ConSEL PLUS – Configuration of ConSEL PLUS hardware and software for IP Site Connect

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AUTHORIZED APPLICATION PROVIDER DIMETRA MOTOROLA SOLUTIONS

AUTHORIZED APPLICATION PROVIDER MOTOTRBO MOTOROLA SOLUTIONS

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1. Basic assumptions for IP Site Connect system design.

- The repeaters operate in **digital mode** (digital channel) in the **DMR** standard (operation in IPSC mode does not require the purchase of additional licences). Setting up the repeaters in analogue or mixed mode does not allow for network connectivity.
- The repeaters are connected to each other via an IP network. The IP network must have stable parameters, i.e. the resulting transmission delays must not exceed **90 ms** and must have a stable character. The manufacturer recommends that network fluctuations be less than 60 ms.
- One of the repeaters is defined as **Master repeater,** the others as **Peer** repeaters**.** The **Master repeater** requires **a static address in the IP network**. Repeaters defined as Peer can have an IP address assigned from a DHCP server.

2. Tasks of devices / applications in the system.

2.1. Device in the IPSC system.

- **Master:** a repeater responsible for registering new repeaters/applications and notifying other repeaters/applications about changes in the network. After registering Peer devices or applications, the Master repeater distributes information about current participants to all network users. The Master repeater does not verify every transmission from Peers. Disconnecting the Master repeater from the network does not break up the established IPSC system.
  Note: Master repeater requires a STATIC IP ADDRESS.
- **Peer:** a repeater that retransmits audio and signals received from another site.

2.2. Applications working in the IPSC system.

- **RDAC** (Repeater Diagnostics and Control):An application for system administration, allowing for monitoring (control) of operation of repeaters in the MOTOTRBO system. The RDAC software is seen as an additional repeater in the IP Site Connect system network.
- **MNIS (**MOTOTRBO Network Interface Service) is a Windows service application handling data between computer applications and MOTOTRBO radios. It is used on systems where Control Station cannot be used or is not needed. For IP Site Connect operation, repeaters used for data traffic require a **NAI Data License**.
- **DDMS** - Device Discovery and Mobility Service (DDMS) is a Windows application running as a service (i.e. launches automatically on Windows startup and runs in the background).It processes presence and mobility information from radios in the MOTOTRBO radio system. If DDMS is implemented with MNIS, both radio presence (radio is there) and mobility notification are supported. The channel and site where the radio transmits the ARS message shall be recorded. MNIS subscribes to DDMS to receive mobility information and uses this information to route data to the radio, wherever it is in the system.
- **ConSEL PLUS –** dispatcher application from **Aksel Sp. z o.o**.
- Other vendors

3. IP Site Connect system design.

For repeaters operating in digital DMR mode, there are two time slots to use, based on which logical communication channels can be created. By connecting several repeaters together, a radio network is created where for each repeater the following parameters can be defined:

- local channel (time slot)
- wide area channel (time slot)

In IP Site Connect mode, repeaters can operate in one of the following modes:

- both logical channels in IP Site Connect mode (two wide area channels);
- both logical channels in digital repeater mode (two local channels);
- one logical channel in IP Site Connect mode (wide area) and the other logical channel in repeater mode (local area).

In IP Site Connect system it is possible to connect up to 15 devices, of which one is of **Master** type and the rest are of **Peer** type.
These 15 connected devices include:
- Disabled repeaters
- Enabled repeaters operating in analogue mode
- Enabled repeaters operating in digital mode
- Maximum of 5 RDAC application connections to the system
- Third-party applications (the application is seen by the system as Peer)

For a defined wide area channel, the radio call is repeated on all connected logical channels (carriers are keyed on all repeaters where a wide area channel is defined – **All Sites Light Up**).

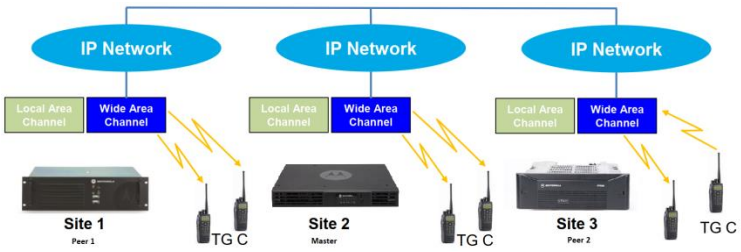


Figure 1 IPSC system design: Slot 1 = local channel; Slot 2 = wide area channel.

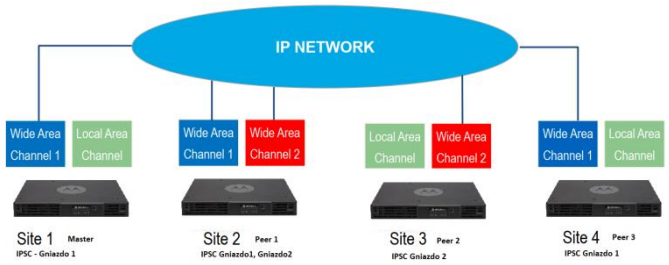


Figure 2 IPSC: combination of two wide area and local channels

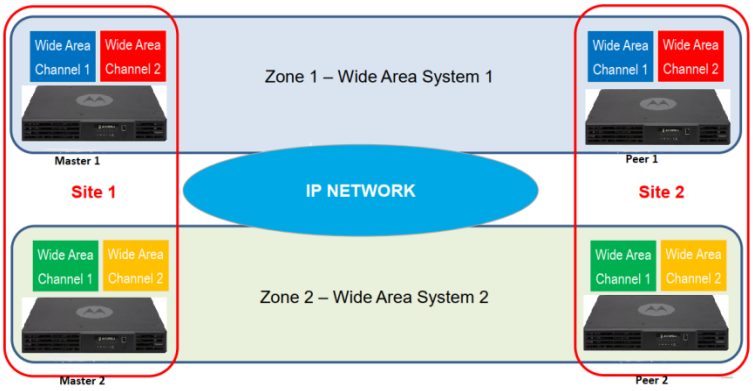


Figure 3 Two IPSC systems with four wide area channels.

4. Repeater Setup for IPSC Operation.

CPS and RM Configuration Client are Motorola's software applications for configuration of MotoTRBO devices.

Figure 4 CPS – repeater configuration software.

CPS is a software that allows you to configure repeaters and upload configurations via USB port.
RM Configuration Client is a software that allows you to configure repeaters and upload configurations via USB and LAN.

Note: The first programming of the repeater must be carried out via USB port.

After reading the device, an SLR5000 repeater can be configured in both programs.

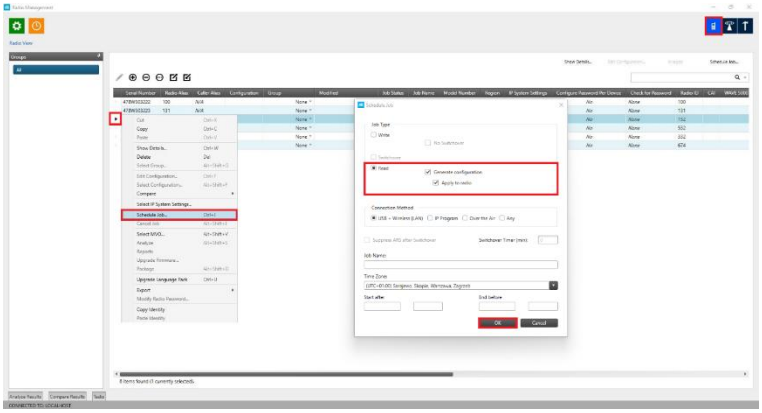
When choosing to edit the configuration for a selected repeater in RM Configuration Client, a window opens identical to that for CPS configuration.

4.1. Reading the radio in CPS.

Figure 5 CPS – radio reading.

4.2. Reading the radio in RM.

The device you want to read must be added to the database with complete information.



Once a configuration has been created on the server, the selected configuration can be edited.

4.3. Editing the configuration.

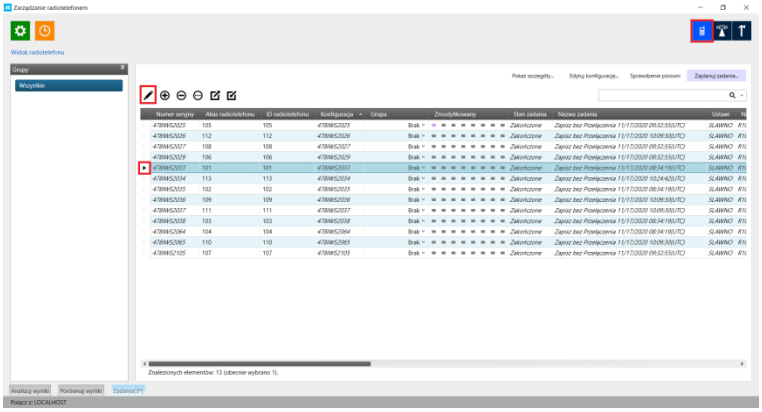


Figure 6 RM – editing configuration for selected device – select from icons

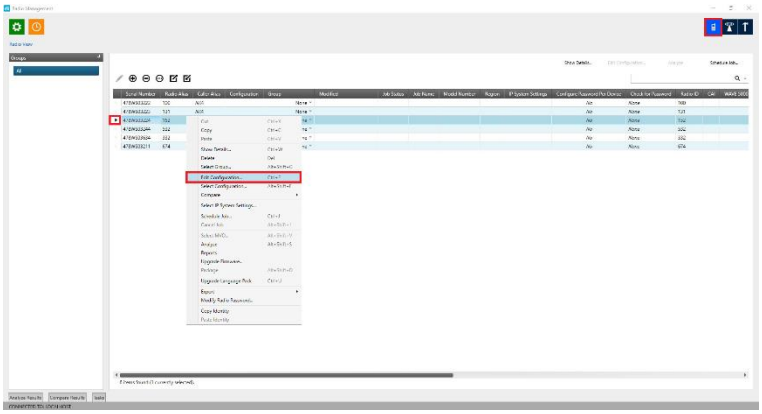


Figure 7 RM – editing configuration for selected device – right-click selection.

When choosing to edit the configuration for a selected device in RM Configuration Client, a window opens identical to that for configuration in CPS.

5. Configuration of repeaters for IPSC Operation.

After reading the device in CPS or editing the configuration in RM, a window appears with configuration tabs.

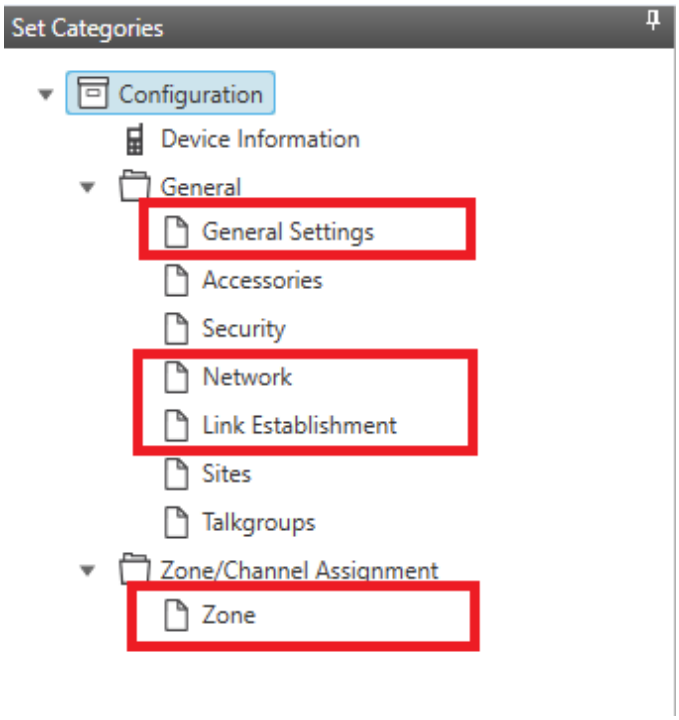


Figure 8 Repeater setup (IP Site Connect) – necessary settings.

5.1. General settings.

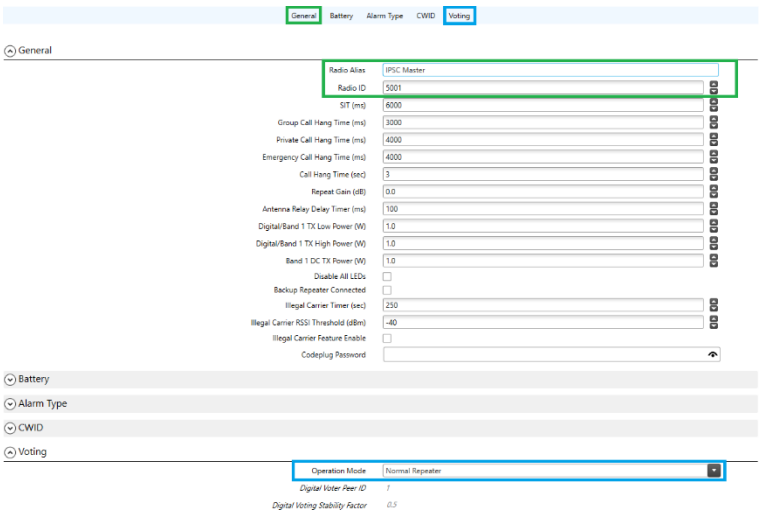


Figure 9 Repeater setup (IP Site Connect) – general settings.

Enter the following:
Repeater / radio name:
Repeater / radio ID:
Operating mode: Operating as a normal repeater.

5.2. Network settings.

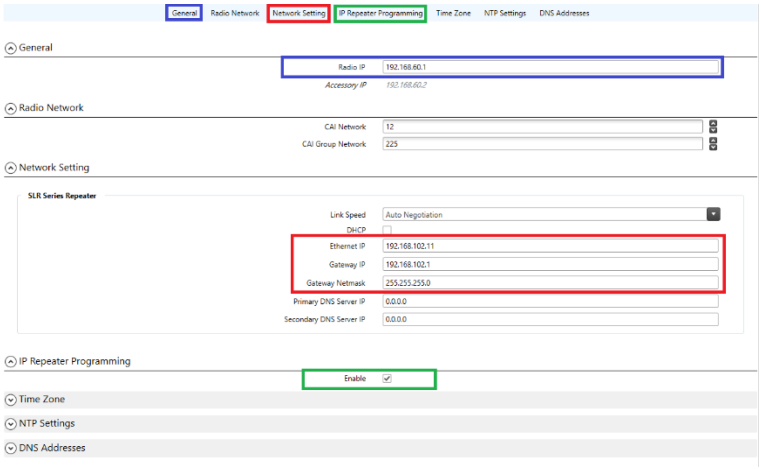


Figure 10 Repeater setup (IP Site Connect) – network settings.

It is necessary to define IP addresses for repeaters from the network side.

Master repeaters must have static IP addresses.
Peer repeaters may have DHCP settings.

If repeaters are to be reprogrammed via the IP network, it is necessary to enable the IP Repeater Programming option.

5.3. Connection setup

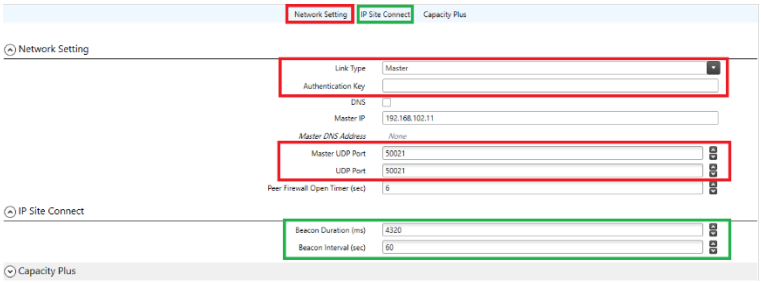


Figure 11 Repeater setup (IP Site Connect) – connection setup.

Define the repeater's function in the system: **Master/Peer**.
In each repeater to operate in IPSC system, you can enter the authentication key for logging on to the Master device (the key provides a type of device authentication).

By default, Peer devices communicate with the Master via port **50000**. In the IPSC system, the Master's UDP port number is port **50000** for connection setup – notification to the Master and registration.
The operating port of the Master repeater can have any number; when changing it, remember to enter the port number correctly in Peer devices.

For the purposes of automatic roaming of radios, it is necessary for exchangers to send beacon signals (short radio transmissions allowing for verification of radio coverage by radios; measurement of the received RSSI signal from a repeater and choosing whether to search for a new repeater for radio communications).
In the IP Mode Connection window, you can specify the duration of the beacon and how often it should be sent.

5.4. Channel zone assignment.

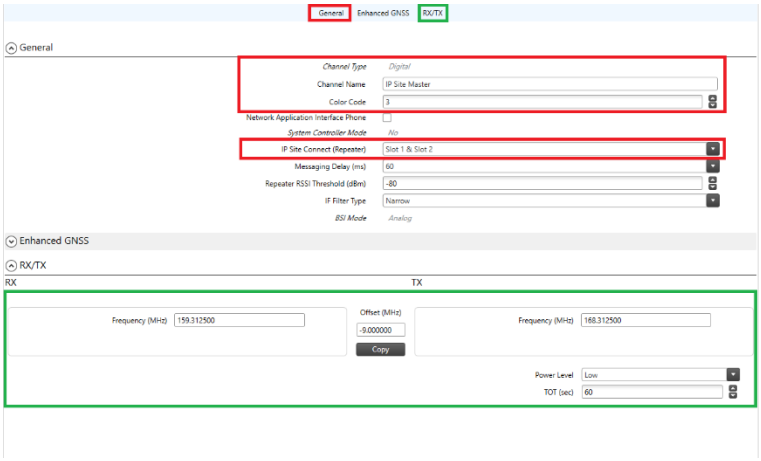


Figure 12 Repeater setup (IP Site Connect) – general settings.

Once a zone is selected, you can add (+) a channel: Digital (connection over IP).

For the radio channel, specify the RX/TX operating frequencies and the colour code.

For the logical channel, specify the slots that operate locally or for wide area [(Slot 1) or (Slot 2) or (Slot 1 and Slot 2)].

For the IP network, specify the delays that can occur on the IP network (60ms/90ms/150ms).

6. Configuration of subscriber radios for IPSC operation

In CPS, in the General/General settings tab, enter the subscriber radio ID according to the acquired contact list.

In CPS under the General/Network tab, set the network parameters and communication ports for the service.

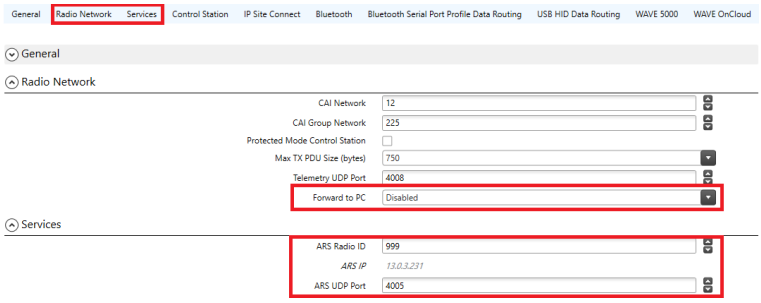


Figure 13 Subscriber radio settings (IP Site Connect) – general settings.

In the Radio Networks tab, disable computer data transfer.

In the ARS ID Services tab, enter the ID of the managed base radio.

In the Contacts tab enter the radio network contact list, as for the managed base radio.

In the RX Group List tab, enter the list of receive talkgroups and assign specific talkgroups from the contact list to each list, as for the managed base radio.

In the Zone/Channel Assignment tab for the entered digital channel, verify the correctness of the parameters required for IPSC operation – the settings are identical to those for the managed base radio, with two additional settings:

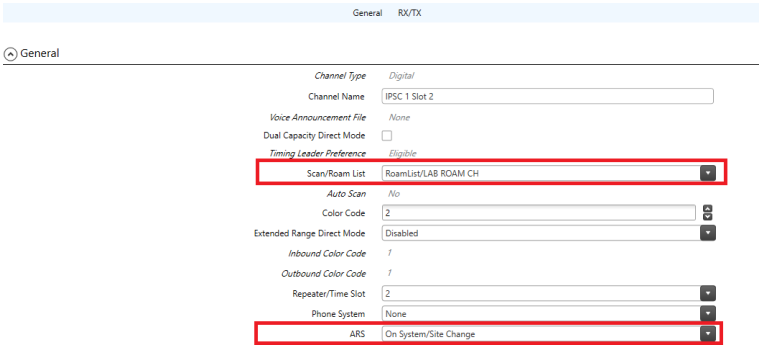


Figure 14 Subscriber radio settings (IP Site Connect) – channel settings.

Select a roaming list for the channel and ARS sending in the system.

In the Scan Lists / Roaming List tab, define the roaming lists that are present in the radio system. The roaming list should include all radio channels (repeater/slot) on which the subscriber radio will operate.

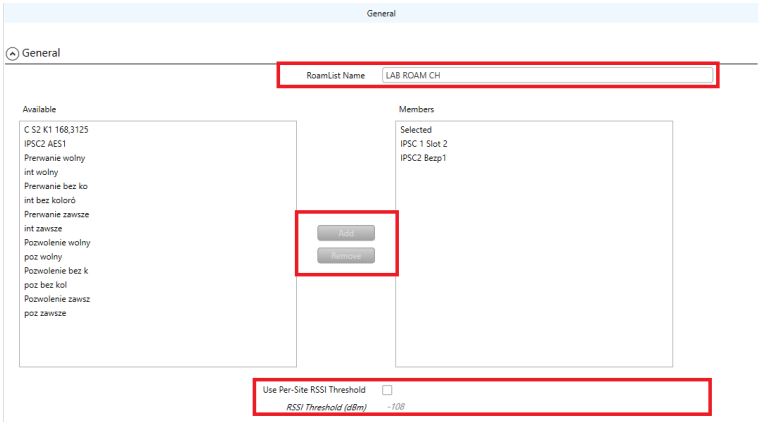


Figure 15 Subscriber radio settings (IP Site Connect) – roaming settings.

7. SCK Client configuration – working with NAI protocols.

The use of NAI protocols in ConSEL PLUS software requires the purchase of a licence in the form of a HASP hardware key.

It is necessary to activate the licence in the repeaters:
NAI Voice HKVN4211A
NAI Data HKVN4212A

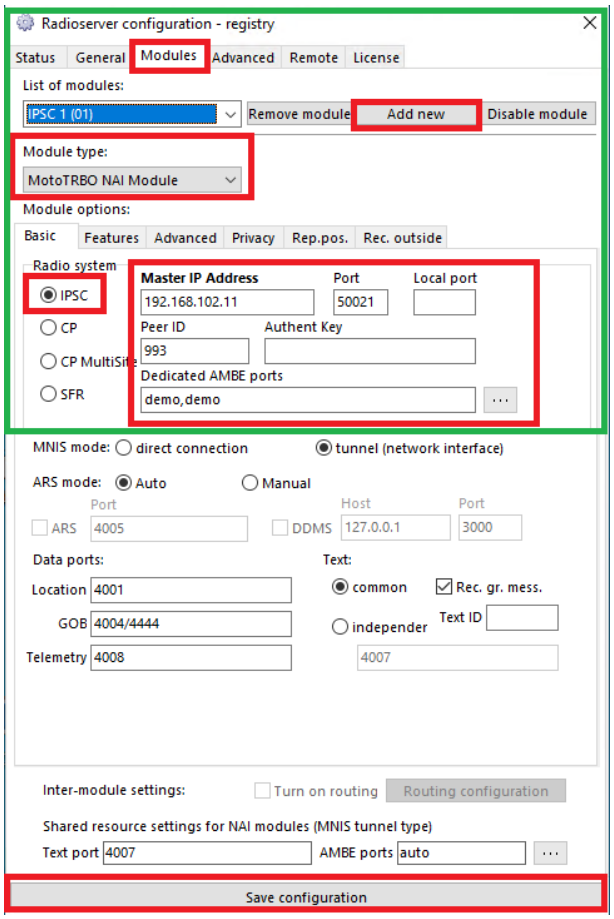


Figure 16 ConSEL PLUS settings – radio server for NAI (IP Site Connect).

In the Modules tab, add a new module under a new name.
Once the module has been added, set the module type as MotoTRBO NAI.
Specify in which radio system the module will work – select IPSC.
Enter the following:

- address of Master repeater
- port on which the Master communicates
- ID to be used by SCK Client
- authenticate the key

the module for the SCK Client to connect.

The ConSEL PLUS SCK Client software is based on AMBE software audio codecs.
After entering these parameters, Save the settings and restart the service.
After restarting the service, the Status tab shows successful connection of the service to the Master repeater.

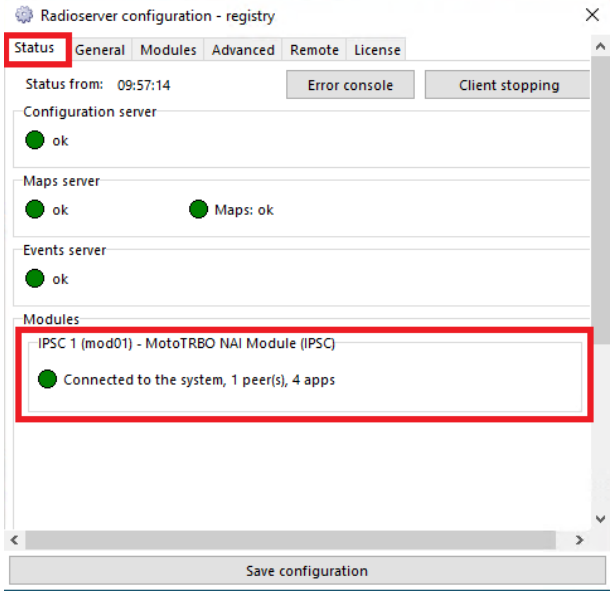


Figure 17 ConSEL PLUS Status – radio server for managed base radio (IP Site Connect)

8. Radio console configuration – IPSC operation using NAI protocols.

When using NAI protocols and direct connection of the radio server to the repeater. Two software defined (virtual) radios can be connected to a single repeater in the ConSEL PLUS system client.
In the ConSEL PLUS system client, select:
Side menu/Administration/Radio Consoles Configuration
Select Add Radio Module to create the first virtual radio.

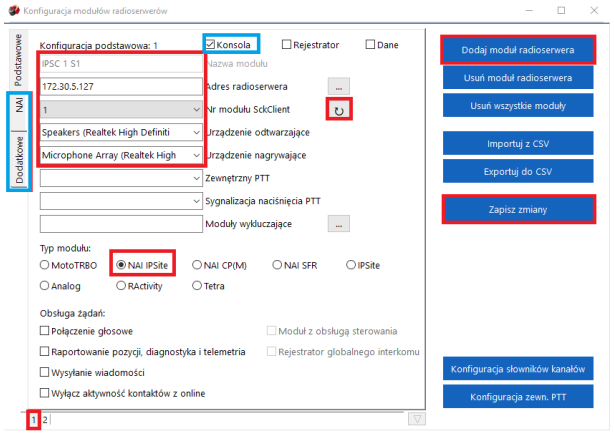


Figure 18 ConSEL PLUS radio console settings for NAI

Select the module to work as a console.
Enter:

- Radio server address – network address of the computer on which the radio server is running (local address 127.0.0.1 in case radio server and console are installed on the same computer).
- SckClient module number – use the α icon to read available radio server modules and select a module for the configured radio network from the list of radio modules running on the radio server – the basic module is selected by default.
- Playback device – from the list of devices available in the system, select the device which will play back the voice communications on the console.
- Recording device – from the list of devices available in the system, select the device to act as a microphone.
- Module Type: NAI IPSite

Select Add Radio Module to create the second virtual radio and enter the same data as for the first virtual radio.

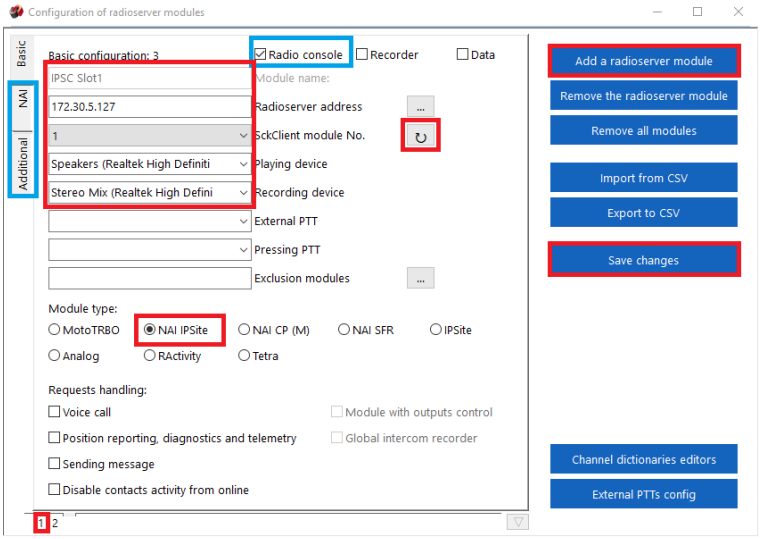


Figure 19 ConSEL PLUS radio console settings for NAI

For the virtual radio created in the NAI tabs, enter the following:

- ID of virtual base radio
- Default receive and transmit talkgroups
- Slot used by the virtual base radio

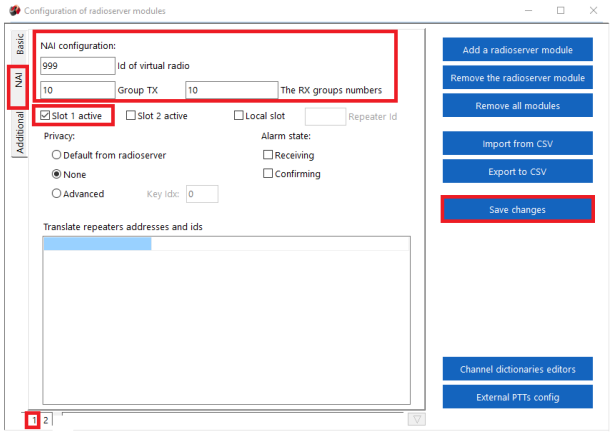


Figure 20 ConSEL PLUS radio console settings for NAI

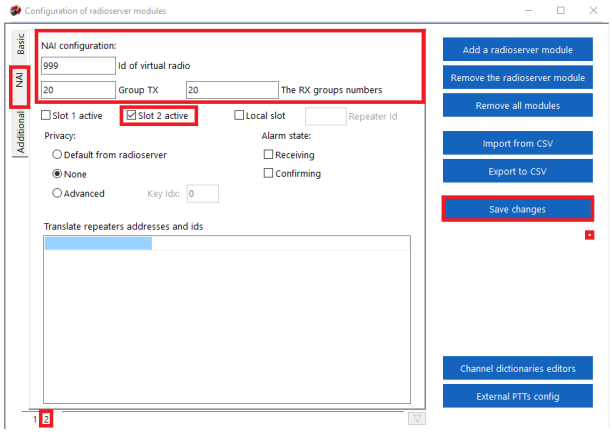


Figure 21 ConSEL PLUS radio console settings for NAI.

After saving the configuration, the dual radio window is available in the main panel – radio console module for two time slots. Once the console is running, two virtual base radios are available.

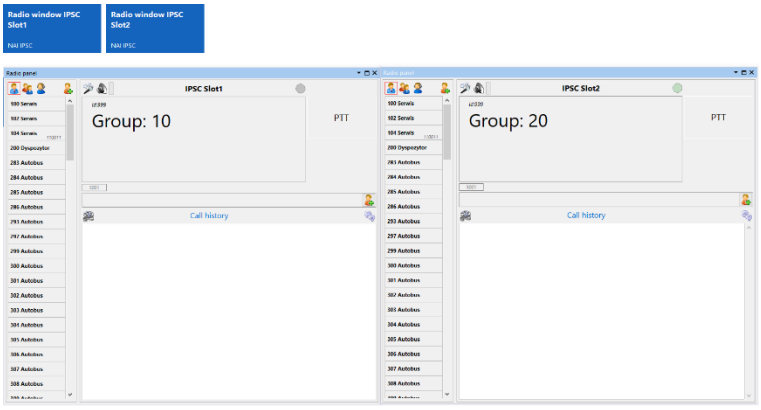


Figure 22 ConSEL PLUS radio console view for NAI.