



Version 9.0

# SmartPTT PLUS

Installation & Configuration Guide

April 2016

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# Installation & Configuration Guide

## Introduction

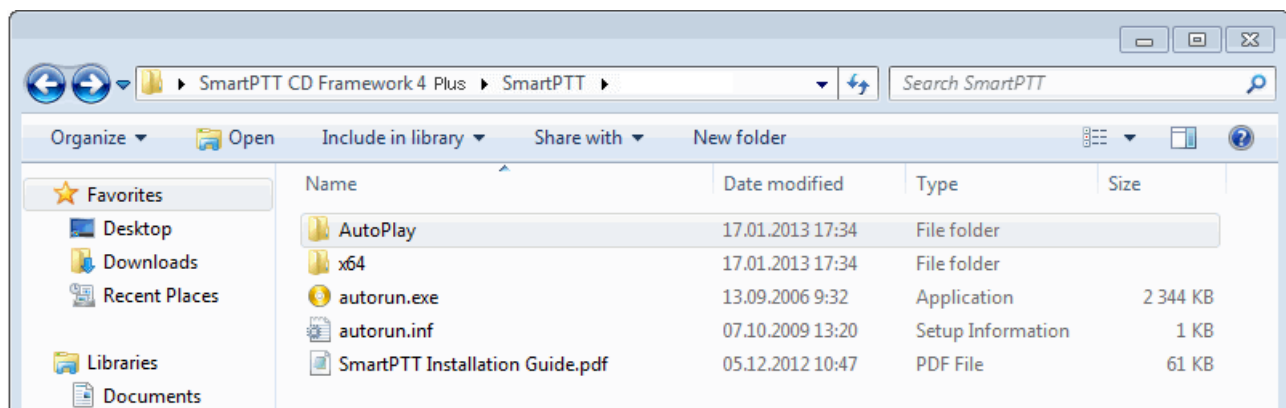
Installation and configuration of the SmartPTT PLUS system is a complex task and comprises the following steps:

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).

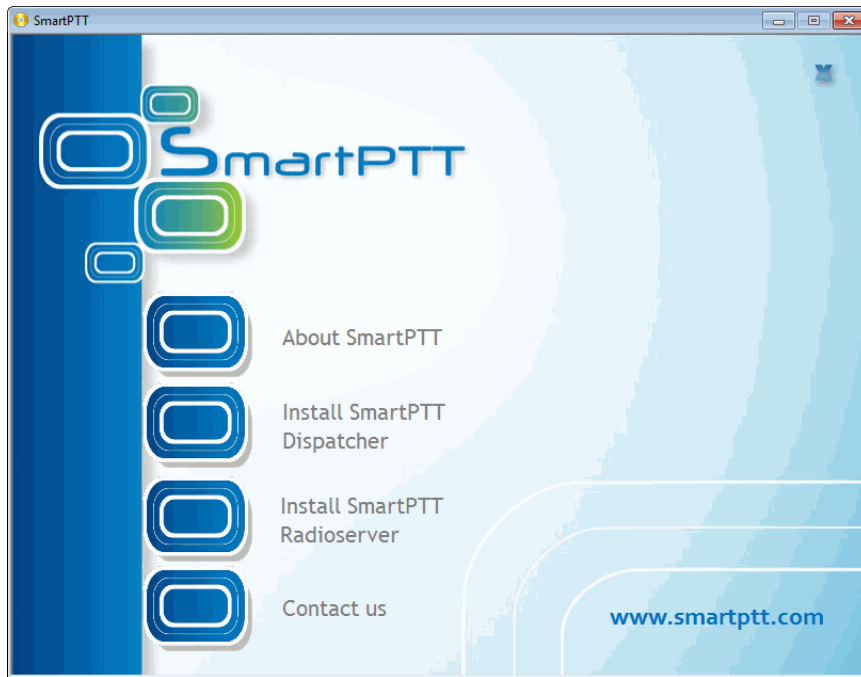
The system configuration depends on the network used and the devices available. In this document, you will learn how to install and configure the system on the basis of Linked Capacity Plus (LCP) and Connect Plus networks consisting of 3 sites.

## SmartPTT Software Installation

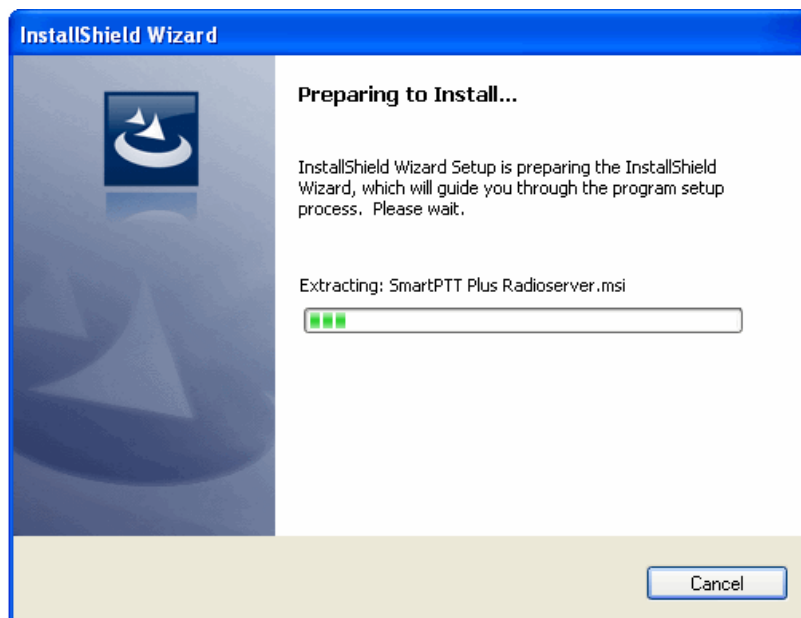
1. After downloading SmartPTT PLUS distribution kit, unpack it to a separate folder.



2. Run **autorun.exe**.

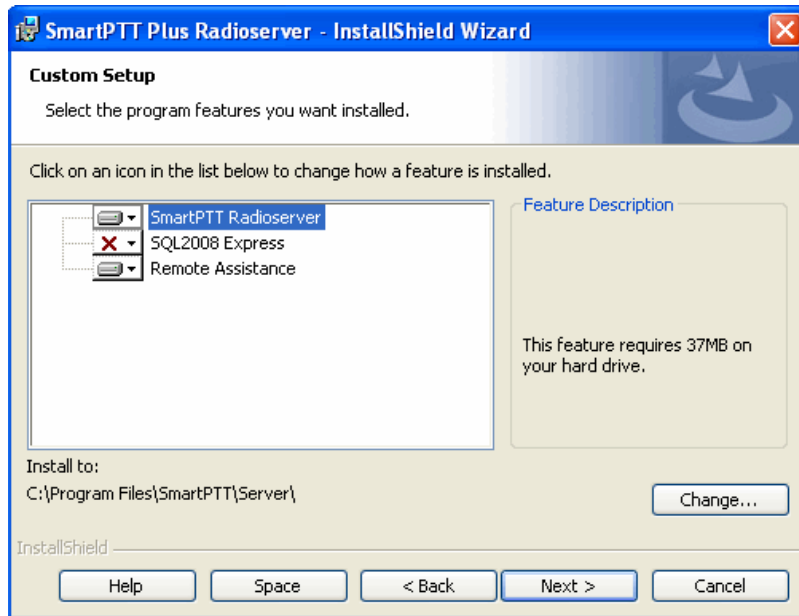


3. Install SmartPTT Radioserver first and then SmartPTT Dispatcher. For both installation processes the setup wizard will be used.

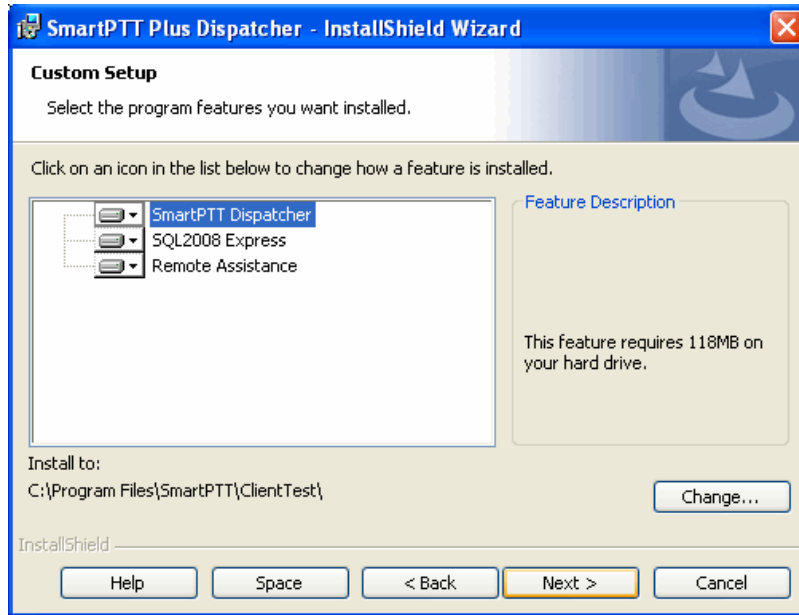


4. Follow the steps of the setup wizard.

**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.

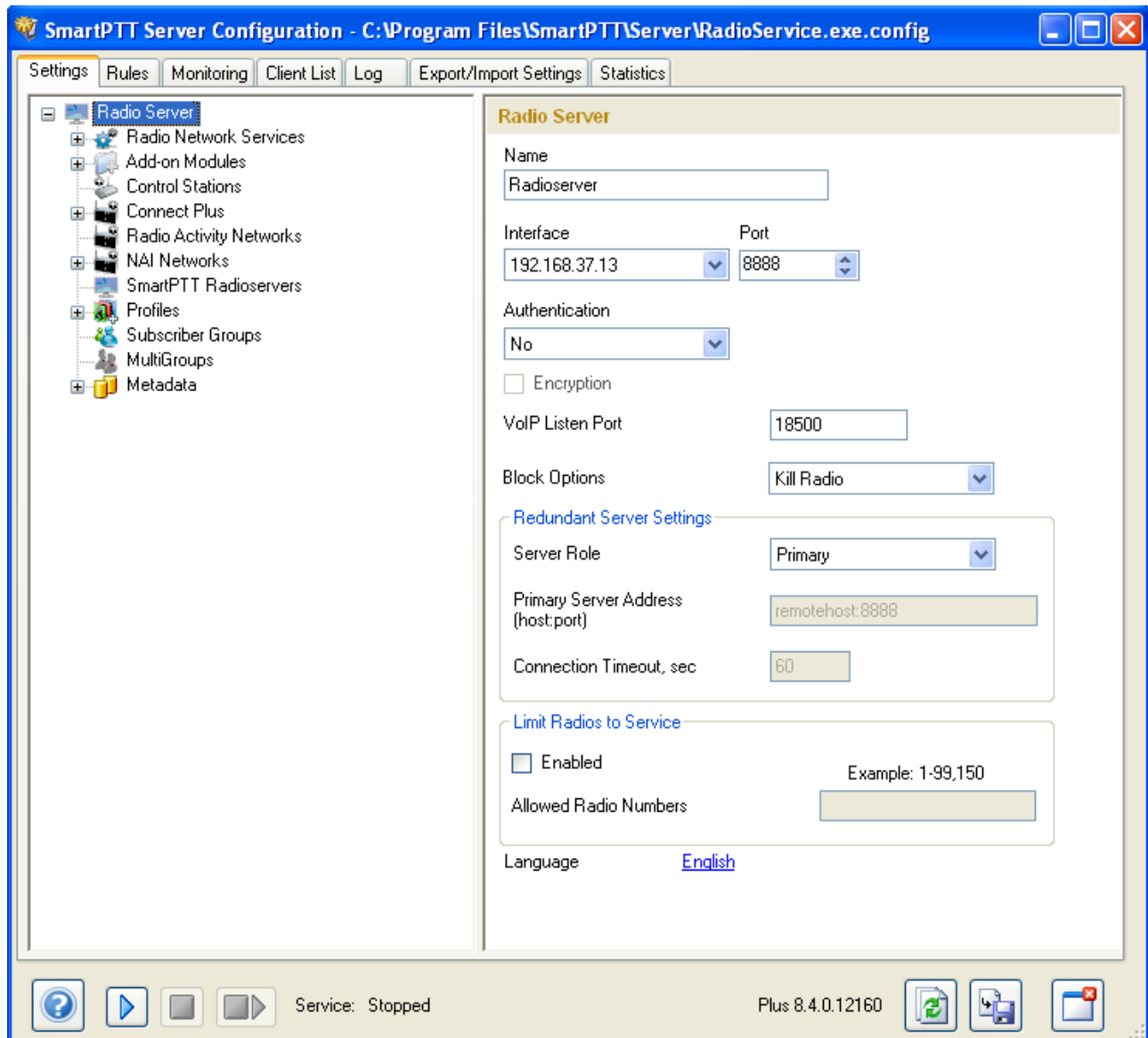


5. Once you have finished, close the installation window.

## 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** check box under **ARS**:

The screenshot shows the configuration for ARS. On the left, a tree view under 'Radio Network Services' has 'ARS' selected. On the right, the 'ARS' configuration panel is displayed with the following settings:

- Active
- Radio Inactivity Timeout, s: 600
- Global Minimum Request Interval, ms: 1000
- Use Radio Check:

- To enable GPS support, select the **Active** check box under **GPS**:

The screenshot shows the configuration for GPS. On the left, a tree view under 'Radio Network Services' has 'GPS' selected. On the right, the 'GPS' configuration panel is displayed with the following settings:

- Active
- Minimum location update interval, s: 60
- Minimum Request Interval, s: 1
- Radio Inactivity Timeout, s: 60

Below these settings is a section titled 'Get Subscriber Location for Following Groups:' with a table:

Group Name	Time Interval, s	On/Off

- To enable text messaging service, select the **Active** check box under **TMS**:

The screenshot shows the configuration for TMS. On the left, a tree view under 'Radio Network Services' has 'TMS' selected. On the right, the 'TMS' configuration panel is displayed with the following settings:

- Active



# 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 or Connect Plus 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:

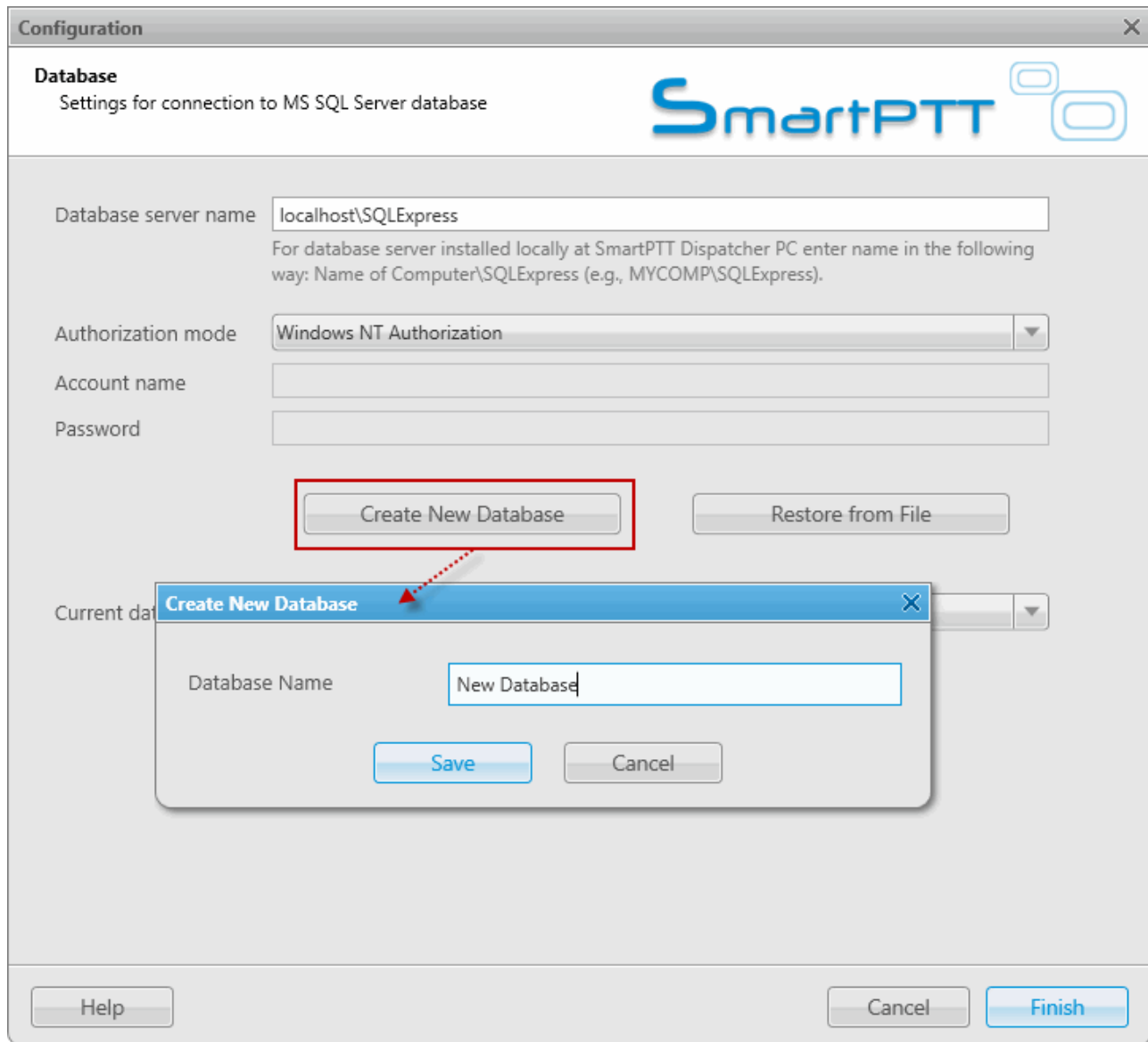
1. Expand the **Settings** menu in the **Main Menu** bar of the SmartPTT Dispatcher window and click **Licenses**.

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

2. Expand the **Settings** menu in the **Main Menu** bar of the SmartPTT Dispatcher window and click **Database**. 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 click **Create New Database**. 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).

In the window that opened enter the name of the new database and click **Save**.



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.

**Authorization Mode** – allows you to select authorization mode with the database.

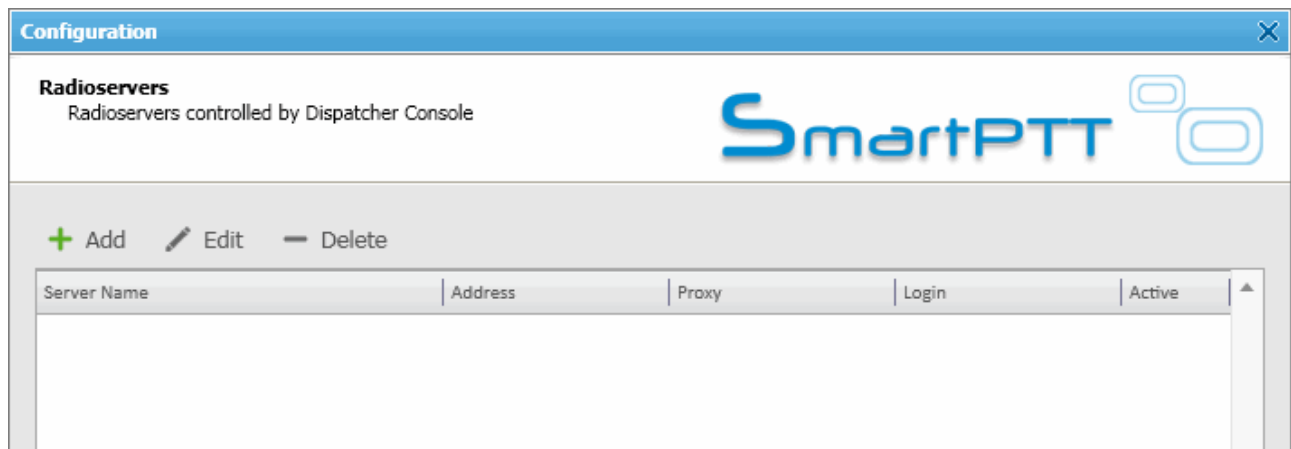
**SQL Server Authorization** – you must have the login and password of the account which has access to the SQL server.

**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.

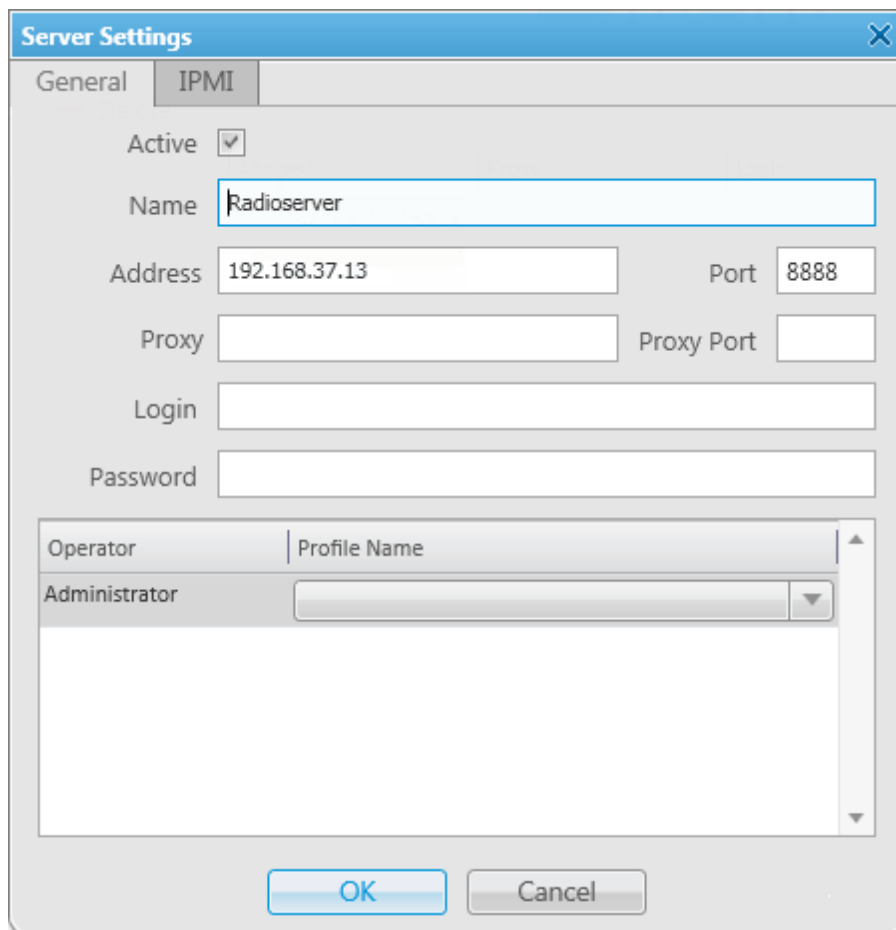
After you have finished, click **Finish** to save the changes. You will need to restart SmartPTT Dispatcher to apply

the changes.

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** check box 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. Expand the **Settings** menu in the **Main Menu** bar of the SmartPTT Dispatcher window and click **Sound**.

The screenshot shows the 'Configuration' window with the 'Sound Settings' tab selected. The window title is 'Configuration' and it has a close button (X) in the top right corner. The main title is 'Sound Settings' with the subtitle 'Audio devices and VoIP settings'. The SmartPTT logo is in the top right. There are three tabs: 'General Settings', 'Audio Output Devices', and 'Other Settings'. The 'Audio Input' section has a 'Device' dropdown set to 'Microphone (2- USB audio CODEC)', an 'Input Line' dropdown set to 'Audio', and a 'Noise Reduction' dropdown set to 'Disabled'. Below these are 'Record', 'Check', and 'Save' buttons. The 'Audio Output' section has a 'Device' dropdown set to 'Default' and a 'Check' button. The 'VoIP Parameters' section has a 'Codec' dropdown set to 'CCITT u-Law', a 'Codec Format' dropdown set to '8000 Hz, 20 ms, 64 (86) kbps', and a 'VoIP Port' text box containing '18501'. At the bottom are 'Help', 'Cancel', and 'Finish' buttons.

Section	Field	Value
Audio Input	Device	Microphone (2- USB audio CODEC)
	Input Line	Audio
	Noise Reduction	Disabled
Audio Output	Device	Default
	VoIP Parameters	
VoIP Parameters	Codec	CCITT u-Law
VoIP Parameters	Codec Format	8000 Hz, 20 ms, 64 (86) kbps
VoIP Parameters	VoIP Port	18501

**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 (86) kbps*:

**8000Hz** – the sampling rate.

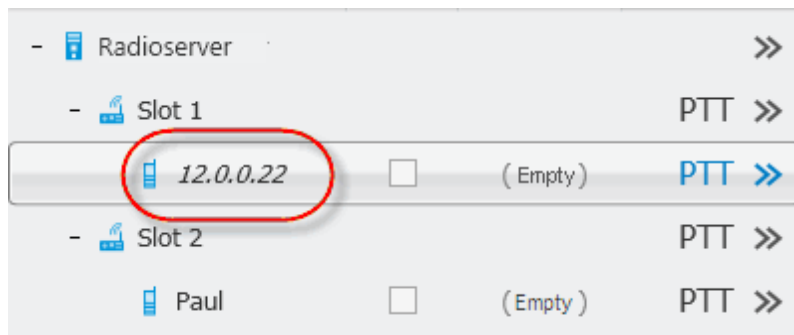
**20 ms** – the frame size.

**64 kbps** – the voice data bit rate.

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

For more information see Help in the SmartPTT Dispatcher application.

5. Register radio subscribers. Unregistered radio subscribers are displayed in italics in the **Radio Fleet** window and are not recorded into the database.



To register the radio subscriber, right-click on the radio subscriber, enter the name and click **Save**.

The screenshot shows a dialog box titled "Properties: Mike" with a close button (X) in the top right corner. The dialog has three tabs: "General", "Location", and "Custom". The "General" tab is selected. On the left side of the "General" tab, there is a profile picture of a person wearing a hard hat and a dark jacket, standing on a bridge or walkway. Below the picture is a "Select" button and a small "x" button. The main area of the dialog contains several fields and controls: an "IP" text box with the value "12.0.0.22"; "MDC ID" and "5 Tone ID" text boxes, both currently empty; a "Name" text box with the value "Mike"; a "Status" dropdown menu currently showing "(empty)"; three icons (a USB symbol, a printer symbol, and a person with a mobile phone symbol) with a small downward arrow to the right; a checked "Lone Worker" checkbox; and a "Security" dropdown menu. At the bottom of the dialog are two buttons: "Save" and "Cancel".

## Connect Plus

SmartPTT PLUS supports Connect Plus multi-site trunking system, which starting from version 8.5 can be used not only for Presence Notification service, 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 at least one XRC Controller. It is the core of the Connect Plus network and its presence on each site is obligatory. The XRC Controller provides central call processing and real-time resource management for MOTOTRBO Connect Plus digital trunking systems. There can be two XRC Controllers per site if one of them serves as backup to the primary XRC. The secondary controller provides backup capability, but it does not increase the number of repeaters and calls that can be managed per site.

XRT Gateways are required for voice communication and call event monitoring.

You can also build the Connect Plus system based on control stations for voice communication instead of the XRT Gateway. In this case, the XRC Controller is not mandatory either. But without the XRC Controller you won't be able to transfer data (GPS, Presence Notification, TMS). For more information on how to configure control stations instead of the XRT Gateway for voice communication see [MOTOTRBO Control Stations](#).

MOTOTRBO Connect Plus multi-site trunking network provides extended load capacity and provides digital communication to as many as 2,900 users per site.

For more information about the XRC Controller and XRT Gateway see MOTOTRBO Connect Plus System Planner.

The Connect Plus network configuration includes the following stages:

1. Setting up MOTOTRBO equipment configuration parameters: XRT Gateway, XRC Controllers, repeaters, control stations (which are to be used instead of the XRT Gateway), and 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. The document contains detailed information on SmartPTT Radioserver settings, specific to this network type, XRC Controller and XRT Gateway settings that are necessary for the operation with SmartPTT Radioserver, and some settings of MOTOTRBO radios, which we think must be covered. Also, the document contains information on the configuration of control stations which can be used for voice calls instead of the XRT Gateway. For detailed description of MOTOTRBO equipment settings see MOTOTRBO Connect Plus System Planner.

## MOTOTRBO Equipment Programming

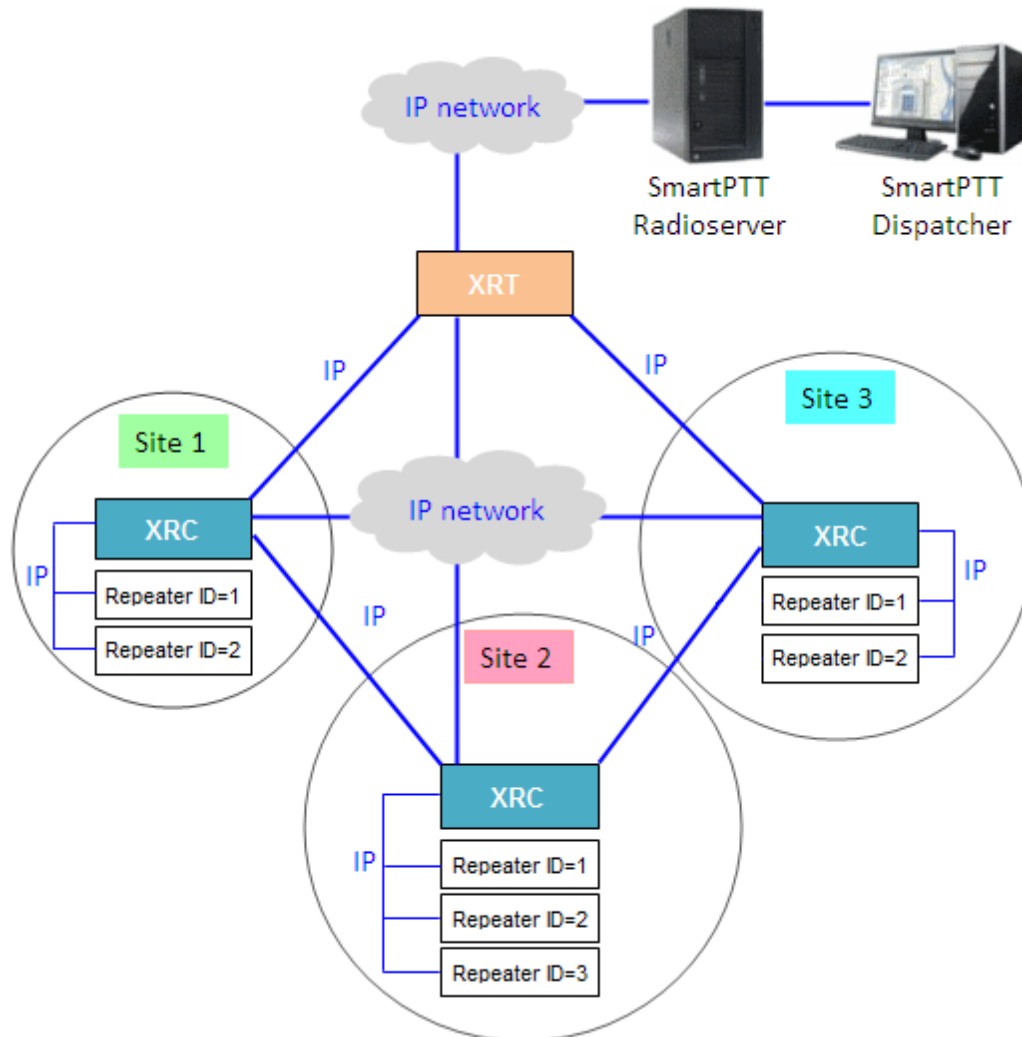
To program MOTOTRBO equipment you will need special MOTOTRBO configuraton software:

- MOTOTRBO Customer Programming Software (CPS)
- MOTOTRBO Connect Plus XRC Network Manager for XRC Controller configuration
- MOTOTRBO Connect Plus XRT Network Manager for XRT 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 Controller and XRT Gateway

The scheme below shows the sample of Connect Plus network.



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

The XRT Gateway joins the MOTOTRBO Connect Plus system as another multi-site XRC Controller peer. It 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 Controller controls up to 15 MOTOTRBO repeaters per trunked site. Because this is an IP interface, the XRC Controller 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 Controller and its trunked



repeaters must be at the same physical location and connected to the same Ethernet switch. The XRC Controller 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 Controller and XRT Gateway, which are required for operation with SmartPTT Radioserver. Other information on the XRC Controller configuration can be found in MOTOTRBO Connect Plus System Planner.

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

The screenshot displays the configuration interface for the XRT Gateway and Site Configuration. The XRT Gateway configuration is shown on the left, and the Site Configuration is shown on the right. A red arrow points from the Pool IDs field in the XRT Gateway configuration to the Pool ID field in the Site Configuration.

**XRT Gateway Configuration:**

- Active:
- Name: XRT
- Gateway Address:Port: 192.168.7.122:10001
- Pool IDs: 16000001-16000010
- Username: username1
- Password: password1
- TX Time-Out Timer, sec: 60
- Group Call Hang Time, ms: 4000
- Private Call Hang Time, ms: 6000
- Emergency Call Hang Time, ms: 8000

**Site Configuration:**

WARNING: Changes to this section will require a reboot of XRT 9000.

**Site Configuration:**

- Local Site ID: 255
- Connect Plus Network ID: 298

**Network Configuration:**

- Multisite UDP Start Port: 46000
- Max Multisite Ports: 32
- Multisite Ping Int.: 2500 ms.
- Multisite Control Port: 45000
- Client TCP Port: 10001
- Client UDP Start Port: 7700

**NTP Configuration:**

- NTP Server
- NTP Server Address: [Empty]
- NTP Update Interval: 60000 ms.

**Pool ID Configuration:**

- Pool ID: 16000001-16000010

3. Make sure that there is a user record for every pool ID in XRC Controller 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 User Configurations** in MOTOTRBO Connect Plus XRT Configuration Tool:

Username	Max Talk Paths	Billing Enabled	NWAC Enabled	Data Path R...	Group Talk Paths	Private Talk Paths
xrttestuser	10	False	True	False	1000-1003	101

**User Details**

Username:

Password:

Confirm Password:

Max Talk Paths:

Billing Enabled

Network Wide All Call (NWAC) Enabled

Data Path Registration Enabled

Group Talk Paths

Group ID:

Private Talk Paths

Console User ID:

- Check that the **Username** and **Password** match **Username** and **Password** in SmartPTT Radioserver Configurator in XRT 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 Gateway talk path settings. If the field is empty, the user should have permission for any Group Talk Path that it validly registers with the XRT 9000. If any Group ID is entered, then all Group IDs not configured into this field will be disallowed!
- Check **Console User ID**. It should match **Radio ID** in SmartPTT Radioserver Configurator.

The screenshot shows the 'Settings' window with the 'Connect Plus' configuration for 'Connect Plus 1'. The 'Radio ID' field is highlighted with a red box and contains the value '101'. Other fields include 'Name' (Connect Plus 1), 'Network ID' (1), 'Peer ID' (1), 'Interface' (192.168.37.170), and 'UDP Start Port' (19000).

If the field is empty, the user should have permission for any Private Talk Path that is validly registered with the XRT 9000. If any Private Talk Path ID is entered, then all other Private Talk path IDs will be disallowed.

## MOTOTRBO Control Stations

This topic will be interesting to those who want to build the Connect Plus system based on control stations instead of the XRT Gateway.

Starting from version 8.7 it is possible to build the Connect Plus system based on control stations. With the use of control stations, the XRC Controllers and the XRT Gateway become optional. Note, that this is true only for SmartPTT Enterprise.

There are two supported network topologies with control stations (i.e. without the XRT Gateway):

1. With the use of control stations and the XRC Controller. In this case the system will have the following characteristics and restrictions:
  - Data transfer
  - Presence Notification service

- One control station per talkgroup
- One control station per dispatcher for private calls and CSBK commands

2. With the use of control stations only. In this case the system will have the following characteristics and restrictions:

- No data transfer
- No Presence Notification service, i.e. the radio subscriber goes online only after some activity (e.g., making a call), and never goes offline. Checking radio's presence in the network will be possible only through the Radio Check command.
- One control station per talkgroup
- One control station per dispatcher for private calls and CSBK commands

**Note:** One control station can be used for both private calls and group calls. However, if a call to the talkgroup is initiated during the ongoing private call, the call to the talkgroup will be missed.

The minimum system requirements are:

- Connect Plus system v1.5 or later
- SmartPTT Enterprise 8.7 or later
- SmartPTT Mobile Client 8.7 or later (only Android OS). The mobile client will work properly only in network systems based on control stations (without the XRT Gateway), and won't support All Call.
- Special license for control stations in Connect Plus and a license for mobile clients (voice and data)
- Control stations with firmware 2.4 or later
- USB cables to connect control stations to the PC with the radioserver
- Empty USB port

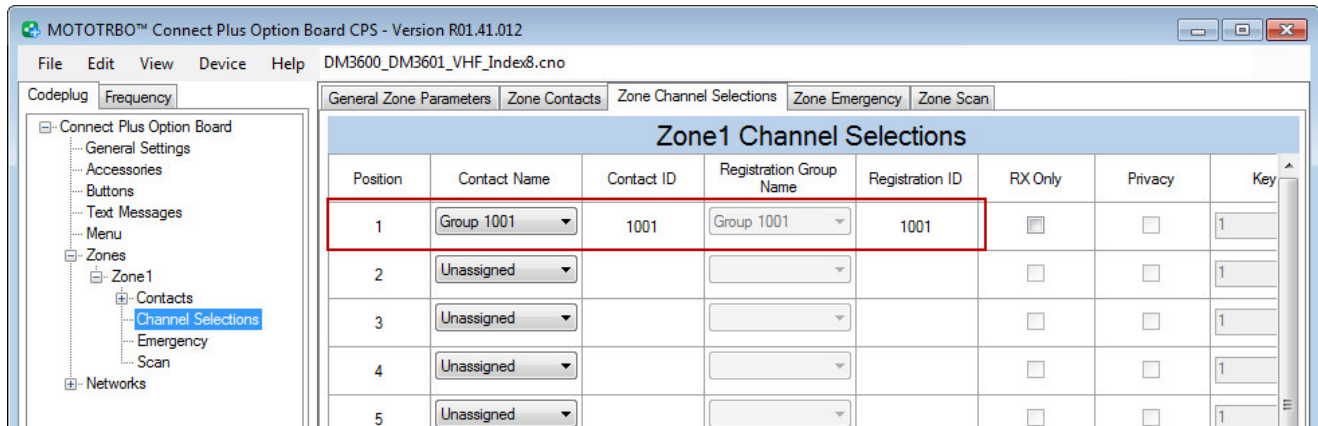
## Key points of the control stations' configuration

Here you can find information on the key points of the configuration of control stations. For more information on MOTOTRBO radio programming for the Connect Plus environment see MOTOTRBO documentation (MOTOTRBO Connect Plus Multi-Site Digital Trunking System Planner).

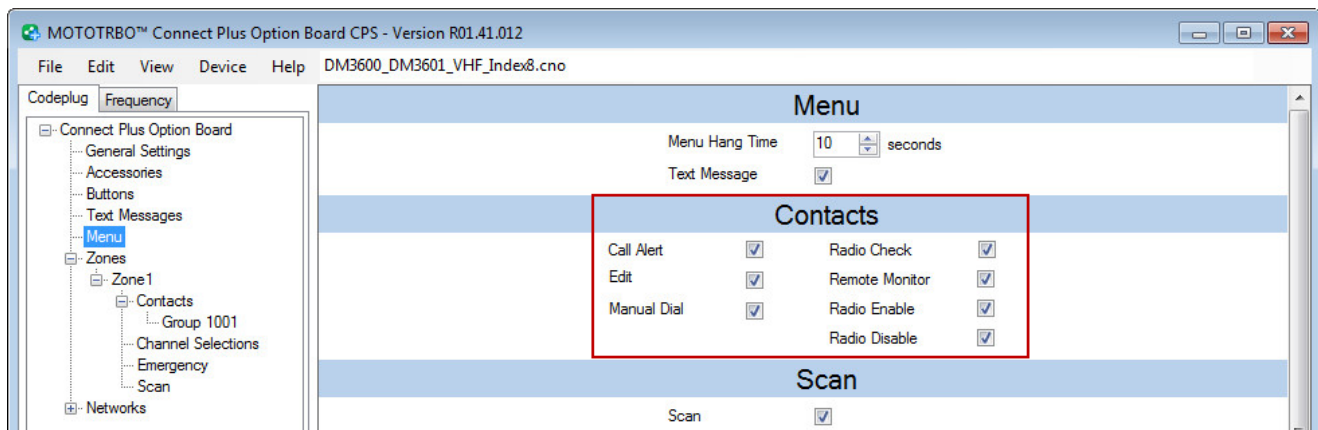
To configure control stations, use the special tool, MOTOTRBO Connect Plus Option Board CPS.

1. In the Connect Plus systems, after the control station is connected to the radioserver, you can't change the channel on the control station. So if you want to use the control station for group calls, it is important to assign it to a channel with a unique registration group (**Connect Plus Option Board > Zones > Channel**

**Selections).** The ID of this group will be used in the radioserver's settings, in SmartPTT Radioserver Configurator.



2. If you want to use the control station for private calls, dedicate a special group for private calls. Make sure that there can be no group calls addressed to it. If you have more than one dispatcher, use this registration group for all control stations reserved for private calls. Also, under **Menu > Contacts** select **Manual Dial** and other CSBK commands.



So, if you have several talkgroups (let's say three) and one dispatcher, you will need three control stations for group calls (each control station must be reserved for a talkgroup), and one for private calls of the operator. If you have more than one dispatcher, you will need an additional control station per dispatcher. Use the same registration group for all control stations reserved for private calls.

After you have finished configuring the control stations, make the necessary settings in SmartPTT Radioserver Configurator (see [here](#)).

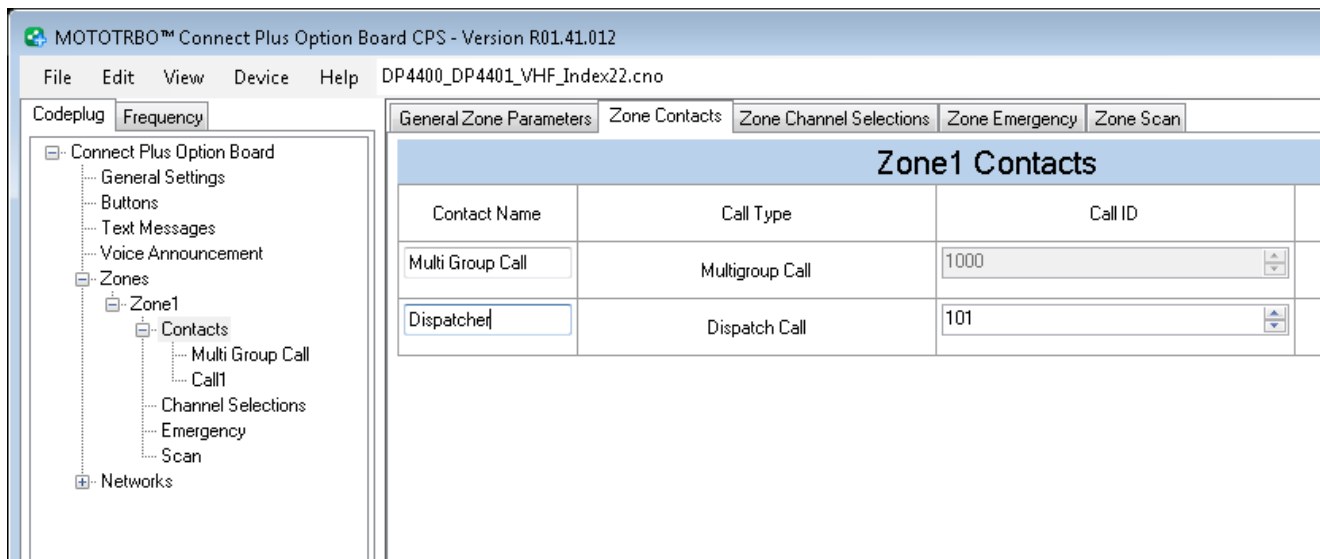
## MOTOTRBO Radio Programming

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 **Profiles**.

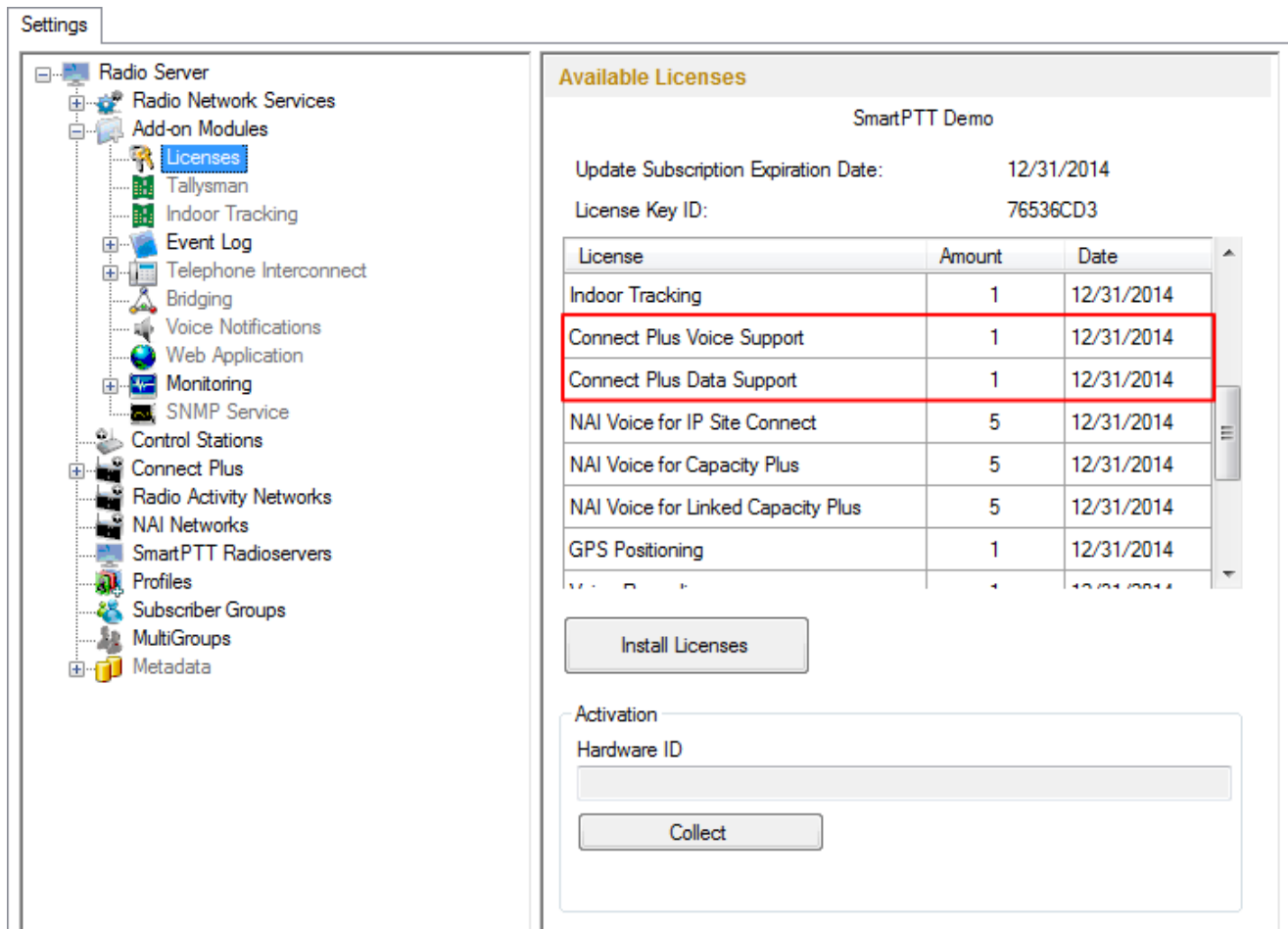
## SmartPTT Radioserver Configuration

In this topic you will find description for two system topologies: Connect Plus based on the XRT Gateway, and [Connect Plus with control stations](#).

## Connect Plus with the XRT Gateway

The configuration process includes the following steps:

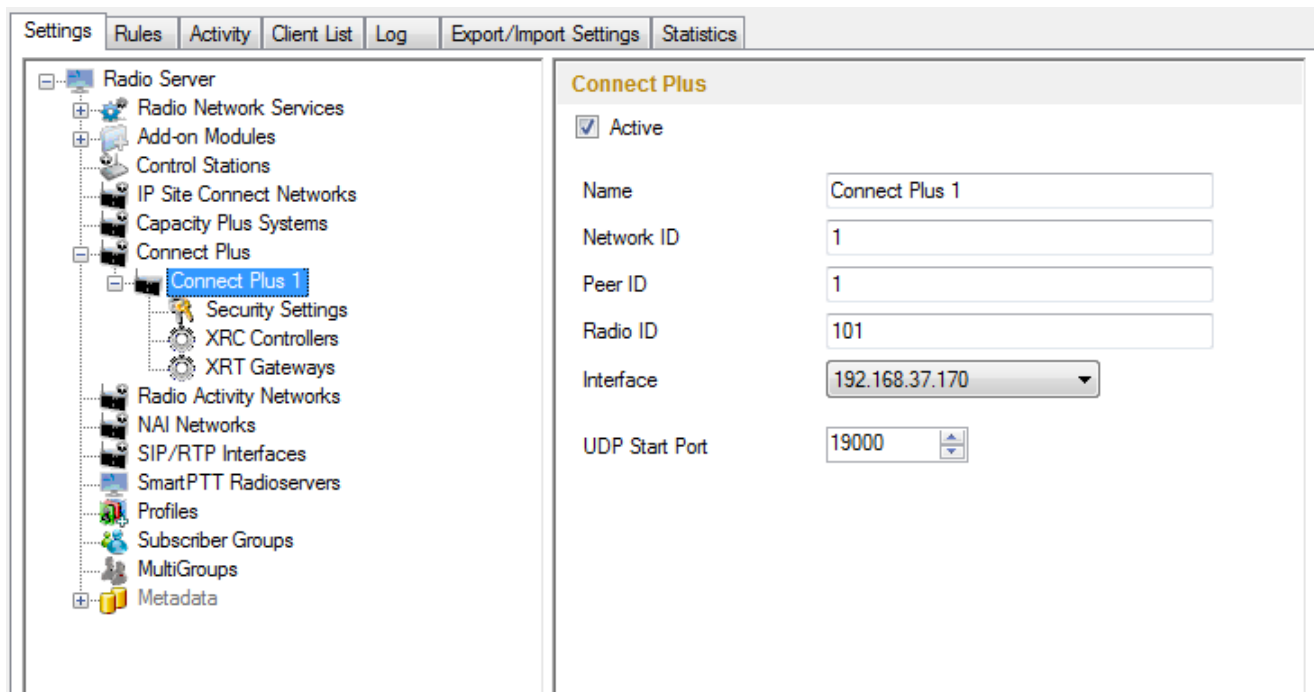
1. Run SmartPTT Radioserver Configurator, which you have downloaded and installed, as described in [SmartPTT Software Installation](#).
2. Make sure you have the necessary licenses to work in Connect Plus network, i.e., Connect Plus Voice Support and Connect Plus Data Support.



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.



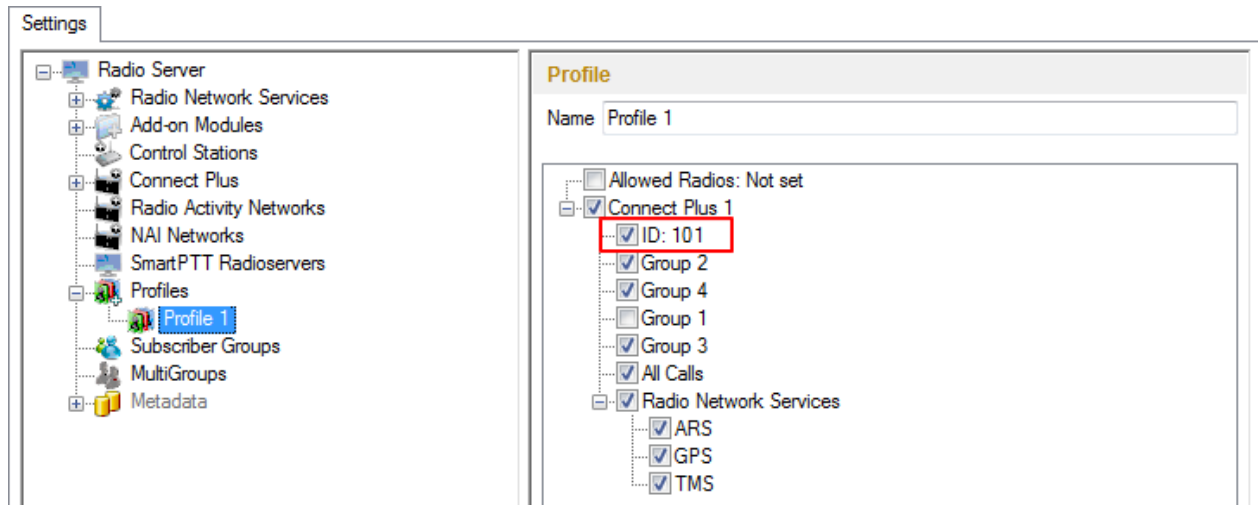
#### 4. Set parameters:

- 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. Note that this ID is different from the Network ID defined in the XRC Controller codeplug.
- In the **Peer ID** field enter unique ID of the virtual repeater (i.e., radioserver in Connect Plus network). This parameter is used only for voice packets to the XRT Gateway, so leave the default value. Make sure this ID is different from the repeater ID in the Connect Plus network.
- In the **Radio ID** field specify the ID of the virtual control station by default, the parameter is used to represent the radioserver inside Connect Plus network, therefore, this ID will be used for the dispatcher. It is used for data and voice transmission. Make sure it is not duplicated to any of the radio ID in the system.
- 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 Gateway talk paths. Each talk path

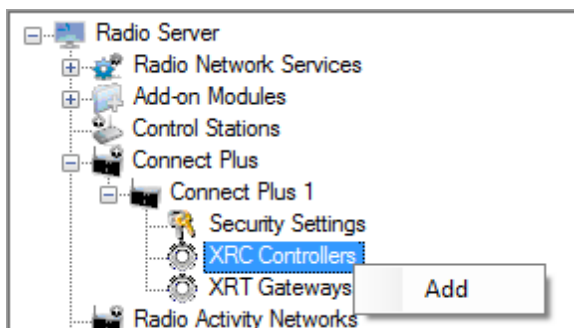


requires one local UDP port. Next talk path will use **UDP Start Port** incremented by 1, and so on.

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



- There are three sites in our network, and each contains one XRC Controller. It is not necessary to add all the three XRC Controllers in SmartPTT Radioserver Configurator. It is required only for monitoring purposes. If you do not want to monitor all XRC Controllers, you can add only one. To add an XRC Controller, right-click **XRC Controller** and select **Add**:



## 6. Specify parameters for the XRC Controller:

The screenshot displays the configuration window for an XRC Controller. The left sidebar shows a hierarchical tree view with 'XRC Controller' selected. The main area is titled 'XRC Controller' and contains the following settings:

- Active**
- Name:** XRC Controller Site1
- Controller Address:** 192.168.7.23
- PN, TMS, GPS**
  - PN:** Controller Port: 4005, Local Port: 50005
  - TMS:** Controller Port: 4007, Local Port: 50007
  - GPS:** Controller Port: 4001, Local Port: 50001
- Monitoring**
  - Controller Port:** 38000
  - Local Port:** 38000
  - Use NAT:**

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

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

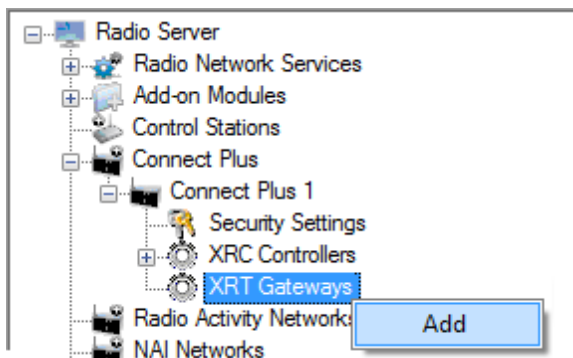
**Note:** The PN, GPS and TMS ports should match the same ports in MOTOTRBO Connect Plus XRC Configuration Tool.

- Select **Monitoring** check box to be able to review the XRC Controller on the **Monitoring** panel in SmartPTT Dispatcher. Specify **Controller port** and **Local port**. The **Monitoring** service is enabled on all existing XRC Controllers. You can leave default values. If the XRC Controller is in one local network with the radioserver, leave **Use NAT** unchecked. If the XRC Controller is outside the local network of the radioserver, select **Use NAT**.

**Note:** Make sure that you have the general **Monitoring** service enabled (SmartPTT Radioserver Configurator > **Add-on Modules** > **Monitoring**).

If needed for monitoring purposes, set parameters for the other XRC Controllers, but remember to leave the **PN, TMS, GPS** check box unchecked.

8. Add an XRT Gateway by right-clicking on **XRT Gateways** and selecting **Add**.



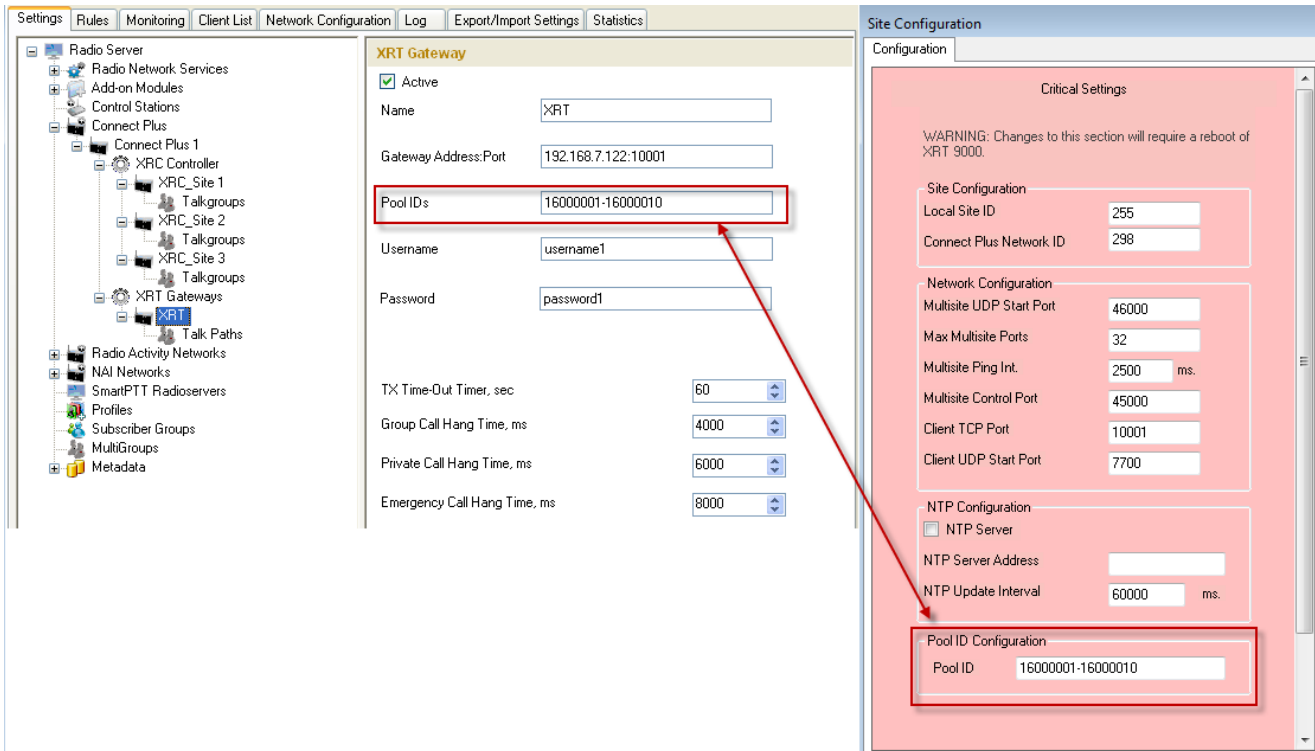
At that, the **XRT Gateway** window opens:

The screenshot shows the 'XRT Gateway' configuration window. The left pane shows a tree view with 'XRT Gateway' selected. The right pane contains the following configuration fields:

Field	Value
<input checked="" type="checkbox"/> Active	
Name	XRT Gateway
Gateway Address:Port	192.168.7.122:10001
Pool IDs	16000001-16000100
Username	xrttestuser
Password	pasw 1
TX Time-Out Timer, s	60
Group Call Hang Time, ms	4000
Private Call Hang Time, ms	6000
Emergency Call Hang Time, ms	8000

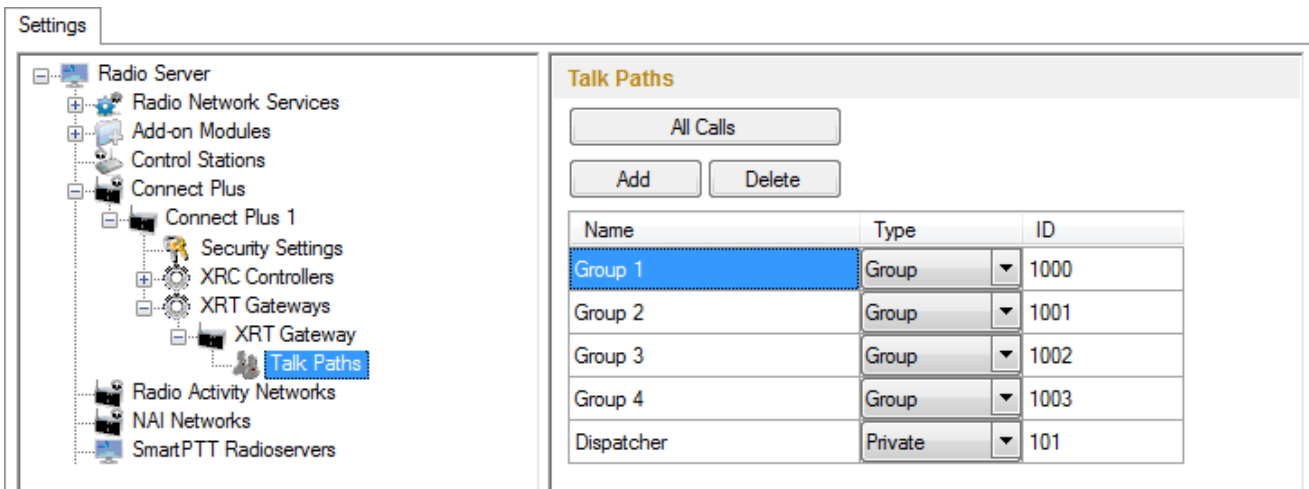
9. Specify parameters of the XRT Gateway.

- Select **Active** to enable XRT Gateway support.
- In the **Name** field enter the XRT 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 Gateway.
- In the **Pool IDs** field use default values. The values must correspond to the range of IDs set in the XRT Gateway settings (**Pool ID**):



- **Username** and **Password** – used for authentication with the XRT Gateway and must equal XRT Gateway Username and password set up in MOTOTRBO Connect Plus XRT 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. Make sure these IDs match the IDs set in MOTOTRBO Connect Plus XRT Configuration Tool (field **Group ID** and **Console User ID**).

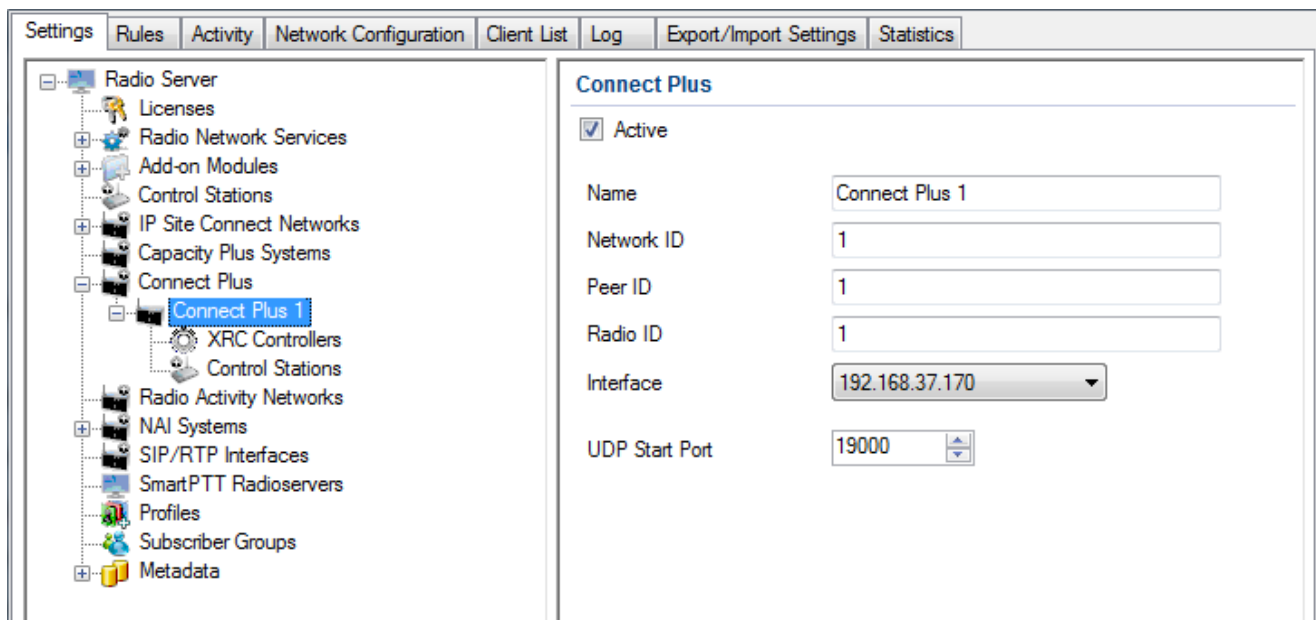


If required, you can define encryption settings for outgoing and incoming traffic under **Security Settings**.

## Connect Plus with control stations

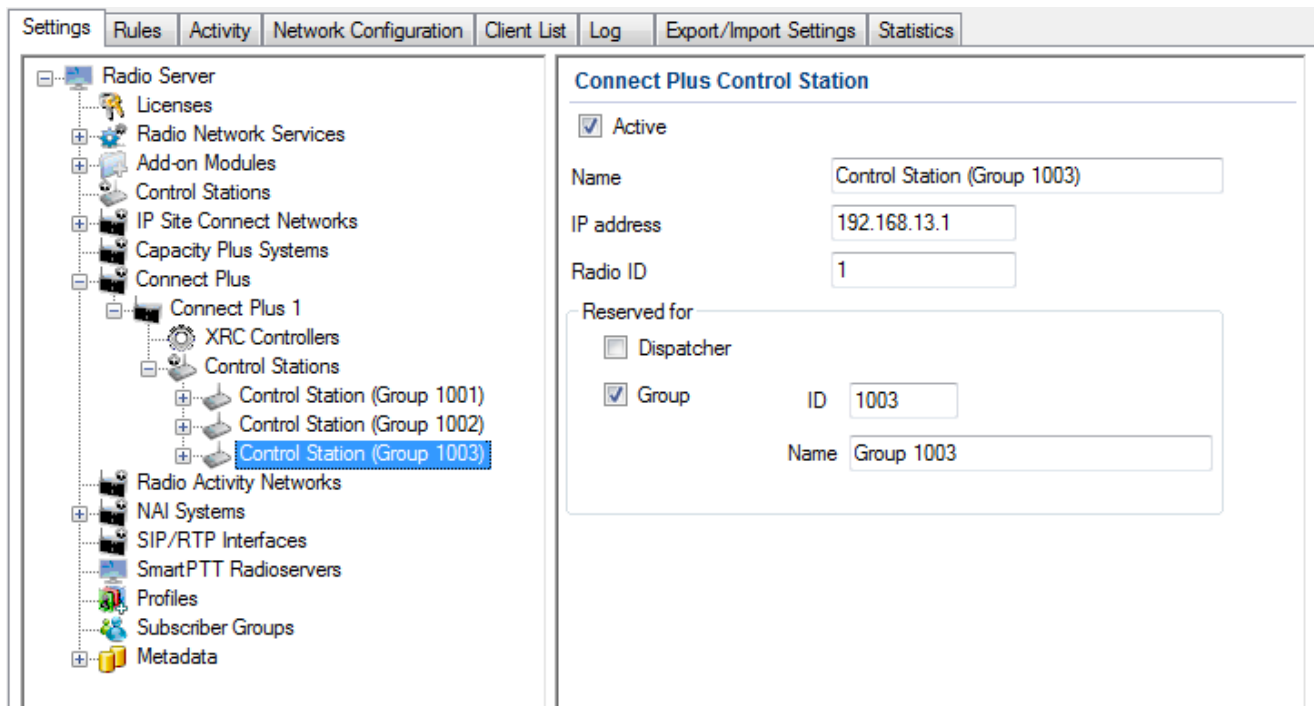
The configuration process includes the following steps:

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 via control stations, i.e. Voice Calls via Control Stations for Connect Plus and Connect Plus Data Support.
3. Add a Connect Plus network and set the following 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. Note that this ID is different from the Network ID defined in the XRC Controller codeplug.
- In the **Peer ID** field leave the default value. This parameter is not used in systems based on control stations without the XRT Gateway.
- In the **Radio ID** field specify the ID of the virtual control station by default, the parameter is used to represent the radioserver inside Connect Plus network, therefore, this ID will be used for the dispatcher (if there is only one dispatcher). It is used for data and voice transmission.

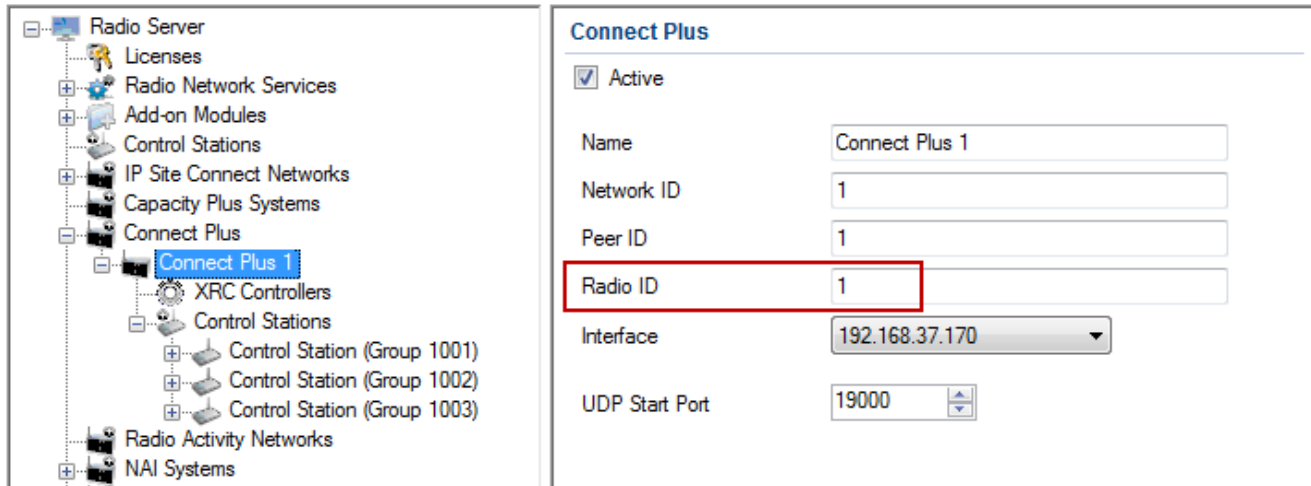
- In the **Interface** field specify the IP address of the virtual repeater (i.e., SmartPTT Radioserver).
  - In the **UDP Start Port** leave the default value. This parameter is not used in systems based on control stations without the XRT Gateway.
4. Add the necessary number of XRC Controllers and specify their settings. If you don't have the XRC Controller, skip this step. See items 5 to 7 in [Connect Plus with the XRT Gateway](#).
  5. Add talkgroups for sending group text messages under **Talkgroups**. If you do not have enough of control stations to cover all talkgroups, you can add talkgroups here, but only for sending text messages, not making voice calls. No other settings in the XRC Controller are required.
  6. Add the necessary number of control stations for group calls. In our case there are three control stations reserved for three talkgroups with IDs *1001*, *1002*, and *1003*.



- Select **Active** to enable the control station
- In the **Name** field enter any name of the control station. It will be used only in SmartPTT Radioserver Configurator.
- In the **IP address** field enter the IP address of the control station. The following address format and range are used: *(001-223).(000-255).(000-255).(001-253)*. Users can use any address except 127.x.x.x in the range from 1.x.x.x to 223.x.x.x. We recommend to use the address *192.168.10.1* by default. In case of conflicts with other network interfaces select a different IP address. If two or more control stations are connected to the computer, one of the first three octets of the IP address must be unique for each control

station.

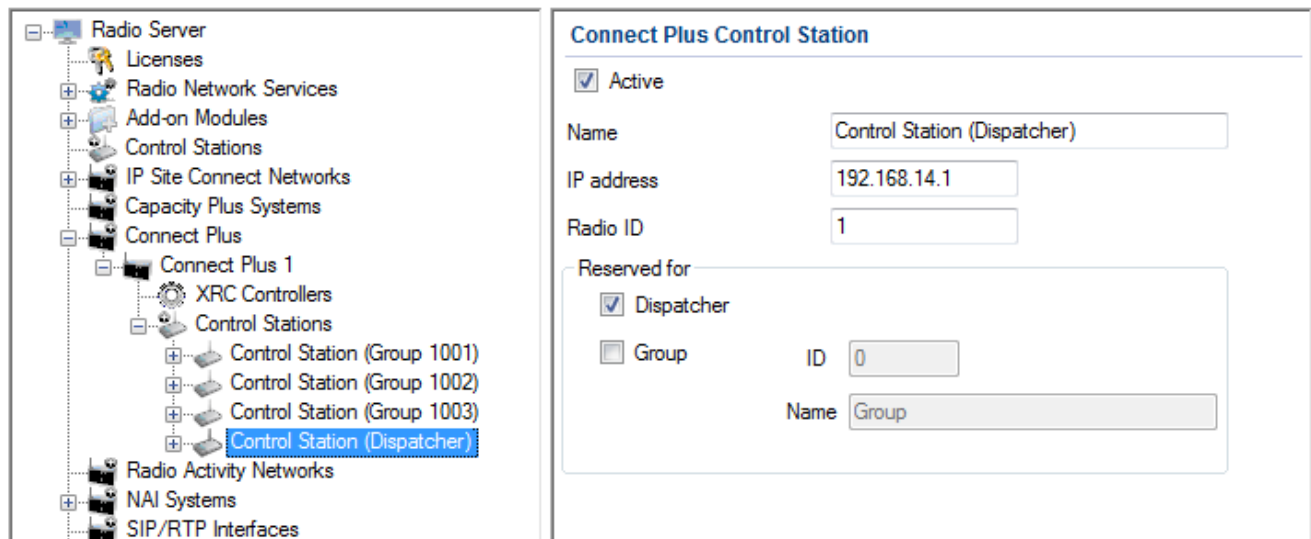
- In the **Radio ID** field enter the identifier of the control station used for communication. For control stations reserved for group calls the Radio ID must match the Radio ID set in the settings under **Connect Plus**.



This Radio ID must also match the Radio ID set in the control station's settings via CPS.

- In the **Reserved for** group box select **Group**, enter the ID of the registrations group to which the control station is assigned (use MOTOTRBO Connect Plus Option Board CPS), and the name of the group which will be displayed in SmartPTT Dispatcher.

7. Add the necessary number of control stations for dispatcher's private calls.

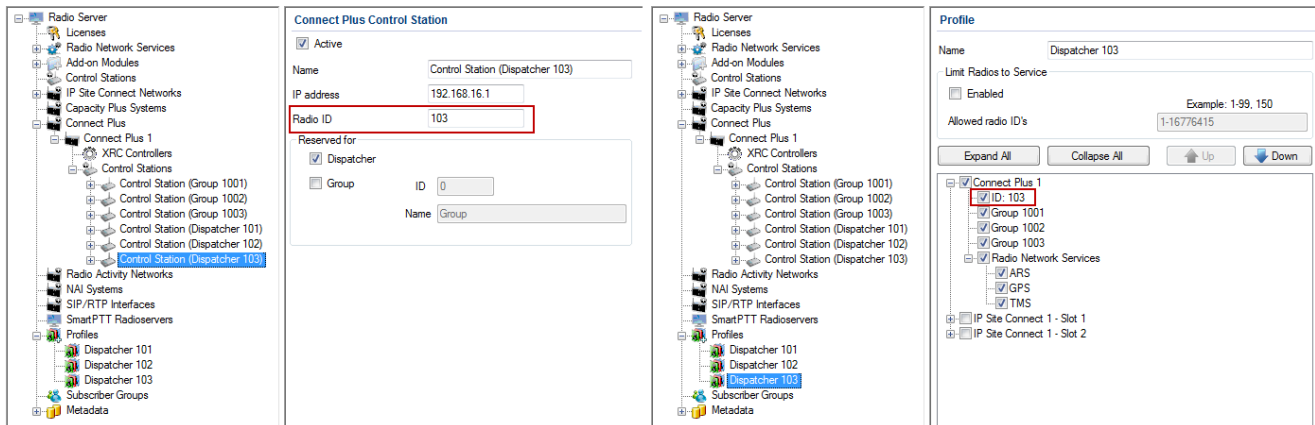


The value in the **Radio ID** field must match **Radio ID** set in the settings under **Connect Plus** (if there is only one dispatcher, and if it does not have any profile). This Radio ID should also match the Radio ID set in the control station's settings via CPS.



In the **Reserved for** group box select **Dispatcher**.

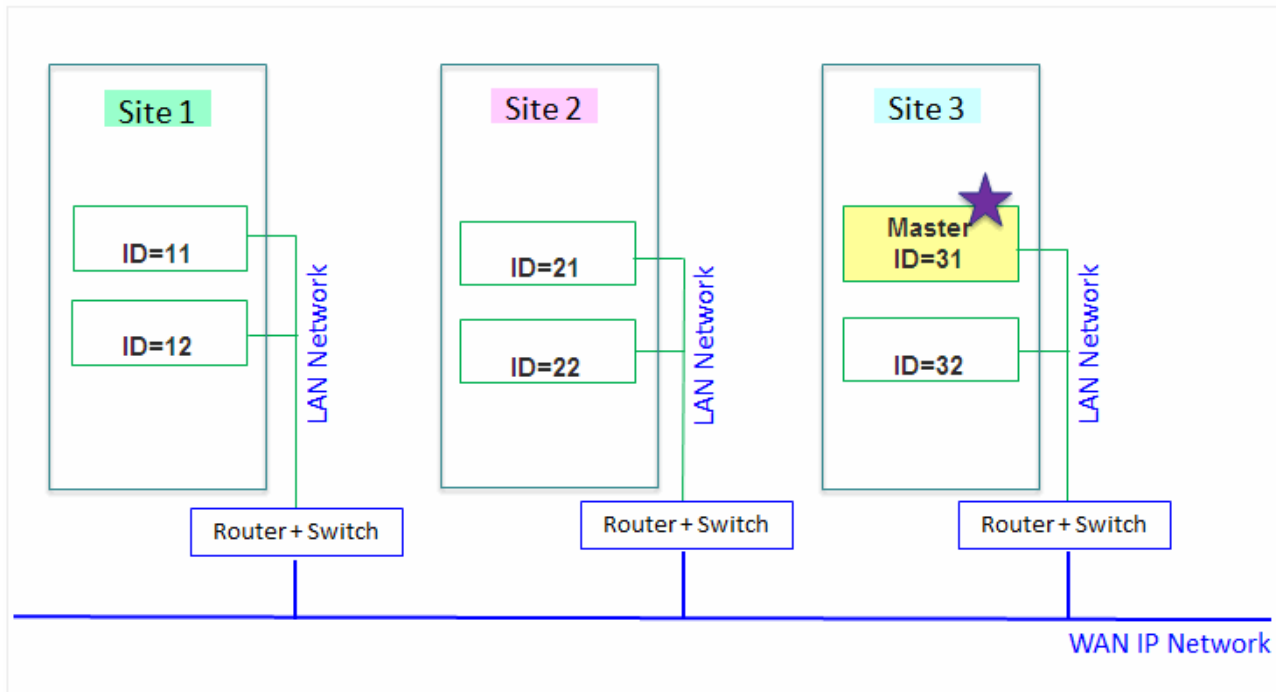
If there are more than one dispatcher, add additional control stations (one per dispatcher) and profiles (one per dispatcher). In this case **Radio ID** must match **ID** set in the profile for each control station reserved for a dispatcher.



Remember that in SmartPTT Dispatcher every operator must use their profile.

## Linked Capacity Plus

To configure Linked Capacity Plus (LCP) system consisting of 3 sites with 2 repeaters on each site, see the following network scheme:

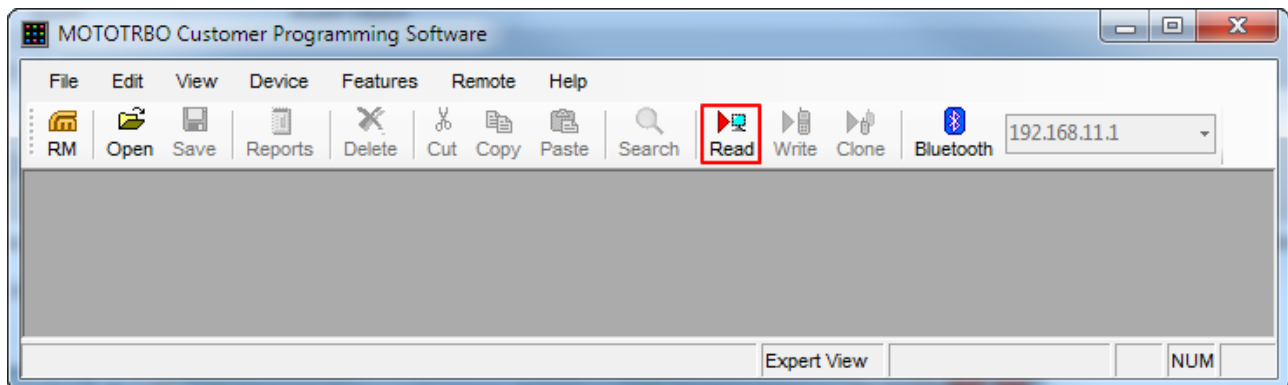


Each radio ID, either subscriber radio ID or repeater ID should be unique in the radio system. In this example you can see 2 repeaters with ID's 11 and 12 on Site 1, 2 repeaters with ID's 21 and 22 on Site 2, and 2 repeaters with ID's 31 and 32 on Site 3. The repeater with ID=31 is a Master.

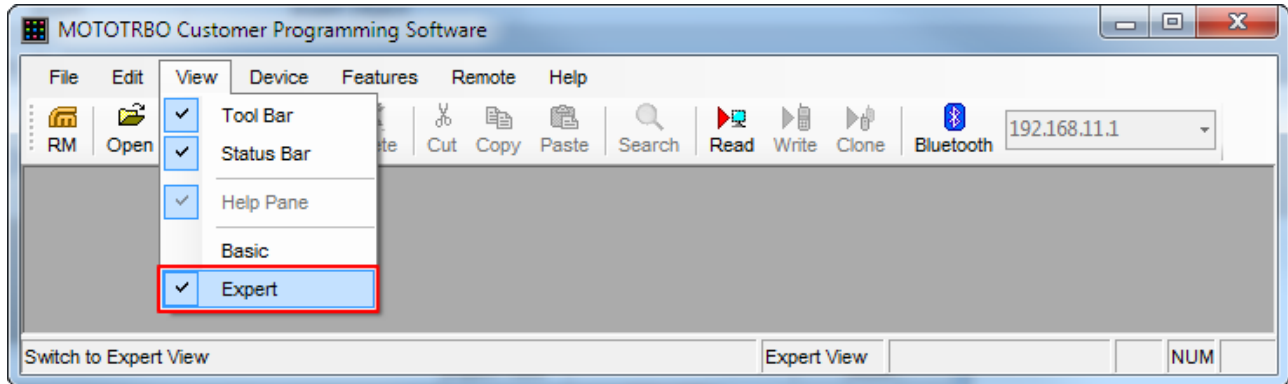
### MOTOTRBO Equipment Programming

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.
2. Switch on the device and check its settings by clicking the **Read** button on the menu bar.



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

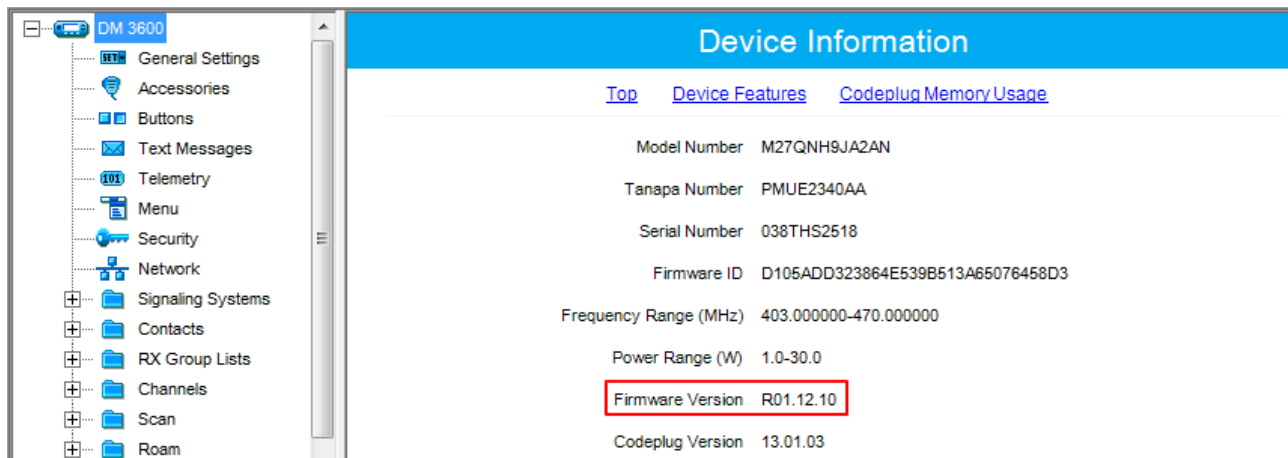


4. In the **Device Information** tab make sure that firmware version is no older than:

- R01.12.11 or R02.30.10 for mobile or portable radios;
- R02.30.12 for repeaters.

Otherwise, contact the supplier to request firmware upgrade.

**Note:** It is recommended to use the same or compatible firmware versions for all MOTOTRBO equipment on the same network.



5. To apply the changes in the settings, click **Write**.

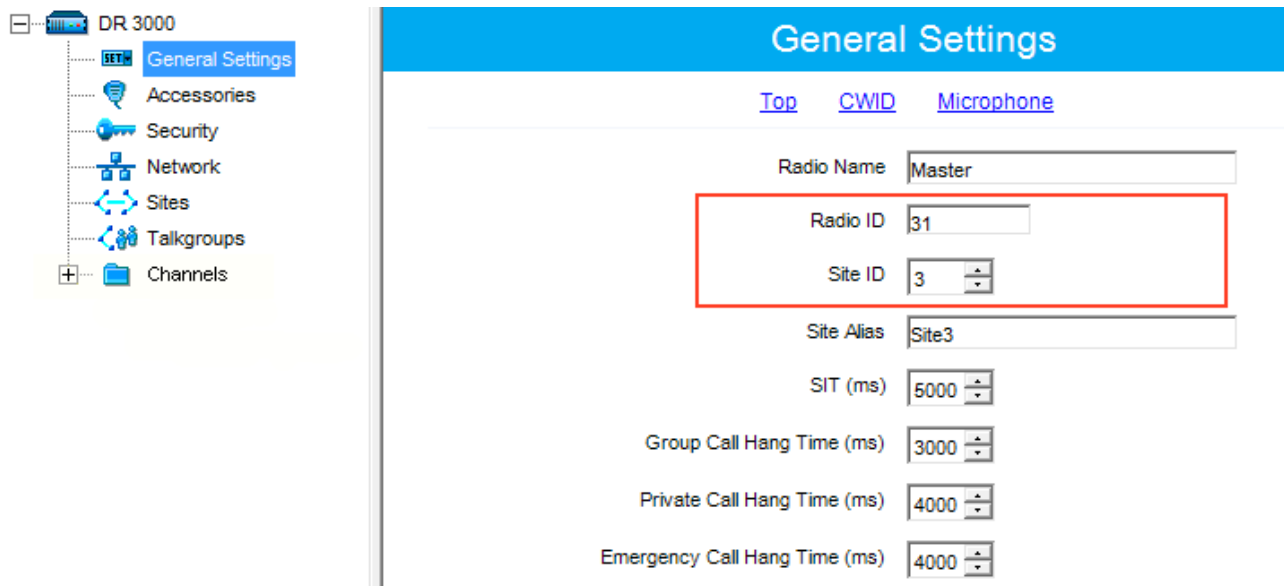
## MOTOTRBO Repeater Programming

**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**.

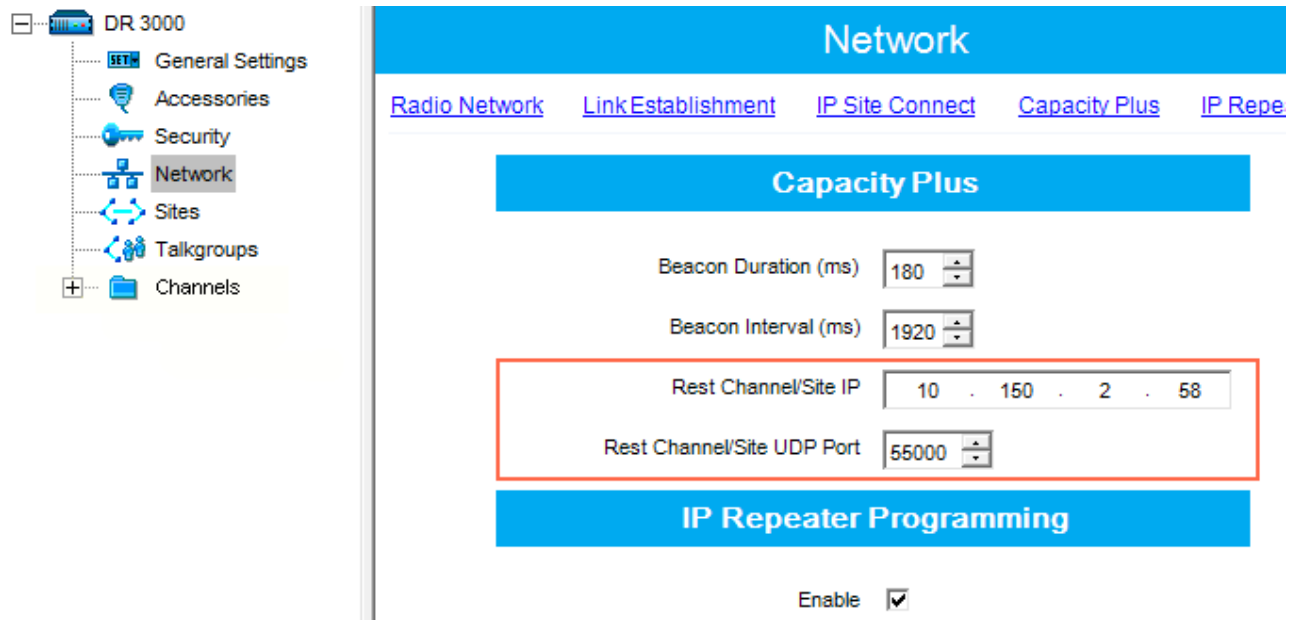


2. Add parameters in the **Network** tab.

- 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*.

Site ID	Reserved Wide Area Channels	Neighbor 1	Neighbor 2	Neighbor 3	Neighbor 4
1	0	2	None	None	None
2	0	1	3	None	None
3	0	2	None	None	None

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.

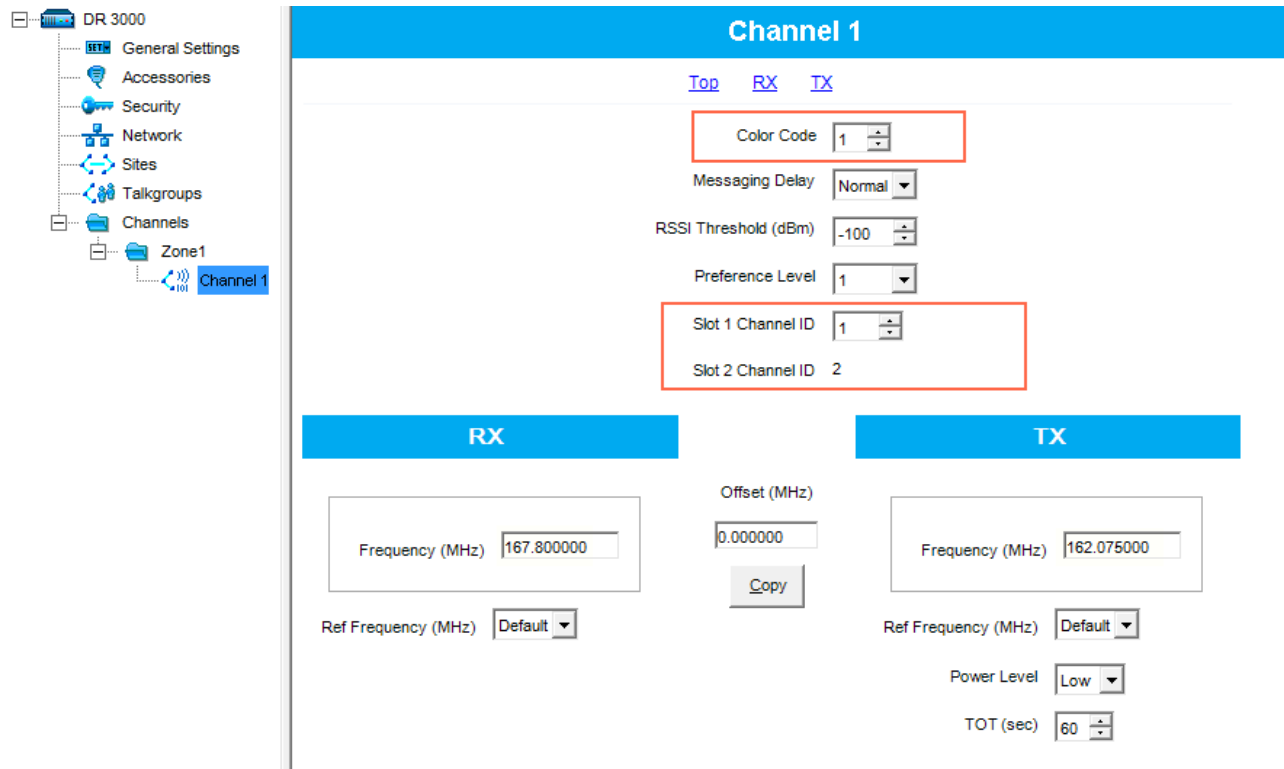
Call ID	Site 1	Site 2	Site 3
1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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**.



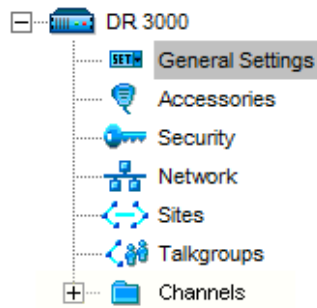
The color code is used to identify radio systems. Therefore, different color codes are used to identify different systems. Channels may have the same or different color codes. However, a repeater can only have one color code. Radios will ignore any channel activity not containing the matching color code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



## General Settings

[Top](#)   [CWID](#)   [Microphone](#)

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Radio Name

Radio ID

Site ID

Site Alias

SIT (ms)

Group Call Hang Time (ms)

Private Call Hang Time (ms)

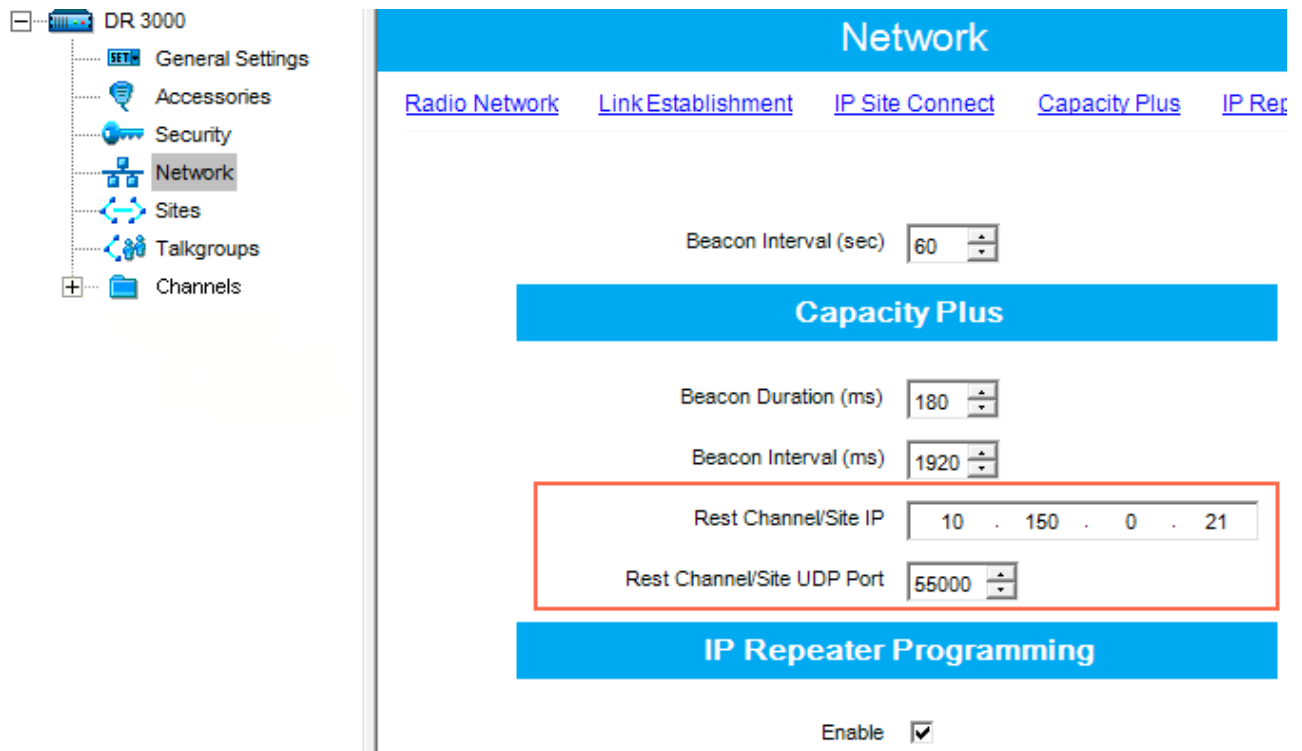
Emergency Call Hang Time (ms)

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

The screenshot shows the configuration interface for a DR 3000 device. On the left is a navigation tree with options: General Settings, Accessories, Security, Network (selected), Sites, Talkgroups, and Channels. The main content area is titled 'Network' and has several tabs: Top, Radio Network, Link Establishment, IP Site Connect, Capacity Plus, and IP Repeater Programming. Under the 'Radio Network' section, the following values are set: Radio IP: 192 . 168 . 10 . 1; Accessory IP: 192.168.10.2; Netmask: 255.255.255.0. Below this is the 'Link Establishment' section, which is highlighted with a red box. It contains the following fields: Link Type: Peer (dropdown); Authentication Key: (empty text box); Master IP: 10 . 150 . 0 . 20; Master UDP Port: 50000 (spin box); DHCP: ; Ethernet IP: 10 . 150 . 2 . 56; Gateway IP: 10 . 150 . 2 . 1; Gateway Netmask: 255 . 255 . 255 . 0; UDP Port: 50000 (spin box); Peer Firewall Open Timer (sec): 6 (spin box).

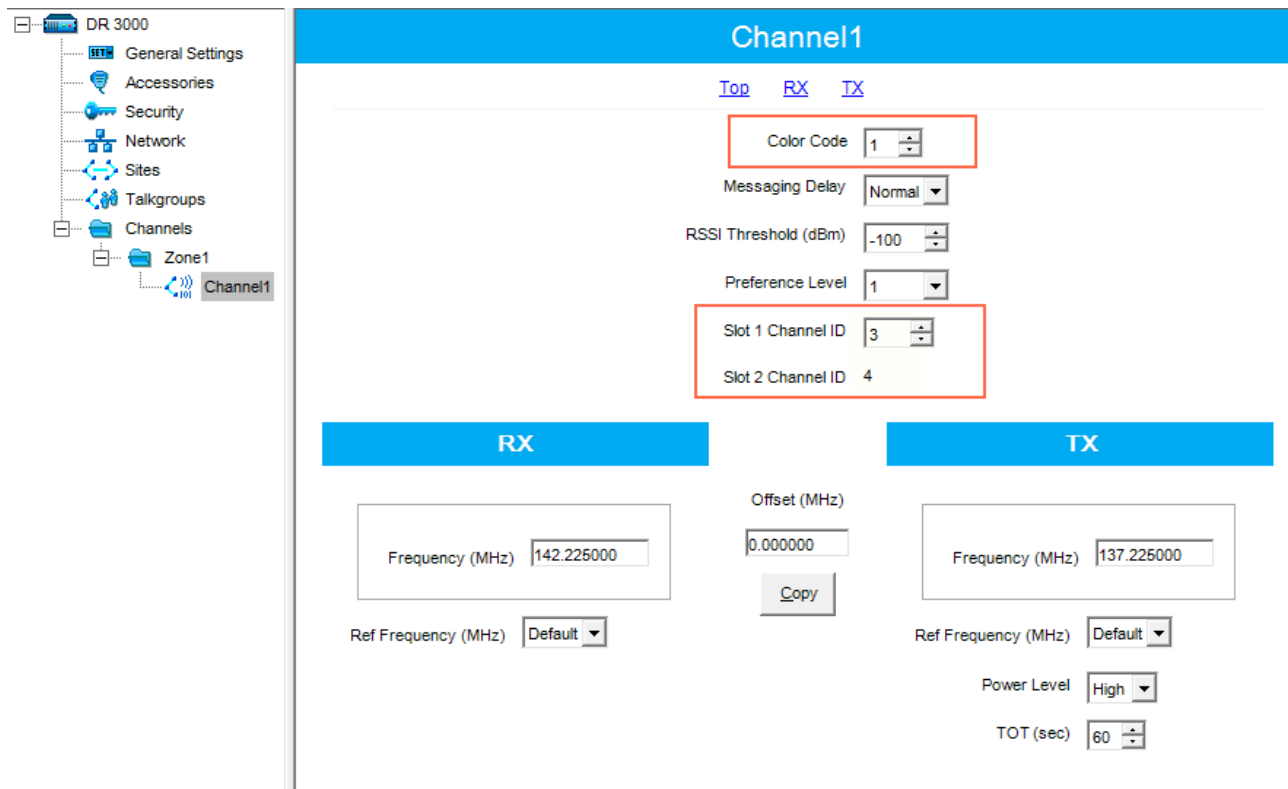
- In the **Link Type** field select *Peer*.
- In the **Master IP** and **Master UDP Port** specify the IP address and port number of the Master repeater.
- Do not select **DHCP**.
- In the **Ethernet IP** field specify the IP address of the repeater. Master IP address (*Site 3*) and Peer repeater IP 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,

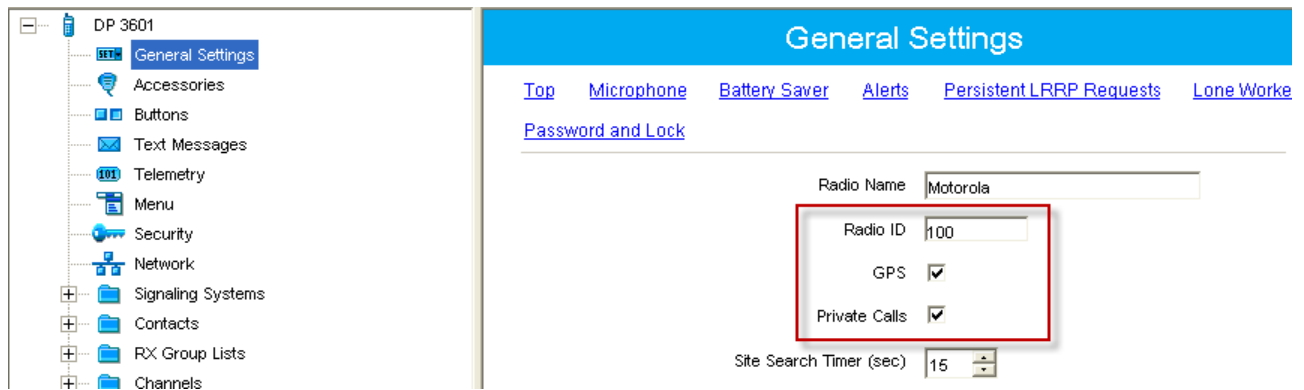
Site 2: 1-2-Peer ID=21, 3-4-Peer ID=22.

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.

The screenshot displays the configuration interface for a DP 3601 device, specifically the **Network** tab. On the left, a sidebar lists various settings categories, with **Network** selected. The main configuration area is divided into three sections:

- Network:**
  - Radio IP: 192 . 168 . 10 . 1
  - Accessory IP: 192.168.10.2
  - Netmask: 255.255.255.0
- Radio Network:**
  - CAI Network: 12
  - CAI Group Network: 225
  - Max TX PDU Size (bytes): 500
  - Telemetry UDP Port: 4008
  - Forward to PC: Disabled (highlighted with a red box)
- Services:**
  - ARS Radio ID: 1
  - ARS IP: 13.0.0.1
  - ARS UDP Port: 4005
  - TMS Radio ID: 1
  - TMS IP: 0.0.0.0

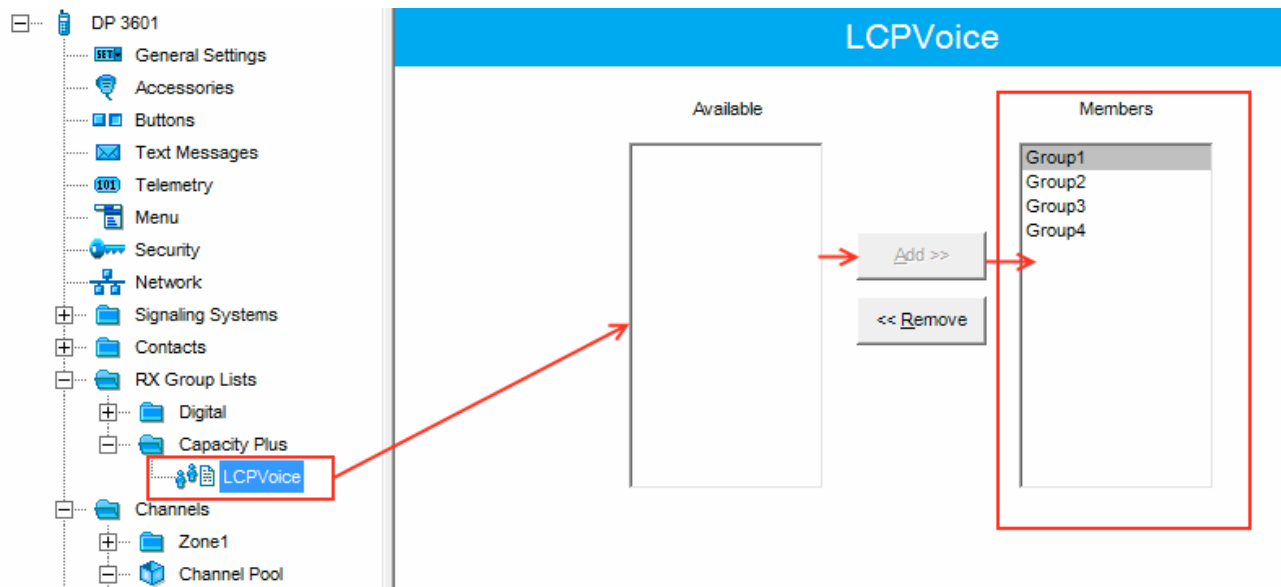
- In the **Forward to PC** field select *Disabled*.
- If you plan to work with SmartPTT application specify **ARS Radio ID** and **TMS Radio ID**. Remember that the **ARS Radio ID** and **TMS Radio ID** should match the **MNIS Radio ID** in the MOTOTRBO MNIS application and Slot ID in SmartPTT Radioserver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

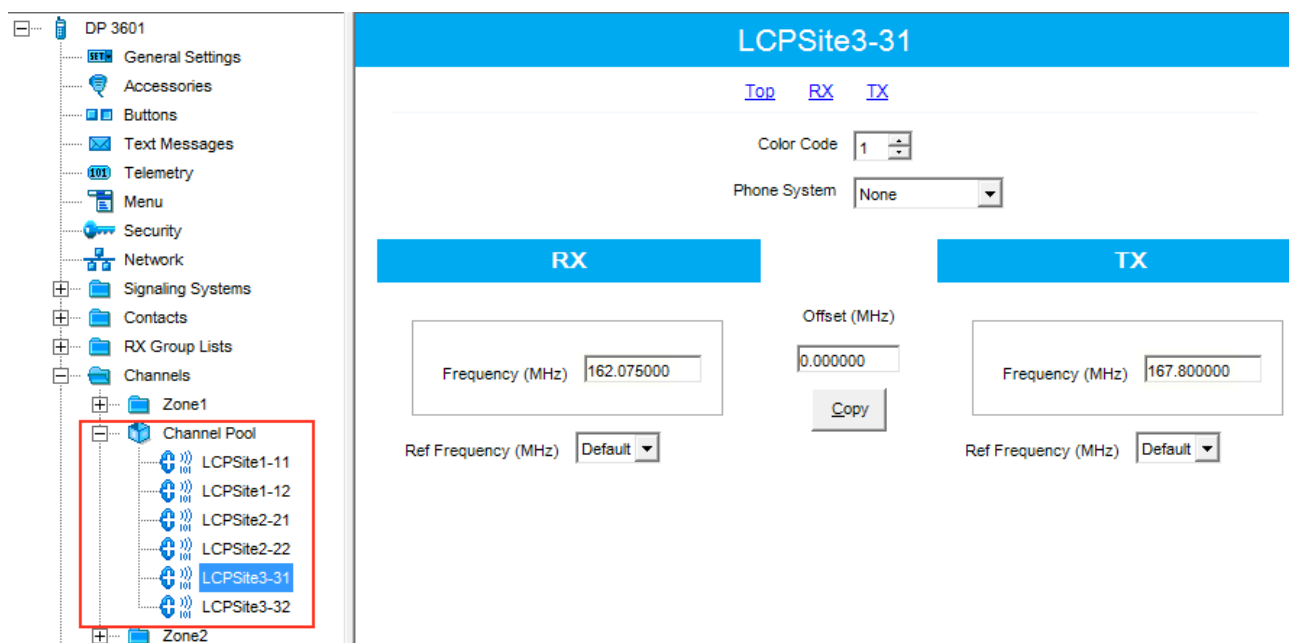
Contact Name	Call ID	Call Receive Tone	Ring Style	Text Message Alert Tone
Group1	1	<input type="checkbox"/>	No Style	Repetitive
Group2	2	<input type="checkbox"/>	No Style	Repetitive
AllCall	255	<input checked="" type="checkbox"/>	No Style	Repetitive
Dispatcher_Voice	1	<input type="checkbox"/>	No Style	Momentary
70	70	<input checked="" type="checkbox"/>	No Style	Momentary
Group3	3	<input type="checkbox"/>	No Style	Repetitive
Group4	4	<input type="checkbox"/>	No Style	Repetitive
Dispatcher-Data	1	<input type="checkbox"/>	No Style	Repetitive

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 **IDs** 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.

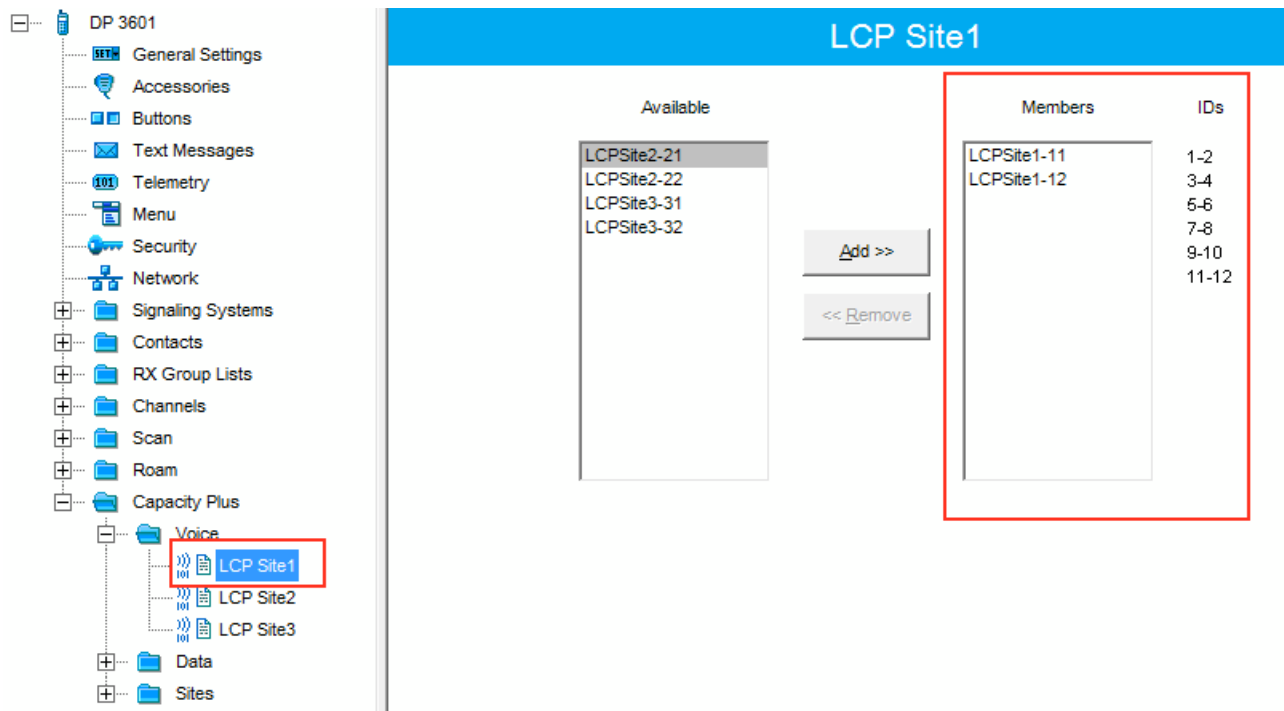


5. Add all repeaters, which are in the LCP system, to the **Channel Pool**. The color code should equal the color code specified for repeaters. In our case **Color Code=1**. Define the RX and TX frequencies. They must correspond to the frequencies set in the repeater, but RX of the radio must correspond to TX of the repeater and TX of the radio must correspond to RX of the repeater.





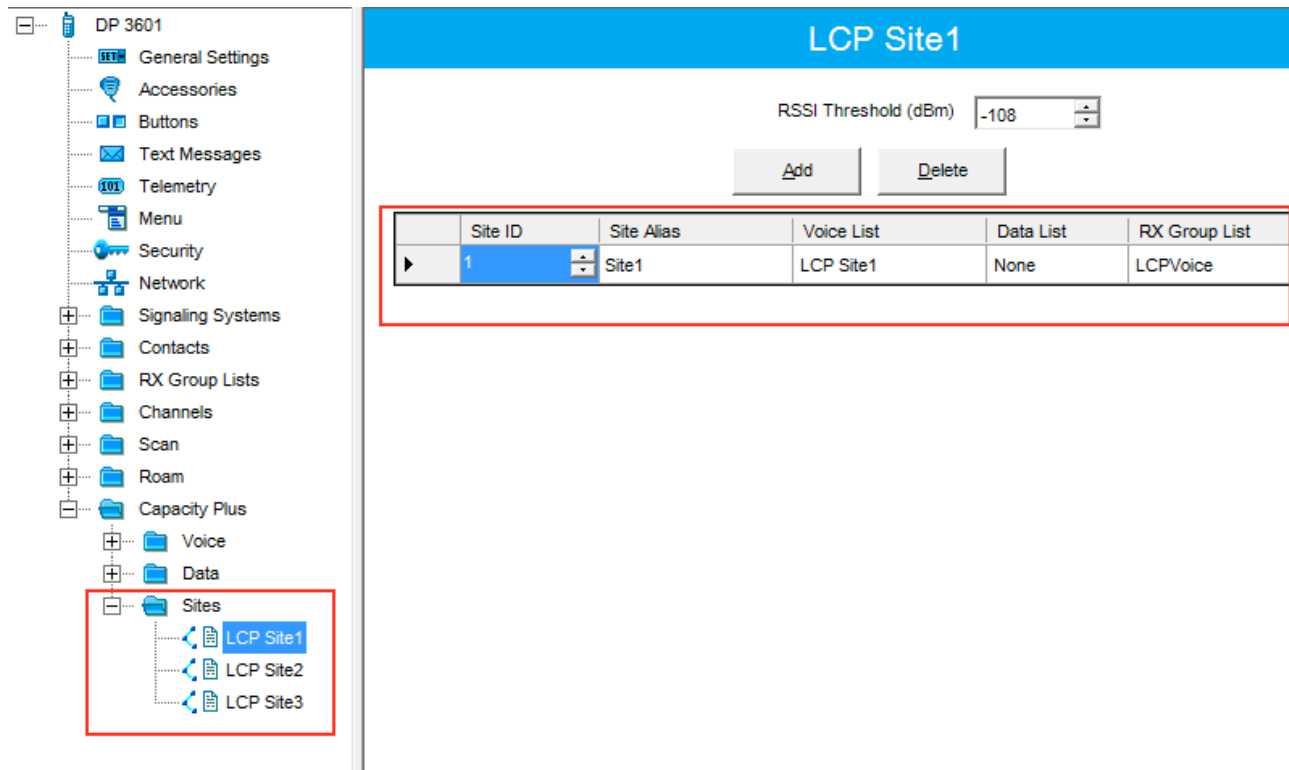
6. Create **Voice** lists and **Data** lists according to the amount of sites. As all of our repeaters are Trunk repeaters (transmit voice and data), create only **Voice** lists. When adding new **Voice** list, under the **Available** list you can see all the channels which were added to the **Channel 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.

	Site ID	Site Alias	Voice List	Data List	RX Group List
▶	1	Site1	LCP Site1	None	LCPVoice
	2	Site2	LCP Site2	None	LCPVoice
	3	Site3	LCP Site3	None	LCPVoice

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

The screenshot shows the configuration page for 'LCP Site1'. On the left is a navigation tree with categories like General Settings, Accessories, Buttons, Text Messages, Telemetry, Menu, Security, Network, Signaling Systems, Contacts, RX Group Lists, Channels, Zone1 (containing LCP Site1, LCP Site2, LCP Site3), Channel Pool, Zone2, Scan, Roam, and Capacity Plus. The main area is titled 'LCP Site1' and has tabs for 'Top', 'RX', and 'TX'. Under 'RX', there are checkboxes for 'Emergency Alarm Indication' (checked), 'Emergency Alarm Ack' (unchecked), and 'Emergency Call Indication' (checked). Under 'TX', there are various settings: 'Contact Name' (Group1), 'Emergency System' (Sys1), 'VOX' (unchecked), 'Power Level' (Low), 'TOT (sec)' (60), 'TOT Rekey Delay (sec)' (0), 'Allow Interruption' (unchecked), 'TX Interruptible Frequencies' (unchecked), 'Admit Criteria' (Channel Free), 'In Call Criteria' (TX Interrupt), 'RSSI Threshold (dBm)' (-90), 'Private Call Confirmed' (checked), and 'Data Call Confirmed' (unchecked). Red boxes highlight the ARS setting (On System/Site Change), the Auto Roam checkbox (checked) and Site List (LCP Sites), the Contact Name (Group1), and the Private Call Confirmed checkbox (checked).

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**.

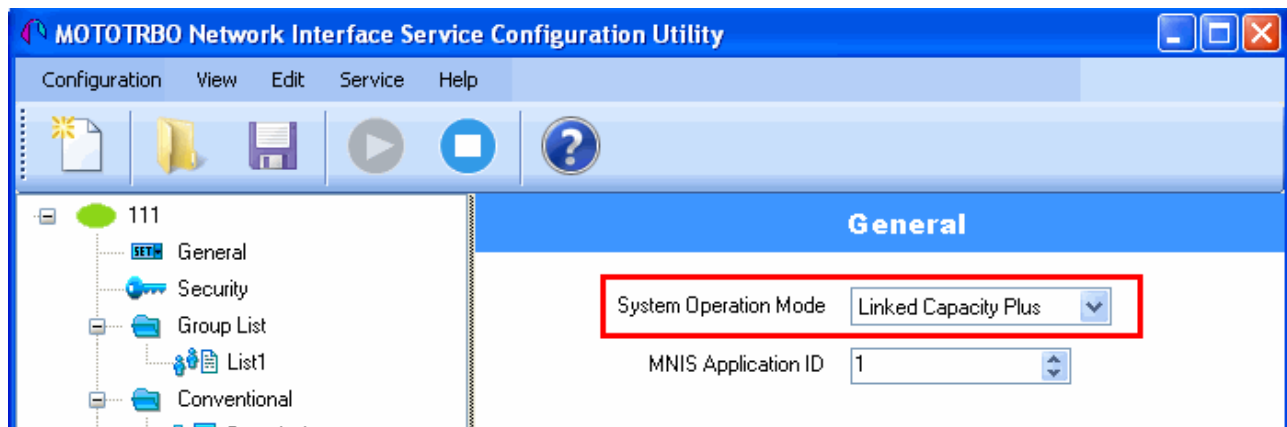
## MNIS and DDMS Client Configuration

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.

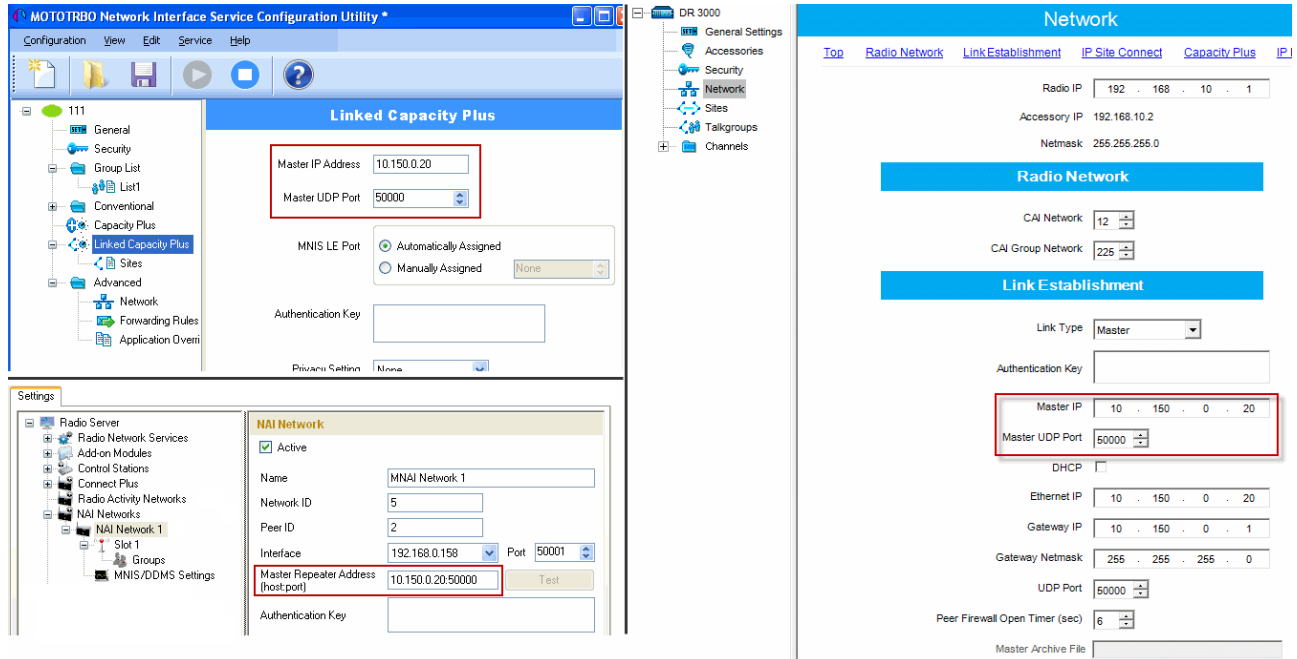
Let's start with MOTOTRBO Network Interface Service Configuration Utility (MNIS).

**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).

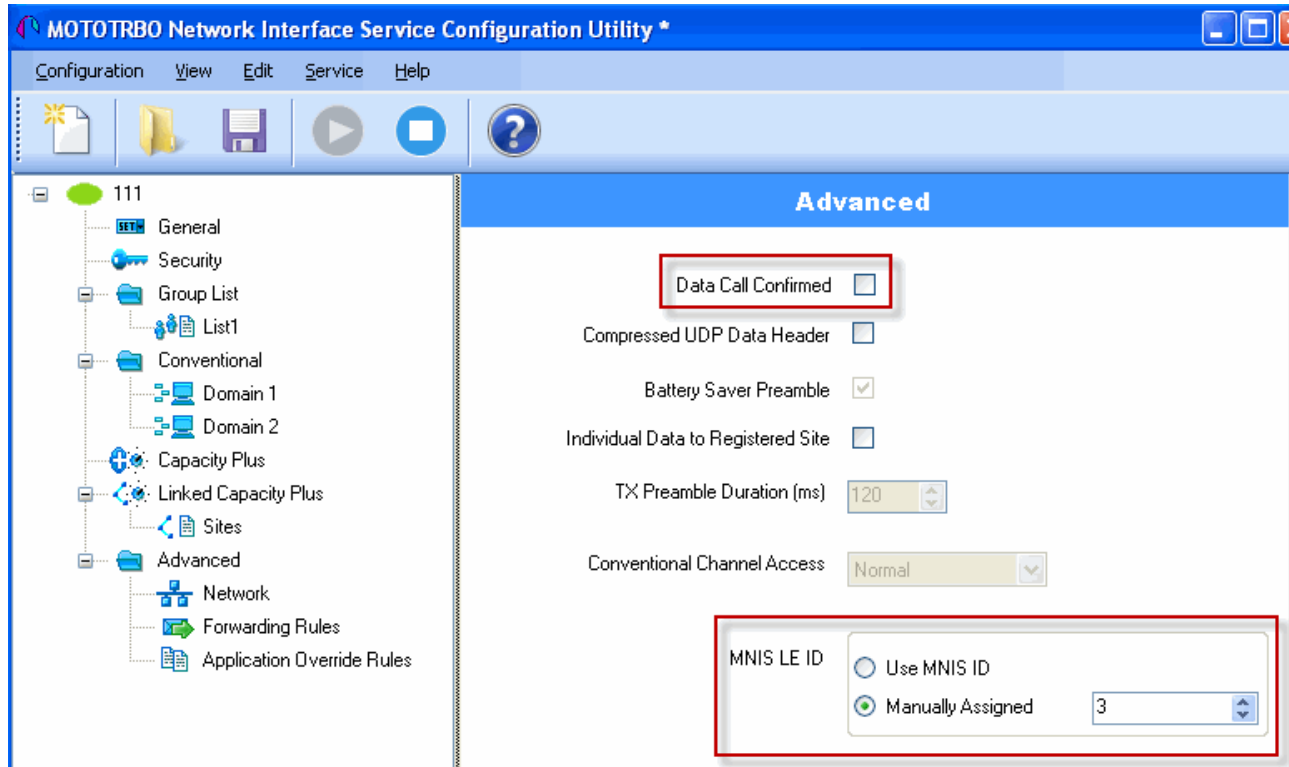
1. In the **General** section in the **System Operation Mode** field select network type. In our case, it is *Linked Capacity Plus*.



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.

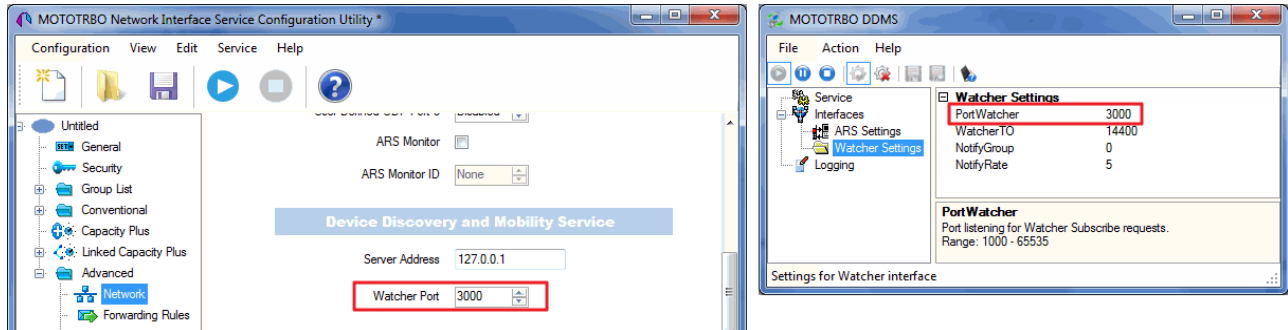


**Note:** In the Firewall settings add MNIS into the exception list.

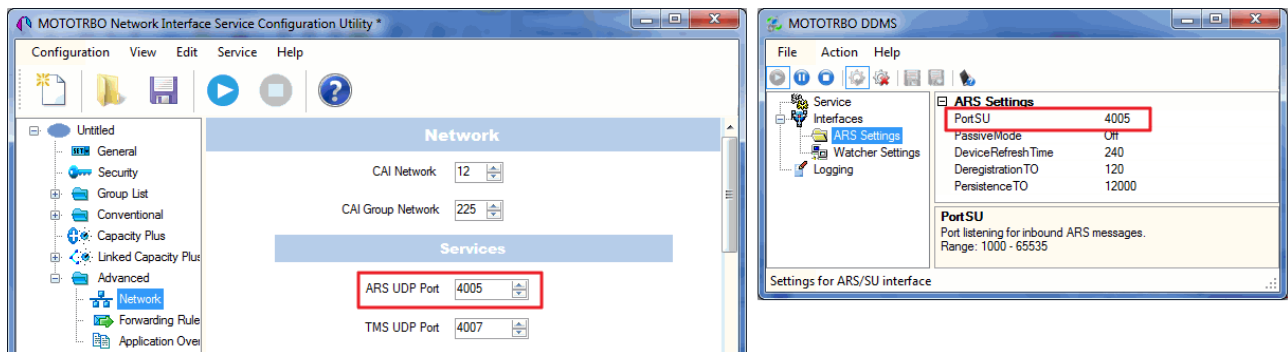
DDMS operation is closely connected to MNIS for data exchange (MNIS serves as DDMS Watcher). DDMS filters ARS packets, received by the repeater, and information on the radio presence in the network is sent to all systems for further processing.

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**).





## SmartPTT Radioserver Configuration

1. Run SmartPTT Radioserver Configurator, which you have downloaded and installed, as described in [SmartPTT Software Installation](#).
2. In the setting tree on the left, right-click on **NAI Systems**, point to **Add** and click **NAI - Linked Capacity Plus**.
3. In the opened window specify the following settings of the future LCP network.

The screenshot displays the configuration interface for a SmartPTT Radioserver. On the left is a tree view of the system configuration, with 'NAI - IP Site Connect 1' selected under 'NAI Systems'. The right pane shows the configuration for this specific network.

**NAI - IP Site Connect Network**

- Active
- Name: NAI - IP Site Connect 1
- Network ID: 10
- Peer ID: 5
- Interface: 192.168.37.13 Port: 50000
- Master repeater address (host:port): 10.150.0.20:50000 [Test]
- Authentication key: [Empty field]
- Voice transmission: Repeaters
- Group call hang time, ms: 3000
- Private call hang time, ms: 4000
- Max number of telephone calls: 100
- Data transmission
- Monitoring

**Local Slots**

[Add] [Delete]

Name	Peer ID	Slot

- **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.
- **Voice transmission** can be carried out in two ways: via repeaters and via control stations. To transmit voice via control stations, configure control station parameters and profiles for making private calls. To transmit voice via repeaters, configure virtual control station channels and talkgroups of the channel. The number of channels depends on the network type. To ensure data packets transmission over the network, configure the DDMS and MNIS services. To transmit CSBK commands use control stations for voice transfer. To transmit data and monitoring data select the corresponding check boxes (**Data transmission** and **Monitoring**). If **Data transmission** is not selected, all data packets will be gray and no data type differentiation will be applied in the **Monitoring** panel in SmartPTT Dispatcher. If **Data transmission** is selected, the data packets addressed to you will be defined, and other data packets, not addressed to you, will be gray.

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

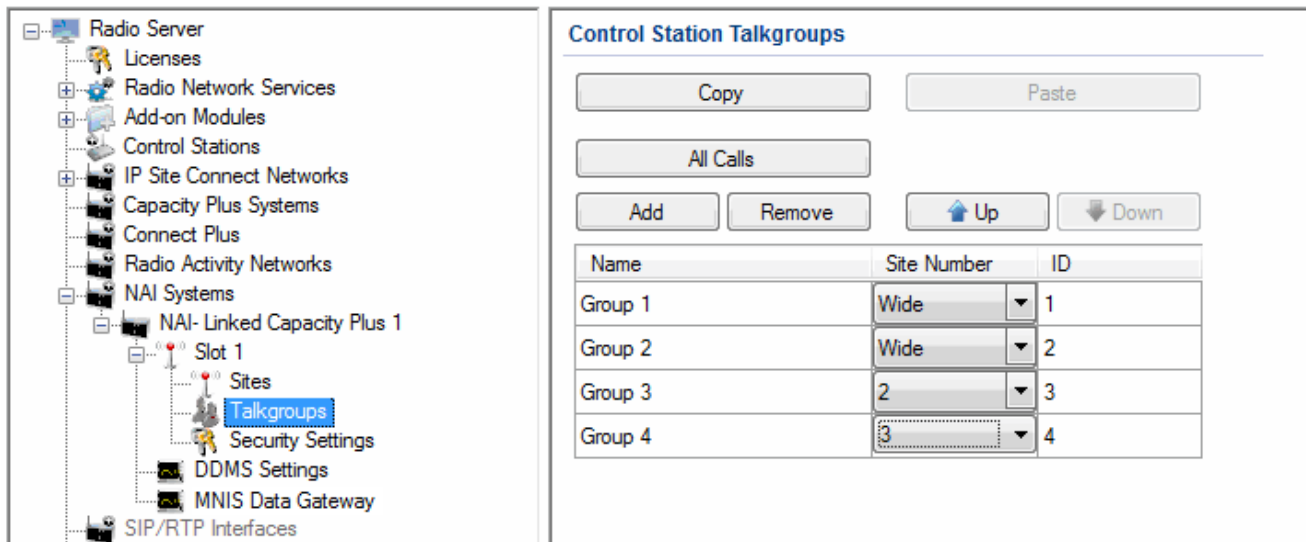
The screenshot displays the configuration interface for a radio server. On the left, a tree view shows the hierarchy: Radio Server > NAI Systems > NAI-Linked Capacity Plus 1 > Slot 1. The right pane, titled 'NAI Control Station', contains the following settings:

- Active
- Name: Slot 1
- Radio ID: 1
- CAI Network: 12
- CAI Network for Groups: 225
- Allow Telephone Interconnect
- TX Time-Out Timer, s: 60
- Options:
  - Emergency Alarm Confirmed
  - Allow Transmit Interrupt
  - GPS Transmission Mode: Data
- Confirmed events:
  - Private Call Confirmed

- **Name** – specify the name of the slot.
- **Radio 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 check box if you need the emergency alarm be acknowledged.
- **Private Call Confirmed** – select this check box if you need set private calls on the current digital channel as confirmed.
- **Allow Transmit Interrupt** – select this check box if you need the ability to interrupt a radio subscriber.
- **GPS Transmission Mode** – allows you to select the way how to transmit location updates: as a data packet in multiple bursts or as a single CSBK (Control Signaling Block). This time select **Data**.
- **Allow Telephone Interconnect** – select this check box if you need the ability to make telephone calls

on the slot.

- 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.

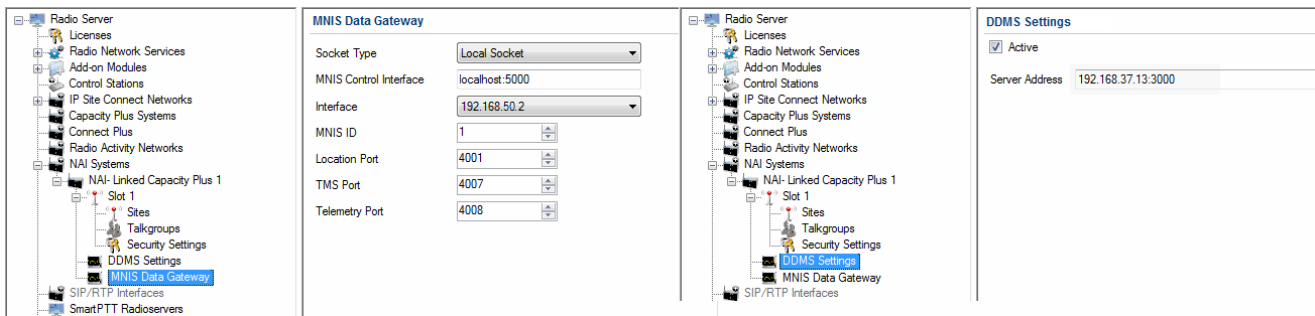


Talkgroups not specified in the repeater settings are regarded as local groups. Local group call does not go beyond the site on which the call was initiated.

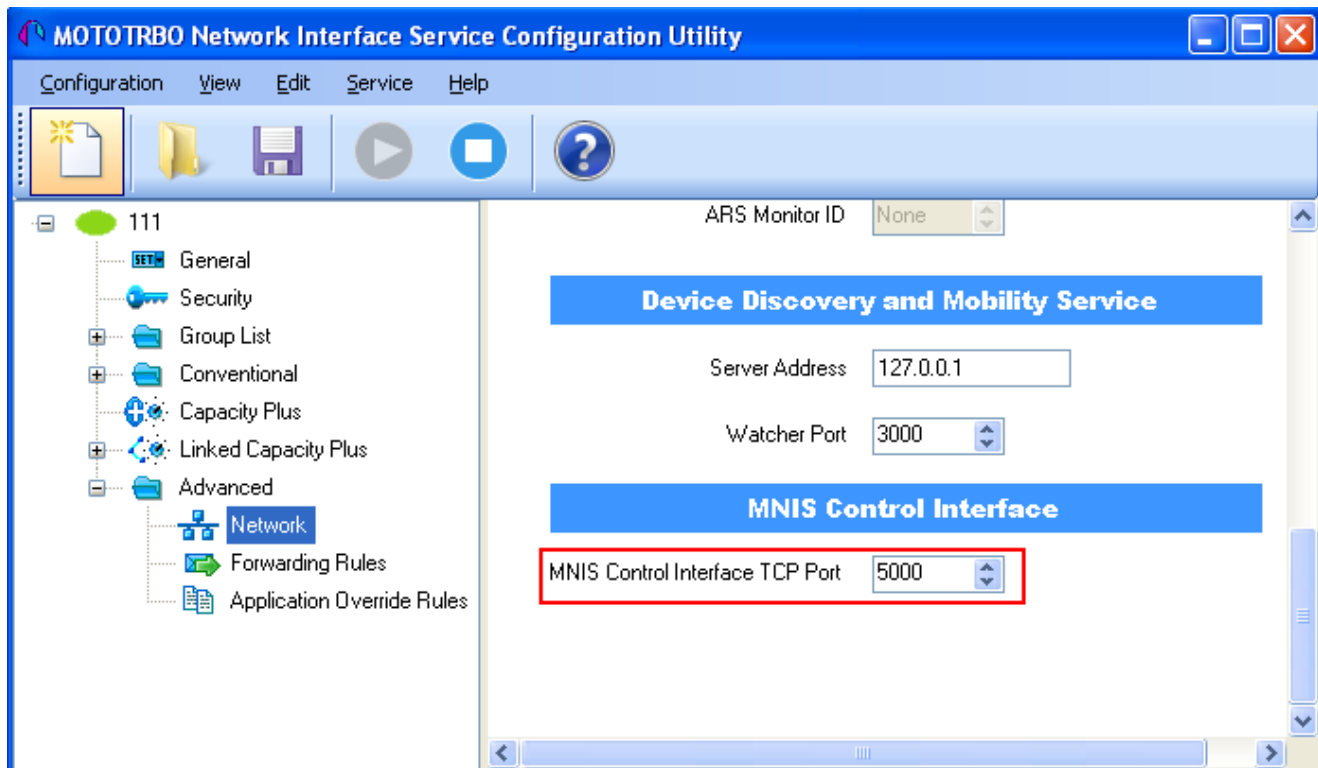
To add local talkgroups, just add them in SmartPTT Radioserver Configurator, define their identifiers and select site number from the list in the **Site Number** field.

**Note:** Wide area and local talkgroup identifiers must differ.

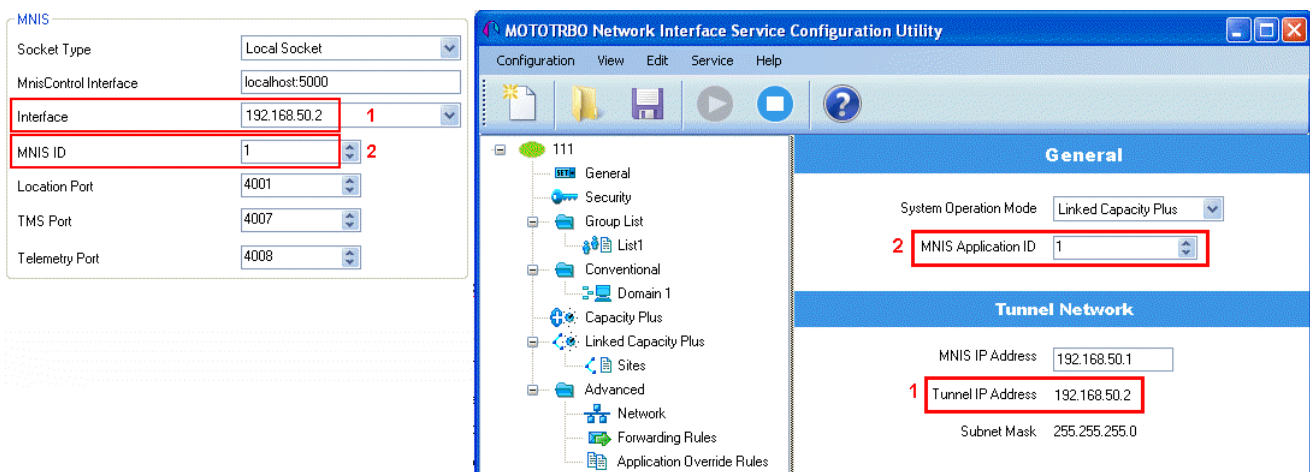
6. Configure MNIS Data Gateway and DDMS settings for data transmission under **MNIS Data Gateway** and **DDMS Settings**.



- 1) Under **MNIS Data Gateway** 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** – 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:

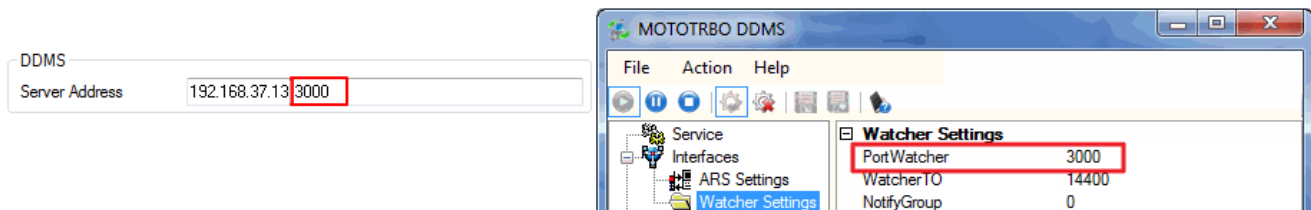




- 3) In the **Interface** field select the IP address of the PC where MOTOTRBO Network Interface Service is installed. It must match the IP address specified in the **Tunnel IP Address** field of MOTOTRBO Network Interface Service Configuration Utility.
- 4) In the **MNIS ID** field set up the Common 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** should match **Radio ID** in the radioserver slot 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 **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 .

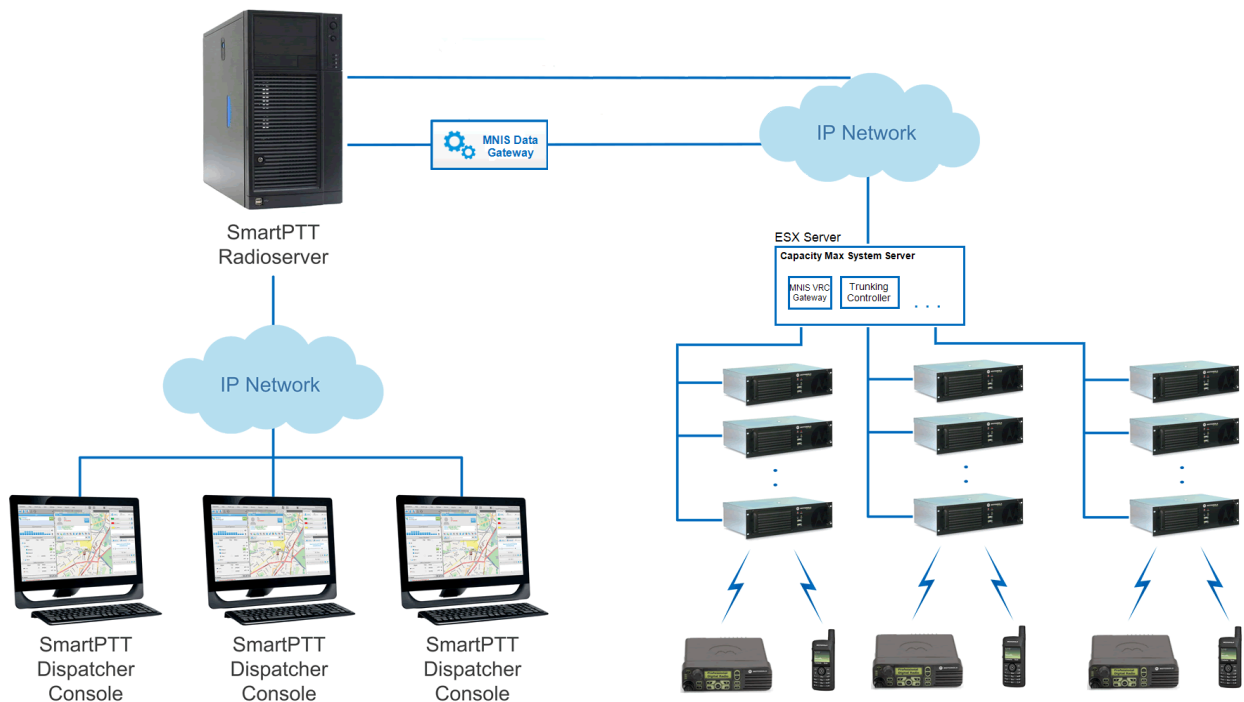
## Capacity Max

Capacity Max is a trunking MOTOTRBO system that supports the European Telecommunications Standards Institute (ETSI) Digital Mobile Radio (DMR) Tier III operation.

Capacity Max system represents the enhancement of the Linked Capacity Plus functionality. It can include up to 15 sites and up to 15 trunked repeaters with up to 3,000 users per site. One slot on each site is allocated as a control channel. Capacity Max also supports data revert repeaters—up to 6 per site and 12 time channels per site.

Capacity Max systems offer the following advantages:

- The simple and efficient system architecture that utilizes standard Internet protocol (IP) network with a centralized Capacity Max System Server (CMSS).



CMSS represents the VMware Sphere version 5.5 ESX server and includes the following virtual resources:

- Trunking Controller based on the Red Hat Linux,
- MNIS VRC gateway, and
- Radio Management application that is used instead of MOTOTRBO Customer Programming Software (CPS) to configure the system.

The system architecture also includes the MNIS Data gateway, which is installed separately.

- High security. All voice, data and control traffic within the IP network is encrypted, and all radios are securely authenticated.
- High level of reliability and resilience. The system can include an optional redundant server in addition to the main server and up to three alternate control channels per site.

Capacity Max is compatible with all MOTOTRBO repeaters, except DR3000 series with the 8MB RAM, and all MOTOTRBO 4000 series portable and/or mobile radio stations.

To configure the Capacity Max system in SmartPTT Radioserver Configurator, you will need to use the following applications:

- Radio Management application—to get the settings of the preconfigured virtual resources, and
- MOTOTRBO Network Interface Service Configuration Utility—to set up the MNIS Data gateway.

Capacity Max configuration in SmartPTT Radioserver Configurator includes the following steps:

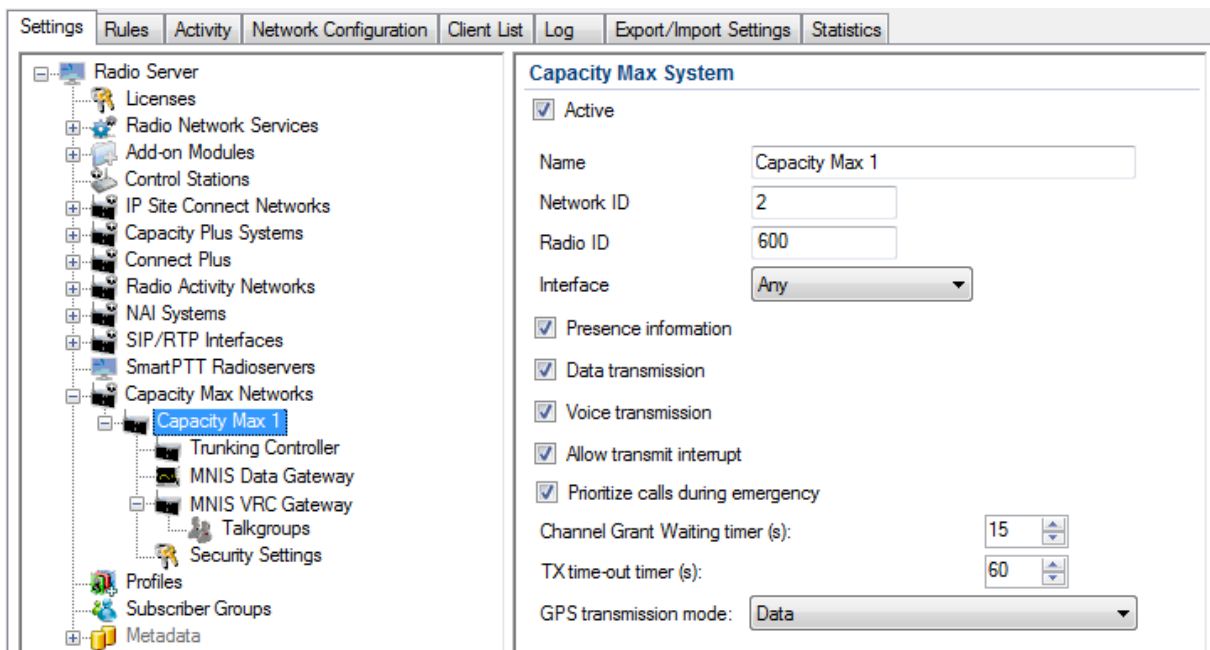


1. [Adding new network and its basic configuration.](#)
2. Setting up the [trunking controller.](#)
3. Setting up [MNIS Data gateway settings](#) for data transfer.
4. Setting up the [MNIS VRC gateway](#) and the talkgroups.
5. Setting up the security settings.

## How to Configure Capacity Max

To add a new Capacity Max system, right-click **Capacity Max Networks** in the setting tree of SmartPTT Radioserver Configurator and click **Add**.

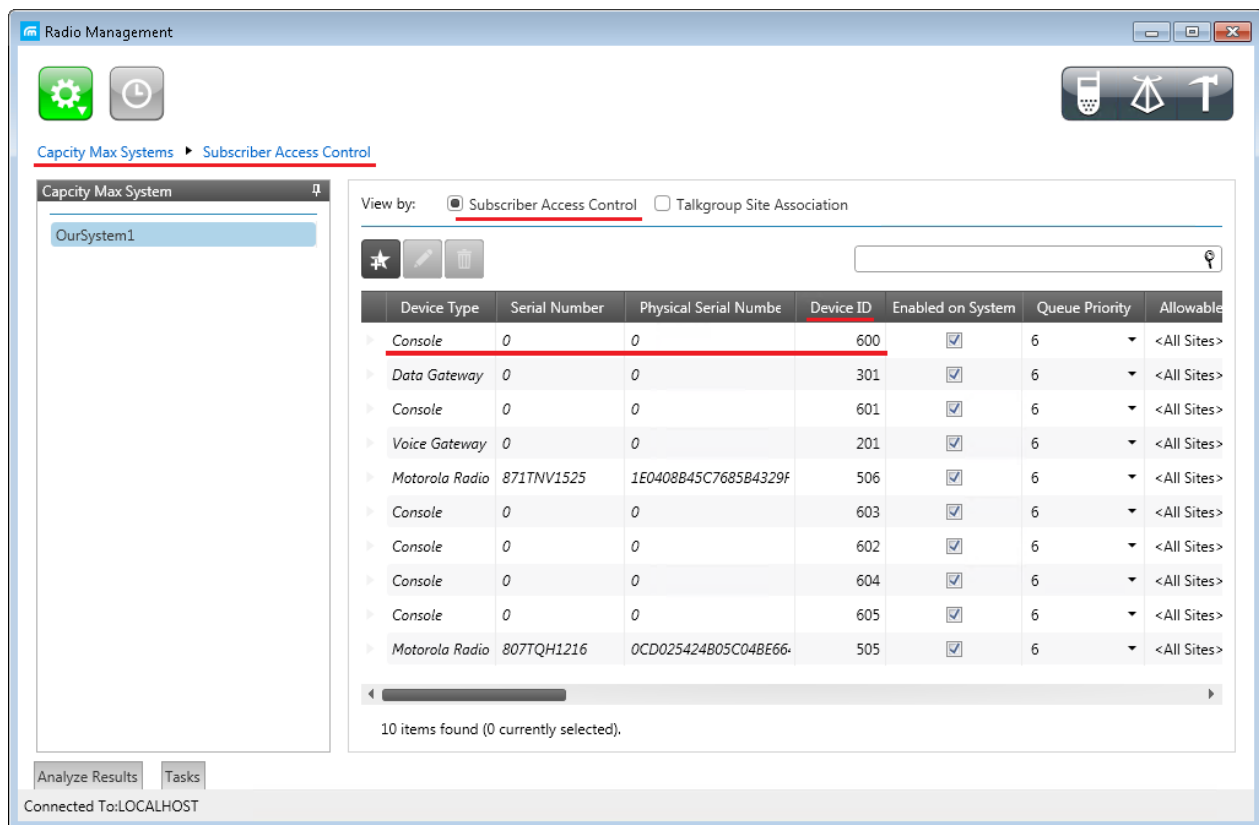
At that, **Capacity Max System** configuration menu appears on the right.



**Name:** Name of the created system.

**Network ID:** Unique ID of the network. The network ID must not match any ID of other SmartPTT Radioserver networks.

**Radio ID:** The identifier of the radioserver. This is the identifier radio subscribers will see at receiving private calls and text messages from the dispatcher. If there are several dispatchers, you can create a profile for each operator (Profiles) and define a unique identifier for each operator. **Radio ID** set in this window must correspond to the value set in the **Device ID** field for the preconfigured radioserver device in the Radio Management application (see the **Capacity Max Systems** settings, sorted by the **Subscriber Access Control** value).



**Note:** To open the **Capacity Max System** settings in the Radio Management application, click **Actions > Manage > Capacity Max System Server Data** or press the **Ctrl+Shift+G** together.

**Interface:** The IP address of the PC where SmartPTT Radioserver is installed.

**Presence information:** Select this check box to enable connection with Trunking Controller.

**Data transmission:** Select this check box to work with MNIS Data Gateway.

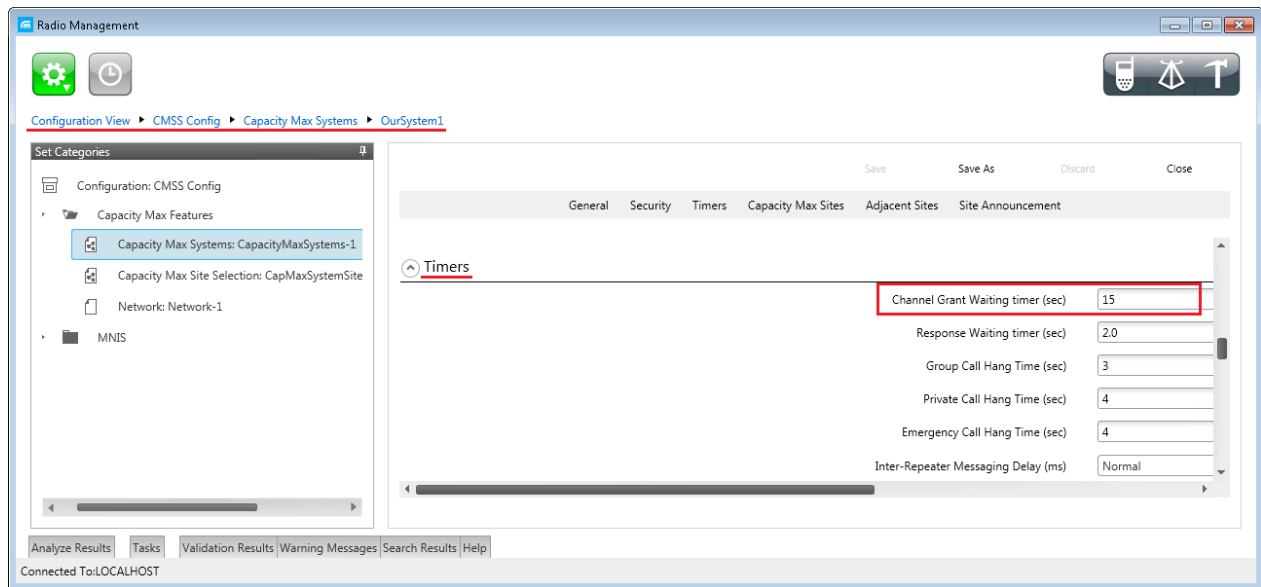
**Voice transmission:** Select this check box to enable MNIS VRC Gateway.

**Allow transmit interrupt:** Select this check box if you need the ability to interrupt a radio subscriber.

**Prioritize calls during emergency:** Sets a priority of the dispatcher call during the Emergency Call. If the check box is selected, the dispatcher call has the highest priority during the Emergency Call in relation to other calls

and interrupts them in case of lack of resources.

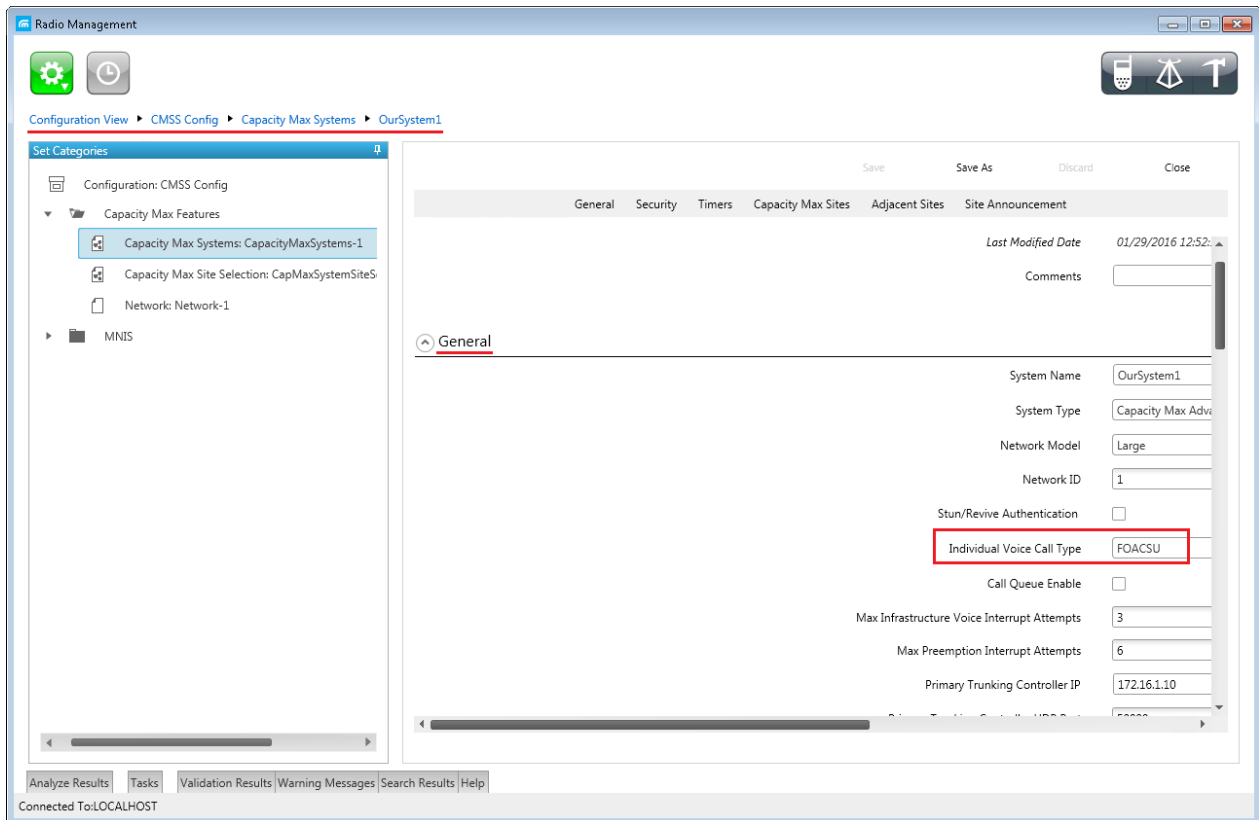
**Channel Grant Waiting timer:** Time period in seconds during which the caller expects a response from the called party (the FOACSU strategy). It is recommended to use the default value of 15 seconds that is set in the Radio Management application (see the **Capacity Max Systems:...** settings in the [Capacity Max Features](#) menu of the **CMSS Config** configuration, the **Channel Grant Waiting timer** field in the **Timers** tab).



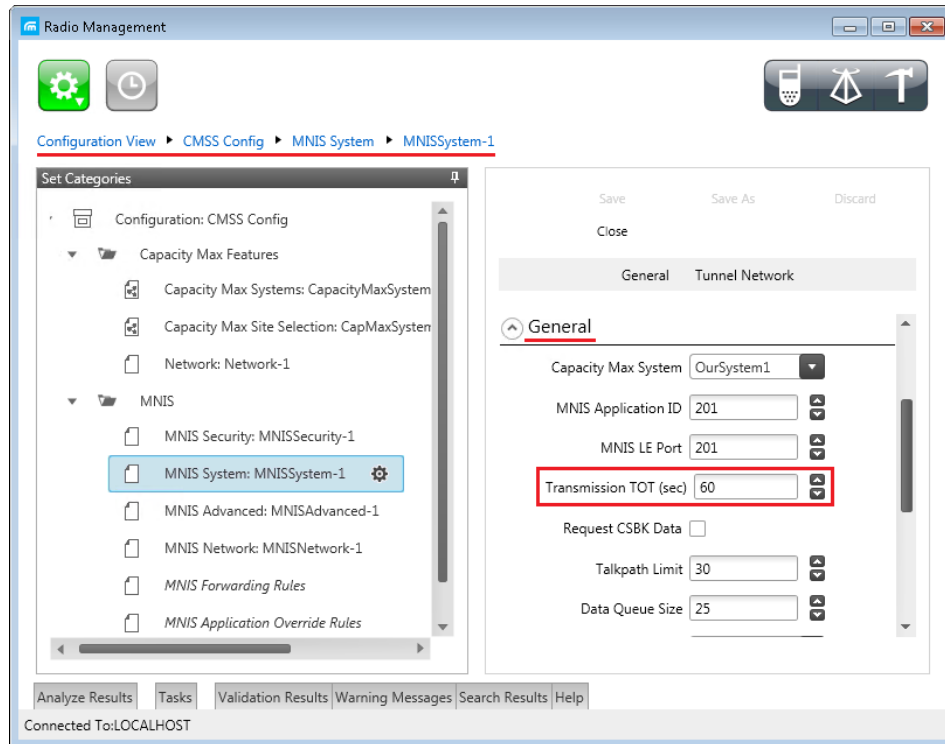
**Note:** To open the **Capacity Max Features** of the **CMSS Config** configuration in the Radio Management application, click **Actions > Manage > Configurations** or press **Alt+C** together. In the table that opened, select the **CMSS Config** item and click **Edit**. In the **Set Categories** tab that opened, click **Configuration: CMSS Config > Capacity Max Features**.

FOACSU (Full Off Air Call Set Up) stands for the strategy of assigning the traffic channel only when the called party user has specifically answered the call. During the timeout the traffic channel is not allocated for the call.

For correct work of the FOACSU private calls, make sure that it is configured in the Radio Management application (see the **Capacity Max Systems:...** settings in the [Capacity Max Features](#) menu of the **CMSS Config** configuration, the **Individual Voice Call Type** field in the **General** tab).



**TX time-out timer:** Time period during which the radio can transmit without interruptions. After this time is over, the transmission is interrupted. It is recommended to use the default value of 60 seconds, which is set in the Radio Management application (see the **MNIS System** settings in the [MNIS](#) menu of the **CMSS Config** configuration, the **Transmission TOT** field in the **General** tab).



**Note:** To open the **MNIS** menu of the **CMSS Config** configuration in the Radio Management application, click **Actions > Manage > Configurations** or press **Alt+C** together. In the table that opened, select the **CMSS Config** item and click **Edit**. In the **Set Categories** tab that opened, click **Configuration: CMSS Config > MNIS**.

**GPS Transmission Mode:** Allows you to select the way how to transmit location updates: as data packet in multiple bursts or as a single CSBK (Control Signaling Block).

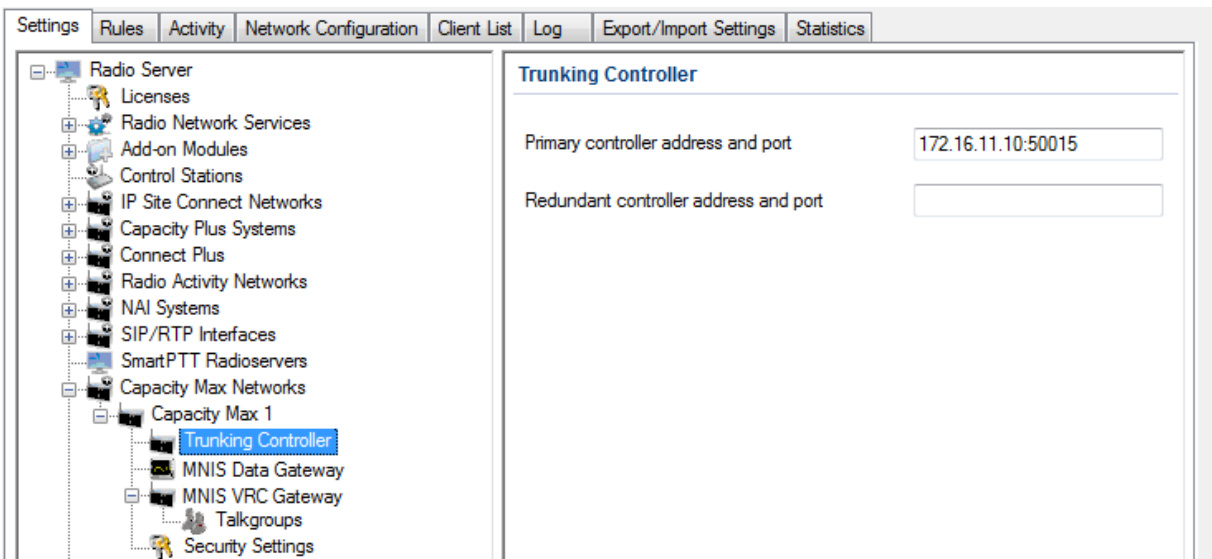
Each solution has its own advantages and disadvantages:

GPS Transmission Mode	Advantages	Disadvantages
Data	<ul style="list-style-type: none"> <li>No need to configure additional settings for receiving GPS data</li> </ul>	<ul style="list-style-type: none"> <li>Increased traffic load on a channel</li> </ul>
CSBK	<ul style="list-style-type: none"> <li>Low traffic load on a channel</li> <li>Increased GPS transmission frequency rate</li> </ul>	<ul style="list-style-type: none"> <li>Not all radios support CSBK commands</li> </ul>

	—once in 15 seconds	
Enhanced CSBK	<ul style="list-style-type: none"> <li>• Low traffic load on a channel</li> <li>• Increased GPS transmission frequency rate —once in 7.5 seconds</li> </ul>	<ul style="list-style-type: none"> <li>• Not all radios support CSBK commands</li> </ul>

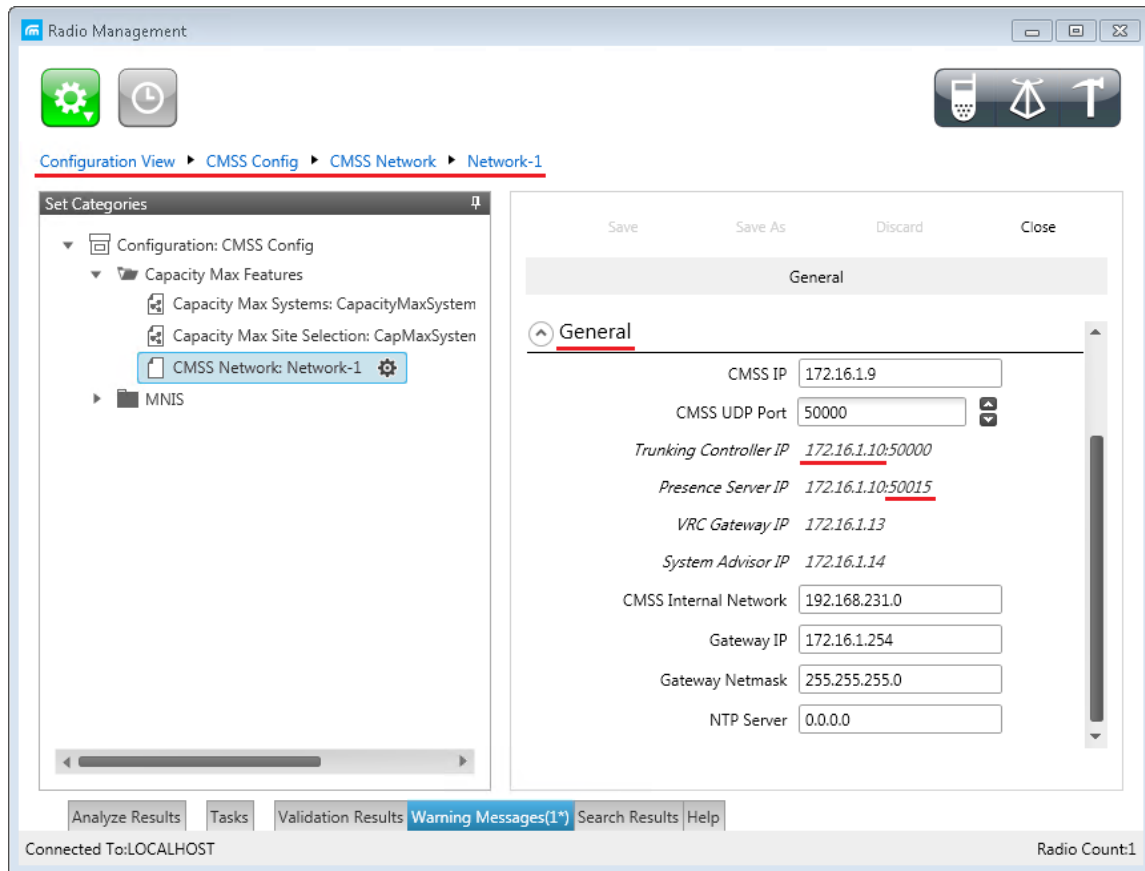
## Trunking Controller

To set up trunking controller click **Trunking Controller**.



**Note:** The **Presence information** check box in the **Capacity Max** window should be selected. Otherwise, the **Trunking Controller** parameter will not be shown.

**Primary controller address and port:** IP address and port of the primary virtual trunking controller, preconfigured in the CMS server. The IP address in this field must match the value set in the corresponding fields in the Radio Management application (see the **CMSS Network:...** settings in the [Capacity Max Features](#) menu of the **CMSS Config** configuration, the **Trunking Controller IP** field and the **Presence Server IP** field in the **General** tab).

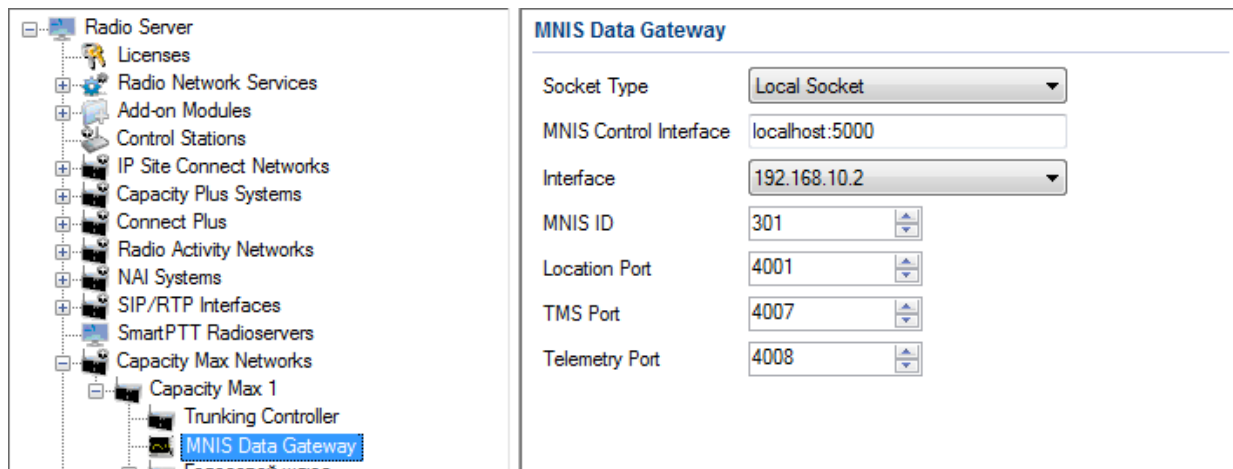


**Redundant controller address and port:** IP address and port of the redundant virtual trunking controller. This field is optional. If you fill in this field, ensure that the corresponding values are set in the Radio Management application.

## MNIS Data Gateway

To set up data transfer over Capacity Max network, set up MNIS Data Gateway settings in [SmartPTT Radioserver Configurator](#) and in the [MOTOTRBO Network Interface Service Configuration Utility](#).

To set up MNIS Data Gateway settings in SmartPTT Radioserver, click **Capacity Max Networks > Capacity Max > MNIS Data Gateway**.

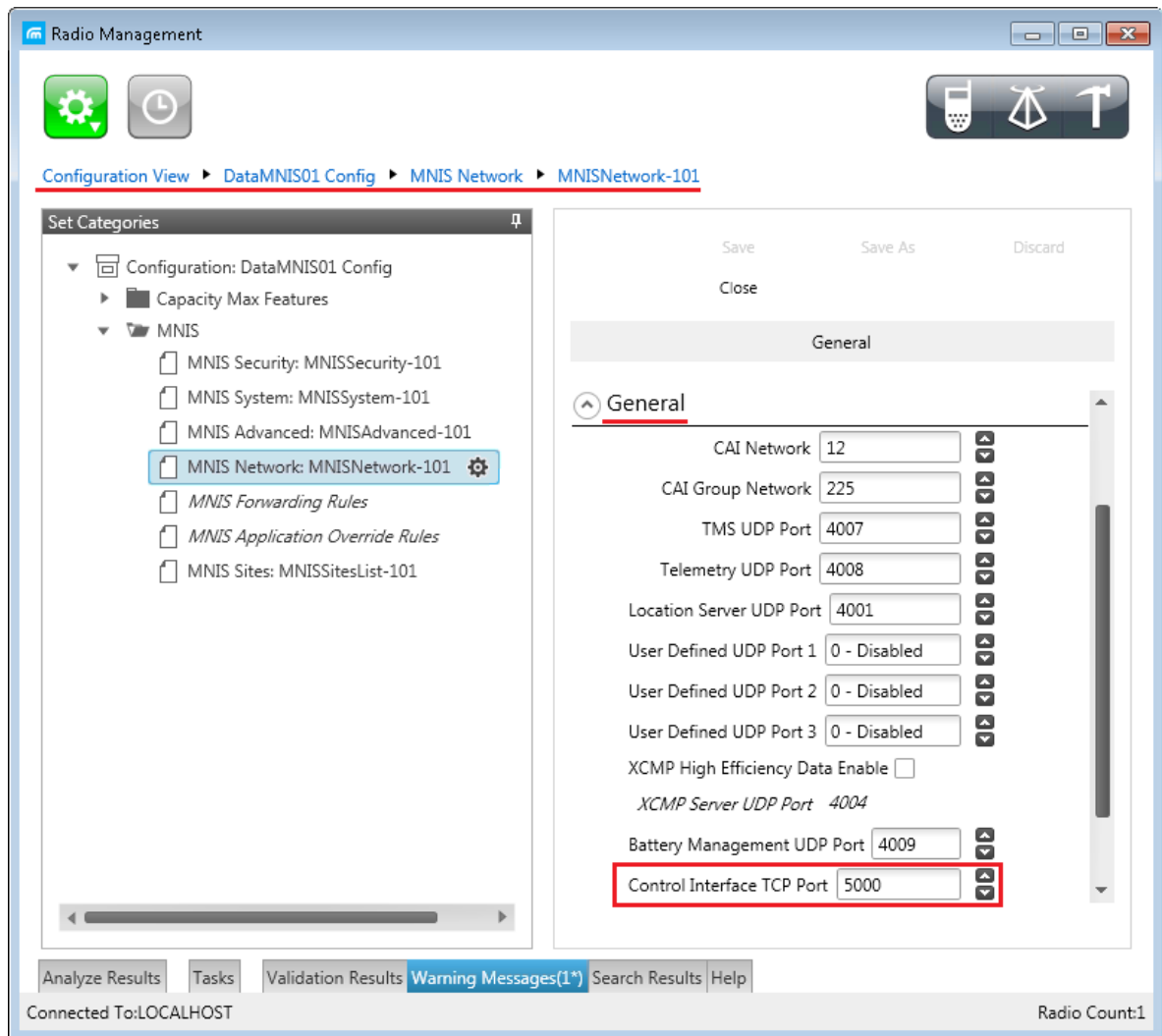


**Note:** The **Data transmission** check box in the **Capacity Max** window should be selected. Otherwise, the **MNIS Data Gateway** parameter will not be shown.

**Socket type:** Defines the software interface type to enable communication between processes. Select the *Local Socket* value if the MOTOTRBO Network Interface Service Configuration Utility is installed on the same PC as SmartPTT Radioserver. Select *Remote Socket* if MOTOTRBO Network Interface Service Configuration Utility and SmartPTT Radioserver are installed on a different PCs. In this case, information exchange between the processes is supported by the MNIS Relay application.

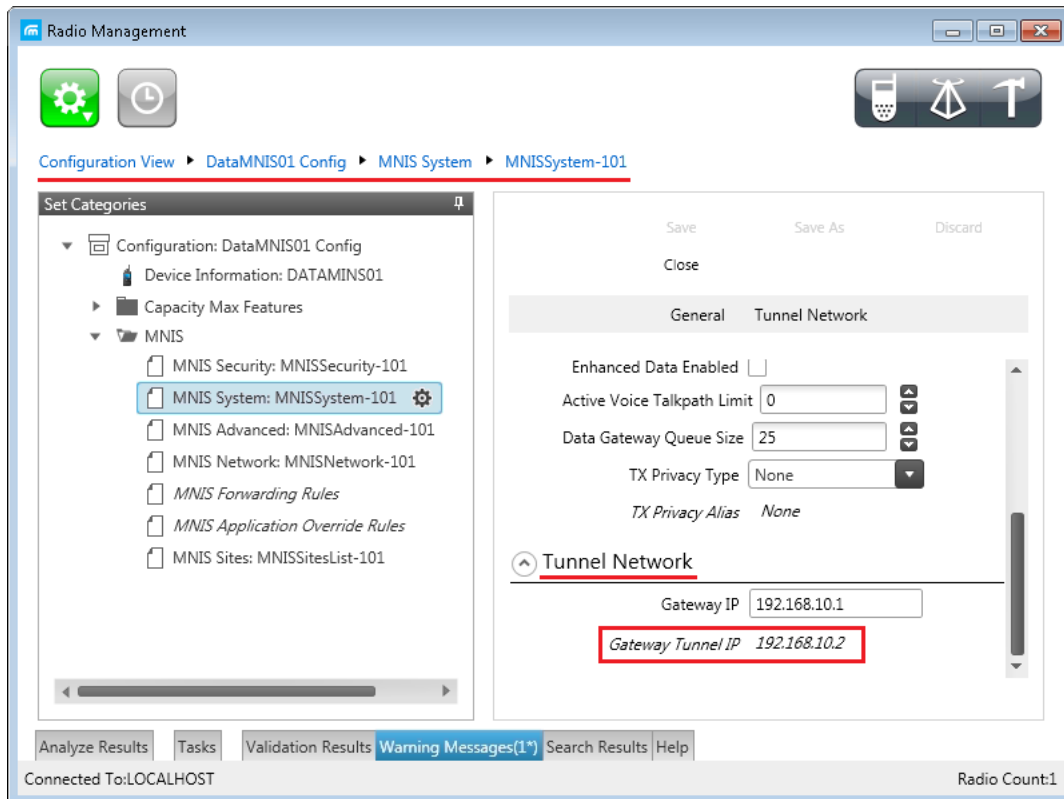


**MNIS Control Interface:** Use *localhost*, if MOTOTRBO Network Interface Service Configuration Utility is installed on the same PC as the radioserver. If MOTOTRBO Network Interface Service Configuration Utility and the radioserver are installed on different PCs, enter the IP address of the PC where MOTOTRBO Network Interface Service Configuration Utility is installed. The port should match the port number specified in the Radio Management application (see the **MNIS Network** settings in the [MNIS](#) menu of the **DataMNIS Config** configuration, the **Control Interface TCP Port** field in the **General** tab).

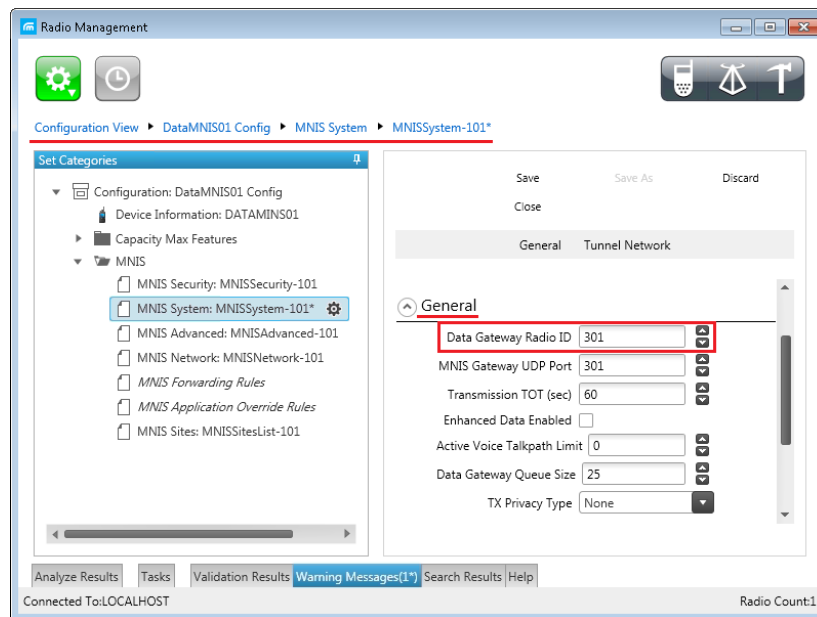


**Note:** To open the **MNIS** menu of the **DataMNIS Config** configuration in the Radio Management application, click **Actions > Manage > Configurations** or press **Alt+C** together. In the table that opened, select the **DataMNIS.. Config** item and click **Edit**. In the **Set Categories** tab that opened, click **Configuration: DataMNIS.. Config > MNIS**.

**Interface:** MOTOTRBO Network Interface Service interface. It must match the interface specified in the Radio Management application (see the **MNIS System** settings in the [MNIS](#) menu of the **DataMNIS Config** configuration, the **Gateway Tunnel IP** field in the **Tunnel Network** tab).



**MNIS ID:** 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 corresponding field in the Radio Management application (see the **MNIS System** settings in the [MNIS](#) menu of the **DataMNIS Config** configuration, the **Data Gateway Radio ID** field in the **General** tab).

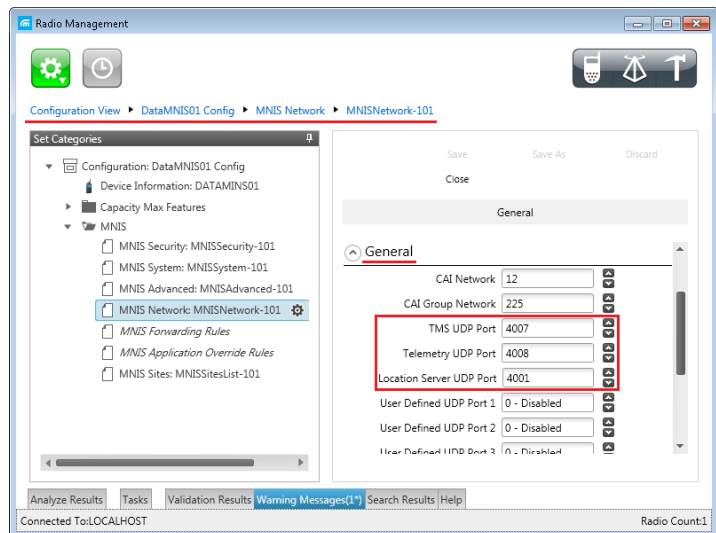


**Location Port:** The port where the radioserver will expect GPS data.

**TMS Port:** The port where the radioserver will expect text messages.

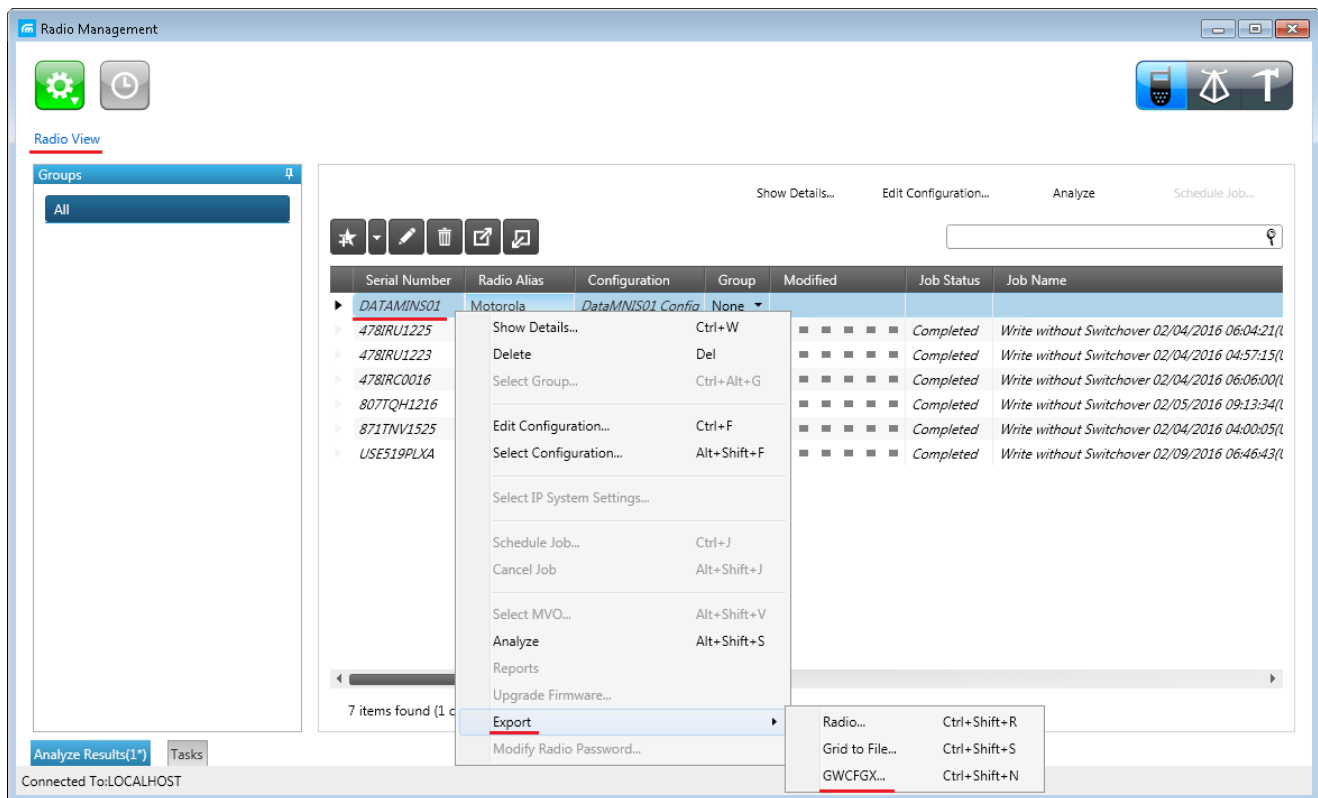
**Telemetry Port:** The port where the radioserver will expect telemetry data.

The ports should match the ports set in the corresponding fields in the Radio Management application (see the **MNIS Network** settings in the [MNIS](#) menu of the **DataMNIS Config** configuration, the **Location Server UDP Port** field, the **TMS UDP Port** field, the **Telemetry UDP Port** field in the **General** tab).

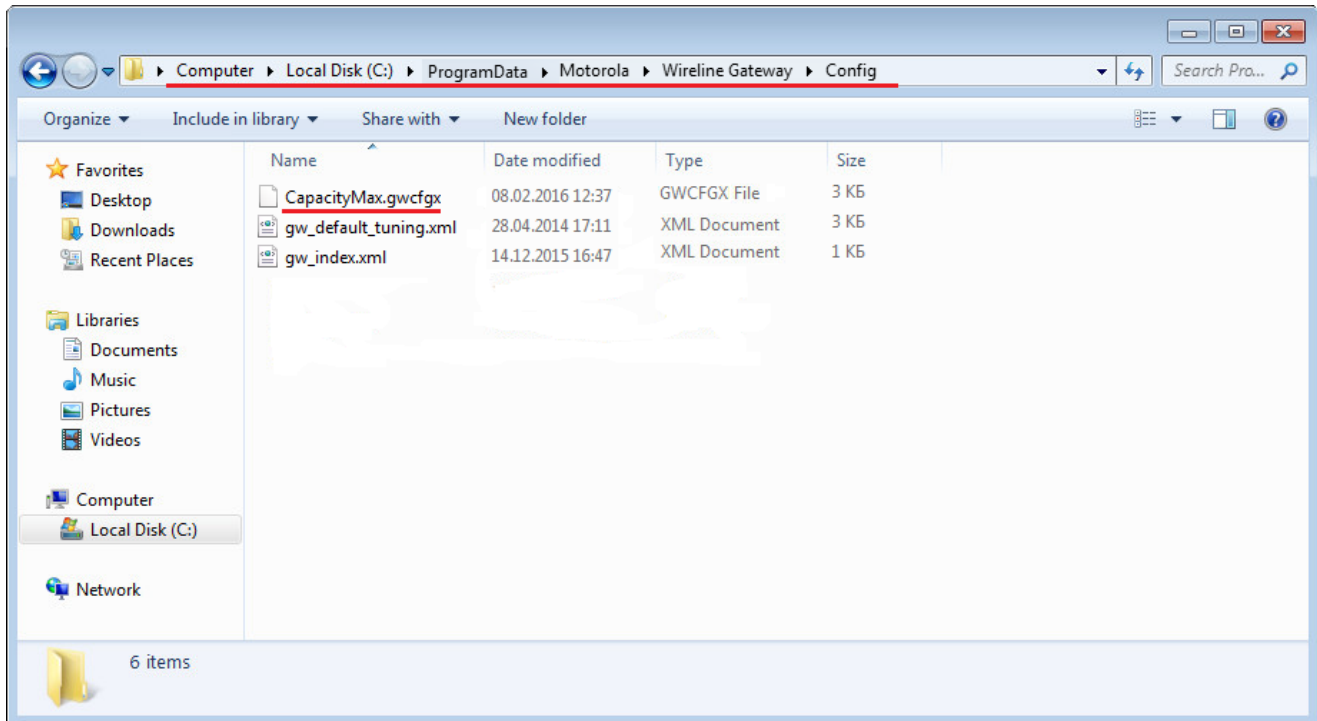


To set up MNIS Data Gateway settings in MOTOTRBO Network Interface Service Configuration Utility, do the following:

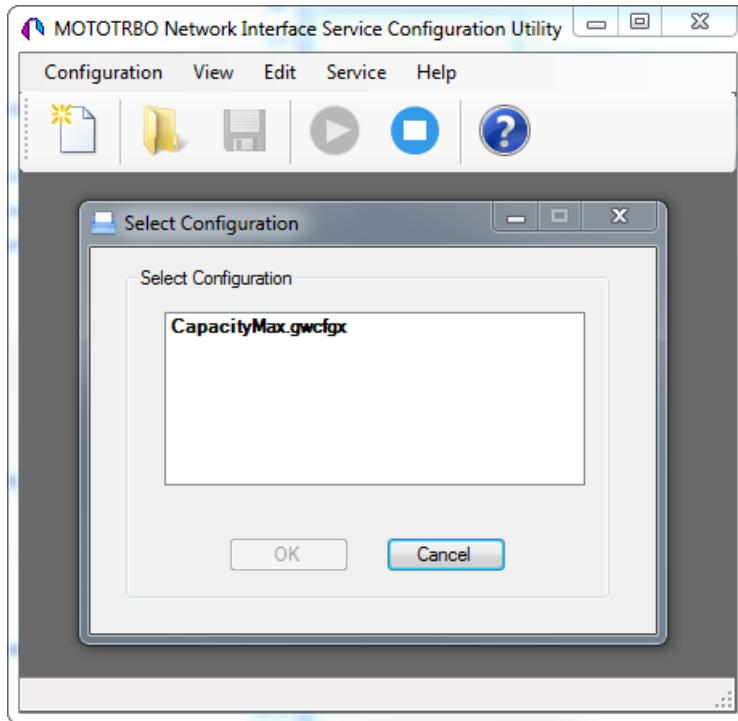
1. Save MNIS Data Gateway settings from the Radio Management application as GWCFGX file. For that, click **Radios**, right click the **DATA MNIS...** item in the table that opened and click **Export > GWCFGX...** or press **Ctrl+Shift+N** together. In the **Export GWCFGX** window that opened, specify the file name and click **OK**.



2. Transfer the saved GWCFGX file to your PC where the MOTOTRBO Network Interface Service Configuration Utility is installed, to the **Config** folder that is located on the local disk C:/ProgramData/Motorola/Wireline Gateway.

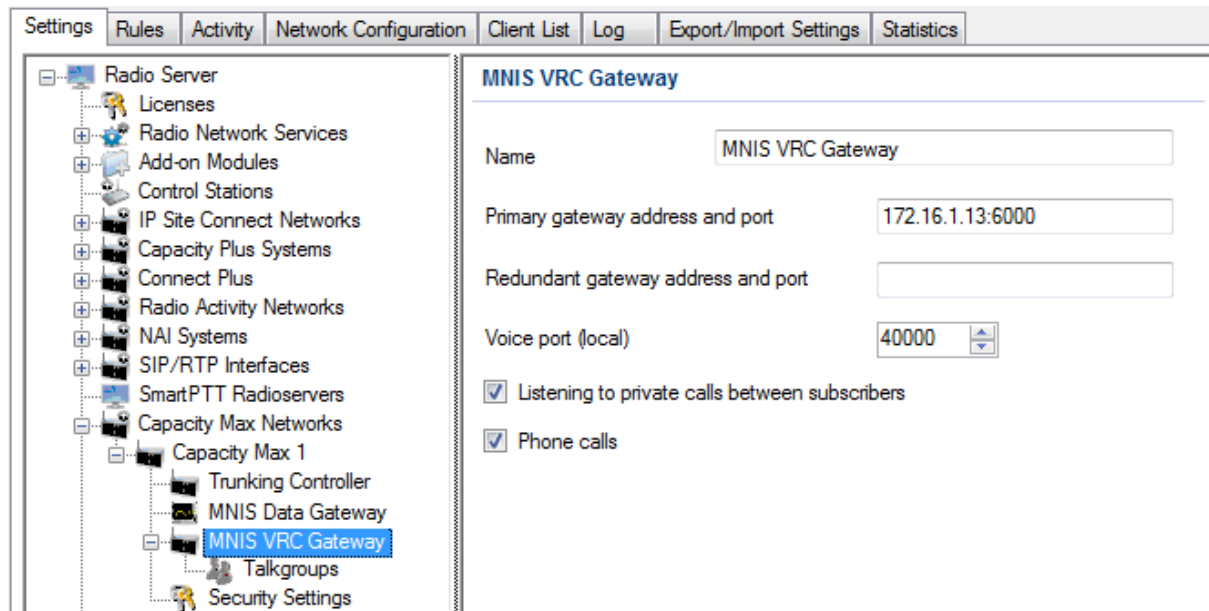


3. Launch MOTOTRBO Network Interface Service Configuration Utility and click **Configuration > Select Active Configuration**. In the **Select Configuration** window that opened, select the GWCFGX file saved before and click **OK**.



## MNIS VRC Gateway

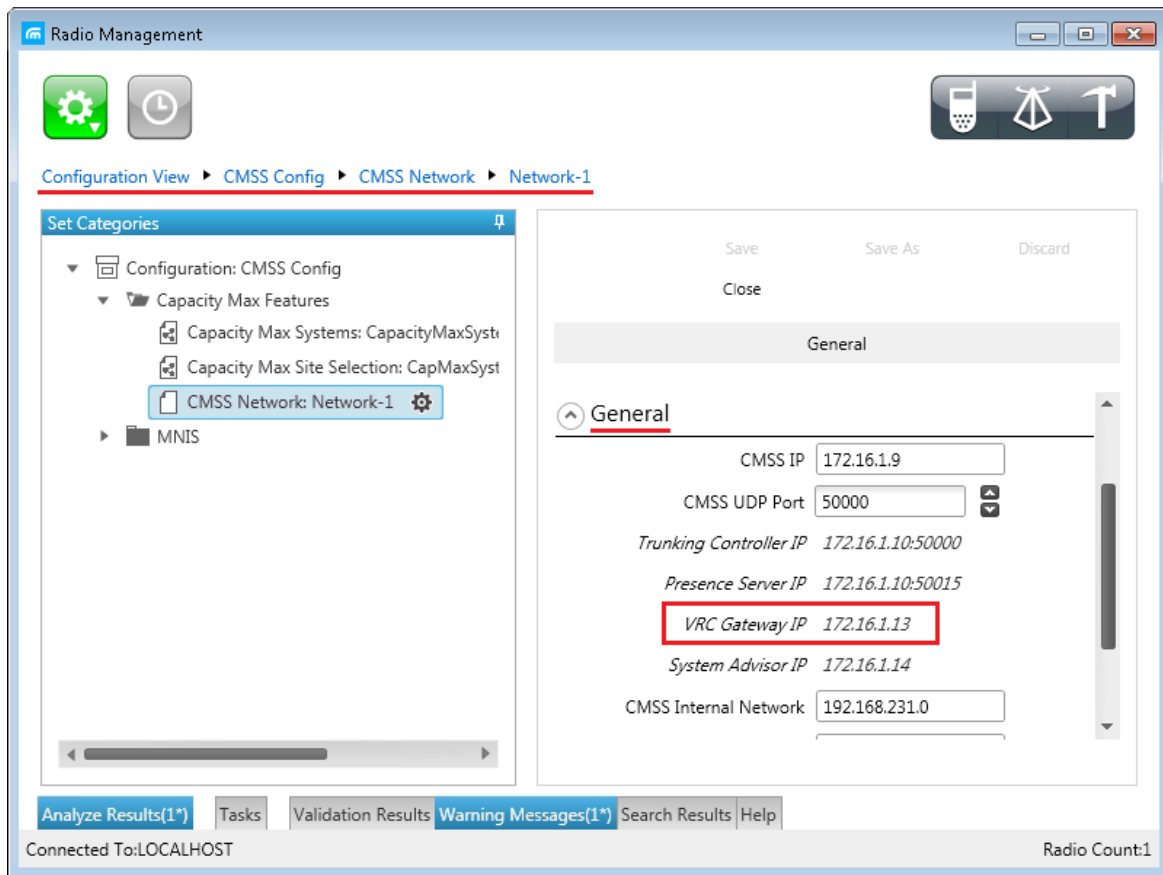
To set up the MNIS VRC gateway and talkgroups, click **MNIS VRC gateway**.



**Note:** The **Voice transmission** check box in the **Capacity Max** window should be selected. Otherwise, the **MNIS VRC Gateway** parameter will not be shown.

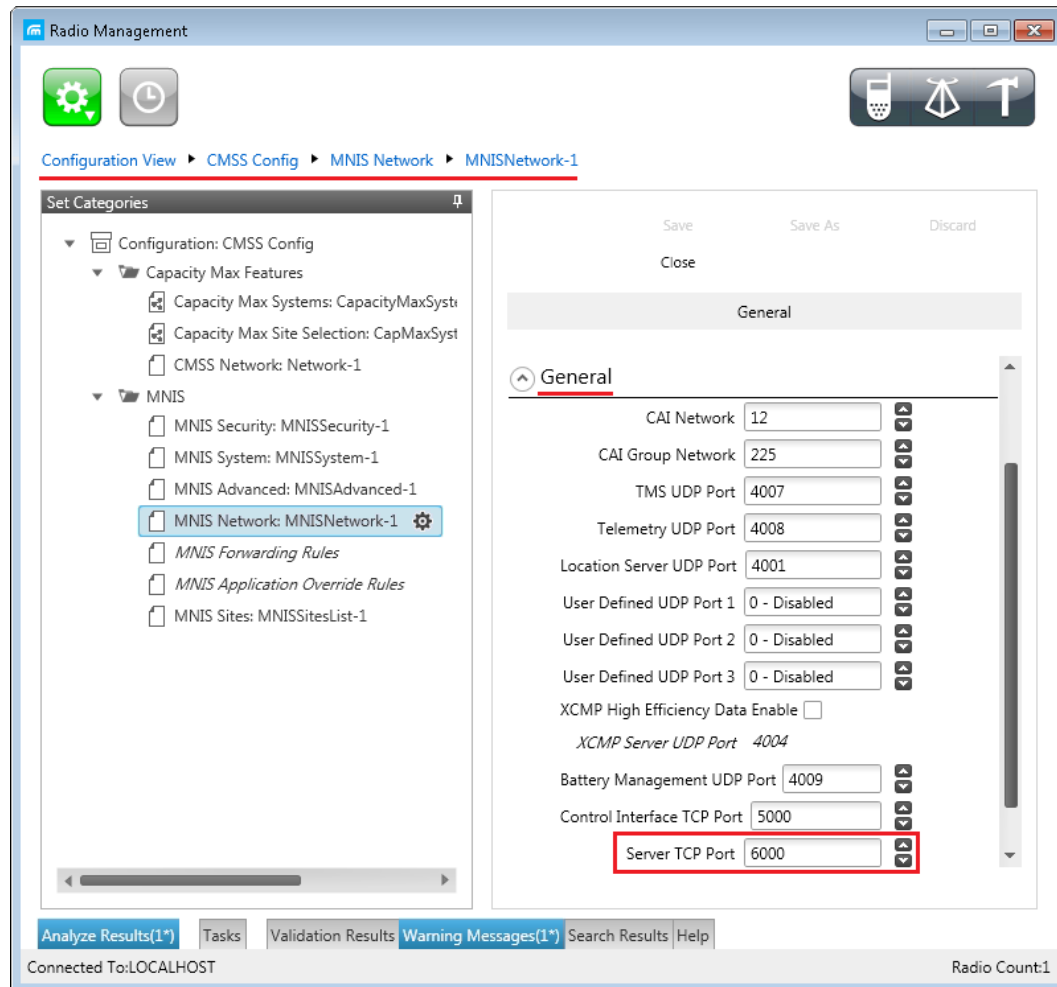
**Name:** The name of the gateway.

**Primary gateway address and port:** IP address and port of the main voice gateway. The IP address in this field must match the value set in the corresponding fields in the Radio Management application (see the **CMSS Network:...** settings in the [Capacity Max Features](#) menu of the **CMSS Config** configuration, the **VRC Gateway IP** field in the **General** tab).





The port in this field must match the value set in the corresponding field in the Radio Management application (see the **MNIS Network:...** settings in the [MNIS](#) menu of the **CMSS Config** configuration, the **Server TCP Port** in the **General** tab).



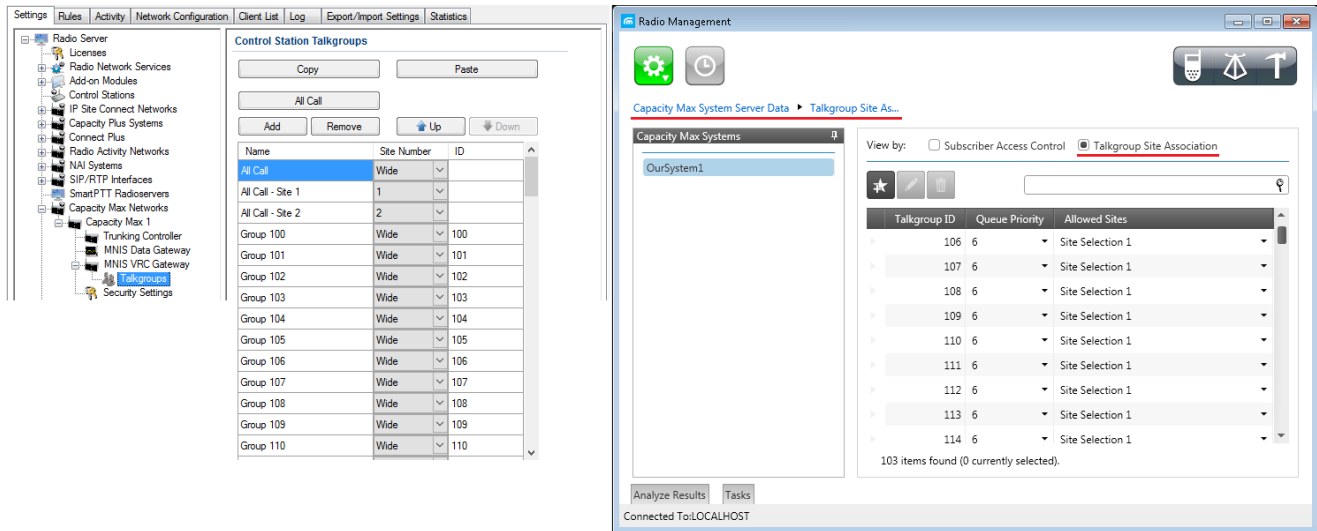
**Redundant gateway address and port:** IP address and port of the redundant voice gateway. This field is optional. If you fill in this field, ensure that the corresponding values are set in the Radio Management application.

**Voice port (local):** The port where the radioserver will expect voice data.

**Listening to private calls between subscribers:** Enables the Voice Recording feature, that allows the dispatcher to hear private calls made from radio subscribers to other radio subscribers, dispatchers or telephone subscribers and vice versa, read their messages.

**Phone calls:** Select this check box if you need the ability to make telephone calls.

Create one or more talkgroups in accordance with the settings in the Radio Management application (see the **Capacity Max Systems** settings, sorted by the **Talkgroup Site Association** value).



**Note:** To open the **Capacity Max System** settings in the Radio Management application, click **Actions > Manage > Capacity Max System Server Data** or press the **Ctrl+Shift+G** together.