8 Internal web page

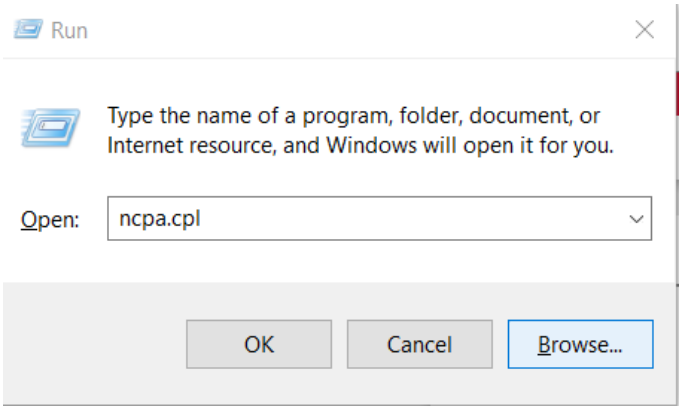
WCC Lite is configured via an internal web browser, so no additional software is required.

8.1 Initial Setup

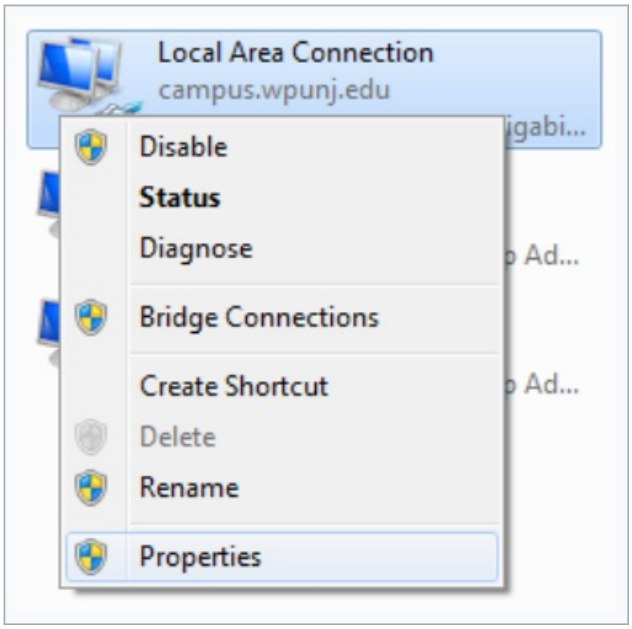
WCC Lite comes with a static network configuration with its IP set to 192.168.1.1. For initial setup set a static IP address on your computer and connect your network card to the WCC Lite with an ethernet cable.

8.1.1 Static IP address setup on Windows

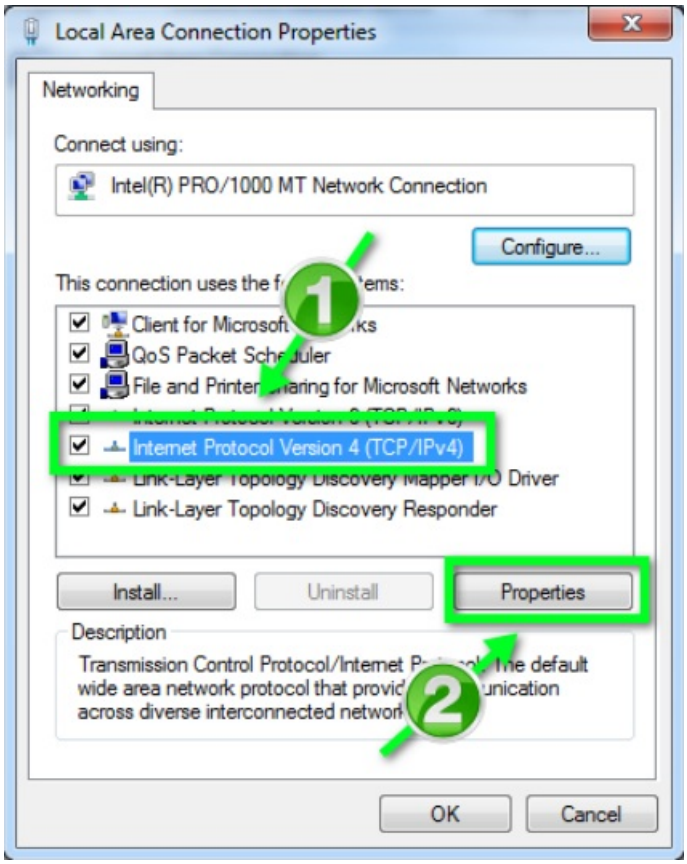
1. Press Win+R on your keyboard. This will open the run window. Enter *ncpa.cpl* and press OK. This will open the Network Connections window.



2. Right-click on the *Local Area Connection* icon, then select Properties

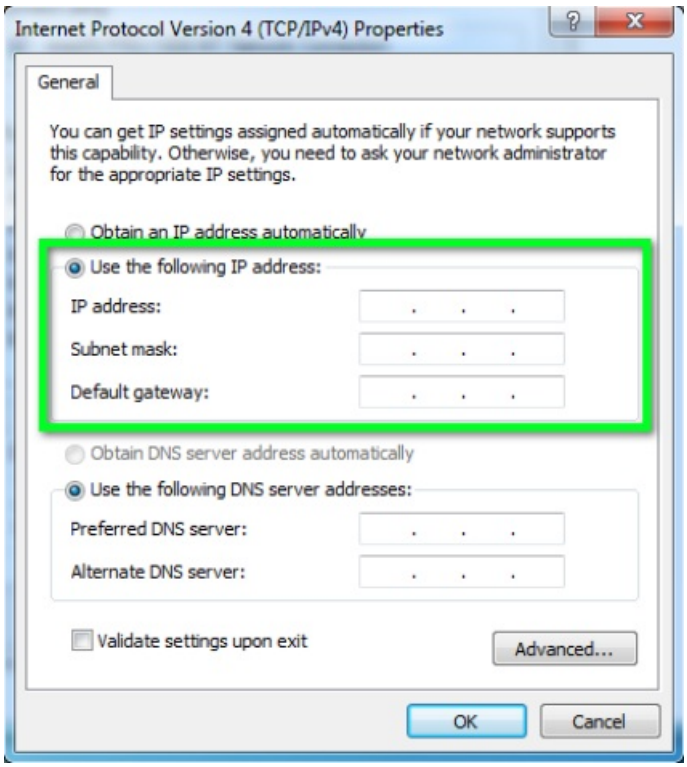


3. In the window that opens, click on the *Internet Protocol Version 4 (TCP/IPv4)* (you may need to scroll down to find it). Next, click on the Properties button.



4. In the window that opens, click the Use the following IP address radio button. Fill the following fields and click OK:

- IP address: *192.168.1.2*
- Subnet mask: *255.255.255.0*
- Default gateway: (leave empty)

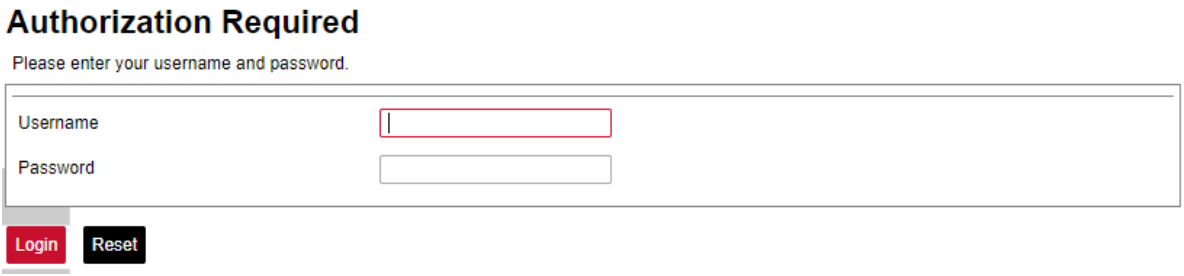


8.1.2 Connecting to an internal web page

If your computer IP address is set up and an ethernet cable is connected, power up the device. Wait a few minutes until the device boots. Then open your web browser and enter the following URL: *http://192.168.1.1/*
Supported web browsers:

- Google Chrome (recommended)
- Mozilla Firefox

- Internet Explorer 8 or later



Login with the root user:

- *Username*: *root*
- *Password*: *wcclite*

It is recommended to change the password immediately to avoid any unauthorized access.

Before plugging WCC Lite with a static IP address to the local computer network, make sure to check if such address is not already reserved by other devices.

8.2 Site layout

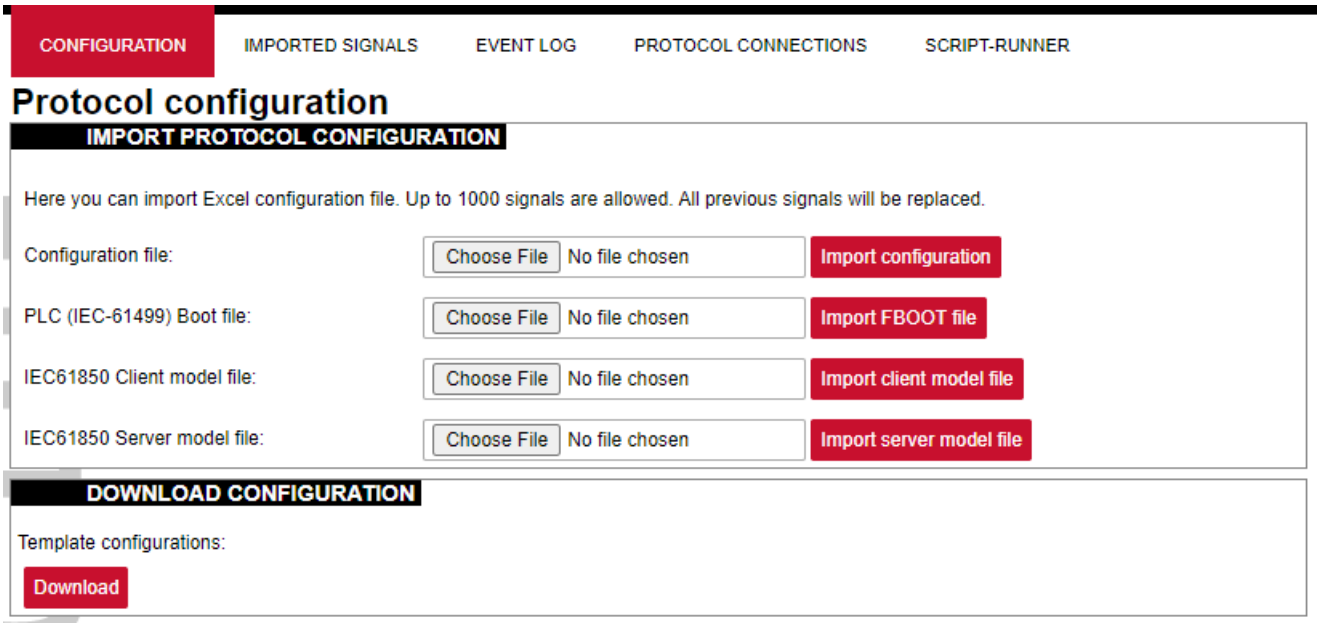
It provides the main navigation through the website. Contains the following sections:

- *PROTOCOL HUB*: configuration related to data exchange between WCC Lite and other devices.
- *STATUS:* system information and diagnostics.
- SYSTEM*:* basic system settings such as time setup.
- *SERVICES:* various other services.
- *NETWORK:* network-related settings and services.
- *USERS*: existing user groups and management of their permissions
- *LOGOUT:* user logout.

8.3 Protocol Hub

Protocol HUB section stores configuration for every connected device. You can configure it by importing settings from an Excel file.

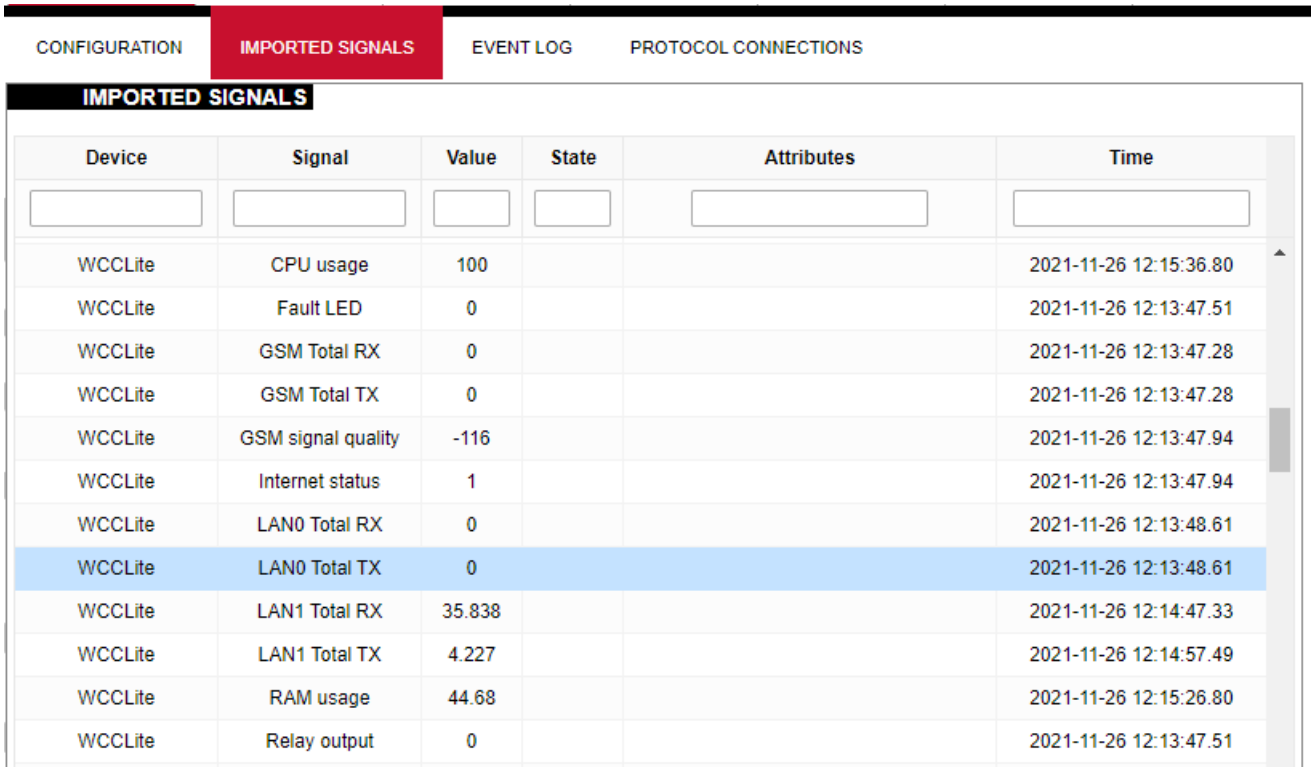
Configuration



In this tab a user can:

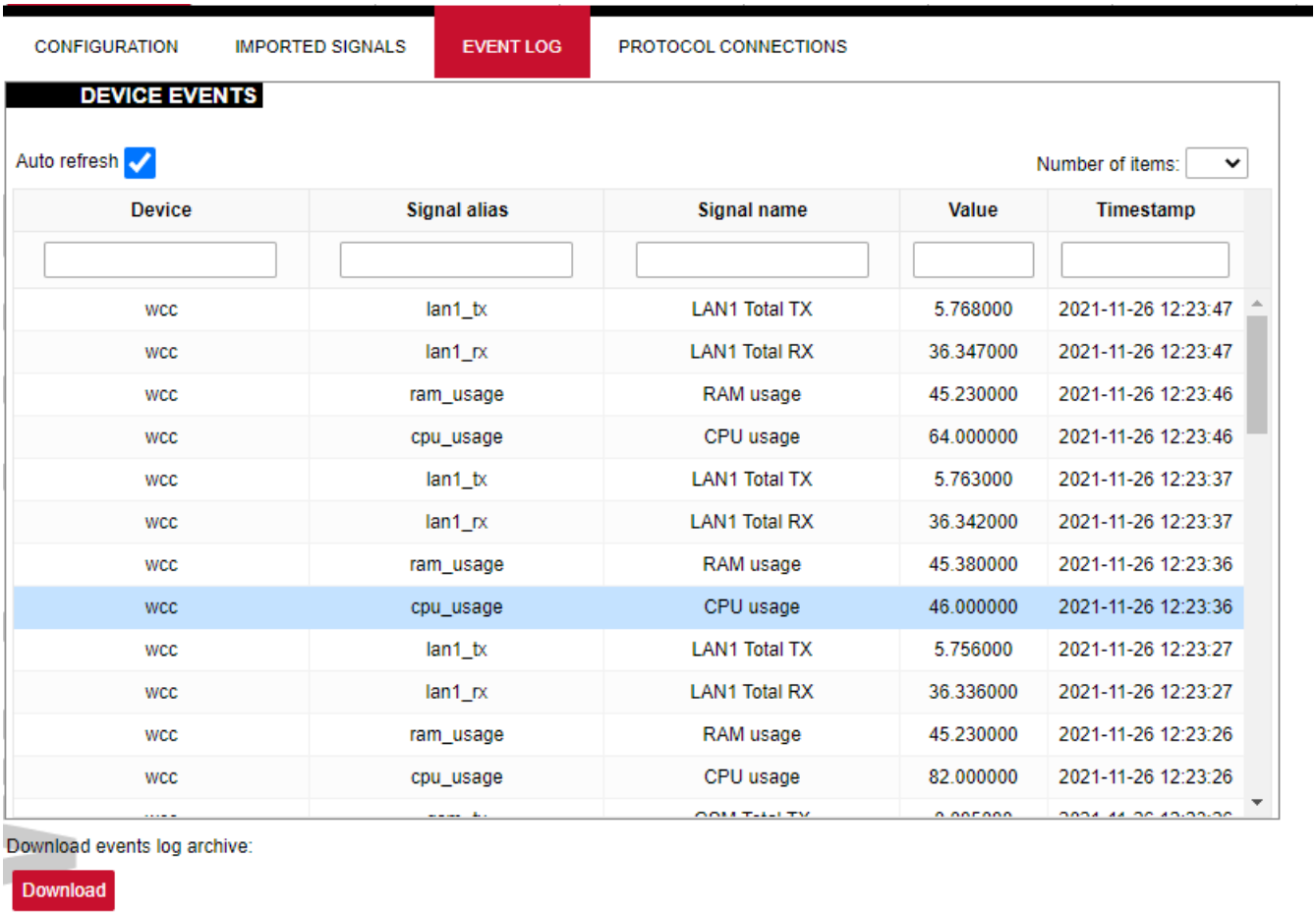
- Import new configuration from Excel file (.xls, .xlsx formats). If any errors in the file are found, the device will not be imported, and importing process will be stopped.
- Import .fboot file for PLC.
- Import IEC61850 Server model file
- Import IEC61850 Client model file
- Download current configuration Excel file.
- Download a template configuration Excel file.

Imported Signals



The imported signals section shows basic information about applied configuration. This section is used for viewing only.

Event Log



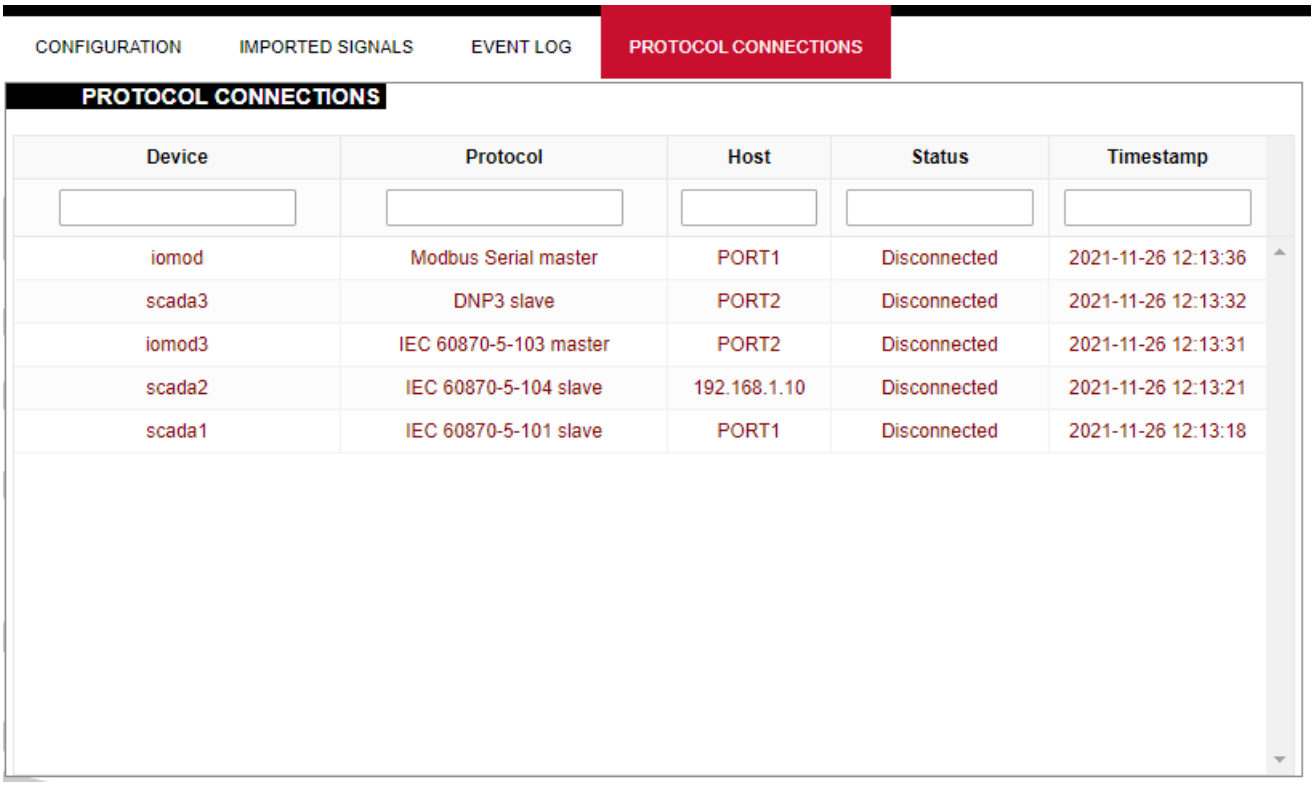
Event Log is the timestamped status data. It allows reviewing of the latest events and changes for devices state changes in chronological order. Newest events are shown at the top of the list. WCC Lite will timestamp the status data with a time resolution of one millisecond.

Initially, all breakers, protection contacts digital status input points in the WCCLite; events captured from IEDs (Intelligent electronic devices) shall be configured as Event Log points. It's possible to assign any digital status input data point in the WCCLite as an SOE point with an Excel template during configuration.

Each time a device changes state, the WCClite will save it with timetag in internal storage. Event Log can also be downloaded by pressing the download button at the bottom of the page.

Events are recorded only for devices that have the *log* field set to 1.

Protocol Connections

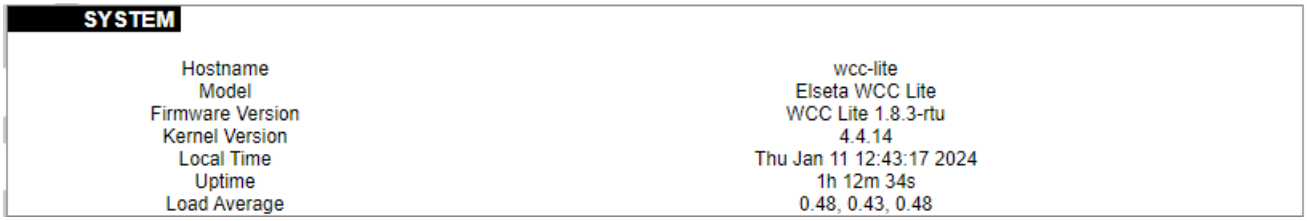


The protocol connections section shows configured devices and their respective ports, statuses

8.4 Status

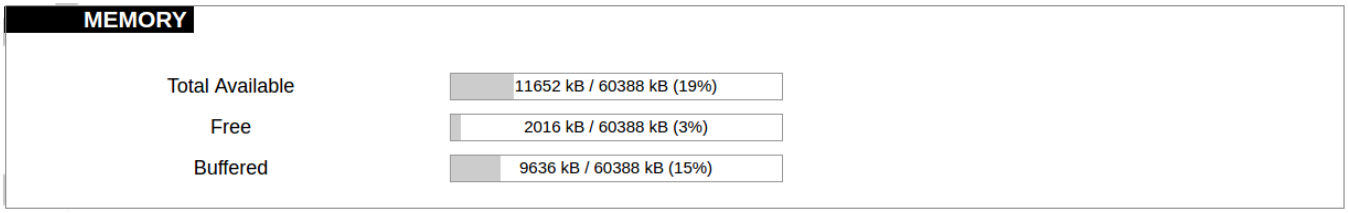
Overview

System



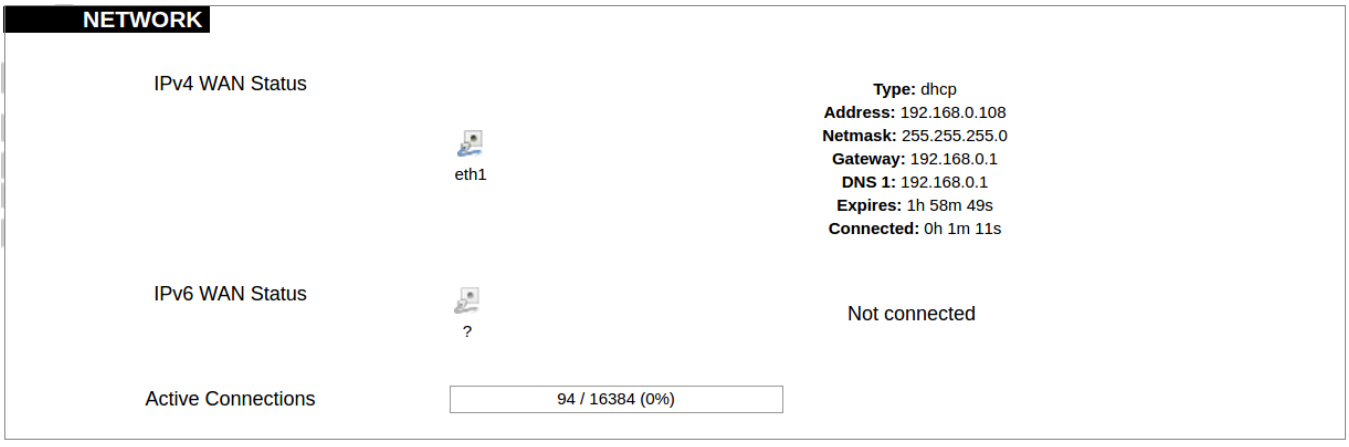
System section in the status tab shows basic information about the current status of the system.
Hostname: The label that is used to identify the device in the network.
Model: Model of the device.
Firmware version: Current firmware version.
Kernel version: Current kernel version.
Local Time: Current local time.
Uptime: The time a device has been working.
Load average: Measure CPU utilization of the last 1, 5, and 15 minute periods. Load of 0.5 means the CPU has been 50% utilized over the last period. Values over 1.0 mean the system was overloaded.

Memory



The ”Memory” window provides memory usage information on the device.
Total available memory: The amount of available memory that could be used over installed physical memory.
Free: The amount of physical memory that is not currently in use over installed physical memory.
Buffered: The amount of buffered memory that is currently in use for active I/O operations over installed physical memory.

Network



IPv4 WAN, IPv6 WAN status, and active connections of the device.
Type: Type of addressing of IPv4 network interface – DHCP or static.
Address: IP address of the device.
Netmask: Netmask of the device.
Gateway: IP address of the Gateway.
DNS: IP address of DNS server.
Expires: DHCP lease expiration time of the connection.
Connected: The time a device has been connected.
Active Connections: The number of active connections with the device.

DHCP leases

DHCP LEASES

Hostname	IPv4-Address	MAC-Address	Leasetime remaining
There are no active leases.			

DHCPV6 LEASES

Host	IPv6-Address	DUID	Leasetime remaining
?	fd74:8536:7bae::33f/128	00046836d59efa382760f3193e5ec5bf4a24	11h 58m 53s

DHCPv4 and DHCPv6 lease expiration time.
Hostname: The label that is used to identify the device in the network.
IPv4-Address: IPv4 address of network interface.
MAC-Address: The media access control address of the IPv4 network interface.
DUID: DHCP Unique Identifier of IPv6 network interface.
Lease Time remaining: The amount of time the device will be allowed connection to the Router.

Wireless

WIRELESS

Generic 802.11bgn Wireless Controller (radio0)

0%
SSID: WCC Lite
Mode: Master
Channel: 11 (2.462 GHz)
Bitrate: ? Mbit/s
BSSID: C6:93:00:0E:C4:33
Encryption: None

60%
SSID: AP5
Mode: Client
Channel: 11 (2.462 GHz)
Bitrate: 6.5 Mbit/s
BSSID: 02:1A:11:FF:87:09
Encryption: WPA2 PSK (CCMP)

WiFi interface information window.
SSID: The sequence of characters that uniquely names a wireless local area network.
Mode: Shows how the device is connected to the wireless network – Master or Client.
Channel: The number of channels and radio frequency for connection to access point.
Bitrate: The number of bits that pass the device in a given amount of time.
BSSID: The MAC address of the wireless access point.
Encryption: Security protocol for the wireless network.

Associated stations

ASSOCIATED STATIONS

	Network	MAC-Address	Host	Signal / Noise	RX Rate / TX Rate
wlan0	Client "AP5"	02:1A:11:FF:87:09	192.168.43.1	-71 / -95 dBm	1.0 Mbit/s, 20MHz 6.5 Mbit/s, 20MHz, MCS 0

List of associated stations (clients).

Network: Mode and SSID of network point.
MAC-Address: The media access control address of IPv4 network interface.
Hostname: The label or IP address that is used to identify the device in the network.
Signal/Noise: Received signal level over the background noise level. -30 dBm is the maximum achievable signal strength, -70 dBm is the minimum signal strength for reliable packet delivery in the wireless network.
RX Rate/TX rate: Used measure data transmission in the wireless network over bandwidth. RX Rate represents the rate at which data packets being received by the device, TX Rate represents the rate at which data packets being sent from the device.

Board information

BOARD INFORMATION

Hardware version	WCCLite v1.3
Serial number	318040040
SoC ID	c493000bf455

Board information provides the following details:
Hardware version: Current hardware version;
Serial number: Serial number of the board;

SoC ID: Unique identifier of CPU unit;

Firewall

IPv4 Firewall

IPv4 Firewall | IPv6 Firewall

Table: Filter

Chain INPUT **(Policy:** ACCEPT**, Packets: 0, Traffic: 0.00 B)**

Pkts.	Traffic	Target	Prot.	In	Out	Source	Destination	Options
576	38.25 KB	ACCEPT	all	lo	*	0.0.0.0/0	0.0.0.0/0	/* !fw3 */
1038	217.50 KB	input_rule	all	*	*	0.0.0.0/0	0.0.0.0/0	/* !fw3: user chain for input */
985	214.56 KB	ACCEPT	all	*	*	0.0.0.0/0	0.0.0.0/0	ctstate RELATED,ESTABLISHED /* !fw3 */
42	2.46 KB	syn_flood	tcp	*	*	0.0.0.0/0	0.0.0.0/0	tcp flags:0x17/0x02 /* !fw3 */
53	2.94 KB	zone_lan_input	all	br-lan	*	0.0.0.0/0	0.0.0.0/0	/* !fw3 */
0	0.00 B	zone_wan_input	all	eth1	*	0.0.0.0/0	0.0.0.0/0	/* !fw3 */

Firewall rule list for IPv4 traffic.
Table: The four distinct tables which store rules regulating operations on the packet. Filter concerns filtering rules. NAT concerns translation of source or destination addresses and ports of packages. Mangle table is for specialized packet alteration. The raw table is for configuration exceptions.

Chain: The list of rules. Filter table has the following built-in chains: Input – concerns packets whose destination is the firewall itself, Forward – concerns packets transiting through the firewall, Output – concerns packets emitted by the firewall, Reject – reject the packet, Accept – allow the packet to go on its way. NAT table has the following built-in chains: Prerouting – to modify packets as soon as they arrive, Postrouting – to modify packets when they are ready to go on their way. Mangle table has one built-in chain: Forward for transiting packets through the firewall.

Pkts.: The packets processed by the firewall.

Traffic: The amount of data processed by the firewall.

Target: The chain of the table of the firewall.

Prot.: The transport layer protocol processed by the firewall.

In: The network interface for the input chain processed by the firewall.

Out: The network interface for the output chain processed by the firewall.

Source: IPv4 address of the device that the packet comes from.

Destination: IPv4 address of the device that the packet goes to.

Options: The options for configuring the firewall.

IPv6 Firewall

IPv4 Firewall | IPv6 Firewall

Table: Filter

Chain INPUT **(Policy:** ACCEPT**, Packets: 0, Traffic: 0.00 B)**

Pkts.	Traffic	Target	Prot.	In	Out	Source	Destination	Options
0	0.00 B	ACCEPT	all	lo	*	::/0	::/0	/* !fw3 */
8041	684.54 KB	input_rule	all	*	*	::/0	::/0	/* !fw3: user chain for input */
32	3.08 KB	ACCEPT	all	*	*	::/0	::/0	ctstate RELATED,ESTABLISHED /* !fw3 */

Firewall rule list for IPv6 traffic.

Table: The three distinct tables which store rules regulating operations on the packet. Filter concerns filtering rules. Mangle table is for specialized packet alteration. The raw table is for configuration exceptions.

Chain: The list of rules. Filter table has the following built-in chains: Input – concerns packets whose destination is the firewall itself, Forward – concerns packets transiting through the firewall, Output – concerns packets emitted by the firewall, Reject – reject the packet, Accept – allow the packet to go on its way. Mangle table has one built-in chain:

Forward for transiting packets through the firewall.

Pkts.: The packets processed by the firewall.

Traffic: The amount of data processed by the firewall.

Target: The chain of the table of the firewall.

Prot.: The transport layer protocol processed by the firewall.

In: The network interface for the input chain processed by the firewall.

Out: The network interface for the output chain processed by the firewall.

Source: IPv6 address of the device that the packet comes from.

Destination: IPv6 address of the device that the packet goes to.

Options: The options for configuring the firewall.

Routes

ARP

IPv4-Address	MAC-Address	Interface
192.168.2.2	f0:76:1c:3b:cb:13	br-lan

ACTIVE IPV4-ROUTES

Network	Target	IPv4-Gateway	Metric	Table
lan	192.168.2.0/24		0	main

ACTIVE IPV6-ROUTES

Network	Target	Source	Metric	Table
lan	fd74:8536:7bae::/64		1024	main
lan	ff00::/8		256	local

IPV6 NEIGHBOURS

IPv6-Address	MAC-Address	Interface

The routing tables provide information on how datagrams are sent to their destinations.

ARP: An address Resolution Protocol which defines how IP address is converted to a physical hardware address needed to deliver packets to the devices.

Interface: The type of Network interface. br-lan refers to the virtual bridged interface: to make multiple network interfaces act as if they were one network interface.

Network: The type of network through which the traffic will be sent to the destination subnet.

Target: An address of the destination network. The prefix /24 refers the subnet mask 255.255.255.0.

IPv4-Gateway: IP address of the gateway to which traffic intended for the destination subnet will be sent.

Metric: The number of hops required to reach destinations via the gateway.

Table: The type of routing tables: main (default), local (maintained by the kernel).

IPv6 Neighbours: The devices on the same network with IPv6 addresses.

System Log

#	Time	Facility	Process	Priority	Message
1	Sat Mar 30 08:57:04 2019	local0	gsm-pinger	info	network unreachable, resetting modem
2	Sat Mar 30 08:57:04 2019	daemon	pppd[14918]	info	Terminating on signal 15
3	Sat Mar 30 08:57:04 2019	daemon	pppd[14918]	info	Connect time 5.0 minutes.
4	Sat Mar 30 08:57:04 2019	daemon	pppd[14918]	info	Sent 272 bytes, received 3180 bytes.
5	Sat Mar 30 08:57:04 2019	daemon	netifd	notice	Network device 'ublox-gsm' link is down
6	Sat Mar 30 08:57:04 2019	daemon	netifd	notice	Network alias 'ublox-gsm' link is down
7	Sat Mar 30 08:57:04 2019	daemon	netifd	notice	Interface 'gsm_6' has link connectivity loss
8	Sat Mar 30 08:57:04 2019	kern	kernel	info	[154912.796479] usb 1-1.1: USB disconnect, device number 126
9	Sat Mar 30 08:57:04 2019	kern	kernel	err	[154912.800748] cdc_acm 1-1.1:1.2: failed to set dtr/rts
10	Sat Mar 30 08:57:04 2019	daemon	pppd[14918]	notice	Modem hangup
11	Sat Mar 30 08:57:04 2019	daemon	pppd[14918]	notice	Connection terminated.
12	Sat Mar 30 08:57:04 2019	daemon	netifd	notice	Interface 'gsm_6' is now down
13	Sat Mar 30 08:57:04 2019	daemon	netifd	notice	Interface 'gsm_6' is disabled
14	Sat Mar 30 08:57:04 2019	daemon	dnsmasq[2046]	info	reading /tmp/resolv.conf.auto
15	Sat Mar 30 08:57:04 2019	daemon	dnsmasq[2046]	info	using local addresses only for domain lan
16	Sat Mar 30 08:57:04 2019	daemon	dnsmasq[2046]	info	using nameserver 192.168.67.1#53
17	Sat Mar 30 08:57:04 2019	daemon	dnsmasq[2046]	info	using nameserver fe80::c693:ff:fe0b:ae28%eth1#53
18	Sat Mar 30 08:57:05 2019	daemon	pppd[14918]	info	Exit.
19	Sat Mar 30 08:57:05 2019	daemon	netifd	notice	Interface 'gsm' is now down
20	Sat Mar 30 08:57:05 2019	local0	gsm	info	Modem was reset
21	Sat Mar 30 08:57:06 2019	kern	kernel	info	[154914.314857] usb 1-1.1: new high-speed USB device number 127 using ehci-platform
22	Sat Mar 30 08:57:08 2019	kern	kernel	info	[154916.380202] usb 1-1.1: USB disconnect, device number 127
23	Sat Mar 30 08:57:10 2019	kern	kernel	info	[154918.914874] usb 1-1.1: new high-speed USB device number 3 using ehci-platform
24	Sat Mar 30 08:57:10 2019	kern	kernel	info	[154919.070028] cdc_acm 1-1.1:1.0: ttyACM0: USB ACM device
25	Sat Mar 30 08:57:10 2019	kern	kernel	info	[154919.075447] cdc_acm 1-1.1:1.2: ttyACM1: USB ACM device
26	Sat Mar 30 08:57:10 2019	kern	kernel	info	[154919.084318] cdc_acm 1-1.1:1.4: ttyACM2: USB ACM device
27	Sat Mar 30 08:57:11 2019	kern	kernel	info	[154919.093522] cdc_acm 1-1.1:1.6: ttyACM3: USB ACM device
28	Sat Mar 30 08:57:11 2019	kern	kernel	info	[154919.103248] cdc_acm 1-1.1:1.8: ttyACM4: USB ACM device
29	Sat Mar 30 08:57:11 2019	kern	kernel	info	[154919.109495] cdc_acm 1-1.1:1.10: ttyACM5: USB ACM device
30	Sat Mar 30 08:57:16 2019	daemon	netifd	notice	Interface 'gsm' is setting up now
31	Sat Mar 30 08:57:18 2019	daemon	netifd	notice	gsm (19093): SIM ready
32	Sat Mar 30 08:57:18 2019	daemon	netifd	notice	gsm (19093): pin_check 0
33	Sat Mar 30 08:57:18 2019	daemon	netifd	notice	gsm (19093): pin_status -> 0
34	Sat Mar 30 08:57:19 2019	daemon	netifd	notice	gsm (19093): sending -> AT+COPS=2
35	Sat Mar 30 08:57:20 2019	daemon	pppd[19260]	notice	pppd 2.4.7 started by root, uid 0

System log window shows a table containing the events that are logged by the device. It has the following columns:

- # (sequence number);
- Time (day of the week, month, day of the month, time and year);
- facility;
- process (who generated the message);
- priority level;
- message.

Messages can be sorted and filtered to extract a particular set of messages. This might be useful when debugging kernel or protocol level problems.

Kernel Log

```
[    0.000000] Linux version 4.4.14 (paulius@paulius-desktop) (gcc version 5.3.0 (OpenWrt GCC 5.3.0 50087) ) #15 Mon Mar 27 14:57:19 UTC 2017
[    0.000000] MyLoader: sysp=23fff3b3, boardp=137b7fb7, parts=70537976
[    0.000000] bootconsole [early0] enabled
[    0.000000] CPU0 revision is: 00019374 (MIPS 24Kc)
[    0.000000] SoC: Atheros AR9330 rev 1
[    0.000000] Determined physical RAM map:
[    0.000000]  memory: 04000000 @ 00000000 (usable)
[    0.000000] Initrd not found or empty - disabling initrd
[    0.000000] No valid device tree found, continuing without
[    0.000000] Zone ranges:
[    0.000000]   Normal   [mem 0x0000000000000000-0x0000000003ffffff]
[    0.000000] Movable zone start for each node
[    0.000000] Early memory node ranges
[    0.000000]   node   0: [mem 0x0000000000000000-0x0000000003ffffff]
[    0.000000] Initmem setup node 0 [mem 0x0000000000000000-0x0000000003ffffff]
```

Kernel log shows a list of the events that are logged by the kernel of the device. Log format: time in seconds since the kernel started and message.

Processes

PID	Owner	Command	CPU usage (%)	Memory usage (%)	Hang Up	Terminate	Kill
1	root	/sbin/procd	8%	3%	Hang Up	Terminate	Kill
2	root	[kthreadd]	0%	0%	Hang Up	Terminate	Kill
3	root	[ksoftirqd/0]	0%	0%	Hang Up	Terminate	Kill
5	root	[kworker/0:0H]	0%	0%	Hang Up	Terminate	Kill
67	root	[writeback]	0%	0%	Hang Up	Terminate	Kill
68	root	[crypto]	0%	0%	Hang Up	Terminate	Kill
70	root	[bioset]	0%	0%	Hang Up	Terminate	Kill
71	root	[kblockd]	0%	0%	Hang Up	Terminate	Kill
73	root	[kswapd0]	0%	0%	Hang Up	Terminate	Kill
152	root	[fsnotify_mark]	0%	0%	Hang Up	Terminate	Kill
169	root	[spi0]	0%	0%	Hang Up	Terminate	Kill
180	root	[bioset]	0%	0%	Hang Up	Terminate	Kill
185	root	[bioset]	0%	0%	Hang Up	Terminate	Kill

List of processes running on the system.

PID: Process ID.

Owner: User to whom the process belongs.

Command: Process.

CPU usage: It is the CPU usage of the individual process. CPU usage above 90 % is an indicator of insufficient processing power.

Memory usage: Memory usage of the individual process.

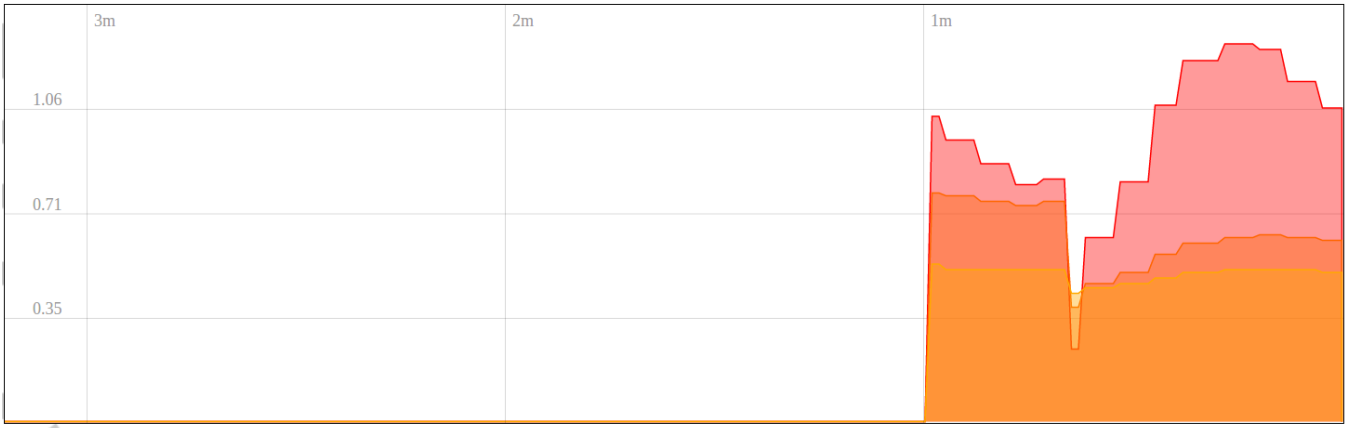
Hang Up: To freeze the process.

Terminate: To end the process cleanly.

Kill: To end the process immediately.

Realtime graph

Realtime Load

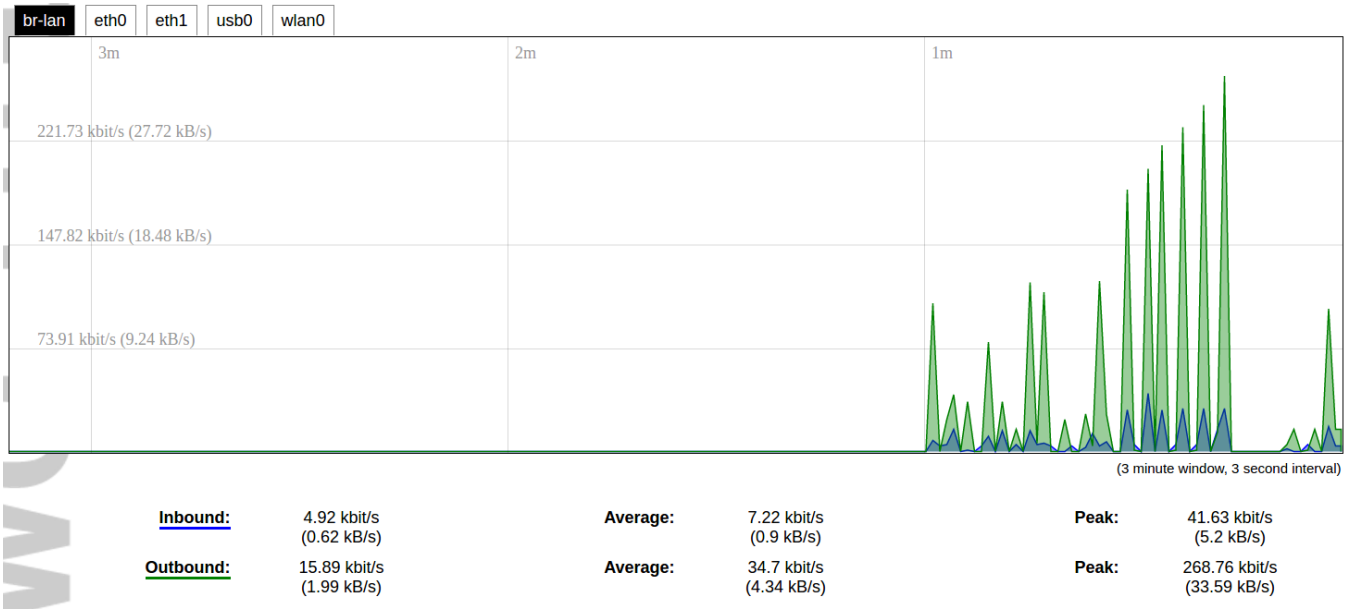


(3 minute window, 3 second interval)

1 Minute Load:	1.07	**Average:**	1.08	**Peak:**	1.29
5 Minute Load:	0.62	**Average:**	0.62	**Peak:**	0.78
15 Minute Load:	0.51	**Average:**	0.51	**Peak:**	0.54

CPU utilization graph. Load of 0.5 means the CPU has been 50% utilized over the last period. Values over 1.0 mean the system was overloaded.

Realtime Traffic



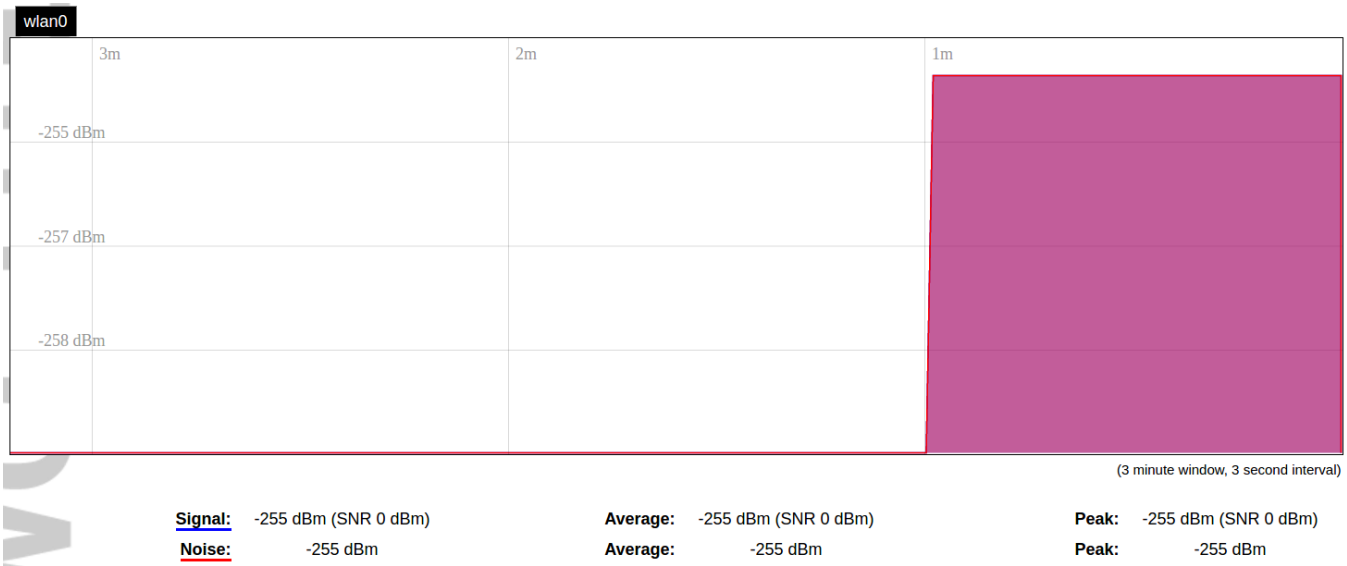
Graphs representing the status of the virtual and physical network interfaces of the device.

Inbound: The speed at which the incoming packets arrive at the device.

Outbound: The speed of the packets which were originated by the device.

Phy. Rate: The speed at which bits can be transmitted over the physical layer.

Realtime Wireless



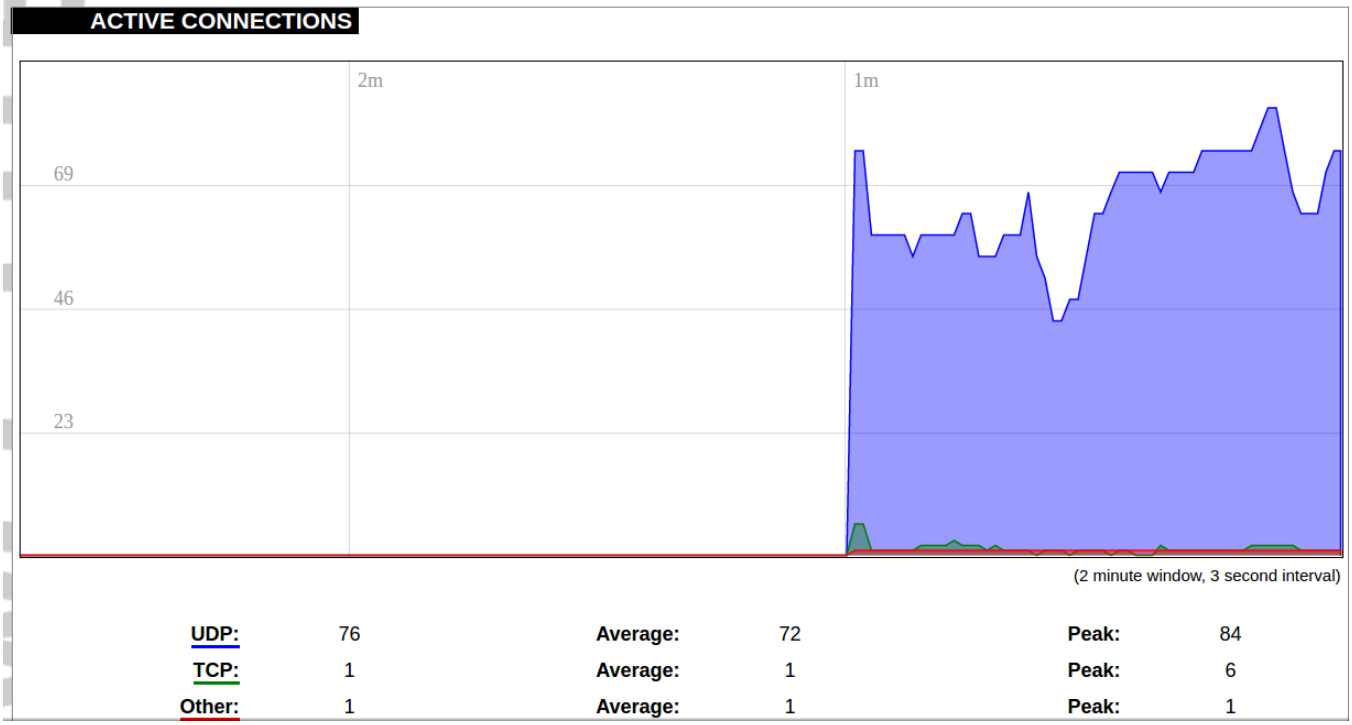
WiFi status graph.

Signal: Signal strength level.

Noise: Noise level.

Phy. Rate: The speed at which bits can be transmitted on the physical layer.

Active connections



Graph representation of active connections with the device.

UDP: Transport layer – User Datagram Protocol.

TCP: Transport layer – Transmission Control Protocol.

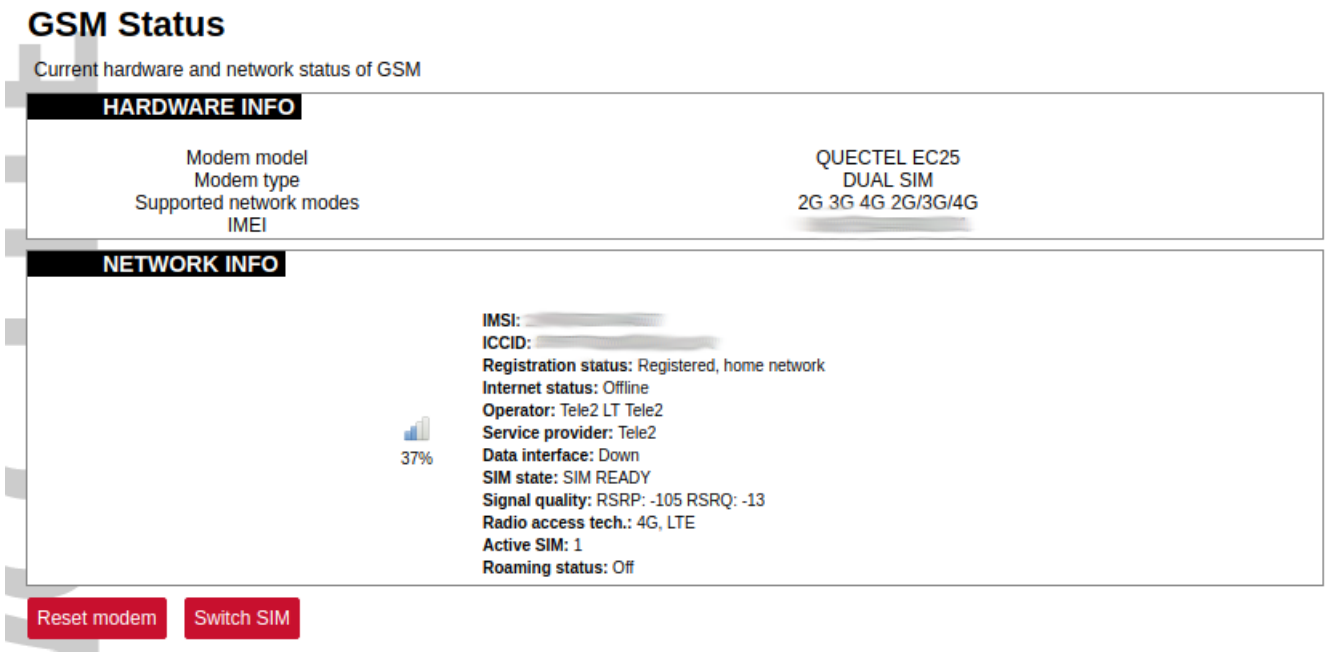
Network: Type of the network layer – IPv4 or IPv6.

Source, Destination: IP address and the port number.

Transfer: The amount of the transferred data in kB and packets.

GSM status

This page shows all information that is related to the GSM modem.



Hardware info

All static information on the GSM modem.

Modem model: Manufacturer and model of present modem.

Modem type: Single SIM or Double SIM modem.

Supported network modes: Shows which network modes (or their combinations) are supported (e.g. 2G 4G 2G/4G).

IMEI: IMEI (International Mobile Equipment Identity number).

Network info

All dynamic information on GSM modem and connected network.

IMSI: IMSI (International Mobile Subscriber Identity) number related to current SIM card user.

ICCID: ICCID (Integrated Circuit Card Identifier) number related to physical SIM card.

Registration status: Curren status of network connection.

Internet status: Status of connection to the internet (valid, when gsm-pinger is enabled and can reach provided hosts).

Operator: Operator's name, to which modem is currently connected.

Service provider: IMEI (Service provider for SIM card. Data interface: Shows, whether wcc-lite has a data connection through gsm or not (possible values: "Up", "Down").

SIM state: Shows current status of SIM card (needs PIN, needs PUK, not-inserted and etc.).

Signal quality: Shows current signal strength value in dBms. The RSSI value is shown, when connected to 2G/3G networks, RSRP-RSRQ values - when connected to 4G network.

Radio access tech.: Current radio technology used (2G, 3G, or 4G).

Active SIM: Shows which SIM card is active (if the modem is Dual SIM).

Roaming status: Current status of roaming ("Off", "On").

Little bars with a percentage at the center-left shows signal strength. It is calculated with the respect to current radio access technology used (RSSI or RSRP). Two buttons at the bottom can reset (cold-reset) modem or manually switch SIM cards (if it is a Dual SIM modem and both cards are enabled).

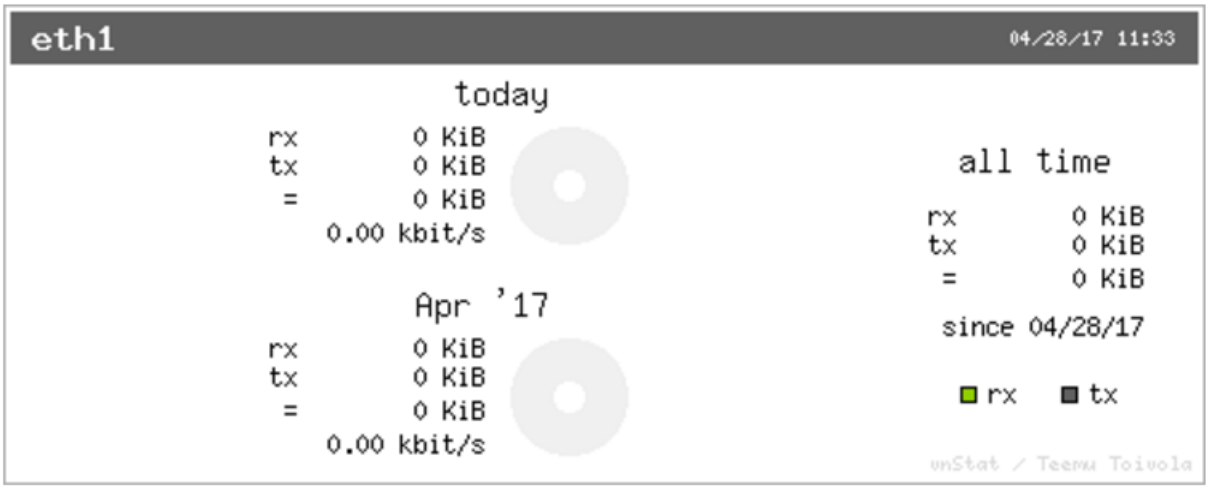
Signal quality is described in different ways for different types of different mobile services: Received Signal Strength Indication (RSSI) in GSM (2G) and UMTS (3G), the Reference Signal Received Quality (RSRQ) in LTE RAT.

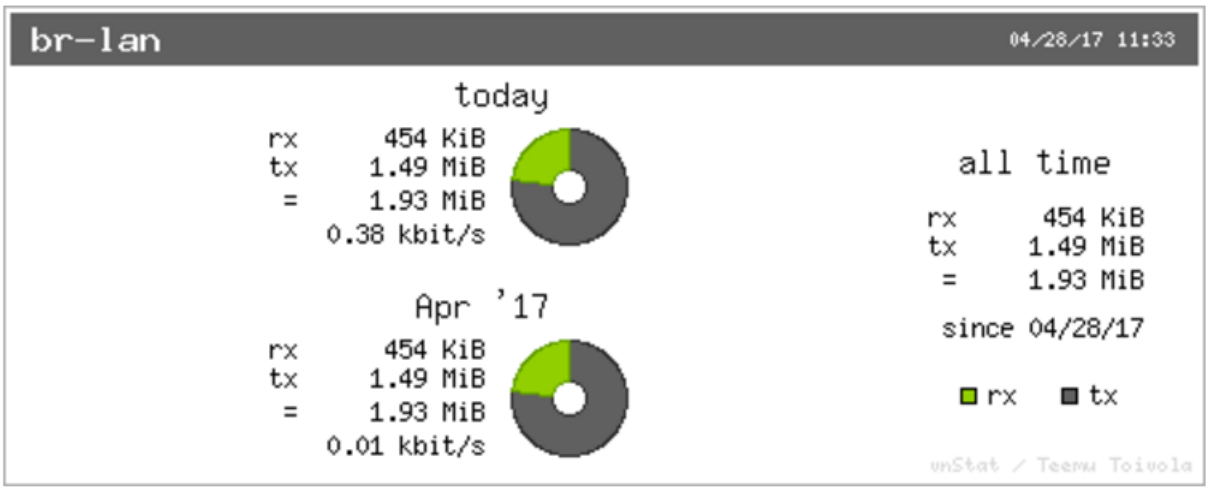
The Reference Signal Received Power (RSRP) is a LTE-specific measure that averages the power received on the subcarriers carrying the reference signal. The RSRP measurement bandwidth is equivalent to a single LTE subcarrier: its value is therefore much lower than the total received power usually referred to as RSSI. In LTE the RSSI depends on the currently allocated bandwidth, which is not pre-determined. Therefore the RSSI is not useful to describe the signal level in the cell.

VNSTAT Traffic monitor

To monitor the traffic of various network interfaces VNSTAT Traffic monitor can be used. Traffic tracking can be useful if the user wants to have precise information on how much data is used because it can have a dependency on data transmission costs, for example, mobile (cellular) data.

Graph





An example graph shows the statistics gathered for two network interfaces. In these graphs:

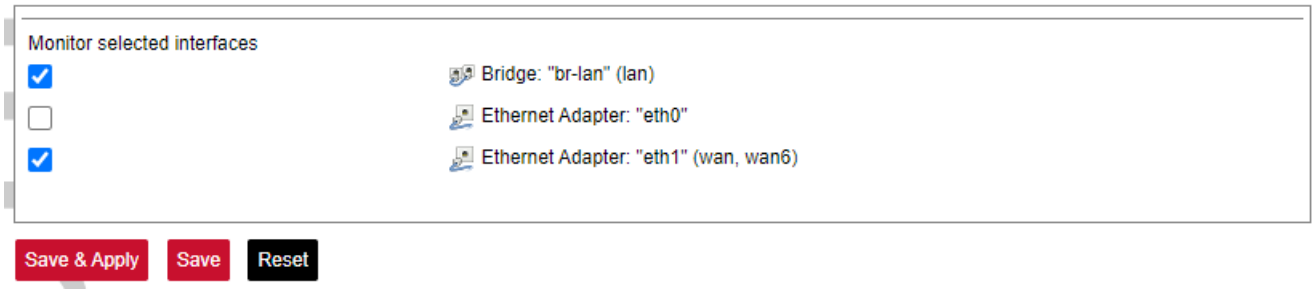
eth1: Network interface (e.g. Ethernet).

br-lan: Virtual network interface (bridge).

rx: Data packets received by the device.

tx: Data packets sent from the device.

Configuration



Interfaces to be monitored can be selected in a configuration screen. It includes all the network interfaces configured in a system. To start or stop monitoring user should either select or unselect the respective checkbox and save settings by pressing Save & Apply.

8.5 System

System

The system tab includes various properties, configurations, and settings of the system and contains the following pages:

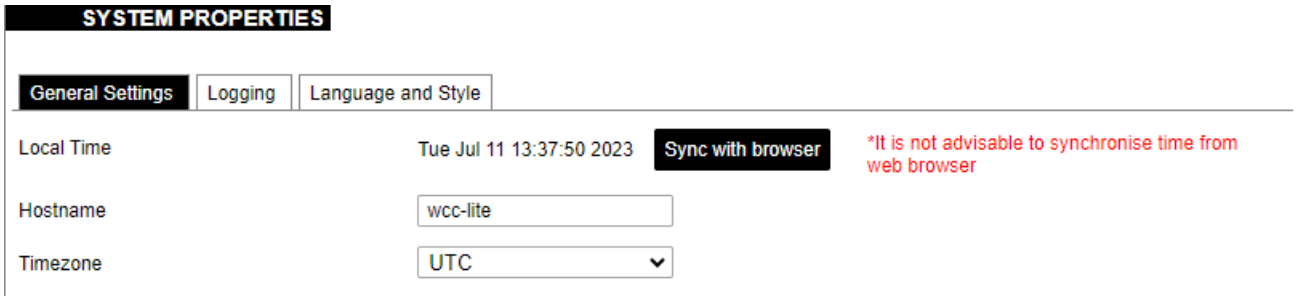
• SYSTEM: properties and settings of the system.
• ADMINISTRATION: settings of the administration for various services.
• SOFTWARE: settings of the packages.
• STARTUP: process management.
• SCHEDULED TASKS: settings of the scheduled tasks.
• MOUNT POINTS: settings for the mount points.
• BOARD: board configuration.
• CERTIFICATE STORAGE: certificate management panel.
• LED CONFIGURATION: settings for the LEDs.
• TIME SYNC: time synchronization of WCC Lite
• BACKUP/FLASH FIRMWARE: management of the configuration files and firmware image upgrade.
• REBOOT: device reboot page.

System

Basic aspects of the device can be configured. These include time settings, hostname, system event logging settings, language and theme selection.

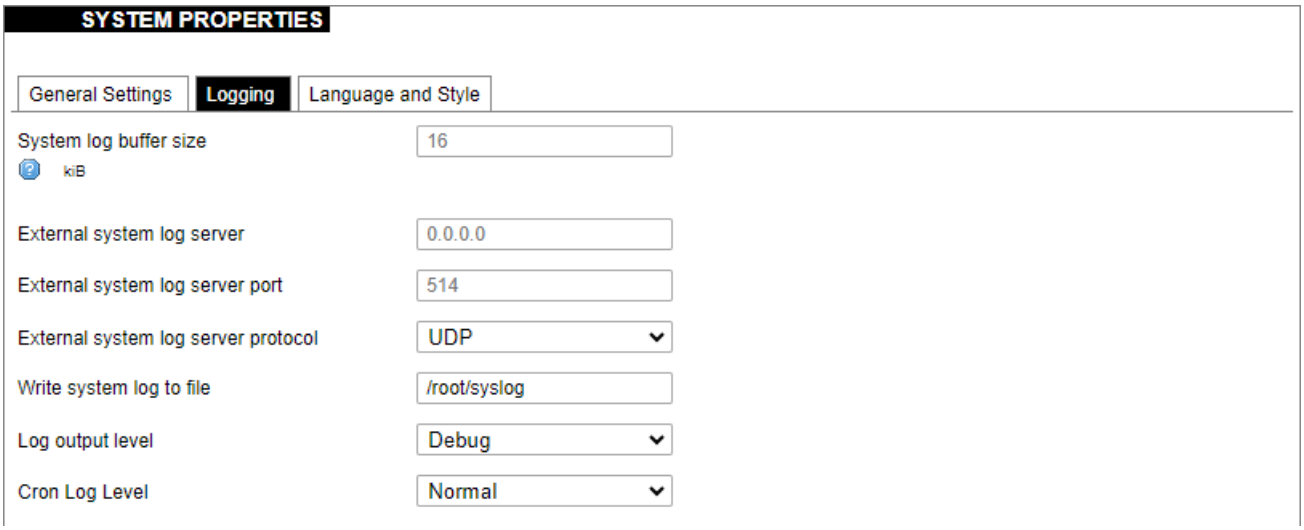
System properties

General Settings



General settings of the WCC Lite device are defined as follows:
Local Time: Current local time.
Hostname: The label that is used to identify the device in the network.
Timezone: A region of the globe that observes a uniform standard time. The time zone number indicates the number of hours by which the time is shifted ahead of or behind UTC – Coordinated
Universal Time. Some zones are, however, shifted by 30 or 45 minutes.

Logging



Logging settings of the WCC Lite device are defined as follows:
System log buffer size: The amount of the records before writing these data to the disk.
External system log server: IP address of the server.
External system log server port: An endpoint of communication with the server.
External system log server protocol: A standard that defines how to establish and maintain a network connection: UDP - User Datagram Protocol, TCP - Transmission Control Protocol.
Write system log to file: The name of the file with the path to it.
Log output level: Log output messages can be grouped by their importance to the user. Levels are described in the table below.

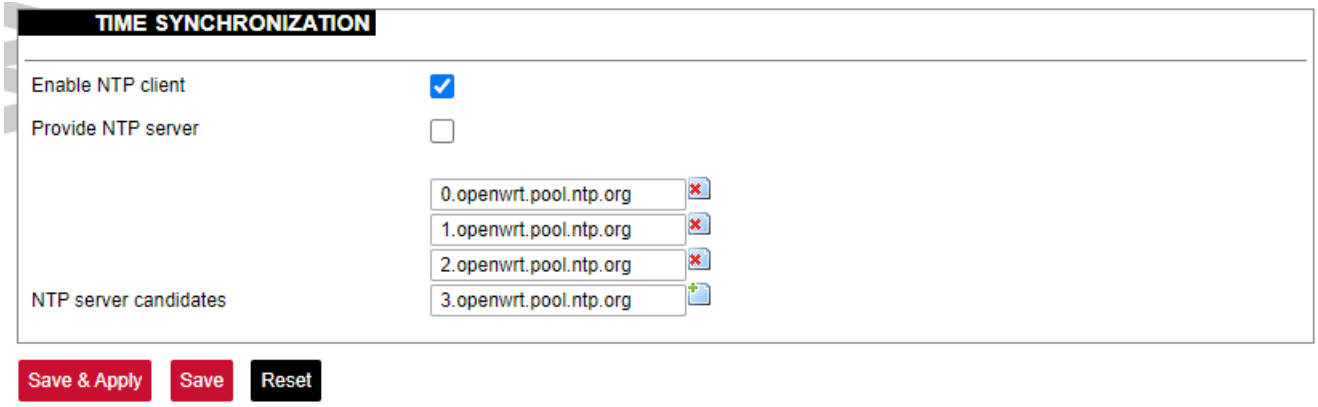
Log output level	**Description**
Emergency	System is unusable
Alert	Action must be taken immediately
Critical	Critical conditions
Error	Error conditions
Warning	Potentially hazardous conditions
Notice	Normal conditions that might need action
Info	Information messages
Debug	Debugging messages

Cron Log Level: Cron has three output levels to choose from to write to its logs. Possible options are described in the table below.

Cron log level	**Description**
Debug	Debugging messages
Normal	General administrative messages
Warning	Potentially hazardous conditions

Time synchronization

WCC Lite has an NTP client to synchronize date and time with external sources. It is not the only source for synchronization, it can also be done using methods defined in IEC-60870-5 protocols.



Please take care choosing a time sync method. If both NTP and IEC 60870-5 protocol slave interface time sync methods are activated simultaneously, they can interfere if there is a time difference. We strongly recommend to use single time sync method to prevent time interference.

Time synchronization options are defined as:
Enable NTP client: The local time of the device will sync with external time servers.
Provide NTP server: Turn the device into a local NTP server.
NTP server candidates: The network time protocol servers.

Language and styles

Language and Style settings are defined as follows:
Language: The language of the Web interface of the device.
Design: The theme of the Web interface of the device.

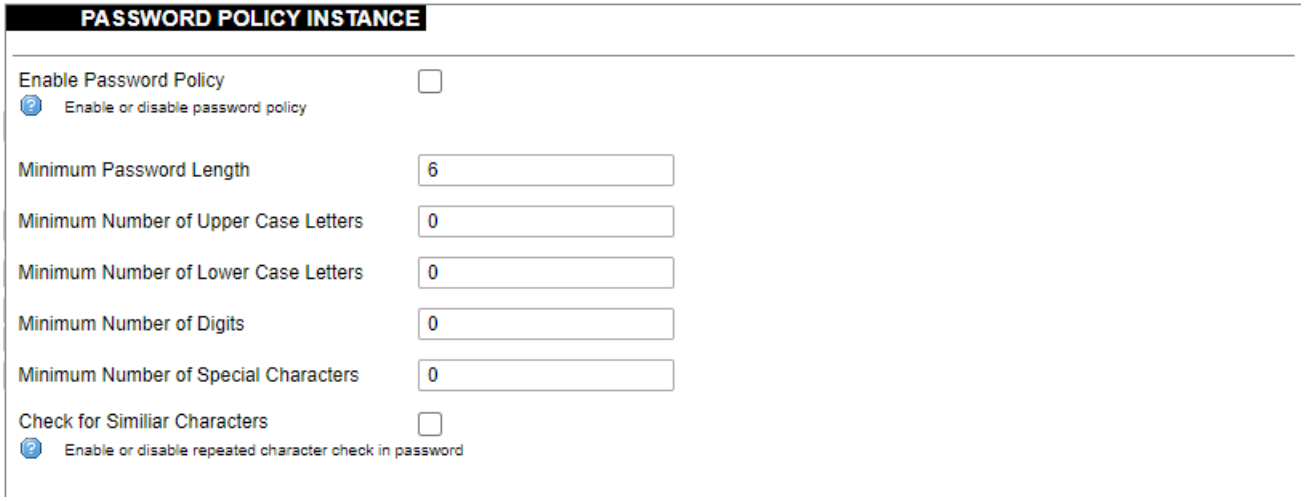
Administration

Administrator Password

Administrator password can be changed. To change it the combination of digits and letters of the alphabet should be entered and then confirmed in the confirmation field by typing in again.

It is advised not to use the default password.

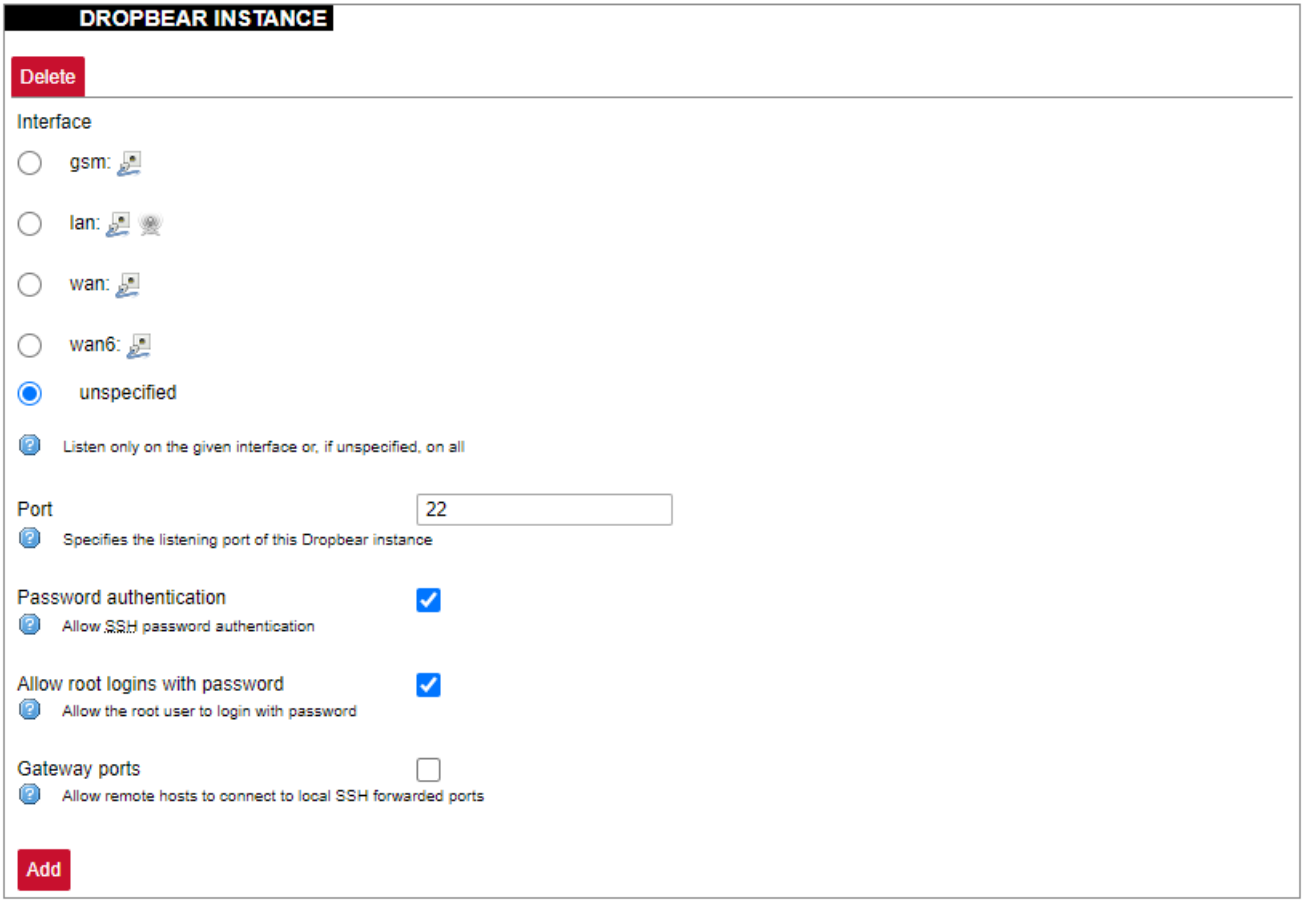
Password policy



For future password changes, user can configurate password policy to create a safer password. Here password requirement can be created such as minimum password length, minimum number of upper or lower case letters, digits and special characters. By ticking the box for checking similar characters, new password will be required to not have repeated characters.

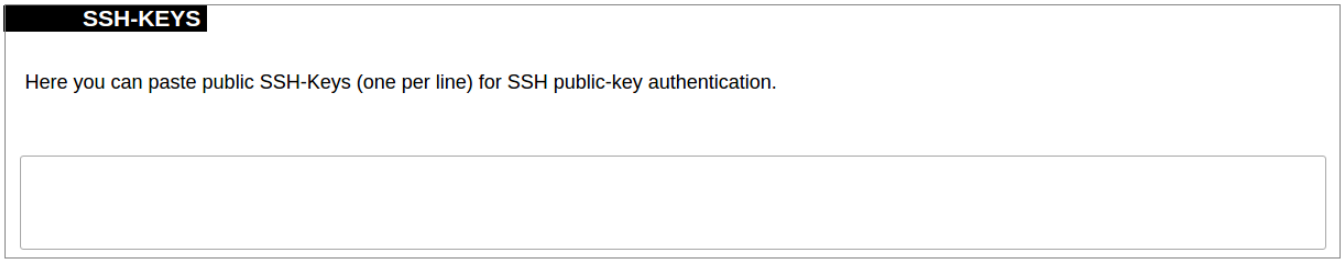
SSH Access

WCC Lite has a compact secure shell (SSH) server named Dropbear. Multiple options are available to be changed via WCC Lite web interface, ranging from automatic firewall rules to authentication flexibility.



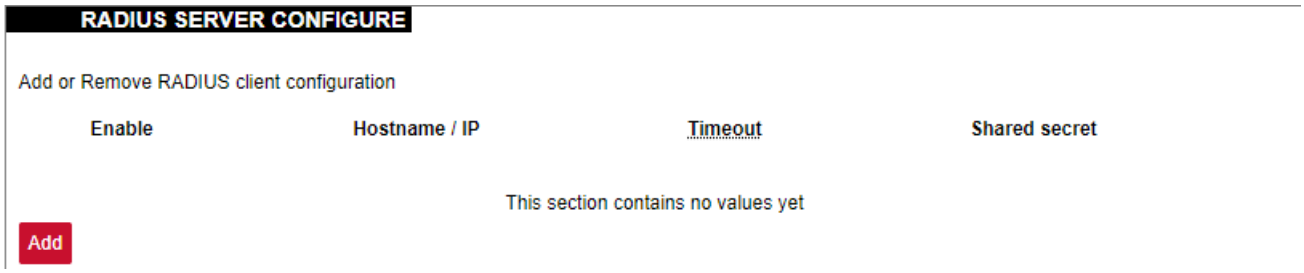
Dropbear options are defined as follows:
Interface: Listen only on the given interface or on all, in unspecified.
Port: Specifies the listening port of this interface.
Password authentication: Allow SSH password authentication.
Allow roots logins with password: Allow the root user to login with the password.
Gateway ports: Allow remote hosts to connect to local SSH forwarded ports.

SSH-keys



SSH keys can be added via WCC Lite web interface. They might be helpful if the user logs into device frequently and does not want to always have to write his credentials.

RADIUS Client



RADIUS client redirects user authorization to remote server, which controls users and their access. A user can add multiple RADIUS clients by clicking add and entering information required.

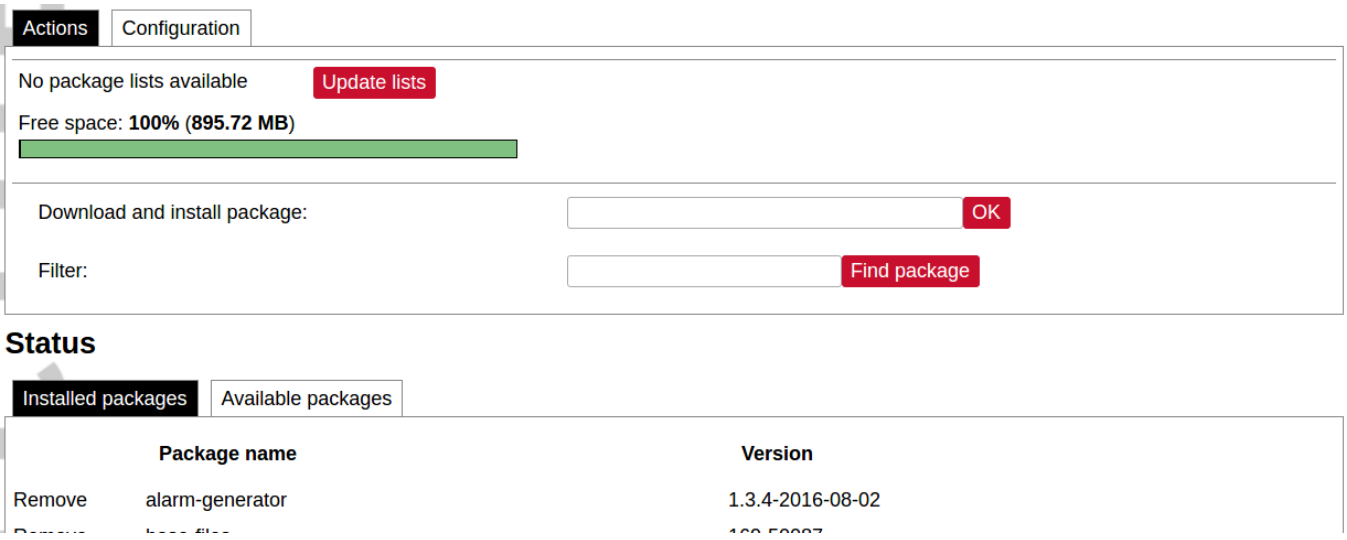
HTTPS certificate

WCC Lite by default is shipped with a default certificate for HTTPS connection. This certificate only enables connecting to device via web interface and might cause warnings from a web browser. To eliminate them, user can use his own certificate to secure access to web interface.

User can use certificates uploaded to a certificate storage. It should be noted that only valid certificates with *.pem extension can be used. Certificate to be used is validated every time device is restarted.
If validation fails, default certificate is used. This is done to prevent user from losing device access via web interface.
For new certificate to come to effect user should restart the device.

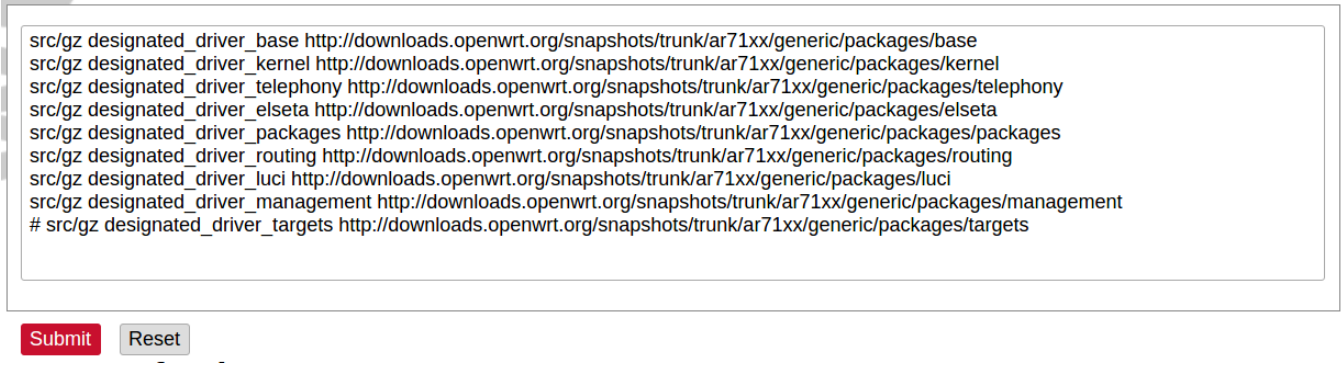
Software

Individual packages can be installed via WCC Lite web interface. They can either be installed using web link or selected from the pre-defined feeds.



Various options can be selected when installing packages, however, default ones should work well enough and it's advised to only change them for advanced users.

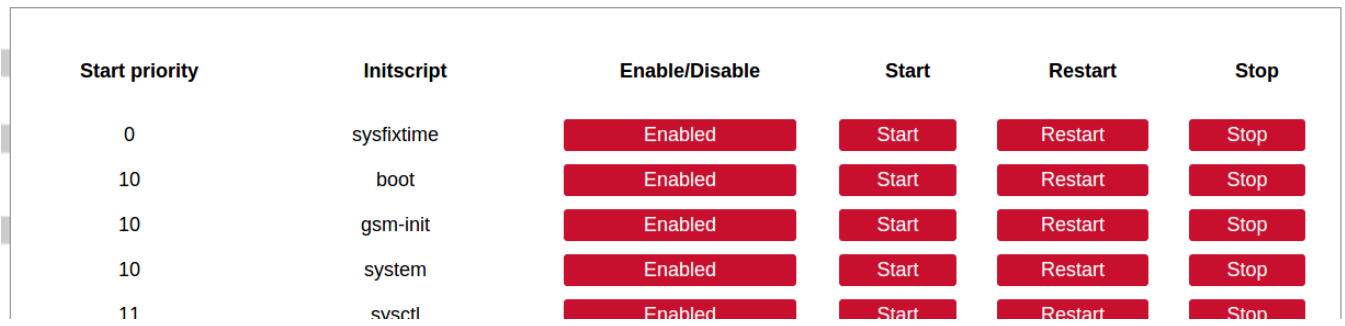
Feeds from which packages are listed for update are defined in Open PacKaGe management (OPKG) configuration that can be changed easily from user interface.



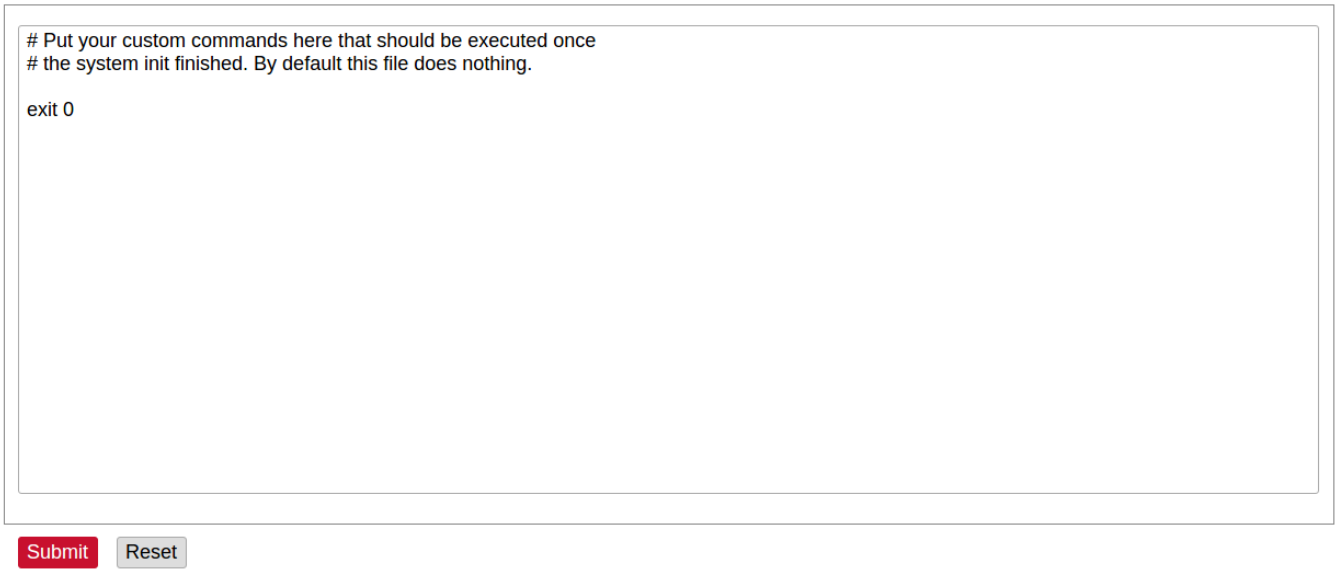
Specific distribution feeds can also be added for special cases if standard ones do not fit the needs.

Startup

All of the processes that have init.d scripts can optionally enabled or disabled. This can be very useful if user only intends to use only part of the processes.



User should not disable processes that are essential for device operation as it can render the device unusable.



User can optionally run scripts and programs on device startup by putting them into a /etc/rc.local file. This file can be updated from WCC Web interface.

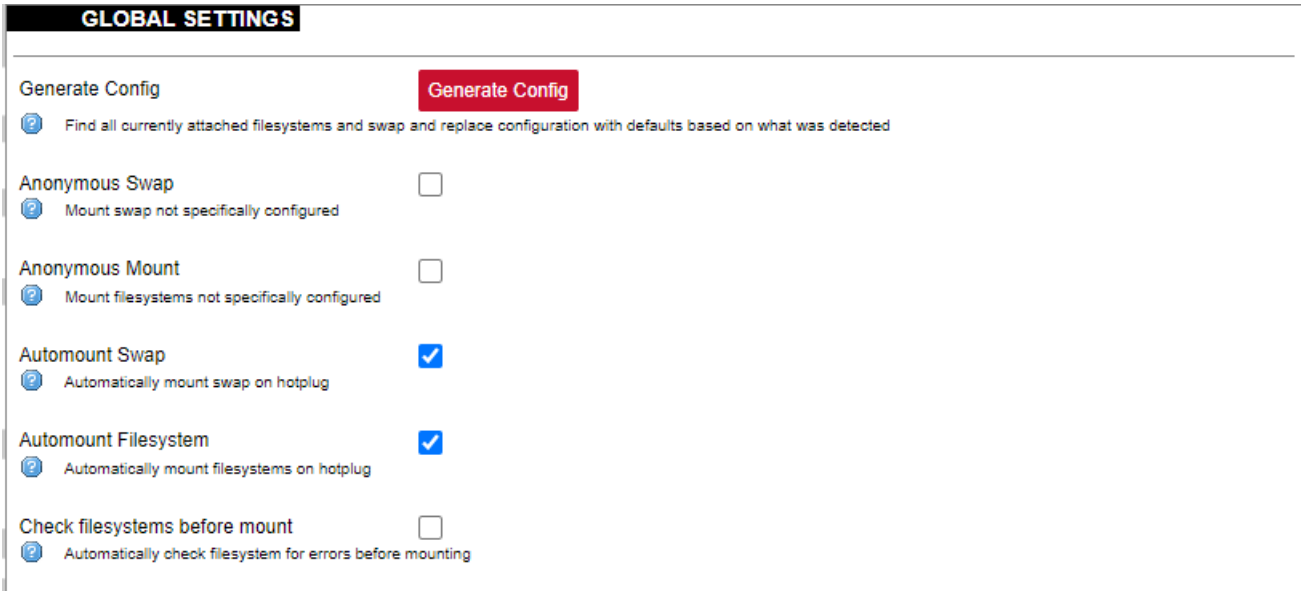
Scheduled tasks

Various tasks can be scheduled with the system crontab. New tasks can be included by creating and saving new rules conforming to cron rules. WCC Lite accepts full cron configuration functionality.

Example in the pictures shows how to execute the disk usage command to get the directory sizes every 6 p.m. on the 1st through the 15th of each month. E-mail is sent to the specified email address.

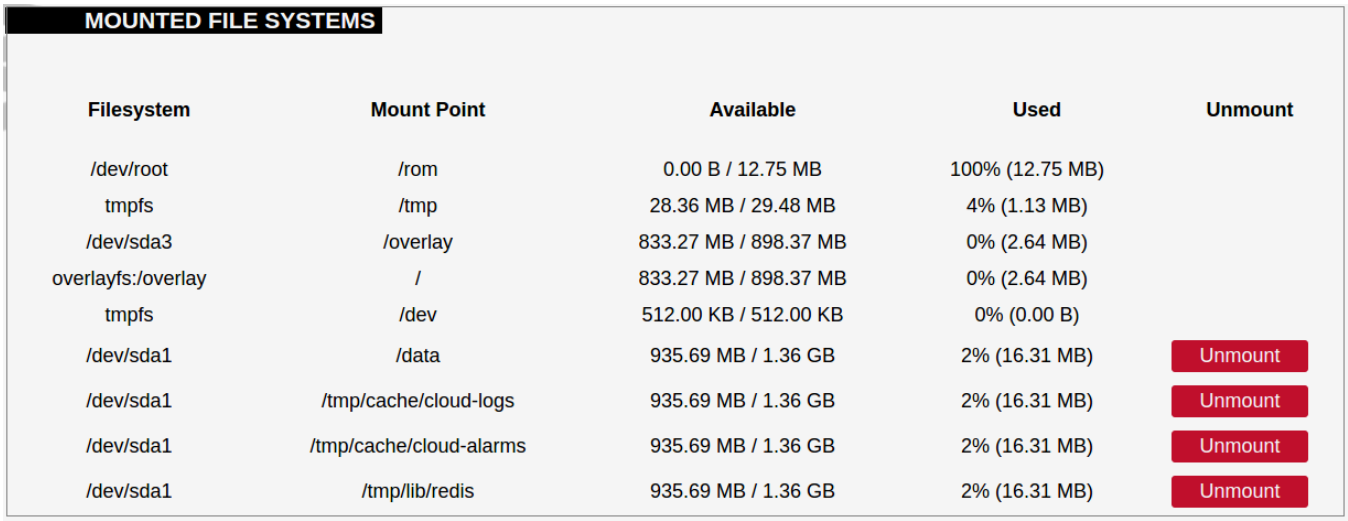
Mount points

Global settings



File system mount point configuration window.
Generate Config: Find all currently attached filesystems and swap and replace configuration with defaults based on what was detected.
Anonymous Swap: Mount swap not specifically configured.
Anonymous Mount: Mount filesystems not specifically configured.
Automount Swap: Automatically mount swap on hotplug.
Automount Filesystem: Automatically mount filesystems on hotplug.
Check filesystems before mount: Automatically check filesystem for errors before mounting.

Mounted file systems

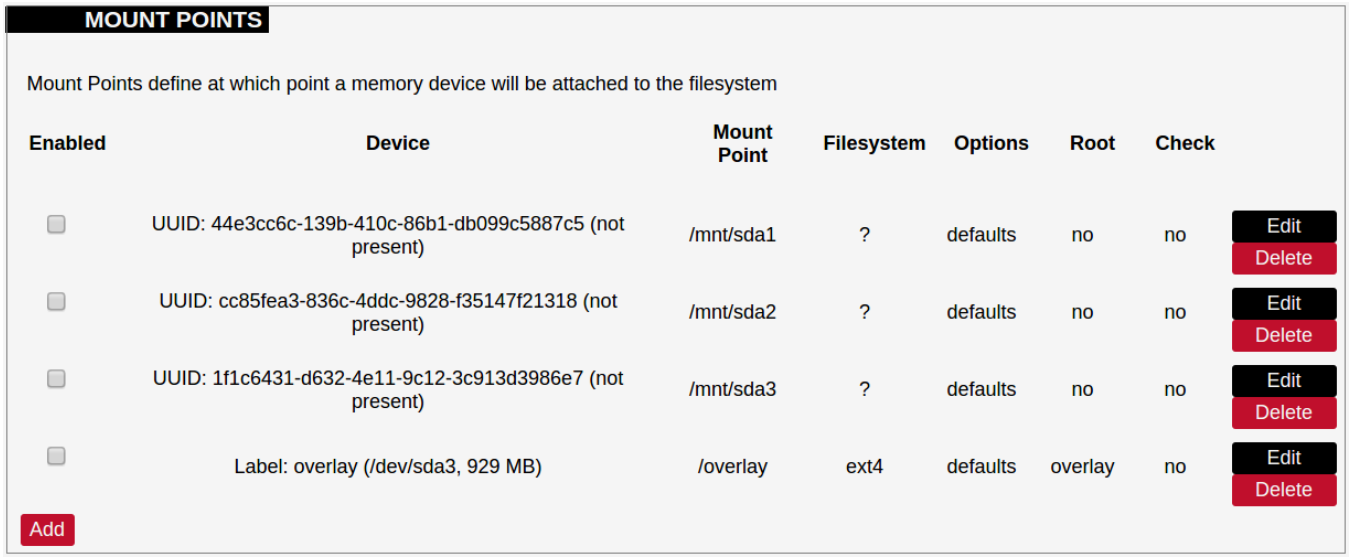


MOUNTED FILE SYSTEMS

Filesystem	Mount Point	Available	Used	Unmount
/dev/root	/rom	0.00 B / 12.75 MB	100% (12.75 MB)	
tmpfs	/tmp	28.36 MB / 29.48 MB	4% (1.13 MB)	
/dev/sda3	/overlay	833.27 MB / 898.37 MB	0% (2.64 MB)	
overlayfs:/overlay	/	833.27 MB / 898.37 MB	0% (2.64 MB)	
tmpfs	/dev	512.00 KB / 512.00 KB	0% (0.00 B)	
/dev/sda1	/data	935.69 MB / 1.36 GB	2% (16.31 MB)	Unmount
/dev/sda1	/tmp/cache/cloud-logs	935.69 MB / 1.36 GB	2% (16.31 MB)	Unmount
/dev/sda1	/tmp/cache/cloud-alarms	935.69 MB / 1.36 GB	2% (16.31 MB)	Unmount
/dev/sda1	/tmp/lib/redis	935.69 MB / 1.36 GB	2% (16.31 MB)	Unmount

List of mounted file systems, some of which can be dismounted manually.

Mount points



MOUNT POINTS

Mount Points define at which point a memory device will be attached to the filesystem

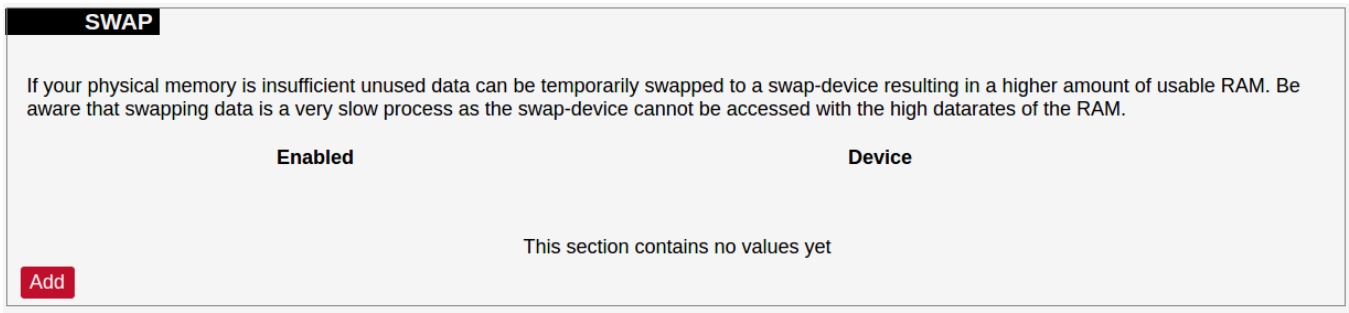
Enabled	Device	Mount Point	Filesystem	Options	Root	Check	
☐	UUID: 44e3cc6c-139b-410c-86b1-db099c5887c5 (not present)	/mnt/sda1	?	defaults	no	no	Edit Delete
☐	UUID: cc85fea3-836c-4ddc-9828-f35147f21318 (not present)	/mnt/sda2	?	defaults	no	no	Edit Delete
☐	UUID: 1f1c6431-d632-4e11-9c12-3c913d3986e7 (not present)	/mnt/sda3	?	defaults	no	no	Edit Delete
☐	Label: overlay (/dev/sda3, 929 MB)	/overlay	ext4	defaults	overlay	no	Edit Delete

Add

List of mount points which can be enabled, disabled or deleted.

Swap

Swap section is used to describe the virtual memory that can be used if there's a lack of main memory. WCC Lite does not use any virtual memory by default.



SWAP

If your physical memory is insufficient unused data can be temporarily swapped to a swap-device resulting in a higher amount of usable RAM. Be aware that swapping data is a very slow process as the swap-device cannot be accessed with the high datarates of the RAM.

Enabled	Device
This section contains no values yet	

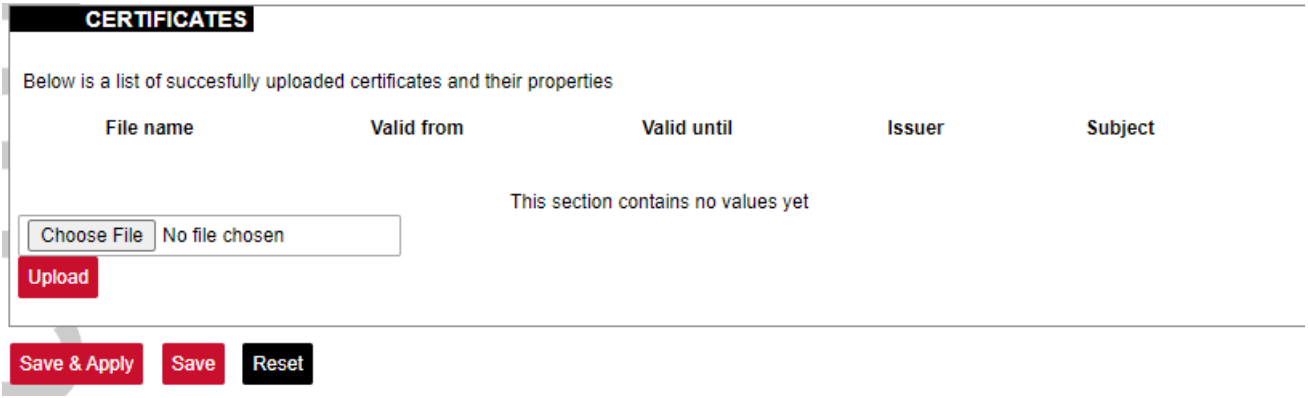
Add

It should be noted that virtual memory might do a lot of reading and writing operations. As WCC Lite uses SD card as an additional flash memory, it is highly advised to not use swap to reduce wearing.

Board

Here a user can configure PORT1 as RS-485 or RS-232.

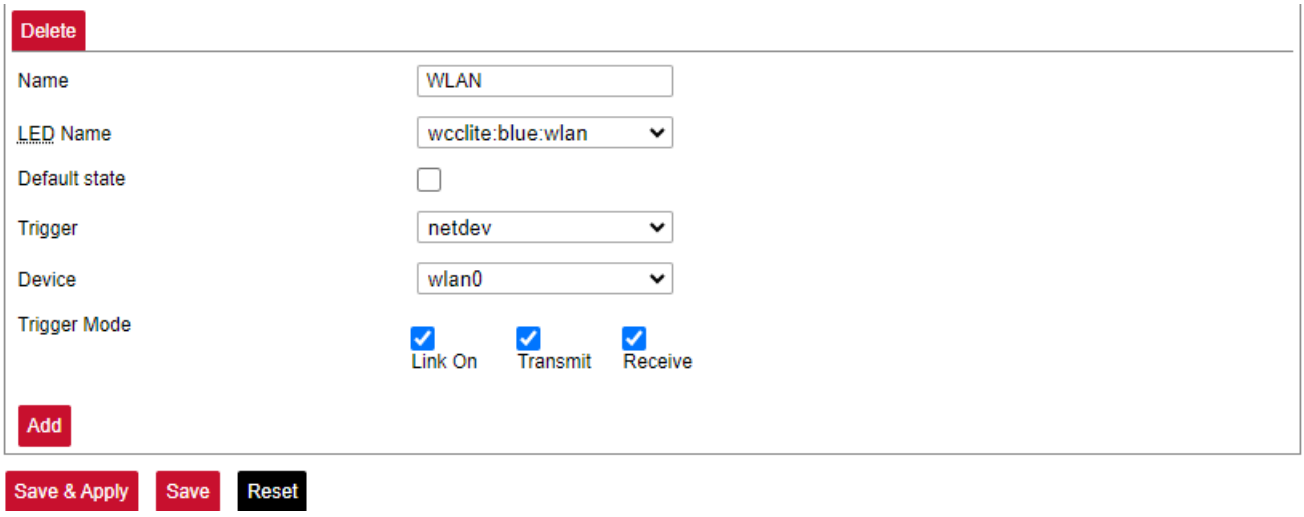
Certificate storage



This section is intended to upload certificate files and viewing information about them.

LED configuration

WCC Lite has three LEDs that can be configured: WAN, LAN and WLAN. All of the LEDs have a default configuration which should fit most of the cases.



All possible LED configuration options: Name: Name of the LED configuration.

LED Name: Colour and location of the LED. These can be changed, however, normally they should be left unchanged.

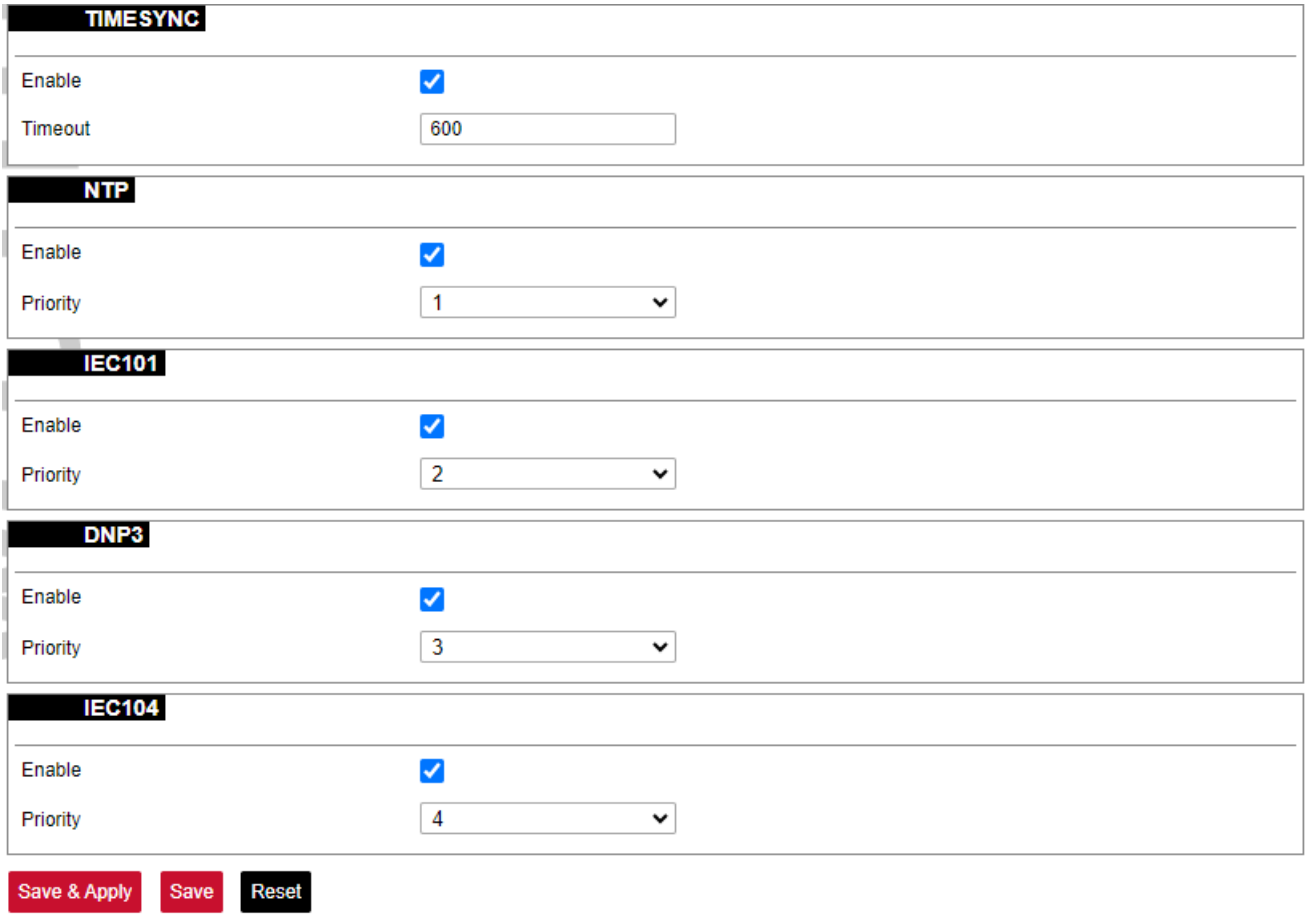
Default state of the LED: On/Off.
Trigger: One of the various triggers can be assigned to an LED to changes its states. Possible values are shown in a table below.

Table. Possible trigger for an LED:

Trigger type	Description
none	No blinking function assigned to LED
defaulton	LED always stays on
timer	Blinking according to predefined timer pattern
heartbeat	Simulating actual heart beats
nand-disk	Flashed as data is written to flash memory
netdev	Flashes according to link status and send/receive activity
phy0rx, phy0tx, phy0radio, phy0tpt, phy0assoc	Flashed on WiFi activity events
usbdev	Turned on when USB device is connected. Applicable for modems

Device: Network interface which is going to be tracked.

Time sync



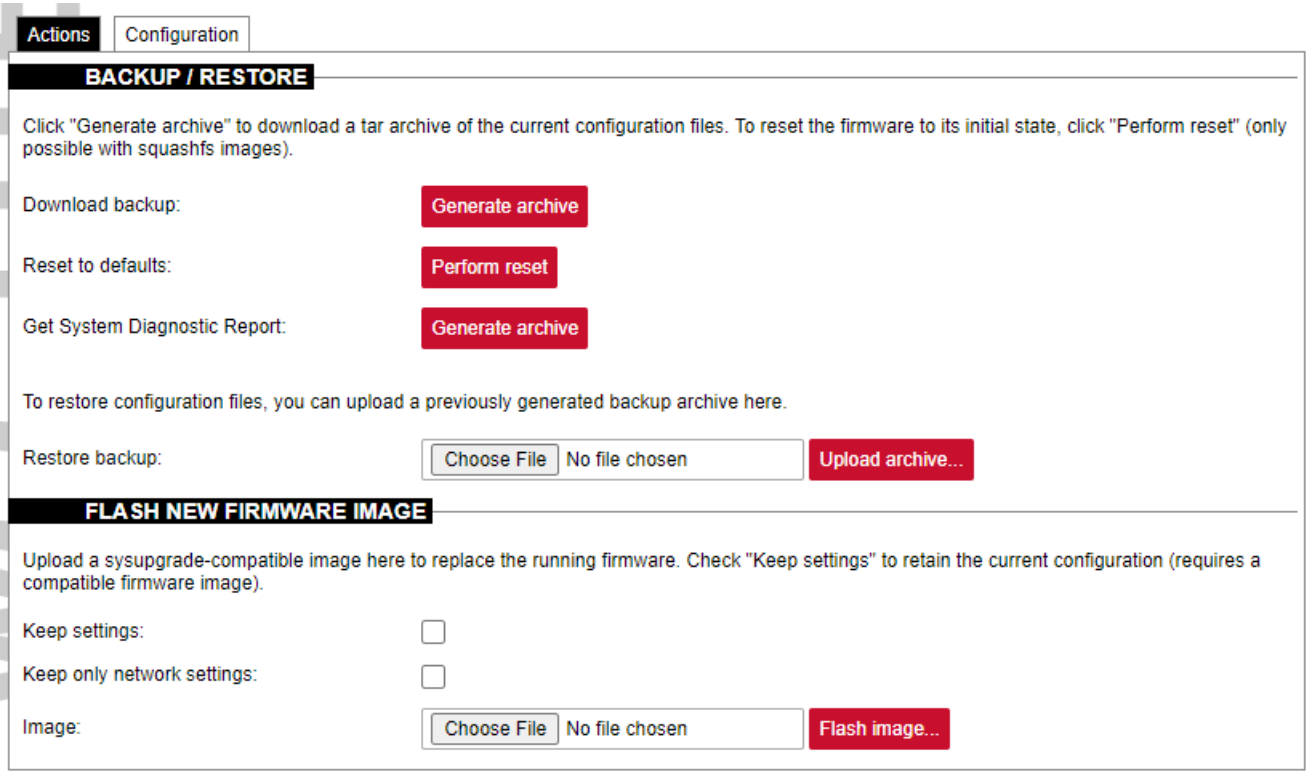
This service syncs WCC Lite time with protocols shown. Here user can also select priority levels of protocols which syncs with WCC Lite.

Backup/flash firmware

Software update allows to upgrade the software running in WCC Lite. It is recommended to keep the device up to date to receive the latest features and stability fixes.

Backup archives contain complete WCC Lite configuration that can be restored at any time. A file will be downloaded by your browser when creating a backup. This file can be later uploaded to the web page to restore configuration.

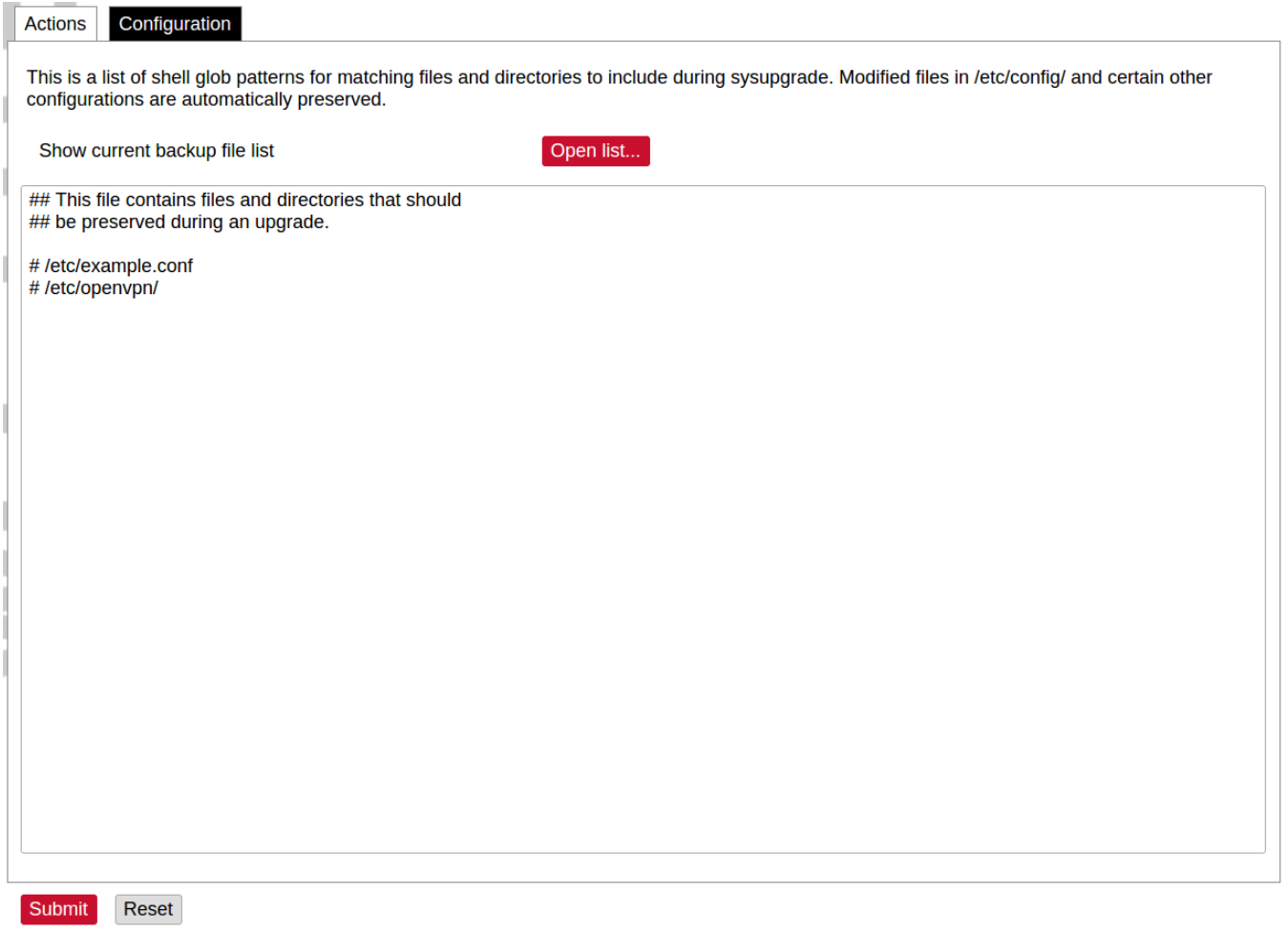
Generated backup archive should only be applied to the same firmware version it was generated. Applying backup to a different firmware version might render some parts of operating system unstable or even unusable



Since version 1.8.3, user can save network settings before upgrading the firmware, such as firewall settings, traffic rules, interfaces etc. To do so, before upgrading firmware, "Keep only network settings:" box should be checked.

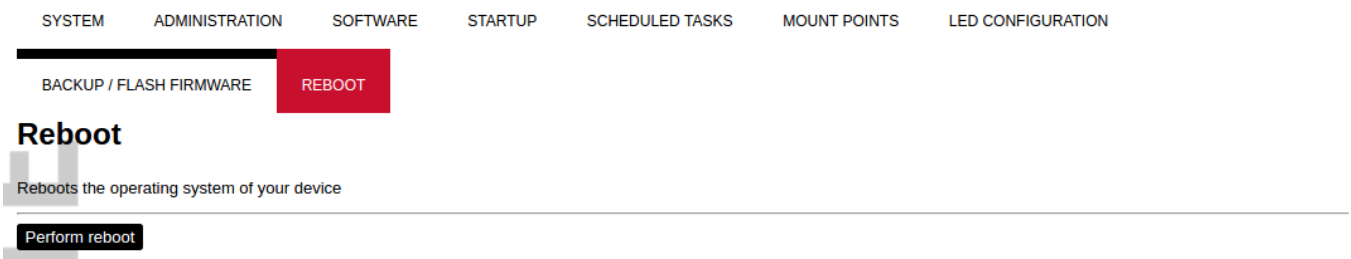
A user can choose to keep existing settings after an upgrade. Marking Keep Settings checkbox preserves files listed in /etc/sysupgrade.conf and /lib/upgrade/keep.d/. It is advised to do a clean install and use backup files to restore settings later if a user intends to make a major system upgrade.

Uploading firmware image, to preserve RAM memory, will stop all Protocol HUB processes. After upload, you will have 2 minutes to proceed with firmware flash or to cancel it. After 2 minutes, firmware file will be deleted and Protocol HUB processes will be restarted.



A file name /etc/sysupgrade.conf can be updated via WCC Web interface. To preserve additional file user should add them to backup file and press Submit. To get the whole list files that would be backed up press Open list.... It is advised to check it before doing a back-up or an upgrade while keeping settings.

Reboot



This reboots the operating system of the device.

8.6 Services

Services tab shows the services of the device and contains the following subsections:

Services tab shows the services of the device and contains the following subsections:

- TELEMETRY AGENT: device telemetry sending to a remote server;
- IPSEC: encrypted virtual private network (VPN) configuration.
- API: application programming interface configuration.
- OPENVPN: shows the open-source software application that implements virtual private network (VPN).
- SER2NET: network-to-serial proxy;

Telemetry agent

Having data about the device helps to easily maintain it. Telemetry agent gathers information in a compact and easily decodable way. It uses UDP packets therefore only small overhead is introduced.

However, UDP does not guarantee the arrival of sent packets therefore not every message might reach the server saving these messages.

To start using Telemetry agent a user should configure and enable it. Four options are available:

- Enable agent;
- Server address;
- Port (UDP);
- Period (s).

Every time timer of period length expires, a message is sent to a server of configured server if service is enabled .

⚠ Telemetry agent doesn’t start as a service if Enable agent checkbox is unchecked.

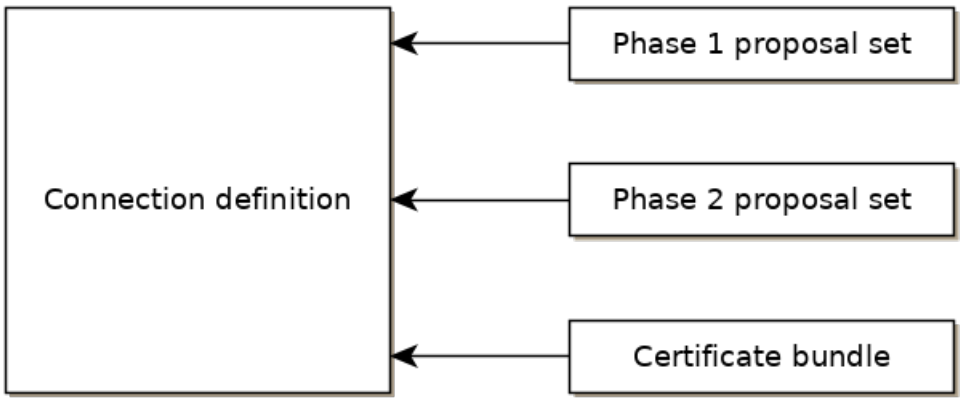
ℹ Enabling agent and saving the configuration automatically starts the process with the new configuration.

IPsec

Background

WCC Lite supports ipsec vpn, thus is able to deliver data securely over encrypted link. To establish ipsec vpn, a connection definition must be created by entering appropriate configuration settings.

For advanced connection description auxiliary settings sets can be defined. They can be joined to the connection and can be reusable several times according to the need. Each configuration record is identified by a unique name, which is assigned in time of creation. The following diagram shows relations between connection and auxiliary sets.



Ipsec settings

Connection description

Options supported by WCC lite is described below.

Item	Type	Description
Gateway	string	Host name or IP address of the remote peer.
Type	selector	Tunnel mode: full packet encryption, covers host-to-host, host-to-subnet, subnet-to-subnet situations or transport mode: ip payload encryption, secures host-to-host data only.
Local subnet	string	Specifies local network, in form network/netmask, for example 192.168.11.0/24
Remote subnet	string	Specifies remote network at another side of a tunnel.
Authentication	selector	Pre-shared key or RSA certificate
Pre-shared key	string	Available if Authentication set to Pre-shared key
Certificate set	selector	Available if Authentication set to RSA certificate. Selectable from configured auxiliary set.
Phase 1 proposal (IKE)	selector	Authentication-encryption schema, selectable from configured auxiliary set.
Phase 2 proposal (ESP)	selector	Authentication-encryption schema, selectable from configured auxiliary set.
Local ID	string	Specifies the identity of the local endpoint
Remote ID	string	Specifies the identity of the remote endpoint
Key exchange	selector	Sets method of key exchange IKEv2 or IKEv1. Default IKEv2.
Exchange mode	selector	Main or aggressive. Available if key exchange is set to IKEv1.
Use compression	checkbox	If selected a compression ability will be proposed to the peer.
DPD action	selector	Controls the use of dead peer detection protocol, values: • none – default, disables sending of DPD messages. • clear – the connection closed with no action. • hold – keeps description, tries re-negotiate connection on demand. • restart – will try to re-negotiate immediately.
DPD delay	string	Time interval in seconds between peer check. Default 30.
DPD timeout	string	Time in seconds after which peer consider to be unusable. IKEv1 only. Default 150.
Key lifetime	string	Lifetime of data channel in seconds . Default 10800.
IKE lifetime	string	Lifetime of keying channel in seconds. Default 3600.

Auxiliary settings

Phase 1 proposals - IKE/ISAKMP cipher suite components:

Item	Type	Description	Note
Encryption algorithm	selector	Encryption algorithm – 3DES, AES128, AES192, AES256.	required
Hash algorithm	selector	Hash algorithm – MD5, SHA1, SHA256, SHA384 or SHA512.	required
DH exponentiation	selector	Specifies Diffie-Hellman groups – 1,2,5,14,15,16,18	required

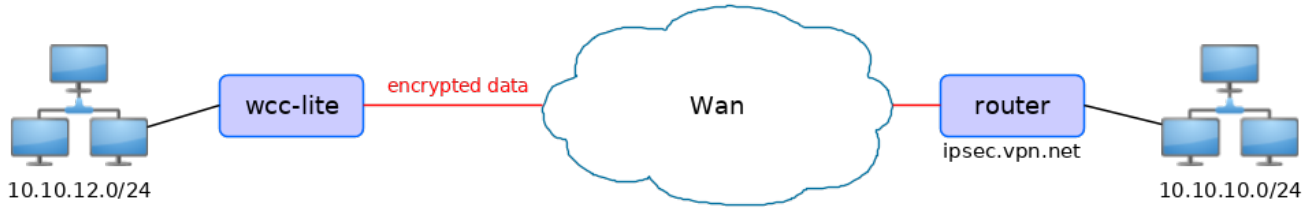
Phase 2 proposals - ESP cipher suite components:

Item	Type	Description	Note
Encryption algorithm	selector	Encryption algorithm – 3DES, AES128, AES192, AES256.	required
Hash algorithm	selector	Hash algorithm – MD5, SHA1, SHA256, SHA384 or SHA512.	required
DH exponentiation	selector	Specifies Diffie-Hellman groups – 1,2,5,14,15,16,18	optional

The following specification and topology map corresponds to settings used in further configuration walk-through example.

Creating a connection description

Site-to-Site VPN scenario



VPN connection details

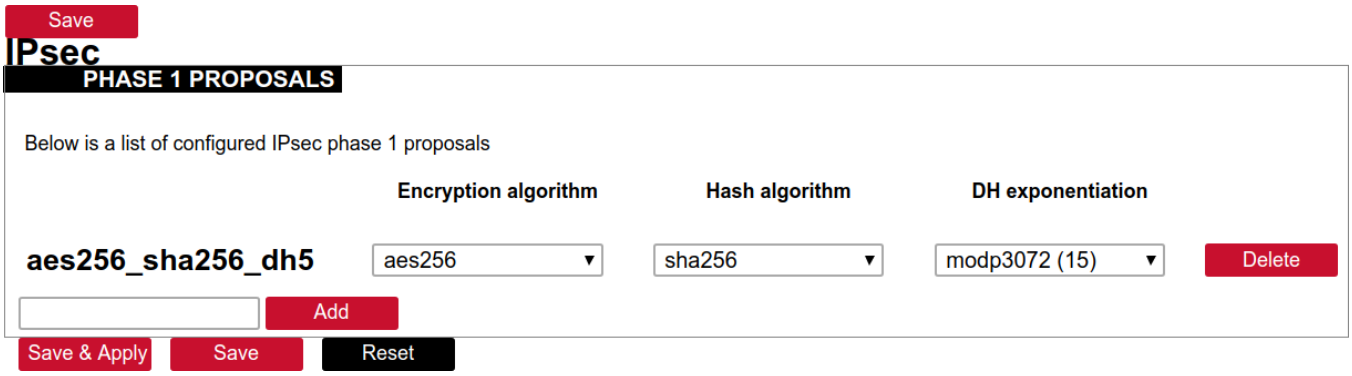
Tunnel: demoo

```
IPSec peer: ipsec.vpn.net
Pre-shared key: thebigsecret
Mode: tunnel
Remote network: 10.10.10.10/24
Local network: 10.10.12.0/24
Local ID: wcclite
IKE authentication: aes256
IKE hash: sha256
IKE DH group: 5 (modp1536)
ESP authentication: aes128
ESP hash: sha1
```

If auxiliary data is needed, it is recommended to check or define it first.

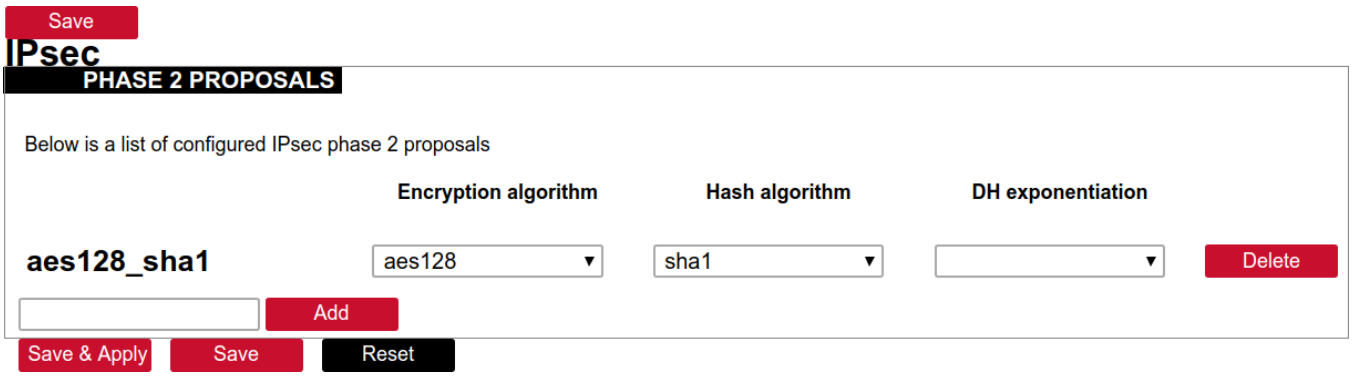
Creation of Phase 1 proposal

- Enter section “Phase 1 proposals”.
- Create a new record by assigning new name, for example “aes256-sha256-dh5” and click the button “Add”.
- Choose corresponding values: encryption, hash algorithm and DH exponentiation.
- Push “save” to save the data.



Creation of Phase 2 proposal

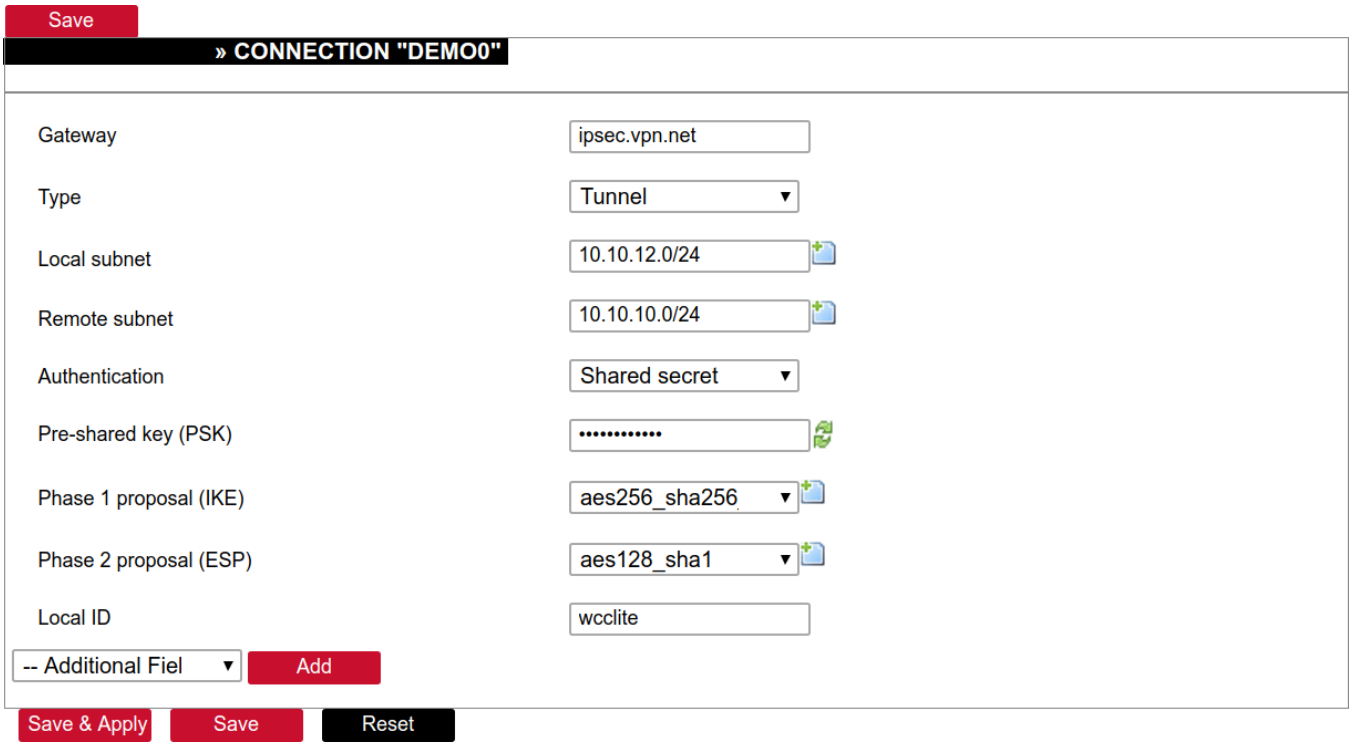
- Enter section “Phase 2 proposals”.
- Create a new record by assign new name for example “aes128-sha1” and click the button “Add”.
- Choose corresponding values: encryption, hash algorithm.
- Push “save” to save the data.



Creation of tunnel definition

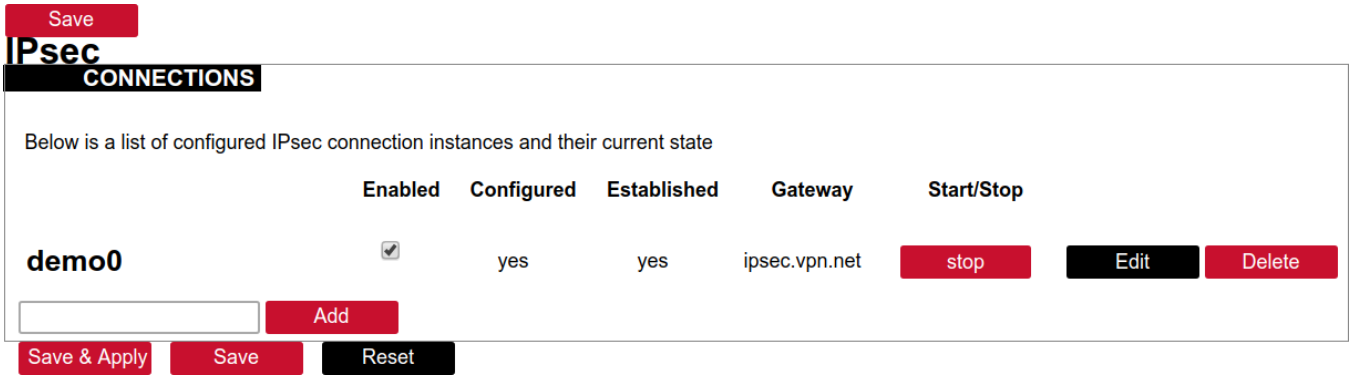
Enter section connections

- Create a new record by assigning new name (e.g.“demo0”) and clicking “Add”.
- Call a detail form by pushing the button “edit”.
- Enter peer address into “Gateway”: “ipsec.vpn.net”.
- Ensure “Type” is set to: “Tunnel”.
- Fill local subnet to: 10.10.12.0/24.
- Fill remote subnet to: 10.10.10.0/24.
- Make sure authentication is set to: “Shared secret”.
- Enter Pre-shared key (PSK): thebigsecret.
- “Phase 1 proposal (IKE)”, choose a value: aes256_sha256_dh5.
- “Phase 2 proposal (ESP)”, choose a value: aes128_sha1.
- Locate combo box “additional field”, select “Local ID”, then set value to: wcclite.
- Push “Save”.



Activating the tunnel

- Return to the section “connections”.
- Check the checkbox “Enabled”.
- Push the button “save & apply”.
- Examine indicator “configured”, it should be “yes”, if not, review settings just entered.
- The tunnel should be prepared for operation and will be established on demand.
- Optionally, it is possible to establish tunnel operation by pressing button “start”.



L2TP/IPsec

Because of the lack of confidentiality inherent in the L2TP protocol, it is often implemented along with IPsec. This is referred to as L2TP/IPsec, and is standardized in IETFRFC 3193. The process of setting up an L2TP/IPsec VPN is as follows:

- Negotiation of IPsec security association (SA), typically through Internet key exchange (IKE). This is carried out over UDP port 500, and commonly uses either a shared password (so-called ”pre-shared keys”), public keys, or X.509 certificates on both ends, although other keying methods exist.
- Establishment of Encapsulating Security Payload (ESP) communication in transport mode. The IP protocol number for ESP is 50 (compare TCP’s 6 and UDP’s 17). At this point, a secure channel has been established, but no tunneling is taking place.
- Negotiation and establishment of L2TP tunnel between the SA endpoints. The actual negotiation of parameters takes place over the SA’s secure channel, within the IPsec encryption. L2TP uses UDP port 1701.

When the process is complete, L2TP packets between the endpoints are encapsulated by IPsec. Since the L2TP packet itself is wrapped and hidden within the IPsec packet, no information about the internal private network can be gathered from the encrypted packet. Also, it is not necessary to open UDP port 1701 on firewalls between the endpoints, since the inner packets are not acted upon until after IPsec data has been decrypted and stripped, which only takes place at the endpoints. A potential point of confusion in L2TP/IPsec is the use of the terms tunnel and secure channel. The term tunnel refers to a channel which allows untouched packets of one network to be transported over another network. In the case of L2TP/PPP, it allows L2TP/PPP packets to be transported over IP. A secure channel refers to a connection within which the confidentiality of all data is guaranteed. In L2TP/IPsec, first IPsec provides a secure channel, then L2TP provides a tunnel.

API

The firmware of the WCC Lite features a built-in API which is accessible via the web interface.

⚠ As of version 1.2.11, it does not implement any access restriction features apart from those provided by the firewall functionality.

Individual API endpoints can be enabled or disabled via the web configuration interface at Services->API.

ℹ All endpoints are disabled by default.

Available API endpoints are shown in the table below.

Table. Available API endpoints:

Endpoint	Description
/api/version	Version of the API
/api/actions	List of available points
/api/syncVersion	Version of the sync service
/api/sync	Protocol hub configuration sync (name=”file”)*
/api/syslog	Prints out the syslog
/api/systemInfo	General system info
/api/gsmInfo	GSM modem information
/api/devices	List of configured devices
/api/device/info	Device information (name=”device_alias”)**
/api/device/tags	List of tags on particular device (name=”device_alias”)**
/api/device/tag/value	Tag value (name=”device_alias”, name=”signal_alias”)**
/api/tags	List of configured tags
/api/sysupgrade	Firmware upgrade (name=”file”)*

* Endpoints accepting files

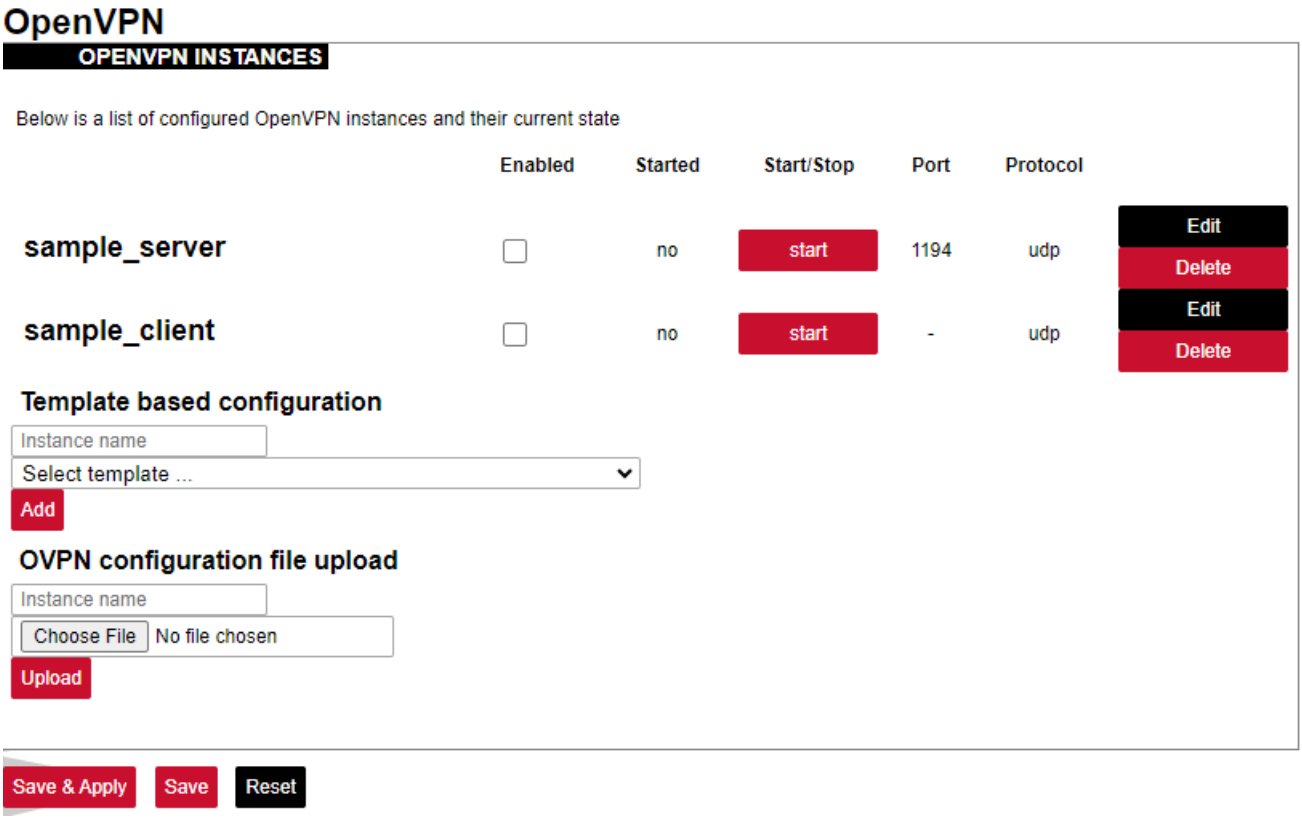
** Endpoints accepting field data

The API accepts data and files as POST requests encoded as ”multipart/form-data”.

OpenVPN

OpenVPN Instances

The primary goal is to get a working WCC Lite tunnel and establish a basic platform for further customization. Most users will require further configuration tailored to their individual needs. If you are creating an OpenVPN server (either type), you must create security certificates using the instructions below. If you are using OpenVPN as a client, the required certificates should have been provided with your configuration details. OpenVPN can be configured either by using WCC Lite Web interface or uploading the OVPN file containing necessary parameters. OpenVPN will automatically attempt to load all *.conf files placed in the /etc/openvpn folder. Several OpenVPN recipes are suggested containing most used configurations that may only require minor changes. If a user intends setting up OpenVPN without OVPN file, it is highly advised to use these recipes and tweaking them up to individual needs.



OpenVPN instances page contains parameters to be configured.

Enabled: Flag to specify if a particular configuration should be enabled;

Started: Specifies if a particular configuration has been started by OpenVPN;

Start/Stop: Button to manually start or stop any configured tunnels;

Port: Specifies the listening port of this service;

Protocol: A standard that defines how to establish and maintain a network connection: UDP - User Datagram Protocol, TCP - Transmission Control Protocol.

More parameters for every instance can be changed by pressing Edit button, configuration can be removed with Delete button. Pressing Edit takes the user to main configuration screen containing the options usually used in particular OpenVPN recipes. To do more specific changes user should further select Switch to advanced configuration.

OVPN files contain configuration in a textual form therefore changing parameters requires having prior knowledge about different OpenVPN parameters. It is advised to used OVPN files, however, if configuration has been pre-built beforehand and is used without further changes.

ser2net

The ser2net daemon allows telnet and tcp sessions to be established with a device's serial ports. The program comes up normally as a daemon, opens the TCP ports specified in the configuration file, and waits for connections. Once a connection occurs, the program attempts to set up the connection and open the serial port. If another user is already using the connection or serial port, the connection is refused with an error message.

SNMP

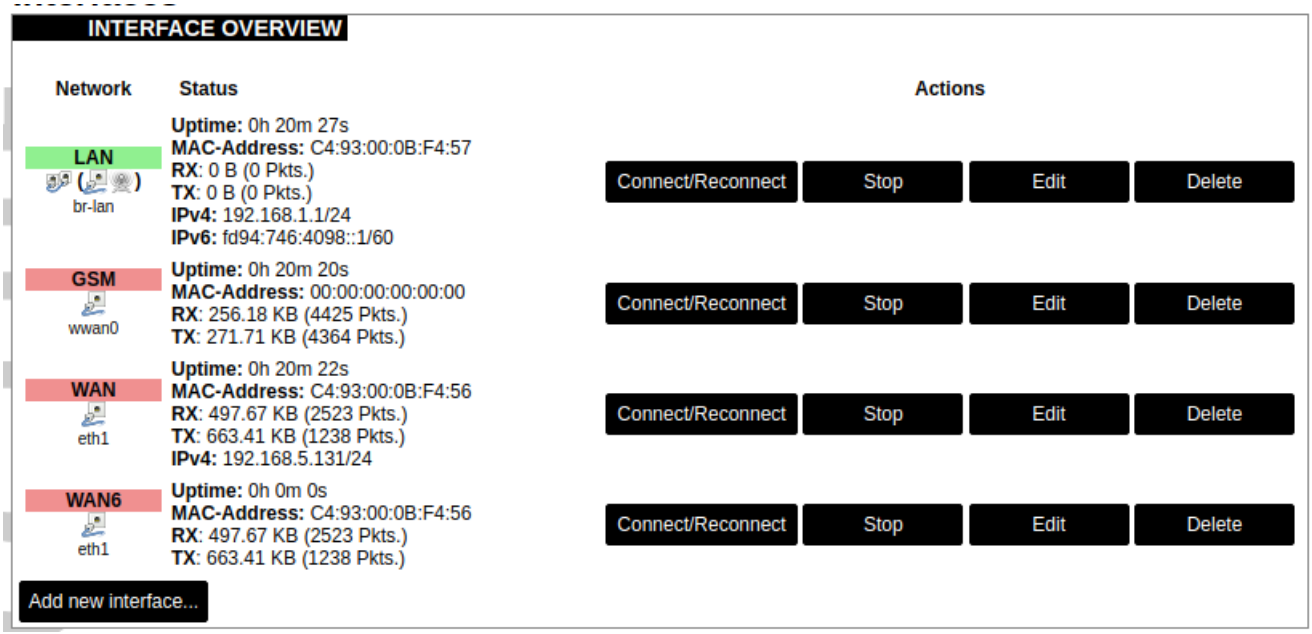
SNMP (Simple Network Management Protocol) is an internet-standard protocol for managing devices on IP networks. SNMP exposes management data in the form of a hierarchy of variables in a MIB (Management Information Base). WCC Lite supports SNMP service which is not added to default build of firmware but can be installed as a module. It enables user to collect data on various parameters of system:
• CPU time - time spent for calculations of various processes:
user - time for user processes;
system - time for system processes;
idle - time spent idling;
interrupts - time spent handling interrupts.
• CPU load average - CPU load average for 1, 5 and 15 minutes respectively;
• Disk usage:
total - total amount of storage in the device (in kB)
available - amount of storage available to store data (in kB)

used - amount of storage used in the device (in KB)
blocks used percentage - blocks (sectors) used to store data in a disk (in kB)
inodes used percentage - the inode (index node) is a data structure in a Unix-style file system that describes a file-system object such as a file or a directory. Each inode stores the attributes and disk block location(s) of the object's data.
• Memory usage - RAM usage statistics:
total - total amount of RAM in the device (in kB);
available - unused amount of RAM in the device (in kB);
shared - shared amount of RAM between multiple processes (in kB);
buffered - refers to an electronic buffer placed between the memory and the memory controller;
cached - a portion of memory made of high-speed static RAM (SRAM) instead of the slower dynamic RAM (DRAM) used for main memory;
• Network interfaces:
MTU - maximum transmission unit to be sent over network;
speed - rate of network transmission;
physical address - unique MAC address assigned to a device;
tx/rx: byte, packet, drop, error count;
• System properties:
uptime - time since the device was turned on;
process uptime - time since the process has been started;
hostname - a label that is assigned to a device connected to a computer network;
name - name of the device (if defined);
location - location of the device (if defined).

8.7 Network

The page shows information about current interface status, its configurations, provides various interface, network properties configuration capabilities and contains the following subsections:
• INTERFACES: shows information about current interface status, allows to create new and configure them.
• WIRELESS: shows information about wireless radio stations, covers physical settings of the wireless hardware.
• DHCP AND DNS: allows management of DHCP and DNS servers.
• HOSTNAMES: allows management of host names.
• STATIC ROUTES: allows management of IPv4 and IPv6 static routes.
• FIREWALL: allows management of firewall zones and various firewall properties.
• DIAGNOSTICS: provides network diagnostics utilities.
• GSM: allows management of gsm modem and SIM cards.

Interfaces



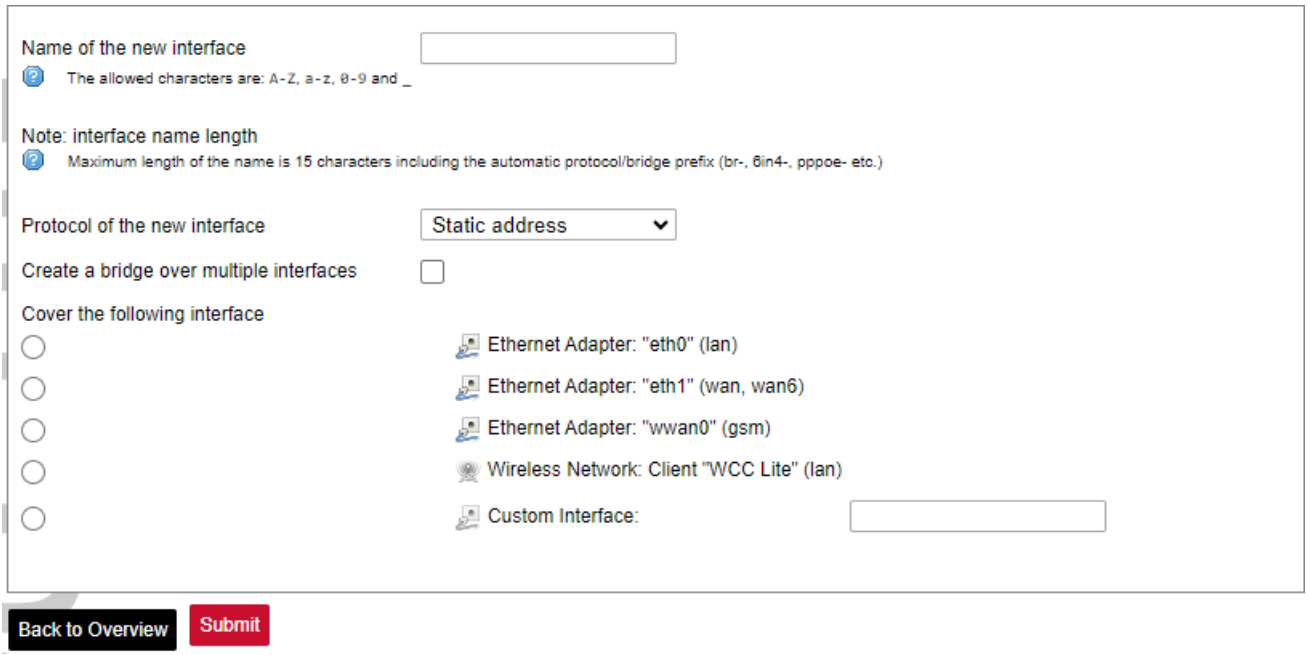
Current information and status of various network interfaces (GSM, LAN, WAN).
Uptime: Current interface uptime in hours, minutes and seconds.
MAC address: Physical interface address.
RX: Received data in bytes (packet count).
TX: Transmitted data in bytes (packet count).
IPv4: Internet protocol version 4 address.
IPv6: Internet protocol version 6 address.

In addition to the network interface status, several actions may be performed:
Connect/Reconnect: Connect to configured interface network if it does not do it automatically. If it already connected to the network it will be trying to reconnect to it.
Stop: Shutdown interface. If you are connected through this interface the connection may be lost.
Edit: Edit interface settings.
Delete: Delete interface.
Add new interface: Adding new Ethernet, GSM or wireless interface with the custom name, protocol and etc.

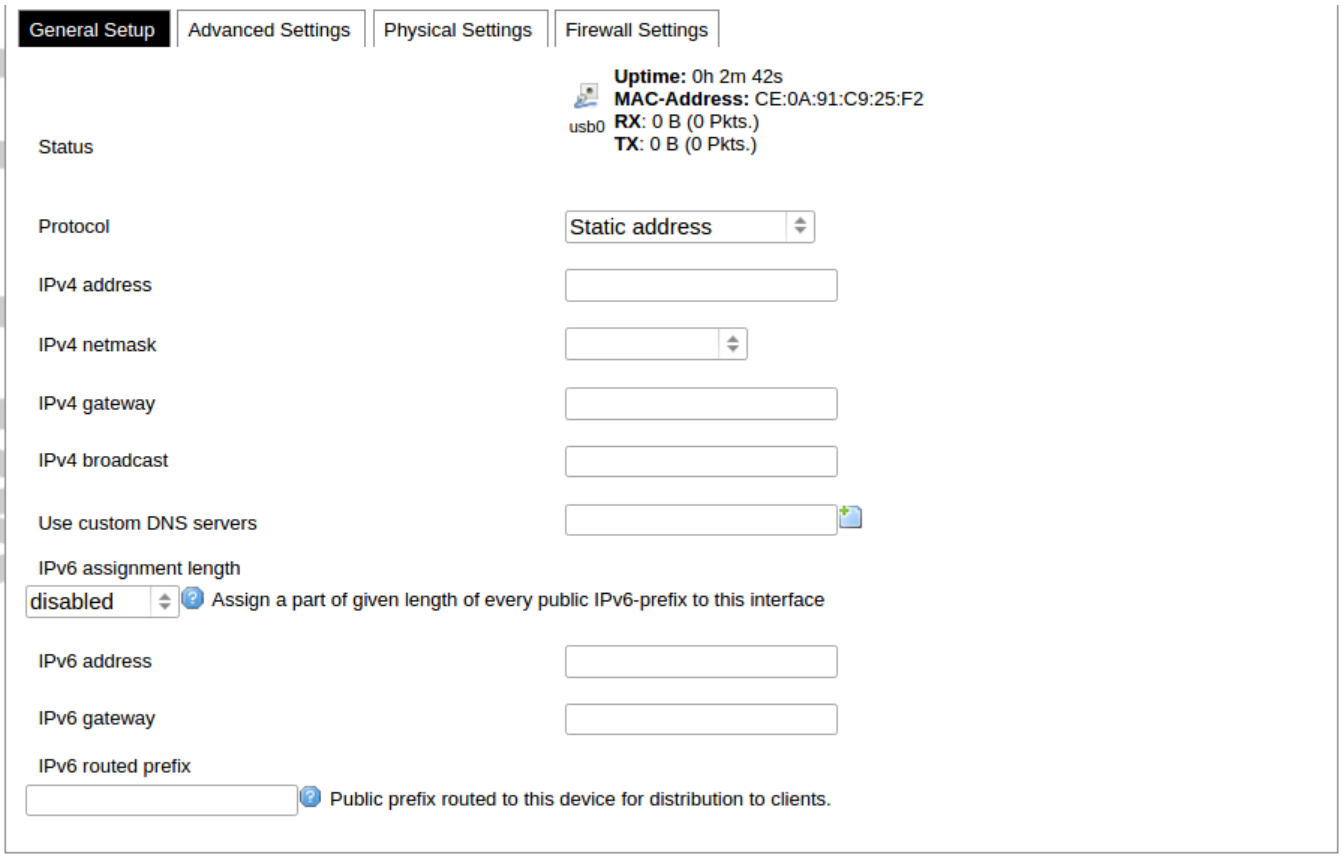
	etho	eth1
Type	Static	DHCP
Address	192.168.1.1	
Subnet mask	255.255.255.0	
Gateway		

Changes will only take effect after device reboots.

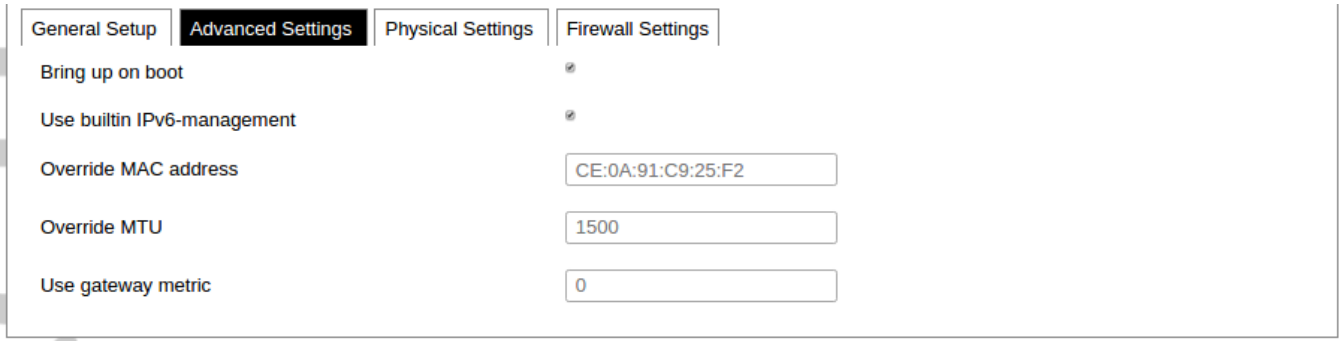
Network interfaces can be configured on the common page, which can be accessed through add new interface or edit button.



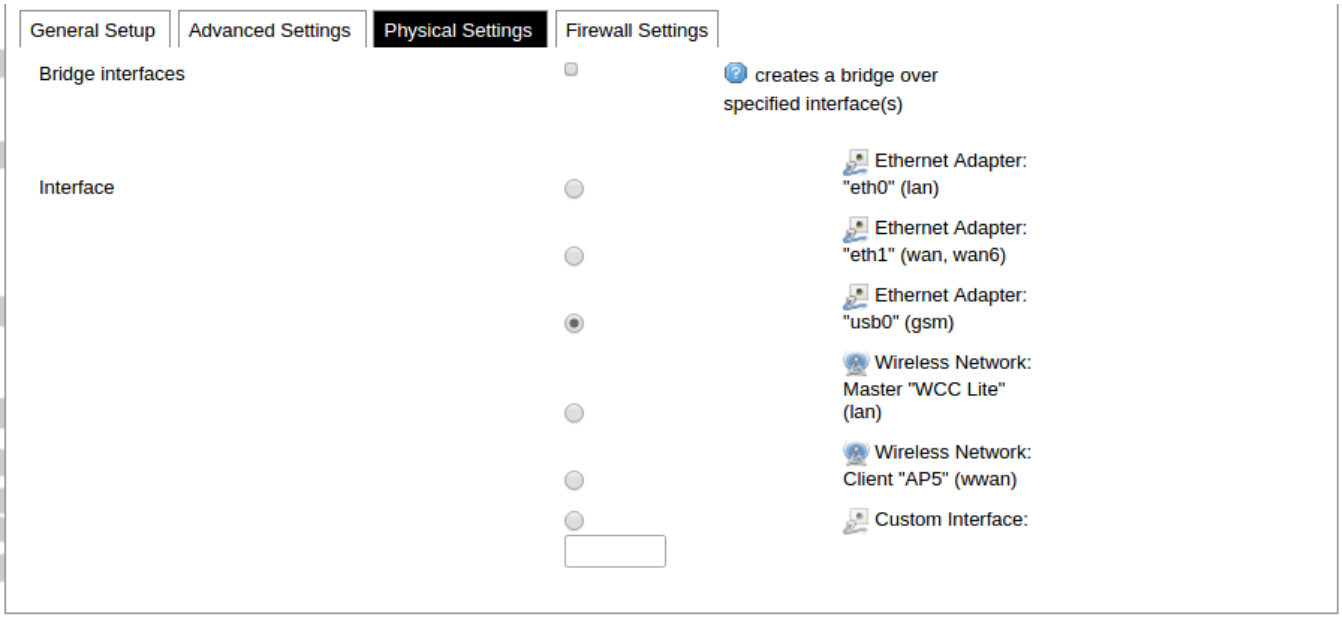
The following options can be defined in the interface creation panel: name of the interface, protocol, coverage of a particular interface or bridging with other interfaces. After the general setup is done, more detailed settings can be set.



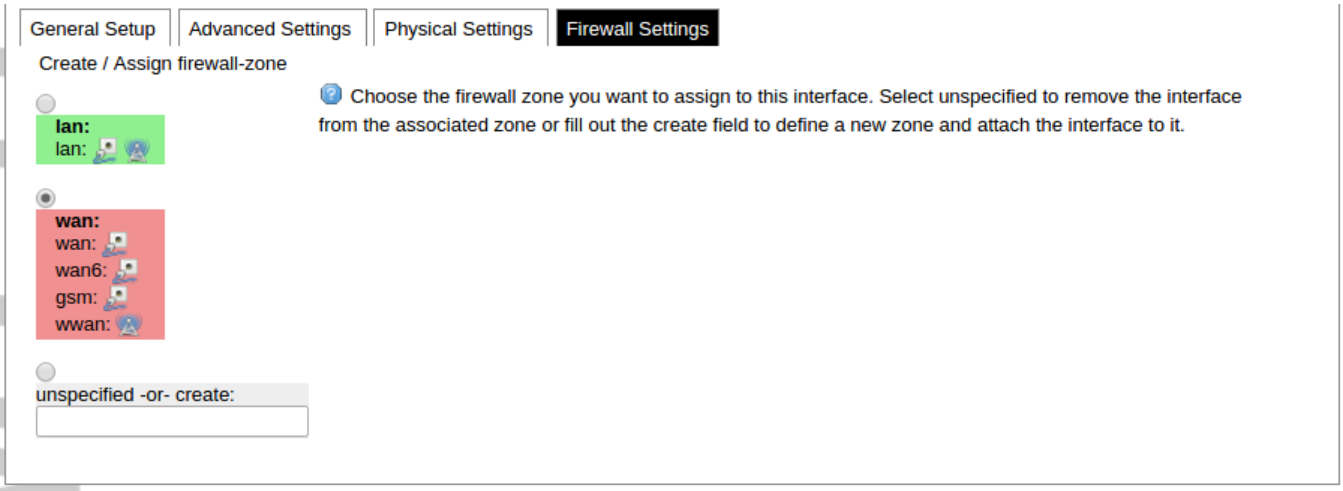
General common interface setup panel.



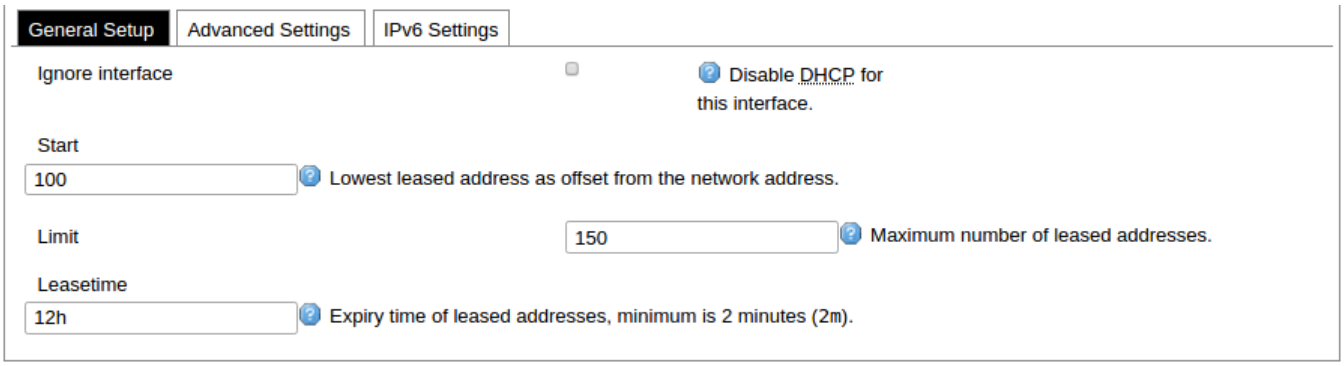
Advanced common interface setup panel.



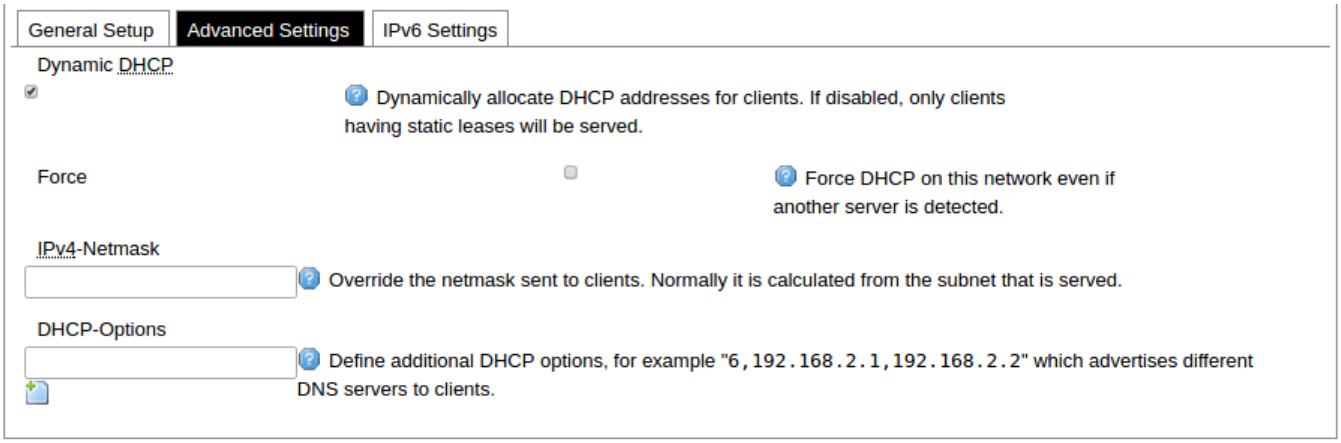
Physical common interface setup panel.



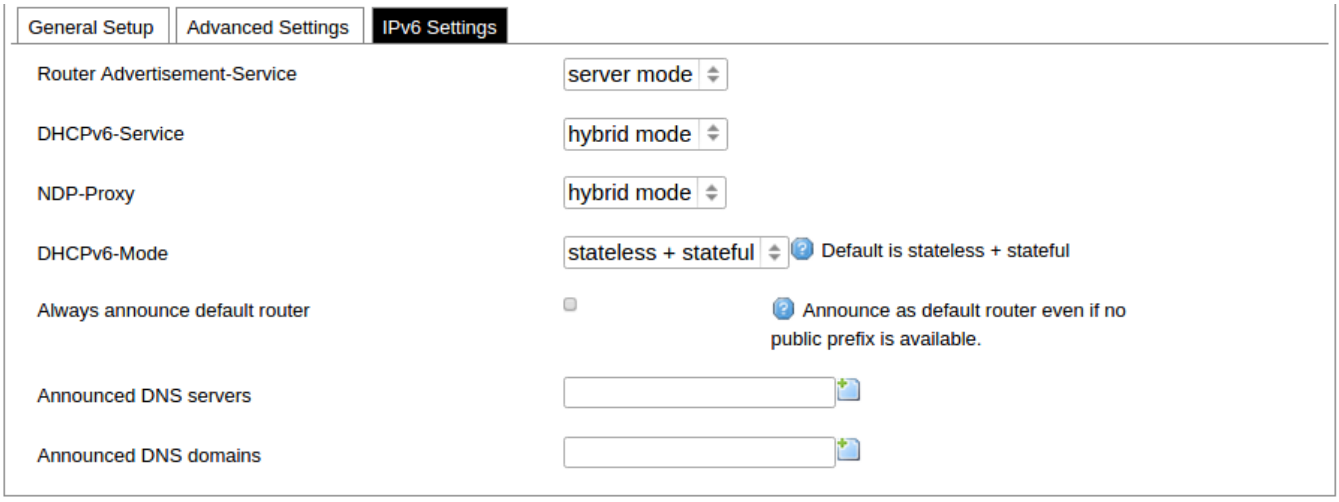
Firewall common interface setup panel.



DHCP server general setup panel.

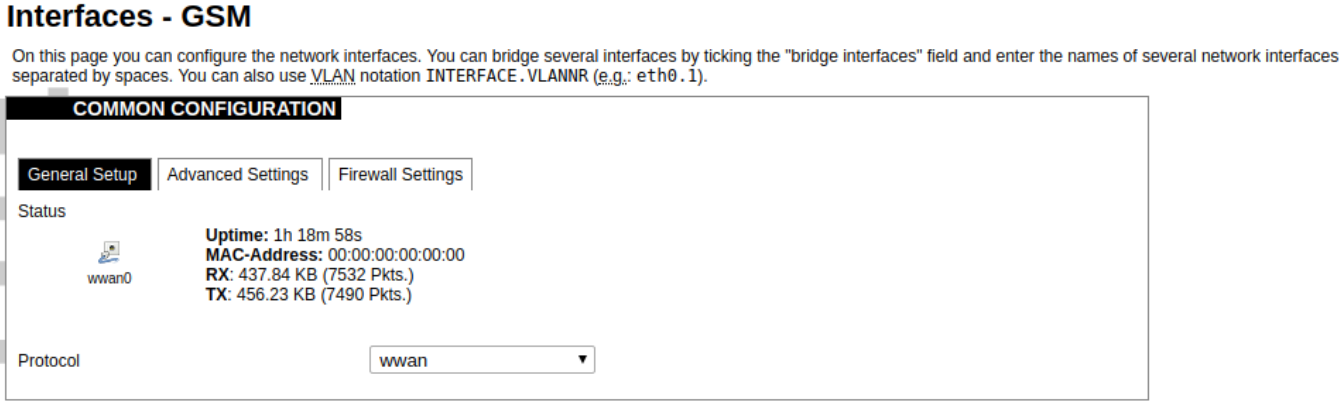


DHCP server advanced setup panel.



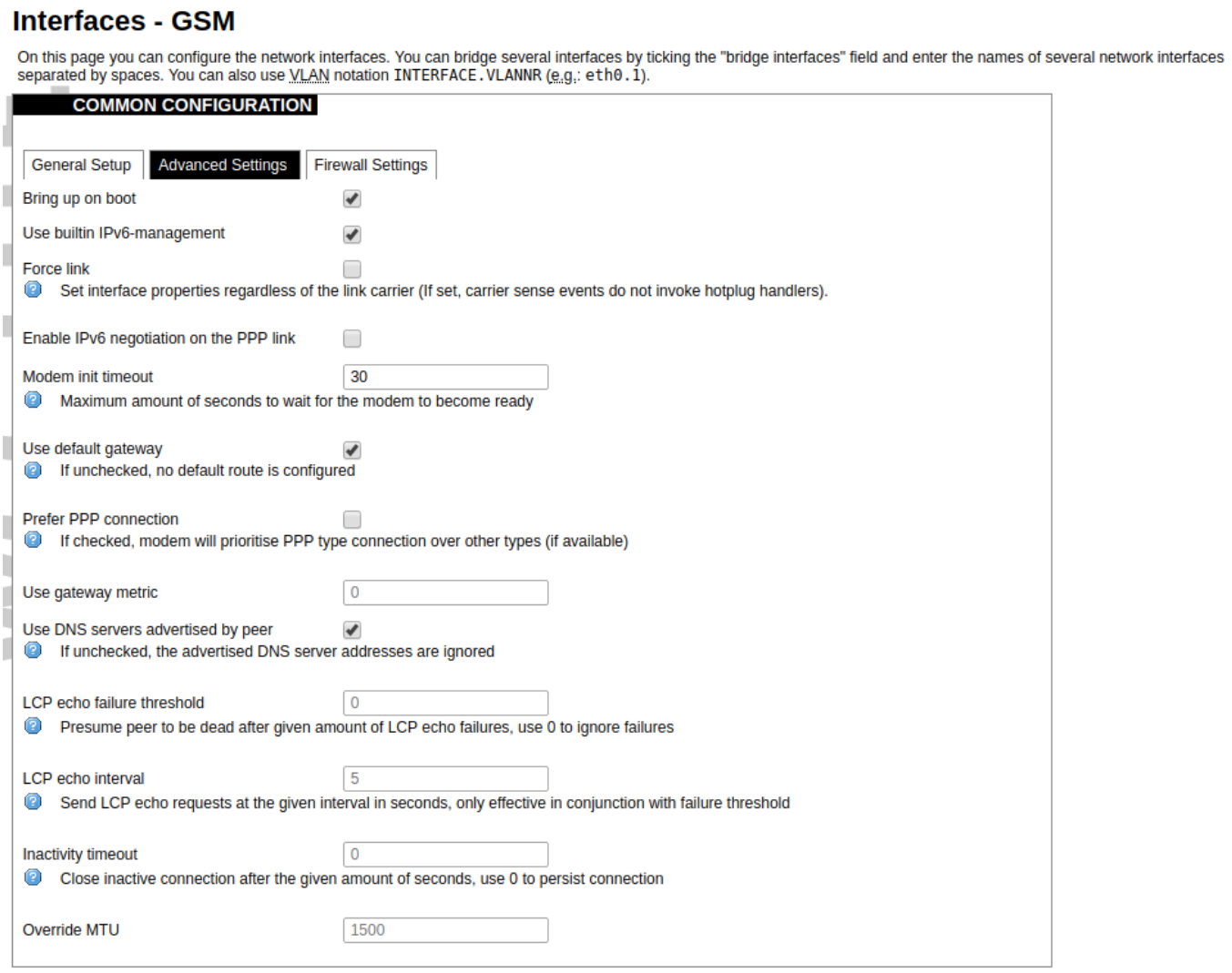
DHCP server IPv6 settings setup panel.

GSM



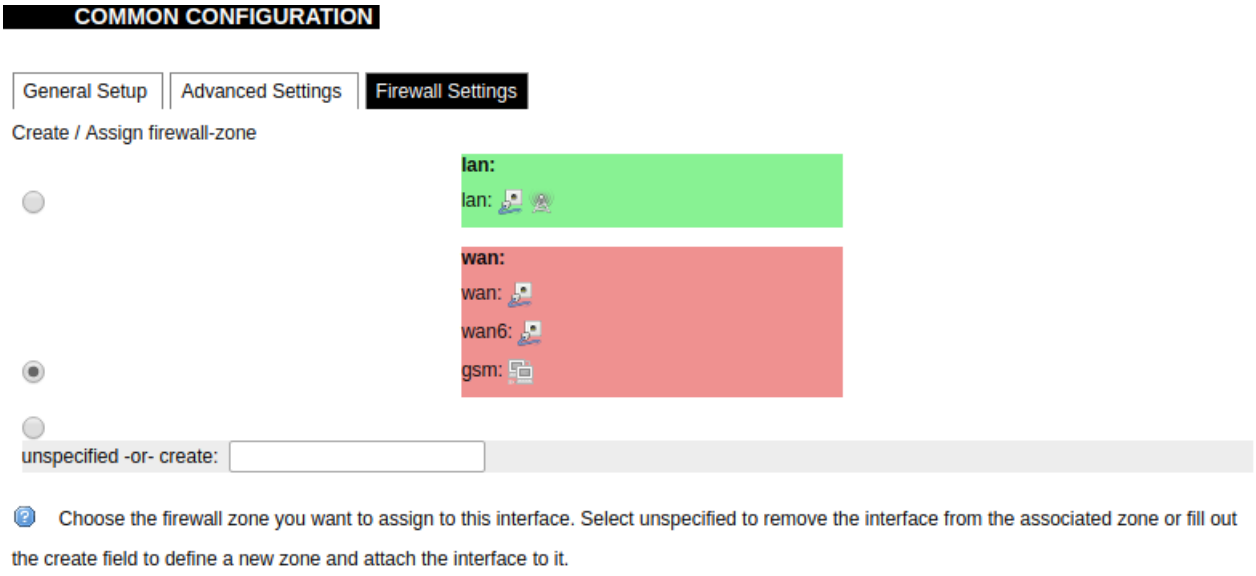
General Settings Information tab. Gives you name of physical GSM interface, lets you choose protocol (not recommended!).

Note: Make sure you won't change GSM interface's protocol, which is set by default to WWAN. Changing this parameter will lead to undefined GSM modem behavior.



Advanced Settings tab enables user to configure advanced settings for mobile communication. It includes the following options:
Bring up on boot: Checkbox to start a GSM interface on startup;
Use built-in IPv6-management: Checkbox to select if the device is going to use its own tools to manage IPv6 transport layer messages;
Force link: Specifies whether IP address, route, and gateway are assigned to the interface regardless of the link being active or only after the link has become active; when active, carrier sense events do not invoke hotplug handlers;
IPv6 support: User can select if IPv6 support is handled automatically, manually or disabled altogether;
Modem init timeout: Maximum amount of seconds before the device gives up on finishing initialization;
Use default gateway: Uses the default gateway obtained through DHCP. If left unchecked, no default route is configured;
Prefer PPP connection: If ,the modem, supports PPP and any other communication protocol (e.g. QMI, RNDIS and etc.), prioritize PPP type connection;
Use gateway metric: The WAN configuration by default generates a routing table entry. In this field you can alter the metric of that entry. Higher metric means higher priority;
Use DNS servers advertised by peer: Uses DNS servers obtained from DHCP. If left unchecked, the advertised DNS server addresses are ignored;
LCP echo failure threshold: LCP (link control protocol) is a part of PPP (Point-to-Point Protocol) and helps to determine the quality of data transmission. If enough failures happen, LCP presumes link to be dead. 0 disables failure count checking;
LCP echo interval: Determines the period of LCP echo requests. Only effective if LCP echo failure threshold is more than zero;
Inactivity timeout: Station inactivity limit in seconds: if a station does not send anything, the connection will be dropped. A value of 0 can be used to persist connection.
Override MTU: Set custom MTU to GSM interface.

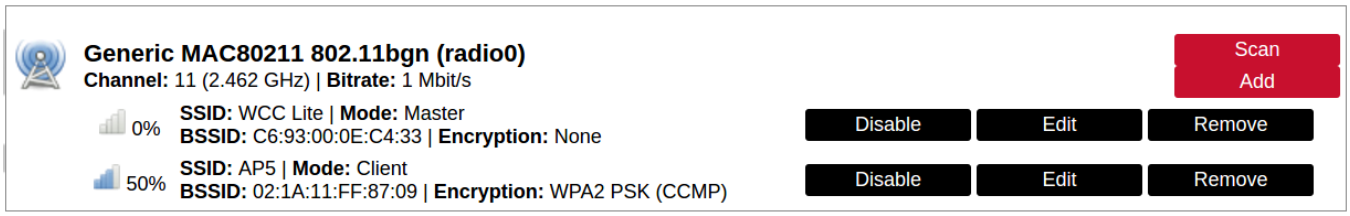
Note: If modem uses QMI connection protocol and user haven't defined custom MTU setting, the MTU on interface will be set to operator's defined MTU value.



GSM configuration ends with firewall settings. A user can assign an already defined firewall zone or create a new one.

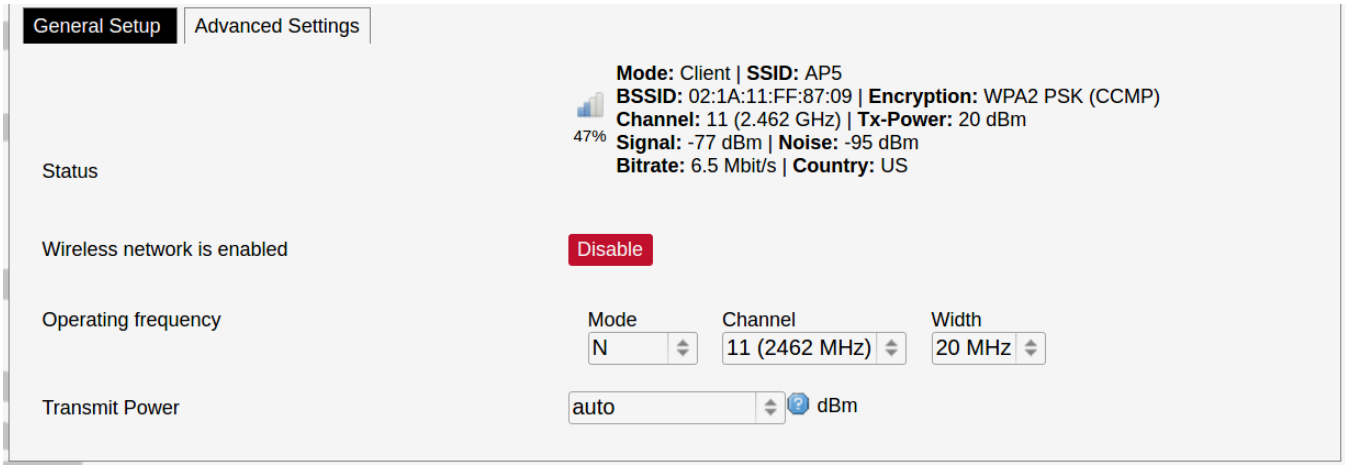
Wireless

The wireless network interface parameters and configuration are described in this section.

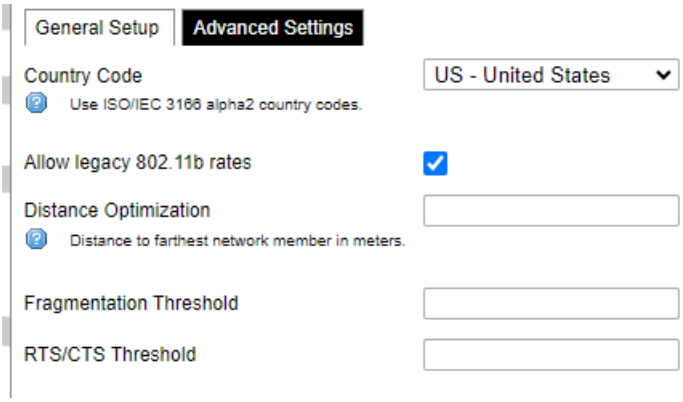


Configured interfaces for the physical radio device.
Channel: Specifies the wireless channel to use.
Bitrate: Specifies transfer rate in Mbit/s.
SSID: The broadcasted service set identifier of the wireless network.
Mode: Selects the operation mode of the wireless network interface controller.
BSSID: The basic service set identification of the network, only applicable in adhoc or STA mode.
Encryption: Wireless encryption method.

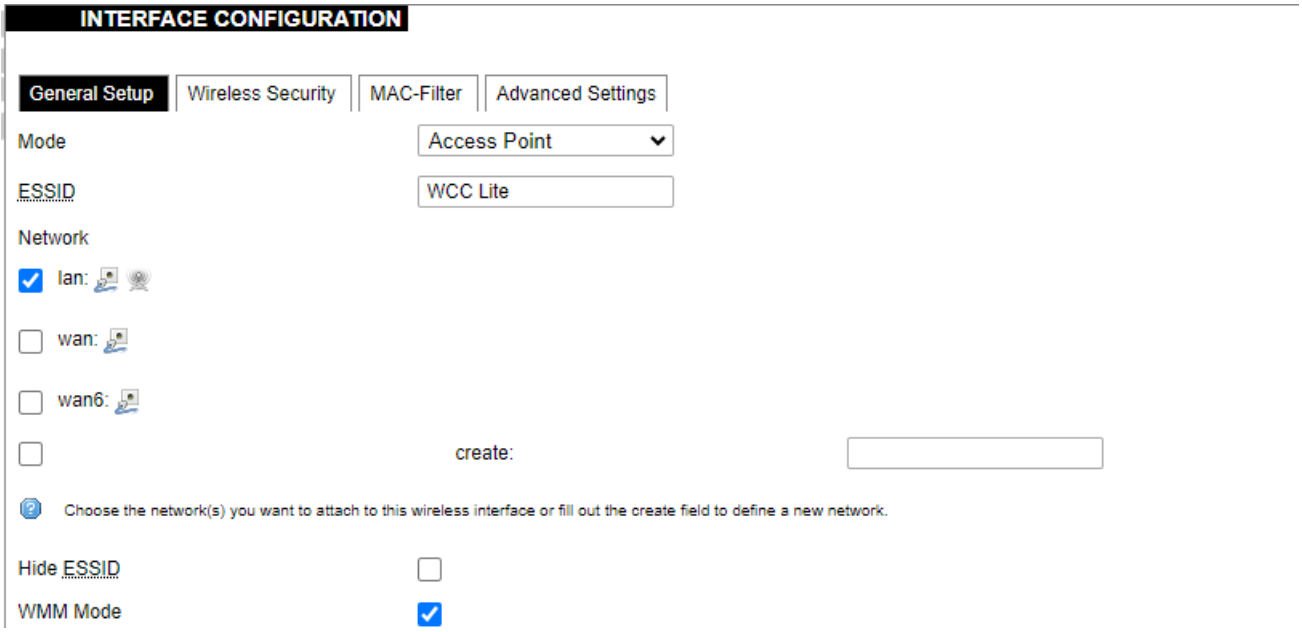
List of associated wireless stations.
The Device Configuration section covers physical settings of the radio hardware such as channel, transmit power or antenna selection which are shared among all defined wireless networks (if the radio hardware is multi-SSID capable). Per network settings like encryption or operation mode are grouped in the Interface Configuration.



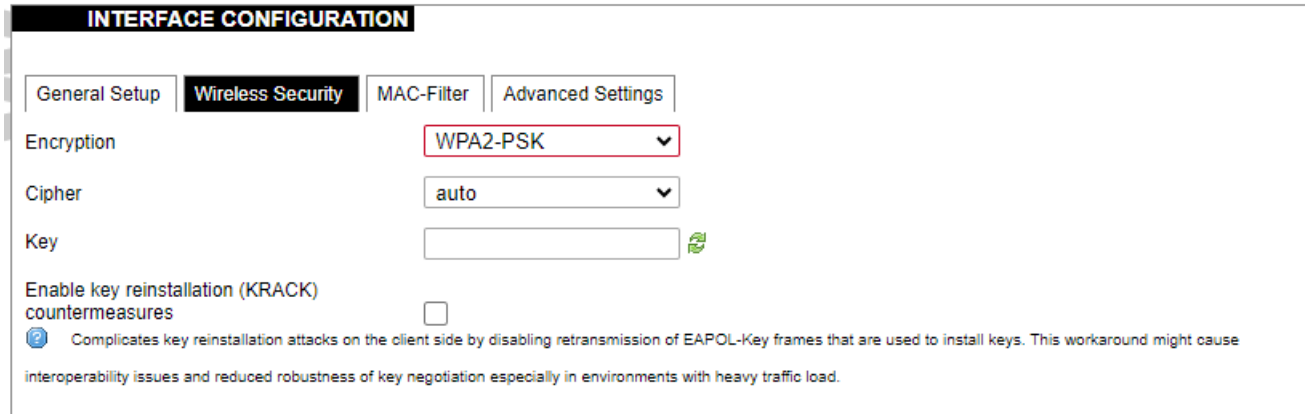
General device settings.



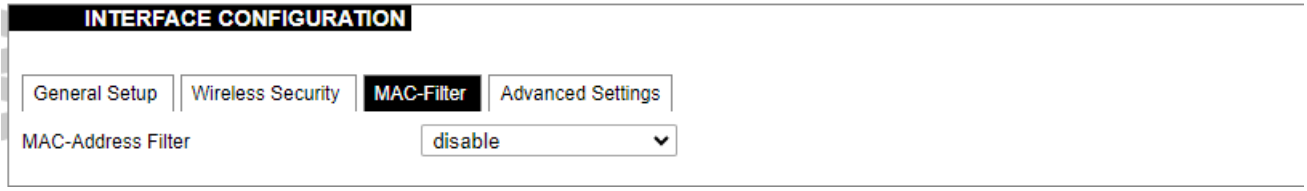
Advanced device settings.



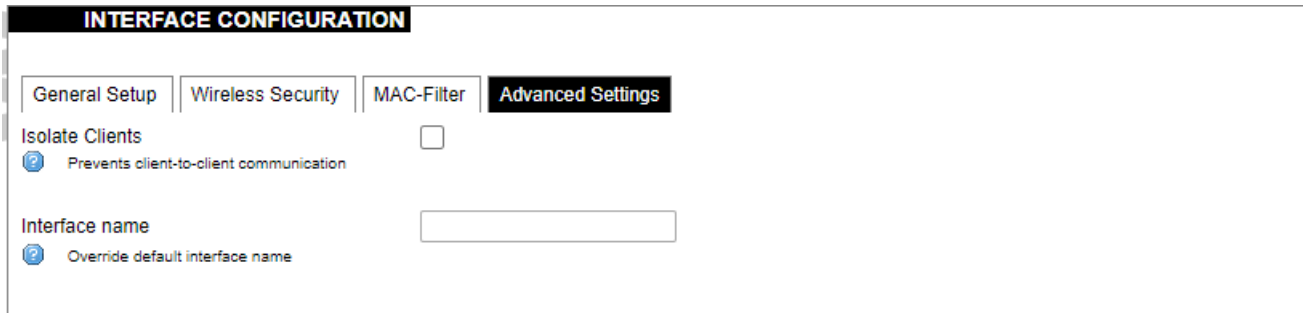
General interface settings.



Wireless security interface settings.



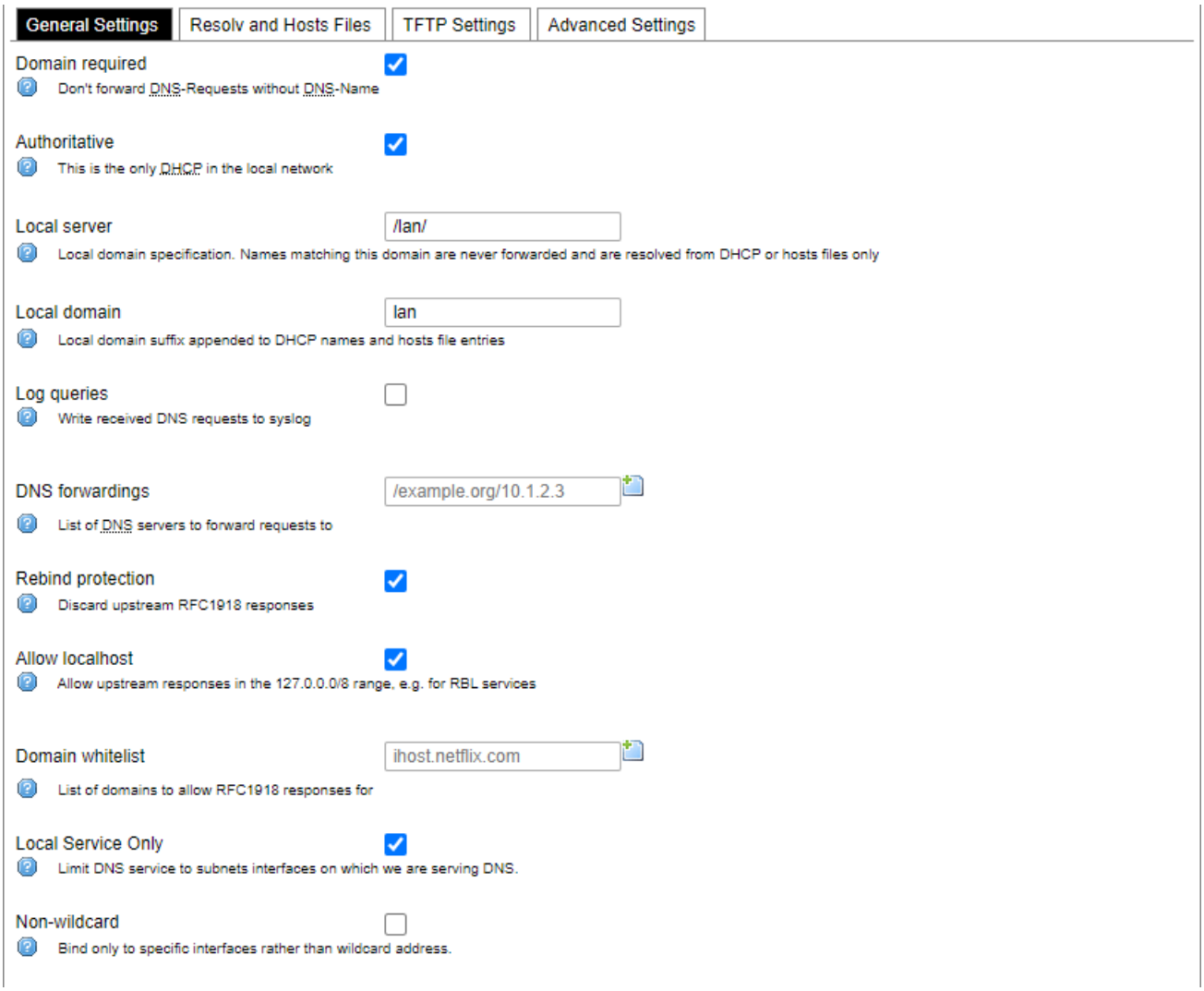
MAC-Filter settings.



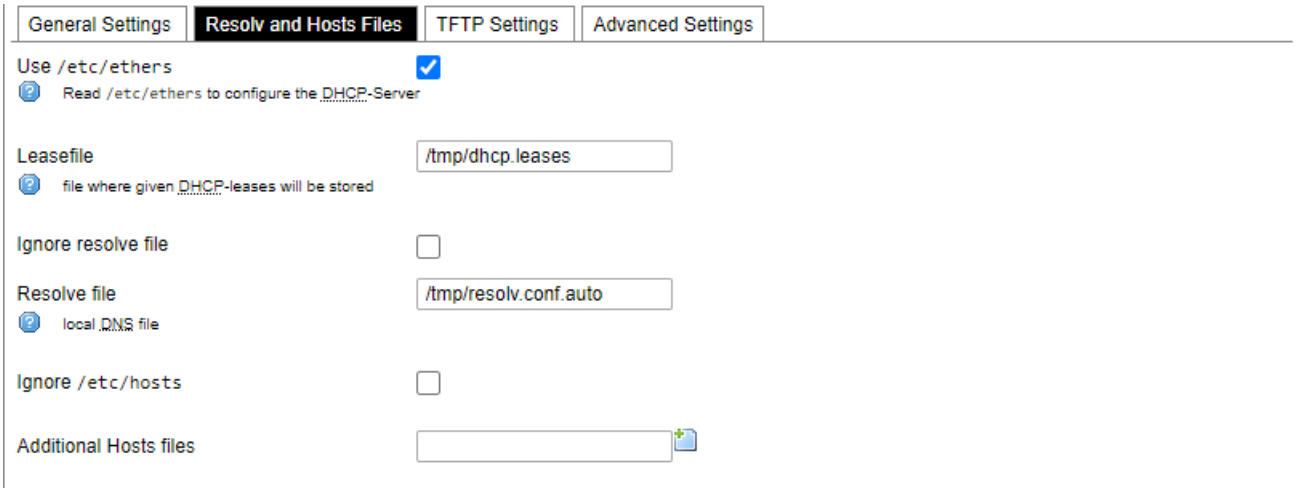
Advanced interface settings.

DHCP and DNS

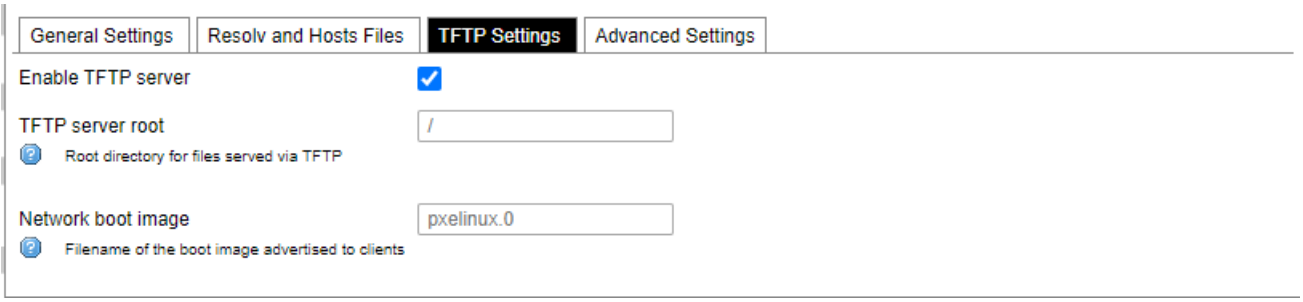
DHCP server and DNS forward for NAT firewalls is described in this section.



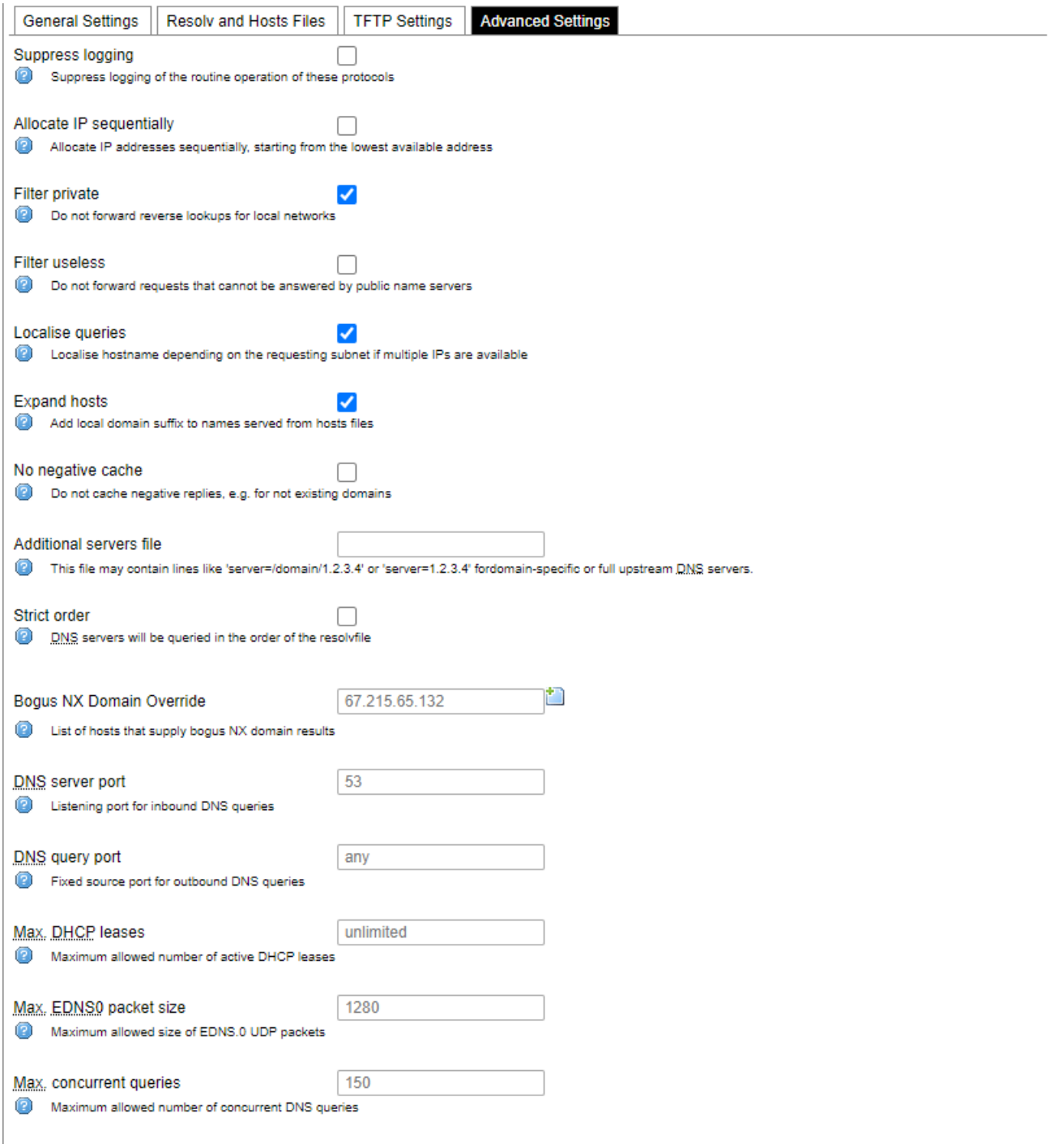
General DHCP settings.



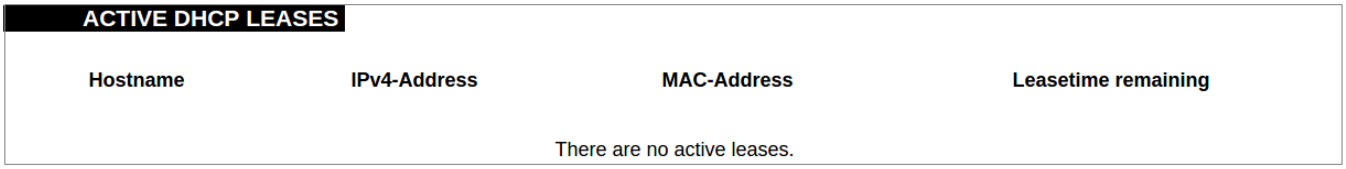
Resolve and hosts files settings.

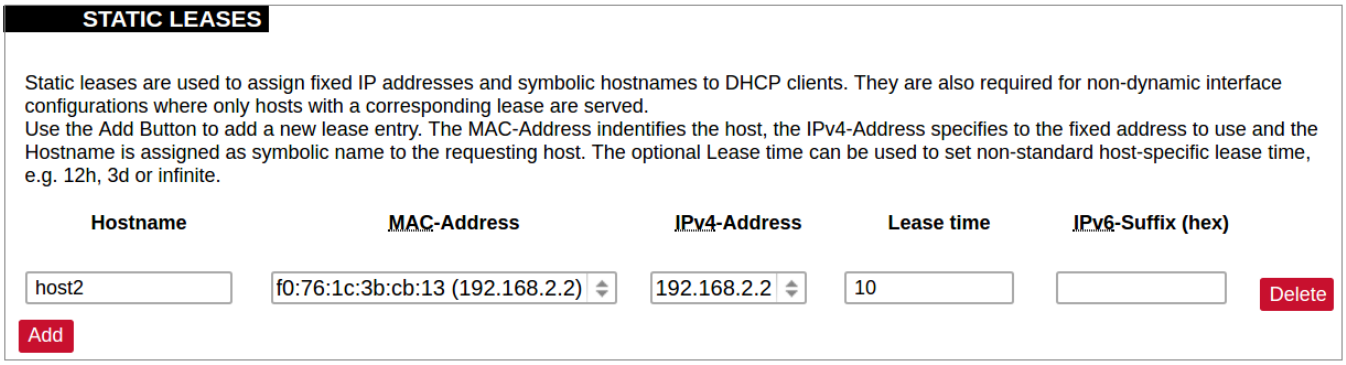


TFTP server settings.



Advanced settings.





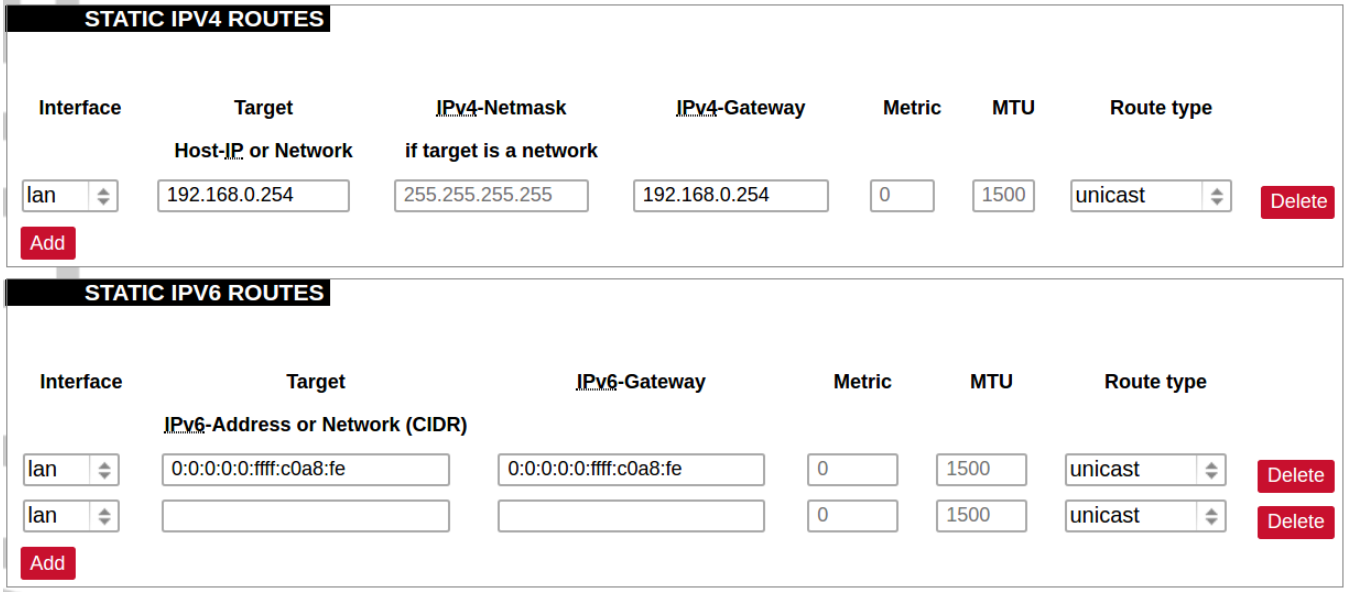
List of active DHCP and static leases. It is also possible to assign fixed IP addresses to hosts on the network, based on their MAC (hardware) address.

Hostnames

List of existing host names. Addition or deletion is allowed for the user.

Static routes

Routes specify over which interface and gateway a certain host or network can be reached.



Current IPv4 and IPv6 static routes configuration.
Interface: Lets to chose for which interface static route is created.

Target: Defines target host IP or network.
IPv4 Netmask: Defines netmask if the target is a network.
IPv4/IPv6 Gateway: Defines IPv4 or IPv6 gateway.
Metric: Specifies the route metric to use for the route.
MTU: Maximum Transmit/Receive Unit, in bytes.
Route type: All incoming packets can be: accepted, rejected, dropped.

Diagnostics

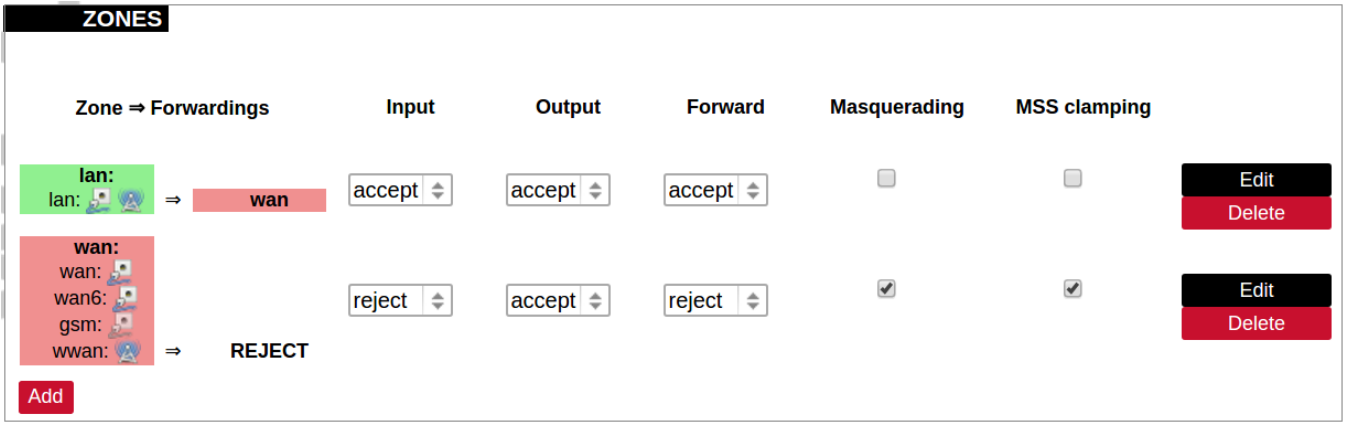
Diagnostics tools which can be used to diagnose some of the networking problems: ping, traceroute and nslookup.

Firewall

This subsection is divided into four categories: general settings, port forwards, traffic rules and custom rules.

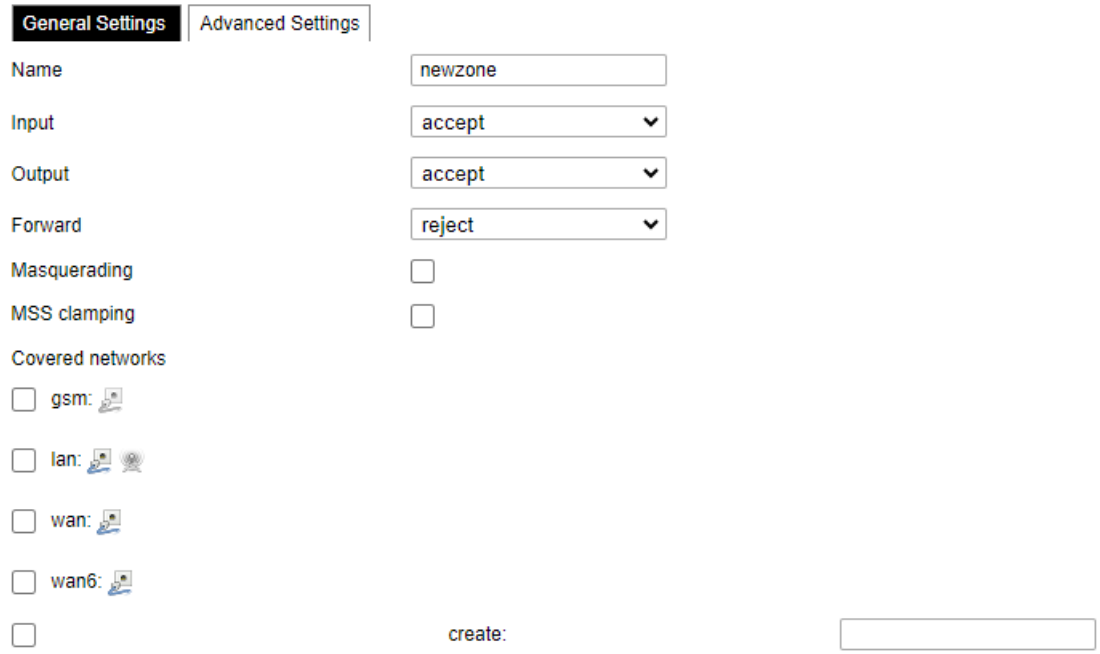
General settings

General Settings for firewall can be changed in General Settings screen. These settings are defined as follows:
Input: All incoming packets can be: accepted, rejected, dropped.
Output: All outgoing packets can be: accepted, rejected, dropped.
Forward: All packets being sent to another device can be: accepted, rejected, dropped.

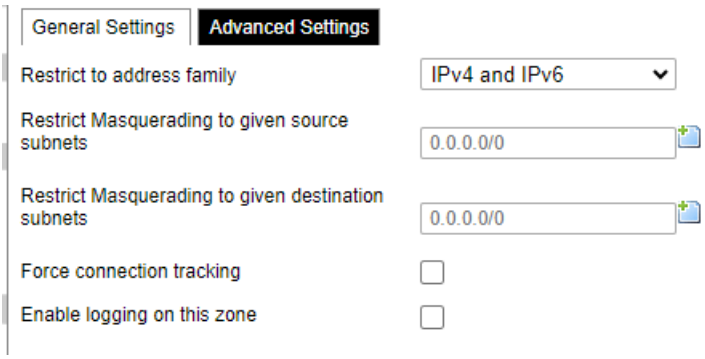


Additional zones for firewall can be created, edited or deleted.
Zone => Forwardings: Defines zones and their traffic flow.
Input: All incoming packets can be: accepted, rejected, dropped.
Output: All outgoing packets can be: accepted, rejected, dropped.
Forward: All packets being sent to another device can be: accepted, rejected, dropped.
Masquerading: Allows one or more devices in a zones network without assigned IP addresses to communicate with the Internet.
MSS clamping: Change the maximum segment size (MSS) of all TCP connections passing through this zone with MTU lower than the Ethernet default of 1500.

Additional actions can be performed with zones: add, edit, delete.



Common properties of newly created or edited zones can be edited in this panel. The input and output options set the default policies for traffic entering and leaving this zone while the forward option describes the policy for forwarded traffic between different networks within the zone. Covered networks specify which available networks are members of this zone.

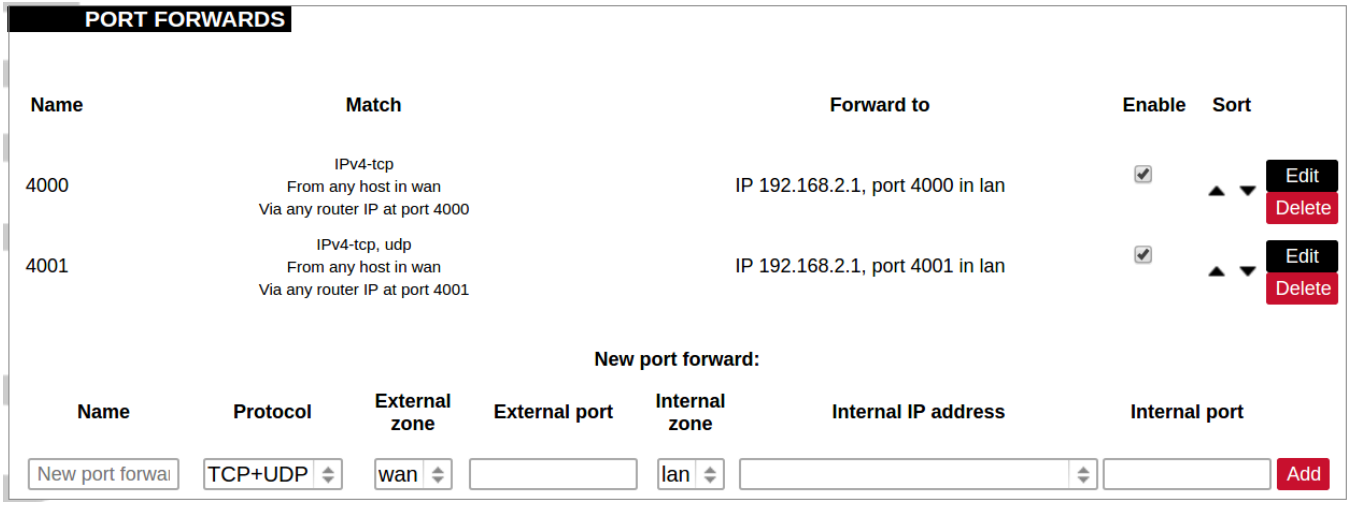


Advanced settings of new created or edited zone. Restrict to address family option defines to what IP families the zone belongs to IPv4, IPv6 or both. Restrict masquerading to given source/destination subnets defines one or more subnets for which the masquerading option is applied to. Connection tracking and logging options enable additional information gathering on the zone.

Controls of the forwarding policies between new/edited zone and other zones. Destination zones cover forwarded

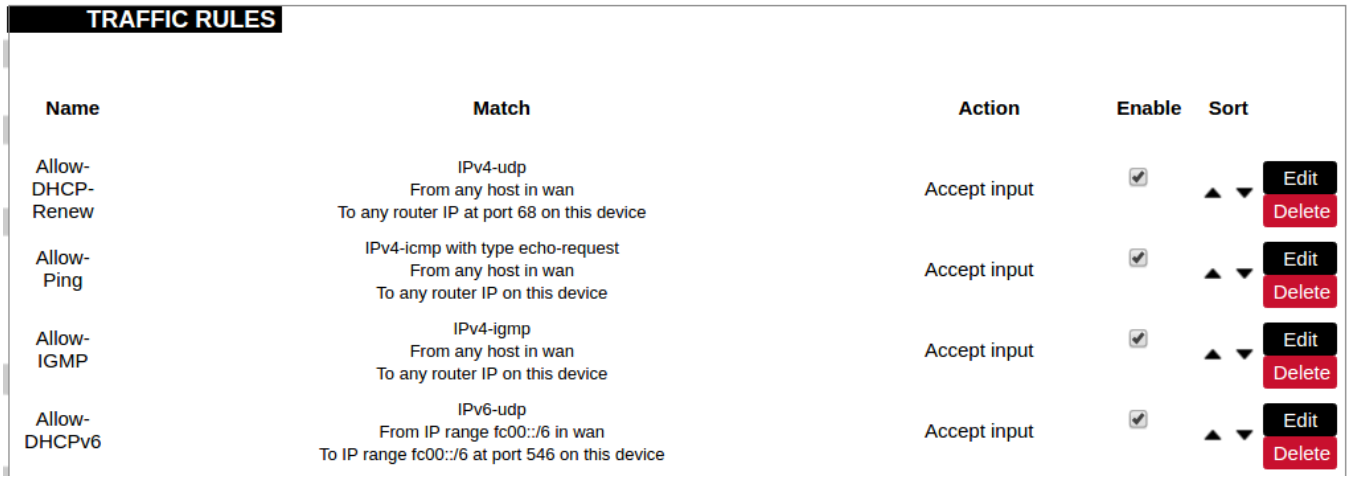
traffic originating from the new/edited zone. Source zones match forwarded traffic from other zones targeted at the new/edited zone. The forwarding rule is unidirectional, e.g. a forward from LAN to WAN does not imply a permission to forward from WAN to LAN as well.

Port forwards



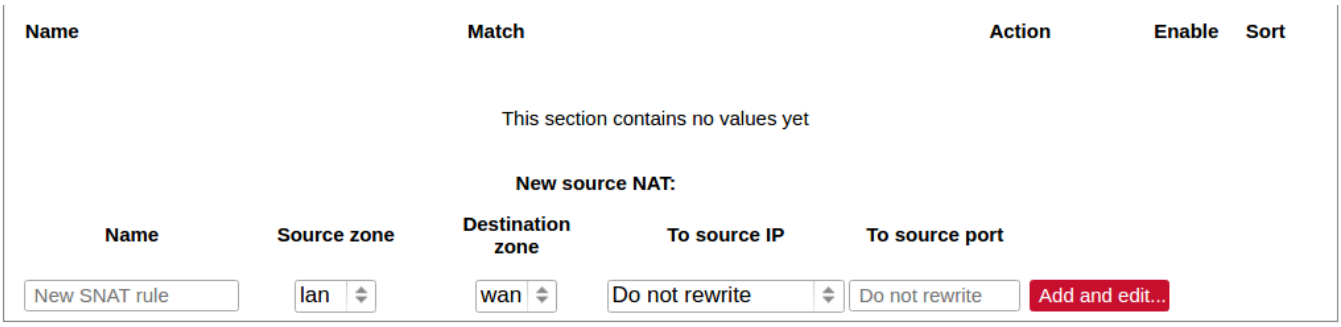
Port forwarding allows remote computers on the Internet to connect to a specific computer or service within the private LAN. It is done in a way of routing network packets within a private network created by the device. Settings for the port forwarding of the device are defined as follows:
Name: The name of the port forwarding rule.
Match: Informs what port forward is matched to.
Forward to: Informs where the port is forwarded to.
Enable: Enable (checked) or disable port forward.
Sort: Allows to sort port forwarding.
The user can add, edit or delete port forwarding rules.

Traffic rules



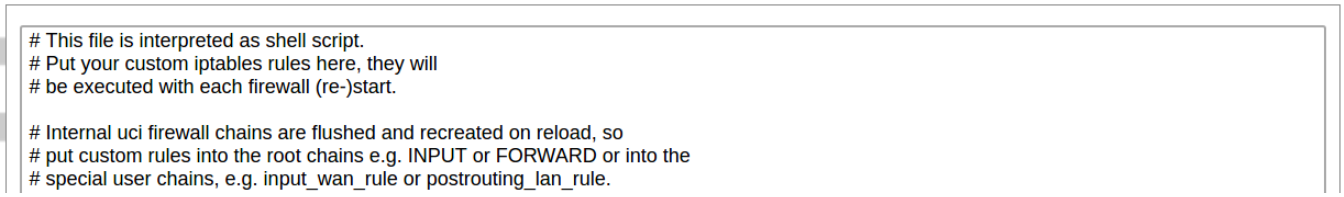
Traffic rules which define policies for packets traveling between different zones.
Name: The name of the traffic rule.
Match: Informs what ICMP types are matched.
Action: Informs what action would be performed.
Enable: Enable (checked) or disable the rule.
Sort: Allows to sort rules.

The user can add, edit or delete traffic rules. For every rule can be defined these options: name,restrict to address family, protocol, match ICMP type, source and destination zones, source MAC, IP addresses and port, destination IP address and port, action and extra arguments, month and weekdays for which rule will apply, start/stop dates and times, time in UTC.



Source NAT, which is a specific form of masquerading which allows fine grained control over the source IP used for outgoing traffic, for the example to map multiple WAN addresses to internal subnets.
The user can add, edit or delete source NAT rules. For every rule can be defined these options: name, protocol, source and destination zones, source, destination, SNAT IP addresses, ports, extra arguments, month and weekdays for which rule will apply, start/stop dates and times, time in UTC.

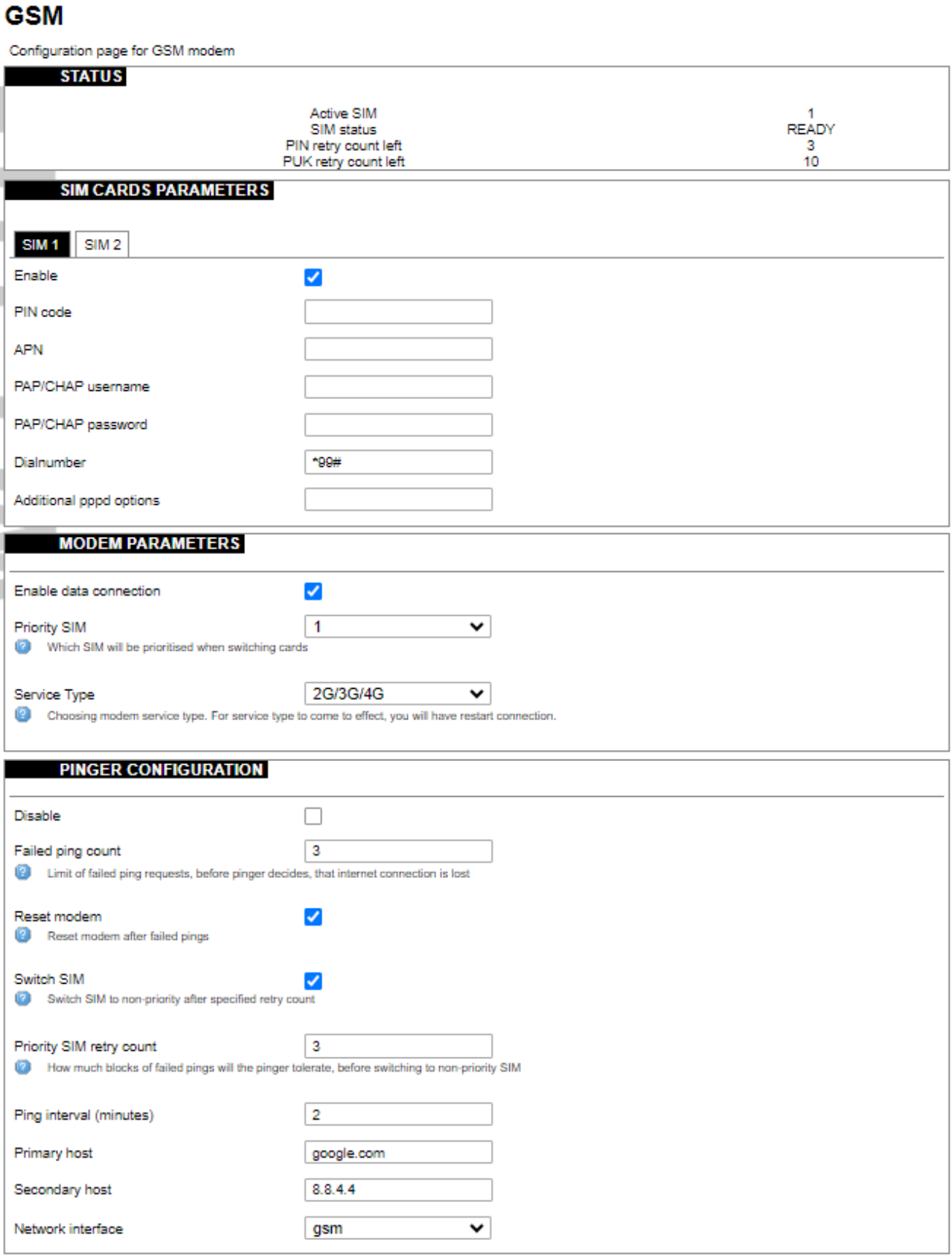
Custom rules



Custom rules allow to executing arbitrary iptables commands which are not otherwise covered by the firewall framework. The commands are executed after each firewall restart, right after the default ruleset has been loaded.

GSM

Note: If you have a WCC Lite without a modem, the GSM tab will still be visible, but these changes won't affect anything.



SIM cards parameters

Parameters for SIM card. If single SIM modem is used, there won't be "SIM 1" and "SIM 2" tabs.
Enable: Enable or disable this SIM card.
PIN code: PIN code to use on that SIM card.
APN: APN to use on that SIM car.
PAP/CHAP username: Username (optional).
PAP/CHAP password: Password (optional).

Modem parameters

Enable data connection: Enable or disable data connection through GSM modem.
Priority SIM: Primary SIM card (if Dual SIM modem is used). Mainly used for pinger configuration.

Service Type: Which radio access technology will be used when connecting to the gsm network.

Pinger configuration

Pinger is a service which pings defined hosts to check internet connection. If both of these hosts are unreachable pinger will wait and restart modem (or switch SIM card, if Dual-SIM modem is installed in WCC Lite)
Disable: Disable pinger functionality.
Failed ping count: Limit of failed ping requests, before pinger decides that internet connection is lost.
Reset modem: If checked, pinger resets gsm modem after ”Failed ping count”.
Switch SIM: If checked, pinger switches SIM to non-priority after ”Priority SIM retry count”. If internet connection is not available with non-priority SIM as well, pinger switches back to priority SIM after one failed ping attempt.
Priority SIM retry count: How many blocks of failed pings will the pinger tolerate, before switching to non-priority SIM.
Ping interval (minutes): Interval between ping requests.
Primary host: The host that will be pinged first.
Secondary host: The host that will be pinged second, if the primary host fails.
Network interface: GSM network interface name.

GSM Pinger is used to detect the status of network connection via cellular network. This status is written to file (/var/run/board/internet-status) and can be configured to be sent to SCADAs. If pinger is disabled, status is always set equal to zero and should not be trusted to represent internet status. Additionally, this status is reflected in the ”Status”->”GSM Status” window.

This is Pinger functionality described step by step:
• Pinger will ping the primary host every 2 minutes.
• If the primary host fails, pinger redirects to the secondary host immediately.
• If either primary or secondary host is responding to ping requests, pinger will continue testing connection every ”Ping interval (minutes)” parameter and no further action is taken.
• If both primary and secondary hosts are unreachable, pinger will start pinging these hosts every ”Ping interval (minutes) / 2” minute for ”Failed ping count” times.
• If hosts are still unreachable, pinger will try to switch SIM and restart modem (if corresponding parameters are set) or will restart immediately if single SIM modem is used.
• SIM card is switched to non-priority SIM after ”Priority SIM retry count” failed modem restarts with priority SIM. If a non-priority SIM fails, it is switched to priority SIM in the next pinger action.

Dual SIM start procedure

Table below shows, which card is expected on boot, when selectiom is made between Enable/Disable SIM cards and Primary card.

SIM 1 Enabled	SIM 2 Enabled	Priority SIM	SIM on boot
X		1	1
X		2	1
	X	1	2
	X	2	2
X	X	1	1
X	X	2	2
		1	Undefined
		2	Undefined

Layer 2 Tunneling Protocol

In computer networking, Layer 2 Tunneling Protocol (L2TP) is a tunneling protocol used to support virtual private networks (VPNs) or as part of the delivery of services by ISPs. It does not provide any encryption or confidentiality by itself. Rather, it relies on an encryption protocol that it passes within the tunnel to provide privacy.

Description

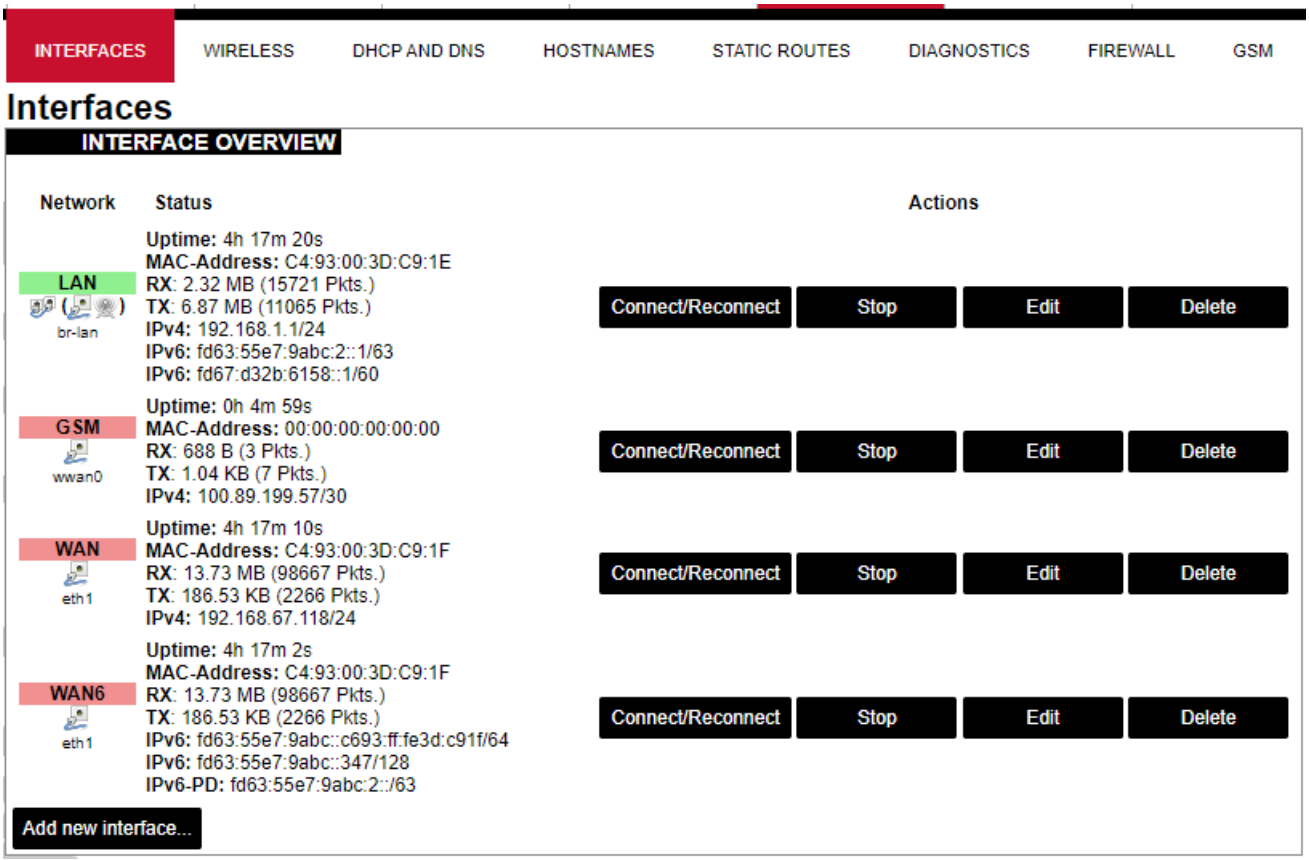
The entire L2TP packet, including payload and L2TP header, is sent within a User Datagram Protocol (UDP) datagram. It is common to carry PPP sessions within an L2TP tunnel. L2TP does not provide confidentiality or strong authentication by itself. IPsec is often used to secure L2TP packets by providing confidentiality, authentication and integrity. The combination of these two protocols is generally known as L2TP/IPsec (discussed below). The two endpoints of an L2TP

tunnel are called the LAC (L2TP Access Concentrator) and the LNS (L2TP Network Server). The LNS waits for new tunnels. Once a tunnel is established, the network traffic between the peers is bidirectional. To be useful for networking, higher-level protocols are then run through the L2TP tunnel. To facilitate this, an L2TP session (or 'call') is established within the tunnel for each higher-level protocol such as PPP. Either the LAC or LNS may initiate sessions. The traffic for each session is isolated by L2TP, so it is possible to set up multiple virtual networks across a single tunnel. MTU should be considered when implementing L2TP. The packets exchanged within an L2TP tunnel are categorized as either control packets or data packets. L2TP provides reliability features for the control packets, but no reliability for data packets. Reliability, if desired, must be provided by the nested protocols running within each session of the L2TP tunnel. L2TP allows the creation of a virtual private dialup network (VPDN) to connect a remote client to its corporate network by using a shared infrastructure, which could be the Internet or a service provider's network.

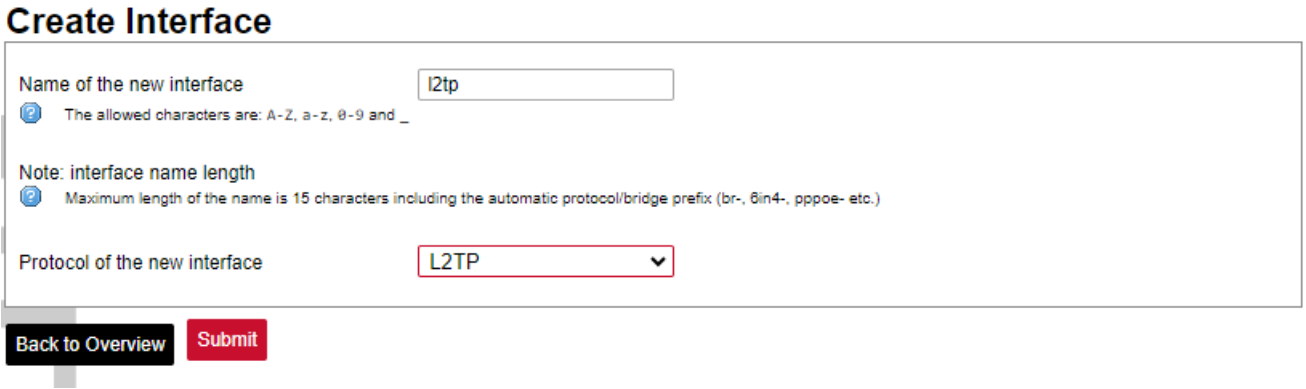
Setting up L2TP interface

In order to create a L2TP tunnel following steps are required:

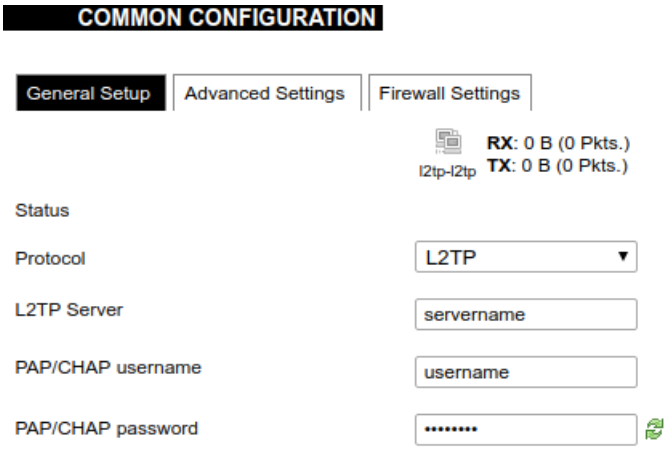
1. Go to **Network > Interfaces > Add new interface:**



2. Enter interface name and select L2TP protocol:



3. Enter server name and authorization parameters:



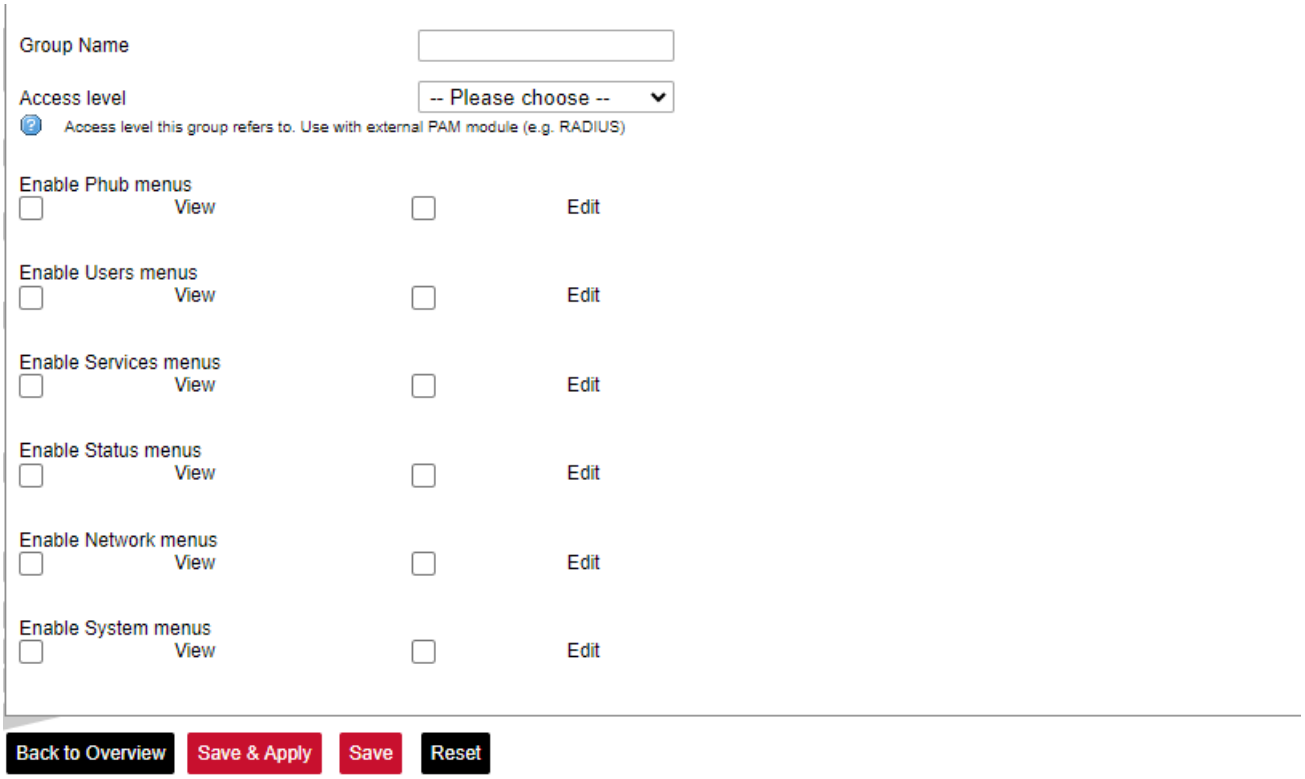
4. Save and apply the new configuration. A new network interface will appear.

8.8 Users

Edit groups

On this page user groups can be edited, deleted or added.
Groups: name of the user group
Status: shows authorization level set to specific user group. The higher the lever, the higher authorization requirements.
Actions: edit or delete user group

Add new group



Configuration window for new group. After group name is determined, acc ess level and permissions can be set.

Edit users

On edit users window list of all the users is shown.
Users: user name
Status: shows if SSH access is enabled and which group the user belongs to.

Actions: edit, delete or change password for the user

Add new user

Configuration window for new user. To create a new user, name and password should be created and user group and SSH access should be set.

Password

Changes password of the device.

8.9 Logout

To log out of the device graphical user interface a logout button in the interface’s upper right corner should be pressed. A user is automatically disconnected after ten minutes of inactivity. This ensures that the device would not be suspect to any deliberate damage made by unauthorized access.