TRBOnet

TRBOnet PLUS

Deployment Guide

For MOTOTRBO Capacity MAX

Version 5.0

MOTOROLA
PROFESSIONAL RADIO
APPLICATION *partner*

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1. Introduction

1.1. About This Guide

The information in this guide is intended for administrators setting up evaluation and proof-of-concept deployments of MOTOTRBO Dispatch over IP solutions. The document describes the installation of Neocom TRBOnet PLUS and the minimum steps required to configure communication with a MOTOTRBO Capacity MAX system.

For more comprehensive information on the Neocom TRBOnet family of radio network software tools, refer to the Documentation section of our web site.

1.2. About TRBOnet

TRBOnet is a suite of professional applications for the MOTOTRBO digital two-way radio networks. TRBOnet manages voice, text and data communication paths to network endpoints and provides a unified graphical dispatcher workbench interface for all the messaging and workforce orchestration tasks.

1.3. Contacts

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APAC	+61 28 6078325	http://kb.trbonet.com — online knowledge base

2. Architecture

TRBOnet PLUS is a Windows-based client-server application that does not require additional hardware to operate with Capacity MAX systems.
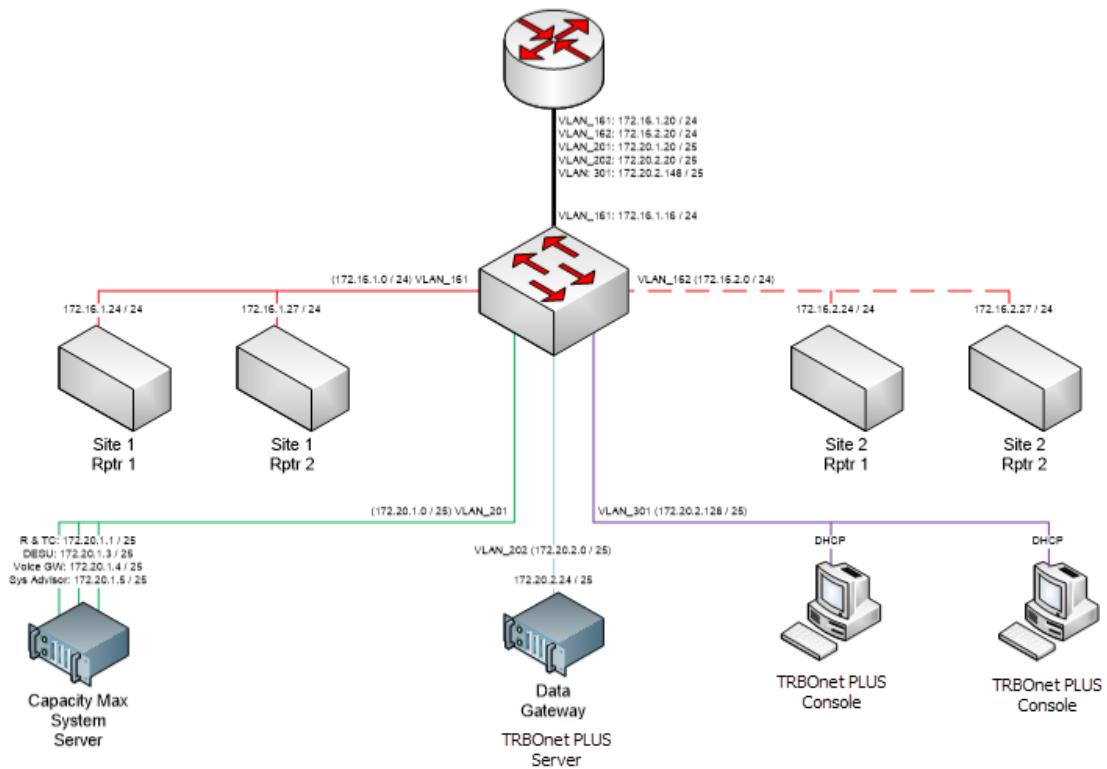
Figure 1: TRBOnet PLUS architecture for LAB setup

The TRBOnet Server application can be installed on any networked computer that meets the hardware and software requirements. The TRBOnet Server implements the MOTOTRBO protocols for IP-based communication with MOTOTRBO Capacity MAX System Server, Data Gateway, and Voice Gateway.

TRBOnet Dispatch Console is a client software that can run on the server host or on any remote computer. The client application communicates with the server over the proprietary TCP/IP protocol.

The TRBOnet PLUS installation can include multiple client applications. The number of client applications simultaneously connected to the server is restricted by the license.

To save all collected data, the TRBOnet Server requires an MS SQL database connection.

3. Installation

Before you start installing TRBOnet PLUS, make sure that your computer meets the following software requirements.

Install Windows Service Packs

For all platforms, we recommend that before installing TRBOnet PLUS you update your operating system to the latest Service Pack and install critical updates available from Windows Update.

Install Microsoft SQL Server

Download and install Microsoft SQL Server 2008 R2 Express edition from

http://www.microsoft.com/en-us/download/details.aspx?id=30438

Select the 32-bit or 64-bit version depending on the underlying operating system. Accept the defaults during the setup.

Install .NET Components

Windows 8 and later, as well as Windows Server 2012 and later, include the required .NET 4.6 components as part of the operating system.

For earlier Windows versions, .NET Framework redistributables are available from Microsoft at

 https://www.microsoft.com/en-us/download/search.aspx?q=.net%20framework.

Select the most recent version to install.

Install TRBOnet PLUS

Download the latest version of fully functional trial of TRBOnet PLUS. Unzip and run the installation file as a local administrator. Follow the prompts to install TRBOnet PLUS 5.0. Click to install Server and Dispatch Console.

After the installation is finished, you need to specify several configuration settings as described in section TRBOnet Server Configuration of this guide.

4. TRBOnet Server Configuration

This section describes how to configure TRBOnet PLUS for communication with a Capacity MAX system.

Table 1: High-level steps for configuring the TRBOnet Server

#	High-level steps	Refer to
1	Launch the TRBOnet Server by double-clicking the TRBOnet Server icon on the desktop, or by selecting **All Programs** and then **Neocom Software** and **TRBOnet PLUS Server** from the START menu. When the TRBOnet Server is launched, the main configuration window appears.	
2	Apply the license with Capacity MAX support.	Applying the License with Capacity MAX Support
3	Create the TRBOnet database connection.	Creating a TRBOnet Database Connection
4	Register a Capacity MAX system.	Registering a Capacity MAX System
5	Run the TRBOnet Server as a Windows service.	Creating a Windows Service

After the server-side configuration is finished, you need to specify several settings in the Dispatch Console as described in section TRBOnet Dispatch Console Configuration of this guide.

4.1. Applying the License with Capacity MAX Support

The downloadable installation package of TRBOnet PLUS comes with a free 60-day evaluation license that does not include Capacity MAX connections. To use TRBOnet PLUS with a Capacity MAX system, contact Neocom Software, Ltd for a new license with the Capacity MAX option included.

To apply the new license:

1. Copy the new license file to a local folder. If this folder contains other license files, delete them.

2. Launch TRBOnet Server. In the configuration window, select **License** in the left pane.

3. Click the **License Manager** link in the right pane.

4. In the **License Manager** window, follow the instructions and select the new license file from the local folder.

4.2. Creating a TRBOnet Database Connection

TRBOnet PLUS stores all collected data in the MS SQL database. You need to create a TRBOnet database and specify the database connection in the TRBOnet Server configuration.

To create a TRBOnet database connection:

1. Launch the TRBOnet Server. In the configuration window, select **Database** in the left pane.

2. In the right pane, specify the following parameters:

   - **SQL Server**: Select the SQL Server from the drop-down menu.
   - **Database**: Specify the preferred name of the database.
   - **Authentication**: Select the authentication method through which the TRBOnet Server will connect to the database:

     - **SQL Server**: The TRBOnet Server will use the SQL Server user credentials to connect to the database.
     - **Windows**: The TRBOnet Server will use your Windows user credentials to connect to the database (recommended).

       Note: The selected account must be granted rights to connect to the SQL Server, create the database, and update the existing database.

   - **Login**: If **SQL Server** authentication is selected, specify a valid SQL Server user name.
   - **Password**: If **SQL Server** authentication is selected, specify a valid SQL Server user password.

3. Click **Create Database**. The database with the specified name is created.

4. Click **Test Connection**.

4.3. Registering a Capacity MAX System

By default, the TRBOnet Server configuration does not include any connections to radio systems. You can add connections to as many MOTOTRBO Capacity MAX systems as allowed by your license.

To add a MOTOTRBO Capacity MAX system:

1. Launch TRBOnet Server. In the configuration window, click **Local Agent** in the left pane and select the **Enable Local Agent** option.

   Agent is a software module responsible for connections to MOTOTRBO equipment. In most cases, you connect a radio system to the local Agent installed on the TRBOnet Server host. In complex setup cases, you can connect a system to a remote Agent installed on a different network or workstation.

2. Under **Local Agent**, select **MOTOTRBO**. Click **Add** and select **Add MOTOTRBO Capacity MAX** from the drop-down menu.
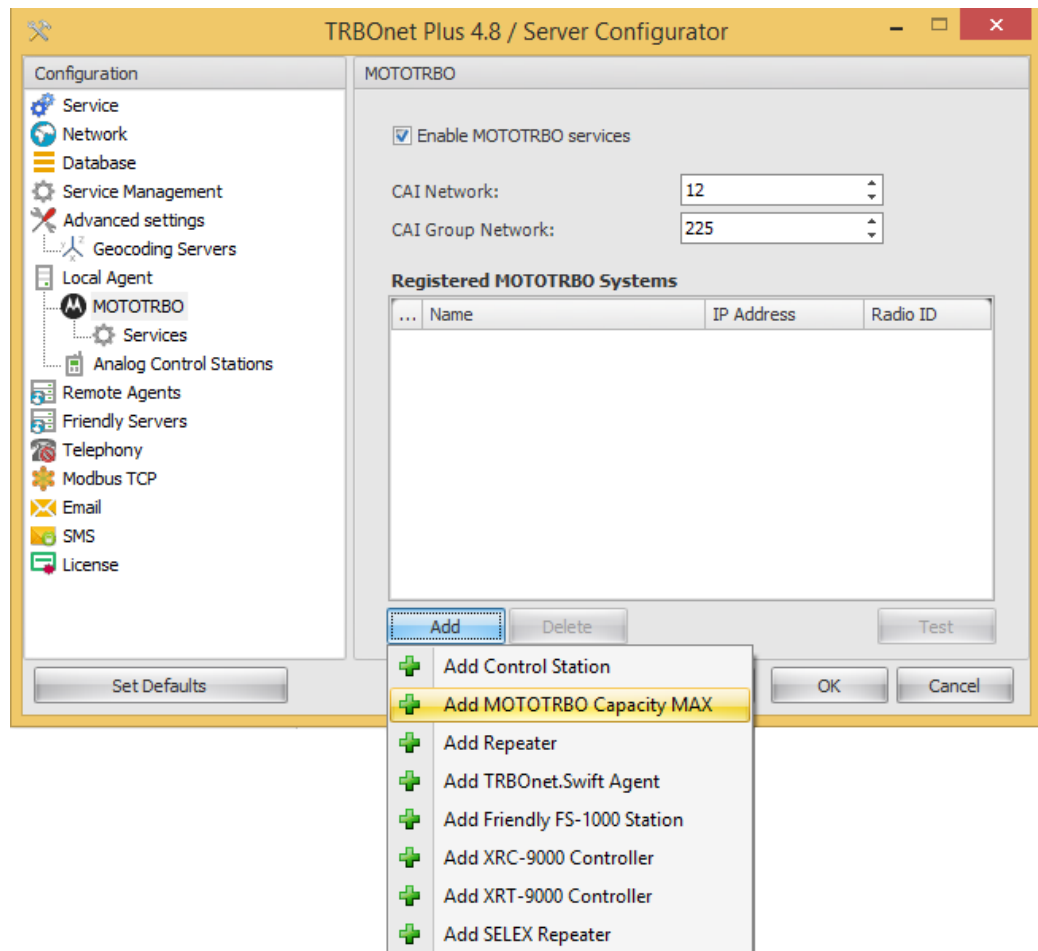

Figure 2: Adding a MOTOTRBO Capacity MAX system

The new Capacity MAX system appears in the left pane under MOTOTRBO.

3. In the right pane, specify the system parameters.

   Note: Some of the system parameters must match the Capacity MAX system configuration settings specified in the Radio Management software. The table indicates the matching Radio Management parameters where applicable.

Table 2: TRBOnet parameters of a Capacity MAX system

TRBOnet parameter	Radio Management software setting	Description
System Name	NA	Enter a user friendly name of the system.
Radio ID	Non-Motorola Radio ID or Console Radio ID	TRBOnet operates like a virtual radio in Capacity MAX systems. Specify the radio ID to be used by the TRBOnet Server by default for making private calls, group calls, site-all-calls, and system-all-calls. Note: This radio ID must be registered in the Radio Management software as a non-Motorola radio.
System Type	NA	Select Capacity MAX.
System Identifier	NA	Specify the Capacity MAX system identifier to be used by TRBOnet. Leave this field empty if you have one Capacity MAX system per TRBOnet Server. Otherwise, enter a unique value for each Capacity MAX system.
Network ID	**Network ID**	Specify the network ID assigned to your Capacity MAX system in the Radio Management software.

4. In the left pane, click **Privacy** under the Capacity MAX system name. Specify the type of privacy and privacy keys as configured in the system.
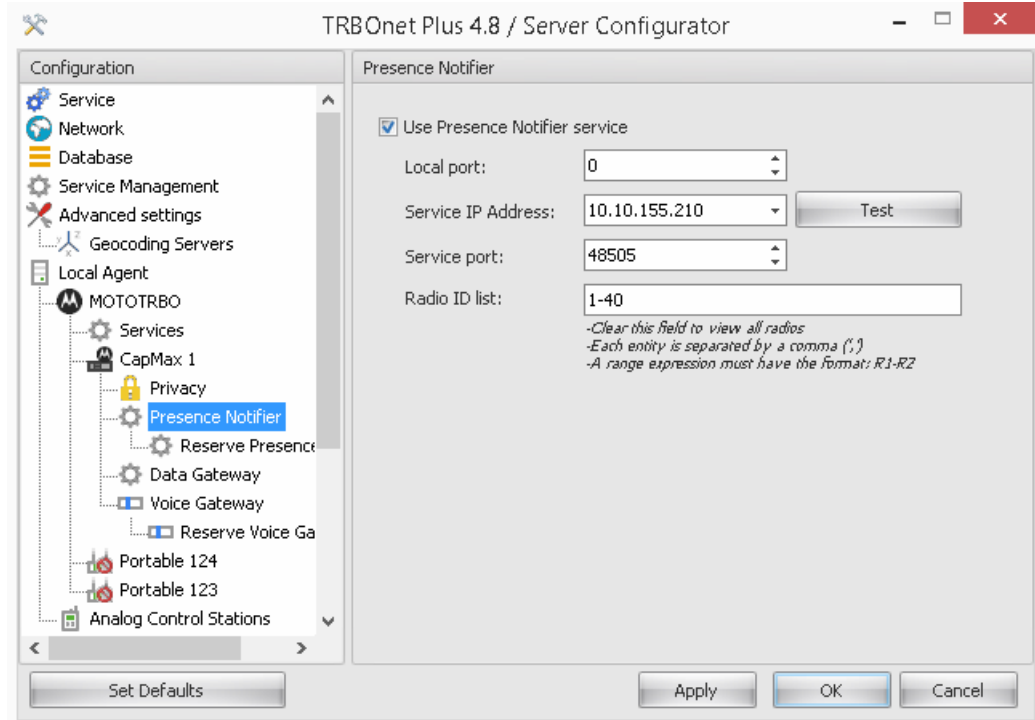
4.3.1. Configuring Connection to CMSS (Presence Notifier)

The Trunked Controller is the CMSS module responsible for notifying 3rd party applications about the actual presence states of the radios. Presence Notifier is a

service that is used by TRBOnet to control the presence states of subscriber radios in a Capacity MAX system.

To configure connection to the Trunked Controller:

1. In the left pane of the configuration window, select **Presence Notifier** under your system.

Figure 3: Configuring a Presence Notifier connection

2. Specify the following parameters in the right pane.

Table 3: Presence Notifier connection - parameters

TRBOnet parameter	Matching CMSS parameter	Description
Use Presence Notifier service	NA	Select to enable the Presence Notifier in TRBOnet.
Local port	NA	Specify any non-used local IP port for communication with the Presence Notifier. Or, keep 0 to enable TRBOnet to select the port automatically.
Service IP Address	Presence Server IP	The IP address of the Trunked Controller.

TRBOnet parameter	Matching CMSS parameter	Description
Service port	CMSS Network > Presence Server Port	The IP port of the Trunked Controller allocated for communication with the Presence Notifier. Default: 50015 Click **Test**. You should receive the "Service Available" message if all properties are configured correctly and the Trunked Controller is up and running. If the test fails, contact the CMSS team to receive the correct IP port.
Radio ID list	NA	The subscriber radios for whose presence states the TRBOnet Server subscribes. The TRBOnet Server will receive PRESENCE and ABSENCE notifications from the Trunked Controller. By default, TRBOnet subscribes for presence information about all radios registered in the system. To minimize the traffic, you can define particular radio IDs and ranges. For example: 1, 5, 15-20

3. If your system includes the second CMSS, you can select **Reserve Presence Notifier** in the left pane and specify the location of the standby Presence Notifier.

4.3.2. Configuring Connection to Data Gateway

Data Gateway is a service that is used by 3rd party applications for data transmission between the 3rd party software and subscriber radios in a Capacity MAX system. It is recommended to deploy the Data Gateway on the same workstation where the 3rd party application is installed.

To configure connection to the Data Gateway:

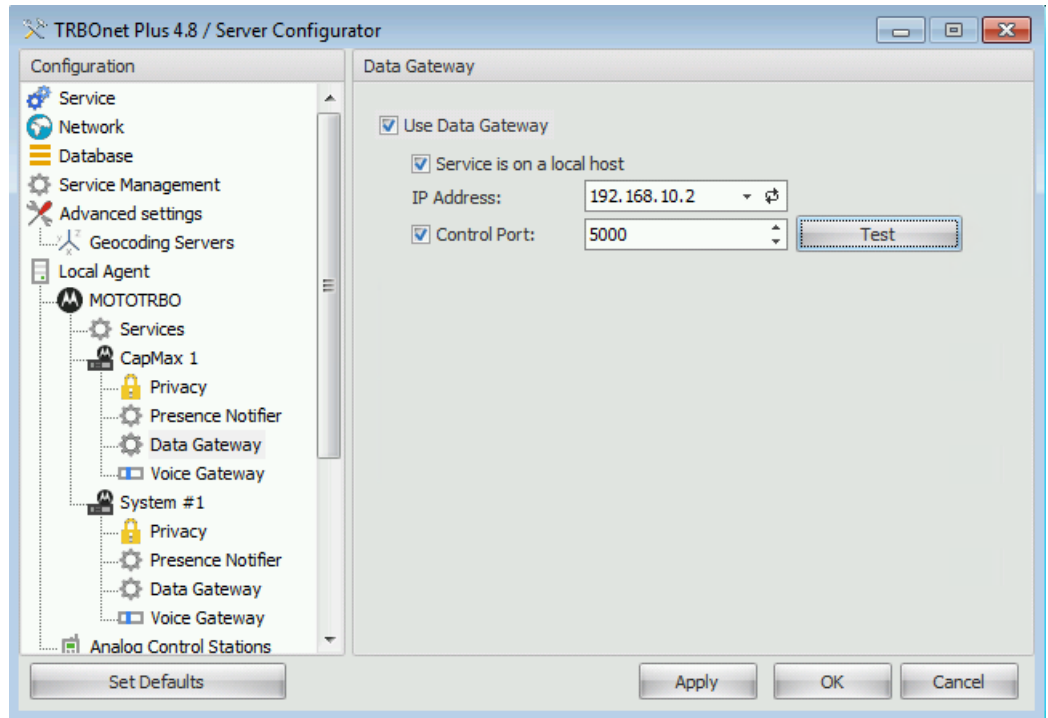1. In the left pane of the configuration window, select **Data Gateway** under your system.

Figure 4: Configuring a Data Gateway connection

2. In the right pane, specify the following parameters.

Table 4: Data Gateway connection - parameters

TRBOnet parameter	Description
Use Data Gateway	Select to enable the Data Gateway in TRBOnet.
Service is on a local host	Select this option if the Data Gateway is installed on the TRBOnet Server host.
IP Address	Press the **Refresh** button and select the MNIS tunnel from the drop-down menu.
Control Port	To receive RSSI information in GPS messages and control the status of the Data Gateway, select this option and specify the correct value. Default: 5000

3. Click **Test** to test the Data Gateway connection. Contact the Data Gateway team if the test is not successful.

4.3.3. Configuring Connection to Voice Gateway

Voice Gateway is a service used by TRBOnet to initiate and receive calls from a Capacity MAX system. TRBOnet requires at least one Voice Gateway connection to be able to initiate, receive, and record voice calls.

TRBOnet operates as a virtual software radio in a Capacity MAX system. TRBOnet can emulate one or more radios. Each virtual radio can initiate and receive private, group, and site calls.

To be able to initiate and receive voice calls:

- In the Radio Management software, register all required virtual radios, groups, and All Call entities. Virtual radios must be registered as non-Motorola radios.
- In the TRBOnet Server configuration, create a connection for each Voice Gateway available in the Capacity MAX system. Then add voice paths for all registered virtual radios, groups, and All Call entities to the Voice Gateway connections. Each virtual radio must be added to one Voice Gateway connection to avoid collisions at runtime.

When the TRBOnet Server starts, it registers all specified voice paths to a respective Voice Gateway.

To configure connection to a Voice Gateway:

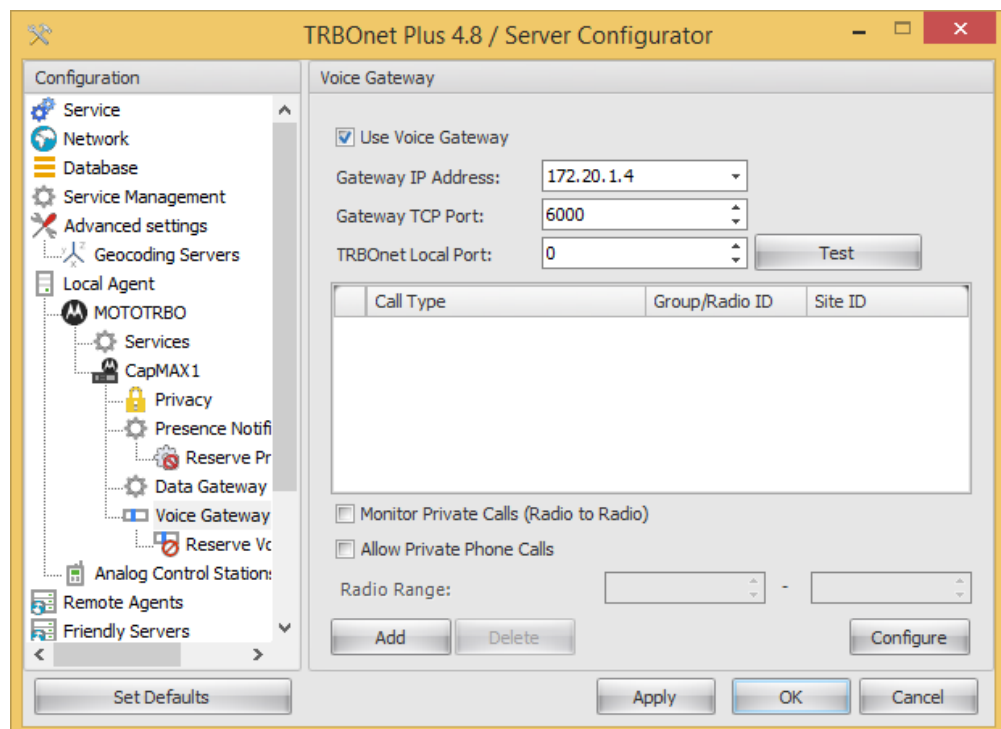1. In the left pane of the configuration window, select **Voice Gateway** under your system.

Figure 5: Configuring connection to the Voice Gateway

2. Specify the Voice Gateway connection parameters in the right pane.

Table 5: Voice Gateway connection - parameters

TRBOnet parameter	Description
Use Voice Gateway	Select to enable the use of the Voice Gateway.
Gateway IP Address	The IP address of the Voice Gateway service.
Gateway TCP Port	The TCP port of the Voice Gateway. Default: 6000 Specify the port as in the Voice Gateway configuration file.
TRBOnet Local Port	The local IP port for Voice Gateway communication. Specify any non-used port or keep 0 to enable TRBOnet to select the port automatically. Press **Test** to make sure the connection parameters are valid. A successful test shows the "System State: Active" message.

3. To add a voice path, click **Add**. Expand the **Call Type** menu and select the type of a voice path:
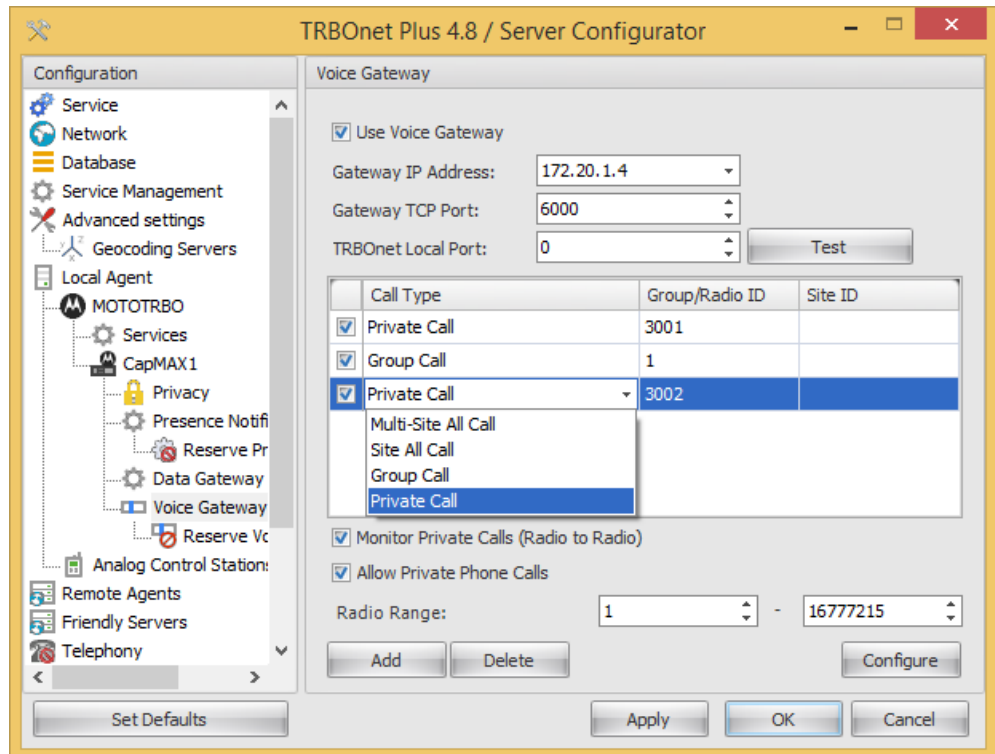

Figure 6: Registering voice call paths

- **Private Call**: Select to add a private voice path for a virtual radio. Specify the radio ID in the **Group/Radio ID** field.
- **Group Call**: Select to add a group voice path for a talk group. Specify the group number in the **Group/Radio ID** field.
- **Site All Call**: Select to add a Site All Calls voice path. Specify the site in the **Site ID** field. You can add one Site All Call voice path per site.
- **Multi-Site All Call**: Select to add a Multi-Site All Calls voice path. You can add one Multi-Site All Call voice path for all sites.

> Note: Add private voice paths for all virtual radios on which you need to initiate and receive voice calls. As a must, register the default radio ID specified in the system parameters.

4. TRBOnet can operate multiple Voice Gateways at a time. To add more Voice Gateways, select the system name in the left pane and click the **Add Voice Gateway** link in the right pane.

5. Optionally, define the reserve Voice Gateway for each main Voice Gateway.

   If the main Voice Gateway fails, the TRBOnet Server switches to the reserve Voice Gateway and re-registers on it all talk paths. When the main Voice Gateway is alive again, TRBOnet switches back to it.

4.3.4. Configuring Phone Interconnect Server

In Capacity MAX systems, a radio can initiate and receive phone calls to/from PSTN users. To be able to use this functionality:

- In the Radio Management software, configure the radios and define for each radio the Voice Gateway for phone calls.
- In the TRBOnet Server configuration, open the respective Voice Gateway page and enable the **Allow Private Phone Calls** option. The **Radio Range** parameter specifies the range of radio IDs for which phone calls are allowed.
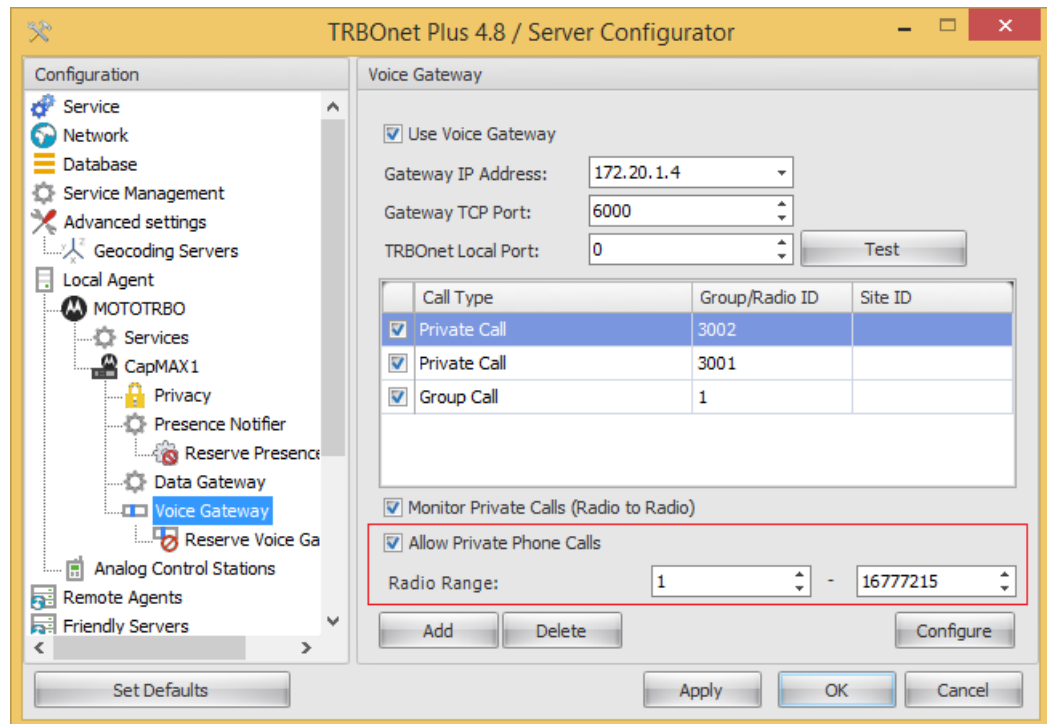
Figure 7: Enabling radio users to make voice calls to phones

TRBOnet can work as a SIP PBX. For testing and for small systems, it is recommended to use the internal TRBOnet PBX service.

To enable the internal SIP PBX:

1. In the left pane of the configuration window, select **Telephony**.
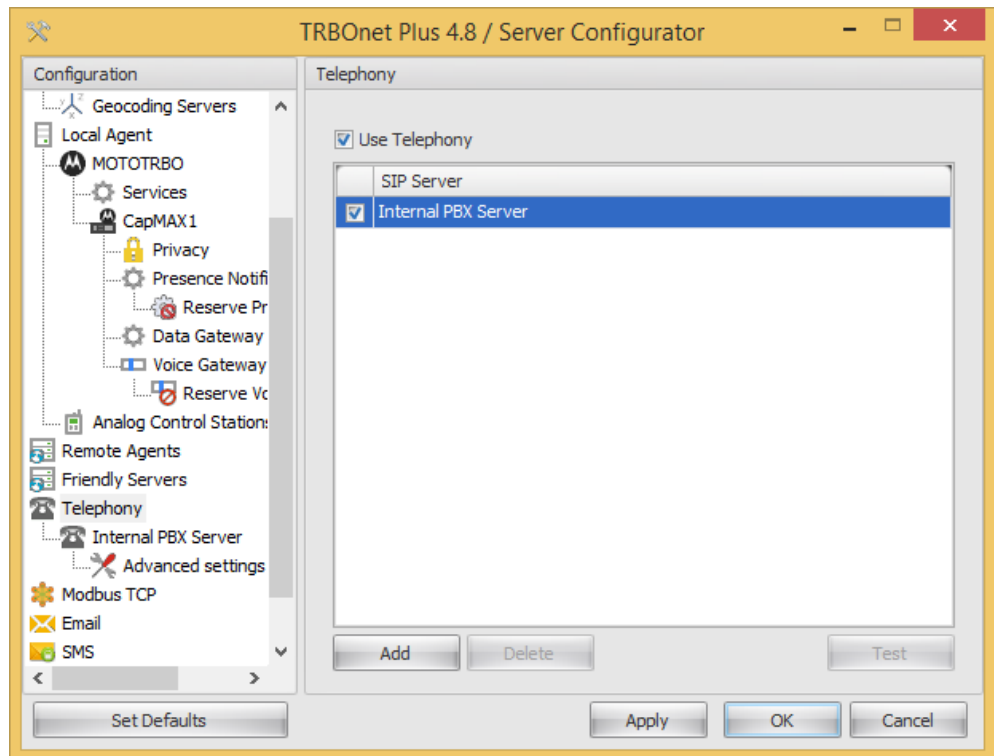2. Select options **Use Telephony** and **Internal PBX Server**.

Figure 8: Activating the internal PBX Server

3. In the left pane, select **Internal PBX Server** under **Telephony**. Specify the following parameters:

Table 6: Internal PBX Server - parameters

TRBOnet parameter	Description
Use Internal PBX Server	Select to enable the internal PBX Server.
Local IP	Select the LAN interface of the internal SIP PBX from the drop-down menu.
	Note: The SIP phones must be on the same network with this LAN. The SIP phone configuration must specify the same IP address for the SIP Proxy/Registrar.
Port	Specify any non-used local port for the internal SIP PBX.
	Default: 5060
	Note: The SIP phone configuration must specify the same UDP port for the SIP Proxy/Registrar.

TRBOnet parameter	Description
Dispatcher Center:	
SIP ID	Specify the SIP number for the Dispatch Center. The user can dial this number on a SIP phone to reach the TRBOnet voice menu (IVR).
SIP user	Specify the SIP user name for the Dispatch Center. Outgoing calls from the TRBOnet Dispatch Center to SIP phones will show this calling user name.

4. The default values in **Advanced Settings** should not be modified, unless the phones require different settings. The recommended packet time is 60 milliseconds.

4.4. Creating a Windows Service

It is recommended to run the TRBOnet Server as a Windows service. When it runs as a service, the Server gains more stability and restarts automatically after reboot.

To run the TRBOnet Server as a Windows service:

1. In the TRBOnet Watch Server window, select **Service** in the **Configuration** pane.
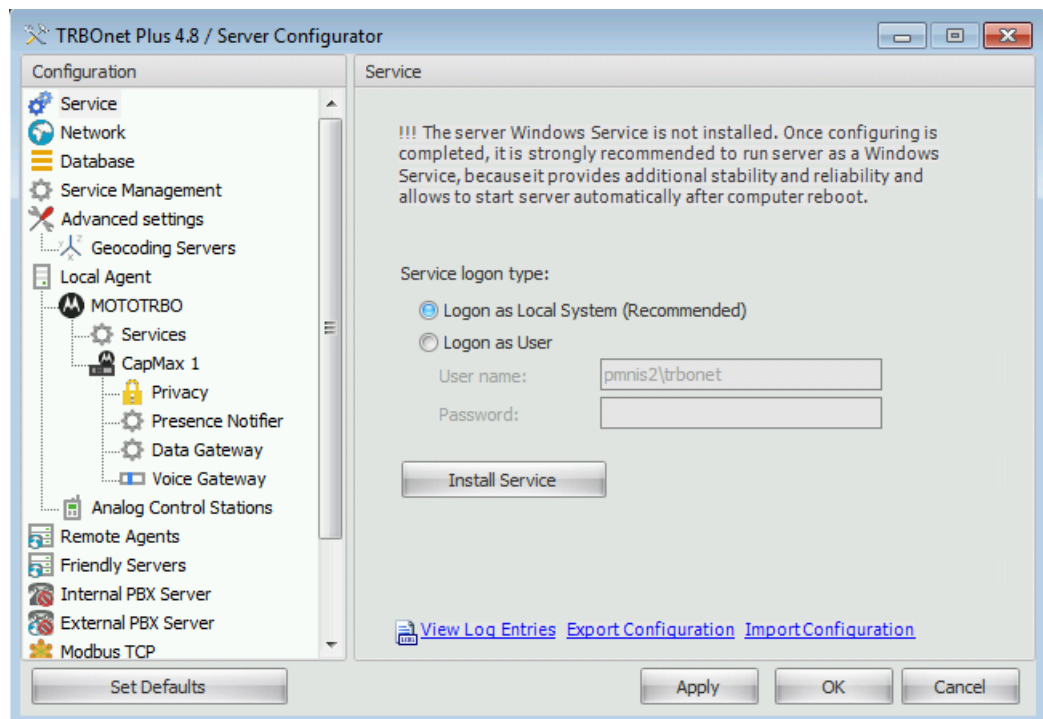

Figure 9: Creating a Windows service

2. Select the Windows account under which the service will be running:

   ▪ **Logon as Local System (Recommended)**: Select the Local System account.

- **Logon as User**: Select your current Windows User account.

> Note: Make sure that the selected account is granted rights to connect to the SQL
> Server, create the database, and update the existing database.

3. Click **Install Service** in the **Service** pane. The Windows service is created and stopped.
4. Click **Save changes and restart service**.
5. To learn the TRBOnet Server state, click **View Log Entries** in the right pane. In the **View Log Entries** window, check the latest TRBOnet Server log on the **Application** page. An empty log indicates normal operational state.

5. TRBOnet Dispatch Console Configuration

The TRBOnet Dispatch Console is a client application intended for dispatchers operating the radio systems. This section describes how to finalize the TRBOnet PLUS configuration in the Dispatch Console and enable dispatchers to operate all types of calls in a Capacity MAX system.

Table 7: High-level steps for configuring the TRBOnet Dispatch Console

#	High-level steps	Refer to:
1	Launch the Dispatch Console by clicking the shortcut on the Windows desktop. The Dispatch Console displays the window asking you to enter the TRBOnet Server IP address, user name, and password. Log in with the following credentials: ▪ Default User Name: **admin** ▪ Default Password: **admin**	
2	Check the real-time system status	Checking Real-time System Status
3	Register talk groups	Registering Talk Groups
4	Register subscriber radios	Registering Radios
5	Register phone extensions	Registering Phone Extensions

5.1. Checking Real-time System Status

The administrative TRBOnet account allows you to check the system status in the Dispatch Console.

To check the system status:

1. In the Dispatch Console main window, click the **Administration** tab in the left pane.
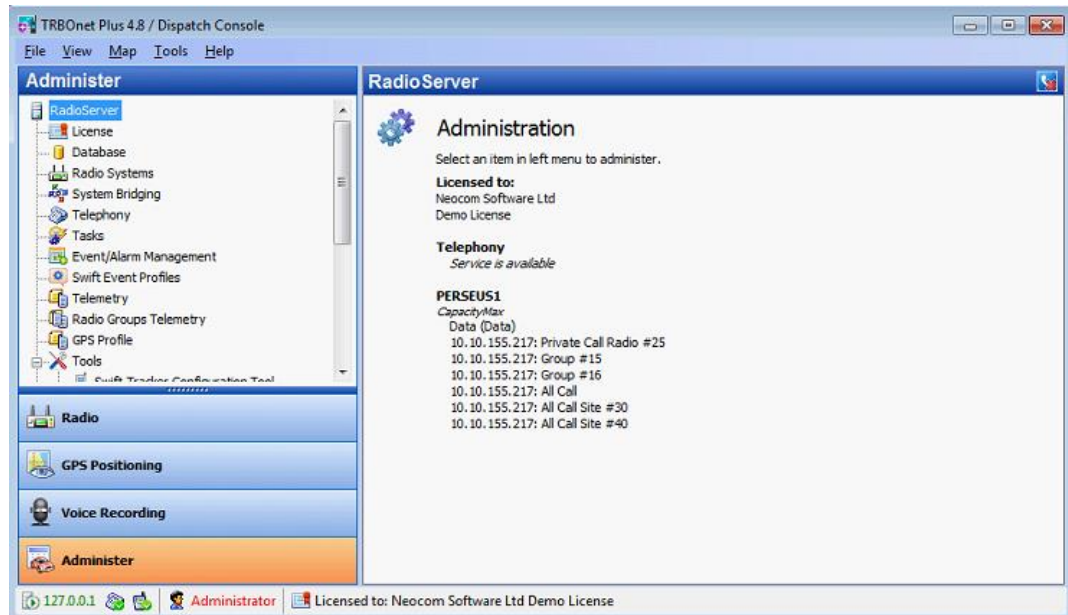2. In the **Administration** pane, select **RadioServer** from the tree.

Figure 10: Checking the real-time status of a Capacity MAX system

The right pane displays the status of your Capacity MAX system. If you do not see any messages in red text, the system is configured correctly. Otherwise, you need to analyze the error messages and make the required changes in the TRBOnet Server configuration.

5.2. Registering Talk Groups

By default, TRBOnet can only receive group calls. To be able to initiate group calls from the Dispatch Console in a Capacity MAX system, you need to register talk groups in the system.

To register radio groups:

1. In the Dispatch Console window, click the **Administration** tab in the left pane.
2. In the **Administration** pane, select **Radio Groups** from the tree.
3. Add all groups that should be accessed by dispatchers. To add a group, click **Add** in the right pane, specify the group properties and click **OK**.
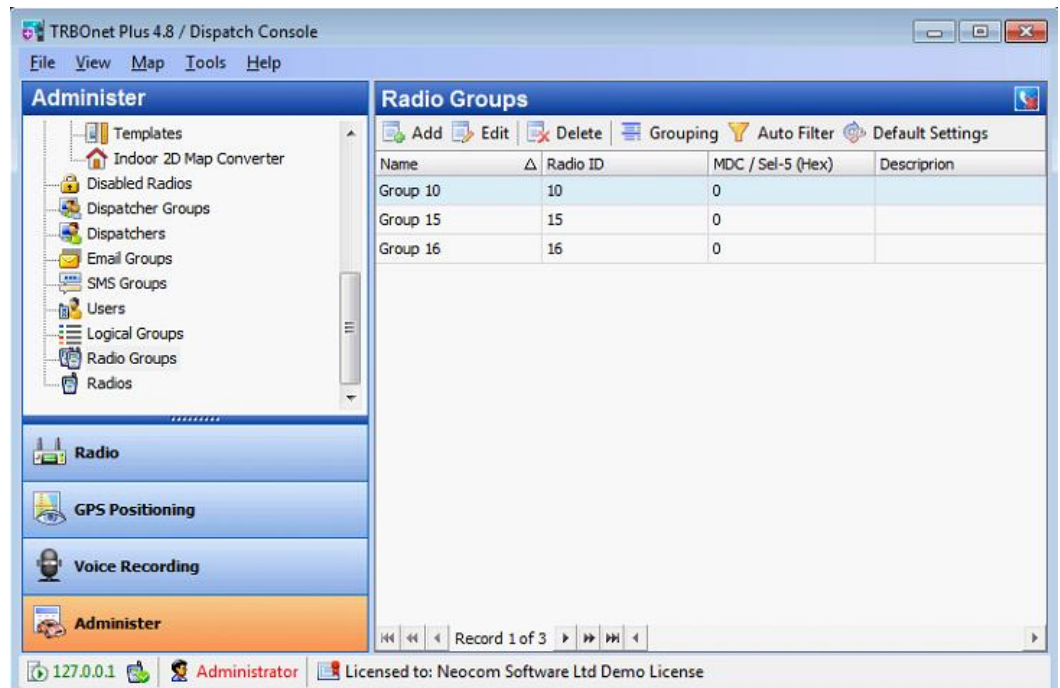
Figure 11: Registering radio groups

The following properties are mandatory:

- **Name**: A descriptive name of the group.
- **Group ID**: The group ID added in the TRBOnet Server configuration as a group voice path.

Later, you will be able to assign groups to particular dispatcher accounts. The administrative account can access all registered groups.

5.3. Registering Radios

TRBOnet can control the states of subscriber radios and receive and initiate private, data, and CSBK calls on subscriber radios. To be able to control a radio from TRBOnet, you need to register that radio in the Dispatch Console. TRBOnet ignores voice, data, and CSBK calls from non-registered radios and does not store ignored calls in the database.

To register subscriber radios:

1. In the Dispatch Console window, click the **Administration** tab in the left pane.
2. In the **Administration** pane, select **Radios** from the tree.
3. Add all required subscriber radios. To add a radio, click **Add Radio** in the right pane, specify the radio properties and click **OK**.
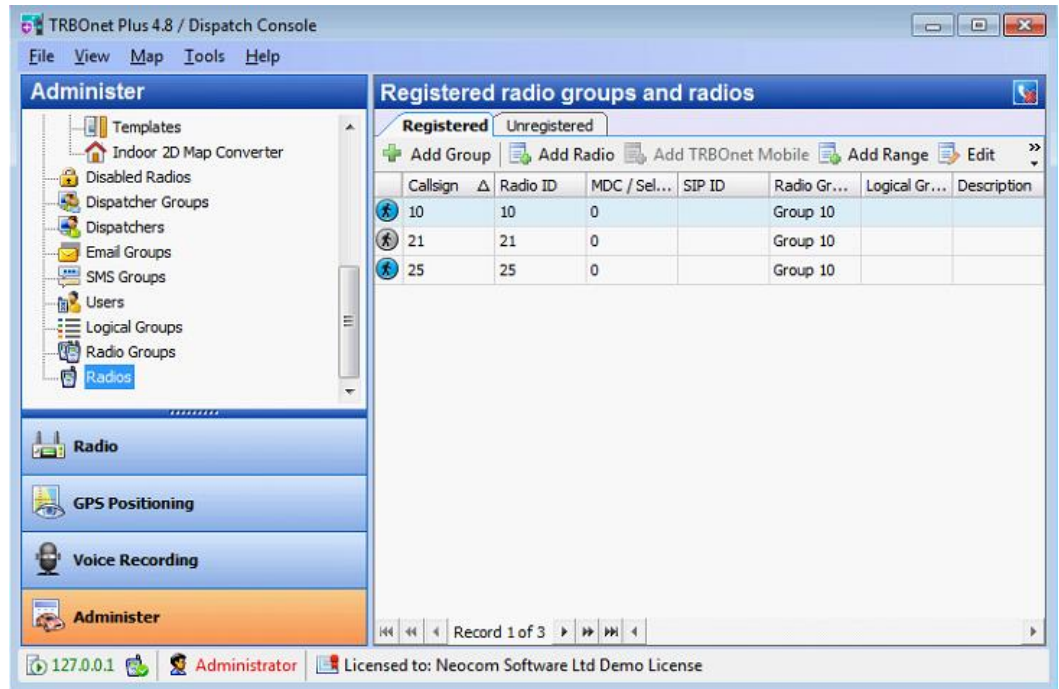
Figure 12: Registering subscriber radios

The following properties are mandatory:

- **Callsign**: A descriptive name of a subscriber radio displayed to the dispatcher.
- **Radio ID**: The radio ID added in the TRBOnet Server configuration as a private voice path.
- **Radio Groups**: The radio groups to which the radio belongs.

5.4. Registering Phone Extensions

To be able to use SIP phones (handsets or softphones) with the TRBOnet SIP PBX, you need to add SIP extensions to the system and configure your SIP devices.

To register SIP Extensions:

1. In the Dispatch Console window, click the **Administration** tab in the left pane.
2. In the **Administration** pane, select **Telephony** from the tree.
3. In the right pane, select the **Extensions** tab and add the required extensions. To add an extension, click **Add** in the right pane, specify the extension properties and click **OK**.
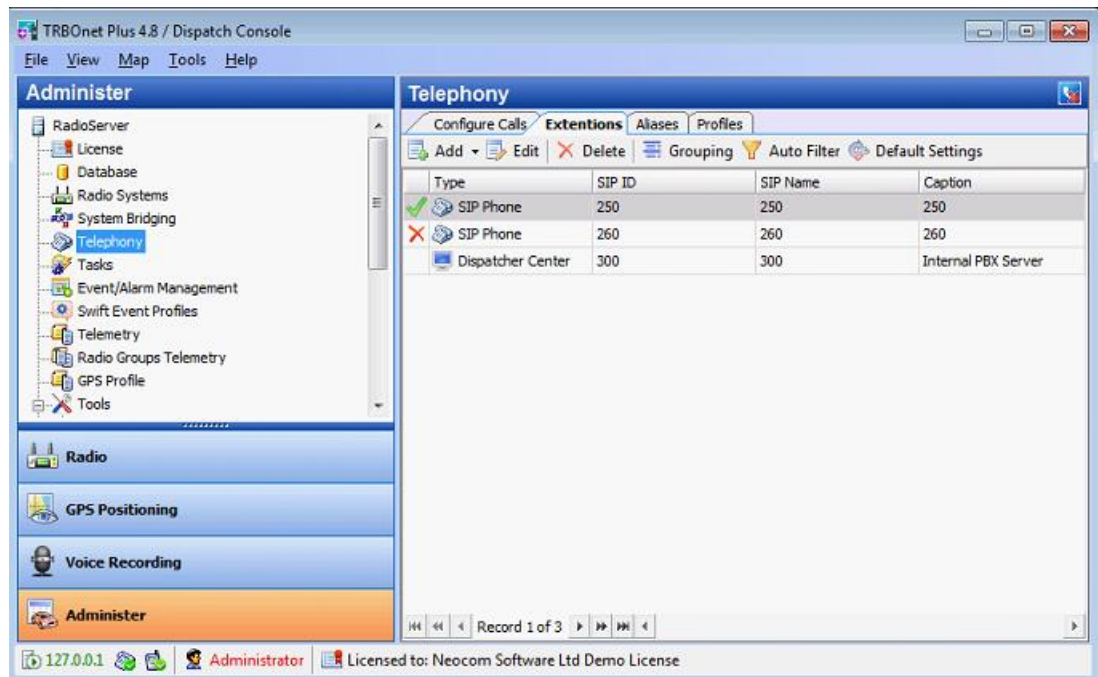
Figure 13: Registering SIP extensions

Configure your SIP devices to connect to the TRBOnet PBX and use extensions created on the **Extensions** tab. If a SIP device is properly connected to the TRBOnet Server, you can check the status of that device on the **Extensions** tab.

Note: Due to the SIP protocol specification, after restarting the TRBOnet Server you need to wait until the registration interval expires and then all SIP devices are re-registered, or you can force reboot on your SIP devices.

By default, TRBOnet allows you to make a call from a SIP phone to a different SIP phone, to a radio ID, and to the Dispatcher Center number, and from a radio to any SIP phone registered in the system.

To be able to make a call from a SIP phone to a radio group, you need to adjust the **Telephony** settings and define additional rules. Rules are needed because a radio group cannot be assigned a registered extension.

To enable calls from a SIP phone to a radio group:

1. In the Dispatch Console window, click the **Administration** tab in the left pane.
2. In the **Administration** pane, select **Telephony** from the tree.
3. In the right pane, select the **Configure Calls** tab and click **Configure** under **Incoming Calls Configuration**.
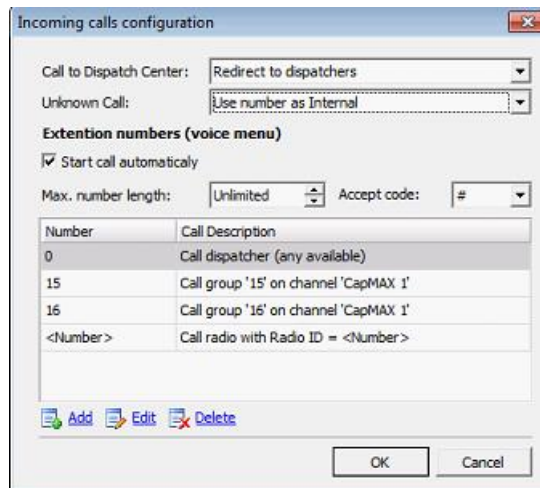4. In the **Incoming Calls Configuration** window, specify the following recommended settings:

Figure 14: Configuring incoming calls

- **Call to Dispatch Center**: Select **Redirect to dispatchers** to redirect phone calls to online dispatchers.
- **Unknown Call**: Select **Use number as Internal** to apply the rules if a non-registered number is dialed.

5. In the **Incoming Calls Configuration** window, add rules for making phone calls to radio groups. To add a rule, click **Add** and specify the rule settings.
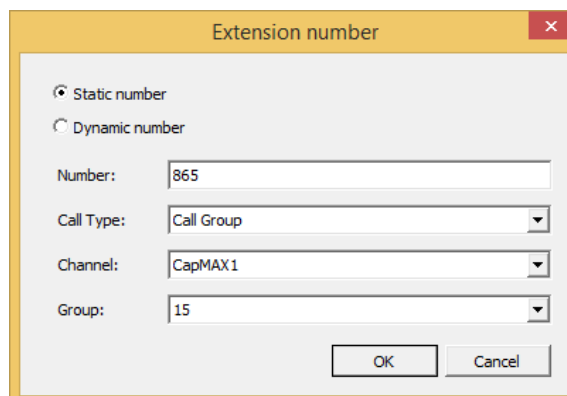

Figure 15: Defining a rule

- **Static number**: Select this option to assign a static dial number to a group ID. Specify a non-used dial number, the channel, and the group ID that can use this channel. The call type must be **Call Group**.

   Note: If you cannot find your talk group in the **Group** drop-down menu, make sure you have added a group voice path for this group in the Voice Gateway configuration.

- **Dynamic number**: Select this option to use the dial number format <prefix><group_id>. Specify the prefix, the system, and the call type (select **Call Group**). The group ID will be identified dynamically from the dialed

number. For instance, if you specify 12 as a prefix and the phone user dials 1233, the rule will redirect the call to Group 33.