

# 8 Internal web page

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

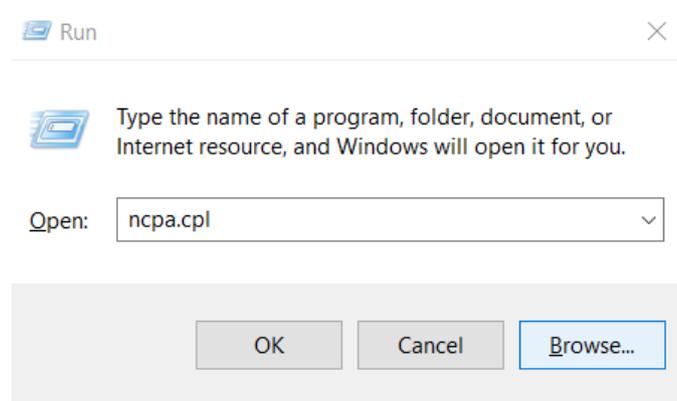
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# 8.1 Initial Setup

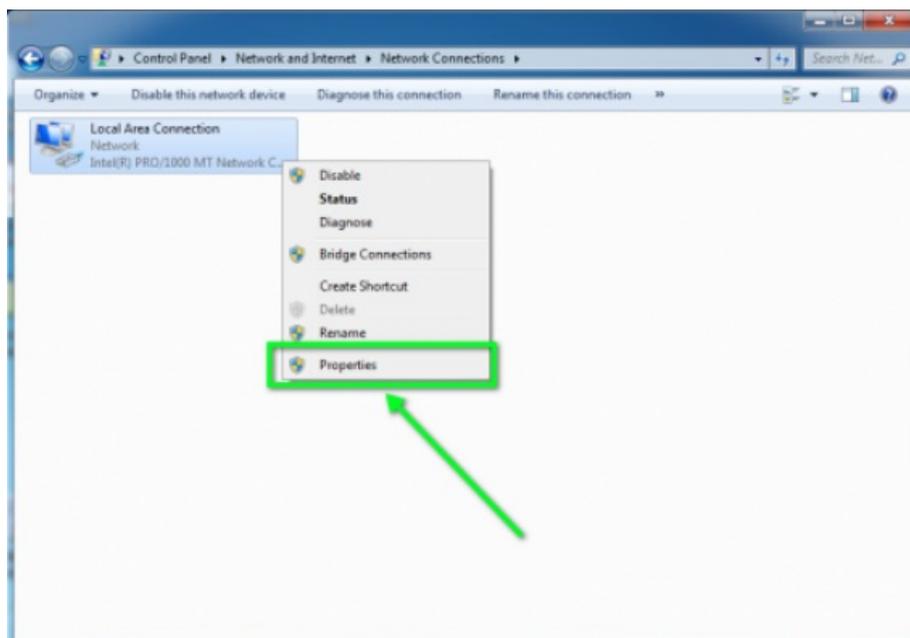
WCC Lite comes with a static network configuration with its IP set to 192.168.1.1. For initial setup set a static IP address on your computer and connect your network card to the WCC Lite with an ethernet cable.

## 8.1.1 Static IP address setup on Windows

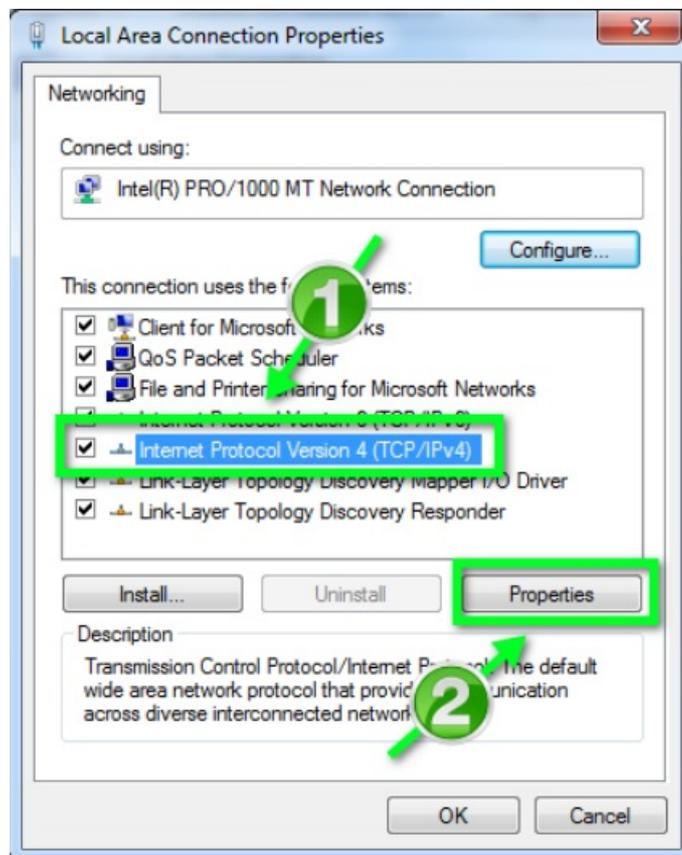
1. Press Win+R on your keyboard. This will open the run window. Enter `ncpa.cpl` and press OK. This will open the Network Connections window.



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

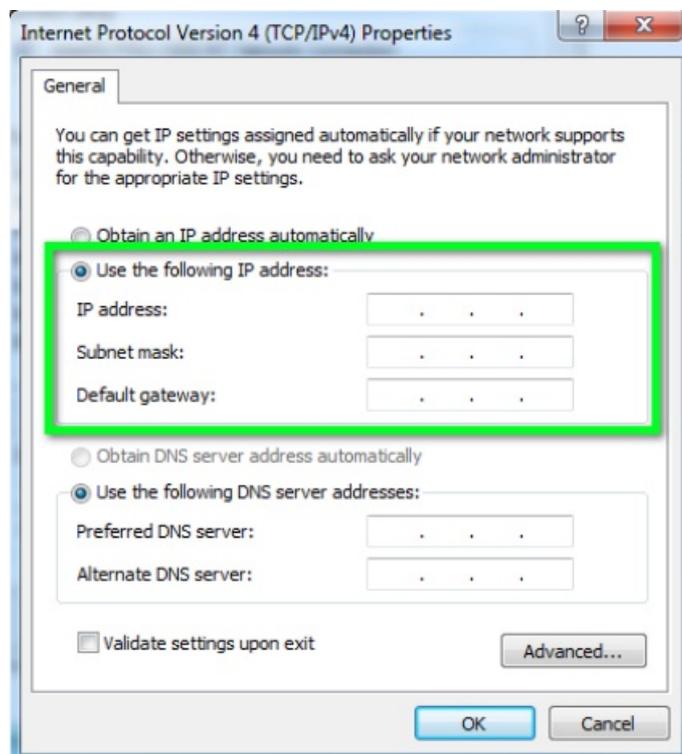


3. In the window that opens, click on the *Internet Protocol Version 4 (TCP/IPv4)* (you may need to scroll down to find it). Next, click on the Properties button.



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

## Authorization Required

Please enter your username and password.

Username	<input type="text"/>
Password	<input type="password"/>

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

**CONFIGURATION** | IMPORTED SIGNALS | EVENT LOG | PROTOCOL CONNECTIONS

### Protocol configuration

#### IMPORT PROTOCOL CONFIGURATION

Here you can import Excel configuration file. Up to 1000 signals are allowed. All previous signals will be replaced.

Configuration file:

PLC (IEC-61499) Boot file:

IEC61850 Server model file:

#### DOWNLOAD CONFIGURATION

Current configuration (elsetaConfig.xlsx):

Template configurations:

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
- Download current configuration Excel file.
- Download a template configuration Excel file.

## Imported Signals

**CONFIGURATION** | **IMPORTED SIGNALS** | EVENT LOG | PROTOCOL CONNECTIONS

### IMPORTED SIGNALS

Device	Signal	Value	State	Attributes	Time
WCCLite	CPU usage	100			2021-11-26 12:15:36.80
WCCLite	Fault LED	0			2021-11-26 12:13:47.51
WCCLite	GSM Total RX	0			2021-11-26 12:13:47.28
WCCLite	GSM Total TX	0			2021-11-26 12:13:47.28
WCCLite	GSM signal quality	-116			2021-11-26 12:13:47.94
WCCLite	Internet status	1			2021-11-26 12:13:47.94
WCCLite	LAN0 Total RX	0			2021-11-26 12:13:48.61
WCCLite	LAN0 Total TX	0			2021-11-26 12:13:48.61
WCCLite	LAN1 Total RX	35.838			2021-11-26 12:14:47.33
WCCLite	LAN1 Total TX	4.227			2021-11-26 12:14:57.49
WCCLite	RAM usage	44.68			2021-11-26 12:15:26.80
WCCLite	Relay output	0			2021-11-26 12:13:47.51

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

# Event Log

**DEVICE EVENTS**

Auto refresh       Number of items:

Device	Signal alias	Signal name	Value	Timestamp
<input type="text"/>				
wcc	lan1_tx	LAN1 Total TX	5.768000	2021-11-26 12:23:47
wcc	lan1_rx	LAN1 Total RX	36.347000	2021-11-26 12:23:47
wcc	ram_usage	RAM usage	45.230000	2021-11-26 12:23:46
wcc	cpu_usage	CPU usage	64.000000	2021-11-26 12:23:46
wcc	lan1_tx	LAN1 Total TX	5.763000	2021-11-26 12:23:37
wcc	lan1_rx	LAN1 Total RX	36.342000	2021-11-26 12:23:37
wcc	ram_usage	RAM usage	45.380000	2021-11-26 12:23:36
wcc	cpu_usage	CPU usage	46.000000	2021-11-26 12:23:36
wcc	lan1_tx	LAN1 Total TX	5.756000	2021-11-26 12:23:27
wcc	lan1_rx	LAN1 Total RX	36.336000	2021-11-26 12:23:27
wcc	ram_usage	RAM usage	45.230000	2021-11-26 12:23:26
wcc	cpu_usage	CPU usage	82.000000	2021-11-26 12:23:26

Download events log archive:

[Download](#)

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

## PROTOCOL CONNECTIONS

Device	Protocol	Host	Status	Timestamp
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
iomod	Modbus Serial master	PORT1	Disconnected	2021-11-26 12:13:36
scada3	DNP3 slave	PORT2	Disconnected	2021-11-26 12:13:32
iomod3	IEC 60870-5-103 master	PORT2	Disconnected	2021-11-26 12:13:31
scada2	IEC 60870-5-104 slave	192.168.1.10	Disconnected	2021-11-26 12:13:21
scada1	IEC 60870-5-101 slave	PORT1	Disconnected	2021-11-26 12:13:18

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

# 8.4 Status

## Overview

### System

SYSTEM	
Hostname	wcc-lite
Model	Elseta WCC Lite board
Firmware Version	OpenWrt Designated Driver 1.2.13-rtu 50167 / LuCI Master (git-19.190.32138-694c7fd)
Kernel Version	4.4.14
Local Time	Thu Jul 11 08:32:15 2019
Uptime	0h 1m 39s
Load Average	1.05, 0.46, 0.17

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

MEMORY	
Total Available	11652 kB / 60388 kB (19%)
Free	2016 kB / 60388 kB (3%)
Buffered	9636 kB / 60388 kB (15%)

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

NETWORK	
IPv4 WAN Status	 eth1
	<b>Type:</b> dhcp <b>Address:</b> 192.168.0.108 <b>Netmask:</b> 255.255.255.0 <b>Gateway:</b> 192.168.0.1 <b>DNS 1:</b> 192.168.0.1 <b>Expires:</b> 1h 58m 49s <b>Connected:</b> 0h 1m 11s
IPv6 WAN Status	 ?
	Not connected
Active Connections	94 / 16384 (0%)

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)	<b>SSID:</b> WCC Lite <b>Mode:</b> Master <b>Channel:</b> 11 (2.462 GHz) <b>Bitrate:</b> ? Mbit/s <b>BSSID:</b> C6:93:00:0E:C4:33 <b>Encryption:</b> None
	<b>SSID:</b> AP5 <b>Mode:</b> Client <b>Channel:</b> 11 (2.462 GHz) <b>Bitrate:</b> 6.5 Mbit/s <b>BSSID:</b> 02:1A:11:FF:87:09 <b>Encryption:</b> 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						
<b>Table: Filter</b>								
<b>Chain INPUT (Policy: ACCEPT, Packets: 0, Traffic: 0.00 B)</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						
<b>Table: Filter</b>								
<b>Chain INPUT (Policy: ACCEPT, Packets: 0, Traffic: 0.00 B)</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	fd74:8536:7bae::64	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.

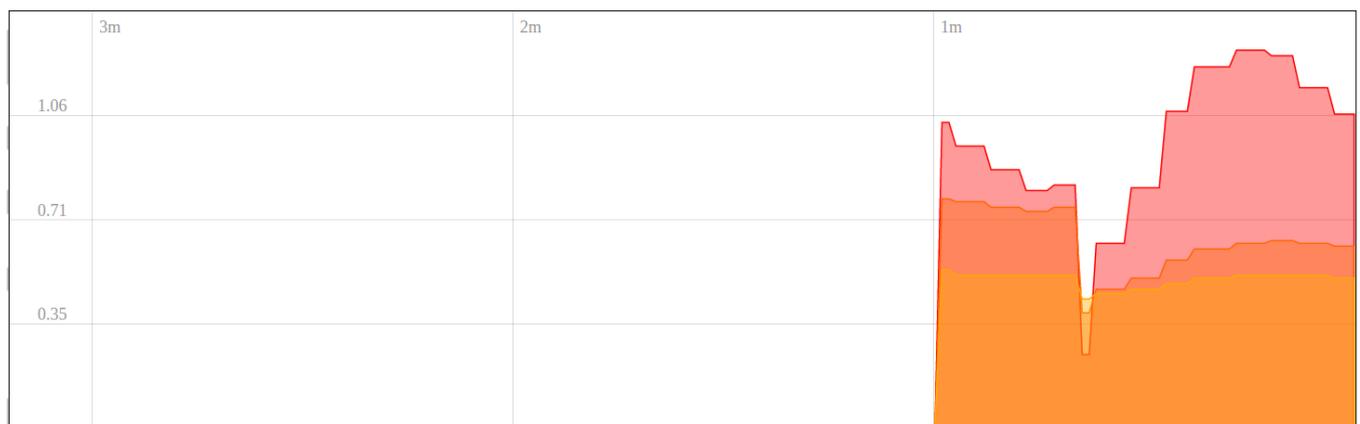
Hang Up: To freeze the process.

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:**

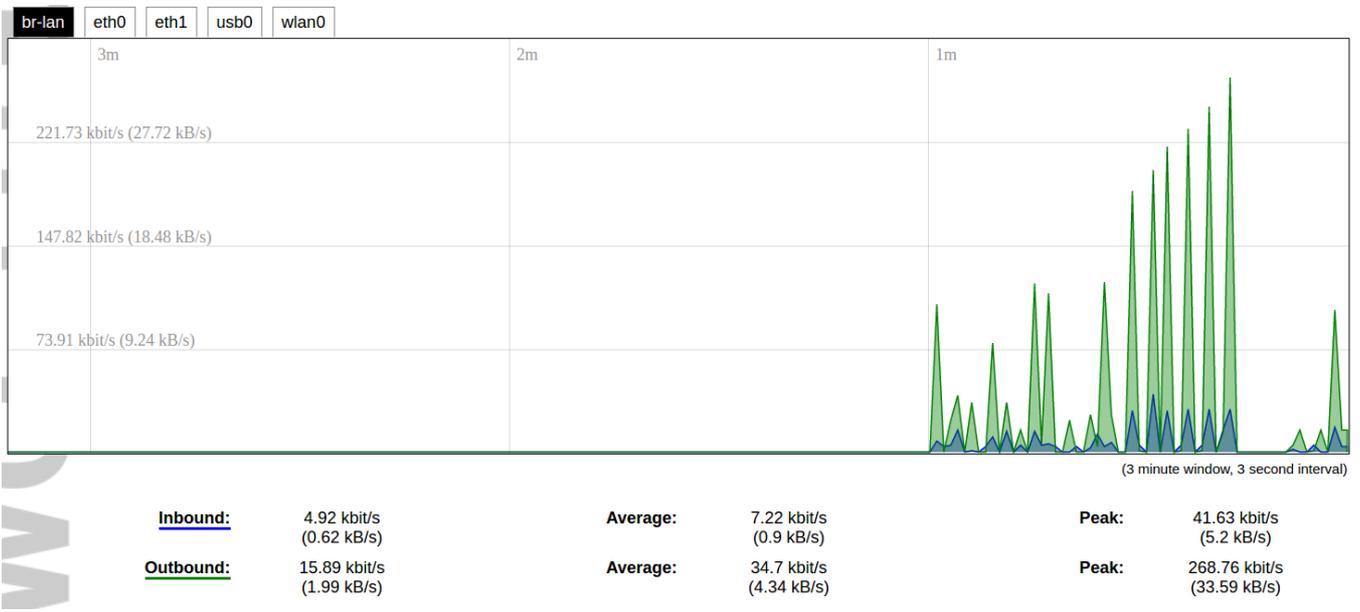
0.51

**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



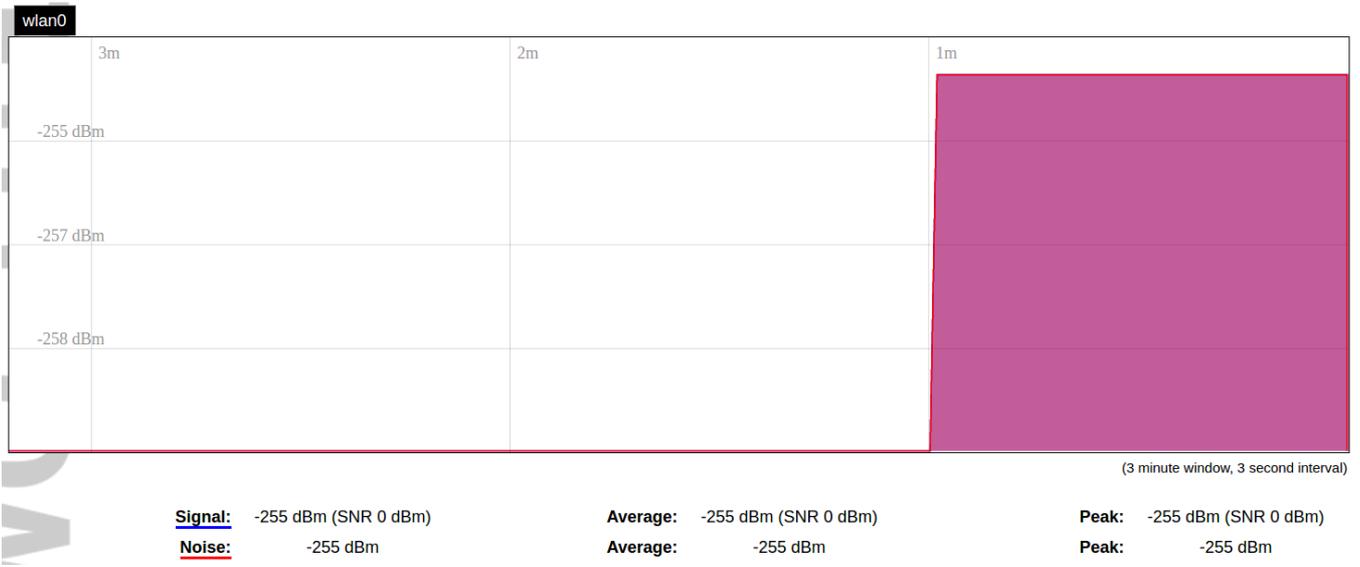
Graphs representing the status of the virtual and physical network interfaces of the device.

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



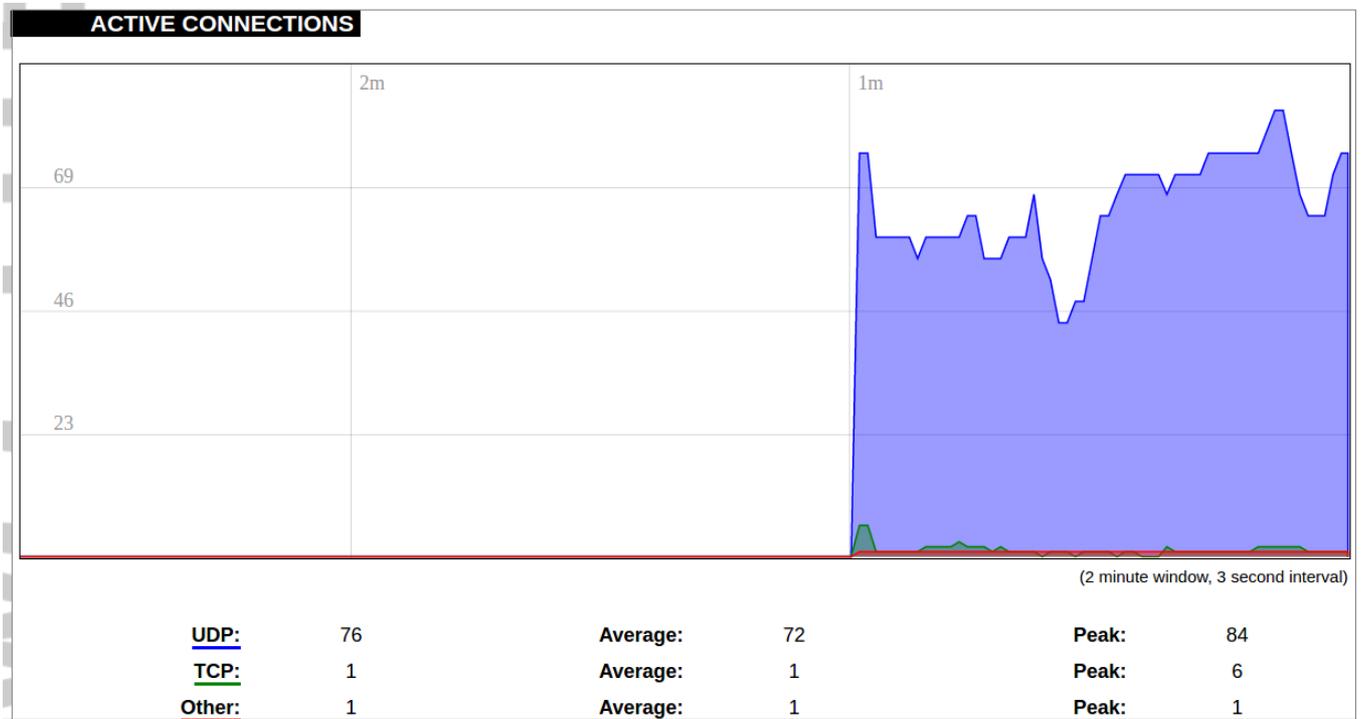
WiFi status graph.

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.

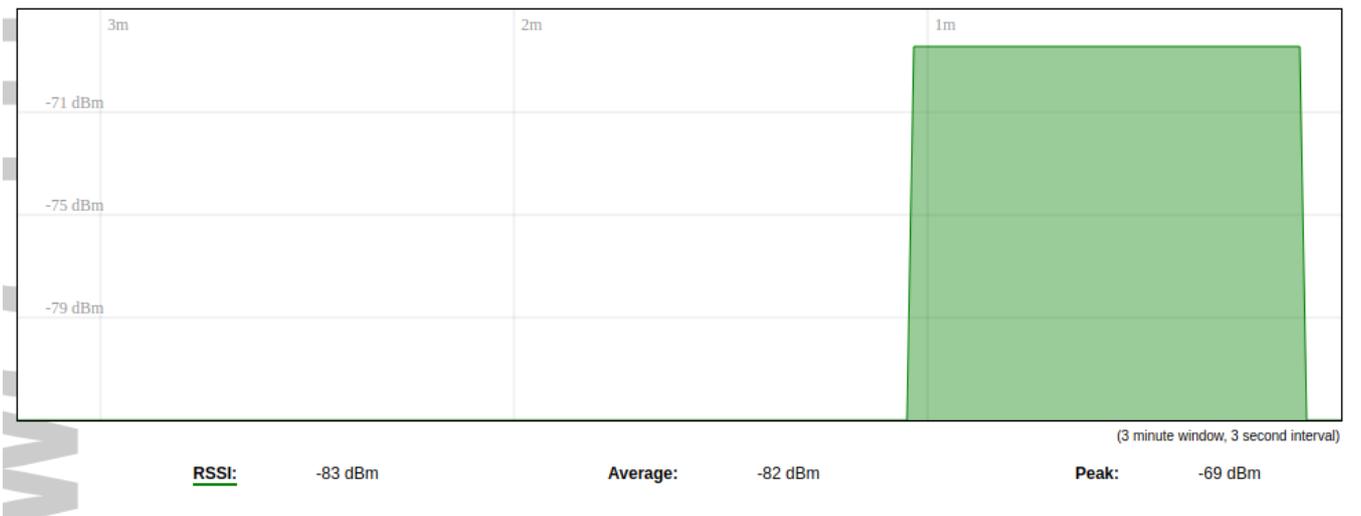
Source, Destination: IP address and the port number.

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

## GSM signal quality

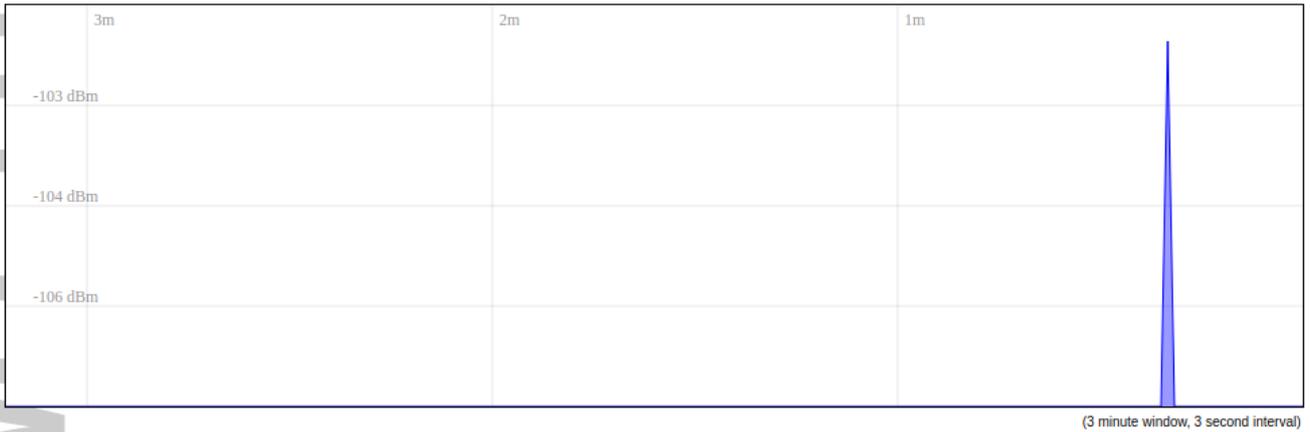
### Realtime GSM Signal Quality

This page gives an overview over current RSSI (2G/3G) or RSRP, RSRQ (4G) signal strengths.



## Realtime GSM Signal Quality

This page gives an overview over current RSSI (2G/3G) or RSRP, RSRQ (4G) signal strengths.



**RSRP:** -108 dBm

**Average:** -107 dBm

**Peak:** -102 dBm



**RSRQ:** -13 dBm

**Average:** -12 dBm

**Peak:** -11 dBm

Graph representation of gsm modem receiving signal quality. RSRP - RSRQ graph is showed, when connected to 4G/LTE network, RSSI - when 2G/3G networks are used.

RSSI: Received Signal Strength Indicator in dBm.

RSRP: Received Signal Reference Power in dBm.

RSRQ: Received Signal Reference Quality in dBm.

## GSM status

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

## GSM Status

Current hardware and network status of GSM

### HARDWARE INFO

Modem model  
Modem type  
Supported network modes  
IMEI

QUECTEL EC25  
DUAL SIM  
2G 3G 4G 2G/3G/4G

### NETWORK INFO



IMSI: [REDACTED]  
ICCID: [REDACTED]  
Registration status: Registered, home network  
Internet status: Offline  
Operator: Tele2 LT Tele2  
Service provider: Tele2  
Data interface: Down  
SIM state: SIM READY  
Signal quality: RSRP: -105 RSRQ: -13  
Radio access tech.: 4G, LTE  
Active SIM: 1  
Roaming status: Off

Reset modem

Switch SIM

## 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: Current 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).

Reset modem

Switch SIM

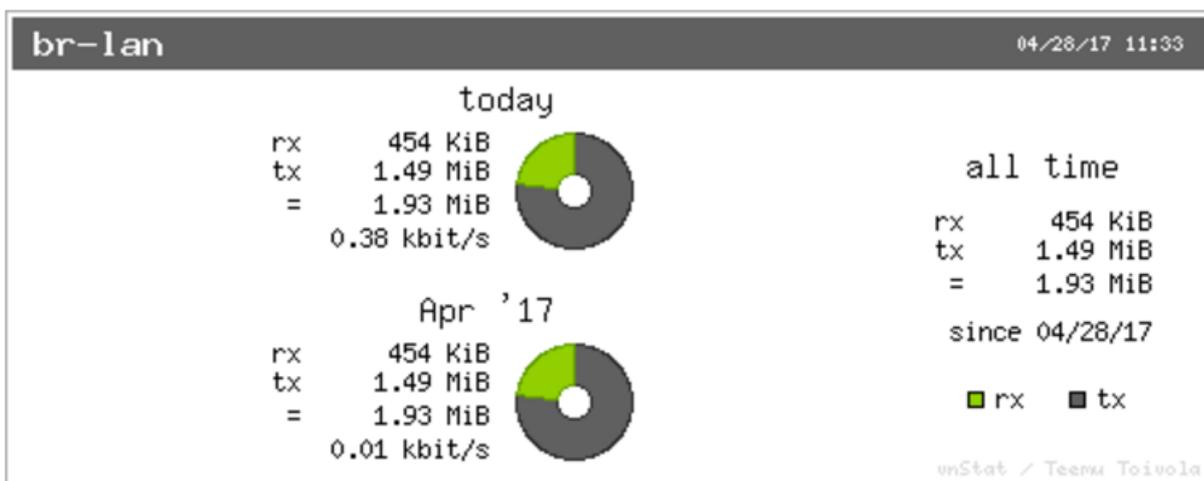
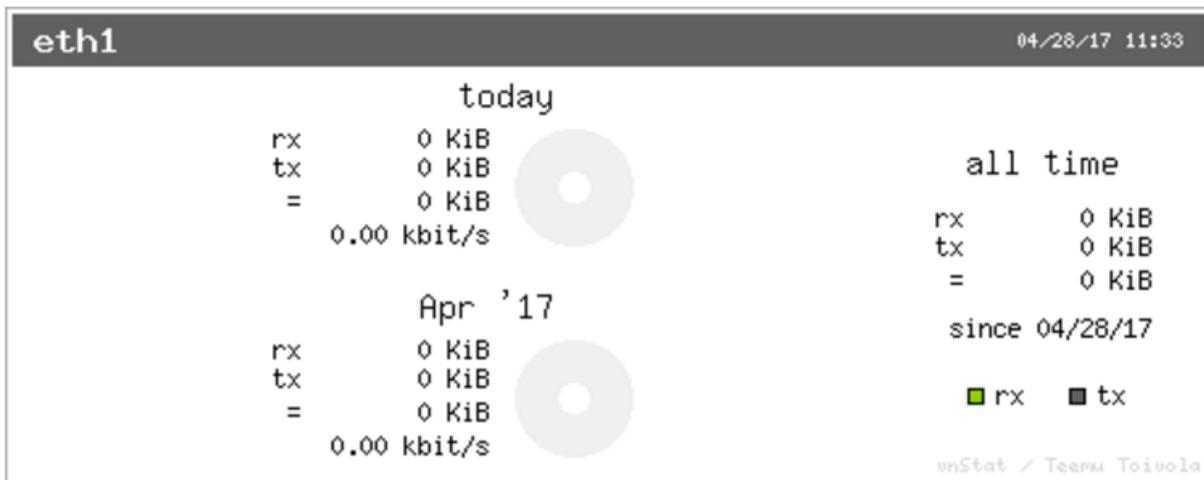
- Signal quality is described in different ways for different types of different mobile services: Received Signal Strength Indication (RSSI) in GSM (2G) and UMTS (3G), the Reference Signal Received Quality (RSRQ) in LTE RAT.

- 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

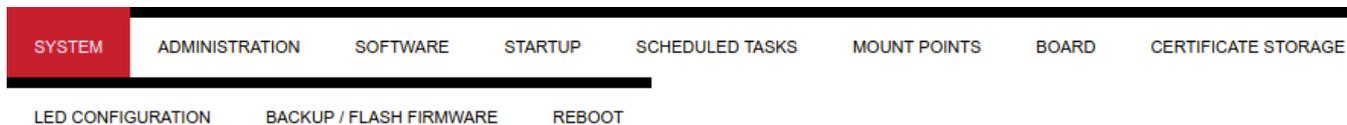
Monitor selected interfaces	<input checked="" type="checkbox"/>	 Bridge: "br-lan" (lan)
	<input type="checkbox"/>	 Ethernet Adapter: "eth0"
	<input checked="" type="checkbox"/>	 Ethernet Adapter: "eth1" (wan, wan6)

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.
- 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

#### SYSTEM PROPERTIES

General Settings | Logging | Language and Style

Local Time	Fri Apr 28 11:53:45 2017	<a href="#">Sync with browser</a>
Hostname	<input type="text" value="wcc-lite"/>	
Timezone	<input type="text" value="UTC"/>	

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.

#### SYSTEM PROPERTIES

General Settings | **Logging** | Language and Style

System log buffer size	<input type="text" value="16"/>	kiB
External system log server	<input type="text" value="0.0.0.0"/>	
External system log server port	<input type="text" value="514"/>	
External system log server protocol	<input type="text" value="UDP"/>	
Write system log to file	<input type="text" value="/tmp/system.log"/>	
Log output level	<input type="text" value="Debug"/>	
Cron Log Level	<input type="text" value="Normal"/>	

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

**SYSTEM PROPERTIES**

General Settings Logging **Language and Style**

Language

Design

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.

## 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.

## TIME SYNCHRONIZATION

Enable NTP client	<input checked="" type="checkbox"/>								
Provide NTP server	<input type="checkbox"/>								
NTP server candidates	<table><tr><td>0.openwrt.pool.ntp.org</td><td><input type="checkbox"/></td></tr><tr><td>1.openwrt.pool.ntp.org</td><td><input type="checkbox"/></td></tr><tr><td>2.openwrt.pool.ntp.org</td><td><input type="checkbox"/></td></tr><tr><td>3.openwrt.pool.ntp.org</td><td><input type="checkbox"/></td></tr></table>	0.openwrt.pool.ntp.org	<input type="checkbox"/>	1.openwrt.pool.ntp.org	<input type="checkbox"/>	2.openwrt.pool.ntp.org	<input type="checkbox"/>	3.openwrt.pool.ntp.org	<input type="checkbox"/>
0.openwrt.pool.ntp.org	<input type="checkbox"/>								
1.openwrt.pool.ntp.org	<input type="checkbox"/>								
2.openwrt.pool.ntp.org	<input type="checkbox"/>								
3.openwrt.pool.ntp.org	<input type="checkbox"/>								

**i** 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.

## Administration

Password	<input type="password"/>	
Confirmation	<input type="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.

**i** It is advised not to use the default password.

## Dropbear instance

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

### DROPBEAR INSTANCE

Delete

Interface

- gsm: **i** Listen only on the given interface or, if unspecified, on all
- lan:
- wan:
- wan6:
- unspecified

Port

**i** Specifies the listening port of this Dropbear instance

- |                                 |                                     |   |
|---------------------------------|-------------------------------------|---|
| Password authentication         | <input checked="" type="checkbox"/> | <b>i</b> Allow SSH password authentication                          |
| Allow root logins with password | <input checked="" type="checkbox"/> | <b>i</b> Allow the root user to login with password                 |
| Gateway ports                   | <input type="checkbox"/>            | <b>i</b> Allow remote hosts to connect to local SSH forwarded ports |

Add

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**  
Here you can paste public SSH-Keys (one per line) for SSH public-key authentication.

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.

## HTTPS certificate

**CERTIFICATE**  
Certificate file

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.

**Actions** | Configuration  
No package lists available   
Free space: **100% (895.72 MB)**  
  
Download and install package:    
Filter:

### Status

	Package name	Version
Remove	alarm-generator	1.3.4-2016-08-02
Remove	...	...

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.

Actions

Configuration

```

dest root /
dest ram /tmp
lists_dir ext /var/opkg-lists
option overlay_root /overlay
option check_signature 1

```

Submit

Reset

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

```

src/gz designated_driver_base http://downloads.openwrt.org/snapshots/trunk/ar71xx/generic/packages/base
src/gz designated_driver_kernel http://downloads.openwrt.org/snapshots/trunk/ar71xx/generic/packages/kernel
src/gz designated_driver_telephony http://downloads.openwrt.org/snapshots/trunk/ar71xx/generic/packages/telephony
src/gz designated_driver_elseta http://downloads.openwrt.org/snapshots/trunk/ar71xx/generic/packages/elseta
src/gz designated_driver_packages http://downloads.openwrt.org/snapshots/trunk/ar71xx/generic/packages/packages
src/gz designated_driver_routing http://downloads.openwrt.org/snapshots/trunk/ar71xx/generic/packages/routing
src/gz designated_driver_luci http://downloads.openwrt.org/snapshots/trunk/ar71xx/generic/packages/luci
src/gz designated_driver_management http://downloads.openwrt.org/snapshots/trunk/ar71xx/generic/packages/management
# src/gz designated_driver_targets http://downloads.openwrt.org/snapshots/trunk/ar71xx/generic/packages/targets

```

Submit

Reset

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

```

# add your custom package feeds here
#
# src/gz example_feed_name http://www.example.com/path/to/files

```

Submit

Reset

## 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.

Start priority	Initscript	Enable/Disable	Start	Restart	Stop
0	sysfixtime	Enabled	Start	Restart	Stop
10	boot	Enabled	Start	Restart	Stop
10	gsm-init	Enabled	Start	Restart	Stop
10	system	Enabled	Start	Restart	Stop
11	svsctl	Enabled	Start	Restart	Stop

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

```
# Put your custom commands here that should be executed once
# the system init finished. By default this file does nothing.
```

```
exit 0
```

Submit

Reset

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

```
MAILTO=info@elseta.com
0 18 1-15 * * du -h --max-depth=1 /
```

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

#### GLOBAL SETTINGS

Generate Config

**Generate Config** ⓘ Find all currently attached filesystems and swap and replace configuration with defaults based on what was detected

Anonymous Swap	<input type="checkbox"/>	ⓘ Mount swap not specifically configured
Anonymous Mount	<input type="checkbox"/>	ⓘ Mount filesystems not specifically configured
Automount Swap	<input checked="" type="checkbox"/>	ⓘ Automatically mount swap on hotplug
Automount Filesystem	<input checked="" type="checkbox"/>	ⓘ Automatically mount filesystems on hotplug
Check filesystems before mount	<input type="checkbox"/>	ⓘ Automatically check filesystem for errors before mounting

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)	
overlays:/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	
<input type="checkbox"/>	UUID: 44e3cc6c-139b-410c-86b1-db099c5887c5 (not present)	/mnt/sda1	?	defaults	no	no	Edit Delete
<input type="checkbox"/>	UUID: cc85fea3-836c-4ddc-9828-f35147f21318 (not present)	/mnt/sda2	?	defaults	no	no	Edit Delete
<input type="checkbox"/>	UUID: 1f1c6431-d632-4e11-9c12-3c913d3986e7 (not present)	/mnt/sda3	?	defaults	no	no	Edit Delete
<input type="checkbox"/>	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.

## 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.

Delete

Name

LED Name

Default state

Trigger

Device

Trigger Mode

Link On  Transmit  Receive

Add

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.

## 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

Actions Configuration

### BACKUP / RESTORE

Click "Generate archive" to download a tar archive of the current configuration files. To reset the firmware to its initial state, click "Perform reset" (only possible with squashfs images).

Download backup:

Generate archive

Reset to defaults:

Perform reset

To restore configuration files, you can upload a previously generated backup archive here.

Restore backup:

Choose File No file chosen

Upload archive...

### FLASH NEW FIRMWARE IMAGE

Upload a sysupgrade-compatible image here to replace the running firmware. Check "Keep settings" to retain the current configuration (requires a compatible firmware image).

Keep settings:



Image:

Choose File No file chosen

Flash image...

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.

This is a list of shell glob patterns for matching files and directories to include during sysupgrade. Modified files in /etc/config/ and certain other configurations are automatically preserved.

Show current backup file list

Open list...

```
## This file contains files and directories that should
## be preserved during an upgrade.
```

```
# /etc/example.conf
# /etc/opensvpn/
```

Submit

Reset

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

SYSTEM

ADMINISTRATION

SOFTWARE

STARTUP

SCHEDULED TASKS

MOUNT POINTS

LED CONFIGURATION

BACKUP / FLASH FIRMWARE

REBOOT

### Reboot

Reboots the operating system of your device

Perform 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.
- 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.

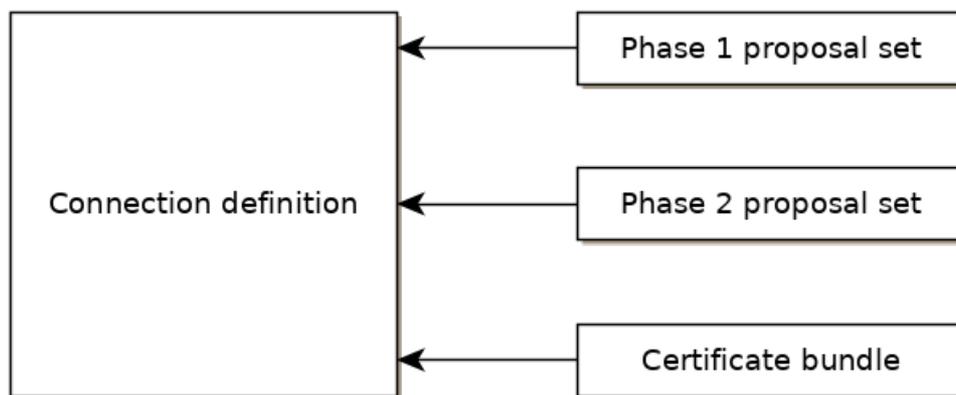
i Enabling agent and saving the configuration automatically starts the process with the new configuration.

## 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.



### Ipssec settings

### Connection description

Options supported by wccclite 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: <ul style="list-style-type: none"> <li>• none – default, disables sending of DPD messages.</li> <li>• clear – the connection closed with no action.</li> <li>• hold – keeps description, tries re-negotiate connection on demand.</li> <li>• restart – will try to re-negotiate immediately.</li> </ul>
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

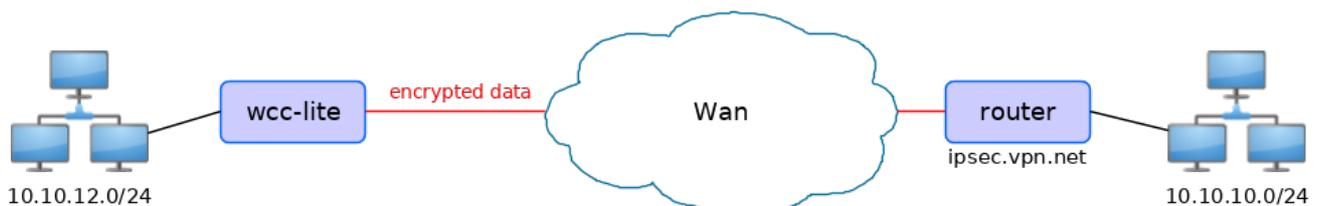
Phase 2 proposals - ESP cipher suite components:

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

**i** 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
```

**i** 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.

Save

### IPsec

#### PHASE 1 PROPOSALS

Below is a list of configured IPsec phase 1 proposals

	Encryption algorithm	Hash algorithm	DH exponentiation	
aes256_sha256_dh5	aes256	sha256	modp3072 (15)	Delete
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	Add

Save & Apply Save Reset

## 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.

Save

### IPsec

#### PHASE 2 PROPOSALS

Below is a list of configured IPsec phase 2 proposals

	Encryption algorithm	Hash algorithm	DH exponentiation	
aes128_sha1	aes128	sha1		Delete
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	Add

Save & Apply Save Reset

## 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”.

Save

» CONNECTION "DEMO0"

Gateway: ipsec.vpn.net

Type: Tunnel

Local subnet: 10.10.12.0/24

Remote subnet: 10.10.10.0/24

Authentication: Shared secret

Pre-shared key (PSK): .....

Phase 1 proposal (IKE): aes256\_sha256

Phase 2 proposal (ESP): aes128\_sha1

Local ID: wcclite

-- Additional Field Add

Save & Apply Save Reset

## 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".

Save

**IPsec**

**CONNECTIONS**

Below is a list of configured IPsec connection instances and their current state

	Enabled	Configured	Established	Gateway	Start/Stop		
demo0	<input checked="" type="checkbox"/>	yes	yes	ipsec.vpn.net	stop	Edit	Delete

Input field: Add

Save & Apply Save Reset

## 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 IETF RFC 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.

# OpenVPN

## OpenVPN Instances

The primary goal is to get a working WCC Lite tunnel and establish a basic platform for further customisation. 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

	Enabled	Started	Start/Stop	Port	Protocol	
<b>custom_config</b>	<input type="checkbox"/>	no	<a href="#">start</a>	-	-	<a href="#">Edit</a> <a href="#">Delete</a>
<b>sample_server</b>	<input type="checkbox"/>	no	<a href="#">start</a>	1194	udp	<a href="#">Edit</a> <a href="#">Delete</a>
<b>sample_client</b>	<input type="checkbox"/>	no	<a href="#">start</a>	-	udp	<a href="#">Edit</a> <a href="#">Delete</a>

**Template based configuration**

Instance name

Simple server configuration for a routed point-to-point VPN

[Add](#)

**OVPN configuration file upload**

Instance name

[Browse...](#) No file selected.

[Upload](#)

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 use 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.

# 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.

 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".

## 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).

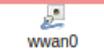
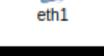
# 8.7 Network

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

### INTERFACE OVERVIEW

Network	Status	Actions
<b>LAN</b>  br-lan	<b>Uptime:</b> 0h 20m 27s <b>MAC-Address:</b> C4:93:00:0B:F4:57 <b>RX:</b> 0 B (0 Pkts.) <b>TX:</b> 0 B (0 Pkts.) <b>IPv4:</b> 192.168.1.1/24 <b>IPv6:</b> fd94:746:4098::1/60	<a href="#">Connect/Reconnect</a> <a href="#">Stop</a> <a href="#">Edit</a> <a href="#">Delete</a>
<b>GSM</b>  wwan0	<b>Uptime:</b> 0h 20m 20s <b>MAC-Address:</b> 00:00:00:00:00:00 <b>RX:</b> 256.18 KB (4425 Pkts.) <b>TX:</b> 271.71 KB (4364 Pkts.)	<a href="#">Connect/Reconnect</a> <a href="#">Stop</a> <a href="#">Edit</a> <a href="#">Delete</a>
<b>WAN</b>  eth1	<b>Uptime:</b> 0h 20m 22s <b>MAC-Address:</b> C4:93:00:0B:F4:56 <b>RX:</b> 497.67 KB (2523 Pkts.) <b>TX:</b> 663.41 KB (1238 Pkts.) <b>IPv4:</b> 192.168.5.131/24	<a href="#">Connect/Reconnect</a> <a href="#">Stop</a> <a href="#">Edit</a> <a href="#">Delete</a>
<b>WAN6</b>  eth1	<b>Uptime:</b> 0h 0m 0s <b>MAC-Address:</b> C4:93:00:0B:F4:56 <b>RX:</b> 497.67 KB (2523 Pkts.) <b>TX:</b> 663.41 KB (1238 Pkts.)	<a href="#">Connect/Reconnect</a> <a href="#">Stop</a> <a href="#">Edit</a> <a href="#">Delete</a>

[Add new interface...](#)

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.

	eth0	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.

Name of the new interface  
  The allowed characters are: A-Z, a-z, 0-9 and \_

Note: interface name length  
 Maximum length of the name is 15 characters including the automatic protocol/bridge prefix (br-, 6in4-, pppoe- etc.)

Protocol of the new interface Static address

Create a bridge over multiple interfaces

Cover the following interface

- Ethernet Adapter: "eth0" (lan)
- Ethernet Adapter: "eth1" (wan, wan6)
- Ethernet Adapter: "usb0" (gsm)
- Wireless Network: Master "WCC Lite" (lan)
- Wireless Network: Client "AP5" (wwan)
- Custom Interface:

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 Setup** | Advanced Settings | Physical Settings | Firewall Settings

**Status**

 **Uptime:** 0h 2m 42s  
**MAC-Address:** CE:0A:91:C9:25:F2  
**RX:** 0 B (0 Pkts.)  
**TX:** 0 B (0 Pkts.)

**Protocol** Static address

**IPv4 address**

**IPv4 netmask**

**IPv4 gateway**

**IPv4 broadcast**

**Use custom DNS servers**  

**IPv6 assignment length**  
disabled  Assign a part of given length of every public IPv6-prefix to this interface

**IPv6 address**

**IPv6 gateway**

**IPv6 routed prefix**  
  Public prefix routed to this device for distribution to clients.

General common interface setup panel.

General Setup	<b>Advanced Settings</b>	Physical Settings	Firewall Settings
Bring up on boot	<input checked="" type="checkbox"/>		
Use builtin IPv6-management	<input checked="" type="checkbox"/>		
Override MAC address		<input type="text" value="CE:0A:91:C9:25:F2"/>	
Override MTU		<input type="text" value="1500"/>	
Use gateway metric		<input type="text" value="0"/>	

Advanced common interface setup panel.

General Setup	Advanced Settings	<b>Physical Settings</b>	Firewall Settings
Bridge interfaces	<input type="checkbox"/>	<input checked="" type="checkbox"/> creates a bridge over specified interface(s)	
Interface	<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="text"/>	<input checked="" type="radio"/> Ethernet Adapter: "eth0" (lan) <input type="radio"/> Ethernet Adapter: "eth1" (wan, wan6) <input type="radio"/> Ethernet Adapter: "usb0" (gsm) <input type="radio"/> Wireless Network: Master "WCC Lite" (lan) <input type="radio"/> Wireless Network: Client "AP5" (wwan) <input type="radio"/> Custom Interface:	

Physical common interface setup panel.

General Setup	Advanced Settings	Physical Settings	<b>Firewall Settings</b>
Create / Assign firewall-zone			
<input type="radio"/>	<input checked="" type="checkbox"/> Choose the firewall zone you want to assign to this interface. Select unspecified to remove the interface from the associated zone or fill out the create field to define a new zone and attach the interface to it.		
<input checked="" type="radio"/> <div style="background-color: #90EE90; padding: 2px;"> <b>lan:</b>          lan:       </div>			
<input type="radio"/> <div style="background-color: #FFB6C1; padding: 2px;"> <b>wan:</b>          wan:          wan6:          gsm:          wwan:       </div>			
<input type="radio"/> unspecified -or- create: <input type="text"/>			

Firewall common interface setup panel.

<b>General Setup</b>	Advanced Settings	IPv6 Settings
Ignore interface	<input type="checkbox"/>	<a href="#">?</a> Disable DHCP for this interface.
Start	<input type="text" value="100"/>	<a href="#">?</a> Lowest leased address as offset from the network address.
Limit	<input type="text" value="150"/>	<a href="#">?</a> Maximum number of leased addresses.
Leasetime	<input type="text" value="12h"/>	<a href="#">?</a> Expiry time of leased addresses, minimum is 2 minutes (2m).

DHCP server general setup panel.

General Setup	<b>Advanced Settings</b>	IPv6 Settings
Dynamic DHCP	<input checked="" type="checkbox"/>	<a href="#">?</a> Dynamically allocate DHCP addresses for clients. If disabled, only clients having static leases will be served.
Force	<input type="checkbox"/>	<a href="#">?</a> Force DHCP on this network even if another server is detected.
IPv4-Netmask	<input type="text"/>	<a href="#">?</a> Override the netmask sent to clients. Normally it is calculated from the subnet that is served.
DHCP-Options	<input type="text"/>	<a href="#">?</a> Define additional DHCP options, for example "6, 192.168.2.1, 192.168.2.2" which advertises different DNS servers to clients.

DHCP server advanced setup panel.

General Setup	Advanced Settings	<b>IPv6 Settings</b>
Router Advertisement-Service		<input type="text" value="server mode"/>
DHCPv6-Service		<input type="text" value="hybrid mode"/>
NDP-Proxy		<input type="text" value="hybrid mode"/>
DHCPv6-Mode		<input type="text" value="stateless + stateful"/> <a href="#">?</a> Default is stateless + stateful
Always announce default router	<input type="checkbox"/>	<a href="#">?</a> Announce as default router even if no public prefix is available.
Announced DNS servers		<input type="text"/>
Announced DNS domains		<input type="text"/>

DHCP server IPv6 settings setup panel.

## GSM

### Interfaces - GSM

On this page you can configure the network interfaces. You can bridge several interfaces by ticking the "bridge interfaces" field and enter the names of several network interfaces separated by spaces. You can also use VLAN notation INTERFACE.VLANNR (e.g.: eth0.1).

COMMON CONFIGURATION	
<b>General Setup</b>	Advanced Settings   Firewall Settings
Status	 <b>Uptime:</b> 1h 18m 58s <b>MAC-Address:</b> 00:00:00:00:00:00 <b>RX:</b> 437.84 KB (7532 Pkts.) <b>TX:</b> 456.23 KB (7490 Pkts.)
Protocol	<input type="text" value="wwan"/>

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 behaviour.

## Interfaces - GSM

On this page you can configure the network interfaces. You can bridge several interfaces by ticking the "bridge interfaces" field and enter the names of several network interfaces separated by spaces. You can also use VLAN notation `INTERFACE.VLANNR` (e.g.: `eth0.1`).

**COMMON CONFIGURATION**  
**General Setup** | **Advanced Settings** | Firewall Settings  
Bring up on boot   
Use builtin IPv6-management   
Force link   
**?** Set interface properties regardless of the link carrier (If set, carrier sense events do not invoke hotplug handlers).  
Enable IPv6 negotiation on the PPP link   
Modem init timeout   
**?** Maximum amount of seconds to wait for the modem to become ready  
Use default gateway   
**?** If unchecked, no default route is configured  
Prefer PPP connection   
**?** If checked, modem will prioritise PPP type connection over other types (if available)  
Use gateway metric   
Use DNS servers advertised by peer   
**?** If unchecked, the advertised DNS server addresses are ignored  
LCP echo failure threshold   
**?** Presume peer to be dead after given amount of LCP echo failures, use 0 to ignore failures  
LCP echo interval   
**?** Send LCP echo requests at the given interval in seconds, only effective in conjunction with failure threshold  
Inactivity timeout   
**?** Close inactive connection after the given amount of seconds, use 0 to persist connection  
Override MTU

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 builtin 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.), prioritise 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.

## COMMON CONFIGURATION

General Setup | Advanced Settings | **Firewall Settings**

Create / Assign firewall-zone

**lan:**  
 lan:

**wan:**  
 wan:   
 wan6:   
 gsm:

unspecified -or- create:

Choose the firewall zone you want to assign to this interface. Select unspecified to remove the interface from the associated zone or fill out the create field to define a new zone and attach the interface to it.

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.

**Generic MAC80211 802.11bgn (radio0)**

Channel: 11 (2.462 GHz) | Bitrate: 1 Mbit/s

Scan Add

0% **SSID: WCC Lite | Mode: Master**

**BSSID: C6:93:00:0E:C4:33 | Encryption: None**

Disable

Edit

Remove

50% **SSID: AP5 | Mode: Client**

**BSSID: 02:1A:11:FF:87:09 | Encryption: WPA2 PSK (CCMP)**

Disable

Edit

Remove

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.

	SSID	MAC-Address	Host	Signal / Noise	RX Rate / TX Rate
wlan0	AP5	02:1A:11:FF:87:09	192.168.43.1	-75 / -95 dBm	1.0 Mbit/s, 20MHz 1.0 Mbit/s, 20MHz

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 Setup

Advanced Settings

**Mode: Client | SSID: AP5**

**BSSID: 02:1A:11:FF:87:09 | Encryption: WPA2 PSK (CCMP)**

**Channel: 11 (2.462 GHz) | Tx-Power: 20 dBm**

**Signal: -77 dBm | Noise: -95 dBm**

**Bitrate: 6.5 Mbit/s | Country: US**

47%

Status

Wireless network is enabled Disable

Operating frequency

Mode

Channel

Width

Transmit Power  dBm

General device settings.

General Setup **Advanced Settings**

Country Code  
US - United States ⓘ Use ISO/IEC 3166 alpha2 country codes.

Distance Optimization  
Distance to farthest network member in meters.

Fragmentation Threshold

RTS/CTS Threshold

Advanced device settings.

**INTERFACE CONFIGURATION**

General Setup **Wireless Security** Advanced Settings

ESSID AP5

Mode Client

BSSID 02:1A:11:FF:87:09

Network

gsm: ⓘ Choose the network(s) you want to attach to this wireless interface or fill out the create field to define a new network.

lan:

wan:

wan6:

wwan:

create:

General interface settings.

General Setup **Wireless Security** Advanced Settings

Encryption WPA2-PSK

Cipher auto

Key .....

Wireless security interface settings.

**INTERFACE CONFIGURATION**

General Setup **Wireless Security** Advanced Settings

Interface name ⓘ Override default interface name

Advanced interface settings.

## DHCP and DNS

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

General Settings | **Resolv and Hosts Files** | TFTP Settings | Advanced Settings

Domain required   
 ? Don't forward DNS-Requests without DNS-Name

Authoritative   
 ? This is the only DHCP in the local network

Local server   
 ? Local domain specification. Names matching this domain are never forwarded and are resolved from DHCP or hosts files only

Local domain   
 ? Local domain suffix appended to DHCP names and hosts file entries

Log queries   
 ? Write received DNS requests to syslog

DNS forwardings  
   
 ? List of DNS servers to forward requests to

Rebind protection   
 ? Discard upstream RFC1918 responses

Allow localhost   
 ? Allow upstream responses in the 127.0.0.0/8 range, e.g. for RBL services

Domain whitelist  
   
 ? List of domains to allow RFC1918 responses for

Local Service Only   
 ? Limit DNS service to subnets interfaces on which we are serving DNS.

Non-wildcard   
 ? Bind only to specific interfaces rather than wildcard address.

General DHCP settings.

General Settings | **Resolv and Hosts Files** | TFTP Settings | Advanced Settings

Use /etc/ethers  ? Read /etc/ethers to configure the DHCP-Server

Leasefile  ? file where given DHCP-leases will be stored

Ignore resolve file

Resolve file  ? local DNS file

Ignore /etc/hosts

Additional Hosts files

Resolve and hosts files settings.

General Settings | Resolv and Hosts Files | **TFTP Settings** | Advanced Settings

Enable TFTP server

TFTP server root  ? Root directory for files served via TFTP

Network boot image  
 ? Filename of the boot image advertised to clients

TFTP server settings.

General Settings	Resolv and Hosts Files	TFTP Settings	Advanced Settings
Suppress logging	<input type="checkbox"/>		<a href="#">?</a> Suppress logging of the routine operation of these protocols
Allocate IP sequentially	<input type="checkbox"/>		<a href="#">?</a> Allocate IP addresses sequentially, starting from the lowest available address
Filter private	<input checked="" type="checkbox"/>		<a href="#">?</a> Do not forward reverse lookups for local networks
Filter useless	<input type="checkbox"/>		<a href="#">?</a> Do not forward requests that cannot be answered by public name servers
Localise queries	<input checked="" type="checkbox"/>		<a href="#">?</a> Localise hostname depending on the requesting subnet if multiple IPs are available
Expand hosts	<input checked="" type="checkbox"/>		<a href="#">?</a> Add local domain suffix to names served from hosts files
No negative cache	<input type="checkbox"/>		<a href="#">?</a> Do not cache negative replies, e.g. for not existing domains
Additional servers file	<input type="text"/>		<a href="#">?</a> This file may contain lines like 'server=/domain/1.2.3.4' or 'server=1.2.3.4' for domain-specific or full upstream DNS servers.
Strict order	<input type="checkbox"/>		<a href="#">?</a> DNS servers will be queried in the order of the resolvfile
Bogus NX Domain Override	<input type="text" value="67.215.65.132"/>		<a href="#">?</a> List of hosts that supply bogus NX domain results
DNS server port	<input type="text" value="53"/>		<a href="#">?</a> Listening port for inbound DNS queries
DNS query port	<input type="text" value="any"/>		<a href="#">?</a> Fixed source port for outbound DNS queries
Max. DHCP leases	<input type="text" value="unlimited"/>		<a href="#">?</a> Maximum allowed number of active DHCP leases
Max. EDNS0 packet size	<input type="text" value="1280"/>		<a href="#">?</a> Maximum allowed size of EDNS.0 UDP packets
Max. concurrent queries	<input type="text" value="150"/>		<a href="#">?</a> Maximum allowed number of concurrent DNS queries

Advanced settings.

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

ACTIVE DHCPV6 LEASES				
Host	IPv6-Address	DUID	Leasetime remaining	
?	fd74:8536:7bae::33f/128	00046836d59efa382760f3193e5ec5bf4a24	11h 54m 16s	

STATIC LEASES				
<p>Static leases are used to assign fixed IP addresses and symbolic hostnames to DHCP clients. They are also required for non-dynamic interface configurations where only hosts with a corresponding lease are served.</p> <p>Use the Add Button to add a new lease entry. The MAC-Address identifies the host, the IPv4-Address specifies the fixed address to use and the Hostname is assigned as symbolic name to the requesting host. The optional Lease time can be used to set non-standard host-specific lease time, e.g. 12h, 3d or infinite.</p>				
Hostname	MAC-Address	IPv4-Address	Lease time	IPv6-Suffix (hex)
<input type="text" value="host2"/>	<input type="text" value="f0:76:1c:3b:cb:13 (192.168.2.2)"/>	<input type="text" value="192.168.2.2"/>	<input type="text" value="10"/>	<input type="text"/>
<input type="button" value="Add"/>				<input type="button" value="Delete"/>

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

HOST ENTRIES		
Hostname	IP address	
<input type="text" value="Host1"/>	<input type="text" value="192.168.2.35"/>	<input type="button" value="Delete"/>
<input type="button" value="Add"/>		

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.

STATIC IPV4 ROUTES						
Interface	Target	IPv4-Netmask	IPv4-Gateway	Metric	MTU	Route type
	Host-IP or Network	if target is a network				
<input type="text" value="lan"/>	<input type="text" value="192.168.0.254"/>	<input type="text" value="255.255.255.255"/>	<input type="text" value="192.168.0.254"/>	<input type="text" value="0"/>	<input type="text" value="1500"/>	<input type="text" value="unicast"/>
<input type="button" value="Delete"/>						
<input type="button" value="Add"/>						

STATIC IPV6 ROUTES						
Interface	Target	IPv6-Gateway	Metric	MTU	Route type	
	IPv6-Address or Network (CIDR)					
<input type="text" value="lan"/>	<input type="text" value="0:0:0:0:ffff:c0a8:fe"/>	<input type="text" value="0:0:0:0:ffff:c0a8:fe"/>	<input type="text" value="0"/>	<input type="text" value="1500"/>	<input type="text" value="unicast"/>	<input type="button" value="Delete"/>
<input type="text" value="lan"/>	<input type="text"/>	<input type="text"/>	<input type="text" value="0"/>	<input type="text" value="1500"/>	<input type="text" value="unicast"/>	<input type="button" value="Delete"/>
<input type="button" value="Add"/>						

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.

## Firewall

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

### General settings

GENERAL SETTINGS	
Enable SYN-flood protection	<input type="checkbox"/>
Drop invalid packets	<input type="checkbox"/>
Input	accept
Output	accept
Forward	reject

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.

ZONES						
Zone => Forwardings	Input	Output	Forward	Masquerading	MSS clamping	
lan:  => wan	accept	accept	accept	<input type="checkbox"/>	<input type="checkbox"/>	<a href="#">Edit</a> <a href="#">Delete</a>
wan: wan6: gsm: wwan:  => REJECT	reject	accept	reject	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<a href="#">Edit</a> <a href="#">Delete</a>
<a href="#">Add</a>						

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.

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

General Settings	Advanced Settings
Name	newzone
Input	accept
Output	accept
Forward	reject
Masquerading	<input type="checkbox"/>
MSS clamping	<input type="checkbox"/>
Covered networks	<input type="checkbox"/> gsm: <input type="checkbox"/> lan: <input type="checkbox"/> wan: <input type="checkbox"/> wan6: <input type="checkbox"/> wwan: <input type="checkbox"/> create: <input type="text"/>

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.

General Settings	<b>Advanced Settings</b>
Restrict to address family	IPv4 and IPv6
Restrict Masquerading to given source subnets	0.0.0.0/0
Restrict Masquerading to given destination subnets	0.0.0.0/0
Force connection tracking	<input type="checkbox"/>
Enable logging on this zone	<input type="checkbox"/>

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.

Allow forward to destination zones:	<input type="checkbox"/>	lan: lan:
	<input type="checkbox"/>	wan: wan: wan6: gsm: wwan:
Allow forward from source zones:	<input type="checkbox"/>	lan: lan:
	<input type="checkbox"/>	wan: wan: wan6: gsm: wwan:

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 FORWARDS

Name	Match	Forward to	Enable	Sort
4000	IPv4-tcp From any host in wan Via any router IP at port 4000	IP 192.168.2.1, port 4000 in lan	<input checked="" type="checkbox"/>	▲ ▼
4001	IPv4-tcp, udp From any host in wan Via any router IP at port 4001	IP 192.168.2.1, port 4001 in lan	<input checked="" type="checkbox"/>	▲ ▼

**New port forward:**

Name	Protocol	External zone	External port	Internal zone	Internal IP address	Internal port
<input type="text" value="New port forward"/>	TCP+UDP	wan	<input type="text"/>	lan	<input type="text"/>	<input type="text"/>

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

Name	Match	Action	Enable	Sort
Allow-DHCP-Renew	IPv4-udp From any host in wan To any router IP at port 68 on this device	Accept input	<input checked="" type="checkbox"/>	▲ ▼
Allow-Ping	IPv4-icmp with type echo-request From any host in wan To any router IP on this device	Accept input	<input checked="" type="checkbox"/>	▲ ▼
Allow-IGMP	IPv4-igmp From any host in wan To any router IP on this device	Accept input	<input checked="" type="checkbox"/>	▲ ▼
Allow-DHCPv6	IPv6-udp From IP range fc00::/6 in wan To IP range fc00::/6 at port 546 on this device	Accept input	<input checked="" type="checkbox"/>	▲ ▼

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.

Name	Match	Action	Enable	Sort
This section contains no values yet				
<b>New source NAT:</b>				
Name	Source zone	Destination zone	To source IP	To source port
<input type="text" value="New SNAT rule"/>	lan	wan	Do not rewrite	Do not rewrite

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

```
# This file is interpreted as shell script.  
# Put your custom iptables rules here, they will  
# be executed with each firewall (re-)start.  
  
# Internal uci firewall chains are flushed and recreated on reload, so  
# put custom rules into the root chains e.g. INPUT or FORWARD or into the  
# special user chains, e.g. input_wan_rule or postrouting_lan_rule.
```

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.

## Diagnostics

**NETWORK UTILITIES**  
  

<input type="text" value="192.168.2.2"/>	<input type="text" value="openwrt.org"/>	<input type="text" value="openwrt.org"/>
IPv4 ▾ <b>Ping</b>	IPv4 ▾ <b>Traceroute</b>	<b>Nslookup</b>

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

## GSM

# GSM

Configuration page for GSM modem

SIM CARDS PARAMETERS	
<b>SIM 1</b>   <b>SIM 2</b>	
Enable	<input checked="" type="checkbox"/>
PIN code	<input type="text"/> 
APN	<input type="text"/>
PAP/CHAP username	<input type="text"/>
PAP/CHAP password	<input type="text"/>

MODEM PARAMETERS	
Enable data connection	<input checked="" type="checkbox"/>
Priority SIM	<input type="text" value="1"/> 
<small>Which SIM will be prioritised when switching cards</small>	
Service Type	<input type="text" value="2G/3G/4G"/> 
<small>Choosing modem service type. For service type to come to effect, you will have restart connection.</small>	

PINGER CONFIGURATION	
Disable	<input type="checkbox"/>
Failed ping count	<input type="text" value="3"/> 
<small>Limit of failed ping requests, before pinger decides, that internet connection is lost</small>	
Reset modem	<input checked="" type="checkbox"/> 
<small>Reset modem after failed pings</small>	
Switch SIM	<input checked="" type="checkbox"/> 
<small>Switch SIM to non-priority after specified retry count</small>	
Priority SIM retry count	<input type="text" value="3"/> 
<small>How much blocks of failed pings will the pinger tolerate, before switching to non-priority SIM</small>	
Ping interval (minutes)	<input type="text" value="2"/>
Primary host	<input type="text" value="google.com"/>
Secondary host	<input type="text" value="8.8.4.4"/>
Network interface	<input type="text" value="gsm"/>

## 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.

**1** 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 selection 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:**

INTERFACES WIRELESS DHCP AND DNS HOSTNAMES STATIC ROUTES FIREWALL DIAGNOSTICS LOAD BALANCING

Save

## Interfaces

### INTERFACE OVERVIEW

Network	Status	Actions
<b>LAN</b>  br-lan	Uptime: 0h 6m 51s MAC-Address: C4:93:00:08:4E:25 RX: 235.56 KB (1340 Pkts.) TX: 786.39 KB (1261 Pkts.) IPv4: 192.168.1.1/24 IPv6: fd15:7d60:daa1::1/60	<input type="button" value="Connect"/> <input type="button" value="Stop"/> <input type="button" value="Edit"/> <input type="button" value="Delete"/>
<b>GSM</b>  ublox-gsm	RX: 0 B (0 Pkts.) TX: 0 B (0 Pkts.)	<input type="button" value="Connect"/> <input type="button" value="Stop"/> <input type="button" value="Edit"/> <input type="button" value="Delete"/>
<b>WAN</b>  eth1	Uptime: 0h 0m 0s MAC-Address: C4:93:00:08:4E:24 RX: 0 B (0 Pkts.) TX: 0 B (0 Pkts.)	<input type="button" value="Connect"/> <input type="button" value="Stop"/> <input type="button" value="Edit"/> <input type="button" value="Delete"/>
<b>WAN6</b>  eth1	Uptime: 0h 0m 0s MAC-Address: C4:93:00:08:4E:24 RX: 0 B (0 Pkts.) TX: 0 B (0 Pkts.)	<input type="button" value="Connect"/> <input type="button" value="Stop"/> <input type="button" value="Edit"/> <input type="button" value="Delete"/>

2. Enter interface name and select L2TP protocol:

Save

## Create Interface

Name of the new interface  ⓘ The allowed characters are: A-Z, a-z, 0-9 and \_

Note: interface name length  
 ⓘ Maximum length of the name is 15 characters including the automatic protocol/bridge prefix (br-, 6in4-, pppoe- etc.)

Protocol of the new interface

- L2TP
- Static address
- DHCP client
- Unmanaged
- DHCPv6 client
- PPP
- PPPoE
- UMTS/GPRS/EV-DO
- L2TP
- ublox

3. Enter server name and authorization parameters:

### COMMON CONFIGURATION

General Setup | Advanced Settings | Firewall Settings

 RX: 0 B (0 Pkts.)  
 l2tp-l2tp TX: 0 B (0 Pkts.)

Status

Protocol

L2TP Server

PAP/CHAP username

PAP/CHAP password  ⓘ

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

## 8.8 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.