SmartPTT Plus

Configuration Guide

Version 8.4

elcomplus

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Configuration Guide

Introduction

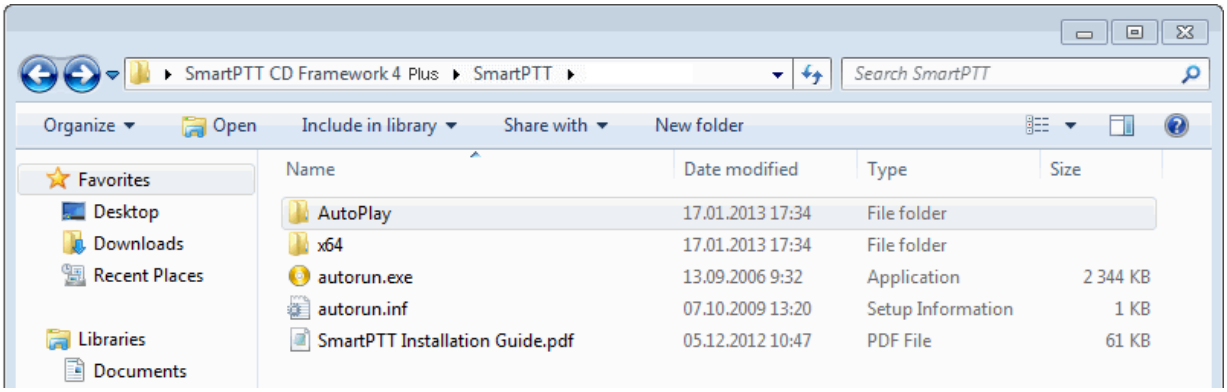
Installation and configuration of the SmartPTT Plus system is a complex task and comprises 4 major steps:

1. Installation and configuration of SmartPTT Radioserver.
2. SmartPTT Dispatcher installation and configuration.
3. Configuration of MOTOTRBO devices, e.g., radios and repeaters.
4. Configuration of MOTOTRBO tools: MOTOTRBO Network Interface Service Configuration Utility and MOTOTRBO DDMS Administrative Client (for networks based on the NAI protocol).

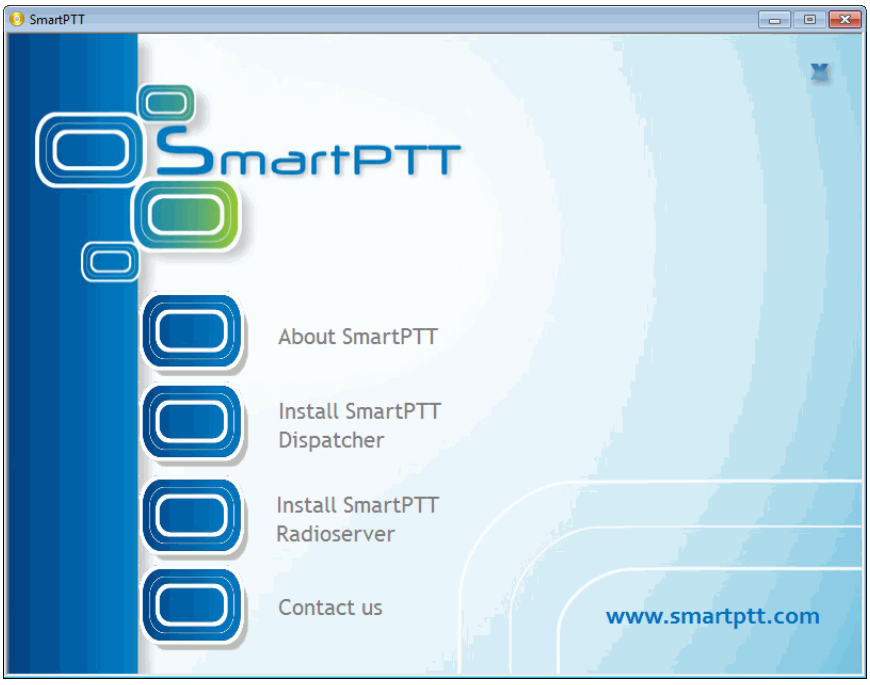
The system configuration depends on the network used and the devices available. In this document, you will learn how to install and configure the system on the basis of the Linked Capacity Plus (LCP) and Connect Plus networks consisting of 3 sites.

SmartPTT Software Installation

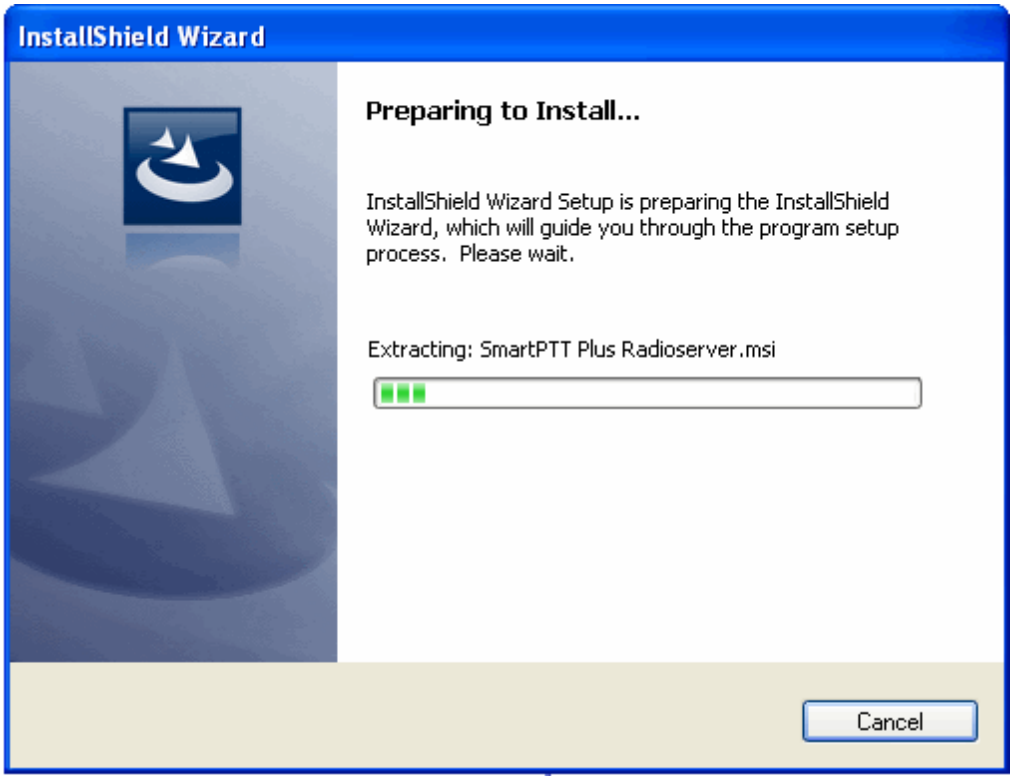
1. After downloading SmartPTT Plus distribution kit, unpack it to a separate folder.



2. Run **autorun.exe**.

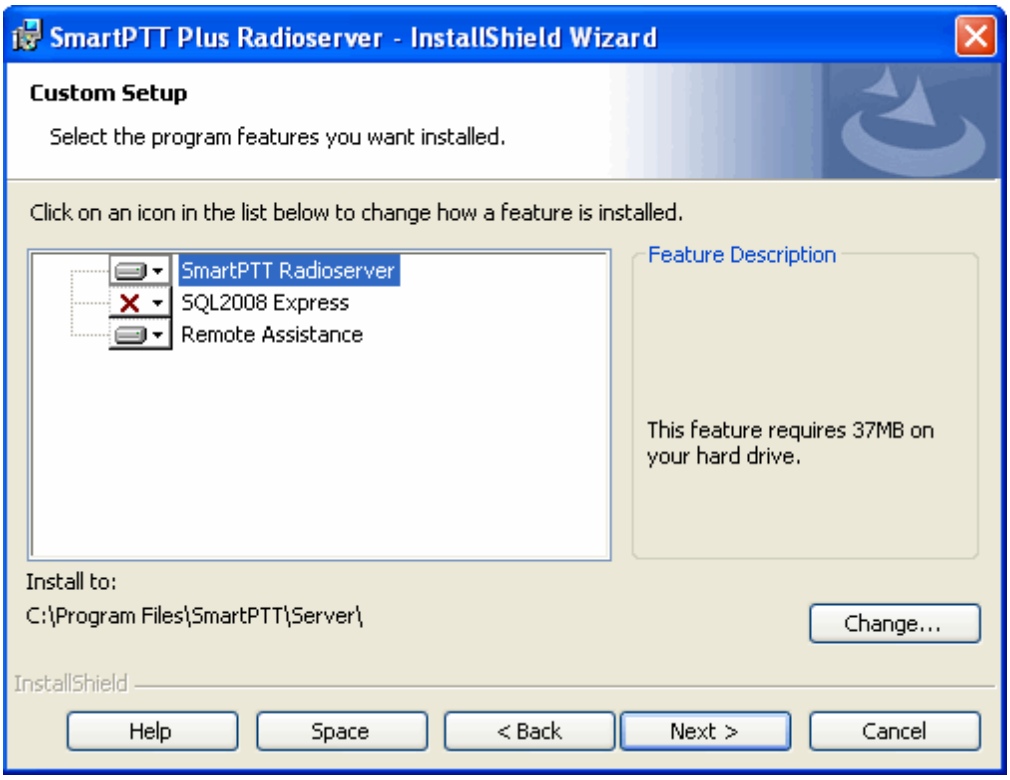


3. Install SmartPTT Radioserver first and then SmartPTT Dispatcher. For both installation processes the setup wizard will be used.

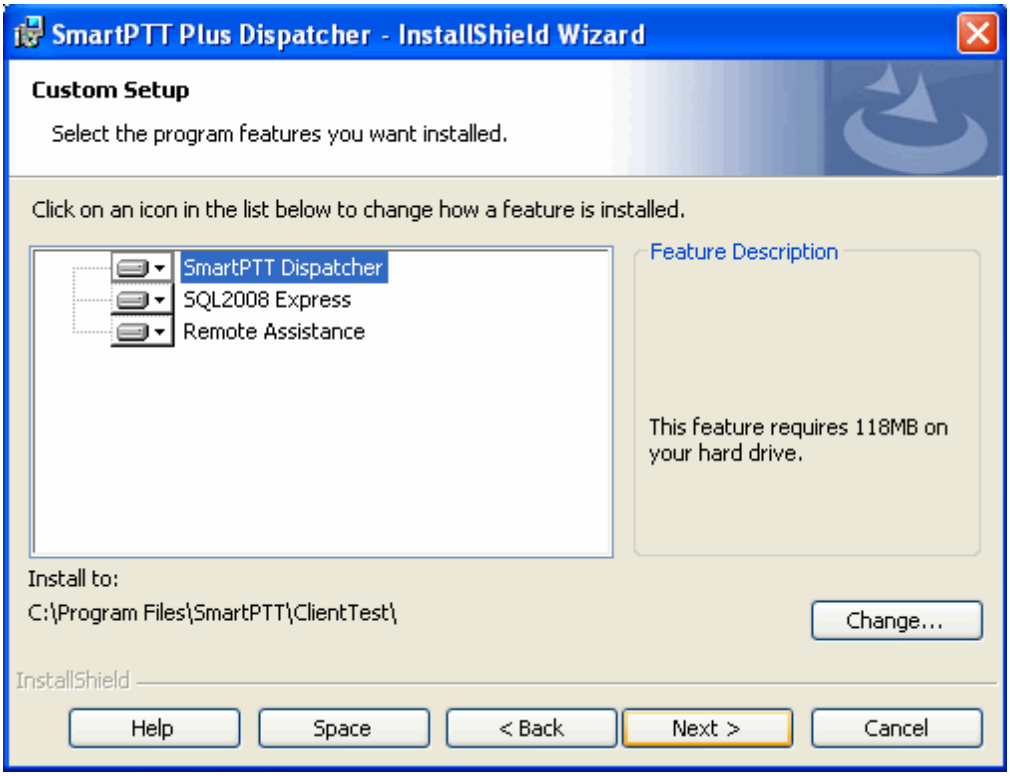


4. Follow the steps of the setup wizard.

Note: When installing SmartPTT Radioserver, please remember that Microsoft SQL Server is used by SmartPTT Radioserver to log network events. This feature is optional and turned off by default.



Note: When installing SmartPTT Dispatcher, make sure you have SQL Server installed. If not, install SQL Express together with the dispatcher console.

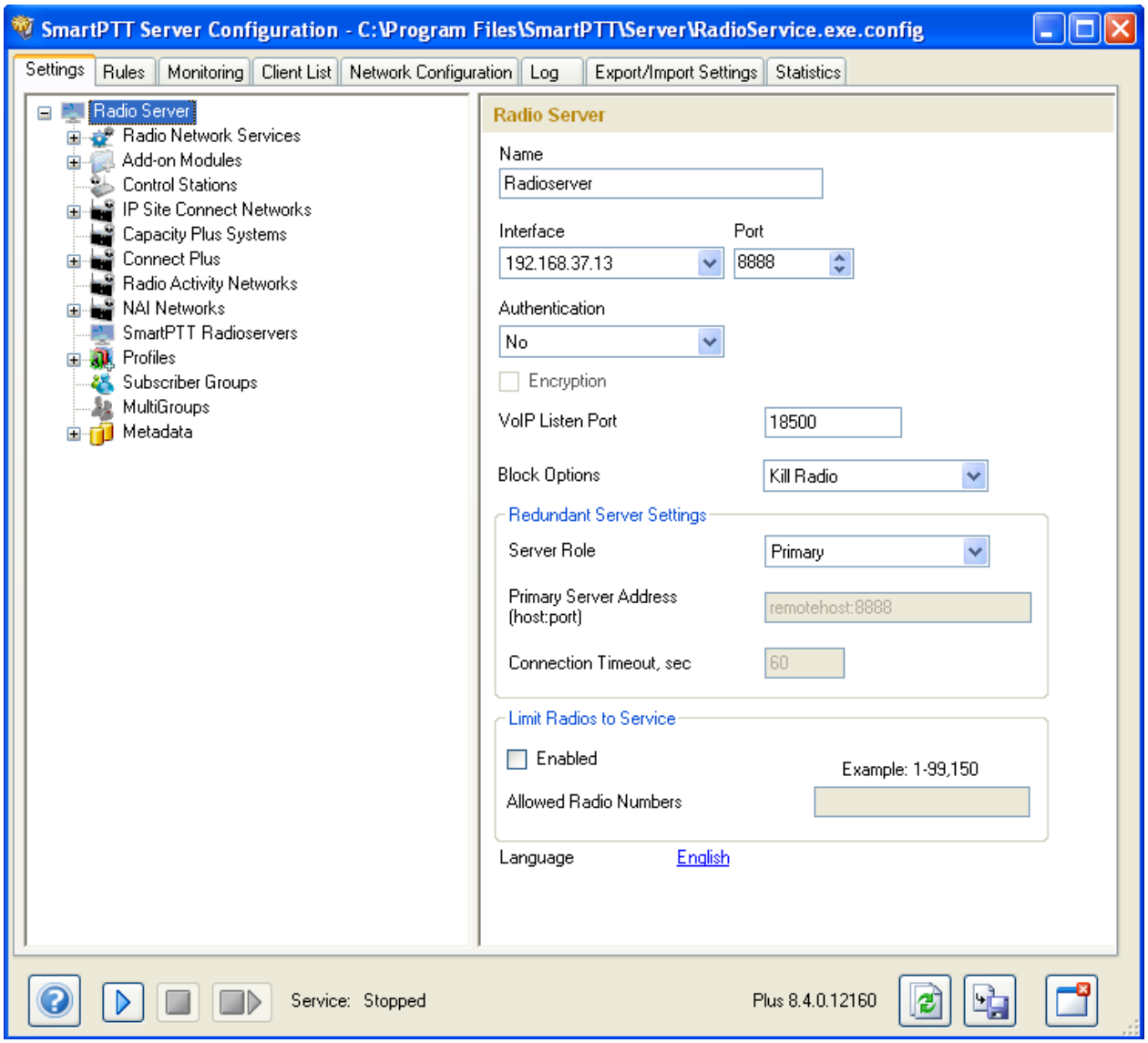


5. Once you have finished, close the installation window.

General SmartPTT Radioserver Configuration

General configuration includes parameters that are independent of the network type. To configure the general settings of the radioserver open SmartPTT Radioserver Configurator.

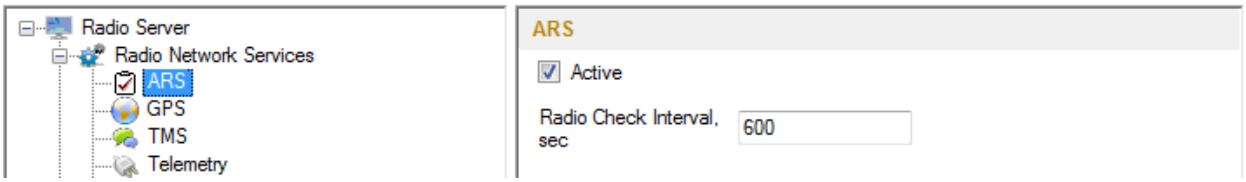
1. Set up parameters of the radioserver.



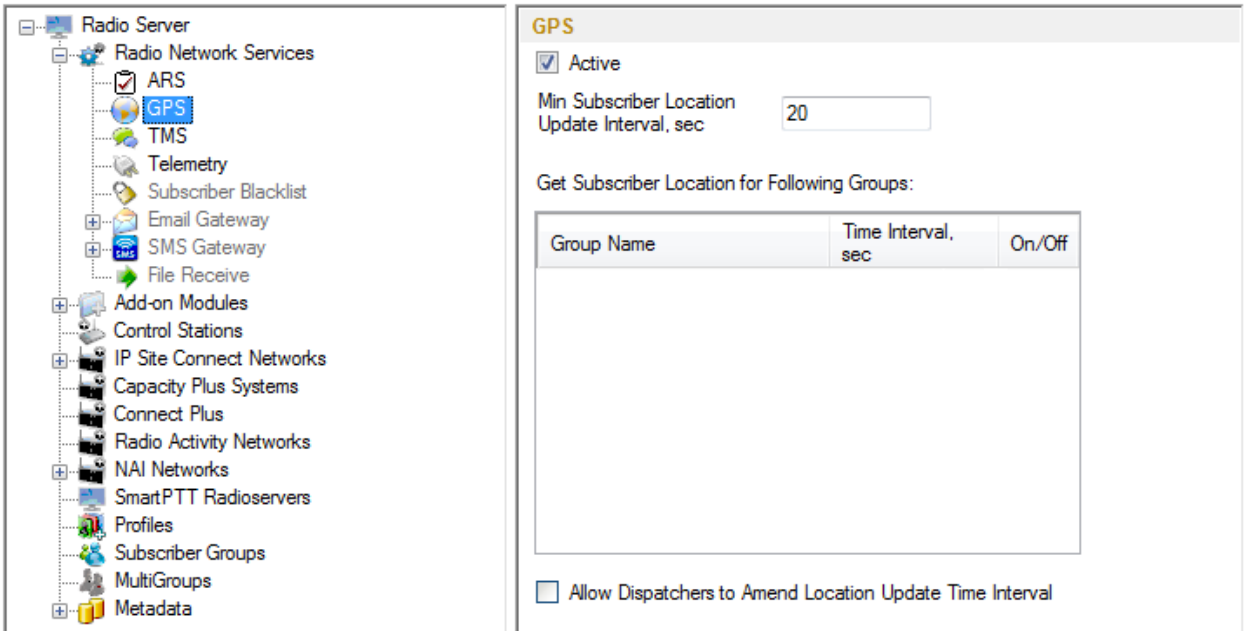
- In the **Name** field specify the radioserver name. This name is used only in SmartPTT Radioserver Configurator;
- In the **Interface** field and the **Port** field specify the IP address and port of the PC where the radioserver is installed.

2. Enable radio network services, e.g., ARS, GPS and TMS support.

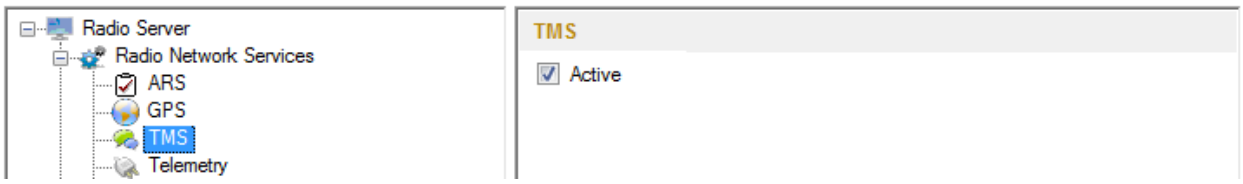
- To enable ARS support select the **Active** checkbox under **ARS**:



- To enable GPS support select the **Active** checkbox under **GPS**:



- To enable text messaging service select the **Active** checkbox under **TMS**:



SmartPTT Dispatcher Configuration

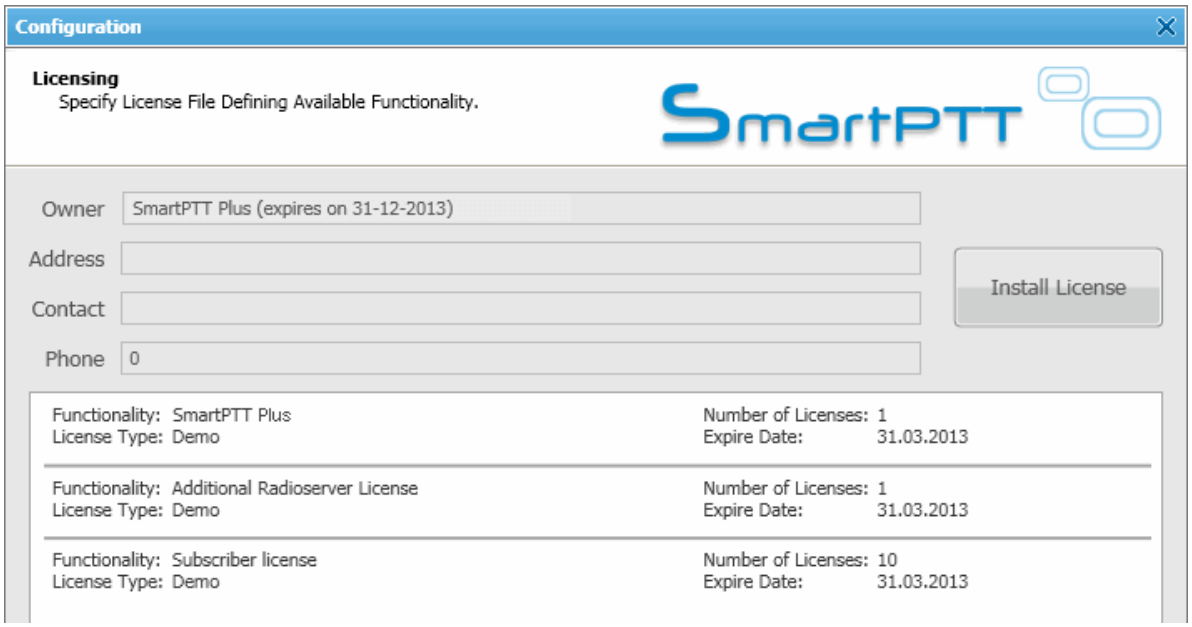
In this topic you will learn how to configure general settings of the SmartPTT Dispatcher console. The general configuration in the scope of the LCP network implies that operators will be able to communicate with radio subscribers and the radio subscribers will be able to communicate with each other.

The general configuration of the SmartPTT Dispatcher console includes the following steps:

1. License installation
2. Database creation
3. Radioserver configuration
4. Audio setting configuration
5. Registration of radio subscribers

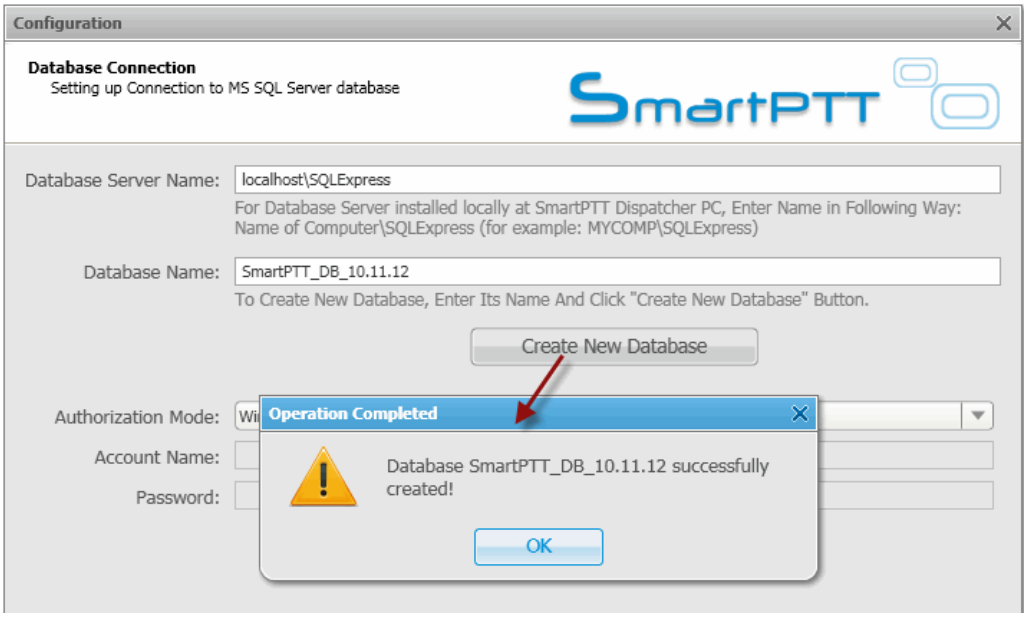
The description of the steps is given below:

1. Go to the **Main** menu and under **Settings** select **Licenses**. Install the required license, which includes:
    - SmartPTT Plus license
    - Additional Radioserver license
    - Subscriber license, which allows you to register up to 10 radio subscribers



After uploading the license, click **Finish** to apply.

2. In the same **Settings** menu select **Database Settings**. In the opened window create the new database and then connect to it.



To create a new database, fill in the **Database Server Name** and **Database Name** fields, and click **Create New Database**. If creation was successful, a message about successful database creation is displayed. If the database is not created, the reason will be displayed at the bottom of the window.

Note: For a database server installed together with the SmartPTT dispatcher application enter the name using the format: Name of PC\SQLExpress (for example, *MYCOMP\SQLExpress*).

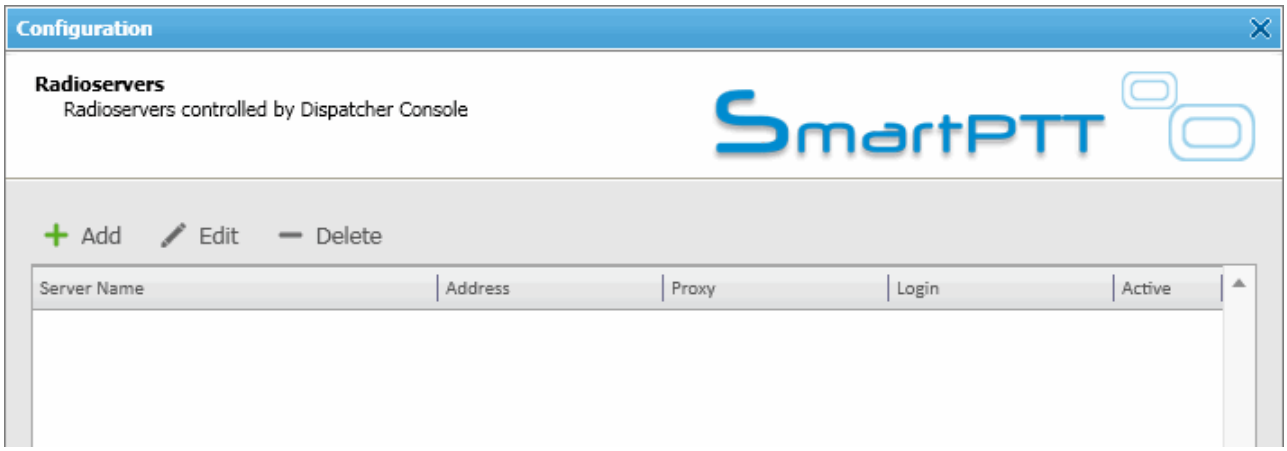
To test connection with the database, choose **Authorization Mode**.

SQL Server Authorization – you must have the login and password of the account which has access to the SQL server.

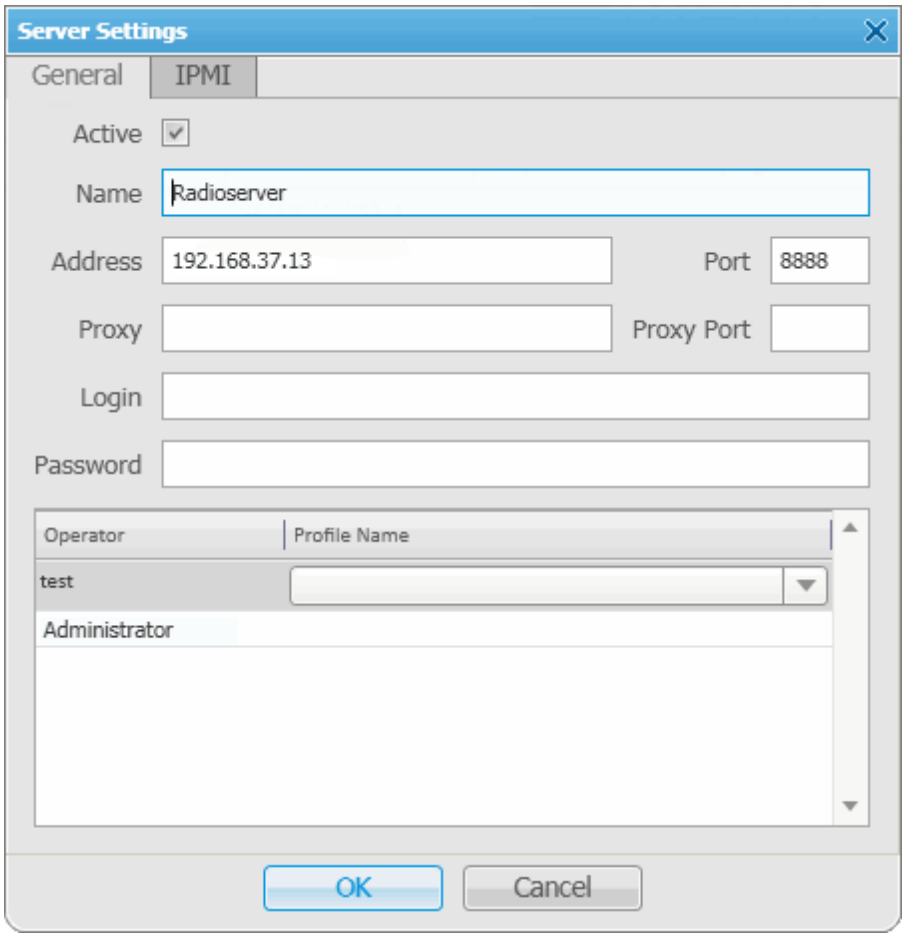
Windows NT Authorization – the user who has logged into the Windows system, must be listed in the SQL server's list of users to make connection.

Click **Check Connection**. In case of successful authorization the message "Connection is established successfully!" is displayed. If authorization fails, the cause of the failure will appear at the bottom of the window.

3. In the **Settings** menu click **Radioservers** to add the radioserver and configure it properly.



Click **Add** to open the window for adding radioservers to the list.



Enter the name of the radioserver in the **Name** field. The name will be displayed in the SmartPTT Dispatcher

console.

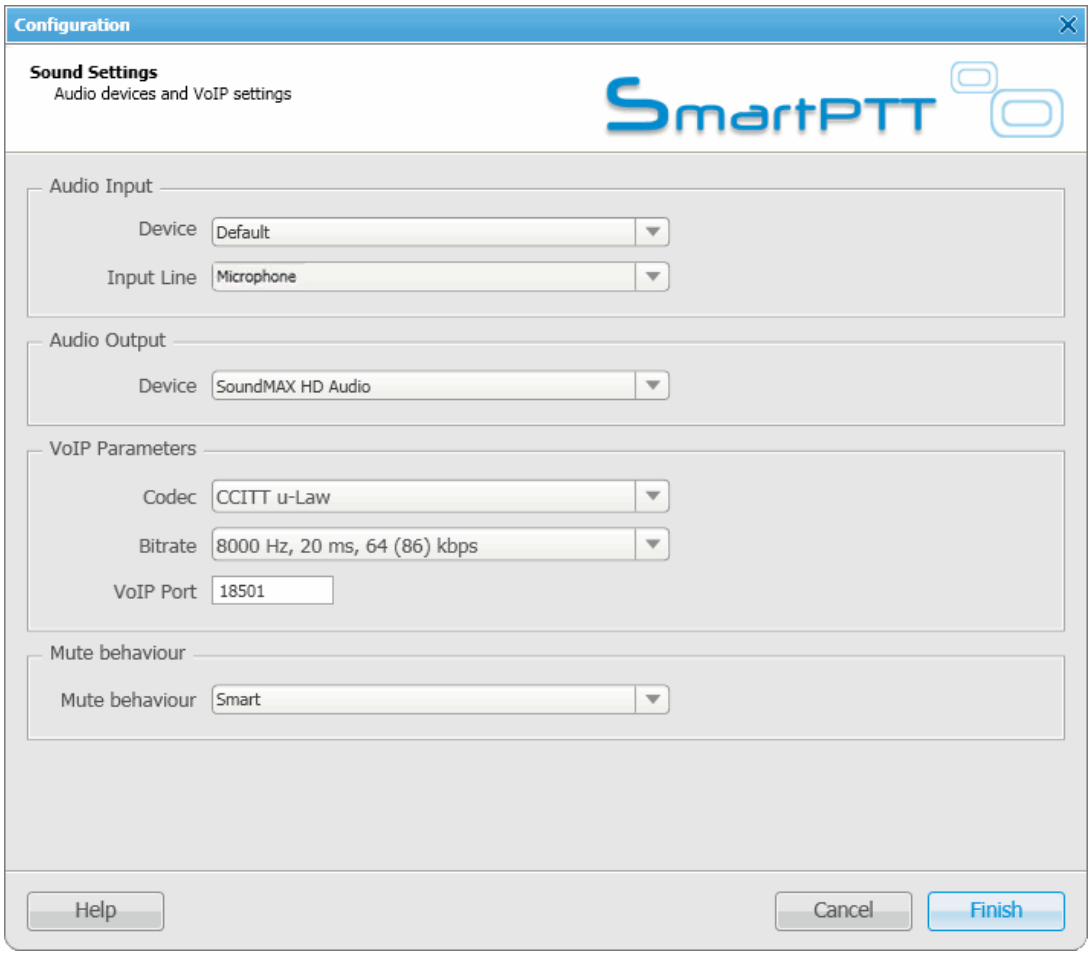
In the **Address** and **Port** fields enter the radioserver IP address and port number to connect with the dispatcher. To find out the radioserver IP run the ***ipconfig*** command on the PC where the radioserver is installed. The default radioserver port number is *8888*.

Select the **Active** checkbox to enable the radioserver.

For more information about the radioserver settings see Help in the SmartPTT Dispatcher application.

4. Audio setting configuration is required to give the operator the ability to communicate with the radio subscribers.

To configure the audio settings, go to the **Settings** menu and select **Sound**.



Audio Input – audio device to which the microphone is connected.

Input Line – audio mixer line used to connect a microphone.

Audio Output – audio device to which headsets or speakers are connected.

Codec – audio stream compression method.

Bitrate – audio stream sampling frequency.

VoIP Port – audio stream receive port.

Specifications of the codec format 8000 Hz, 20 ms, 64 (89) kbps:

8000Hz – the sampling rate.

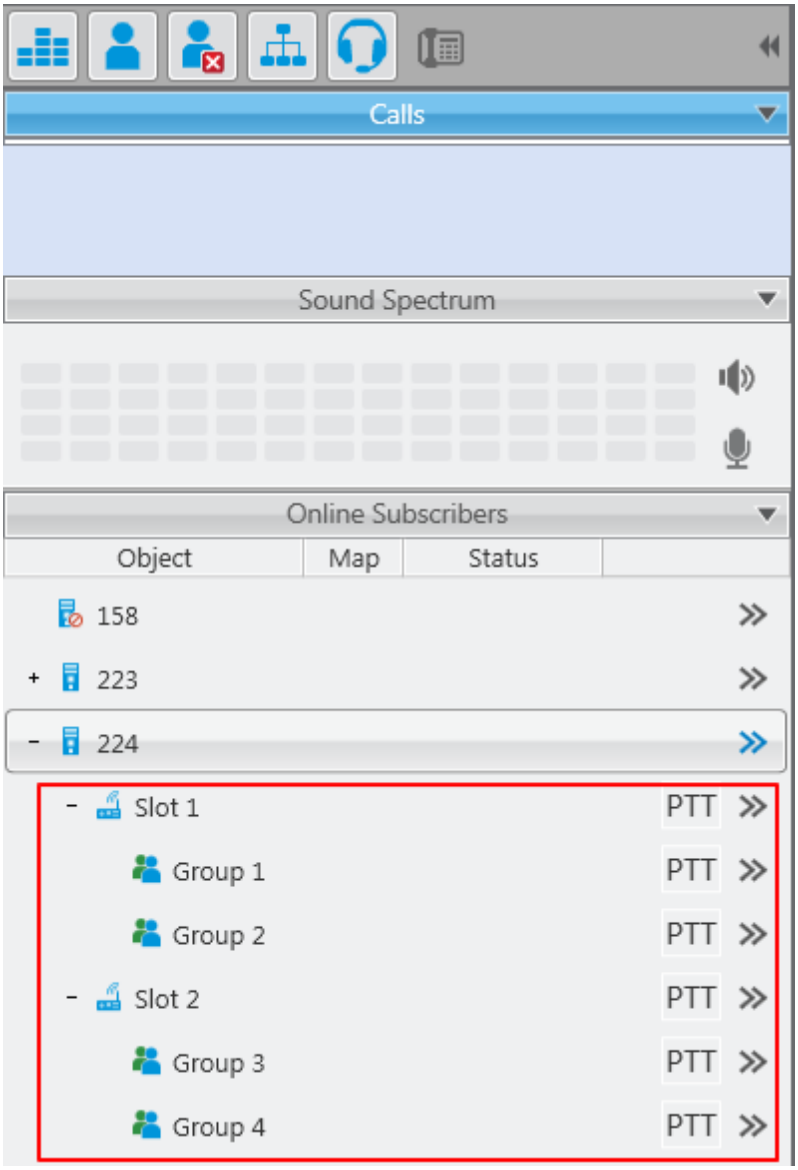
20 ms – the frame size.

64 kbps – the voice data bit rate.

89 kbps – a full bit rate (required network bandwidth).

For more information see Help in the SmartPTT Dispatcher application.

5. Now, check that the created network is available in SmartPTT Dispatcher. You should see the added radioserver with talkgroups:



Connect Plus

SmartPTT Plus supports Connect Plus multi-site trunking system, which starting from version 8.3 can be used not only for ARS, TMS and GPS functionality, but also for voice communication between the dispatcher and radio subscribers.

Connect Plus network can include up to 15 repeaters (29 channels + 1 control channel) on each site. Each site must have one XRC 9000 Controller. It is the core of the Connect Plus network and its presence on each site is obligatory. The XRC 9000 Controller provides central call processing and real-time resource management for MOTOTRBO Connect Plus digital trunking systems.

XRT 9000 Gateways are required for voice communication only. MOTOTRBO Connect Plus multi-site trunking network provides extended load capacity and provides digital communication to as many as 2,900 users per site.

System requirements specific to Connect Plus network environment:

- One XRC 9000 Controller per site. Each controller requires a static IP address.
- One XRT 9000 Gateway per network. It creates a pathway between the radios of the Connect Plus system and SmartPTT Radioserver.
- Each subscriber radio in the Connect Plus network must be enabled for Connect Plus operation.
- An Option Board must be installed in each Connect Plus-enabled subscriber radio. The Option Board must be loaded with MOTOTRBO Connect Plus Option Board firmware, which requires a purchasable license.
- Additional hardware for IP communications:
    - Single-site: At a minimum, this requires an Ethernet switch and cables to connect the XRC 9000 Controller and MOTOTRBO repeaters to the switch.
    - Multi-site: In addition to the hardware required for single-site operation, a multi-site network requires additional IP infrastructure. This varies according to network configuration and the type of connections utilized.

The Connect Plus network configuration includes the following stages:

1. Setting up MOTOTRBO equipment configuration parameters: XRT 9000 Gateway, XRC 9000 Controllers, repeaters, radios.
2. Setting up SmartPTT Radioserver parameters to operate with Connect Plus network.

The goal of this document is to help system administrators configure SmartPTT Radioserver parameters to operate in the Connect Plus network. Therefore, the document contains detailed information on SmartPTT Radioserver settings, specific to this network type, XRC 9000 Controller and XRT 9000 Gateway settings that are necessary for the operation with SmartPTT Radioserver, and some settings of other MOTOTRBO equipment (radios and repeaters), which we think must be covered. See special MOTOTRBO documentation for general information about Connect Plus network and its settings.

MOTOTRBO Equipment Programming

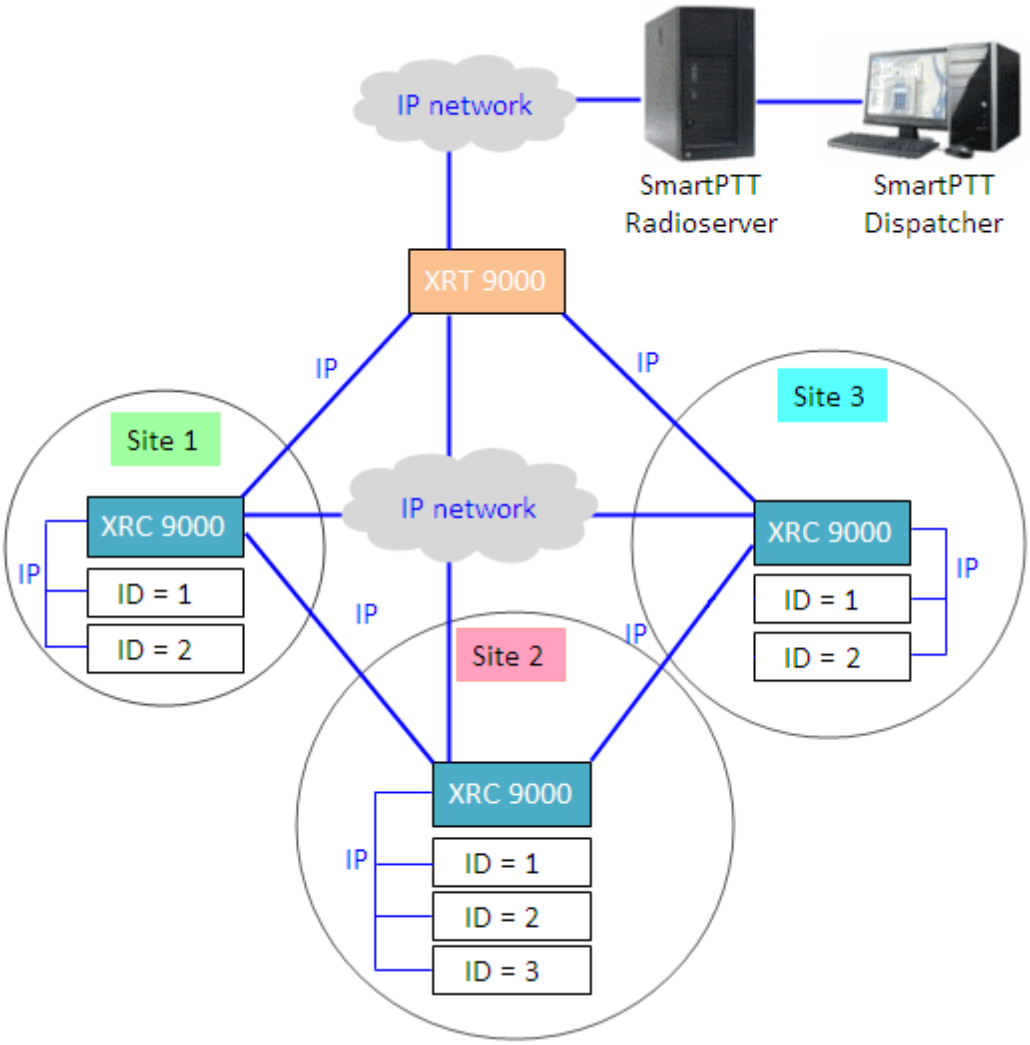
To program MOTOTRBO equipment you will need special MOTOTRBO configuraton software:

- MOTOTRBO Customer Programming Software (CPS);
- MOTOTRBO Connect Plus XRC 9000 Network Manager for XRC 9000 Controller configuration;
- MOTOTRBO Connect Plus XRT 9000 Network Manager for XRT 9000 Gateway configuration;
- MOTOTRBO Connect Plus Option Board CPS for radio option board configuration

Note: Make sure you that firmware versions for all MOTOTRBO equipment used in one network are compatible.

MOTOTRBO XRC 9000 and XRT 9000

The scheme below shows the sample Connect Plus network.



In this network there is only one XRT 9000 Gateway in the network system, and one XRC 9000 Controller per site. The number of repeaters per site can be different. In this case there are two and three repeaters on site.

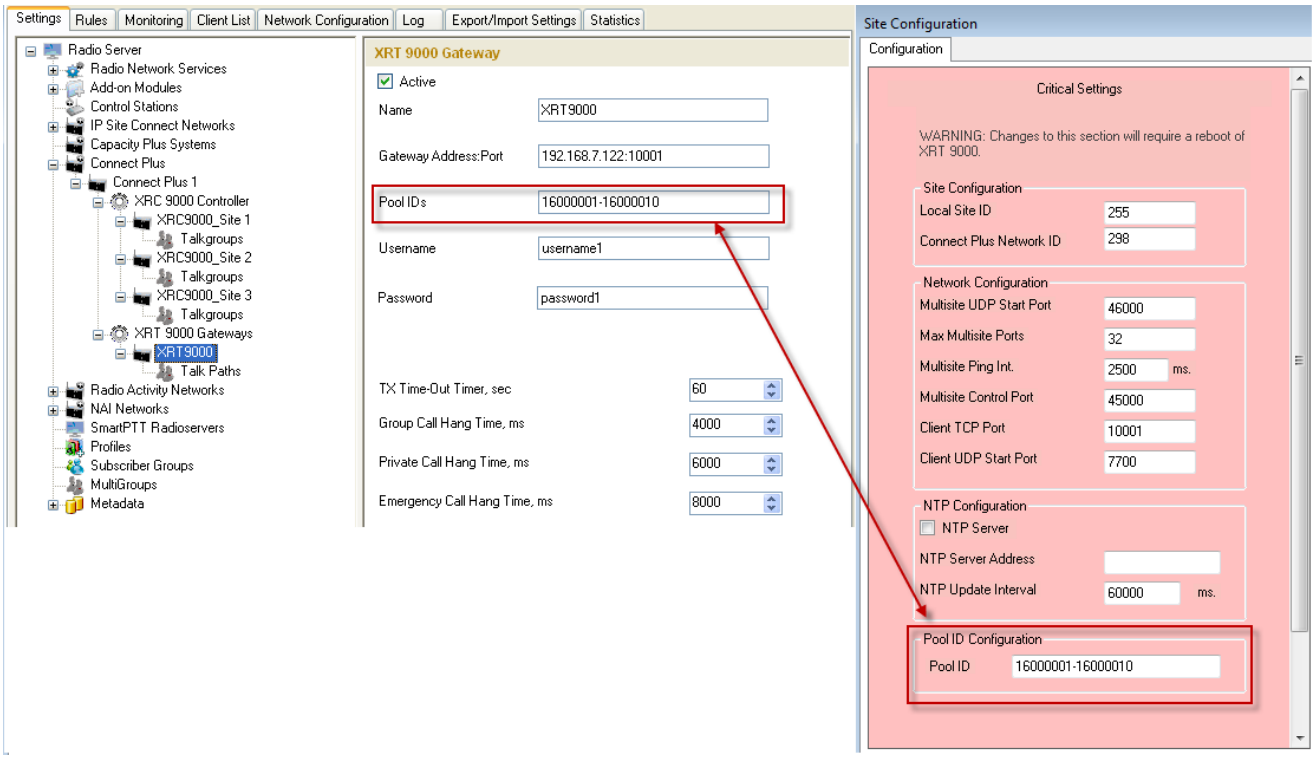
XRT 9000 joins the MOTOTRBO Connect Plus system as another multi-site XRC 9000 Controller peer. XRT 9000 creates a pathway between the radios on a Connect Plus system and the third party application, in our case it is SmartPTT Radioserver.

The XRC 9000 controls up to 15 MOTOTRBO repeaters per trunked site. Because this is an IP interface, the XRC 9000 and its connected repeaters could theoretically be in different locations. However, due to the time sensitive

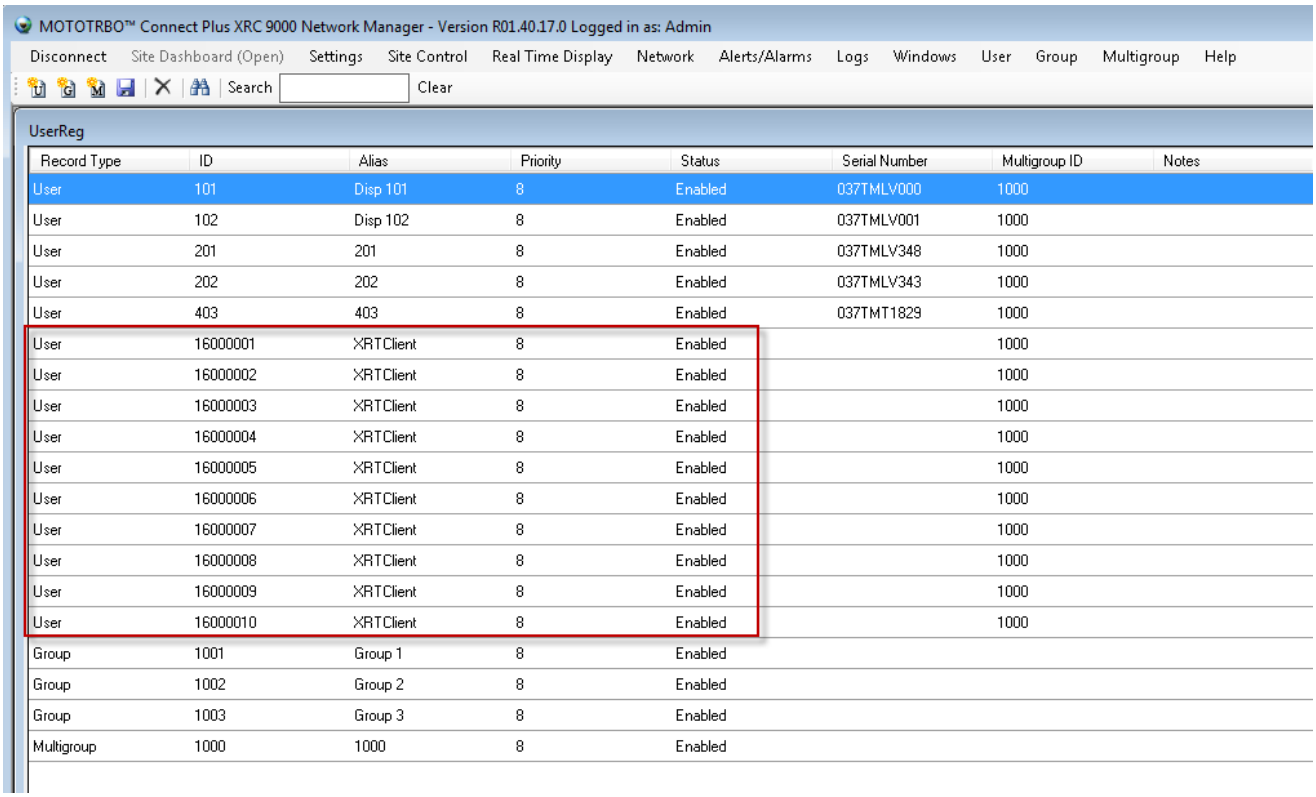
nature of the messaging between the controller and the repeaters, the XRC 9000 and its trunked repeaters must be at the same physical location and connected to the same Ethernet switch. The XRC 9000 can control up to 30 digital channels (timeslots) per Connect Plus site. One of these timeslots must be dedicated for Control Channel signaling. All other timeslots are used by the controller for call assignment.

In this article we will focus mainly on the most critical parameters of the XRC 9000 and XRT 9000, which are required for operation with SmartPTT Radioserver. Other information on the XRC 9000 Controller configuration can be found in MOTOTRBO documentation.

1. In our example we describe a multisite networking, therefore each XRC 9000 must be enabled for multisite operation.
2. Make sure the **Pool IDs** field in SmartPTT Radioserver Configurator matches the **Pool ID** field in XRT 9000 Gateway.

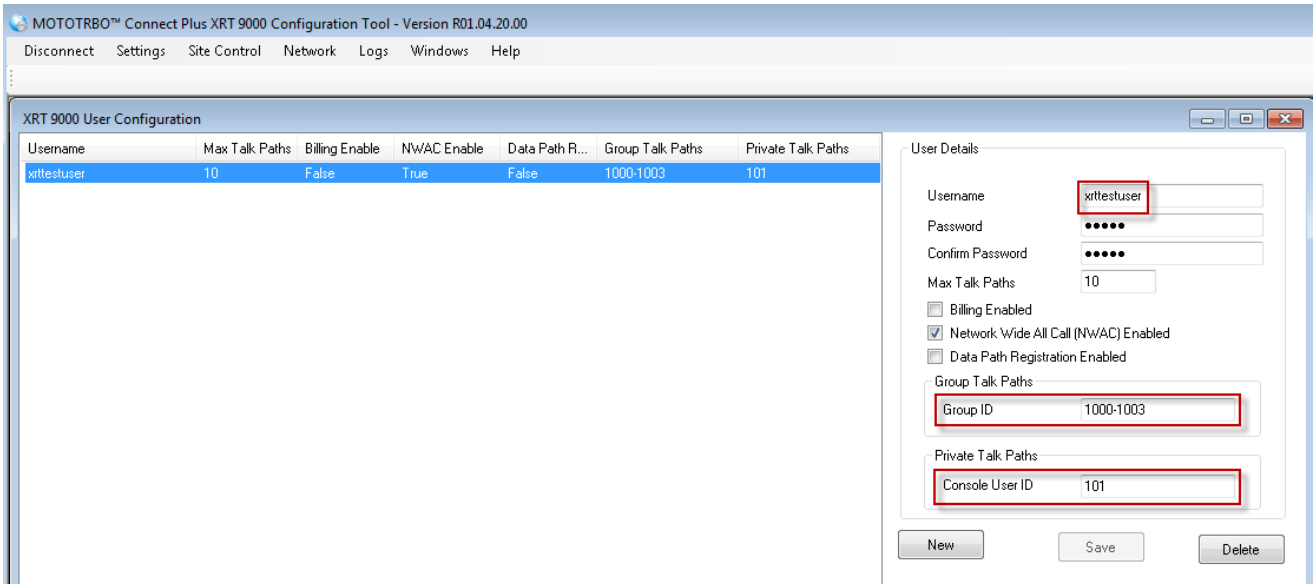


3. Make sure that there is a user record for every pool ID in XRC 9000 configuration:



Record Type	ID	Alias	Priority	Status	Serial Number	Multigroup ID	Notes
User	101	Disp 101	8	Enabled	037TMLV000	1000	
User	102	Disp 102	8	Enabled	037TMLV001	1000	
User	201	201	8	Enabled	037TMLV348	1000	
User	202	202	8	Enabled	037TMLV343	1000	
User	403	403	8	Enabled	037TMT1829	1000	
User	16000001	XRTClient	8	Enabled		1000	
User	16000002	XRTClient	8	Enabled		1000	
User	16000003	XRTClient	8	Enabled		1000	
User	16000004	XRTClient	8	Enabled		1000	
User	16000005	XRTClient	8	Enabled		1000	
User	16000006	XRTClient	8	Enabled		1000	
User	16000007	XRTClient	8	Enabled		1000	
User	16000008	XRTClient	8	Enabled		1000	
User	16000009	XRTClient	8	Enabled		1000	
User	16000010	XRTClient	8	Enabled		1000	
Group	1001	Group 1	8	Enabled			
Group	1002	Group 2	8	Enabled			
Group	1003	Group 3	8	Enabled			
Multigroup	1000	1000	8	Enabled			

4. Check user restrictions under **XRT 9000 User Configurations** in MOTOTRBO Connect Plus XRT 9000 Configuration Tool:



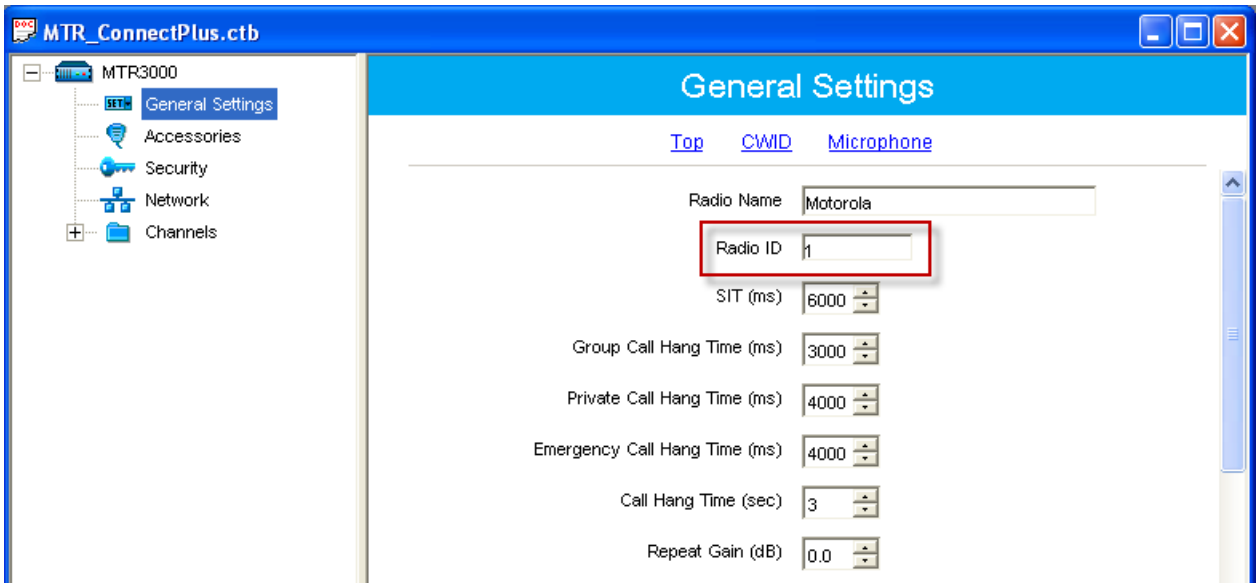
- Check that the **Username** and **Password** match **Username** and **Password** in SmartPTT Radioserver Configurator in XRT 9000 Gateway settings.
- Check the **Group ID**. The values in the field must match the IDs used for group calls in SmartPTT Radioserver Configurator in XRT 9000 talk path settings.
- Check **Console User ID**. It should match **Radio ID** in SmartPTT Radioserver Configurator.

5. Make sure the ARS, GPS and TMS ports specified in SmartPTT Radioserver Configurator in XRC 9000 settings match the same ports in MOTOTRBO Connect Plus XRC 9000 Configuration Tool.

MOTOTRBO Repeater Programming

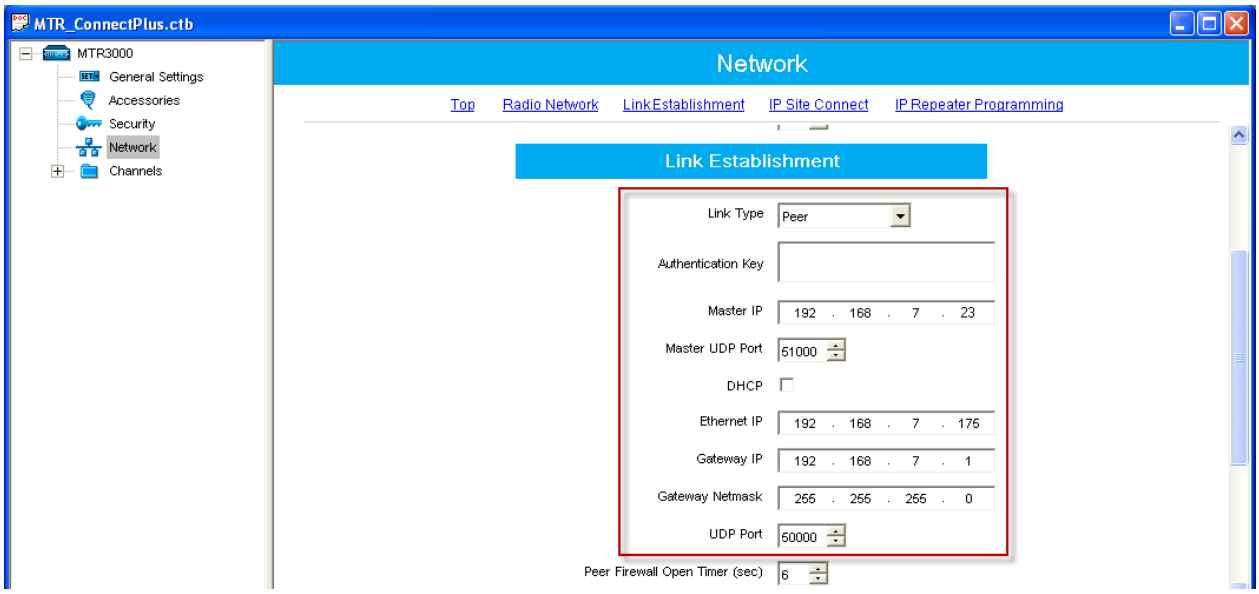
In the given sample scheme the Connect Plus network consists of 3 Sites with 2 or 3 repeaters on each. In general, repeater settings in the Connect Plus network are similar to those in the IP Site Connect network. In this article, we will review only a few settings, which we consider important:

1. Set repeaters' radio IDs. In the **Radio ID** field of the repeater from Site 1 enter *1*.



In the **Radio ID** field of the other repeater from Site 1 enter *2*. On Sites 2 and 3, the repeaters must be assigned the same radio IDs like on Site 1, starting from **Radio ID**=*1*. That is, for Site 2 repeaters' **Radio IDs** are set to *1, 2* and *3,* and Site 3 repeaters' **Radio IDs** are set to *1* and *2,* respectively.

2. Specify parameters in the **Network** tab.



- In the **Link Type** field select *Peer*—the role of the Master will be played by the XRC 9000 Controller.
- In the **Master IP** and **Master UDP Port** specify the IP address and port number of the Master, i.e. the XRC 9000 of the Site. Make sure that the **Master UDP Port** specified in the settings of the repeater with **Radio ID=***1* matches the **First UDP Repeater Listen Port** specified in the settings of the XRC 9000 of the Site. For other repeaters of the Site the port number must be incremented by 1. So, in the **Network** settings of the repeater with **Radio ID=***2,* **Master UDP Port** will be set to *51001*.
- Do not select **DHCP**. **Master IP** should be static.
- In the **Ethernet IP** field specify the IP address of the repeater.
- In the **Gateway IP** field specify the gateway IP address for the repeater.
- In the **Gateway Netmask** field specify the gateway netmask address for the repeater.
- In the **UDP Port** field specify the UDP port of the repeater. The default value is set to 50000.

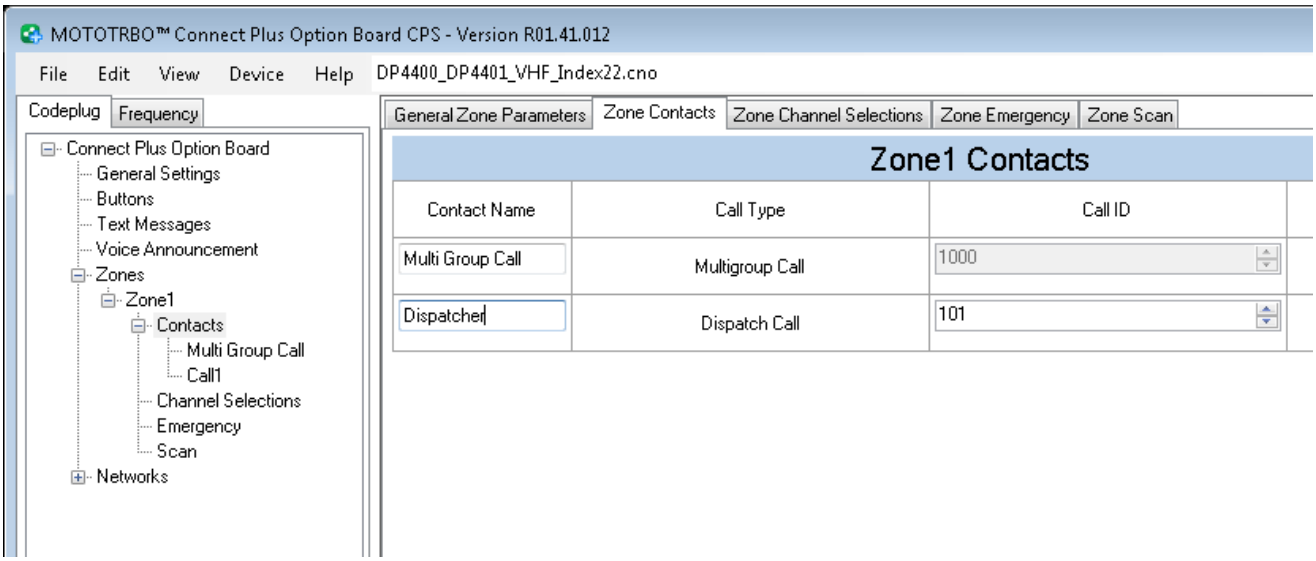
Likewise, specify the **Network** settings for all of the repeaters on other 2 Sites.

MOTOTRBO Radio Programming

In this article we will focus on the radio settings critical for communication between the radio and SmartPTT Dispatcher. Other information on MOTOTRBO radio programming for the Connect Plus environment can be found in MOTOTRBO documentation (MOTOTRBO Connect Plus Multi-Site Digital Trunking System Planner).

As was stated before, radio programming for the Connect Plus environment requires special software: MOTOTRBO Connect Plus Option Board CPS.

To allow radio subscribers to send messages to the dispatcher, add special contact of the **Dispatch Call** type:

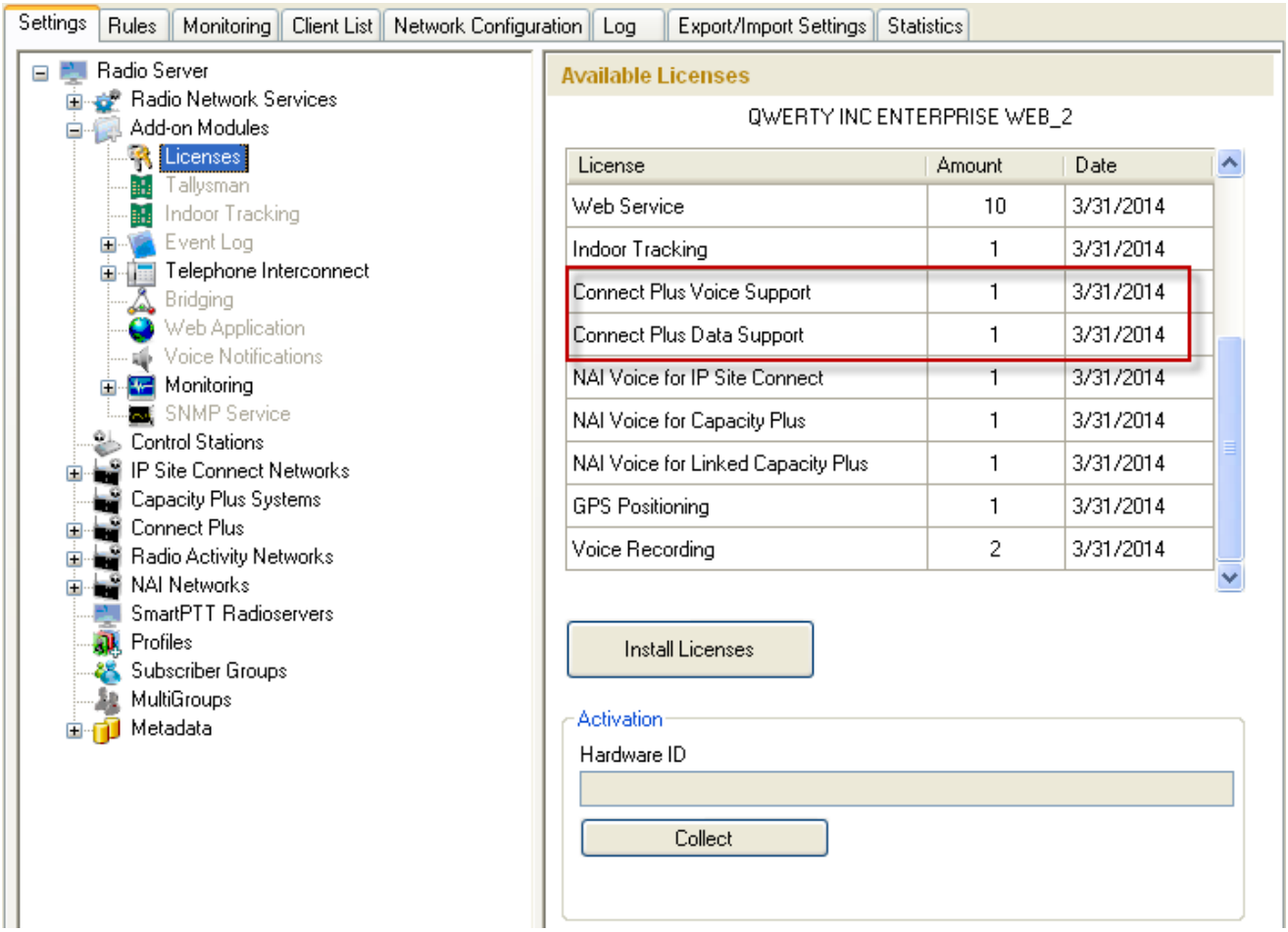


Note: Remember to add contacts of **Dispatch Call** for all dispatchers (if you have more than one) and specify their unique IDs, which are specified in SmartPTT Radioserver Configurator under **Profile**.

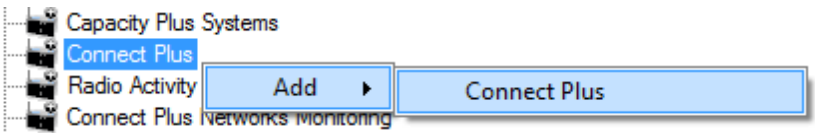
SmartPTT Radioserver Configuration

The configuration process includes the following steps:

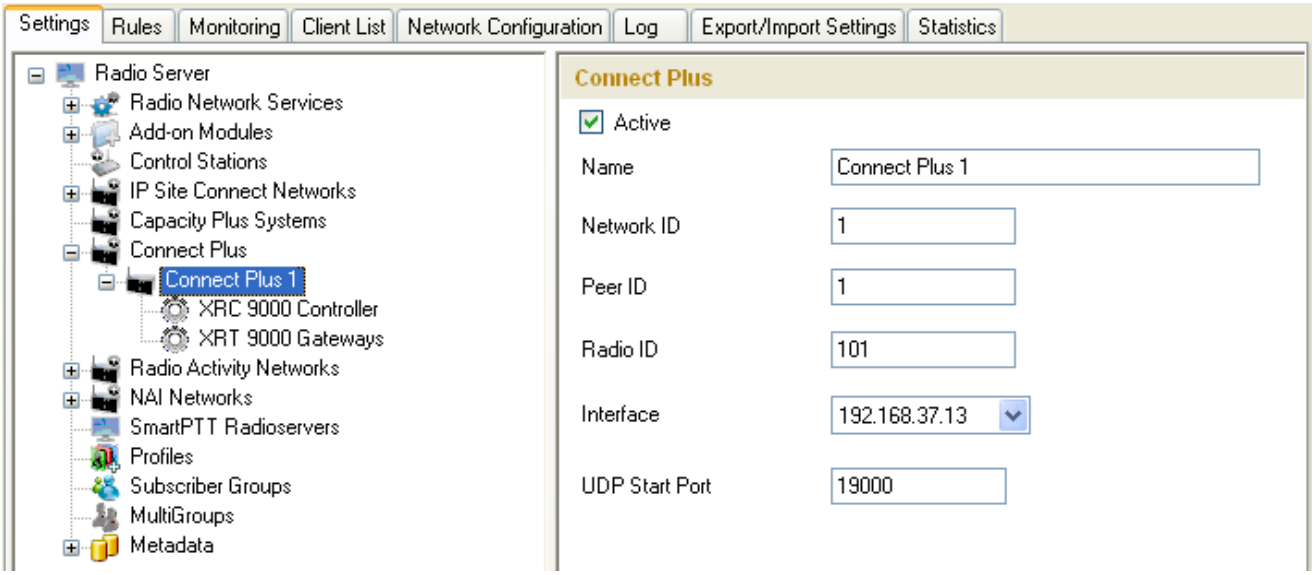
1. Run SmartPTT Radioserver Configurator, which you have downloaded and installed, as described in SmartPTT Software Installation.
2. Make sure you have the necessary licenses to work in Connect Plus network, i.e., Connect Plus Voice Support and Connect Plus Data Support.



3. In the setting tree on the left, right-click **Connect Plus**, select **Add**, and then **Connect Plus**.



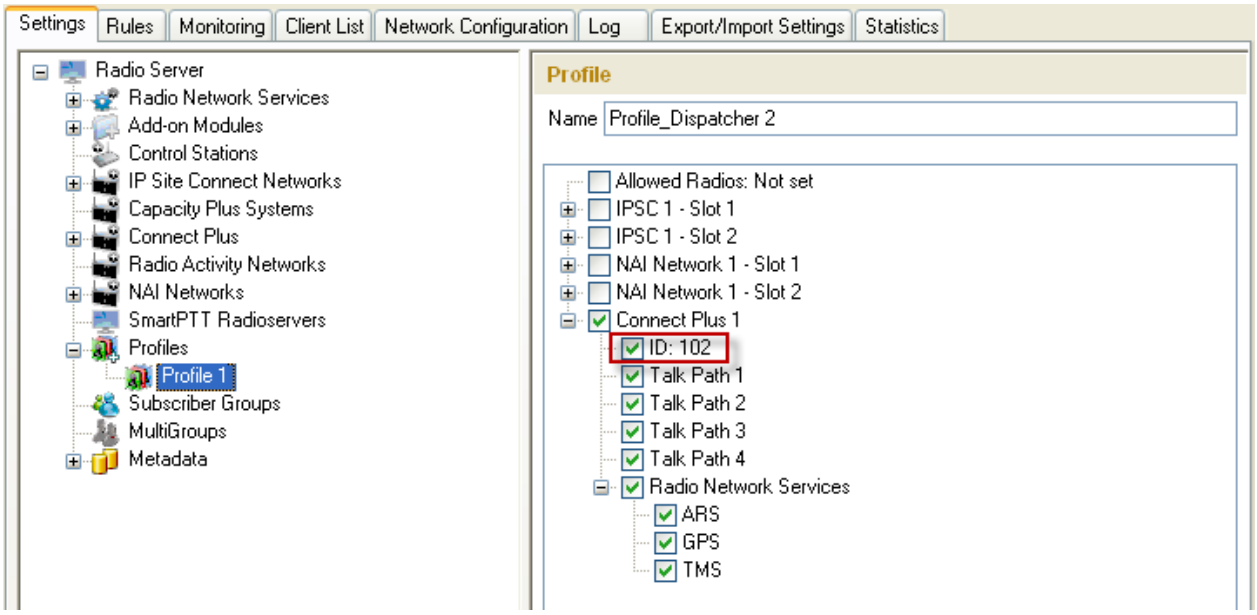
At that, the **Connect Plus** window opens.



4. Set parameters:

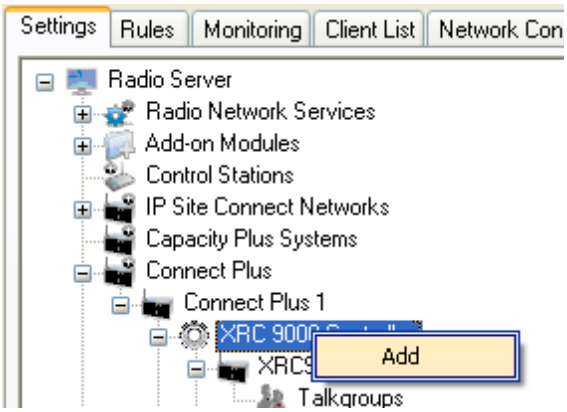
- Select **Active** to enable the Connect Plus network.
- In the **Name** field enter the name of the network.
- In the **Network ID** field enter the unique ID of the Connect Plus network, which is used inside SmartPTT. This is important if you have more than one Connect Plus network. In our case there is only one network, so we leave the default value.
- In the **Peer ID** field enter unique ID of the virtual repeater, i.e. of the radioserver in Connect Plus network. This parameter is used only for voice packets to XRT 9000 Gateway, so leave the default value.
- In the **Radio ID** field specify the ID of the virtual control station by default, the parameter is used to represent radioserver inside Connect Plus network, therefore, this ID will be used for the dispatcher. It is used for data and voice transmission.

Note: If you have more than one dispatcher in the system, you should specify unique ID for all dispatchers. To do it, create a profile per dispatcher and specify the unique ID:

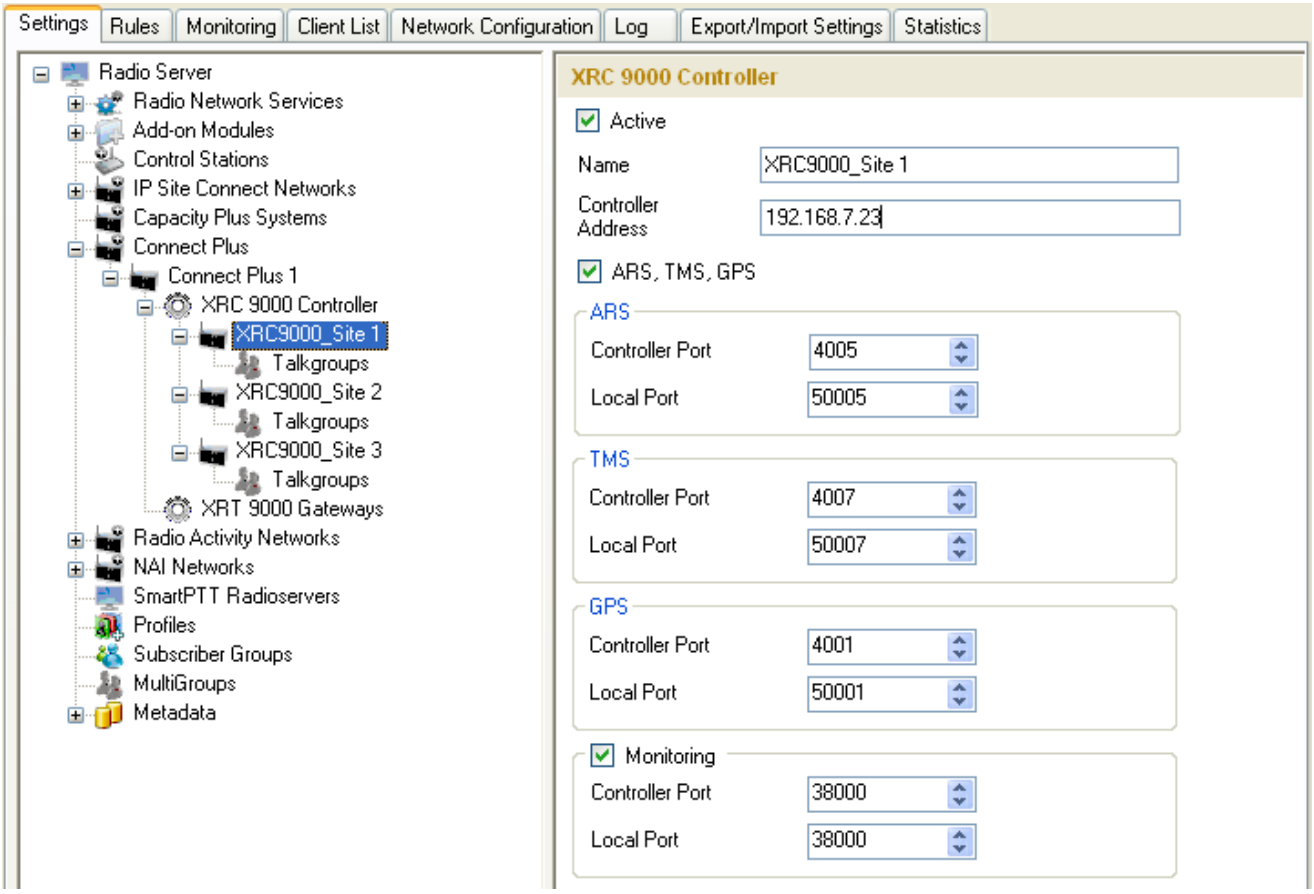


- In the **Interface** field specify the IP address of the virtual repeater, i.e., SmartPTT Radioserver.
- In the **UDP Start Port** specify the first local UDP port available for XRT 9000 talk paths. Each talk path requires one local UDP port. Next talk path will use **UDP Start Port** incremented by 1, and so on.

5. There are three sites in our network, and each contains one XRC 9000 Controller. Add them in SmartPTT Radioserver Configurator. To add an XRC 9000 Controller, right-click **XRC 9000 Controller** and select **Add**:



6. Specify parameters for each XRC 9000:



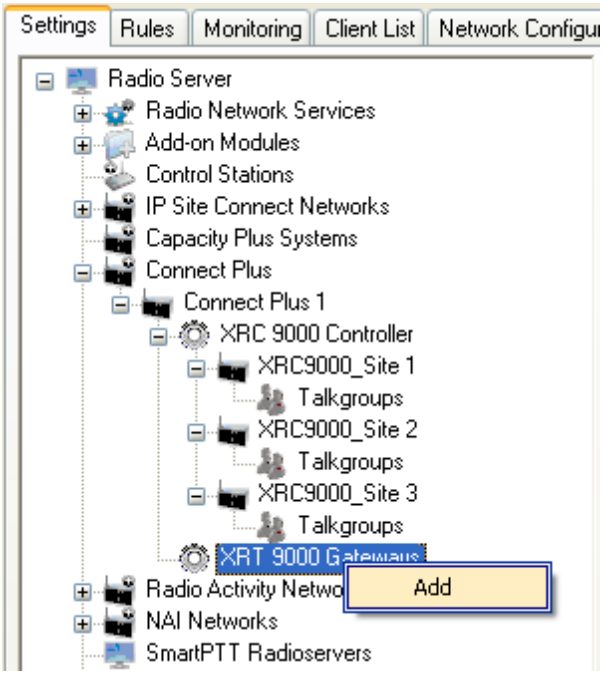
- Select **Active** to enable XRC 9000 Controller support.
- In the **Name** field enter the XRC 9000 Controller name. This is used only in SmartPTT Radioserver Configurator.
- In the **Controller Address** field specify the IP address of the XRC 9000 Controller. Port is not required in this field.
- Select the **ARS, TMS, GPS** checkbox to enable data services. Specify **Controller port** and **Local port** for each service, where **Controller port** is the XRC 9000 Controller port and **Local port** is the virtual repeater port. You can leave default values. Local ARS, TMS and GPS ports should not be in conflict with other local ports used for other purposes used on this PC.

Note: The ARS, TMS and GPS services can be set only for one of the XRC 9000 Controllers in the network. These settings will be used by other controllers available in the network.

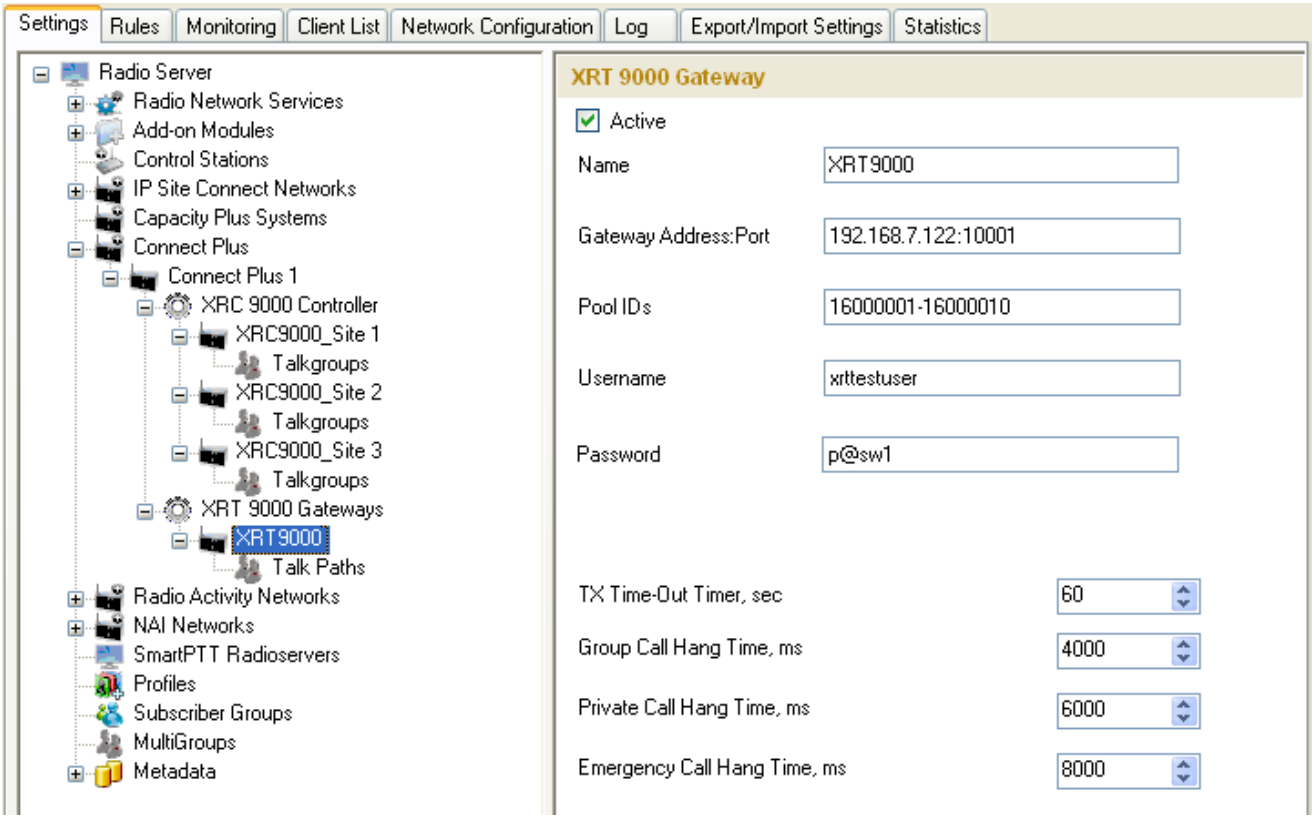
- Select **Monitoring** checkbox to be able to review the XRC 9000 Controller on the **Monitoring** panel in SmartPTT Dispatcher. Specify **Controller port** and **Local port**. The **Monitoring** service is enabled on all existing XRC 9000 Controllers. You can leave default values.

Note: Make sure that you have the general Monitoring service enabled (Monitoring).

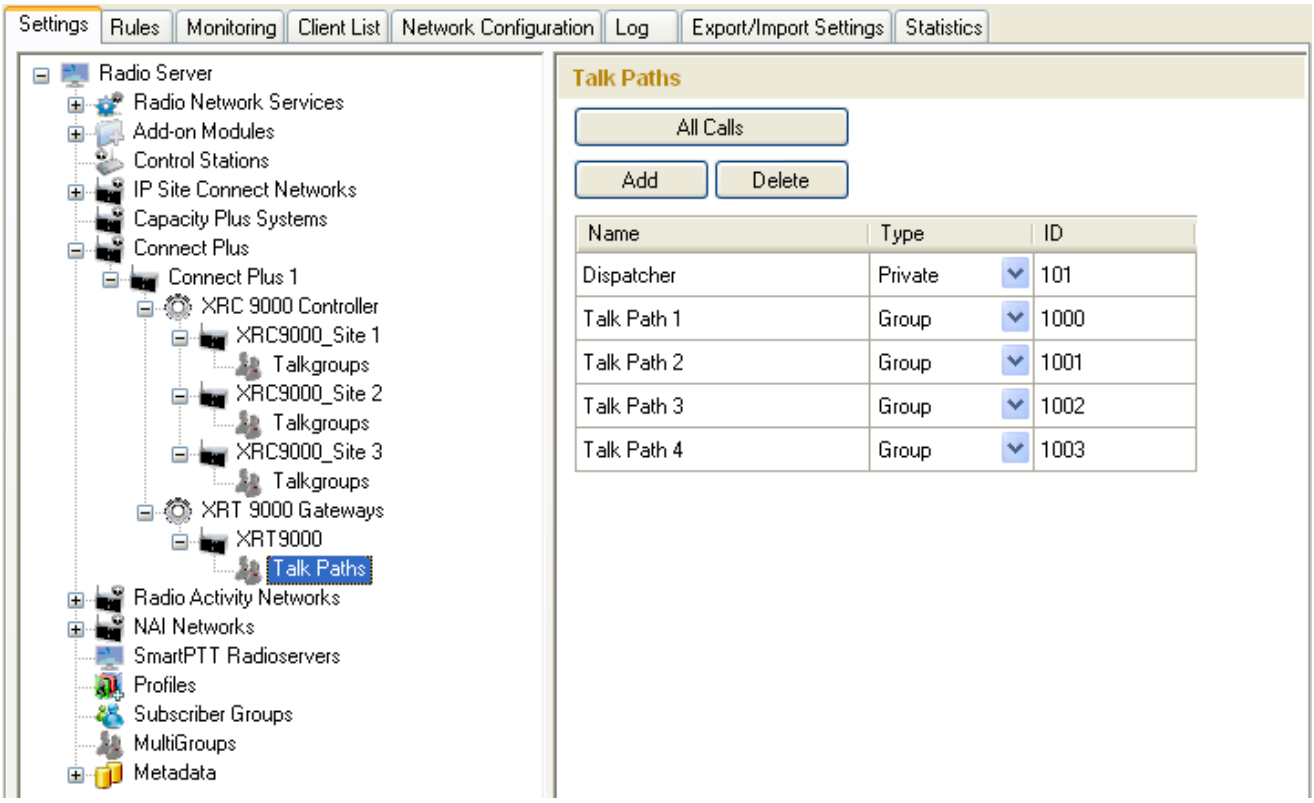
7. Set parameters for the other two XRC 9000 Controllers, but remember to leave the **ARS, TMS, GPS** checkbox unchecked.
8. Add XRT 9000 Gateway by right-clicking **XRT 9000 Gateways** and selecting **Add**.



At that, the **XRT 9000 Gateway** window opens:

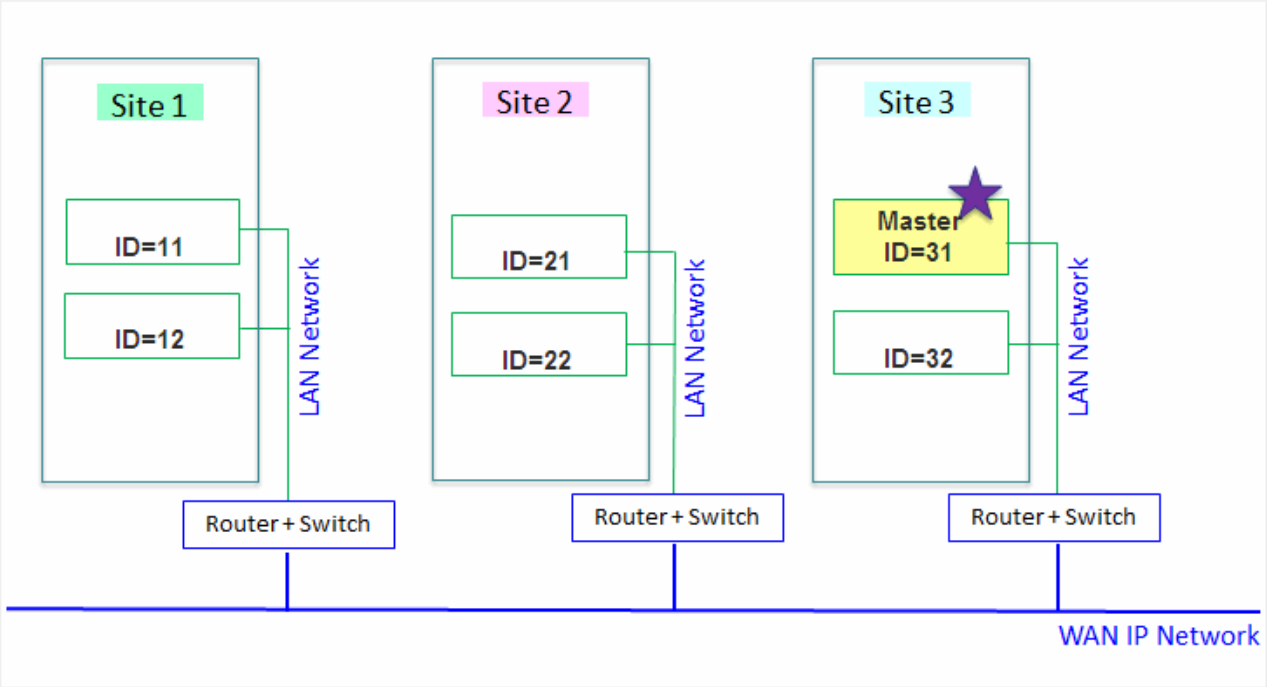


9. Specify parameters of the XRT 9000 Gateway.
    - Select **Active** to enable XRT 9000 Gateway support.
    - In the **Name** field enter the XRT 9000 Gateway name, which is used only in SmartPTT Radioserver Configurator.
    - In the **Gateway Address:Port** field enter the IP address and port of the XRT 9000 Gateway.
    - In the **Pool IDs** field use default values. The values must correspond to the range of IDs set in the XRT 9000 Gateway settings (**Pool ID**).
    - **Username** and **Password** – used for authentication with the XRT 9000 Gateway and must equal XRT 9000 Username and password set up in MOTOTRBO Connect Plus XRT 9000 Configuration Tool.
10. Add talk paths on the **Talk Paths** window. They are necessary for voice communication. For each talkgroup add one talk path, select **Group** in the **Type** column, and specify the **ID**. For the dispatcher add another talk path, select **Private** in the **Type** column, and enter the **Radio ID** specified in step 4.


Settings
Rules
Monitoring
Client List
Network Configuration
Log
Export/Import Settings
Statistics
Radio Server
Radio Network Services
Add-on Modules
Control Stations
IP Site Connect Networks
Capacity Plus Systems
Connect Plus
Connect Plus 1
XRC 9000 Controller
XRC9000_Site 1
Talkgroups
XRC9000_Site 2
Talkgroups
XRC9000_Site 3
Talkgroups
XRT 9000 Gateways
XRT9000
Talk Paths
Radio Activity Networks
NAI Networks
SmartPTT Radioservers
Profiles
Subscriber Groups
MultiGroups
Metadata
Talk Paths
All Calls
Add
Delete
Name
Type
ID
Dispatcher
Private
101
Talk Path 1
Group
1000
Talk Path 2
Group
1001
Talk Path 3
Group
1002
Talk Path 4
Group
1003

Linked Capacity Plus

In this document we are going to configure Linked Capacity Plus (LCP) system consisting of 3 sites with 2 repeaters on each site, see the following network scheme:



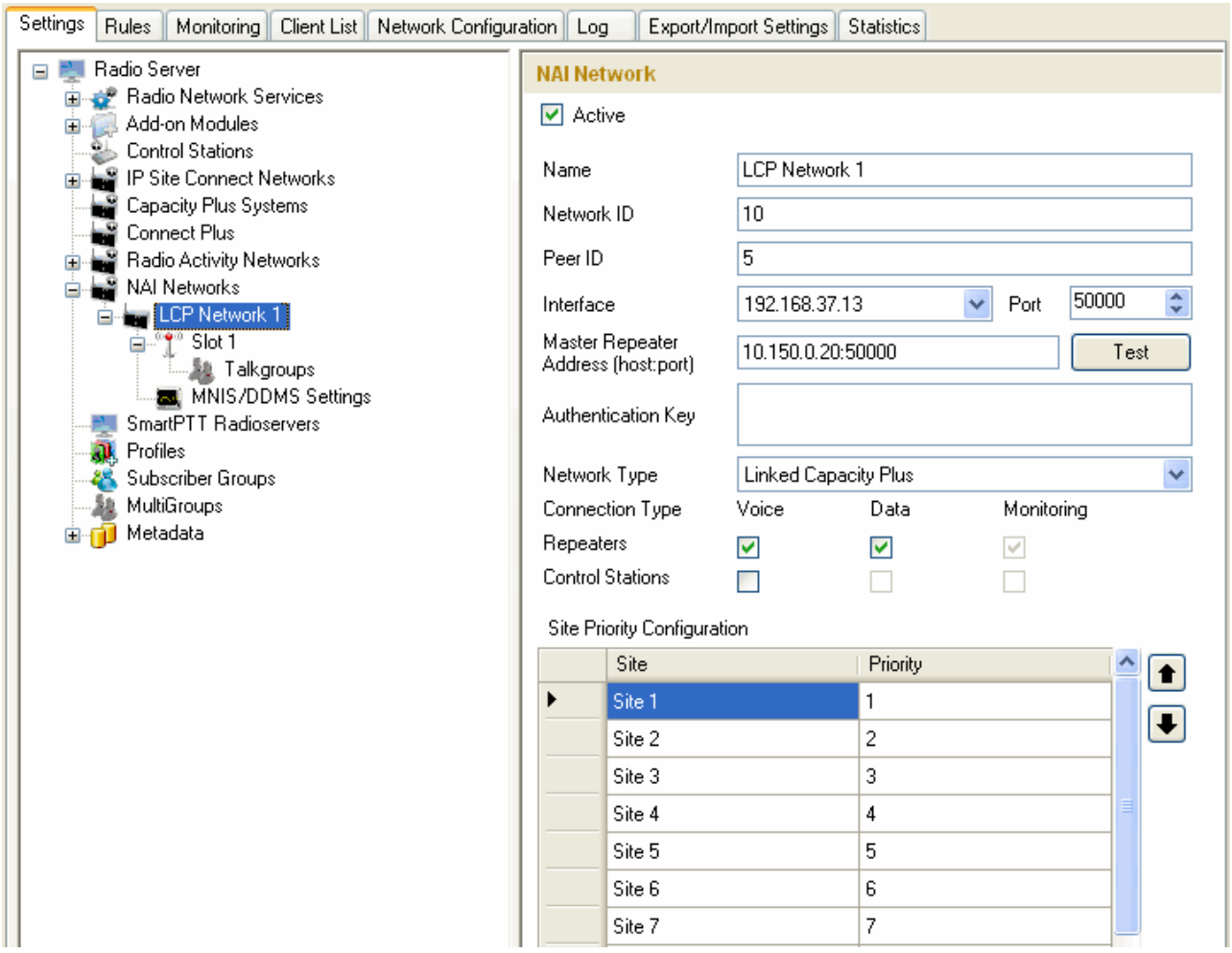
Each radio ID, either subscriber radio ID or repeater ID should be unique in the radio system. In this example you can see 2 repeaters with ID's *11* and *12* on *Site 1*, 2 repeaters with ID's *21* and *22* on *Site 2*, and 2 repeaters with ID's *31* and *32* on *Site 3*. The repeater with ID=*31* is a Master.

SmartPTT Radioserver Configuration

To connect the system to SmartPTT Plus, you need to configure the radioserver settings, which can be done using the special software application SmartPTT Radioserver Configurator. In this document we will review the main settings of the radioserver, that are required for the LCP configuration of the system.

The configuration process includes the following steps:

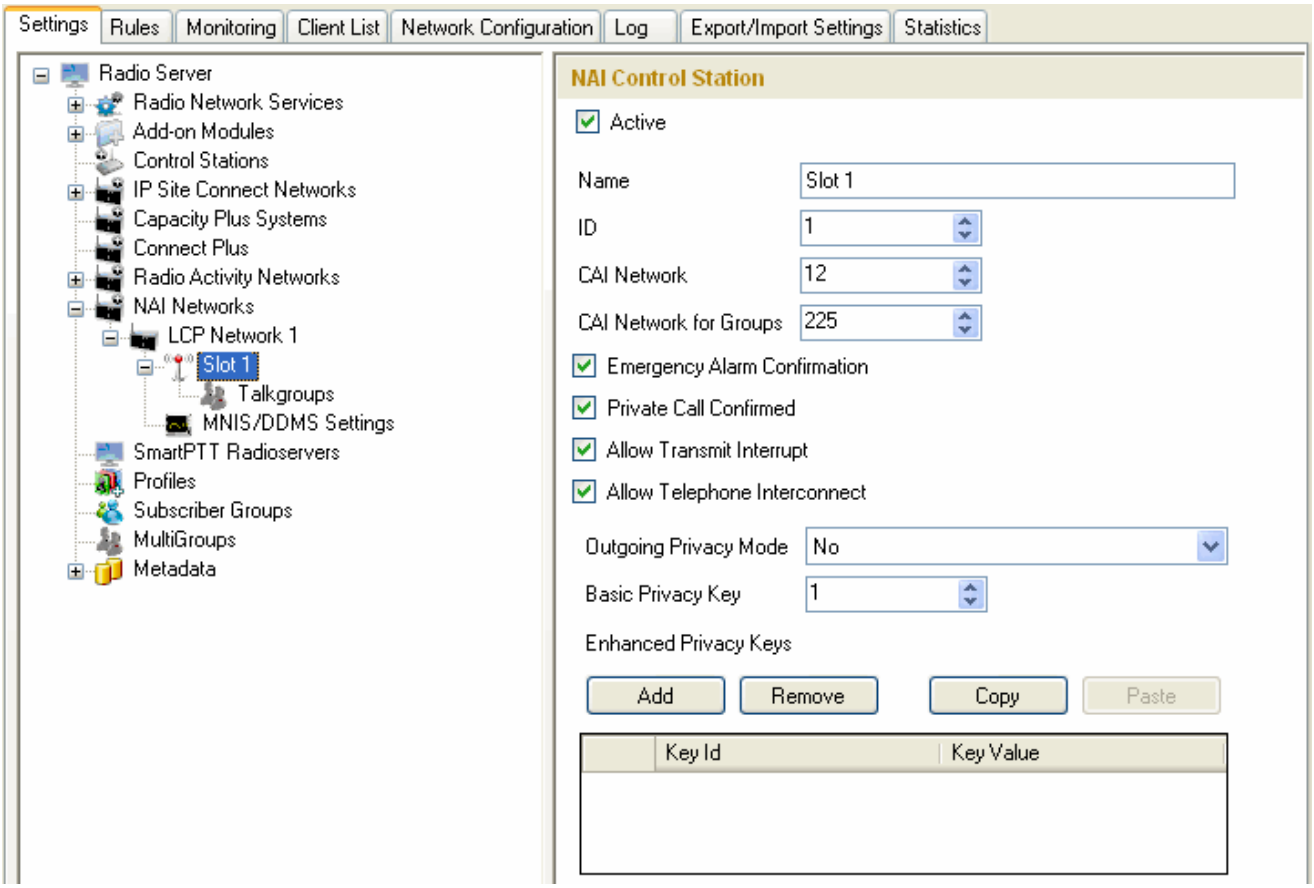
1. Run SmartPTT Radioserver Configurator, which you have already downloaded and installed, as described in SmartPTT Software Installation.
2. In the setting tree on the left, right-click on **NAI Networks**, point to **Add** and click **NAI**.
3. In the opened window specify the following settings of the future LCP network.



- **Name** – add network name.
- **Network ID** – specify unique ID of the network. The network ID must not match any ID of the other SmartPTT Radioserver networks.
- **Peer ID** – enter unique ID of the virtual repeater in the network. The virtual repeater ID must not match any of the other repeater IDs in this network.
- **Interface** – specify the IP address of the PC where SmartPTT Radioserver is installed.

- **Port** – set up port number of SmartPTT Radioserver. It should differ from the corresponding ports in other networks.
- **Master repeater address (host:port)** – specify IP address and port number of the Master repeater (see **Master IP** and **Master UDP Port** in MOTOTRBO CPS). In this example it is *10.150.0.20:50000*.
- Click **Test** to check connection between the virtual and Master repeaters.
- **Authentication Key** – enter repeater authorization key (to be equal to the **Authentication Key** in the repeater settings in MOTOTRBO CPS). In this example we are not setting any authentication keys.
- **Network Type** – select *Linked Capacity Plus*.
- **Connection type** – select **Data** and **Voice** checkboxes next to **Repeaters**.
- In the **Site Priority Configuration** table set priorities by clicking on the arrows on the right to the table. Priorities should be set on the basis of radioserver proximity to the site. The closer the radioserver to the site, the higher priority it should have.

4. Configure slot parameters. In order to do that, go to **Slot 1** in the setting tree of SmartPTT Radioserver Configurator.

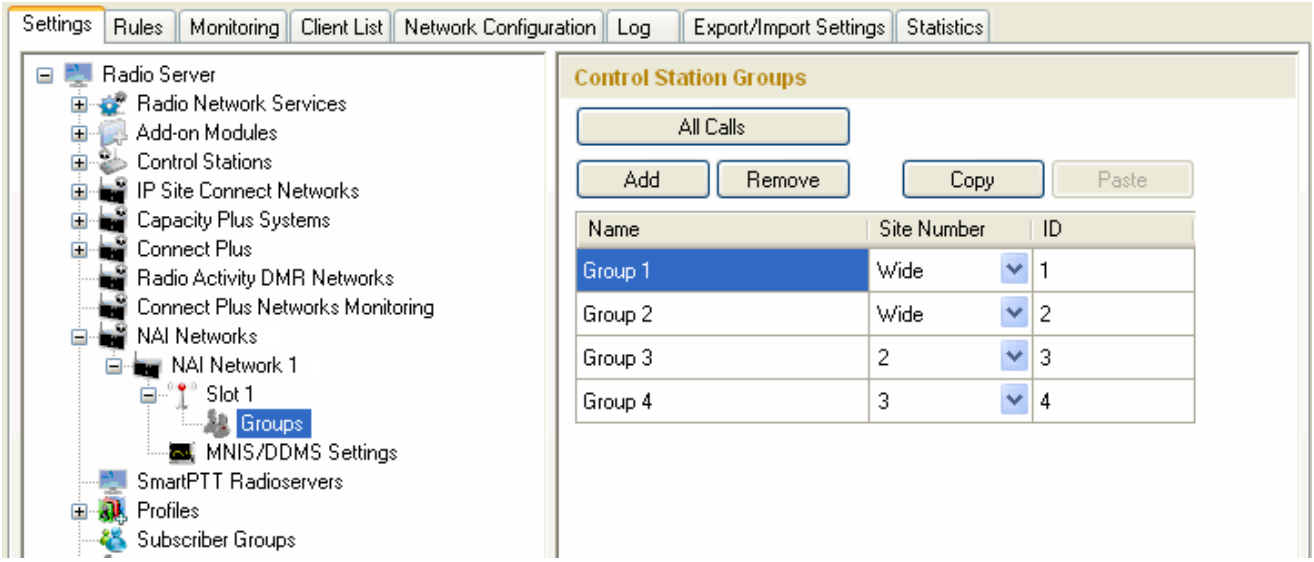


- **Name** – specify the name of the slot.
- **ID** – set unique ID of a virtual control station corresponding to the network slot. Remember that it should match **ARS Radio ID**, **TMS Radio ID** and **MNIS ID**, in this example it is *1*.
- **CAI Network** – CAI-network ID. Use the default value of 12 (must match MOTOTRBO CPS settings).
- **CAI Network for Groups** – CAI-network for groups ID. Use the default value of 225 (must match **CAI Group Network** in MOTOTRBO CPS settings).
- **Emergency Alarm Confirmation** – select this checkbox if you need the emergency alarm be acknowledged.

- **Private Call Confirmed** – select this checkbox if you need set private calls on the current digital channel as confirmed.
- **Allow Transmit Interrupt** – select this checkbox if you need the ability to interrupt a radio subscriber.

- **Allow Telephone Interconnect** – select this checkbox if you need the ability to make telephone calls on the slot.
  - In this example we are not going to enable any privacy mode.

5. Configure talkgroup parameters. To do that, click **Talkgroups**. Parameters of wide area and local groups are set in the **Control Station Talkgroups** window. In order to display wide area talkgroups by the SmartPTT Dispatcher application, add necessary talkgroups in SmartPTT Radioserver Configurator, define group identifiers which correspond to the identifiers of the wide area groups in the repeater MOTOTRBO CPS settings and select *Wide* in the **Site Number** field. In this example we have two wide area talkgroups and two local talkgroups, so we add them into SmartPTT Radioserver Configurator.

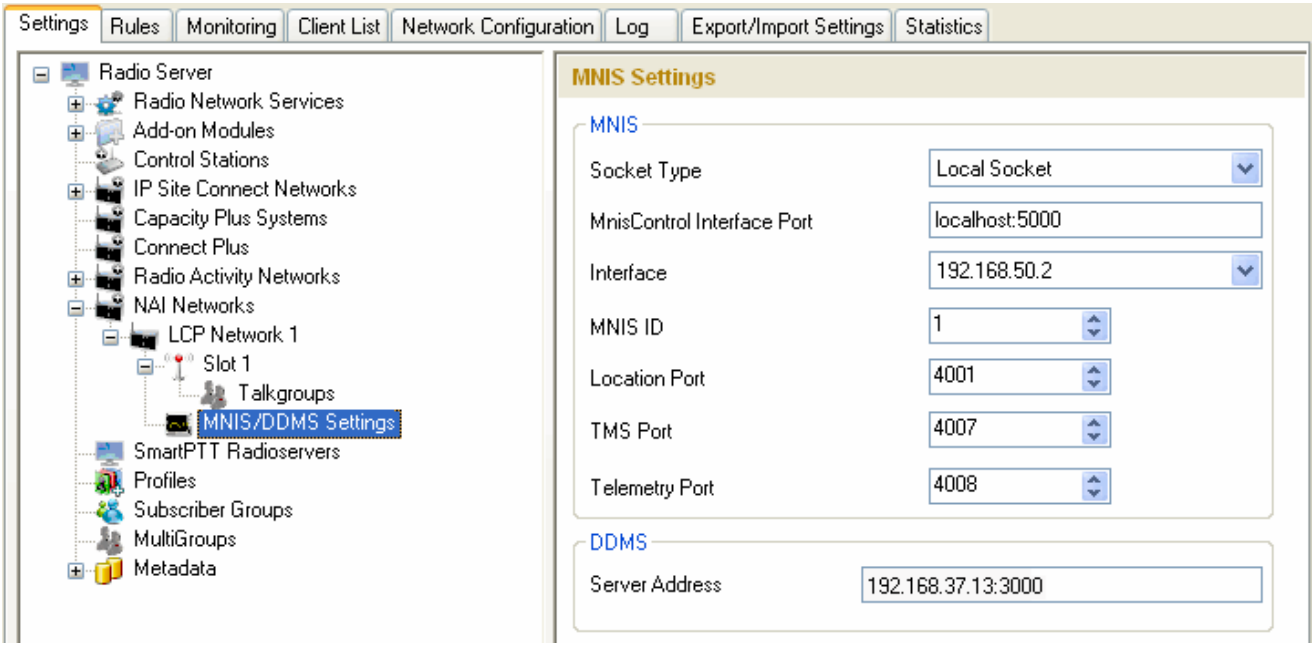


Talkgroups not specified in the repeater settings are regarded as local groups. Local group call does not go beyond the site on which the call was initiated.

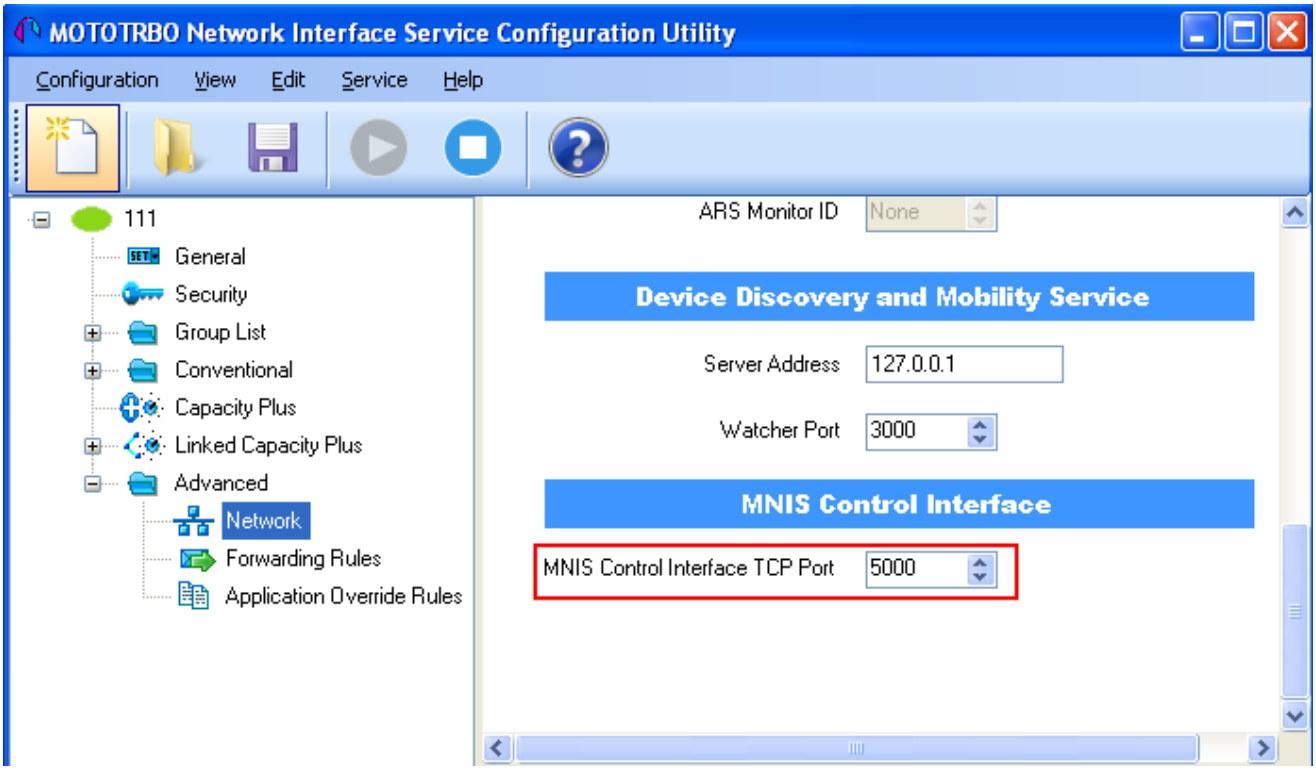
To add local talkgroups, just add them in SmartPTT Radioserver Configurator, define their identifiers and select site number from the list in the **Site Number** field.

Note: Wide area and local talkgroup identifiers must differ.

6. Configure MNIS and DDMS settings for data transmission under **MNIS/DDMS Settings**.

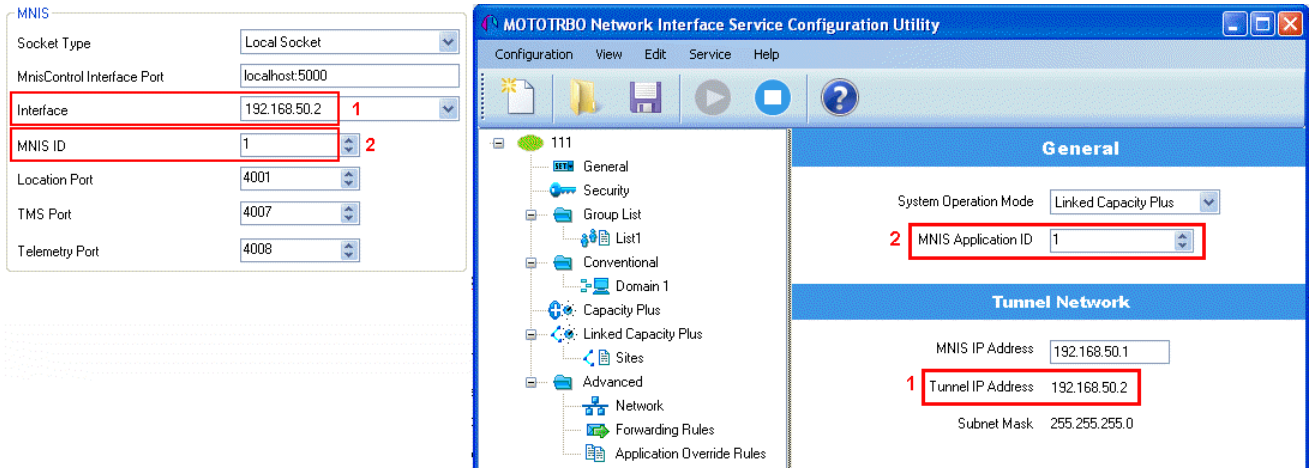


1) In the MNIS settings select *Local Socket* in the **Socket type** field since the MOTOTRBO Network Interface Service Configuration Utility application is installed on the same PC as SmartPTT Radioserver.
2) **MNIS Control Interface Port** – use *localhost*, if MOTOTRBO Network Interface Service is installed on the same PC as the radioserver. If MOTOTRBO Network Interface Service and the radioserver are installed on different PCs, use the interface specified in the **MNIS Relay Address** field. The port should match the port number specified in the **MNIS Control Interface TCP Port** field in MOTOTRBO Network Interface Service Configuration Utility settings:



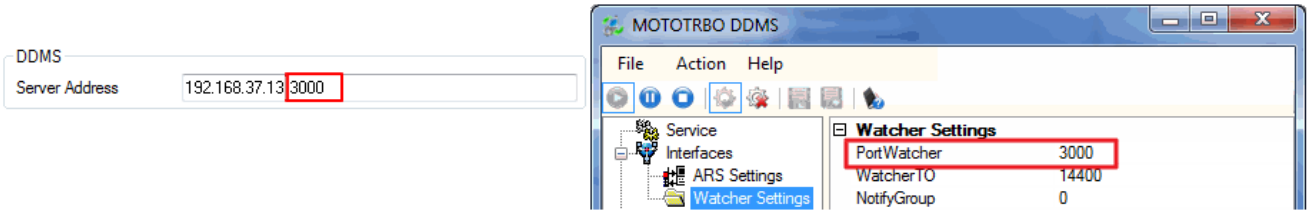
3) In the **Interface** field select the IP address of the PC where MOTOTRBO Network Interface Service is installed. It must match the IP address specified in the **Tunnel IP Address** field of MOTOTRBO Network Interface Service Configuration Utility.

4) In the **MNIS ID** field set up the Common Air Interface (CAI) ID of the MNIS in the radio network. The ID is used by other calling radios when addressing MOTOTRBO Network Interface Service. Make sure **MNIS ID** matches the **MNIS Application ID** field in the **General** tab in MOTOTRBO Network Interface Service Configuration Utility. It is also recommended that **MNIS ID** matches the **Slot ID** field value in the radioserver settings.



5) In the **TMS Port**, **Telemetry Port** and **Location Port** fields specify ports where the radioserver will expect text messages, telemetry and GPS data. The ports should match the ports set in the **TMS UDP PORT**, **Telemetry UDP Port**, **Location Server UDP Port** fields in MOTOTRBO Network Interface Service Configuration Utility (**Advanced** > **Network**).

6) Under the DDMS settings specify **Server Address**, i.e., IP address of the PC with the MOTOTRBO DDMS Administrative Client application installed, and port number of the DDMS server. In this case the DDMS server is installed on the same PC as the radioserver. The port number in this field must match the port number in the **PortWatcher** field of the MOTOTRBO DDMS Administrative Client (**Interfaces > Watcher Settings**).



7. Save changes by clicking **Save**  . To cancel the changes made, click the **Restore** button  . All the changes, made after the last save, will be restored.To apply the saved changes you must restart the service. The service is managed using the following buttons: Start  , Stop and Restart  .

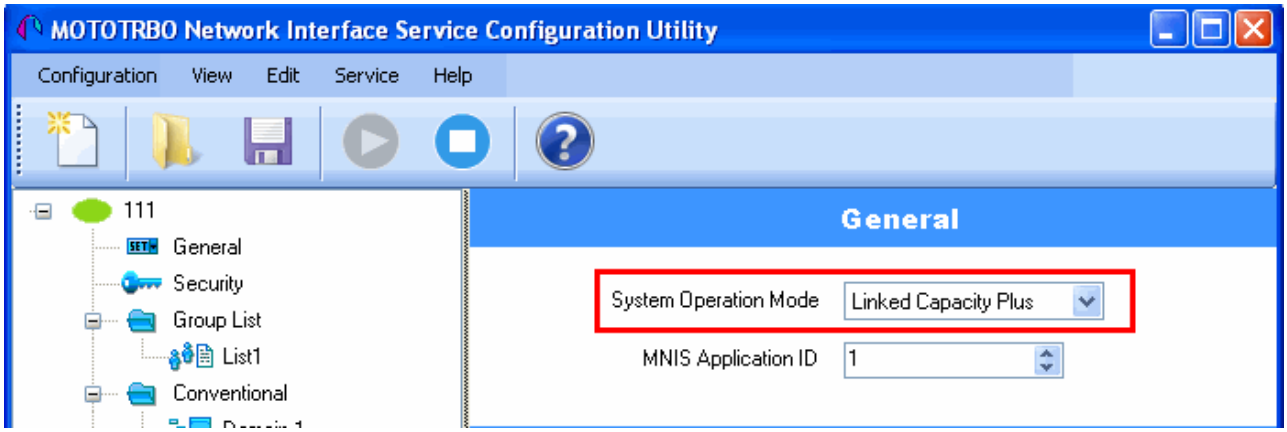
MNIS and DDMS Client Configuration

In order to process data packets, ARS, Call Alerts, GPS, TMS it is obligatory to have MOTOTRBO Network Interface Service Configuration Utility (MNIS) and MOTOTRBO DDMS Administrative Client properly installed and configured.

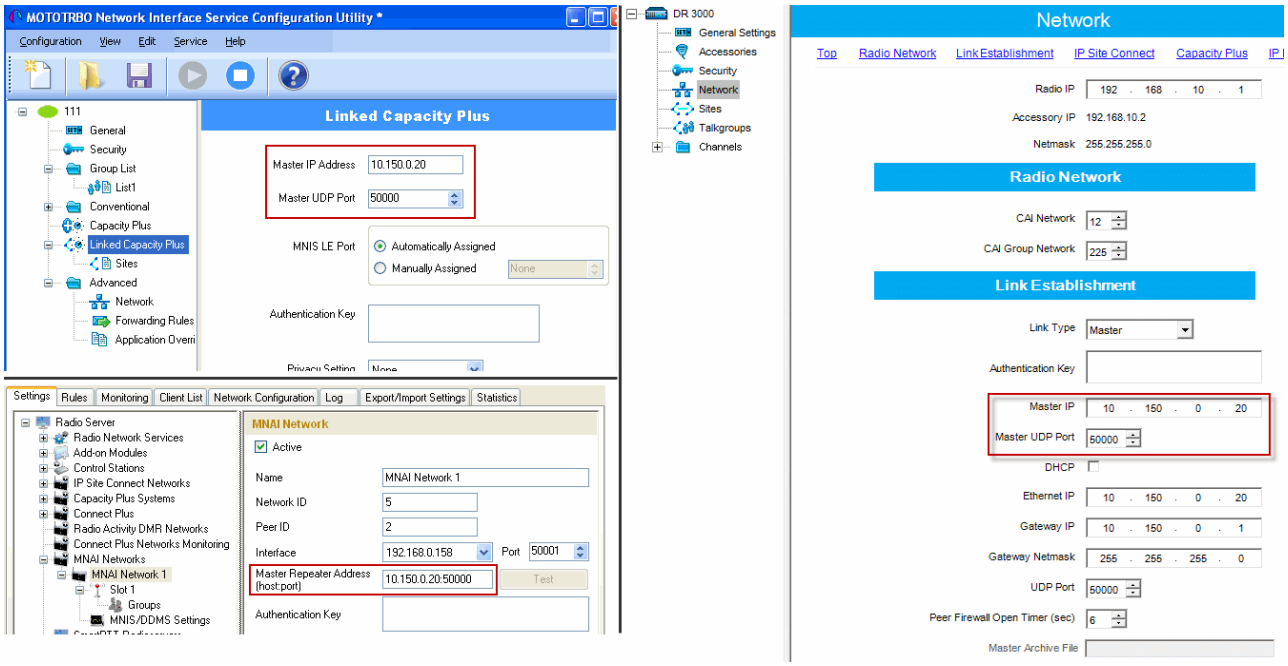
Let's start with MOTOTRBO Network Interface Service Configuration Utility (MNIS).

Note: Before configuring, make sure the firmware versions of the repeaters and MOTOTRBO Network Interface Service are compatible (please find compatibility information in MNIS Release Notes).

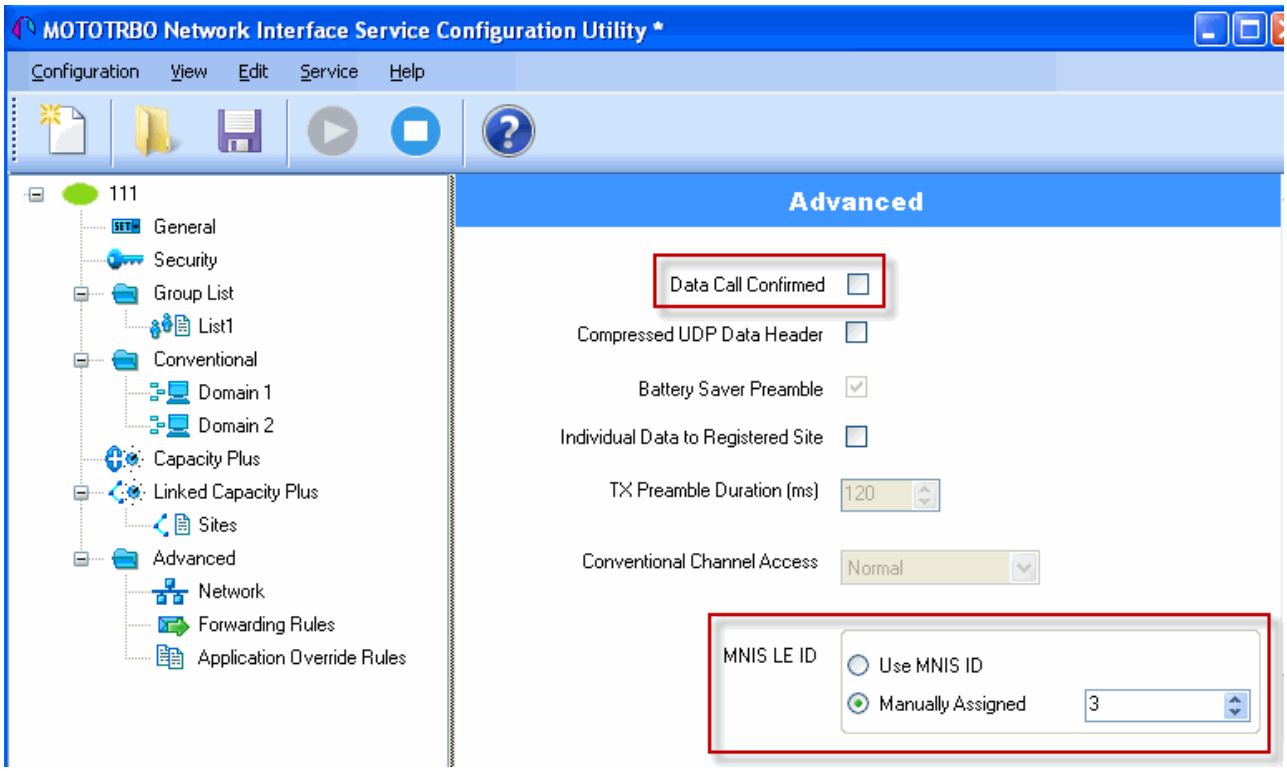
1. In the **General** section in the **System Operation Mode** field select network type. In our case, it is *Linked Capacity Plus*.



2. In the **Linked Capacity Plus** section set up **Master IP Address** and **Master UDP Port** fields. These values should correspond to the same values in MOTOTRBO CPS and in SmartPTT Radioserver Configurator, which you will set up later.



3. It is recommended to clear the **Data Call Confirmed** field in the **Advanced** section and to specify the identifier in the **MNIS LE ID** field explicitly. Make sure **MNIS LE ID** does not match **Peer ID** of any repeaters in the system.

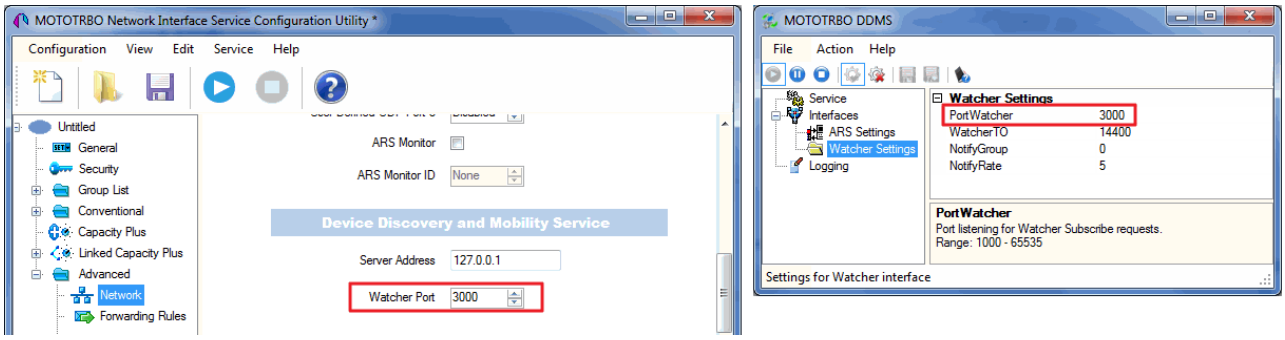


Note: In the Firewall settings add MNIS into the exception list.

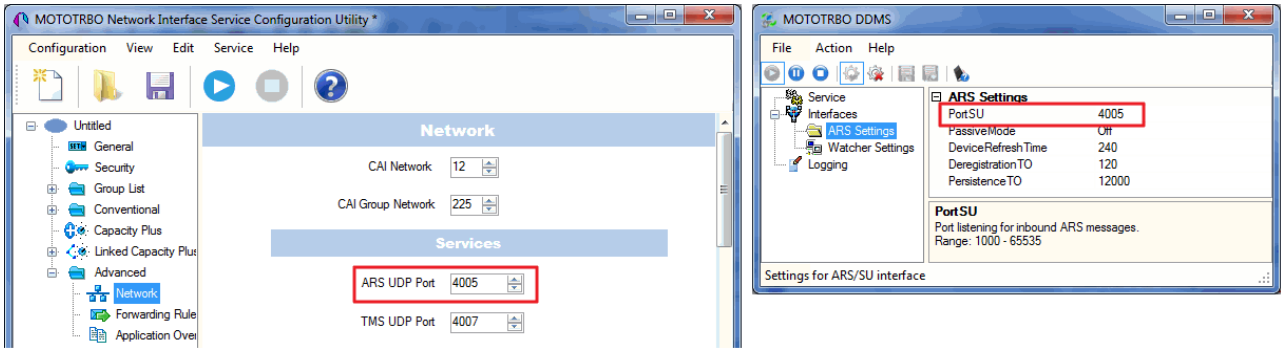
DDMS operation is closely connected to MNIS for data exchange (MNIS serves as DDMS Watcher). DDMS filters ARS packets, received by the repeater, and information on the radio presence in the network is sent to all systems for further processing.

Therefore, when you configure DDMS settings, make sure that:

1. The **PortWatcher** field in MOTOTRBO DDMS Administrative Client matches the **WatcherPort** field in MNIS settings (**Advanced > Network**).



2. The **PORT SU** field (**Interfaces > ARS Settings**) in MOTOTRBO DDMS Administrative Client matches the **ARS UDP Port** field in MOTOTRBO Network Interface Service Configuration Utility (**Advanced > Networks**).

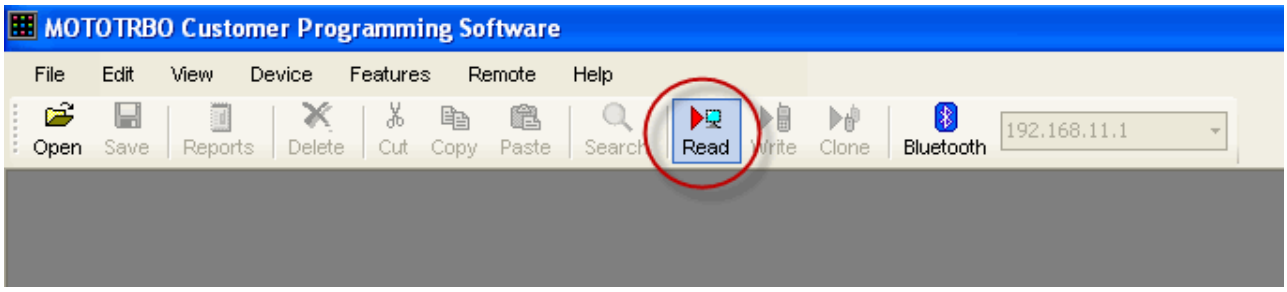


MOTOTRBO Equipment Programming

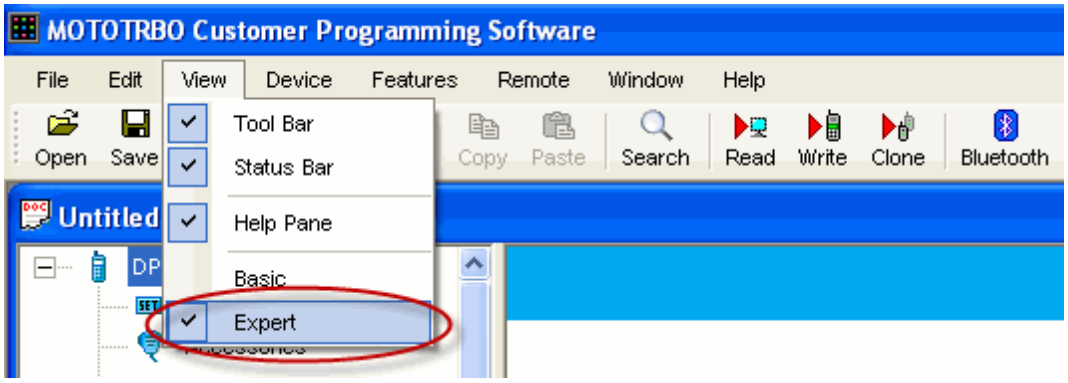
To program MOTOTRBO equipment you will need MOTOTRBO Customer Programming Software (CPS).

1. Connect your device to the PC via a programming cable and launch MOTOTRBO CPS. Please check that the CPS version is no older than 10.x.

2. Switch on the device and check its settings by clicking the Read button in the tool bar.

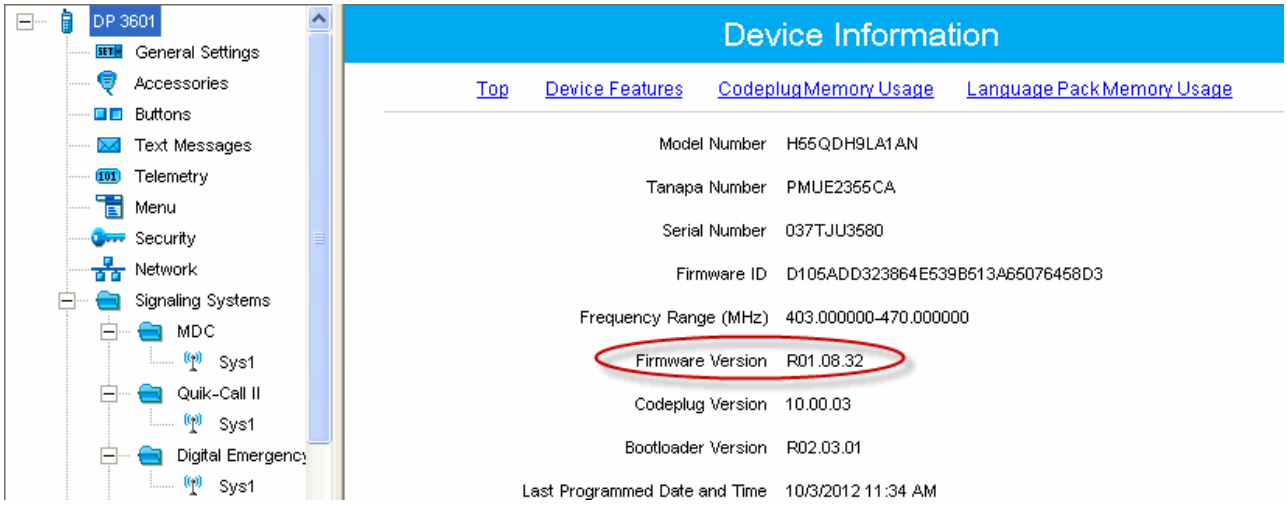


3. In the **View** menu select **Expert** to gain access to all the settings parameters.



4. In the **Device Information** tab make sure that firmware version is no older than R01.08.32. Otherwise, contact the supplier to request firmware upgrade.

Note: It is recommended to use the same firmware version for all MOTOTRBO equipment in the same network.



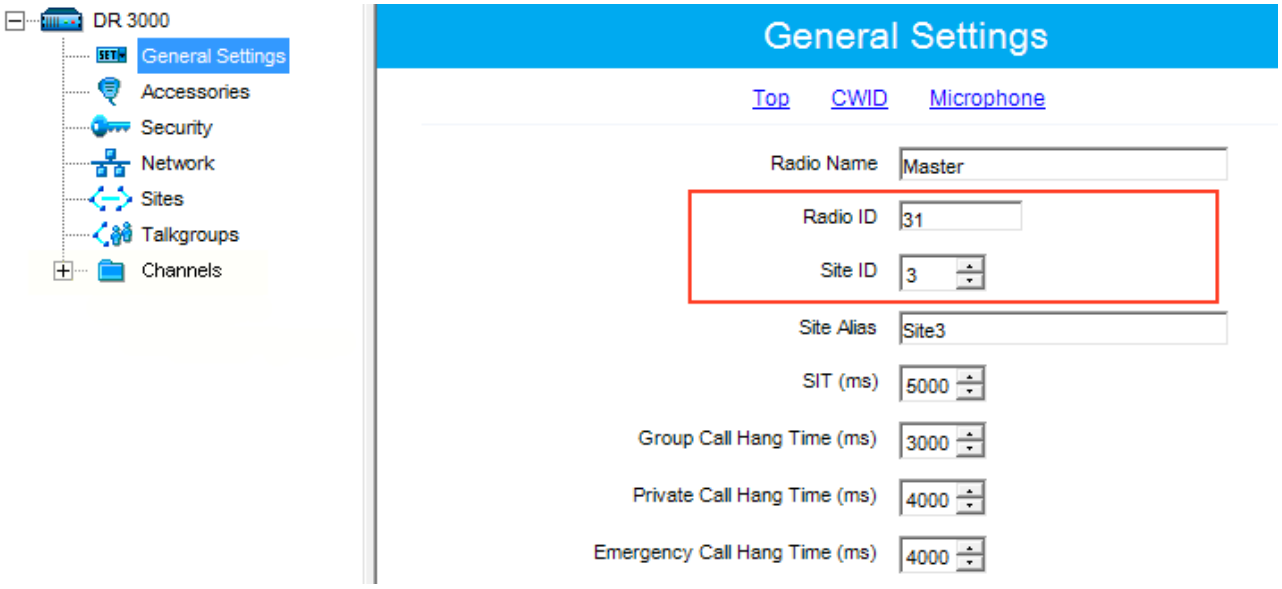
5. Click **Write** (next to the **Read** button in the tool bar) to apply changes in the settings.

MOTOTRBO Repeater Programming

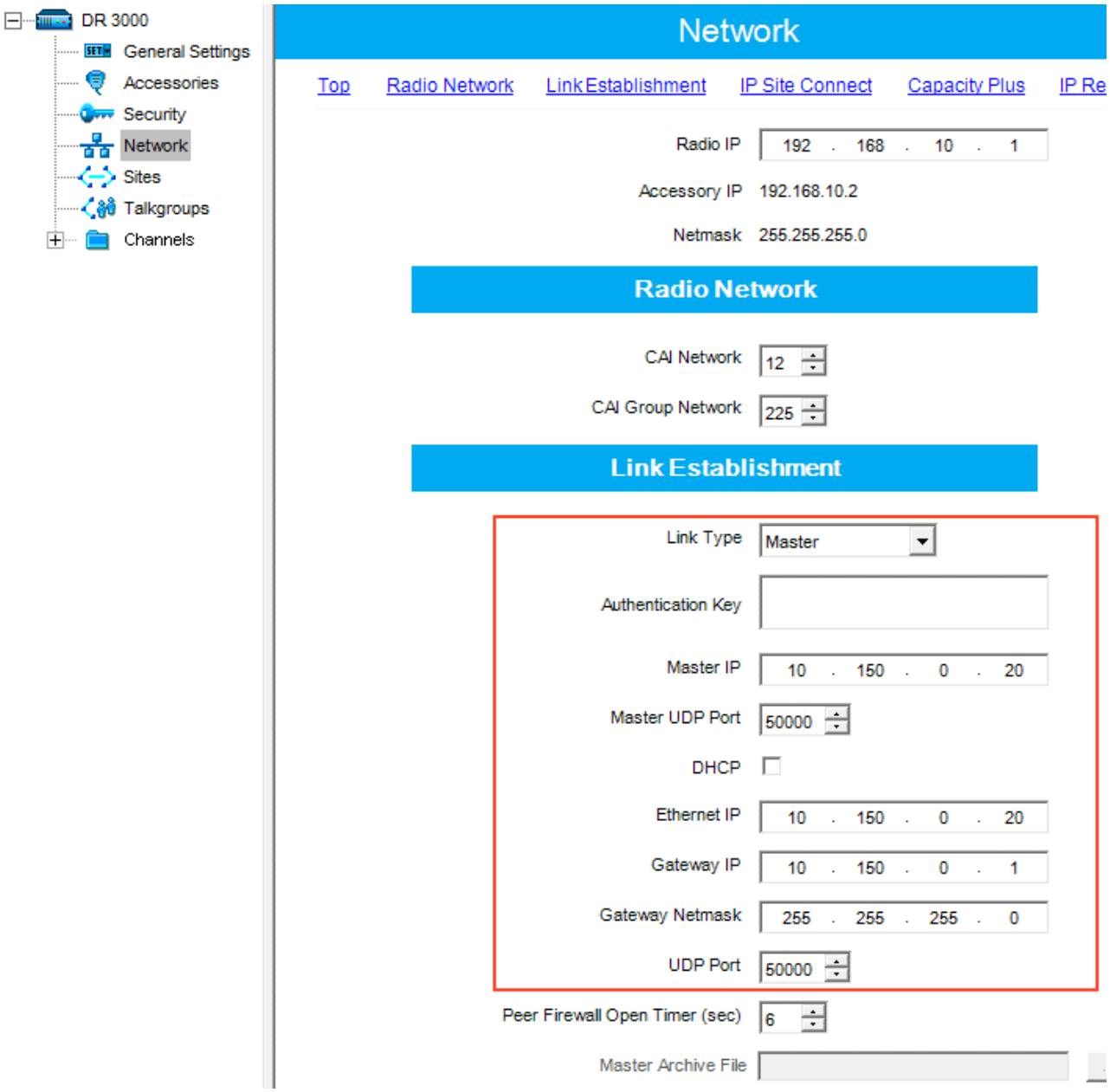
Note: Only repeaters with 32 MB of internal memory (e.g., DR 3000 or MTR3000) can support the LCP configuration. Also, make sure that the repeater supports such features as **Network Application Interface Voice**, **Network Application Interface Data** and **Capacity Plus (Linked)**.

First of all, configure the Master repeater parameters. Each LCP system needs one repeater to act as a Master. The Master repeater has a static IP address, while other repeaters can have either static or dynamic IP addresses. All the repeaters in the LCP configuration register with the Master using the static IP address of the Master.

1. In the **General Settings** tab specify **Radio ID** and **Site ID**. In our case **Radio ID**=*31* and **Site ID**=*3*.



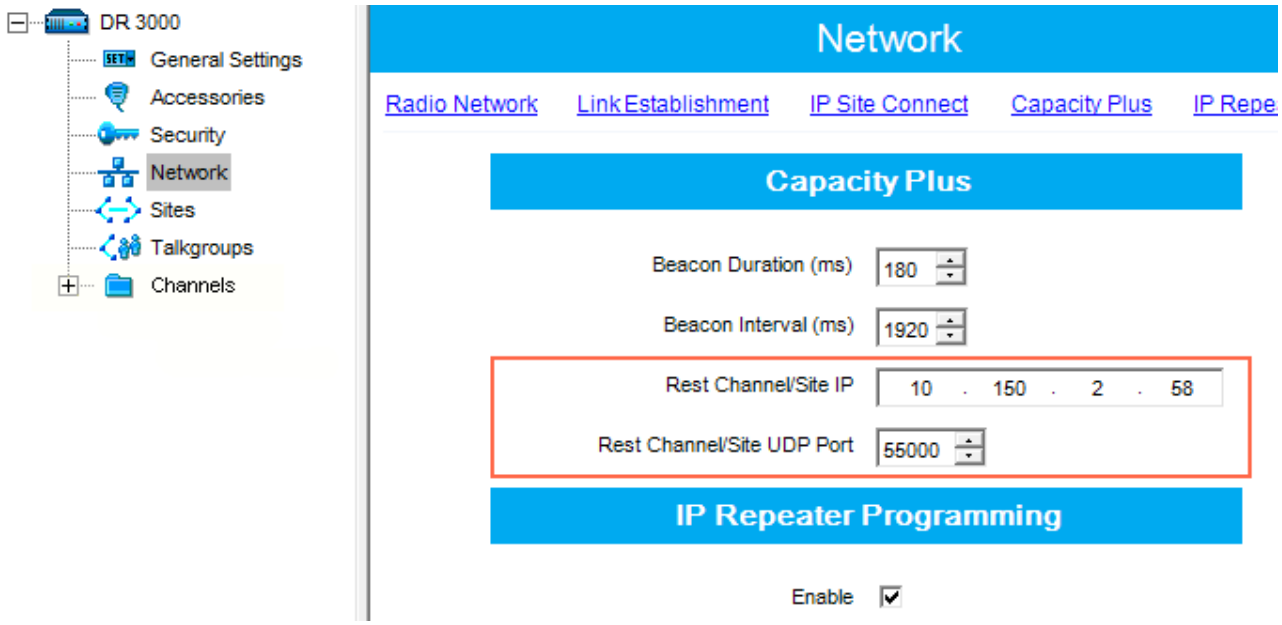
2. Add parameters in the **Network** tab.



- In the **Link Type** field select *Master*.
- In the **Master IP** and **Master UDP Port** specify the IP address and port number of the Master repeater.
- Do not select **DHCP**. Master IP address should be static.
- In the **Ethernet IP** field specify the IP address of the Master repeater, the same as in the **Master IP** field.
- In the **Gateway IP** field specify the gateway IP address for the repeater.

- In the **Gateway Netmask** field specify the gateway netmask address for the repeater.
- In the **UDP Port** field specify the UDP port of the repeater. The default value is set to *50000*.

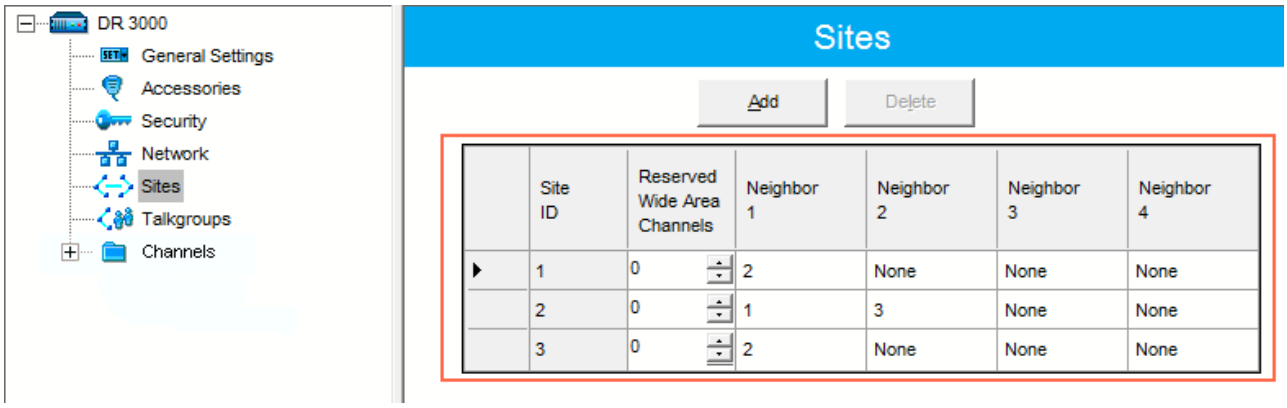
3. In the same **Network** tab specify **Rest Channel/Site IP** and **Rest Channel/Site UDP Port**.



Rest Channel/Site IP is a virtual IP address that is required for correct operation of the LCP system. As the Rest Channel rotates through the channel pool of a site, this virtual IP address is associated with a different physical repeater only for the duration for which one of its slots is the Rest Channel. This IP address MUST be the same for all repeaters at the same site. **Rest Channel/Site IP** address should be at the same sub network as all repeaters of this site. No other device should use this IP address.

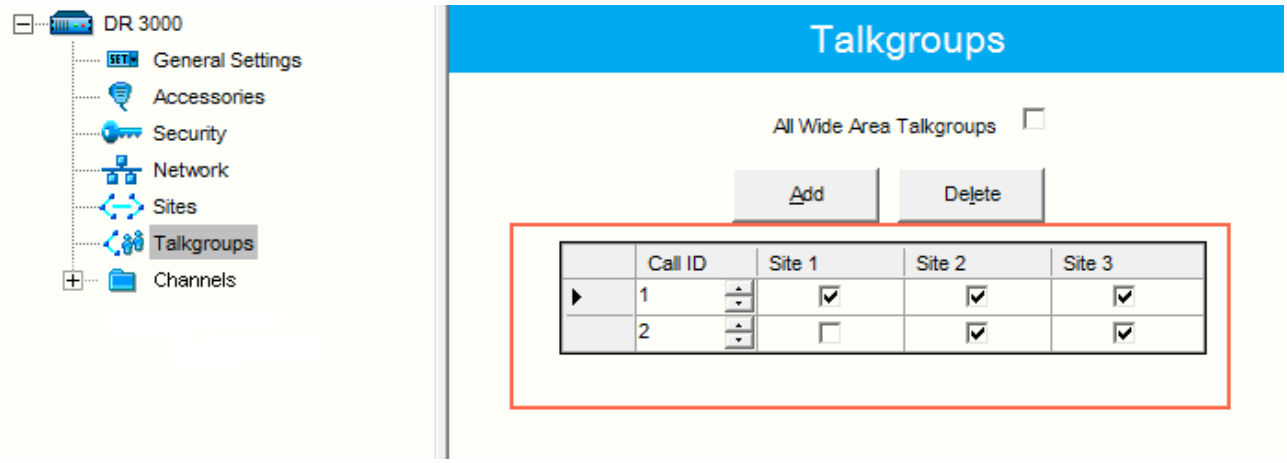
In the LCP system **Rest Channel/Site UDP Port** allows the user to configure the UDP port of site for communication with other sites connected within the LCP system.

4. In the **Sites** tab set up the site map. In this example we have 3 sites (see the network scheme above). *Site 1* has only one neighbor – *Site2*. *Site 2* has 2 neighbors – *Site 1* and *Site 3*. And *Site 3* has only one neighbor – *Site 2*.



In the **Reserved Wide Area Channels** column you can specify how many channels are to be reserved for a wide group call per site, if necessary.

5. In the **Talkgroups** tab, specify wide groups and sites on which these groups are available. You do not need to add local groups which are available only on one site.

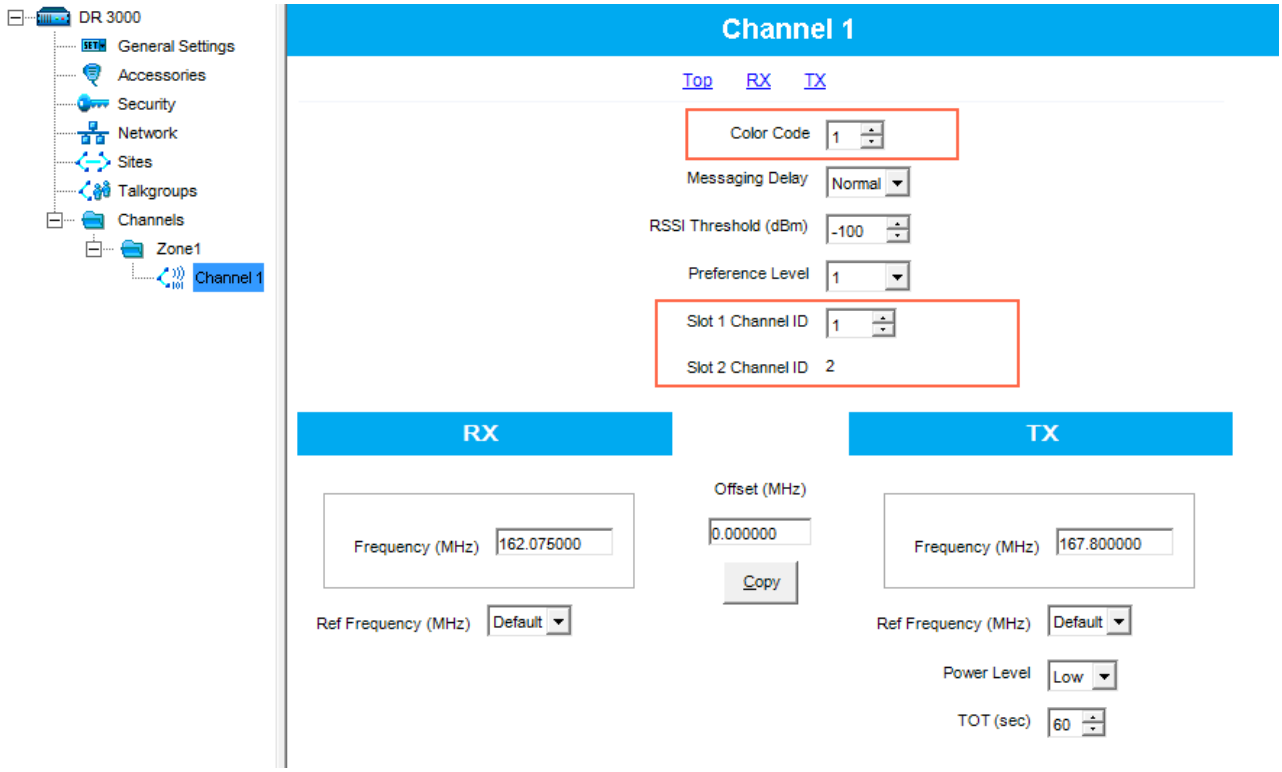


In our example we have only two wide groups. Group 1 is a wide group which is available on all sites. So when a subscriber initiates a call to Group 1, this call will be transmitted on all sites. Group 2 is also a wide group and is available on *Site 2* and *Site 3*.

6. Set up channels. Click on **Channels**, right-click on **Zone**, select **Add** and then **Capacity Plus Voice Channel (Linked)** or **Capacity Plus Data Channel (Linked)**. Please remember that both repeater channels

will be used for one and the same purpose. In LCP, a Data Revert Channel can be configured either as a local Data Revert Channel, or as a wide area Data Revert Channel. In our configuration all repeaters will be used for voice, that is why in the Master repeater settings we add **Capacity Plus Voice Channel (Linked)**.

7. Specify **Color Code** and **Slot Channel ID**.

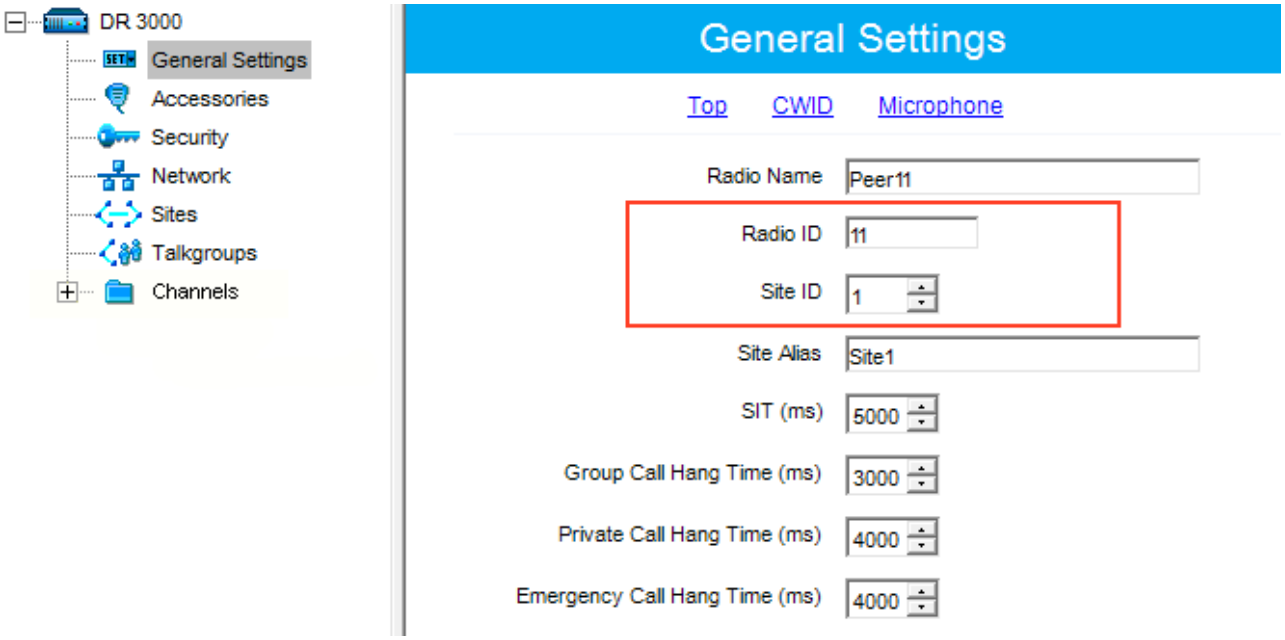


The color code is used to identify radio systems. Therefore, different color codes are used to identify different systems. Channels may have the same or different color codes. However, a repeater can only have one color code. Radios will ignore any channel activity not containing the matching color code for the system. Repeaters using the same frequency may be associated with different color codes.

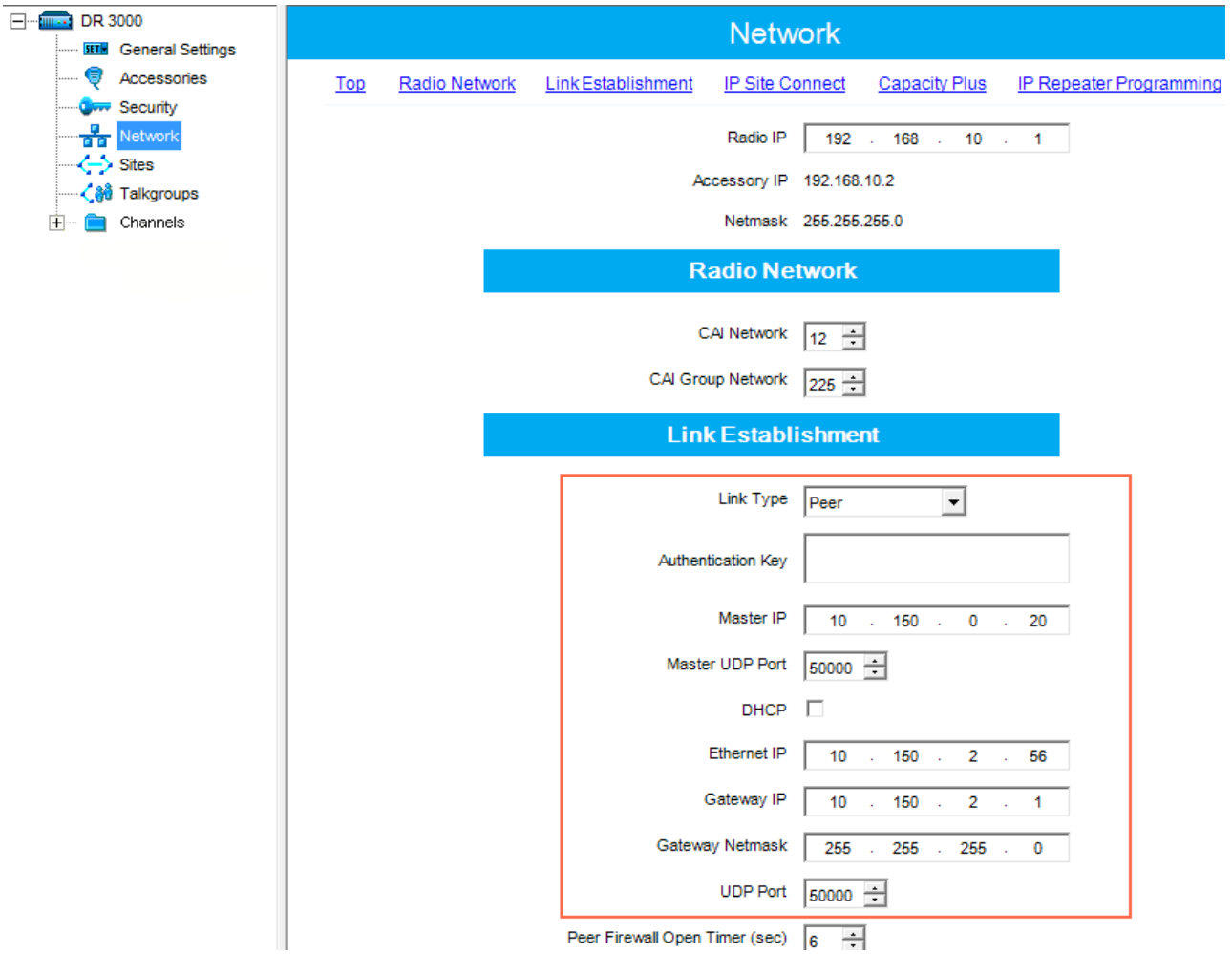
Slot 2 Channel ID is set up automatically.

Now, configure parameters of one of the peer repeaters on *Site 1.*

1. In the **General Settings** tab specify **Radio ID** and **Site ID**. In our case **Radio ID**=*11* and **Site ID**=*1*.

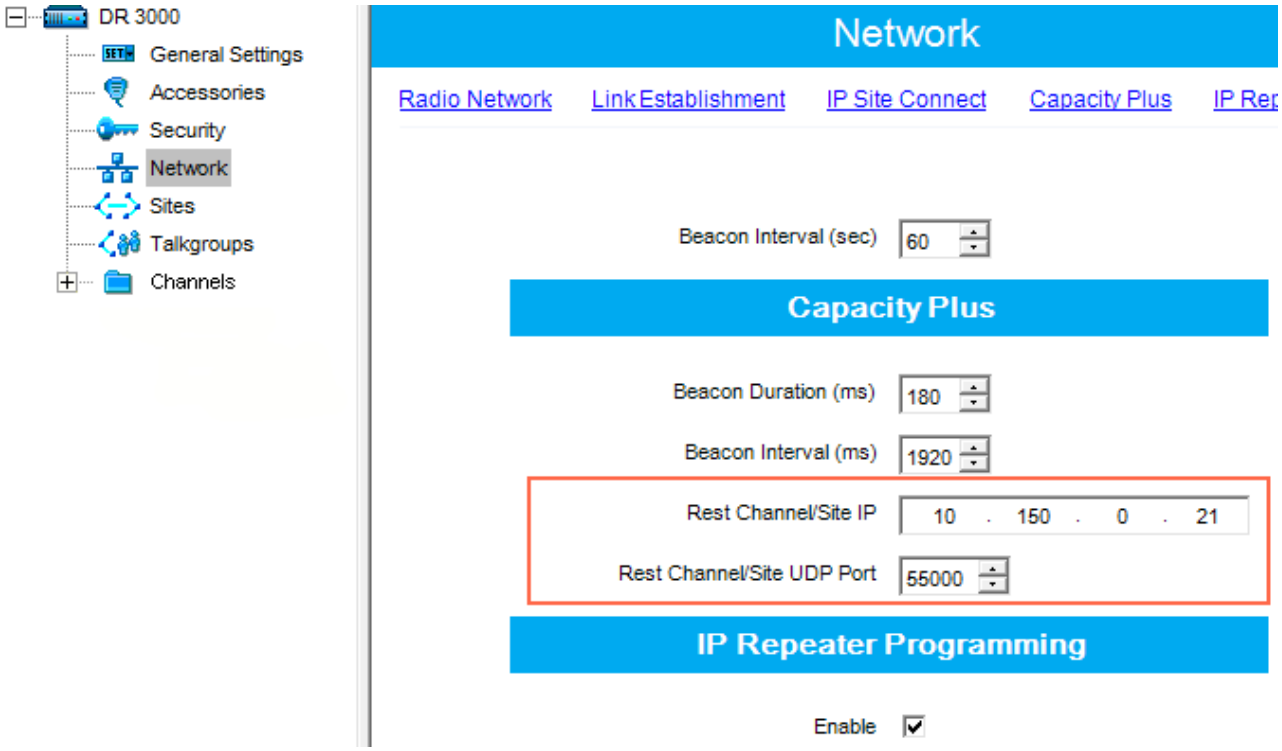


2. In the **Network** tab configure network settings.



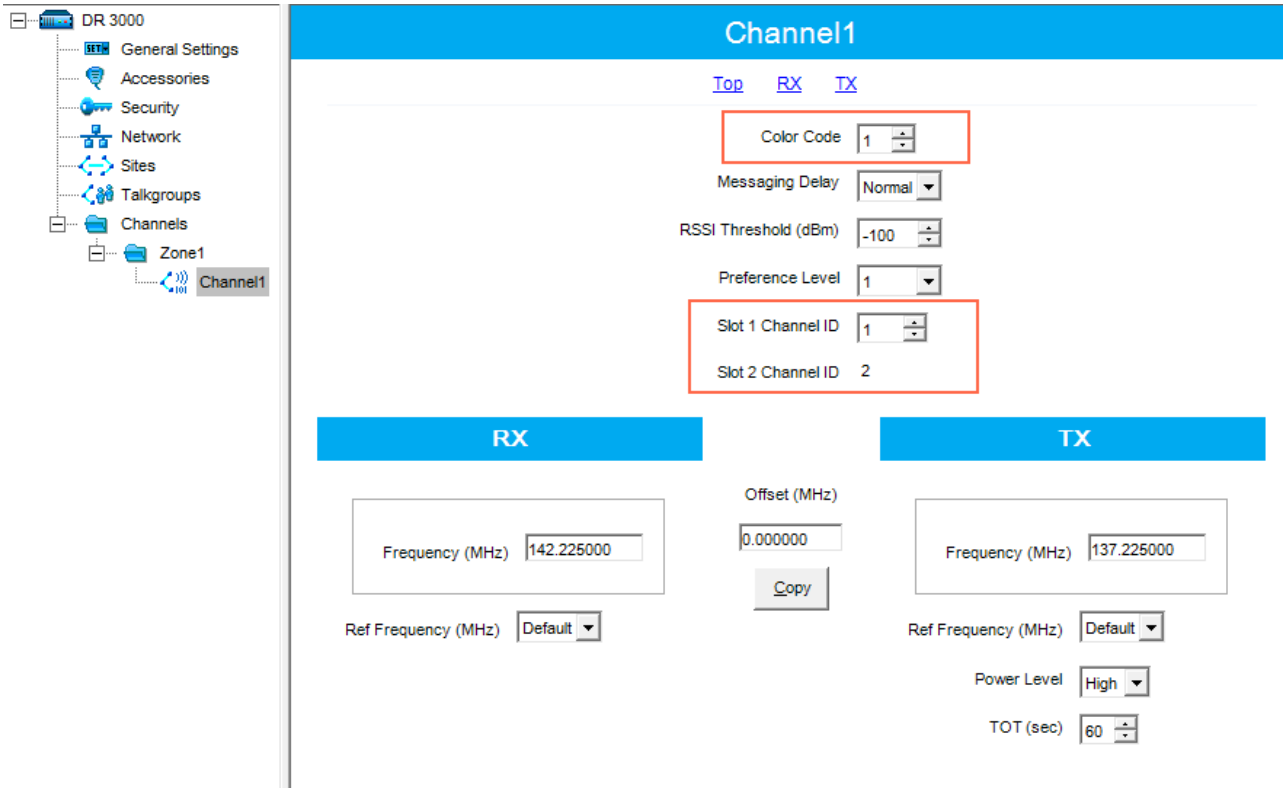
- In the **Link Type** field select *Peer*.
- In the **Master IP** and **Master UDP Port** specify the IP address and port number of the Master repeater.
- Do not select **DHCP**.
- In the **Ethernet IP** field specify the IP address of the repeater. Master IP address (*Site 3*) and Peer repeater IP address (*Site 1*) will be in different sub networks, because each site should be located in different sub network.
- In the **Gateway IP** field specify the gateway IP address for the repeater.
- In the **Gateway Netmask** field specify the gateway netmask address for the repeater.
- In the **UDP Port** field specify the UDP port of the repeater. The default value is set to *50000*.

3. In the same **Network** tab specify **Rest Channel/Site IP** and **Rest Channel/Site UDP Port**.



Rest Channel/Site IP is configured in each repeater. Repeaters from the same site will have the same **Rest Channel IP** address.

4. Add channels. Click on **Channels**, right-click on **Zone**, select **Add** and then **Capacity Plus Voice Channel (Linked)**. Specify **Color Code** and **Slot Channel ID** for each channel.



The **Color Code** must match the color code set for other repeaters.

When configuring a new site, you need to start numeration with **Slot 1 Channel ID**=*1*.

Example:

Site 3 (with Master): 1-2-Master ID=31, 3-4-Peer ID=32,

Site 1: 1-2-Peer ID=11, 3-4-Peer ID=12,

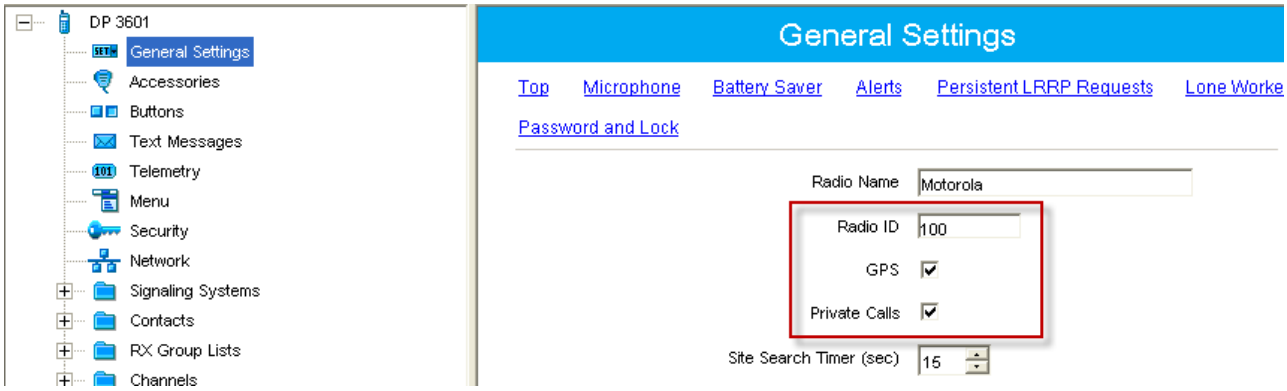
Site 2: 1-2-Peer ID=21, 3-4-Peer ID=22.

Other peer repeaters are configured likewise. When configuring, please keep in mind that:

- All repeaters from the same site should be in the same LAN.
- Each repeater must have **Master IP Address/Port** and **Rest Channel/Port**.

MOTOTRBO Radio Programming

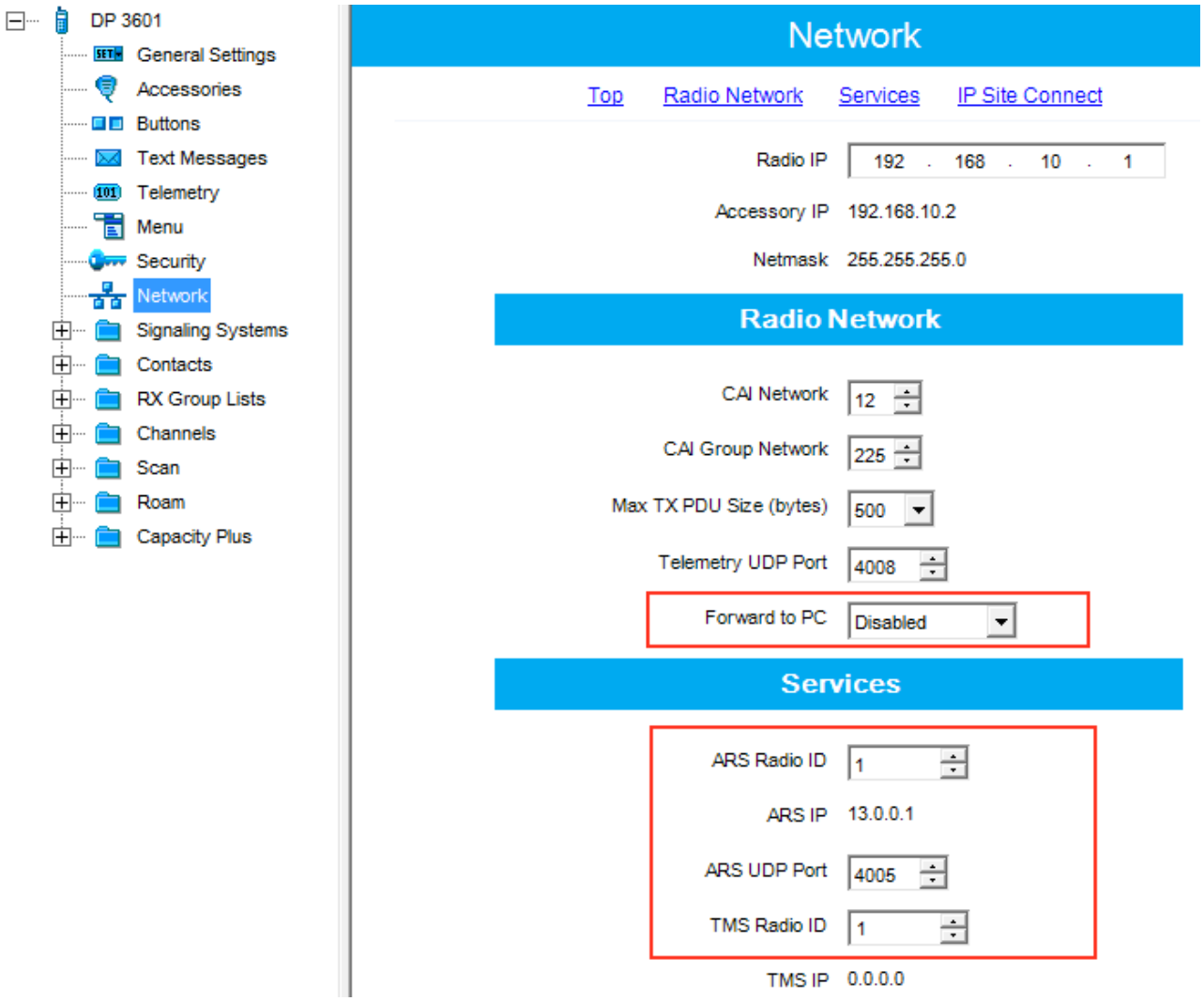
1.In the **General Settings** specify **Radio ID**.



Select **GPS**, if you need to track the subscriber location (only for radios with GPS support DP/DM 3401, 3601, 4401, 4601, DP 4801, SL4010).

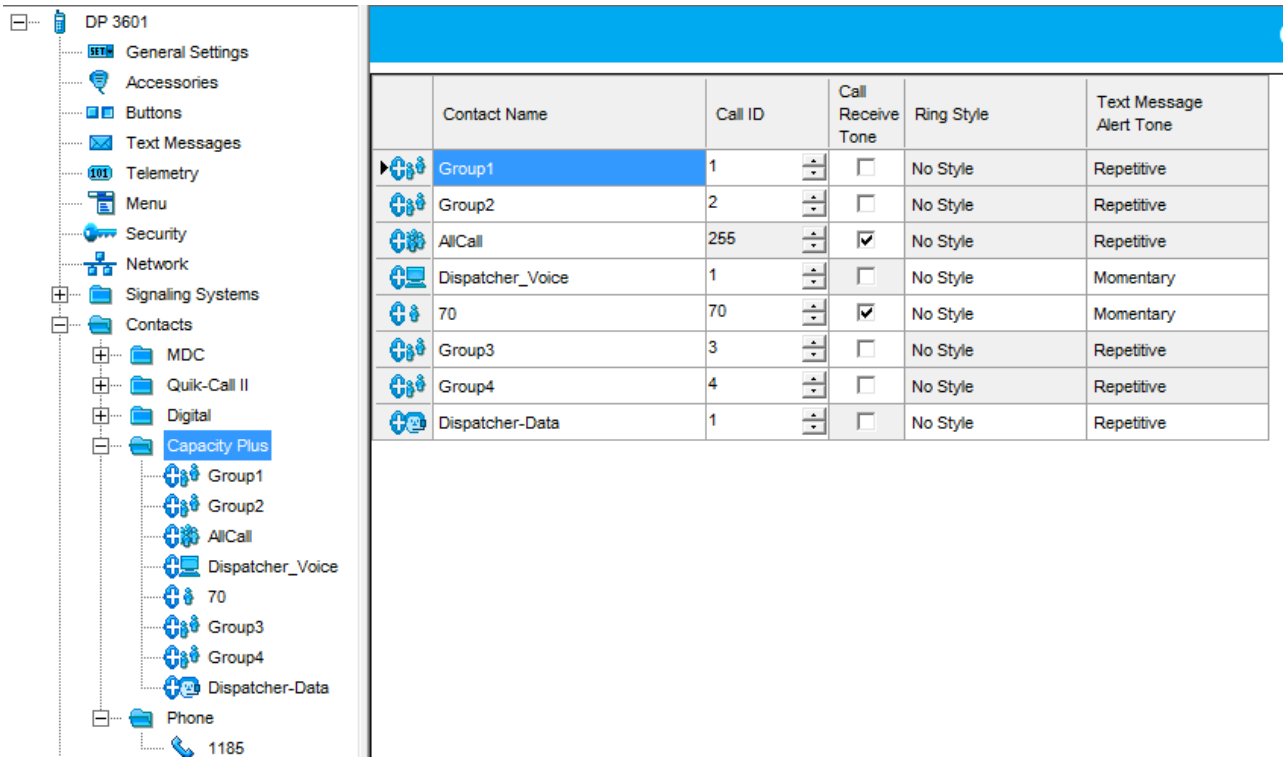
Select **Private Calls**, if radio subscriber needs to transmit private calls. If **Private Call** is not selected, radio subscriber won't be able to initiate a private call, but the user can continue to receive and respond to private calls, and is still able to initiate call alerts.

2. In the **Network** tab configure the necessary settings.



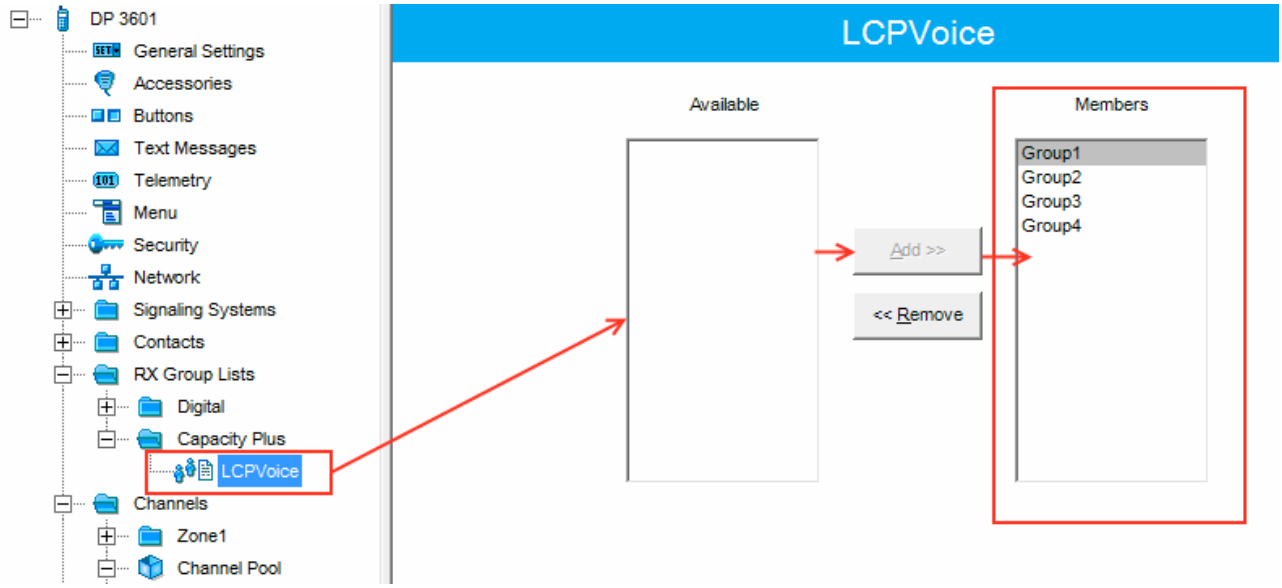
- In the **Forward to PC** field select *Disabled*.
- If you plan to work with SmartPTT application specify **ARS Radio ID** and **TMS Radio ID**. Remember that the **ARS Radio ID** and **TMS Radio ID** should match the **MNIS Radio ID** in the MOTOTRBO MNIS application and Slot ID in SmartPTT Radioserver Configurator. In our case, **ARS Radio ID=TMS Radio ID=Slot ID=MNIS ID=***1*.

3. In the **Contacts** tab right-click on the **Capacity Plus** system to add necessary contacts (**Private Call**, **Group Call**, **All Call**) to subscriber's contact list. When configuring the Master repeater, we added 2 groups as wide groups in the **Talkgroups** tab. Group 1 with ID=*1* is available for all sites, Group 2 with ID=*2* is available for *Site 2* and *Site 3*. Local groups should be added in the radio settings. In this example we will add 4 groups: Group 1, Group 2 – as wide groups, Group 3 and Group 4 as local groups, and other necessary contacts.

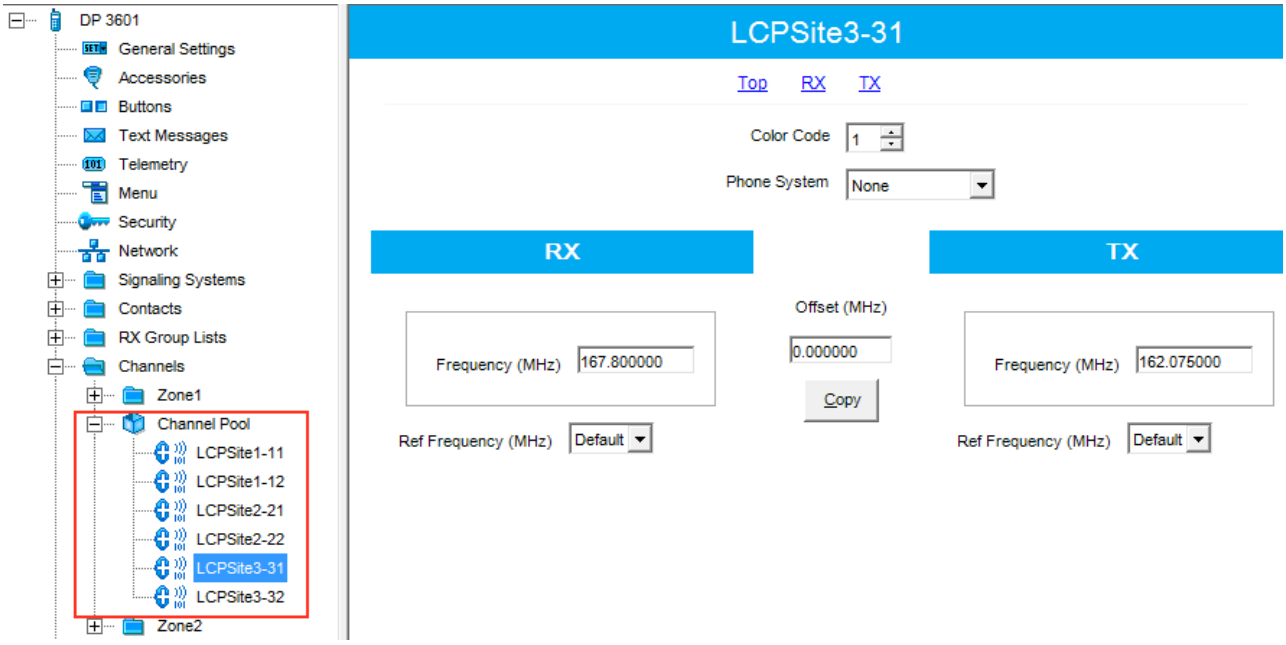


Also, add **Dispatcher Call** for transmitting data to SmartPTT Radioserver and **PC Call** to be able to initiate calls to SmartPTT Dispatcher. Make sure that the **ID**s of these calls equal **Slot ID** in SmartPTT Radioserver Configurator (see SmartPTT Radioserver configuration).

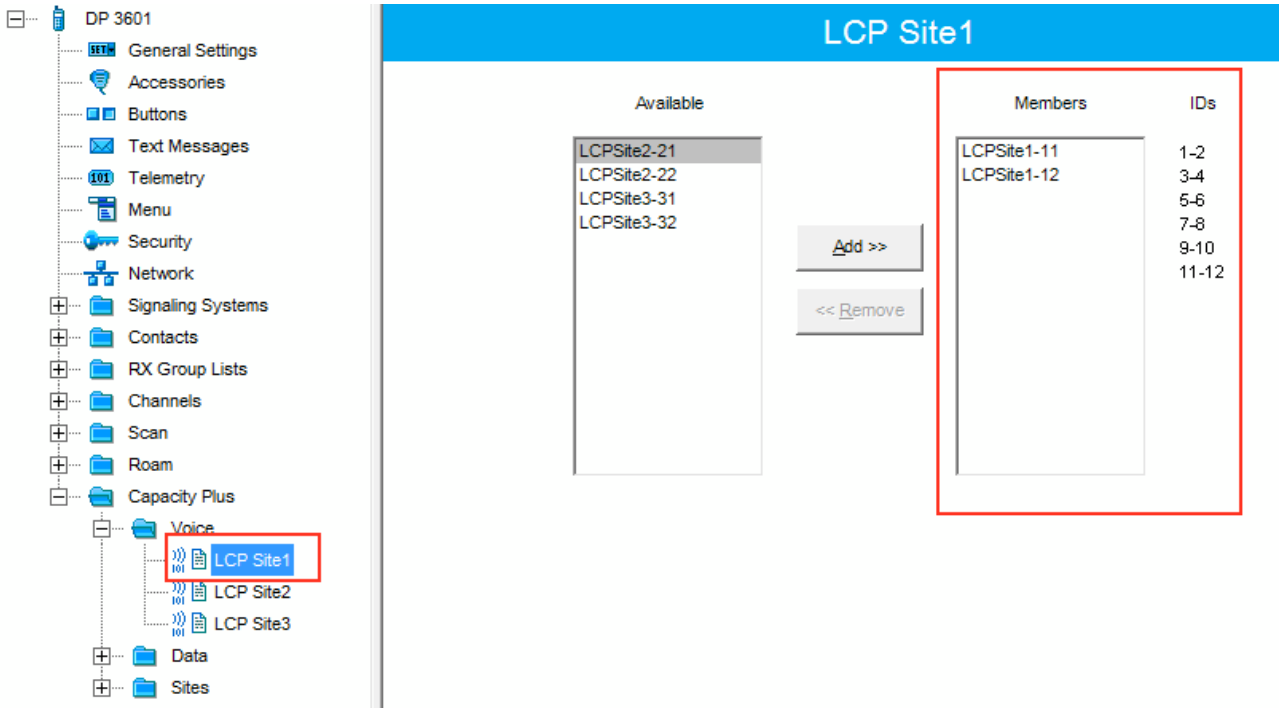
4. Add these groups to the **RX List**. In our example we use the same RX list for all sites. That is why the **RX List** contains all the groups.



5. Add all repeaters, which are in the LCP system, to the **Channel Pool**. The color code should equal the color code specified for repeaters. In our case **Color Code**=*1*.



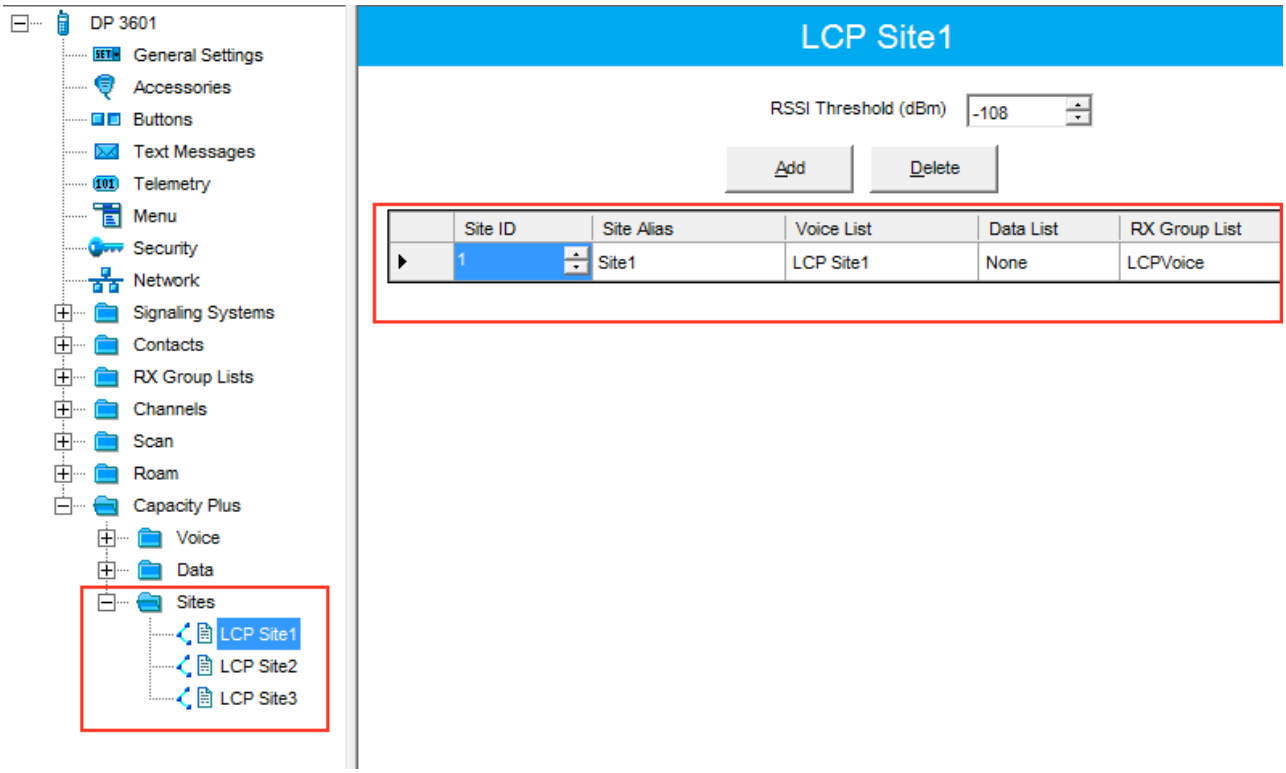
6. Create **Voice** lists and **Data** lists according to the amount of sites. As all of our repeaters are Trunk repeaters (transmit voice and data), create only **Voice** lists. When adding new **Voice** list, under the **Available** list you can see all the channels which were added to the **Channel Pool**. So, for *Site 1* add a **Voice** list (LCP Site 1) and add *LCP Site 1-11* and *LCP Site 1-12* to this list.



Please note that **IDs** in the **Members** list should correspond to **Slot 1 ID Channel** and **Slot 2 ID Channel** specified in repeater settings.

7. Create **Voice** lists for *Site 2* and *Site 3* accordingly.

8. Configure **Sites** lists. If you do not use roaming, create several site lists and add only one site per list.



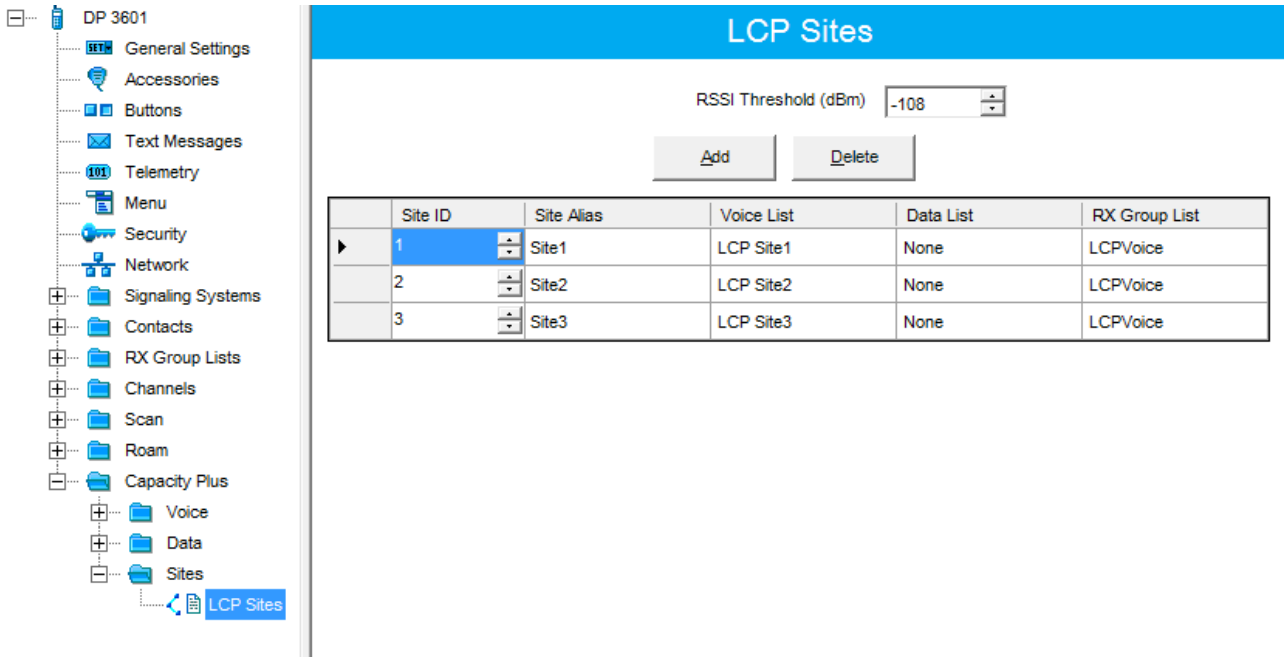
Since in this example there are three Sites, add three **Sites** lists.

For each **Site** configure:

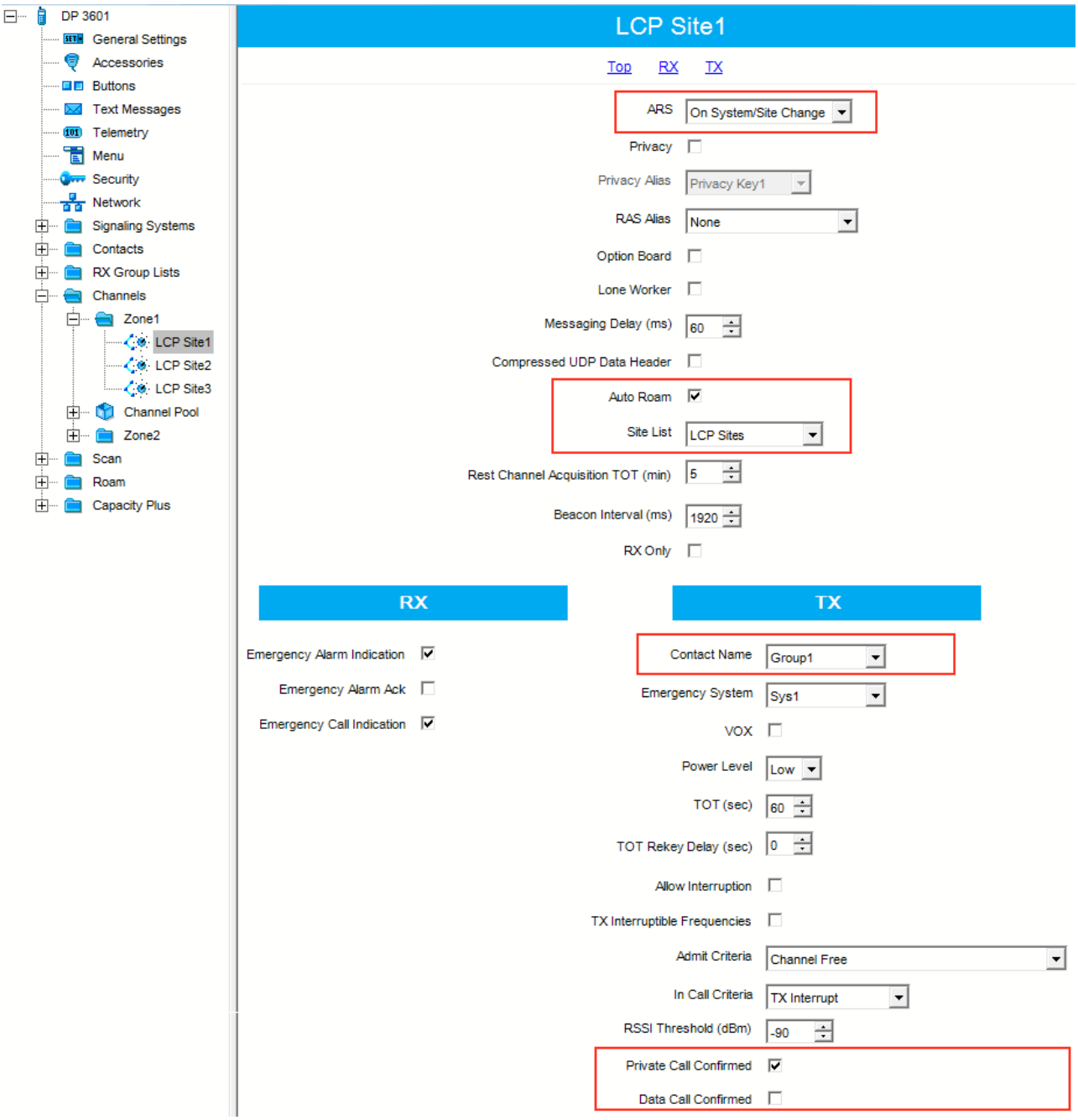
- **Site ID** – ID of the site to which the subscriber radio is connected.
- **Site Alias** – name of the site to which the subscriber radio is connected.
- **Voice List** – Voice Channel List which the subscriber radio will use to make voice calls when on the site.
- **Data List** – Data Channel List which the subscriber radio will use to make data calls when on the site.
- **RX Group List** – RX Group List which the subscriber radio will use to receive group calls when on the site.

If subscriber roams between different sites, one site list will contain several sites.

In our case a subscriber with **Radio ID**=*100* can roam between all three sites, so we created one **Sites** list with all the sites.



9. Add LCP Personalities. To do this, right-click on **Zone** and add **Capacity Plus Personality (linked)**.



For each channel specify:

- **ARS** – select *On System/Site Change.* ARS feature provides an automatic radio registration. When the radio powers up, the radio automatically registers with the server. This feature is also used with Text

Messaging or Location Services.

- **Auto Roam** – select **Auto Roam** if the radio is to roam between sites in the LCP system. If disabled, the radio subscriber won't be able to roam to another LCP site when moving from one site to another.
- For each channel select appropriate **Sites** list. The subscriber radio can roam to the sites listed in the **Sites** list.
- Select **Contact Name** which defines the call that may be initiated on the channel by pressing the PTT button, when there are no active calls on the channel.
- Select **Private Call Confirmed** and clear **Data Call Confirmed**.