50002	50002	50002
Local RTP port (time slot 2)	50003[3]	50003	50003	50003	50003	50003
AIS service port	19888	19888	19888	19888	19888	19888
Voice service port (time slot 1)	30000	30000	30000	30000	30000	30000
Voice service port (time slot 2)	30001	30001	30001	30001	30001	30001

Note: The ports with same subscripts should be configured the same.

2.3 Simulcast Scenario

The following planning data is used as sample data. Please replace it with actual data during configuration.

Figure 2-3 Sample diagram simulcast



2.3.1 IP planning

The following planning data is used as sample data. Please replace it with actual data during configuration.

Table 2-7 Simulcast IP planning

Network Element	IP	Subnet mask
Dispatch sever	70.1.91.101	255.255.255.0
Dispatch client	70.1.91.102/103	255.255.255.0
Repeater 4 (simulcast master)	70.1.91.130	255.255.255.0
Repeater 5 (simulcast slave1)	70.1.91.131（DHCP）	255.255.255.0
Repeater 6 (simulcast slave2)	70.1.91.132（DHCP）	255.255.255.0

2.3.2 Radio planning

The following planning data is used as sample data. Please replace it with actual data during configuration.

Table 2-8 Simulcast radio planning

Network Element	ID	Name	Rx frequency	Tx frequency	Time slot	Colour code	Tx contact ID

			(MHz)	(MHz)			
Repeater 4	400	PR900-S1	410	420	slot1/slot2	1	104(group)
Repeater 5	401	PR900-S2	410	420	slot1/slot2	1	104(group)
Repeater 6	402	PR900-S3	410	420	slot1/slot2	1	104(group)
Radio 4	104	P104	420	410	slot1	1	104(group)
Radio 5	105	P105	420	410	slot1	1	104 (group)

2.3.3 Port planning

The following planning data is used as the default data. It is generally not recommended to modify the ports.

Table 2-9 Simulcast port planning

Network Element	Master UDP Port	IP connect UDP Port	IP connect RTP port (slot 1)	IP connect RTP port (slot 2)	Service port	Voice service port (slot 1)	Voice service port (slot 2)
Repeater 4	/	50102	50103	50104	19888	30000	30001
Repeater 5	50102	50101	50103	50104	/	/	/
Repeater 6	50102	50101	50103	50104	/	/	/

2.4 Operating system

Table 2-10 Operating system

Network Element	OS Requirement
Dispatcher server（MySQL）	Windows 64bit OS
Dispatcher client	Windows 32/64 bit OS
Repeater CPS	Windows 32/64 bit OS
Radio CPS	Windows 32/64 bit OS
NMS server	Windows 32/64 bit OS
NMS client	Windows 32/64 bit OS

The above software supports Windows 10 and Windows Server. For specific system requirements, please refer to Section 5.1.

2.5 Repeater registration planning

The following planning data is used as sample data. Please replace it with actual data during configuration.

Table 2-11 Repeater registration planning

Network Element	Password setting
Repeater 1	111111
Dispatcher (repeater 1)	111111
Repeater 2	111111
Dispatcher (repeater 2)	111111
Repeater 3	333333
Dispatcher (repeater 3)	333333
Repeater 4	555555

Dispatcher (repeater 4)	555555
Repeater 7	111111
Dispatcher(repeater 7)	111111
Inter-network master M1	666666
Subnet slave M2	666666
Subnet master A1	666666
Subnet slave A2	666666
Subnet master B1	666666
Subnet slave B2	666666

The password registered by the repeater to the dispatcher should be the same as the password filled in when the repeater is added to the dispatcher. Different repeater can use the same password.

2.6 Dispatcher planning

The following planning data is used as sample data. Please replace it with actual data during configuration. Range of dispatcher number segment: 16775905 ~16775999

Table 2-12 Dispatcher planning

Network Element	ID	Account name	Password
Administrator (system default)	16775904	admin	111111
Dispatcher	16775905	shenzhen	07552019
Dispatcher	16775906	Caltta	07552021

The administrator account is set to "admin" and the password is set to "111111" as default.

2.7 Network authentication code planning

The following planning data is used as sample data. Please replace it with actual data during configuration.

Table 2-13 Network authentication code planning

Network Element	Network authentication code	Inter-network master network authentication code	Subnet network authentication code
Repeater 1 (master)	A1B2C3	/	/
Repeater 2 (slave)	A1B2C3	/	/
Repeater 7(analog slave)	A1B2C3	/	/
Inter-network master M1	/	A123456	A1B2C1
Subnet slave M2	A1B2C1	/	/
Subnet master A1	/	A123456	A1B2C2
Subnet slave A2	A1B2C2	/	/
Subnet master B1	/	A123456	A1B2C3

Subnet slave B2	A1B2C3	/	/

The authentication code of master must be the same as the authentication code of slave in order to connect successfully.

The authentication code of Inter-network master must be the same as the authentication code of subnet master in order to connect successfully.

The authentication code of Inter-network master (Subnet master) must be the same as the authentication code of subnet slave (subnet) in order to connect successfully.

3 Configuration check

3.1 IP check

According to chapter 2.1.1, 2.2.1 and 2.3.1 IP planning in chapter 2 configuration planning, run the PING command to check whether the IP addresses are occupied. If the IP address is already occupied, you need to re-plan the IP address.

3.2 Frequency check

According to chapter 2.1.2, 2.2.2 and 2.3.2 radio planning, check if the Rx frequency and the Tx frequency are already in use by other devices. If you have already used it, you need to re-plan the frequency.

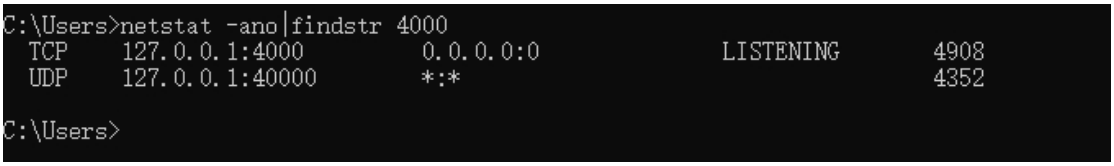
3.3 Port check

According to the chapter 2.1.3, 2.2.3 and 2.3.3 port planning, check whether the port of the dispatcher server PC is occupied. Enter the "netstat -ano|findstr port number" in the command window to check if there is any content. As shown in the following figure, the port 19888 has no content, indicate that the port is idle and can be used.

Figure 3-1 Port check -1

As shown in the following figure, there is a displayed content, indicate that port 4000 is already occupied, and the port number needs to be re-planned.

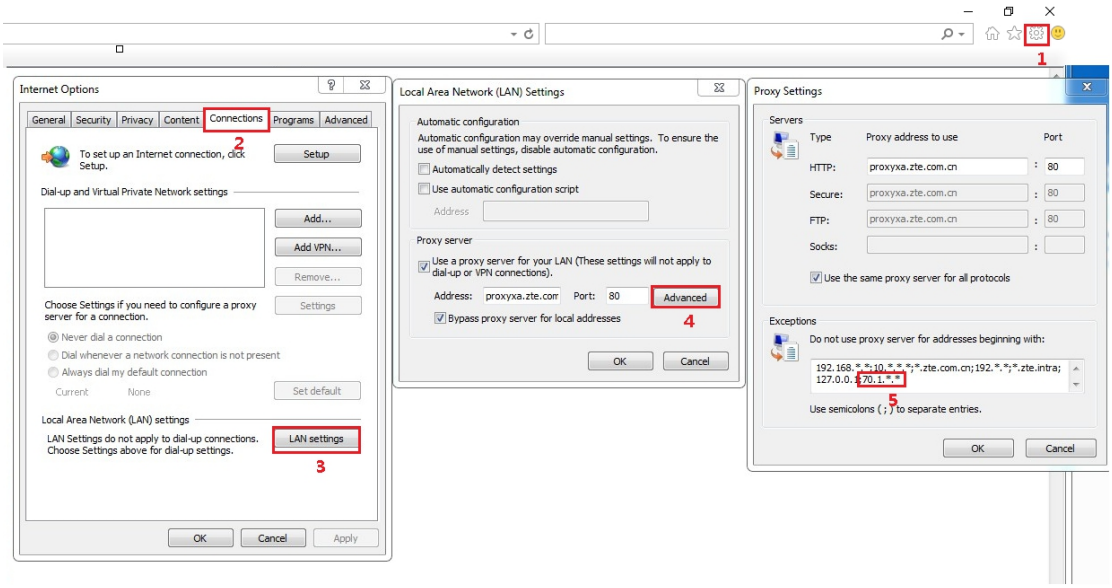
Figure 3-2 Port check -2



3.4 IE browser check

If the PC where the dispatch server is installed uses a proxy server to connect internet, the IP segment where the dispatch server is located needs to be added to the unused proxy server. The specific setting is to open Internet Explorer, select "Internet Options" - "Connection" - "LAN settings" - "Advanced", and add an IP segment to the content of "Exceptions", such as "70.1.91. *", as shown in the following figure. **If your PC is not using a proxy server, you do not need to do operations in this chapter.**

Figure 3-3 IE browser check

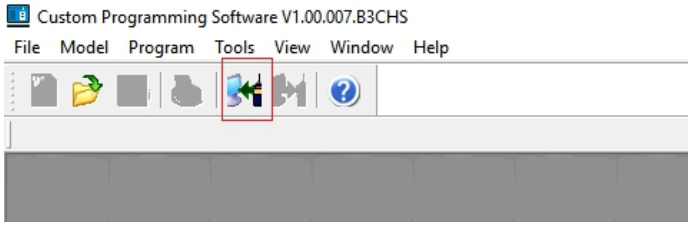


4 Repeater configuration

4.1 CPS read

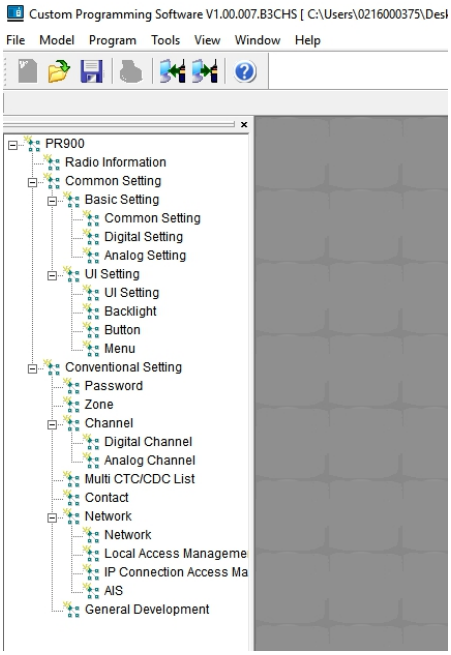
Connect the repeater with PC, open CPS software on the PC, as shown in the following figure.

Figure 4-1 Repeater CPS read



Click the "Read" icon  on the toolbar and click "OK" to read. After the reading is successful, the corresponding list is displayed on the left side of the CPS, as shown in the following figure.

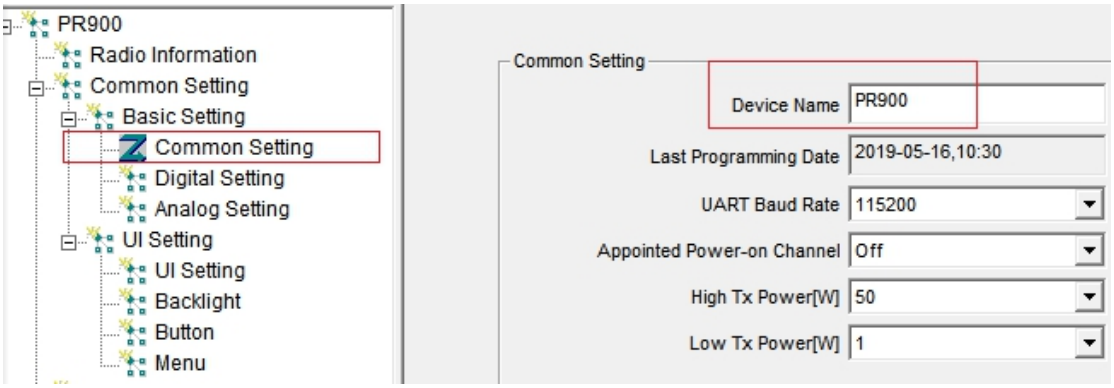
Figure 4-2 CPS read success



4.2 Common setting

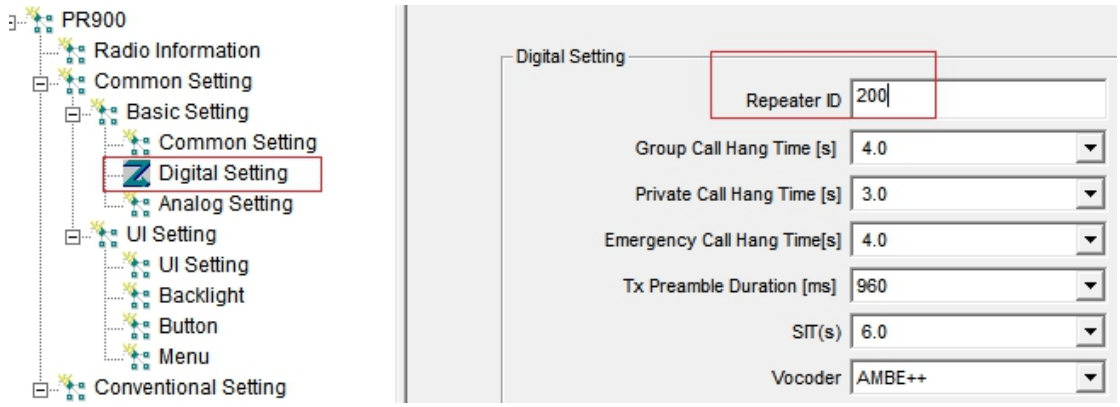
Double-click the "Common Setting" option under "Common Setting" - "Basic Setting". on the pop-up page "Device Name" option, you can modify the name of the repeater, such as "PR900", as shown in the following figure.

Figure 4-3 Repeater common setting



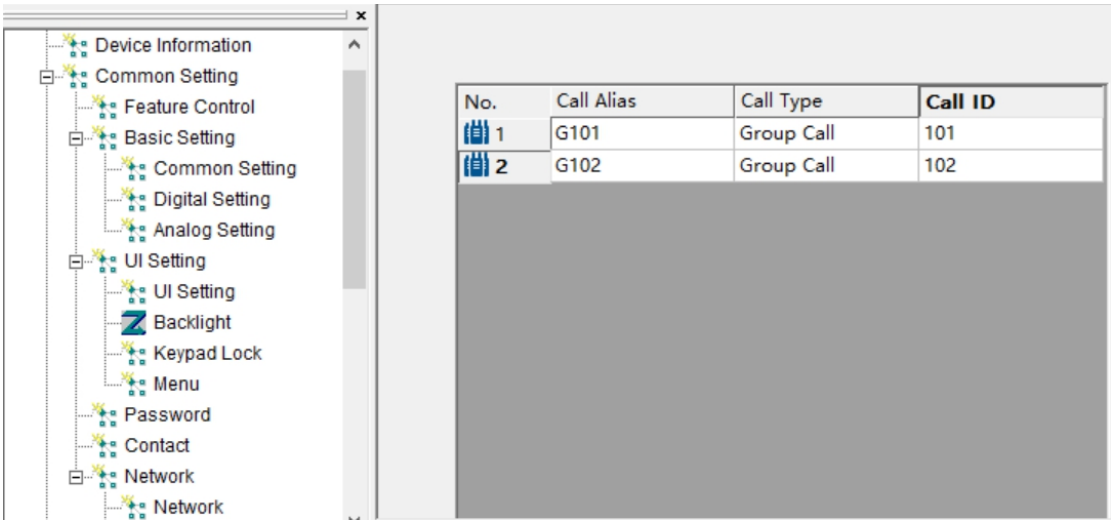
Double-click the "Digital Setting" option under "Common Setting" - "Basic Setting". on the pop-up page "Repeater ID" option, you can set the repeater ID, ranging from 1 to 16775903. For example, repeater 1 ID is 200 as shown in the following figure.

Figure 4-4 Repeater ID setting



Double-click the "Contact" option under "Common Setting". on the pop-up page you can set the repeater's group call. For example, input group 101 and 102, as shown in the following figure.

Figure 4-5 Contact setting

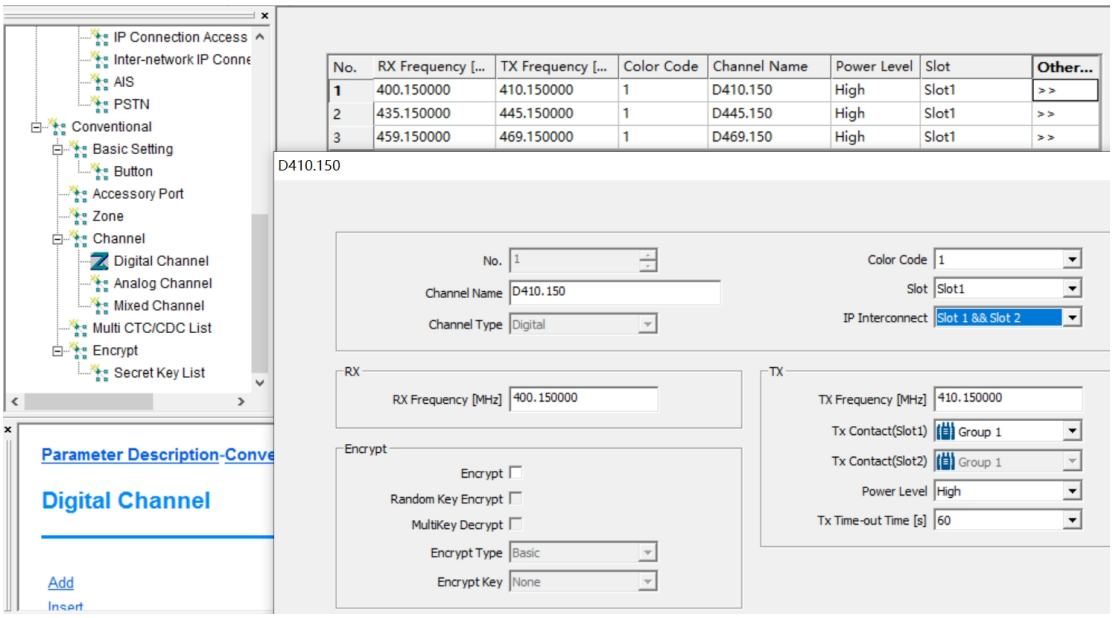


4.3 Channel setting

4.3.1 Digital channel setting

Configure digital channel. Double-click the "Digital Channel" option under "Conventional Setting" - "Channel". On the pop-up page, the frequency value can be modified, added, or deleted. According to the chapter 2.1.2 Radio planning, the Rx frequency of repeater 1 is 402.05MHz, the Tx frequency of repeater 1 is 412.05MHz, the color code is 1, and the channel name is D412.05. Set the power level. Click the ">>" icon, and select the IP interconnect timeslot in the pop-up window. Configure other repeaters according to the planning. (Note that the contact settings in time slots and different time slots are for the hand mic, and you do not need to configure them separately if you do not connect the hand mic.) see the following figure.

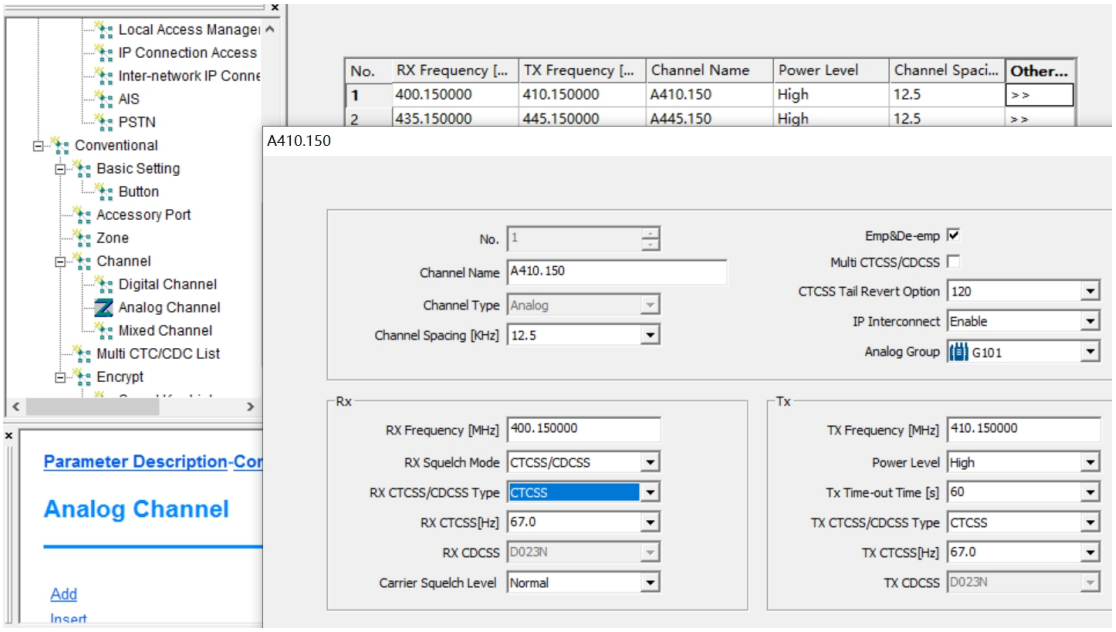
Figure 4-6 Repeater digital channel setting



4.3.2 Analog channel setting

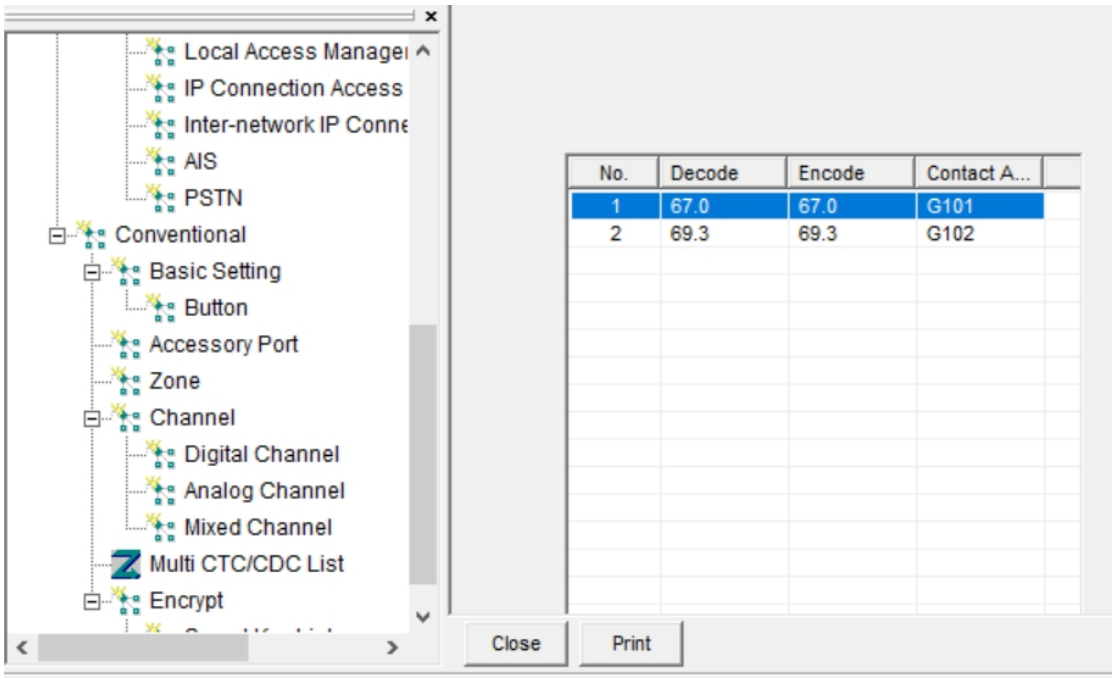
Configure analog channel. Double-click the "Analog Channel" option under "Conventional Setting" - "Channel". On the pop-up window, you can modify, add or delete the frequency value. According to the planning in Section 2.1.2, the analog receive frequency of repeater 7 is 402.1 MHz, the transmit frequency is 412.1 MHz, the channel name is A412.1, and set the power level. For the IP interconnection site, click the ">>" icon, and select "Enable" in the pop-up page. Analog group choose the digital interconnection group, and then select the corresponding RX squelch mode according to the actual environment, and the RX and TX CTCSS/CDCSS type, as shown in the figure below.

Figure 4-7 Repeater analog channel setting



If there are multiple interconnection groups, then need configure the Multi CTC/CDC list. Double-click the Multi CTC/CDC under "Conventional " to add multiple CTC/CDC to the interconnection group, see the following figure. After the Multi list is added, set RX Squelch Mode, RX &TX CTCSS/CDCSS type, then enable Multi CTCSS/CDCSS.

Figure 4-8 Multi CTCSS/CDCSS setting



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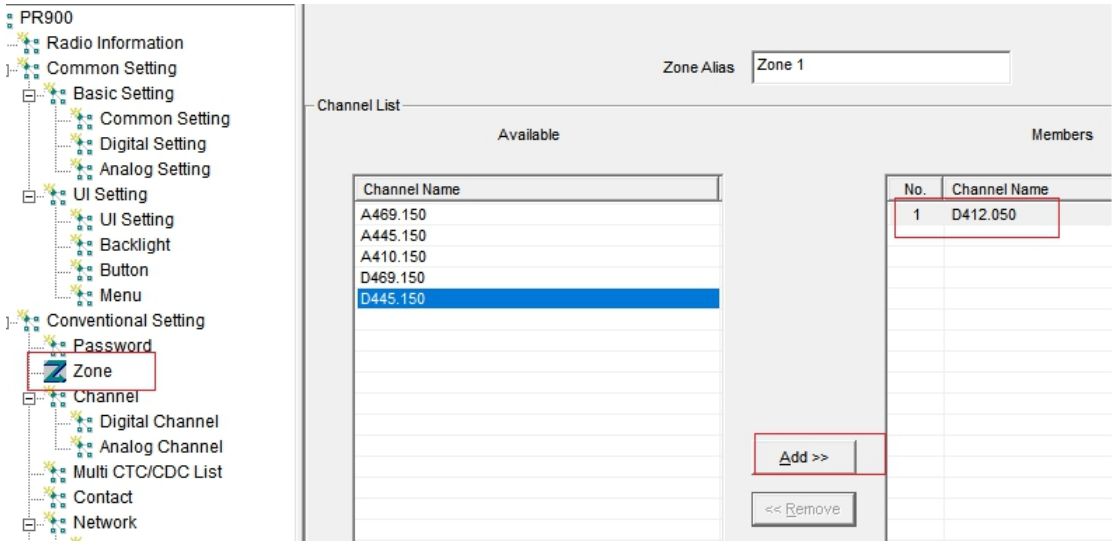
4.4 Zone setting

Double-click the "Zone" option under "Conventional Setting". Select the Channel under "Available" on the left and click the "Add>>" button in the middle to add to the right "Members", as shown in the following figure.

Figure 4-9 Repeater zone setting

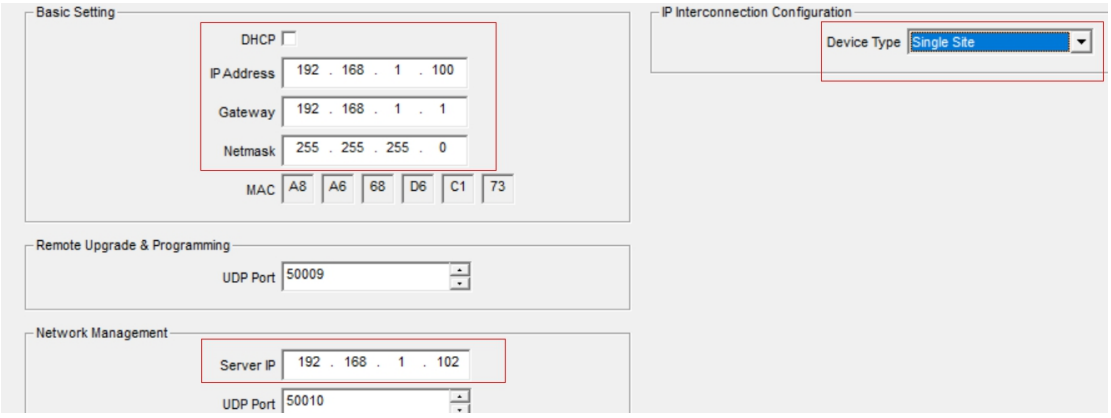


4.5 Network setting

4.5.1 Single site

Double-click the "Network" option under "Conventional Setting" - "Network". Under the "Basic Setting", "DHCP" is not checked. The IP address is set to "70.1.91.121" according to chapter 2.1.1 IP planning, and the Netmask is set to "255.255.255.0". The "Gateway" is configured according to the actual router gateway. Under the "IP Interconnection Configuration", the "Repeater Type" is set to "Single Site". Under the "Network Management", the network management "Server IP" is filled with the IP address of the network management server, as shown in the following figure

Figure 4-10 Single site network setting



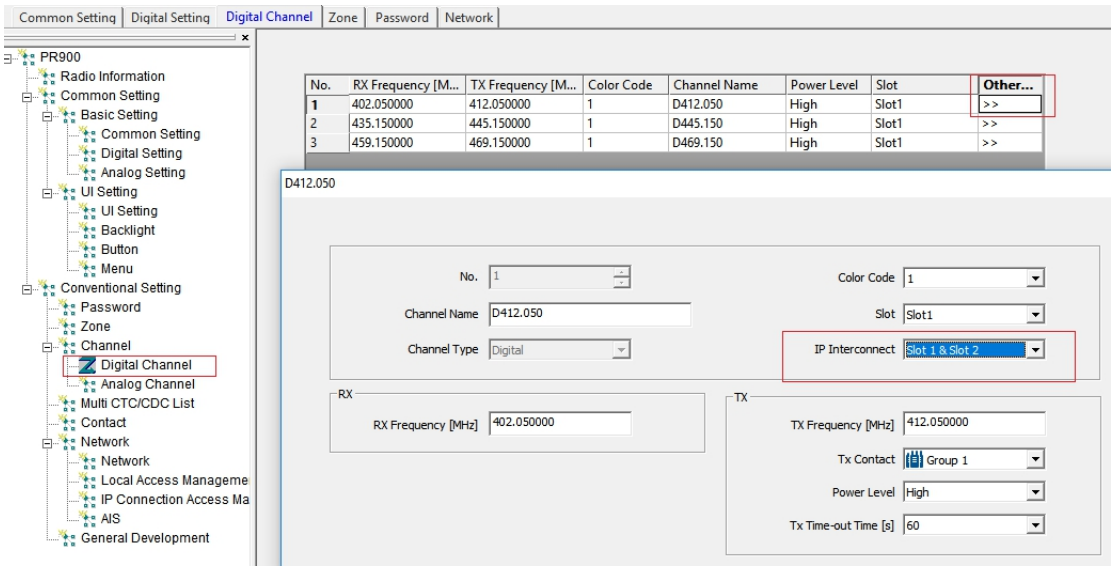
4.5.2 IP Connect

4.5.2.1 Master repeater

Double-click the "Digital Channel" option under "Conventional Setting" - "Channel". Select the "Other " - ">>" button, the "IP Connect " selects "Slot 1 & Slot 2", as shown in the following

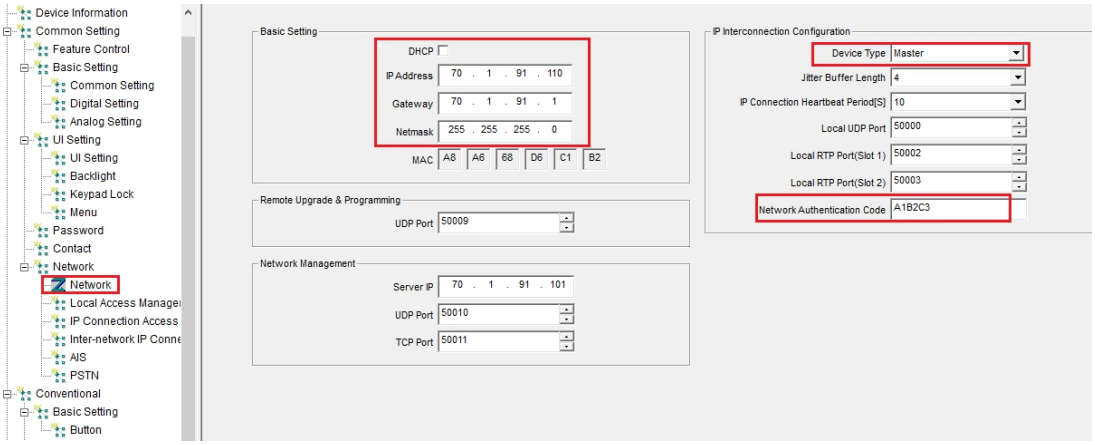
figure.

Figure 4-11 Master site IP connect slot



Double-click the "Network" option under "Conventional Setting" - "Network". Under the "Basic Setting", "DHCP" is not checked. The IP address is set to "70.1.91.110" according to chapter 2.1.1 IP planning, and the netmask is set to "255.255.255.0". The "Gateway " is configured according to the actual router gateway. Under the "IP Interconnection Configuration", the "Repeater type" is set to "Master". The port is configured according to port planning. The "Network Authentication Code" is configured with "A1B2C3" according to authentication code planning, as shown in the following figure (take V3.0 as an example).

Figure 4-12 Master repeater network setting

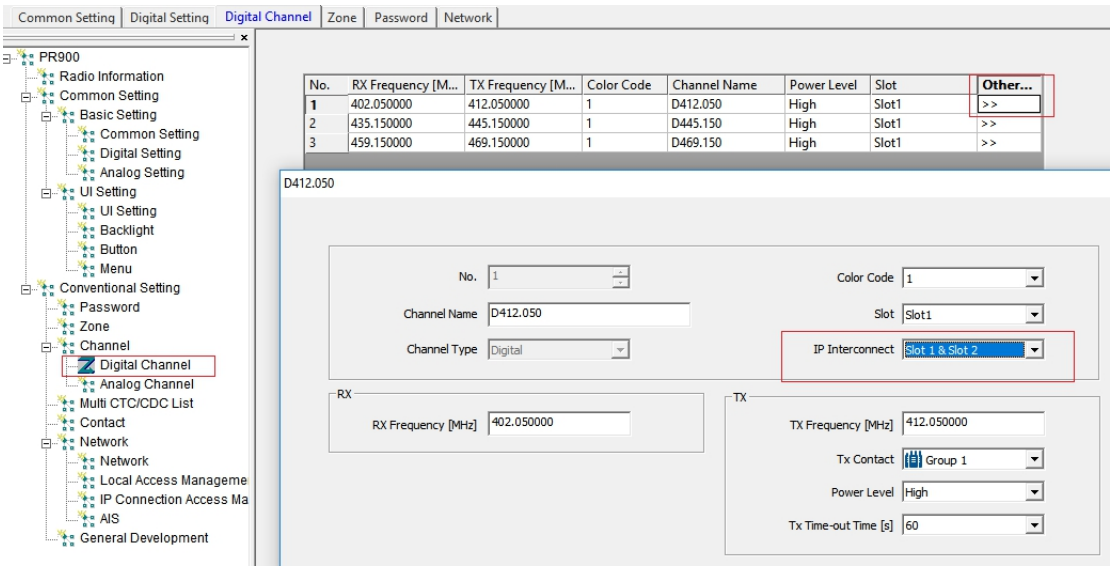


4.5.2.2 Slave repeater

Double-click the "Digital Channel" option under "Conventional Setting" - "Channel". Select the "Other" - ">>" button, the "IP Interconnect" selects "Slot 1 & Slot 2", as shown in the following

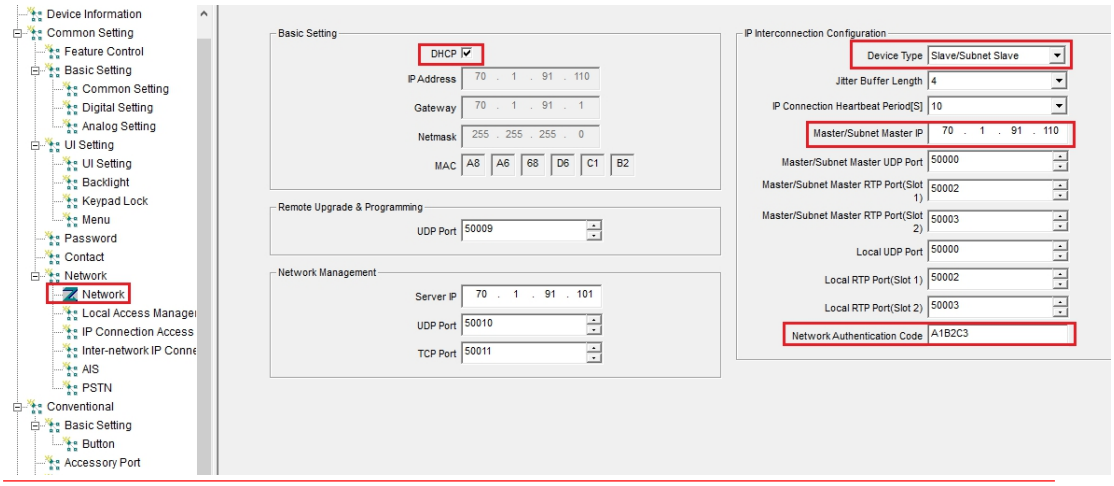
figure.

Figure 4-13 Slave site IP connect slot



Double-click the "Network" option under "Conventional Setting" - "Network". Under the "Basic Setting", "DHCP" is checked. Under the "IP Interconnection Configuration". The "Repeater type" is set to "Slave". The IP address is set to "70.1.91.110" according to IP planning. The port is configured according to port planning. The "Network Authentication Code " is configured with "A1B2C3 " according to authentication code planning and it need to be the same with master, as shown in the following figure (take V3.0 as an example). The network settings of the analog slave are the same as those of the digital slave server.

Figure 4-14 Slave repeater network setting



4.5.3 Inter-network IP connect

According to the design, in the inter-network IP connect mode, the gateway route connected to the Inter-network master should use the static IP, and port mapping should be configured in the

gateway route. According to chapter 2.2.1 IP planning, the static IP is "10.192.28.30". According to chapter 2.2.1 and 2.2.3 port planning, the three ports 50000, 50002, and 50003 of the inter-network master "192.168.1.110" need to be configured in port mapping of the gateway routing configuration, the two ports 19888 and 18000 of the dispatch server "192.168.1.101" need to be configured in port mapping of the gateway routing configuration. If the dispatch client and server are not in the same subnet, you need to configure the same port mapping of three ports 18226, 28226 and 8082 of dispatch server on the gateway router.

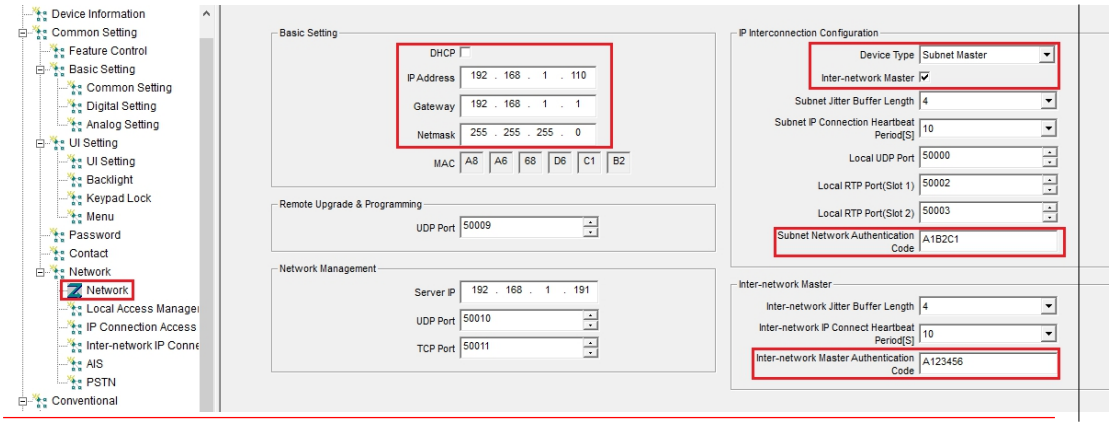
4.5.3.1 Inter-network master

Take subnet master M1 as an example. Double-click the "Network" option under "Common Setting" - "Network", uncheck "DHCP". Set IP address as "192.168.1.110" according to chapter 2.2.1 IP planning, set gateway as "192.168.1.1" and subnet mask as "255.255.255.0".

In the IP connect configuration ,set the repeater type as "Subnet master" and check "Inter-network master", set the port according to chapter 2.3.3 port planning, set network authentication code as "A1B2C1" according to chapter 2.7.

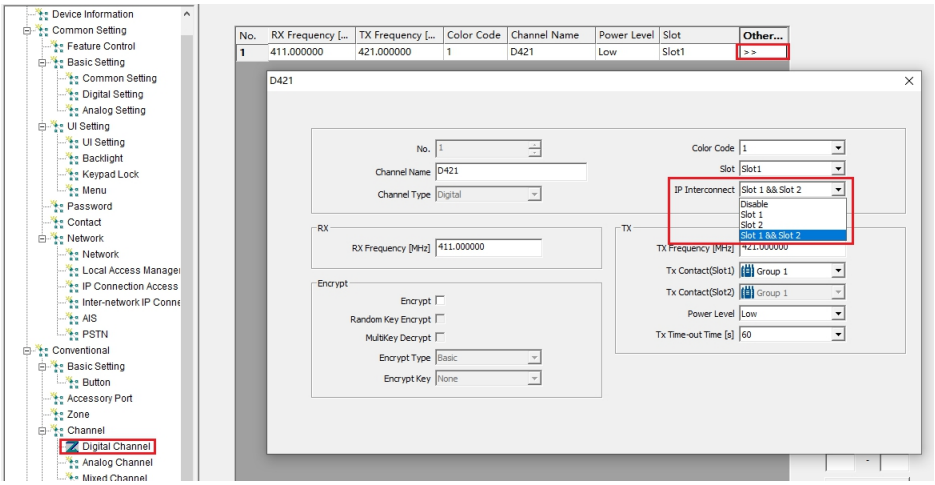
In the Inter-network configuration set the network authentication code as "A123456" according to chapter 2.7, as shown in the following figure (take V3.0 as an example).

Figure 4-15 Inter-network master network setting



Double-click the "Digital Channel" option under "Channel". Select the "Other " - ">>" button, select the time slot for IP connect, e.g., in "IP Connect " selects "Slot 1 & &Slot 2", as shown in the following figure.

Figure 4-16 Inter-network master IP connect time slot setting



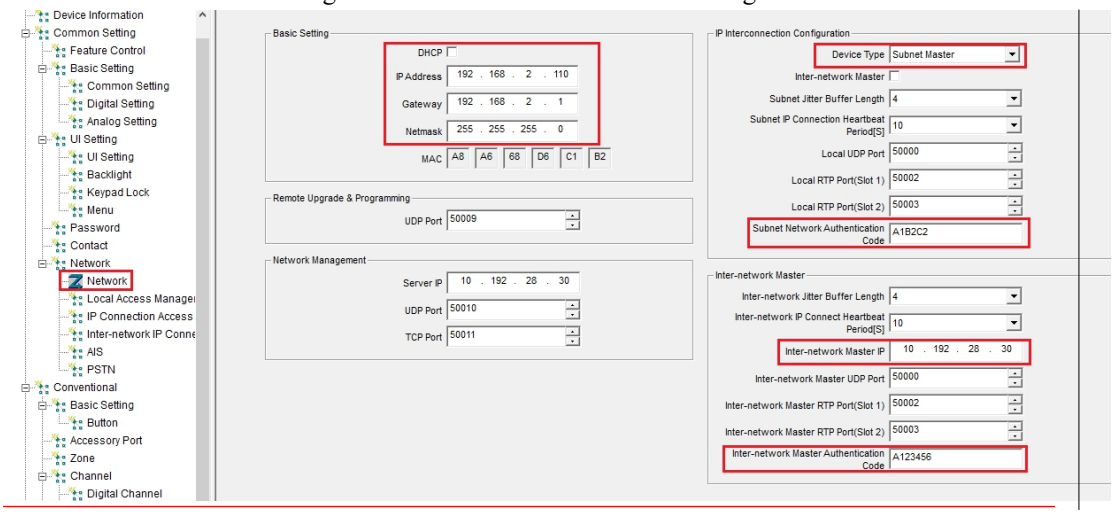
4.5.3.2 Subnet master

Take subnet master A1 as an example, double-click the "Network" option under "Conventional Setting" - "Network". Under the "Basic Setting", uncheck "DHCP". Set IP address as "192.168.2.110" according to chapter 2.2.1 IP planning, set gateway as "192.168.2.1" and subnet mask as "255.255.255.0".

In the IP connect configuration set the repeater type as "Subnet master", set the port according to chapter 2.3.3 port planning, set network authentication code as "A1B2C2" according to chapter 2.7.

In the Inter-network configuration set the Inter-network master IP as "10.192.28.30" according to chapter 2.2.1 IP planning, which should be an static IP of the external gateway. Set the port according to chapter 2.3.3 port planning, set the inter-network master network authentication code as "A123456" according to chapter 2.7, as shown in the following e figure (take V3.0 as an example).

Figure 4-17 Subnet master network setting



Set the IP connect time slot in the "Digital Channel", referring to chapter 4.5.3.1 for detail configuration.

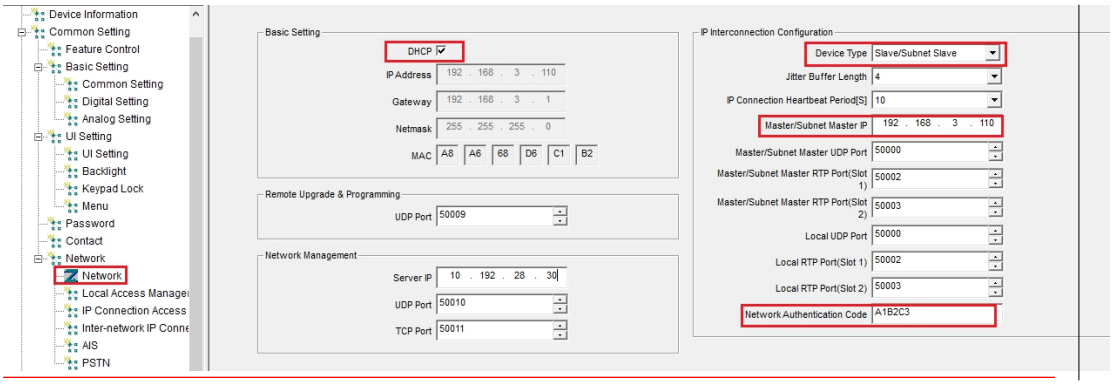
The configuration of subnet master B is similar so it is not repeated here.

4.5.3.3 Subnet slave

Take subnet slave B2 as an example, double-click the "Network" option and check "DHCP" or set static IP.

In the IP connect configuration set the repeater type as "Slave/Subnet slave", set the master/Subnet master IP address as "192.168.3.110" according to chapter 2.3.1 IP planning, set the port according to chapter 2.3.3 port planning, set network authentication code as "A1B2C3" according to chapter 2.7, as shown in the following figure (take V3.0 as an example).

Figure 4-18 Subnet slave network setting



Set the IP connect time slot in the "Digital Channel", referring to chapter 4.5.3.1 for detail configuration.

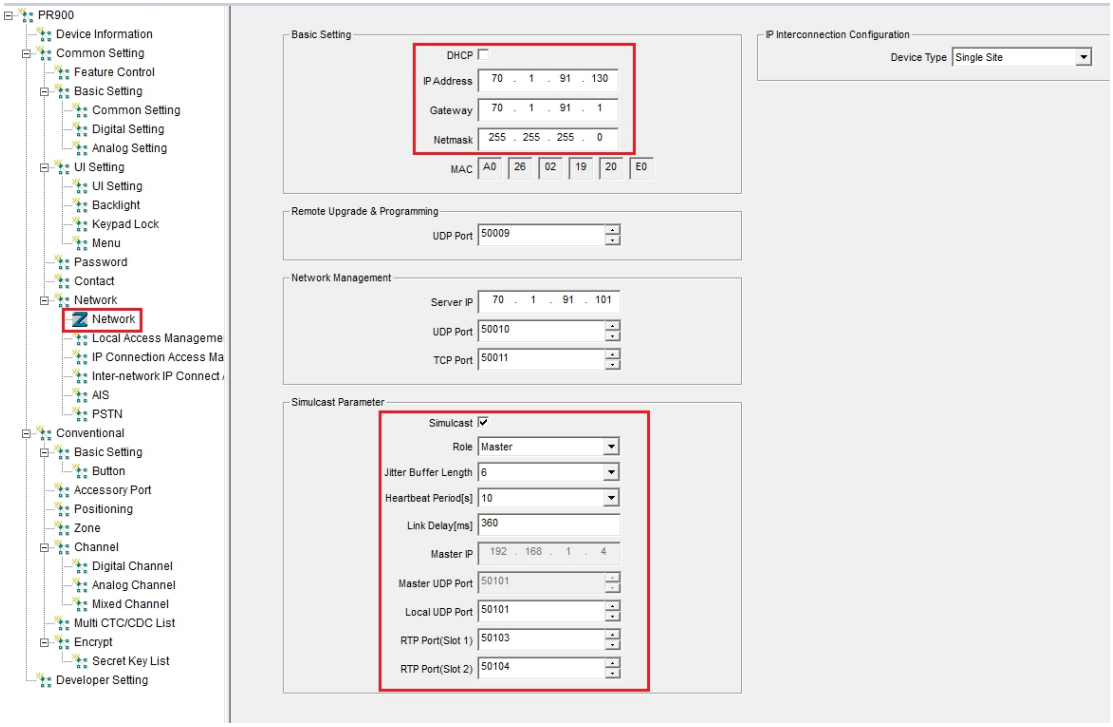
The configuration of subnet slave M2, subnet salve A2 is similar so it is not repeated here.

4.5.4 Simulcast

4.5.4.1 Simulcast master repeater

Double-click the "Network" option under "Conventional Setting" - "Network". Under the "Basic Setting", uncheck "DHCP". Set IP address as "70.1.91.130" according to chapter 2.3.1 IP planning, set subnet mask as "255.255.255.0" and set gateway to actual configuration. Check "Simulcast" in simulcast parameters, set simulcast role to "Master", set port configuration according to chapter 2.3.3 port planning, as shown in the following figure (take V3.0 as an example).

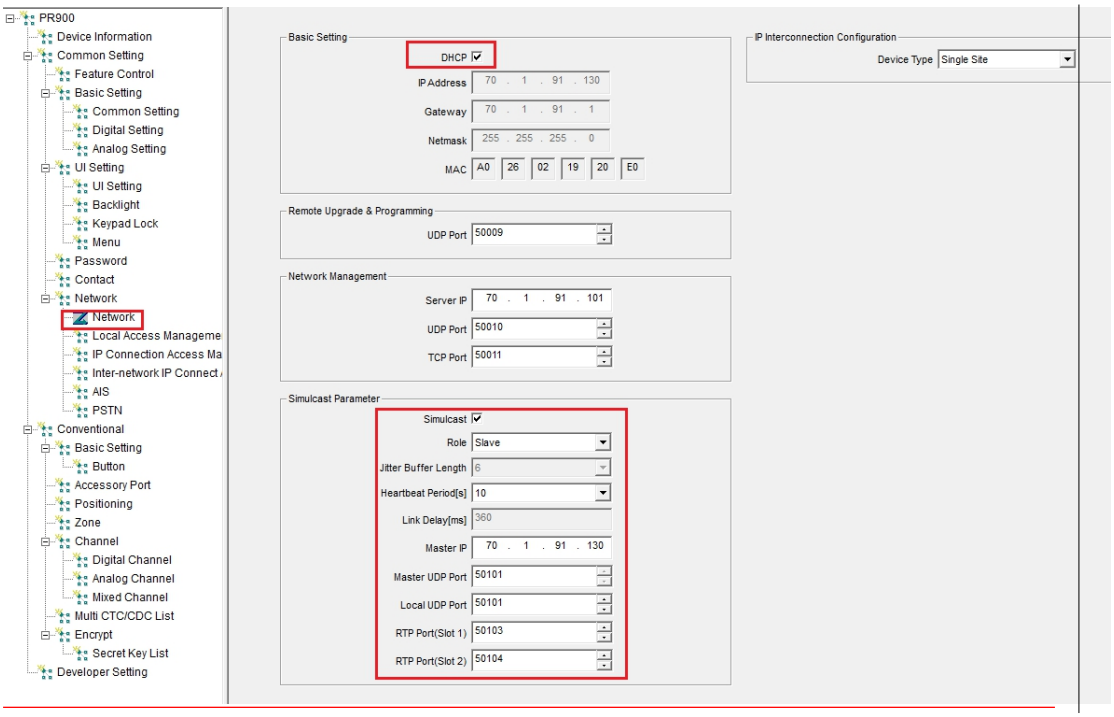
Figure 4-19 Simulcast master repeater network setting



4.5.4.2 Simulcast slave repeater

Double-click the "Network" option under "Conventional Setting" - "Network". Under the "Basic Setting", check "DHCP" or uncheck "DHCP". Set IP address, subnet mask and gateway. Check "Simulcast" in simulcast parameters, set simulcast role to "Slave". Set Master IP to simulcast master repeater IP according to chapter 2.3.1 IP Planning. Set port configuration according to chapter 2.3.3 port planning, as shown in the following figure (take V3.0 as an example).

Figure 4-20 Simulcast slave network setting

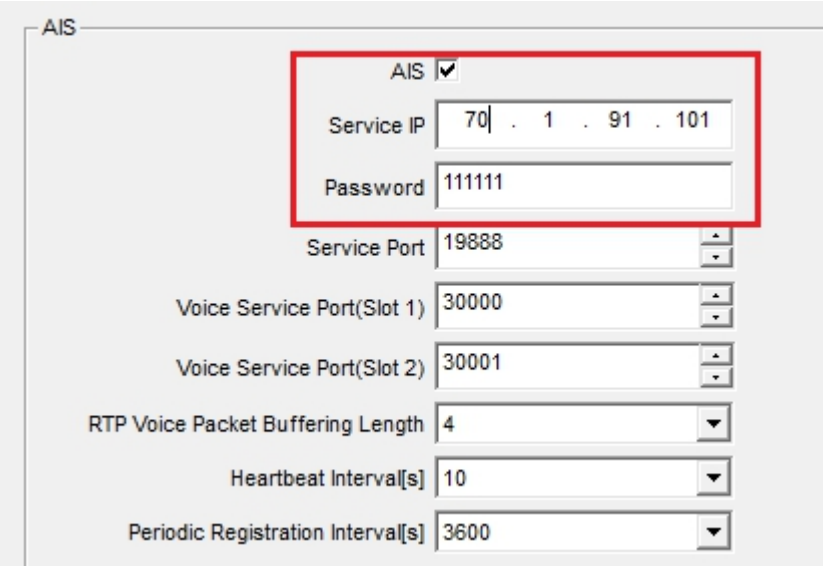


4.5.5 AIS setting

When it is needed to use the dispatcher for the single site, IP Connect site or Inter-network IP Connect site, "AIS" should be checked by the single site, IP Connect master, IP Connect slave, Inter-network master, subnet master and subnet slave. When it is needed to use the dispatcher for the simulcast system, "AIS" should be checked by the simulcast master, and simulcast slave doesn't need to check it. Detail configuration as below:

Double-click the "AIS" option under "Conventional Setting" - "Network". Check "AIS" and fill in the IP of the dispatch server according to chapter 2.1.1 IP planning (You can just fill in the PD200 server IP if the PD200 server is in the same LAN. If it is Inter-network IP connect scenario, you need to fill in PD200 server routing gateway static IP). According to chapter 2.5 Repeater authentication planning, set the password registered from repeater to the dispatcher server. The port is set according to chapter 2.1.3, 2.2.3 or 2.3.3 Port planning, as shown in the following figure

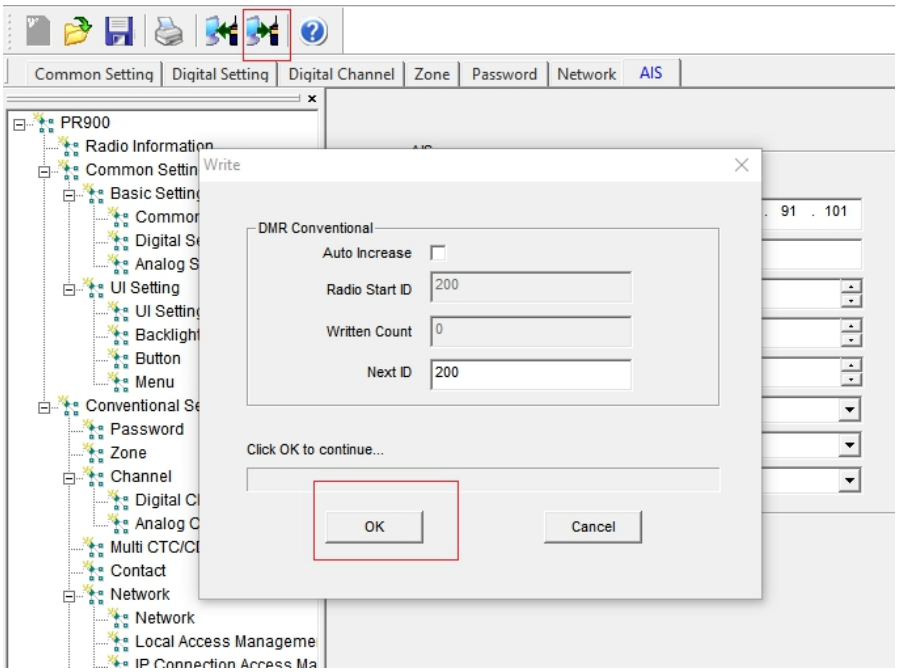
Figure 4-21 AIS setting



4.6 CPS write

After performing the above steps, click the "Write" icon  on the toolbar, and click the "OK" button on the pop-up page. After the writing is successful, the repeater will restart, as shown in the following figure.

Figure 4-22 Repeater CPS write



5 Dispatcher setting

5.1 Dispatch software installation requirements

The common DMR dispatch software uses the CS architecture. The hardware and operating system requirements for the installation of the dispatch server and clients are described in the following table.

1: A large-capacity network has higher requirements for the processing and storage capabilities of the dispatch server, so there are specific requirements for hardware installation of the dispatch server.

If no more than eight repeaters/self-networking devices are connected, it is recommended that you connect the dispatch server to a desktop (corresponding to dispatch server 1 in the following table).

When more than eight repeaters or self-networking devices are connected, it is recommended that you use a server for the dispatch server (corresponding to dispatch server 2 in the following table).

If the hardware indicators of the server do not meet the requirements, the processing delay may be too long and the recording storage may fail, affecting normal services and user experience.

2: The installation of the dispatch server should meet the requirements of the operating system version in the following table. Otherwise, the installation may fail and the dispatch software cannot be used.

Table 5-1 DMR common dispatch software and hardware requirements for installation

Dispatch server 1	CPU	3 GHz, 6 cores	1: Desktop: Connected to no more than eight repeaters or self-networking networks. 2: Material code of ZTE: Host: 0.53. 30.0400669 Display: 0.53. 30.0600112 3: Operating system: Windows 10 1909 or above
	Memory	8GB	
	Hard disk	1TB	
	Operating system	64-bit windows operating system	
Dispatch server 2	CPU	2.2 GHz, 12 cores	1: Server: Used to connect to more than eight repeaters or self-networking networks. 2: Material code of ZTE: Host: 0.53. 10.0500840 Display: 0.53. 30.0600112 3: Operating system: Windows server 2016 or above 4: Considering large capacity and long time recording, the hard disk should be at least 4*600 GB
	Memory	4*16GB	
	Hard disk	4*600GB	
	Operating system	64-bit windows operating system	
Dispatch client	CPU	2GHz	1: Desktop 2: Material code of ZTE : Host: 0.53. 30.0400669
	Memory	8GB	
	Hard disk	500GB	

	Operating system	32/64 bit windows operating system	
	Accessory Requirements	A microphone, loudspeaker, or earphone must be configured	

5.2 Dispatcher installation

5.2.1 Dispatcher version and repeater version check

Check if repeater version matches dispatcher version. The repeater version and dispatcher version must be matching. For the repeater, click the front panel menu—device information, and check the firmware version. For the dispatcher, check the suffix of installation package name. USB Key or soft license should authorize the corresponding service.

- Repeater version: Repeater_V*.*.*
- Dispatcher server version: PD200Server_V*.*.*
- Dispatcher client version: PD200Client_V*.*.*
- USB Key or soft license

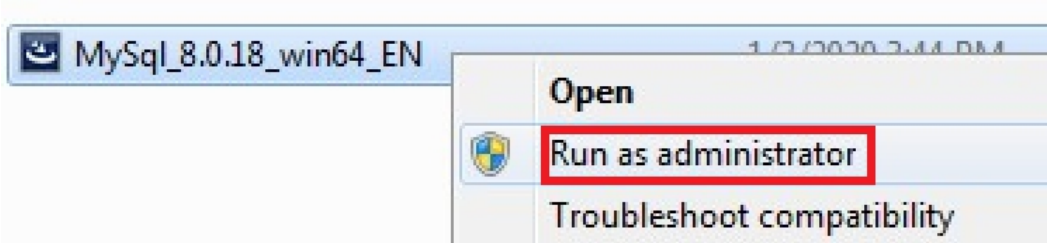
5.2.2 MySQL installation

According to chapter 2.4 Operating system planning, MySQL and the dispatcher server are installed on the same PC with 64-bit operating system. First find the "MySql_8.0.20_win64_EN.exe" (taking V3.0 for example) installation package 

(**You need to use the installation package that comes with the version package for installation. If the version you downloaded doesn't come with the version package, you will not be able to connect**), then right click on the installation package and select "**Run as administrator**" to install, as shown in the following figure.

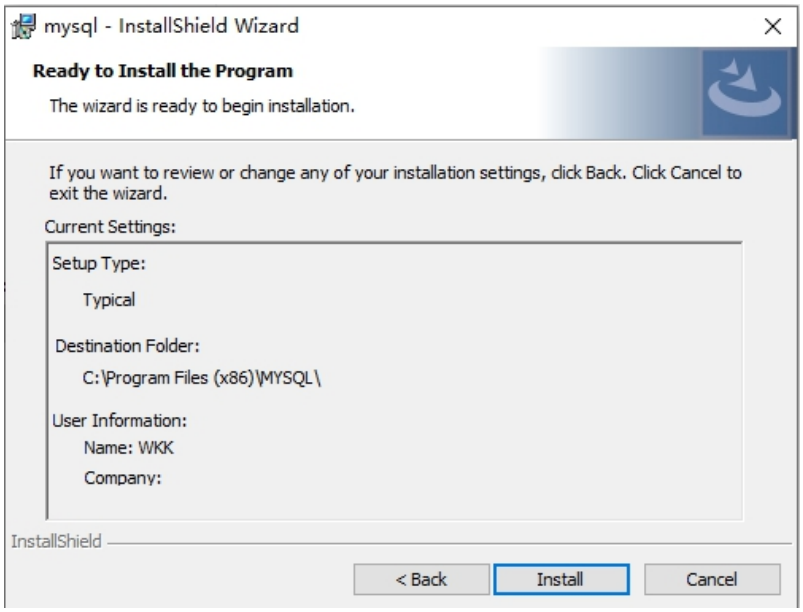
Note: After MySQL is installed for the first time, there is no need to reinstall for the dispatcher upgrade without special instruction.

Figure 5-1 Right-click the installation package to run as administrator



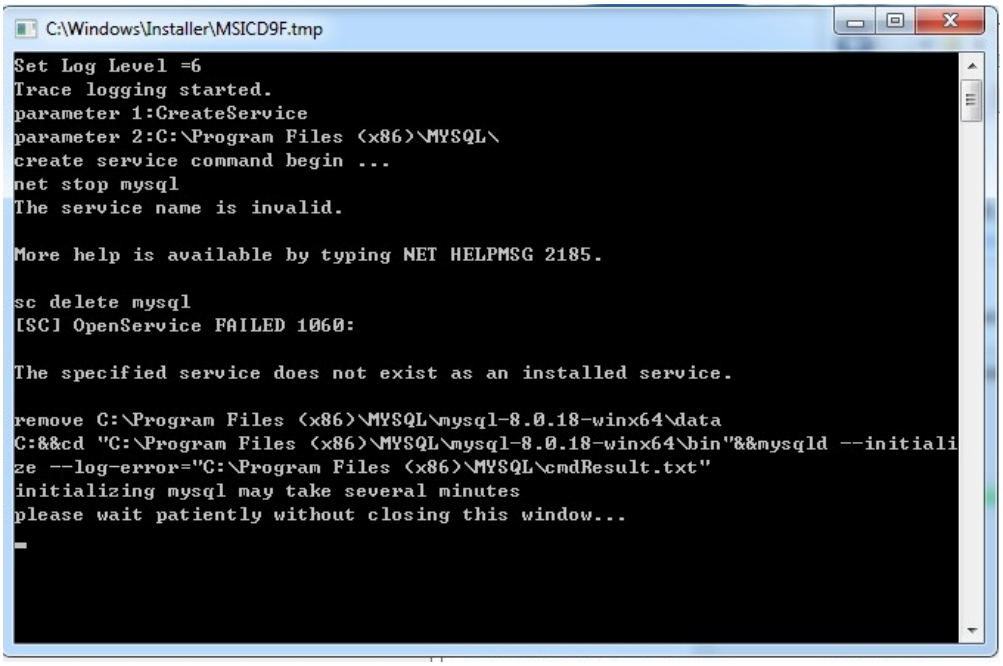
In the pop-up installation interface, click "Install" to select every option and perform installation, as shown in the following figure.

Figure 5-2 MySQL installation



After clicking the "Install" button, it is normal that the command prompt will pop up during the installation process. Do not manually close the window, as shown in the following figure.

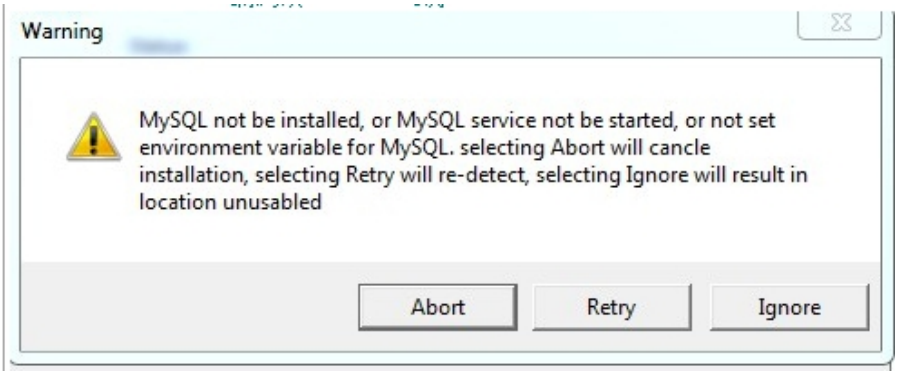
Figure 5-3 Command prompt during MySQL installation



5.2.3 Dispatcher server installation

If MySQL is not installed successfully, there will be a pop-up telling that MySQL is not installed. Please install MySQL first, as shown in the following figure.

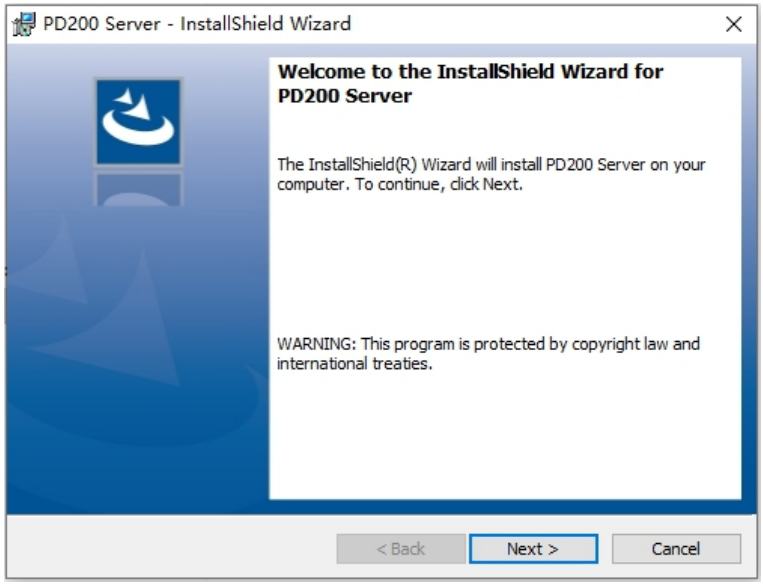
Figure 5-4 Pop-up of MySQL is not installed when installing the dispatcher server



Please select "Abort", and install MySQL before installing the dispatcher server.

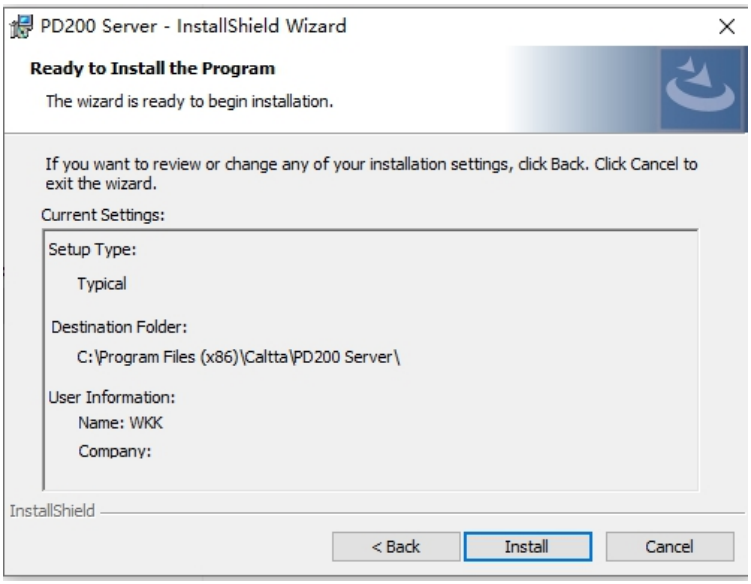
According to chapter 2.4 Operating system planning, the PD200 server and MySQL must be installed on the same PC. After the steps in chapter 5.1.3 are completed, unzip the server installation package, double click "PD200Server_V*.*.*.exe" to install, then the following figure will be shown.

Figure 5-5 PD200 server installation



In the pop-up window, click "Next" until the installation path appears, select corresponding installation path, for example, "C:\Program Files (x86)\Caltta\PD200 Server\", as shown in the following figure, click "Install" button. The appearance of black command prompt pop-up window is normal during the process, please do not manually close it.

Figure 5-6 PD200 server installation



After the installation is complete, the PD200 Server shortcut appears on the desktop. Double-click the shortcut icon to start the software, as shown in the following figure.

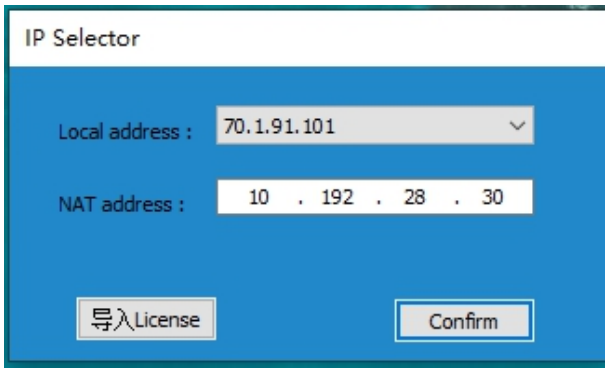
Note: The version upgrade of dispatcher server is overwrite installation, and retain the configuration file. Please choose to install by default after running the file.

Figure 5-7 PD200 server shortcut

To start the dispatcher successfully, you need to connect the PC to the USB Key or a soft license. You need to confirm the authorization item in advance.

Double-click the desktop icon to start PD200 Server. Select the local address in the pop-up window that appears, select "192.168.1.101" according to Chapter 2.2.1 IP planning if it is Inter-network IP connect scenario. Select "70.1.91.101" according to Chapter 2.1.1 or 2.3.1 IP planning in other scenarios. NAT address: When dispatcher server, dispatcher client and repeater are in the same local area network or external network, the NAT address does not need to be configured. Fill in the NAT address when the dispatcher server is in the local area network, and the dispatch client and / or the repeater are in the external network and need to be traversed by the private network, e.g., select "10.192.28.30". For soft license authorization, click "Import License" button to select the authorization file and click "OK" to start the dispatcher server. For USB Key authorization, click "OK" to start the dispatcher server. See the following figure.

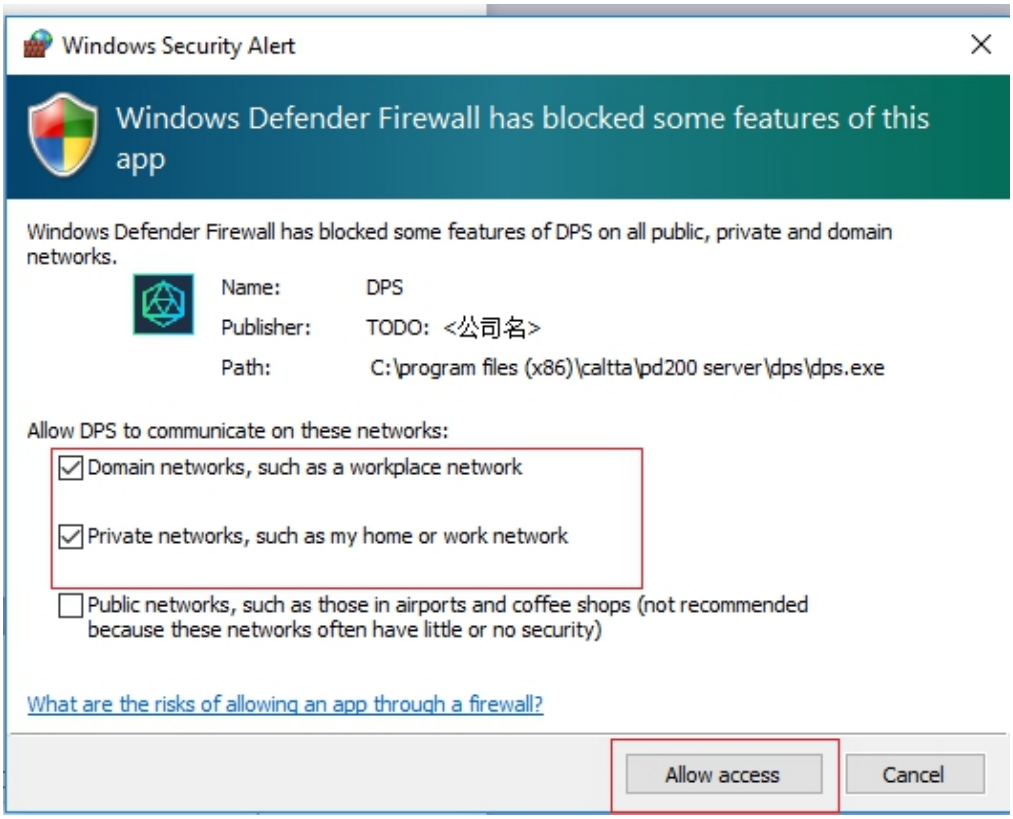
Figure 5-8 PD200 server IP setting



After startup, the firewall will pop up window to display the network that allows communication. Check the network option and click "Allow access" button.

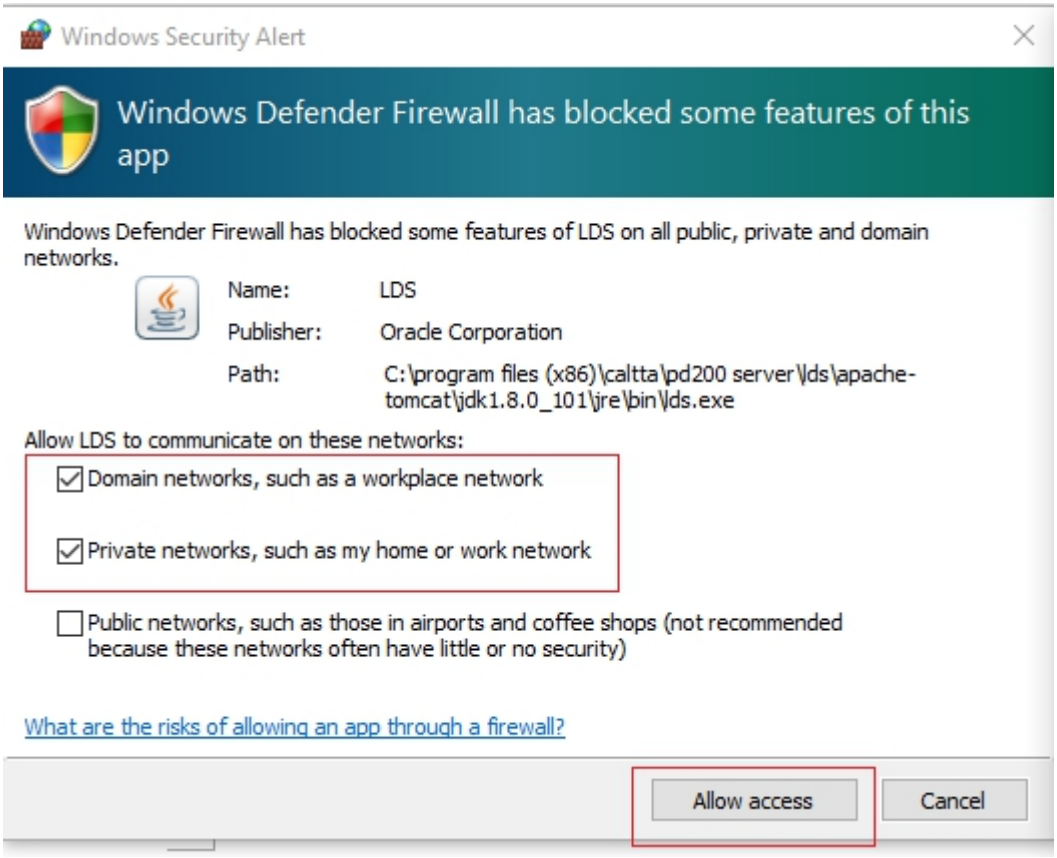
The following figure allows the DPS process to communicate.

Figure 5-9 Firewall allows DPS process communication



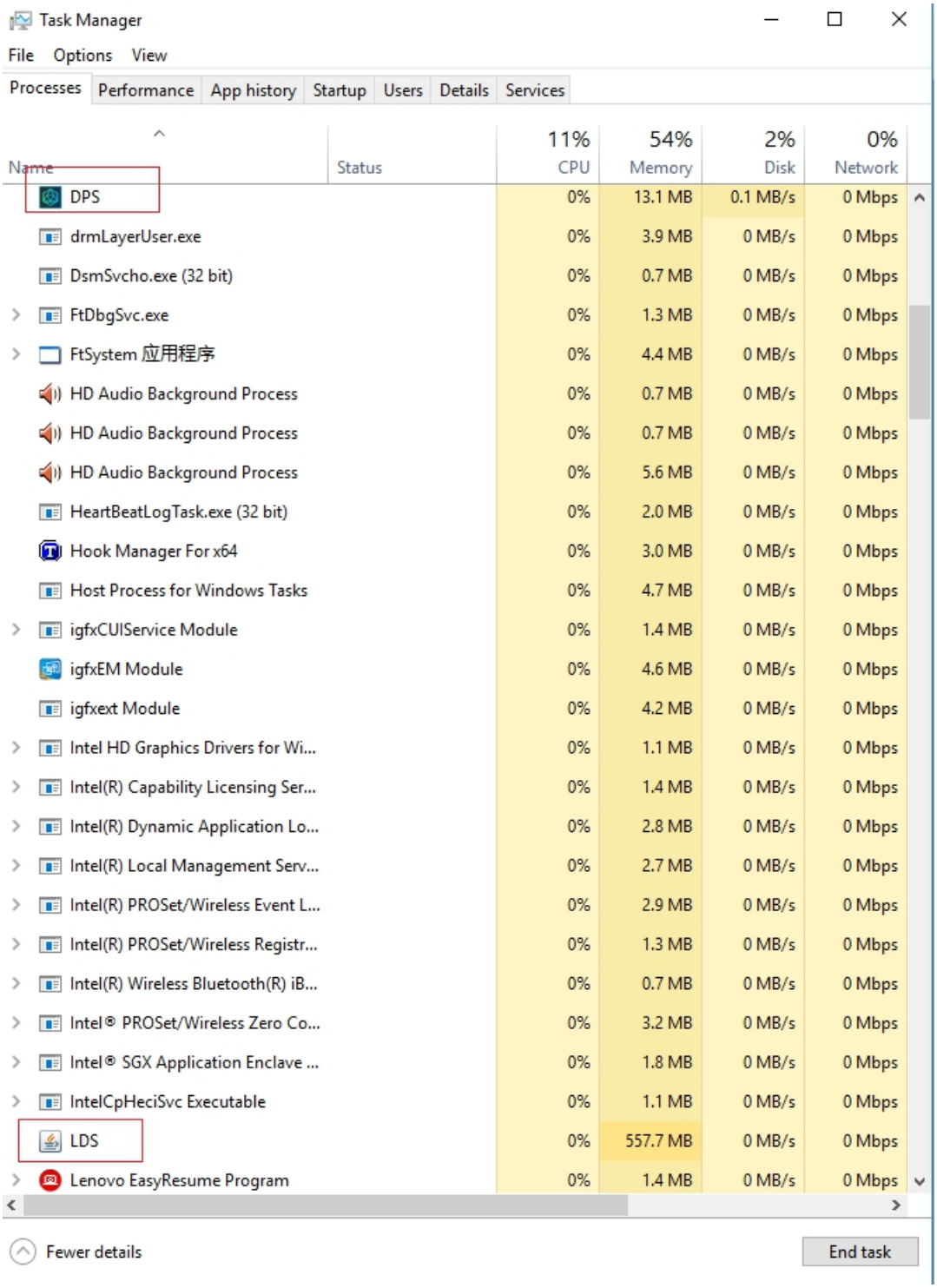
The following figure shows the LDS process is allowed (or displays "Java (TM) Platform SE binary" on Windows 10).

Figure 5-10 Firewall allows LDS process communication



After the startup is successful, check the "Processes" option in the task manager, if DPS and LDS (or display "Java (TM) Platform SE binary") processes are included, it indicates that the startup is successful, as shown in the following figure.

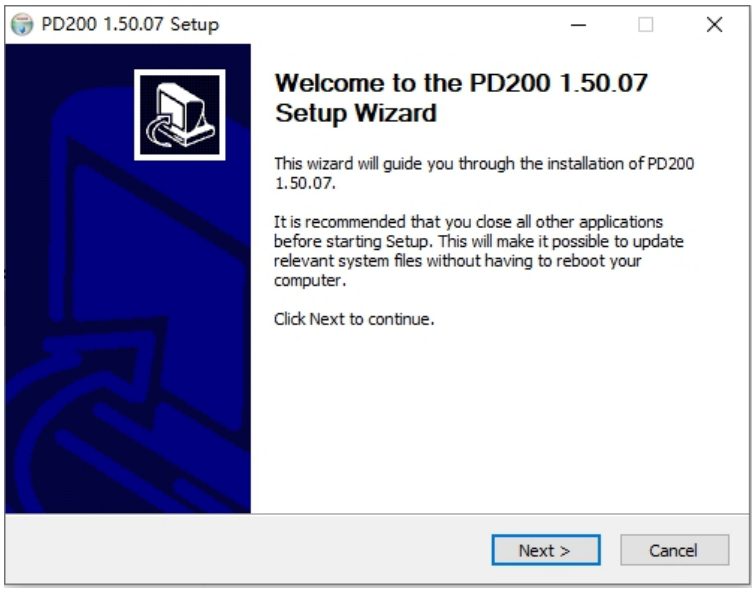
Figure 5-11 Server's processes displayed in task management



5.2.4 Dispatcher client installation

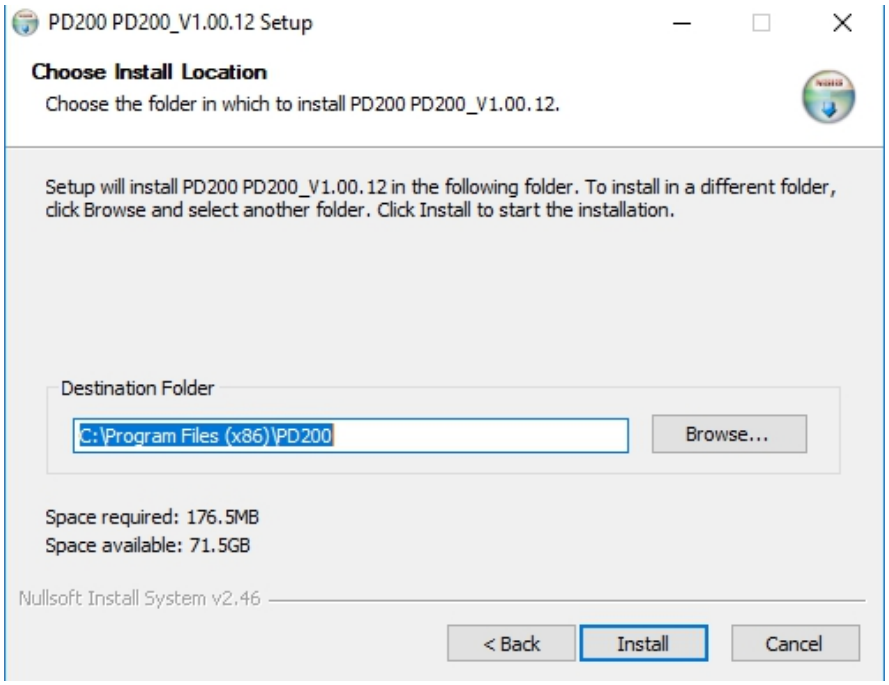
Double-click the PD200 client installation package "PD200Client_V*.*.*.exe" to install, as shown in the following figure.

Figure 5-12 PD200 client installation



Select the installation path and click the "Install" button to install PD200 client, as shown in the following figure.

Figure 5-13 PD200 client installation



After the installation is complete, double-click the PD200 client shortcut on the desktop to start the client.

Note: The version upgrade of dispatcher client is overwrite installation. Please choose to install by default after running the file.

5.3 Dispatcher client setting

Dispatcher client differentiates the administrator and the dispatcher account. The administrator only configures data, and the dispatcher only handles dispatching.

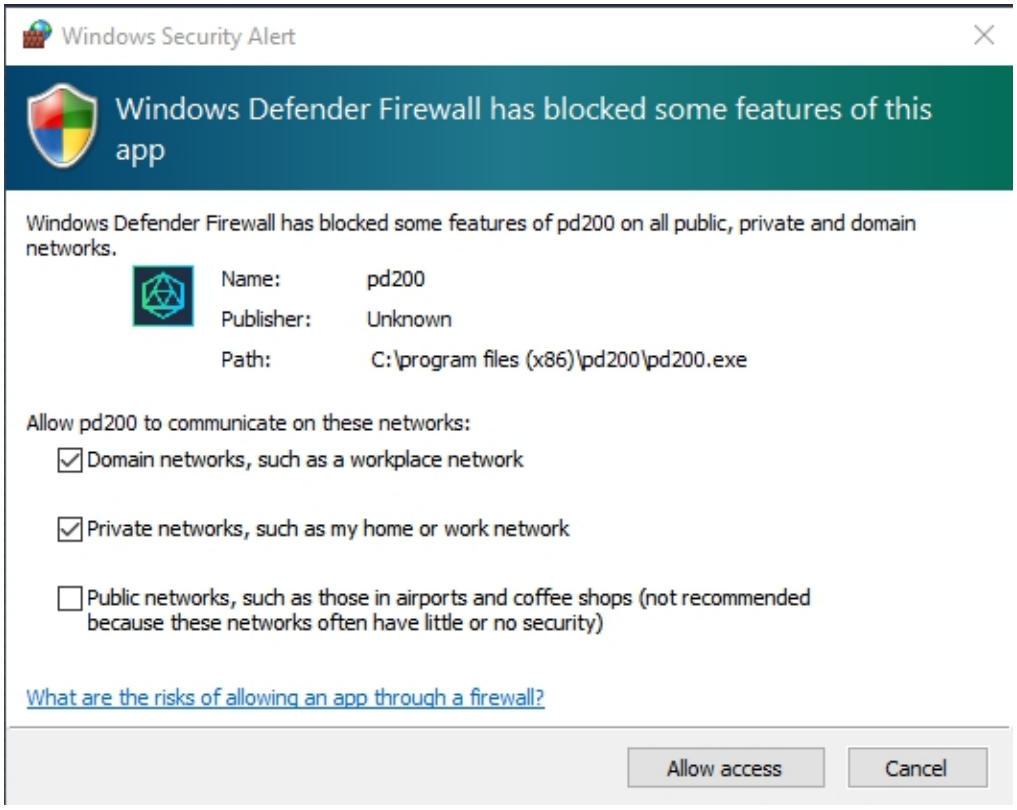
5.3.1 Dispatcher client login

Double click the icon to start PD200 client, and use the admin account to log in. Select "70.1.91.102" as the local IP, fill in "70.1.91.101" as the server IP, and set the password as "111111" according to chapter 2.6 account planning, as shown in the following figure (taking V3.0 as an example), and click the login button to log in.

Figure 5-14 Dispatch client login

When logging in, the firewall pop-up window is displayed. Check the network option to allow the PD200 client to communicate. Click the "Allow access" button, as shown in the following figure.

Figure 5-15 Firewall allows dispatcher client communication

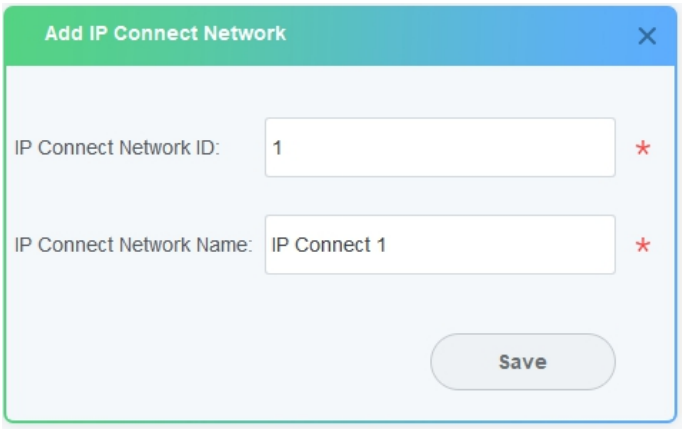


5.3.2 Configure IP connect network

IP connect network management mainly differentiates different IP connected networks, the IP services of different IP connected networks are independent of each other.

Select the "Configure" menu on the left, click "IP Connect Network Management" on the page that pops up on the right, click the "Add" button in the upper right corner, and fill in the IP connect network ID and IP connect network name in the pop-up interface, you need to add different IP connect network ID if there are multiple independent networks, as shown in the following figure.

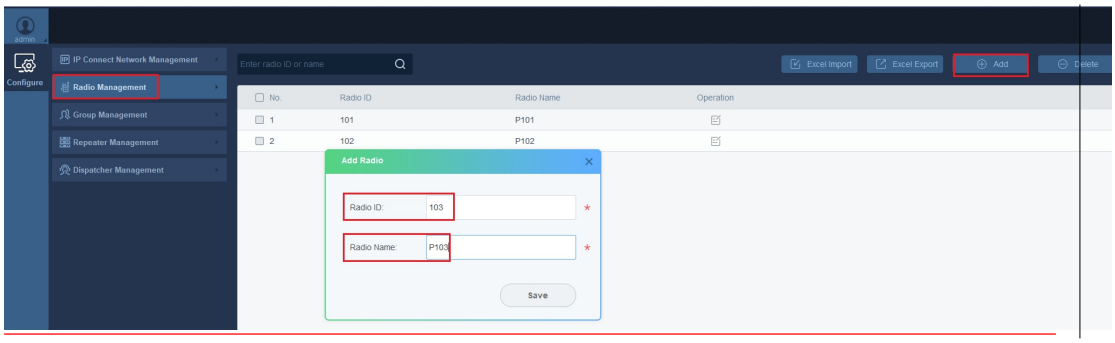
Figure 5-16 IP connect network management configuration



5.3.3 Add radio

Select the "Configure" menu on the left, click "Radio Management" on the page that pops up on the right, click the "Add" button in the upper right corner, and fill in the "Radio ID" and "Radio Name" in the pop-up interface, as shown in the following figure. Add Radio according to chapter 2.1.2 or 2.2.3.

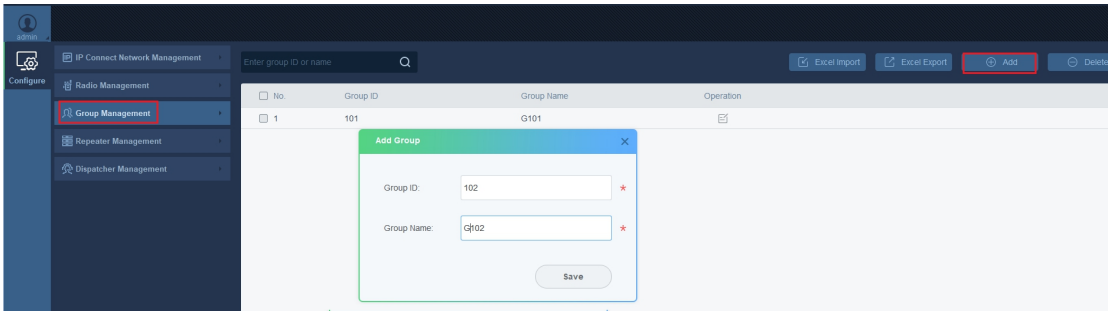
Figure 5-17 Add radio



5.3.4 Add group

Select the "Configure" menu on the left, click "Group Management" on the page that pops up on the right, click the "Add" button in the upper right corner, and fill in the "Group ID" and "Group Name" in the pop-up interface, as shown in the following figure. Add group ID 101, 102 and 103, group name G101, G102 and G103. In the simulcast scenario add group ID 104, group name G104.

Figure 5-18 Add group

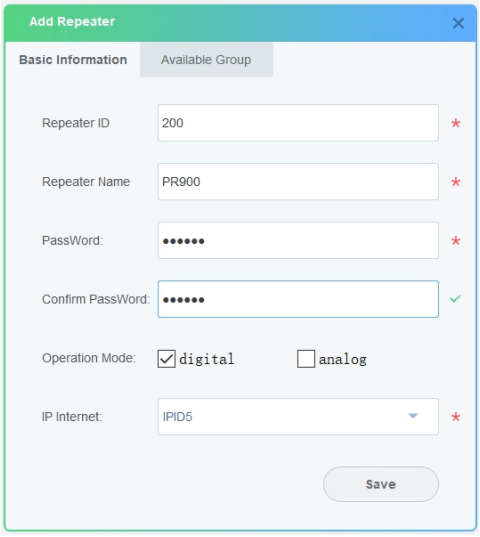


5.3.5 Add repeater and bind group

Select the "Configure" option on the left, click "Repeater Management" on the page that pops up on the right, click the "Add" button in the upper right corner, set the repeater ID as 200 for repeater 1, and set repeater name as "PR900" in the pop-up interface. Set the password as "111111" according to chapter 2.4 Repeater authentication planning. Select IP connect network according to chapter 5.2.2 configuration, then click "Save" button, as shown in the following

figure. Add other repeaters and select IP connect networks in the same way（Choose analog in analog repeater）. In the simulcast scenario only add repeater 4 (simulcast slave repeater 5 and 6 don't need to add to dispatch).

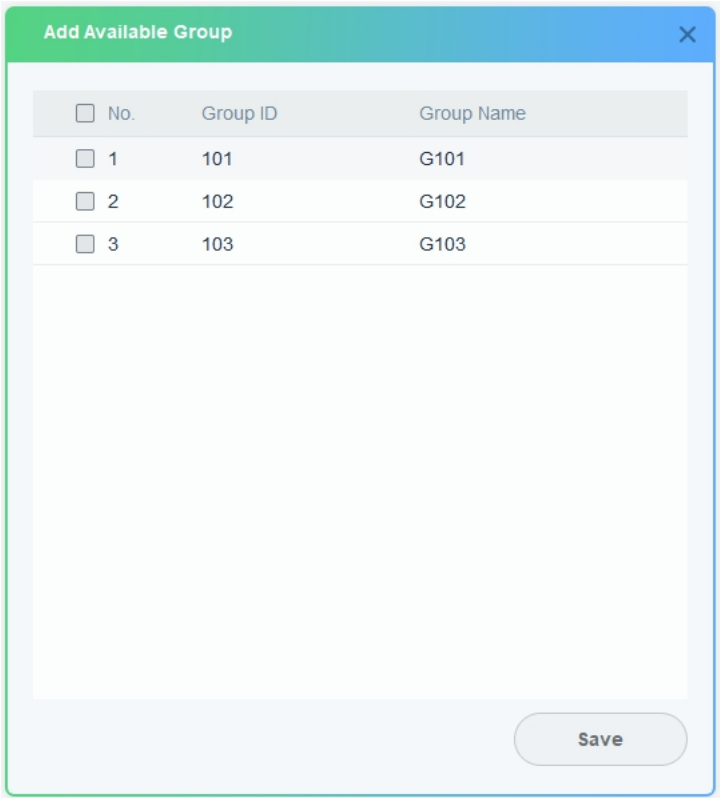
Figure 5-19 Add repeater



Click on the "Available Group" page in the pop-up window, repeater1 and repeater2 select time slot 1, click the "Add Available Group" button, select group G101 in the pop-up window and click "Save"; also for the time slot 2, click the "Add Available Group" button, select group G102 in the pop-up window and click "Save", as shown in the following figure. The repeater 3 selects group G103 in the same way. In simulcast scenario repeater 4 selects group G104 in the same way. Analog repeater 7 can only be bound to groups that bound to other digit repeaters time slot 1.

Note: One group can only be bound to either time slot 1 or time slot 2 of a repeater, and cannot be bound to both two time slots at the same time. The group under the IP connect master and slave sites can only be bound to either time slot 1 or time slot 2, it cannot be bound to time slot 1 of master site and bound to time slot 2 of slave site, and vice versa. The analog repeater does not distinguish time slots, can only be bound to groups that bound to other digit repeaters time slot 1.

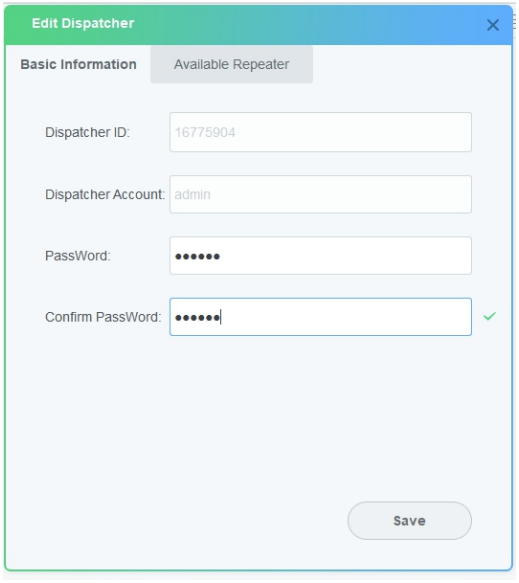
Figure 5-20 Repeater slot bind group



5.3.6 Modify admin password

Select "Configure" - "Dispatcher Management" on the left. The currently logged admin account already exists on the pop-up page. Click the edit button below the "Operation" column, you can set the new password in the pop-up window. The password and the confirm password must be the same. Click the save button, as shown in the following figure.

Figure 5-21 Modify admin password

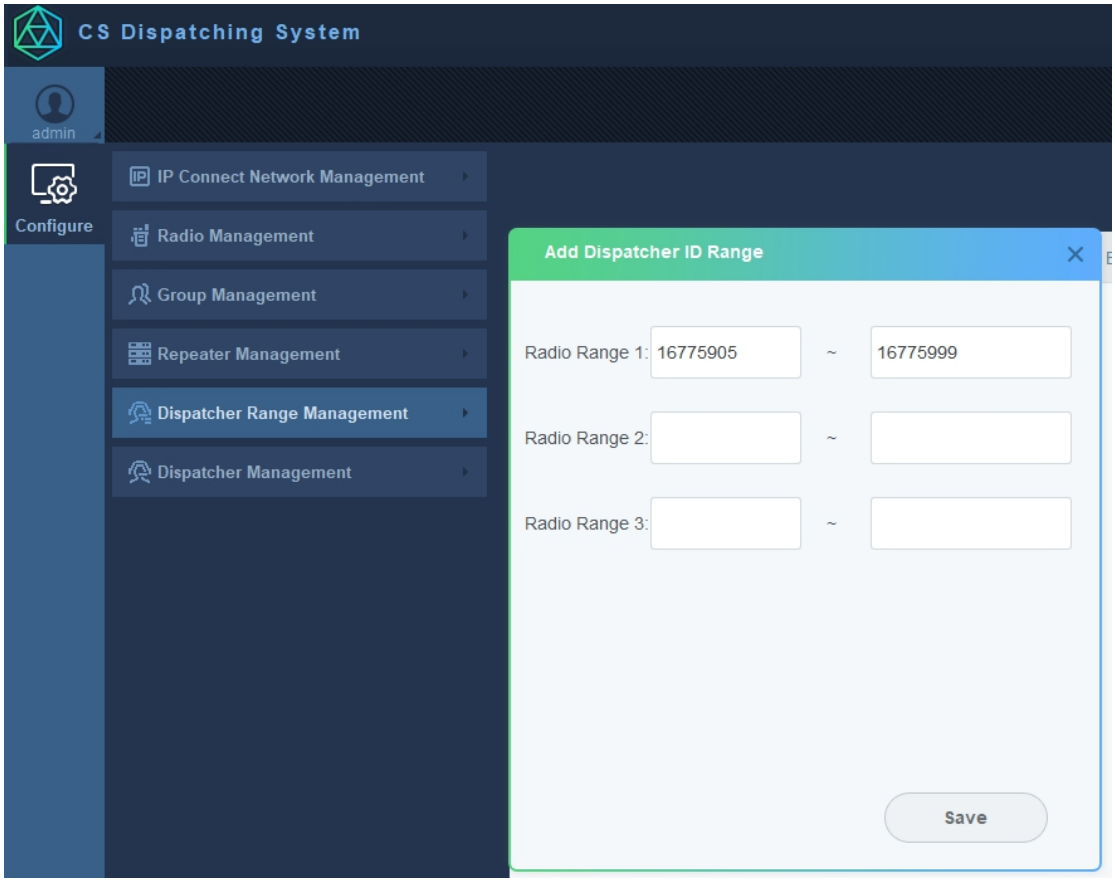


On the "Available Repeater" page, you can add or delete the repeater that the account can manage.

5.3.7 Add dispatcher account

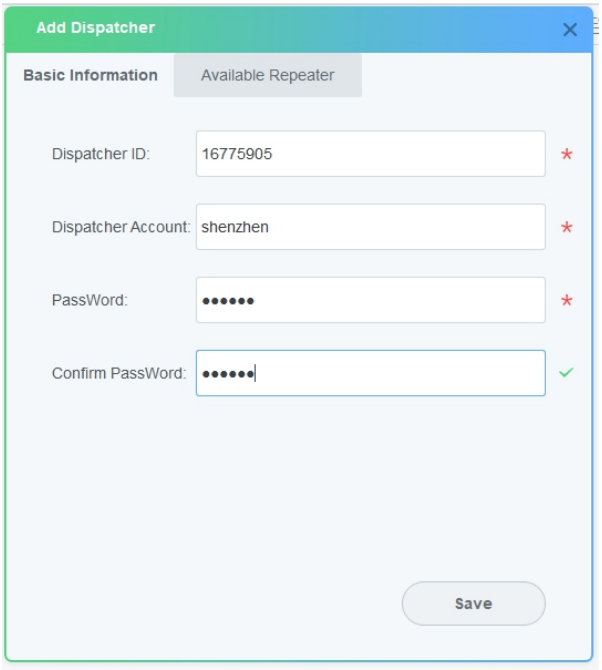
To add a dispatcher, first need add a dispatcher number segment, select dispatcher number segment management, and click add. The add dispatcher number segment dialog box is displayed, see the following figure.

Figure 5-22 Dispatcher number segment management



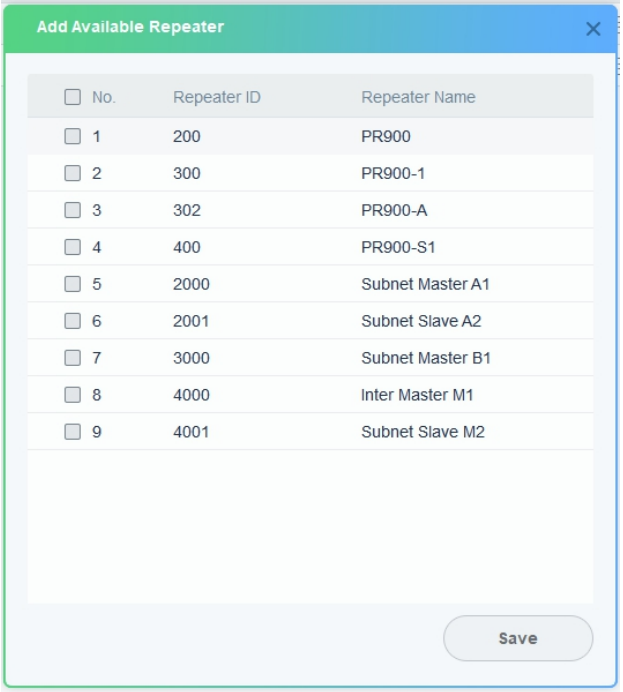
Select "Configure" - "Dispatcher Management" on the left, click the add button in the upper right corner of the pop-up page, and fill in the dispatcher ID as 16775905 in the pop-up window according to chapter 2.6 Account planning, set the dispatcher Account as shenzhen, set the dispatcher password as 07552019, the password and the confirm password must be the same, click the save button, as shown in the following figure.

Figure 5-23 Add dispatcher account



On the "Available Repeater" page, you can add available repeaters that the account can manage. On the new page, select the existed repeaters and save them, the admin account can be allocated to different dispatcher to manage different repeaters, as shown in the following figure.

Figure 5-24 Dispatcher add available repeater

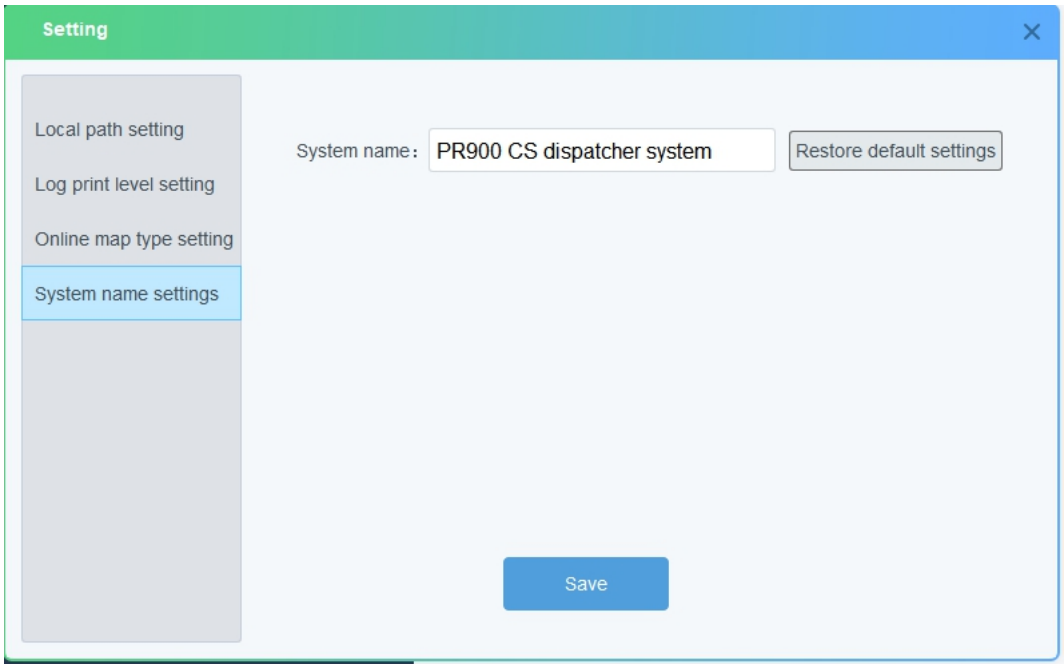


5.3.8 Customized system name

The current version (V3.50) supports the customization of system names, and can only be

modified by the admin account. After logging in to the client as the admin account, click the setting button in the lower left corner. In the pop-up window, select the system name setting, and enter the customized system name in the dialog box, see the following figure. After the modification, the customized system name is displayed on the login page and the upper left corner of the login page.

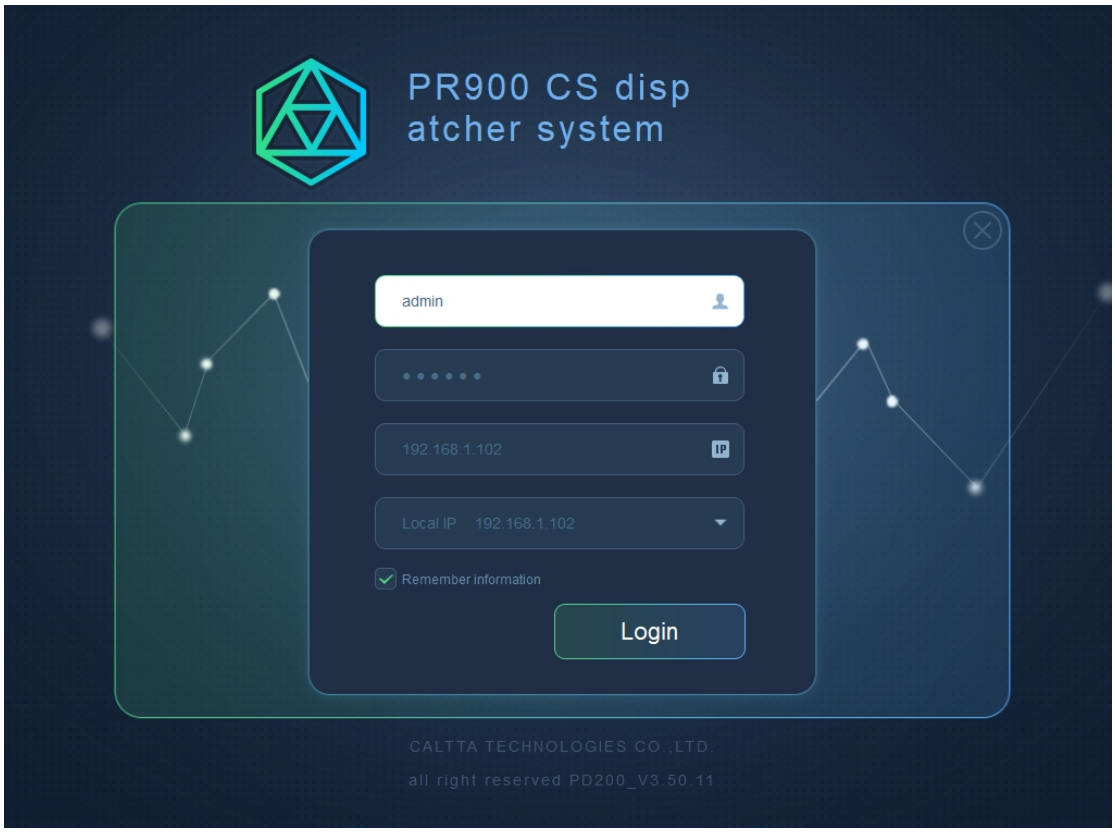
Figure 5-31 Customized system name



5.3.9 New dispatcher account login

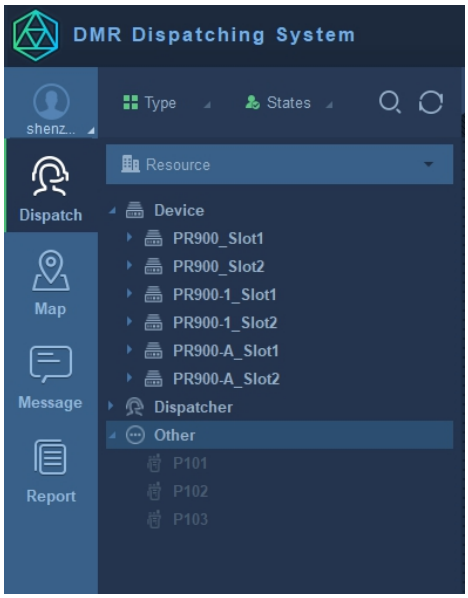
Exit the current admin account login interface, re-open the PD200 client, log in with dispatcher account "shenzhen", input password "07552019", and server IP address "70.1.91.101", as shown in the following figure.

Figure 5-25 New dispatcher account login



After the login is successful, select the left "Dispatch" menu, click on the "Device" list in the "Resource" tree, you can view the added repeaters. When the font of the repeater is highlighted, it indicates that the repeater has been registered successfully, as shown in the following figure.

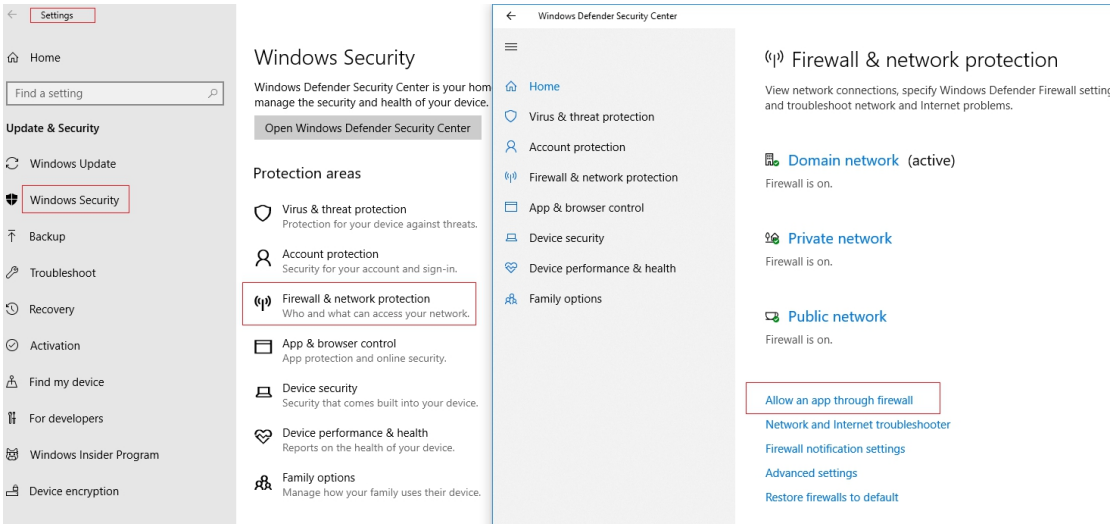
Figure 5-26 Repeater login successful to dispatcher



If the font of the repeater is gray, it indicates that the repeater is not registered successfully, please

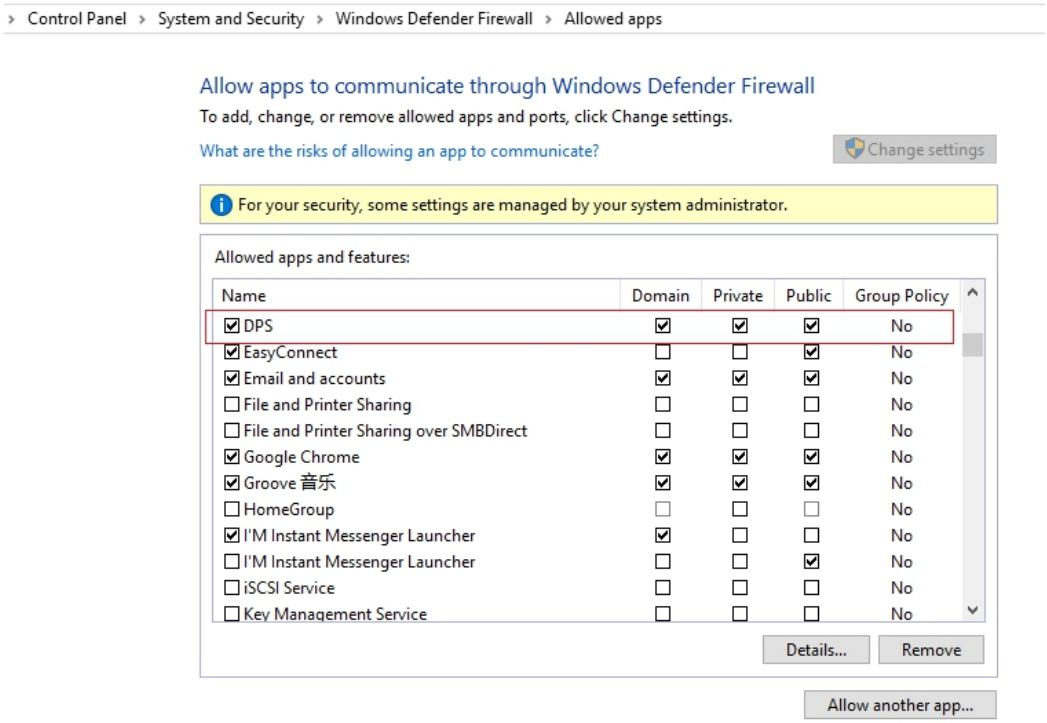
check if the configuration is correct, and check whether the PC firewall of the PD200 has added DPS, LDS (or displays "Java (TM) Platform SE). Binary"), PD200 to the list of "allowed apps and features", as shown in the following figure.

Figure 5-27 Windows defender firewall setting -1



Make sure that DPS, LDS (or displays "Java (TM) Platform SE). Binary"), and PD200 have been added and checked in the list, as shown in the following figure.

Figure 5-28 Windows defender firewall setting -2



5.4 Offline map setting (licensed feature)

5.4.1 Dispatch server setting

Offline map function version 3.0 requires licence, please make sure you have licence permission before using this function.

The default path to load offline map is "c:\offlinemap" in dispatch server, put the downloaded offline map in this folder (if the folder doesn't exist, create it manually and rename it as offlinemap), reboot the server, make sure that DPS and LDS processes are restarted successfully.

If offline map package should be put in other path, you should open server.xml file in server installation folder, e.g. (C:\Program Files (x86)\Caltta\PD200 Server\LDS\apache-tomcat\conf\server.xml) , find <Context path="/offlineMap" docBase="C:\offlinemap" debug="0" reloadable="false" /> line, and modify docBase path to the offline map path, then save the file and reboot the server.

5.4.2 Dispatch client setting

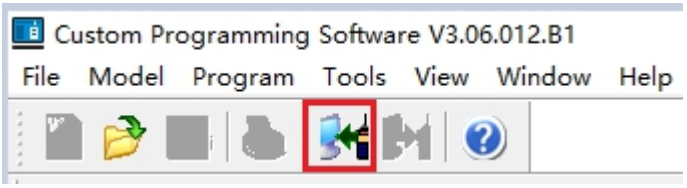
The offline map is automatically selected and loaded after the dispatch client logs in.

6 Radio configuration

6.1 Radio CPS read

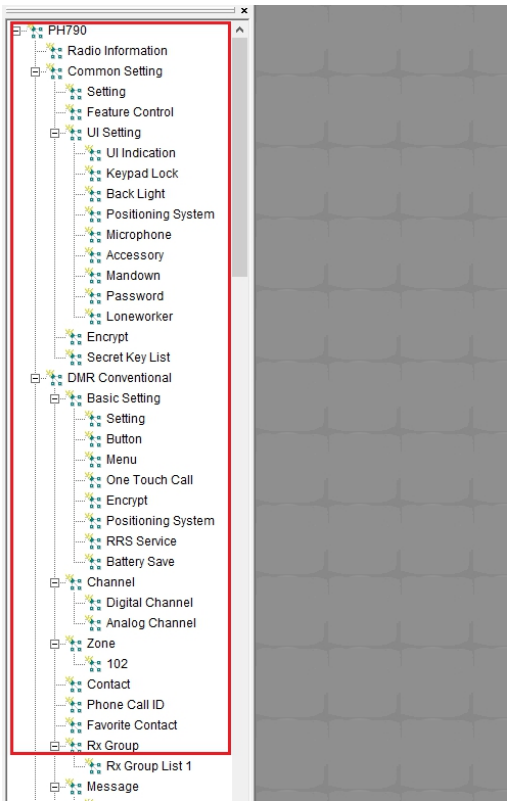
The radio 1 connects to the PC through the programming cable and opens the corresponding radio CPS software (If it is an installation version, please install it first), as shown in the following figure.

Figure 6-1 Radio CPS read



Click the "Read" icon  on the toolbar and click "OK" to read. After the successful reading, the list is displayed on the left side of the CPS, as shown in the following figure.

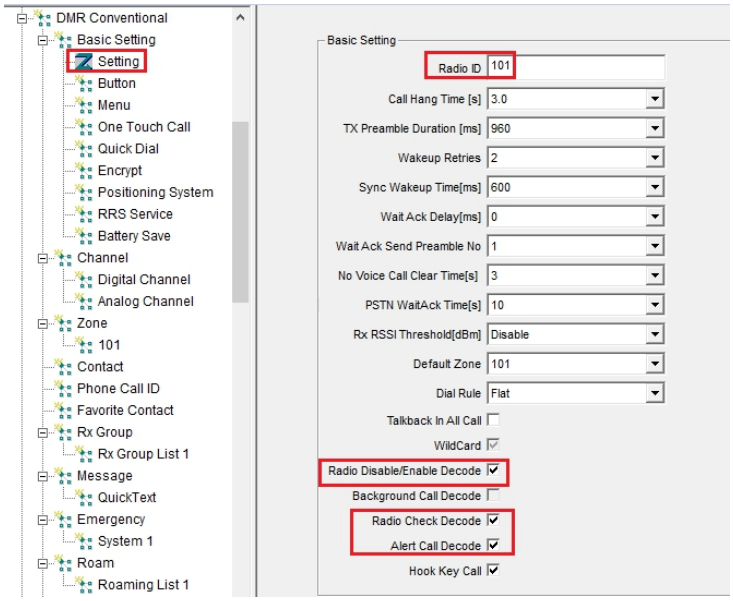
Figure 6-2 Radio reading successful



6.2 Basic setting (supplementary service)

Double-click the "Settings" option under "DMR Conventional" - "Basic Setting". on the pop-up page "Radio ID" parameter, radio 1 is filled in as "101" according to chapter 2.1.2 Radio planning, as shown in the following figure. Configure radio 2 and 3 according to chapter 2.2.2 planning in simulcast scenario (If the dispatcher needs to use remote kill, remote revive, call alert, radio check functions, then the remote kill/revive, radio check and call alert decode boxes should be checked).

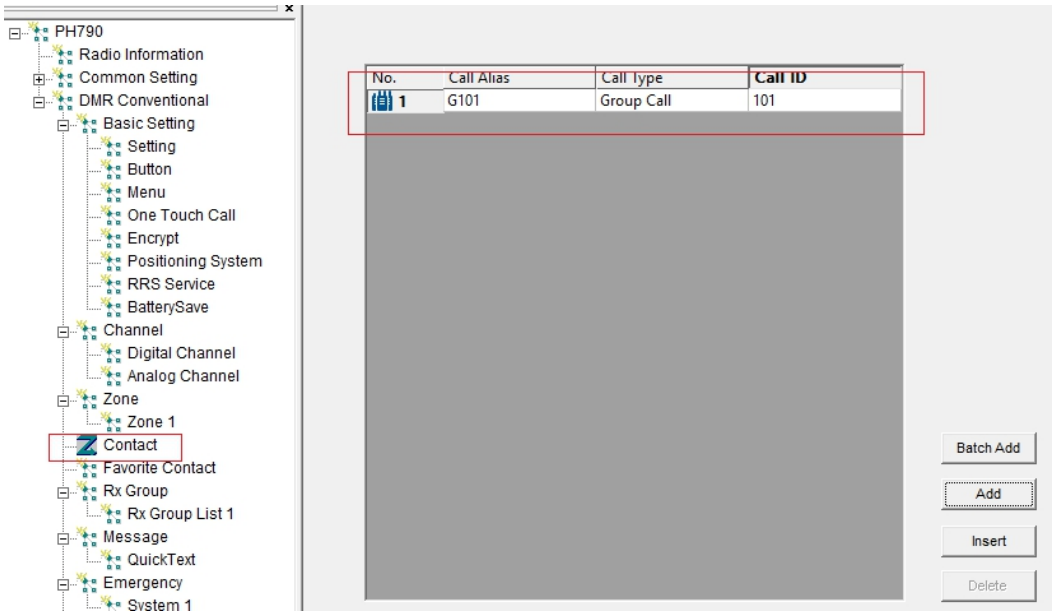
Figure 6-3 Radio basic setting



6.3 Contact setting

Double-click the "Contact" option under "DMR Conventional". You can modify, add, or delete contacts on the pop-up page. According to chapter 2.1.2 radio planning, the radio 1 is configured with group call 101 as the contact, the call alias is G101, the call type is group call, and the call ID is 101, as shown in the following figure.

Figure 6-4 Contact setting

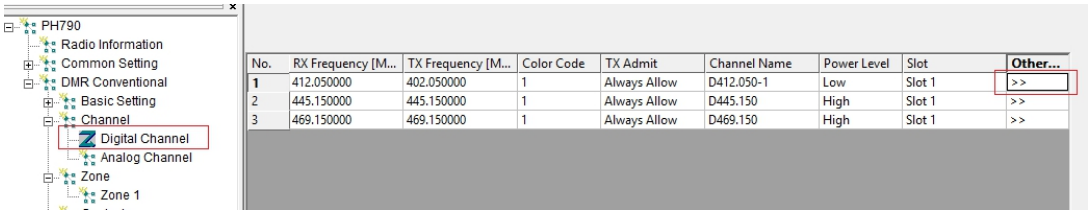


6.4 Channel setting

Double-click the "Digital Channel" option under "DMR Conventional" - "Channel". Click ">>"

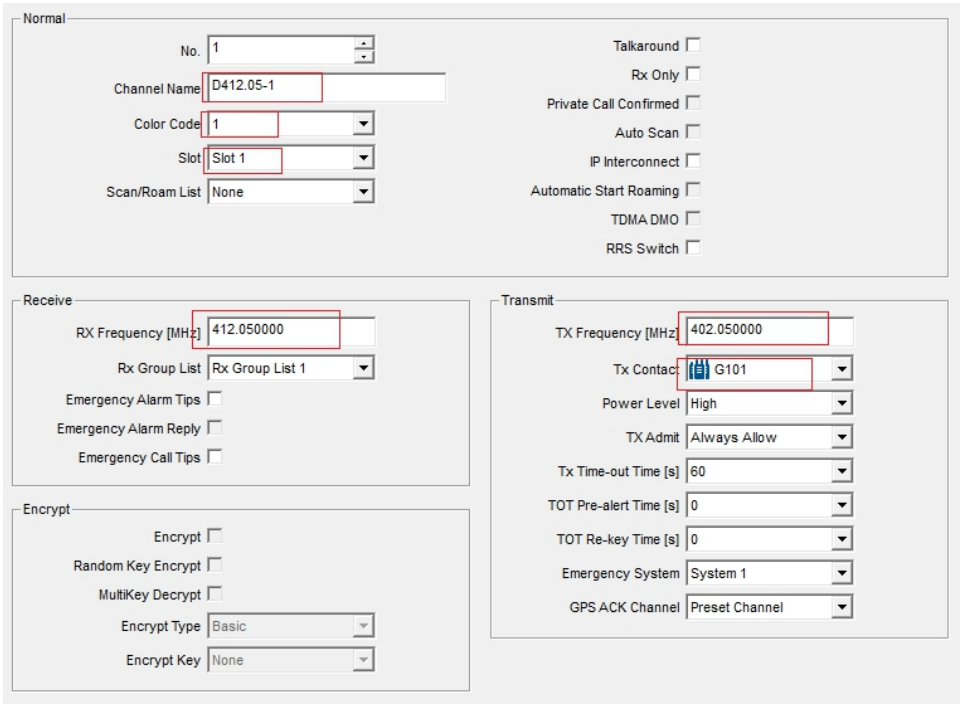
under "Other" Column, the frequency value can be modified, added or deleted on the pop-up page.

Figure 6-5 Radio add channel



According to the radio planning, the RX frequency of radio 1 is 412.05Mhz, the TX frequency is 402.05Mhz, the color code is 1, and the time slot is 1, the channel name is D412.05-1, and the TX contact selects G101, as shown in the following figure.

Figure 6-6 Radio 1 channel configuration



Click the Add button to configure the same frequency, color code, contact, time slot select time slot 2, and the name is changed to D412.05-2, as shown in the following figure.

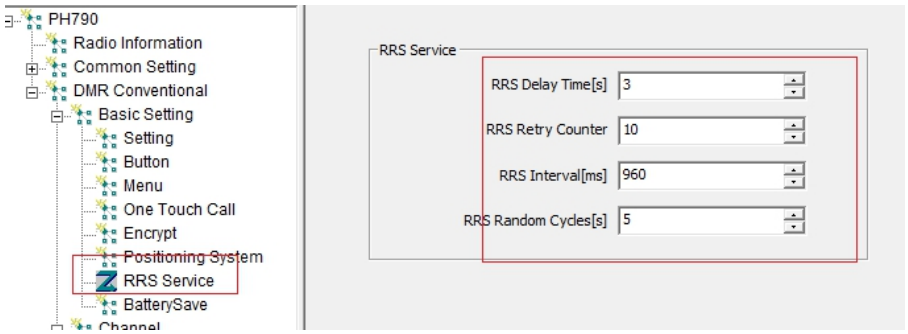
Figure 6-7 Radio add channel

6.5 Radio RRS setting

Double-click "RRS Service" under "DMR Conventional" - "Basic Setting", and the radio registration parameters can be set on the pop-up page, as shown in the following figure.

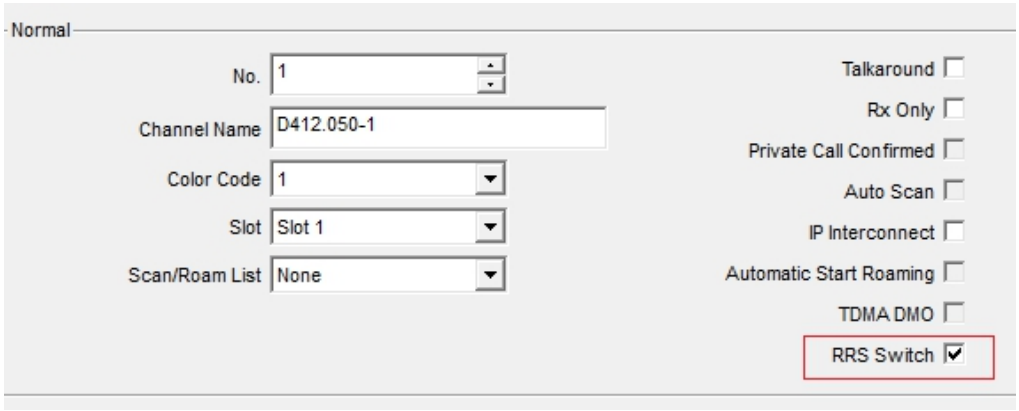
On the pop-up page, you can set the number of repetitions and the time interval for repeated registration when the radio registration fails.

Figure 6-8 Radio RRS setting - 1



After RRS service is set, click "Digital Channel" under "Channel", click "Other", and check RRS switch on the pop-up page. When the radio powers on, it will send a registration message in the channel, and will send a de-registeration message when it is turned off, as shown in the following figure.

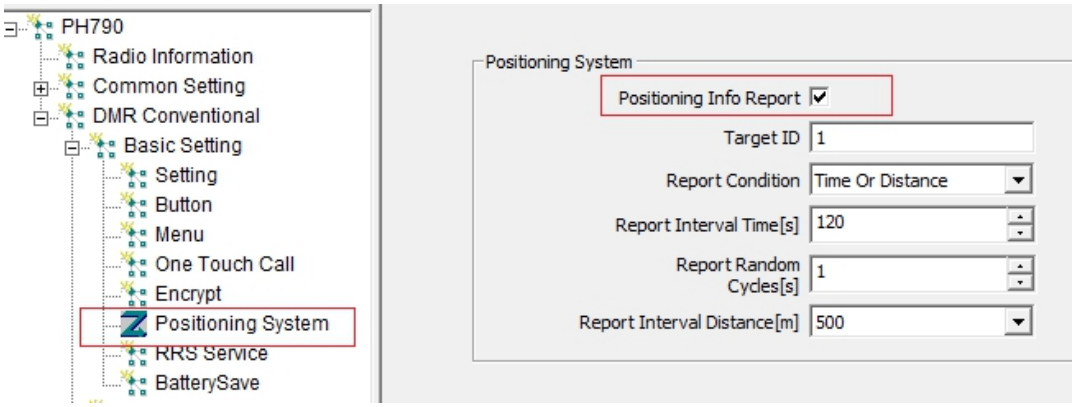
Figure 6-9 Radio RRS setting - 2



6.6 Radio positioning information report

Double-click "Positioning System" under "DMR Conventional" - "Basic Setting", check the "Positioning Info Report" on the pop-up page, and configure "Report Condition", "Report Interval Time", "Report Random Cycles" and "Report Interval Distance" ("Target ID" is not used right now). The radio will report the GPS information according to the corresponding period or distance, as shown in the following figure.

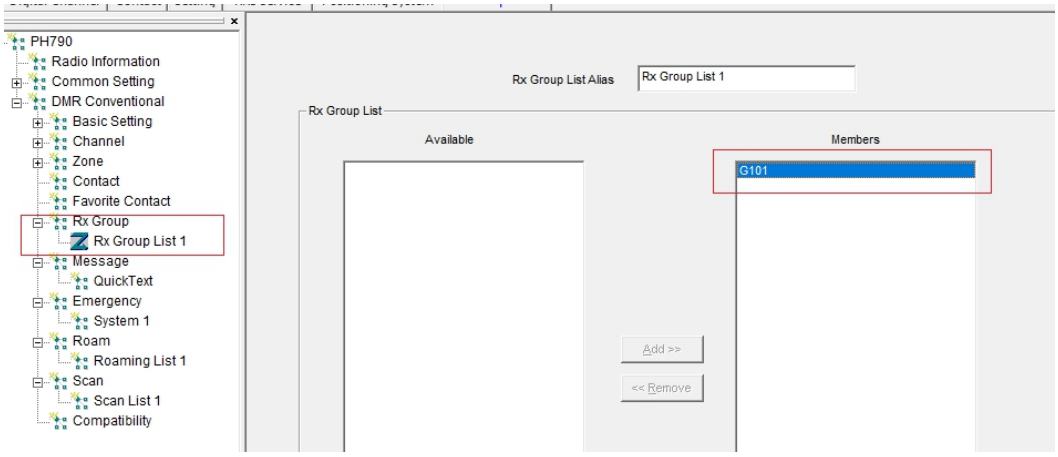
Figure 6-10 Radio positioning system setting



6.7 Rx group setting

Double-click "RX Group" under "DMR Conventional", select "G101" under "Available" on the left, and click the "Add>>" button, add "G101" to the right "Members" , as shown in the following figure.

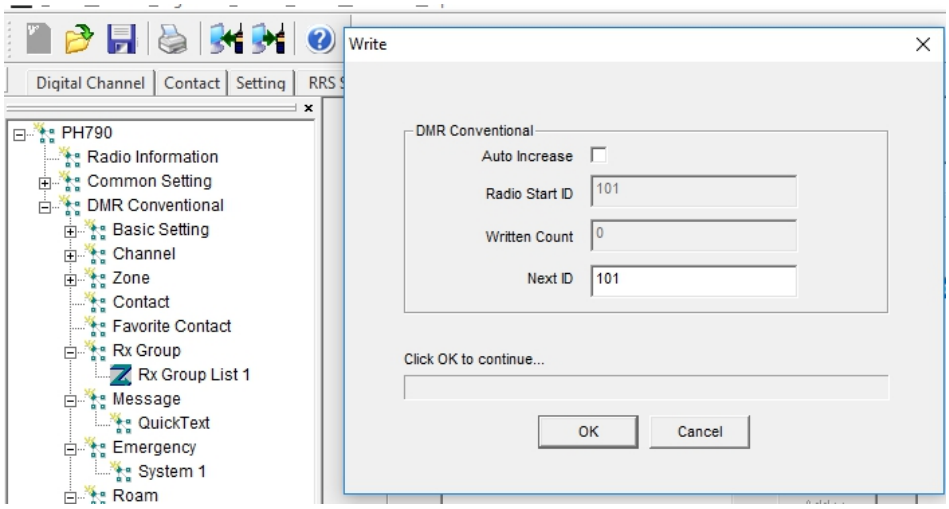
Figure 6-11 Radio Rx group setting



6.8 Radio CPS write

After setting the above steps, click the "Write" icon  on the toolbar, click "OK" button on the pop-up interface to write, the radio will restart after the successful writing, as shown in the following figure.

Figure 6-12 Radio CPS write



According to chapter 2.1.2 Radio planning, perform CPS writing operations on radio 2 and radio 3 in the same way. In simulcast scenarios, perform CPS writing operation on terminals 4 and 5 in the same way.

7 Commissioning system

7.1 Radio registration

- Precondition:
  1. Repeater1 is connected to the PD200 server and the PD200 client is logged in.
- Operation step:
  1. Radio 1 powers on
- Expected result:
  1. P101 (radio 1) is displayed under the time slot 1 of PR900, and the font is highlighted, as shown in the following figure.

Figure 7-1 Radio registration check

7.2 Radio de-registration

- Precondition:

  1. The repeater1 is connected to the PD200 server and the PD200 client is logged in. The radio has successfully registered in the corresponding time slot.

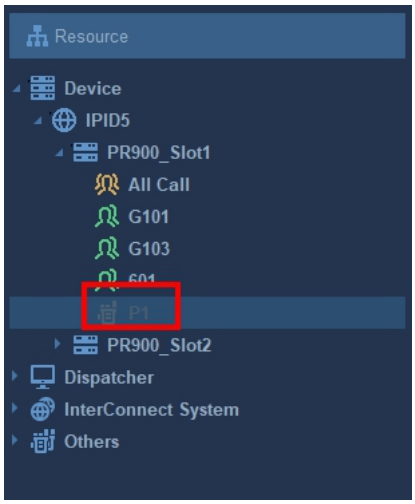
- Operation step:

  1. Radio 1 power off.

- Expected result:

  1. P101 (radio 1) is offline, and the font is gray. As shown in the following figure.

Figure 7-2 Radio de-registration check



7.3 Voice call

- Precondition:

  1. The repeater1 and repeater 2 are connected to the PD200 server successfully, the PD200 client is logged in. Radio 1 & 2 are online in the corresponding time slots.

- Operation steps:

  1. Radio 1 initiates group call G101 in slot 1.
  2. After the radio 1 releases the PTT button, click the PTT button of the slot 1 on the PD200 client interface to initiate the group call G101.

- Expected result:

  1. Radio 2 receives the G101 group call initiated by radio 1 and can hear radio 1 speaking. PD200 client can receive the G101 group call initiated by radio 1 and can hear radio 1 speaking (PD200 client PC is connected with headset), the dispatching interface is shown in figure 7-3.
  2. Both radio 1 and radio 2 receive the group call G101 initiated by the PD200 client. The dispatching interface is shown in figure 7-4.

Figure 7-3 Radio 1 initiates IP group call G101

Figure 7-4 Dispatcher initiates group call G101

7.4 Send message

- Precondition:

  1. The repeater is connected to the PD200 server successfully, the PD200 client is logged in. Radio 1 & 2 are online in the corresponding time slots.

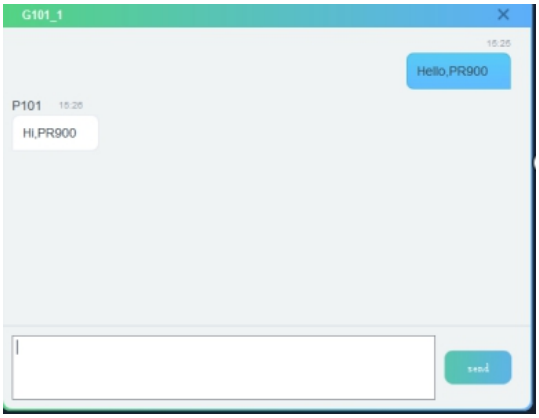
- Operation steps:

  1. On PD200 client PC, select "Message" - "Resource", right click group G101 under slot 1, select "Send Message", enter "Hello, PR900" in the pop-up window, and click "Send".
  2. Radio 1 sends a group message "Hi, PR900" to group G101.

- Expected result:

  1. Radio 1 and radio 2 receive the message "Hello, PR900" sent from PD200 client.
  2. Radio 2 and PD200 client receive the message "Hi, PR900" from radio 1, as shown in the following figure.

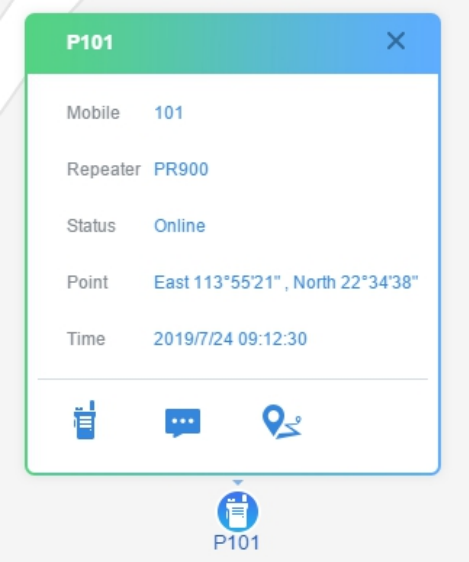
Figure 7-5 Message display on dispatcher interface



7.5 GPS Location

- Precondition:
  1. The repeater is connected to the PD200 server and the PD200 client is logged in. Radio 1 is configured with positioning information report and has enable GPS.
- Operation step:
  1. Select "Map" - "Resource", right click P101 under slot 1, select "Location".
- Expected result:
  1. The PD200 interface switches to the map interface, and the location of radio 1 will be displayed on the map, which is consistent with the actual location, as shown in figure.

Figure 7-6 Map display on dispatcher interface



7.6 Real-time GPS location

- Precondition:
  1. The repeater is connected to the PD200 server and the PD200 client is logged in. Radio 1 is configured with positioning information report on, and the automatic report has been chosen and periodic report has been selected.
- Operation steps:
  1. Right click P101 under slot 1, select "Real Time Location".
  2. After a period of time, right click P101, select "Cancel Location".
- Expected result:

1. The PD200 interface switches to the map interface. The icon of radio 1 is centered on the map interface, and there is a highlighted display around the icon. Radio 1 location can be automatically refreshed periodically.
2. After "Cancel Location" operation, the highlighted display around the radio icon disappears.

Figure 7-7 Real-time location display on dispatcher interface