

Version 9.3.1 SmartPTT PLUS

Installation and Configuration Guide

July 2018



Contents

1 Introduction	3
2 Preliminary Actions	4
2.1 HDD Space Estimation	4
3 Installation of SmartPTT Software	6
4 General SmartPTT Radioserver Configuration	11
5 SmartPTT Dispatcher Configuration	14
6 Linked Capacity Plus	20
6.1 MOTOTRBO Equipment Programming	20
6.1.1 MOTOTRBO Repeater Programming	21
6.1.2 MOTOTRBO Radio Programming	29
6.2 MNIS and DDMS Client Configuration	36
6.3 SmartPTT Radioserver Configuration	39
7 Connect Plus	47
7.1 MOTOTRBO Equipment Programming	48
7.1.1 MOTOTRBO XRC Controller and XRT Gateway	49
7.2 SmartPTT Radioserver Configuration	53
8 Capacity Max	61
8.1 How to Configure Capacity Max	63
8.2 Trunking Controller	67
8.3 MNIS Data Gateway	73
8.4 MNIS VRC Gateway	80
8.5 Adding Console in Radio Management	83
8.6 Talkgroups	85
8.7 Security Settings in Capacity Max	86

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 \approx 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.

🕵 SmartPTT Dispatcher - InstallShield Wizard	×
Custom Setup Select the program features you want installed.	>
Click on an icon in the list below to change how a feature is installed.	
SmartPTT Dispatcher Feature Description Microsoft SQL Express Microsoft SQL Express	
This feature will be installed on local hard drive.	
This feature, and all subfeatures, will be installed on local hard drive.	
📠 This feature will be installed to run from network.	
🚛 🖁 This feature, and all subfeatures, will be installed to run from the networ	к.
This feature will be installed when required.	
Install to C:\Progr	
Change	- 1
InstallShield	
Help Space < Back Next > Cancel	

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.

/ SmartPTT Rad	lioserver - InstallShield Wizard X
Program Main Modify, repair,	tenance or remove the program.
● <u>M</u> odify	Change which program features are installed. This option displays the Custom Selection dialog in which you can change the way features are installed.
○ Regair	Repair installation errors in the program. This option fixes missing or corrupt files, shortcuts, and registry entries.
○ <u>R</u> emove	Remove SmartPTT Radioserver from your computer.
InstallShield ———	< <u>B</u> ack <u>N</u> ext > Cancel

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.

👘 SmartP	PTT Dispatcher - InstallShield Wizard	×
Custom Select th	Setup he program features you want installed.	E
Click on an	i con in the list below to change how a feature is installed.	
	■ SmartPTT Dispatcher Feat ■ Microsoft SQL Express Microsoft	ture Description psoft SQL Express
· · · · · · · · · · · · · · · · · · ·	This feature will be installed on local hard drive.	
6	This feature, and all subfeatures, will be installed	on local hard drive.
ļ	面 This feature will be installed to run from network 图 This feature, and all subfeatures, will be installed	c. I to run from the network.
1	This feature will be installed when required.	
Install to C:\Progr	× This feature will not be available.	
InstallShield		change
	Help Space < Back Ne	ext > Cancel

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.

<table-cell> Sma</table-cell>	artPTT Serve	er Configur	ation - (C:\Progra	m Files ((x86)\SmartPTT\Server	\RadioServi	ce.exe.config	_	×
Settings	Networks	Client List	Rules	Activity	Log	Export/Import Settings	Statistics			
	Radio Serve Licenses	er				Radio Server				
	Radio Netw Add-on Mod	ork Services Iules	•			Server Role		Primary	~	
	Profiles Radio Group	os				Name		Radioserver		
📄 🗄 👘	Metadata					Interface		Port		
						Any	\sim	8888 🜲		
						Authentication				
						No	\sim			
						VoIP Listen Port		18500		
						Block option		Radio Disable	~	
						Limit Radios to Serv	vice			
						Enabled		Example	1-99,150	
						Allowed Radio Num	bers			
						Process priority		Above normal	~	
						Language		English		

- 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**:

🎯 SmartPTT Server Configuration - C:\Program Files (x86)\SmartPTT\Server\RadioService.exe.config	_	×
Settings Networks Client List Rules Activity Log	Export/Import Settings Statistics		
Radio Server	ARS Active Use Radio Check		 _
	Radio inactivity timeout (s)	600	
Radio Blacklist ∎ Email Gateway	Global Minimum Request Interval, ms	1000	
SMS Gateway File Receive Add-on Modules Profiles Radio Groups Metadata	Automatic update of registration, h	0.0	

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

🎯 SmartPTT Server Configuration - C:\Program Files	(x86)\SmartPTT\Server\RadioService.exe.co	onfig	_	n x
Settings Networks Client List Rules Activity Log	Export/Import Settings Statistics			
Radio Server	GPS			
adio Network Services	Active			
ARS 	Minimum radio location update interval (s)	30		
	Minimum Request Interval, s	1		
ia	Radio inactivity timeout (s)	60		
Add-on Modules	Get location information on the following rad	dio groups:		
	Group Name	Time Interval, s	On/Of	f
i Metadata		la data Tiana latana		
	Allow Dispatchers to Amend Location	Jpdate Time Interval		

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

SmartPTT Server Configuration - C:\Program Files	(x86)\SmartPTT\Server\RadioService.exe.config	—	\times
Settings Networks Client List Rules Activity Log	Export/Import Settings Statistics		
Radio Server Licenses Radio Network Services RAGio Network Services RAGio Blacklist Radio Blacklist Email Gateway File Receive Add-on Modules Profiles Radio Groups Metadata	TMS Active		

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**.

Configuration		×
Database Settings for connection	to MS SQL Server database	Ö
Database server		
Database server name	localhost\SQLExpress	
	For database server installed locally at SmartPTT Dispatcher PC enter name in the following way:	
	Name of Computer/SQLExpress (e.g., MYCOMP/SQLExpress).	
Authorization mode	Windows NT Authorization	•
Account name		
Password		
	Connect	
Database		
Connection to the dat	abase server is established.	
	Create database Restore database	
C + D + I		
Create Database		-
Database nan	ne New Database	
	Save Cancel	
Help	Cancel Back Next Finish	

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.

Configuration					\sim
Radioservers Radioservers controlled by Dispatcher	Console			;	Ö
🕇 Add 🖌 Edit 🗕 Delete 🤇	🔍 Search				
Server Name	Address	Proxy	Login	Active	-

Radioserver						×
General	IPMI					
Active	\checkmark					
Name	Radadiose	rver 1				
Address	192.168.30	5.110		Port	8888	
Proxy				Proxy Port		
Login						
Password						
Operator		Profile Name				*
Administrat	or	(none)			-	
Dispatcher		(none)				
						*
		OK	Cancel			

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**.

figuration		
Audio devices and	VoIP settings	10
General Settings	Audio Output Devices Other Settings	
– Audio Input		
Device	Default 🔍	
Input Line		
Noise Reduction	Disabled	
Audio Input Test	Record Play Save	
– Audio Output –		
Device	Default Check	
– VoIP Parameters –		
Codec	CCITT u-Law	
Codec Format	8000 Hz, 20 ms, 64 (86) kbps	
VoIP Port	18501	
Holp	Cancel	Finish

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.

- 🚦 Radioserver		>>
- 🍶 Slot 1		PTT »
12.0.0.22	(Empty)	PTT »
- 🍶 Slot 2		PTT »
Paul	(Empty)	PTT »

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

Radio Propert	ties: Radio 1			×
Common	Location	Other		
Radio ID	34		12	
5 Ione ID				
Name	Radio 1			
Status	(empty)		•	Select x
🗹 Lone Wo	rker			; ;
Default			•	
	Save	•	Cancel	

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.

I MOTOTRBO Customer Programming Soft	ware - [Sample.ctb]	– 🗆 X
File Edit View Device Fegtures Image: State Image: State <t< td=""><td>Remote Window Help Ba C P Paste Search Read Write Cione Bluetooth</td><td>_ & ×</td></t<>	Remote Window Help Ba C P Paste Search Read Write Cione Bluetooth	_ & ×
SLR 5500	Link Establishment	
Accessories	Top IP Site Connect Capacity Plus	
Network	Capacity Plus	^
- 약 Link Establishment - 수 Sites - 수 양 Talkgroups 표 - () Channels	Site ID 1 :	

- 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.

Linked Capacity Plus

MOTOTRBO Customer Programming Soft	tware - [Sample.ctb]	- 🗆 X
Elle Edit View Device Features Image: Comparison of the state of	s Remote Window Help 6 🖶 🛍 🔍 I I Read Write Clone Bluetooth 🗾	- 8 ×
SLR 5500	Network	
	Top Radio Network Network Setting IP Repeater Programming Time Zone NTP Settings DNS Addresses	
Link Establishment	Network Setting	^
	Link Speed Auto Negotiation	
🕀 🖻 Channels	рнср 🗌	
	Ethernet IP 10 . 150 . 0 . 20	
	Gateway IP 10 . 150 . 0 . 1	
	Gateway Netmask 255 . 255 . 0	
	Primary DNS Server IP 0 . 0 . 0 . 0	_

- 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.

MOTOTRBO Customer Programming Sof	tware - [Sample.ctb]								-	$\Box \rightarrow$
File Edit View Device Features	s <u>R</u> emote <u>W</u> indow <u>H</u> elp									_ 8
RM Open Save Reports Delete Cu	t Copy Paste Search Read	Write Clone E	Bluetooth]						
				Site	s					
General Settings										
Security				Max Number of S	Sites 15 -					
Network					,					
Link Establishment			_	Add	Delete					
		Site	Reserved Wide Area	Neighbor M	Neighbor M	Neighbor N	Veighbor	Neighbor		
+ Channels		ID	Channels 1	2 3	3 4	4 5	5	6		
		1	0 + 2	None N	None N	None N	lone	None		
		2	0 + 1	3 N	None N	None N	lone	None		
		▶ 3	0 ÷2 ▼	None N	None N	None N	lone	None		
		· -								

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

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

I MOTOTRBO Customer Programming Soft	tware - [Sample.ctb]										-	
File Edit View Device Features	<u>R</u> emote <u>W</u> ind	dow <u>H</u> elp											_ 8 ×
RM Open Save Reports Delete Cu	t Copy Paste	Q ▶ Search Read	Write Clone	Bluetooth		•							
SLR 5500						Talk	groups						
								All Wide Area T	alkgroups 🔲				
Network								Add	De <u>l</u> ete				
Sites	Call ID	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12
⊞ 📄 Channels	▶ 2		I	V									

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.

- 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.

MOTOTRBO Customer Programming Sof	ftware - [Sample.ctb]	– 🗆 X
Elle Edit View Device Feature		_ 8 ×
RM Open Save Reports Delete C	ut Copy Paste Search Read Write Clone Bluetooth	
SLR 5500	Network	
	Top Radio Network Network Setting IP Repeater Programming Time Zone NTP Settings DNS Addresses	
Security Network Link Establishment	Network Setting	^
	Link Speed Auto Negotiation	
🗄 💼 Channels	DHCP	
	Ethernet IP 10 . 150 . 2 . 56	
	Gateway IP 10 . 150 . 2 . 1	
	Gateway Netmask 255 . 255 . 0	
	Primary DNS Server IP 0 . 0 . 0 . 0	

- 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.

MOTOTRBO Customer Programming Soft	tware - [Sample.ctb]	- U X
Elle Edit View Device Features	s <u>R</u> emote <u>Wi</u> ndow <u>H</u> elp	_ 8 ×
RM Open Save Reports Delete Cu	at Copy Paste Search Read Write Clone Bluetooth	
SLR 5500	Link Establishment	
	Top IP Site Connect Capacity Plus	
Network	Link Type Peer 💌	^
Sites	Authentication Key	
	Master IP 10 . 150 . 0 . 20	
	Master DNS Address None	
	Master UDP Port 50000 🛨	
	UDP Port 60000	
	Peer Firewall Open Timer (sec)	

3. In the same Link Establishment tab, specify Rest Channel/Site IP and Rest Channel/Site UDP Port.

MOTOTRBO Customer Programming Soft	tware - [Sample.ctb]	– 🗆 X
Eile Edit View Device Fegtures	s <u>R</u> emote <u>W</u> indow <u>H</u> elp	_ 8 ×
RM Open Save Reports Delete Cu	at Copy Paste Search Read Write Clone Bluetooth	
General Settings	Link Establishment	
	Top IP Site Connect Capacity Plus	
Security	Capacity Plus	^
Link Establishment	Site ID	
🖓 Talkgroups		
⊞… 🚞 Channels	Beacon Duration (ms)	
	Reson Interval (ms)	
	Rest Channel/Site IP 10 . 150 . 0 . 21	
	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.

I MOTOTRBO Customer Programming Soft	tware - [Sample.ctb]	– 🗆 X
Eile Edit View Device Features	s <u>R</u> emote <u>W</u> indow <u>H</u> elp	_ & ×
RM Open Save Reports Delete Cur	t Copy Paste Search Read Write Clone Bluetooth	
	Channel1	
General Settings	Chamber	
👳 Accessories	Top RX TX	
Network	Color Code 1	
Link Establishment		
	Messaging Delay (ms) 60 💌	
	RSSI Threshold (dBm)	
🖃 🔁 Channels		
Zone1	IF Filter Type Wide 💌	
Channel1	Preference Level 1	
	Slot 1 Channel ID 3 +	
	Slot 2 Channel ID 4	

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**.

1	MOTOTRBO Customer Programming Software		
[📆 <u>File Edit View D</u> evice Fe <u>a</u> tures <u>R</u>	3emote <u>W</u> indow <u>H</u> elp	- 8 ×
	Image: Constraint of the second se	by Paste Search Read Write Clone Bluetooth	
Γ	🖃 🔋 DP4801	General Settings	
	General Settings		
	💜 Accessories	Top CWID Audio Profile Microphone Backlight Battery Saver Alerts Over-the-Air Programming Persistent LRRP Requests Lone Worker	Power Up
	Buttons	Password and Lock Front Programming Password Delete All 5 Tone Radio ID	
	Text Messages		
	101 Telemetry	Radio Name Motorola	
	Security		
	Security Network	Select.	
	Announcement	Welcome Image	
	Job Tickets	Remove	
	🗄 📄 Signaling Systems		
	🕀 💼 Encoder		
	🕀 💼 Decoder	Radio ID 100	
	E Contacts	GNSS 🔽	
	🕀 💼 RX Group Lists	GNSS cociose	
	Channels	GP3(223 ·	
	the scan	Private Calls 🔽	
	H Roam	Site Search Timer (sec)	
	term capacity MUS		~

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.

MOTOTRBO Customer Programming S	Software	e - [Sample.ctb]						-	
Eile Edit View Device Feature RM Open Save Reports Delete	res <u>F</u> % E	Bemote <u>W</u> indow <u>H</u> elp ⓑ ाऀ ♀ ▶ ♥ ▶ ● opy Paste Search Read Write	e Clone Blue	B etooth	Ŧ				- 8 ×
DP4801 General Settings					С	apacity Plu	S		
Accessories		Contact Name	Call ID	Route Type	Call Receive Tone	Ring Style	Text Message Alert Tone		
1 Telemetry	►C88	Group1	1 ÷	Regular		No Style	Repetitive		
🔚 Menu	Coô	Group2	2 ÷	Regular		No Style	Repetitive	-	
Security	CØ	All Call	255 ÷	N/A	~	No Style	Repetitive	-	
Network	60	Dispatcher Voice	1 ÷	N/A		No Style	Repetitive		
Contacts	C	Dispatcher Data	1 🕂	N/A		No Style	Repetitive		
MDC	Côô	Group3	3 ÷	Regular		No Style	Repetitive		
🕀 💼 Quik-Call II	Caô	Group4	4 ÷	Regular		No Style	Repetitive		
⊕ ■ Digital ⊖ ■ Opposity Plus ⊖ ⊕ ⊕ ↓ ⊕ ⊕<									

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 <u>SmartPTT Radioserver Configuration</u>).

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.

I MOTOTRBO Customer Programming S	oftware - [Sample.ctb]		– 🗆 X
Eile Edit View Device Feature Image: Constraint of the state RM Open Save Reports Delete	es Bemote Window Help 从 唱	*,	_ & ×
DP4801		LCPSite3-31	
		TOD RX TX Color Code 1 ÷	
💷 Telemetry		Phone System None	
	RX		TX
	Frequency (MHz) 136.025000 Ref Frequency Default	Offset (MHz) 5.000000 Copy Ref Frequency	e) 136.025000

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.

MOTOTRBO Customer Programming Software - [Sample.ctb]			– 🗆 X
Ele Edit View Device Fegtures Remote Window Help Image: Second			- 8 ×
Revi Operi Save Reports Delete Cut Copy Paste Search Read write Curle E ☐ DP4801 ☐ @ DP4801 ☐ @ Accessories	LCP	Site1	
Image: Security	Available LCPSite2.21 LCPSite3.31 LCPSite3.32 Add >> << <u>Removi</u>	Members IDs LCPSte1-11 1-2 3.4 5-6 7-8 9-10 11-12 13-14 15-16	

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.

MOTOTRBO Customer Programming S	Software - [Sample.ctb]	– 🗆 X
File Edit View Device Feature	ures <u>R</u> emote <u>Wi</u> ndow <u>H</u> elp	_ 8 ×
Image: Constraint of the second se	K Image: Constraint of the second s	
DP4801	LCP Site1	
Accessones Buttons Text Messages	RSSI Threshold (dBm) -108 ÷	
- I elemetry - T Menu - Grow Security - T Network	Site ID Site Alias Voice List Data List RX Group List Image: Site 1 LCP Site 1 None None	
 ➡		
Cranites		
Capacity Plus Capacity Plus Capacity Plus Capacity Plus Capacity Capaci		

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.

MOTOTRBO Customer Programming Sof	ftware - [Sample.ctb]			-	D X
Elle Edit View Device Feature:	us <u>R</u> emote <u>W</u> indow <u>H</u> elp	Vrite Clone Bluetooth	*		- 8 ×
DP4801			LCP Sites		
Accessories Buttons Text Messages Telemetry			RSSI Threshold (dBm) -108 -		
Menu Security Security Signaling Systems Contacts C	Site ID ▶ 1 1 1 1 1	Ste Alias Voice List Ste1 LCP Ste1 Ste2 LCP Ste2 Ste3 LCP Ste3	/ Data List None None None	RX Group List LCPVoice LCPVoice LCPVoice	

 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.

Linked Capacity Plus

MOTOTRBO Customer Programming	Software - [Sample.ctb]	– 🗆 X
File Edit View Device Feat	ures <u>R</u> emote <u>W</u> indow <u>H</u> elp	_ 8 ×
RM Open Save Reports Delete	K Ban Cut Copy Paste Search Read Write Cione Bluetooth	
🖃 🏮 DP4801	L CP Site1	
General Settings	LOF Site I	
	TOP RX TX	
Buttons		
🖂 Text Messages	ARS On System/Site Change 🔻	
Telemetry		
🔁 Menu	Plivacy	
Security	Privacy Alias Privacy Key1 -	
Network		
🗄 💼 Signaling Systems	None V	
E Contacts	Option Board	
RX Group Lists		
Channels	LUIB WORKER	
E Zone1	Messaging Delay (ms) 150 +	
CO LCP Site1	Compressed UDD Date Monday	
CO LCP Site2	Compressed ODP Data Header None V	
CP Site3	Auto Roam 🔽	
H. Channel Pool		
E Scan	Site List LCP Sites	
H Roam	Rest Channel Acquisition TOT (min) 17	
the Capacity Plus		

- 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**.

MOTOTRBO Customer Programming S	joftware - [Sample.ctb]		-	- 🗆 X
File Edit View Device Feature	ires <u>R</u> emote <u>W</u> indow <u>H</u> elp			_ @ ×
RM Open Save Reports Delete	K Ea Call NR H H I <thi< th=""> <thi< th=""> I <thi< th=""></thi<></thi<></thi<>			
DP4801		LCP Site1		
		Top RX TX		
Buttons				^
Text Messages	RX		ТХ	
- E Menu	Emergency Alarm Indication	Contact Name	Group1	
Network	Emergency Alarm Ack	Emergency System	Suel	
🗄 💼 Signaling Systems	Emergency Call Indication		5,51	
E Contacts		VOX		
RX Group Lists		Power Level	Low	
Channels		TOT (sec)	60 🔹	
LCP Site1		TOT Rekey Delay (sec)	0 🔹	
LCP Site3		Allow Interruption		
Em 🎲 Channel Pool		TX Interruptible Frequencies		
E Scan		Admit Criteria	Channel Free	-
E Capacity Plus				-
		In Call Criteria	TX Interrupt	
		RSSI Threshold (dBm)	-124 ÷	
		Private Call Confirmed		
		Data Call Confirmed		

35

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.

MOTOTRBO Network Inte	rface Service Co	onfiguration Utility 📃 🗖 🔀
Configuration View Edit	Service Help	
*	00	2
111		General
Group List		System Operation Mode 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.

MOTOTRBO Network Interface Service C	onfiguration Utility *
Configuration View Edit Service Help	
	2
-= - 111	Advanced
General General Group List Group List Conventional Co	Data Call Confirmed Compressed UDP Data Header Battery Saver Preamble Battery Saver Preamble Individual Data to Registered Site TX Preamble Duration (ms) 120 Conventional Channel Access
Application Override Rules	MNIS LE ID Use MNIS ID Manually Assigned 3

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**).



 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).

MOTOTRBO Network Interfac	ce Service Configuration Utility *	🐔 MOTOTRBO DDMS
Configuration View Edit	Service Help	File Action Help
1		C C
E Untitled	Network	ARS Settings PassiveMode Off
🚥 General 🗫 Security	CAI Network 12 🛫	
Conventional	CAI Group Network 225 😓	PortSU Port listening for inbound ARS messages.
Linked Capacity Plus	Services	Range: 1000 - 65535
Advanced	ARS UDP Port 4005	Settings for ARS/SU interface .::
Forwarding Rule	TMS UDP Port 4007	

6.3 SmartPTT Radioserver Configuration

- 1. Run SmartPTT Radioserver Configurator, which you have downloaded and installed, as described in <u>SmartPTT Software Installation</u>.
- In the setting tree on the left, right-click on NAI Systems, point to Add and click
 NAI Linked Capacity Plus.

🎯 Sma	rtPTT Serve	er Configur	ation - C:\Program File	es (x86)	\SmartPT	T\Serve	r\Rad	lioService.exe.com	fig	_		×
Settings	Networks	Client List	Network Configuration	Rules	Activity	Log	Ехф	ort/Import Settings	Statistics			
Control Stations Connect Plus NAI Systems NAI Systems NAI Systems NAI - Linked Capacity Plus 1 Sites Talkgroups Security Settings MNIS Data Gateway Capacity Max Networks SIP/RTP Interfaces		IN F IN F	NAI - Linked Capacity MAI - Linked Capacity Mame Network ID Peer ID Interface Master repeater address (IP Address:Port)			Import Settings Statistics Import Settings Statistics Import Index In						
				Authenticati	on key							
			6	Voice tr	ansmissi	on	Repeaters			~		
				0	Group call h	ang time	, ms			3000	-	
				F	Private call	hang tim	e, ms			4000	-	
			F	Preamble du	uration, r	ıs			180	-		
				1	Max Numbe	r of Sim	Iltane	ous Telephone Calls	3	100	-	
				6	🗸 Data tra	insmissio	n					
				6	✓ Monitori	ng						

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.

🎯 Sma	rtPTT Serve	er Configur	ation - C:\Program File	- C:\Program Files (x86)\SmartPTT\Server\RadioService.exe.config —						×	
Settings	Networks	Client List	Network Configuration	Rule	es Activity	Log	Export/Import	Settings	Statistics		
	Control Stati Connect Plu NAI System NAI-Lin Slot Capacity Ma SIP/RTP In	ons is ked Capacit Sites Talkgroups Security Set MS Settings IS Data Gate ax Networks terfaces	y Plus 1 tings eway		NAI Contr Active Name S Radio ID CAI Netwo CAI	ol Station ot 1 rk rk for Grou relephone ut Timer, s rgency ala r transmit in ansmission d Events re calls	n 65535 12 ups 225 Interconnect 60 m confirmed nterrupt Mode Data		<u>↓</u>	~	

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.

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

🎯 SmartPTT Server	Configur	ation - C:\Program File	es (x8	6)\SmartPT	T\Serve	r\RadioService.exe.co	nfig	_		×
Settings Networks (lient List	Network Configuration	Rule	s Activity	Log	Export/Import Settings	Statistics			
Control Station	IS			MNIS Data	Gatew	ay				
NAI Systems				Socket Typ	в		Local Socket		~	
inke in°¶° Slot 1	ed Capacit	y Plus 1		Interface			192.168.56.1		~	
Site Tr	tes alkarouns			MNIS Contro	ol Interfa	ce	loopback:5500	0		
se se	curity Set	tings		MNIS ID			1	* *		
				Location Po	rt		4001	•		
Capacity Max	Capacity Max Networks			TMS Port			4007	-		
				Telemetry P	ort		4008	•		
🎯 SmartPTT Server	Configur	ation - C:\Program File	es (x8	6)\SmartPT	T\Serve	r\RadioService.exe.co	nfig	_		×
Settings Networks (lient List	Network Configuration	Rule	s Activity	Log	Export/Import Settings	Statistics			
Control Station	IS			DDMS Settings						
NAI Systems				Active						
NAI- Linke	d Capacit	y Plus 1		Server Add	ess lo	calhost:3000				
Site Site Site Site Site Site Site Site	tes Ikaroups									
Se Se	curity Set	tings								
	Data Gate	eway								
Capacity Max	Networks faces									

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:

MOTOTRBO Network Interface Service	e Configuration Utility	
<u>Configuration View Edit Service H</u> el	p	
-🖃 🛑 111	ARS Monitor ID None 🤤	~
🛲 General		
Security	Device Discovery and Mobility Service	
😨 🥽 Group List 🗊 😋 Conventional	Server Address 127.0.0.1	
	Watcher Port 3000 🗢	
🖨 🥌 Advanced	MNIS Control Interface	
Forwarding Rules	MNIS Control Interface TCP Port 55000	
		≡
		~
	K	

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.

MNIS Socket Type MnisControl Interface Interface	Local Socket v localhost:5000 192.168.50.2 1 v	MOTOTRB0 Network Interface Service Configuration Utility Configuration View Edit Service Help
MNIS ID	1 2	General General
Location Port TMS Port Telemetry Port	4001 4007 4008	Image: Convertional System Operation Mode Linked Capacity Plus Image: Convertional System Operation ID 1
		Capacity Plus Tunnel Network
		Linked Capacity Plus MNIS IP Address 192.168.50.1 Advanced Tunnel IP Address 192.168.50.2 Subnet Mask 255.255.255.0

- 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**).

	S MOTOTRBO DDMS
DDMS Server Address 192.168.37.13 3000	File Action Help Image: Image
	Service Matcher Settings PortWatcher 3000 Watcher TO 14400 NotifyGroup 0

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

Connect Plus

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.

SmartPTT Server Configuration - C:\Program Files	(x86)\SmartPTT\Server\Radi	oService.exe.config	_				
Settings Networks Client List Rules Activity Log	Export/Import Settings Statis	stics					
Control Stations	XRT Gateway						
	Active	Active					
XRC Controllers XBT VoiceGateways	Name	XRT Gateway 1					
ART Gateway 1	Gateway Address:Port	remotehost:10001					
NAI Systems	Pool IDs	Pool IDs 16000001-16000010					
SIP/RTP Interfaces	Usemame						
	Password						
	TX Time-Out Timer, s		60 🌲				
	Group Call Hang Time, ms		4000 🖨				
	Private Call Hang Time, ms	ł	6000	-			
	Emergency Call Hang Time	e, ms	8000 🖨	-			

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

MOTOTRBO	™ Connect Plus XRC 9000) Network Manager - Versio	on R01.40.17.0 Logged	in as: Admin			
Disconnect	Site Dashboard (Open)	Settings Site Control	Real Time Display	Network Alerts/A	larms Logs Windo	ws User Group	Multigroup Help
ਚਿ 🔂 😼 🖢	🛃 🗙 🏦 Search 🗌	Clear					
UserReg							
Record Type	ID	Alias	Priority	Status	Serial Number	Multigroup ID	Notes
User	101	Disp 101	8	Enabled	037TMLV000	1000	
User	102	Disp 102	8	Enabled	037TMLV001	1000	
User	201	201	8	Enabled	037TMLV348	1000	
User	202	202	8	Enabled	037TMLV343	1000	
User	403	403	8	Enabled	037TMT1829	1000	
User	16000001	XRTClient	8	Enabled		1000	
User	1600002	XRTClient	8	Enabled		1000	
User	16000003	XRTClient	8	Enabled		1000	
User	16000004	XRTClient	8	Enabled		1000	
User	16000005	XRTClient	8	Enabled		1000	
User	16000006	XRTClient	8	Enabled		1000	
User	16000007	XRTClient	8	Enabled		1000	
User	16000008	XRTClient	8	Enabled		1000	
User	16000009	XRTClient	8	Enabled		1000	
User	16000010	XRTClient	8	Enabled		1000	
Group	1001	Group 1	8	Enabled			
Group	1002	Group 2	8	Enabled			
Group	1003	Group 3	8	Enabled			
Multigroup	1000	1000	8	Enabled			

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

Disconnect Settings Site Control Network Logs Windows Help XRT 9000 User Configuration	
XRT 9000 User Configuration	
XRT 9000 User Configuration	• ×
Username Max Talk Paths Billing Enable NWAC Enable Data Path R Group Talk Paths Private Talk Paths User Details	
xittestuser 10 False True False 1000-1003 101	_
Username xrttestuser	
Password •••••	
Confirm Password	
Max Talk Paths 10	
Billing Enabled	
Vetwork Wide All Call (NWAC) Enabled	
Data Path Registration Enabled	
Group Talk Paths	
Group ID 1000-1003	1
Private Talk Paths	
Console User ID 101	1
New Save D	elete

- 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.

SmartPTT Server Configuration - C:\Program Files	(x86)\SmartPTT\Server\Radio	Service.exe.config $-\Box$ X
Settings Networks Client List Rules Activity Log	Export/Import Settings Statis	tics
Control Stations	Connect Plus	
Connect Plus 1	Active	
* XRT VoiceGateways	Name	Connect Plus 1
NAI Systems	Network ID	1
Capacity Max Networks	Peer ID	1
SHATT Intendoes	Radio ID	101
	Interface	Any ~
	UDP Start Port	19000

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

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 <u>SmartPTT Software Installation</u>.
- 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.

SmartPTT Server Configuration - C:\Program Files (_		×								
Settings Networks Client List Network Configuration Re	ules	Activity	Log	Export/Import Setting	s Statistics						
Radio Server		Licenses	6								
Radio Network Services	I	Licensed to: SmartPTT PLUS 9.1									
Add-on Modules	ι	License kej	y ID:								
		Contacts:									
⊕		Address:									
_		Support exp	piration d	ate: 4/19/2018							
		License			Quantity	Expiration Date	^				
		Indoor Tra	cking		1	1/31/2018					
		Connect Plus Voice Support 1				1/31/2018					
		Connect P	lus Data	Support	1	1/31/2018					
		NAI Voice	for IP Sit	e Connect	2	1/31/2018					
		NAI Voice	for Capa	city Plus	2	1/31/2018					
		NAI Voice	for Linke	d Capacity Plus	2	1/31/2018					
		GPS Positi	oning		1	1/31/2018	~				
						1					
	μ	Chang	ge Licen	se							
		Activation									
		Hardware	ID								
						_					
			Collect		Сору						

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

🎯 Sma	SmartPTT Server Configuration - C:\Program Files (x86)\SmartPTT\Server\RadioService.exe.config									×
Settings	Networks	Client List	Network Configuration	Rules	Activity	Log				
	Control Stati Connect Plu NAI Systems Capacity Ma SIP/RTP In	ons s Ada ax Networks terfaces	d	<u> </u>	onnect P	lus				

The **Connect Plus** window appears:

🎯 Smartl	PTT Serve	r Configur	ation - C:\Program File	es (x86)\	SmartPT	T\Serve	r\RadioService.exe.con	fig	_	\times
Settings N	Vetworks	Client List	Network Configuration	Rules	Activity	Log	Export/Import Settings	Statistics		
	Connect Plus Connect Plus XRC XRT XRT Secu Al Systems apacity Ma IP/RTP Int	Plus 1 Plus 1 Controllers VoiceGater unity Settings k Networks erfaces	ways s	F F	Active Active Name Network ID Peer ID Radio ID Interface	Port	Connect Plus 1 1 1 1 1 Any 19000		×	

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.

tings	Networks	Client List	Network Configuration	Rules	Activity	Log	Export/Import Settings	Statistics		
	Radio Serve Licenses	er		P	rofile					
Ż	Radio Netw	ork Services	1	Na	ame		Profile 1			
1	Profiles	ules			Limit Radios	s to Serv	ice			
	Radio Group	os			Enable	ed		Example: 1-9	9, 150	
- J	Metadata				Allowed ra	dio ID's		1-16776415		
					Expand	I Ali	Collapse All	💧 🖕 U	p	- Down
					⊡ F	ect Plus D: 1 Private c	1 alls			
					<u>⊜</u>	Radio Ne ØARS ØGPS	twork Services			

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:

SmartPTT Server Configuration - C:\Program Files (x8)	6)\SmartPTT\Server\RadioService.exe	e.config — 🗆 X								
Settings Networks Client List Network Configuration Rule	es Activity Log Export/Import Set	tings Statistics								
Control Stations	XRC Controller									
Connect Plus 1	Active									
RC Controller 1	Name	XRC Controller 1								
XRT VoiceGateways	Controller Address	remotehost								
Security Settings	PN, TMS, GPS									
Capacity Max Networks	Controller Port	4005								
	Local Port	50005								
	TMS									
	Controller Port	4007								
	Local Port	50007								
	GPS									
	Controller Port	4001 🖨								
	Local Port	50001 🚔								
	Monitoring									
	Controller Port	38000 🖨								
	Local Port	38000								
	Use NAT									

- 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** \rightarrow **Add-on Modules** \rightarrow **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**.

🎯 Sma	When the server Configuration - C:\Program Files (x86)\SmartPTT\Server\RadioService.exe.config										×
Settings	Networks	Client List	Network Configuration	Rules	Activity	Log	Export/Import Settings	Statistics			
	Control Stati Connect Plu Connect XRC XRC XRC XRC Sec NAI Systems Capacity Ma SIP/RTP Int	ons s t Plus 1 C Controllers VoiceGater unity Settings s x Networks terfaces	Add	x	RT Voice	Gatewa	ys				

The XRT Gateway window appears:

SmartPTT Server Configuration - C:\Program Files ((x86)\SmartPTT\Server\RadioServi	/ice.exe.config	– 🗆 X
Settings Networks Client List Network Configuration Ru	ules Activity Log Export/Imp	oort Settings Statistics	
Connect Plus Connect Plus 1 Connect Plus 1 XRC Controllers XRT VoiceGateways XRT Gateway 1 Talkpaths Security Settings NAI Systems Capacity Max Networks SIP/RTP Interfaces	XRT Gateway Active Name XRT Gateway Address:Port remo Pool IDs 160 Usemame	T Gateway 1 iotehost:10001 000001-16000100	
	TX Time-Out Timer, s Group Call Hang Time, ms Private Call Hang Time, ms Emergency Call Hang Time, ms	60 4000 6000 8000	

- 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):

r				Site C	onfiguration				
SmartPTT Server Configuration - C:\Pro	gram Files (x86)\SmartPTT\	Server\RadioService.exe	e.config	Config	juration				
Settings Networks Client List Network Cor	figuration Rules Activity	Log Export/Import Se	ettings Statistics			Critical Se	ettings		-
Control Stations	XRT Gateway								
Connect Plus 1	Active	VPT 0 / 1			WARNING: XRT 9000.	Changes to this se	ection will requi	re a reboot of	
R Controller 1	Name	XRT Gateway T			- Site Configu	ration			
Talkgroups	Gateway Address:Port	remotehost:10001			Local Site ID	,	255		
ART Gateway 1	Pool IDs	16000001-16000010			Connect Plu	s Network ID	298		
R Security Settings					Network Co	nfiguration			
Capacity Max Networks	Usemame				Multisite UDI	P Start Port	46000		
SIP/RTP Interfaces	Deserved				Max Multisite	Ports	32		
	Fassword				Multisite Ping	g Int.	2500	ms.	-
					Multisite Con	trol Port	45000		
					Client TCP P	ort	10001		
	TX Time-Out Timer, s		60 🌲		Client UDP 9	Start Port	7700		
	Group Call Hang Time, ms		4000 🌩		NTDO				
	Private Call Hang Time, ms		6000			uration			
						vei			
	Emergency Call Hang Time	e, ms	8000 🚖		NTP Server.	Address			
					NTP Update	Interval	60000	ms.	
					Pool ID Con	figuration			
					Pool ID	1600001 10	000010		
					POOLD	1000001-16	000010		
					-				1

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**).

🎯 SmartPTT Server Configuration - C:\Program Files ()	<pre><66)\SmartPTT\Server\RadioSer</pre>	vice.exe.config	_	×
Settings Networks Client List Network Configuration Ru	Iles Activity Log Export/Im	nport Settings Statis	tics	
Control Stations	Talkpaths			
Connect Plus 1	All Call			
XRT VoiceGateways XRT Gateway 1 Talkpaths	Name	Туре	ID	
R Security Settings	Group 1	Group 🗸	1000	
NAI Systems	Group 2	Group ~	1001	
SIP/RTP Interfaces	Group 3	Private 🗸	1002	

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:

SmartPTT Server Configuration - C:\Program File	es (x86)\SmartPTT\Server\RadioService.exe.config — 🗌 刘	×
Settings Networks Client List Rules Activity Log	Export/Import Settings Statistics	
Control Stations Connect Plus NAI Systems Capacity Max Networks Capacity Max 1 Trunking Controller MNIS Data Gateway MNIS VRC Gateways MNIS VRC Gateways Security Settings SIP/RTP Interfaces Smart PTT Radioservers	Capacity Max System Active Name: Capacity Max 1 Network ID: 1 Radio ID: 1 Interface: Any Trunking Controller ✓ MNIS Data Gateway ✓ MNIS VRC Gateways Data Data Transmission Options GPS transmission Options GPS transmission Options TX Interrupt Prioritize calls during emergency Encrypted connection Channel Grant Waiting timer (s): 15 🔹 TX time-out timer (s): 60 🔹	

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** (**\square**) \rightarrow **Manage** \rightarrow **Capacity Max System Server Data** or press Ctrl+Alt+S.

🚾 Radio Management								- 0	×
									1
Capacity Max System Server Data 🔸 Subscrib.	s Cont	trol							
Capacity Max Systems	Viev	v by: 🔳 Subscrib	er Access Control	Talkgroup Site A	ssociation				
Systemi		• • •	ß						Q , ~
		Device Type	Radio Alias 🗜	Serial Number 보	Physical Serial Number	÷	Device ID 👎	Enabled on System	÷
	\rightarrow	Console		0	0		4000009		
	->-	Console		0	0		4000004		
		Console		0	0		4000010		

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

Trunking Controller: Select to allow the connection to <u>Trunking Controllers</u>.

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** (\square) \rightarrow **Manage** \rightarrow **Configurations** or press Alt+C. In the open table, select the CMSS configuration and click **Edit** \checkmark . In the open **Set Categories** pane, expand **Configuration:<CMSS configuration name>** and select **Capacity Max Features**.

📠 Radio Management									-		×
Configuration View + CMSS01 + Capacity Max Systems + Syste	em1							I	₿	8	1
Set Categories 4						Save	Save As	Discard	0	Close	
Device Information: USE519PLXA		General	Authentication	Timers	Capacit	y Max Sites	Adjacent Sites	Site Announcemen	it		
 Capacity Max Features 		User Name	e Verification Appli	cation							
Capacity Max Systems: CapacityMaxSystem											
Capacity Max Site Selection: VoiceMNISSite	 Timers 										•
CMSS Network: Network-101			Channel Grant Wa	aiting Timer	(sec)	15					-
Gridge			Response W	aiting Timer	(sec)	4.0					
			Group Call	l Hang Time	(sec)	3					
			Private Call	l Hang Time	(sec)	4					

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 <u>Capacity Max Features</u> menu of the CMSS configuration, the **Individual Voice Call Type** field in the **General** tab).

📠 Radio Management								- C	×
									1
Configuration View CMSS01 Capacity Max Systems Systems	stem1								
Set Categories 4					Save	Save As	Discard	Close	
Device Information: USE519PLXA		General	Data Revert	Authentication	Timers	Channel Plan Lists	Capacity Max Sites		
 Capacity Max Features Capacity Max Systems: CapacityMaxSystem 	🔿 General								•
Capacity Max Site Selection: VoiceMNISSite		System Name System1							
				System Type	Capacit	ty Max Advantage		•	
► ☐ Bridge				Network Model	Large			•	
				Network ID	1			▲	
			Individ	ual Voice Call Type	FOACS	U			-

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 (\square)** \rightarrow **Manage** \rightarrow **Configurations** or press Alt+C. In the open table, select the CMSS configuration and click **Edit (** \checkmark **)**. In the open **Set Categories** pane,

expand **Configuration: <CMSS configuration name>** and select **MNIS** \rightarrow **MNIS System**.

🚾 Radio Management						:
Configuration View + CMSS01 + MNIS System + MNISSystem	n-101					e 7 1
Set Categories ₽ ▼ □ Configuration: CMSS01 □			Save .	Save As	Discard	Close
Capacity Max Features		Ge	eneral			
MNIS System: MNISSystem-101		Set Name Last Modified Date	MNISSyst	em-101 1 <i>6 13:35:06</i>		
Bridge		Comments				
	🔿 General					
		VRC Gateway Enable	✓			
		MNIS Gateway UDP Port	50000			
		Transmission TOT (sec)	60			
		Active Voice Talkpath Limit	20			

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.

痛 Radio Management								- 🗆	×
Configuration View	TVZSystem1							i T	1
Set Categories Configuration: 478IRC0016					Save	Save As	Discard	Close	
Device Information: 478IRC0016		General	Data Revert	Authentication	Timers	Channel Plan Lists	Capacity Max Sites		
General									
Capacity Max Features Capacity Max System 1 items found (1 currently selected). Cone/Channel Assignment									
	🔿 Data	Revert							
			Enhanced (GNSS Window Size	10			•	-

• **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*.

Capacity Max

📠 Radio Management					- 0	×		
Configuration View + CMSS01 + CMSS Network + Network-	101					1		
Set Categories 4		Save	Save As	Discard	Close			
Device Information: USE519PLXA								
 Capacity Max Features Capacity Max Systems: CapacityMaxSystem 	🔿 General					*		
Capacity Max Site Selection: VoiceMNISSite	Trunking Controller Enable	\checkmark						
CMSS Network: Network-101	CMSS IP	192.0.2.0						
Bridge	CMSS UDP Port	50000						
	Trunking Controller IP	192.0.2.1:500	000					
	Presence Server IP	192.0.2.1:500	015					
	VRC Gateway IP	192.0.2.4						
	System Advisor IP	192.0.2.5						

- 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.

🎯 Sma	🥎 SmartPTT Server Configuration - C:\Program Files (x86)\SmartPTT\Server\RadioService.exe.config — □ ×												
Settings	Networks	Client List	Rules	Activity	Log	Export/Import Set	tings	Statistics					
	Control Stati Connect Plu NAI Systems Capacity Ma Capacity Ma Capacity Ma Trur Capacity MNI MNI MNI Capacity Trur Stati	ons Is ax Networks <mark>v Max 1</mark> Iking Contro IS Data Gate IS VRC Gate MNIS VRC (cgroups urity Settings terfaces Radioservers	ller eway eways Gateway s	1		Capacity Max Active Name: Network ID: Radio ID: Interface: Trunking C MNIS Data MNIS VRC	Capa 1 1 Any Controll Gate	item acity Max 1 ller sway ways			~		

68

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.

ngs Networks	Client List	Rules	Activity	Log	Export/Import Settings Statistics							
Control Stati	ions Is				Trunking Controller							
Capacity Max Networks					Primary controller (IP Address:Port) remotehost:50015							
Capacity Max 1 Trunking Controller MNIS Data Gateway MNIS VRC Gateways MNIS VRC Gateway 1 Talkgroups Security Settings					Add Remove Powr							
					Name	IP Address:Port						

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.

🚾 Radio Management				_		×
Configuration View CMSS01 Capacity Max Systems TVZSys	tem1			Ħ	T	1
Set Categories 4		Save	Save As	Discard	Close	
Device Information: USE519PLXA	General Authentication Timers C	Capacity Max Sites	Adjacent Sites	Site Announcement		
Capacity Max Features	User Name Verification Application					
Capacity Max Systems: Capacity MaxSystem Capacity Max Site Selection: VoiceMNISSite CMSS Network: Network-101 MNIS Ridge	Primary Trunking Controlle Primary Trunking Controller UDP F Call Monitor Application 1 UDP F Call Monitor Application 1 UDP F Call Monitor Application 2 UDP F Call Monitor Application 2 UDP F Call Monitor Application 3 UDP F Voice Interrupt Supp	er IP 192.0.2.1 Port 50000 1 IP 192.0.2.5 Port 51112 2 IP 0.0.0.0 Port 51112 3 IP 0.0.0.0 Port 51112 port \$				
<	Telephone Supp	port 🖌				-

- 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.

💱 SmartPTT Server Configuration - C:\Program Files (x86)\SmartPTT\Server\RadioService.exe.config — 🛛 🗙											
Settings Networks Client List Rules Activity Log	Export/Import Settings Statistics										
Control Stations	Trunking Controller										
AI Systems	Primary controller (IP Address:Port) 192.0.2.1:50015										
Capacity Max 1	Add Remove Add Remove										
MNIS VRC Gateways Talkgroups Security Settings SIP/RTP Interfaces	Name IP Address:Port										

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.

SmartPTT Settings Netwo	Server Configu vorks Client List	ration - (Rules	C:\Progra	am Files	(x86)\SmartPTT\Server Export/Import Settings	\RadioService.exe	e.config	-		×			
Contr	ol Stations ect Plus				Trunking Controller								
Partial SiP/f	ystems city Max Networks apacity Max 1 Trunking Contro MNIS Data Gat MNIS VRC Gat Talkgroups Security Setting TP Interfaces	s Joller ieway eways js			Primary controller (IP Redundant control Add Name Redundant control	Address:Port) lers Remove	192.0.2.1:50	Jp	Down				

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 Θ 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.

SmartPTT Server Configuration - C:\Program Files	(x86)\SmartPTT\Server\RadioService.exe.conf	ïg − □ ×						
Settings Networks Client List Rules Activity Log	Export/Import Settings Statistics							
Control Stations	Trunking Controller							
NAI Systems	Primary controller (IP Address:Port) 192.0.2.1:50015							
Capacity Max 1	Redundant controllers Add Remove	👚 Up 🛛 🐺 Down						
MNIS VRC Gateways MNIS VRC Gateways MIS vrc gateways	Name	IP Address:Port						
Security Settings	Redundant controller 1	192.0.2.1:50016						
SIP/RTP Interfaces	Redundant controller 2	192.0.2.1:50017						
	Redundant controller 3	192.0.2.1:50018						

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**.

SmartPTT Server Configuration - C:\Program Files	(x86)\SmartPTT\Server\RadioService.exe.config	– 🗆 X						
Settings Networks Client List Rules Activity Log	Export/Import Settings Statistics							
Control Stations	Trunking Controller							
Al Systems Capacity Max Networks	Primary controller (IP Address:Port) 192.	0.2.1:50015						
Capacity Max 1	Add Remove	👚 Up 🛛 🏺 Down						
Talkoroups	Name	IP Address:Port						
Security Settings	Redundant controller 1	192.0.2.1:50016						
SIP/RTP Interfaces	Redundant controller 2	192.0.2.1:50017						
	Redundant controller 3	192.0.2.1:50018						
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 \rightarrow Capacity Max \rightarrow MNIS Data Gateway.

🎯 SmartPTT Server Configuration - C:\Program Files ((x86)	\SmartPT	T\Serve	r\RadioService.exe.	onfig	_		×
Settings Networks Client List Network Configuration R	ules	Activity	Log	Export/Import Settin	gs Statistics			
Control Stations	М	INIS Data	Gatew	ay				
NAI Systems Capacity Max Networks Capacity Max 1 Trunking Controller	Si	ocket Typ nterface	e		Local Socke 192.168.56.	st 1	~	
	м	INIS Contro	ol Interfa	ce	loopback:55	6000		
MNIS VRC Gateways Talkgroups	M L	INIS ID ocation Po	rt		1 4001	÷		
SIP/RTP Interfaces	Т	MS Port			4007			
		elemetry P	ort ndant M	NIS data gateway —	4008	•		
		Socket Ty	/pe		Remote Soc	cket	~	
	MNIS Control Interface (IP Address			face (IP Address:Port	loopback:55	5001		
		MNIS Rel	ay Addre	ess (IP Address:Port)	remotehost:	8890		
		Location F	Port		4011	-		
		TMS Port			4017	-		
		Telemetry	Port		4018	-		

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).

📾 Radio Management					-		×
Configuration View + DataMNIS01 + MNIS Network + MNISN	letwork-102				₿	T	1
Set Categories	etwork-102	Save General	Save As	Discard		Close	
Capacity Max Features MNIS	TMS UDP Port	4007					*
MNIS Security: MNISSecurity-101 MNIS System: MNISSystem-102	Telemetry UDP Port Location Server UDP Port	4008					
MNIS Advanced: MNISAdvanced-102	User Defined UDP Port 1	0 - Disable	d				
MNIS Forwarding Rules MNIS Application Override Rules	User Defined UDP Port 2 User Defined UDP Port 3	0 - Disable	.d				
MNIS Sites: MNISSitesList-101	XCMP High Efficiency Data Enable XCMP Server UDP Port	4004					Ш
	Battery Management UDP Port	4009					11
	Control Interface TCP Port	55000					
·	Job Ticket UDP Port	4013					-

NOTE

To open the **MNIS** menu of the DataMNIS configuration in the *Radio Management* application, click **Action (** \square **)** \rightarrow **Manage** \rightarrow **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>** \rightarrow **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).

🚾 Radio Management		– 🗆 X
		a T
Configuration View DataMNIS01 MNIS System MNISSy	stem-102	
Set Categories 무	Save Save As Discard	Close
Device Information: DATAMNIS01	General Tunnel Network Location Radio ID Range List	
Capacity Max Features		
V MNIS	General General General General Second S	^
MNIS Security: MNISSecurity-101	Data Gateway Radio ID 300	
MNIS System: MNISSystem-102 🔅	Data Gateway Nadio 10 500	
MNIS Advanced: MNISAdvanced-102	MNIS Gateway UDP Port 50000	_ 🖸
MNIS Network: MNISNetwork-102	Enhanced Data Enabled 🗹	
MNIS Forwarding Rules	Data Gateway Queue Size 25	
MNIS Application Override Rules	TX Privacy Type None	
MNIS Sites: MNISSitesList-101	TX Privacy Alias None	

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:

 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**.

🚾 Radio Management				-	
				Ħ	T
Radio View					
Groups 7		Show Details	Edit Configuration	Analyze Sch	edule Job
Infrastructure	◢⊕⊝⊙◪◪	Cut	Ctrl+X		Q , ~
Radios	Serial Number Radio Alias Configura	Сору	Ctrl+C	mware Version Codeplug Versio	n Job Statu
Repeaters	USE519PLXA Motorola CMSS01	Paste	Ctrl+V	03.00.00	Completec
	DATAMNIS01 Motorola DataMNIS0			02.00.00	
	MXQ62407XL Motorola CMSS02	Show Details	Ctrl+W	03.00.00	Completec
		Select Group	Dei Chris Alts G		
		Select Group	CITTAILEG		
		Edit Configuration	Ctrl+F		
		Select Configuration	Alt+Shift+F		
		Compare	•		
		Select IP System Settings			
	•	Schedule Job	Ctrl+J		•
	3 items found (1 currently selected).	Cancel Job	Alt+Shift+J		
Analyze Results Compare Results Tasks(3	3*)	Salact MVO	Alt+Shift+V		
CONNECTED TO: LOCALHOST		Analyze	Alt+Shift+S		
		Reports			
		Upgrade Firmware			
		Package	Ctrl+Alt+P		
		Upgrade Language Pack	Ctrl+U		
		Export		Radio Ctrl+Shift+	R
		Modify Radio Password		Grid to File Ctrl+Shift+	s
				GWCFGX Ctrl+Shift+	N
		Copy Identity			
		Paste Identity			

- 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*.
- 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.

MOTOTRBO Network Interface S	ervice Configuration Utility	_	\times
Configuration View Edit S	arvice Help		
4	Select Configuration — — X		
	Select Configuration		
	CapacityMax.gwcfgx OK Cancel		

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.

🎯 MNIS Data G	-	_	×		
MNIS interface:	192.168.1.1	\sim			
Server interface:	192.168.1.1	\sim	Port	8890	•

- 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**.

tings Networks Client List Rules Activity Lo	g Export/Import Settings Statistics	
Control Stations	MNIS Data Gateway	
MAI Systems	Socket Type	Remote Socket \sim
Capacity Max Networks	MNIS Control Interface	192.168.2.2:55000
Trunking Controller	MNIS Relay Address	192.168.2.2:8890
	MNIS ID	1
SIP/RTP Interfaces	Location Port	4001
	TMS Port	4007
	Telemetry Port	4008
	Redundant MNIS data gateway	
	Socket Type	Remote Socket \lor
	MNIS Control Interface (IP Address:Port)	loopback:55000
	MNIS Relay Address (IP Address:Port)	remotehost:8890
	Location Port	4011
	TMS Port	4017
	Telemetry Port	4018

- 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*.

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

SmartPTT Server Configuration - C:\Program Files	(x86)\SmartPTT\Server\RadioService.exe.config - 🗆 🗙
Settings Networks Client List Rules Activity Log	Export/Import Settings Statistics
Control Stations Connect Plus NAI Systems Capacity Max Networks Capacity Max 1 Capacity Max 1 MNIS Data Cateway	Capacity Max System Image: Capacity Max 1 Network ID: 1
MNIS VRC Gateways MNIS VRC Gateways Talkgroups Security Settings SIP/RTP Interfaces SmartPTT Radioservers	Radio ID: 1 Interface: Any ✓ Trunking Controller ✓ MNIS Data Gateway ✓ MNIS VRC Gateways Data Transmission Options GPS transmission mode: Voice Transmission Options △ Allow transmit interrupt ○ Prioritize calls during emergency ○ Encrypted connection Channel Grant Waiting timer (s): 15 ▼

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

🎯 Sma	rtPTT Serve	er Configur	ation - (C:\Progra	m Files	(x86)\SmartPTT\Server	\RadioService.exe.config	_	\times
Settings	Networks	Client List	Rules	Activity	Log	Export/Import Settings	Statistics		
	Control Stati Connect Plu NAI Systems Capacity Ma Capacity Ma Capacity Ma Trur Trur MN Trur SIP/RTP In	ons is xx Networks y Max 1 hking Contro IS Data Gate S VRC Gate is vRC Gate is groups unity Setting: terfaces	ller way waye	Add		MNIS VRC Gatewa	iys		

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.

ttings Networks Client List Rules Activity Log	Export/Import Settings Statistics	
Control Stations	MNIS VRC Gateway	
NAI Systems Capacity Max Networks Capacity Max 1 Capacity Max 1 MNIS Data Gateway MNIS VRC Gateways MNIS VRC Gateways Talkgroups Security Settings SIP/RTP Interfaces Smart PTT Badioservers	Name Primary gateway address and port Redundant gateway address and port Voice port (local) Recording of voice calls between Radio IDs for voice calls recording	MNIS VRC Gateway 1 remotehost:56000 40000 m radios Example: 1-99, 150 1-16776415
2	✓ Telephone calls	
	Radio IDs for phone calls	Example: 1-99, 150 1-16776415
	Talkpaths (1) Private (1) Group (0)	
	Active Name	ID
	Default radio ID	1

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 (\square), and select Manage \rightarrow 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.

G Add Device		×
Device Type	Console	•
	ОК	Cancel

- 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.

🦾 Allowed Sites Li	ists				×
Allowed Site Lis	st Name 🛛 🖌	Available		Selected	
<all sites=""></all>		Site Name		Site Name	
DataMNISSite3:	1	DataMNIS01	Add All	VoiceMNIS01	
VoiceMNISSite3	36				
Allowed Site1			Add		
Allowed Site2					
			Remove		
			Remove All		
		1 items found (1 currently selected).		1 items found (1 currently selected)).
				Save Close	

- 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.

🚾 Radio Management									- 🗆 X
Capacity Max System Server Data 🔸 Subscrib	s Conti	rol							
Capacity Max Systems # TVZSystem1	View	by: Subscrib	er Access Contro	I 🗌 Talkgroup Site As	ssociation				٩. ٧
		Device Type 👎	Device ID 보	Allowed Sites	Þ	Telephone Gateway Site +⊐	Voice Recording Site	þ	Serial Number 🔷
		Console	4000019	VoiceMNISSite36	-	None -	None	•	0
	->-	Console	600	VoiceMNISSite36	•	VoiceMNIS01 🔹	VoiceMNIS01	•	0
	>	Console	4000018	VoiceMNISSite36	-	None -	None	•	0

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 <u>Voice transmission</u> 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.

Settings	Networks	Client List	Rules	Activity	Log	Export/Import Settings	Statistics	s				
	Control Stati Connect Plu NAI Systems Capacity Ma Capacity Ma Capacity MNI MNI MNI SiP/RTP In	ons s xx Networks / Max 1 aking Contro S Data Gate S VRC Gate MNIS VRC (groups urity Setting terfaces	ller eway eways Gateway	1		Security Settings Copy Enhanced Privacy Add Key ID Key TX Privacy Type No	Remove Value	~ K	Key ID	Paste		

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.

Radio Management							_	
								\mathbb{R}
esource View 🕨 Privacy Keys								
Resources	4		_					
Firmware		Ð	Θ					
Language Packs		Key ID	Key Alias	Key Value	In-Use Templates and Sets	In-Use Templates(Template Mode)	In-Use Sets(Configuration Mode)	С
Voice Announcements		4	Priv3	2	1	0	1	
Text To Speech Packs		3	Priv9	1	1	0	1	
Symmetric Keys		2	Priv8	1	1	0	1	
RAS Keys		1	Priv2	1	8	0	8	
RAS Keys Privacy Keys		1	Priv2	T	ŏ	U	8	

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.

(🖷 Radio Management							-		×
	Configuration View + 871TRR8902 + Security + Security-104							₿	T	1
	Set Categories 7 © Configuration: 871TRR8902					Save	Save As Discard		Close	
	Device Information: 871TRR8902		General	Privacy /	AES Restricted	d Access to System	Over-the-Air Programming			
	CO General Welcome Bitmap: WelcomeBitmap-101 Language Packs: PCRLanguage-104	Privacy								•
	General Settings: GeneralSettings-104				Privacy Type	Enhanced		•		11
	Accessories: Accessories-104				basic riivacy ney	-				
	Control Buttons: ControlButtons-104	Enha	nced Privacy Keys							
	 Text Messages: TextMessages-104 Telemetry: Telemetry-104 		⊕ ⊝ ⊙							
	Menu: Menu-104		Key ID	Key Alias	Key Val	lue				
	Security: Security-104	E.	1	Priv2	1				1	
	Network: Network-104		2	Priv8	1					
	Voice Announcement: VoiceAnnouncer		3	Priv9	1					
	🗋 Indoor Location: IndoorLocations-104 🖉									

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**.

🦟 Add Privacy Key					×
					٥, ۷
🗱 🛛 Key ID	Key Alias	Key Value	Comments		
▶ 🔽 4	Priv3	2			
1 items found (1	currently sele	cted).			
				ОК	Cancel

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.

MOTOTRBO Network Interface Service Configuration Utility *						-	×
<u>C</u> onfiguration <u>V</u> iew <u>E</u> dit <u>S</u> ervice <u>H</u> elp							
1							
E: Untitled							^
III General							
- G Security							
🕀 💼 Group List		Add	Delete				
Conventional		760	Doloto				
Gio Capacity Plus					1		
		Alias	Key ID	Key Value			
🗄 🔄 Advanced	1	Enhanced Key1	1	2612346782			

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.

Add	Remove	
Key ID	Key Value	
	0123456789	

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** (**D**) 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.

📠 Radio Management			- 🗆 ×
Resource View 🕨 Symmetric Keys			
Resources #	A 🕀 🖂		۹. ۲
Language Packs	Key ID Key Alias Key Value In-U	Use Templates and Sets In-Use Templates(Template Mod	e) In-Use Sets(Configuration Mode) Comn
Voice Announcements	1 Sym102 1 3	0	3
Text To Speech Packs Symmetric Keys			

 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.

📠 Radio Management					- (⊐ ×
Configuration View • 871TRR8902 • Security • Security-104						<u>*</u> 1
Set Categories			Save	Save As Discard	Clos	e
General Welcome Ritman: WelcomeRitman_101	General	Privacy AES	Restricted Access to System	Over-the-Air Programming		
Cancel Buttons: Control Buttons: 104 Cancel Buttons: Control Buttons: 104 Cancel Buttons: Control Buttons: 104 Cantrol Buttons: Control Buttons: 104 Cantrol Buttons: Control Buttons: 104 Cantrol Buttons: Control Buttons: Contr	aes					•
Text Messages: TextMessages-104	Key ID	Key Alias	Key Value			
Telemetry: Telemetry-104	> 1	Sym102	1			
Menu: Menu-104						

3. At that the **Add Keys** window appears: Select the required keys, which you want to be available for selection in the <u>AES Alias</u> 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.

NOTOTRBO Network Interface Service Conf	iguration Utility *			-	×
<u>C</u> onfiguration <u>V</u> iew <u>E</u> dit <u>S</u> ervice <u>H</u> e	elp				
1 🔁 📔 🖪 🖸	2				
🖃 🛑 Untitled			Symmetric Keys		^
- III General					
- Green Security					
🕀 💼 Group List			Add Delete		
🕀 🚞 Conventional					
😳 Capacity Plus					_
Einked Capacity Plus	Alias	Key ID	Key Value		 _
🗄 📹 Advanced	Symmetric Key1	1	54634562435		

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**.

痛 Radio Management									-	
Configuration View • 871TRR8902 • Zone • CapMaxZone									₽	T
Set Categories 9 Configuration: 8711RR8902 Image: Configuration: 8711RR8902 Device Information: 8711RR8902 Image: Configuration: Configuratio: Configuratio: Configuration: Configuratio: Configuration: Conf	Zone Items	∋ ▲ ▼					Save	Save As	Discard	Close
Encoder	Position	Set Name	Channel Type	Channel Name	Voice Announ	Phone System	Privacy	Privacy Alias	AES Alias	
Contacts	► N ¥	1 Personality-460	Capacity Max Personality	TG101Channel	None	Sys1		Priv2	Sym102	
RX Group Lists	≻ <mark>Mik</mark> i	2 Personality-459	Capacity Max Personality	TG102Channel	None	Sys1		Priv2	None	
 Capacity Max Features 	> NX	3 Personality-458	Capacity Max Personality	TG103Channel	None	Sys1		Priv2	None	
 Zone/Channel Assignment 	> Niki	4 Personality-457	Capacity Max Personality	TG104Channel	None	Sys1	~	Priv2	None	
V D Zone	> N×	5 Personality-456	Capacity Max Personality	Enhanced	None	Sys1	~	Priv2	None	
ConnectPlus	> N *	6 Personality-455	Capacity Max Personality	SiteAllCall	None	Sys1		Priv2	None	
CapMaxZone 🔯	► N¥	7 Personality-454	Capacity Max Personality	MultiSiteAllCall	None	Sys1	v	Priv2	None	

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.

Remove	
Key Value	
9876543210	
00/00/02/0	
	Remove Key Value 9876543210

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:

🧐 SmartPTT Server Configuration - C:\Program Files (x86)\SmartPTT\Server\RadioService.exe.config — □ 🗙											
Settings	Networks	Client List	Rules	Activity	Log	Export/Import Settings	Statistics				
Control Stations Connect Plus						Security Settings		Paste		1	_
	Capacity Ma	ax Networks				Copy Enhanced Privacy Add I Key ID Key TX Privacy Type No	Remove Value Value		~		

- 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** (**D**) to restart SmartPTT Radioserver and apply changes.