Capacity Plus

Configuration Guide

Version 8.3

elcomplus

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1 Introduction

SmartPTT is a software package designed to manage communication between linear-extended and geographically-distributed objects where it is necessary to facilitate voice and data transmission and dispatching of remote radio network control stations.

SmartPTT Enterprise allows users to connect to the Capacity Plus network repeaters directly over IP. This approach reduces the amount of the MOTOTRBO equipment used in the system (radios functioning as control stations).

The following picture displays the scheme of the direct connection between SmartPTT radioserver and Capacity Plus radio network repeaters (Fig.1).

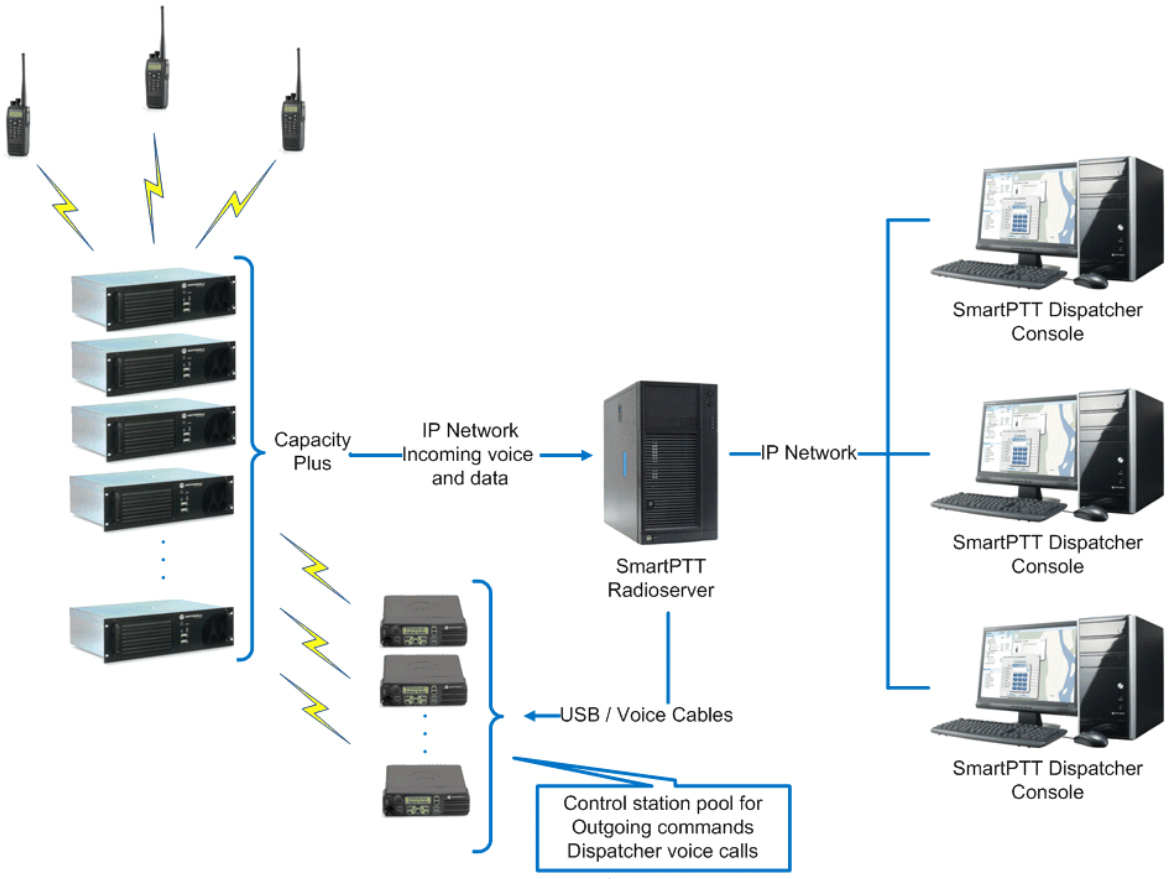

Fig. 1 - Direct connection to the Capacity Plus radio network

Here, SmartPTT Radioserver connects directly over IP to the Master repeater of the Capacity Plus network to receive incoming voice and data traffic. To organize outgoing voice and data traffic, control stations (MOTOTRBO

digital mobile radios) are connected to the SmartPTT radioserver via USB and audio cables. The audio cable is used only for control stations that provide outgoing voice calls.

This guide describes how to configure the following system components to implement dispatch control system over Capacity Plus radio network:

- Repeaters
- Control stations and subscriber radios
- SmartPTT radioserver

In this document we presume that the system is built based on the following hardware:

- Three MOTOTRBO DR 3000 repeaters – Master (Trunk), Slave (Trunk), Slave (Data Revert)
- Two TX control stations (Group1, Group2)
- One subscriber radio
- SmartPTT Dispatcher
- SmartPTT radioserver with two sound cards

2 Brief Information on Use of Control Stations

- There are 2 roles performed by control stations: data control stations and voice control stations. A single control station can play both roles or be dedicated to data or voice only.
- Neither data nor voice control stations are displayed in SmartPTT Dispatcher subscriber tree, but automatically controlled by the radioserver.
- Data control station is used for data transmission (ARS request, GPS request, telemetry request, Radio Check, Call Alert, Radio “Kill” command, outgoing text messages). Dedicated data control station doesn’t require sound device and can be connected via USB only.
- To dedicate a control station to data transmission only, remove the **Active** checkbox at the **Sound** section of the **TX Radio** folder in SmartPTT Radioserver Configurator **Settings** tab.
- You can use multiple data control stations to balance workload depending on the system capacity. All data control stations must have the same **Radio ID** equal to the **ID** of the virtual Capacity Plus control station specified in SmartPTT Radioserver Configurator.
- Voice control station must be connected to the radioserver by means of USB and audio cables.
- There are 2 ways how to set **Radio ID** on voice control station:
    1. To set **Radio ID** of the voice control station equal to **ID** of the virtual Capacity Plus control station specified in SmartPTT Radioserver Configurator. In this case all voice control stations will belong to a single pool. The radioserver will automatically select the available free control station to make dispatcher voice call.
    2. To set unique **Radio IDs** on all voice control stations. This can be useful if you need to assign a dedicated voice control station to a specific dispatcher. Use **Profiles** in SmartPTT Radioserver Configurator to set up dispatcher profiles to have a dedicated voice control station. Use the radioserver settings in the dispatcher console to assign the profile to the dispatcher.
- For dispatchers located within the Capacity Plus radio coverage it is recommended to use portable radios, not mobile radios, to make outgoing voice calls to reduce the amount of radios connected to the radioserver. Voice control stations must be used to make outgoing voice calls from the dispatcher console located outside the Capacity Plus radio coverage.
- Voice call control station must be programmed with the channels for each talk group. So, the amount of

channels programmed for voice control station must be equal to the amount of used talk groups. To assign the channels to groups use **Groups** / **Channels** in **TX Station** settings in SmartPTT Radioserver Configurator.

3 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 in the tool bar (Fig.2).

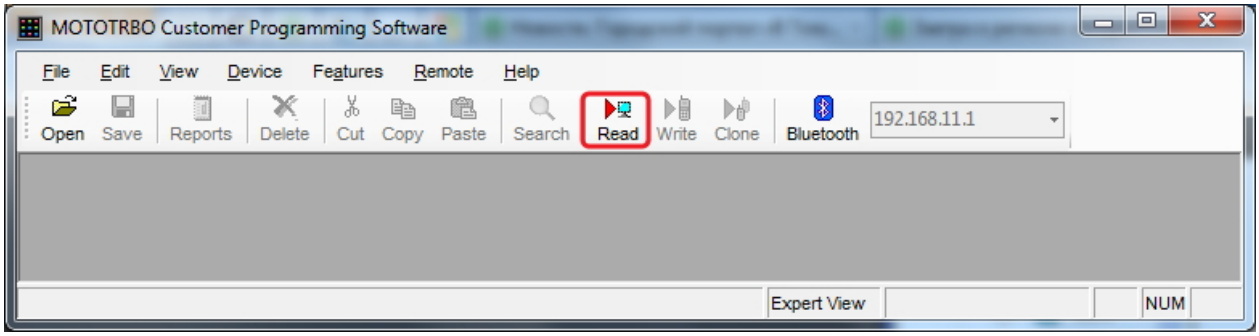

Fig. 2 - Reading device settings in CPS

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

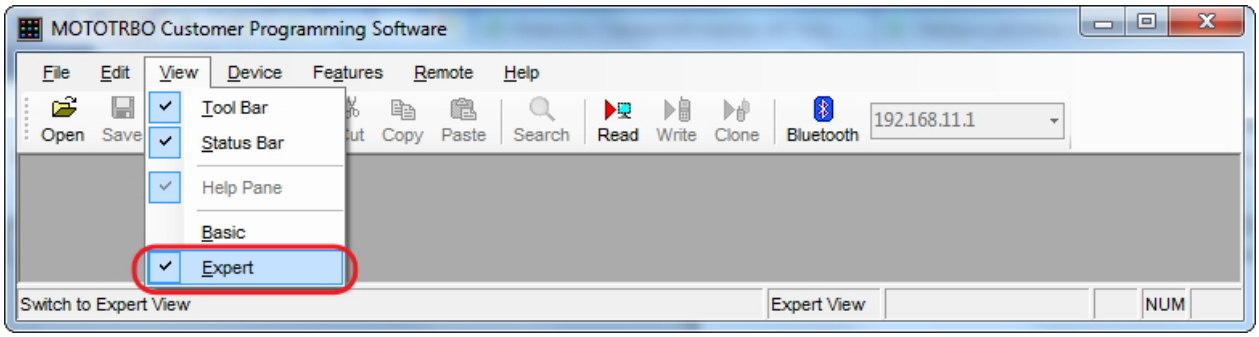

Fig. 3 - Selecting Expert View in CPS

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

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

Fig. 4 - Checking firmware version

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

3.1 Programming Repeter

3.1.1 Master Repeater Settings

1. In the **Channels** tab create **Capacity Plus Voice Channel** (*Master_Trunk*).
2. Set the **Slot 1 Channel ID** equal to *1* (Fig.5).

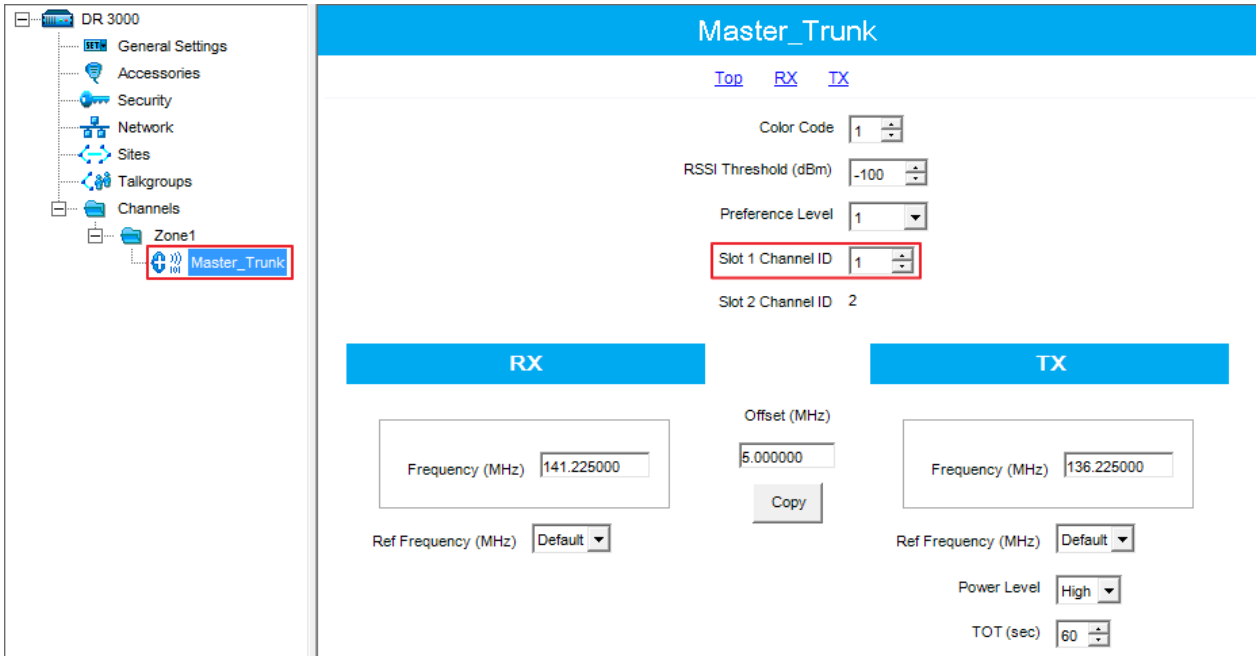

Fig. 5 - Setting Slot 1 Channel ID for Master repeater

3. In the **Network** tab select *Master* in the **Link Type** field.

4. Set the repeater and gateway IP addresses, gateway network mask, and UDP port (Fig.6).

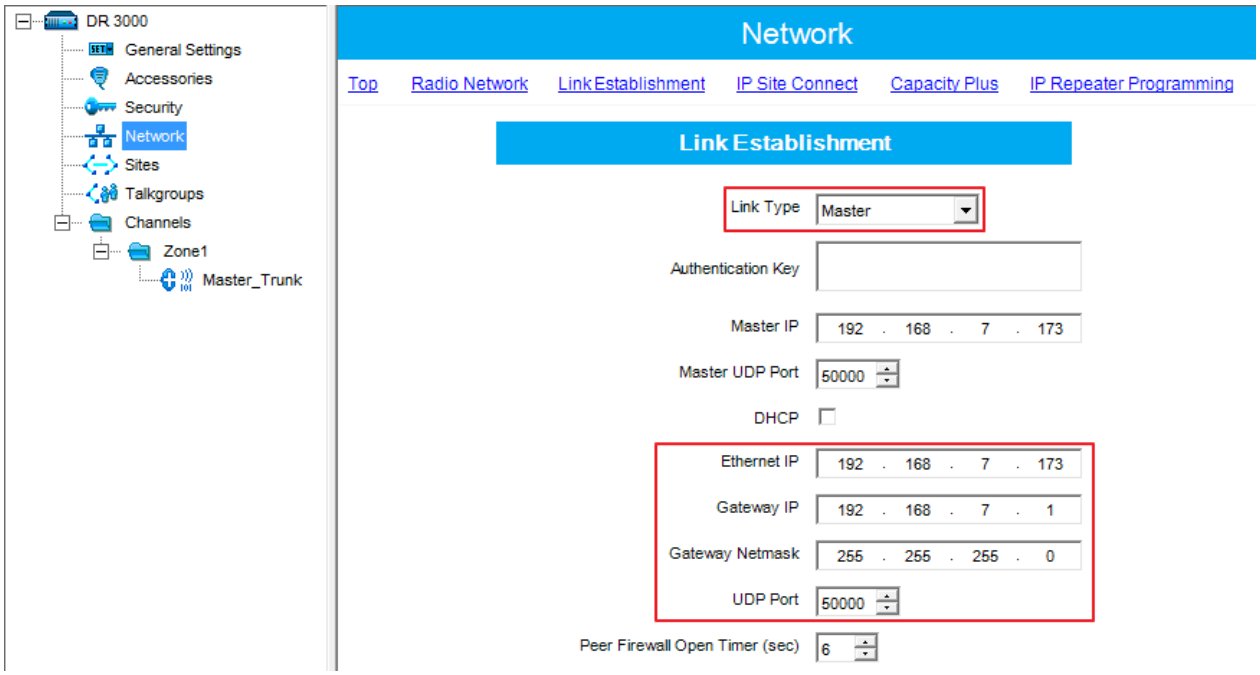

Fig. 6 - Setting Network parameters for Master repeater

3.1.2 Slave Repeater Settings for Voice Transmission (Trunk)

1. In the **Channels** tab create **Capacity Plus Voice Channel** (*Slave_Trunk*).
2. Set the **Slot 1 Channel ID** equal to *3* (Fig.7).

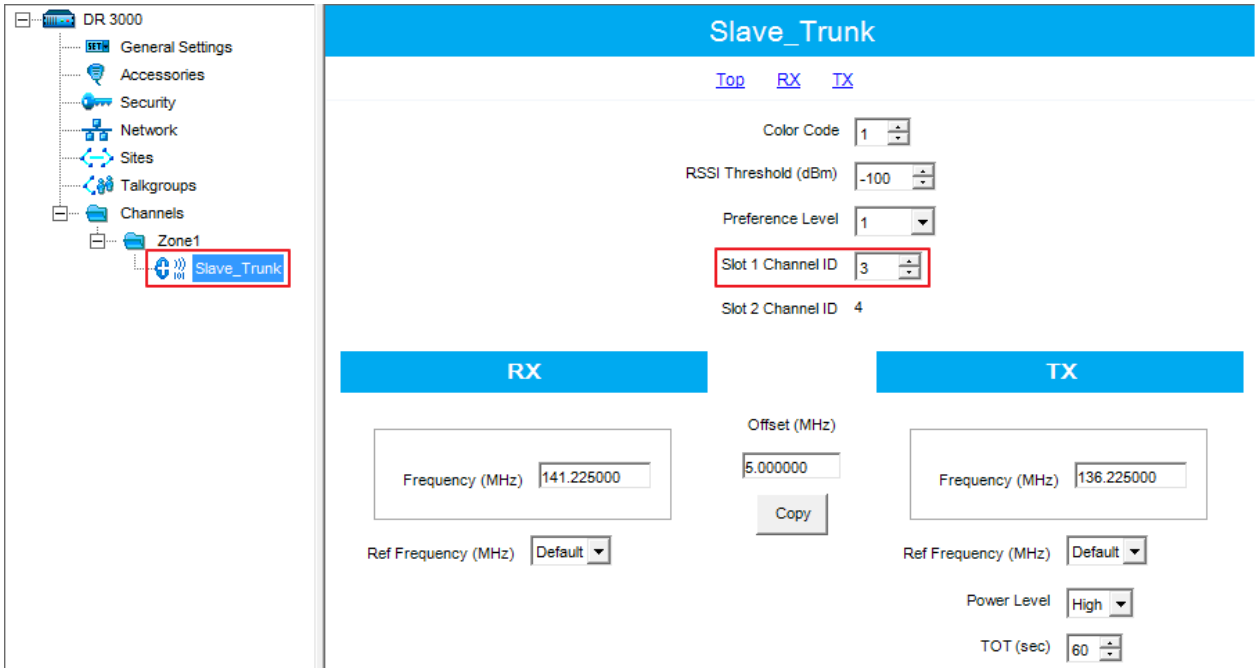

Fig. 7 - Setting Slot 1 Channel ID for Slave repeater

3. In the **Network** tab select *Peer* in the **Link Type** field (Fig.8).
4. Enter **Master IP** and **UDP port** (Fig.8).
5. Set **Ethernet IP**, **Gateway IP** and **Gateway Netmask** (Fig.8).

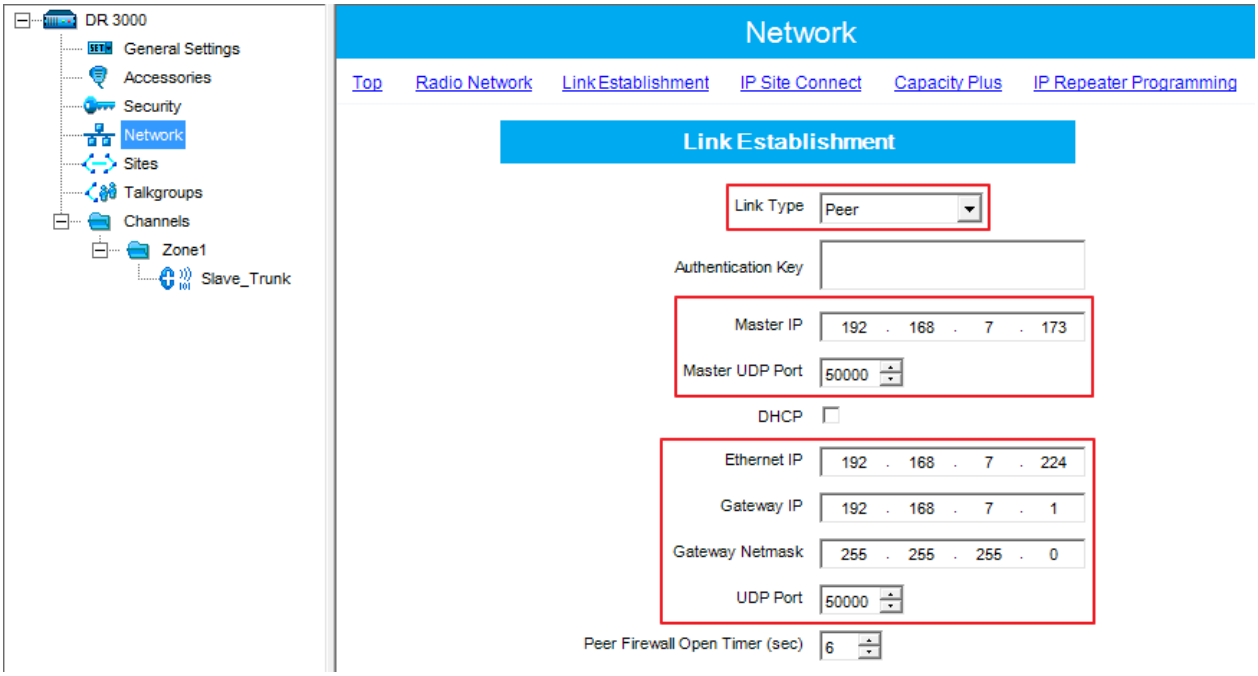

Fig. 8 - Setting Network parameters for Slave repeater

3.1.3 Slave Repeater Settings for Data Transmission (Trunk)

1. In the **Channels** tab create **Capacity Plus Data Channel** (*Slave_DataRevert*) (Fig.9).

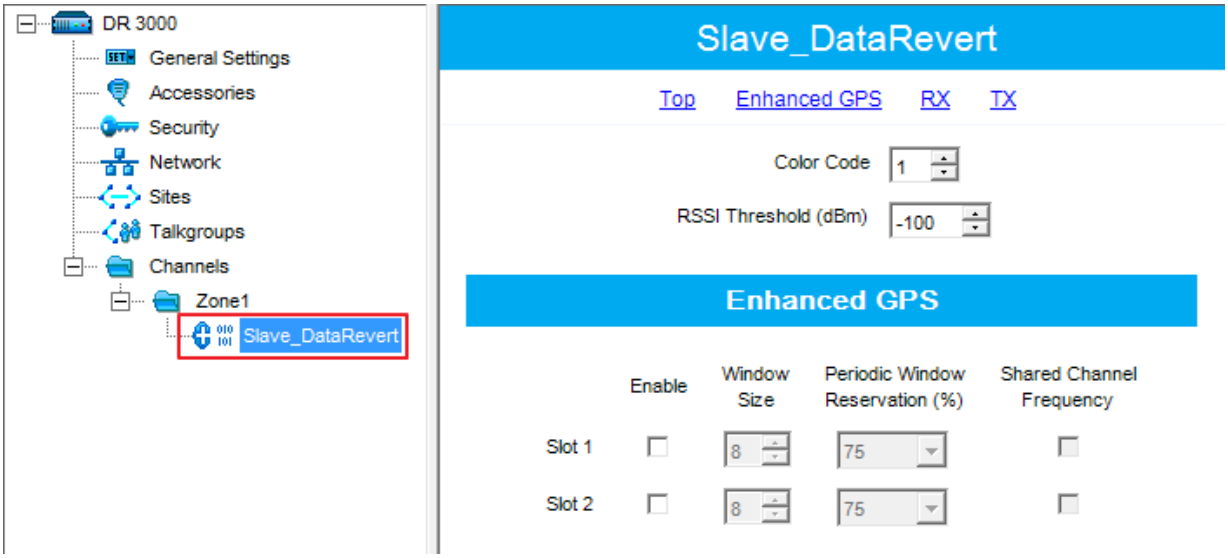

Fig. 9 - Creating a channel

2. Select *Peer* in the **Link Type** field in the **Network** tab (Fig.10).

3. Enter **Master IP** and **UDP port** (Fig.10).
4. Set **Ethernet IP**, **Gateway IP** and **Gateway Netmask** (Fig.10).

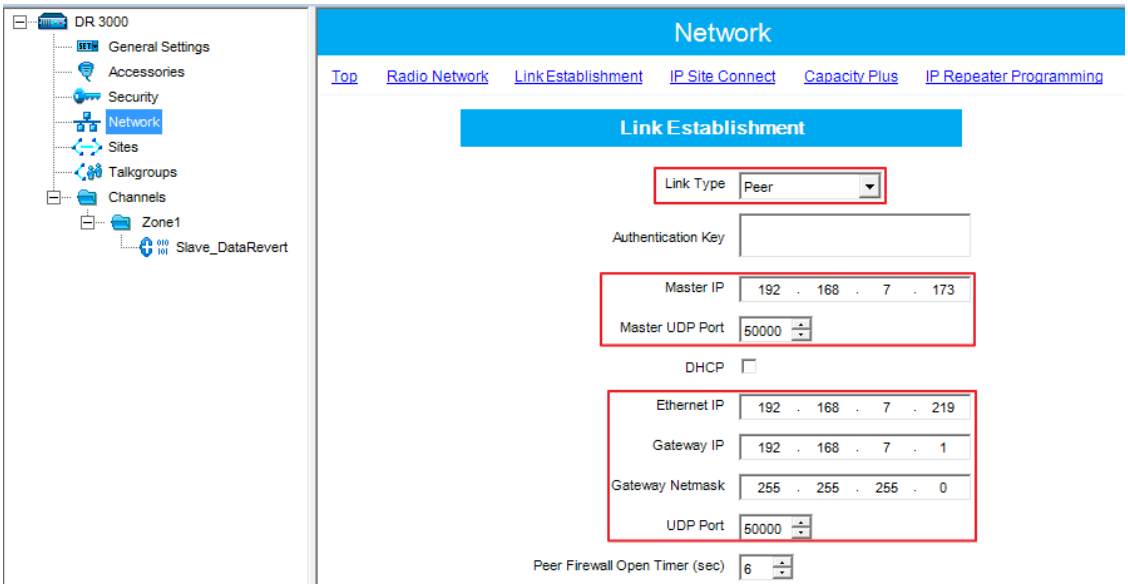

Fig. 10 - Setting Network parameters for Slave repeater

3.2 Programming Control Station

3.2.1 TX Control Station Settings

Trunk control stations are used for two-way group calls on the dispatcher console. To eliminate group calls lost because of the busy channel, each control station must be programmed to work with one only talk group.

All trunk control stations must have different **Radio IDs**.

1. In the **Network** tab set **Forward to PC** to *Via USB* (Fig.11).

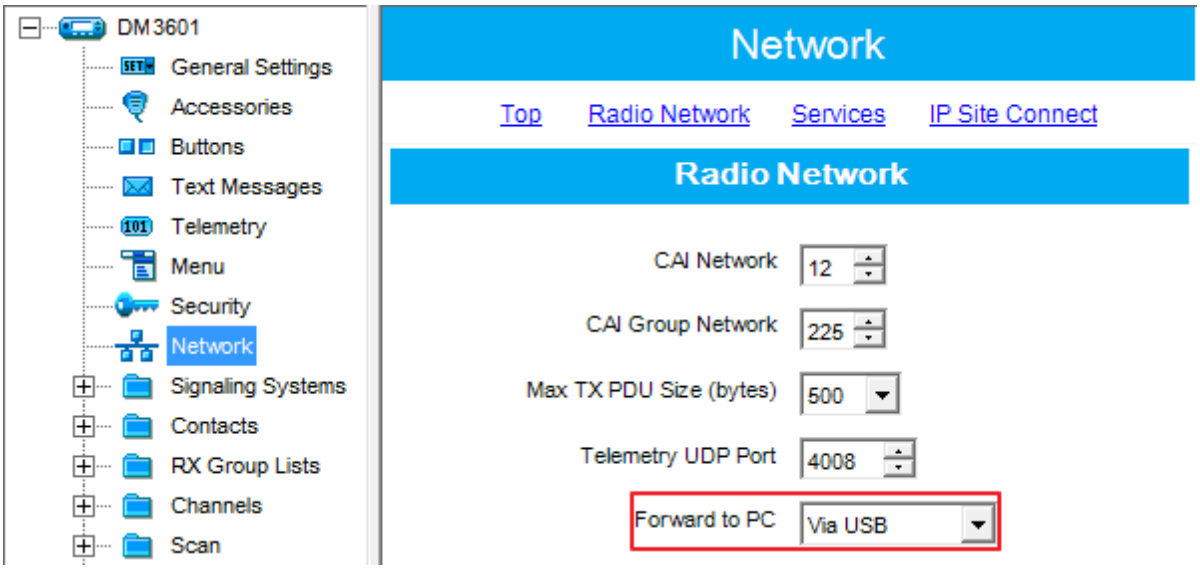

Fig. 11 - Selecting Forward to PC parameter

2. In the **Contacts** tab add subscriber groups to the contact list. Set unique **Call ID** for each group (Fig.12).

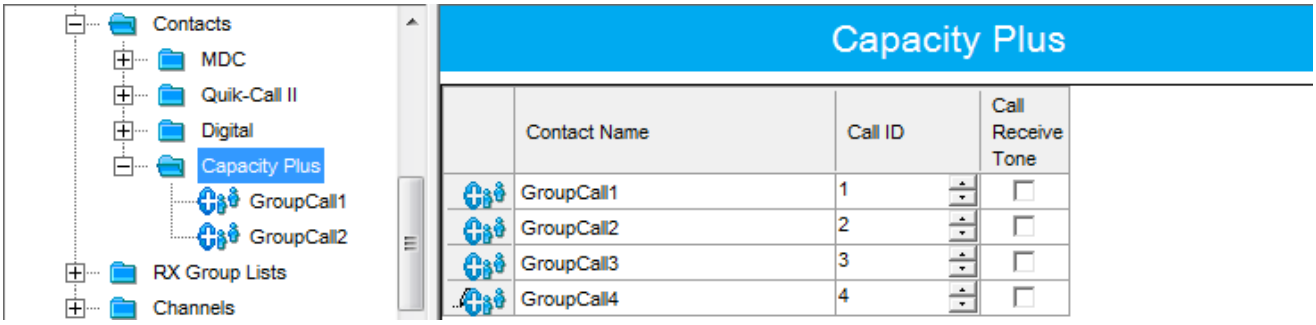

Fig. 12 - Adding groups in the Contacts tab

3. In the **RX Group Lists** tab switch to an **Available** list. Add created groups from the **Available** section to the **Members** list (Fig.13).

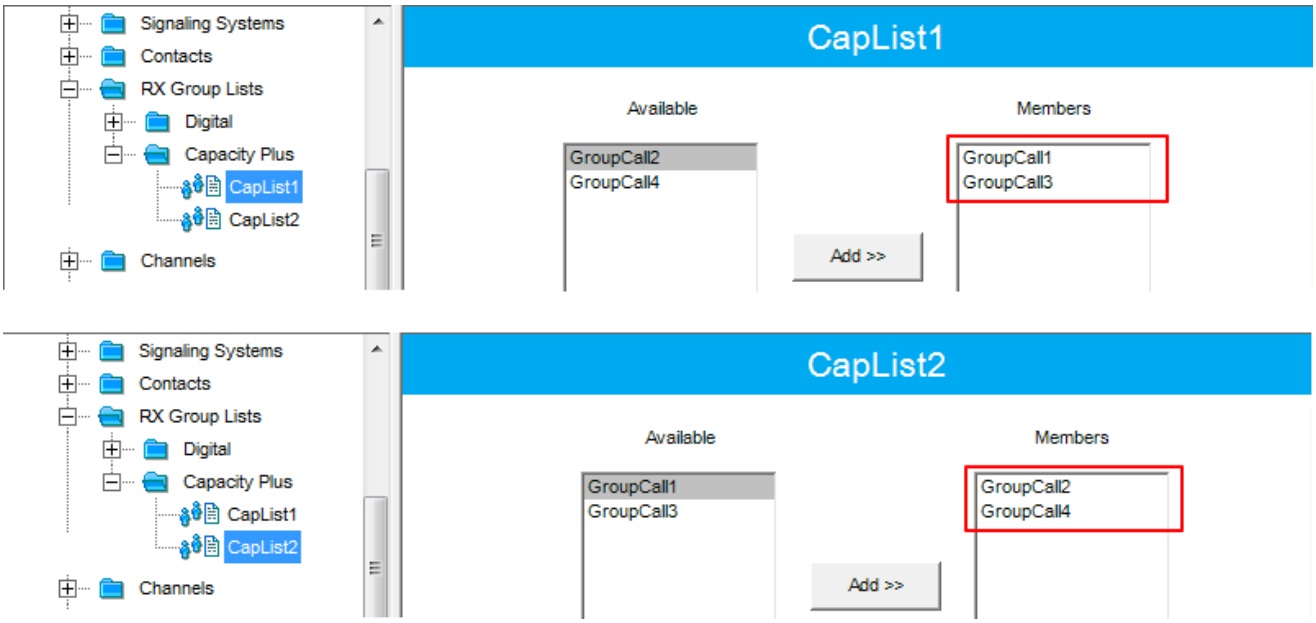

Fig. 13 - Moving Groups to the Members list

4. Add **Capacity Plus Voice Channel** for Master repeater to **Channel Pool**. Set frequency pair of the trunk repeater (Fig.17).

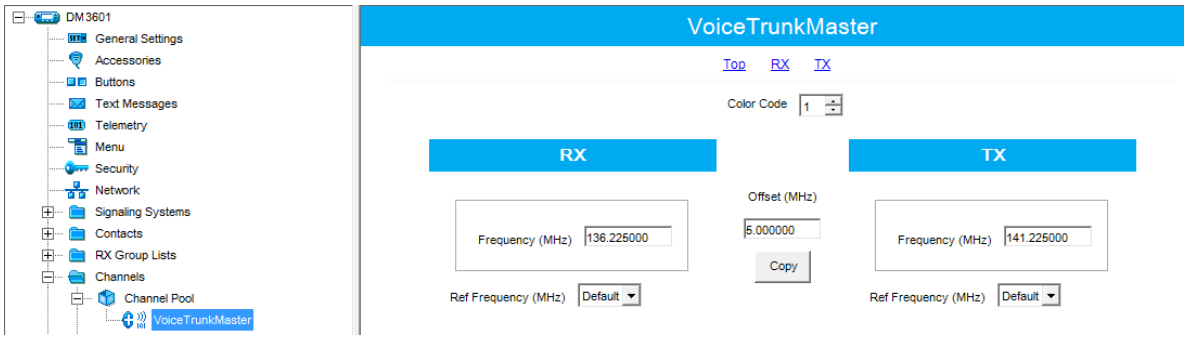

Fig. 14 - Setting frequency pair for Master repeater channel

5. Add **Capacity Plus Voice Channel** for Slave repeater to **Channel Pool**. Set frequency pair of the trunk repeater (Fig.18).

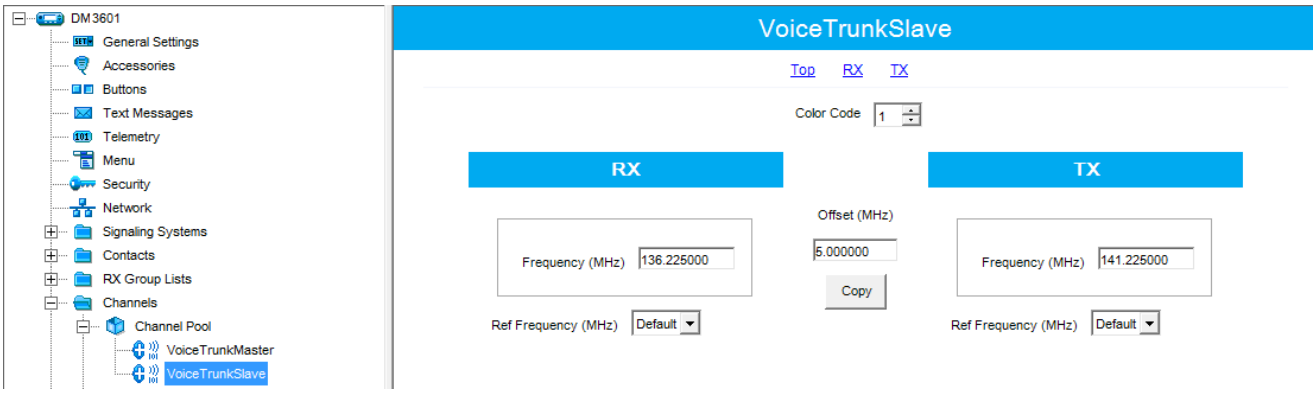

Fig. 15 - Setting frequency pair for Slave repeater channel

6. Add the created voice channels to the **Members** list of Capacity Plus voice channels. Add the channel pool of the Master (Trunk) repeater first (**ID** = *1-2*), then add the channel pool of the Slave (Trunk) repeater (**ID** = *3-4*) (Fig.19).

Fig. 16 - Adding channels to the Members list

7. In the **Channels** section create a trunk channel dedicated to GroupCall1 and do the following settings (Fig.14).

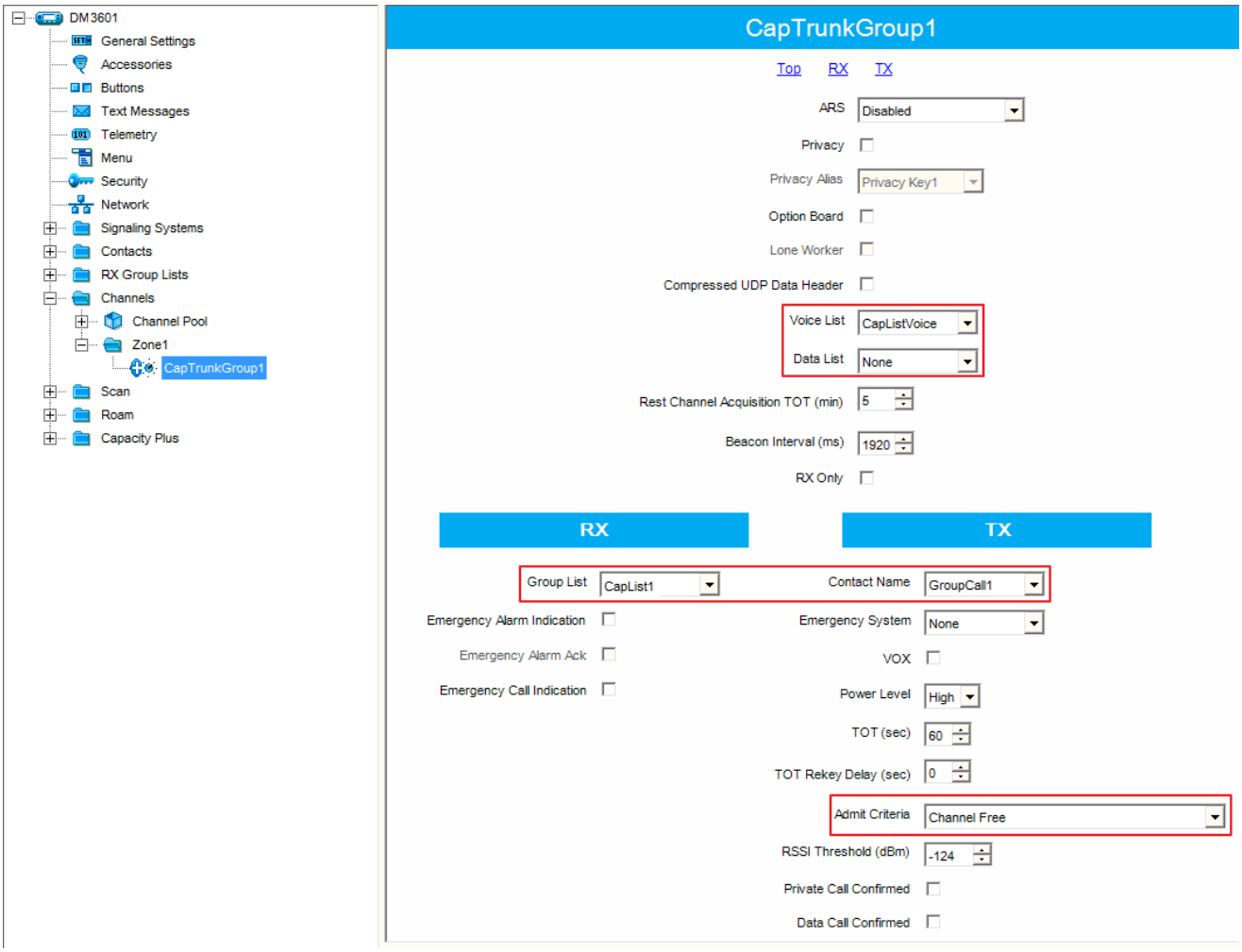

Fig. 17 - Setting parameters for GroupCall1 channel

8. In the **Channels** section create a trunk channel dedicated to GroupCall2 and do the following settings (Fig.15).

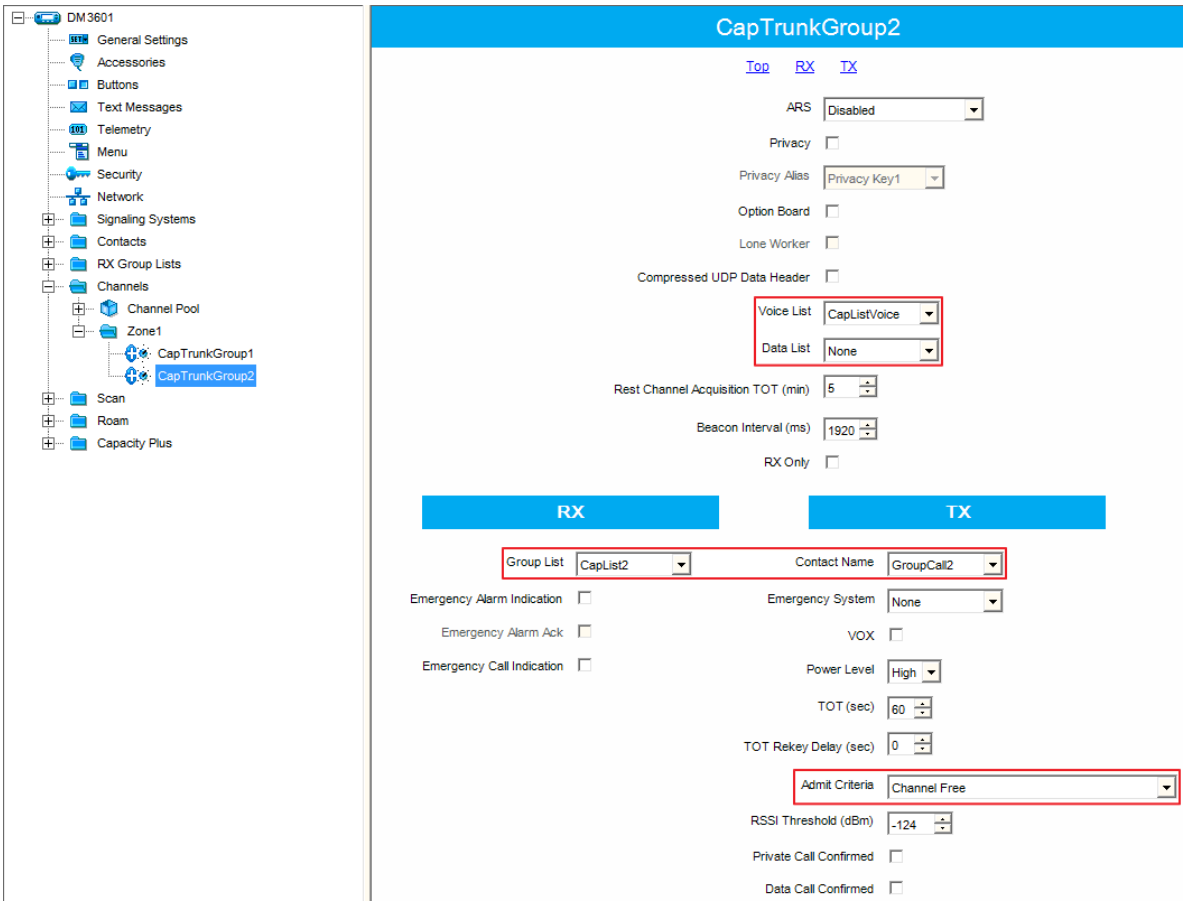

Fig. 18 - Setting parameters for GroupCall2 channel

9. In the **Channels** section create a trunk channel dedicated to data transmission and do the following settings (Fig.16).

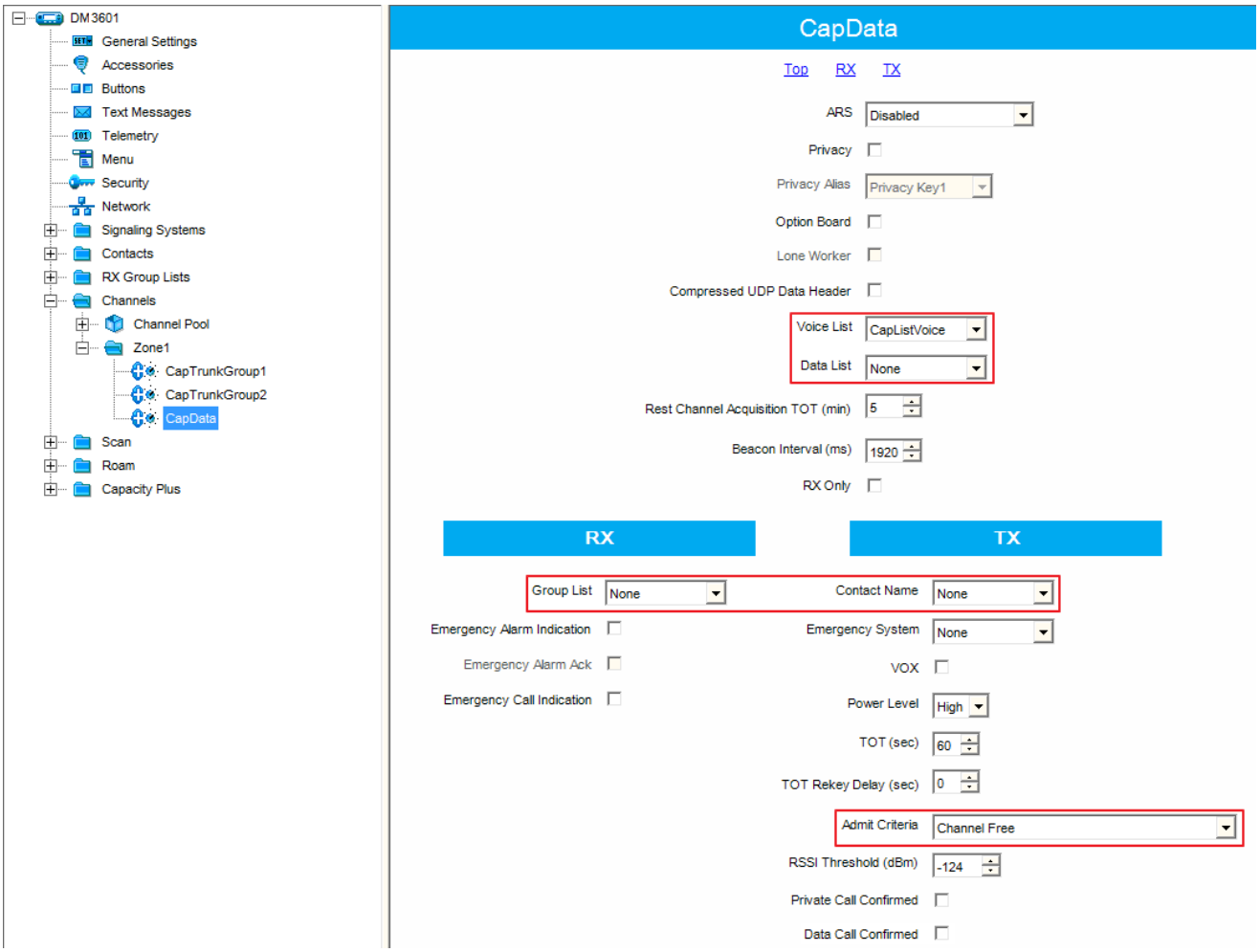

Fig. 19 - Setting parameters for data transmission channel

3.2.2 Control Station Settings for Dispatcher Individual Calls

Trunk (Dispatcher) MOTOTRBO control stations are used for private calls, private text messages from the the dispatch console or for Telephone Interconnect Service.

Settings for Trunk (Dispatcher) control station are the same as for TX control station, but with one difference: **Private Call** must be added to Capacity Plus contacts, instead of **Group Call**.

3.3 Subscriber Radio Settings

1. Create channel pool for Master (Trunk) repeater (Fig.20).

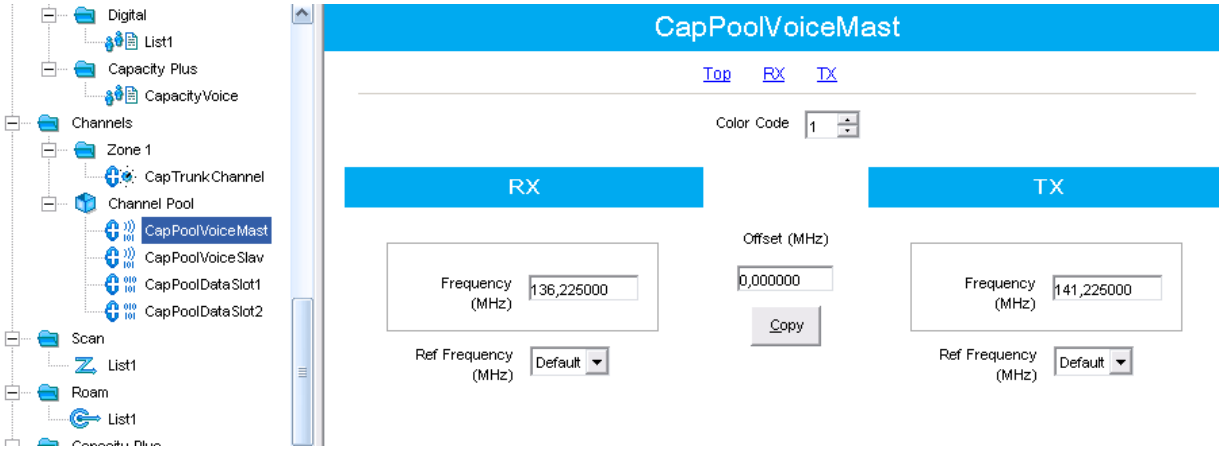

Fig. 20 - Creating channel pool for Master repeater

2. Create channel pool for Slave (Trunk) repeater (Fig.21).

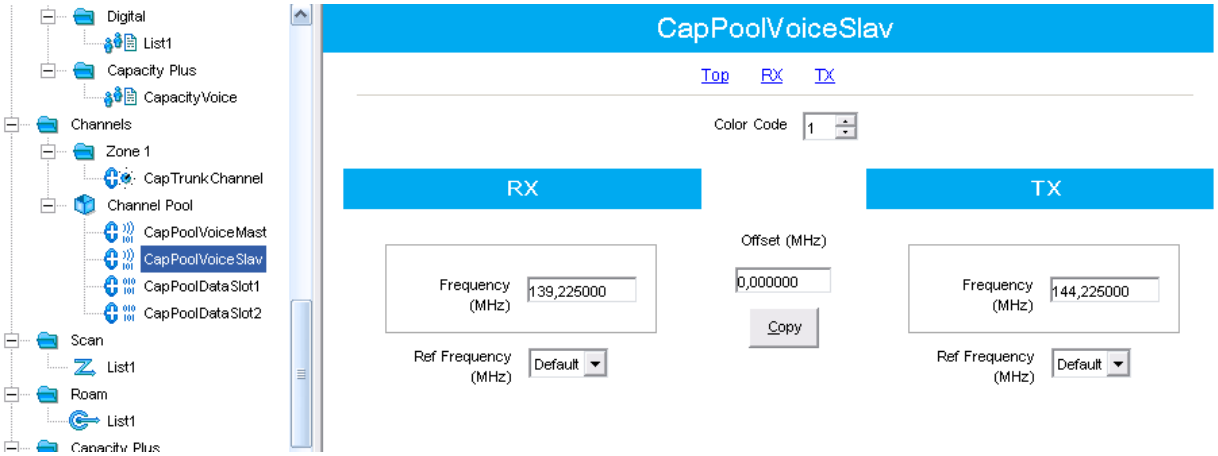

Fig. 21 - Creating channel pool for Slave repeater

3. Create channel pool for slot 1 of Slave (DataRevert) repeater (Fig.22).

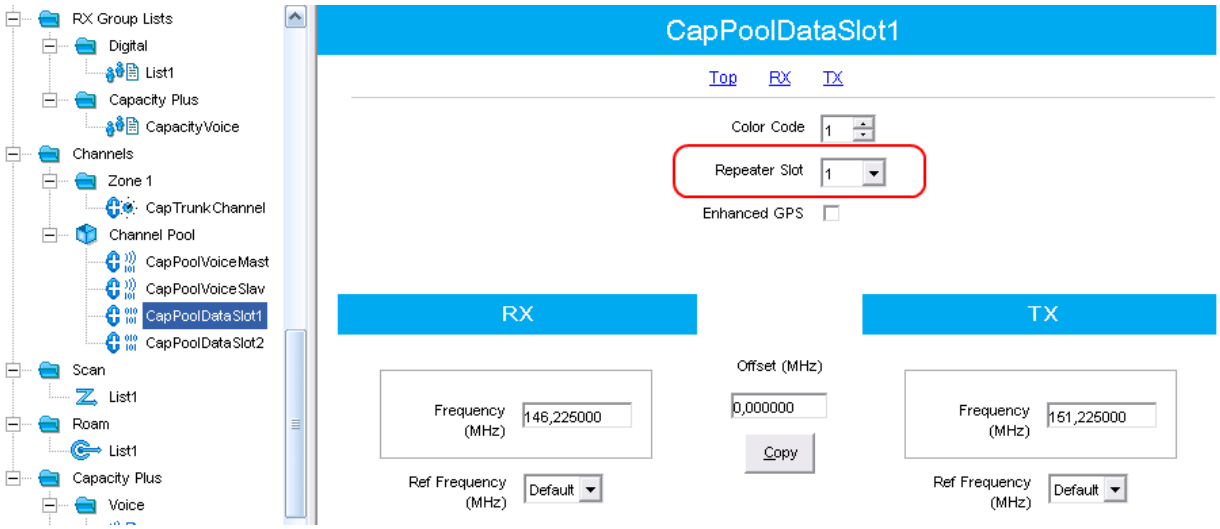

Fig. 22 - Creating channel pool for Slave (Data revert) repeater Slot 1

4. Create channel pool for slot 2 of Slave (DataRevert) repeater (Fig.23).

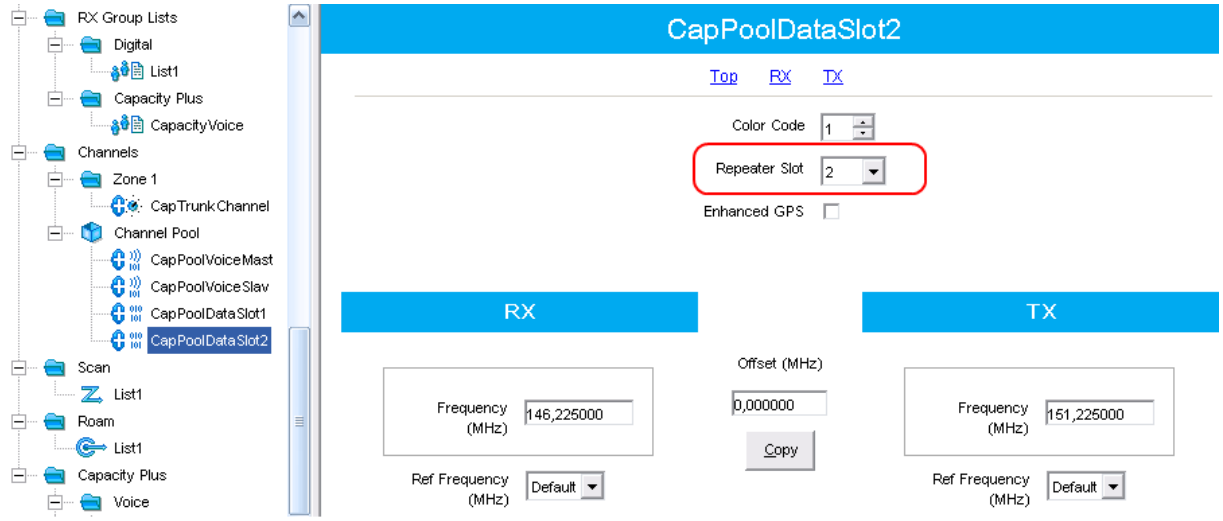

Fig. 23 - Creating channel pool for Slave (Data revert) repeater Slot 2

5. Add created voice channel pools to Capacity Plus voice channel list (Fig.24).

Fig. 24 - Adding voice channel pools to voice channel list

6. Add created data channel pools to Capacity Plus data channel list (Fig.25).

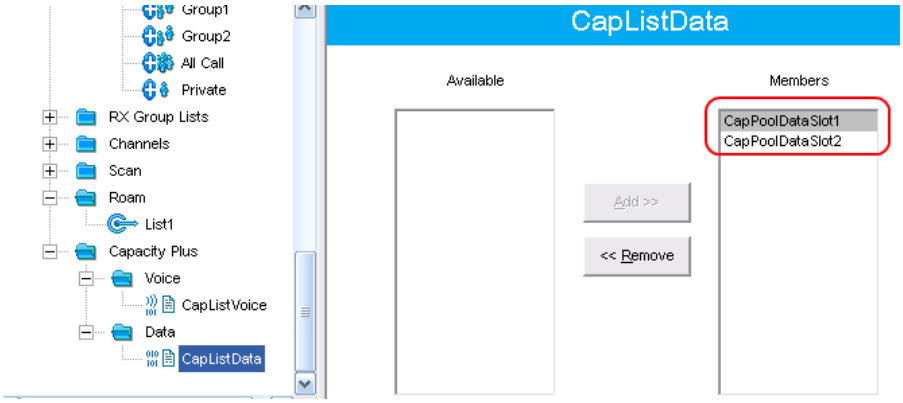

Fig. 25 - Adding data channel pools to data channel list

7. Create Capacity Plus contacts (Fig.26).

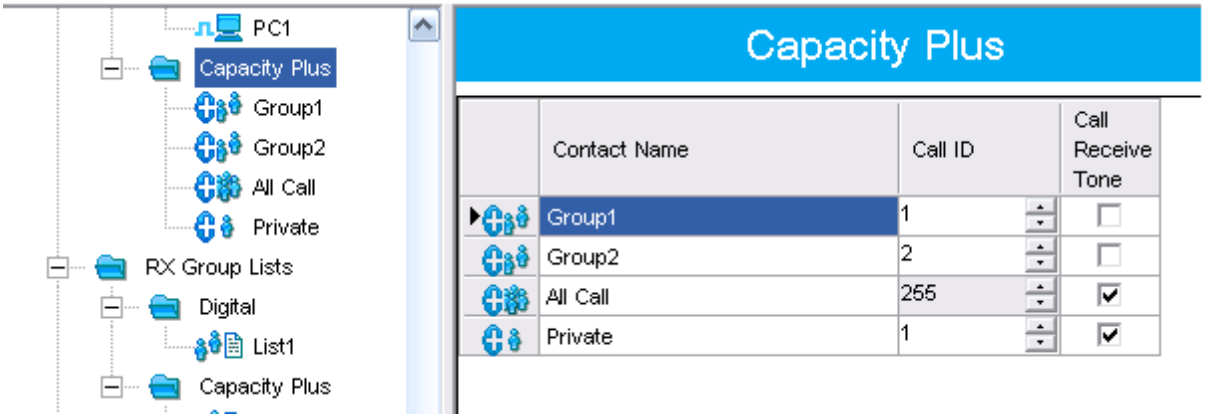

Fig. 26 - Adding contacts

8. Add created contacts to Capacity Plus **RX Group List** (Fig.27).

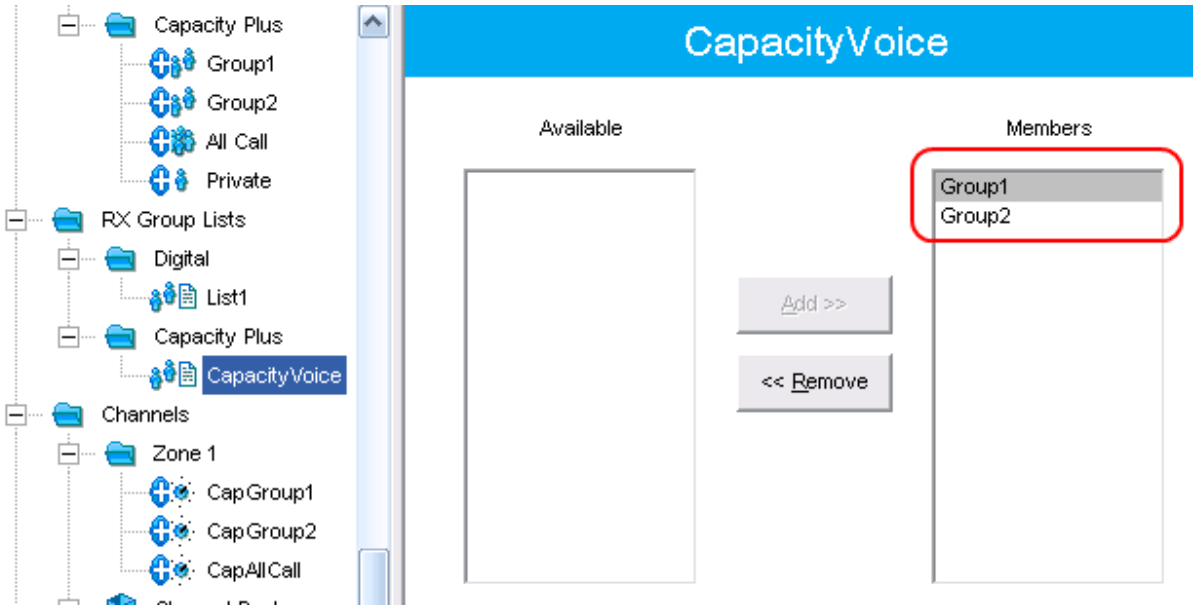

Fig. 27 - Adding contacts to RX Group List

9. Create Capacity Plus trunk channel (Fig.28).

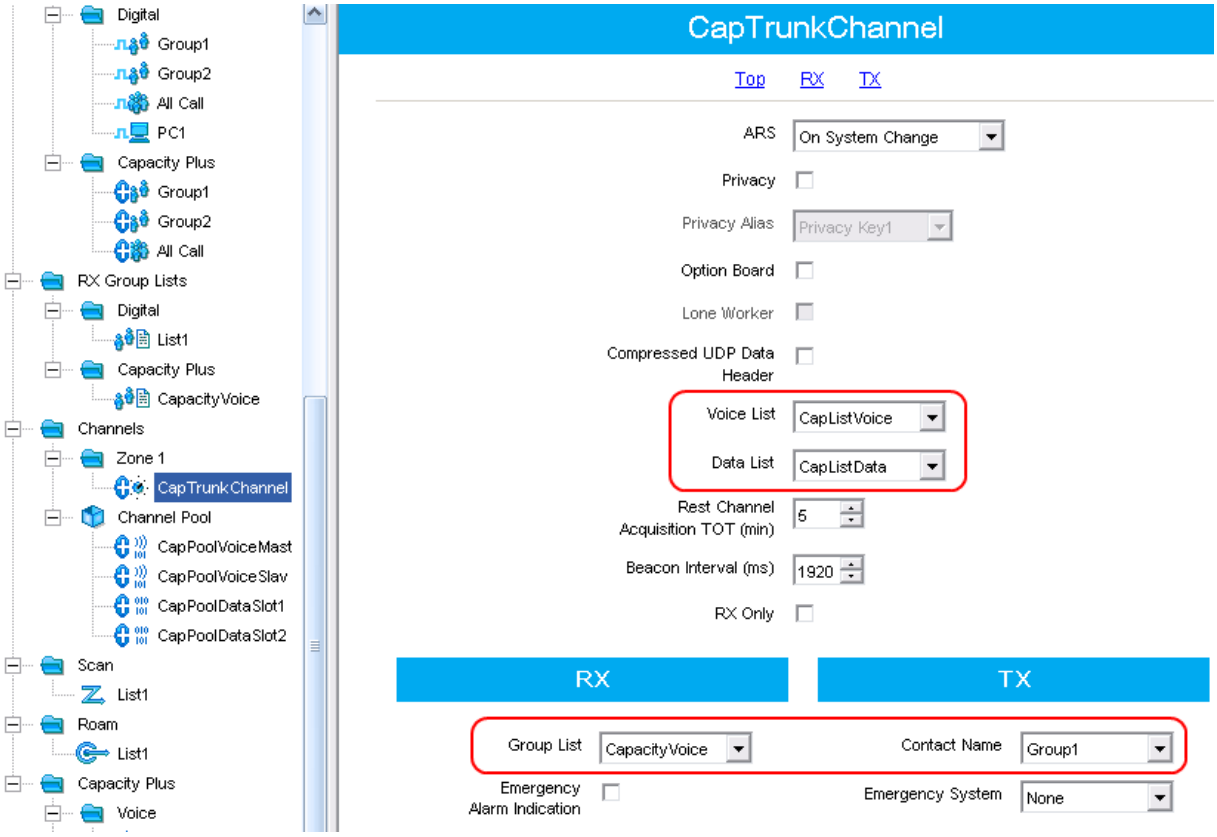

Fig. 28 - Creating trunk channel

10. Capacity Plus trunk channel settings (Fig.29).

Fig. 29 - Configuring trunk channel settings

4 Programming Radioserver

SmartPTT implies direct connection to the repeaters operating in the Capacity Plus mode. Capacity Plus network can contain up to 6 repeaters (up to 12 time-slots) for voice communication and up to 12 repeaters (up to 24 time-slots) for data communication through revert channels. Several Capacity Plus systems can be connected to one SmartPTT Radioserver.

To work with Capacity Plus it is necessary to create a virtual repeater and virtual control station on SmartPTT Radioserver. For data transmission TX Control Stations are to be added.

4.1 Capacity Plus Settings

1. First, run SmartPTT Radioserver Configurator.
2. To add a new Capacity Plus system right-click on **Capacity Plus System** in the setting tree of the **Settings** tab and chose **Add** (Fig.30).

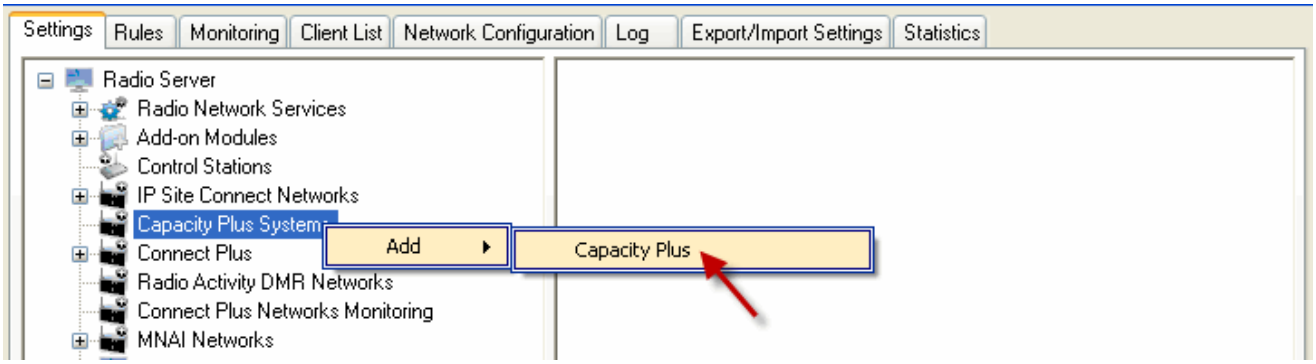

Fig. 30 - Adding Capacity Plus system

Capacity Plus configuration window appears on the right (Fig.31).

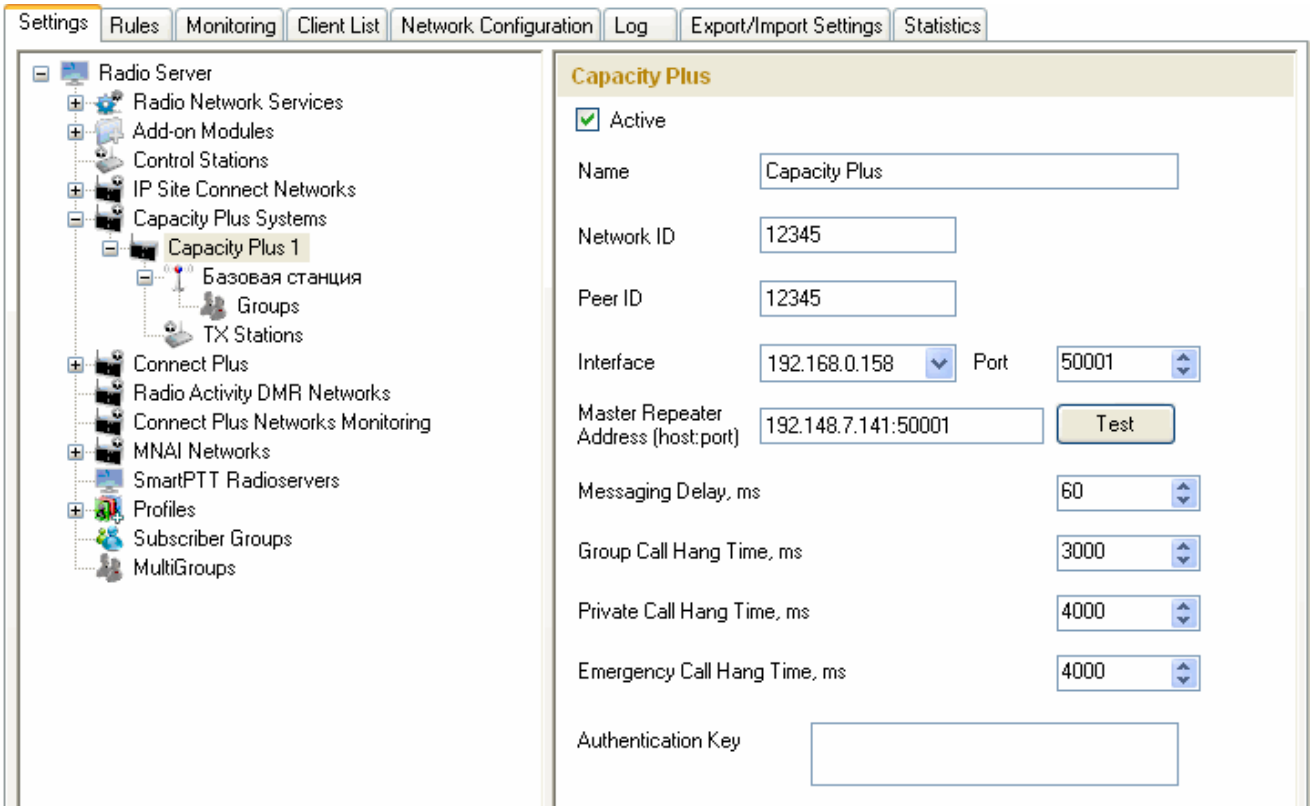

Fig. 31 - Capacity Plus settings window

Set up the following parameters (or accept the default).

Name – the Capacity Plus network name.

Network ID – unique ID of the Capacity Plus network.

Peer ID – unique identifier of the virtual repeater in Capacity Plus. Make sure it does not match any other repeater identifiers in this Capacity Plus system.

Interface (host:port) – network interface of the radioserver which will be used for connection with the repeaters in the Capacity Plus system.

Master repeater address (host:port) – IP address and port of Capacity Plus Master repeater.

Messaging Delay (ms) – the inter-repeater messaging delay.

Group Call Hang Time (ms) – the time period during which a radio will talk back to a received call or continue a transmitted Talkaround Group Call using the previously received or previously transmitted digital group ID. After expiration of the Talkaround Group Call hang timer, the radio will transmit using the TX Contact Name (digital group) specified for this channel in CPS.

Private Call Hang Time (ms) – the time period during which the radio keeps the Talkaround Private Call setup after the user releases the Push-to-Talk (PTT) button. During this time, other radios can still transmit since the channel is essentially idle. After the hang timer expires, the radio transmits using the TX Contact Name specified for this channel in CPS.

Emergency Call Hang Time (ms) – the time period during which the radio keeps the Talkaround Emergency Call setup after the user releases the Push-to-Talk (PTT) button. Until the hang time has run out only participants of the group call can transmit on the channel.

Authentication Key – repeater authorization key. Required only if it is set in CPS.

4.2 Virtual Control Station Settings

Capacity Plus virtual control station is designed for receiving data and voice.

To set up a virtual control station for Capacity Plus, click **Capacity Plus System**, select **Capacity Plus 1** and then **Control Station**. **Capacity Plus Control Station** window will open (Fig.32).

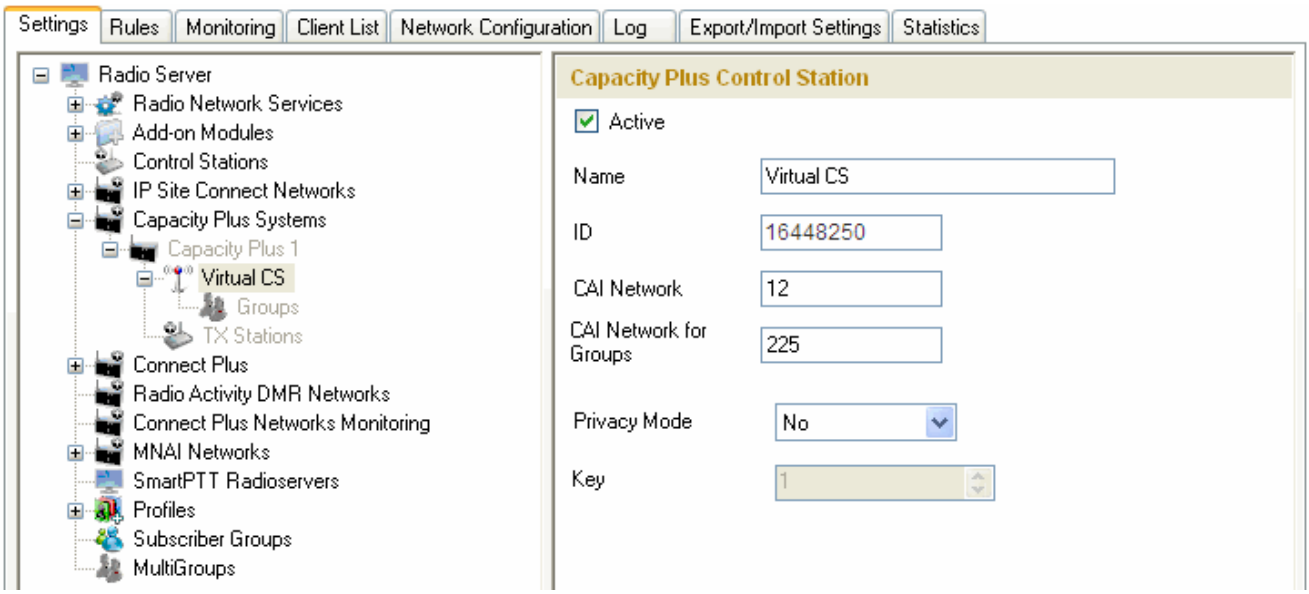

Fig. 32 - Adding Capacity Plus Control Station

Set up the following parameters (or accept the default).

Name – the control station name. You cannot type more than 20 characters into this field.

Note: If two or more control stations are connected to the computer, one of the first three octets of the IP address

must be unique for each control station.

ID – the unique radio identifier which is used during communication with this radio. It is recommended to use 16448250 as ID. It is set in the range from 1 to 16776415.

CAI Network – CAI-Network identifier. It is recommended to use the default value of *12*.

CAI Network for Groups – the identifier of the group's CAI-Network. It is recommended to use the default value 225.

Privacy Mode – encryption mode.

To set up groups of the virtual control station, click **Capacity Plus System**, **Capacity Plus 1**, **Virtual CS**, **Groups** in SmartPTT Radioserver Configurator **Settings** tab. The **Control Station Groups** window appears on the right (Fig.33).

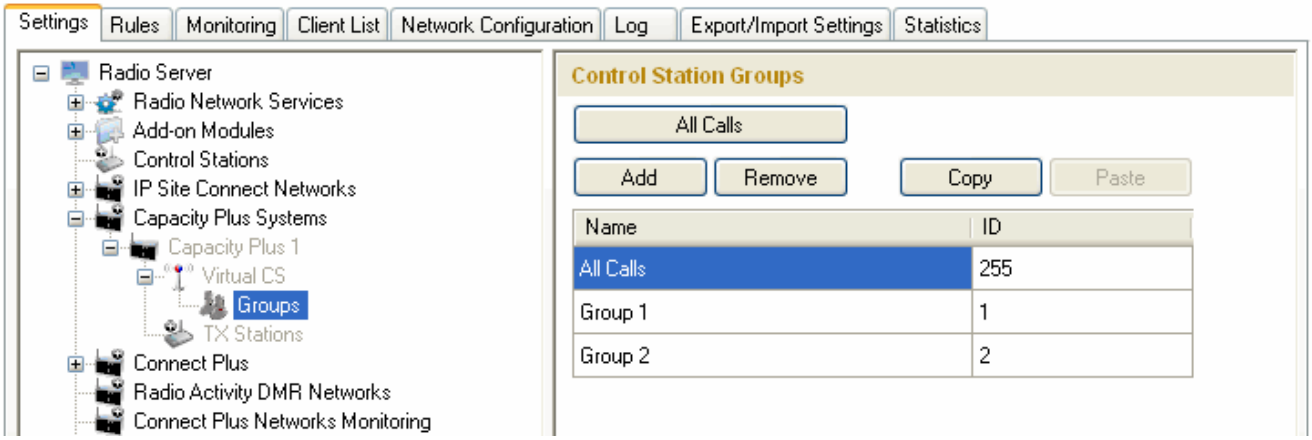

Fig. 33 - Adding Control Station groups

Note: Configuring virtual control station groups for Capacity Plus is similar to the TX control station group settings.

4.3 TX Control Station Settings

TX control station is designed for voice and data communication.

First add TX control station. To do it click **Capacity Plus System**, select **Capacity Plus 1**, then right-click **TX Stations**, and add the new TX control station (Fig.34).

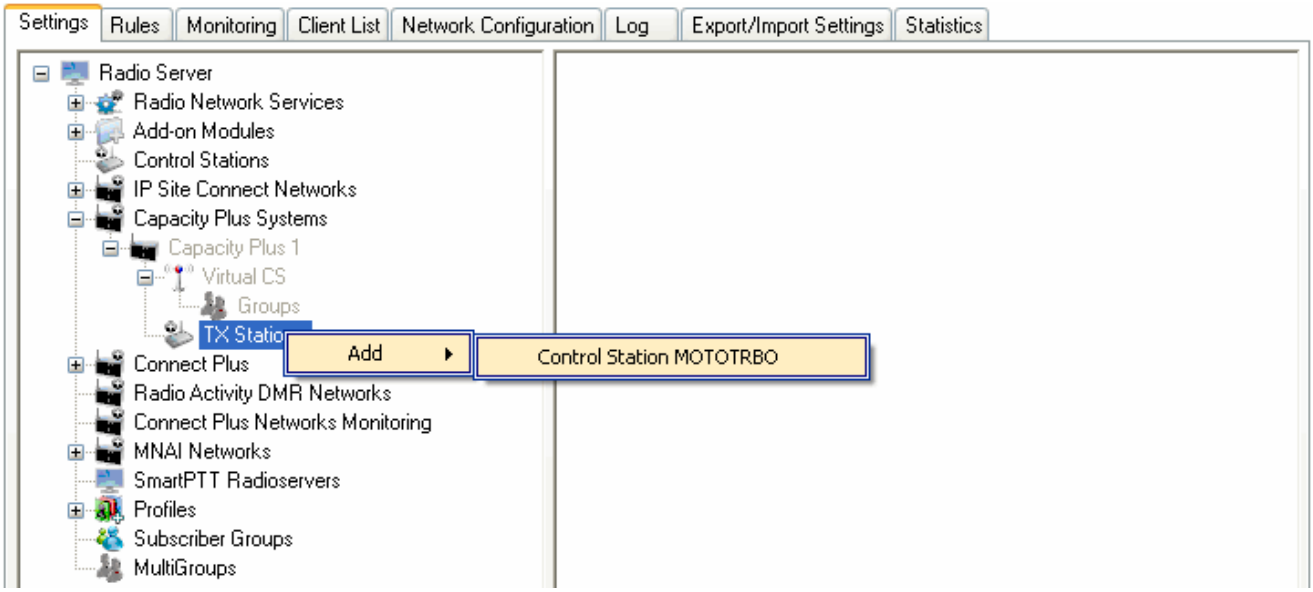

Fig. 34 - Adding TX Control Station

TX Control Station window appears on the right (Fig.35).

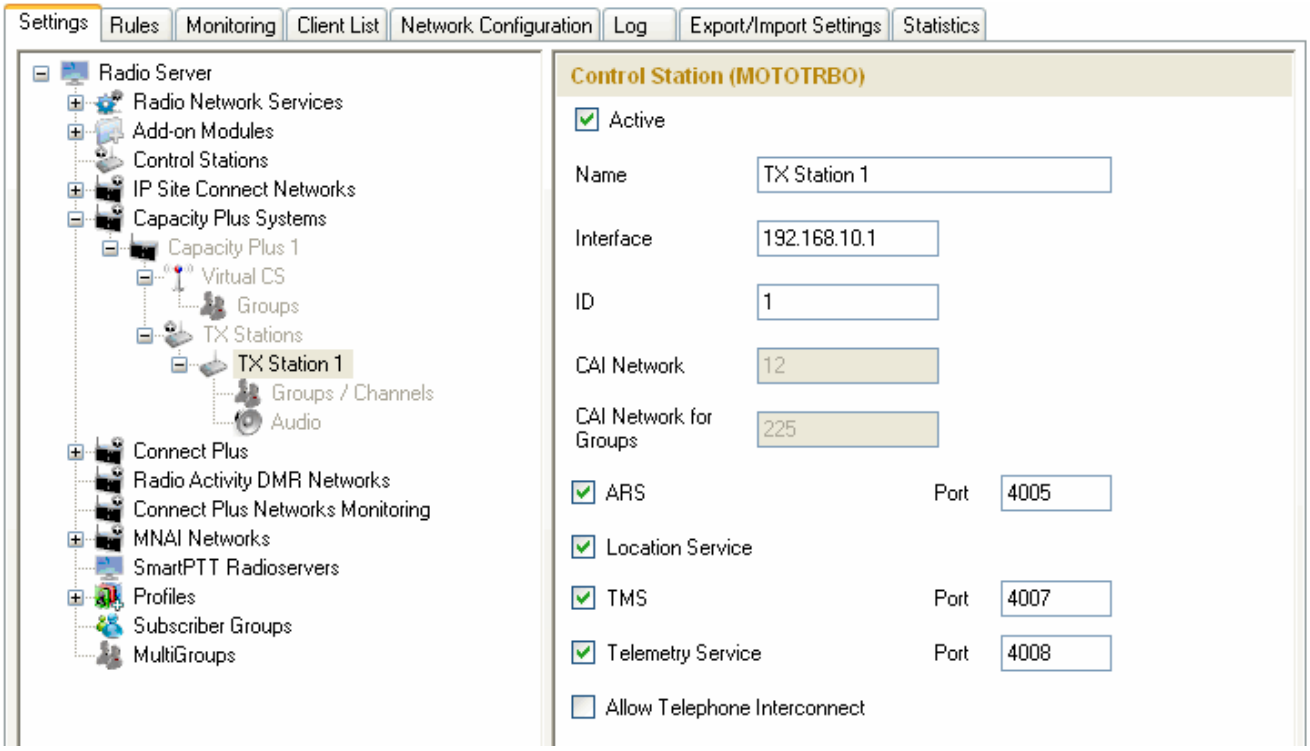

Fig. 35 - TX Control Station settings window

Set up the following parameters (or accept the default).

Name – TX control station name

IP – TX control station IP address, which is configured in CPS.

ID – TX control station Radio ID configured in CPS.

For setting up **Groups** / **Channels** of the TX control station click the **Groups / Channels** item in the tree of SmartPTT Radioserver Configurator. The **Groups / TX Radio Channels** window will appear on the right (Fig.36).

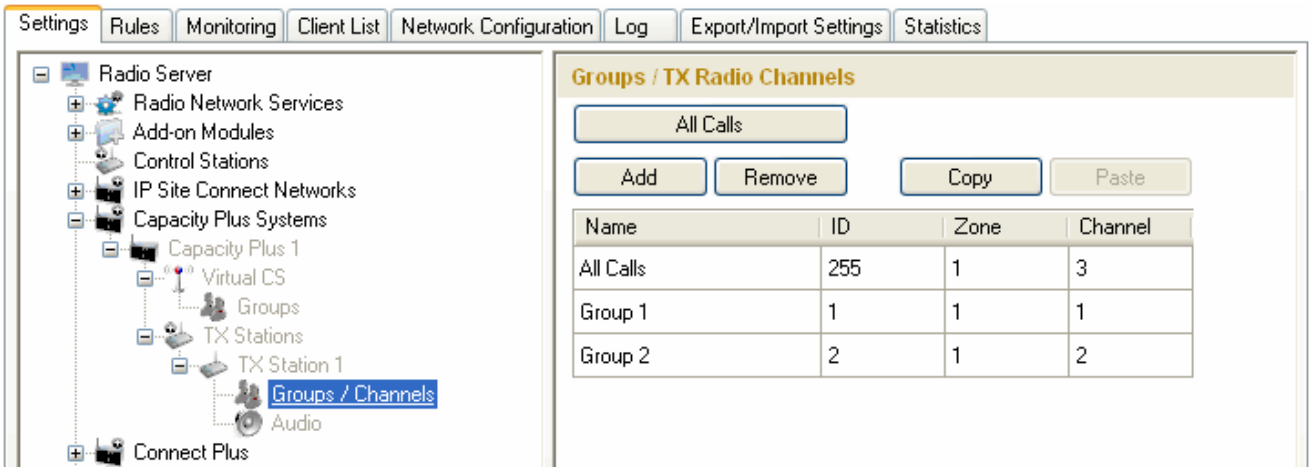

Fig. 36 - Adding TX Control Station Groups

Name – channel name.

ID – channel identifier as programmed in CPS.

Zone – index number of the channel group as programmed in CPS.

Channel – channel index number as programmed in CPS.

All Calls channel is designed for All calls, private calls and data communication.

To delete **Capacity Plus System**, right-click the existing **Capacity Plus System** and click **Delete**.