SmartPTT Technical Course

STC001 80

Course Overview

- SmartPTT Series
- SmartPTT Architecture
- SmartPTT Basic Functionality
- System Design based on Control Stations
- System Design for control over IPSC
- System Design for control over Capacity Plus

Technical Course "SmartPTT Essentials and Basic Configurations"

The course purpose is to give general knowledge about:

1. Positioning and key features of SmartPTT products
2. SmartPTT Architecture
3. Radioserver and Dispatcher Console installation routines
4. MOTOTRBO base and subscriber equipment programming in regards to the configurations covered by the course
5. Basic Radioserver settings
6. Basic dispatcher console functionality (Voice Calls, GPS Monitoring, Text message exchange, Status Control, etc.)
7. System design based on control stations – MOTOTRBO mobile radios connected to Radioserver via USB
8. System design for direct IP control over IP Site Connect systems
9. System design for the control over Capacity+, based on direct IP connection for incoming voice / data and control stations for outgoing commands / data / voice calls.

Course Agenda

Day 1	
SmartPTT Series Overview, Architecture, Installation, Control Station programming, Radioserver Settings, Dispatcher first Launch	10:00 – 12:00
Coffee break	12:00 – 12:15
SmartPTT Dispatcher functionality	12:15 – 13:00
Lunch	13:00 – 14:00
SmartPTT Dispatcher functionality	14:00 – 16:00
Coffee break	16:00 – 16:15
IPSC direct IP connection set up	16:15 – 17:15
Q & A session	17:15 – 18:00
Day 2	
Capacity Plus settings, Telephone Interconnect, Permission profiles	10:00 – 12:00
Coffee break	12:00 – 12:15
Database management	12:15 – 13:00

Course Prerequisites

- Audience skills
  - Basic knowledge of MOTOTRBO equipment
  - Basic MOTOTRBO programming skills (CPS)
  - IP Networking essentials
- Equipment
  - 2 MOTOTRBO mobile radios
  - 2 MOTOTRBO portable radios with GPS support and display
  - 1 MOTOTRBO repeater with IPSC feature enabled
  - Power supplies and antennas required to use listed radio equipment

SmartPTT Series

- SmartPTT Basic. Small dispatch systems without repeaters
- SmartPTT Enterprise. Middle and large dispatch systems based on IP Site Connect or Capacity Plus

SmartPTT Basic

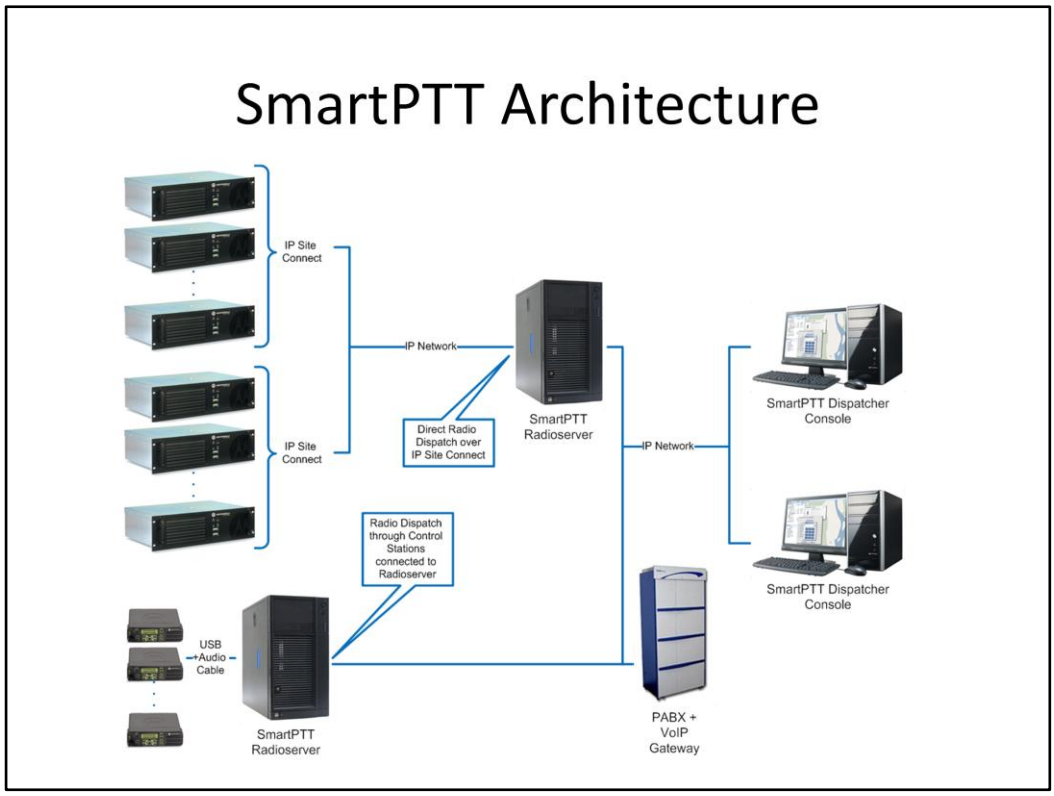
SmartPTT Basic is the Client-Server application which allows building dispatching systems consisting of multiple radio networks and dispatcher consoles. SmartPTT Dispatcher Console is the software application installed at the Windows-based PC, which can be located at any distance from controlled radio networks. SmartPTT Dispatcher Consoles connect SmartPTT Radioservers via IP to perform dispatching functions.

SmartPTT Basic Radioserver communicates to radio subscribers only through the **control stations** (MOTOTRBO mobile radios), connected by USB and audio cables. SmartPTT Basic is an ideal solution for small or middle dispatch systems without MOTOTRBO repeaters.

SmartPTT Enterprise

SmartPTT Enterprise software implements effective dispatching solution, network bridging and call routing over MOTOTRBO digital radio networks. SmartPTT Enterprise includes all functionality of SmartPTT Advanced, but considerably differs in architecture approach and provides additional services for MOTOTRBO networks integration.

The key feature of SmartPTT Enterprise is possibility of direct control over MOTOTRBO IP Site Connect networks and Capacity Plus systems (SmartPTT Enterprise connects directly to MOTOTRBO repeaters through IP protocol).



SmartPTT is the Client-Server application

SmartPTT Client (SmartPTT Dispatch Console) key features:

- Window based application providing visual interface for dispatcher functionality.
- SmartPTT Dispatch console doesn't require any radios and can be located on any distance from controlled fleets.
- SmartPTT Dispatch console can connect to SmartPTT Radioserver via public or dedicated IP channels.
- Each Dispatch console can connect multiple SmartPTT Radioservers

SmartPTT Radioserver key features:

- Interface between SmartPTT Dispatch Consoles and radio fleets.
- Up to 15 Control Stations per server (USB/audio connection). 8 Control Stations recommended.
- Direct 2-way control over multiple IP Site Connect systems (IP connection to Master repeater).
- Mixed control over Capacity+. Direct IP connection for incoming voice/data. Control Station pool for outgoing voice/data (will be covered in more details later in the course).
- Telephone Interconnect (will be covered in more details later in the course).
- Permission Profiles (will be covered in more details later in the course).
- Each Radioserver can serve multiple SmartPTT Dispatcher Consoles.

SmartPTT Configurations

- Analog and Digital conventional channels (2-way control through the Control Stations)
- IP Site Connect (2-way control via IP connection)
- Capacity Plus (1-way IP connection to collect voice and data from the repeaters, Control Stations to send out voice and data)
- Connect Plus (through XRC9000 and XRT9000)
- RadioActivity (2-way control via IP connection)

SmartPTT Enterprise supports 5 radio network configuration variants:

1. Control over Analog or MOTOTRBO digital conventional channels. Implemented by means of control stations connected to SmartPTT Radioserver. Usually control station is MOTOTRBO mobile radio, connected to the Radioserver by means of USB (for data) and Audio (for voice) cables. It is also possible to connect original analog mobile radio (for example, Motorola GM series) through Serial Port for voice communication on open analog channel. MDC1200 is supported in case of usage of MOTOTRBO control stations programmed correspondingly with analog channels.
2. IP Site Connect networks are controlled through two-way IP connection between SmartPTT Radioserver and the repeaters. Radioserver works as another IP Site Connect peer and is able to play as master or ordinary peer.
3. Capacity Plus systems are controlled through combined IP and Control Station interfaces. IP connection to Capacity Plus master repeater is used to collect all voice and data going through the site. Control Stations are used to send out commands and voice calls from Radioserver to Capacity Plus.
4. Control over Connect Plus system is done through XRC9000 (for ARS, TMS, GPS) and XRT9000 controllers (for private and group Voice Calls).
5. Simulcast solution from RadioActivity is supported through IP connection to RadioActivity Audio Gateway for voice and data control.

SmartPTT System Requirements

- SmartPTT Dispatcher Console
  - Core 2 Duo, RAM 2Gb, HDD 250Gb
  - Windows XP/SP3, Windows 7
- SmartPTT Radioserver
  - Core 2 Duo, RAM 2Gb, HDD 500Gb
  - Windows XP/SP3, Windows 7
- MOTOTRBO firmware 1.6 or higher

System configuration key features:

- For the Radioserver configuration with Control Stations, it is required to use 32-bit Windows operating system. 64-bit Windows can be used in case of direct IP connection to MOTOTRBO repeaters.
- For the Radioserver configuration with multiple Control Stations used for voice calls it is recommended to use professional multichannel sound cards. For example – M-Audio DELTA 10/10LT. It is especially important in case of using telephone interconnect for correct DTMF tone recognition.
- All MOTOTRBO radios and repeaters working in the system must use the same firmware version!

Network Bandwidth Requirements

- Dispatcher <–> Radioserver = From 32 to 90 Kbit per channel depending on used codec
- Radioserver <–> Repeater = as defined by MOTOTRBO system planner for IP Site Connect

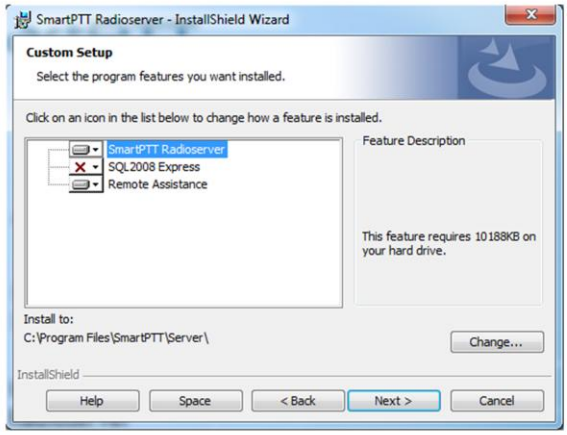
Network bandwidth required for Dispatcher and Radioserver communication depends on 2 factors:

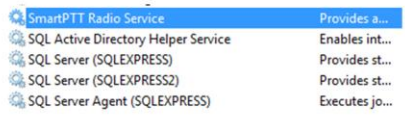
- Codec used to transfer voice data. SmartPTT supports number of codecs which differs by required network bandwidth and sound quality (will be covered in more details later in the course).
- Amount of channels processed by Dispatcher Console. Total bandwidth = Codec bandwidth * Amount of channels provided to Dispatcher by Radioserver

Recommended delay for Dispatcher-Radioserver channel = 60ms. It can be more, but the voice quality will be harmed with the delay growth.

Required network bandwidth between Radioserver and connected IP Site Connect is calculated in accordance with MOTOTRBO system planner. Radioserver should be considered as another peer of the total IP Site Connect network.

SmartPTT Radioserver Installation



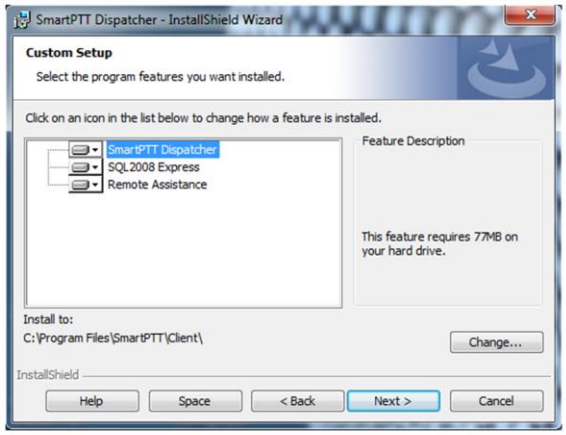


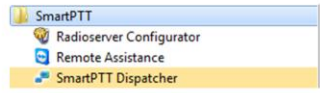
SmartPTT Radioserver Installation is the ordinary routine specific for most Windows applications.

Following components are installed during setup process:

- Windows Service “SmartPTT Radio Service” – SmartPTT Radioserver Engine
- Radioserver Configurator – Radioserver configuration tool
- SQL2008 Express – Free SQL database engine. Installed for storing event log at the Radioserver
- Remote Assistance – Utility for remote connection to computer via Internet for technical support (based on TeamViewer)

SmartPTT Dispatcher Installation



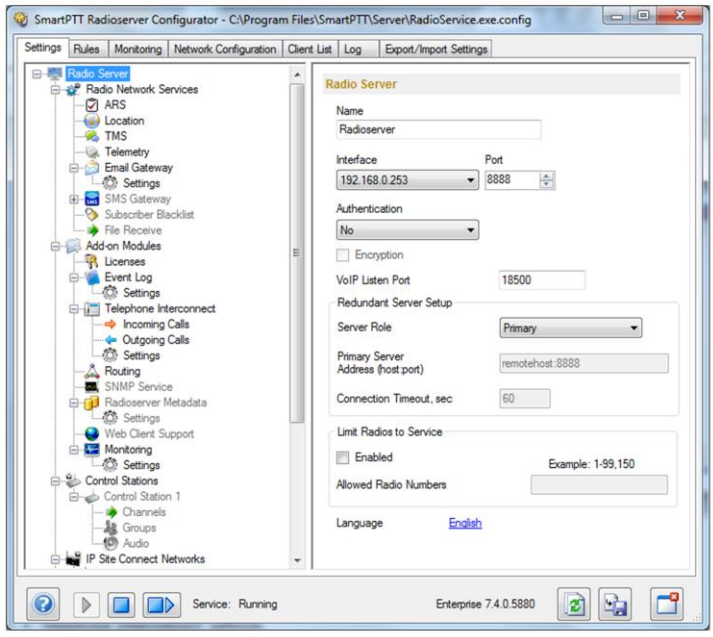


SmartPTT Dispatch Console Installation is the ordinary routine specific for most Windows applications.

The following components are installed during setup process:

- SmartPTT Dispatcher – Dispatcher console application
- SQL2008 Express – Free SQL database engine. Installed for storing event log and meta data at the Dispatcher Console
- Remote Assistance – Utility for remote connection to computer via Internet for technical support (based on TeamViewer)

Radioserver Configurator Overview



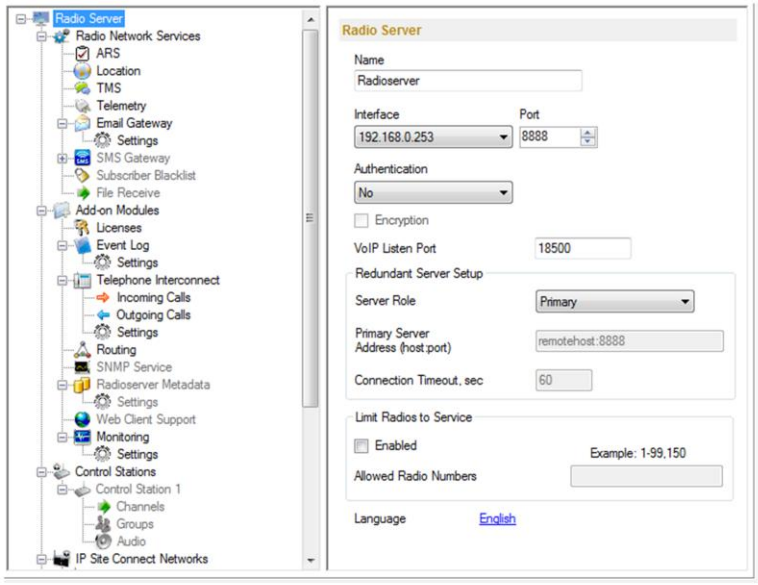
Radioserver Configurator is the utility for Radioserver administration.

Radioserver Configurator allows to do following settings:

- Radio Network Services. Settings for ARS, Location service, TMS, Telemetry, Routing Service
- Event Log. Settings for storing event log to database
- Telephone Interconnect settings
- Email gateway
- Server license settings
- Control Station settings (for mobile radios connected via USB)
- IP Site Connect Networks. Settings of IPSC networks connected via IP
- Capacity Plus Systems. Settings of controlled Capacity Plus systems.
- Profiles. Permission profiles defined at the Radioserver to limit dispatcher privileges.
- Subscriber Groups. Groups used to limit subscribers permission to use system services. For example, dynamic routing of individual calls between IPSC networks.

Radioserver Configurator also provides functionality for real time monitoring of radio activity processed by the Radioserver (**Monitoring** tab), Rules setting (**Rules** tab) and Log viewing (**Log** tab)

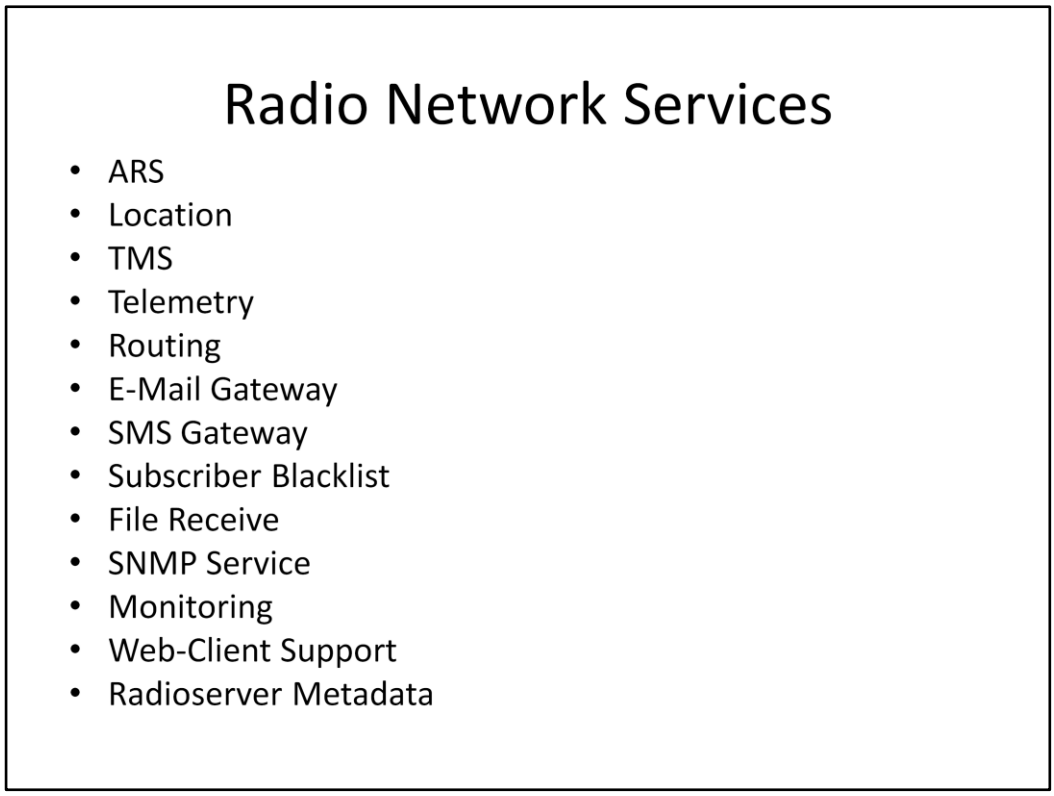
Radioserver General Settings



Radioserver general settings define connection parameters for dispatcher consoles:

- Name – Radioserver Name
- Interface / port – Network interface and port number which will be used to process dispatcher connections
- Authentication:
    - No – no authentication is used
    - Windows – to connect to Radioserver, dispatcher must specify windows user name and password of the windows account which was used to start Radioserver service
- Encryption – set to use Kerberos encryption (can be applied for Windows authentication only)
- VoIP Port – UDP port to transfer voice data
- Redundant Server Settings – Defines the role of the Radioserver (Master or Redundant)
- Limit Radios to Service – Limit range of radios to put under control of SmartPTT. This is feasible when number of available subscriber licenses is less then total number of subscriber radios in the fleet.

For successful dispatcher connection make sure that “Port” and “VoIP Port” are allowed by firewalls



“Radio Network Services” settings define major points of interaction between SmartPTT and services provided by MOTOTRBO.

ARS Settings
UDP Port – port number used by Radioserver to receive ARS packets from subscriber radios. The same port number must be programmed into all subscriber radios by CPS (Section “Network / ARS UDP Port”)
Radio Check Interval, sec – Subscriber radio presence check interval. When a subscriber after initial registration makes no activity during specified period of time, it is requested for registration. It is recommended to increase this value in case of high workload over the channel to minimize unnecessary air usage.

Location
Min SU Location Update Interval, sec – minimal automatic time frame to get GPS location from a subscriber. If dispatcher sets lower value for subscriber automatic GPS location update in the dispatcher console, the update interval will be equal to “Min SU Location Update Interval”.

TMS
UDP Port – port number used by Radioserver to receive text messages from subscriber radios. The same port number must be programmed into all subscriber radios by CPS (Section “Network / TMS UDP Port”).

Telemetry
UDP Port – port number used by Radioserver to receive telemetry state from subscriber radios. The same port number must be programmed into all subscriber radios by CPS (Section “Network / Telemetry UDP Port”).

Routing
Set “Active” checkbox to enable routing service at the Radioserver. Routing service is only available if corresponding functionality presents in the license key.
Notice! Routing configuration is defined from dispatcher console connected to the Radioserver (In the dispatcher console, right click on Radioserver item in Online tree and click “Configure Routing Table” button).

E-Mail Gateway
Settings to apply gateway between radio subscribers and e-mail box (Covered in more details later in the training).

SMS Gateway
Settings to apply gateway between radio subscribers and GSM mobile phones to exchange text messages (Covered in more details later in the training).

Subscriber Blacklist
Settings to define the range of subscriber which will be automatically blocked by the Radioserver.

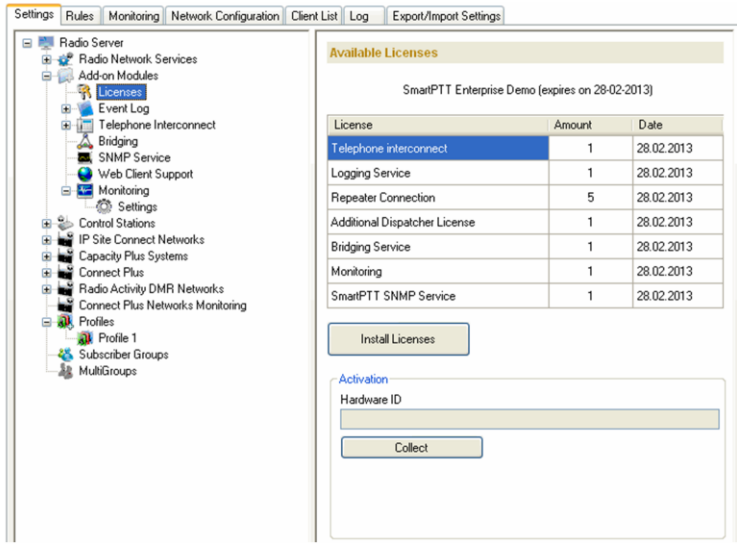
File Receive
Settings to define folder to store the files received by Radioserver from SmartPTT File Transfer installed at the computers out in the field.

SNMP Service
Settings to enable the Radioserver to work as the SNMP server for third-party SNMP clients.

Monitoring
Settings to enable system monitoring functionality at the Radioserver.

Web-Client Support
Settings to enable the Radioserver to accept SmartPTT Web Service connections.

Radioserver Licenses

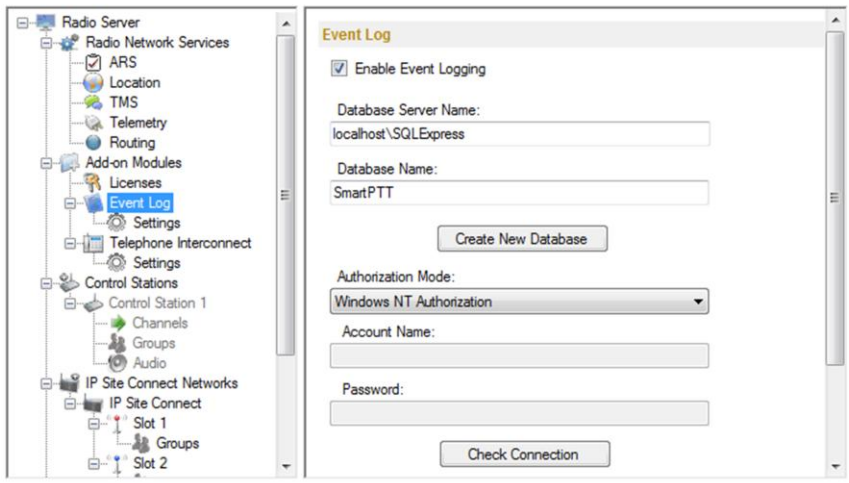


License key file is required to activate SmartPTT functionality. Single license file is supplied for Dispatcher console and Radioserver and must be applied to both of them correspondingly. To apply license key at Radioserver side use “Add-on Modules / Licenses” pane at Radioserver Configurator.

Radioserver specific functionality activated by license key:

- Telephone Interconnect
- Radioserver Logging Service
- Repeater Connection
- Routing Service

Radioserver Event Log



SmartPTT provides event logging at both Radioserver and Dispatcher sides. To enable event logging use “Add-on Modules / Event Log” pane of Radioserver Configurator. Notice! Event log is saved into Microsoft SQL Server Database. If event logging is required at Radioserver make sure to install local SQL Express during Radioserver installation or have SQL Server instance in corporate LAN available for log database creation.

At the first time when the logging is enabled create new SQL Server database at the available SQL Server instance:

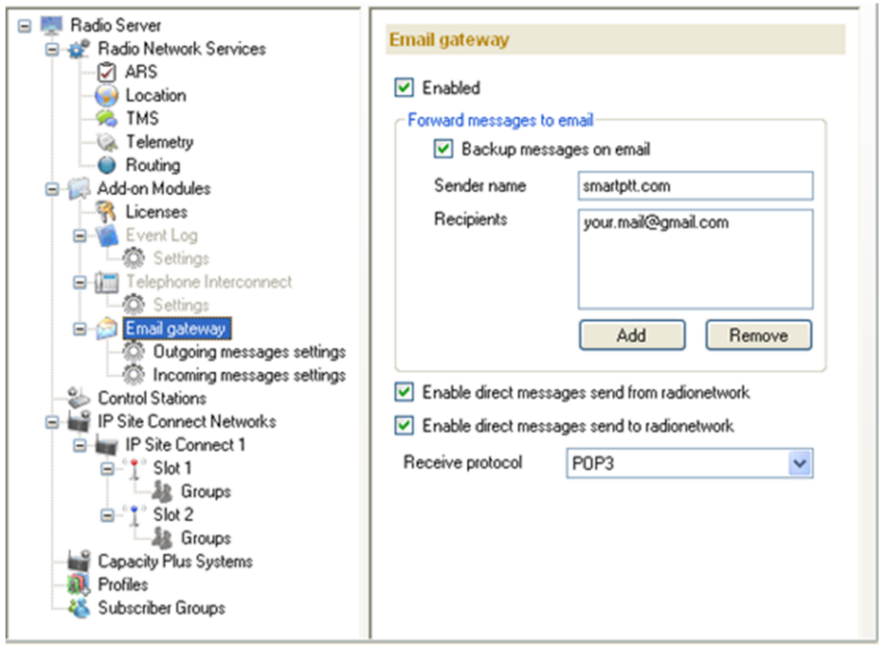
- Specify “Database Server Name” (in case of default SQLExpress installation, “Database Server Name” = localhost\SQLExpress)
- Set “Database Name”. “Database Name” must be any unique name with regards to databases already created at the SQL Server
- Click “Create New Database” to create database

Additional settings are specified at “Add-on Modules / Event Log / Settings” pane:

- Voice log settings (voice log truncate options, folder to save voice log mp3 files, sound quality, sound level, etc.)
- Event log settings (event log truncate options)

Notice! Radioserver event logging can be enabled only if the license key allows this functionality.

Email Gateway

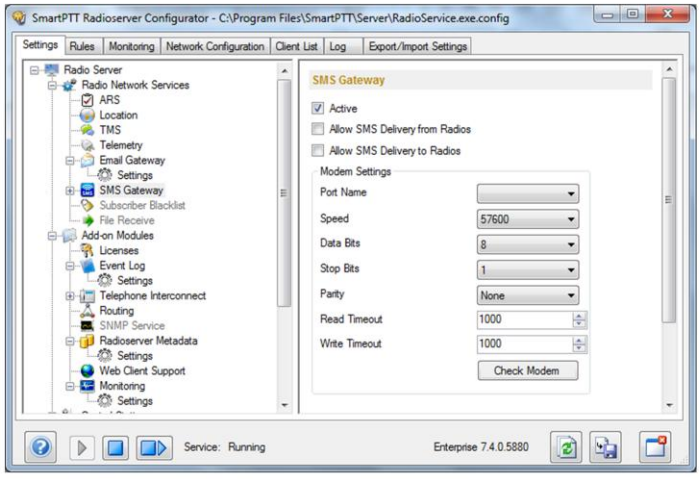


E-Mail Gateway is SmartPTT Radioserver service providing the possibility to organize text message exchange between e-mail box and MOTOTRBO radio network subscribers.

E-Mail Gateway functionality:

- Forwarding text messages, sent within the radio network, to the email addresses
- Direct delivery of messages sent from E-Mail box to the radio network subscribers
- Direct forwarding of text messages sent by radio network subscribers to the E-Mail box
- Notification to E-Mail box through “Rules & Alerts” functionality

SMS Gateway

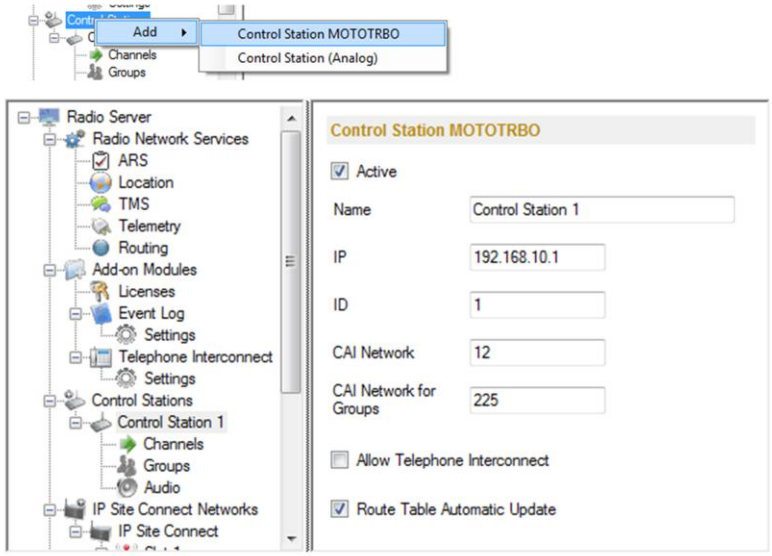


SMS Gateway allows exchanging text messages between subscriber radios and GSM mobile phones.
SMS Gateway functionality:

- Radio subscriber sends SMS to phone subscriber
- Phone subscriber sends SMS to Radio subscriber
- SMS notification through “Rules & Alerts” functionality

SMS Gateway is established through external GSM-modem connected via Serial Port

Control Stations (Digital)



Control Stations are mobile radios connected to Radioserver by means of USB and Audio cables.
Combined USB + audio cable is required when control station is used for both voice and data transmission. For data-only transmission ordinary USB cable can be used. (USB + Audio cable circuit can be found at http://www.smartptt.com, DOWNLOAD page)

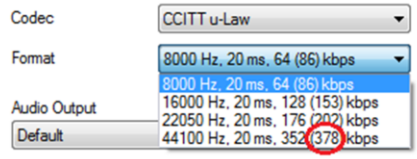
SmartPTT supports 2 types of Control Stations: Digital (MOTOTRBO) and Analog (for example GM series)
Single Radioserver can connect up to 15 Control Stations, although it is recommended to use up to 8.

Each connected Control Station must be defined in Radioserver Configurator. To add digital Control Station, right click on “Control Stations” item and select “Add / Control Station MOTOTRBO” menu.
Digital Control Station settings:
Name – Control Station name to be displayed in the dispatcher console
IP – Control Station IP. Must be the same as Radio IP programmed by CPS in connected MOTOTRBO radio (Network / Radio IP)
ID – Control Station ID. Must be the same as Radio ID programmed by CPS in connected MOTOTRBO radio (General Settings / Radio ID)
CAI Network – Must be the same as CAI Network programmed by CPS in connected MOTOTRBO radio (Network / CAI Network)

Allow Telephone Interconnect – Allows using this Control Station for telephone interconnect service

Control Stations (Digital)

- Channels
- Groups
- Audio

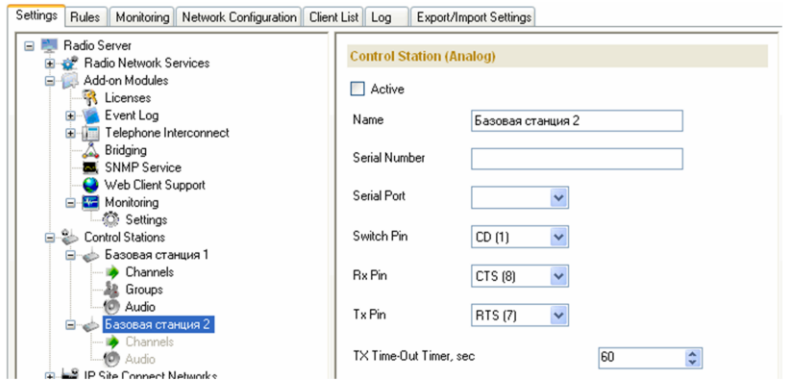


Channels
Channel list must consist of all the channels programmed in connected MOTOTRBO Control Station. Channels in the list must go in the same order and have corresponding zone numbers assigned.
Using “Copy” and “Paste” buttons, channel list can be copied from one control station to another.

Groups
Group list contains the groups available to dispatcher for incoming/outgoing calls. Group list added at Radioserver configurator must correspond to groups programmed by CPS (“Contacts / Digital”)

Audio
Audio settings for the Control Stations. Make sure to specify right sound device (audio input and audio output) used by the Control Station. It is especially important in case of using multiple Control Stations.
Codec – codec used to code outgoing audio stream
Format – Codec settings. Depending on selected Codec/Format pair network bandwidth between Radioserver and Dispatcher is calculated.

Control Station (Analog)



Analog control stations can be connected to Radioserver to support voice calls for analog fleets.
Analog control stations are connected by RS-232 interface.

Analog control station settings:

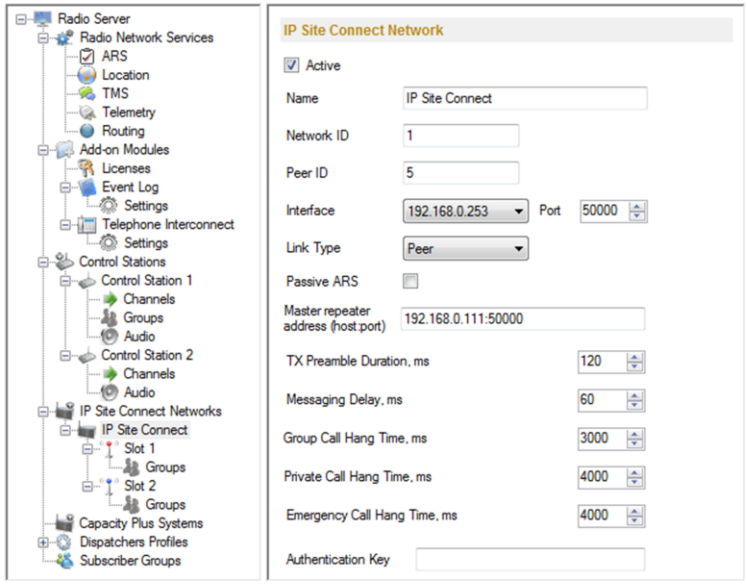
- Serial Number – control station serial number.
- Serial Port – serial port to which the control station is connected.
- Switch Pin (incoming) is set to 1 (< -3.0V) when the control station is switched on
- Rx Pin (incoming) is set to 1 when a signal carrier is registered on the channel
- Tx Pin (outgoing) is set to 1 to switch to transmit mode
- TX Timeout – continuous transmission timeout. After this time the transmission is interrupted.

At the Channels pane only one channel should be added to assign the name displayed at the Dispatcher Console (otherwise the Dispatcher will display 1:1).
Audio settings for the analog control station are set up in the same way as for the digital control station.

The best practice to use the analog control station is to support low-band analog

radios. For VHF, UHF analog fleets it is recommended to use MOTOTRBO radio programmed with analog channel. In this case MOTOTRBO control station is connected via USB as described at “Control Station (Digital)” pages.

IP Site Connect Networks



Single SmartPTT Radioserver can handle multiple IP Site Connect networks simultaneously. All IP Site Connect networks under control of the Radioserver must be defined at Radioserver Configurator. To add IP Site Connect Network, right click on “IP Site Connect Networks” item and select “Add / IP Site Connect” menu.

IP Site Connect Settings

- Network ID – ID of IP Site Connect Network. Network ID is specific for SmartPTT and used to enumerate all connected IP Site Connect Networks.
- Peer ID – ID of virtual repeater. SmartPTT Radioserver plays as the virtual repeater in each controlled IP Site Connect. Peer ID of this virtual repeater must be unique in scope of all repeater’s Radio ID included into the network.
- Interface / Port – Radioserver network interface and port to connect to the IP Site Connect. Port number must correspond to UDP Port of all other repeaters programmed by CPS (General Settings / Network / UDP Port).
- Link Type – Role of the virtual repeater (Peer or Master). Master role is recommended to implement cross-server routing.
- Passive ARS – set to ignore “Radio Check Interval”. Radioserver will not send automatic ARS requests over IP site Connect if Passive ARS is on.
- Master repeater address (host:port) – Master repeater IP and port number. Must be specified if virtual repeater has Role Type = Peer.
- TX Preamble Duration (ms) – duration of TX preamble. Must be the same as “TX Preamble Duration (ms)” programmed in subscriber radios.
- Messaging Delay (ms) – message exchange delay between repeaters. Must

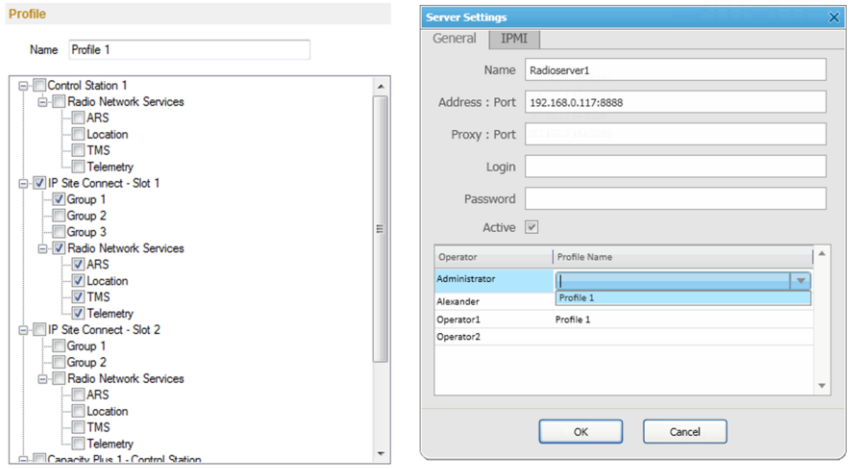
be the same as “Messaging Delay” programmed in IP Site Connect repeaters (Channel settings).

- Group Call Hang Time (ms) – time to reserve the channel by repeater to group call after the end of transmission. During the timeout only participant of talk group can transmit on the channel. Must be the same as “Group Call Hang Time (ms)” programmed in IP Site Connect repeaters.
- Private Call Hang Time (ms) – time to reserve the channel by repeater to individual call after the end of transmission. During the timeout only participant of the individual call can transmit on the channel. Must be the same as “Private Call Hang Time (ms)” programmed in IP Site Connect repeaters.
- Emergency Call Hang Time (ms) – time to reserve the channel by repeater to emergency call after the end of transmission. During the timeout only participant of the group call can transmit on the channel. Must be the same as “Emergency Call Hang Time (ms)” programmed in IP Site Connect repeaters.
- Authentication Key - Must be the same as “Authentication Key” programmed in IP Site Connect repeaters.

Slot Settings

Name – Slot name to be displayed in the dispatcher console.
ID – ID of virtual control station corresponding to the slot of IP Site Connect. This ID must be programmed as “ARS Radio ID” in subscriber radios working on the slot.
CAI Network – CAI network ID. It is recommended to use default value = 12.
CAI Network for Groups – CAI network for groups ID. It is recommended to use default value = 225.
Compressed UDP Data Header – Must be the same as “Compressed UDP Data Header” value programmed in subscriber radios working on the slot.
Emergency Alarm Confirmation – determines if the radio is allowed to acknowledge an emergency alarm.
TX Time-Out Timer (sec) **–** continuous radio transmission timeout. After this time the transmission is interrupted.
Private Call Confirmed – this feature sets Private Individual calls on the current digital channel as confirmed.
Data Call Confirmed – this feature enables individual packets in data calls (ARS, GPS, and Text Message) on the current digital channel or personality to be confirmed.
Allow Telephone Interconnect – allow telephone interconnect on the slot.
Privacy Mode – Privacy Mode (No, Basic, Enhanced). Must be the same as “Privacy Mode” programmed in subscriber radios working on the slot.

Permission Profiles

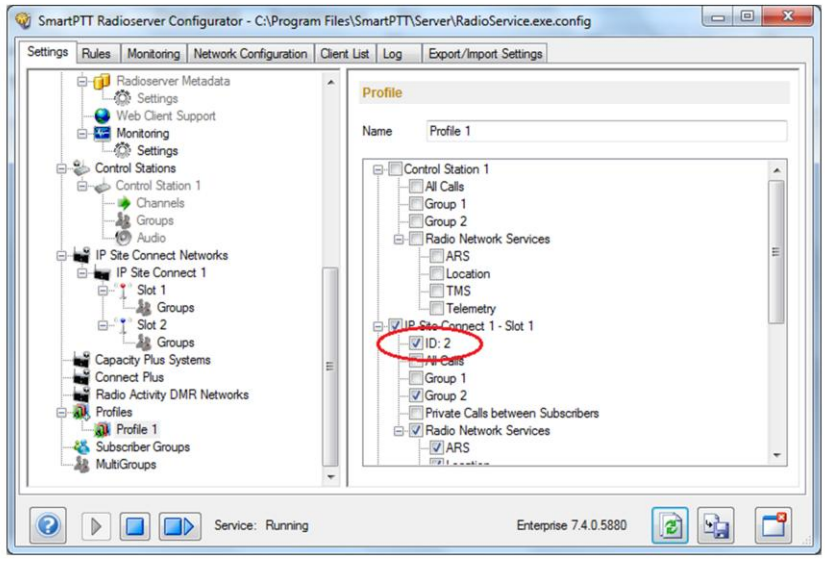


Permission profiles are defined at Radioserver to limit dispatchers permissions on using control stations and services.
Multiple permission profiles can be created depending on access privileges required for all possible dispatchers.
To add permission profile right click on “Profiles” item and select “Add” menu.

In the profile tree set checkboxes for Control Stations and services which must be available for the given profile.

To apply permission profile at the dispatcher console, open Radioserver property window (menu “Settings / Radioservers” to open Radioservers list and “Edit” button to open Radioserver properties) and select profile name for operator, which must have limited access to the Radioserver.

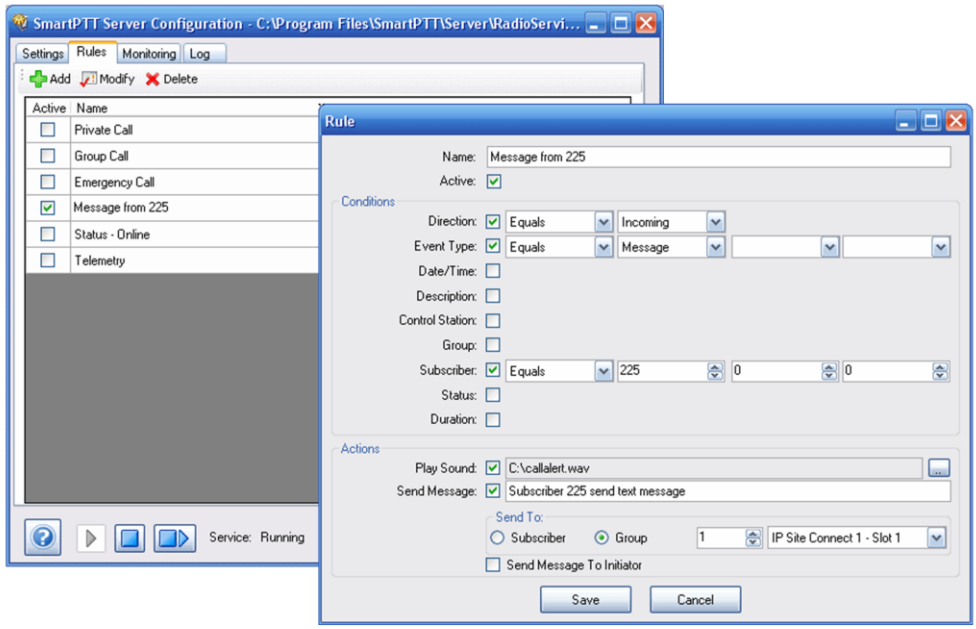
Dispatcher ID



In the environment having multiple dispatch consoles working on the same channels, it is possible to assign each dispatcher with unique Radio ID. Dispatcher Radio ID allows calling the dispatcher individually doing private call from a subscriber radio. Dispatcher Radio ID is assigned through permission profiles at the Radioserver Configurator. Double-click on the “ID” label in the profile configuration tree to set the Radio ID.

Note! Radio ID can be assigned only for the slots controlled through direct IP connection to the repeaters.

Rules Tab



SmartPTT Radioserver provides the opportunity to set rules (on a wide range of criteria) and perform actions (playback sounds, send messages) upon the occurrence of events specified by the rules. This functionality is available in a tab of Radioserver Configurator – **Rules**.

To create a new rule, click “Add”. To change an existing one, click “Modify” or double-click the rule name in the list of rules.

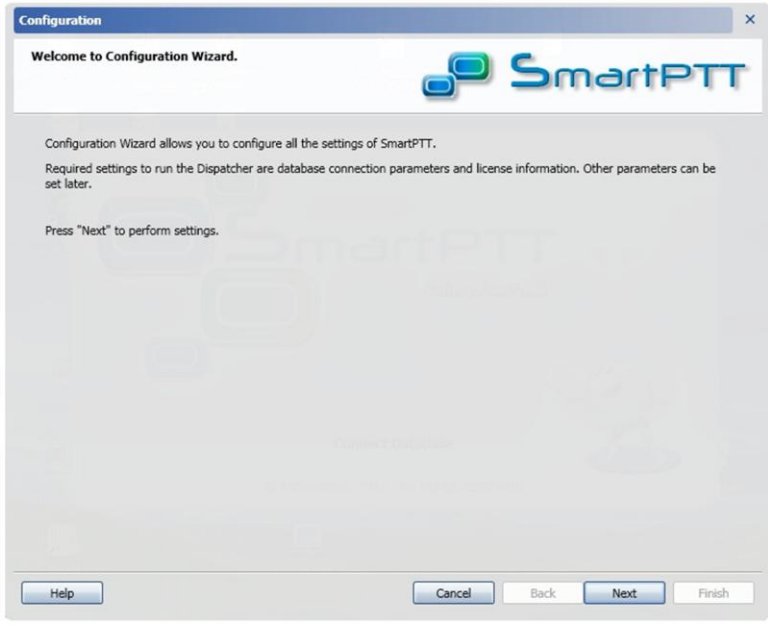
Name – Rule Name
Active – activates the rule - enables Radioserver to react on the event specified by conditions listed below.

Conditions Section defines set of rule criteria. Each condition is described by**:**
Attribute – name of the rule criterion (Direction, Event Type, Date/ Time, Description, Control Station, Subscriber, Group, Status, Duration)
Operation – mathematical operations to be performed on the attribute value (Equals, Not Equals, In Interval, Contains, Greater, Greater than or Equal, Less, Less than or Equal)
Value **–** condition value (Incoming, Outgoing, ARS, Call, Message, Telemetry, Alarm, Status, Block, Time interval, Type event description text, Control station name, Subscriber ID, Group name, Status from the list of statuses, Duration of time (seconds))

Actions Section defines the actions that system shall perform when the rule event meets specified criteria:

Play Sound **–** when activated, contains specified folder and audio file name (.wav) to be played.
Send Message – when activated, contains field for short text message; options defining text message recipients (*Subscriber* or *Group*, specified by ID and Channel); and *Send Message to Initiator* option.

SmartPTT Dispatcher First Start

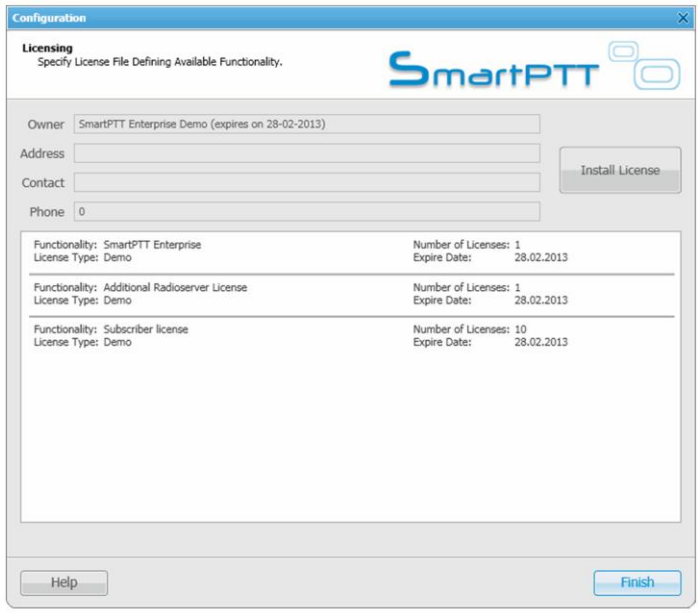


There are two mandatory steps to do at the first start of SmartPTT dispatcher console:

1. Select license file
2. Connect to dispatcher database

When the mandatory steps are completed “Finish” button can be pressed to start the Dispatcher. Also it is possible to pass through other wizard pages and do settings for Radioservers, Statuses, etc. All these steps are optional and can be performed later.

Dispatcher Licenses

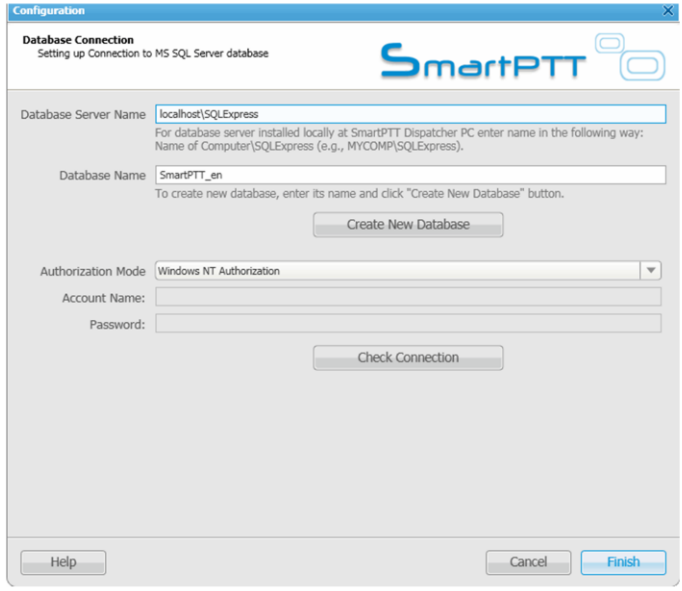


Valid license key is required to use SmartPTT dispatcher console. License key is supplied as the file with *.spttlx extension.
License key is applied either at the dispatcher console launch (if no valid license is already used) or by means of Licenses configuration dialog (menu “Settings / Licenses”).
In the Licenses configuration dialog click “Install License” button and choose valid license key file.
Functionality and amount of licenses available for the dispatcher will be listed in the dialog.

There are 2 types of SmartPTT licenses:

- Demo license. Free license provided for limited time only for demo purposes
- Permanent license. Permanent license provided to customer upon the purchase

Database Settings

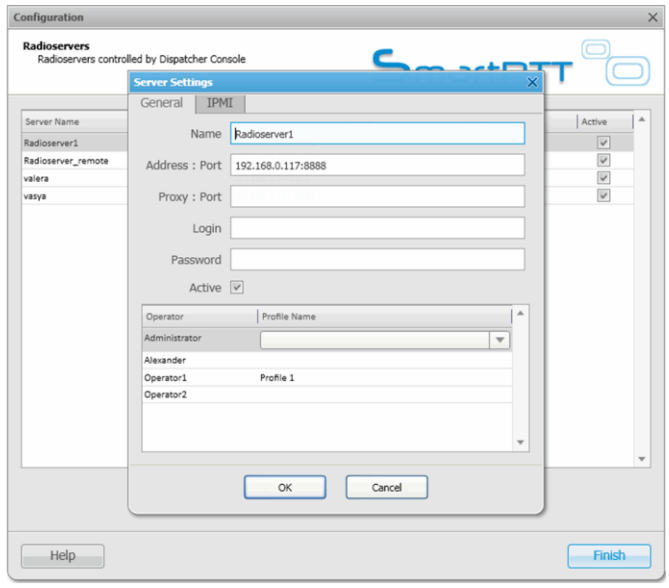


SmartPTT Dispatcher Console uses Microsoft SQL Server database to save event log and meta-data. Free edition of Microsoft SQL Server – SQL Express 2008 is supplied in scope of SmartPTT setup package and must be installed together with the Dispatcher if no other corporate SQL Server is going to be used for the console.

At the first start of dispatcher console create new SQL Server database at the available SQL Server instance:

- Specify “Database Server Name” (in case of default SQLExpress installation, “Database Server Name” = localhost\SQLExpress)
- Set “Database Name”. “Database Name” must be any unique name with regards to databases already created at the SQL Server
- Click “Create New Database” to create database

Radioserver Settings



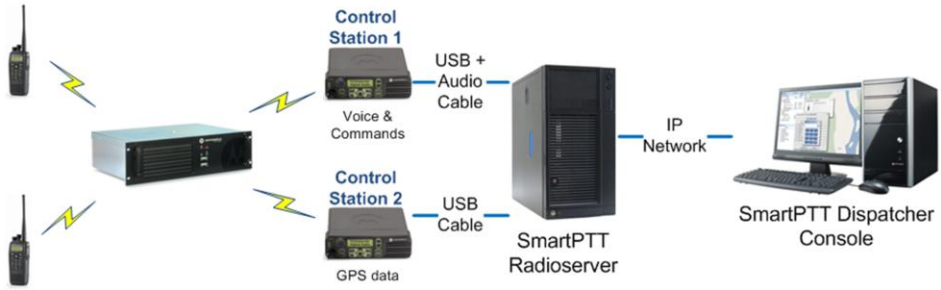
SmartPTT Dispatcher Console can connect several Radioservers simultaneously. Although the Dispatcher can be started without any connected Radioserver (for example, to do reports), no real time operation to control the fleets will be available since interface to all the subscribers is provided by means of the Radioservers.
To set up Radioservers use “Settings / Radioservers” menu.

Radioserver Settings
Name – Radioserver name to be displayed in the Dispatcher
Address : Port – Radioserver address. This address and port must correspond to the settings done at Radioserver Configurator (see page “Radioserver General Settings”)
Proxy : Port – IP address and port of the router providing NAT to the “Address : Port” of Radioserver. “Address : Port” in this case is internal IP and port of Radioserver which receives the traffic forwarded by the router.
Login and Password – Windows login and password used to connect to Radioserver. Must be specified if Windows authentication is enabled at the Radioserver (for more details see page “Radioserver General Settings”)
Profile assignment – each operator can be assigned with the permission profile defined at the Radioserver (for more details see page “Permission Profiles”)

MOTOTRBO Firmware Requirements

- All the radios and repeaters working in the system must have the same firmware
- SmartPTT supports MOTOTRBO firmware 1.6 or higher

System Design: Control Stations



System design based on two control stations and utilizing GPS Revert channel.

In this configuration voice calls and commands are transmitted by Control Station 1 connected to radioserver by special USB+Audio cable.
The second radio (Control Station 2) is used to receive GPS data that is transmitted on GPS Revert channel.

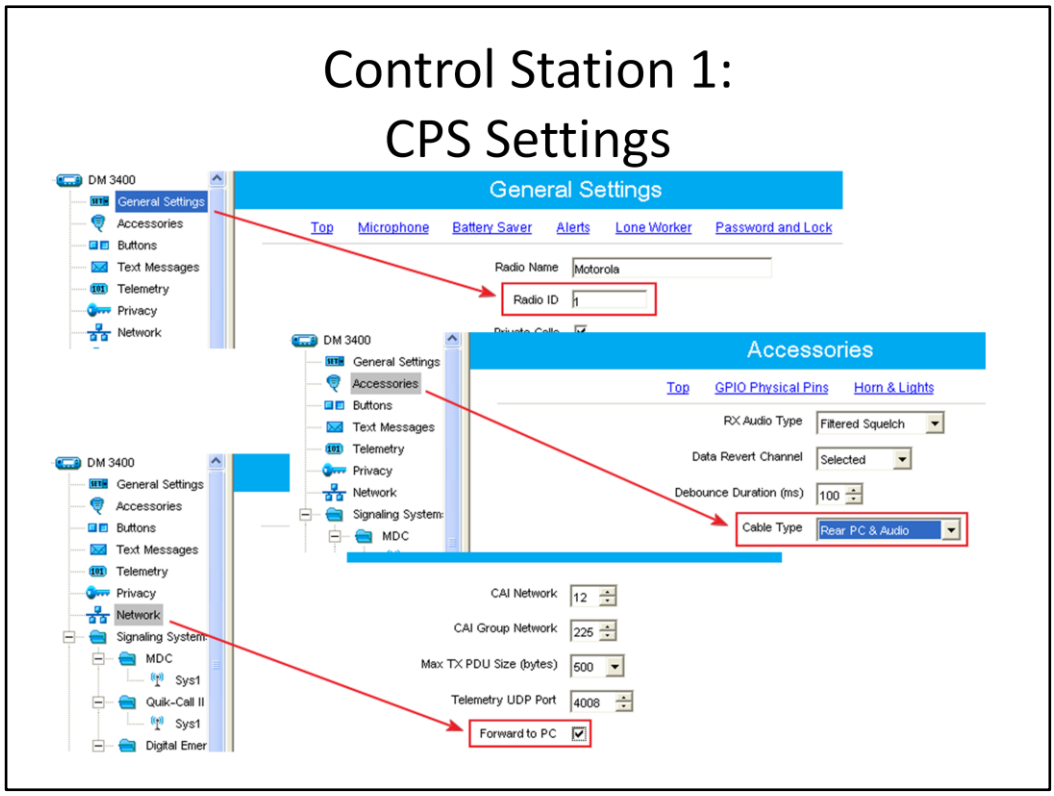
Control Station 1: General functionality

- Voice calls
- Text messaging
- Radio commands

Control Station 1 is used by radioserver to:

- Transmit and receive all types of voice calls (private calls, group calls, all calls, emergency calls)
- Transmit and receive text messages and telemetry commands
- Transmit radio commands (GPS requests, radio check, radio kill, remote monitoring etc.)
- Receive ARS data

Control Station 1: CPS Settings

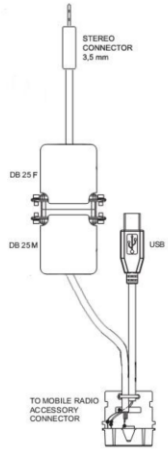


Beside the regular settings for the mobile radio, specific settings must be set for Control Station 1 in MOTOTRBO CPS:

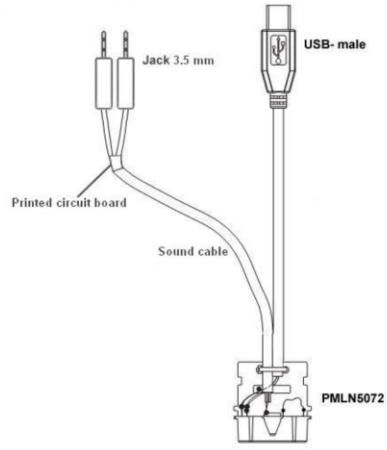
- Radio ID, that will be used to identify SmartPTT dispatch system (both radioserver and dispatchers)
- On Accessories tab set Cable Type to Rear PC & Audio
- On Network tab check Forward to PC checkbox, so all data packets received by base radio will be forwarded to radioserver. Also make sure that ARS Radio ID is empty.

Control Station 1: Connection Cable

Based on MOTOTRBO Programming Rear Accessory Cable (PMKN4016)



Based on MOTOTRBO Rear Accessory Connector (PMLN5072)

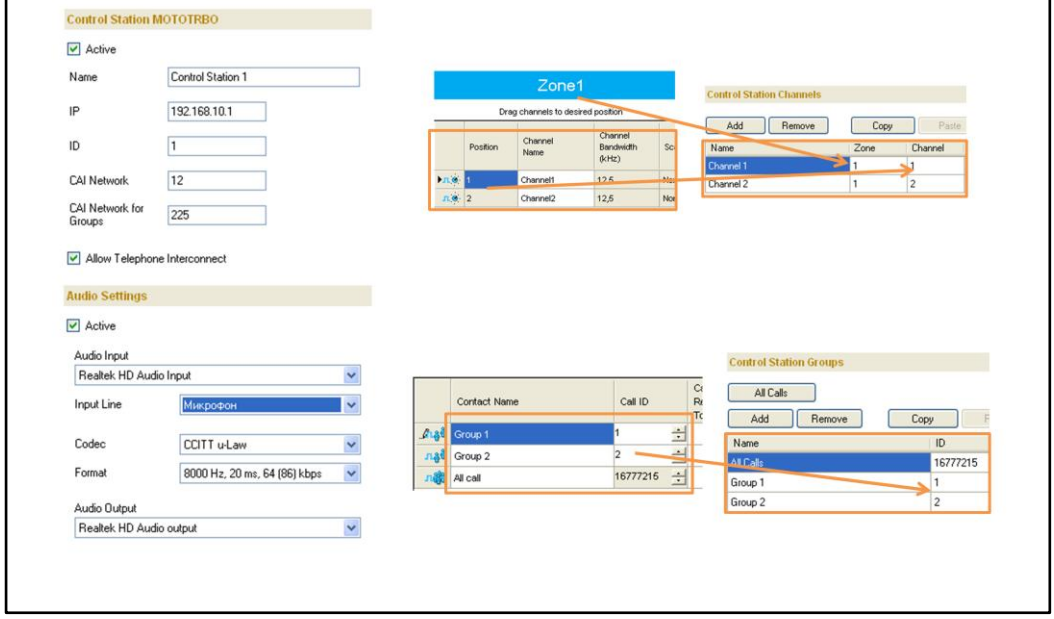


Control Station 1 must be connected to radioserver with cable that supports both audio and data. There are two options how to make such cable:

1. Using regular MOTOTRBO Programming Rear Accessory Cable (PMKN4016).
2. Using MOTOTRBO Rear Accessory Connector (PMLN5072).

Detailed instructions how to make both types of cables can be downloaded from our site http://www.smartptt.com/.

Control Station 1:
Radioserver Configurator Settings



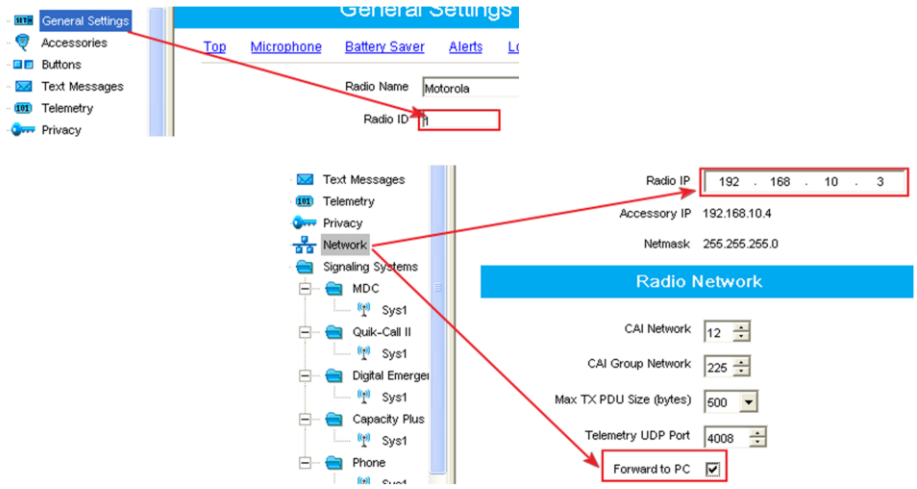
In Radioserver Configurator add new Control Station or modify existing one and configure the following settings:

- Control Station IP – set to Radio IP from CPS.
- ID – set to Radio ID from CPS.
- CAI Network and CAI Network for Groups – the same as in CPS.
- Add all channels from CPS to Channels list.
- Add all groups and all call (Group Calls and All Call from Contacts / Digital in CPS) and to Groups list.
- Makes sure that audio is enabled (Active check-box is set) and select the audio interface Controls Station 1 is connected to.

Control Station 2: GPS Revert

- GPS revert channel is the designated digital channel on which automatic GPS updates are transmitted.
- This reduces traffic on a channel and allows the main channel to accommodate more voice transmissions.
- The radio performs this action by automatically switching to the GPS revert channel before transmitting a GPS update, and switching back when the update is completed.
- One digital channel can be used as GPS Revert for multiple voice channels. Voice traffic is discouraged on revert channels.

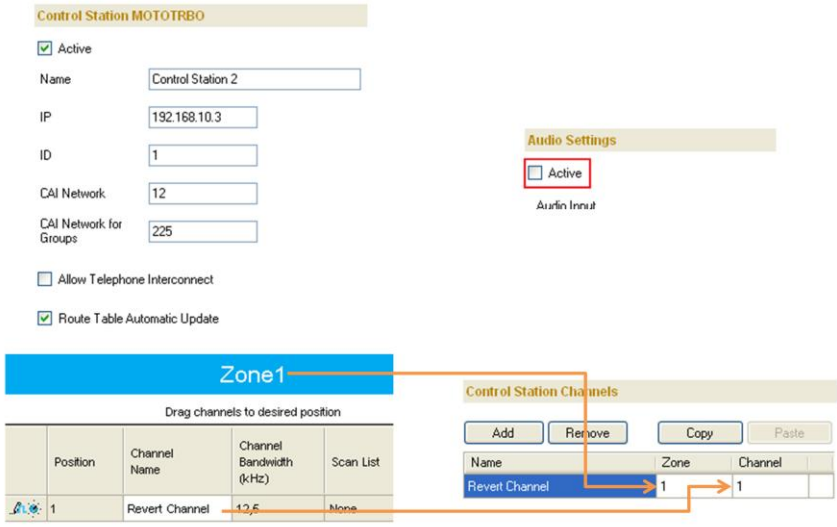
Control Station 2:
CPS Settings for GPS Revert



Beside the regular settings for the mobile radio, specific settings must be set for Control Station 2 in MOTOTRBO CPS:

- Radio ID must be the same as Control Station 1 Radio ID.
- On Network tab make sure that Radio IP is NOT the same as Radio IP of Control Station 1, check Forward to PC checkbox and make sure that ARS Radio ID is empty.

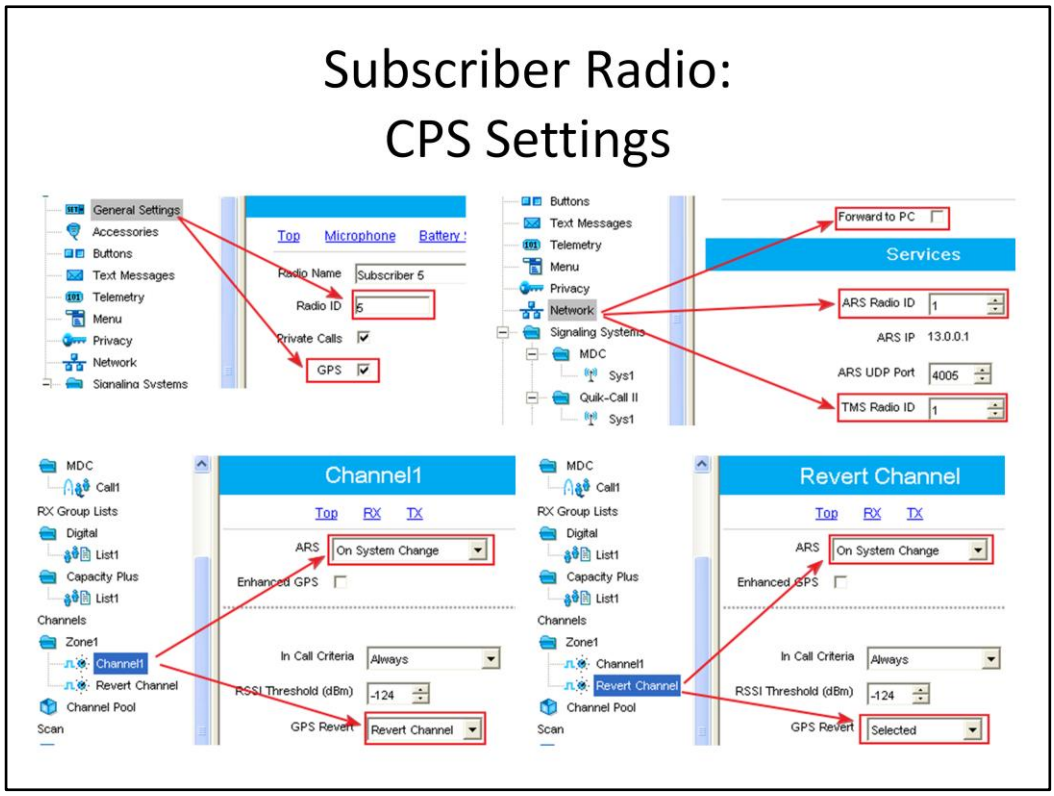
Control Station 2: Radioserver Configurator Settings



In Radioserver Configurator add new Control Station with following settings:

- Control Station IP – set to Control Station 2 Radio IP from CPS.
- ID – set to Radio ID from CPS.
- CAI Network and CAI Network for Groups – the same as in CPS.
- Add all channels from CPS to Channels list.
- Makes sure that audio is disabled (Active check-box is unset).

Subscriber Radio: CPS Settings

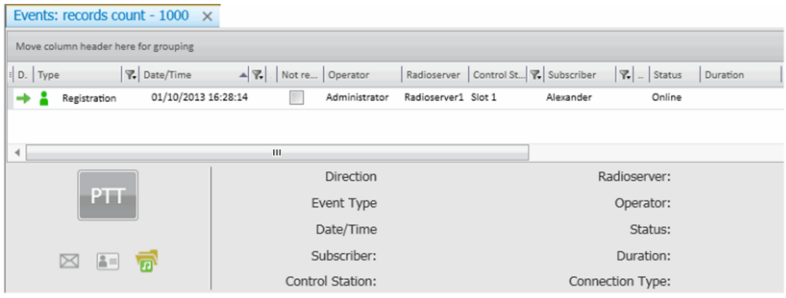


For subscriber radio configure the following settings:

- On General Settings tab set Radio ID (should be different from other IDs in the radio network) and enable GPS
- On Network tab make sure that Forward to PC is unchecked and set ARS Radio ID and TMS Radio ID to Radio ID of Control Station 1 (or Control Station 2 – they must be the same)
- Add all required channels. Please note that there must be at least two channels: one for voice communications (the same frequency/timeslot as were configured in Control Station 1) and one for GPS revert (the same frequency/timeslot as were configured in Control Station 2).
- For voice channel (Channel1 here) enable ARS and set GPS Revert to GPS revert channel.
- For GPS revert channel (Revert Channel here) enable ARS and set GPS Revert to Selected.

Automatic Subscriber Registration

- The **Automatic Registration Service (ARS)** feature provides an automated data application registration for the radio. When the radio powers up, the radio automatically sends the presence notification and registers with the server.

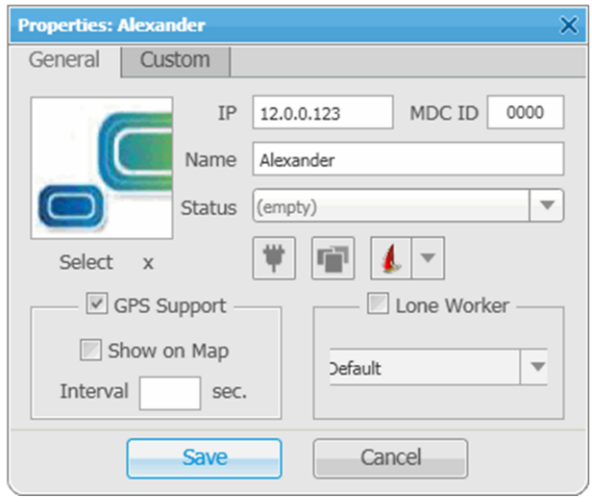


If you correctly configured ARS service, subscribers should appear online automatically after some minutes they turned the radio on.
SmartPTT Dispatch console by default is configured to automatically enroll all subscribers to the subscriber list based on their activity. So when radio subscriber make one of the following actions it gets recognized by SmartPTT.

- ARS registration
- Text message
- Voice call (private to dispatcher, group, all-call)

After that the operator can manage the subscribers in this list even in case they are not appear online.

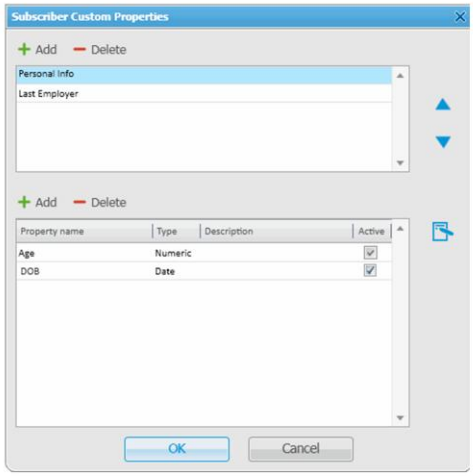
Subscriber Properties

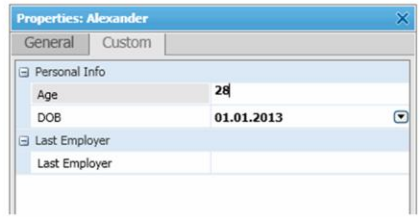


Properties of the registered subscriber are edited in Subscriber Window (right-click the subscriber in the list to open this window).
Name – subscriber's name. Operator can rename the subscriber to easily identify him in the system.
Subscriber icon – this icon will be displayed on the map and next to subscriber name in subscribers list.
Status – subscriber's system status.
Select – selects the subscriber's photo (image file).
Categories – select the categories this subscriber refer to.
Show on map – the subscriber is displayed on the map and the GPS coordinates request interval is set.
GPS Support – mark this checkbox if the subscriber has GPS support.
Lone Worker – Turns On/Off lone worker rules.

After the subscriber's profile is set up, click Save.

Subscriber Custom Properties





SmartPTT implements the functionality of subscriber custom properties. Subscriber customer properties have several types: text, numeric, date, enumeration.

To create custom properties use “Settings / Subscriber Custom Properties” menu.

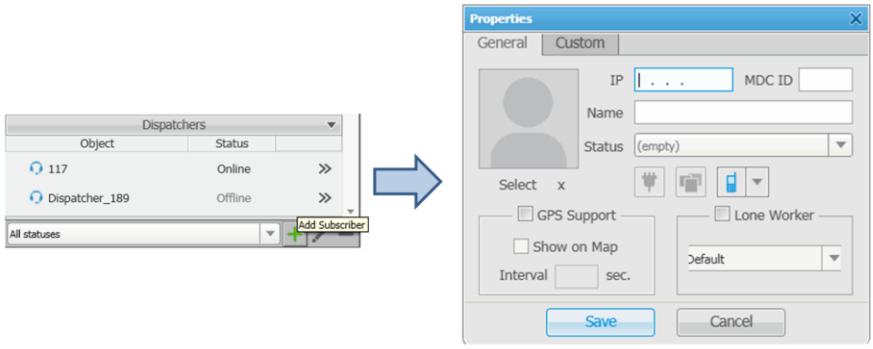
The top list in Subscriber Custom Properties window contains subscriber property groups. The bottom list contains properties of selected group. To add new custom property you will need to specify following fields.

- Name – custom property name.
- Type – property type (Text, Numeric, Data or List).
- List – property list (this field is enabled if Type is equal t0 List).
- Active – When this checkbox is set, custom property is displayed in the subscriber property window.

To create enumeration, use Edit Enumerations button .

Custom properties are displayed and can be edited in the Custom tab of subscriber property window.

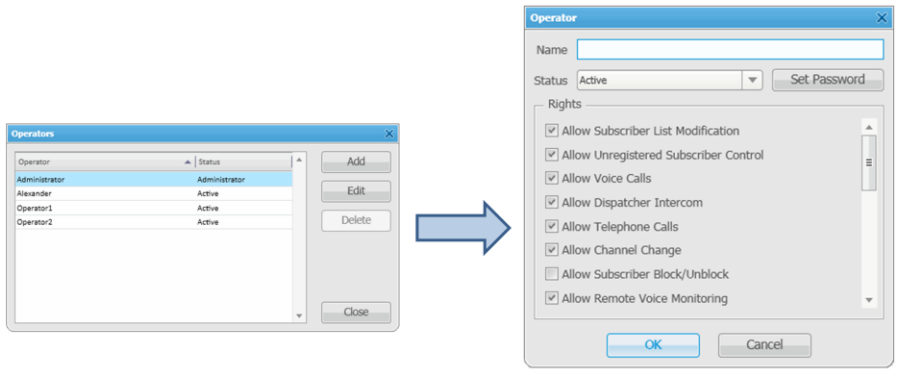
Manual Subscriber Record Creation



Beside the automatic subscriber registration, you can also add subscribers manually. To do this, click Add Subscriber button at the bottom of subscriber's list. In the New Subscriber window there must be specified subscriber identification:

- For digital subscribers: subscriber's IP address – it's formed from CAI Network and Radio ID, configured in CPS for subscriber.
- For analog subscribers: MDC ID – an identifier used to identify MDC (Motorola Data Communication) messages (up to 4 hexadecimal numbers).

Operator Permissions



By default an operator with the name Administrator and a blank password is created in the Dispatcher. Administrator has full access to SmartPTT management functions. To add new operators, click Operators button in the main menu.

In Operators window one can add, edit or delete operators. Please note, Administrator record can't be deleted from the system.

For every operator following settings can be defined:

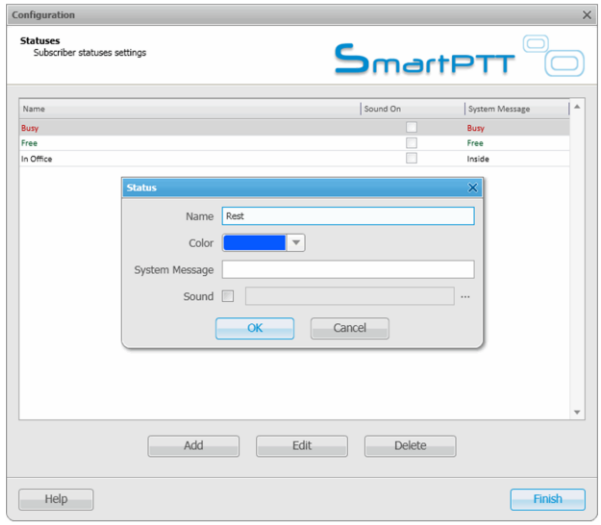
Name – operator's name.

Status – operator's status (Active or Archive). Archive is used for operators that are not working with the dispatcher console anymore but cannot be removed from the system as the event log contains entries referring to them.

Set Password – set operator's password.

Rights – contains the list of rights which can be granted or denied for different operator's activities.

Subscriber Statuses

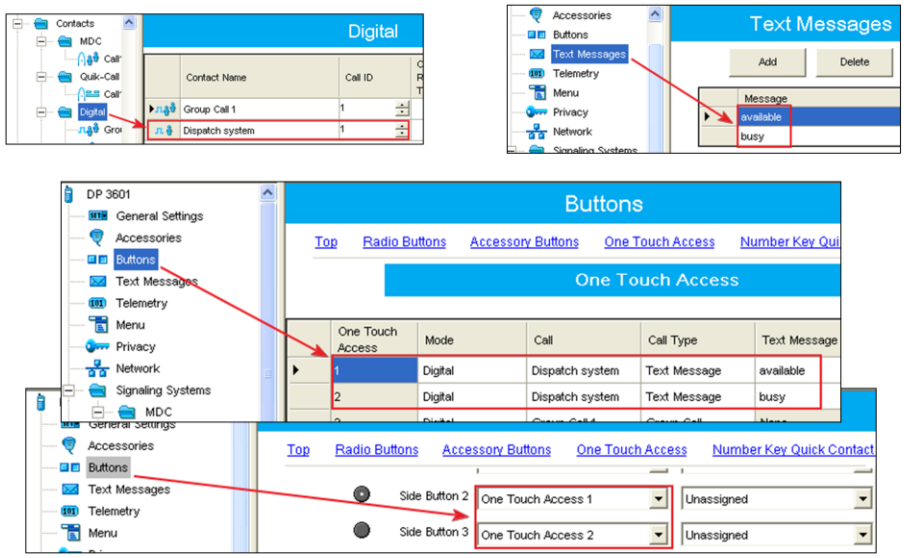


SmartPTT supports customized subscriber statuses (e.g. Available, On Call, In Place, Busy). This status can be set either by the operator or by the subscriber himself.
To define list of statuses use Statuses Configuration dialog (menu “Settings / Statuses”).

Status settings:

- Name – display name for the system status.
- Color – display color for the status.
- System Message – status message (text message) received from subscriber to trigger status change.
- Sound – audio file played back if the status is applied.

Change Subscriber Status by Pre-programmed Radio Button

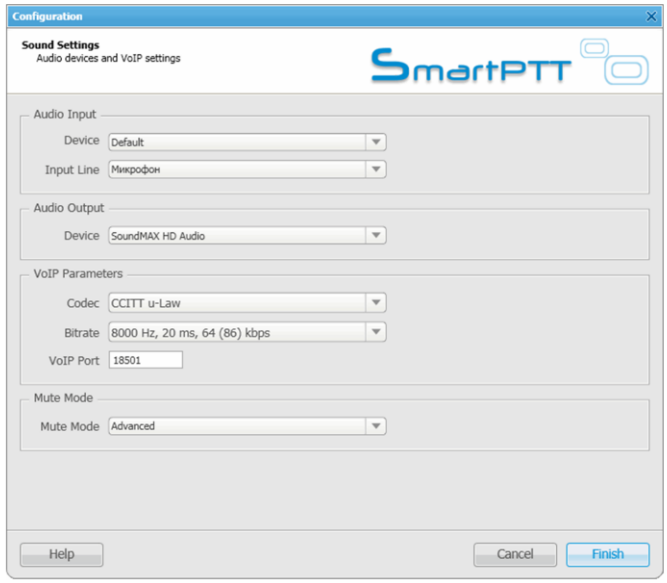


Subscriber can change its status by sending short text message dispatcher. Such text messages can be sent manually or using pre-programmed buttons.

Steps to configure radio to allow subscriber change his status in one button push.

1. Add Private Call for SmartPTT Dispatch System to Contacts (Call ID is Radio ID of Control Station 1).
2. Add all required status messages on Text Messages tab. They should be added in the same form as configured in System Message field of the status in SmartPTT Dispatcher.
3. On Buttons tab configure One Touch Access actions to send predefined status text messages to Control Station 1 (SmartPTT Dispatch System).
4. Configure required pre-programmed radio buttons to trigger One Touch Access actions by short or long press of the button.

Dispatcher Sound Settings

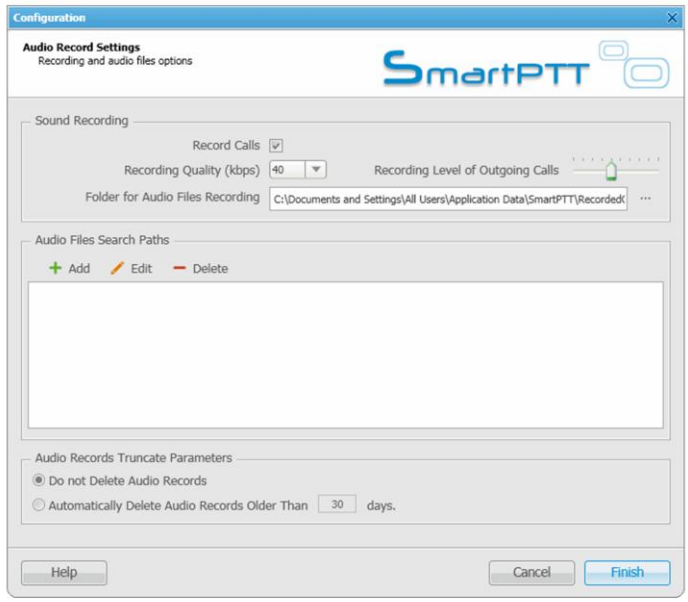


Dispatcher Sound Settings configuration dialog allow to select sound device for dispatcher sound speakers and microphone

Codec – codec used to code outgoing audio stream
Bitrate – Codec settings. Depending on selected Codec/Format pair network bandwidth between Radioserver and Dispatcher is calculated.
VoIP Port – UDP port used to receive audio data
Mute Mode – provides muting options:

- Basic – in this mode when you click to mute the control station, you will hear nothing from the control station.
- Advanced – in this mode when you click to mute the control station, the system will work differently. You will still be able to hear private incoming calls, calls initiated on the dispatcher side or calls answered by the dispatcher.

Dispatcher Record Settings



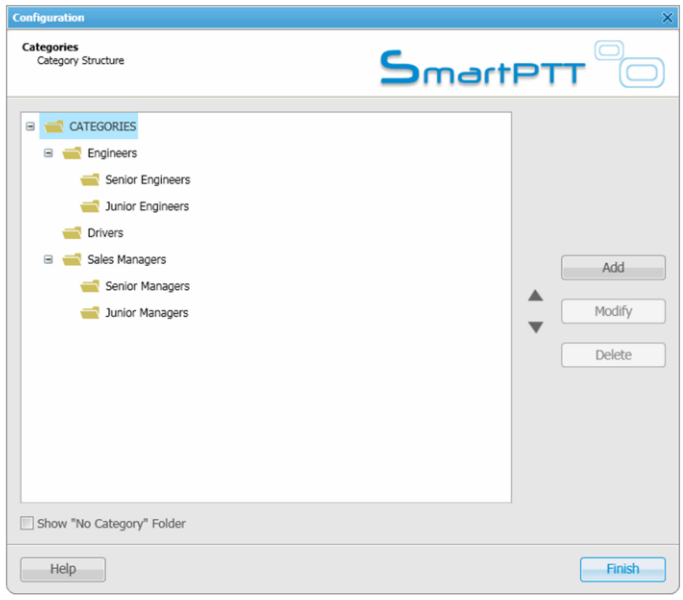
Audio Record Settings configuration dialog contains the settings for voice logging at the dispatcher console:

- Record Calls – if this option is on, incoming and outgoing calls are recorded.
- Recording Level of Outgoing Calls – increase or decrease sound volume for recording outgoing calls. Adjust this value for good quality logging; the value can depend on hardware configuration of the dispatcher PC.
- Recording Quality (kbps) – sound quality for audio files.
- Folder for Audio Files Recording – set path to the folder where recorded audio files are stored.
- Audio Files Search Paths – set paths to additional folders for recorded audio files. When voice call is played back from the event journal corresponding audio record is first searched at “Folder for Audio Files Recording” and then at each path specified in “Audio Files Search Paths” list.

Note: After changing the folder path where audio files are stored, the former path is automatically added to the audio files search path field.

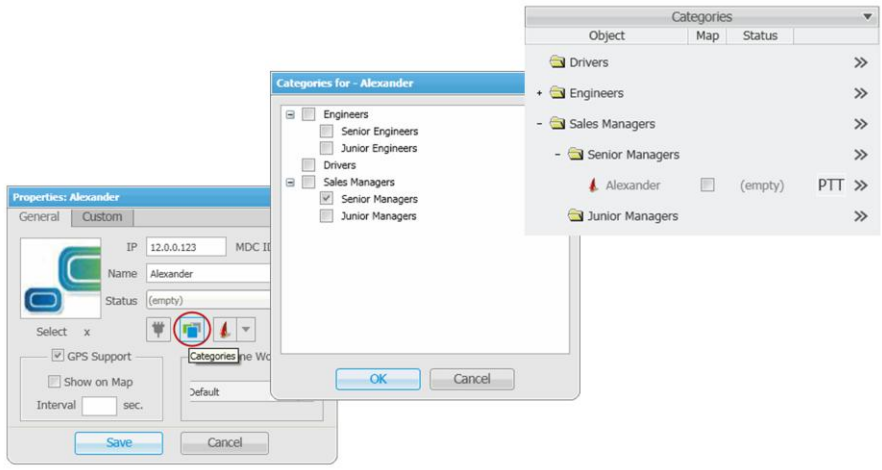
- Audio Records Truncate Parameters – allows you to configure the cleanup settings.

Categories



Category functionality allows organizing all objects (radio subscribers, groups, control stations, external dispatchers, telephone subscribers) into multilevel logical structure for convenient management. Each object can belong to one or several categories simultaneously.
Category structure is created by means of the special configuration dialog (menu “Settings / Categories”).

Assign Subscriber to Category

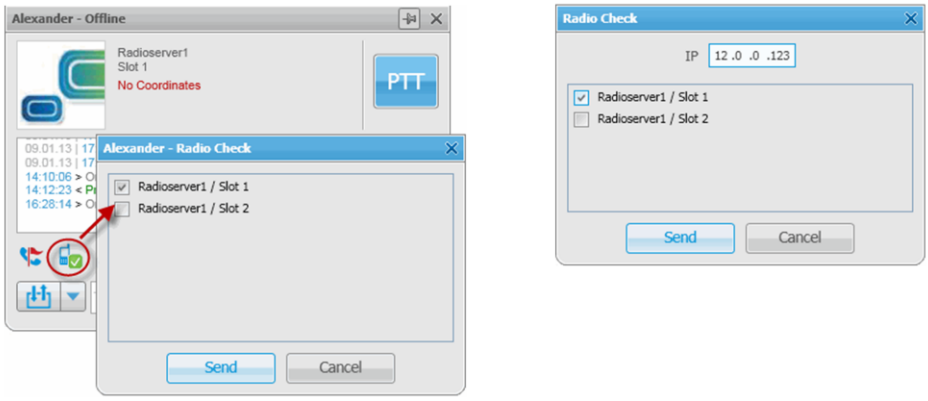


To assign subscriber to category:

- Right click on the subscriber to show subscriber property window.
- Click “Categories” button
- Select check boxes inside the categories to assign them to the subscriber

Subscribers and other objects arranged in the category tree are displayed at “Categories” pane under “Subscribers” section.

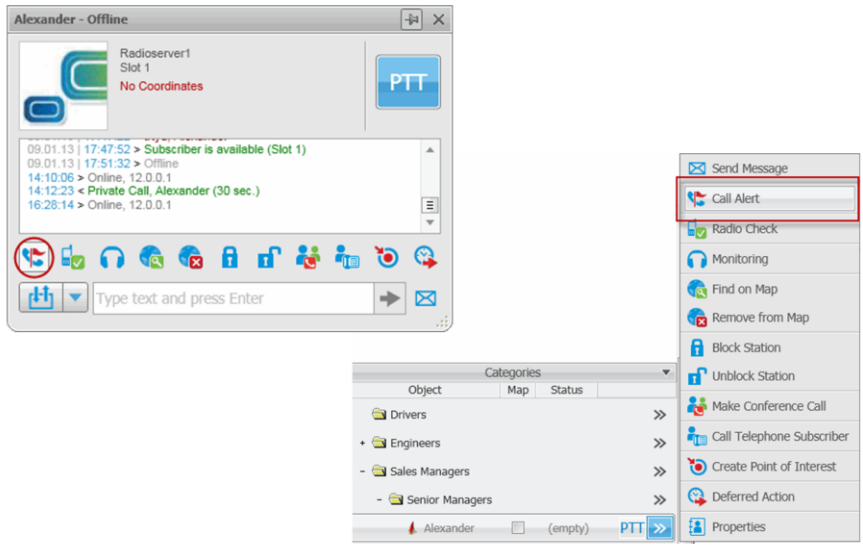
Subscriber Radio Check



There are 2 ways to check subscriber presence at the radio network:

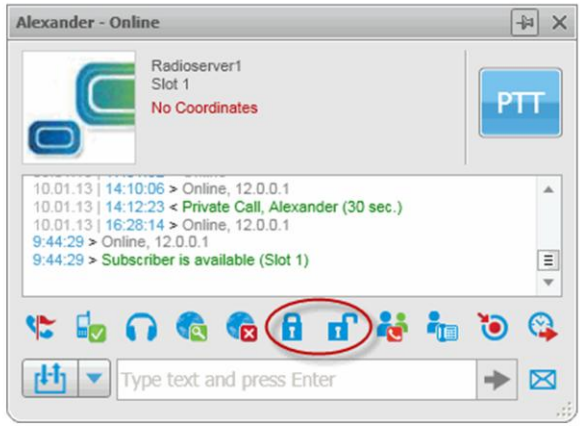
1. Right click on the subscriber to show subscriber property window and click “Radio Check” button. In the dialog select the channels to send radio check requests and click “Send”.
2. Use “Service / Radio Check” menu to show “Radio Check” dialog. In the dialog enter IP address of the subscriber to check, select the channels to send radio check requests and click “Send”.

Subscriber Call Alert



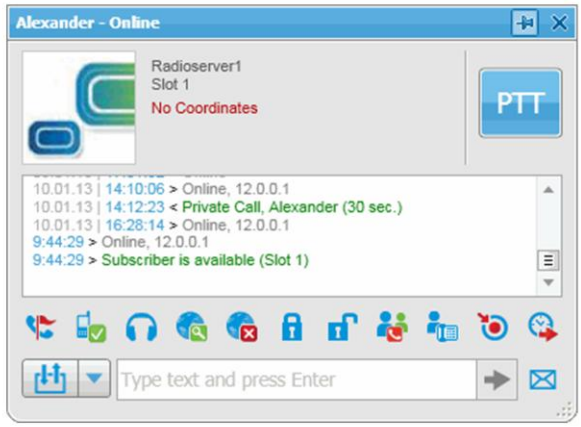
To send Call Alert right click on the subscriber to show subscriber property window and click “Call Alert” button.
Or, expand the Action List next to the subscriber and select “Call Alert”.

Subscriber Radio “Kill”



To block the radio, right-click on the subscriber to show subscriber property window and click the “Block Station” button. To unblock the radio, click the “Unblock Station” button.

Call Window Functionality

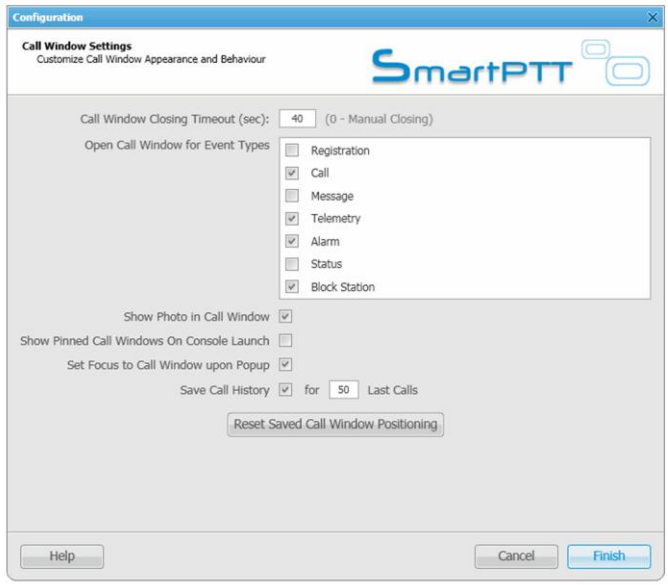


Call window is the small popup window displayed automatically on the screen upon a subscriber activity (ARS, voice call, text message, status change, telemetry signal). Call window contains all the information about the subscriber activity – subscriber name, status, Radioserver and control station, last subscriber events. By default, Call window disappears automatically at specified timeout. To prevent the Call window disappearance, use the pin button at the upper-right corner of the window.

Call window contains a number of controls to do actions specific for the subscriber:

- Call (PTT) – Do the private voice call
- Message – Type and press Enter to send the text message
- Call Alert – Send Call Alert command
- Radio Check – Send Radio Check command
- Monitoring – Start voice monitoring
- Find on Map – Send single GPS location request
- Call Telephone Subscriber – Show the dialog to patch the radio and telephone subscribers
- Conference Call – initiate conference call with the subscriber
- Telemetry – check telemetric status and apply available telemetric commands
- Create Point of Interest – create POI at the current place of the subscriber
- Create Deferred Action – opens a window to create a deferred action for the subscriber

Call Window Settings

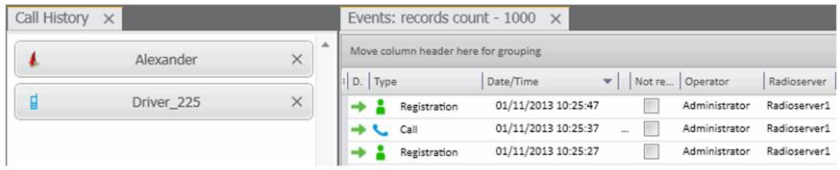


Call Window Settings configuration dialog allows to define the behavior of call windows.

Call Window Settings:

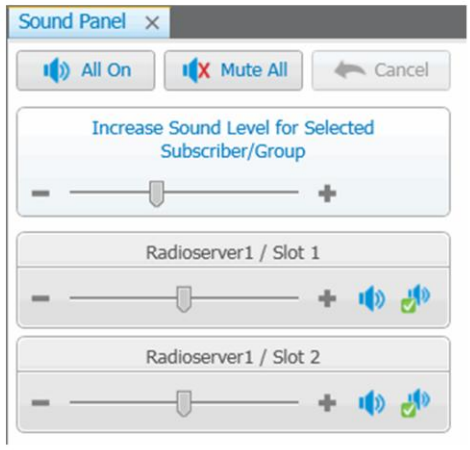
- Call Window Closing Timeout (sec) – time in seconds, after which the call window is closed automatically (setting the value to zero cancels automatic closing).
- Open Call Window for Event Types – types of events triggering the call window opening.
- Show Photo in Call Window – if selected, the call window displays the subscriber's photo.
- Show Pinned Call Windows On Console Launch – if activated, all call windows recorded before the SmartPTT Dispatcher application is exited will be restored at the next launch.
- Set Focus to Call Window Popup – set this property on to set focus on a call window when it is opened or have some new activity.
- Save Call History – enables saving specified amount of items in the Call History when the Dispatcher Console is closed.
- Reset Saved Call Window Positioning – click the button to reset the current position of the call windows to the default one.

Call History



Call History panel provides quick access to the list of subscribers who made most recent voice calls. At the top of the list you can see the latest caller. To show the Call History panel, use the menu “View / Call History”.

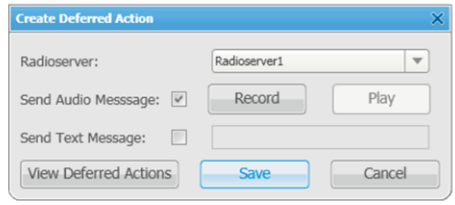
Sound Panel

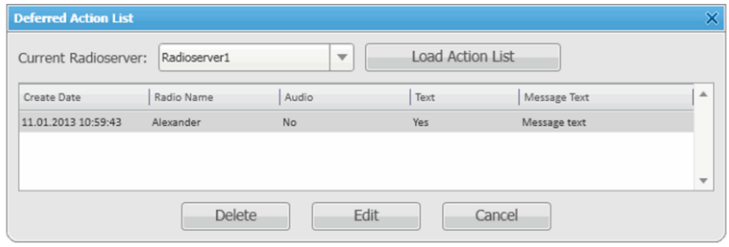


Sound panel allows to tune sound level for each control station or slot controlled by the dispatcher.
To show the Sound panel use the menu “View / Sound Panel”.

Deferred Actions

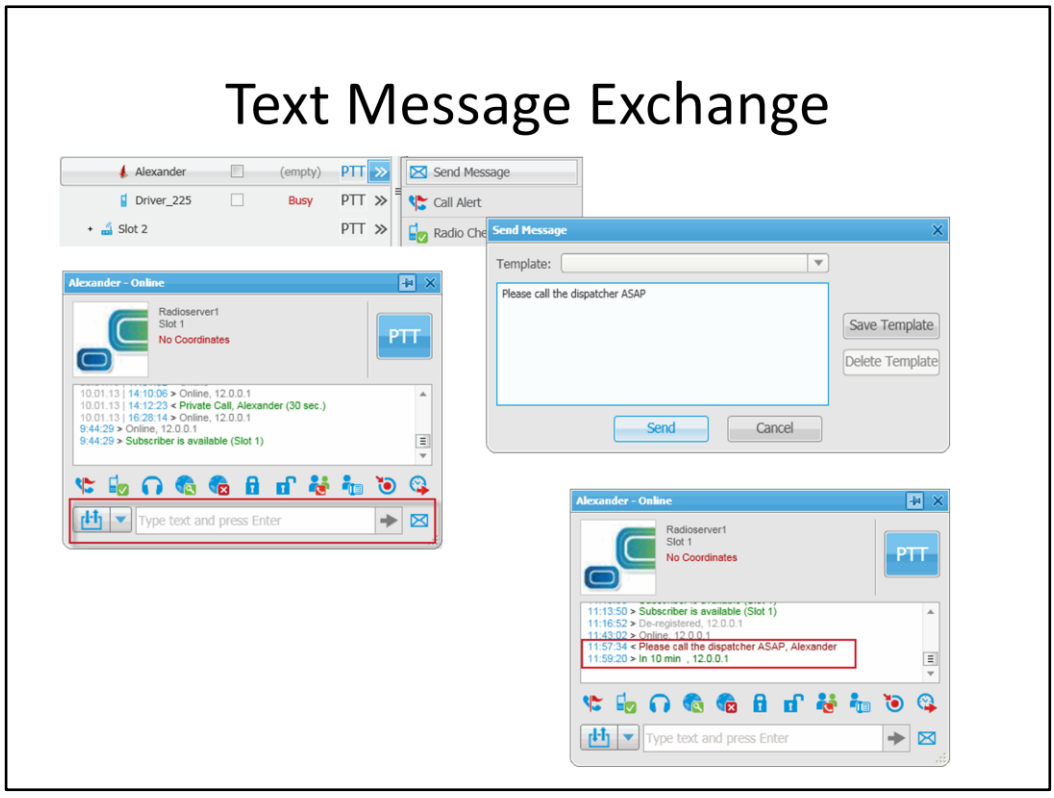
- Voice Calls or Text Messages





SmartPTT allows sending deferred voice or text messages to the radio subscribers who are offline at the moment of sending the message.
To create a deferred action, open subscriber property window and click “Create Deferred Action” button, or select this option in the Action List.
Voice call or text message is stored at the selected Radioserver. Radioserver is waiting until destination subscriber goes online to playback voice call or send text message.
To modify or delete deferred actions use “Deferred Action List” dialog.

Text Message Exchange



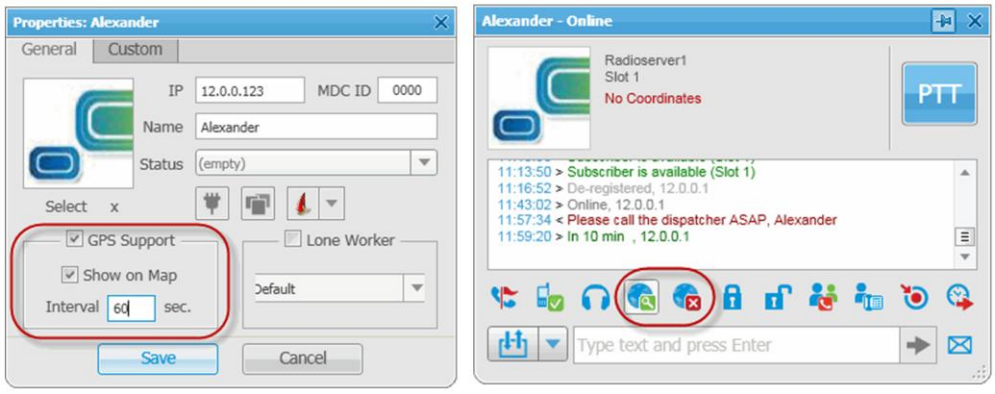
SmartPTT supports text message exchange with subscribers. Text messages can be sent to individual subscribers or groups.
Quick text messages can be sent from:

- Call window
- Action List

Also, you can open a separate Send Message window to ease sending of long text messages or use saved templates. To open this window, click the Message icon in the Call window right next to the message box. In this window you can type the message and save it as a template for future use.

When subscriber sent the message, it appears as text in Subscriber Call window. Also, the records about all received or sent text messages are kept in Events log.

Subscriber GPS Settings



SmartPTT supports 3 ways to get subscriber locations:

1. Periodical location request
2. Manual location request
3. Location request by event

Periodical location request

Periodical location request can be enabled for each subscriber individually. To enable location request at the given time interval, select the subscriber in the tree and right-click to show subscriber property window. GPS settings in the property window:

- GPS Support – select this check box to identify that the radio has GPS-receiver and must be tracked on the map in SmartPTT
- Show on Map – select this check box to enable periodical GPS data request at the time interval specified in the textbox behind

Recommendations for Enhanced GPS:

- Windows size programmed in the radios must be 8
- Time frames assigned to subscribers in the dispatcher console must be in range: 30 sec, 60 sec, 120 sec, 240 sec, 480 sec, 960 sec
- To calculate the amount of subscribers allowed on the channels for enhanced GPS, use MOTOTRBO system planner

Manual location request

To do a single location request, open the subscriber Call window and click the “Find

on Map” button. Upon the response subscriber location will be displayed and centered on the map. To hide the map icon, click the “Remove from Map” button.

Location request by event

Location request by event is done by means of “Rules and Alerts” functionality covered later in this course.

Map Formats

- Open Vector Map
- Raster Map
- MapInfo
- MapPoint
- Google Map
- Open Street Map

Open Vector Map
SmartPTT supports maps in Polish format which is open vector map format. There are number of other open vector map formats which can be easily converted to Polish by means of third-party application – GPSMapEdit.

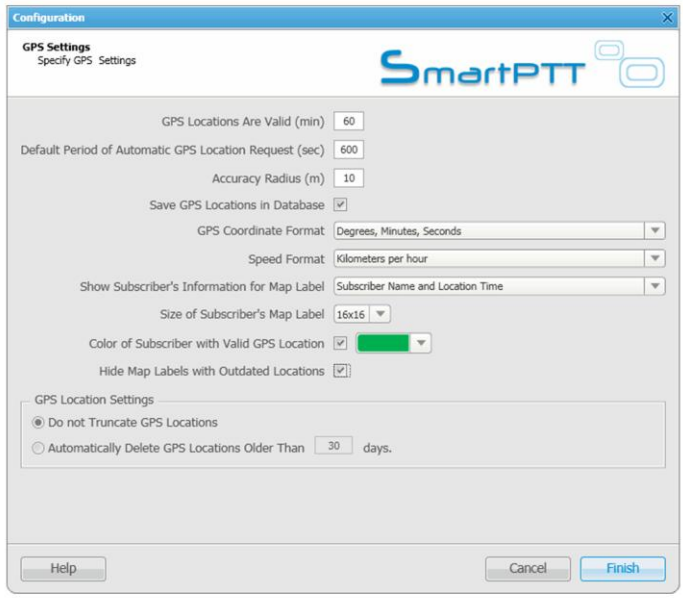
Raster Map
Raster map is based on the graphical image in JPG, BMP, PNG. Raster map creation is covered later in this course.

MapPoint
MapPoint is the product of Microsoft corporation and must be purchased from Microsoft reseller to be used in scope of SmartPTT.

Google Map
Google Map usage is only allowed for non-commercial and demo purposes.

Open Street Map
Open street map (www.openstreetmap.org) is supported for both online and offline (.osm files) viewing

GPS Settings

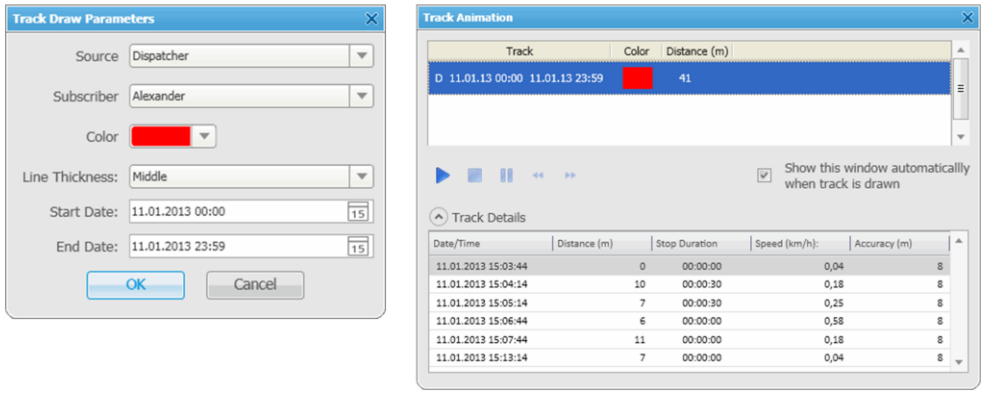


GPS Settings Configuration dialog contains general options for GPS Monitoring functionality.

GPS Settings:

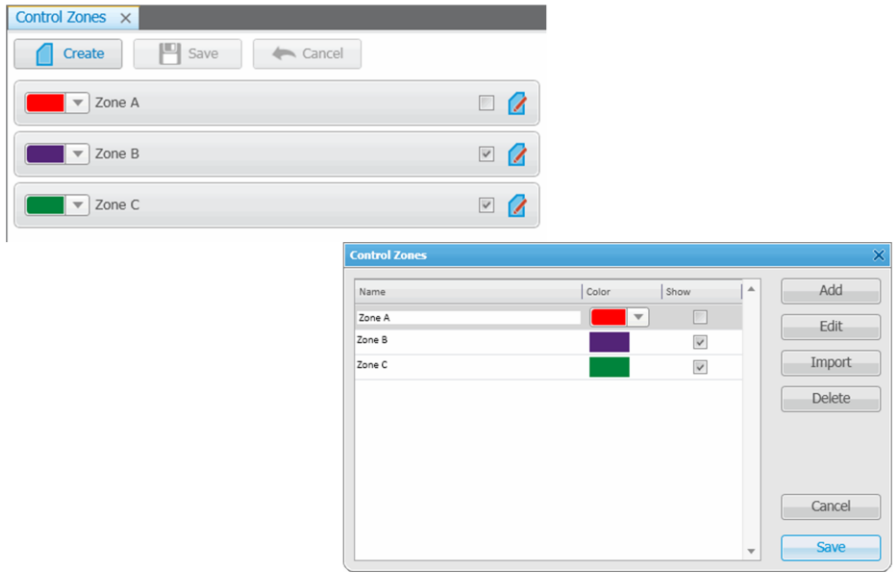
- GPS Locations are Valid (minutes) – time interval when subscriber locations are supposed to be valid. Subscribers having valid locations can be displayed with the special color (“Color of Subscriber with Valid GPS Location”). Outdated locations are hidden from the map if “Hide Map Labels with Outdated Locations” checkbox is on.
- Default Period of Automatic GPS Location Request (seconds) – time interval which is set by default at subscriber properties when periodical location request is enabled (“Show on Map” checkbox)
- Accuracy Radius – sets the size of the circle where 50% of the actual GPS measurements is held
- Save GPS Locations to Database – Set this checkbox to enable saving subscriber locations to dispatcher database
- GPS-coordinate Format – defines the way GPS coordinates will be displayed in the dispatcher interface
- Speed Format – defines the way subscriber speed is displayed in the dispatcher interface (kilometers/hour, meters/second, miles/hour, nautical miles/hour)
- GPS Location Settings define amount of days to store GPS Locations in the database

Track Drawing and Animation



All GPS data collected by the Dispatcher is saved into the database (GPS Location saving must be enabled, see page “GPS Settings”)
Track drawing and animation functionality shows subscriber movement track for the given time interval and allows analyzing each collected subscriber location.
Use “Map / Show Route” menu to open “Track Draw Parameters” dialog where route criteria are specified (start date / time, end date / time, subscriber).
When a track is drawn over the map, “Track Animation” dialog is automatically opened. “Track Animation” dialog allows starting movement of subscriber map icon over the track.
Click “Track Details” button to display the table showing all location details.
To clear the track, close “Track Animation” dialog and use “Map / Clear Shown Routes” menu.

Control Zones



Control Zones are polygons drawn on the map which are used to control subscriber input or output.

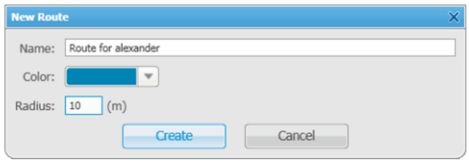
Ways to create Control Zones:

- Visual drawing of control zone. Use “View / Control Zone Panel” menu to display Control Zones panel. Click “Create” button and add polygon right at the displayed map. Control Zone panel also allow quick show and hide operations.
- Import from polish map file (*.mp). Use GPSMapEdit application to create polygons with the custom type = 0x99 right over the map in polish format. Use “Map / Zones Definition” menu to display “Control Zones” dialog. Click “Import” button to import polygons with the type = 0x99 from the map file.
- Add manually. Use “Map / Zones Definition” menu to display “Control Zones” dialog. Click “Add” button to show “Zone Coordinates” dialog. Add zone angle coordinates.

Use “Map / Zones Definition” menu to delete zone or change zone name.

Subscriber input/output control is applied by means of GPS Rules described later on page “GPS Rules”

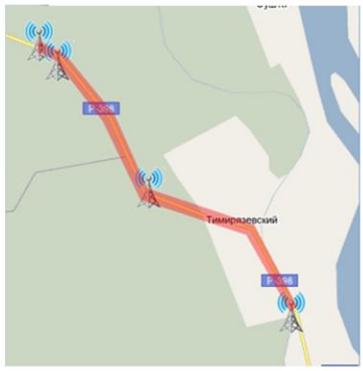
Routes

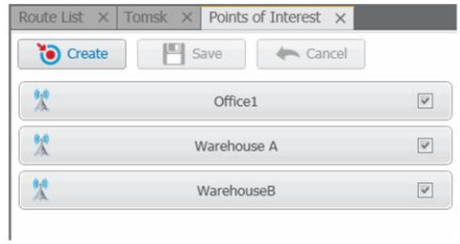


Route is a tool that significantly extends functionality of the SmartPTT system, especially for dispatch control over networks of highly mobile subscribers moving along the predefined route (for example, employees of transportation companies).
The Route is a polyline connecting key points of the network coverage area. Subscriber location near the key points is identified by the specified radius of the route and can be summarized in the Subscriber Locations report.

For creating a new route or editing an existing one, click View → Routes → Create or Edit route.
For specifying Route parameters (Color, Radius, Coordinates), click Map → Route Definition → Add or Edit.

Points of Interest





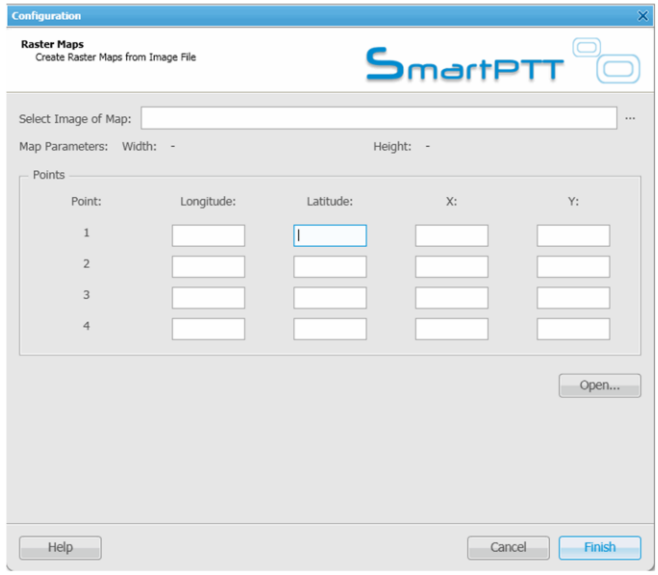
Points of Interest are points on the map which are usually required to have quick access at the dispatcher console.
A point of interest has 5 properties:

- Point name
- Latitude and longitude
- Point icon
- Point visibility

There are 3 ways to create a point of interest:

1. Use “Map / Points of Interest” menu to show “Points of Interest” dialog. Click “Add” button to create new point of interest.
2. Use “View / Points of Interest” menu to how “Points of Interest” panel. Click the “Create” button to add a point of interest right on the map which is currently displayed in the dispatcher.
3. Use subscriber property window to add a point of interest at the present subscriber location.

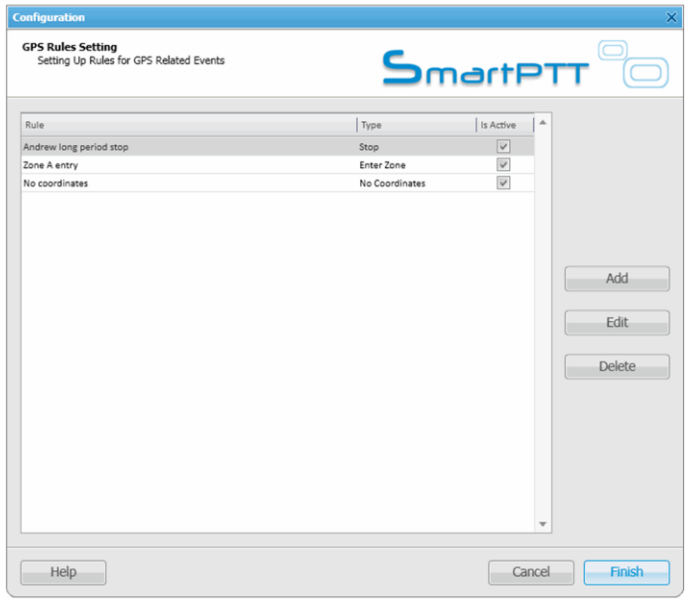
Raster Map Creation



Raster map is the map based on the image file in JPG, BMP or PNG format. Map image can be linked to geographical coordinates by means of “Raster Map” configuration dialog (“Settings / Raster Map Settings” menu).
The map image is linked by 4 points (4 coordinates must be assigned to corresponding points at the image file).
It is recommended to use Raster maps for not big regions where the distortion is not noticeable.

To show created raster map use “Map / Raster Map” menu.

GPS Rules



GPS Rules is the tool to track events related with subscriber's GPS monitoring (menu "Settings / GPS Rules")
Multiple GPS rules can be created and activated simultaneously.
There are 5 types of GPS rules:

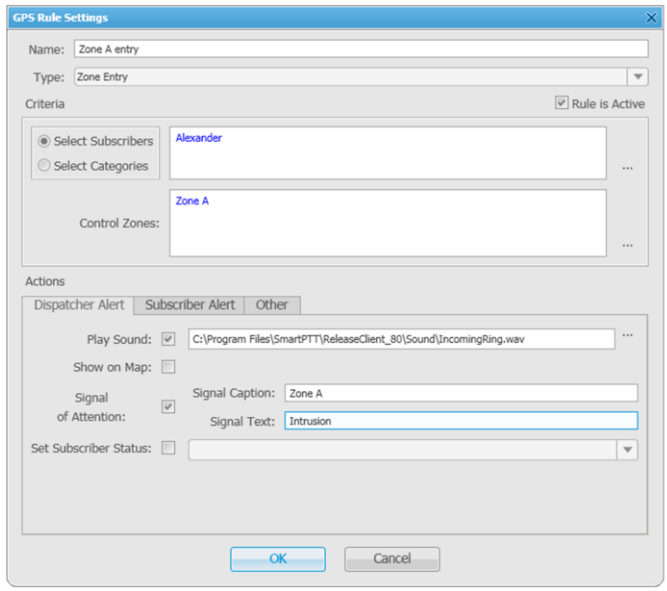
- Subscriber stops (the subscriber's GPS coordinates do not change) for a period longer than the specified period of time;
- Subscriber appears after being absent (no GPS coordinates) for a period longer than the specified period of time;
- No subscriber coordinates for a period longer than the specified period of time (the subscriber's GPS coordinates were received and then disrupted and they have not been received for a period longer than the specified period of time);
- Subscriber enters the zone (the subscriber's previous GPS coordinates were outside any of the zones specified in the rule, and the current coordinates are within any of the zones specified in the rule);
- Subscriber leaves the zone (the subscriber's previous GPS coordinates were within any of the zones specified in the rule, and the current coordinates are outside any of the zones specified in the rule);

Each rule can be applied to the list of subscribers or list of categories

If the rule meets selected criteria, the system can perform the following actions:

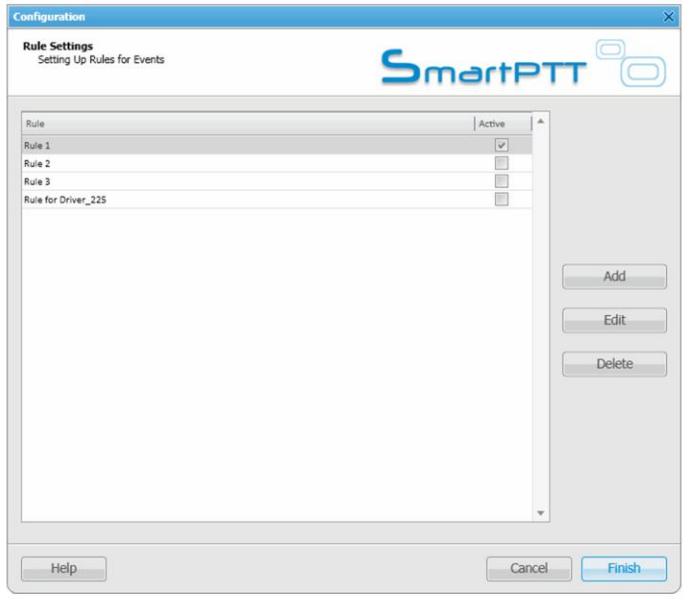
Play Sound – a selected .wav audio file is played back.
Show on Map – location of the subscriber specified in the rule is shown on the map.
Signal of Attention – a window with event description is displayed in the top left corner of the SmartPTT Dispatcher application. Event description is set in Signal Caption and Signal Text options.
Send Text Message - a text message is sent to the selected subscribers or categories, and also to the subscriber who initiated triggering of the rule if the Send Message to Initiator option is selected.

GPS Rule Example. Track Zone Entry



At the example above “Zone A Entry” rule is created to track entry to “Zone A” of subscribers Alexander.
When the subscriber enters the zone, the dispatcher console will show a signal of special attention in a special window “Notifications” with the text: “Zone A / Intrusion”.

Rules and Alerts

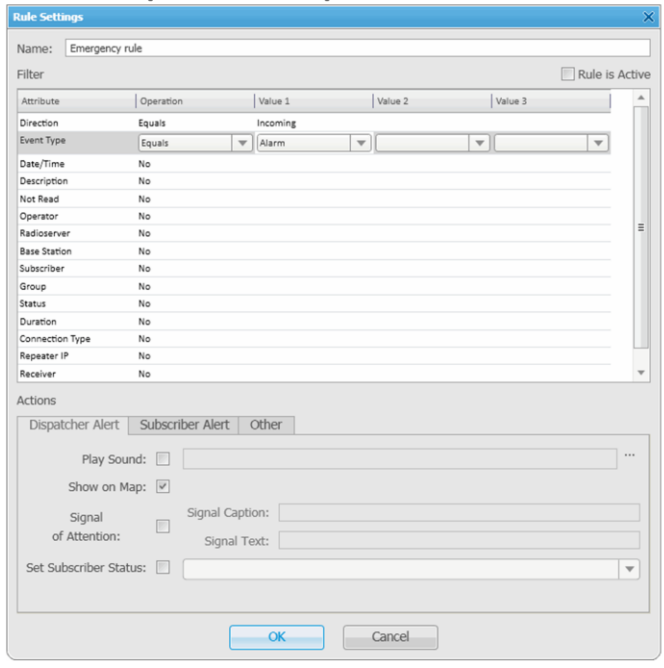


“Rules and Alerts” is a tool to track system events related with subscriber’s non-GPS activity.
Multiple rules can be created and activated simultaneously.

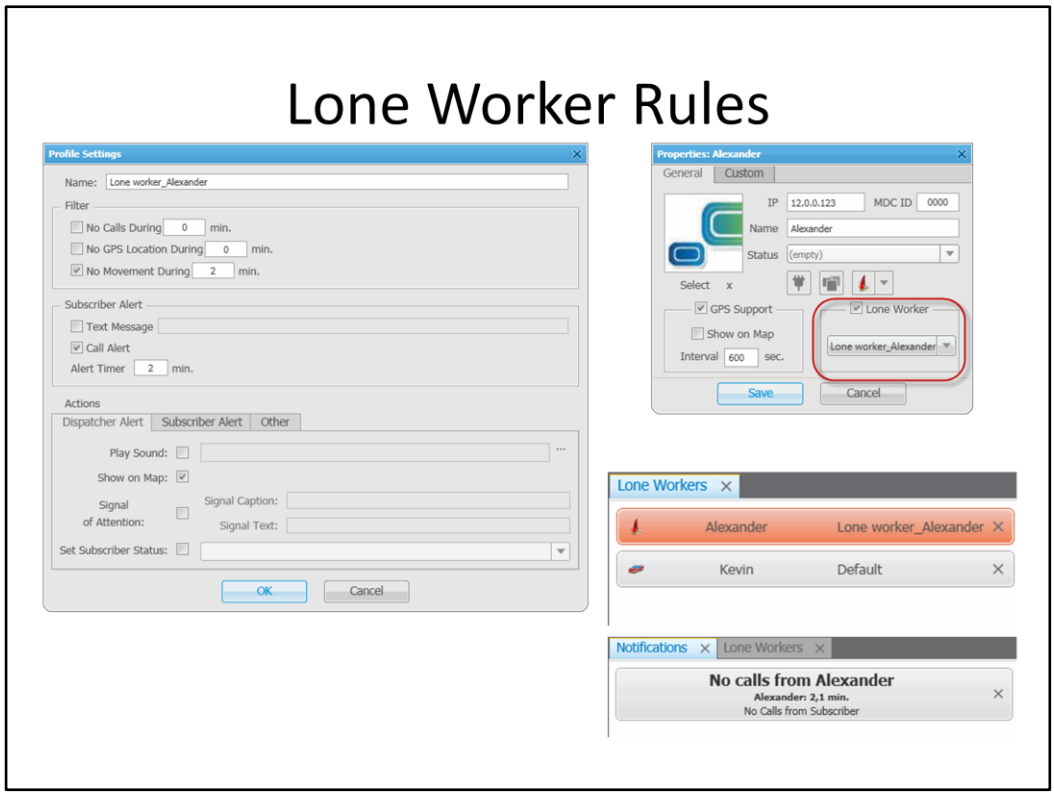
SmartPTT Rule is defined as the filter based on event log properties. The filter is not focused on any special cases, but allows setting universal criteria to track necessary events.

If the rule meets selected criteria, the system can perform the following actions:
Play Sound – a selected .wav audio file is played back.
Show on Map – location of the subscriber specified in the rule is shown on the map.
Signal of Attention – a window with event description is displayed in the top left corner of the SmartPTT Dispatcher application. Event description is set in Signal Caption and Signal Text options.
Send Text Message - a text message is sent to the selected subscribers or categories, and also to the subscriber who initiated triggering of the rule if the Send Message to Initiator option is selected.

Rule Example. Request GPS Location



At the example above “Emergency Rule” is created to track incoming emergency signal from all subscribers. In case of emergency the dispatcher automatically sends the request for the subscriber location (“Show on Map” check box).



SmartPTT Dispatch system provides Lone Worker functionality for radio subscribers, who is operating machinery, carrying out a security patrol or working in a plant alone.

When a subscriber is assigned to work in the Lone Worker mode, SmartPTT automatically tracks the following conditions:

- no calls from subscriber during specified period of time
- no GPS location from subscriber during specified period of time
- no movement of subscriber during specified period of time

When any of the events specified by these conditions occur, the dispatcher console executes the actions defined by the settings.

To create and specify Lone Worker rules, open Lone Worker Settings window (click Settings → Lone Worker Rules).

SmartPTT allows creating several Lone Worker profiles which can be selected in the subscriber property window.

Lone Worker Settings

Filter sets rule conditions:

No Calls – Specifies period of time for subscriber to make a voice call. If subscriber doesn't make a call longer than specified timeout, corresponding actions are executed.

No GPS Location – Specifies period of time for subscriber to send GPS Location. If subscriber doesn't send its location longer than specified timeout, corresponding actions are executed.
No Movement – Specifies period of time to check subscriber stop (deviations in range of 5 meters are ignored). If subscriber does no movement longer than specified timeout, corresponding actions are executed.

Subscriber Alert section defines the alert that shall be forwarded to the Lone Worker when the rule is violated (Text Message and/or Alert Call) and specifies Alert Timer period.

Action section defines
Play Sound – system plays a sound file in wav format.
Show on Map – system sends a request for GPS location to the subscriber radio.
Signal of Attention – a window with event description is displayed in a special window called "Notifications". Event description is specified in *Signal Caption* textbox. *Signal Text* is not assigned (this text is generated automatically).
Set Subscriber Status – set status for the subscriber from the list of statuses.
Send Text Message – a text message is sent to the selected subscribers or categories (all subscribers, groups and dispatchers assigned to specific categories), and also to the subscriber who initiated triggering of the rule if the *Send Message to Initiator* option is selected.

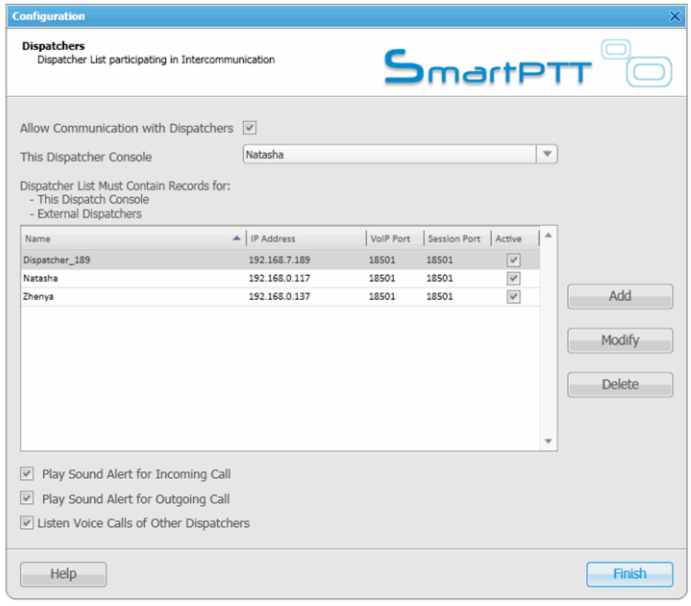
To open the Lone Worker panel for better visualization, click View → Lone Workers.

In the Lone Worker panel, subscribers assigned to work in this mode are displayed with the specific color corresponding to the degree of deviation from the specified criteria:

- Gray – Lone Worker does not violate the rule.
- Yellow – rule violation: event, described by the rule, occurs. Alert Timer starts.
- Red – Lone Worker does not react in a specified way after Alert Timer expired.

Lone Worker mode is turned on/off in the subscriber's property window.

External Dispatchers



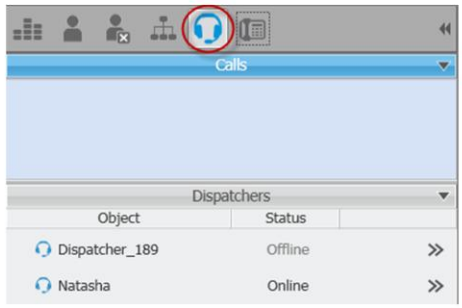
External dispatchers are SmartPTT dispatcher consoles which are also working in the system and must be available for voice calls and text message exchange from the given dispatcher.
Use menu “Settings / Dispatchers” to open the dispatchers configuration dialog.
Dispatchers dialog is used to add the records for all dispatcher consoles (including local one) which must be available for intercommunication.
Local dispatcher console record must be added to identify itself. Local dispatch console record is selected in “This Dispatcher Console” combo box.

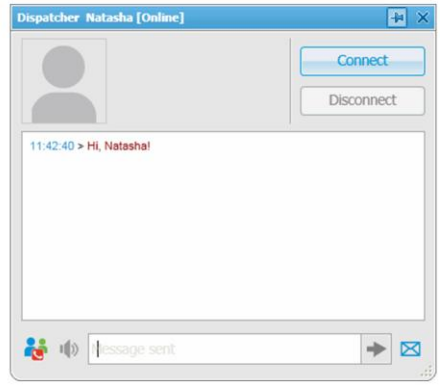
To add the external dispatcher record click the “Add” button.
External dispatcher properties:

- Name – external dispatcher name
- IP – IP address of external dispatcher network interface
- VoIP port – UDP port for voice data exchange (leave default value = 18501 if the port is not taken by another service)
- Session port – TCP port to send text messages and commands (leave default value = 18501 if the port is not taken by another service)

Note! Enable “Listen Voice Calls of Other Dispatchers” to listen to voice calls from other dispatchers working at the same control stations / slots as the given dispatcher. This setting doesn’t depend on the list of external dispatchers added for intercommunication.

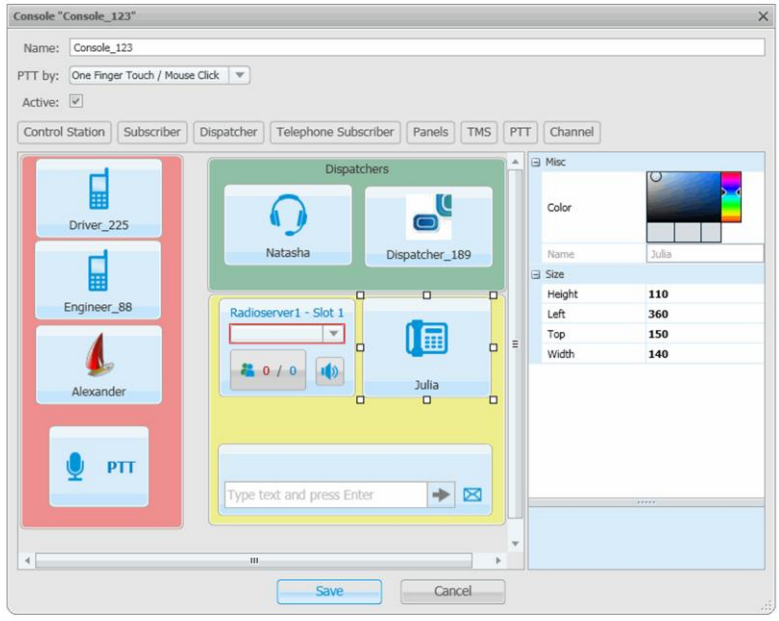
Calls between Dispatchers





External dispatchers are listed in the dispatchers pane in “Subscribers” tree. Make sure the dispatchers pane is not hidden.
External dispatchers which are launched and available via network have the Online status.
To make a voice call or send a text message to the external dispatcher double click on the dispatcher in the list and use the call window.

Custom Console Designer

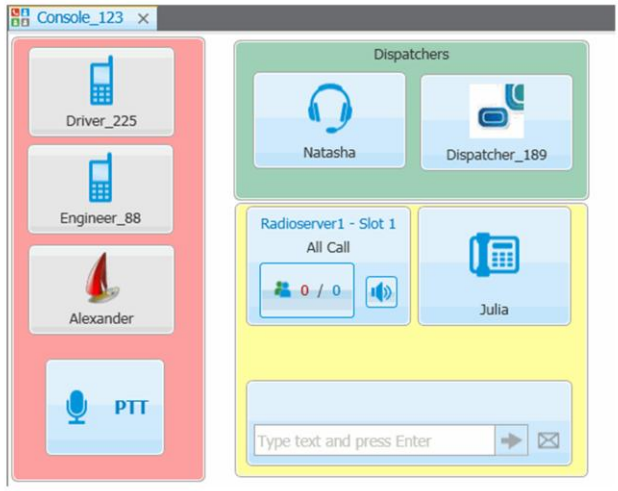


Custom Console designer is the tool to design a console window containing number of visual elements to control specific subscribers, groups or control stations.
Use “Settings / Custom Consoles” menu to show the dialog for managing custom consoles. SmartPTT allows using multiple custom consoles simultaneously which can be flexibly placed and aligned in scope of the dispatcher window area.
Click the “Add” button in “Custom Consoles” dialog to create new custom console.

There are 8 types of visual elements available for use at the custom console:
1) Control Station. Click “Control Station” in the console designer to add “Control Station” buttons to the console area. The Control Station button is linked to specific Control Station and one of the groups defined for the control station. The “Control Station” button is designed to do group or all voice calls.
2) Subscriber. Click “Subscriber” in the console designer to add subscriber buttons to the console area. Subscriber button is linked to a specific subscriber and can have any size and placement. The “Subscriber” button is designed to do private a voice call or show subscriber property and call windows.
3) Dispatcher. Click “Dispatcher” in the console designer to add dispatcher buttons to the console area. The “Dispatcher” button is designed to make connection to a specific external dispatcher.
4) Telephone Subscriber. Click “Telephone Subscriber” in the console designer to add telephone subscriber buttons to the console area. The “Telephone Subscriber” button is linked to specific subscriber and designed to do private voice call or show telephone subscriber property and call windows.

5) Panels. Rectangular areas to arrange sets of the other elements. The panel is assigned with its own color and can have any size and placement.
6) TMS. Click “TMS” in the console designer to add TMS buttons to the console area. The “TMS” button is designed to send short text messages to specified subscribes or groups.
7) PTT. The “PTT” button is designed for multiple users call. If the “PTT” button is located inside the panel, clicking it will make a call to all subscribers located within this panel. If the “PTT” button is located outside the panel, clicking it will make a call to all subscribers located outside the panel.
8) Channel. The “Channel” button is linked to the whole channel selected and displays all the activity going on the channel, including the statistics on the calls missed by the dispatcher, and the ability to mute voice calls on the channel.

Using Custom Consoles



Custom consoles created in the designer are displayed under “View” menu. Select custom console to open in the dispatcher window area.
SmartPTT dispatcher allows opening multiple custom consoles simultaneously.

SmartPTT Monitoring

In-depth analysis and control over connected MOTOTRBO infrastructure

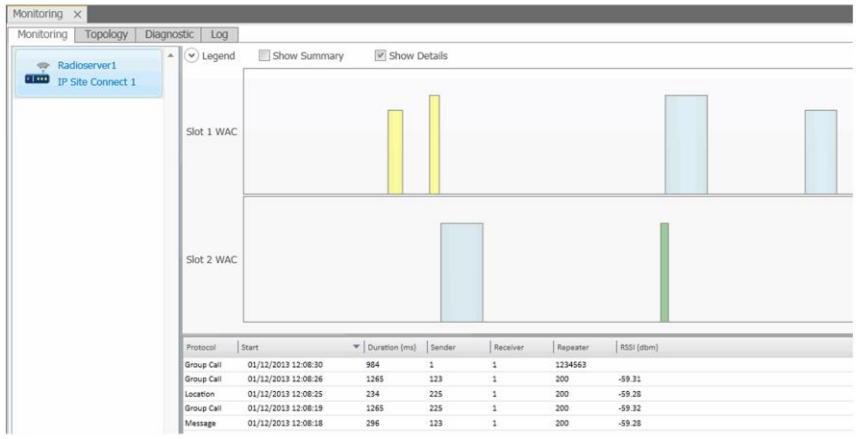
- Real Time Monitoring
- Coverage Map
- Network Topology
- Hardware Diagnostics
- Monitoring Analytics
- Monitoring Reports

SmartPTT Monitoring is a tool for in-depth analysis and control over connected MOTOTRBO infrastructure.

Supported MOTOTRBO Systems:

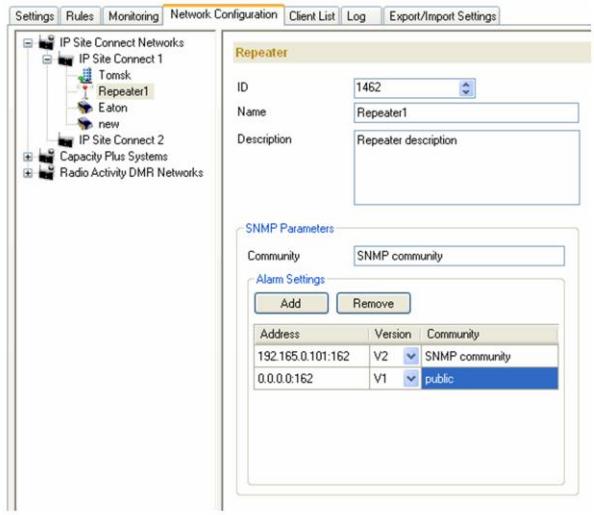
- Standalone repeater
- IP Site Connect
- Capacity Plus

Real Time Monitoring



Real Time Monitoring – graphical representation of voice and data activity received from MOTOTRBO repeaters allows watching over the system in real time. Flowing bars representing the activity and signal level are displayed for each connected channel individually and in aggregated view. The bar height corresponds to the received signal strength.

Network Topology



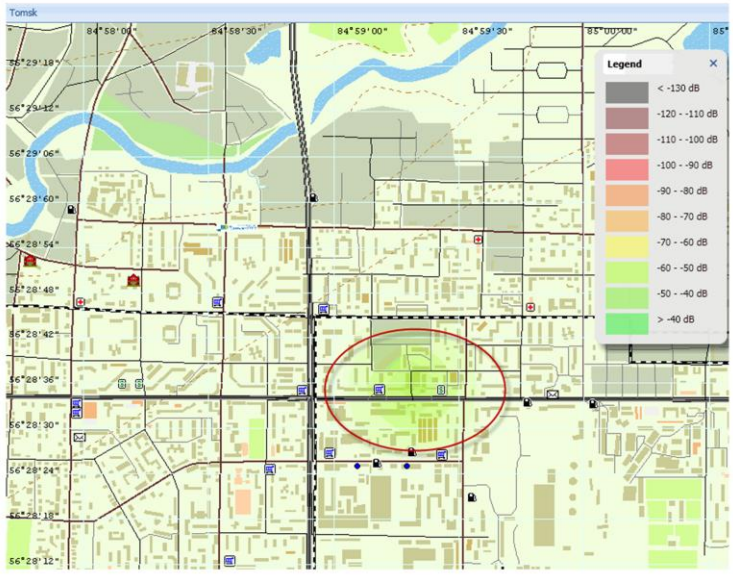
Network topology is defined at Radioserver Configurator (“Network Configuration” tab) and based on the connections to IP Site Connect and Capacity Plus systems (“Settings” tab). Connection settings required to control IP Site Connect or Capacity Plus are minimal to provide full functional dispatching functionality, but system monitoring needs more detailed configuration definition up to each used repeater to provide in-depth information about MOTOTRBO infrastructure.

Hardware Diagnostics

Hardware Diagnostics – information about current state and control of connected MOTOTRBO repeaters. Hardware Diagnostics provides all the same data as Motorola RDAC and has number of control functions:

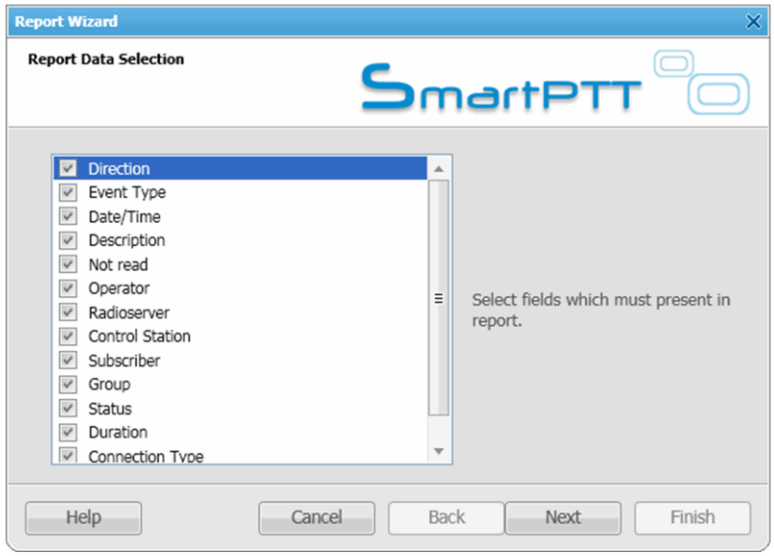
- Switch channel on the repeater
- Change power level
- Change repeater state (enabled/disabled)

Coverage Map



Coverage map is the graphical representation of radio coverage. Different colors shows different signal level in the given area.

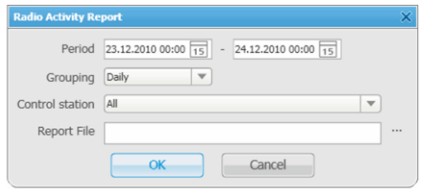
Report Wizard



Report Wizard functionality allow flexible report creation based on the information stored in the event log. Using Report Wizard it is possible to select necessary fields for viewing, specify grouping and sorting fields, specify filtering criteria. Reports generated by Report Wizard are exported to Microsoft Excel.

Use “Reports / Report Wizard” menu to open the report wizard.

Radio Activity Report



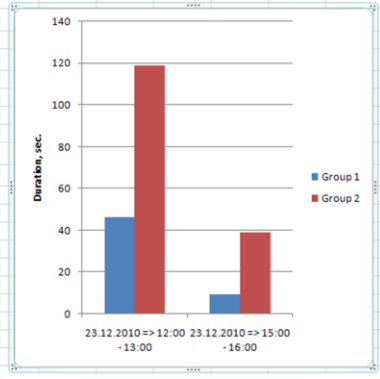
Radio Activity Report

from 23.12.2010 0:00:00 to 24.12.2010 0:00:00

	Amount of Calls	Duration, sec.
Group Calls	**18**	**213**
Group 1	12	55
Group 2	6	158

Hourly Details

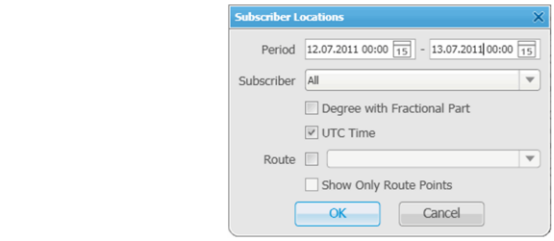
	Amount of Calls	Duration, sec.	Period
Group Calls	**14**	**165**	**23.12.2010 => 12:00 - 13:00**
Group 1	10	46	23.12.2010 => 12:00 - 13:00
Group 2	4	119	23.12.2010 => 12:00 - 13:00
Group Calls	**4**	**48**	**23.12.2010 => 15:00 - 16:00**
Group 1	2	9	23.12.2010 => 15:00 - 16:00
Group 2	2	39	23.12.2010 => 15:00 - 16:00

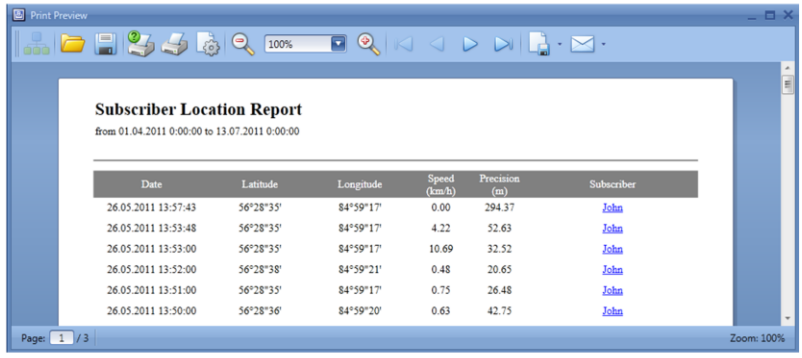


Radio Activity Report presents information about quantity and duration of all and group calls on the hourly or daily basis.
Radio Activity Report is exported to Microsoft Excel.

Use “Reports / Radio Activity Report” menu to open the report criteria window.

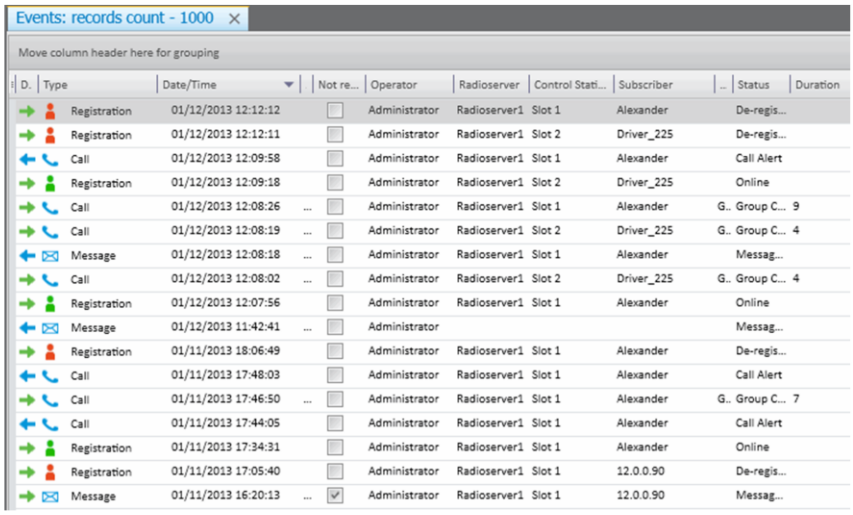
Subscriber Location Report





Subscriber location report represent detailed subscriber location data for the given time interval.
Subscriber location report can be either printed right form the dispatcher console or exported to a number of formats including Excel, PDF, RTF, etc.

Event Log. Sorting, Grouping, Filtering



SmartPTT Dispatcher console collects event log at the connected Microsoft SQL Server database.
Collected even log is displayed in the Event Journal powered with the functionality which allows filtering, sorting and grouping of the displayed data.

Event Journal Sorting
To sort event journal by any displayed column just click on the column header.

Event Journal Filtering
There are 3 way to apply filters to Event Journal:

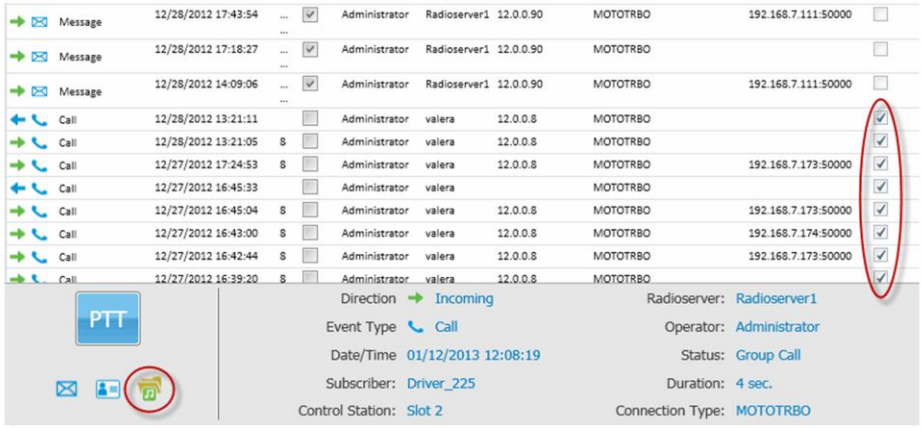
1. Limit amount of displayed records for optimal workload. Menu “Settings / Event Log”
2. Filter event journal by clicking the combo box behind the column header and check only those items you want to see in the list
3. Apply filter by time interval (menu “Events / Events for Period”) or to display only unread messages (menu “Events / Unread Messages”)

Event Journal Grouping
To apply grouping for any column displayed in the event journal drag column header to “Move column header here for grouping” area. Note! Grouping of the event journal can be multilevel.

To hide event journal columns which are not required for the dispatcher, right click at

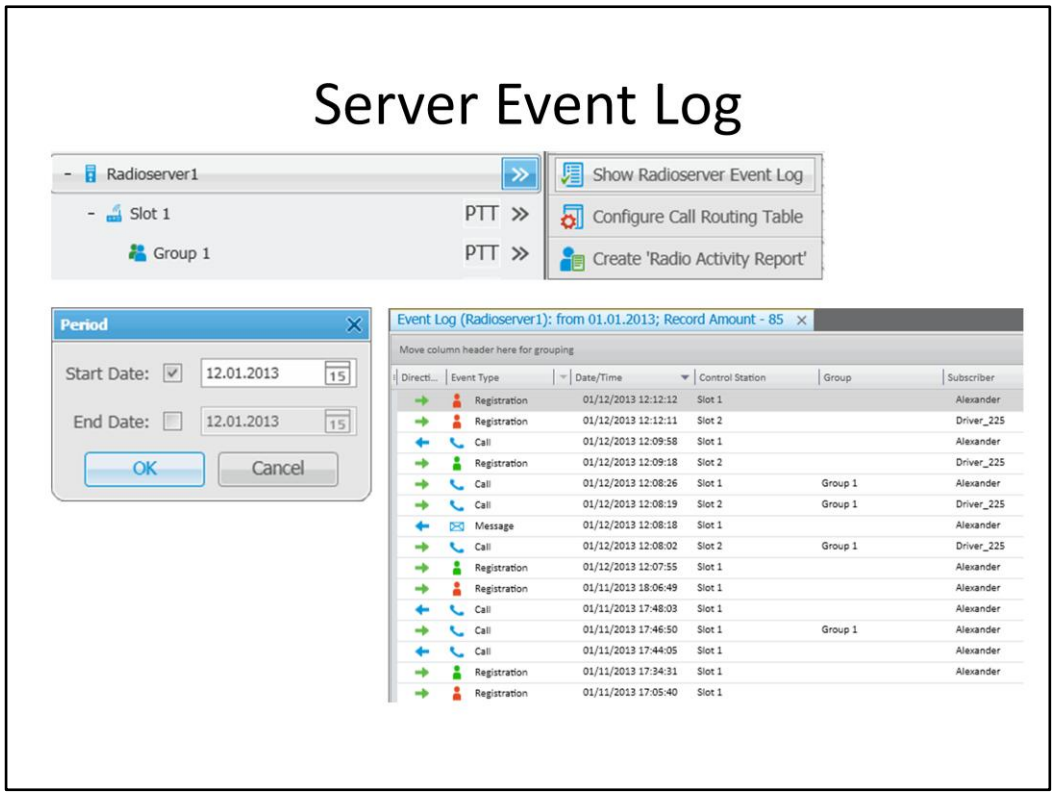
the journal header and unselect extra columns.

Playback Voice Calls



Voice calls are recorded by SmartPTT into the files in mp3 format. The path of voice log files and other recording options are defined at the Audio Record Settings Dialog (menu “Settings / Record Settings”)

To playback recorded voice calls use Event Journal. At the details pane of the journal click “Play selected records” button. Selected voice records will be played by the dispatcher console. Multiple records can be selected by holding SHIFT key.

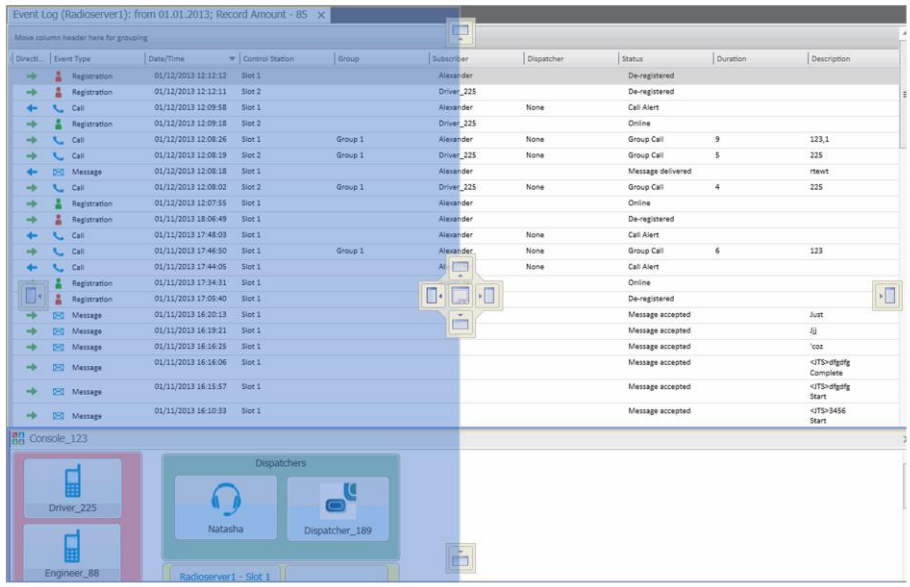


SmartPTT provides event and voice logging functionality at both Dispatcher console and Radioserver.

To fetch event log collected at the Radioserver:

1. Open the Action List next to the Radioserver item in the “Subscribers” tree.
2. Specify the date interval to retrieve the data, click “OK” to display the radioserver event log.

Panel Layout Configuration

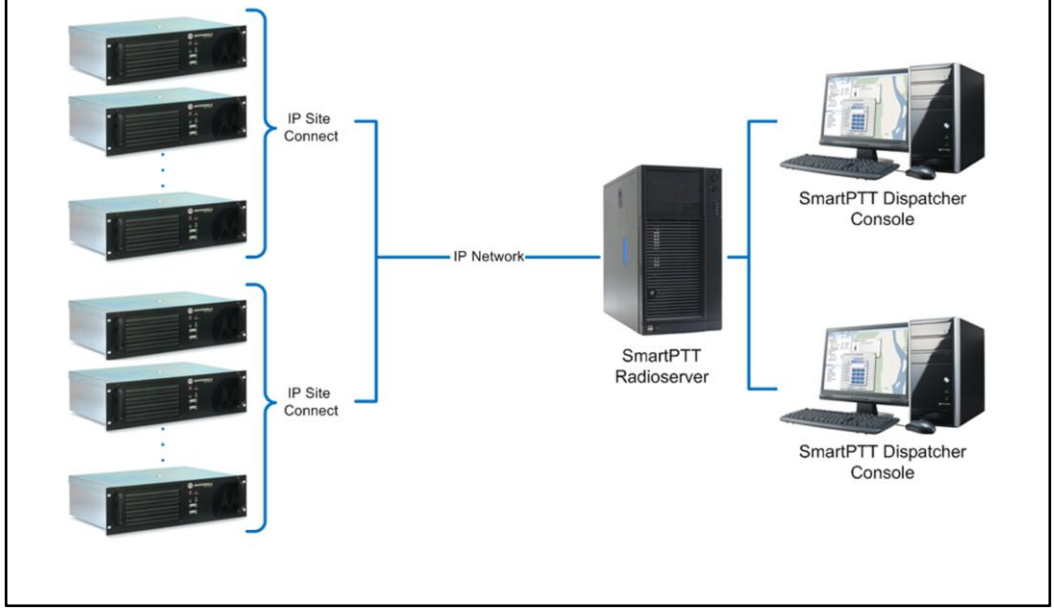


Panels (docked windows) displayed in the dispatcher window area can be organized in following ways:

1. Multiple panels can be arranged in tabs.
2. Each panel can be docked to any part of the dispatcher window area and have a flexible size
3. Panels layout can be saved for further reuse (use “Show list of window configurations” button at the top menu bar).

To change panel placement start panel dragging by holding mouse pointer over the panel header or tab.

System Design. Direct IP control over IP Site Connect

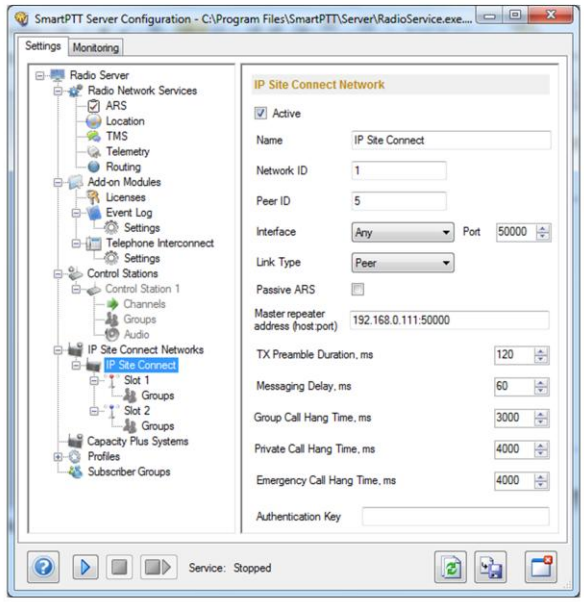


SmartPTT provides functionality to control IP Site Connect Systems by means of IP connection

Key features of the direct IP connection control:

- No control stations (mobile radios) should be connected to Radioserver.
- Radioserver can be located on any distance from controlled IP Site Connect network. Requirements for IP connection between Radioserver and IP Site Connect are the same as for the connection between IP Site Connect peers. Radioserver connected to IP Site Connect system plays as another peer.
- Single SmartPTT Radioserver can handle multiple IP Site Connect systems simultaneously
- Direct IP connection allows logging all voice and data transferred by IP Site Connect including private calls

Radioserver Configurator. IP Site Connect Common Settings

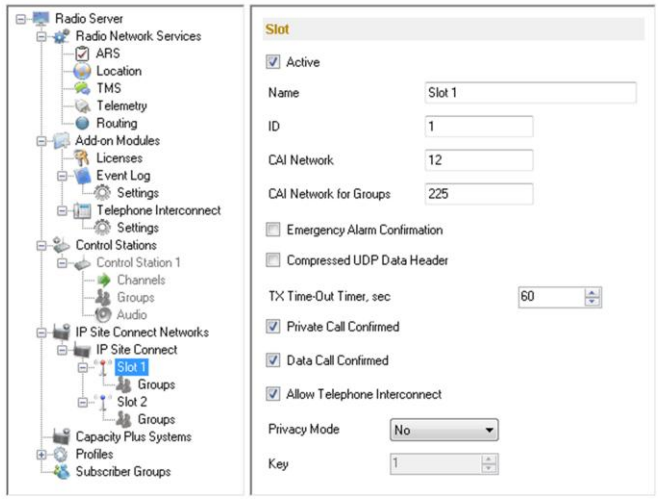


IP Site Connect Major Settings

- Network ID – ID of IP Site Connect Network. Network ID is specific for SmartPTT and used to enumerate all connected IP Site Connect Networks.
- Peer ID – ID of virtual repeater. SmartPTT Radioserver plays as the virtual repeater in each controlled IP Site Connect. Peer ID of this virtual repeater must be unique in scope of all repeater's Radio ID included into the network.
- Interface / Port – Radioserver network interface and port to connect to the IP Site Connect. Port number must correspond to UDP Port of all other repeaters programmed by CPS (General Settings / Network / UDP Port).
- Master repeater address (host:port) – Master repeater IP and port number. Must be specified if virtual repeater has Role Type = Peer.

Before configuring IP Site Connect in Radioserver make sure that necessary network connection is properly established. To check the connection ping master repeater IP from Radioserver computer.

Radioserver Configurator. IP Site Connect Slot Settings



IP Site Connect Slot Settings

Name – Slot name to be displayed in the dispatcher console.

ID – ID of virtual control station corresponding to the slot of IP Site Connect. This ID must be programmed as “ARS Radio ID” in subscriber radios working on the slot.

CAI Network – CAI network ID. It is recommended to use default value = 12.

CAI Network for Groups – CAI network for groups ID. It is recommended to use default value = 225.

Compressed UDP Data Header – Must be the same as “Compressed UDP Data Header” value programmed in subscriber radios working on the slot.

Emergency Alarm Confirmation – determines if the radio is allowed to acknowledge an emergency alarm.

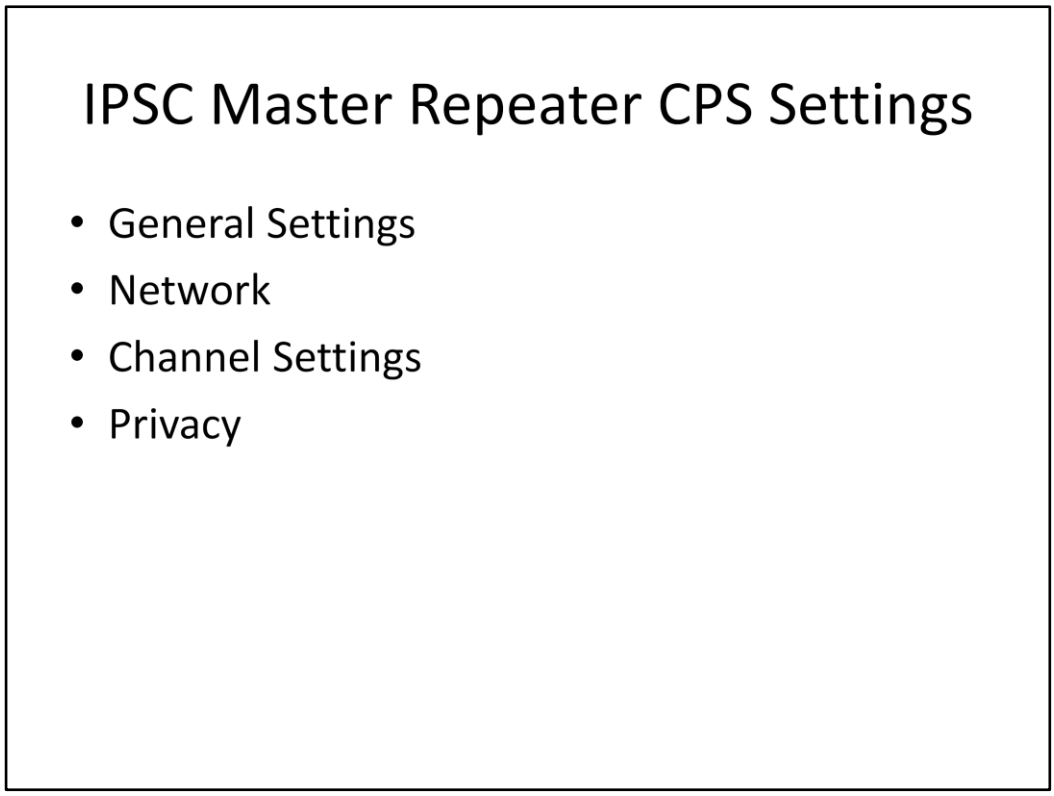
TX Time-Out Timer (sec) – continuous radio transmission timeout. After this time the transmission is interrupted.

Private Call Confirmed – this feature sets Private Individual calls on the current digital channel as confirmed.

Data Call Confirmed – this feature enables individual packets in data calls (ARS, GPS, and Text Message) on the current digital channel or personality to be confirmed.

Allow Telephone Interconnect – allow telephone interconnect on the slot.

Privacy Mode – Privacy Mode (No, Basic, Enhanced). Must be the same as “Privacy Mode” programmed in subscriber radios working on the slot.



Major CPS settings required to setup master repeater for IP Site Connect

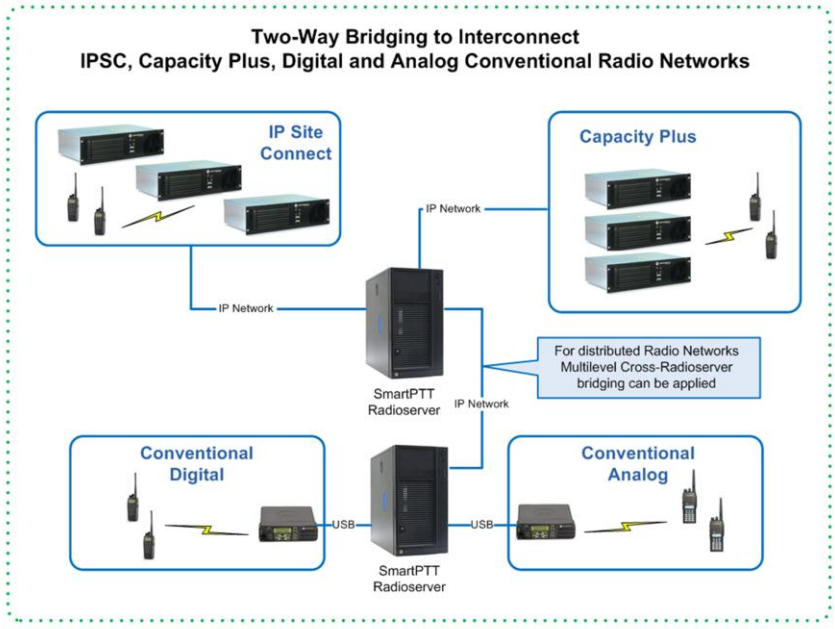
General Settings
Radio ID – must be unique for all repeaters of IP Site Connect network including Peer ID of SmartPTT virtual repeater set up in Radioserver Configurator (see “Radioserver Configurator. IP Site Connect Common Settings” page)

Network
Link Type – Select “Master” to assign Master role to the repeater
Ethernet IP, Gateway IP, Network Mask – network interface settings of master repeater. It is recommended to assign static IP to master repeater. While configuring the connection to IP Site Connect in Radioserver Configurator make sure to specify correct master repeater address (host:port) as programmed by CPS.

Channel Settings
Check that one or both slots are provided for IP Site Connect (“IP Site Connect” option)

Privacy
Privacy setting must correspond to the privacy set up in the subscriber radios

Radio Network Bridging

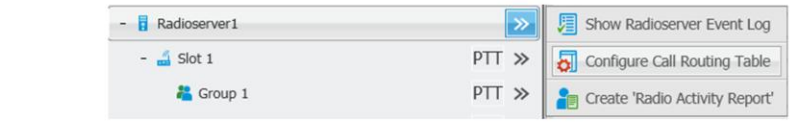


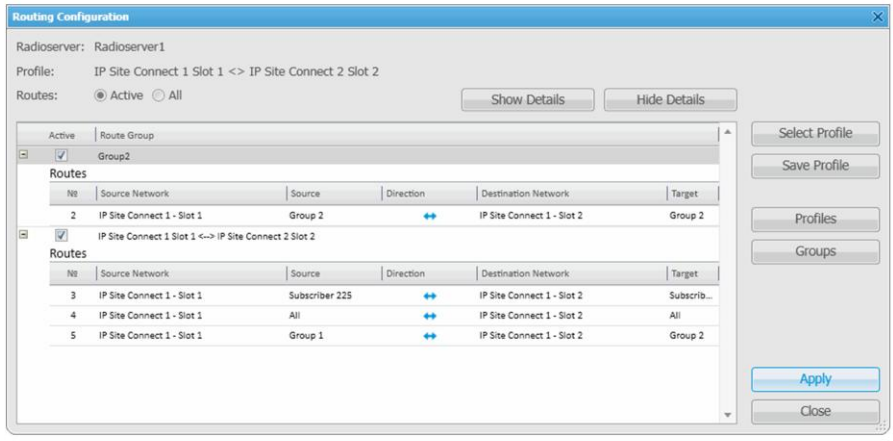
Radio Network Bridging service allows seamless integration of multiple radio networks into single network.

- Ability to patch different types of radio systems: IPSC, Capacity Plus, Digital and Analog conventional channels
- Cross Radioserver bridging
- Breaks the limit of 15 repeaters per MOTOTRBO IP Site Connect
- Direct connection to the MOTOTRBO repeaters via IP
- Short voice delay for routed call (from 60ms for direct IP connection)
- Voice quality is not harmed by the routing service (no double voice encode for direct IP connection)
- Selective voice and data routing
- Convenient tool to manage profiles for predefined routing configuration

Important feature! SmartPTT routing service provides automatic routing for private and group calls. SmartPTT Radioserver plays as a site controller for all connected IP Site Connect systems. When a subscriber makes private call SmartPTT Radioserver automatically finds destination radio and routes the call to corresponding site. For automatic routing of group calls subscribers are joined to so called MultiGroups defined at the Radioserver.

Routing Table Configuration

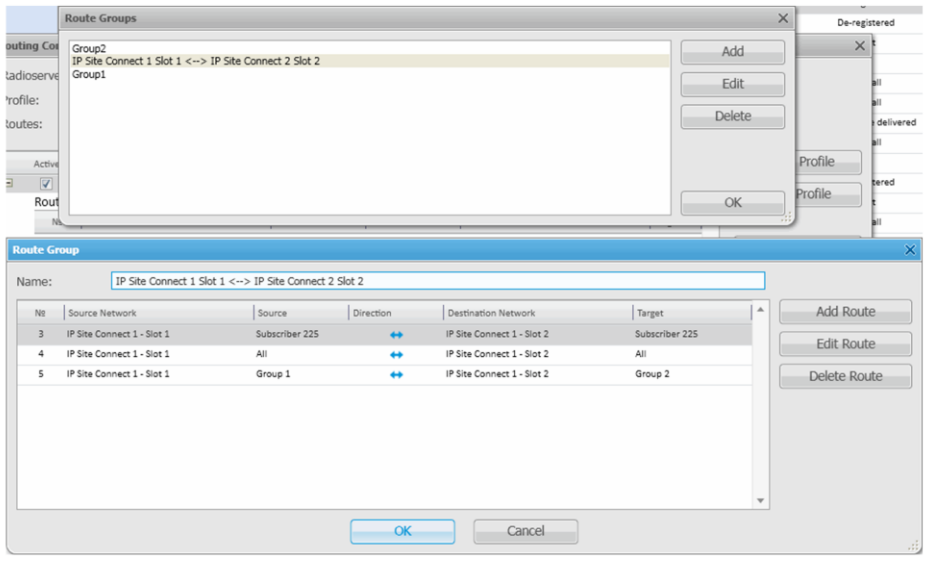




Routing table is configured at the dispatcher console. Right click on the Radioserver in “Subscribers” tree and choose “Configure Call Routing Table” button.
Note! Route Configuration is available only at SmartPTT Enterprise with the license for routing service enabled at the Radioserver.

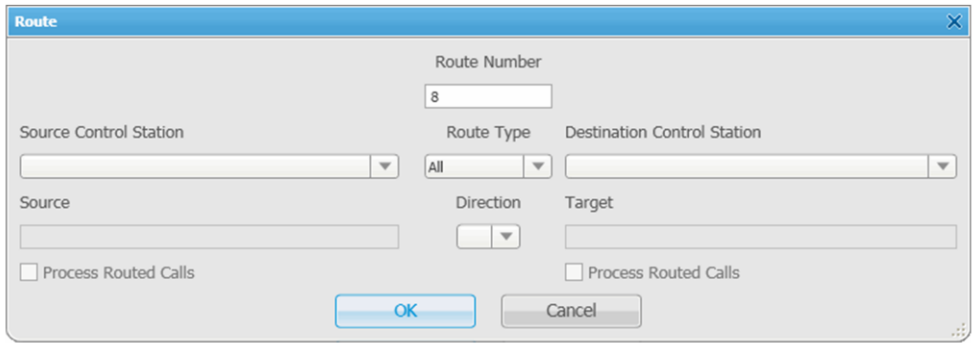
Routing table consists of the routes organized into groups. Each route defines the path of voice and data stream between IP site Connects / Slots for all, group or private transmissions. Each group consists of one or many routes. Routing can be enabled or disabled only at group level. To establish quick switch between different routing schemas consisting of multiple groups, routing profiles can be used.

Routing Groups



In the “Routing Configuration” window click “Groups” button to open “Route Groups” configuration dialog. Click “Add” button to create new group.
In the “Route Group” window add the routes for the group.
To enable the routes defined in the group use “Routing Configuration” window (tick the group at the “Active” column and click “Apply” button).

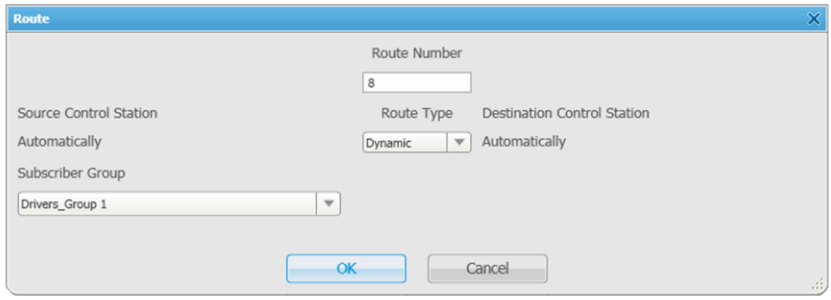
Route Settings



Route settings are defined at the “Route” dialog:

Route Number – the ordinal number of the route.
Source Control Station – Source Network and Slot.
Destination Control Station – Destination Network and Slot.
To create the route, Source and Destination Networks and Slots must be defined at the Radioserver Configurator.
Direction – route direction. Can be “One Way” -> from source to destination only or “Two Way” -> for both directions routing.
Route Type – set “All” to route all voice and data from source to destination slot. Set “Group” to route only specified group voice calls. Set “Subscriber” to do static route for specified subscriber voice calls. Set “Dynamic” to establish dynamic routing for private calls.
Process Route Calls – if selected the call which is already routed once (by one route) also can be routed another time by another route. It takes place only when several routes are added.

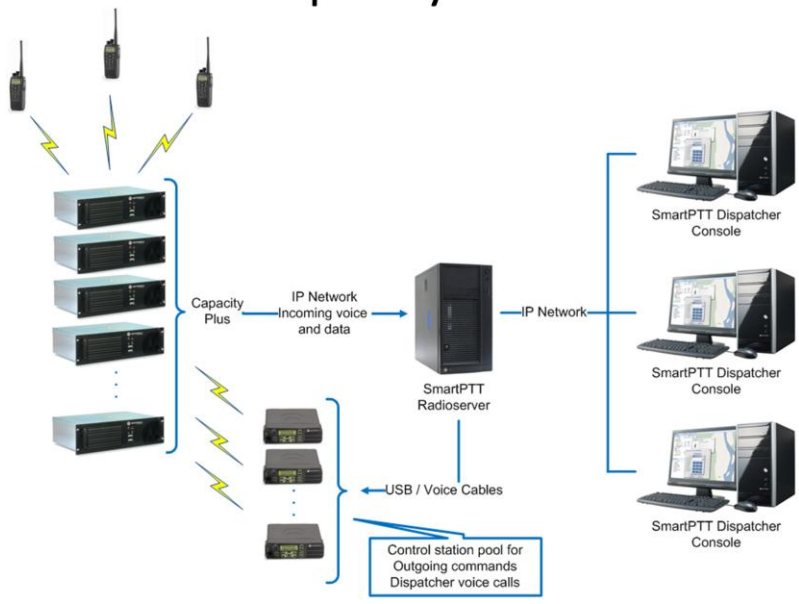
Dynamic Routing for Private Calls



Dynamic routing for private calls allows seamless integration of IP Site Connect networks and is transparent for radio subscribers. Dynamic routing uses Radioserver internal subscriber list to automatically find destination subscriber to route the call. The subscriber list contains valid subscriber site information based on the last activity performed by the radios (ARS, voice calls, text messages, etc.).

Note! Only one “Dynamic” route per Radioserver can be applied!

System Design. Direct IP control over Capacity Plus



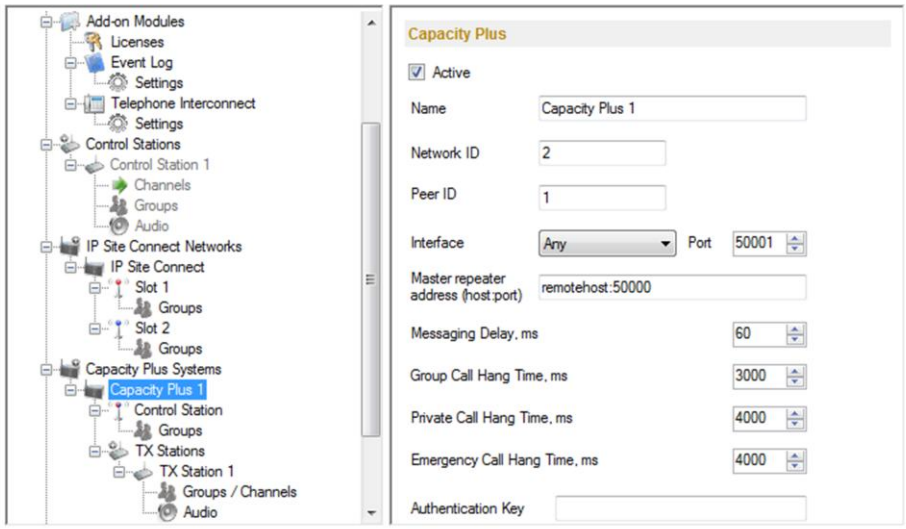
SmartPTT Radioserver connects directly to the master repeater of Capacity Plus to receive all incoming voice and data.
To send outgoing data and voice calls SmartPTT Radioserver uses control stations (MOTOTRBO mobile radios) connected via USB and Audio cable (Audio cable is required only for Control Stations providing outgoing voice calls).

Considerations on using Control Stations

- There are 2 roles performed by control stations: data control stations and voice control stations. Single control station can play either both roles or be dedicated for data or voice only.
- Neither data nor voice control stations are displayed in Dispatcher console subscriber's tree, but automatically controlled by the Radioserver.
- Data control station is used for data transmission (ARS request, GPS request, telemetry request, Radio Check, Call Alert, Radio "Kill" command, outgoing text messages). Dedicated data control station doesn't require sound device and can be connected via USB only. Specific routing table settings must be done for data control station to work properly (see below in this document).
- To dedicate control station for data transmission only, remove "Active" checkbox at "Sound" section of TX Radio settings in Radioserver Configurator.

- There can be used multiple data control stations to balance workload depending on the system capacity. All data control stations must have the same Radio ID equal to the ID of Capacity Plus virtual Control Station specified at Radioserver Configurator.
- Voice control station must be connected to the Radioserver by means of USB and Audio cables.
- To dedicate control station for voice transmission only, **do not** add route records as described in “Route table settings for outgoing data transmission” section.
- There are 2 options to set Radio ID to voice control station:
    - Voice control station Radio ID = ID of Capacity Plus virtual Control Station specified in Radioserver Configurator. In this case all voice control stations belong to the single pool. The Radioserver automatically selects available free control station to make dispatcher voice call.
    - All voice control stations are set with unique Radio IDs. This can be done to assign dedicated voice control station for specific dispatcher. Use **Profiles** functionality of Radioserver Configurator to define dispatcher profiles with the only dedicated voice control station available. Use Radioserver settings in the dispatcher console to assign the profile to the dispatcher. Note! **Profiles** functionality can’t limit data control stations available to dispatchers. Data control station using is only regulated be the Radioserver routing table.
- For dispatchers located at the radio coverage of Capacity Plus it is recommended to use “on table” subscriber radios to do outgoing voice calls to minimize amount of radios connected to Radioserver. Voice control stations must be used to do outgoing voice calls from dispatcher console located out of the Capacity Plus radio coverage.
- Voice call control station must be programmed with the channels for each talk group. So amount of channels programmed for voice control station must be equal to amount of used talk groups. To assign the channels to groups use “Groups / Channels” item in scope of TX Station settings in Radioserver Configurator.

Capacity Plus Systems. Radioserver Configurator Settings



Capacity Plus Settings

- Network ID – unique ID of Capacity Plus system
- Peer ID – unique identifier of virtual repeater in Capacity Plus (should not coincide with identifiers of other repeaters in this Capacity Plus system).
- Interface (host:port) – network interface of Radioserver that will be used for the connection with the repeaters in Capacity Plus
- Master repeater address (host:port) – IP address and port of Capacity Plus Master repeater.
- Messaging Delay (ms) – message exchange delay between repeaters. Must be the same as “Messaging Delay” programmed in Capacity Plus repeaters (Channel settings).
- Group Call Hang Time (ms) – time to reserve the channel by repeater to group call after the end of transmission. During the timeout only participant of talk group can transmit on the channel. Must be the same as “Group Call Hang Time (ms)” programmed in Capacity Plus repeaters.
- Private Call Hang Time (ms) – time to reserve the channel by repeater to individual call after the end of transmission. During the timeout only participant of the individual call can transmit on the channel. Must be the same as “Private Call Hang Time (ms)” programmed in Capacity Plus repeaters.
- Emergency Call Hang Time (ms) – time to reserve the channel by repeater to emergency call after the end of transmission. During the timeout only

participant of the group call can transmit on the channel. Must be the same as “Emergency Call Hang Time (ms)” programmed in Capacity Plus repeaters.
- Authentication Key - Must be the same as “Authentication Key” programmed in Capacity Plus repeaters.

Setting up virtual Capacity Plus Control Station

Capacity Plus Virtual Control Station is designed for receiving data and voice. For setting up virtual Control Station Capacity Plus click Capacity Plus System / Capacity Plus 1 / Control Station item in the tree of Radioserver Configuration window. Capacity Plus Control Station window appears on the right.

Capacity Plus Virtual Control Station Settings:
ID – the unique radio identifier which is used during communication with this radio.
CAI Network – CAI-Network identifier. It is recommended to use the default value 12.
CAI Network for Groups – the identifier of the group's CAI-Network. It is recommended to use the default value 225.
Privacy Mode – encryption mode.

For setting up the groups of virtual Control Station choose Capacity Plus System / Capacity Plus 1 / Control Station/Groups item in the tree of Radioserver Configuration window. Control Station Groups window appears on the right.
Note: If two or more Control Stations are connected to the computer, one of the first three octets of the IP address must be unique for each control station.

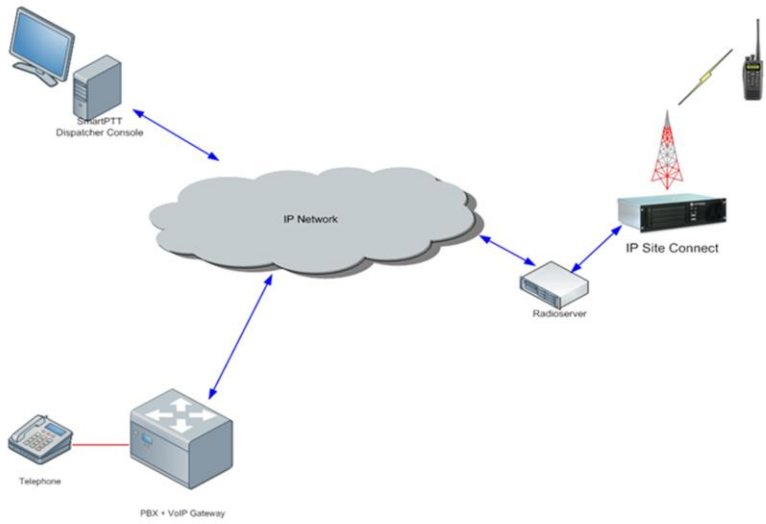
TX Station Settings

Control Station TX is designed for voice and data communication.
For setting up TX Station click Capacity Plus System / Capacity Plus 1 / TX Stations / TX Station 1 item in the tree of Radioserver Configuration window. TX Station window appears on the right:
IP – Control Station IP-address, which is configured in CPS
ID – Control Station Radio ID configured in CPS.

For setting up Groups / Channels of TX Control Station click the Capacity Plus System / Capacity Plus 1 / TX Stations / TX Station 1 / Groups / Channels item in the tree of Radioserver Configuration window. Groups / TX Radio Channels window appears on the right:
Name –channel name

ID – channel identifier as programmed in CPS
Zone – index number of channel group as programmed in CPS
Channel – channel index number as programmed in CPS
All Calls channel is designed for All calls, Private calls and data communication

Telephone Interconnection. Schema

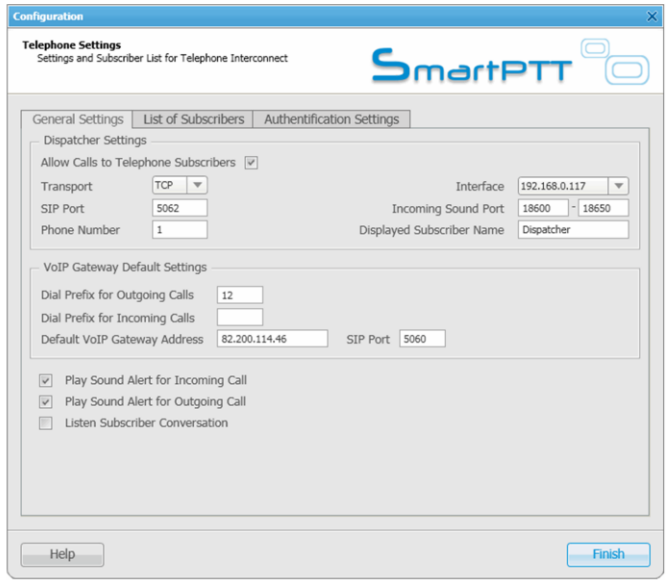


Telephone Interconnect service allows patching telephone and radio subscribers. The service is implemented in scope of SmartPTT Radioserver.
At the telephone side SmartPTT Radioserver connects to the VoIP gateway, which support SIP-trunk service. At the radio side Radioserver can use either control stations or direct IP connection for IP Site Connect systems.

There are 4 ways to initiate the patch between telephone and radio subscribers:

1. Dial prefixed Radio ID or Group ID from the telephone set to do corresponding call. VoIP Gateway must be programmed to parse such calls properly and forward them to SmartPTT Radioserver for further processing.
2. Dial telephone number from MOTOTRBO subscriber radio by means of DTMF (DTMF support was implemented in the firmware 1.7) or Phone Dial (starting from firmware 1.8)
3. Send text message from MOTOTRBO subscriber radio to the Radioserver with the telephone number to request the call
4. Use SmartPTT dispatch console to patch radio and telephone subscribers.

Dispatcher Console Telephone Settings



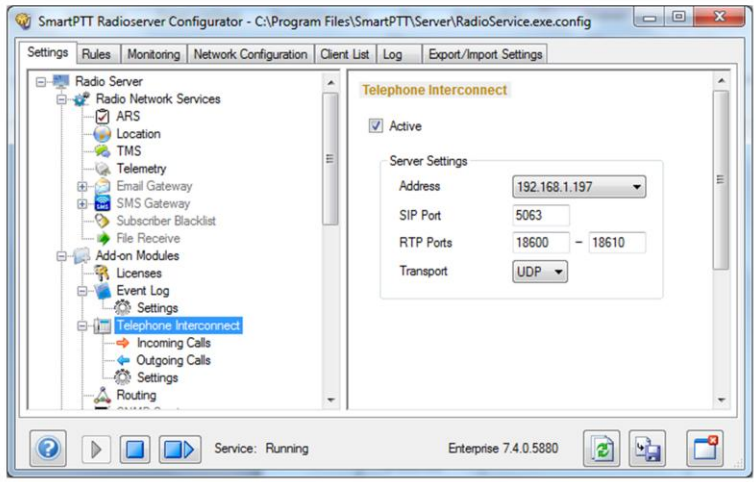
SmartPTT Dispatcher allows making full duplex telephone calls through VoIP gateway. Before establishing telephone interconnect at the Radioserver it is recommended to check telephone settings by making calls from dispatcher console.

Use “Telephone Settings” configuration dialog to:

- Setup the connection to VoIP gateway
- Create telephone subscriber contact list for quick telephone interconnection from the dispatcher

Note! Use “Listen Subscriber Conversation” checkbox to forward voice conversation between patched radio and telephone subscribers to the dispatcher console.

Radioserver Configurator. Telephone Settings

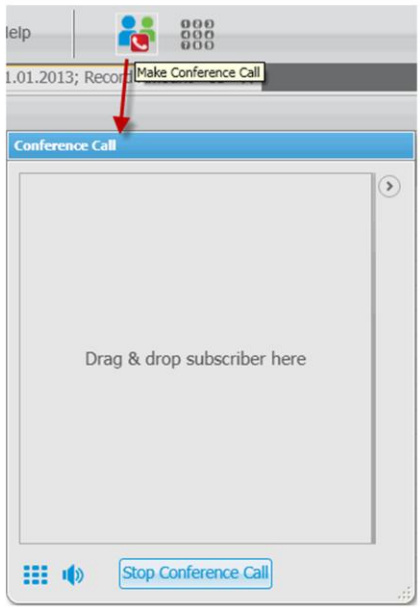


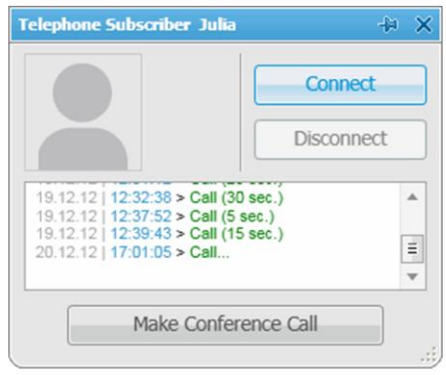
Telephone interconnect settings are done in Radioserver Configurator. Click "Telephone Interconnect" item to show the settings:

- Server Settings. Network interface of the Radioserver used to connect to VOIP gateway and prefixes for private and group calls
- Server Settings / Incoming Calls. Settings to process calls from VoIP Gateway to Radioserver
- Server Settings / Outgoing Calls. Settings to process calls from VoIP Radioserver to Gateway

Additional settings for telephone interconnect and permission settings to limit radio subscribers allowed to participate in telephone patch are defined at "Telephone Interconnect / Settings" window.

Conference Calls



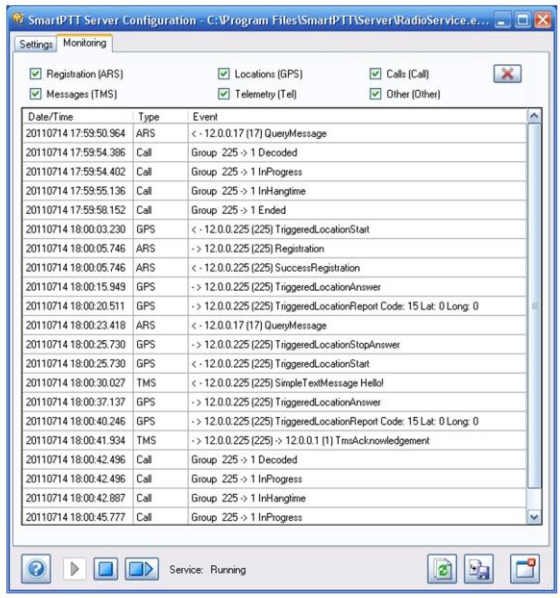


“Conference Call” is the function of the dispatch console which allows joining different types of subscribers into the voice conference call.
Types of subscribers allowed for conference calls:

- Radio subscribers or groups
- Telephone subscribers
- SmartPTT dispatchers

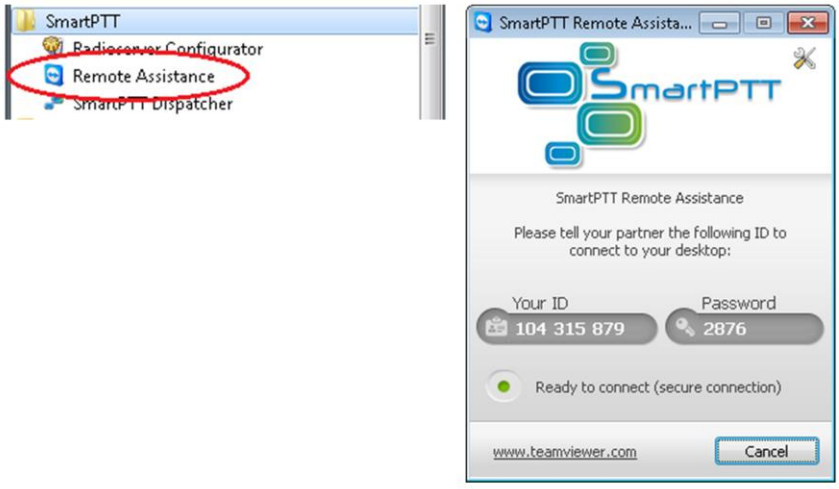
Conference call can be initiated by pressing “Create Conference” button in the main menu or call windows of telephone subscribers or dispatchers.

Radioserver Monitoring



Radioserver monitoring functionality is included into Radioserver Configurator to provide real time tracking of the detailed information about the events processed by the server. To start monitoring necessary event types must be selected at the top of the window.

SmartPTT Remote Assistance



SmartPTT Remote Assistance allows remote technical support of SmartPTT right at the customer computer.
Remote assistance is based on the TeamViewer Remote Support solution (www.teamviewer.com)

To establish remote connection following steps should be done:

- SmartPTT Remote Assistance application must be launched at the customer computer
- ID and Password must be passed to technical support engineer having full functional TeamViewer client to connect to the customer computer.