

To access this page, click **Configuration > Services > DynDNS**.

The screenshot shows the 'DynDNS Configuration' window. At the top, there is a blue header with the text 'DynDNS Configuration'. Below the header, there is a checkbox labeled 'Enable DynDNS client' which is currently unchecked. Underneath, there are five input fields: 'Hostname', 'Username', 'Password', 'Server *', and 'IP Mode'. The 'IP Mode' field is a dropdown menu currently showing 'IPv4'. The 'Server *' field has an asterisk next to it. At the bottom left, there is a button labeled 'Apply'. Below the input fields, there is a small note: '* can be blank'.

Figure 3.33 Configuration > Services > DynDNS

Item	Description
Hostname	The third order domain registered on the www.dyndns.org server.
Username	Username for logging into the DynDNS server.
Password	Password for logging into the DynDNS server.
IP Mode	Specifies a DynDNS service other than the www.dyndns.org. Possible other services: www.spdns.de, www.dnsdynamic.org, www.noip.com. Enter the update server service information in this field. If you leave this field blank, the default server members.dyndns.org will be used.
Server	Specifies the version of IP protocol: <ul style="list-style-type: none"> ■ IPv4 - IPv4 protocol is used only (default). ■ IPv6 - IPv6 protocol is used only. ■ IPv4/IPv6 - IPv4 and IPv6 dual stack is enabled.

Example: DynDNS client configuration with the domain company.dyndns.org:

This screenshot shows the 'DynDNS Configuration' window with the 'Enable DynDNS client' checkbox checked. The 'Hostname' field contains 'company.dyndns.org', 'Username' contains 'company', and 'Password' contains 'company'. The 'Server *' field is empty. The 'IP Mode' dropdown is set to 'IPv4'. The 'Apply' button is visible at the bottom left. The note '* can be blank' is present below the input fields.

Figure 3.34 DynDNS Configuration Example

3.4.8.2 HTTP

To access this page, click **Configuration > Services > HTTP**.

Figure 3.35 Configuration > Services > HTTP

Item	Description
Enable HTTP service	Click the check box to set up Ethernet encapsulation (remote access) through HTTP function.
Enable HTTPS service	Click the check box to set up Ethernet encapsulation over HTTPS.
Session Timeout	Enter the variable in minutes to define the timeout period for the session.
Apply	Click Apply to save the values.

3.4.8.3 NTP

The NTP configuration form allows you to configure the NTP client. To open the NTP page, click NTP in the Configuration section of the main menu. NTP (Network Time Protocol) allows you to periodically set the internal clock of the device. The time is set from servers that provide the exact time to network devices. IPv6 Time Servers are supported.

- If you mark the Enable local NTP service check box, then the device acts as a NTP server for other devices in the local network (LAN).
- If you mark the Synchronize clock with NTP server check box, then the device acts as a NTP client. This means that the device automatically adjusts the internal clock every 24 hours.

To access this page, click **Configuration > Services > NTP**.

Figure 3.36 Configuration > Services > NTP

Item	Description
Primary NTP Server	IPv4 address, IPv6 address or domain name of primary NTP server.
Secondary NTP Server	IPv4 address, IPv6 address or domain name of secondary NTP server.
Timezone	Specifies the time zone where you installed the device.
Daylight Saving Time	Activates/deactivates the DST shift. <ul style="list-style-type: none"> ■ No - The time shift is inactive. ■ Yes - The time shift is active.

The figure below displays an example of a NTP configuration with the primary server set to ntp.cesnet.cz and the secondary server set to tik.cesnet.cz and with the automatic change for daylight saving time enabled.

The screenshot shows the 'NTP Configuration' page. It includes a header 'NTP Configuration' and several sections:

- Enable local NTP service
- Synchronize clock with NTP server
 - Primary NTP Server: ntp.cesnet.cz
 - Secondary NTP Server: tik.cesnet.cz
- Timezone: GMT+01:00
- Daylight Saving Time: yes
- An 'Apply' button at the bottom.

Figure 3.37 Example of NTP Configuration

3.4.8.4 SNMP

The SNMP page allows you to configure the SNMP v1/v2 or v3 agent which sends information about the device (and its expansion ports) to a management station. To open the SNMP page, click SNMP in the Configuration section of the main menu. SNMP (Simple Network Management Protocol) provides status information about the network elements such as devices or endpoint computers. In the version v3, the communication is secured (encrypted). To enable the SNMP service, mark the Enable the SNMP agent check box. Sending SNMP traps to IPv6 address is supported.

To access this page, click **Configuration > Services > SNMP**.

The screenshot shows the 'SNMP Configuration' page. It includes a header 'SNMP Configuration' and several sections:

- Enable SNMP agent
 - Name *
 - Location *
 - Contact *
 - (Configuration via SNMP is not possible.)
- Enable SNMPv1/v2 access
 - Community: Read (public), Write (private)
- Enable SNMPv3 access
 - Username: Read, Write
 - Authentication: MD5, MD5
 - Authentication Password
 - Privacy: DES, DES
 - Privacy Password
- Enable I/O extension
- Enable M-BUS extension
 - Baudrate: 300
 - Parity: even
 - Stop Bits: 1
- Enable reporting to supervisory system
 - IP Address
 - Period min
 - * can be blank
- An 'Apply' button at the bottom.

Figure 3.38 Configuration > Services > SNMP

Item	Description
Name	Designation of the device.

Item	Description
Location	Location of where you installed the device.
Contact	Person who manages the device together with information how to contact this person.

To enable the SNMPv1/v2 function, mark the Enable SNMPv1/v2 access check box. It is also necessary to specify a password for access to the Community SNMP agent. The default setting is public.

You can define a different password for the Read community (read only) and the Write community (read and write) for SNMPv1/v2. You can also define 2 SNMP users for SNMPv3. You can define a user as read only (Read), and another as read and write (Write). The device allows you to configure the parameters in the following table for every user separately. The device uses the parameters for SNMP access only.

To enable the SNMPv3 function, mark the Enable SNMPv3 access check box, then specify the following parameters:

Item	Description
Username	User name
Authentication	Encryption algorithm on the Authentication Protocol that is used to verify the identity of the users.
Authentication Password	Password used to generate the key used for authentication.
Privacy	Encryption algorithm on the Privacy Protocol that is used to ensure confidentiality of data.
Privacy Password	Password for encryption on the Privacy Protocol.

Activating the Enable I/O extension function allows you monitor the binary I/O inputs on the device.

Selecting Enable M-BUS extension and entering the Baudrate, Parity and Stop Bits lets you monitor the meter status connected to the expansion port MBUS status.

Selecting Enable reporting to supervisory system and entering the IP Address and Period lets you send statistical information to the monitoring system, R-SeeNet.

Item	Description
IP Address	IPv4 or IPv6 address.
Period	Period of sending statistical information (in minutes).

Each monitored value is uniquely identified using a numerical identifier OID - Object Identifier. This identifier consists of a progression of numbers separated by a point. The shape of each OID is determined by the identifier value of the parent element and then this value is complemented by a point and current number. So it is obvious

that there is a tree structure. The following figure displays the basic tree structure that is used for creating the OIDs.

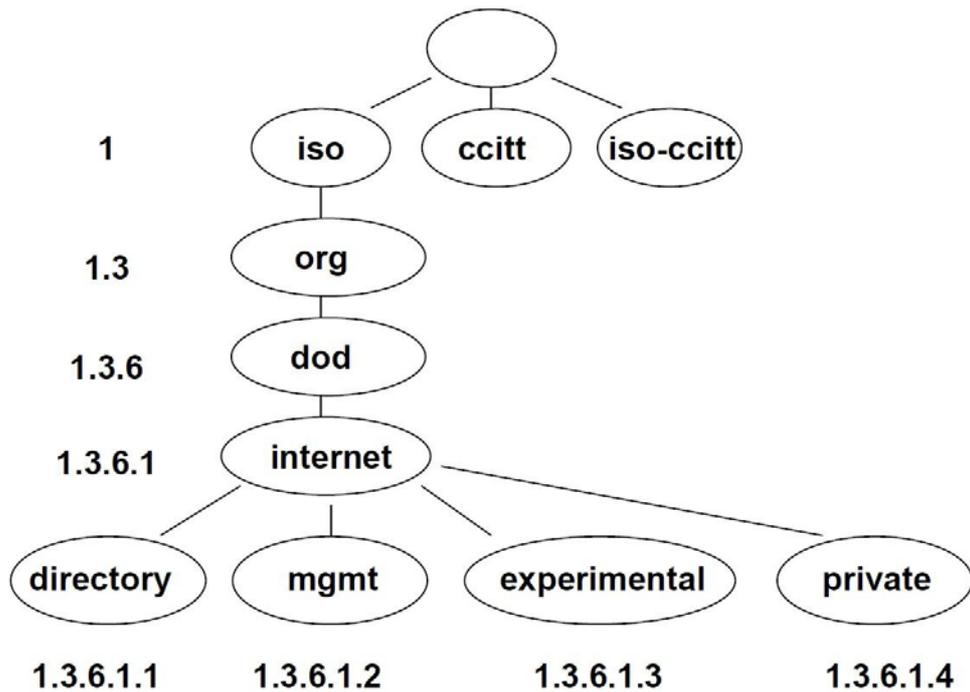


Figure 3.39 OID Basic Structure

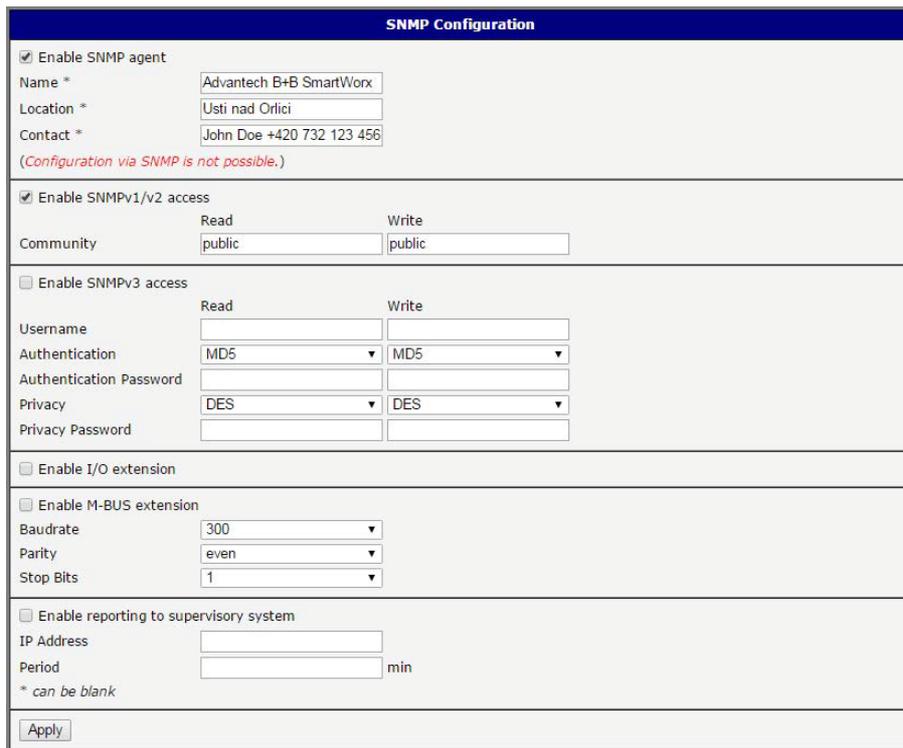
The SNMP values that are specific for Conel devices create the tree starting at OID = .1.3.6.1.4.1.30140. You interpret the OID in the following manner:

iso.org.dod.internet.private.enterprises.conel

This means that the device provides for example, information about the internal temperature (OID 1.3.6.1.4.1.248.40.1.3.3) or about the power voltage (OID 1.3.6.1.4.1.248.40.1.3.4). For binary inputs and output, the following range of OID is used:

OID	Description
.1.3.6.1.4.1.30140.2.3.1.0	Binary input BIN0 (values 0,1)
.1.3.6.1.4.1.30140.2.3.2.0	Binary output OUT0 (values 0,1)
.1.3.6.1.4.1.30140.2.3.3.0	Binary input BIN1 (values 0,1)

The list of available and supported OIDs and other details can be found in the application note SNMP Object Identifier [8].



The image shows a 'SNMP Configuration' dialog box with several sections. The first section, 'Enable SNMP agent', has a checked checkbox and fields for Name (Advantech B+B SmartWorx), Location (Usti nad Orlici), and Contact (John Doe +420 732 123 456). Below this is a note: '(Configuration via SNMP is not possible.)'. The second section, 'Enable SNMPv1/v2 access', has a checked checkbox and fields for Read and Write communities, both set to 'public'. The third section, 'Enable SNMPv3 access', has an unchecked checkbox and fields for Username, Authentication (MD5), Authentication Password, Privacy (DES), and Privacy Password. The fourth section, 'Enable I/O extension', has an unchecked checkbox. The fifth section, 'Enable M-BUS extension', has an unchecked checkbox and fields for Baudrate (300), Parity (even), and Stop Bits (1). The sixth section, 'Enable reporting to supervisory system', has an unchecked checkbox and fields for IP Address and Period (min). An 'Apply' button is at the bottom.

Figure 3.40 SNMP Configuration Example

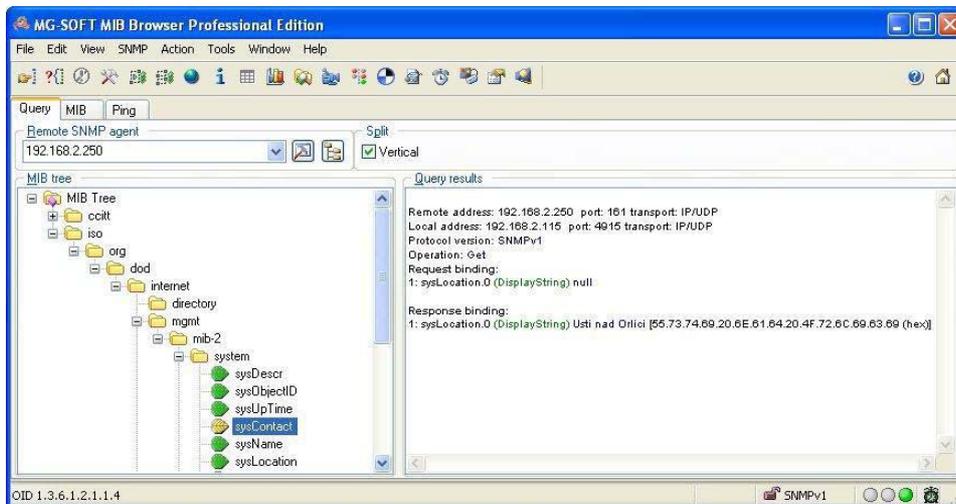


Figure 3.41 MIB Browser Example

In order to access a particular device enter the IP address of the SNMP agent which is the device, in the Remote SNMP agent field. The dialog displayed the internal variables in the MIB tree after entering the IP address. Furthermore, you can find the status of the internal variables by entering their OID.

The path to the objects is:

iso ? org ? dod ? internet ? private ? enterprises ? conel ? protocols

The path to information about the device is:

iso ? org ? dod ? internet ? mgmt ? mib-2 ? system

3.4.8.5 SMTP

Use the SMTP form to configure the Simple Mail Transfer Protocol client (SMTP) for sending e-mails. IPv6 e-mail servers are supported.

To access this page, click **Configuration > Services > SMTP**.

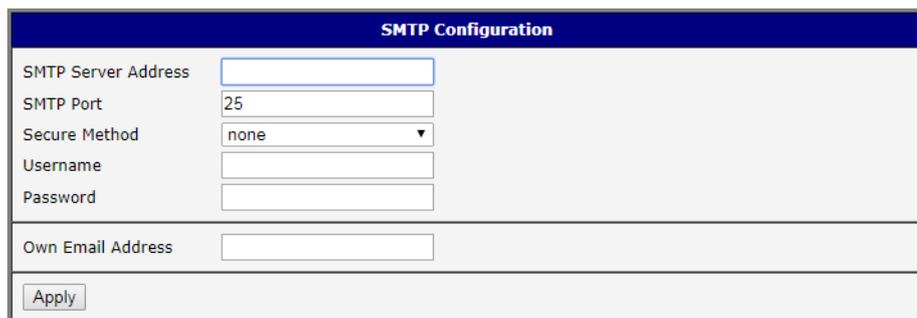


Figure 3.42 Configuration > Services > SMTP

Item	Description
SMTP Server Address	IPv4 address, IPv6 address or domain name of the mail server.
SMTP Port	Port the SMTP server is listening on.
Secure Method	None, SSL/TLS, or STARTTLS. Secure method has to be supported by the SMTP server.
Username	Name for the e-mail account.
Password	Password for the e-mail account. The password can contain the following special characters * + , - . / : = ? ! # % [] _ { } ~ The following special characters are not allowed: " \$ & ' () ; < >
Own Email Address	Address of the sender.

The mobile service provider can block other SMTP servers, then you can only use the SMTP server of the service provider.

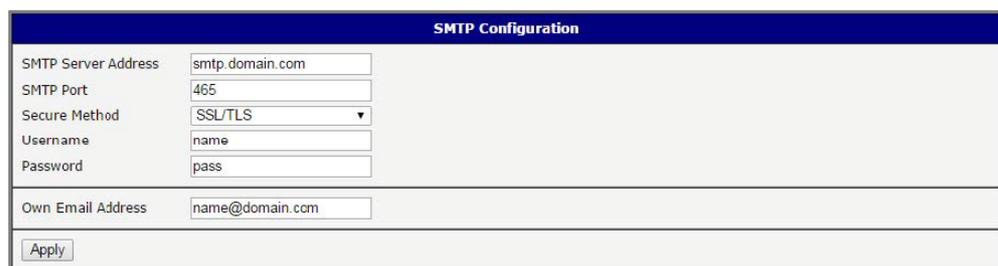


Figure 3.43 SMTP Client Configuration Example

You can send e-mails from the Startup script. The Startup Script dialog is located in Scripts in the Configuration section of the main menu. The device also allows you to send e-mails using an SSH connection. Use the email command with the following parameters:

- -t: e-mail address of the receiver
- -s: subject, enter the subject in quotation marks
- -m: message, enter the subject in quotation marks
- -a: attachment file

- -r: number of attempts to send e-mail (default setting: 2)

Note! *Commands and parameters can be entered only in lowercase.*



Example: Sending an e-mail:

```
email -t john@doe.com -s "System Log" -m "Attached" -a /var/log/messages
```

The command above sends an e-mail to address john@doe.com with the subject "System Log", body message "Attached" and attachment messages file with System Log of the device directly from the directory /var/log/.

3.4.8.6 SSH

To access this page, click **Configuration > Services > SSH**.

Figure 3.44 Configuration > Services > SSH

Item	Description
Enable SSH service	Click the check box to set up Ethernet encapsulation (remote access) through the Secure Shell (SSH) function.
Session Timeout	Enter the variable in minutes to define the timeout period for the session.
Apply	Click Apply to save the values.

3.4.9 Scripts

There is possibility to create your own shell scripts executed in the specific situations. Go to the Scripts page in the Configuration section in the menu. The menu item will expand and there are Startup Script, Up/Down IPv4 and Up/Down IPv6 scripts you can use - there is IPv4 and IPv6 independent dual stack. For more examples of Scripts and possible commands see the Application Note Commands and Scripts [1]. To access this page, click **Configuration > Scripts**.

3.4.9.1 Startup Script

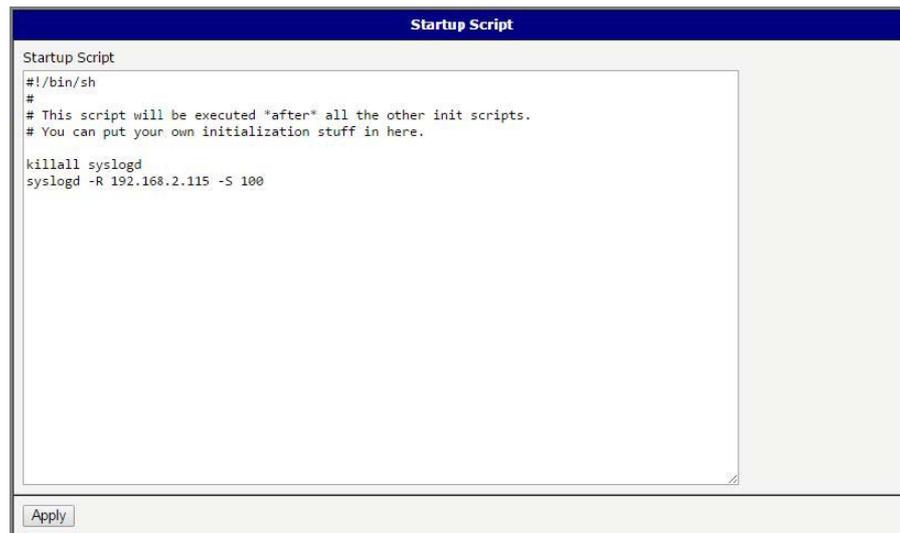
Use the Startup Script window to create your own scripts which will be executed after all of the initialization scripts are run - right after the device is turned on or rebooted. The changes in settings will apply after pressing the **Apply** button.

To access this page, click **Configuration > Scripts > Startup Script**.

Note! *Any changes to the Startup Script will take effect the next time the device is power cycled or rebooted. This can be done with the Reboot button in the Administration section, or by SMS message.*



Example: Startup Script



```
Startup Script
#!/bin/sh
#
# This script will be executed *after* all the other init scripts.
# You can put your own initialization stuff in here.

killall syslogd
syslogd -R 192.168.2.115 -S 100
```

Figure 3.45 Example of a Startup Script

When the device starts up, stop syslogd program and start syslogd with remote logging on address 192.168.2.115 and limited to 100 entries. Add these lines to the Startup Script:

```
killall syslogd
syslogd -R 192.168.2.115 -S 100
```

3.4.9.2 Up/Down Scripts

Use the Up/Down IPv4 and Up/Down IPv6 page to create scripts executed when the Mobile WAN connection is established (up) or lost (down). There is independent IPv4 and IPv6 dual stack implemented in the device, so there is independent IPv4 and IPv6 Up/Down script. IPv4 Up/Down Script runs only on the IPv4 WAN connection established/lost, IPv6 Up/Down Script runs only on the IPv6 WAN connection established/lost. Any scripts entered into the Up Script window will run after a WAN connection is established. Script commands entered into the Down Script window will run when the WAN connection is lost.

The changes in settings will apply after pressing the **Apply** button. Also you need to reboot the device to make Up/Down Script work.

To access this page, click **Configuration > Scripts > Up/Down IPv4** or **Up/Down IPv6**.

Example: IPv6 Up/Down Script

```
IPv6 Up/Down Script

Up Script
#!/bin/sh
#
# This script will be executed when PPP/WAN IPv6 connection is established.
email -t name@domain.com -s "SmartFlex router" -m "Connection established."

Down Script
#!/bin/sh
#
# This script will be executed when PPP/WAN IPv6 connection is lost.
email -t name@domain.com -s "SmartFlex router" -m "Connection lost."

Apply
```

Figure 3.46 Example of IPv6 Up/Down Script

After establishing or losing an IPv6 WAN connection (connection to mobile network), the device sends an email with information about the connection state. It is necessary to configure SMTP before.

Add this line to the Up Script field:

```
email -t name@domain.com -s "Router" -m "Connection up."
```

Add this line to the Down Script field:

```
email -t name@domain.com -s "Router" -m "Connection down."
```

3.4.10 Automatic Update

Use the Automatic Update menu to configure the automatic update settings. The device can be configured to automatically check for firmware and configuration updates from a HTTP(S) or FTP(S) server. IPv6 sites/servers are supported. Used protocol is specified by an address in Base URL field: HTTP, HTTPS, FTP or FTPS. To prevent possible unwanted manipulation of the files, the device verifies that the downloaded file is in the tar.gz format. At first, the format of the downloaded file is checked. Then the type of architecture and each file in the archive (tar.gz file) is checked.

If the Enable automatic update of configuration option is selected, the device will check if there is a configuration file on the remote server, and if the configuration in the file is different than its current configuration, it will update its configuration to the new settings and reboot.

If the Enable automatic update of firmware option is checked, the device will look for a new firmware file and update its firmware if necessary.

To access this page, click **Configuration > Automatic Update**.

Figure 3.47 Configuration > Automatic Update

Item	Description
Base URL	Base URL, IPv4 or IPv6 address from which the configuration file will be downloaded. This option also specifies the communication protocol (HTTP, HTTPS, FTP or FTPS), see examples below.
Unit ID	Name of configuration (name of the file without extension). If the Unit ID is not filled, the MAC address of the device is used as the filename (the delimiter colon is used instead of a dot.)
Update Hour	Use this item to set the hour (range 1-24) when the automatic update will be performed every day. If the time is not specified, automatic update is performed five minutes after turning on the device and then every 24 hours. If the detected configuration file is different from the running one, it is downloaded and the device is restarted automatically.

The configuration file name consists of Base URL, hardware MAC address of ETH0 interface and cfg extension. Hardware MAC address and cfg extension are added to the file name automatically and it isn't necessary to enter them. When the parameter Unit ID is enabled, it defines the concrete configuration name which will be downloaded to the device, and the hardware MAC address in the configuration name will not be used.

The firmware file name consists of Base URL, type of device and bin extension. For the proper firmware filename, see the Update Firmware page in Administration section - it is written out there. See "Update Firmware" on page 66.

Note!  *It is necessary to load two files (.bin and .ver) to the HTTP/FTP server. If only the .bin file is uploaded and the HTTP server sends the incorrect answer of 200 OK (instead of the expected 404 Not Found) when the device tries to download the nonexistent .ver file, then there is a risk that the device will download the .bin file over and over again.*

Note!  *Firmware update can cause incompatibility with the user modules. It is recommended that you update user modules to the most recent version. Information about the user modules and the firmware compatibility is at the beginning of the user module's Application Note.*

Example 1: Automatic Update

In the following example the device checks for new firmware or configuration file each day at 1:00 a.m. An example is given for the WISE-6610 Series device.

- Firmware file: <http://example.com/SPECTRE-v3L-LTE.bin>
- Configuration file: <http://example.com/test.cfg>

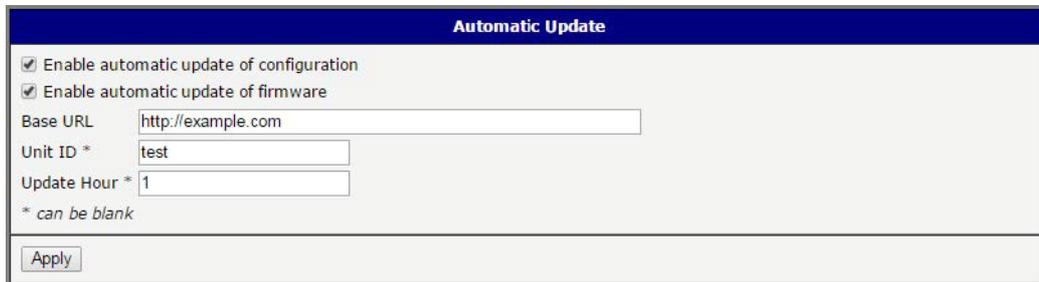


Figure 3.48 Example of Automatic Update 1

Example 2: Automatic Update Based on MAC

In the following example the device checks for new firmware or configuration each day at 1:00 a.m. An example is given for the WISE-6610 Series device with MAC address 00:11:22:33:44:55.

- Firmware file: <http://example.com/SPECTRE-v3L-LTE.bin>
- Configuration file: <http://example.com/00.11.22.33.44.55.cfg>

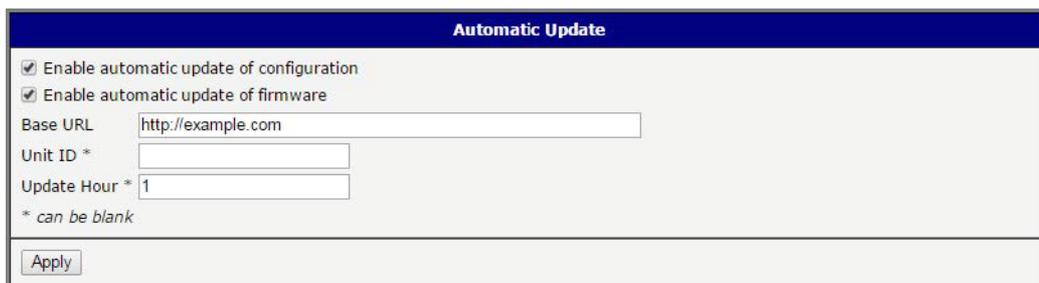


Figure 3.49 Example of Automatic Update 2

3.5 Customization

3.5.1 Adding a Module

You may run custom software programs in the device to enhance the features of the device. Use the User Modules menu item to add new software modules to the device, to remove them, or to change their configuration. Use the **Browse** button to select the user module (compiled module has `tgz` extension). Use the **Add** button to add a user module.

To access this page, click **User Modules** (located under Customization).

The new module appears in the list of modules on the same page. If the module contains an `index.html` or `index.cgi` page, the module name serves as a link to this page. The module can be deleted using the **Delete** button.

Updating a module is done the same way. Click the **Add** button and the module with the higher (newer) version will replace the existing module.

Programming and compiling of modules is described in the Application Note Programming of User Modules [10].

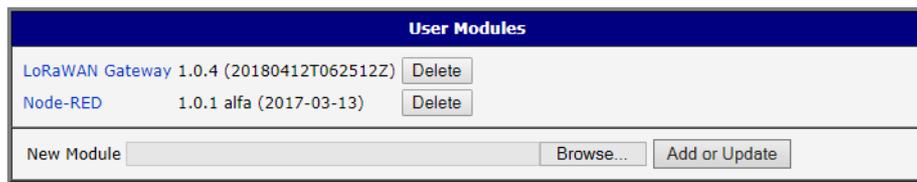


Figure 3.50 User Modules

Item	Description
MODBUS TCP2RTU	Provides a conversion of MODBUS TCP/IP protocol to MDBUS RTU protocol, which can be operated on the serial line.
Easy VPN client	Provides secure connection of LAN network behind our device with LAN network behind CISCO device.
NMAP	Enables TCP and UDP scan.
Daily Reboot	Enables daily reboot of the device at the specified time.
HTTP Authentication	Adds the process of authentication to a server that doesn't provide this service.
HTTP Authentication	Adds support of dynamic protocols.
PIM SM	Adds support of multicast routing protocol PIM-SM.
WMBUS Concentrator	Enable the reception of messages from WMBUS meters and saves contents of these messages to an XML file.
pduSMS	Sends short messages (SMS) to specified number.
Pinger	Allows you to manually or automatically verify the functionality of the connection between two network interfaces (ping).
IS-IS	Adds support of IS-IS protocol.

Note!  *In some cases the firmware update can cause incompatibility with installed user modules. Some of them are dependent on the version of the Linux kernel (for example SmsBE and PoS Configuration). It is best to update user modules to the most recent version.*

Information about the user module and the firmware compatibility is at the beginning of the user module's Application Note.

3.5.1.1 MQTT and LoRaWAN

To access the gateway configuration page, navigate to Customization and click **User Modules > LoRaWAN Gateway > MQTT and LoRaWAN**.

Figure 3.51 User Modules > LoRaWAN Gateway > MQTT and LoRaWAN

Item	Description
LoRaWAN Radio Setting	
Model Name	Enter the model name.
LoRaWAN Radio Enable	Click the drop-down menu to enable the radio channel and corresponding settings.
Radio 0 Main Frequency(KHz)	Enter the frequency setting for the interface.
Radio 1 Main Frequency(KHz)	Enter the frequency setting for the interface.
Quick Setup	Click to enter the Quick Setup menu enabling the selection of pre-configured region-specific, radio frequency settings.
LoRaWAN Gateway Setting	
LoRaWAN Gateway Identifier	Displays the gateway identifier for the remote LoRa network server.
Backup Enable	Click the drop-down menu to enable (default: Off) the LoRaWAN backup feature.
Backup Database Interval	Set the backup frequency, setting: 5 to 60 minutes.
LoRaWAN Network Server Setting	
LoRaWAN Network Server Enable	Click the drop-down menu to disable the LoRaWAN network server (default: On).
LoRaWAN Server Listen Port	Enter a variable (1 to 65535) to designate the listening port.
LoRaWAN Network Server HTTP Port	Enter a variable (1 to 65535) to designate the HTTP port.
LoRaWAN Network Server HTTPS Port	Enter a variable (1 to 65535) to designate the HTTPS port.

Item	Description
LoRaWAN Web Username	Enter an identifier used to access the Web user interface for the LoRaWAN network server.
LoRaWAN Web Password	Enter the corresponding password to the set LoRaWAN Web username.
LoRaWAN Network Server HTTPS Enable	Click the drop-down menu to enable the HTTPS service (default: Off).
Update Database	Click to upload an existing server database.
Download Database	Click to upload the current server database. In the ensuing screen, click Download to save the database to a local drive.
Factory Reset	Click to reset the current server database. In the ensuing screen, click to reset the database to its factory default.
MQTT Broker	
MQTT Broker Enable	Click the drop-down menu to enable or disable local MQTT broker.
MQTT Broker Port	Enter a value to specify the port of MQTT broker (default: 1883).
MQTT Bridge	
MQTT Bridge Enable	Click the drop-down menu to enable or disable bridging to a remote MQTT broker.
MQTT Bridge Port	Enter a value to specify the port of MQTT bridge (default: 1883).
MQTT Bridge Address	Enter a value to specify the bridge address of the MQTT bridge.
MQTT Bridge User	Enter the name of the MQTT bridge user.
MQTT Bridge Password	Enter the character set for the define password type.u
MQTT Bridge Client Identifier	With MQTT and LoRa configured, pair and modify the node settings, see Node Control.
Advantech Application Server Setting	
Application Server Enable	Click the drop-down menu to enable the local Application server (default: Off).
Application Server Connect MQTT Address	Enter the private network address to allow bidirectional sending and receiving of messages.
Application Server Connect MQTT Port	Enter a port designation to associate with the previously defined network address.
MQTT User	Enter an identifier used to access the remote MQTT broker.
MQTT Password	Enter the password associated with the MQTT user listed previously.
Uplink Topic	Enter a string identifier to describe the MQTT broker, uplink, subscription topic.
Downlink Topic	Enter a string identifier to describe the MQTT broker, downlink, subscription topic.
Save	Click Save to save the values.
Restore	Click Restore to restore the values.

With MQTT and LoRa configured, pair and modify the node settings, see Node Control.

3.5.1.2 Licenses

To download the LoRa license, click the **Licenses** on the **Router** menu.

3.5.1.3 LoRaWAN Status

The LoRaWAN Status menu displays specific information pertaining to the basic and channel settings of the LoRaWAN Gateway.

To access the page use the following guidelines:

1. From the LoRaWAN router, Customization menu, click **User Modules**.
2. In User Modules, click the **LoRaWAN Gateway** link.
3. The LoRaWAN Gateway Settings menu displays. Under **Router** menu, click **LoRaWAN Status**.

The LoRaWAN Gateway Settings menu displays listing Basic, Channel, and Live Up Stream status information.

Navigation		LoRaWAN Gateway Settings					
Router		Basic Status					
MQTT and LoRaWAN Licenses LoRaWAN Status LoRaWAN Server LoRaWAN Server(https) Advantech Application Return to Router		Data Record Time : 2018-10-23T10:14:09Z Total Up Stream : 0 Bytes CRC OK packet : 0 CRC Bad packet : 0 NO CRC packet : 0					
		Channel Status					
Channel	Radio Index	Enabled	Frequency(Hz)	Received(Bytes)			
0	0	Enabled	902300000	0			
1	0	Enabled	902500000	0			
2	0	Enabled	902700000	0			
3	0	Enabled	902900000	0			
4	1	Enabled	903100000	0			
5	1	Enabled	903300000	0			
6	1	Enabled	903500000	0			
7	1	Enabled	903700000	0			
std	0	Enabled	903000000	0			
FSK	0	Disabled	902700000	0			
Uplink Frame							
Time	Type	Devaddr/EUI	Freq	DR	RSSI	Fcnt	Data
Download Frame							
Type	Devaddr/EUI		Freq	DR	Fcnt	Data	
Refresh							

Figure 3.52 User Modules > LoRaWAN Gateway > LoRaWAN Status

3.5.1.4 LoRaWAN Server

The LoRaWAN Server is a ready-to-use solution, which includes a web-based user interface, providing the components needed to build networks.

To access this page, click **User Modules > LoRaWAN Gateway > LoRaWAN Server**.

Server Admin

- Infrastructure >
- Devices >
- Backends >
- Received Frames
- Transmission Frames

Dashboard

16:02	16:03	16:04	16:05	16:06	16:07	16:08	16:09	16:10	16:11
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

Wed 15 August

Servers				
Name	Version	Memory	Disk	Status
lorawan@Router	0.5.1	450 MB		✓

Gateways				
MAC	IP Address	Dwell [%]	Last Alive	Status
74FE48FFFE358C86	127.0.0.1		2018-08-15T08:30:14Z	✓

Nodes					
DevAddr	Profile	Battery	D/L SNR	Last RX	Status

Events				
Last Occurred	Entity	Eid	Text	Args

Received Frames				
Received	Application	DevAddr	MAC	U/L SNR

Figure 3.53 User Modules > LoRaWAN Gateway > LoRaWAN Server

3.5.1.5 LoRaWAN Server (https)

Enable the **LoRaWAN Network Server HTTPS Enable** function under **MQTT and LoRaWAN** to access the website through https.

To access this page, click **User Modules > LoRaWAN Gateway > LoRaWAN Server (https)**.

Figure 3.54 User Modules > LoRaWAN Gateway > LoRaWAN Server (https)

3.5.1.6 Advantech Application

To access this page, click **User Modules > LoRaWAN Gateway > Advantech Application**. For more details, see “Changing the Raw LoRa Data Format” on page 86.

Figure 3.55 User Modules > LoRaWAN Gateway > Advantech Application

3.5.1.7 Return to Router

The main menu is accessible through the Return to Router function. To return the WISE-6610 Series to the main menu, click **Customization > User Modules > LoRaWAN Gateway > Return to Router**.

3.6 Administration

3.6.1 Users

Note! This configuration function is only available for users assigned the admin role!



To assign roles and manage user accounts open the Users form in the Administration section of the main menu. The first frame of this configuration form contains an overview of available users. The table below describes the meaning of the buttons in this frame.

To access this page, click **Administration > Users**.

Figure 3.56 Administration > Users

Item	Description
Lock	Locks the user account. This user is not allowed to log in to the device, neither web interface nor SSH.
Change Password	Allows you to change the password for the corresponding user.
Delete	Deletes the corresponding user account.

Warning! If you lock every account with the permission role Admin, you can not unlock these accounts. This also means that the Users dialog is unavailable for every user, because every admin account is locked and the users do not have sufficient permissions.



The second block contains configuration form which allows you to add new user. All items are described in the table below.

Item	Description
Role	Specifies the type of user account: <ul style="list-style-type: none">■ User: User with basic permissions.■ Admin: User with full permissions.
Username	Specifies the name of the user allowed to log in the device.
Password	Specifies the password for the corresponding user.
Confirm Password	Confirms the password you specified above.

Note! Ordinary users are not able to access device via Telnet, SSH or SFTP. Read only FTP access is allowed for these users.



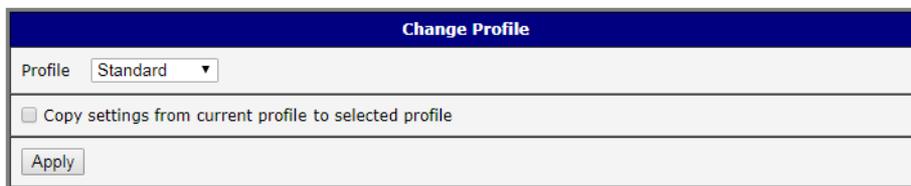
3.6.2 Change Profile

In addition to the standard profile, up to three alternate device configurations or profiles can be stored in device's non-volatile memory. You can save the current configuration to a device profile through the Change Profile menu item. Select the alternate profile to store the settings to and ensure that the Copy settings from current profile to selected profile box is checked. The current settings will be stored in the alternate profile after the **Apply** button is pressed. Any changes will take effect after restarting device through the Reboot menu in the web administrator or using an SMS message.

To access this page, click **Administration > Change Profile**.

Example: Using Profiles

Profiles can be used to switch between different modes of operation of the device such as PPP connection, VPN tunnels, etc. It is then possible to switch between these settings using the front panel binary input, an SMS message, or Web interface of the device.



The screenshot shows a web form titled "Change Profile". It features a dropdown menu for "Profile" currently set to "Standard". Below the dropdown is a checkbox labeled "Copy settings from current profile to selected profile", which is currently unchecked. At the bottom of the form is an "Apply" button.

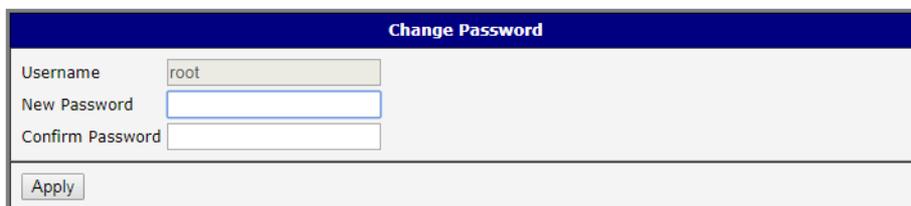
Figure 3.57 Administration > Change Profile

3.6.3 Change Password

Use the Change Password configuration form in the Administration section of the main menu for changing your password used to log on the device. Enter the new password in the New Password field, confirm the password using the Confirm Password field, and press the **Apply** button.

To access this page, click **Administration > Change Password**.

Warning! *The default password of the device is root for the root user. To maintain the security of your network change the default password. You can not enable remote access to the device for example, in NAT, until you change the password.*



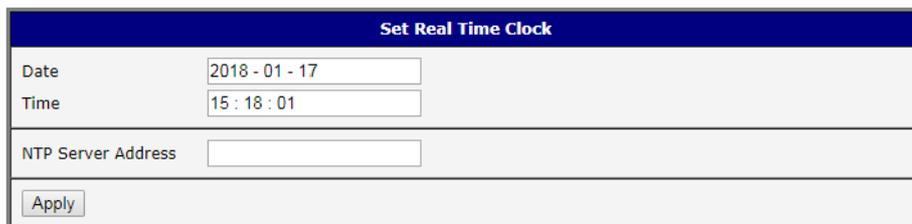
The screenshot shows a web form titled "Change Password". It has three input fields: "Username" with the value "root", "New Password", and "Confirm Password". An "Apply" button is located at the bottom of the form.

Figure 3.58 Administration > Change Password

3.6.4 Set Real Time Clock

You can set the internal clock directly using the Set Real Time Clock dialog in the Administration section of in the main menu. You can set the Date and Time manually. When entering the values manually use the format yyyy-mm-dd as seen in the figure below. You can also adjust the clock using the specified NTP server. IPv4, IPv6 address or domain name is supported. After you enter the appropriate values, click the **Apply** button.

To access this page, click **Administration > Set Real Time Clock**.



The screenshot shows a dialog box titled "Set Real Time Clock". It contains three input fields: "Date" with the value "2018 - 01 - 17", "Time" with the value "15 : 18 : 01", and "NTP Server Address" which is empty. Below the input fields is an "Apply" button.

Figure 3.59 Administration > Set Real Time Clock

3.6.5 Backup Configuration

You can save the configuration of the device using the Backup Configuration function. If you click on Backup Configuration in the Administration section of the main menu, then the device allows you to select a directory in which the device saves the configuration file.

3.6.6 Restore Configuration

You can restore a configuration of the device using the Restore Configuration form. To navigate to the directory containing the configuration file (.cfg) you wish to load on the device, use the **Browse** button.

To access this page, click **Administration > Restore Configuration**.



The screenshot shows a dialog box titled "Restore Configuration". It contains a "Configuration File" input field with a "Browse..." button next to it. Below the input field is an "Apply" button.

Figure 3.60 Administration > Restore Configuration

3.6.7 Update Firmware

Select the Update Firmware menu item to view the current device firmware version and load new firmware into the device. There is current firmware version and firmware filename written out. When loading the new firmware, it has to have this name. To load new firmware, browse to the new firmware file and press the **Update** button to begin the update.

Warning! *Do not turn off the device during the firmware update. The firmware update can take up to five minutes to complete. Always use the filename written out as Firmware Name when updating the firmware.*



To access this page, click **Administration > Update Firmware**.

Update Firmware	
Firmware Version : 6.1.0 (2016-12-15)	
Firmware Name : SPECTRE-v3L-LTE.bin	
New Firmware <input type="text"/>	<input type="button" value="Browse..."/>
<input type="button" value="Update"/>	

Figure 3.61 Administration > Update Firmware

During the firmware update, the device will show the following messages. The progress is shown in the form of adding dots ('.').

Firmware Update

**Do not turn off the router during the firmware update.
The firmware update can take up to 5 minutes to complete.**

Uploading firmware to RAM... ok
Checking firmware validity... ok
Backing up configuration... ok
Programming FLASH..... ok

Reboot in progress

Continue [here](#) after reboot.

After the firmware update, the device will automatically reboot.

Note! *Uploading firmware intended for a different device can cause damage to the device.*



Starting with FW 5.1.0, a mechanism to prevent multiple startups of the firmware update is included. Firmware update can cause incompatibility with the user modules. It is recommended to update user modules to the most recent version. Information about user module and firmware compatibility is at the beginning of the user module's Application Note.

3.6.8 Reboot

To reboot the device select the Reboot menu item and then press the **Reboot** button. To access this page, click **Administration > Reboot**.

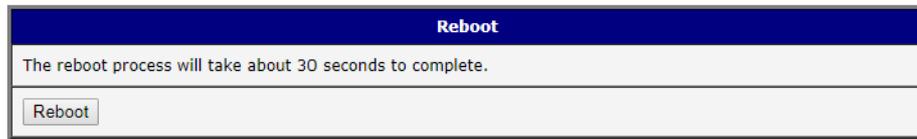


Figure 3.62 Administration > Reboot

Chapter 4

Configuration in
Typical Situations

4.1 Enabling the LoRaWAN and Network Server

1. Login WISE-6610 Series. See “Access Interface” on page 14.
2. Go to **Customization > User Modules**.
3. A list of available devices display. Click on the target **LoRaWAN Gateway**.

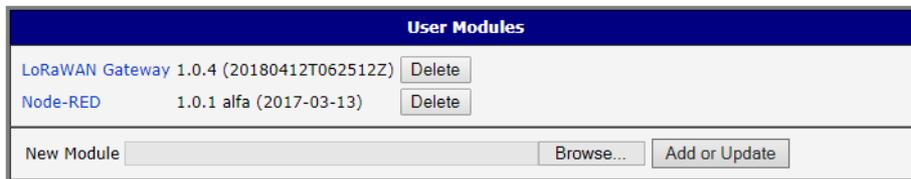


Figure 4.1 Customization > User Modules

4. The Settings menu displays. In **LoRaWAN Radio Enable**, click the drop-down menu to enable LoRaWAN function.
5. Configure the main frequency for radio 0 and radio 1. For radio 1, there are eight channels and one standard channel.

- Note!**
1. *The offset setting for the eight channels must be +/-500KHz.*
 2. *Use Quick Setup to define the main frequency for receiving the data from the LoRaWAN node.*

3. In **LoRaWAN Gateway Identifier**, copy the gateway ID and set on LoRaWAN network server.

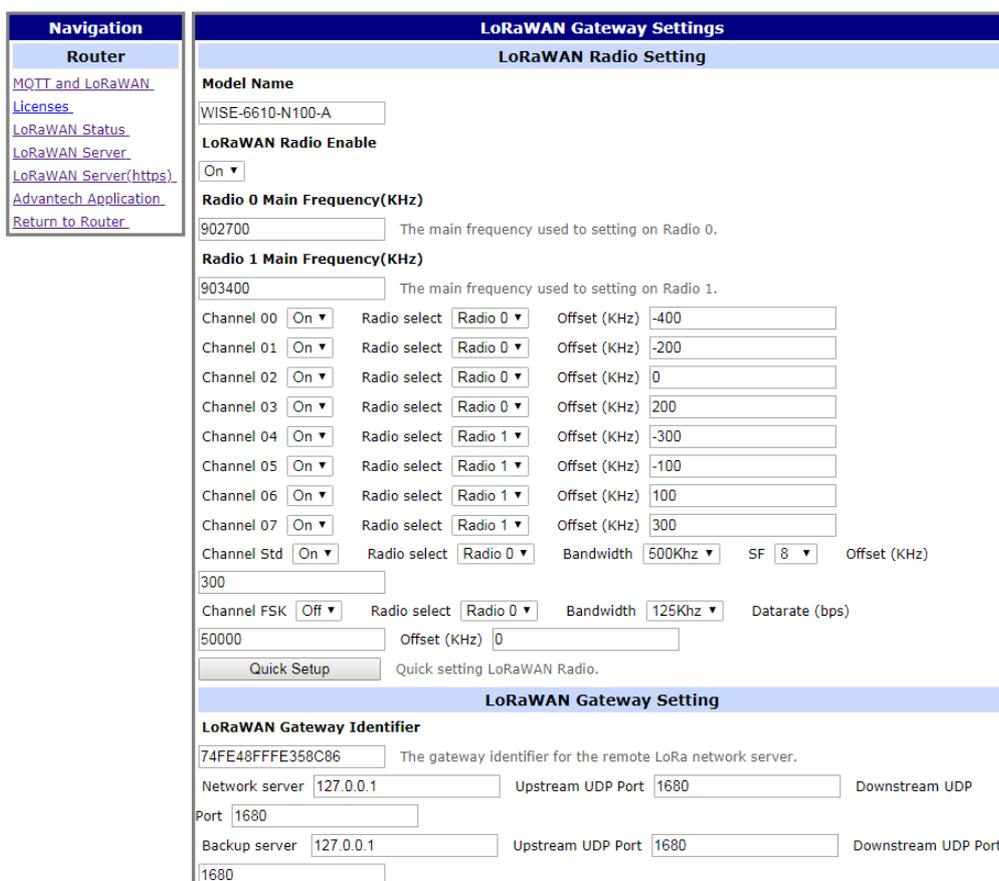


Figure 4.2 LoRaWAN Gateway > MQTT and LoRaWAN

4. In **LoRaWAN Network Server Setting**, click the drop-down menu to enable LoRaWAN network server.
5. In **MQTT Broker Enable**, click the drop-down menu to enable MQTT broker.

LoRaWAN Network Server Setting

LoRaWAN Network Server Enable
 Enable LoRaWAN network server.

LoRaWAN Server Listen Port
 The LoRa network server listen port number (1 - 65535).

LoRaWAN Network Server HTTP Port
 The LoRaWAN network server HTTP port number (1 - 65535).

LoRaWAN Network Server HTTPS Port
 The LoRaWAN network server HTTPS port number (1 - 65535).

LoRaWAN Web Username
 The user name for the LoRaWAN network server.

LoRaWAN Web Password
 The password for the LoRaWAN network server.

LoRaWAN Network Server HTTPS Enable
 Enable HTTPS service.

Upload LoRaWAN network server database.
 Download LoRaWAN network server database.
 Reset LoRaWAN network server database.

MQTT Broker

MQTT Broker Enable
 Enable the local MQTT broker.

MQTT Broker Port
 The local MQTT broker TCP port number (1 - 65535).

MQTT Bridge

MQTT Bridge Enable
 Enable bridging to a remote MQTT broker.

Figure 4.3 LoRaWAN Gateway > MQTT and LoRaWAN

6. Click **Save** to save the configuration.

- Click **LoRaWAN Server** and enter the default user name and password (root/root) to log into the LoRaWAN Network Server page.

Note! The LoRaWAN Network Server does not support IE or EDGE browser.



Figure 4.4 LoRaWAN Gateway > LoRaWAN Server

- Click **Infrastructure > Gateways** to enter the Gateways List page.
- Click **Create** to add a new gateway.

Figure 4.5 LoRaWAN Server > Infrastructure > Gateways

- In the Create new gateway page, configure the new gateway settings. Input the MAC which is the LoRaWAN gateway ID shows on the LoRaWAN setting Page.

Figure 4.6 LoRaWAN Server > Infrastructure > Gateways > Create

Item	Description
MAC	Enter the LoRaWAN gateway ID shown on MQTT and LoRaWAN menu.
Group	Enter the opaque string with application-specific settings.
TX Chain	Enter a value to identify the radio chain used for downlinks (default: 0). It shall correspond to a <code>radio_x</code> (e.g. <code>radio_0</code>) with <code>tx_enable: true</code> in gateway's <code>global_conf.json</code> .
Antenna Gain (dBi)	Enter a value to ensure the TX Power + Antenna Gain is below the maximal allowed Equivalent Isotropic Radiated Power (EIRP) for the given Network.
Description	Enter the description for the gateway.
Submit	Click Submit to save the values and update the screen.

- Click **Infrastructure > Networks** to enter the Networks List page.
By default, the WISE-6610 Series pre-configures the network to support EU868, AU915, AS923 and US902.

Name	NetID	SubID	Region
EU868	000000		EU868
AU915	000000		AU915
AS923	000000		AS923
US902	000000		US902

Figure 4.7 LoRaWAN Server > Infrastructure > Networks

- Click **Create** to create your own network frequency.

The screenshot shows the 'Create new network' form in the 'General' tab. The left sidebar contains navigation options: Infrastructure, Gateways, Networks, Multicast Channels, Events, Devices, Backends, Received Frames, and Transmission Frames. The main form area has tabs for 'General', 'ADR', and 'Channels'. The 'General' tab is active, showing various input fields for network configuration. A 'Submit' button is located at the bottom of the form.

Figure 4.8 LoRaWAN Server > Infrastructure > Network > Create > General

Item	Description
Name	Enter the name of the network.
NetID	Enter the NetID of the network. Use 000000 or 000001 for private networks.
SubID	Enter the SubID of the network in the format of HexValue:Length which specifies the fixed bits in the DevAddr of the active node. (optional)
Region	Enter a value to determine the regional characteristics of LoRaWAN.
Coding Rate	Enter a value to define the coding rate. It is regularly set on 4/5.
RX1 Join Delay (s)	Enter a value to define the JOIN_ACCEPT_DELAY1.
RX2 Join Delay (s)	Enter a value to define the JOIN_ACCEPT_DELAY2.
RX1 Delay (s)	Enter a value to define the RECEIVE_DELAY1.
RX2 Delay (s)	Enter a value to define the RECEIVE_DELAY2.
Gateway Power (dBm)	Enter a value to define the default transmission power for downlinks.
Submit	Click Submit to save the values and update the screen.

In the General tab, follow the table below when configuring a new network:

Parameter	EU868	US902	CN779	EU433	AU915	CN580	AS923	KR920	IN865	RU864
Coding Rate	4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5	4/5
RX1 Join Delay(s)	5	5	5	5	5	5	5	5	5	5

Parameter	EU868	US902	CN779	EU433	AU915	CN580	AS923	KR920	IN865	RU864
RX2 Join Delay(s)	6	6	6	6	6	6	6	6	6	6
RX1 Delays	1	1	1	1	1	1	1	1	1	1
RX2 Delays	2	2	2	2	2	2	2	2	2	2
Gateway Power	16	26	12	12	30	19	16	23	30	16
Max EIRP (dBm)	16	30	12.15	12.15	30	19.15	16	14	30	16
Max Power	Max									
Min Power	Max - 14 dB	Max - 20 dB	Max - 10 dB	Max - 10 dB	Max - 20 dB	Max - 14 dB	Max - 14 dB	Max - 14 dB	Max - 20 dB	Max - 14 dB
Max Data Rate	SF7 125 kHz	SF8 500 kHz	SF7 125 kHz	SF7 125 kHz	SF8 500 kHz	SF7 125 kHz				
Initial RX1 DR Offset	0	0	0	0	0	0	0	0	0	0
Initial RX2 DR	SF12 125 kHz	SF12 500 kHz	SF12 125 kHz	SF12 125 kHz	SF12 500 kHz	SF12 125 kHz	SF10 125 kHz	SF12 125 kHz	SF10 125 kHz	SF10 125 kHz
Initial RX2 Freq (MHz)	869.525	923.3	786	434.665	923.3	505.3	923.2	921.9	866.550	869.1
Initial Channels	0-2	0-71	0-2	0-2	0-71	0-95	0-x*	0-2	0-2	0-1

13. Click the **ADR** tab to configure the ADR settings for a specified parameter.

Figure 4.9 LoRaWAN Server > Infrastructure > Network > Create > ADR

Item	Description
Max EIRP (dBm)	Enter a value to specify the EIRP used in your region.
Max Power	Enter a value to define the first TX Power item.
Min Power	Enter a value to define the last TX Power item.

Item	Description
Max Data Rate	Enter a value to define the highest DR (lowest SF) supported by the channels in this network. Additional channels may need to be given a different value. <i>Note: The Max Data Rate is not always the last item (lowest SF) in the TX data rate table. Not all channels (frequencies) are allowed to use all data rates. For example, in EU868, the default channels use SF12/125 to SF7/125 only. The SF7/250 is allowed for the 867.3 MHz channel only and FSK for 867.7 MHz only.</i>
Initial RX1 DR Offset	Enter a value to define the offset between the uplink and downlink data rates used to communicate with the end-device on the first reception slot (RX1).
Initial RX2 DR	Enter a value to define the data rate for the second reception slot (RX2).
Initial RX2 Freq (MHz)	Enter a value to define the default frequency in the RX2 receive window.
Submit	Click Submit to save the values and update the screen.

14. Click the **Channel** tab to configure the channel settings following the frequency rule.

Figure 4.10 LoRaWAN Server > Infrastructure > Network > Create > Channel

Item	Description
Initial Channels	Enter a range of values to define the initial channels including a comma-separated list of intervals, e.g. 0-2 for EU and 0-71 for US.
Channels	Click Add new channels to define a list of additional channels sent to the device during Join (CFList). <ul style="list-style-type: none"> ■ Frequency (MHz): Enter a value to define the channel frequency. ■ Min Data Rate: Enter a value to define the lowest data rate allowed in this channel. Enter 0 if it's not specified. ■ Max Data Rate: Enter a value to define the highest data rate allowed in this channel. Enter the global value of the ADR tab if it's not specified.
Submit	Click Submit to save the values and update the screen.

- Click **Backends > Handlers** to enter the Handlers List page.
The WISE-6610 Series handler is created by default. The LoRaWAN data comes with the item with the Field in the handler settings.

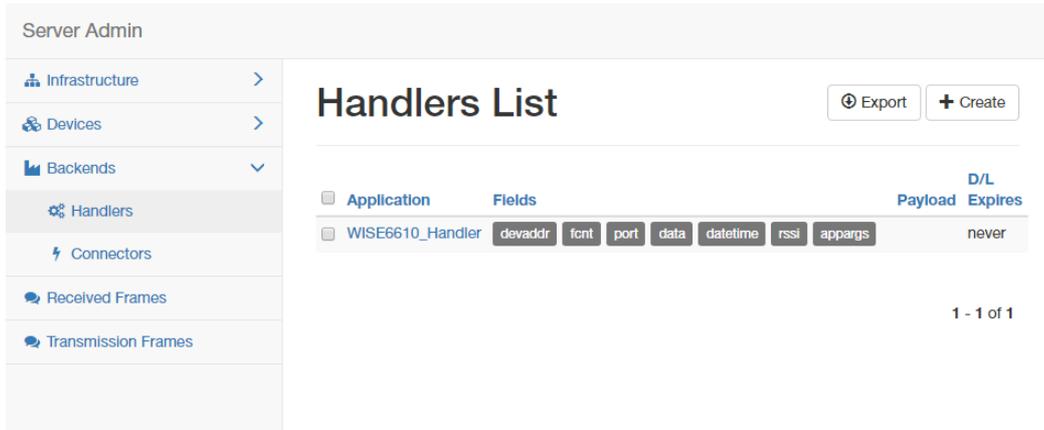


Figure 4.11 LoRaWAN Server > Backends > Handlers

Field	Type	Definition
app	String	Application (Handler) name
devaddr	Hex String	DevAddr of the active node
deveui	Hex String	DevEUI of the device
appargs	Any	Application arguments for the node
battery	Integer	Most recent battery level reported by the device
fcnt	Integer	Received frame sequence number
port	Integer	LoRaWAN port number
data	Hex String	Raw application payload encoded as a hexadecimal string
datetime	ISO 8601	Timestamp using the server clock
freq	Number	RX central frequency in MHz (unsigned float/ Hz precision)
datr	String	LoRa data rate identifier (e.g. SF12BW500)
codr	String	LoRa ECC coding rate identifier (default: 4/5)
best_gw	Object	Gateway with the strongest reception
mac	Hex String	MAC address of the gateway with the strongest reception
lsnr	Number	LoRa uplink SNR ratio in dB (signed float/ 0.1 dB precision) (same as rxq.lsnr for best_gw)
rssi	Number	RSSI in dBm (signed integer/ 1 dB precision) (same as rxq.rssi for best_gw)
all_gw	Object	List of all gateways that received the frame

- Click **Create** to add a new handler rule. This function allows you to choose the desired uplink fields and supports the parse script option that helps you parse the raw data received from the sensor node as shown in Figure 4.13.

Figure 4.12 LoRaWAN Server > Backends > Handlers > Create

Item	Description
Application	Enter the name of the handler.
Uplink Fields	Enter the filter values to be forwarded to the backend connector.
Payload	Enter the filter values as the format for automatic decoding.
Parse Uplink	Enter the string to extract additional data fields from the uplink frame. See Figure 4.13 for references.
Parse Event	Enter the string to be forwarded to the backend connector.
Build Downlink	Enter the string to create a downlink frame based on backend data fields.

Item	Description
D/L Expires	<p>Click the drop-down menu to define when the downlinks may be dropped.</p> <ul style="list-style-type: none"> ■ Never: <ul style="list-style-type: none"> – All class A downlinks for a device will be queued and eventually delivered. – All confirmed downlinks will be retransmitted until acknowledged even when a new downlink is sent. ■ When Superseded: <ul style="list-style-type: none"> – Only the most recent class A downlinks will be scheduled for delivery. Superseded downlinks will be dropped. – Unacknowledged downlinks will be dropped when a new downlink (either class A or C) is sent.
Submit	Click Submit to save the values and update the screen.

```

fun(Fields,Port, <<DEV, Temp:16, Hum:16, Sensor:16>>) ->
if
  DEV==1 ->
    Fields#(device => co2, temp => Temp/100, hum => Hum/100, sensor => Sensor);
  DEV==2 ->
    Fields#(device => co, temp => Temp/100, hum => Hum/100, sensor => Sensor);
  DEV==3 ->
    Fields#(device => pm25, temp => Temp/100, hum => Hum/100, sensor => Sensor);
true ->
false
end
end.

```

Figure 4.13 Parse Uplink Sample

- Click **Backends > Connectors** to enter the Connectors List page.
 The connector settings define the data flow which is the rule for processing the LoRaWAN data. For example, data comes with the handler rule should be saved to the MQTT broker or websocket.
 The broker and websocket on the WISE-6610 Series is enabled by default. The uplink from the sensor node comes with the MQTT topic is `uplink/{devaddr}` and the downlink topic is `out/{devaddr}`.

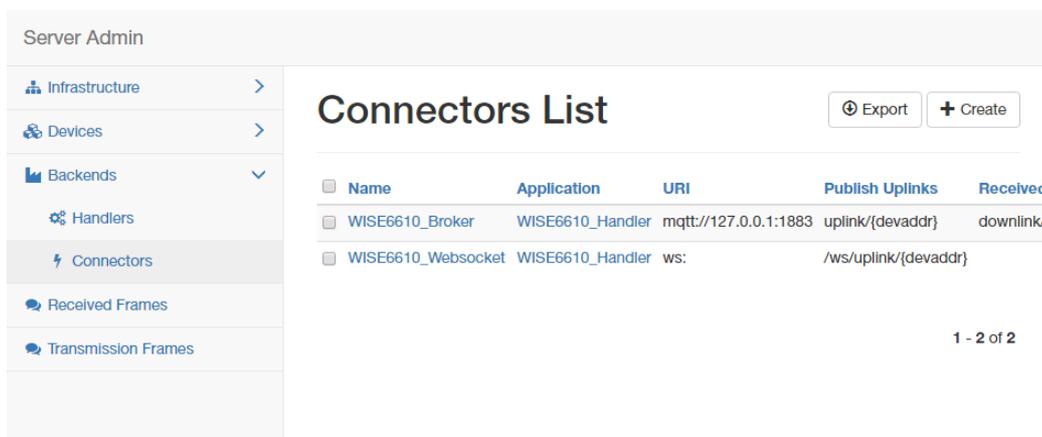


Figure 4.14 LoRaWAN Server > Backends > Connectors

18. Click **Create** to create your own connector rule.

Figure 4.15 LoRaWAN Server > Backends > Connectors > Create

Item	Description
Connector Name	Enter the name of the connector.
Application	Click the drop-down menu to select the application to reference a specific backend handler.
Format	Click the drop-down menu to select the format. <ul style="list-style-type: none"> ■ JSON: Encode data fields as Json structures such as { "Name-One" : ValueOne, "NameTwo" : ValueTwo }. ■ Raw Data: Send only the binary content of the data field without ant port numbers nor flags. ■ Web Form: Encode fields in query strings such as Name-One=ValueOne&NameTwo=ValueTwo.
URI	Enter a string to define the target host which can be <code>mqtt://</code> for MQTT or <code>mqttts://</code> for MQTT/SSL.
Publish Uplinks	Enter a string to define a server pattern for constructing the publication topic for uplink messages, including the actual DevEUI, DevAddr or other data fields in the message topic. e.g. <code>out/{devaddr}</code> .
Publish Events	Enter a string to define a server pattern for constructing the publication topic for event messages.
Subscribe	Enter a string to define a topic for subscription. It may include broker specific wildcards, e.g. <code>in/#</code> . The MQTT broker will then send messages with a matching topic to this connector.
Received Topic	Enter a string to define the template for parsing the topic of received messages, e.g. <code>in/{devaddr}</code> . This can be used to obtain a DevEUI, DevAddr or a device group that receives a given downlink.
Enabled	Check to allow a temporarily disable on an existing connector.

Item	Description
Failed	Click the drop-down menu to select the flag indicates the failure items. <ul style="list-style-type: none"> ■ badarg: Some connector parameters are bad. ■ network: The destination server cannot be reached. ■ topic: The target broker configuration is wrong.
Submit	Click Submit to save the values and update the screen.

19. Click **Devices > Profiles** to enter the Profiles List page.
Define the profile rule for the LoRa node and assign the handler rule to each profile. The default profiles are listed in the figure below:

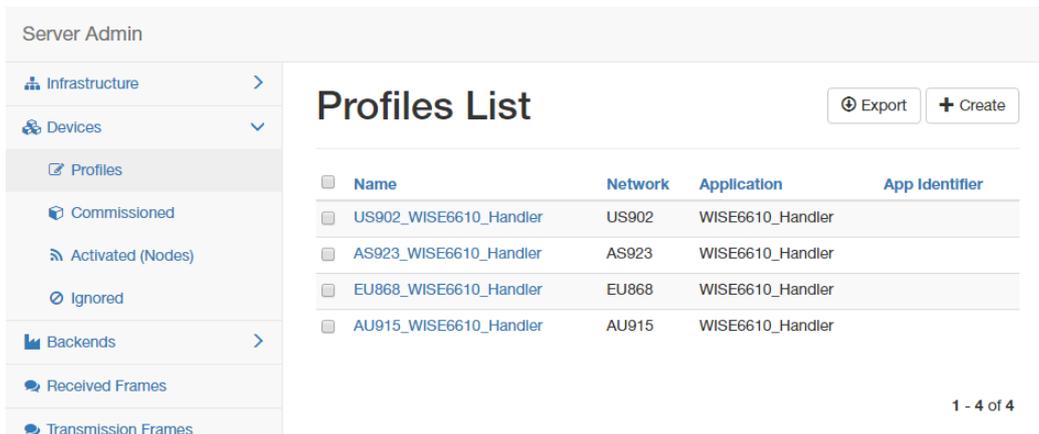


Figure 4.16 LoRaWAN Server > Devices > Profiles

20. Click **Create** to add a new profile.

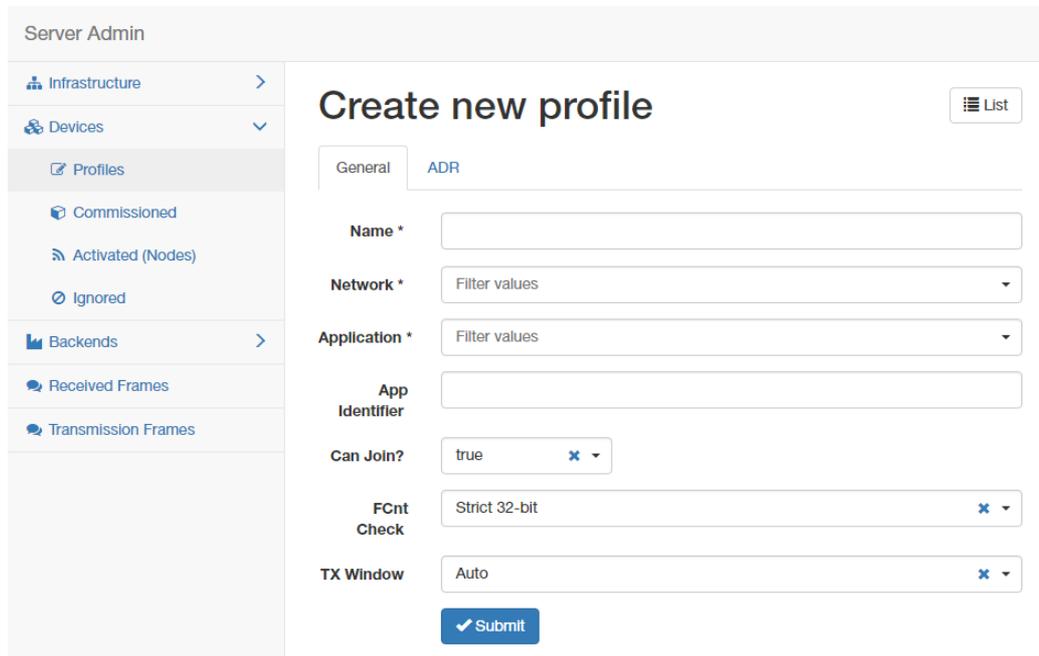


Figure 4.17 LoRaWAN Server > Devices > Profiles > Create > General

Item	Description
Name	Enter the name of the profile.
Network	Click the drop-down menu to select the network.
Application	Click the drop-down menu to select the application in use.
App Identifier	Enter the name of the application ID.

Item	Description
Can Join?	Click the drop-down menu to select a flag to prevent the device from joining.
FCnt Check	Click the drop-down menu to select the FCnt check for the device. <ul style="list-style-type: none"> Strict 16-bit (default) or Strict 32-bit: Indicates a standard compliant counter. Reset on zero: Behaves as a "less strict 16-bit" which allows personalised (ABP) devices to reset the counter. This weakens the device security a bit as more reply attacks are possible. Disabled: Disables the check for faulty devices and destroys the device security.
TX Window	Click the drop-down menu to select the TX window for downlinks to the device. <ul style="list-style-type: none"> Auto: Choose the earliest feasible option: RX1 or RX2. RX1: Always use the first RX window. RX2: Always use the second RX window.
Submit	Click Submit to save the values and update the screen.

21. Click the **ADR** tab to configure further settings for the node.

The screenshot shows the 'Create new profile' page in the LoRaWAN Server interface, specifically the 'ADR' tab. The left sidebar contains navigation options like Infrastructure, Devices, Profiles, Commissioned, Activated (Nodes), Ignored, Backends, Received Frames, and Transmission Frames. The main content area has the following fields:

- ADR Mode:** A dropdown menu currently set to 'Disabled'.
- Set Power:** A dropdown menu with 'Filter values' selected.
- Set Data Rate:** A dropdown menu with 'Filter values' selected.
- Max Data Rate:** A dropdown menu with 'Filter values' selected.
- Set Channels:** A text input field with the placeholder 'e.g. 0-2'.
- Set RX1 DR Offset:** A text input field.
- Set RX2 DR:** A dropdown menu with 'Filter values' selected.
- Set RX2 Freq (MHz):** A text input field.
- Request:** A dropdown menu currently set to 'true'.

Figure 4.18 LoRaWAN Server > Devices > Profiles > Create > ADR

Item	Description
ADR Mode	Click the drop-down menu to determine the adaptive data rate (ADR) mechanism for the device: Disabled, Auto-Adjust or Maintain.
Set Power	Enter a value to define the power (in dBm).
Set Data Rate	Enter a value to define the data rate.
Max Data Rate	Enter a value to define the maximal data rate supported by the devices.
Set Channels	Enter a value to define the set of channels. The channels are given as a comma-separated list of interfaces, e.g. 0-2 for EU, 0-71 for the whole US band, or 0-7, 64 for the first US sub-band.

Item	Description
Set RX1 DR Offset	Enter a value to define the offset between the uplink and the RX1 slot downlink data rates.
Set RX2 DR	Enter a value to define the data rate for the second reception slot (RX2).
Set RX2 Freq (MHz)	Enter a value to define the default frequency in the RX2 receive window.
Request Status?	Click the drop-down menu to select the flag used to disable the status requests for simple devices that do not support the function (default: true).
Submit	Click Submit to save the values and update the screen.

22. Click **Devices > Activated (Nodes)** to enter the Nodes List page.

Activated (Nodes) is the setting for ABP type nodes and **Commissioned** is for OTAA type nodes. The LRPv2 nodes only supports ABP so the info can only be created in the ABP options.

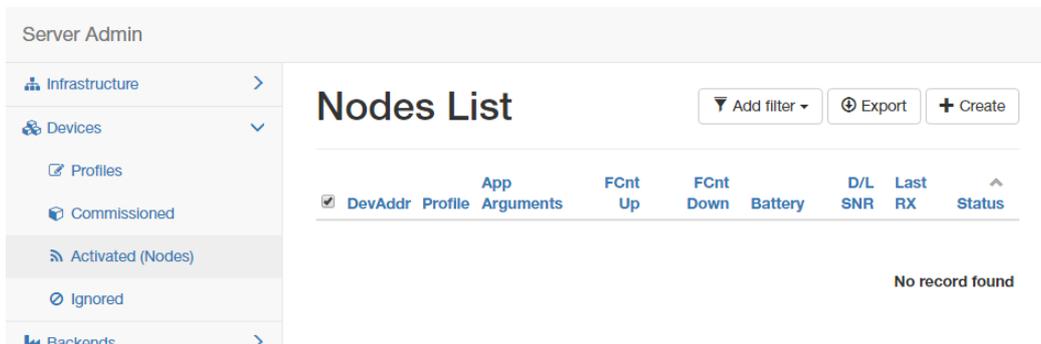


Figure 4.19 LoRaWAN Server > Devices > Activated (Nodes)

23. Click **Create** to add a new LoRaWAN node (ABP) along with its Devaddr, APPkey and NwkKey.

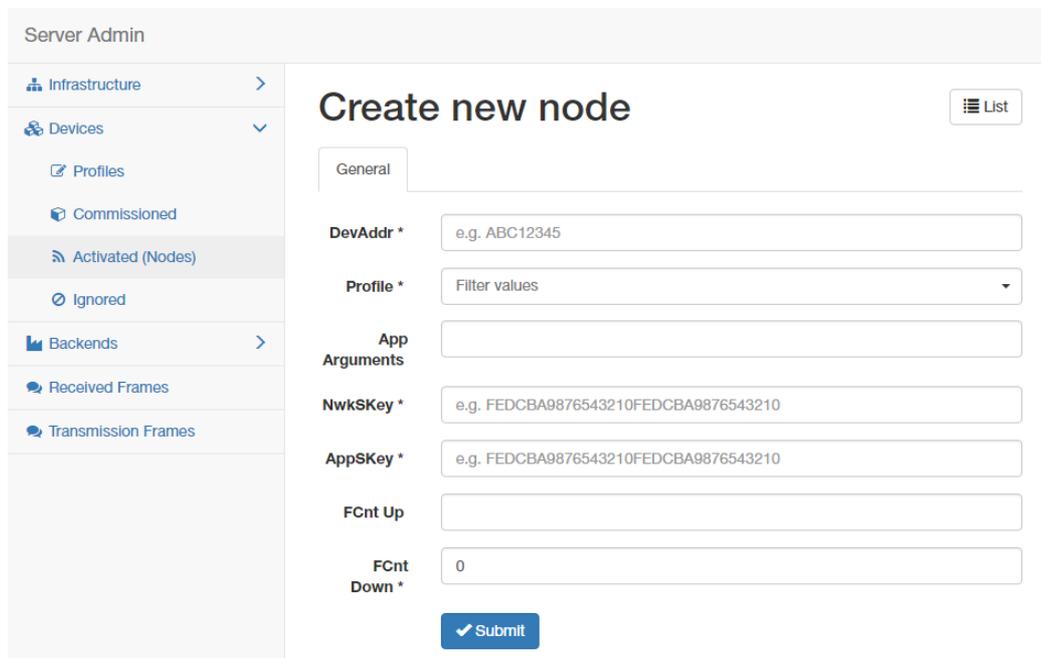


Figure 4.20 LoRaWAN Server > Devices > Activated (Nodes) > Create

Item	Description
DevAddr	Enter the name of the node.
Profile	Click the drop-down menu to select the profile for the node.

Item	Description
App Arguments	Enter the opaque string with application-specific settings.
NwkSKey	Enter the NwkSKey for the node.
AppSKey	Enter the AppSKey for the node.
FCnt Up	Enter a value to define the frame counter.
FCnt Down	Enter a value to define the frame counter.
Submit	Click Submit to save the values and update the screen.

24. Click **Devices** > **Commissioned** to enter the Devices List page.

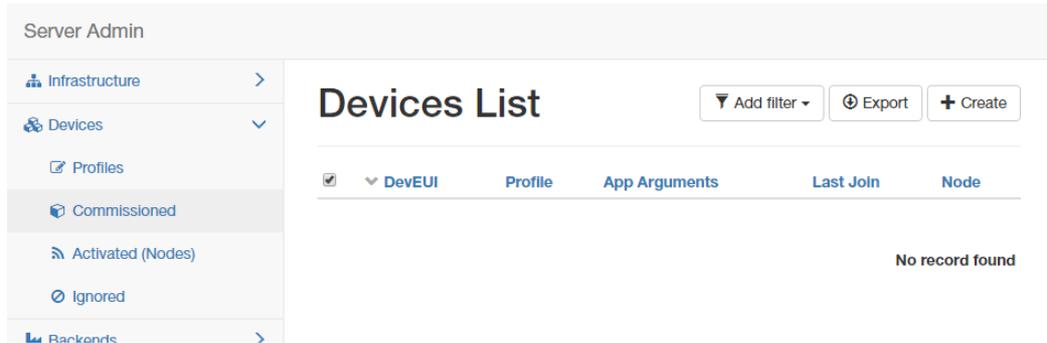


Figure 4.21 LoRaWAN Server > Devices > Commissioned

25. Click **Create** to add a new LoRaWAN node (OTAA).

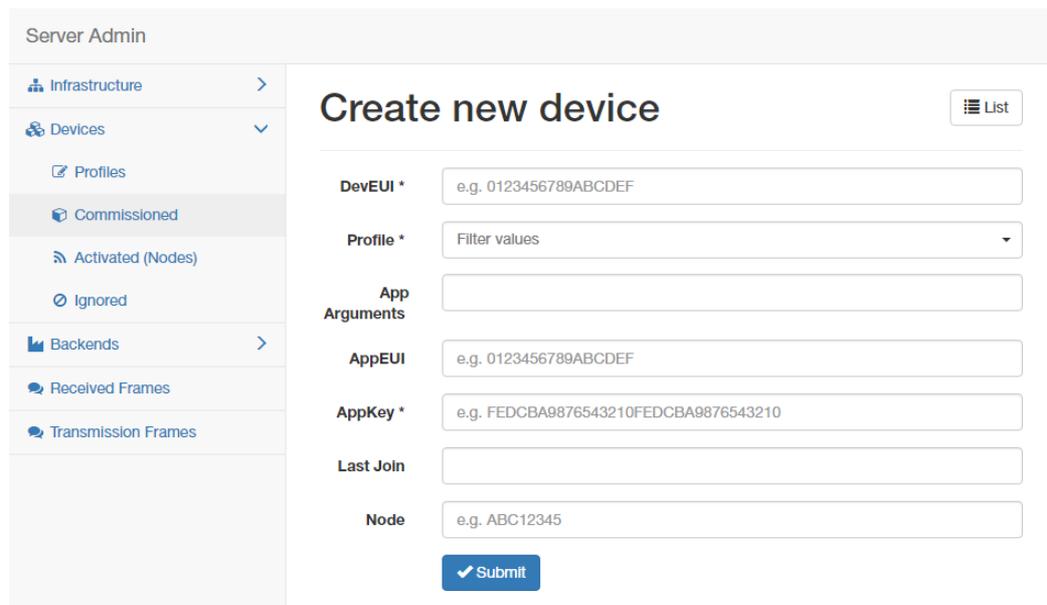


Figure 4.22 LoRaWAN Server > Devices > Commissioned > Create

Item	Description
DevEUI	Enter the DevEUI for the device.
Profile	Click the drop-down menu to select the profile for the device.
App Arguments	Enter the opaque string with application-specific settings.
AppEUI	Enter the AppEUI for the device.
AppKey	Enter the AppKey for the device.
Last Join	Enter a value to define the timestamp of the last successful Join request.
Node	Enter the corresponding node.
Submit	Click Submit to save the values and update the screen.

- After the LoRaWAN network, gateway, node, handler and connector functions are enabled. Click **Received Frames** to enter the Received Frames page and check the received messages.

Received Frames ▼ Add filter - 📄 Export

Received	Application	DevAddr	MAC	UIL_RSSI	UIL_SNR	FCnt	Confirm	Port	Data
2018-03-02T11:02:41Z	WISE6610_Handler	00220009	000A14FFFEDEFDA1	-37	7	4	✓	15	0109010E5002E8
2018-03-02T13:55:00Z	WISE6610_Handler	00220009	000A14FFFEDEFDA1	-47	14	2	✓	15	0109010E5002E8
2018-03-02T13:54:34Z	WISE6610_Handler	00220009	000A14FFFEDEFDA1	-41	10	1	✓	15	0109010E5002E8
2018-02-27T14:36:55Z	WISE6610_Handler	0A6A3668	000A14FFFEDEFDA1	-77	7	9	✗	2	030A4414610009
2018-02-27T14:34:25Z	WISE6610_Handler	0A6A3668	000A14FFFEDEFDA1	-77	9.8	8	✗	2	030A47140C000A
2018-02-27T14:31:55Z	WISE6610_Handler	0A6A3668	000A14FFFEDEFDA1	-72	7.8	7	✗	2	030A481414000B
2018-02-27T14:29:25Z	WISE6610_Handler	0A6A3668	000A14FFFEDEFDA1	-81	9.2	6	✗	2	030A4E142A000A
2018-02-27T14:26:55Z	WISE6610_Handler	0A6A3668	000A14FFFEDEFDA1	-74	6.5	5	✗	2	030A55140000C
2018-02-27T14:24:25Z	WISE6610_Handler	0A6A3668	000A14FFFEDEFDA1	-79	9.2	4	✗	2	030A581406000A
2018-02-27T14:21:55Z	WISE6610_Handler	0A6A3668	000A14FFFEDEFDA1	-77	9	3	✗	2	030A531429000C
2018-02-27T14:19:26Z	WISE6610_Handler	0A6A3668	000A14FFFEDEFDA1	-78	9.8	2	✗	2	030A4F13E9000B
2018-02-27T14:16:56Z	WISE6610_Handler	0A6A3668	000A14FFFEDEFDA1	-76	9.5	1	✗	2	030A35148E000F
2018-02-27T14:15:22Z	WISE6610_Handler	0A6A3668	000A14FFFEDEFDA1	-76	10.2	1	✗	2	030A12148E000B
2018-02-27T14:12:48Z	WISE6610_Handler	0A6A3668	000A14FFFEDEFDA1	-63	8.5	4	✗	2	0309C415510006
2018-02-27T14:09:49Z	WISE6610_Handler	0A6A3668	000A14FFFEDEFDA1	-60	10.5	3	✗	2	0309B615AB000A
2018-02-27T14:06:49Z	WISE6610_Handler	0A6A3668	000A14FFFEDEFDA1	-63	8.5	2	✗	2	03099C160A000B
2018-02-27T10:43:03Z	WISE6610_Handler	067D3663	000A14FFFEDEFDA1	-74	6.5	7	✗	2	01093016820477
2018-02-27T10:37:10Z	WISE6610_Handler	067D3663	000A14FFFEDEFDA1	-109	8	5	✗	2	010937169B04F0
2018-02-27T10:34:14Z	WISE6610_Handler	067D3663	000A14FFFEDEFDA1	-115	5.8	4	✗	2	010929168E0533

Figure 4.23 LoRaWAN Server > Received Frames

- Since the MQTT broker on the WISE-6610 series is enabled by default, you can subscribe the MQTT "#" on 192.168.1.1 to receive the LoRaWAN node messages.

```

david@david:~/VirtualBox/~/WORK_PATH/LoRa/LoRaWAN_USER_MODULE/LoRa_gateway_1_0_0/usermodule-adv-lora$ mosquitto_sub -t '#' -h 192.168.1.1 -v
out/FE050872 [data:{"030A5015310004", "datetime": "2017-11-28T11:33:12Z", "devaddr": "FE050872", "fcnt": 10, "gateway": [{"mac": "000A14FFFEDEFDA1"}, {"group": "Local", "port": 15, "rxq": {"codr": "4/5", "datr": "SF10BW125", "freq": 923.8, "lsnr": 12.2, "rssi": -35, "time": "2017-11-28T11:33:12.106972Z", "tmst": 2190760940}}, {"shall_reply": true}]}]
out/FE050872 [data:{"030A6615310003", "datetime": "2017-11-28T11:34:10Z", "devaddr": "FE050872", "fcnt": 11, "gateway": [{"mac": "000A14FFFEDEFDA1"}, {"group": "Local", "port": 15, "rxq": {"codr": "4/5", "datr": "SF10BW125", "freq": 924.8, "lsnr": 19.2, "rssi": -38, "time": "2017-11-28T11:34:10.343071Z", "tmst": 2248948030}}, {"shall_reply": true}]}]
out/FE050872 [data:{"030A6615310003", "datetime": "2017-11-28T11:35:08Z", "devaddr": "FE050872", "fcnt": 12, "gateway": [{"mac": "000A14FFFEDEFDA1"}, {"group": "Local", "port": 15, "rxq": {"codr": "4/5", "datr": "SF10BW125", "freq": 923.2, "lsnr": 12.2, "rssi": -37, "time": "2017-11-28T11:35:08.540100Z", "tmst": 2307136124}}, {"shall_reply": true}]}]

```

Figure 4.24 MQTT Subscription

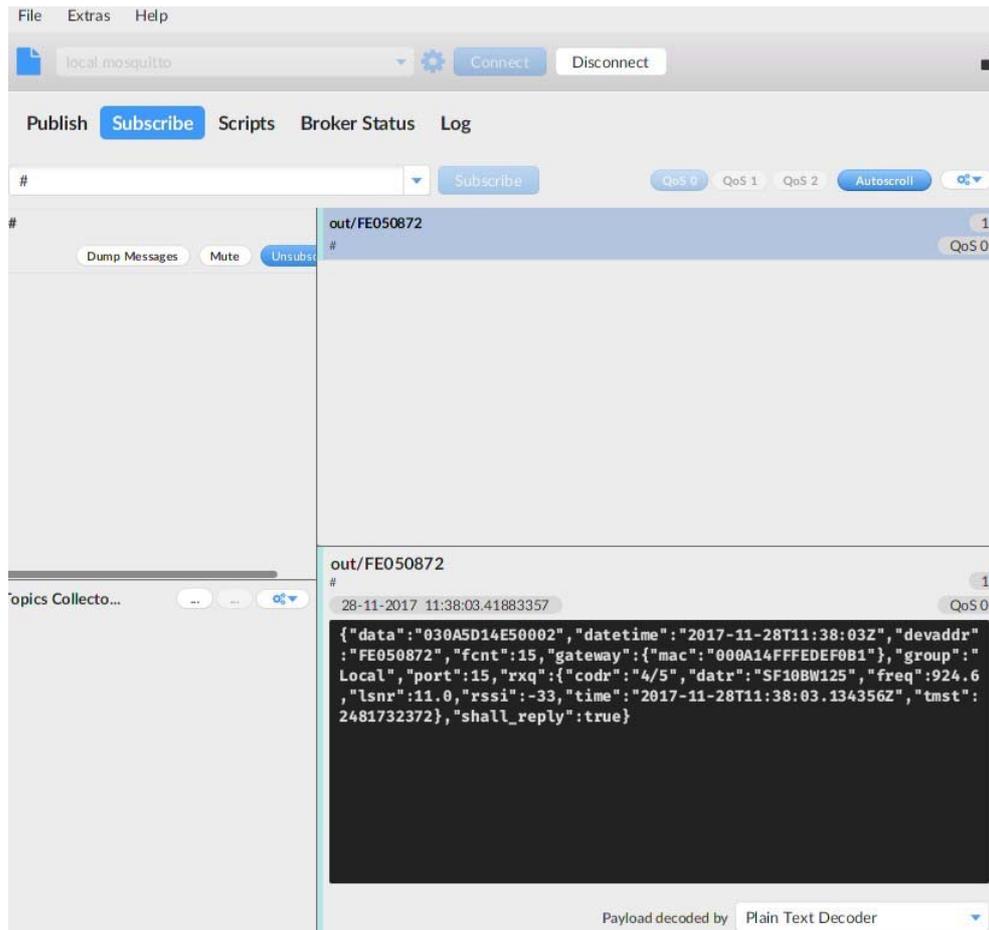


Figure 4.25 MQTT Subscription

28. Click **Infrastructure** > **Events** to enter the Events List page to view the events.

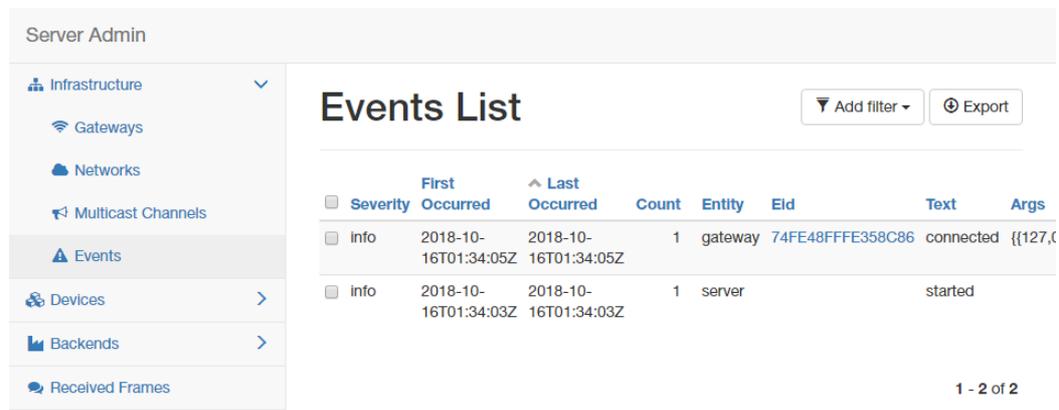


Figure 4.26 LoRaWAN Server > Infrastructure > Events

4.2 Changing the Raw LoRa Data Format

This function parses and shows the raw data from an Advantech LRPv2 LoRa node.

Note! *WISE-6610 series models does not parse data from a non-Advantech LoRa node through the Advantech Application function.*



Note! *All the foregoing settings must be configured before using this function.*



1. To access this page, click **User Modules > LoRaWAN Gateway > Advantech Application**.



Figure 4.27 User Modules > LoRaWAN Gateway > Advantech Application

2. Click **Detail** to list the real data and status detail of the node.

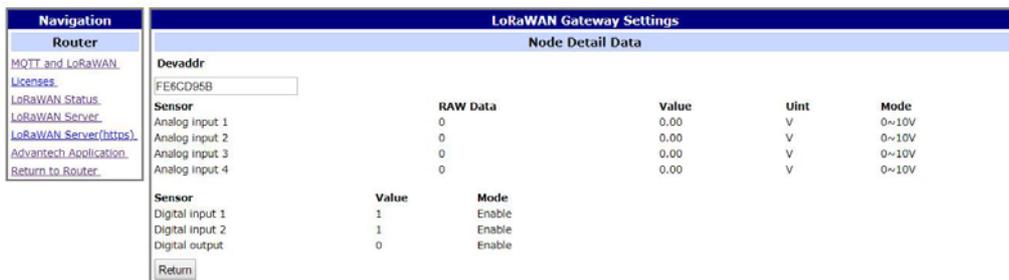


Figure 4.28 Data and Status

- To get the sensor node data, the application server needs to be enabled first. After the application server is enabled, the Advantech application server will parse the data subscribed from the MQTT broker (WISE-6610 with topic uplink/#) as shown in the figure below.

Figure 4.29 User Modules > LoRaWAN Gateway > MQTT and LoRaWAN

- Click **LoRaWAN Server > Devices > Activated (Nodes)** to enter the Nodes List page.

DevAddr	Profile	App Arguments	FCnt Up	FCnt Down	Battery	D/L SNR	Last RX	Status
00001F58	868netvox		1,356	38	169	30	2018-09-20T16:06:37Z	
00001457	868netvox		1,924	46	180	-20	2018-09-20T16:08:06Z	
FE6CD95B	EU868_WISH6610_Handler	Advantech	4	1	254	5	2018-08-31T14:55:31Z	
FE0EBCF6	EU868_WISH6610_Handler	Advantech	858	19	254	27	2018-08-10T03:42:06Z	

Figure 4.30 LoRaWAN Server > Activated (Nodes)

- Edit the LoRa Node and enter **Advantech** in the **App Arguments** field. The Advantech application server will deal with the raw data based on the info and list the real data on the **Advantech Application** page.

Figure 4.31 LoRaWAN Server > Activated (Nodes) > Edit > General

- Not only the data will be shown on the Advantech Application page, if you would like to apply the data to other software applications, you can also subscribe Topic “#” or direct Topic “Advantech/+/data” from the WISE-6610 MQTT server.

The screenshot shows a dialog box titled "Edit mqtt in node". It contains the following fields and controls:

- Server:** A dropdown menu showing "127.0.0.1:1883" with an edit icon to its right.
- Topic:** A text input field containing "Advantech/+/data".
- QoS:** A dropdown menu showing "2".
- Name:** A text input field containing "Name".
- Buttons:** "Cancel" and "Done" buttons are located at the top right of the dialog.

Figure 4.32 Applying Data to Other Software Applications

4.3 Node-RED Setup

- Go to **Customization > User Modules**.
- A list of available devices display. Click on the target **Node-RED**.

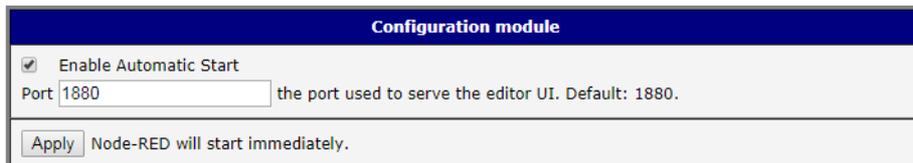
The screenshot shows the "User Modules" interface. It features a table with the following entries:

User Modules	
LoRaWAN Gateway 1.0.4 (20180412T062512Z)	Delete
Node-RED 1.0.1 alfa (2017-03-13)	Delete

Below the table, there is a "New Module" input field, a "Browse..." button, and an "Add or Update" button.

Figure 4.33 Customization > User Modules

- The Settings menu displays. Click **Node-RED** and check the box to enable the Node-RED and enter the port number (default: 1880).



The screenshot shows the "Configuration module" settings for Node-RED. It includes the following elements:

- Enable Automatic Start
- Port: the port used to serve the editor UI. Default: 1880.
- Node-RED will start immediately.

Figure 4.34 Node-RED

- Go to Node-RED page (<http://192.168.1.1:1880/>) and log in using the default user name and password (root/root) for further configuration.

The screenshot shows the Node-RED login page. It contains the Node-RED logo and a login form with the following fields:

- Username:
- Password:
-

Figure 4.35 Node-RED

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