SmartPTT

SmartPTT PLUS

Installation and Configuration Guide

elcomplus

Contents

1 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 (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 ofLinked Capacity Plus (LCP) and Connect Plus networks consisting of 3 sites.

2 Preliminary Actions

Before the software installation, your must ensure that the target computer meets the minimum hardware and software requirements. For details, see *SmartPTT PLUS System Requiremenents*.

2.1 HDD Space Estimation

Required HDD space depends on multiple factors. The most important factors are the following:

- Size of the installed Windows operating system with all necessary components installed (for example, Microsoft .NET Framework).

- Size of the SmartPTT software (~400 MBytes).

- Size of the locally installed Microsoft SQL Server and its databases:

    - Dispatch system event log.

    - Monitoring.

    - Dispatch system metadata.

    - SmartPTT Dispatcher event log.

- Voice notifications database.

- Voice records.

To estimate the required HDD space and prepare the relevant storage device, you should estimate all the aspects mentioned above.

Voice Records

You can record voice calls in SmartPTT (using the "Voice Recording" license). They are saved as audio files in one of the following locations:

- Local folder on the computer with SmartPTT Radioserver.

- Network folder.

- Removable drive or flash storage.

Audio file with the one-minute call record takes up to 300 KB of the HDD space. Use this value as the reference point (B = 300).

To prepare for HDD space calculations, estimate the following values:

- Average call rate during the day (N).

- Average duration of the calls during the day (D).

- Number of working days in the week/month/other period of time (P).

- Risk factor to foresee the deviation of the actual parameters from their average values (R). If unsure, assume R = 2.

To calculate the required HDD space (C), multiply the obtained parameters:

$$C = B \times N \times D \times P \times R$$

You will receive the result in KB. If required, convert them to MB or GB.

For example, you answer 2500 calls per day (N = 2500) and each call longs for 1 min (D = 1). Assume that you consider 100-day period of time with no holidays (P = 100) and assume the risk factor R = 2. This makes the required HDD space equal to C = 150,000,000 KB ≈ 150 GB.

> **NOTE**
> Considered period of time (100 days) is the default value of the retention period for call record files on SmartPTT Radioserver.

3 Installation of SmartPTT Software

Installation of the SmartPTT Software allows making the following:

- Fresh installation of the SmartPTT Software.

- Adding the programs and applications which were omitted during the previous installation.

- Repairing the errors occurred during the previous installation.

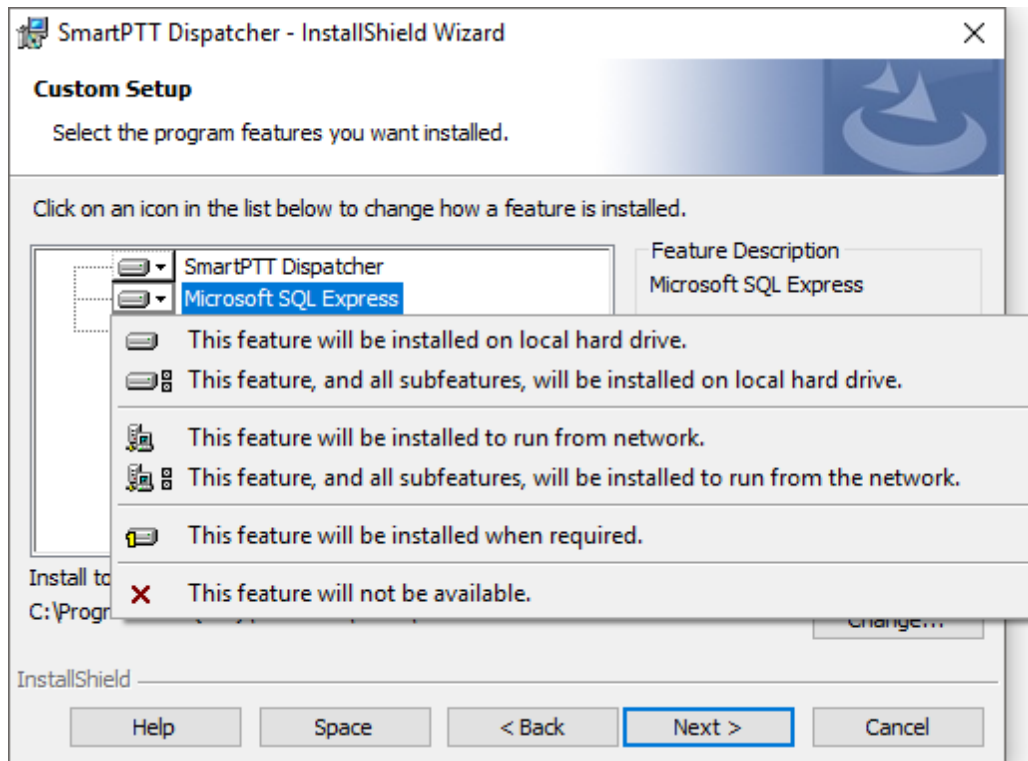- Uninstallation of the SmartPTT Software.

> **NOTE**
> If you wish to upgrade the SmartPTT Software by means of the product or version, you should uninstall the current SmartPTT Software and then install a new one.

Before the installation make sure the following:

- You have Microsoft .NET Framework installed (not earlier than 4.6):

  - YES: you will not be asked to install it.

  - NO: you should agree to install Microsoft .NET Framework when InstallShield Wizard will ask you.

- You have Microsoft SQL Server installed:

  - YES: specify if its version is not earlier than 2008:

    - YES: select **This feature will not be available** for Microsoft SQL Express during the installation of the SmartPTT Software.

- NO: you should upgrade to at least Microsoft SQL Server 2008 before the installation of the SmartPTT Software and select **This feature will not be available** during the installation of the SmartPTT Software.

- NO: you should select **This feature will be installed on local hard drive** during the installation of the SmartPTT Software.

To begin the installation of the SmartPTT Software, follow these steps:

1. Run *autorun.exe* file from the folder where you copied SmartPTT installation package.

2. Select SmartPTT Radioserver and SmartPTT Dispatcher to install on the current PC. If you install both of them on the same PC, we would recommend you to start with Radioserver.
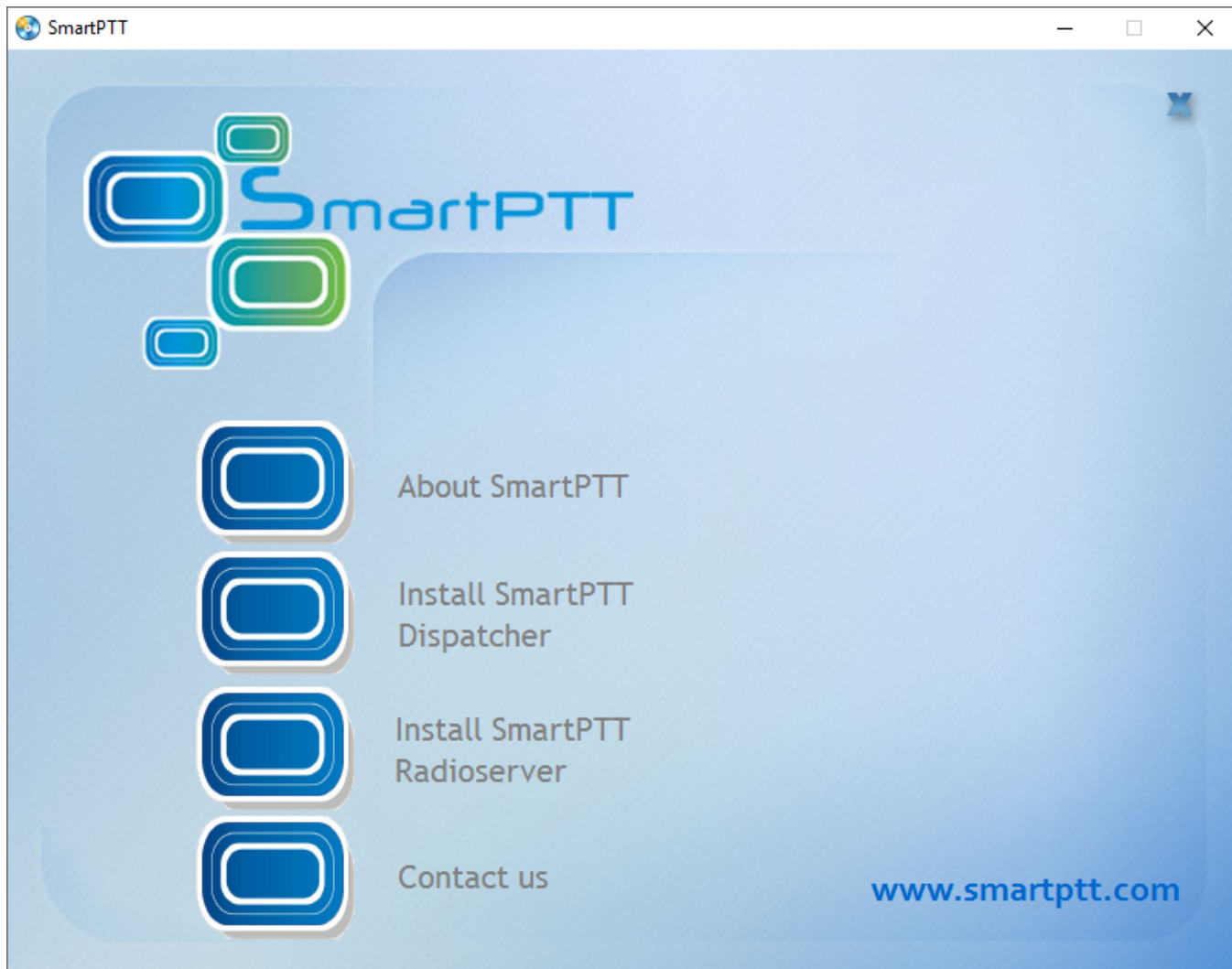
3. Follow the instructions of InstallShield Wizard. You should perform the following additional actions during the installation:

   3.1. Install Microsoft .NET Framework if InstallShield Wizard asks you. It is needed for the work of the SmartPTT Software.

   3.2. Restart the PC after Microsoft .NET Framework installation if InstallShield Wizard asks you.

> **NOTE**
>
> In rare cases InstallShield Wizard will not ask you to restart the PC. However, the problem may occur in the work of the freshly installed SmartPTT Software. If you notice them, please, start the installation and select **Modify** or **Repair** in the **Program Maintenance** window.

3.3. Select the proper variant in the **Program Maintenance** window:

- Select **Modify** to change the installed program features.

- Select **Repair** to fix installation errors in the program.

- Select **Remove** to delete the program from the computer.
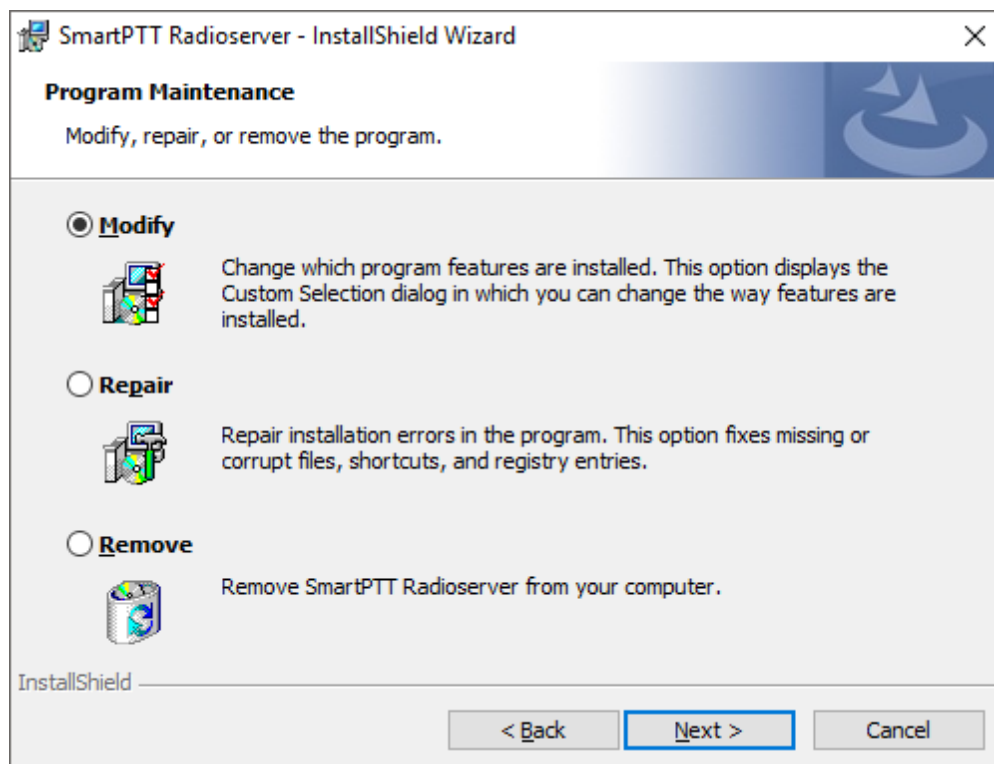
3.4. Install or do not install Microsoft SQL Server:

- If you have Microsoft SQL Server not earlier than 2008 version, in the **Custom Setup** window click the **Microsoft SQL Express** icon and select **This feature will not be available.**

- If you have Microsoft SQL Server earlier than 2008 version, in the **Custom Setup** window click the **Microsoft SQL Express** icon and select **This feature will not be available.** Then you should upgrade to at least Microsoft SQL Server 2008.

- If you do not have Microsoft SQL Server, you should select in the **Custom Setup** window. For this in the **Custom Setup** window click the **Microsoft SQL Express** icon and select **This feature will be installed on local hard drive** or **This feature, and all subfeatures, will be installed on local hard drive.**
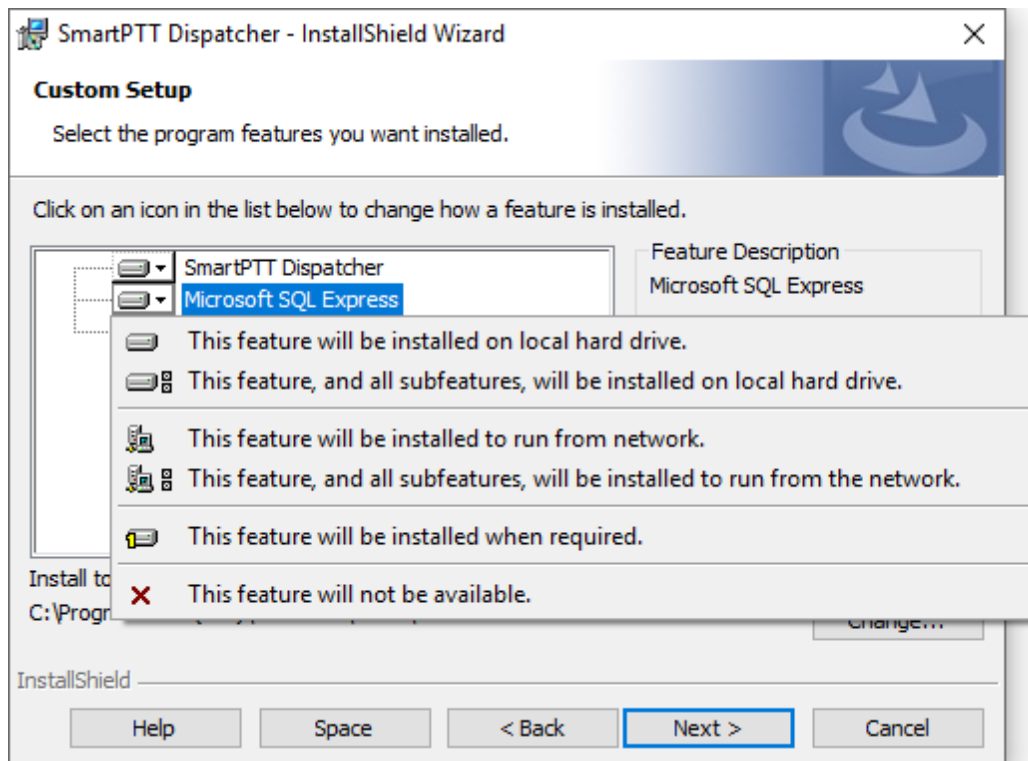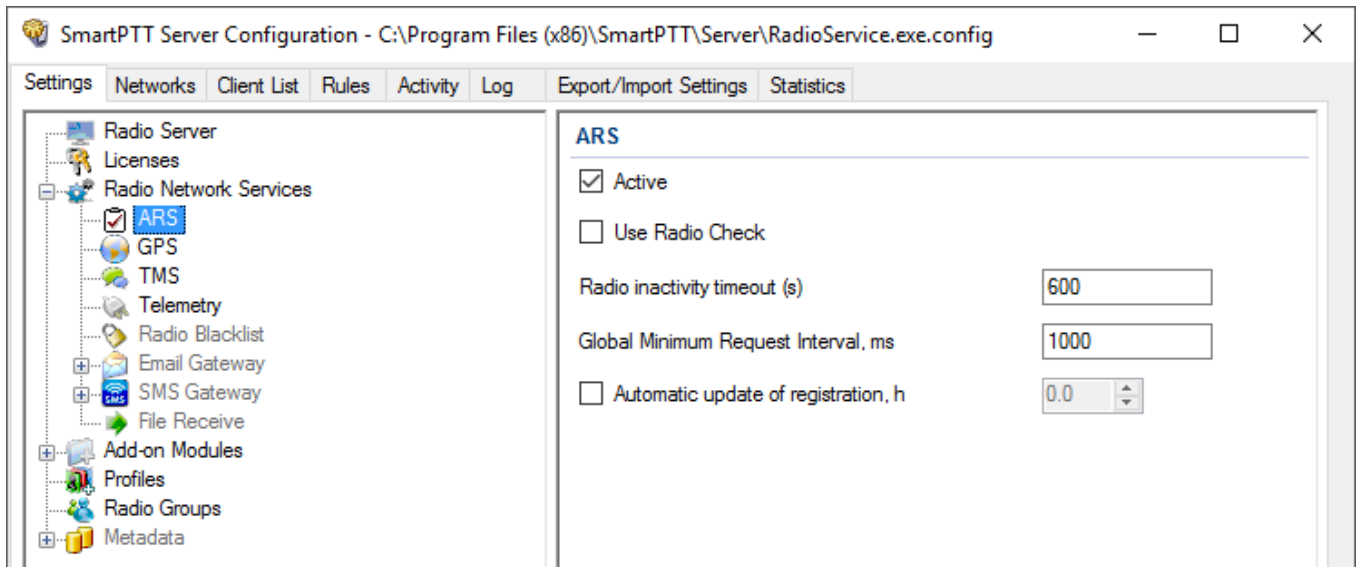
4 General SmartPTT Radioserver Configuration

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.
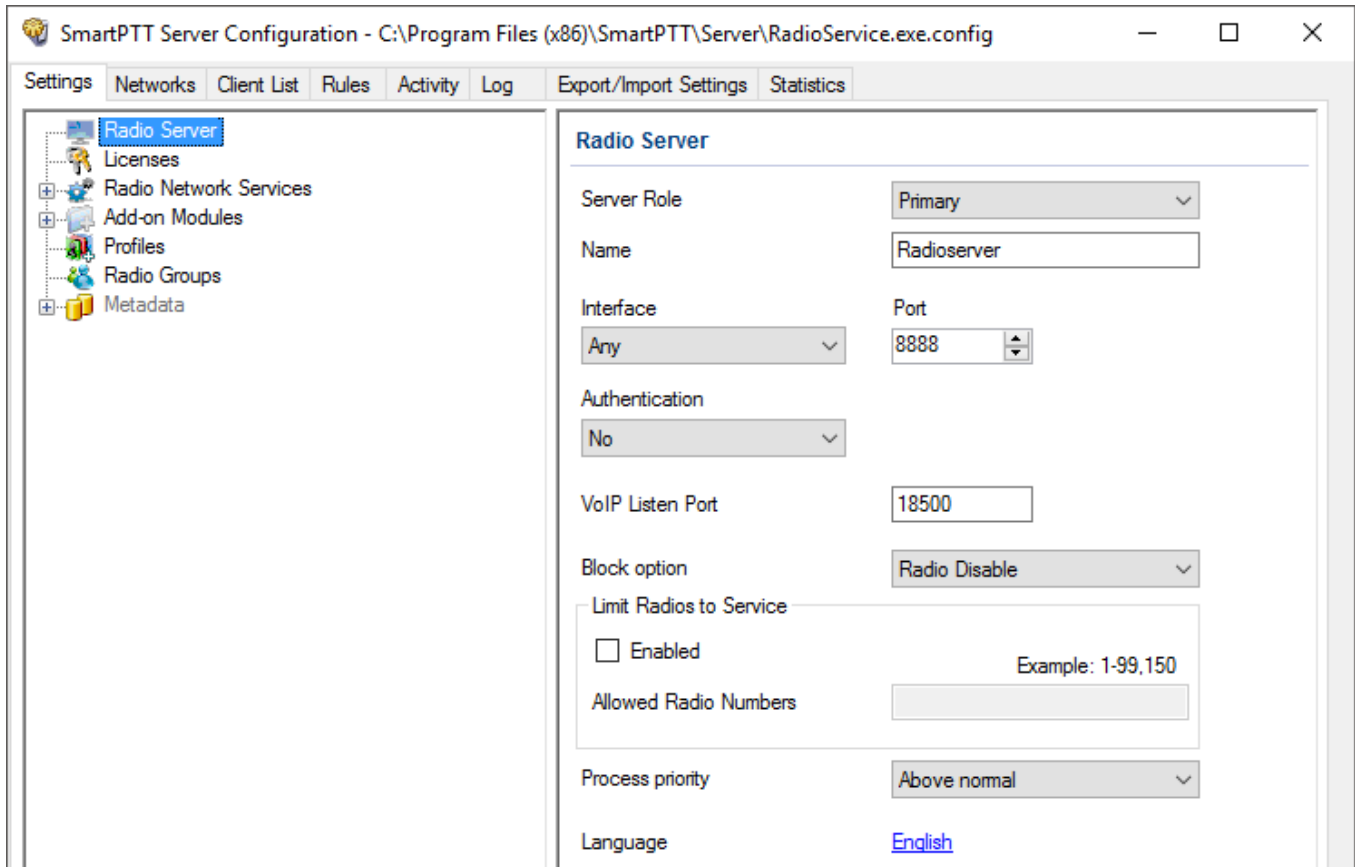
- In the **Name** field specify the radioserver name. This name is used only in SmartPTT Radioserver Configurator.

- In the **Interface** field and the **Port** field specify the IP address and port of the PC where the radioserver is installed.

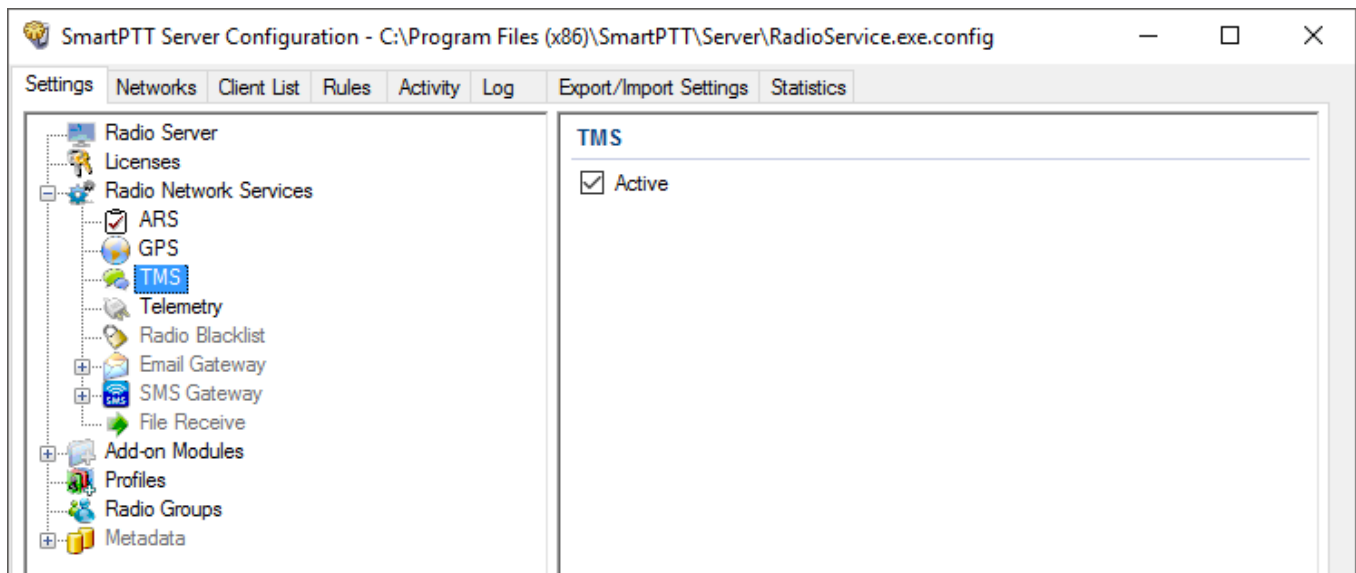2. Enable radio network services, e.g., ARS, GPS and TMS support.

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

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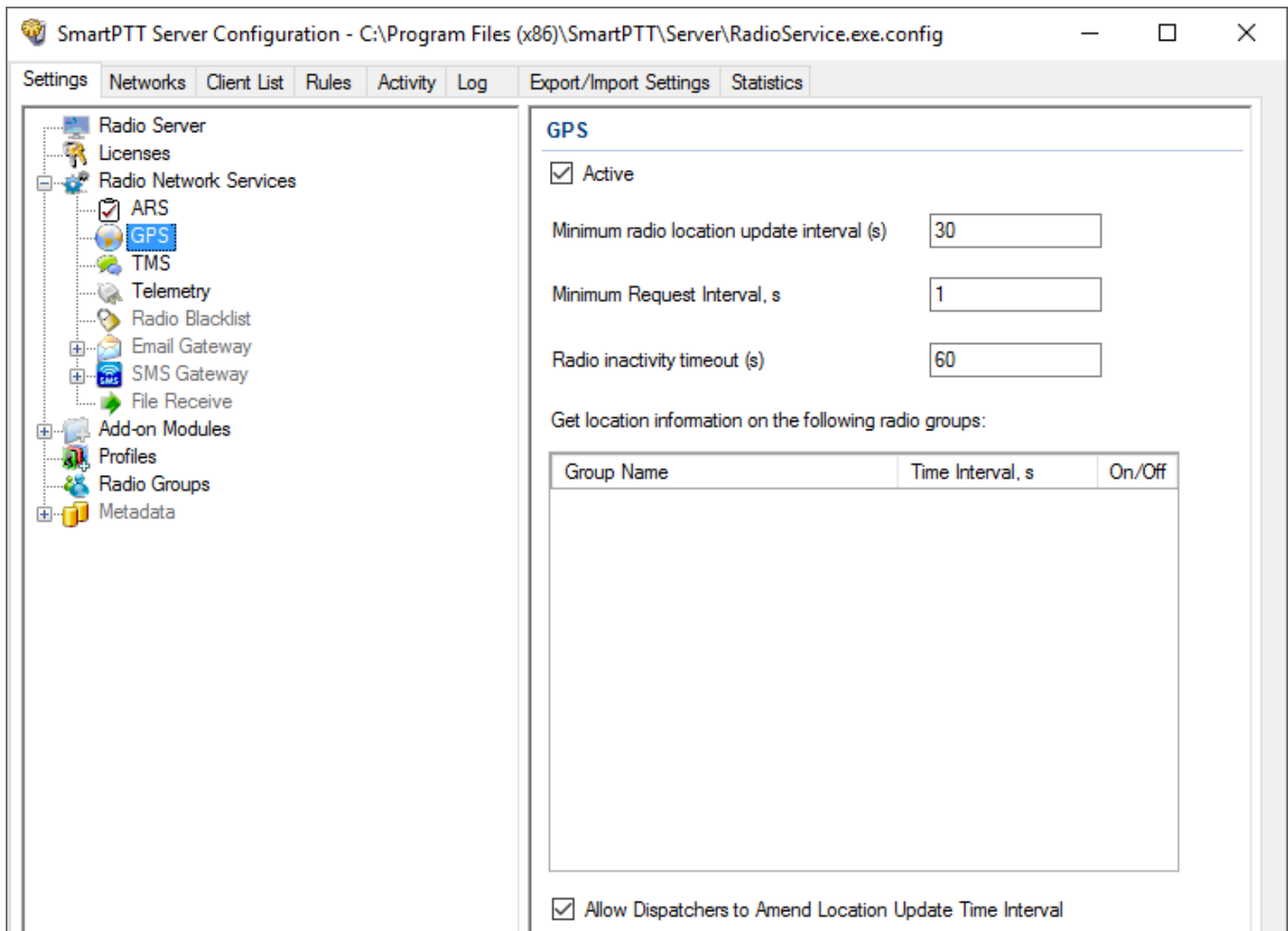
- To enable text messaging service, select the **Active** check box under **TMS**:

5 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 radios and the radios 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 radios.

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**.

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, follow these steps:

1. 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).

2. In the window that opened enter the name of the new database and click **Save**.
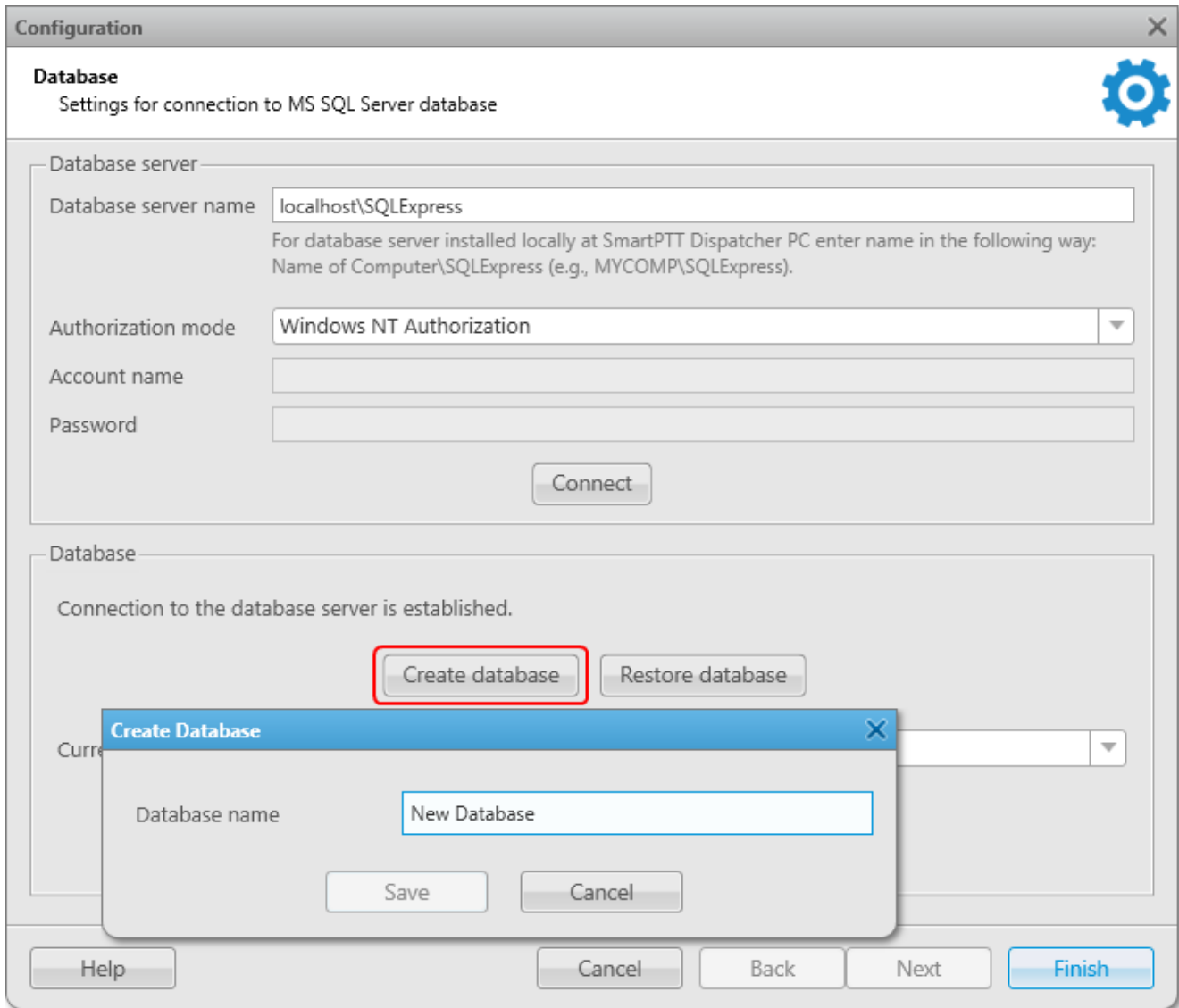
If creation was successful, a message about successful database creation is displayed. If the database is not created, the reason will be displayed at the bottom of the window.
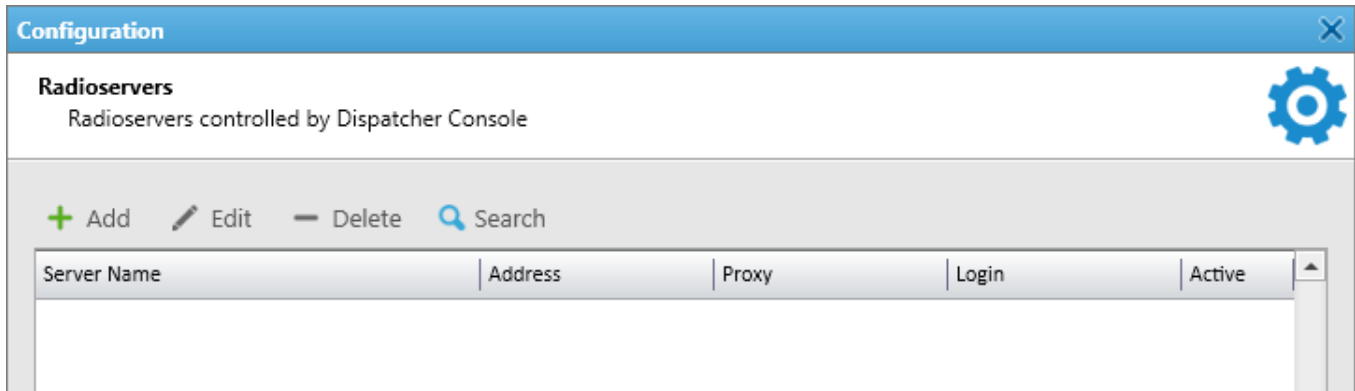
Authorization Mode: Allows you to select authorization mode with the database.

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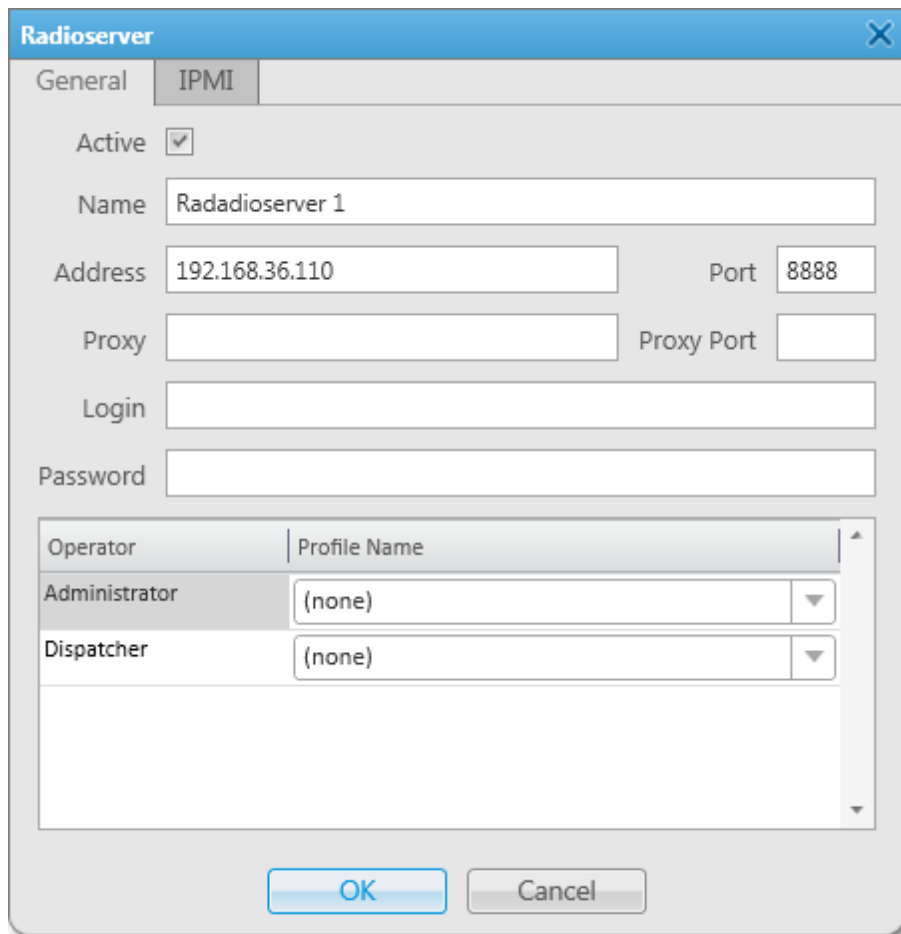
After you have finished, click **Finish** to save the changes. You will need to restart SmartPTT Dispatcher to apply the changes.

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 radios. Expand the **Settings** menu in the **Main Menu** bar of the SmartPTT Dispatcher window and click **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 (86) kbps*:
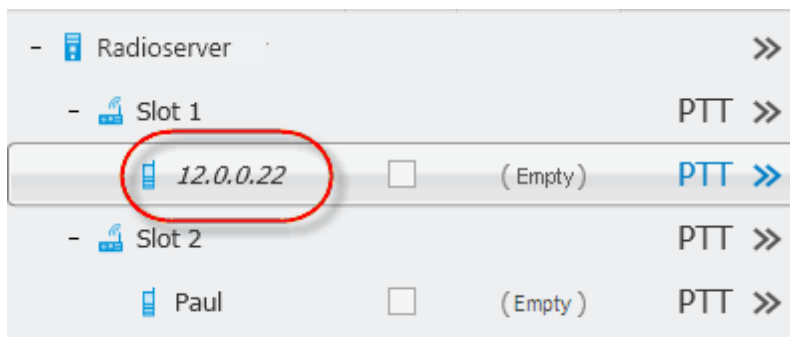
8000Hz: The sampling rate.

20 ms: The frame size.
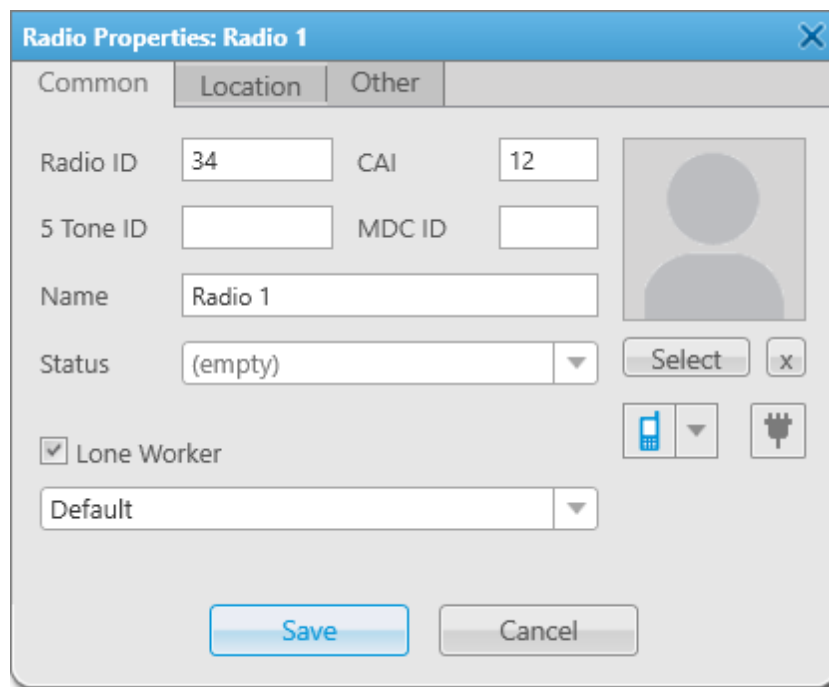
64 kbps: The voice data bit rate.

86 kbps: A full bit rate (required network bandwidth).

For more information, see Help in the SmartPTT Dispatcher application.

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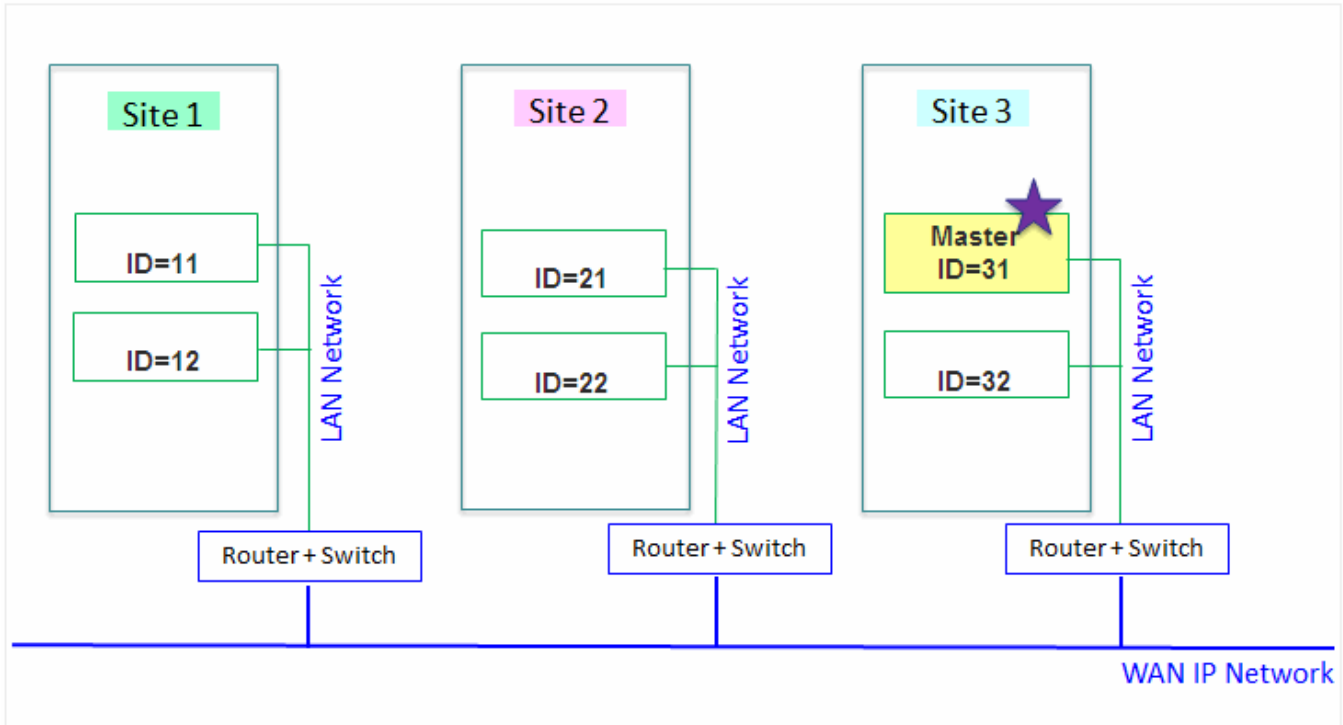

To register the radio, right-click on the radio, enter the name and click **Save**.

6 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 ID, either 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.

6.1 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.
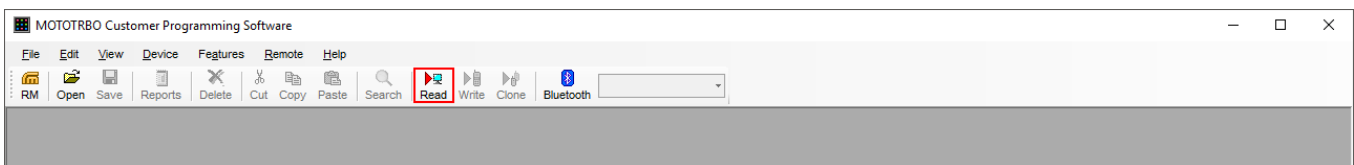
3. In the **View** menu select **Expert** to gain access to all the setting parameters.
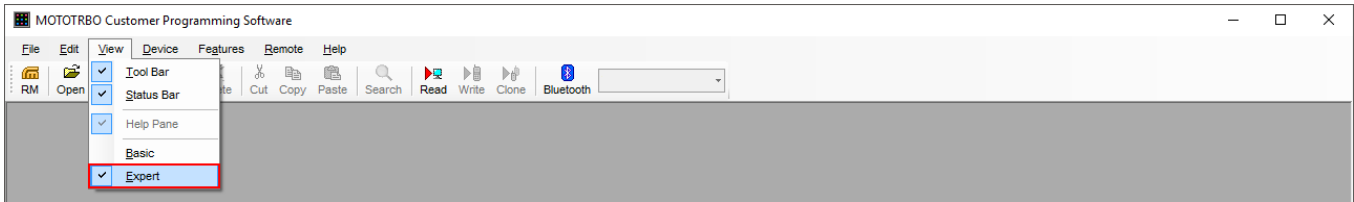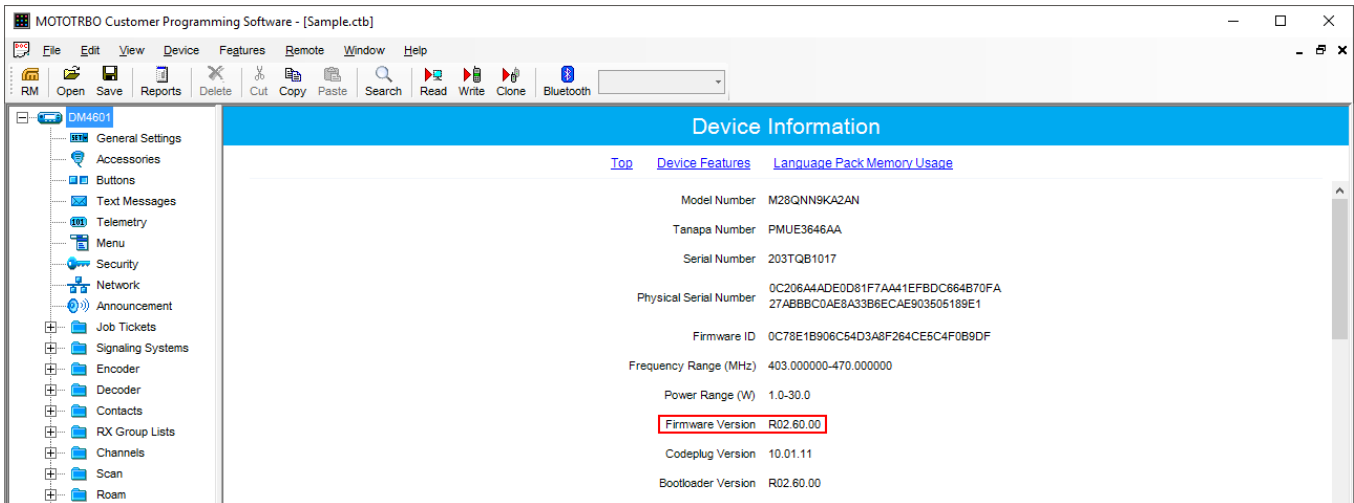

4. In the **Device Information** tab make sure that firmware version is no older than:

- R01.12.11 or R02.60.00 for mobile or portable radios

- R02.60.00 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**.

6.1.1 MOTOTRBO Repeater Programming

> **NOTE**
>
> Only repeaters with 32 MB of internal memory 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**. In our case **Radio ID** = *31*.
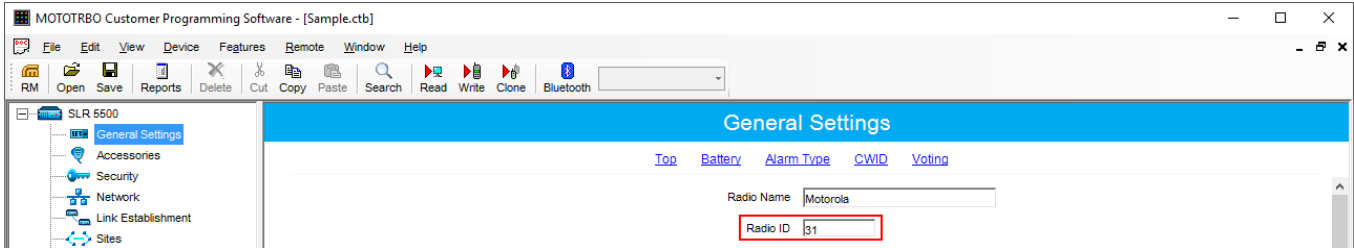
2. In the **Link Establishment** tab, specify **Site ID**. In our case and **Site ID** = *3*.
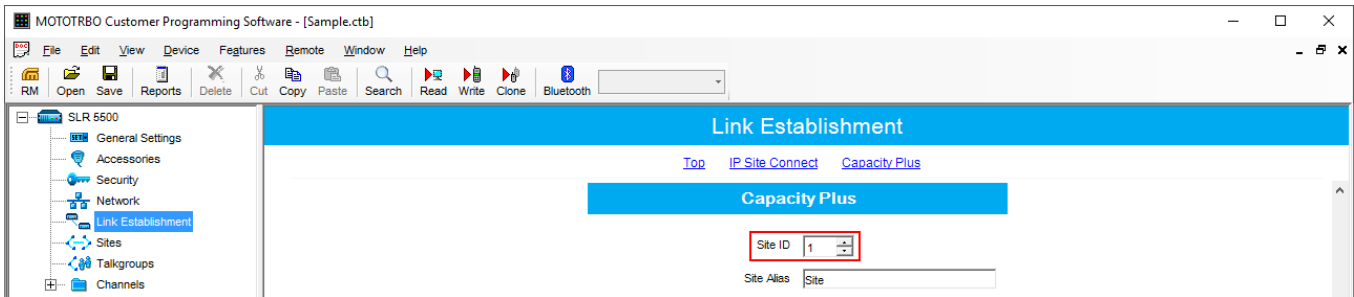
2. Add parameters in the **Network** tab.

• 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.
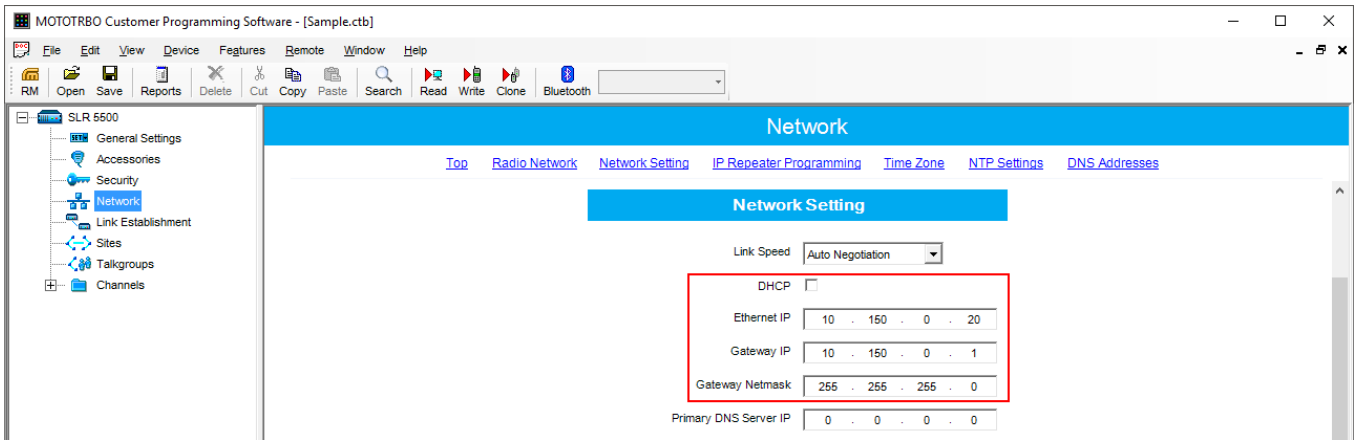
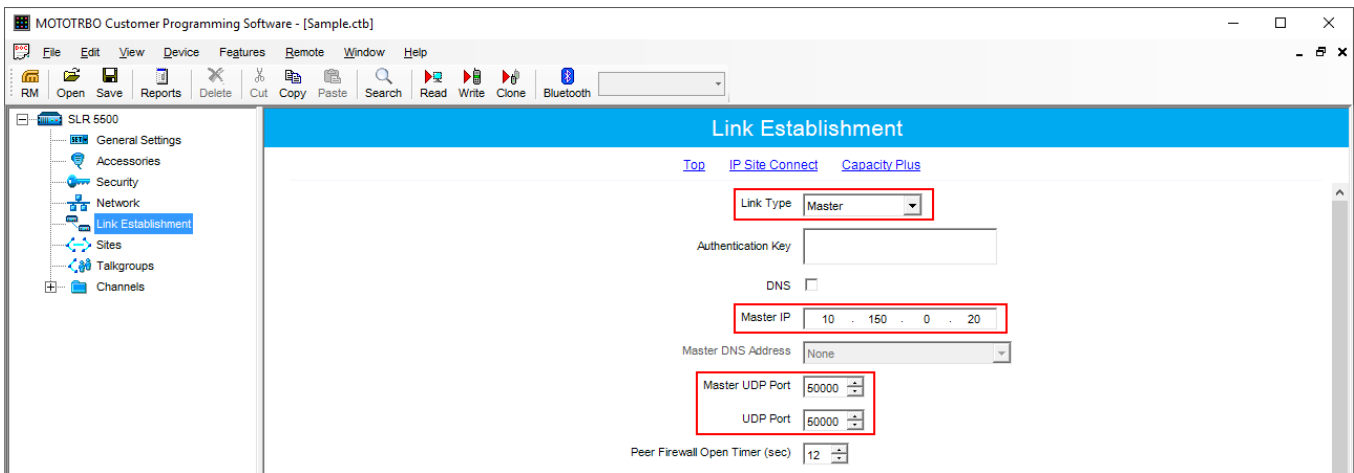3. Add parameters in the **Link Establishment** tab.

• 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.

• In the **UDP Port** field, specify the UDP port of the repeater. The default value is set to *50000*.

3. In the same **Link Establishment** tab, specify **Rest Channel/Site IP** and **Rest Channel/Site UDP Port**.
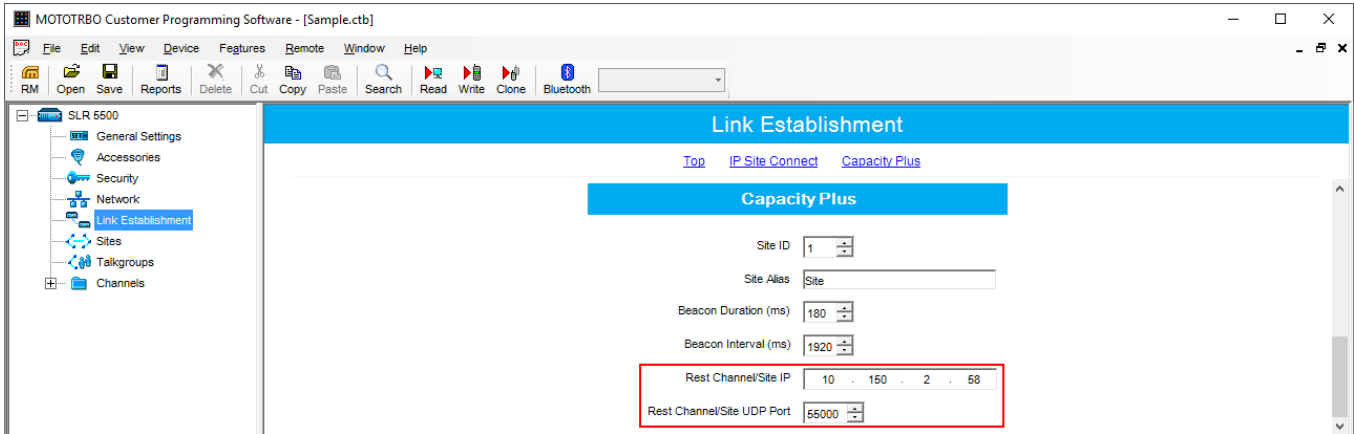
Rest Channel/Site IP is a virtual IP address that is required for correct operation of the LCP system. As the Rest Channel rotates through the channel pool of a site, this virtual IP address is associated with a different physical repeater only for the duration for which one of its slots is the Rest 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*.
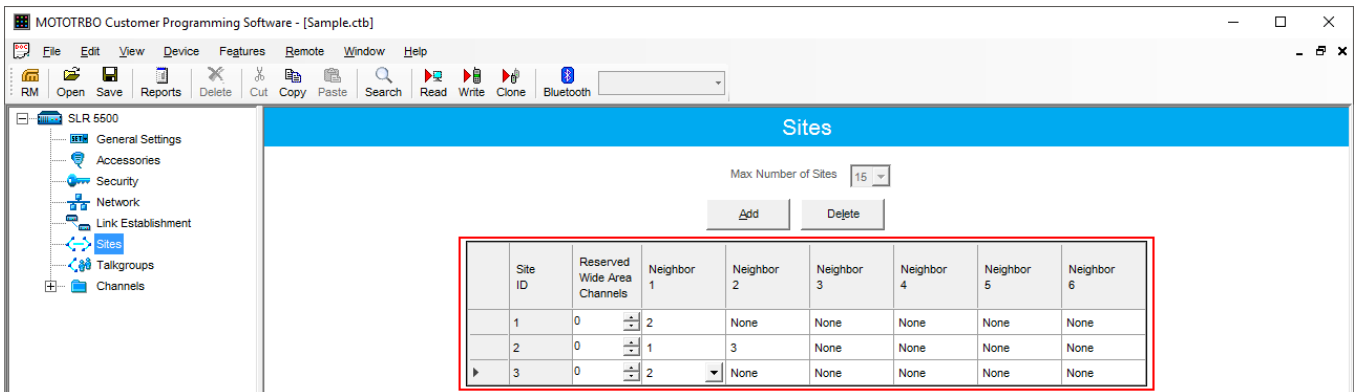
In the **Reserved Wide Area Channels** column you can specify how many channels are to be reserved for a wide group call per site, if necessary.
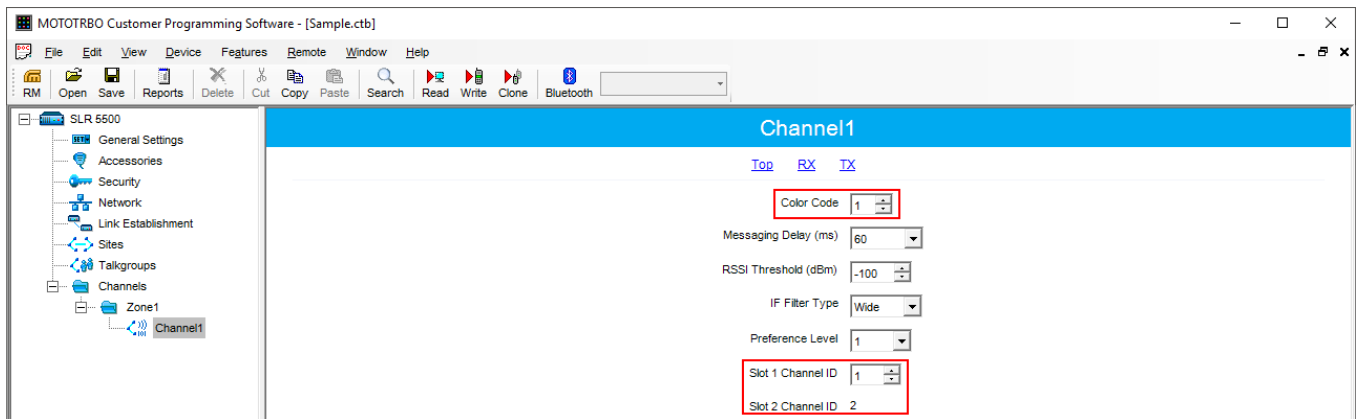
5. In the **Talkgroups** tab, specify wide groups and sites on which these groups are available. You do not need to add local groups which are available only on one site.
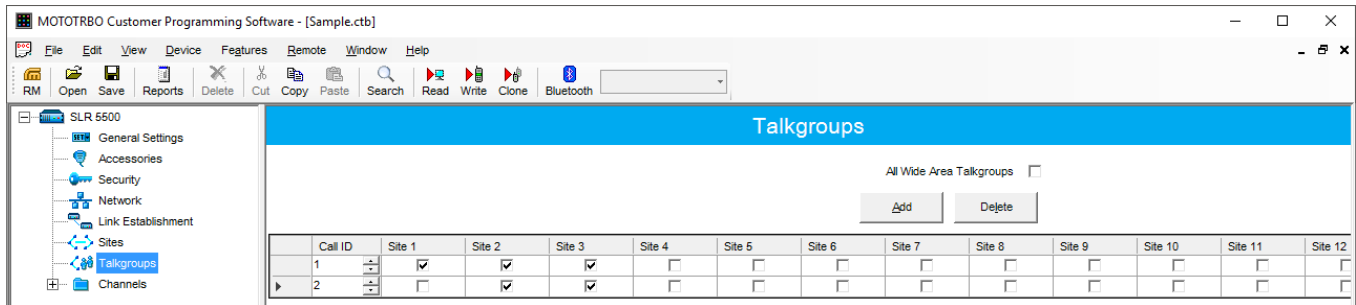
In our example we have only two wide groups. Group 1 is a wide group which is available on all sites. So when a radio initiates a call to Group 1, this call will be transmitted on all sites. Group 2 is also a wide group and is available on *Site 2* and *Site 3*.

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*.

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

- 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.
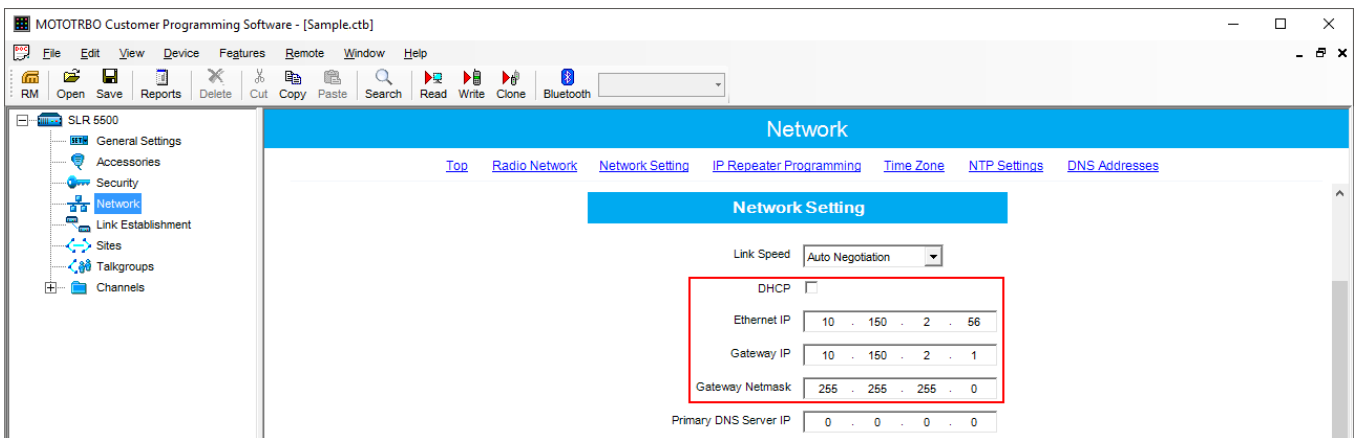
3. In the **Link Establishment** tab, configure network settings.

- 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.

- In the **UDP Port** field specify the UDP port of the repeater. The default value is set to *50000*.
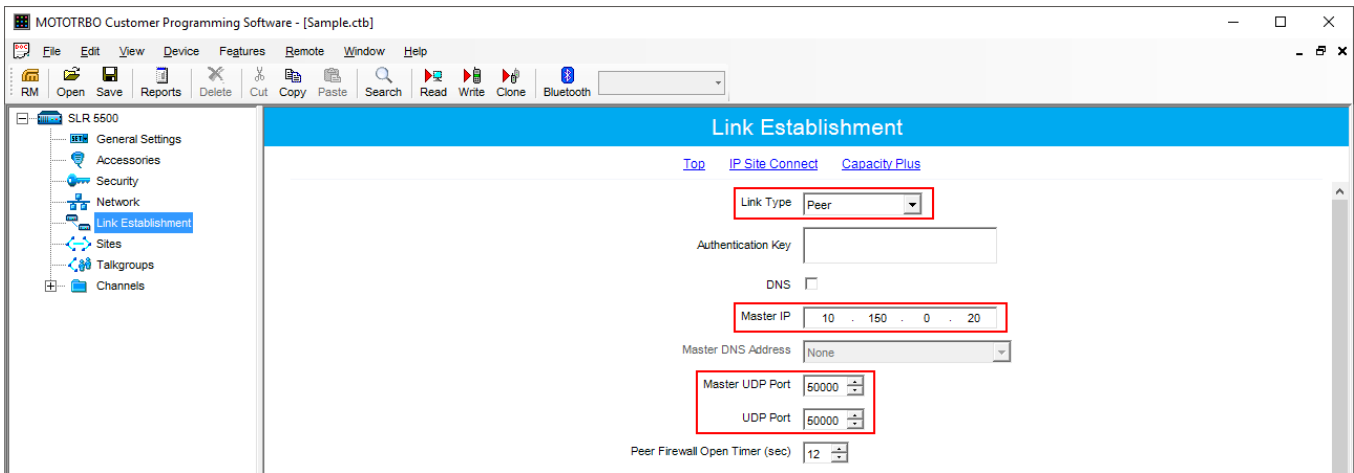

3. In the same **Link Establishment** tab, specify **Rest Channel/Site IP** and **Rest Channel/Site UDP Port**.
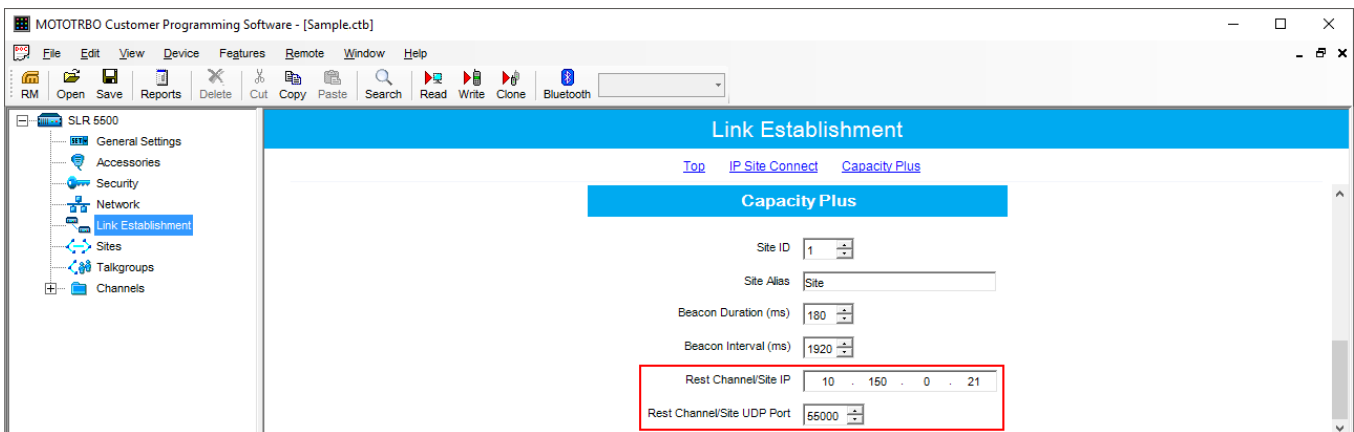
Rest Channel/Site IP is configured in each repeater. Repeaters from the same site will have the same **Rest Channel IP** address.

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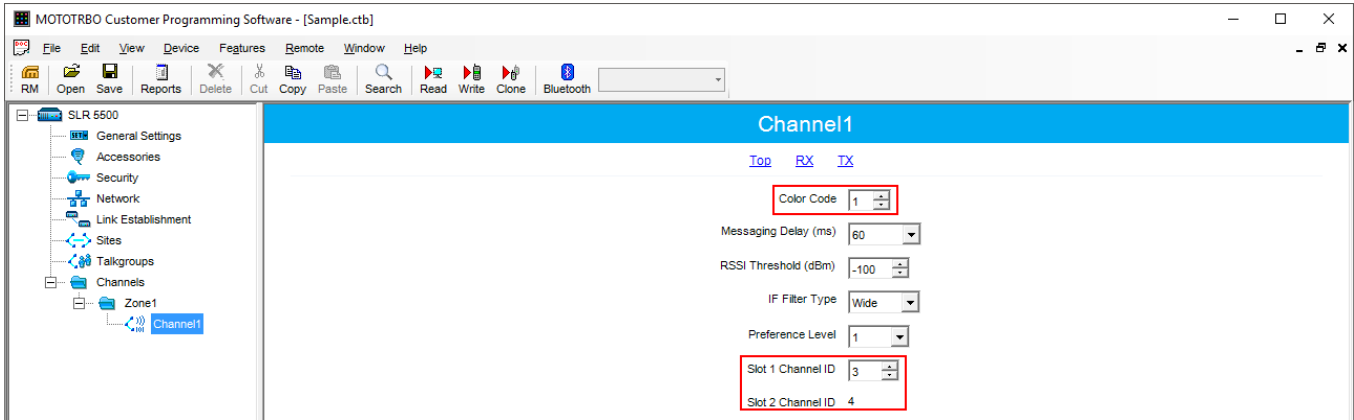
The **Color Code** must match the color code set for other repeaters.

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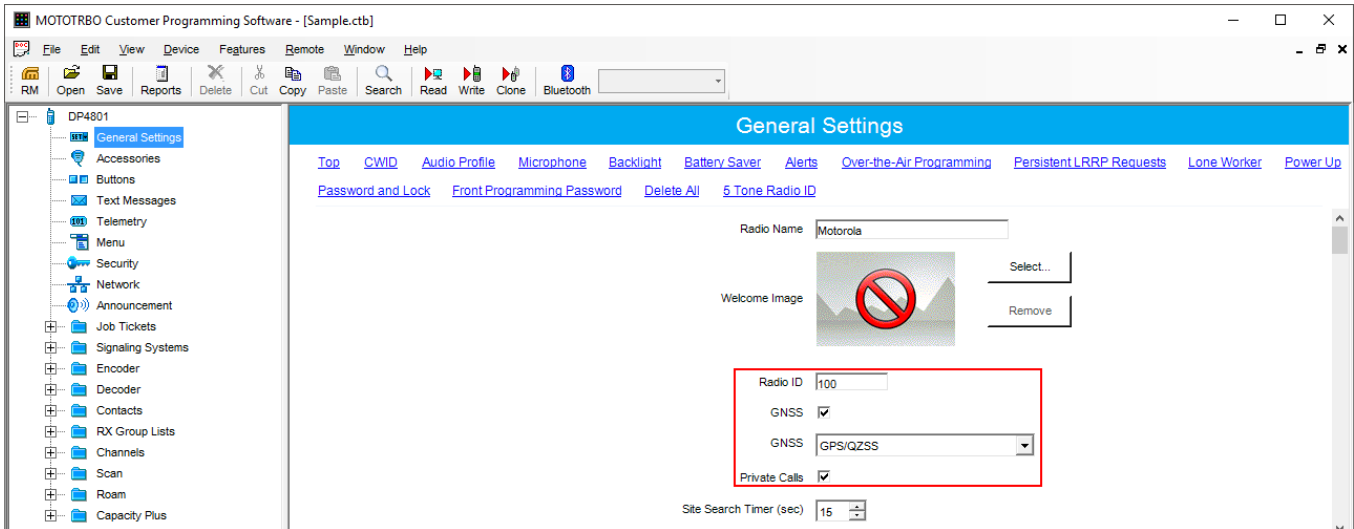
Site 1: 1-2-Peer ID = 11, 3-4-Peer ID = 12,

Site 2: 1-2-Peer D = 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**.

6.1.2 MOTOTRBO Radio Programming

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

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

Select **Private Calls**, if radio needs to transmit private calls. If **Private Call** is not selected, radio will not 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.
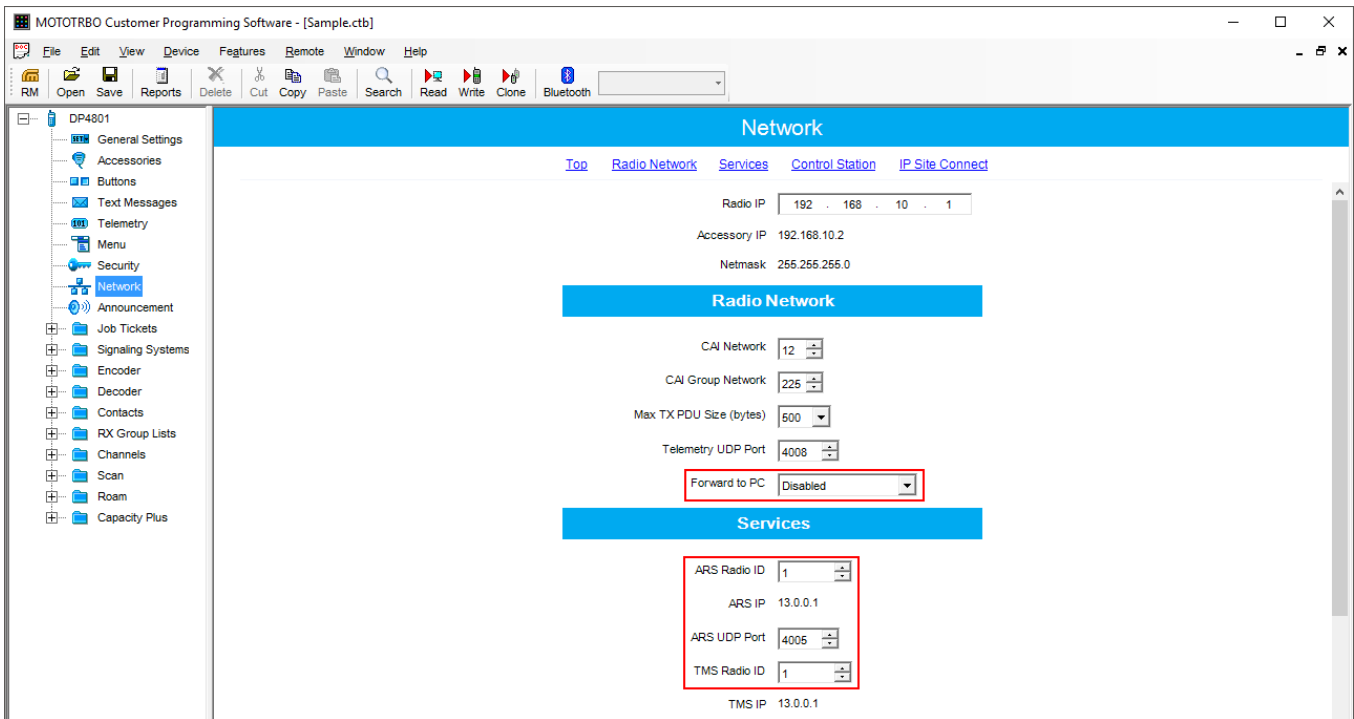
- In the **Forward to PC** field select *Disabled*.

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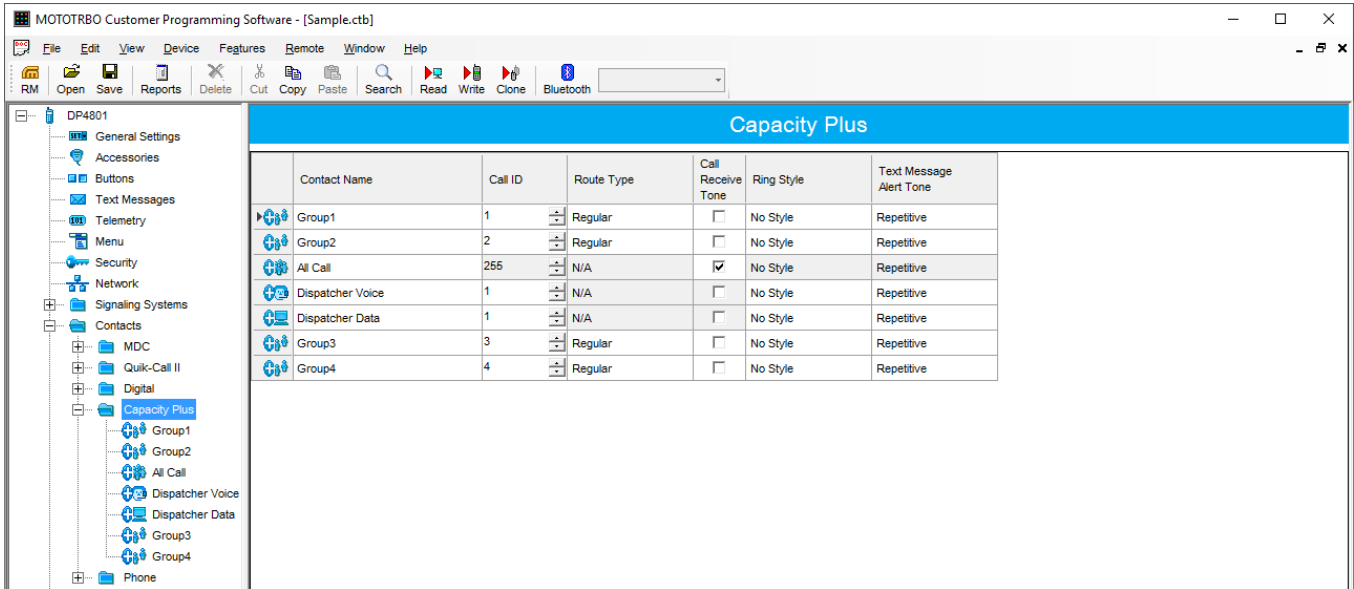
Also, add **Dispatcher Call** for transmitting data to SmartPTT Radioserver and **PC Call** to be able to initiate calls to SmartPTT Dispatcher. Make sure that the **ID**s of these calls equal **Slot ID** in SmartPTT Radioserver Configurator (see SmartPTT Radioserver Configuration).

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.
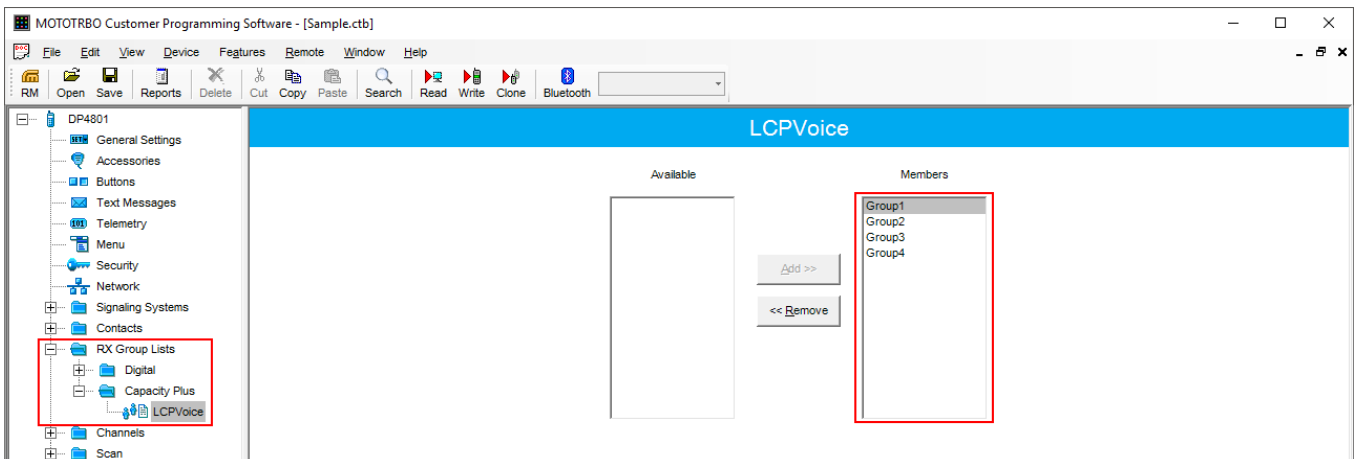
5. Add all repeaters, which are in the LCP system, to the **Channel Pool**. The color code should equal the color code specified for repeaters. In our case **Color Code** = *1*. Define the RX and TX frequencies. They must correspond to the frequencies set in the repeater, but RX of the radio must correspond to TX of the repeater and TX of the radio must correspond to RX of the repeater.
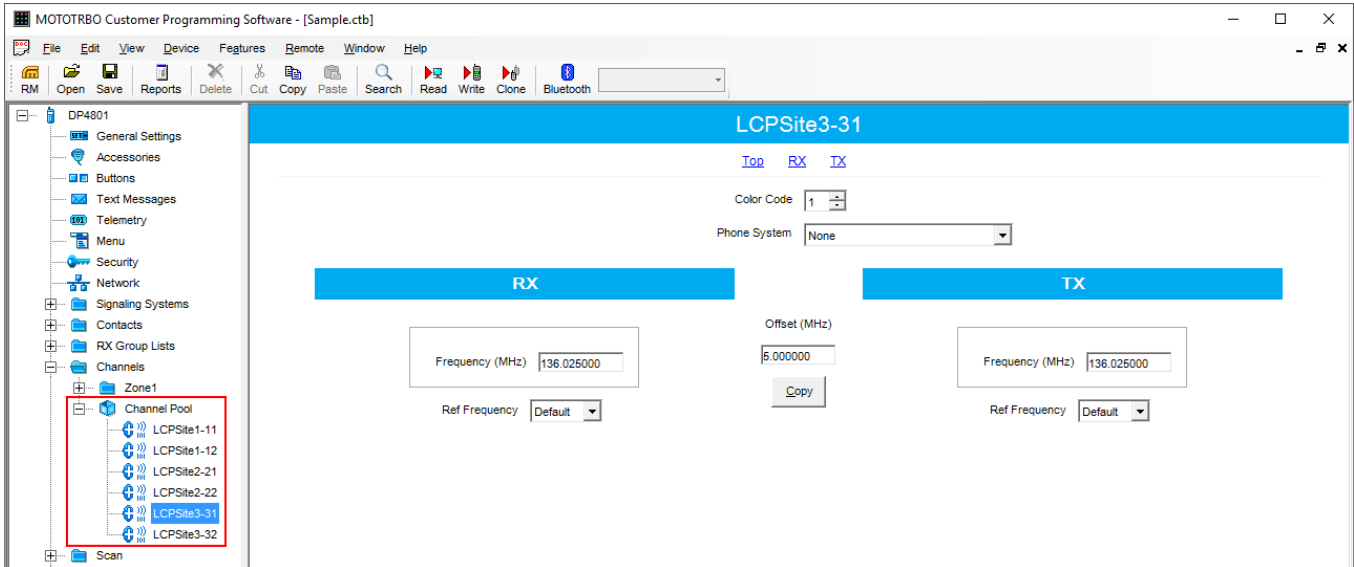
6. Create **Voice** lists and **Data** lists according to the amount of sites. As all of our repeaters are Trunk repeaters (transmit voice and data), create only **Voice** lists. When adding new **Voice** list, under the **Available** list you can see all the channels which were added to the **Channel 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.
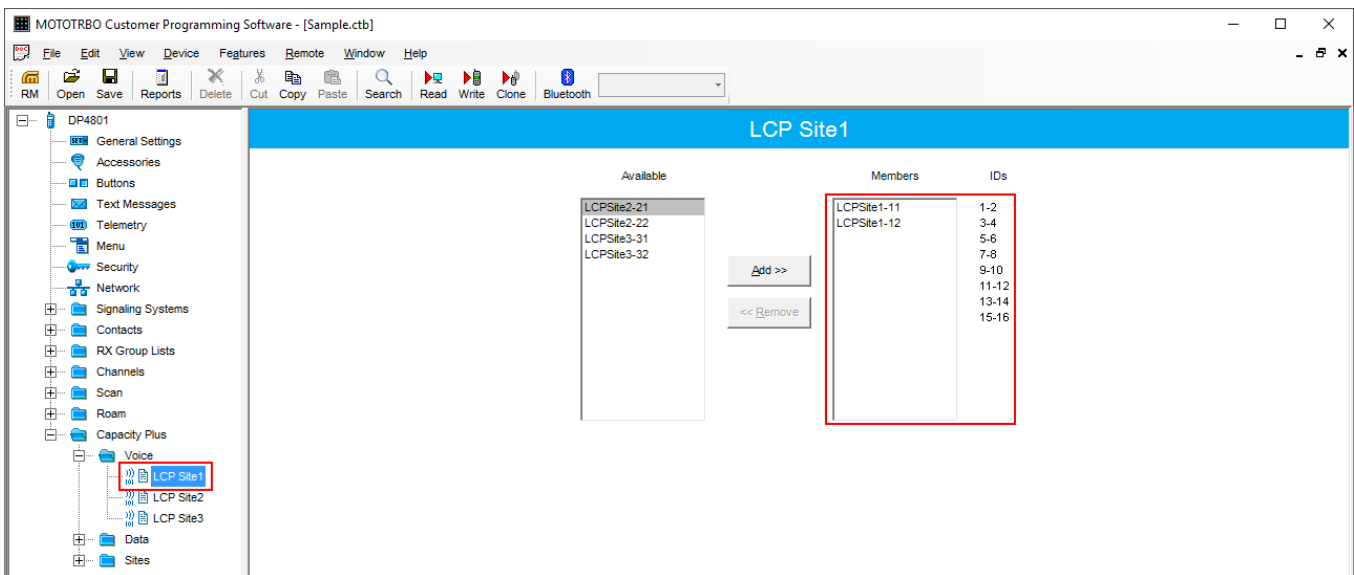
Please note that **ID**s in the **Members** list should correspond to **Slot 1 ID Channel** and **Slot 2 ID Channel** specified in repeater settings.

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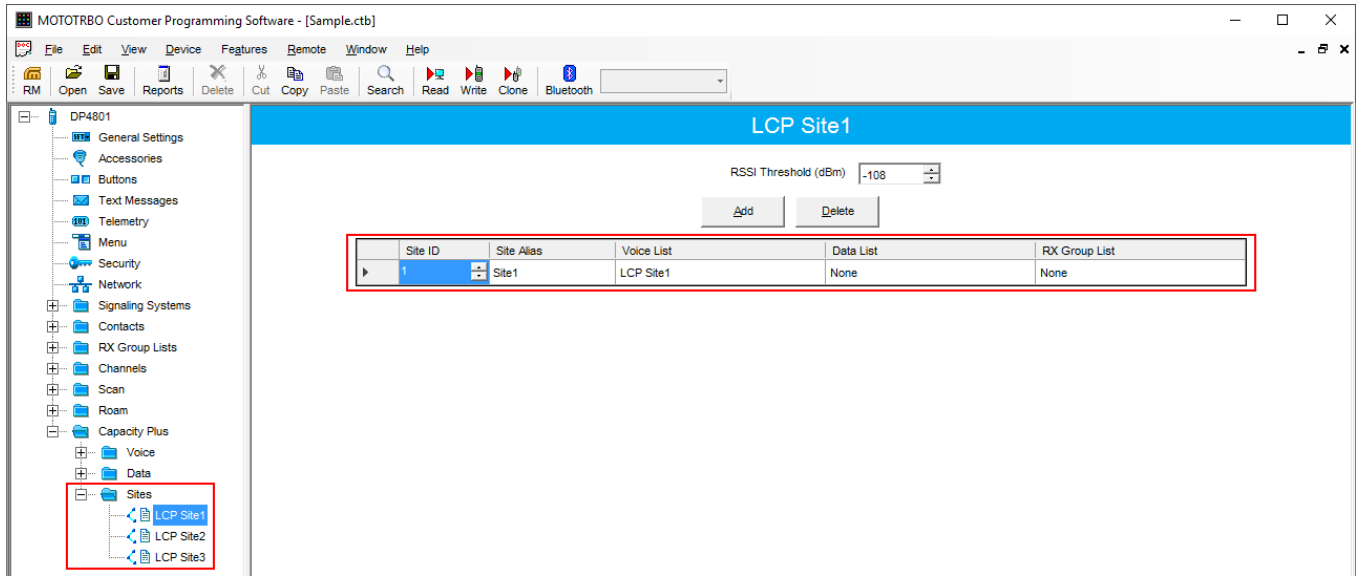
Since in this example there are three Sites, add three **Sites** lists.

For each **Site** configure:

Site ID: ID of the site to which the radio is connected.

Site Alias: Name of the site to which the radio is connected.

Voice List: Voice Channel List which the radio will use to make voice calls when on the site.

Data List: Data Channel List which the radio will use to make data calls when on the site.

RX Group List: RX Group List which the radio will use to receive group calls when on the site.

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

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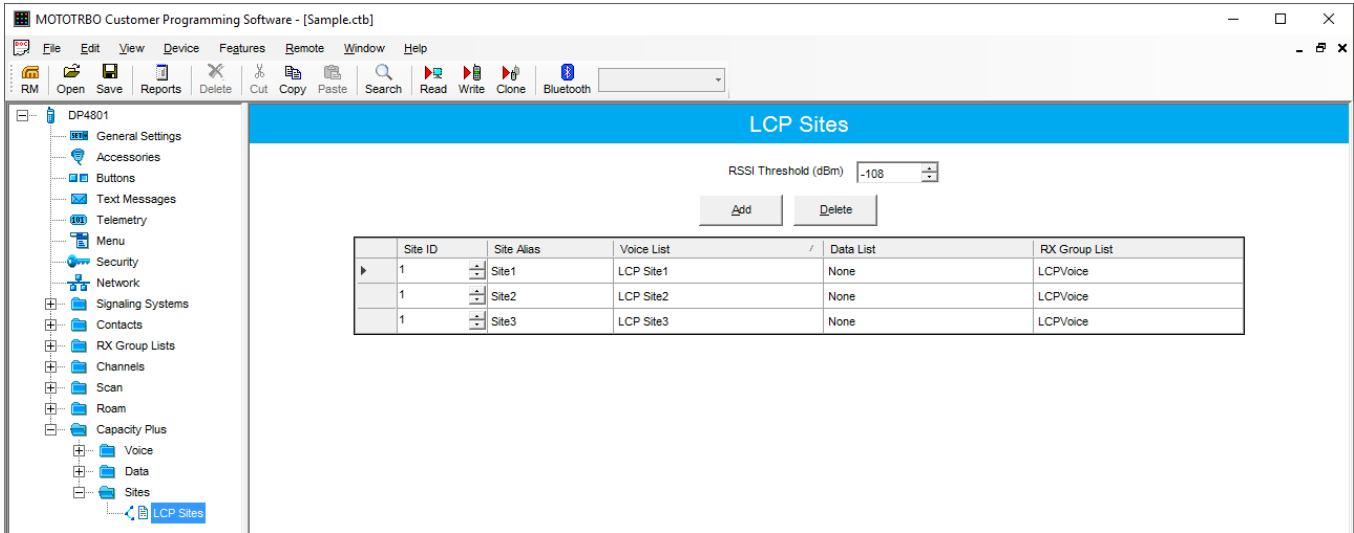

9. Add LCP Personalities. To do this, right-click on **Zone** and add **Capacity Plus Personality (linked)**.

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 will not be able to roam to another LCP site when moving from one site to another.

• For each channel select appropriate **Sites** list. The radio can roam to the sites listed in the **Sites** list.
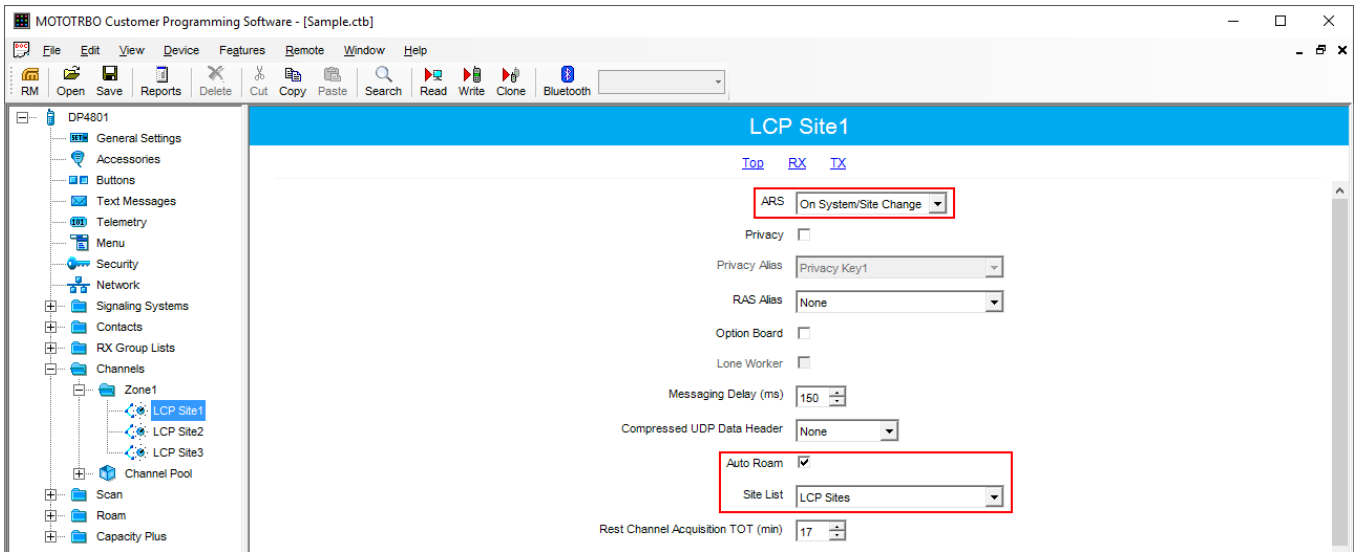
- Select **Contact Name** which defines the call that may be initiated on the channel by pressing the PTT button, when there are no active calls on the channel.

- Select **Private Call Confirmed** and clear **Data Call Confirmed**.
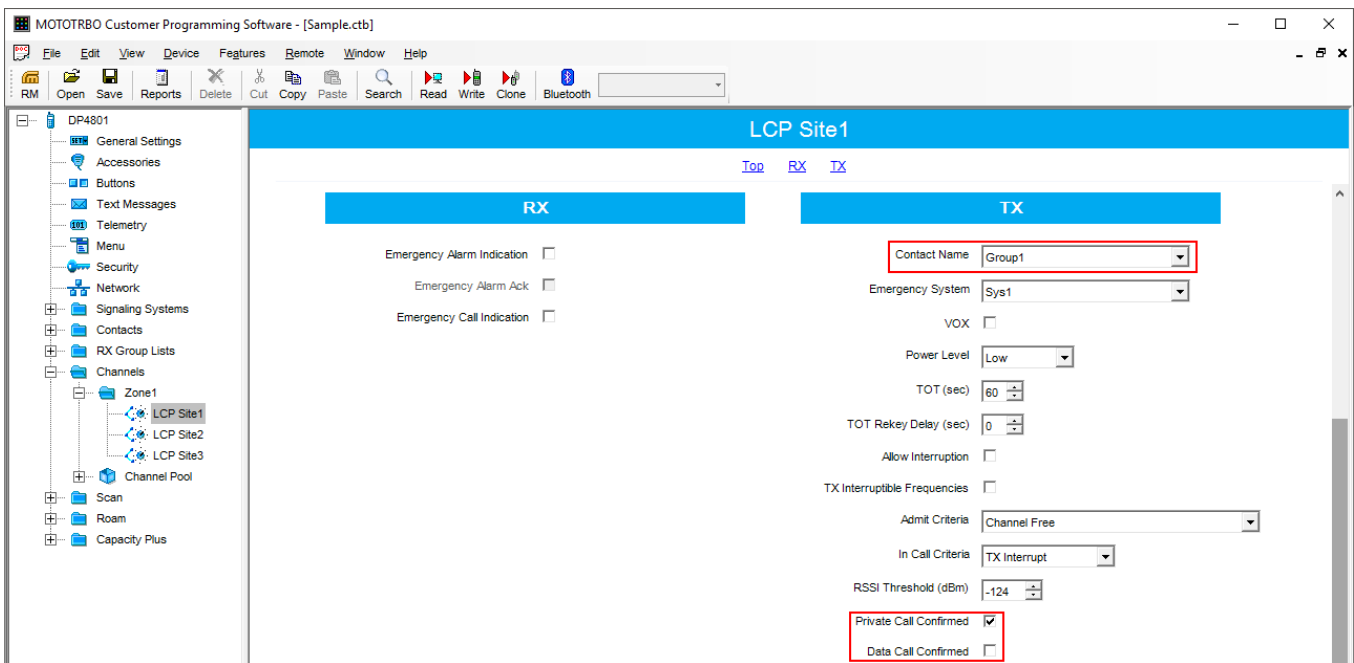
6.2 MNIS and DDMS Client Configuration

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* 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 MNIS 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.
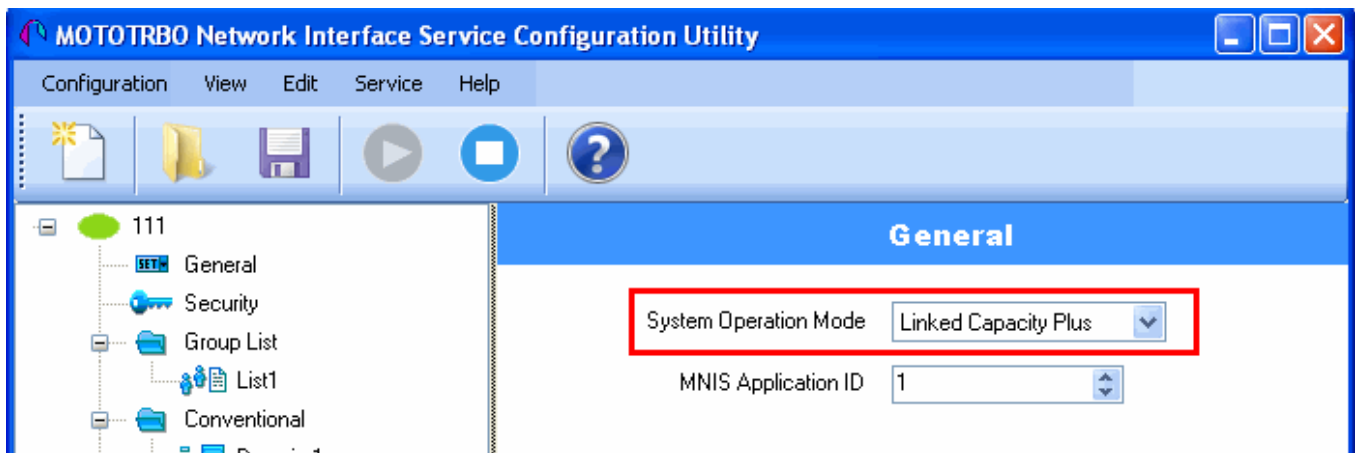
2. In the **Linked Capacity Plus** section set up **Master IP Address** and **Master UDP Port**
    fields. These values should correspond to the same values in *MOTOTRBO CPS* and in
    SmartPTT Radioserver Configurator, which you will set up later.
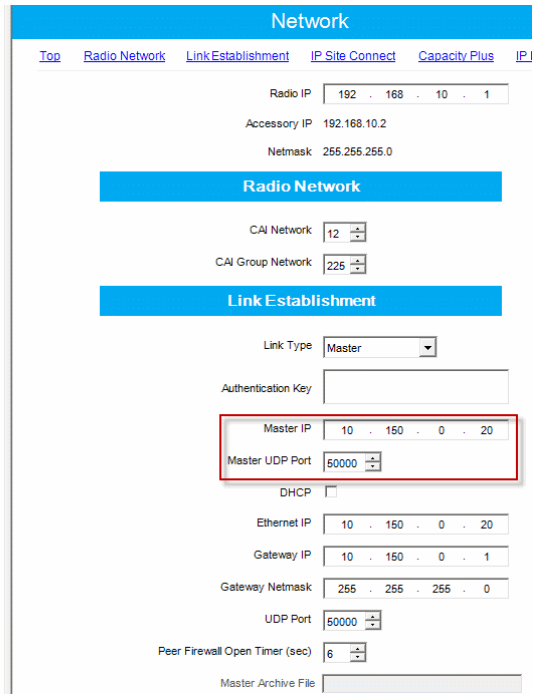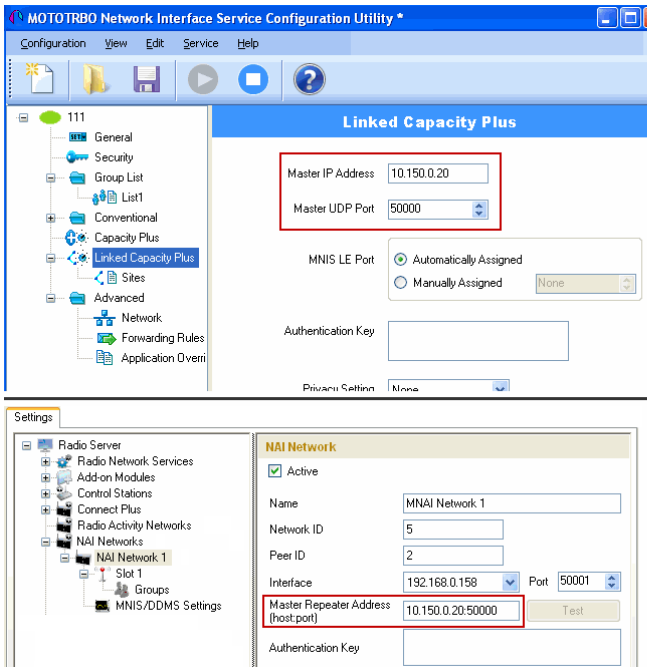
3. It is recommended to clear the **Data Call Confirmed** field in the **Advanced** section and to specify the identifier in the **MNIS LE ID** field explicitly. Make sure **MNIS LE ID** does not match **Peer ID** of any repeaters in the system.
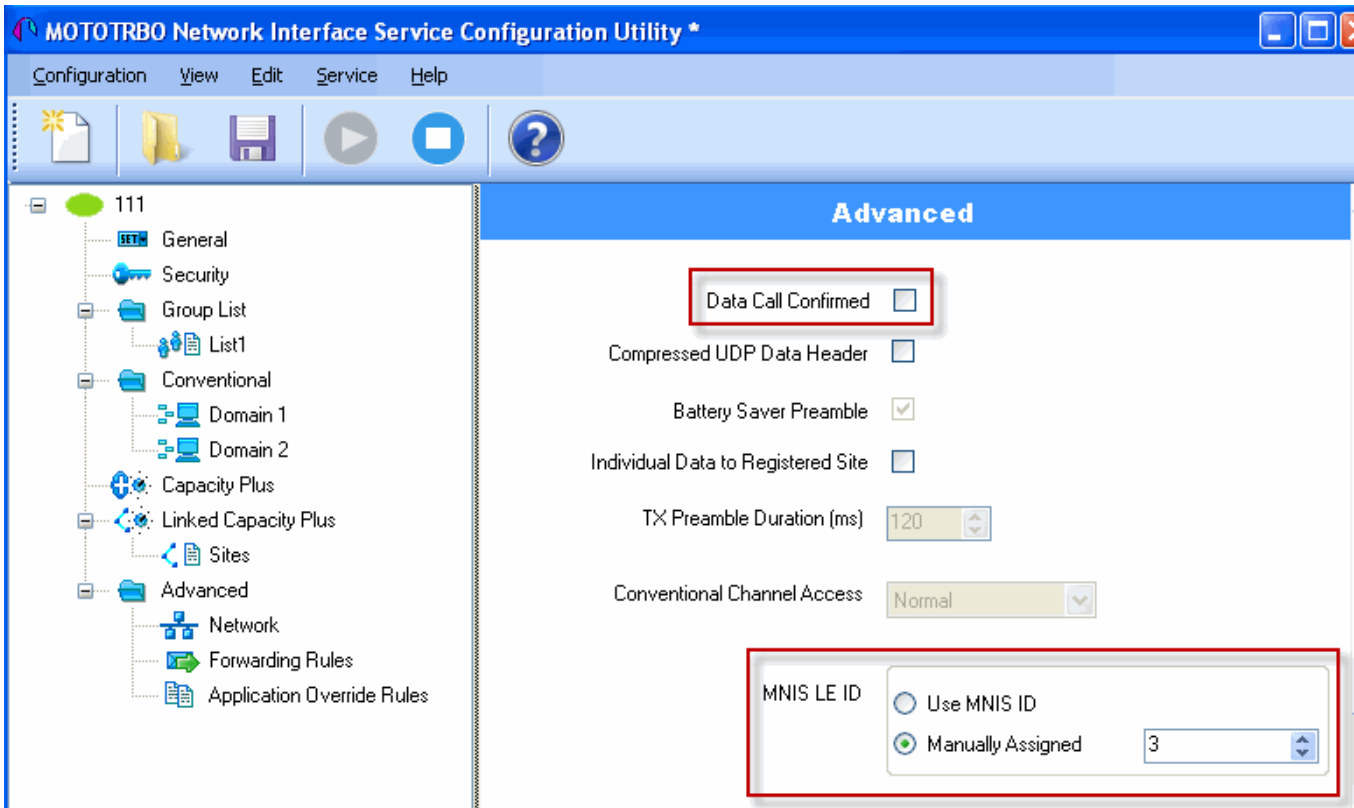

NOTE

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 Network Interface Service Configuration Utility* matches the **WatcherPort** field in MNIS settings (**Advanced → Network**).
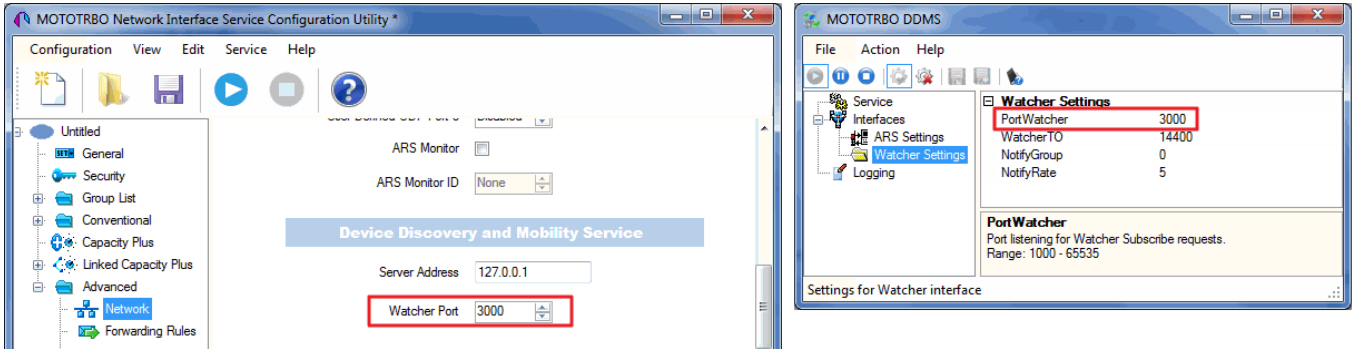
2. The **PORT SU** field (**Interfaces → ARS Settings**) in MOTOTRBO DDMS matches the **ARS UDP Port** field in *MOTOTRBO Network Interface Service Configuration Utility* (**Advanced → Networks**).
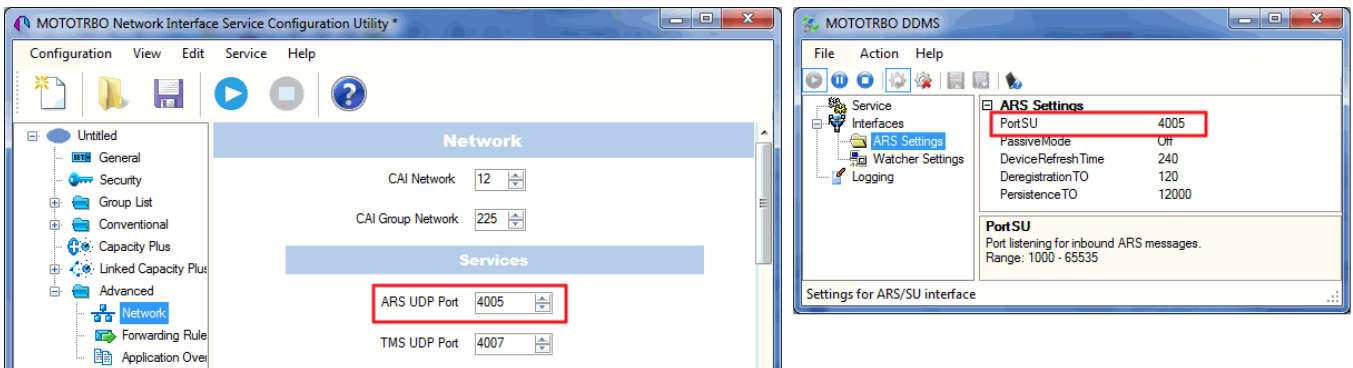
6.3 SmartPTT Radioserver Configuration

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 LCP network:
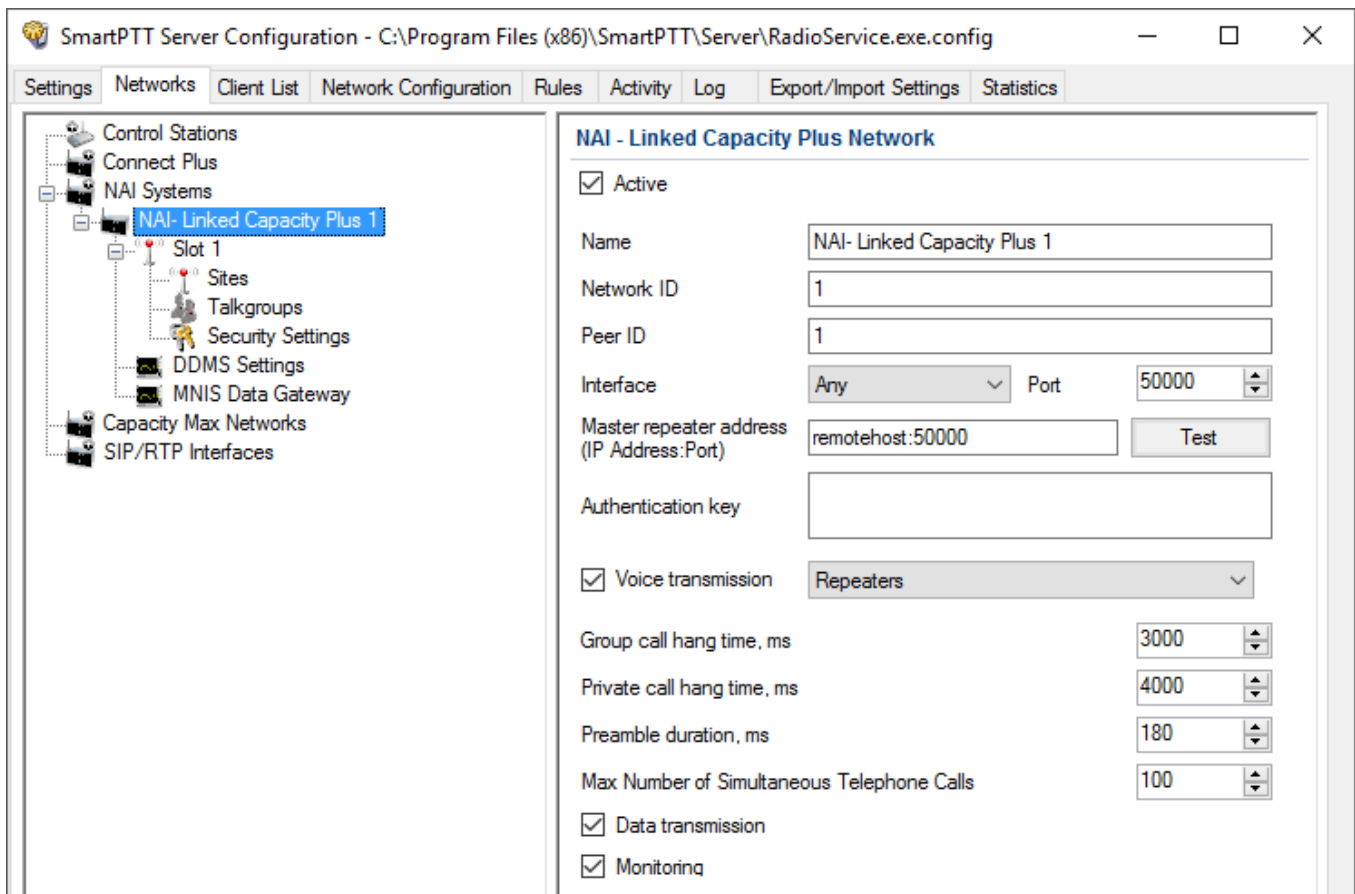
Name: Add network name.

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.

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.
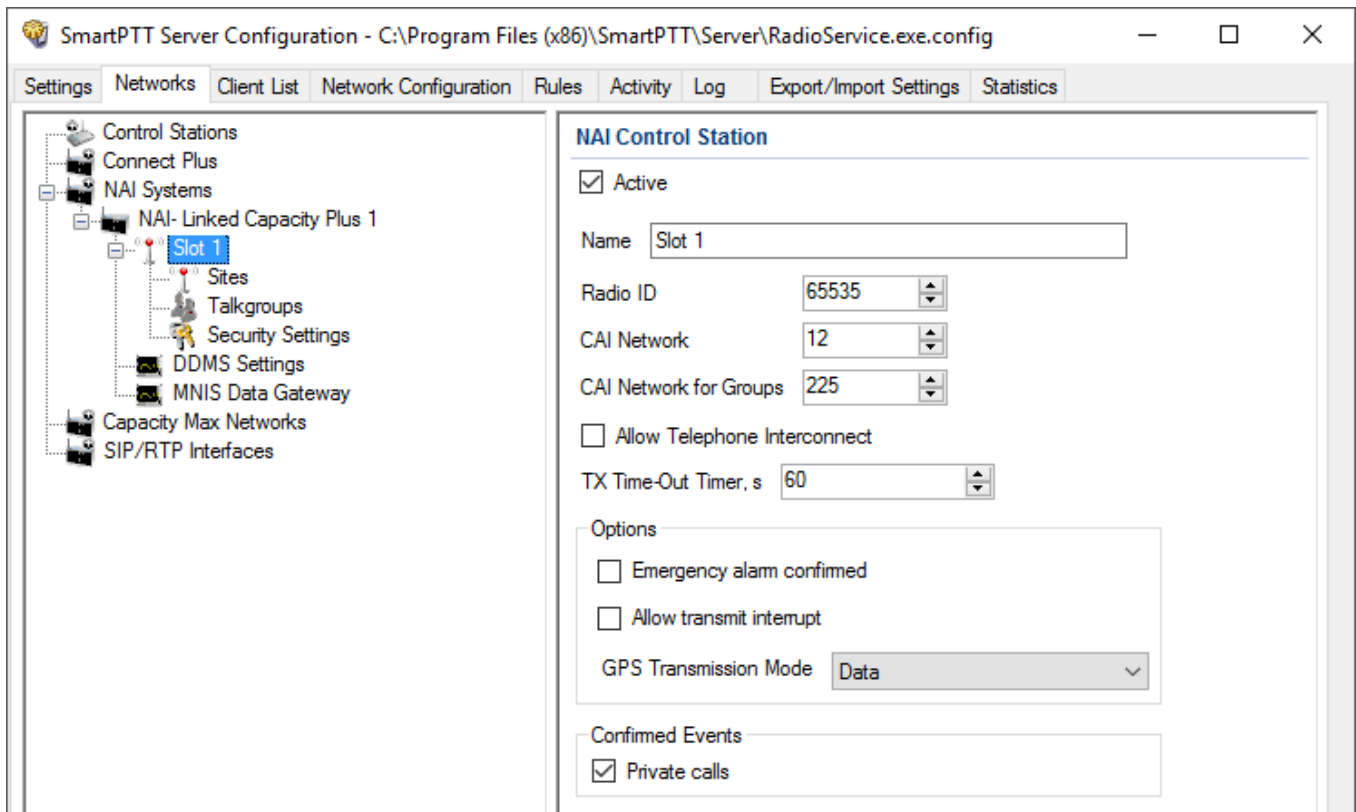
Name: Specify the name of the slot.

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 Confirmed: Select this check box if you need the emergency alarm be acknowledged.

Private Calls: 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.

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.

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.
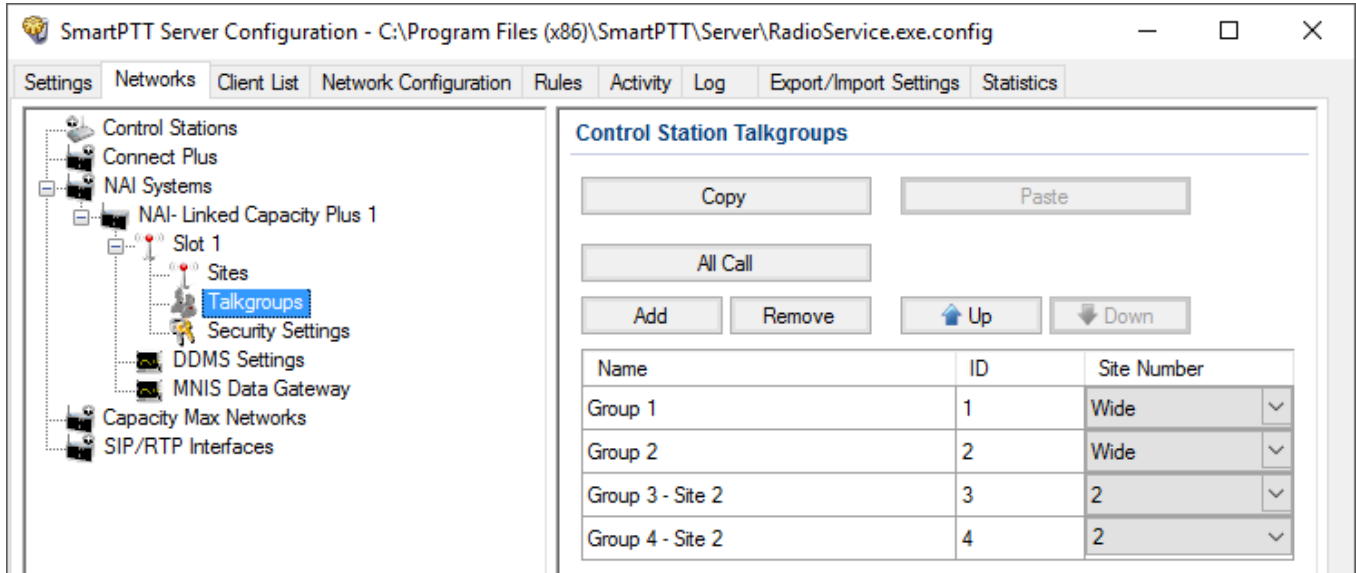

Talkgroups not specified in the repeater settings are regarded as local groups. Local group call does not go beyond the site on which the call was initiated.

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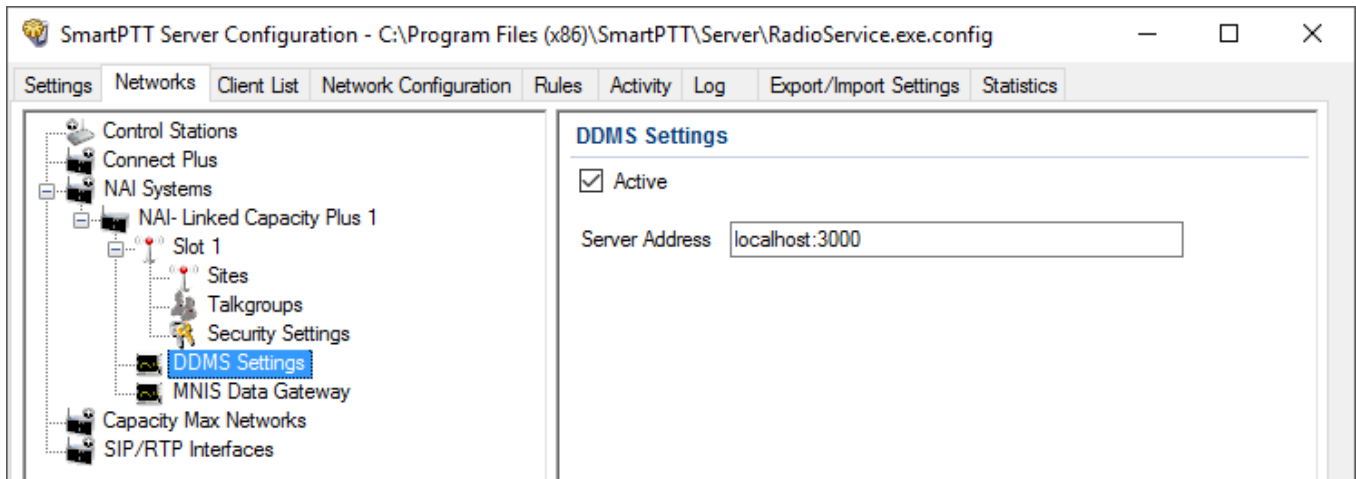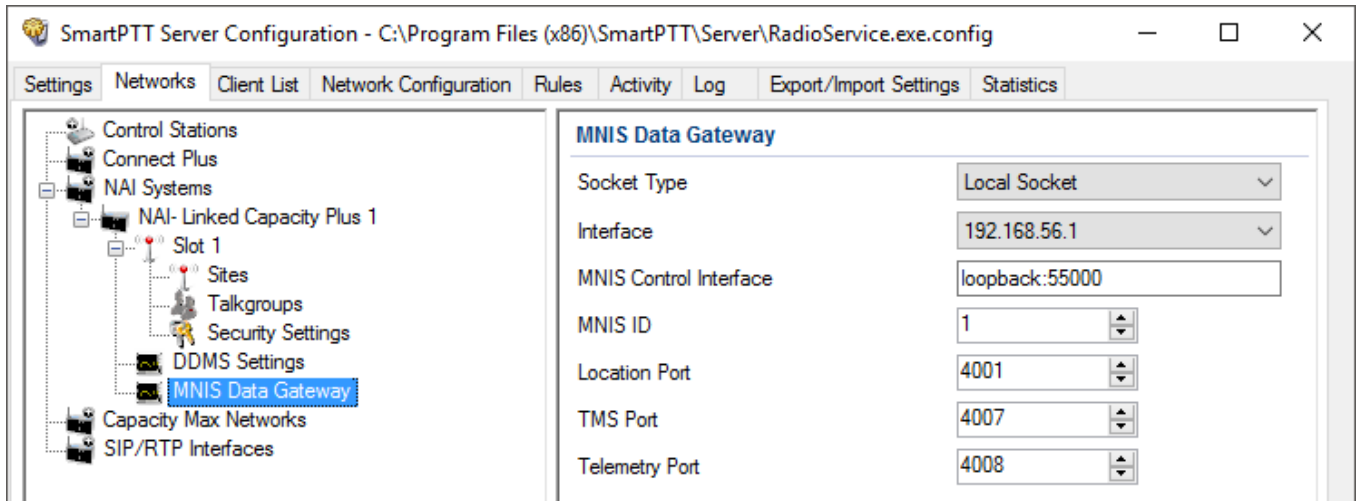

7. Under **MNIS Data Gateway** select *Local Socket* in the **Socket Type** field since the MOTOTRBO Network Interface Service Configuration Utility application is installed on the same PC as SmartPTT Radioserver.

8. **MNIS Control Interface** – use localhost, if MNIS is installed on the same PC as the radioserver. If MNIS 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:
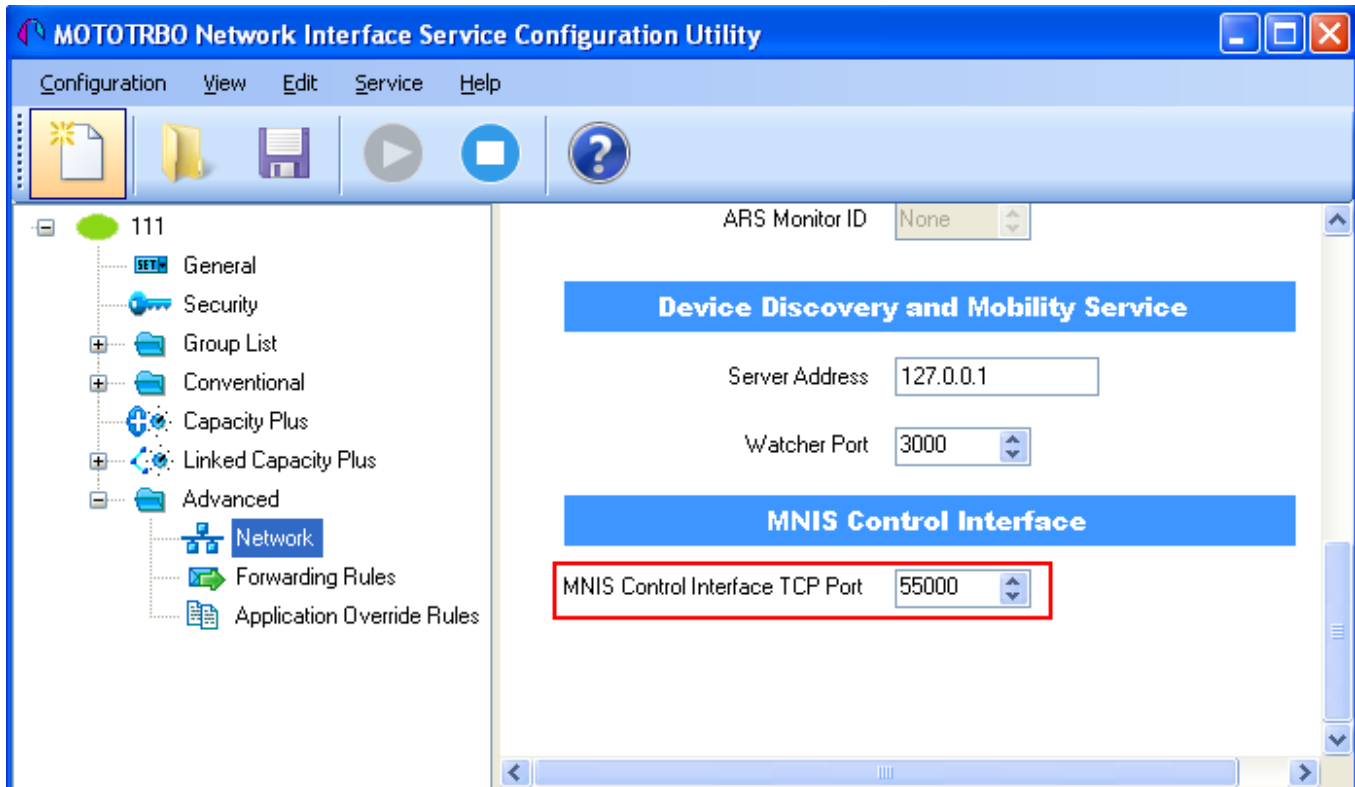

9. In the **Interface** field select the IP address specified in the **Tunnel IP Address** field of MOTOTRBO Network Interface Service Configuration Utility. The IP address should not match the IP address of the computer on which MNIS is installed.

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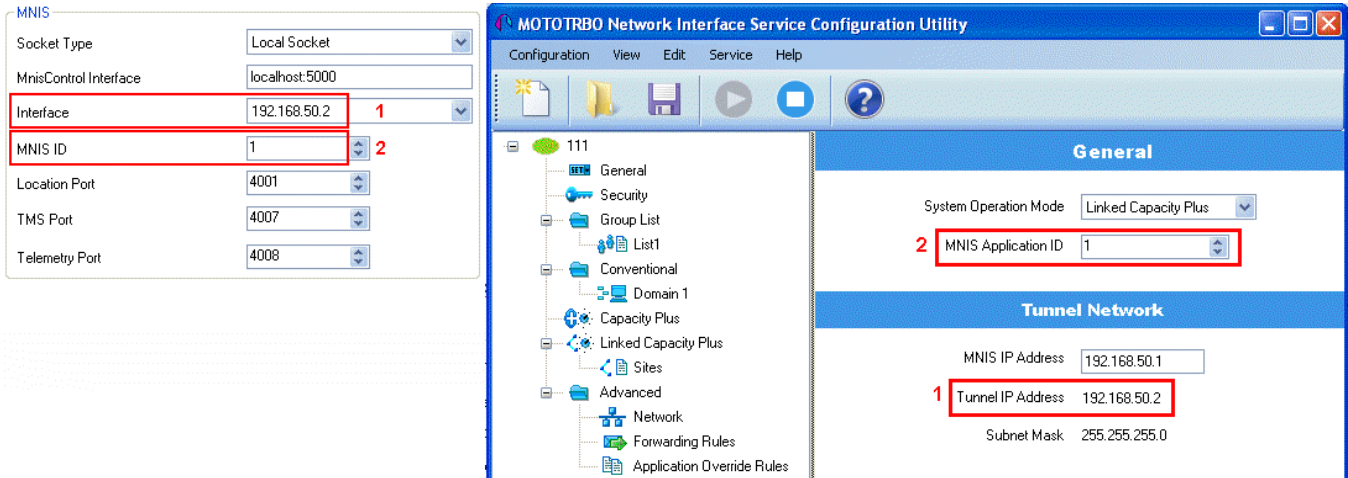
11. In the **TMS Port**, **Telemetry Port** and **Location Port** fields specify ports where the radioserver will expect text messages, telemetry and GPS data. The ports should match the ports set in the **TMS UDP PORT**, **Telemetry UDP Port**, **Location Server UDP Port** fields in MOTOTRBO Network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

12. Under **DDMS settings** specify **Server Address**, i.e., IP address of the PC with the MOTOTRBO DDMS 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 (**Interfaces→Watcher Settings**).
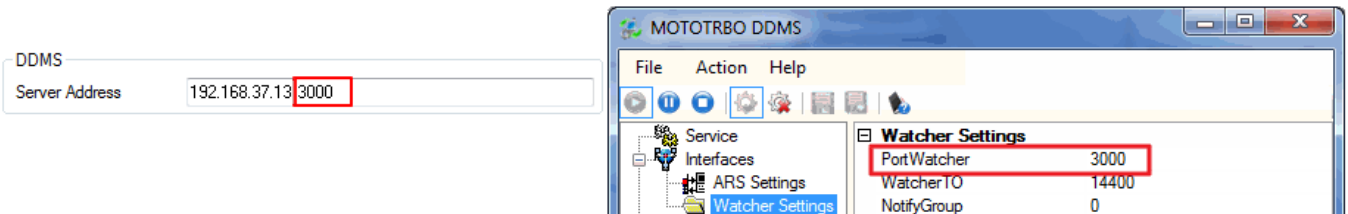
13. Save changes by clicking **Save** 🖫. To cancel the changes made, click the **Restore** button 🔁. All the changes, made after the last save, will be restored.To apply the saved changes you must restart the service. The service is managed using the following buttons: **Start** ▷, **Stop** ⬜ and **Restart** ⬜▷.

7 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 radios.

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.

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

The Connect Plus network configuration includes the following stages:

- Setting up MOTOTRBO equipment configuration parameters: XRT Gateway, XRC Controllers, repeaters, and radios.

- 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.

7.1 MOTOTRBO Equipment Programming

To program MOTOTRBO equipment you will need special MOTOTRBO configuration 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

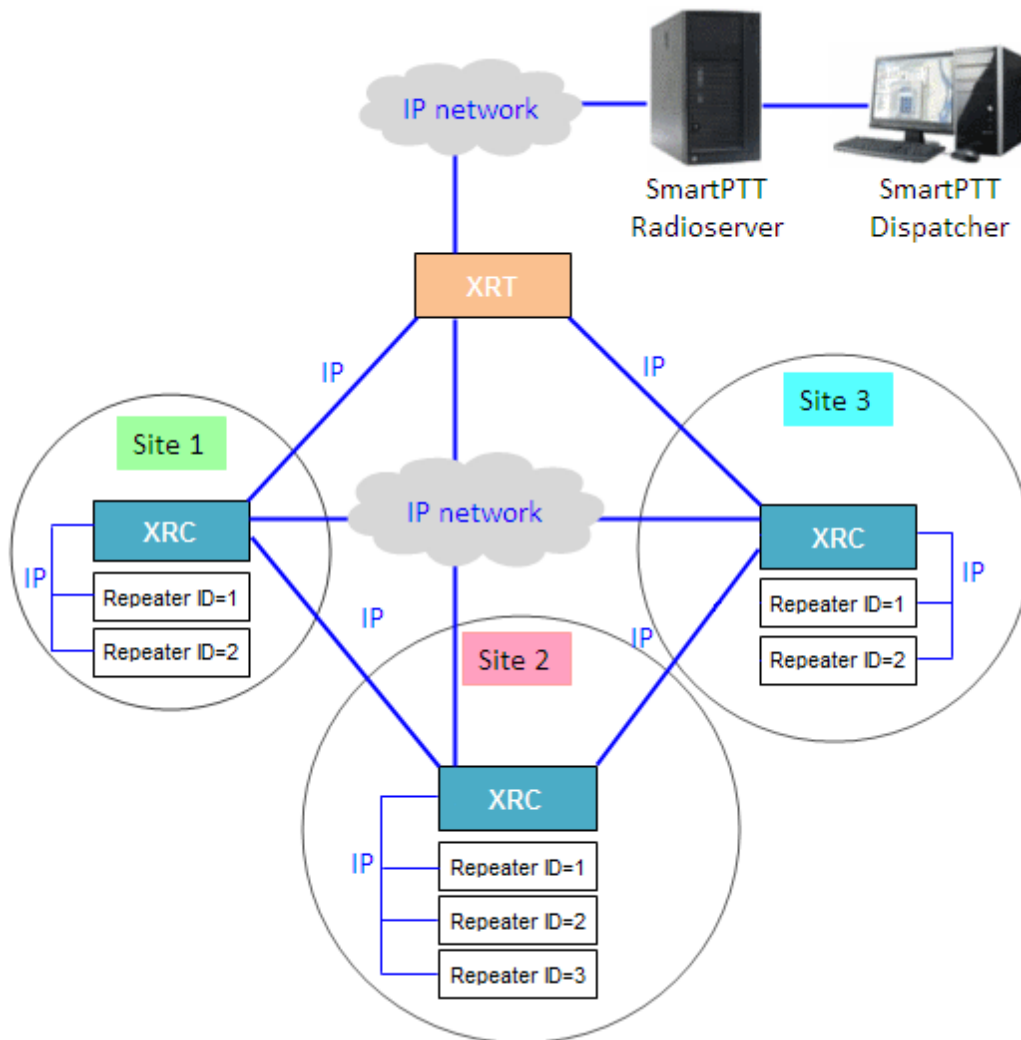- MOTOTRBO Connect Plus Option Board CPS for radio option board configuration

NOTE

Ensure that firmware versions for all MOTOTRBO equipment used in one network are compatible.

7.1.1 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.
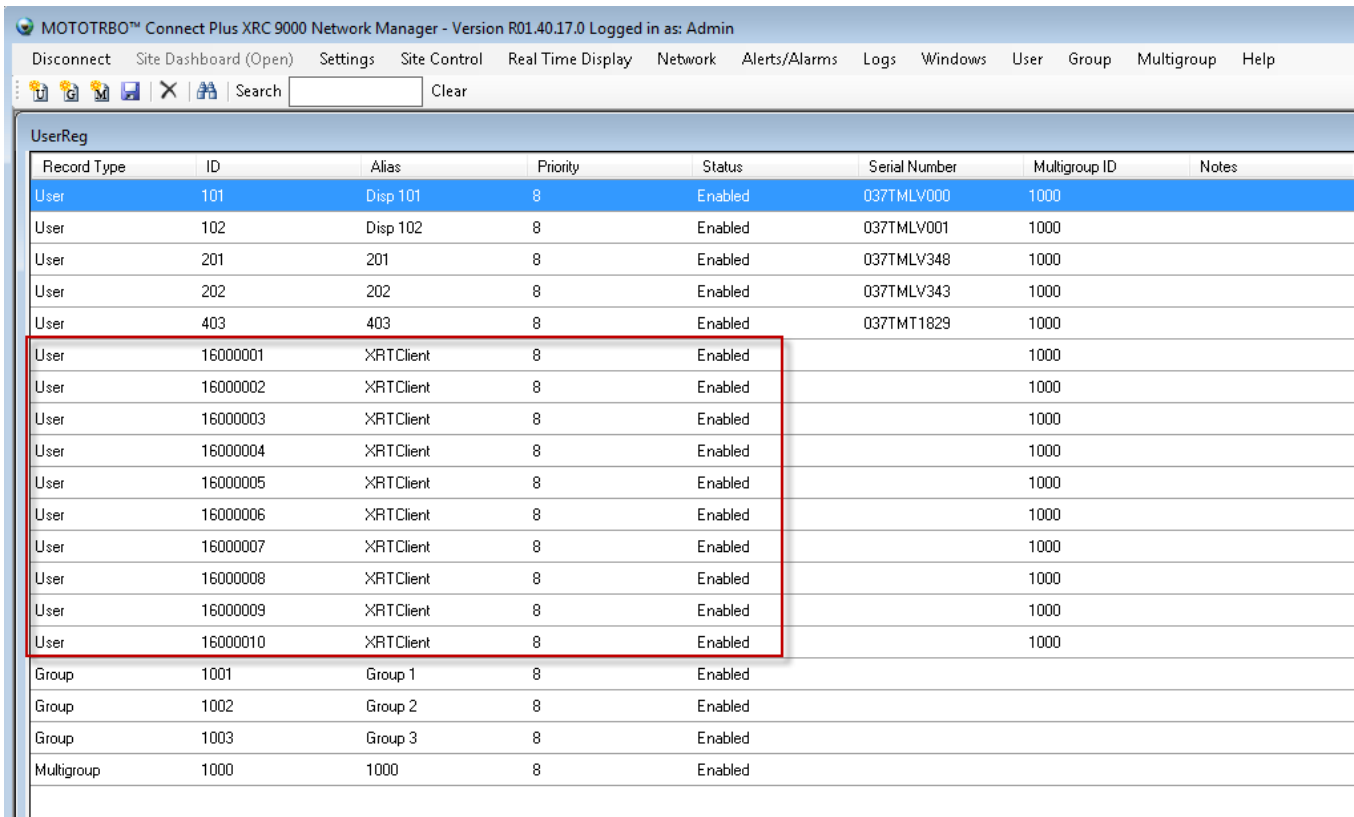
In this article we will focus mainly on the most critical parameters of the XRC Controller and XRT Gateway, which are required for operation with SmartPTT Radioserver.

In our example we have a multisite networking, therefore each XRC Controller must be enabled for multi-site operation.

1. Make sure the **Pool IDs** field in SmartPTT Radioserver Configurator matches the **Pool ID** field in **Site Configuration** window of XRT Gateway settings.
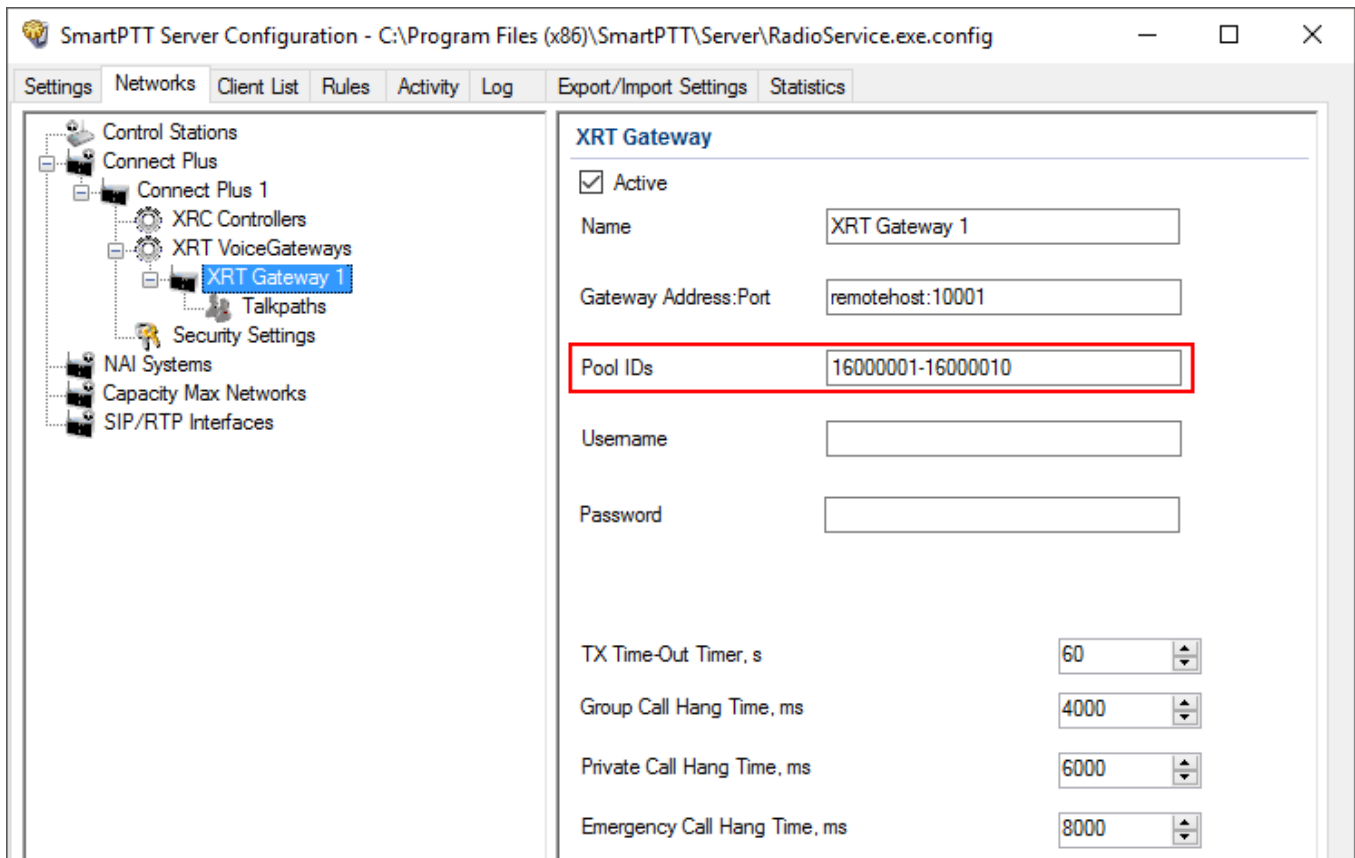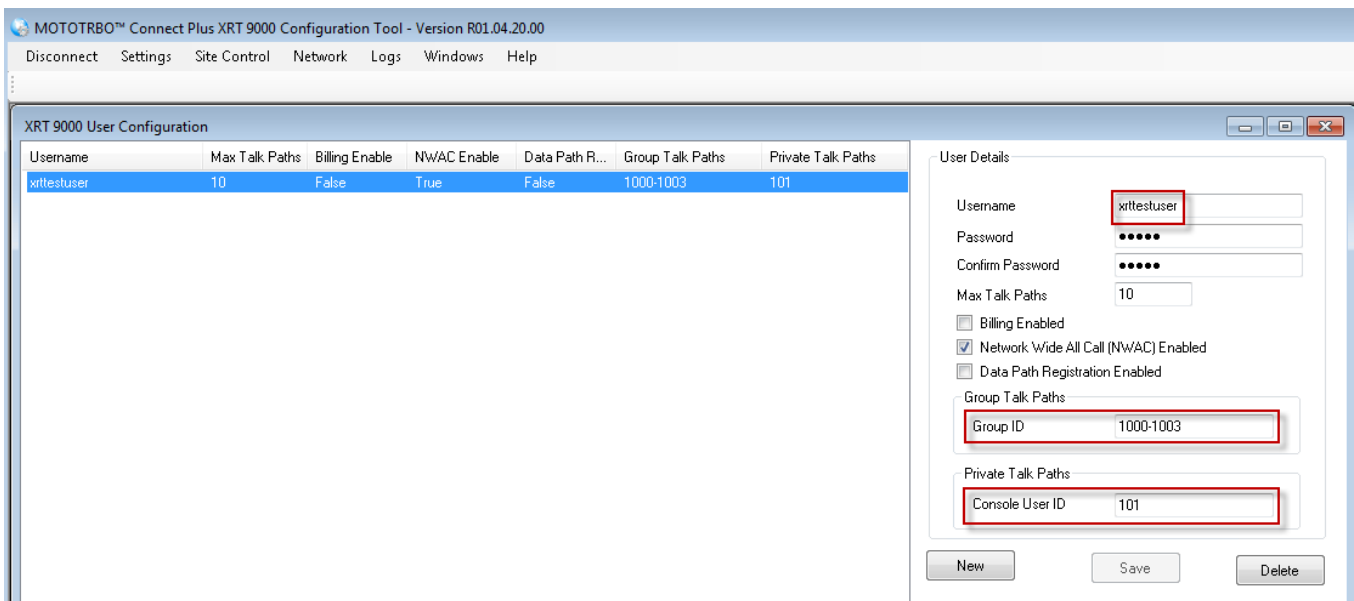
3. Make sure that there is a user record for every pool ID in XRC Controller configuration:

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

5. Check that the **Username** and **Password** match **Username** and **Password** in SmartPTT Radioserver Configurator in XRT Gateway settings.

6. 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.

7. Check **Console User ID**. It should match **Radio ID** in SmartPTT Radioserver Configurator.
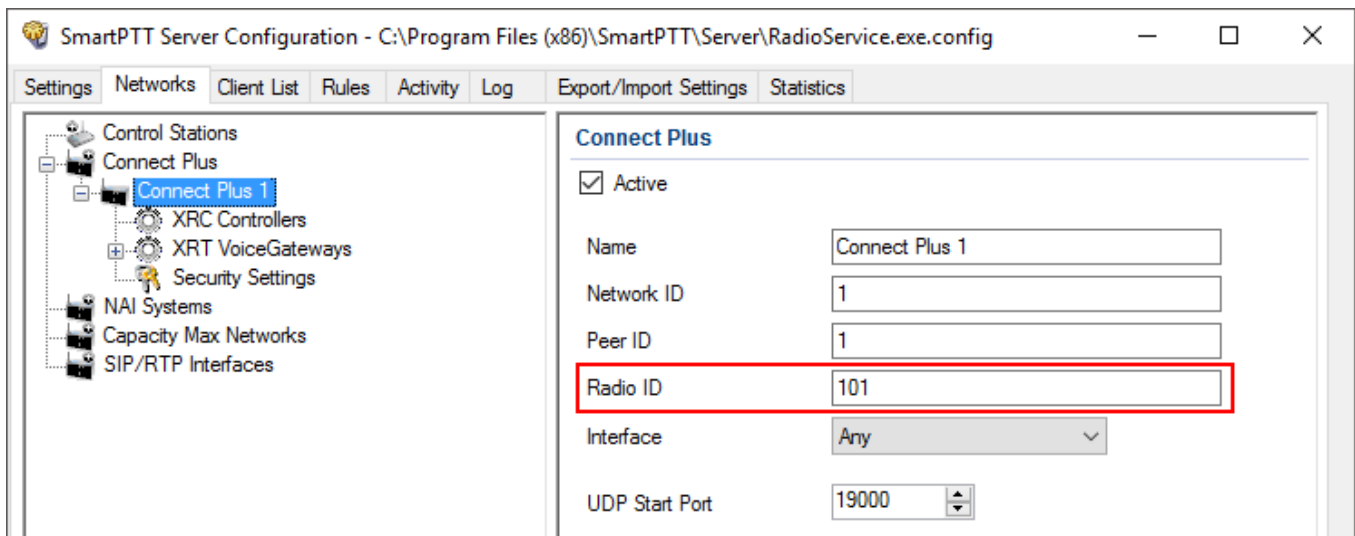
If the field is empty, the user should have permission for any Private Talk Path that is validly registered with the XRT 9000. If any Private Talk Path ID is entered, then all other Private Talk path IDs will be disallowed.

7.2 SmartPTT Radioserver Configuration

In this topic you will find description of the following system topology: Connect Plus based on the XRT Gateway.

## 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.
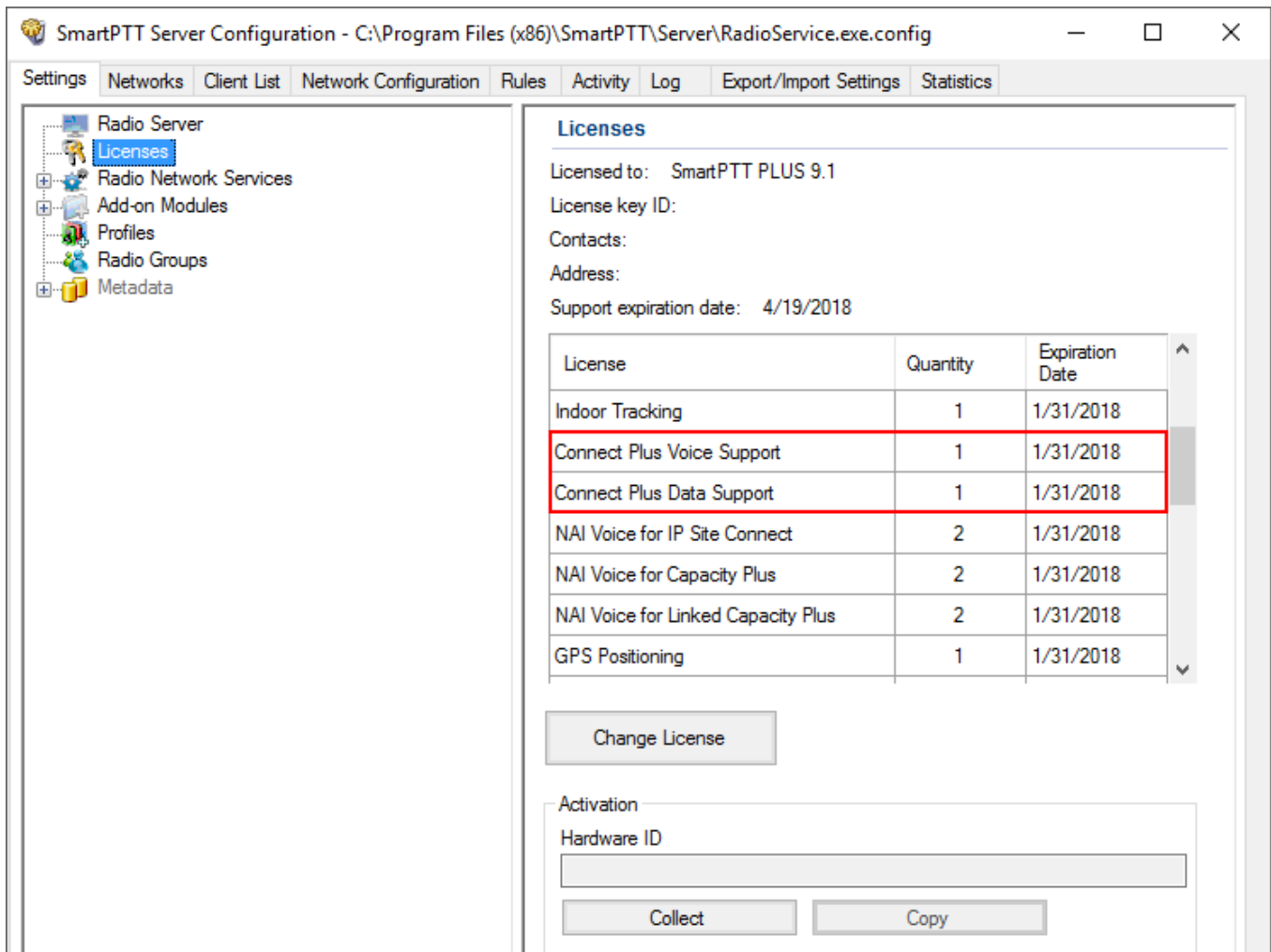
3. In the setting tree on the left, right-click **Connect Plus**, select **Add**, and then **Connect Plus**.
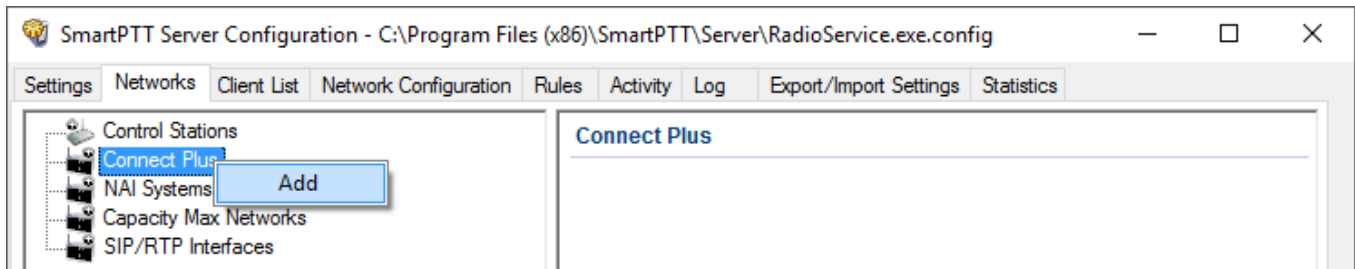
The **Connect Plus** window appears:
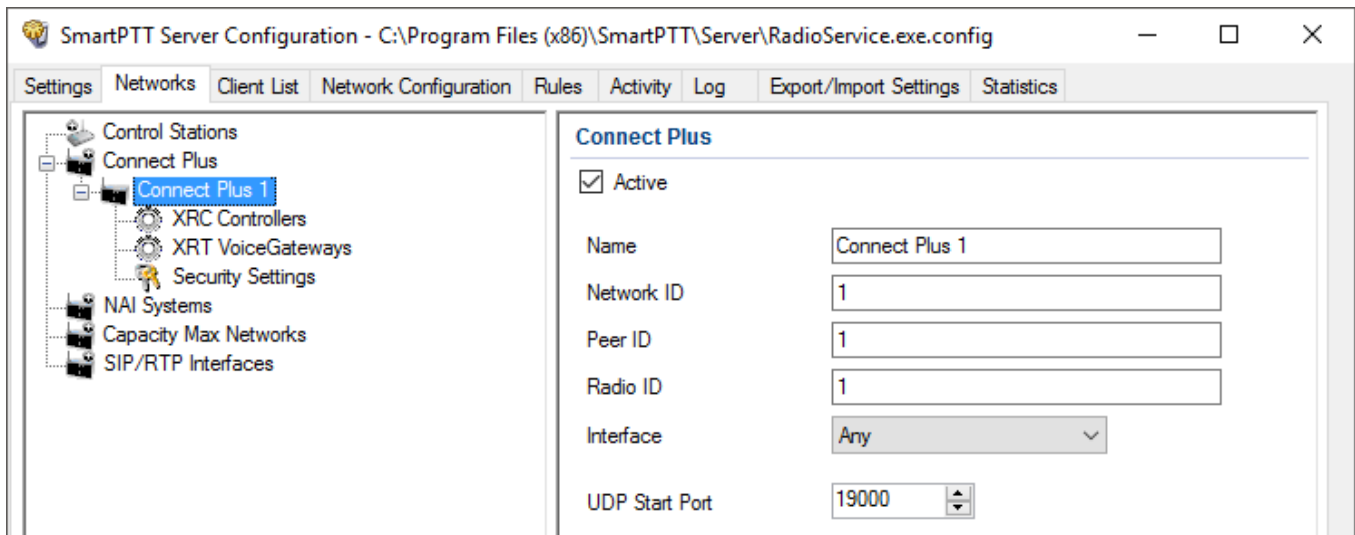
4. Set parameters:

4.1. Select **Active** to enable the Connect Plus network.

4.2. In the **Name** field enter the name of the network.

4.3. 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.

4.4. 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.

4.5. 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.

4.6. In the **Interface** field specify the IP address of the virtual repeater (i.e., SmartPTT Radioserver).

4.7. 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.
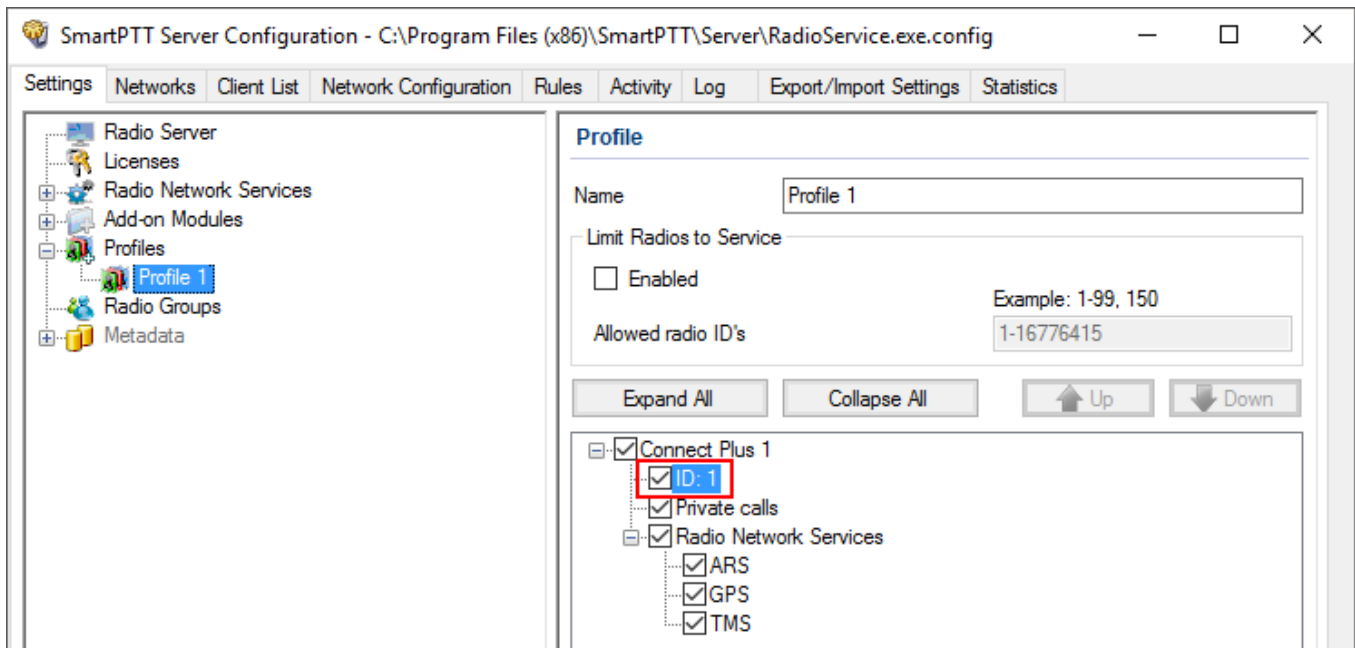
5. There are three sites in our network, and each contains one XRC Controller. It is not necessary to add all the three XRC Controllers in SmartPTT Radioserver Configurator. It is required only for monitoring purposes. If you do not want to monitor all XRC Controllers, you can add only one. To add an XRC Controller, right-click **XRC Controller** and click **Add**:
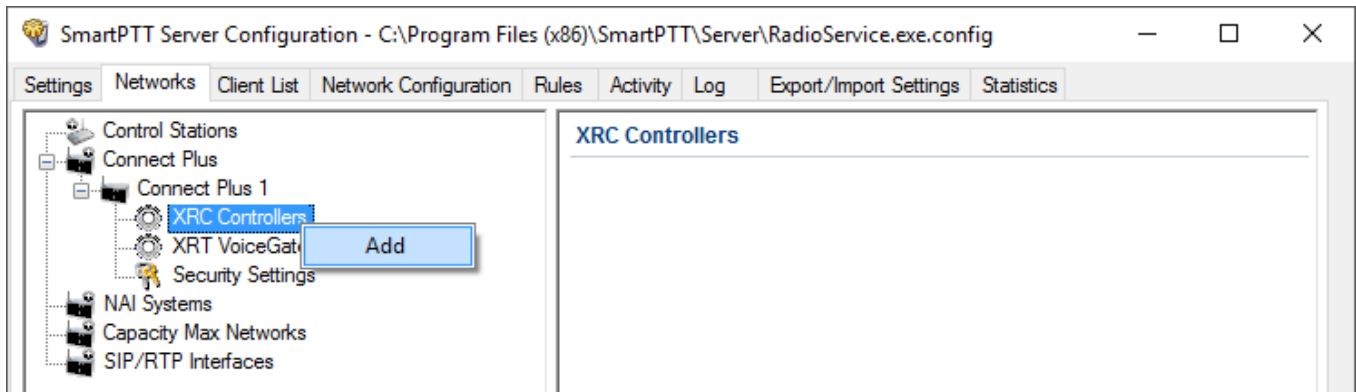
6. Specify parameters for the XRC Controller:
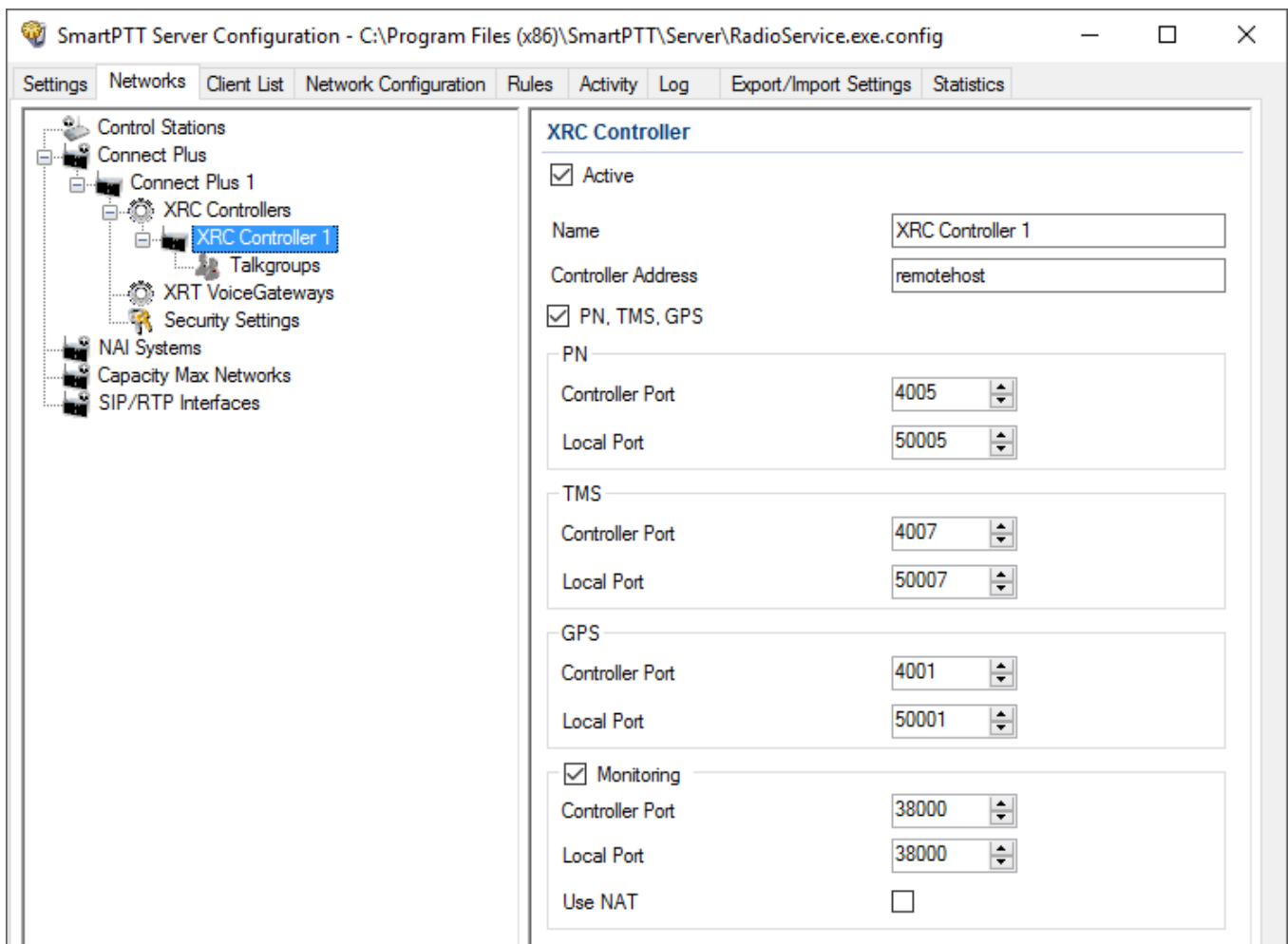
6.1. Select **Active** to enable XRC Controller support.

6.2. In the **Name** field enter the XRC Controller name. This is used only in SmartPTT Radioserver Configurator.

6.3. In the **Controller Address** field specify the IP address of the XRC Controller. Port is not required in this field.

6.4. 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.

7. 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 VoiceGateways** and selecting **Add**.
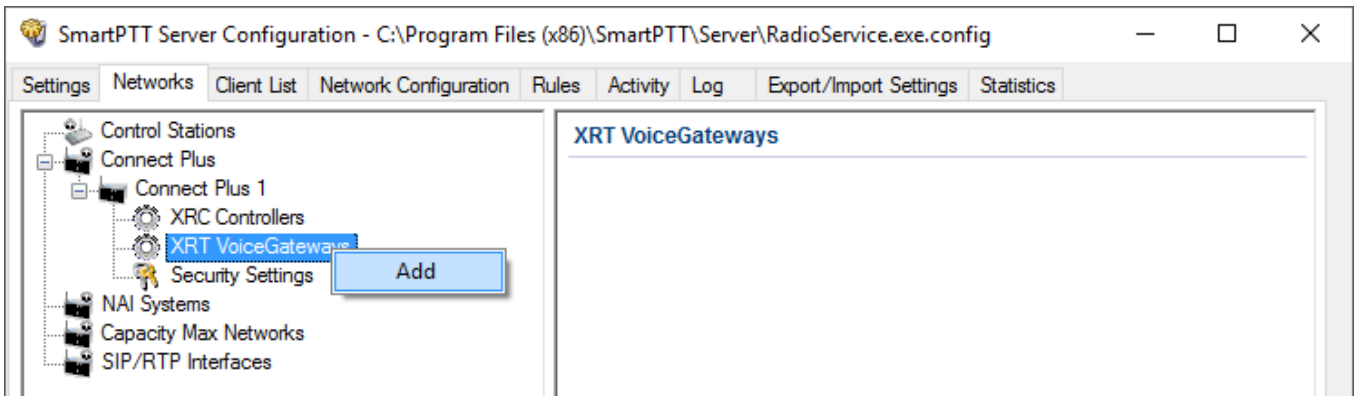
The XRT Gateway window appears:
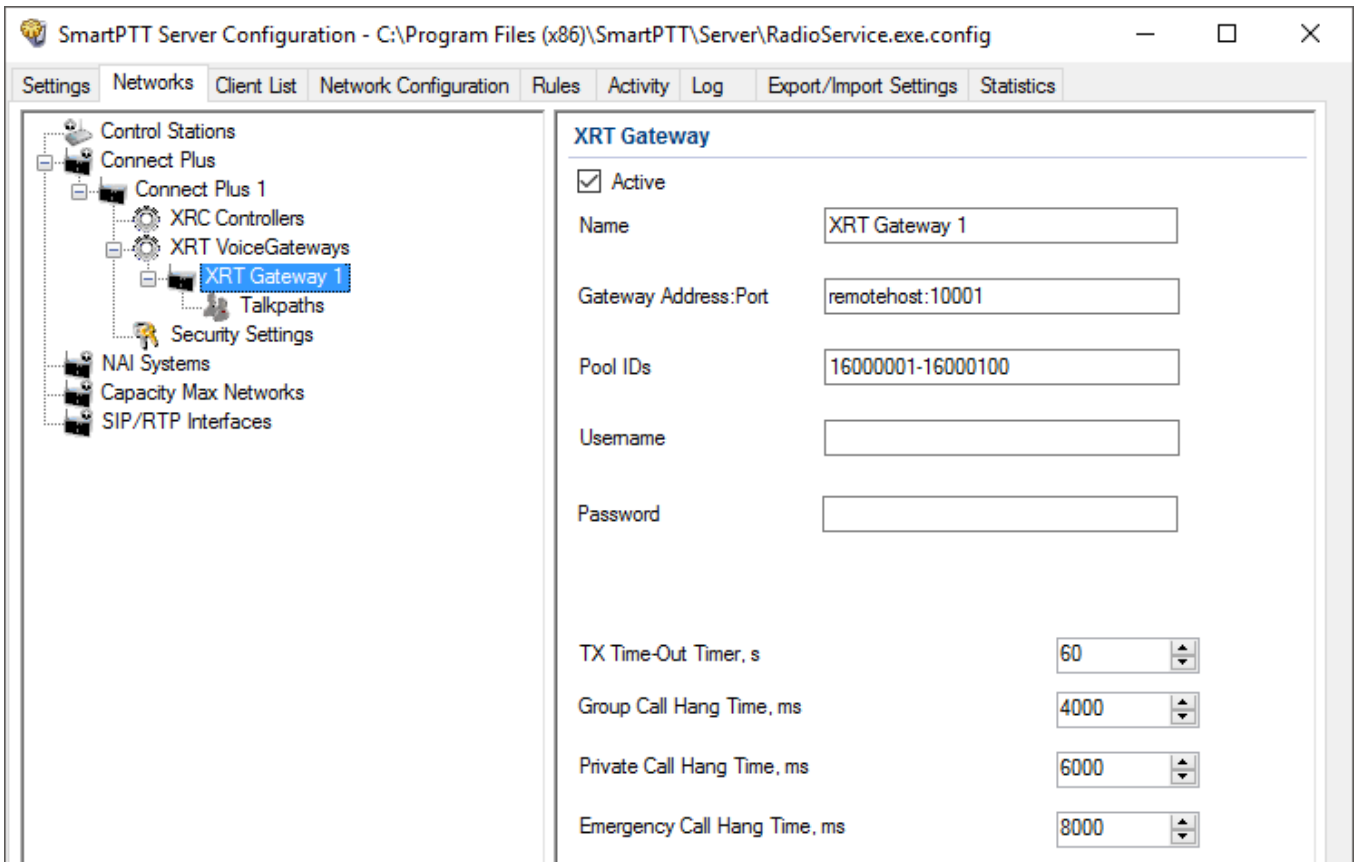
9. Specify parameters of the XRT Gateway.

   9.1. Select Active to enable XRT Gateway support.

   9.2. In the Name field enter the XRT Gateway name, which is used only in SmartPTT Radioserver Configurator.

   9.3. In the Gateway Address:Port field enter the IP address and port of the XRT Gateway.

   9.4. 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):
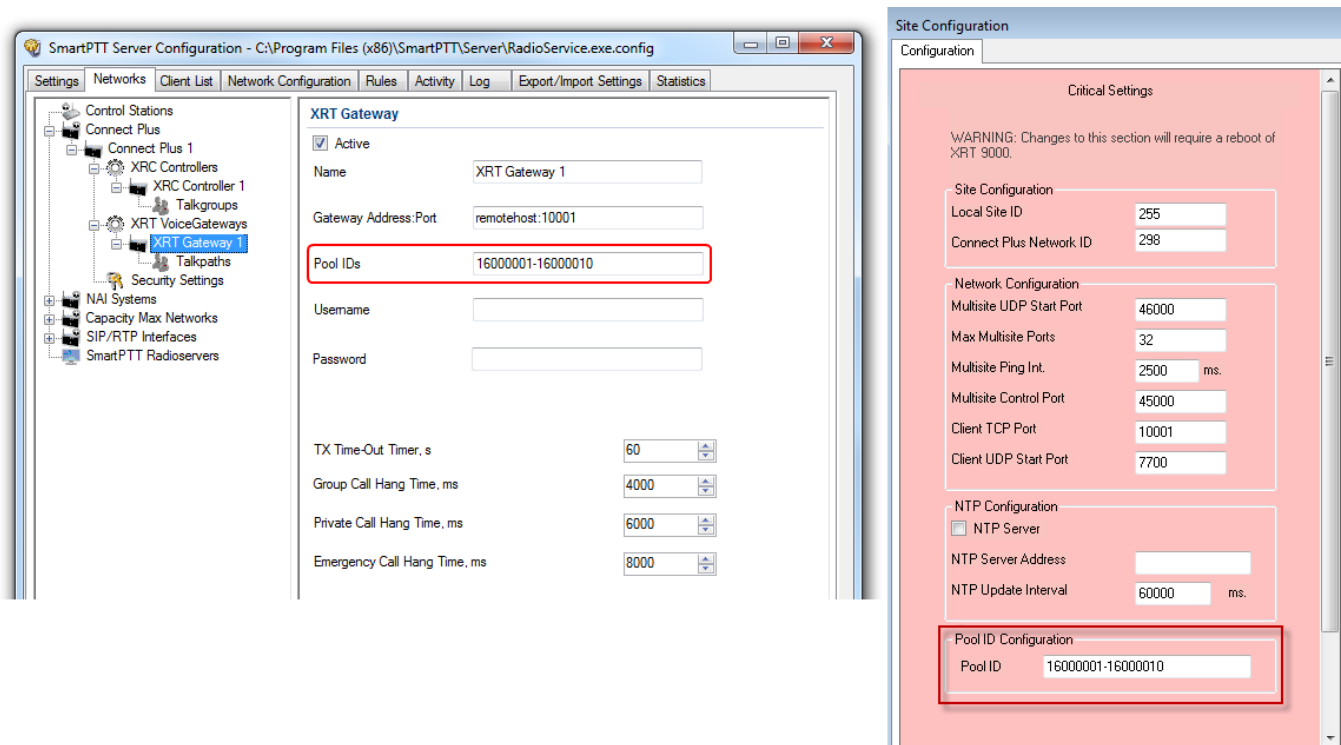
Username and **Password:** Used for authentication with the XRT Gateway and must equal XRT Gateway Username and password set up in MOTOTRBO Connect Plus XRT Configuration Tool.

10. Add talkpaths on the **Talkpaths** window. They are necessary for voice communication. For each talkgroup add one talkpath, select **Group** in the **Type** column, and specify the **ID**. For the dispatcher add another talkpath, 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**).
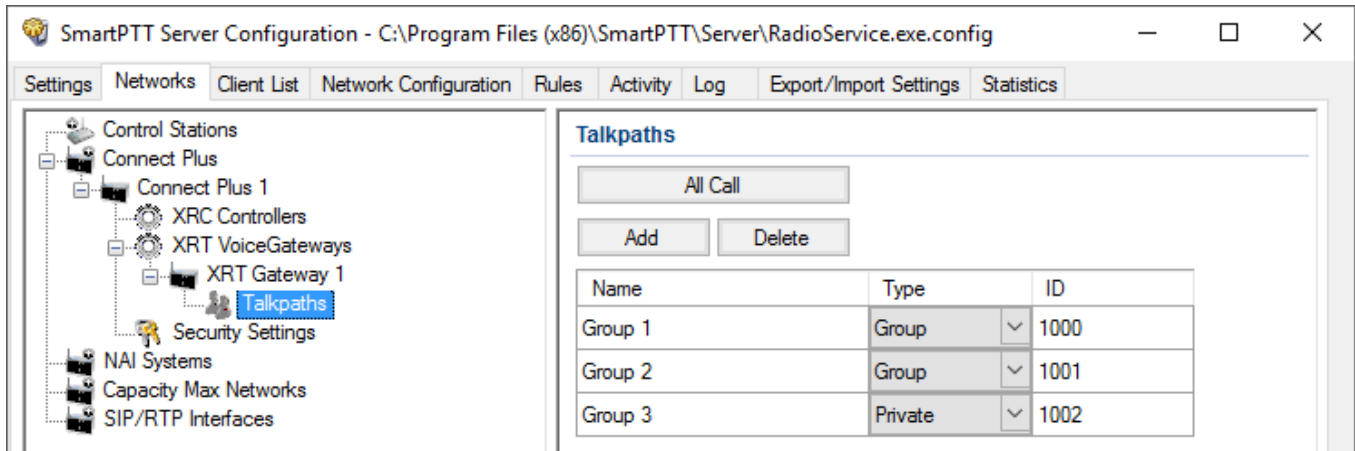
If required, you can define encryption settings for outgoing and incoming traffic under **Security Settings**.

8 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 system supports connection by using control stations. The parameters of the control station correspond to the parameters of an ordinary MOTOTRBO control station.

Capacity Max system offers the simple and efficient system architecture that utilizes standard Internet protocol (IP) network with a centralized Capacity Max System Server (CMSS).
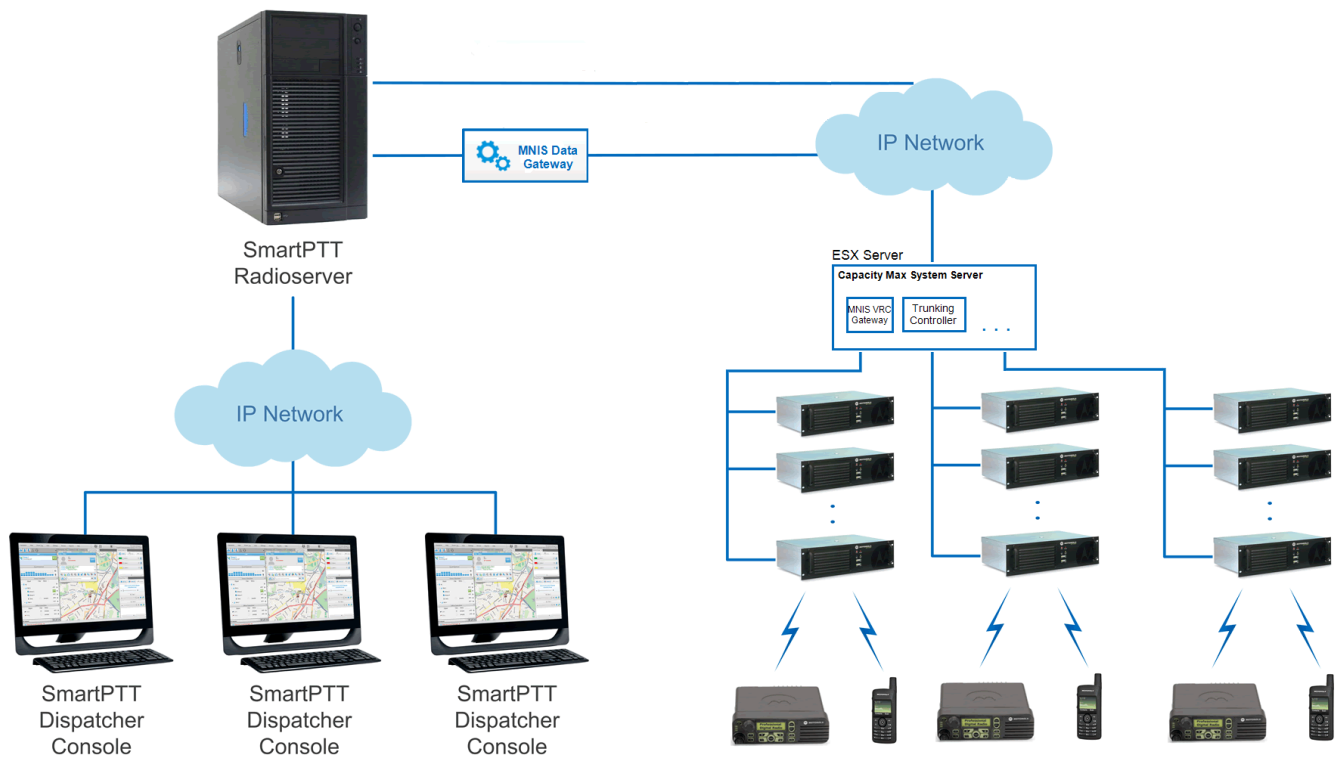
CMSS represents the VMware Sphere version 5.5 ESX server and includes the following virtual resources:

- Trunking Controller based on the Red Hat Linux

- MNIS VRC gateway

- Radio Management application that is used instead of *MOTOTRBO Customer Programming*

Software (MOTOTRBO 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 should have the following programs installed:

- *Radio Management* – to get the settings of the preconfigured virtual resources

- *MOTOTRBO Network Interface Service Configuration Utility* – to set up the MNIS Data Gateway

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

- Adding a new network and performing its basic configuration

- Configuring a Trunking Controller

- Configuring MNIS Data Gateway settings for data transfer

- Configuring MNIS VRC Gateway settings and talkgroups
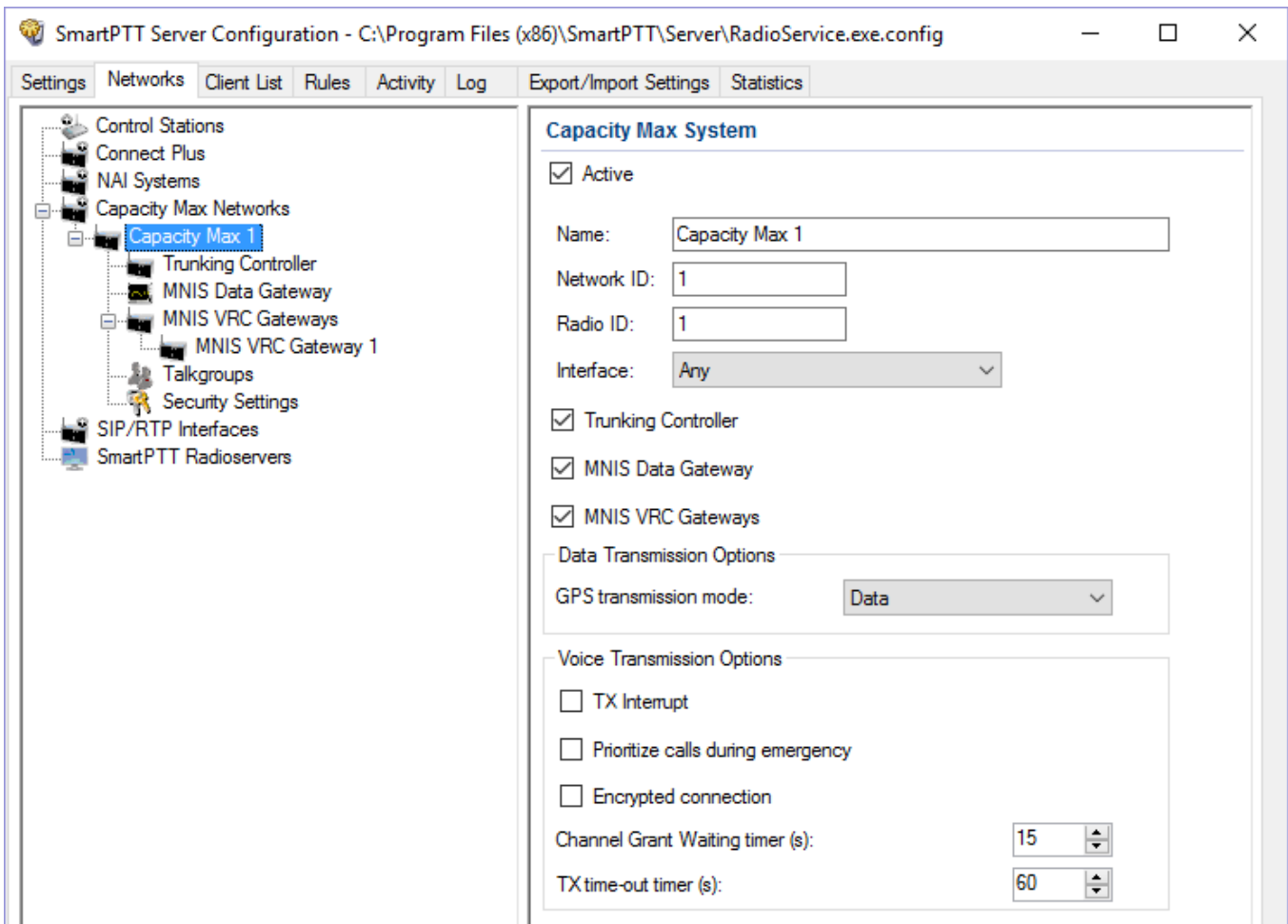
- Configuring security settings

8.1 How to Configure Capacity Max

To connect a new Capacity Max system to the SmartPTT Radioserver, follow these steps:

1. On the **Networks** tab, right-click **Capacity Max Networks** and then click **Add**.
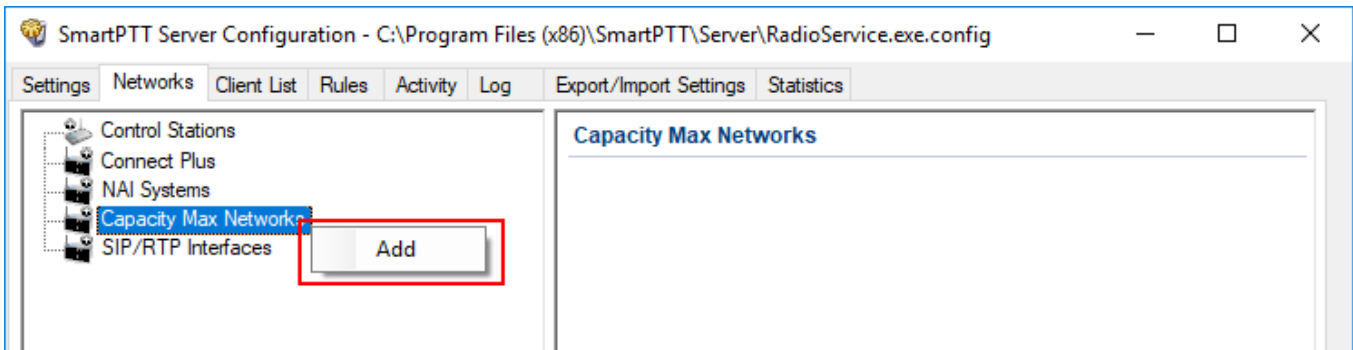
2. Select the created Capacity Max system. The **Capacity Max System** pane appears:

3. In the **Capacity Max System** pane, configure the available options:

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 identifier is displayed on a radio when it receives private calls and text messages from the dispatcher. If there are several dispatchers, you can create a profile for each operator 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, viewed by the **Subscriber Access Control** value).

To open the **Capacity Max System** settings in the *Radio Management* application, click **Action (** ⚙ **) → Manage → Capacity Max System Server Data** or press Ctrl+Alt+S.
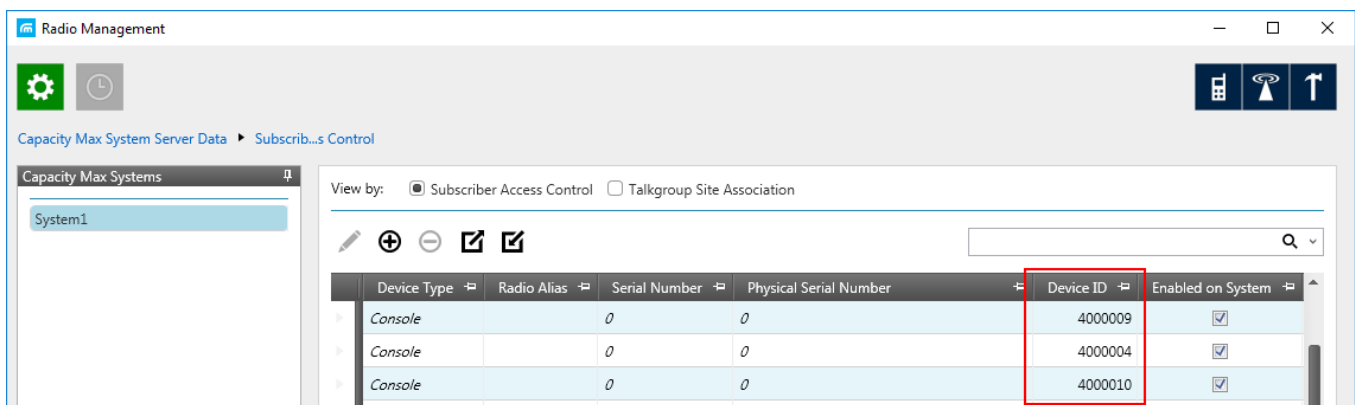
Interface: The IP address of the computer where SmartPTT Radioserver is installed.

Trunking Controller: Select to allow the connection to Trunking Controllers.

MNIS Data Gateway: Select to allow a connection to a MNIS Data Gateway and its use.

MNIS VRC Gateways: Select to allow a connection to a MNIS VRC Gateway and its use.

TX Interrupt: Select if you want to interrupt a radio.

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.

Encrypted connection: Select to activate encrypted TLS connection between radioserver and voice gateway.

Channel Grant Waiting timer (s): 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 *Radio Management* (see the **Capacity Max Systems:...** settings in the Capacity Max Features menu of the CMSS configuration, the **Channel Grant Waiting timer** field in the **Timers** tab).
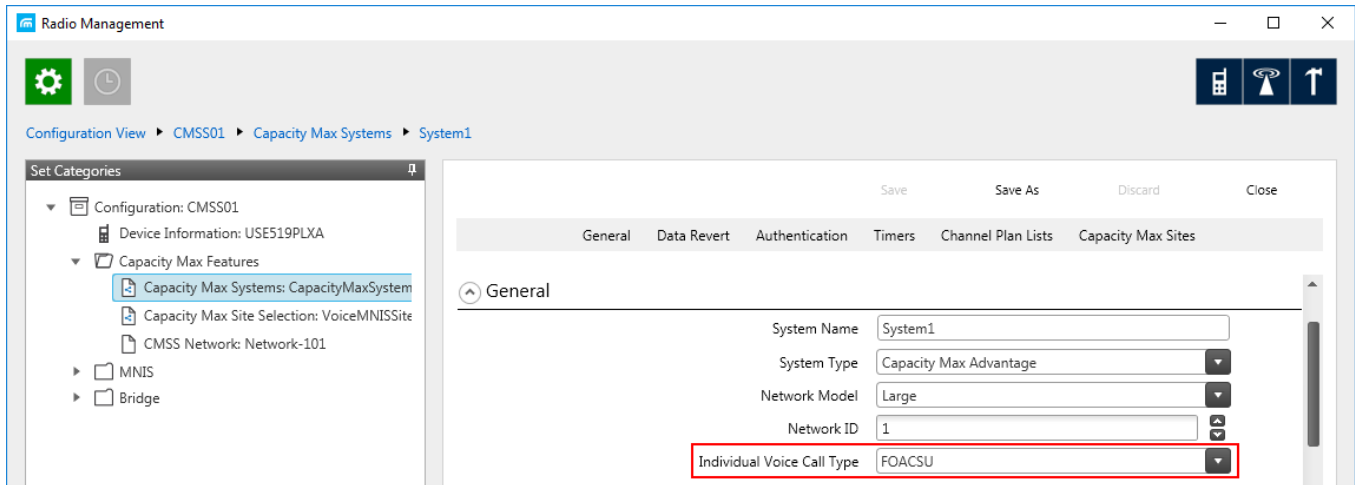
> **NOTE**
>
> To open the **Capacity Max Features** of the of the CMSS configuration in the *Radio Management* application, click **Action (⚙) → Manage → Configurations** or press Alt+C. In the open table, select the CMSS configuration and click **Edit ✎**. In the open **Set Categories** pane, expand **Configuration:<CMSS configuration name>** and select **Capacity Max Features**.
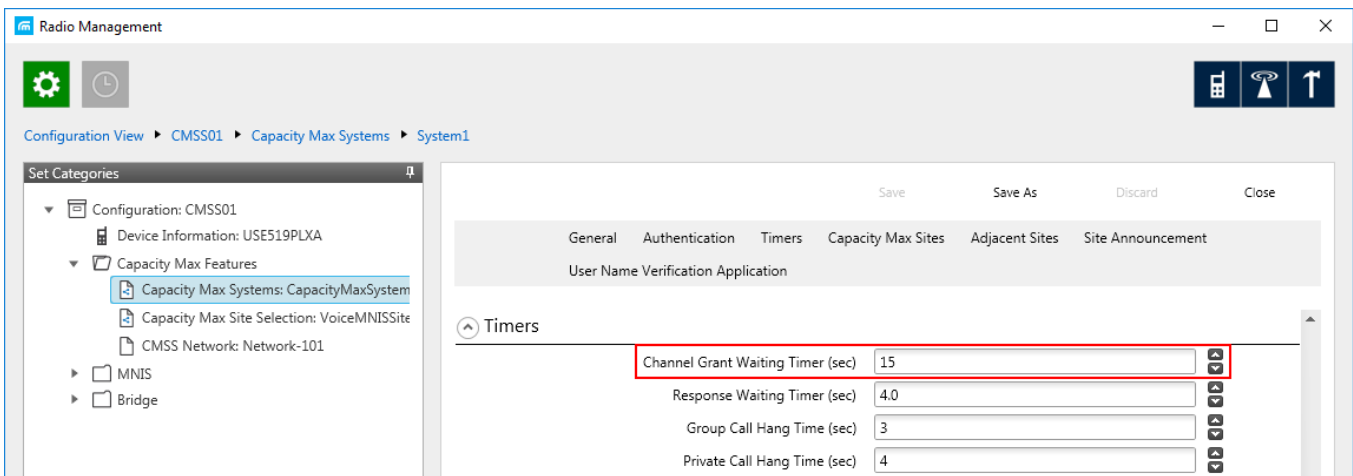
FOACSU (Full Off Air Call Set Up) stands for the strategy of assigning the traffic channel only when the called party user answered the call specifically. During the timeout the traffic channel is not allocated for the call.

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

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

> **NOTE**
>
> To open the **MNIS** menu of the **CMSS configuration** in the *Radio Management* application, click **Action (⚙) → Manage → Configurations** or press Alt+C. In the open table, select the CMSS configuration and click **Edit (✎)**. In the open **Set Categories** pane, expand **Configuration: <CMSS configuration name>** and select **MNIS → MNIS System**.
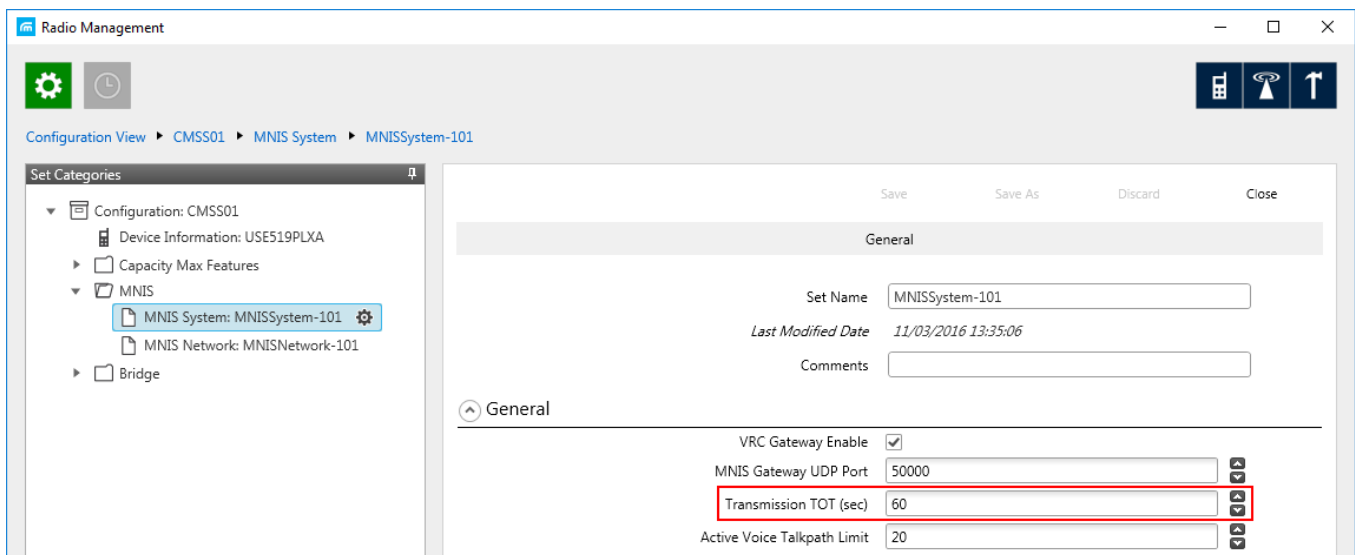
GPS Transmission Mode: Select the suitable mode:

- **Data:** GPS coordinates will be received in several packets. This mode is working only if **Trunking channel** is set in *Radio Management*. However, traffic is consumed in this mode.
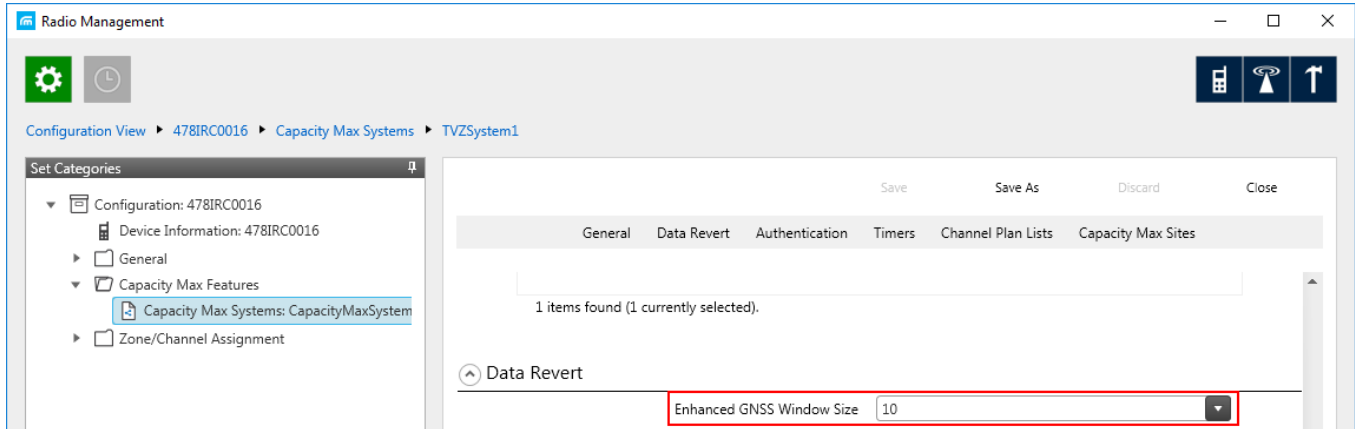
- **Enhanced CSBK:** GPS coordinates will be sent as a single Control Signaling Block. This is traffic-effective option and it allows to increase GPS request rate up to 7.5 s. However, you should make sure that radio units in your system support CSBK commands.

8.2 Trunking Controller

Trunking controller of the Capacity Max network provides actual information about the network status (registered radios).

> **IMPORTANT**
>
> To configure trunk controller, install the corresponding license. For more information on how to install licenses, see Licenses.

To configure a primary trunking controller, follow these steps:

1. Ensure trunking controller is configured by using the *Radio Management* application, in particular, you can obtain IP address and port from the **Presence Server IP** field.

> **NOTE**
>
> For more information on how to configure Radio Management application, see *Motorola Radio Management User Guide*.
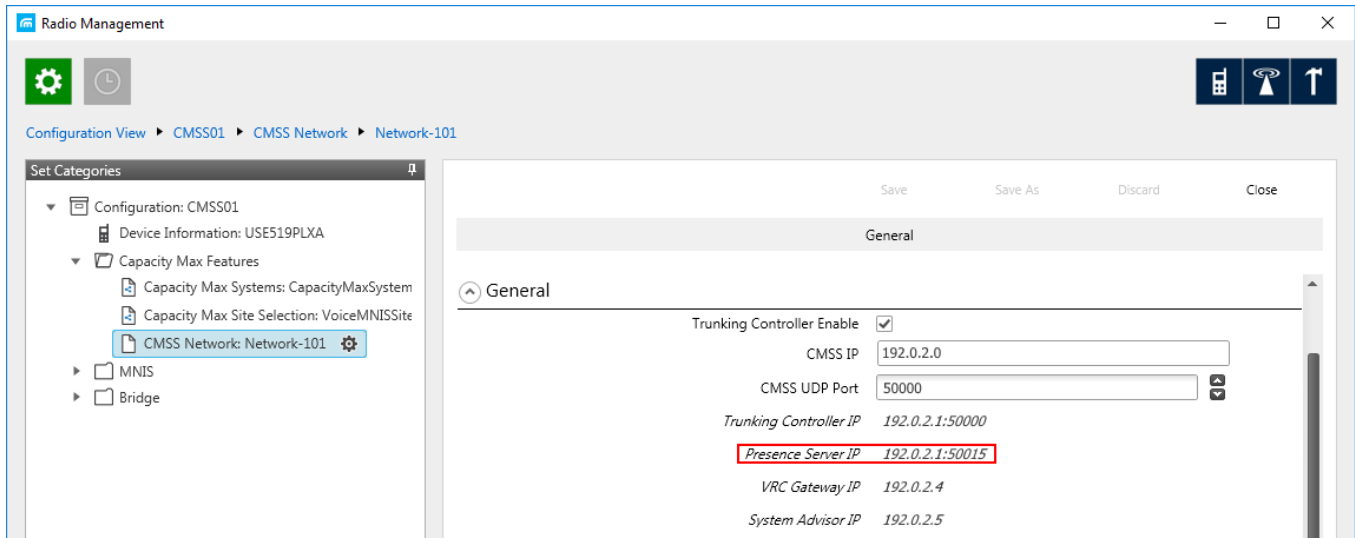
2. Add a new Capacity Max network or select the existing one.

3. In the **Capacity Max System** pane, select the **Trunking Controller** check box to make trunking controller settings available.
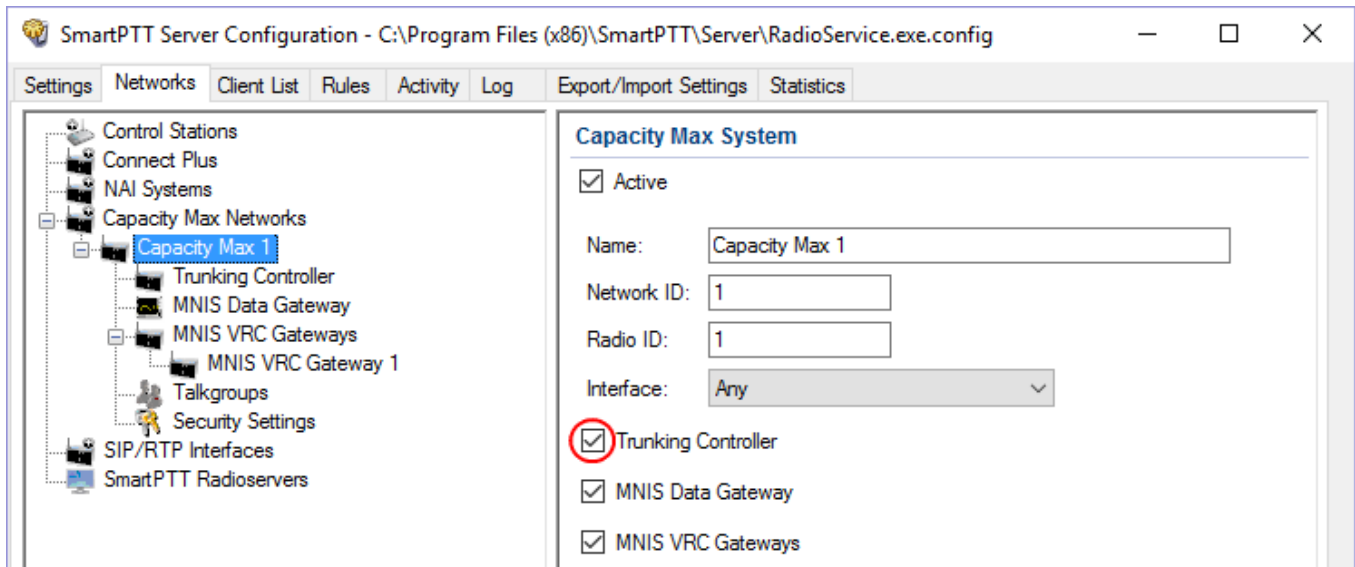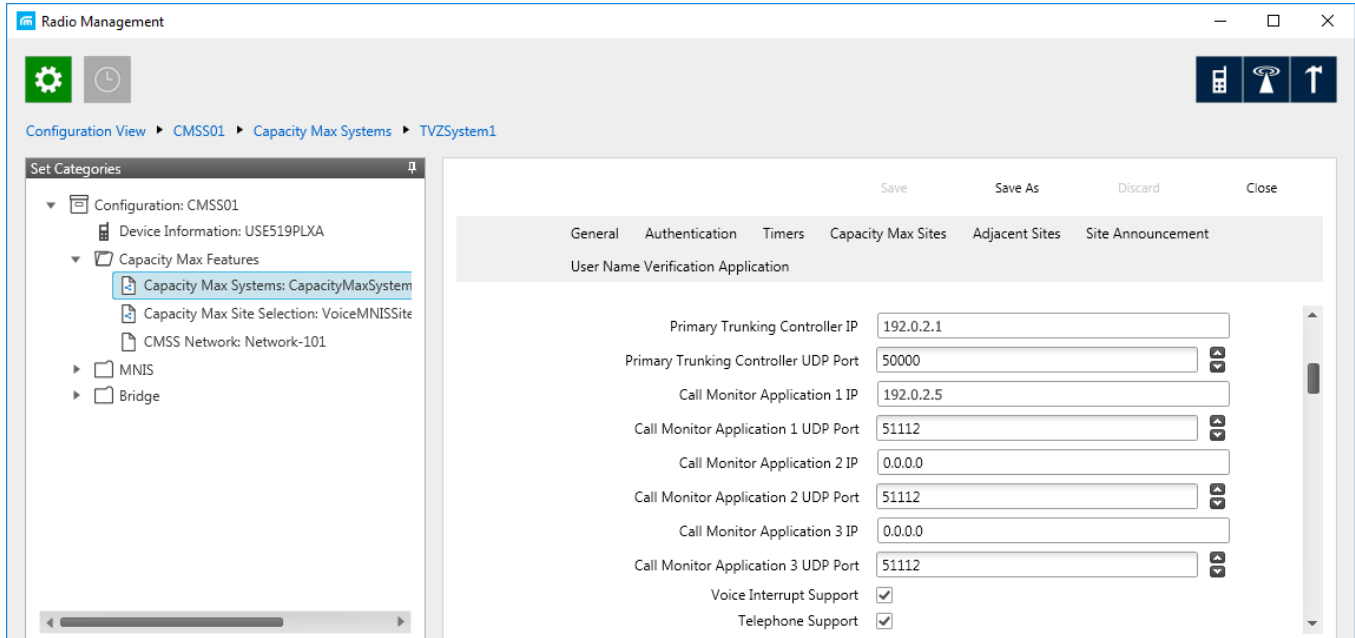
4. In the left pane, select **Trunking Controller** and in the **Trunking Controller** pane replace the default text "*remotehost:50015*" in the **Primary controller (IP address:Port)** field with IP address and port of the Presence Server from the *Radio Management* application.
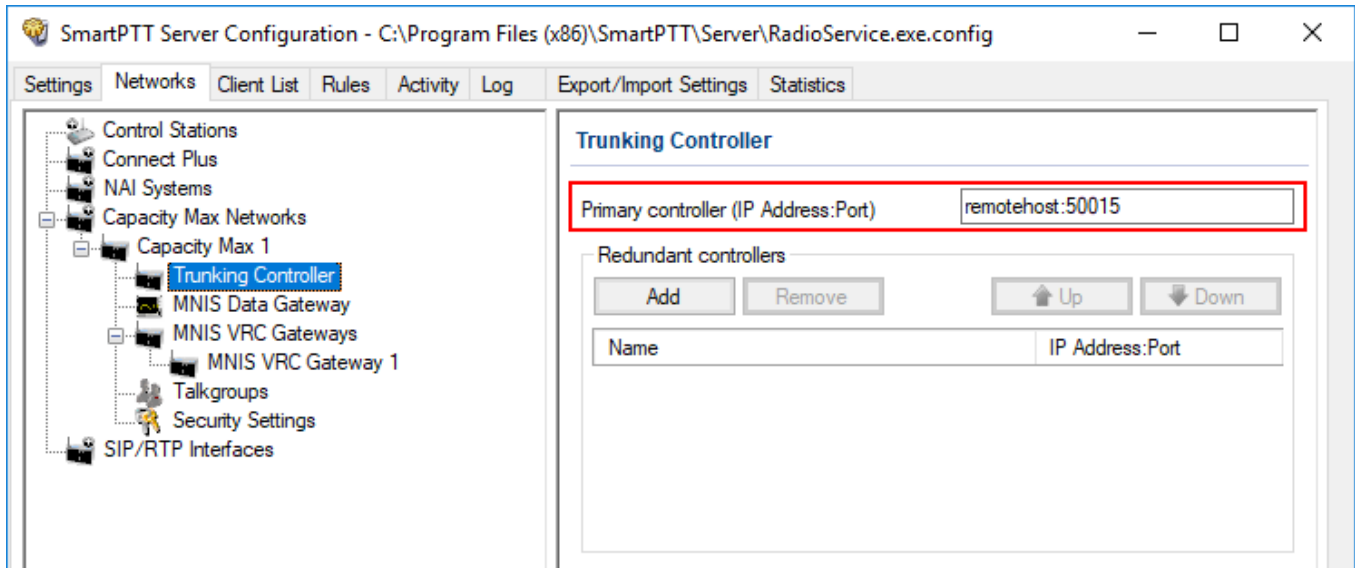

Capacity Max supports up to 4 redundant trunking controllers to keep the radios online when the primary controller goes offline. The order of redundancy is defined by the settings in the *Radio Management* application.

To configure additional trunking controllers:

1. Make sure that redundant trunking controllers are configured in the *Radio Management* application.

2. In your Capacity Max network select **Trunking controller.**

3. In the **Redundant controllers** area, click **Add** to add a new controller to the table.
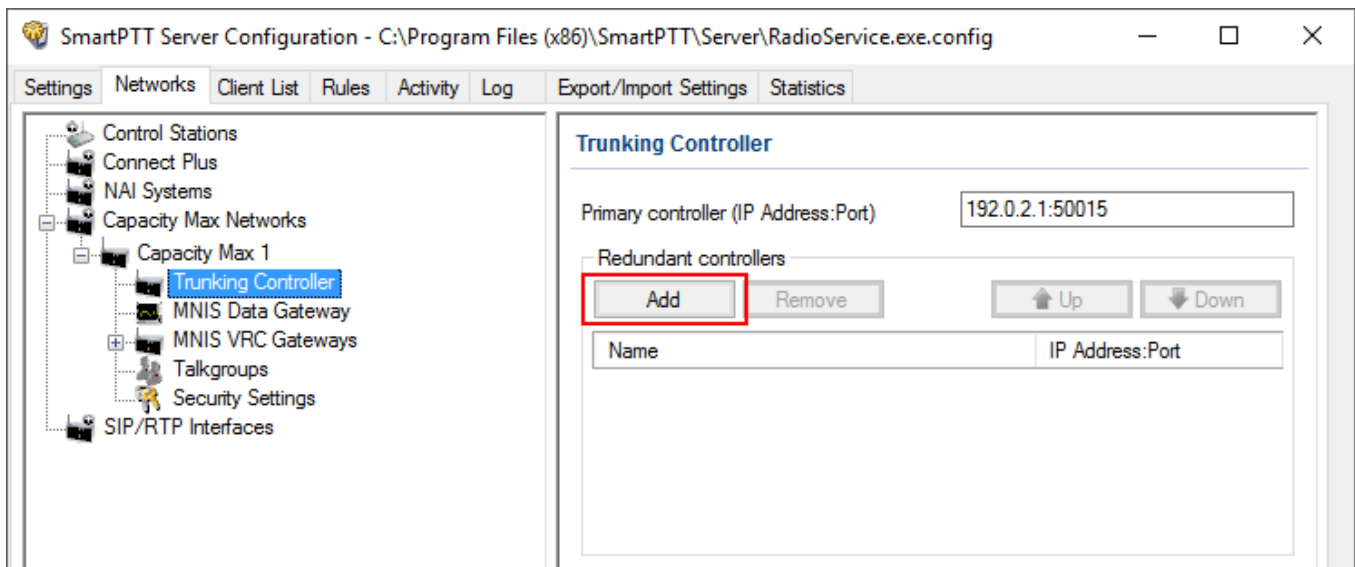
4. Change the redundant controller IP address and port according to the settings in the *Radio Management* application. Rename the controller if needed. You should name controllers differently.
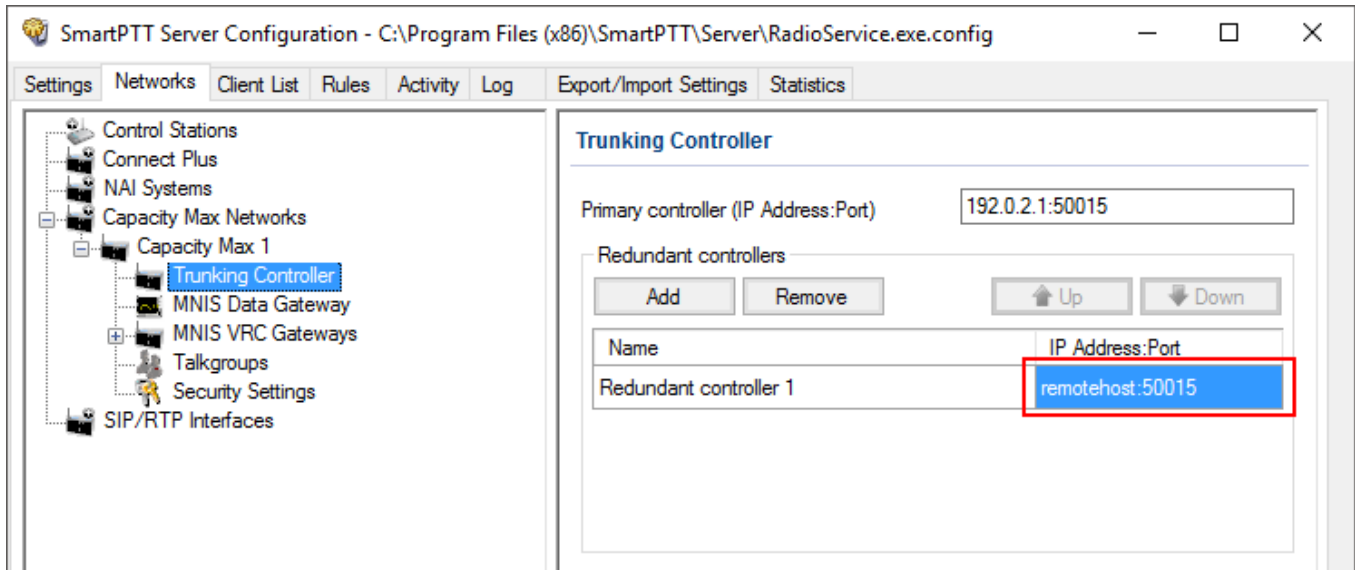
5. Add more redundant controllers if needed. Change their IP addresses and ports according to the settings in the *Radio Management* application.

> **NOTE**
>
> If ports of some controllers are the same, the exclamation mark ❶ appears near them. You cannot switch to another menu until you change the ports.

You can change the order of the redundant controllers in the table. This helps to assign a new active controller in case when others disconnect from each other.

To change the order of the controllers in the table, follow these steps:
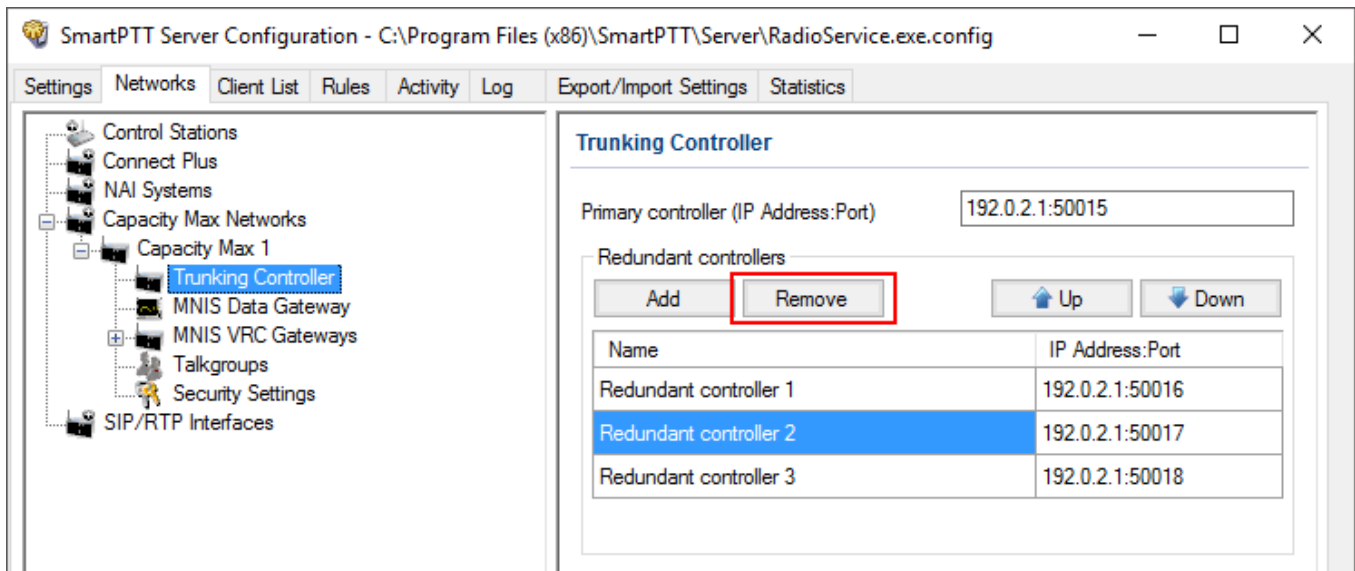
1. Select the desired redundant controller.

2. Click **Up** or **Down** to move the redundant controller up and down.
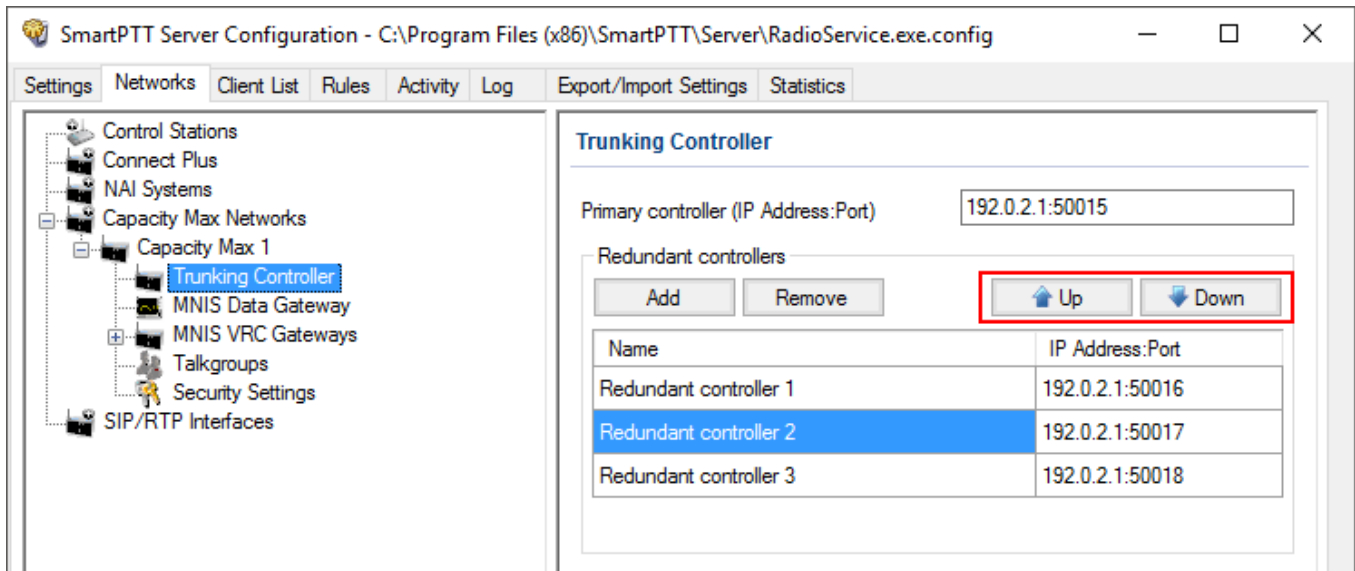
To delete a redundant trunking controller from the table, follow these steps:

1. In your Capacity Max network select **Trunking Controller**.

2. In the **Redundant Controller** area, in the table select a redundant controller and click **Remove**.
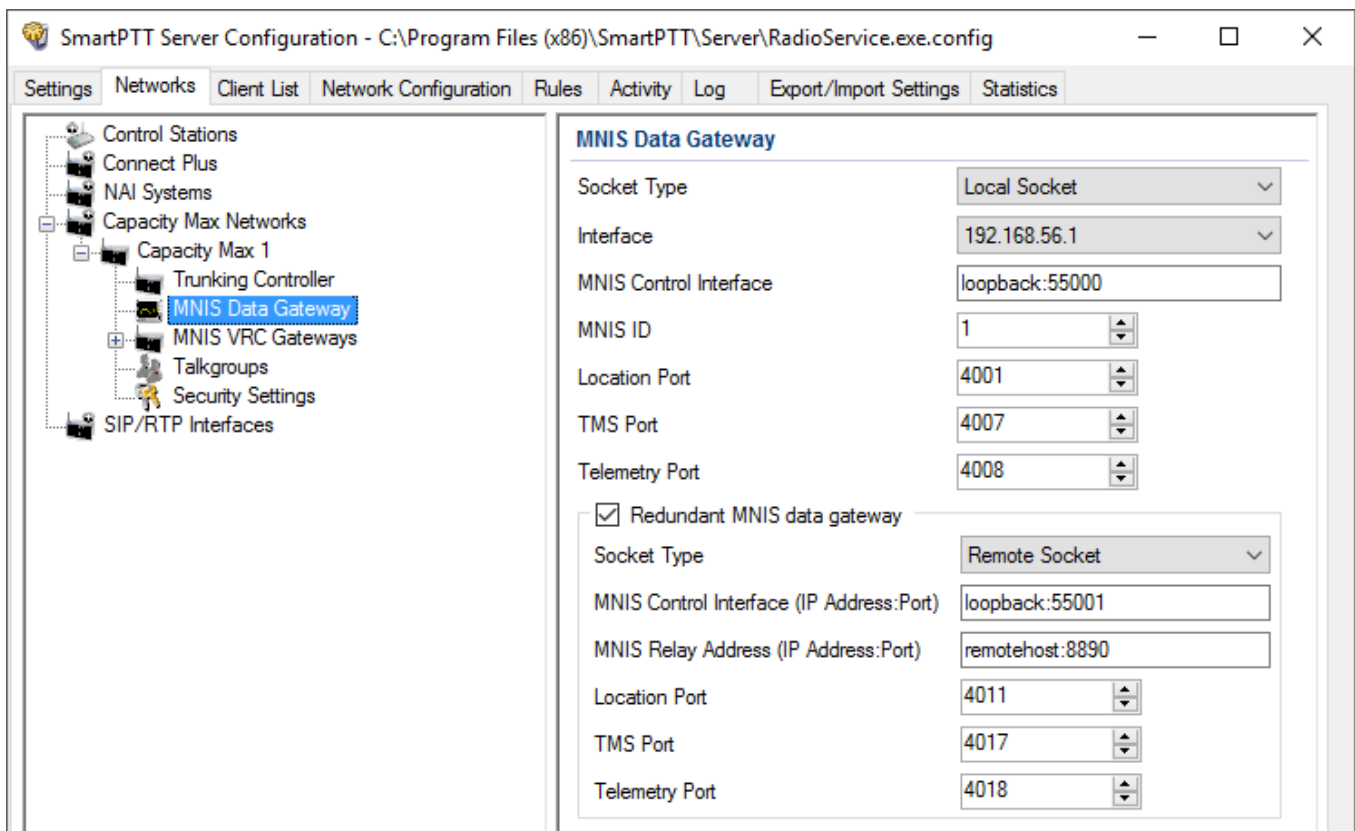
8.3 MNIS Data Gateway

To configure data transfer over Capacity Max network, configure MNIS Data Gateway settings in *SmartPTT Radioserver Configurator* and in *MOTOTRBO Network Interface Service Configuration Utility*.

> **IMPORTANT**
>
> To configure data transfer, install the corresponding license. For more information on how to install licenses, see Licenses.

To configure 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 computer as SmartPTT Radioserver. Select *Remote Socket* if the *MOTOTRBO*

Network Interface Service Configuration Utility and SmartPTT Radioserver are installed on different computers. In this case, information exchange between the processes is supported by the MNIS Relay application.

Interface: MNIS 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).
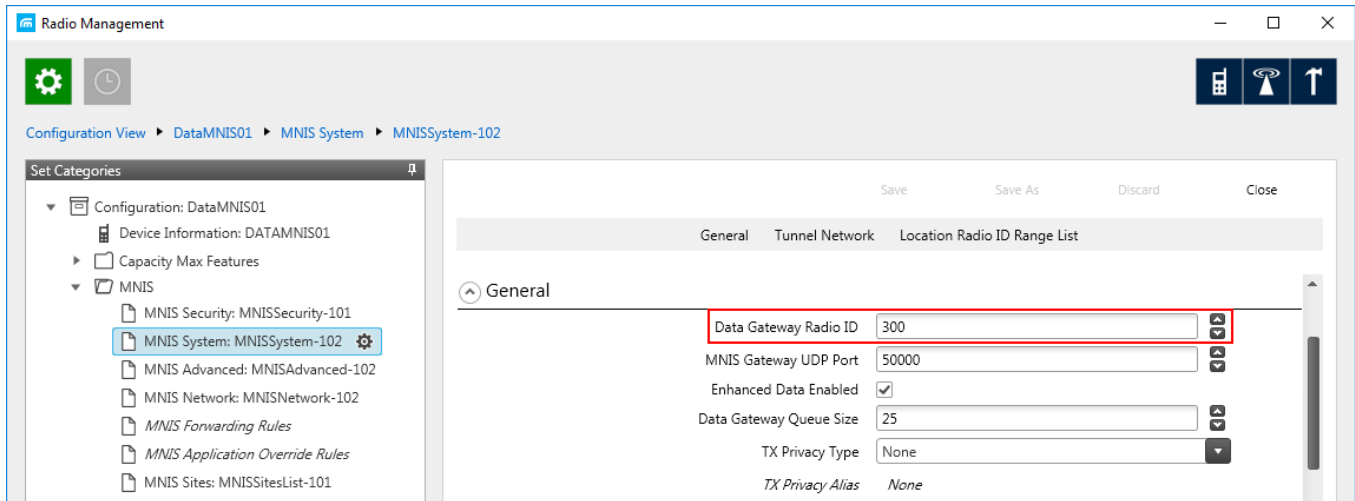
MNIS Control Interface: Use *localhost*, if *MOTOTRBO Network Interface Service Configuration Utility* is installed on the same computer as the radioserver. If *MOTOTRBO Network Interface Service Configuration Utility* and the radioserver are installed on different computers, enter the IP address of the computer 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).
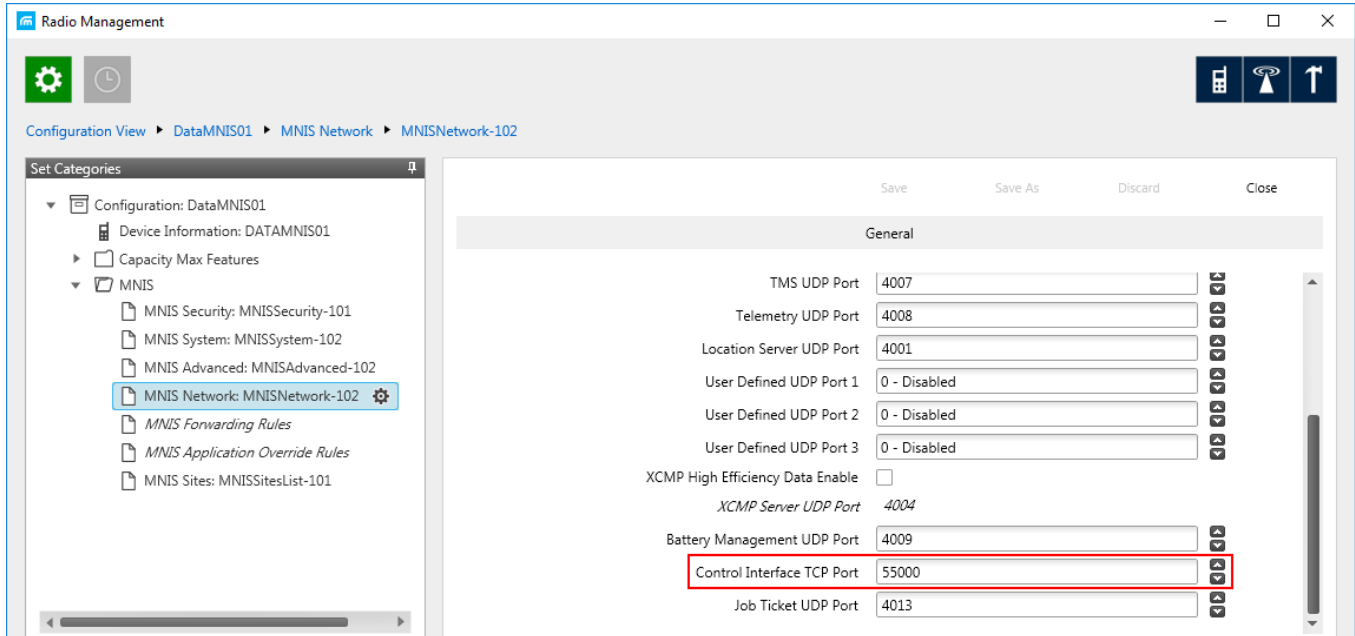
> **NOTE**
>
> To open the **MNIS** menu of the DataMNIS configuration in the *Radio Management* application, click **Action (⚙) → Manage → Configurations** or press Alt+C. In the open table, select the DataMNIS and click **Edit**. In the **Set Categories** pane that opened, click **Configuration: <DataMNIS name> → MNIS**.

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 Configuration Utility*. Verify **MNIS ID** matches the corresponding field in the *Radio Management* application (see the **MNIS System** settings in the **MNIS** menu of the DataMNIS 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 configuration, the **Location Server UDP Port** field, the **TMS UDP Port** field, the **Telemetry UDP Port** field in the **General** tab).
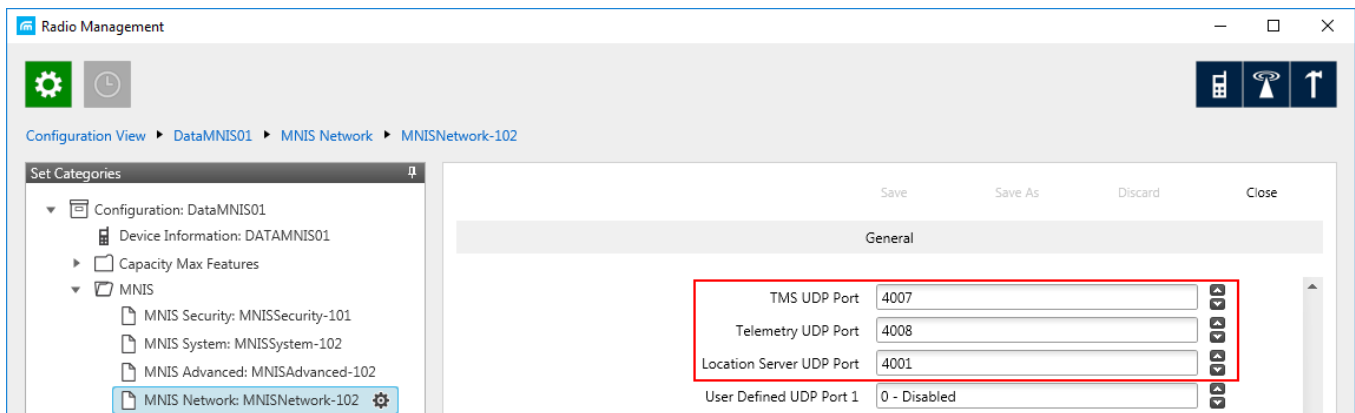
To set up MNIS Data Gateway settings in the *MOTOTRBO Network Interface Service Configuration Utility*, follow these steps:

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. In the open **Export GWCFGX** window, select the file and click **OK**.
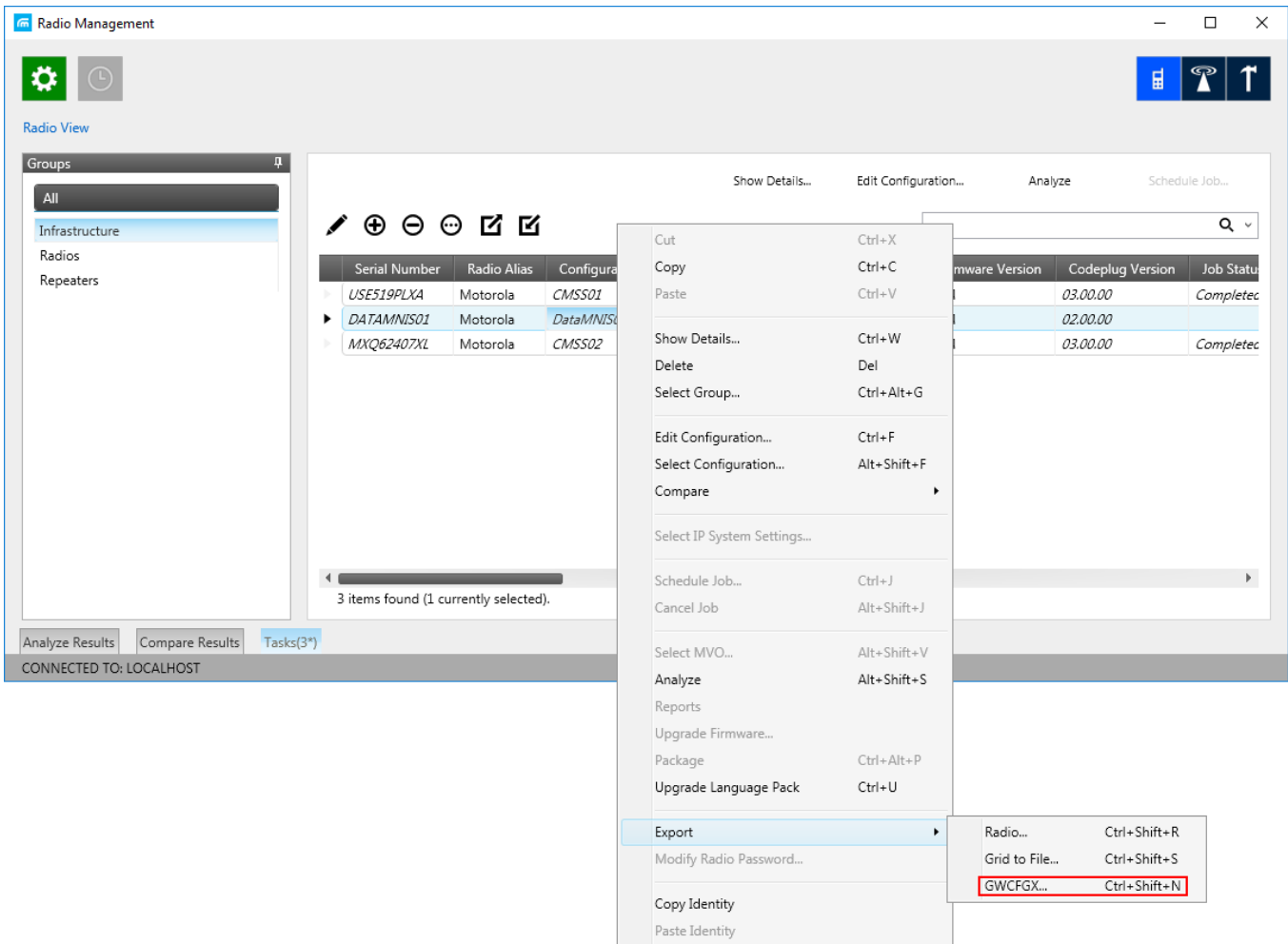
2. Transfer the saved GWCFGX file to your computer where the *MOTOTRBO Network Interface Service Configuration Utility* is installed, to the **Config** folder that is located on the local disk *C:/ProgramData/Motorola/Wireline Gateway*.

3. Launch the *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**.
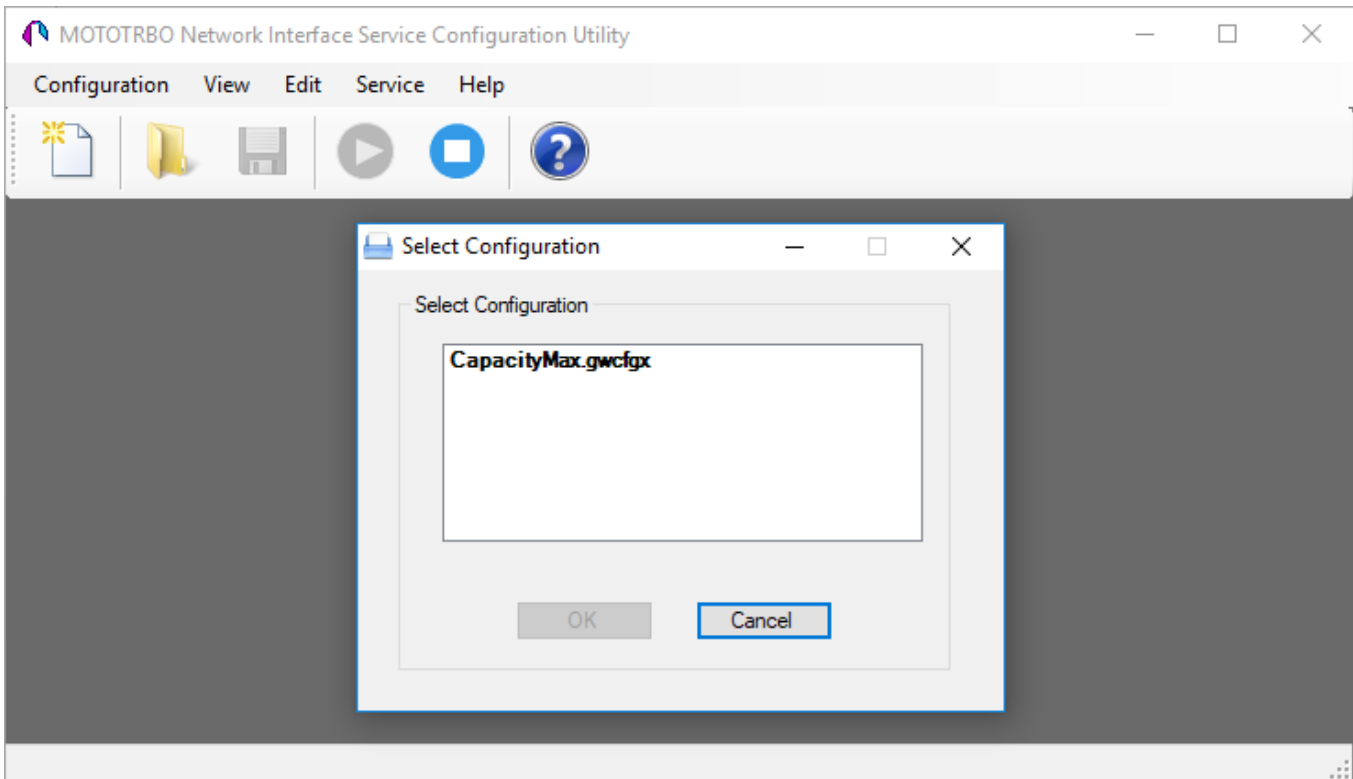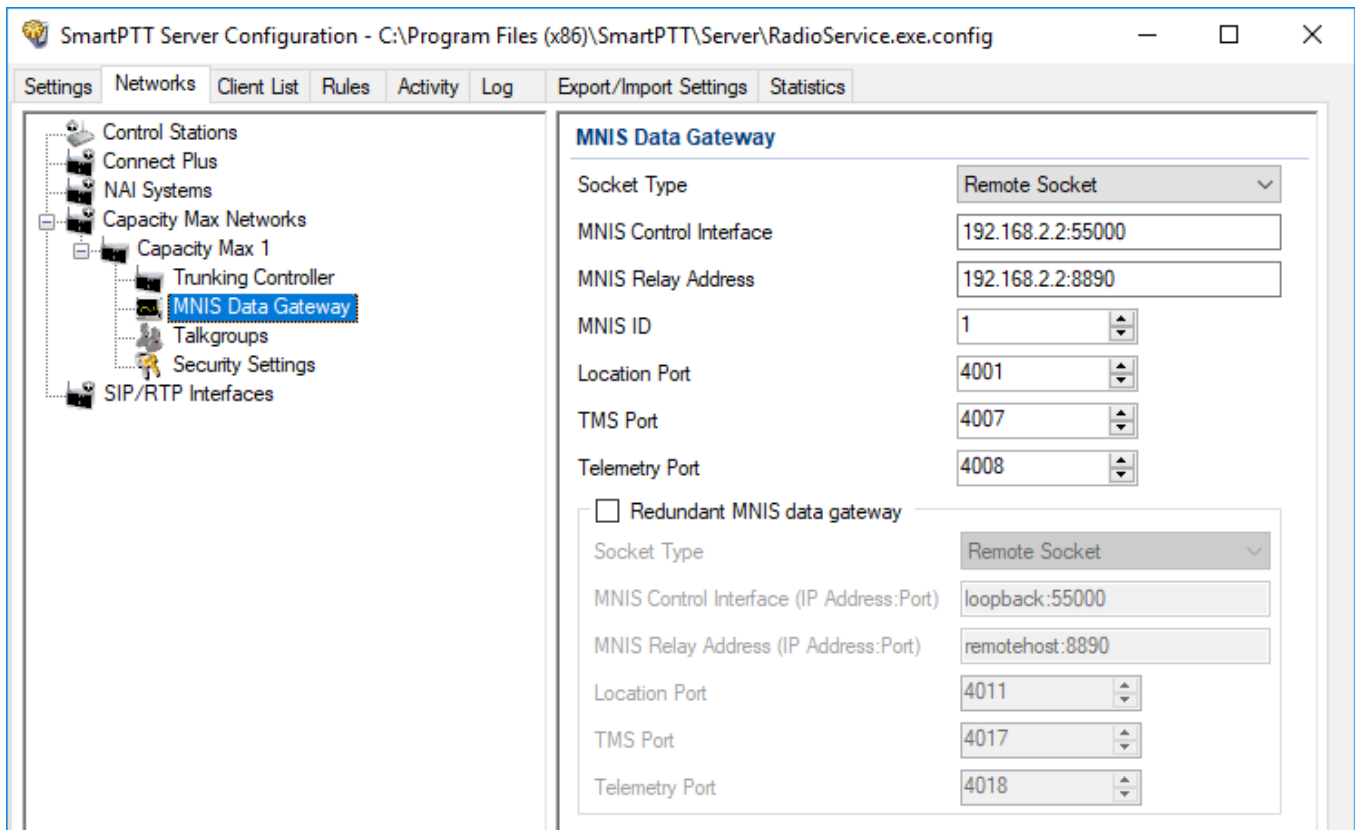

If *MOTOTRBO Network Interface Service Configuration Utility* and the SmartPTT Radioserver are running on different computers, or you configure several MNIS Data Gateways, follow these steps:

1. Install and run MNIS Data Gateway Relay on the computer where *MOTOTRBO Network Interface Service Configuration Utility* is running.

2. Run the MNIS Data Gateway Relay Configurator.

3. In the **MNIS interface** field enter the same address as it is in the **Tunnel IP Address** of MNIS.

4. In the **Server interface** field enter the same address as you did in the previous step.

5. In the **Port** type the available port of the computer.

6. Save changes and restart MNIS Data Gateway Relay.

7. In SmartPTT Radioserver Configurator double-click your network and click **MNIS Data Gateway**.

8. In the **Socket Type** field select *Remote Socket*.

9. In the **MNIS Control Interface** field, enter the IP address of the computer where MNIS service is running and the port from the **MNIS Control Interface TCP Port** field of the *MOTOTRBO Network Interface Service Configuration Utility*.

10. In the **MNIS Relay Address** field, enter the IP address of the computer where *MNIS Data Gateway Relay* service is running and the port from the **Port** field of *MNIS Data Gateway Relay*.

11. Configure other settings as describer previously.

12. At the bottom of the **SmartPTT Server Configuration** window, click **Save (🖫)** to save changes.

13. Click **Restart (🔲)** to restart SmartPTT Radioserver and apply changes.

8.4 MNIS VRC Gateway

Every Capacity Max network supports up to 15 MNIS VRC gateways. The first gateway is created always exists in the network, so you can add 14 gateways more.

> **IMPORTANT**
>
> To configure MNIS VRC gateway, install the corresponding license. For more information on how to install licenses, see Licenses.

The order of the gateways matters a lot. All newly created profiles and talkgroups for your Capacity Max network will be assigned for the first MNIS VRC Gateway in the list. Therefore, you should be careful when configure several MNIS VRC Gateways.
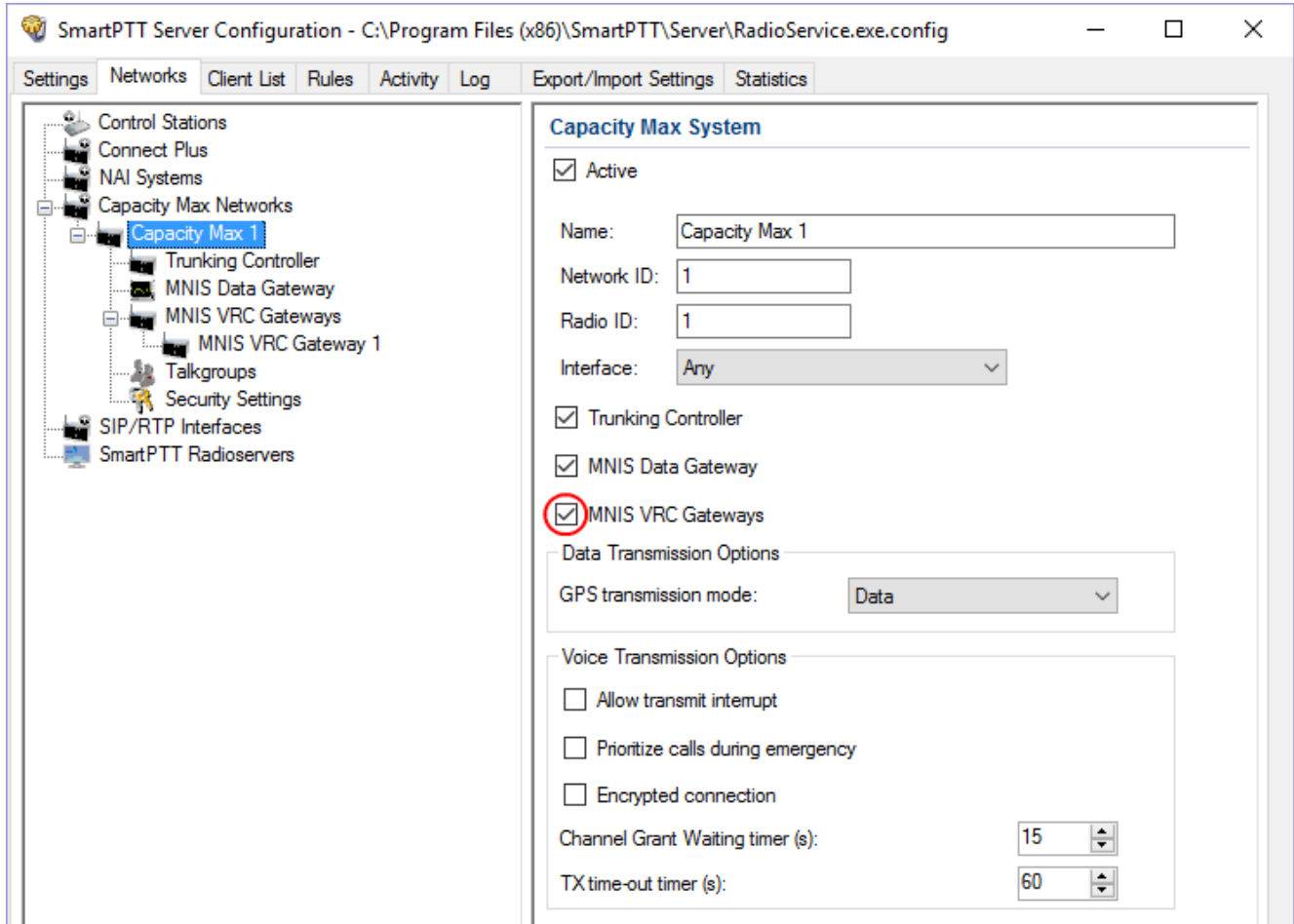
To configure MNIS VRC gateway, follow these steps:

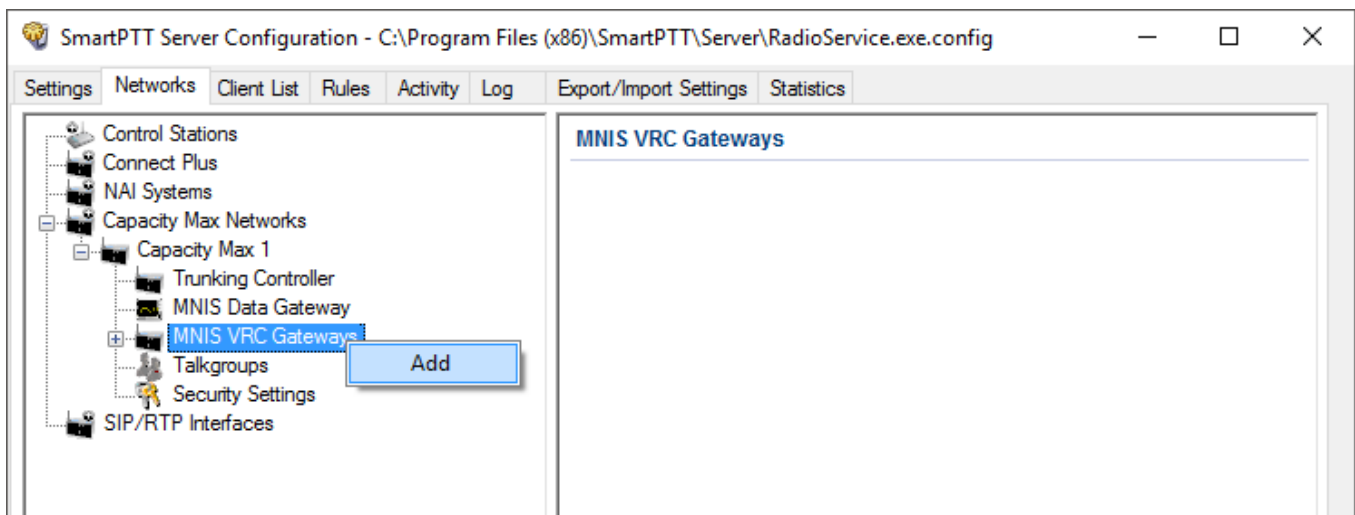1. Make sure that VRC Gateway is configured in the *Radio Management*.

> **NOTE**
>
> For more information on how to configure Radio Management application, see *Motorola Radio Management User Guide*.

2. In your Capacity Max network select **MNIS VRC Gateways** to show and allow to configure MNIS VRC Gateways.

3. To add a new MNIS VRC Gateway right-click **MNIS VRC Gateway** and click **Add**.
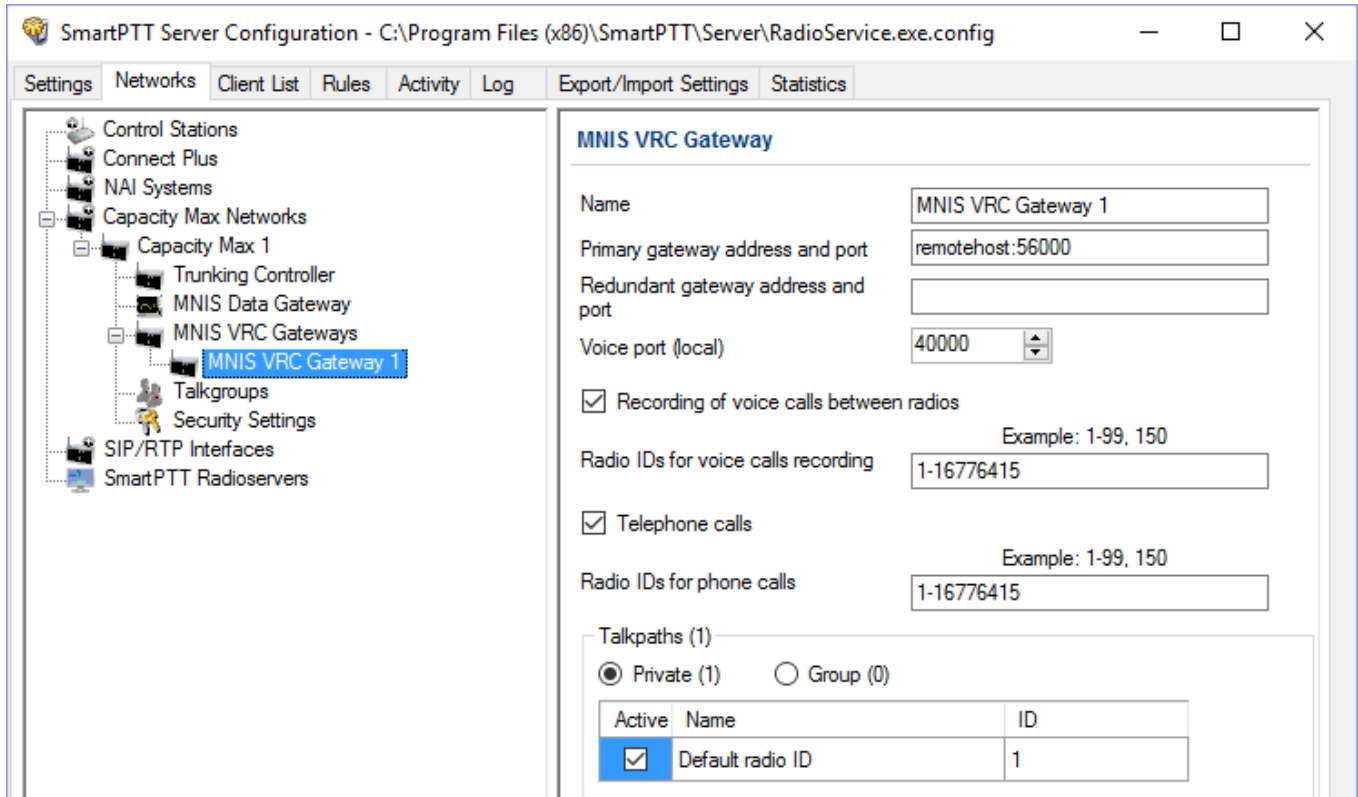

4. Select the newly created or existing gateway.

> **NOTE**
>
> By default, all new gateways obtain equal IP addresses and ports. When you select one of those, you will not be able to leave the menu until you make its IP address and port unique within the site.

5. Configure the gateway options.

Name: The name of the gateway in SmartPTT Radioserver Configurator. Rename your gateway if needed.

Primary gateway address and port: IP address from **VRC Gateway IP** and port from **Server TCP port** which were configured in your CMSS Network in *Radio Management*.

Redundant gateway address and port: IP address of **VRC Gateway IP** and port from **Server TPC port** of the additional CMS server you assign to be redundant. You can leave this field empty if you do not have redundant VRC gateway.

Voice port (local): The port at which SmartPTT Radioserver will expect the voice data.

Recording of voice calls between radios: Select this to activate voice recording feature, that allows the dispatcher to hear private calls made from radios to other radios, dispatchers or telephone subscribers.

Radio IDs for voice call recording: Enter radio IDs for which the recording should be active. Follow the example, to specify the IDs.

Phone calls: Select this if you want to allow telephone calls for this gateway.

Radio IDs for phone calls: Enter radio IDs for which phone calls should be available. Follow the examples, to specify the IDs.

**Talk paths:** You can reorganize the default gateway for radios and profiles here.

Private: Click this to view the radio profiles which assigned to the current gateway. Profiles can be assigned to the gateway (**Active** is selected), not assigned (**Active** is clear) and unavailable on it (**Active** is clear, profile name is discolored). If the profile is unavailable, it means that it is selected on the other gateway. By default all new profiles will be selected on the first gateway in the list and their ID will be the same as that of the first gateway in the list.

Group: Select this to view talkgroups created for the current site. For more information see Capacity Max Talkgroups.

# 8.5 Adding Console in Radio Management

Radio Management dispatch console is used for providing a dispatcher with an access to the Capacity Max network.

To add console in *Radio Management*, follow these steps:

1. Click **Actions (⚙)**, and select **Manage → Capacity Max System Server Data**.

2. Click **Add (⊕)**.

3. In the open **Add Device** window, from the **Device Type** list, select *Console* and click **OK**.
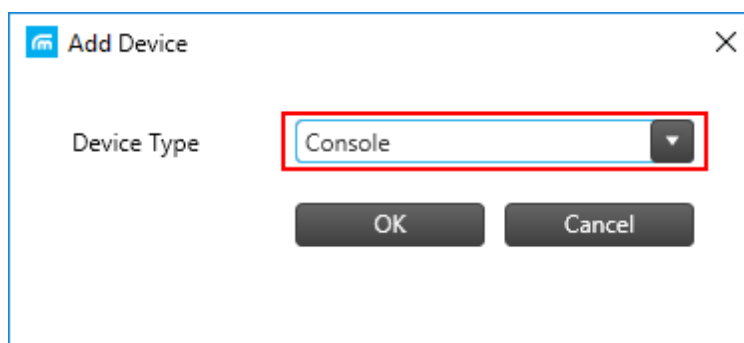
4. In the table, in the added console row, perform the following actions:

   a. In the **Device ID** column, enter radio ID for the console.

   b. In the **Allowed Sites** column, from the list select **Edit**.

      i. In the **Allowed Sites Lists** window, from the **Allowed Site List Name**, select the desired site for registering.

      ii. Click **Save**.
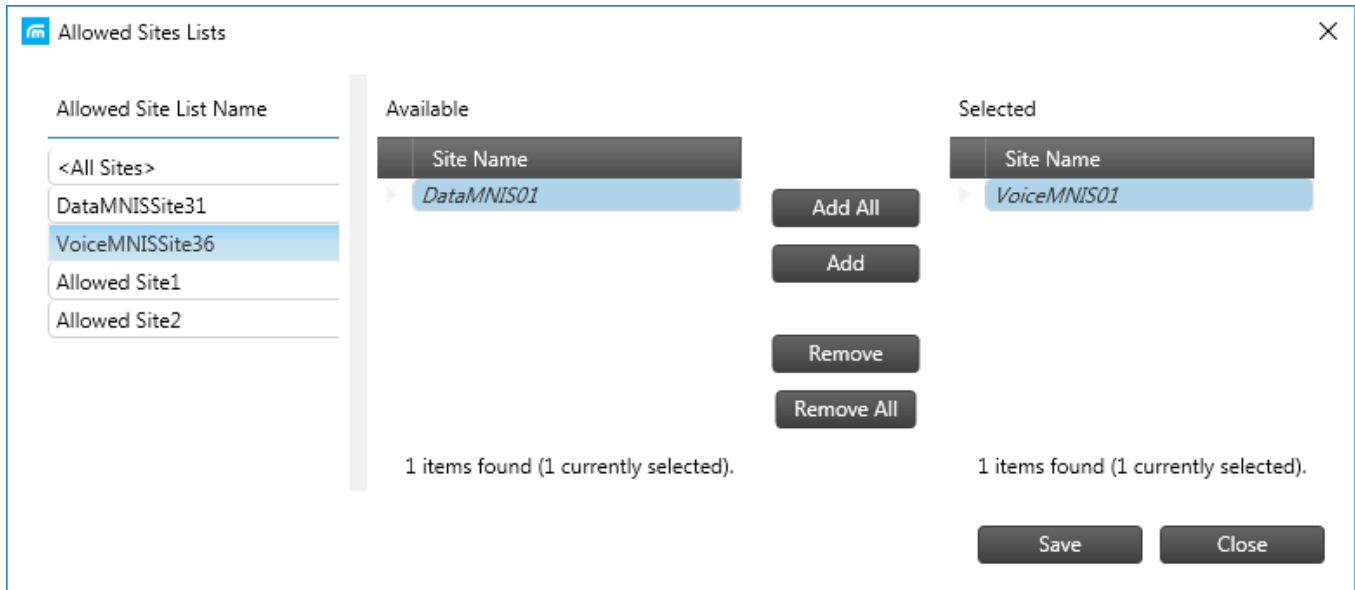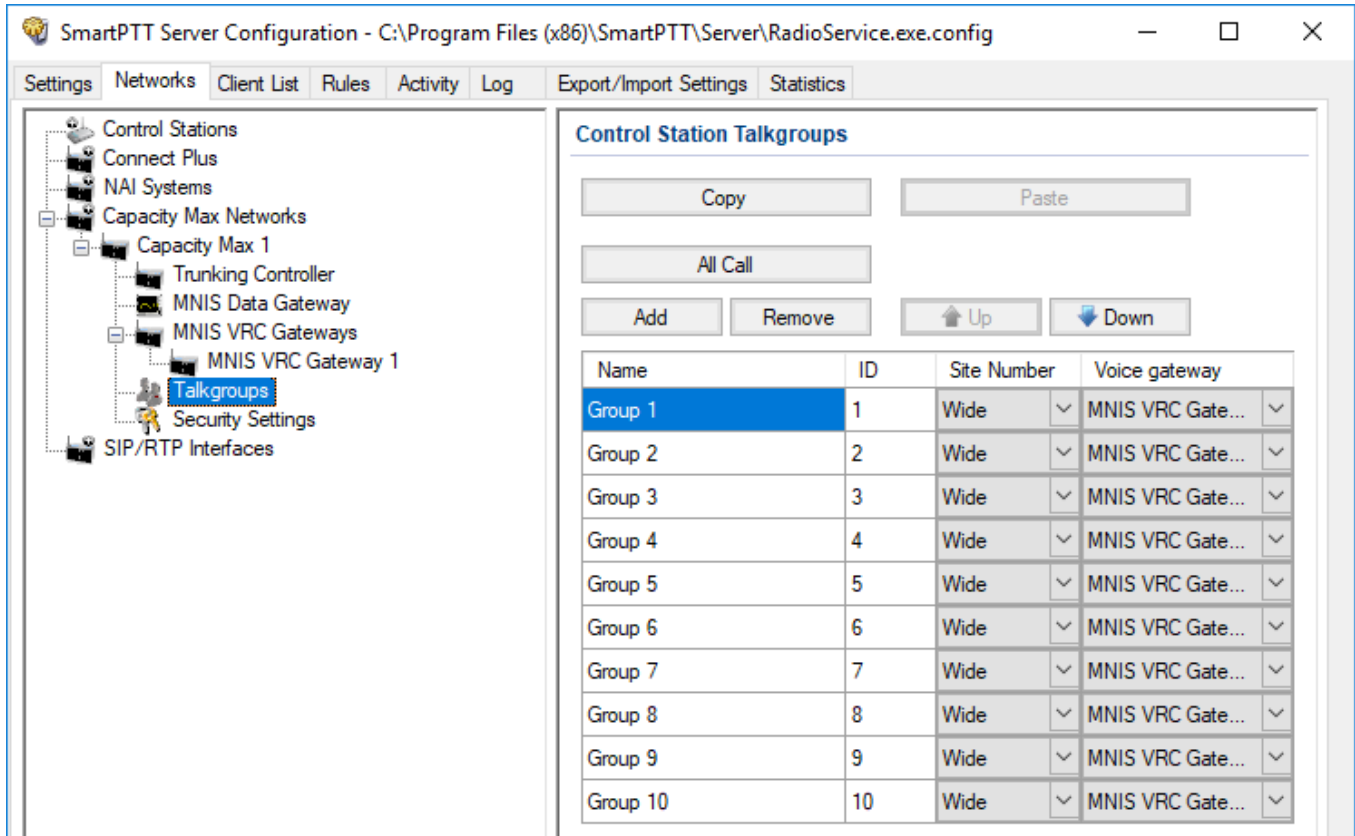

   c. In the **Telephone Gateway Site** column, from the list select the desired site for telephone recording.

   d. In the **Voice Recording Site** column, from the list select the desired site for voice recording.
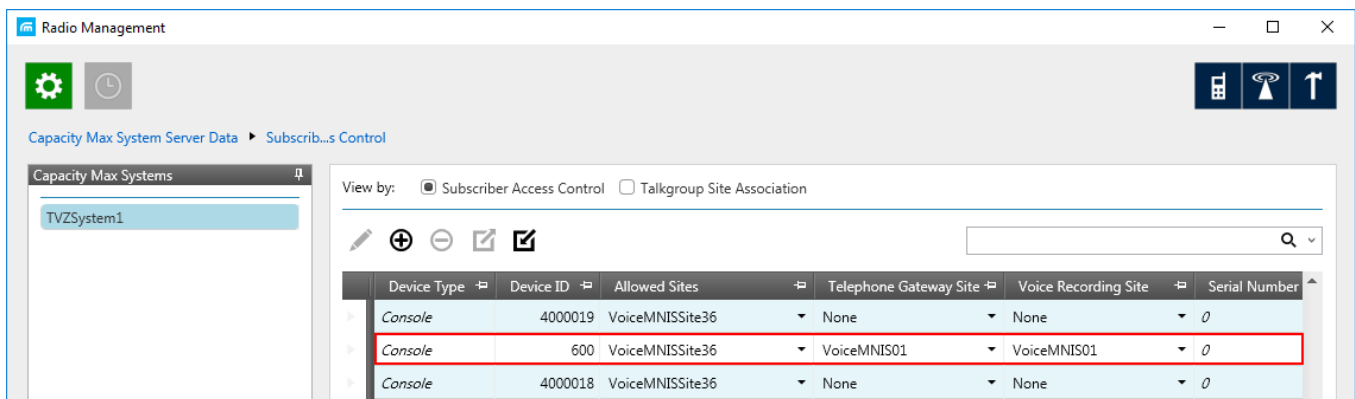
8.6 Talkgroups

To configure Capacity Max talkgroups, click **Talkgroups**. The **Control Station Talkgroups** window appears:

To add a talkgroup, click **Add**. To add an All Call, click **All Call**. The added talkgroups will also appear in the **Profiles** window. To change the order of groups in the list, use the **Up** and **Down** arrows. The order defined in the window will be used in *SmartPTT Dispatcher*. To copy added groups to the clipboard, click **Copy**. To paste copied groups from the clipboard, click **Paste**. To delete the selected talkgroup, click **Remove**.

Name: Talkgroup alias displayed by the control station.

ID: Talkgroup unique identifier used during communications. To be set in the range from 1 to 65535 for a talkgroup, and in the ranges from 1 to 16776415, from 16777056 to 16777183 or be equal to *16777214* for an All Call.

To edit the talkgroup name or ID, set the cursor on the corresponding field and make changes.

Site Number: Site number list allowed for transmitting. In the Capacity Max network the talkgroups can be only wide-area, while All Call can be wide-area or local.

> **NOTE**
>
> In the Capacity Max network you can add only wide-area talkgroups, so only the *Wide* value is available for groups in the **Site Number** field. In order to display wide area talkgroups in *SmartPTT Dispatcher*, add necessary talkgroups in *SmartPTT Radioserver Configurator*, define talkgroup identifiers that correspond to the identifiers of the wide-area talkgroups in the *Radio Management* settings. You can add a wide-area All Call and a local All Call, which is limited to one site. To add a wide-area All Call, which is available to all sites, click **All Call**. Verify that **Site Number** is set to *Wide*. To add an All Call limited to one site, click **All Call**, and in the **Site Number** field select the site number where the All Call will be heard. Please note, that you do not need any IDs for All Calls.

Voice gateway: List of available voice gateways. You can assign a certain voice gateway for each talkgroup.

> **NOTE**
>
> If there are some available voice gateways, all talkgroups use by default the first voice gateway in the list. If the talkgroup is not registered on any voice gateway, the **Voice gateway** field will be empty. If Voice transmission is not selected in the Capacity Max network settings, the **Voice gateway** column will be hidden.

You should create talkgroups in accordance with the settings in the Radio Management application (see the **Capacity Max Systems** settings, sorted by the **Talkgroup Site Association** value). For more information, see *Motorola Radio Management User Guide*.

8.7 Security Settings in Capacity Max

Capacity Max network supports two types of privacy mechanisms – Enhanced and Advanced Encryption Standard (AES).

The Enhanced Privacy utilizes Motorola proprietary algorithms and therefore is not interoperable with other vendor's privacy offerings. The Enhanced Privacy provides high level of protection by means of 40-bit key length and supports multiple keys in a radio.

The Advanced Encryption Standard (AES) is a specification for the encryption of electronic data established by the U.S. National Institute of Standards and Technology (NIST). The AES feature supports 256-bit key length, unlike Enhanced Privacy. Similar to Enhanced Privacy, the AES also supports multiple keys. For AES encryption a special license is required.

You can specify the encryption keys for incoming and outgoing traffic on the digital channel in the **Security Settings** window.
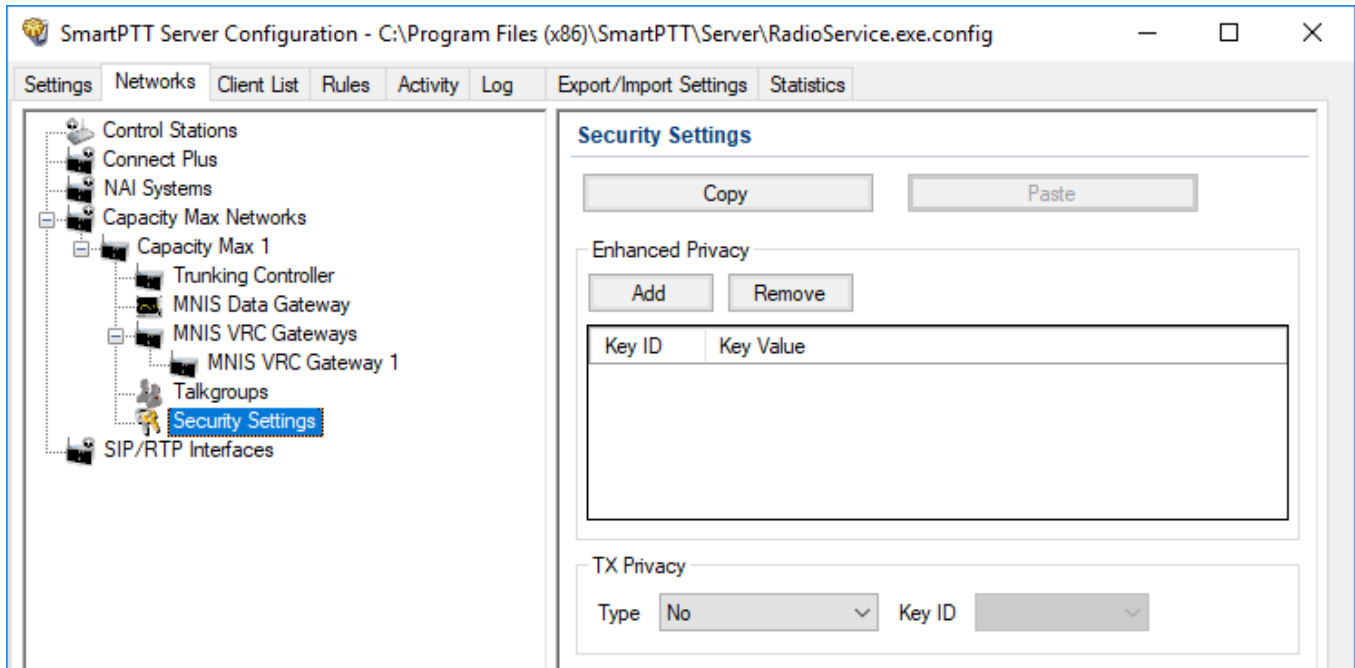

Copy: Copy encryption settings of the channel to the clipboard.

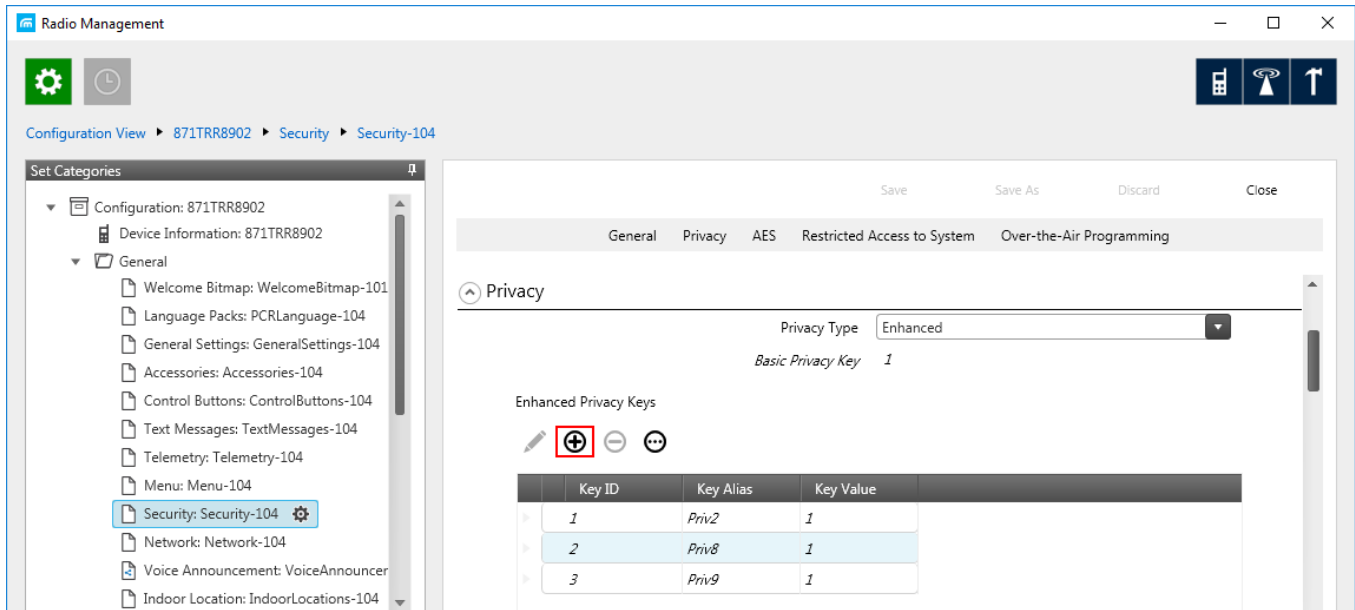**Paste:** Paste encryption settings of the channel from the clipboard.

Enhanced Privacy

To configure **Enhanced Privacy**, follow these steps:

1. Run the *Radio Management* application.

2. In the **Privacy Keys** tab of the Radio Management application add the enhanced privacy key. Enter its ID and value in the corresponding fields.
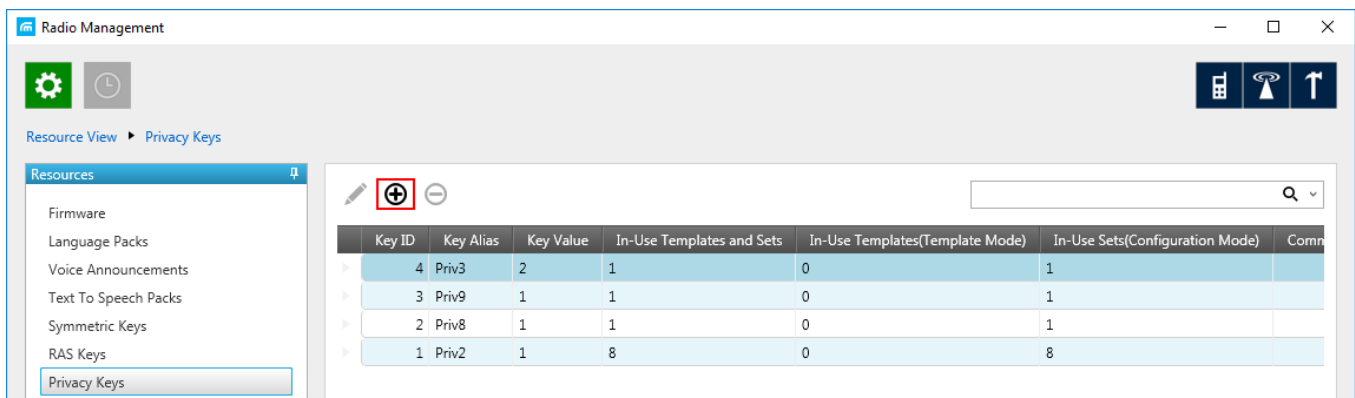
2. Open the configuration of the required radio station and in the **Set Categories** menu click **General → Security**. To make the added enhanced privacy keys available for selection, add them in the selection set. To do that, in the **Privacy** tab click the **Add**.

3. In the **Add Keys** window, select the required keys, which you want to be available for selection in the **Privacy Alias** field when specifying the enhanced key on the channel and click **OK**.
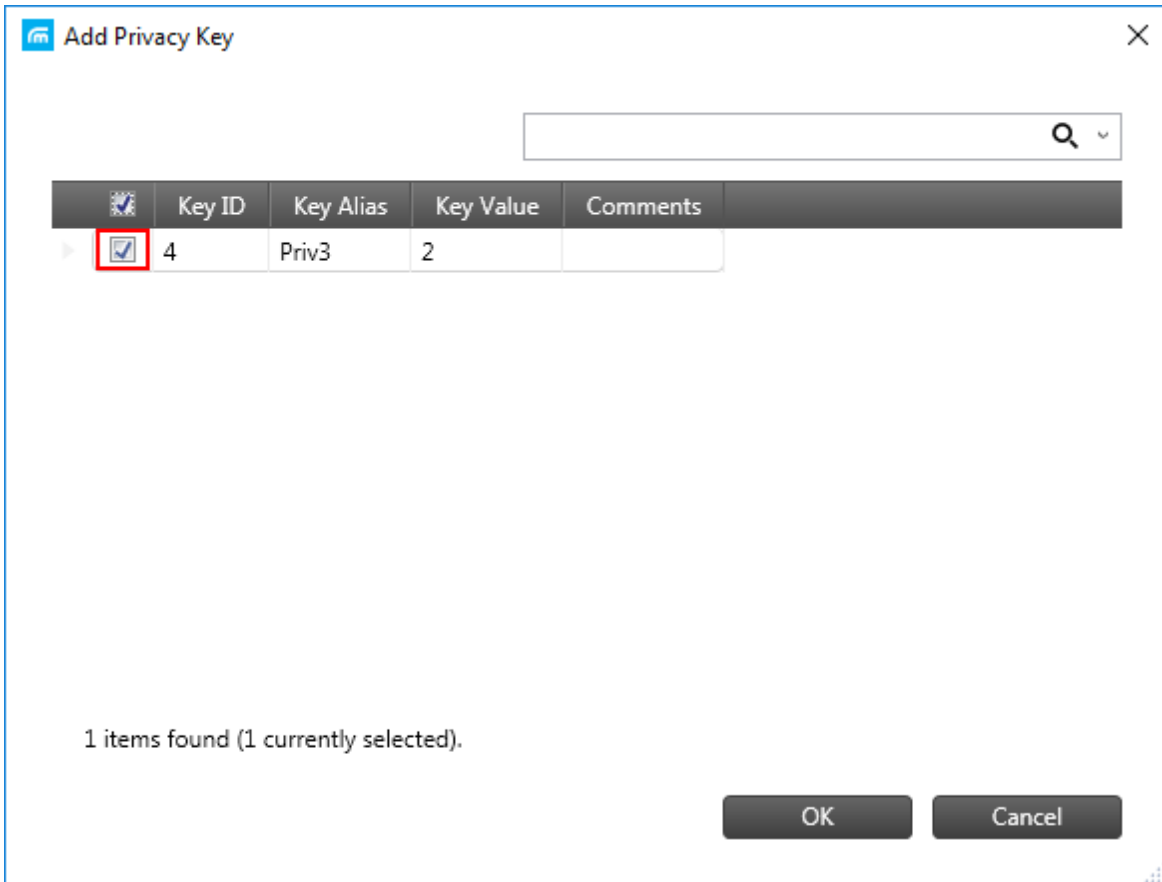

4. In the **Security** window of the repeater settings in *MOTOTRBO CPS* in the **Privacy Type** field select **Enhanced**.
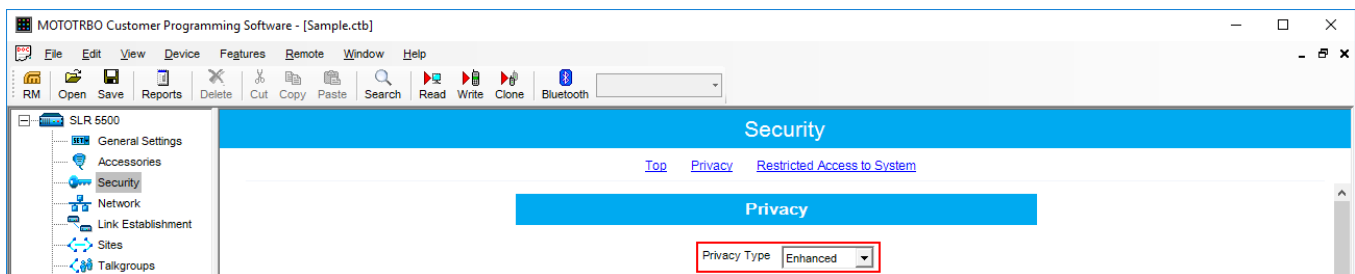
5. In the **Security** window of *MOTOTRBO Network Interface Service Configuration Utility* in the **Enhanced** field add the enhanced privacy key. Enter its ID and value in the corresponding fields.
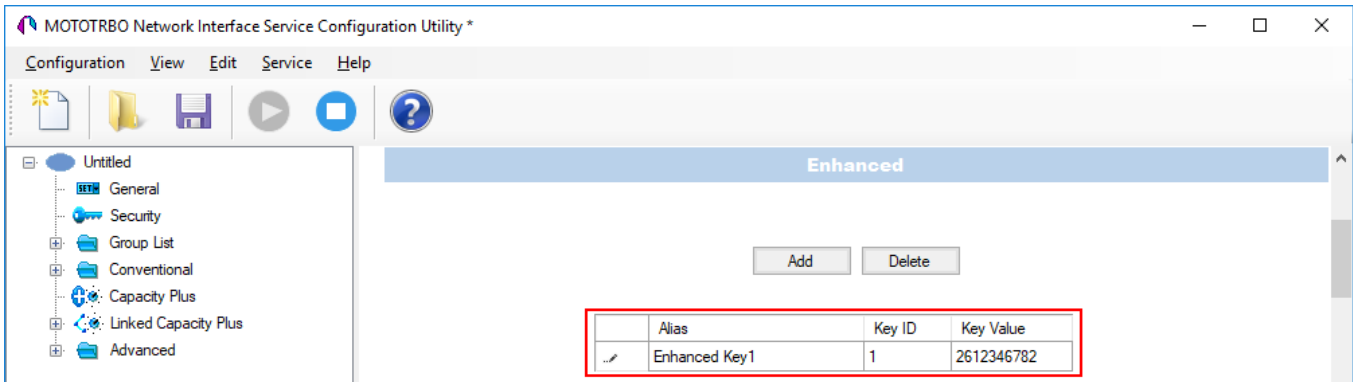
6. In the **Security Settings** window of SmartPTT Radioserver Configurator add an enhanced privacy key for incoming traffic. Enter its ID and value in the corresponding fields.
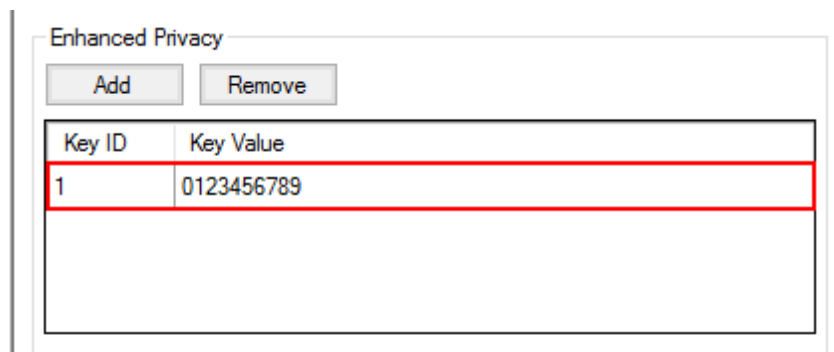

NOTE

Key ID and Key Value must match the values set in the radio settings in the *Radio Management* program and *MOTOTRBO Network Interface Service Configuration Utility*. If the values in the Key ID fields are the same, but the values in the Key Value fields do not match, the receiving side hears only a distorted voice. If the key identifier of the transmitting side does not coincide with one of the key identifiers in the list of the receiving side, then transfer to the receiving party will not be heard.

7. At the bottom of the **SmartPTT Server Configuration** window, click **Save (** 🖫 **)** to save changes.

8. Click **Restart (** ▣▷ **)** to restart SmartPTT Radioserver and apply changes.

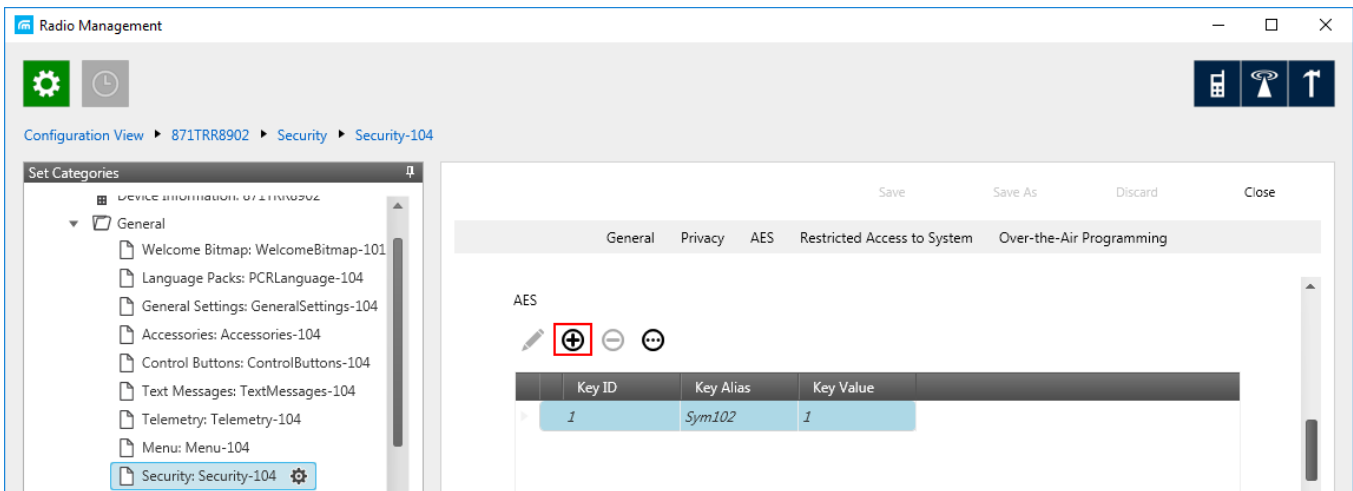**AES Privacy**

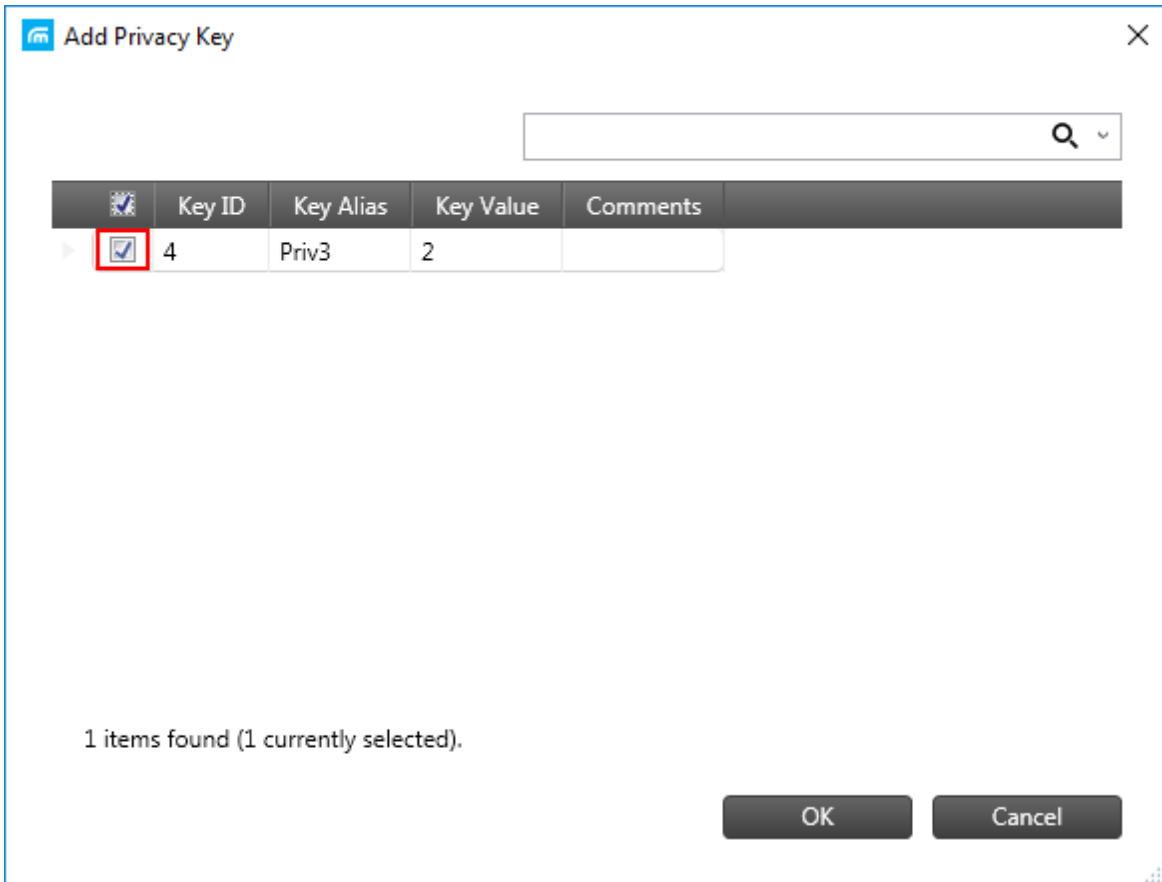To configure the **AES** privacy, follow these steps:

1. Run the *Radio Management* application.

2. In the **Symmetric Keys** tab of the *Radio Management* application add the AES privacy key. Enter its ID and value in the corresponding fields.
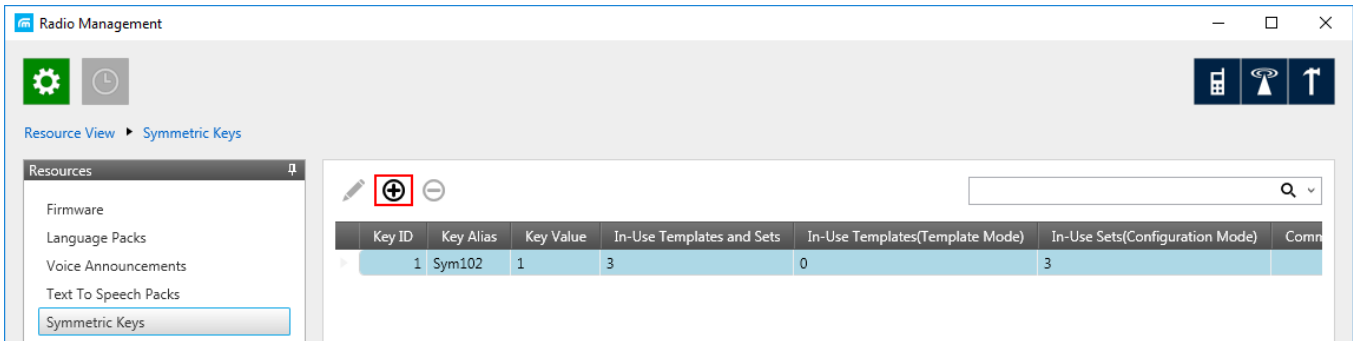

2. Open the configuration of the required radio station and in the **Set Categories** menu click **General → Security**. To make the added AES privacy keys available for selection, add them in the selection set. To do that, in the **AES** field, click **Add**.

3. At that the **Add Keys** window appears: Select the required keys, which you want to be available for selection in the **AES Alias** field when specifying the AES privacy key on the channel and click **OK**.


4. In the **Security** window of the repeater settings in *MOTOTRBO CPS* in the **Privacy Type** field select **Enhanced**.
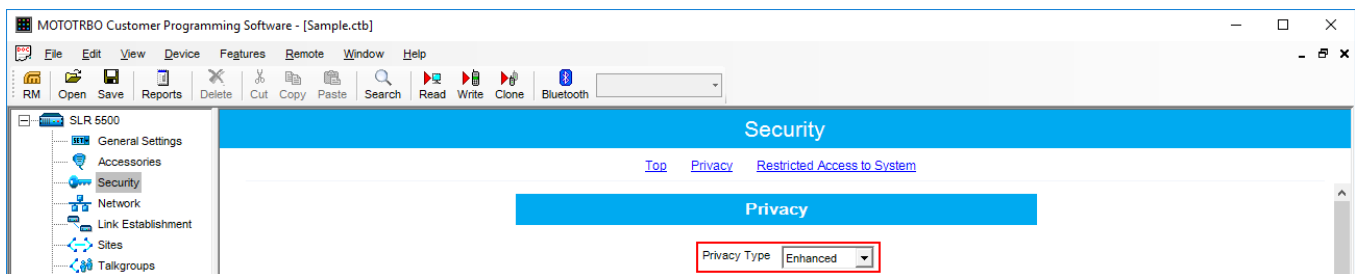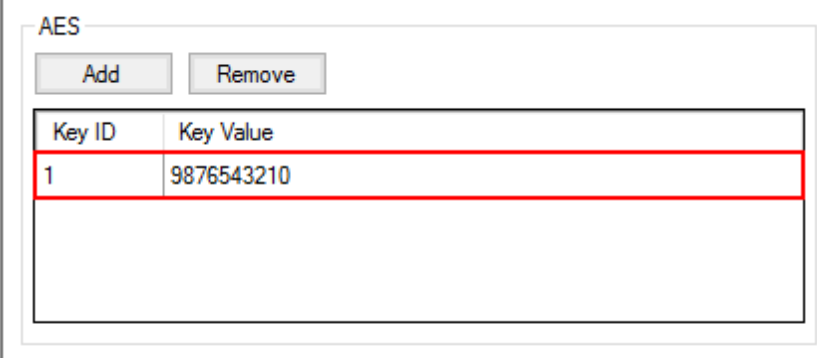
5. In the **Security** window of MNIS in the **Symmetric Keys** area, add the AES symmetric privacy key. Enter its ID and value in the corresponding fields.
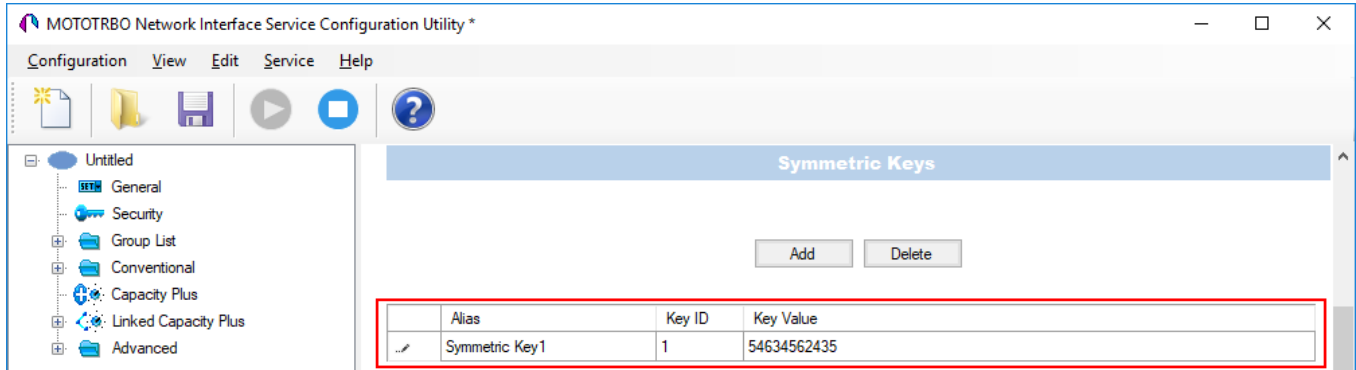
6. In the radio settings in the *Radio Management* application to enable the AES encryption mode on the required channel, clear the **Privacy** check box and in the **AES Alias** field select the **AES privacy key**.
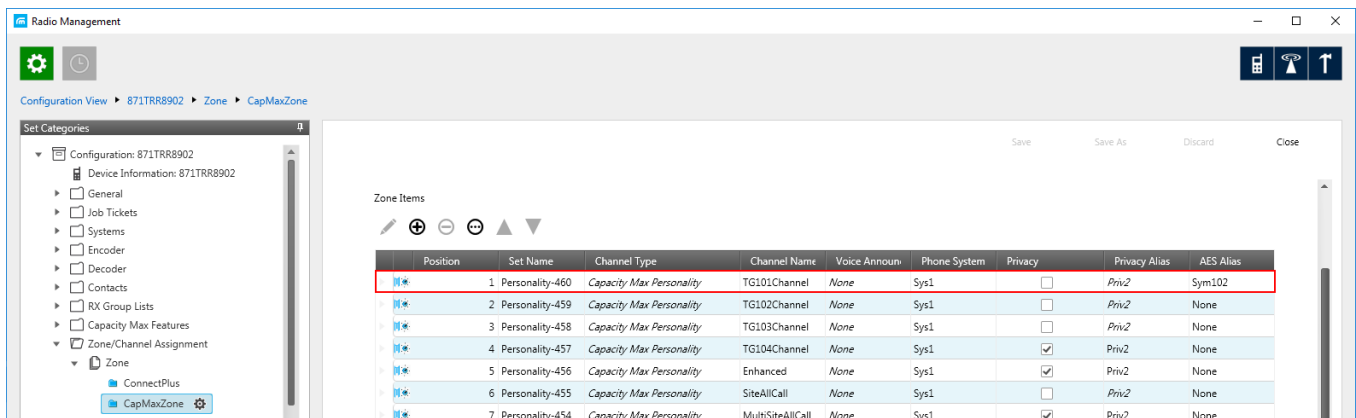
7. In the **Security Settings** window of *SmartPTT Radioserver Configurator* add an AES privacy key for incoming traffic. Enter its ID and value in the corresponding fields.

NOTE

Key ID and Key Value must match the values set in the radio settings in the Radio Management program and in MOTOTRBO Network Interface Service Configuration Utility. If the values in the Key ID fields are the same, but the values in the Key Value fields do not match, the receiving side hears only a distorted voice. If the key identifier of the transmitting side does not coincide with one of the key identifiers in the list of the receiving side, then transfer to the receiving party will not be heard.
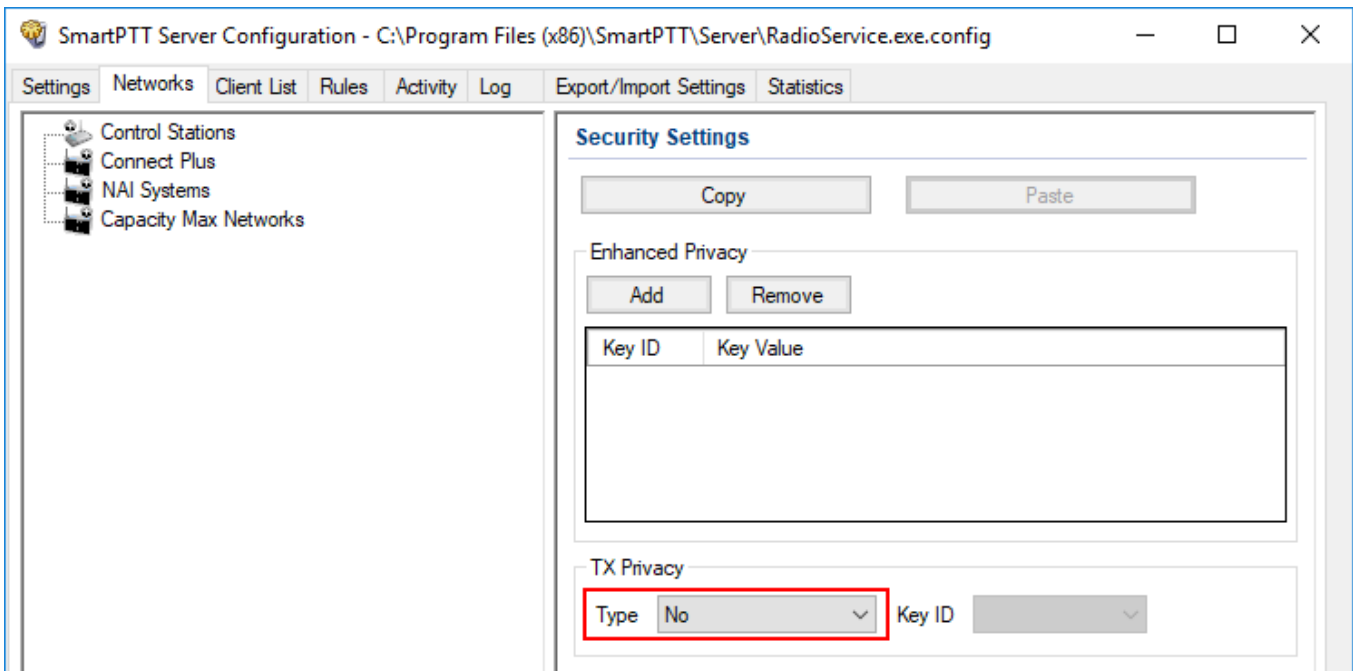
8. At the bottom of the **SmartPTT Server Configuration** window, click **Save ( )** to save changes.

9. Click **Restart ( )** to restart SmartPTT Radioserver and apply changes.

TX Privacy

TX Privacy is used for selecting an encryption mode for outgoing traffic on the side of *SmartPTT Dispatcher*.

To configure the TX Privacy for a Capacity Max system, follow these steps:

1. In the **TX Privacy** area, from the **Type** list select the desired encryption type:

- Select *Enhanced* if you want to use enhanced encryption for outgoing traffic from the radioserver. Use the Key ID you specified in the **Enhanced Privacy** area.

- *AES license is required:* Select *AES (Symmetric Key)* if you want to use AES (*Symmetric Key*) encryption for outgoing traffic from the radioserver. Use the Key ID you specified in the **AES** area.

NOTE

If from the **Type** field *No* is selected and you have AES encryption for incoming traffic configured, AES (Symmetric Key) is used for incoming traffic by default.

2. At the bottom of the **SmartPTT Server Configuration** window, click **Save (⊞)** to save changes.

3. Click **Restart (⏩)** to restart SmartPTT Radioserver and apply changes.