SPECTRE Router CONFIGURATION MANUAL







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DOCUMENT INFORMATION

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Used symbols



Danger – Information regarding user safety or potential damage to the router.



Attention – Problems that can arise in specific situations.



Useful tips or information of special interest.

GPL license

Source codes under GPL license are available free of charge by sending an email to support@bb-elec.com.

Router version

The properties and settings associated with the cellular network connection are not available in non-cellular SPECTRE RT routers.

PPPoE configuration is only available on SPECTRE RT routers. It is used to set the PPPoE connection over Ethernet.



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1. ROUTER CONFIGURATION USING A WEB BROWSER

Attention! The SPECTRE cellular router will not operate unless the cellular carrier has been correctly configured and the account activated and provisioned for data communications. For UMTS and LTE carriers, a SIM card must be inserted into the router. Do not insert the SIM card when the router is powered up.

You can monitor the status, configuration and administration of the router via the Web interface. To access the router over the web interface, enter http://xxx.xxx.xxx into the URL for the browser where xxx.xxx.xxx is the router IP address. The modem's default IP address is **192.168.1.1**. The default username is "*root*" and the default password is "*root*".

The left side of the web interface displays the menu. You will find links for the Status, Configuration and Administration of the router.

Name and Location displays the router's name, location and SNMP configuration (See SNMP configuration). These fields are user-defined for each router.

For enhanced security, you should change the default password. If the router's default password is set, the menu item "*Change password*" is highlighted in red.

Status	General Status
General Mobile WAN Network DHCP IPsec DynDNS System Log	Mobile Connection SIM Card : Primary Interface : usb0 Flags : Multicast IP Address : Unassigned State : Offline
Configuration	> Less Information «
LAN VRRP Mobile WAN Backup Routes Firewall NAT OpenVPN IPsec GRE LITP PPTP DynDNS NTP SNMP SMTP	Primary LAN Interface : eth0 Flags : UD, Running, Multicast IP Address : 132.166.1.2 / 255.255.0 MAC Address : 100.144.021.621.2A MTU : 1500 B Ax Data : 13.2 KB Rx Pathers : 116 Rx Errors : 0 Rx Overruns : 0 TX Pather : 130.8 KB TX Pather : 130.8 KB TX Pather : 130.8 KB TX Pather : 0 TX Pather : 0 TX Data : 0
SMS Expansion Port 1 Expansion Port 2 USB Port	IX Overruns : 0 > Less Information <
Startup Script Up/Down Script Automatic Update Customization User Modules	Secondary LAN Interface : eth1 Flags : Multicast IP Address : Unassigned MAC Address : 00:0A:14:81:6E:2B + Less Information <
Administration	Peripheral Ports
Change Profile Change Password Set Real Time Clock Set SMS Service Center Unlock SIM Card	Expansion Port 1 : Ethernet Expansion Port 2 : None Binary Iput : Off Binary Output : Off
Send SMS Backup Configuration Restore Configuration Update Firmware Reboot	System Information Firmware Version : 3.0.9 (2014-02-14) Serial Number : 5900091 Profile : 5tandard Supply Voltage : 12.3 V Temperature : 37 *C Time : 2014-04-08 15:37:32 Uprime : 0 days, 0 hours, 1 minute

Figure 1: Web Configuration

If the green LED is blinking, you may restore the router to its factory default settings by pressing RST on front panel. The configuration will be restored to the factory defaults and the router will reboot. (The green LED will be on during the reboot.)

SECURED ACCESS TO WEB CONFIGURATION

The Web interface can be accessed through a standard web browser via a secure HTTPS connection.

Access the web interface by entering https://192.168.1.1 in the web browser. You may receive a message that there is a problem with the website's security certificate. If you do, click on "Continue to this website". If you wish to prevent this message, you must install a security certificate into the router.

Since the domain name in the certificate is given the MAC address of the router (such addresses use dashes instead of colons as separators), it is necessary to access the router under this domain name. For access to the router via a domain name, a DNS record must be added to the DNS table in the operating system.

There are three methods to add a domain name to the operating system:

- Editing /etc/hosts (Linux/Unix)
- Editing C:\WINDOWS\system32\drivers\etc\hosts (Windows XP)
- Configuring your own DNS server

You must then add a security certificate to the web server on the router. When using a self-signed certificate, you must upload your files to the certs directory /etc/certs in the router.

GENERAL

A summary of basic information about the router and its activities can be invoked by selecting the *General* menu item. This page is also displayed when you login to the web interface. Information is divided into several of separate blocks according to the type of router activity or the properties area – Mobile Connection, Primary LAN, Peripherals Ports and System Information. If your router is equipped with a Wi-Fi expansion port, there is also a WI-FI section.

MOBILE CONNECTION

Item	Description
SIM Card	Identification of the SIM card (Primary or Secondary)
Interface	Defines the interface
Flags	Defines the flags (Example: Up, Running, Multicast)
IP address	IP address of the interface
MTU	Maximum packet size that the equipment is able to transmit
Rx Data	Total number of received bytes
Rx Packets	Received packets
Rx Errors	Erroneous received packets
Rx Dropped	Dropped received packets
Rx Overruns	Lost received packets because of overload
Tx Data	Total number of sent bytes
Tx Packets	Sent packet
Tx Errors	Erroneous sent packets
Tx Dropped	Dropped sent packets
Tx Overruns	Lost sent packets because of overload
Uptime	Time indicating how long the connection to mobile network is established

Table 1: Mobile Connection

PRIMARY LAN

Items displayed in this part have the same meaning as items in the previous part. Moreover, there is information about the MAC address of the router (MAC Address item).

WIFI

Items displayed in this part have the same meaning as items in the previous part. (This is displayed if your model has a Wi-Fi.)

PERIPHERAL PORTS

Table 2: Peripheral ports

Item	Description
Expansion Port 1	Expansion port fitted to the position 1 (None indicates that this position is equipped with no port)
Expansion Port 2	Expansion port fitted to the position 2 (None indicates that this position is equipped with no port)
Binary Input	State of binary input
Binary Output	State of binary output

SYSTEM INFORMATION

Table 3: System information

Item	Description
Firmware Version	Information about the firmware Version
Serial Number	Serial number of the router (in case of N/A is not available)
Profile	Current profile – standard or alternative profiles (profiles are used for example to switch between different modes of operation)
Supply Voltage	Supply voltage of the router
Temperature	Temperature in the router
Time	Current date and time
Uptime	Time indicating how long the router is used

MOBILE WAN STATUS

The SPECTRE RT industrial router does not display the *Mobile WAN* status option.

The Mobile WAN menu item contains current information about connections to the mobile network. The first part of this page (Mobile Network Information) displays basic information about the mobile network in which the router is operated. There is also information about the module, which is mounted in the router.

Item	Description
Registration	State of the network registration
Operator	Specifies the operator in whose network the router is operated
Technology	Transmission technology
PLMN	Code of operator
Cell	Cell to which the router is connected
LAC	Located Area Code – unique number assigned to each location area
Channel	Channel on which the router communicates
Signal Strength	Signal strength of the selected cell
Signal Quality	 Signal quality of the selected cell: EC/IO for UMTS and CDMA technologies (It is the ratio of the signal received from the pilot channel – EC – to the overall level of the spectral density, i.e. the sum of the signals of other cells – IO.) RSRQ for LTE technology (Defined as the ratio (N x RSRP) / RSSI)
Neighbors	Signal quality of neighboring hearing cells
Manufacturer	Module Manufacturer
Model	Type of module
Revision	Revision of module
IMEI	IMEI (International Mobile Equipment Identity) number of module
ESN	ESN (Electronic Serial Number) number of module (for CDMA routers)
MEID	MEID (Mobile Equipment Identifier) number of module

Table 4: Cellular network information

If a neighboring cell is highlighted in red, there is a risk that the router may repeatedly switch between the neighboring cell and the primary cell. This can affect the performance of the router. To prevent this, re-orient the antenna or use a directional antenna.

The next section of this window displays historical information about the quality of the cellular WAN connection during each logging period. The router has standard intervals, such as the previous 24 hours and last week, and also includes information one user-defined interval.

Table 5: Description of period

Period	Description
Today	Today from 0:00 to 23:59
Yesterday	Yesterday from 0:00 to 23:59
This week	This week from Monday 0:00 to Sunday 23:59
Last week	Last week from Monday 0:00 to Sunday 23:59
This period	This accounting period
Last period	Last accounting period

Table 6: Mobile network statistics

Item	Description
Signal Min	Minimal signal strength
Signal Avg	Average signal strength
Signal Max	Maximal signal strength
Cells	Number of switch between cells
Availability	Availability of the router via the mobile network (expressed as a percent-age)

Tips for Mobile Network Statistics table:

Availability of connection to mobile network information is expressed as a percentage that is calculated by the ratio of the time when connection to a mobile network is established to the time when the router is turned on.
When you place your cursor on the maximum or minimum signal strength, you will be shown the last time the router reached this signal strength. The middle part of this page displays information about transferred data and number of connections for both SIM card (for each period).

Table 7: Traffic statistics

Item	Description
RX data	Total volume of received data
TX data	Total volume of sent data
Connections	Number of connection to mobile network establish

The last part (Mobile Network Connection Log) displays information about the mobile network connection and any problems that occurred while establishing them.

Mobile WAN Status									
	Mobile Network Information								
Operator Technology PLMN Cell LAC Channel Signal Strength	: -83 dBm (80),	, -81 dBm (57)	, -93 dBm (59)						
				Mobile Net	work Statistics				
Signal Min Signal Avg Signal Max Cells Availability	: 15	Yesterday -121 dBm -71 dBm -65 dBm 261 99.7%		-121 dBm -69 dBm	This Period -121 dBm -70 dBm -63 dBm 730 99.7%	-121 dBm -85 dBm			
			٦	raffic Statistics	for Primary SIM	card			
Rx Data Tx Data Connections	Today : 12 KB : 13 KB : 2	Yesterday 21 KB 19 KB 7		Last Week 6366 KB 3382 KB 36	This Period 25768 KB 8549 KB 56	Last Period 18868 KB 3726 KB 49			
			Tr	affic Statistics fo	or Secondary SIN	M card			
Rx Data Tx Data Connections	Today : 0 KB : 0 KB : 0	Yesterday 0 KB 0 KB 0	This Week O KB O KB O	Last Week O KB O KB O	This Period O KB O KB O	Last Period O KB O KB O			
				Mobile Netwo	rk Connection Lo	og			
2013-07-10 21:17 2013-07-10 21:18 2013-07-11 08:39 2013-07-11 08:40 2013-07-11 09:22	2013-07-10 11:52:40 Connection successfully established. 2013-07-10 21:17:21 Terminated by signal. 2013-07-10 21:18:01 Connection successfully established. 2013-07-11 08:39:20 Terminated by signal. 2013-07-11 08:40:01 Connection successfully established. 2013-07-11 09:22:24 Terminated by signal. 2013-07-11 09:23:08 Connection successfully established.								

Figure 2: Mobile WAN Status

NETWORK STATUS

Select the Network menu item to view the current system information for the router. The upper part of the window displays detailed information about the active interfaces.

Table 8: Interface connection status

Interface	Description
eth0, eth1	Network interfaces

usb0	Mobile Network interface (active connection to GPRS/EDGE/CDMA/LTE)
tun0	OpenVPN tunnel interface
ipsec0	IPSec tunnel interface
gre1	GRE tunnel interface
ррр0	PPPoE interface (Industrial RT Router only)
lo	Local loopback interface

The following detailed information will be shown for each active connection.

Table 9: Description of information in network status

Item	Description
HWaddr	Hardware MAC (unique) address of primary network interface
inet	IP address of primary network interface
P-t-P	IP address second ends connection
Bcast	Broadcast address
Mask	Network Subnet Mask
MTU	Maximum transmittable packet size
Metric	Number of routers that the packet must pass through
RX	 packets – number of received packets errors – number of errors
	 dropped – number of dropped packets overruns – incoming packets lost because of overload
	frame – number of frame errors
ТХ	 packets – number of transmitted packets errors – number of packet errors dropped – number of dropped packets
	 overruns – number of outgoing packets lost because of overload
	 carrier - outgoing packet errors resulting from the physical layer
collisions	Number of collisions on physical layer
txqueuelen	Number of packets in the transmit queue
RX bytes	Total number of received bytes
TX bytes	Total number of transmitted bytes

					Netwo	rk Status	
					Inte	rfaces	
in UP RX TX co: RX	Ak encap:Ethernet tt addr:192.168.1.1 BROADCAST RUNNING packets:1718 error packets:106 errors Lisions:0 txqueuel bytes:177132 (172. serrupt:23	Bcast:192.168. MULTICAST MTU:1 s:0 dropped:0 ove :0 dropped:0 ove en:32	1.255 500 Me erruns rruns:(Mask:2 etric:1 :0 fram 0 carri	e:0 er:0	.255.0	
ine UP RX TX co	Ak encap:Local Loop et addr:127.0.0.1 LOOPBACK RUNNING packets:0 errors:0 packets:0 errors:0 lisions:0 txqueuel bytes:0 (0.0 B) T	Mask:255.0.0.0 MTU:16436 Metrid dropped:0 overn dropped:0 overn en:0	uns:0 : uns:0 (
ine UP RX TX co	<pre>Link encap:Ethernet HWaddr 00:A0:C6:00:00:00 inet addr:100.90.7.37 Bcast:100.255.255.255 Mask:255.255.255.255 UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1 RX packets:0 errors:0 dropped:0 overruns:0 frame:0 TX packets:0 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000 RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)</pre>						
					Rout	e Table	
192.168.254.3	Gateway 254 0.0.0.0 0.0.0.0 192.168.254.254	255.255.255.255 255.255.255.0	UH U	0 0	0 0	0 usb0 0 eth0	

Figure 3: Network Status

DHCP STATUS

Information about the DHCP server can be accessed by selecting the **DHCP status**. The DHCP server provides automatic configuration of the client devices connected to the router. The DHCP server assigns each device an IP address, subnet mask, default gateway (IP address of router) and DNS server (IP address of router).

For each client in the list, the DHCP status window displays the following information.

Item	Description			
lease	Assigned IP address			
starts	Time that the IP address was assigned			
ends	Time that the IP address lease expires			
hardware ethernet	Hardware MAC (unique) address			
uid	Unique ID			
client-hostname	Computer name			

Table 10: DHCP status description

	DHCP Status	
	Active DHCP Leases	
<pre>lease 192.168.1.2 { starts 1 2011/01/17 08:08:37; ends 1 2011/01/17 08:18:37; hardware ethernet 00:1d:92:25:72:33; uid 01:00:1d:92:25:72:33; client-hostname "felgr2"; }</pre>		

Figure 4: DHCP Status

The DHCP status may occasionally display two records for one IP address. This may be caused by resetting the client network interface.

IPSEC STATUS

Selecting the *IPsec* option in the status menu of the web page will bring up the information for any IPsec Tunnels that have been established. Up to 4 IPsec tunnels can be created. If no IPsec tunnels are configured, the status will show that "*IPsec is disabled*".

If an IPsec tunnel is established, the router will show "IPsec SA established" (highlighted in red) in the IPsec status information.

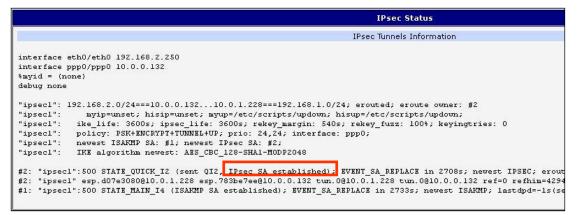


Figure 5: IPsec Status

DYNDNS STATUS

The router supports DynamicDNS using a DNS server on <u>www.dyndns.org</u>. If Dynamic DNS is configured, the status can be displayed by selecting menu option **DynDNS**. Refer to <u>www.dyndns.org</u> for more information on how to configure a Dynamic DNS client.

DynDNS Status	
Last DynDNS Update Status	

Figure 6: DynDNS status

Table 11: DynDNS report

DynDNS client is disabled.Invalid username or password.Specified hostname doesn't exist.Invalid hostname format.Hostname exists, but not under specified username.No update performed yet.DynDNS record is already up to date.DynDNS record successfully updated.DNS error encountered.DynDNS server failure.

For Dynamic DNS to function properly, the router's SIM card must have a public IP address assigned.

SYSTEM LOG

Use the **System Log** menu item to view the router system log. The system log contains helpful information about the operation of the router. Only the most recent information is shown on the screen, but older log entries can be viewed by saving the system log to a file and opening it with a text editor. The **Save** button allows you to save the system log to a file. The system log is cleared when the unit re-boots.

System Log	
System Messages	
70-01-01 00:00:24 pppd[491]: rcvd [LCP DiscReq id=0x1 magic=0xd86e2fe9]	
70-01-01 00:00:24 pppd[491]: rcvd [CHAP Challenge id=0x1 00000000000000000000000000000000000	
//0-01-01 00:00:24 pppq[491]; sent [LFAF Kesponse 1d=0x1 0d3/e9/25/c5er6/651412/541/000, hame = ""] //0-01-01 00:00:24 pppq[491]; rcvd [LFP EchoRep id=0x0 madie=0x4862f89 60 8d 8c 57]	
70-01-01 00:00:24 pppg14911: revd [her Feinkes in-bod magne-baddeezies 60 od 60 37]	
70-01-01 00:00:24 pppd[491]: CHAP authentication succeeded	
ViO-01-01 00:00:24 last message repeated 1 time	
970-01-01 00:00:24 pppd[491]: sent [IPCP ConfReg id=0x1 addr 0.0.0.0 ms-dns1 0.0.0.0 ms-dns3 0.0.0.0]	
070-01-01 00:00:24 pppd[491]: rcvd [IPCP ConfReg id=0x0]	
070-01-01 00:00:24 pppd[491]: sent [IPCP ConfNak id=0x0 addr 192.168.254.254]	
970-01-01 00:00:24 pppd[491]: rcvd [IPCP ConfNak id=0x1 addr 10.169.109.133 ms-dns1 93.153.117.1 ms-dns3 62.141.0.2]	
970-01-01 00:00:24 pppd[491]: sent [IPCP ConfReq id=0x2 addr 10.169.109.133 ms-dns1 93.153.117.1 ms-dns3 62.141.0.2]	
970-01-01 00:00:24 pppd[491]: rcvd [IPCP ConfReq id=0x1]	
970-01-01 00:00:24 pppd[491]: sent [IPCP ConfAck id=0x1]	
70-01-01 00:00:24 pppd[491]: rcvd [IPCP ConfAck id=0x2 addr 10.169.109.133 ms-dns1 93.153.117.1 ms-dns3 62.141.0.2]	
770-01-01 00:00:24 dnsmasq[399]: reading /etc/resolv.conf	
770-01-01 00:00:24 dnsmasq[399]: using nameserver 62.141.0.2#53	
70-01-01 00:00:24 dnsmasg[399]: using nameserver 93.153.117.1#53	
770-01-01 00:00:24 pppd[491]: local IP address 10.169.109.133	
770-01-01 00:00:24 pppd[491]; remote IP address 192.168.254.254	
770-01-01 00:00:24 pppd[491]; primary DNS address 93.153.117.1 770-01-01 00:00:24 pppd[491]; secondary DNS address 62.141.0.2	
//0-01-01 00:00:24 pppd[491]: Script /etc/scripts/jp-up started (pid 495)	
70-01-01 00:00:25 pppd(491): Script /etc/scripts/ip-up finished (pid 495), status = 0x0	
vio-ol-ol 00:16:14 login[528]: socie login on 'tryp'	
to of or control to solve to solve	
Save	



The Syslog default size is 1000 lines. When the system log reaches the maximum size, it is deleted and a new log file is started.

The program *syslogd* can be run on the router to configure the system log. The *syslogd* option "-*s*" followed by a decimal number will set the maximum number of lines in the log file. The "-*r*" option followed by the hostname or IP address will enable logging to a syslog daemon on a remote computer. On remote Linux machines, the syslog daemon is enabled by running *syslogd* with the parameter "-*r*". On remote Windows machines, a syslog server such as Syslog Watcher must be installed.

To enable remote logging when the router powers up, modify the script "/etc/init.d/syslog" or insert the commands "killall syslogd" and "syslogd <options>" into the startup script.

The following example shows how to send syslog information to a remote server at 192.168.2.115 on startup.

Startup Script	
Startup Script	
<pre>#!/bin/sh # # This script will be executed *after* all the other init scripts. # You can put your own initialization stuff in here.</pre>	
killall syslogd syslogd -R 192.168.2.115	
gure 8: Example syslogd startup script with the parameter -r	

LAN CONFIGURATION

Select the *LAN* menu item to enter the network configuration for the Ethernet ports. The main Ethernet port, **ETH**, is setup in the *Primary LAN* section. If the router has additional Ethernet ports (**PORT1** or **PORT2**), they are configured under the *Secondary LAN* section. For routers with 2 additional Ethernet ports, **PORT1** and **PORT2** are automatically bridged together.

Table 12: Configuration of network interface

Item	Description			
DHCP Client	 disabled – The router will not obtain an IP address automatically from a DHCP server on the network. enabled – The router will attempt to obtain an IP address automatically from a DHCP server on the network. 			
IP address	Fixed IP address of the network interface.			
Subnet Mask	IP address Subnet Mask for the interface.			
Media type	 Auto-negotiation – The router automatically selects the communication speed of the network interface. 100 Mbps Full Duplex – The router communicates at 100Mbps, in full-duplex mode. 100 Mbps Half Duplex - The router communicates at 100Mbps, in half-duplex mode. 10 Mbps Full Duplex - The router communicates at 10Mbps, in full-duplex mode. 10 Mbps Half Duplex - The router communicates at 10Mbps, in full-duplex mode. 10 Mbps Half Duplex - The router communicates at 10Mbps, in full-duplex mode. 			
Default Gateway	IP address of Default gateway for the router. When entering IP address of default gateway, all packets for which the record was not found in the routing table are sent to this address.			
DNS server	IP address of the primary DNS server for the router.			

The DHCP server assigns the IP address, default gateway IP address, and IP address of the DNS server to the connected DHCP clients.

The DHCP server supports both static and dynamic assignment of IP addresses. In Dynamic IP address assignment, the DHCP server will assign a client the next available IP address from the allowed IP address pool. Once the lease time on an IP address has expired, the DHCP server is free to re-assign that IP to another client.

Item	Description
Enable dynamic DHCP leases	Select this option to enable a dynamic DHCP server.
IP Pool Start	Starting IP address of the range allocated to the DHCP clients.
IP Pool End	Ending IP address of the range allocated to the DHCP clients.
Lease time	Time in seconds that the IP address is reserved before it can be re-used.

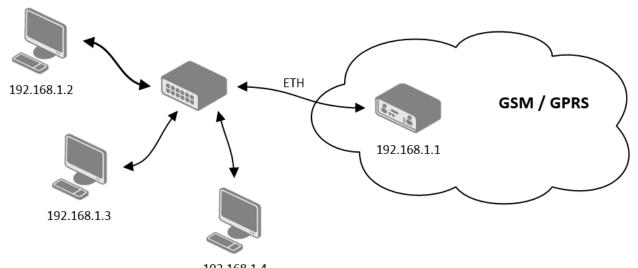
The DHCP server can also assign a Static IP address to a client. The MAC address of the client must be configured in the MAC address table along with the desired IP address. Up to 6 static IP addresses are supported. Do not overlap the static IP addresses with the addresses allocated by the dynamic DHCP address pool. Otherwise, the network may function incorrectly.

Table 14: Configuration of static DHCP server

Item	Description
Enable static DHCP leases	Select this option to enable a static DHCP server.
MAC Address	MAC address of a DHCP client.
IP Address	Assigned IP address.

Example of the network interface configuration for a dynamic DHCP server:

- The range of dynamically allocated addresses is from 192.168.1.2 to 192.168.1.4.
- The addresses are allocated for 600 seconds (10 minutes).



192.168.1.4 Figure 9: Example 1 - Network Topology for Dynamic DHCP Server

DHCP Client disa IP Address 192.1	ary LAN abled 🔹 🔻	Secondary LAN		
IP Address 192.	abled 🔻			
		disabled	•	
Culturet Merels 055 (168.1.1			
Subnet Mask 255.	255.255.0			
Bridged no	•	no	•	
Media Type auto	-negotiation 🔹	auto-negotiation	۲	
Default Gateway		1		
DNS Server				
🖉 Faabla duaamia DUK	CD	Л		
Enable dynamic DHC IP Pool Start 192.	168.1.2	1		
	168.1.4			
Lease Time 600	100.1.4	sec		
]		
Enable static DHCP leases MAC Address IP Address				
MAC Address	IF Address			
Apply				

Figure 10:	Example	1 -	LAN	Configuration	Page
iguic 10.	Example	÷.,		comparation	I uge

Example of the network interface configuration with both dynamic and static DHCP servers:

- The allocated address range is from 192.168.1.2 to 192.168.1.4.
- The address is allocated for 10 minutes.
- The client with MAC address 01:23:45:67:89:ab has IP address 192.168.1.10.
- The client with MAC address 01:54:68:18:ba:7e has IP address 192.168.1.11.

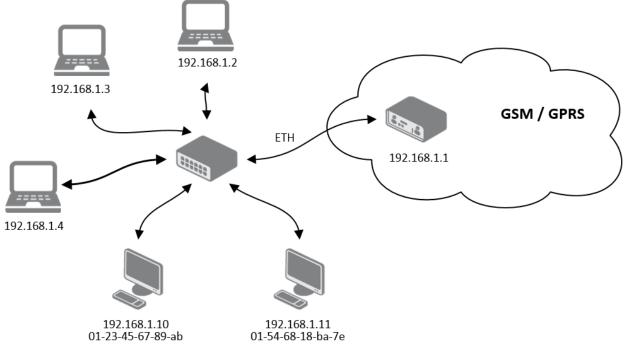


Figure 11: Example 2 - Network Topology with both Static and Dynamic DHCP Servers

			LAN C	onfigu
	Primary LAN		Secondary LAN	
DHCP Client	disabled	۲	disabled	۲
IP Address	192.168.1.1			
Subnet Mask	255.255.255.0			
Bridged	no	۲	no	۲
Media Type	auto-negotiation	۲	auto-negotiation	۲
Default Gateway	/			
DNS Server		_		
🗷 Enable dynam	ic DHCP leases			
IP Pool Start	192.168.1.2			
IP Pool End	192.168.1.4			
Lease Time	600		sec	
🗷 Enable static [
MAC Address	IP Address			
01:23:45:67:89:a				
01:54:68:18:ba:7	e 192.168.1.11			
Apply				



Example of the network interface configuration with default gateway and DNS server:

- Default gateway IP address is 192.168.1.20
- DNS server IP address is 192.168.1.20

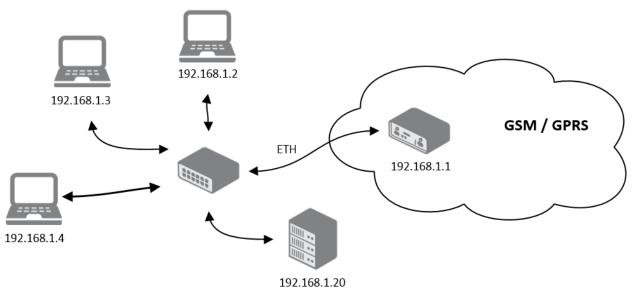


Figure 13: Example 3 - Network Topology

¢		LAN	N Configu	ation	
	Primary LAN	Secondary LAN			
DHCP client	disabled 🛛 💌	disabled	~		
IP Address	192.168.1.1				
Subnet Mask	255.255.255.0				
Media Type	auto-negotiation	auto-negotiation	~		
Default Gateway	192.168.1.20]			
DNS Server	192.168.1.20]			
🗹 Enable dynam	nic DHCP leases				
IP Pool Start	192.168.1.2				
IP Pool End	192.168.1.4]			
Lease Time	600	sec			
🔲 Enable static	DHCP leases				
MAC Address	IP Address				
Apply					
<u></u>					

Figure 14: Example 3 - LAN Configuration Page

VRRP CONFIGURATION

Select the *VRRP* menu item to enter the VRRP configuration. VRRP protocol (Virtual Router Redundancy Protocol) allows you to transfer packet routing from the main router to a backup router in case the main router fails. This can be used to provide a wireless cellular backup to a primary wired router in critical applications. If the *Enable VRRP* is checked, you may set the following parameters.

Table 15: VKKP Colling	
Item	Description
Virtual Server IP Address	This parameter sets the virtual server IP address. This address must be the same for both the primary and backup routers. Devices on the LAN will use this address as their default gateway IP address.
Virtual Server ID	This parameter distinguishes one virtual router on the network from another. The main and backup routers must use the same value for this parameter.
Host Priority	The active router with highest priority set by the parameter <i>Host Priority</i> , is the main router. According to RFC 2338, the main router should have the highest possible priority - 255. The backup router(s) have a priority in the range $1 - 254$ (default value is 100). A priority value of 0 is not allowed.

Table 15: VRRP configuration

You may set the *Check connection* flag in the second part of the window to enable automatic test messages for the cellular network. In some cases, the mobile WAN connection could still be active but the router will not be able to send data over the cellular network. This feature is used to verify that data can be sent over the PPP connection and supplements the normal VRRP message handling. The currently active router (main/backup) will send test messages to the defined *Ping IP Address* at periodic time intervals (*Ping Interval*) and wait for a reply (*Ping Timeout*). If the router does not receive a response to the Ping command, it will retry up to the number of times specified by the *Ping Probes* parameter. After that time, it will switch itself to a backup router until the PPP connection is restored.

Item	Description
Ping IP Address	Destination IP address for the Ping commands.
Ping Interval	Interval in seconds between the outgoing Pings.
Ping Timeout	Time in seconds to wait for a response to the Ping.
Ping Probes	Maximum number of failed ping requests

Table 16: Check connection

You may use the DNS server of the mobile carrier as the destination IP address for the test messages (Pings).

The *Enable Traffic Monitoring* option can be used to reduce the number of messages that are sent to test the PPP connection. When this parameter is set, the router will monitor the interface for any packets different from a ping. If a response to the packet is received within the timeout specified by the *Ping Timeout* parameter, then the router knows that the connection is still active. If the router does not receive a response within the timeout period, it will attempt to test the mobile WAN connection using standard Ping commands.

Example of the VRRP protocol:

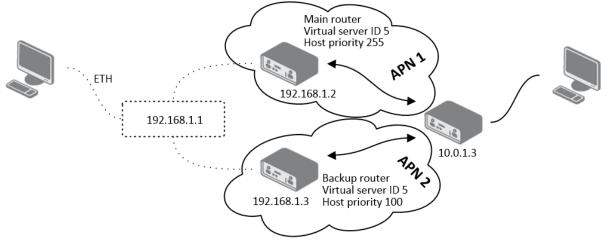


Figure 15: Example 4 - Network Topology for VRRP configuration

VRRP Configuration				
🗹 Enable VRRP				
Virtual Server IP Address	192.168.1.1			
Virtual Server ID	5			
Host Priority	255			
Check PPP connection				
Ping IP Address	10.0.1.3			
Ping Interval	10	sec		
Ping Timout	5	sec		
Ping Probes	10			
🗌 Enable traffic monitor	ng			
Apply				

Figure 16:	: Example 4 -	VRRP	configuration	of	main	router
------------	---------------	------	---------------	----	------	--------

VRRP Configuration			
🗹 Enable VRRP			
Virtual Server IP Address	192.168.1.1		
Virtual Server ID	5		
Host Priority	100]	
Check PPP connection			
Ping IP Address	10.0.1.3		
Ping Interval	10	sec	
Ping Timout	5	sec	
Ping Probes	10]	
Enable traffic monitoring			
Apply			

Figure 17. Example 4 - VRRP configuration of backup router

MOBILE WAN CONFIGURATION

The SPECTRE RT industrial router does not display the *Mobile WAN* Configuration option.

Select the *Mobile WAN* menu item to enter the cellular network configuration page.

Mobile WAN Configuration			
Create connection to mobile network			
	Primary SIM card	Secondary SIM card	_
Carrier	Generic UMTS •	Generic UMTS 🔹	
APN *			
Username *			
Password *			
Authentication	PAP or CHAP	PAP or CHAP	
IP Address *			
Phone Number *			
Operator *			
Network Type	automatic selection 🔹	automatic selection	
PIN *			
MRU	1500	1500	bytes
мти	1500	1500	bytes
DNS Settings	get from operator	get from operator	
DNS Server			
(The feature of check c	onnection to mobile netwo	rk is necessary for uninte	rrupted operation)
Check Connection	disabled 🔹	disabled 🔹	
Ping IP Address			
Ping Interval			sec
Enable traffic monitor	ring		
Data Limit		мв	
Warning Threshold		%	
Accounting Start	1		
	·		
Default SIM card	primary •		
Backup SIM card	secondary •	J	
	ard when connection fails		
	-		It SIM card when home network is detected
Switch to backup SIM card when data limit is exceeded and switch to default SIM card when data limit isn't exceeded Switch to backup SIM card when binary input is active and switch to default SIM card when binary input isn't active			
Switch to default SIM		_	
Initial Timeout	60	min	
Subsequent Timeout *		min	
Additive Constant *		min	
Enable PPPoE bridge mode * can be blank			
Apply			

Figure 18: Cellular WAN configuration

CELLULAR CARRIER SELECTION

The SPECTRE 3G Cellular Router can be configured to communicate on up to 2 UMTS or CDMA cellular networks. This allows the router to switch to a second carrier network if there is a problem with the primary network. The router can only communicate on one cellular network at a time and if redundancy is not required, then only one account needs to be activated. For GSM/UMTS networks, the account information will be on the SIM card provided by the carrier. For CDMA networks, the account is provisioned over-the-air by the network provider and a SIM card is not required. The Mobile Equipment Identifier (MEID) of the router must be provided to the CDMA network cellular carrier when the account is set up.

The primary and secondary cellular carriers are selected using the drop-down lists on the Cellular WAN configuration page under the Primary and Secondary SIM card headings. The 3G router supports AT&T, Verizon, Sprint, T-Mobile, and Rogers Cellular networks. Verizon and Sprint have CDMA networks and the others are GSM networks. The default carrier is set to a generic UMTS provider. Refer to Sprint CDMA network connection section below for activating the router on the Sprint CDMA network.

The carrier selection drop-down list is not available on LTE devices. For LTE devices, the carrier must be specified when ordering the router and the account settings will be on the SIM card provided by the network operator.

CONNECTION TO MOBILE NETWORK CONNECTION

If the **Create connection to mobile network** option is selected, the router will automatically try to establish a connection after power up. If the attempt is unsuccessful, the router will re-boot and try again. For GSM/UMTS and LTE networks, the following network information can be configured. In most cases, the necessary information will be included on the SIM card provided by the carrier and these fields can be left empty or at their default values. Please contact your cellular network provider for more information.

Description	
Generic, AT&T, T-Mobile, Sprint, Verizon (These are commonly used options on the drop-	
down list only available on the 3G Models)	
Network identifier (Access Point Name)	
User name to log into the GSM network	
Password to log into the GSM network	
Authentication protocol in GSM network	
• PAP or CHAP – Router is chose either authentication method.	
• PAP – Router will use PAP authentication.	
• CHAP – Router will use CHAP authentication.	
IP address of SIM card. (Required if a static IP address was assigned by the cellular carrier.)	
Telephone number to dial a GPRS or CSD connection. Router uses *99***1 # as the default telephone number.	
PLNM code for the network operator	
Automatic selection – The router will automatically select the network type	
 Depending upon the type of router, it is also possible to select a specific method of data transmission (GPRS, EDGE, UMTS). 	

Table 17: GPRS connection configuration

PIN	PIN code for the SIM card. (Only required if the SIM card has been locked with a PIN to prevent unauthorized access)
MRU	(Maximum Receiving Unit) – The maximum packet size that can be received in a given environment. Default value is 1500 bytes. Other settings may cause incorrect transmission of data.
MTU	(Maximum Transmission Unit) – The maximum packet size that can be transmitted in a given environment. Default value is 1500 bytes. Other settings may cause incorrect transmission of data.

If the *IP address* field is not filled in, the network operator will automatically assign an IP address when the connection is established. If a static IP address is supplied by the operator, the time required to connect to the network will be reduced.

If the **APN** field is not filled in, the router will automatically select the APN based on the IMSI code of the SIM card. If the PLMN of the cellular carrier is not in the APN list, then default APN is "internet". Contact your mobile operator to determine if the APN information must be entered.



Access to the SIM card may be blocked if the PIN code for a locked SIM is entered incorrectly. Contact technical support if your SIM card becomes blocked.



If only one SIM card is installed in the router, the router switches between the APNs on the SIM card. A router with two SIM cards switches between SIM cards.

The items marked with an '*' should only be entered if they are required by the cellular network operator. If the router is unable to establish a Mobile Network connection, verify that the network settings have been entered correctly. You may also try a different authentication method or network type.

SPRINT CDMA NETWORK CONNECTION

The SPECTRE 3G router must be manually activated on the Sprint network using the web interface after the account has been set up by Sprint.

To activate the router on the Sprint network:

- 1. Ensure that a data account has been set up by Sprint. You will need to provide the **MEID** of the router to the Sprint account rep. This number can be found on the label on the bottom of the router and on the outside of the router package. It can also be found on the *Mobile WAN* status web page when Sprint is selected as the primary carrier.
- 2. Connect the antennas and Ethernet cable to the router and power up the device.
- 3. Select Sprint as the primary carrier on the *Mobile WAN* configuration web page. This will enable the *CDMA Administration* menu item.
- 4. Bring up the Advanced CDMA Administration web page by clicking on the *CDMA* menu item under *Administration*.
- 5. Click on the *Activate Device* button to perform the over-the-air device activation. When it is complete, you can view the Mobile Device Number (MDN) on the *Mobile WAN* status page.
- 6. If the activation fails, verify that the antenna connections are tight and that the correct MEID has been set up on the Sprint network.

Status	Advanced CDMA Administration
Network DHCP Mobile WAN IPsec DynDNS System Log	One-Touch OTA Provisioning Activate Device Client-Initiated Device Configuration (CIDC) Update Profile
Configuration LAN VRRP Mobile WAN Firewall	Client-Initiated Preferred Roaming List (CIPRL) Update PRL Reset Cellular Module to Factory Defaults Reset Module
NAT OpenVPN IPaec GRE L2TP PPTP DynDNS NTP SMTP SMS Expansion Port 1 Expansion Port 2 USB Port Startup Script Up/Down Script Automatic Update	
Customization User Modules Administration	
Change Profile Change Password CDMA Set Real Time Clock Set SMS Service Center Unlock SIM Card Send SMS Backup Configuration Restore Configuration Update Firmware Behnat	

SPECTRE 3G UMTS/CDMA Router

Figure 19: Advanced CDMA administration

DNS ADDRESS CONFIGURATION

If *Get DNS address from operator* option is selected, the router will automatically attempt to get the IP addresses for the primary and secondary DNS servers from the cellular network operator.

CHECK CONNECTION TO MOBILE NETWORK CONFIGURATION

You may set the *Check connection* flag to enable automatic test messages for the cellular network. In some cases, the PPP connection may still be active but the router will not be able to send data over the cellular network. The router will send a Ping command to the *Ping IP Address* at periodic time intervals (*Ping Interval*) If the router does not receive a response to the Ping command, it will retry up to the number of times specified by the *Ping Probes* parameter. After that time, it will switch itself to a backup router until the mobile network connection is restored.

Table 18: Check connection to mobile network configuration

Item	Description
Ping IP Address	Destination IP address or domain name for the ping queries.
Ping Interval	Time intervals between the outgoing pings.

If the *Enable Traffic Monitoring* option is selected, the router stops sending ping questions to the *Ping IP* Address and it will watch traffic in mobile network connection. If mobile network connection is without traffic longer than the *Ping Interval*, then the router sends ping questions to the *Ping IP* Address.

Note: It is recommended that you enable Check Connection to ensure reliable data communication.

DATA LIMIT CONFIGURATION

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The router can be configured to automatically send an SMS message or switch to a backup SIM card if the amount of data sent or received exceeds a given threshold for the monthly billing period.

Item	Description
Data limit	With this parameter, you can set the maximum expected amount of data transmitted (sent and received) over the cellular network in one billing period (month).
Warning Threshold	Percentage of <i>Data Limit</i> (50% to 99%). The router will send an SMS message with <i>Router has exceeded (value of Warning Threshold) of data limit</i> in the message text when this threshold is exceeded.
Accounting Start	Sets the day of the month in which the billing cycle starts for the SIM card being used. The start of the billing period is determined by the network operator.

Table 19: Data limit configuration

If neither one of the options *Switch to backup SIM card when data limit is exceeded* (see next) or *Send SMS when data limit is exceeded* (see SMS configuration) is selected, the data limit will be ignored.

SWITCHING BETWEEN SIM CARDS OR NETWORKS

You may define rules in the router for switching between two APNs on one SIM card or between two SIM cards or network providers. The router can automatically switch between the network setups when the active PPP connection is lost, the data limit is exceeded, or the binary input on the front panel goes active.

Table 20: Default and backup SIM configuration

Item	Description
Default SIM card	This parameter sets the default APN or SIM card for the PPP connection. If this parameter is set to none , the router boots up in off-line mode and it will be necessary to initiate the PPP connection by sending an SMS message to the router.
Backup SIM card	Defines the backup APN or SIM card.

If parameter Backup SIM card is set to *none*, then the parameters *Switch to other SIM card when connection fails*, *Switch to backup SIM card when roaming is detected* and *Switch to backup SIM card when data limit is exceeded* will switch the router to off-line mode

Item	Description
Switch to other SIM card when connection fails	If the PPP connection fails, the router will switch to the secondary SIM card or secondary APN of the SIM card. The router will switch to the backup SIM card if the router is unable to establish a PPP connection after 3 attempts or the <i>Check the PPP connection</i> option is selected and the router detects that the PPP connection has failed.
Switch to backup SIM card when roaming is detected	If roaming is detected, this option forces the router to switch to the secondary SIM card or secondary APN of the SIM card.
Switch to backup SIM card when data limit is exceeded	This option enables the router to switch to the secondary SIM card or secondary APN of the SIM card when the data limit of default APN is exceeded.
Switch to backup SIM card when binary input is active	This parameter forces the router to switch to the secondary SIM card or secondary APN of the SIM card when binary input ' <i>bin0</i> ' is active.
Switch to primary SIM card after timeout	This parameter defines the method the router will use to try to switch back to the default SIM card or default APN.

The following parameters define the amount of time that must elapse before the router will attempt to go back to the default SIM card or APN.

Table 22: Switch between S	SIM card configurations
Item	

Item	Description	
Initial timeout	The first attempt to switch back to the primary SIM card or APN shall be made after the time defined in the parameter Initial Timeout. The range of this parameter is from 1 to 10000 minutes.	
Subsequent Timeout	After an unsuccessful attempt to switch to the default SIM card, the router will make a second attempt after the amount of time defined in the parameter Subsequent Timeout. The range is from 1 to 10000 minutes.	
Additive constant	Any further attempts to switch back to the primary SIM card or APN shall be made after a timeout computed as the sum of the previous timeout period and the time defined in the parameter <i>Additive constants</i> . The range is from 1 to 10000 minutes.	

Example: Option *Switch to primary SIM card after timeout* is checked and the parameters are set as follows: *Initial Timeout* = 60 min. *Subsequent Timeout* = 30 min. *Additive Constant* = 20 min.

The first attempt to switch back to the primary SIM card or APN shall be carried out after 60 minutes. The second attempt will be made 30 minutes later. The third attempt will be made after 50 minutes (30+20). The fourth attempt will be made after 70 minutes (30+20+20).

PPPOE BRIDGE MODE CONFIGURATION

If the *Enable PPPoE bridge mode* option is selected, the router will activate the PPPoE bridge protocol. PPPoE (point-to-point over ethernet) is a network protocol for encapsulating Point-to-Point Protocol (PPP) frames inside Ethernet frames. This feature allows a device connected to the ETH port of the router to create a PPP connection with the cellular network.

The figure below describes the situation, when the connection to mobile network is controlled on the address 8.8.8.8 in the time interval of 60 s for primary SIM card and on the address www.google.com in the time interval 80 s for secondary SIM card. In the case of traffic on the router the control pings are not sent, but the traffic is monitored.

(The feature of check connection to mobile network is necessary for uninterrupted operation)					
Check Connection	enabled 🔻 enabled 🔻				
Ping IP Address	8.8.8.8	www.google.com			
Ping Interval	60	80	sec		
✓ Enable traffic monitoring					

Figure 20: Example of Mobile WAN configuration 1

Figure 21 shows an example of how to configure the router to automatically switch to the backup SIM card when it exceeds the data limit of 800 MB in the billing period. It will send out a warning SMS message when 400 MB of data have been transmitted. In the example shown, the billing period begins on the 18th day of the month.

Data Limit	800	мв
Warning Threshold	50	%
Accounting Start	18	
Default SIM card	primary 🔻	
Backup SIM card	secondary 🔻	
Switch to other SIM c	ard when connection fails	
	-	ected and switch to default SIM card when home network is detected
		cceeded and switch to default SIM card when data limit isn't exceeded active and switch to default SIM card when binary input isn't active
Switch to default SIM		active and switch to default still card when binary input isn't active
Initial Timeout	60	min
Subsequent Timeout *		min
Additive Constant *		min

Figure 21: Example of Mobile WAN configuration 2

Example: Configuring the router to switch to offline mode when it detects that it is roaming. The first attempt to switch back to the default SIM card is made after 60 minutes, the second after 40 minutes, the third after 50 minutes (40 + 10)...

Default SIM card	primary •]
Backup SIM card	none 🔻]
Switch to backup SIM	I card when data limit is ex I card when binary input is	tected and switch to default SIM card when home network is detected xceeded and switch to default SIM card when data limit isn't exceeded s active and switch to default SIM card when binary input isn't active
Initial Timeout	60	min
Subsequent Timeout *	40	min
Additive Constant *	10	min

Figure 22: Example of Mobile WAN configuration 3

BACKUP ROUTES

By using the configuration form on the **Backup Routes** page, you can back up the primary connection with alternative connections to the Internet/mobile network. Each back up connection can be assigned a priority. Switching between connections is done based on set priorities and the state of the connections (for Primary LAN and Secondary LAN).

If the *Enable backup routes* switching option is checked, the default route is selected according to the settings below.

You can set the parameters for enabling each of backup route

If the *Enable backup routes* switching option is not checked, the *Backup routes* system operates in the so-called backward compatibility mode. The default route is selected based on implicit priorities according to the status of each enabled network interface. The names of backup routes and corresponding network interfaces, in order of implicit priorities, are:

- Mobile WAN (pppX, usbX)
- PPPoE (ppp0)
- Secondary LAN (eth1)
- Primary LAN (eth0)

Example:

Secondary LAN is selected as the default route only if Create connection to mobile network option is not checked on the Mobile WAN page, alternatively if Create PPPoE connection option is not checked on the PPPoE page. To select the Primary LAN it is also necessary not to be entered IP address for Secondary LAN and must not be enabled DHCP Client for Secondary LAN.

Item	Description
Priority	Priority for the type of connection
Ping IP Address	Destination IP address of ping queries to check the connection (address cannot be specified as a domain name)
Ping Interval	Time intervals between sent ping queries

Table 23: Backup routes

Backup Routes Configuration				
Enable backup routes	Enable backup routes switching			
Enable backup routes	switching for Mobile WAN			
Priority	1st 🗸]		
Enable backup routes	switching for Primary LAN			
Priority	1st 🗸]		
Ping IP Address	Ping IP Address			
Ping Interval		sec		
Enable backup routes	switching for Secondary LA	N		
Priority	1st 🗸]		
Ping IP Address				
Ping Interval sec				
Apply				

Figure 23: Backup Routes

PPPOE CONFIGURATION

The SPECTRE cellular router does not support the PPPoE configuration option. PPPoE configuration is only available on SPECTRE RT routers. It is used to set the PPPoE connection over Ethernet.

PPPoE (Point-to-Point over Ethernet) is a network protocol where PPP frames are encapsulated in Ethernet frames. The PPPoE feature in the SPECTRE RT industrial router operates in client mode. The router will connect to a PPPoE server or a PPPoE bridge device such as an ADSL modem.

To enter the PPPoE configuration, select the **PPPoE** menu item. If the **Create PPPoE connection** option is selected, the router will attempt to establish a PPPoE connection on power up. The PPPoE client will connect to devices that support either a PPPoE bridge or a PPPoE server. After a PPPoE connection is established, the router obtains the IP address of the PPPoE Server device and all communications from the device are forwarded to the industrial router.

Item	Description			
Username	Username for secure access to PPPoE			
Password	Password for secure access to PPPoE			
Authentication	Authentication protocol in GSM network			
	• PAP or CHAP – Router is chosen one of the authentication methods.			
	• PAP – It is used PAP authentication method.			
	• CHAP – It is used CHAP authentication method.			
MRU	(Maximum Receiving Unit) – The maximum packet size that can be received in the given environment. Default value is set to 1492 bytes. Other settings may cause incorrect data transmission.			
MTU	(Maximum Transmission Unit) – The maximum packet size that can be transmitted in the given environment. Default value is set to 1492 bytes. Other settings may cause incorrect data transmission			

Table 24: PPoE configuration

	PPPoE Configuration			
Create PPP	oE connection			
Username *				
Password *				
Authentication	PAP or CHAP			
MRU	1492	bytes		
MTU	1492	bytes		
Get DNS ac	Idresses from server			

Figure 24: PPPoE configuration

LTE FIREWALL CONFIGURATION

The first security element which incoming packets must pass is check of enabled source IP address and destination ports. The IP address can be specified from which you can remotely access the router and the internal network connected behind a router. If the Enable filtering of incoming packets items is checked (located at the beginning of the configuration form Firewall), this element is enabled and accessibility is checked against the table with IP addresses. This means that access is permitted only to the address specified in the table. It is possible to define up to eight remote accesses. There are the following parameters:

Table 25: LTE Firewall configuration

Item	Description			
Source	IP address from which access to the router is allowed			
Protocol	Specifies protocol for remote access			
	all – access is allowed by all			
	• TCP – access is allowed by TCP			
	UDP – access is allowed by UDP			
	ICMP – access is allowed by ICMP			
Target Port	The port number on which access to the router is allowed			
Action	Type of action:			
	 allow – access is allowed 			
	deny – access is denied			

Caution! The firewalls on the 3G and LTE models do not filter traffic received over the Ethernet ports.

The following part of the configuration form defines the forwarding policy. If enabled filtering of forwarded packets item is not checked, packets are automatically accepted. If this item is checked and incoming packet is addressed to another network interface, it will go to the FORWARD chain. In case that the FORWARD chain accepted this packet (there is a rule for its forwarding), it will be sent out. If the forwarding rule does not exist, packet will be dropped.

Then there is a table for defining the rules. It is possible to allow all traffic within the selected protocol (rule specifies only protocol) or create stricter rules by specifiying items for source IP address, destination IP address and port.

Table 266: LTE Firewall configuration

Item	Description		
Source	IP address of source device		
Destination	IP address of destination device		
Protocol	 Specifies protocol for remote access all – access is allowed by all TCP – access is allowed by TCP UDP – access is allowed by UDP ICMP – access is allowed by ICMP 		
Target Port	The port number on which access to the router is allowed		
Action	Type of action: • allow – access is allowed • deny – access is denied		

There is also the possibility to drop a packet whenever request for service which is not in the router comes (check box named Enable filtering of locally destinated packets). The packet is dropped automatically without any information.

As a protection against DoS attacks (this means attacks during which the target system is flooded with plenty of meaningless requirements) is used option named Enable protected against DoS attacks which limits the number of connections per second for five.

	Fire	ewall Configuration	
Enable filtering	of incoming packets		
Source *	Protocol Target		
	all 🔻	allow 🔻	
	all 🔻	allow 🔻	
	ICMP 🔻	allow 🔻	
	all 🔻	allow 🔻	
	all 🔻	allow 🔻	
	all 🔻	allow 🔻	
	all 🔻	allow 🔻	
	all 🔻	allow 🔻	
			allow
		all 🔻	allow 🔻
		all 🔻	allow 🔻
		all 🔻	allow 🔻
		all 🔻	allow 🔻
		all 🔻	allow 🔻
		all 🔻	allow 🔻
Enable filtering	of locally destinated packets	,	
Enable protection * can be blank	on against DoS attacks		
Apply			

Figure 25: LTE Firewall configuration

Example firewall configuration:

The router has allowed the following access:

- from host address 171.92.5.45 using any protocol
- from host address 10.0.2.123 using TCP protocol on any ports
- from host address 142.2.26.54 using ICMP protocol

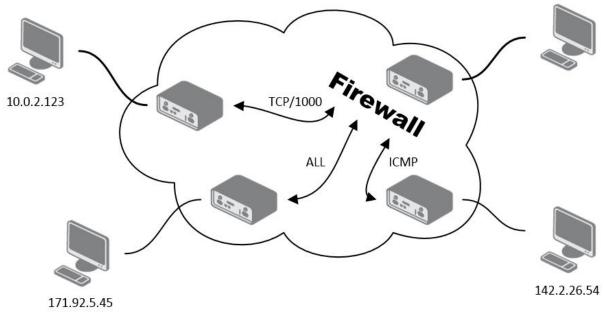


Figure 266: Example 5 - Network Topology for Firewall Application

			Firewall Configuration
🗹 Enable filtering of i	ncoming packets		
Source *	Protocol	Target Port * Action	
✓ 171.92.5.45	all 🔻	allow 🔻	
10.0.2.123	TCP V	1000 allow T	
✓ 142.2.26.54	ICMP V	allow 🔻	
	all 🔻	allow 🔻	
	all 🔻	allow 🔻	
	all 🔻	allow 🔻	
	all 🔻	allow 🔻	
	all 🔻	allow v	

Figure 277: Example 5 – LTE Firewall configuration

3G and RT FIREWALL CONFIGURATION

The 3G and RT router firewall can be configured to only allow certain hosts to access the router and internal LAN network or it can only allow traffic on a certain IP port to pass through to the internal network. Up to 8 filters can be defined when the *Allow remote access only from specified hosts* option is selected. The following parameters can be defined for each filter: *Source, Source IP Address, Protocol* and *Target Port*.

Table 277: 3G and RT Firewall configuration

Item	Description				
Source	IP address of source device				
Destination	IP address of destination device				
Protocol	Specifies protocol for remote access				
	all – access is allowed by all				
	TCP – access is allowed by TCP				
	 UDP – access is allowed by UDP 				
	ICMP – access is allowed by ICMP				
Target Port	The port number on which access to the router is allowed				
Action	Type of action:				
	allow – access is allowed				
	deny – access is denied				

Caution! The firewalls on the 3G and LTE models do not filter traffic received over the Ethernet ports.

Example firewall configuration:

The router has allowed the following access:

- from host address 171.92.5.45 using any protocol
- from host address 10.0.2.123 using TCP protocol on any ports
- from host address 142.2.26.54 using ICMP protocol

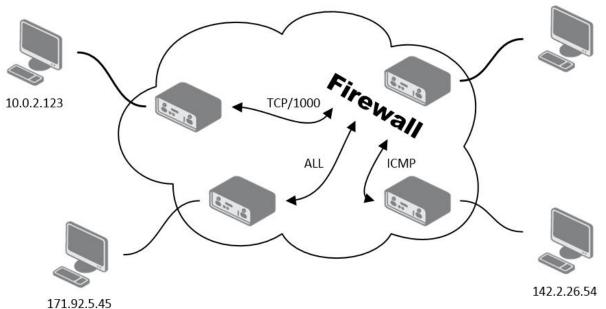


Figure 288: Example 5 - Network Topology for Firewall Application

			Firewall Co
Allow remote a	ccess only from specified	l hosts	
Source	Source IP Address *	Protocol	Target Port *
single address ▼	171.92.5.45	all	·
single address 🔻	10.0.2.123	TCP •	1000
single address 🔻	142.2.26.54	ICMP •	·
single address 🔻		all	
single address 🔻		all	·
single address 🔻		all	·
single address 🔻		all	·
single address 🔻		all	·
* can be blank			
Apply			

Figure 299: Example 5 – 3G and RT Firewall configuration

NAT CONFIGURATION

NAT (Network address Translation / Port address Translation - PAT) is a method of sharing a single external IP address among many internal hosts. It also helps prevent unauthorized access to the internal network. To enter the Network Address Translation configuration, select the **NAT** menu item. Up to sixteen NAT rules may be defined.

Table 288: NAT configuration

Item	Description
Public Port	Public port
Private Port	Private port
Туре	Protocol selection
Server IP address	IP address which will be forwarded incoming data.

If you need to set up more than 16 NAT rules, insert the following statement into the startup script

iptables -t nat -A napt -p tcp --dport [PORT_PUBLIC] -j DNAT --to-destination [IPADDR]:[PORT1_PRIVATE]

The IP address parameter [IPADDR] and port parameters [PORT_PUBLIC] and [PORT1_PRIVATE] must be filled in with the desired information.

The following option can be used to route all incoming traffic from the PPP to a single internal host address.

Table 299: Configuration of send all incoming packets

Item	Description
Send all incoming packets to	Select this item to route all traffic received over the PPP connection to a
default server	single IP address on the internal network.
Default Server	Send all incoming packets to this IP address.

You can also use common protocols to specify which ports to use for access to the router. In most cases, the default port for each protocol should not be changed.

Table 30: Remote access configuration

Item	Description
Enable remote HTTP	Select this option to allow access to the router using HTTP.
access on port	
Enable remote HTTPS	Select this option to allow access to the router using HTTPS.
access on port	
Enable remote FTP access	Select this option to allow access to the router using FTP.
on port	
Enable remote SSH access	Select this option to allow access to the router using SSH.
on port	
Enable remote Telnet	Select this option to allow access to the router using Telnet.
access on port	
Enable remote SNMP	Select this option to allow access to the router using SNMP.
access on port	
Masquerade outgoing	Select this option to turn on NAT.
packets	

Example NAT configuration with one host connected to the router:

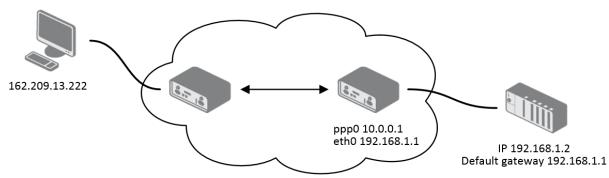


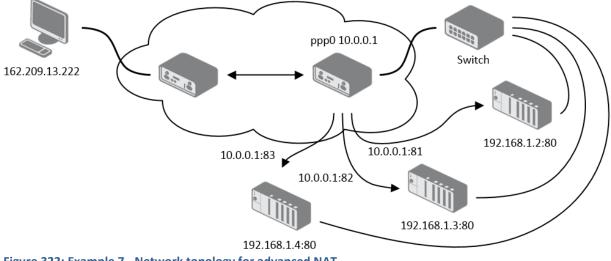
Figure 300: Example 6 - Network Topology for basic NAT

				NAT Configuration
Public Port	Private Port	Туре	Server IP Address	
		TCP 💌		
		TCP 🛰		
		TCP 💊	- <u>_</u>	
		TCP N		
		TCP 💌		
		TCP 🛓		
		TCP 💊		
		TCP N		
		TCP 💌		
		TCP 🔽		
		TCP 💌	- L	
		TCP N		
		TCP V		
:		TCP		
		TCP		
		TCP N		
🗹 Enable	remote HTTP	access (on port 80	
🗹 Enable i	remote FTP a	ccess or	port 21	
🗹 Enable i	remote Telne	t access	on port 23	
🗹 Enable I	remote SNMP	access	on port 161	
🗹 Send all	remaining in	coming	oackets to default server	
	ver IP Addres			
🕑 Masque	rade outgoin	g packet	:s	
Apply				



In this configuration, it is important to select **Send all remaining incoming packets to default server**.

Example NAT configuration with additional connected equipment:



				NAT Con
Public Port	Private P	Port Type	Server IP Addre	ess
81	80	TCP V	192.168.1.2	
82	80	TCP 🔻	192.168.1.3	
83	80	TCP 🔻	192.168.1.4	
		TCP V		
	1	TCP V		
	1	TCP V		
	1	TCP V		
		TCP V		
		TCP V		
	1	TCP V		
	1	TCP V	1	
	1	TCP V	1	
	1	TCP V	1	
	1	TCP V	1	
	1	TCP V	1	
	1	TCP V	1	
🛛 Englishing an	and the late	TP access on		
		TPS access on		
		access on p		
		H access on p		
🗹 Enable re	mote Tel	net access or	n port 23	
🗹 Enable re	mote SNI	MP access on	port 161	
Send all r	remaining	incoming pa	ckets to default	server
Default Serv				
🕑 Masquera	ide outgo	ing packets		
Apply				

	Figure	333:	Example	7 -	Advanced	NAT	configuration
--	---------------	------	---------	-----	----------	-----	---------------

OPENVPN TUNNEL CONFIGURATION

Select the **OpenVPN** item to configure an OpenVPN tunnel. OpenVPN is a protocol which is used to create a secure connection between two LANs. Up to 2 OpenVPN tunnels may be created.

Table 31: Overview of OpenVPN tunnels

Item	Description
Create	Enables the individual tunnels.
Description	Displays the name of the tunnel specified in the configuration of the tunnel.
Edit	Select to configure an OpenVPN tunnel.

Open¥PN Tunnels Configuration					
Create Description 1st no 🖌 2nd no 🖌	Edit				

Figure 344: OpenVPN tunnel configuration

Table 312: OpenVPN configuration

Item	Description			
Description	Description of tunnel.			
Protocol	 Protocol by which the tunnel will communicate. UDP – OpenVPN will communicate using UDP. TCP server – OpenVPN will communicate using TCP in server mode. TCP client – OpenVPN will communicate using TCP in client mode. 			
UDP/TCP port	Port by which the tunnel will communicate.			
Remote IP Address	IP address of the opposite side of the tunnel. Can be used domain name.			
Remote Subnet	Network IP address of the opposite side of the tunnel.			
Remote Subnet Mask	Subnet mask of the opposite side of the tunnel.			
Redirect Gateway	It is possible to redirect all traffic on Ethernet.			
Local Interface IP Address	IP address of the local side of tunnel.			
Remote Interface IP Address	IP address of interface local side of tunnel.			
Ping Interval	Parameter (in seconds) defines how often the router will send a message to the remote end to verify that the tunnel is still connected.			
Ping Timeout	Parameter which defines how long the router will wait for a response to the ping (in seconds). <i>Ping Timeout</i> must be larger than <i>Ping Interval</i> .			
Renegotiate Interval	Parameter sets the renegotiation period (reauthorization) for the OpenVPN tunnel. After this time period, the router will re-establish the tunnel to ensure the continued security of the tunnel.			
Max Fragment Size	Defines maximum packet size.			
Compression	 none – No compression is used. LZO – Lossless LZO compression. Compression has to be selected on both tunnel ends. 			
NAT Rules	 not applied – NAT rules are not applied to OpenVPN tunnel. applied – NAT rules are not applied to OpenVPN tunnel. 			

Authenticate Mode	 none – is used any authentication mode Pre-shared secret – enables authentication using pre-shared secret keys. Both sides of the tunnel must use the same key Username/password – enables authentication using CA Certificate, Username and Password X.509 Certificate (multiclient) – enables authentication by CA Certificate, Local Certificate and Local Private Key X.509 Certificate (client) – enables authentication by CA Certificate, Local Certificate and Local Private Key X.509 Certificate (server) – enables authentication by CA Certificate, Local Certificate and Local Private Key 	
Pre-shared Secret	Authentication using Pre-shared secret keys can be used in all authentication modes.	
CA Certificate	This authentication certificate can be used in authentication mode Username/password and X.509 certificate.	
DH Parameters	DH parameters can be used in authentication mode X.509 server.	
Local Certificate	This authentication certificate can be used in authentication mode X.509 certificate.	
Local Private Key	Local private key can be used in authentication mode X.509 certificate.	
Username	Authentication using a login name and password authentication can be used in the Authenticate Mode Username/Password.	
Password		
Extra Options	Use parameter <i>Extra Options</i> to define additional parameters of the OpenVPN tunnel, for example DHCP options etc.	

Press the *Apply* button to apply the changes.

	O	penVPN Tunnel Configuration
🔲 Create 1st OpenVPN tunr	rel	
Description *		
Protocol		
UDP port	1194	
Remote IP Address *		
Remote Subnet *		
Remote Subnet Mask *		
Redirect Gateway	no 💌	
Local Interface IP Address		
Remote Interface IP Address		
Ping Interval *		sec
Ping Timeout *		sec
Renegotiate Interval *		sec
Max Fragment Size *		bytes
Compression	LZO 💌	
NAT Rules	not applied	
Authenticate Mode	none	
Pre-shared Secret		
CA Certificate		
DH Parameters		
Local Certificate		
Local Private Key		
Username		
Password		
Extra Options *		
* can be blank		
Apply		

Figure 355: OpenVPN tunnel configuration

Example of the OpenVPN tunnel configuration:

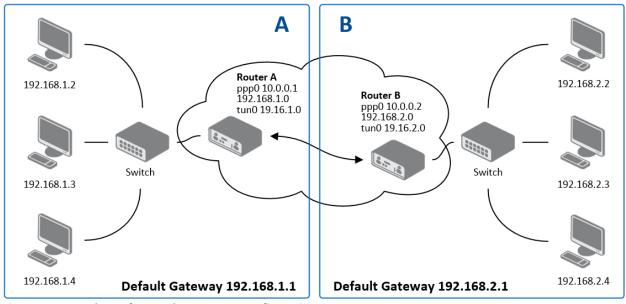


Figure 366: Topology of example OpenVPN configuration

OpenVPN tunnel configuration:

Table 323:	Example of	f OpenVPN	configuration
------------	------------	-----------	---------------

Configuration	Α	В
Protocol	UDP	UDP
UDP Port	1194	1194
Remote IP Address	10.0.0.2	10.0.0.1
Remote Subnet	192.168.2.0	192.168.1.0
Remote Subnet Mask	255.255.255.0	255.255.255.0
Local Interface IP Address	19.16.1.0	19.16.2.0
Remote Interface IP Address	19.16.2.0	19.18.1.0
Compression	LZO	LZO
Authenticate mode	none	none

Examples of different options for configuration and authentication of OpenVPN can be found in OpenVPN's tunnel configuration manuals.

IPSEC TUNNEL CONFIGURATION

Select the *IPsec* item in the menu to configure an IPsec tunnel. IPsec is a protocol which is used to create a secure connection between two LANs. Up to 4 *IPsec* tunnels may be created.

Table 334: Overview IPsec tunnels

Item	Description
Create	This item enables the individual tunnels.
Description	This item displays the name of the tunnel specified in the configuration of the tunnel.
Edit	Select to configure an IPsec tunnel.

	IPsec Tunnels Configuration		
Create Description			
1st no 💌	Edit		
2nd no 💌	Edit		
3rd no 💌	Edit		
4th no 💌	Edit		

Figure 377: IPsec tunnels configuration

Table 345: IPsec tunnel configuration

Item	Description	
Description	Description of tunnel.	
Remote IP Address	IP address or domain name of the remote host.	
Remote ID	Identification of remote host. The ID contains two parts: a <i>hostname</i> and a <i>domain-name</i> .	
Remote Subnet	Remote Subnet address	
Remote Subnet Mask	Remote Subnet mask	
Local ID	Identification of local host. The ID contains two parts: a <i>hostname</i> and a <i>domain-name</i> .	
Local Subnet	Local subnet address	
Local subnet mask	Local subnet mask	
Encapsulation	IPsec mode – you can choose tunnel or transport	
NAT Traversal	If address translation between two end points of the IPsec tunnel is used, it needs to allow NAT Traversal	
IKE Mode	Defines mode for establishing connection (main or aggressive). If the aggressive mode is selected, establishing of IPsec tunnel will be faster, but encryption will set permanently on 3DES-MD5.	
IKE Algorithm	Way of algorithm selection:	
	 Auto – encryption and hash alg. Are selected automatically 	
	 Manual – encryption and hash alg. Are defined by the user 	
IKE Encryption	Encryption algorithm – 3DES, AES128, AES192, AES256	
IKE Hash	Hash algorithm – MD5 or SHA1	
IKE DH Group	Diffie-Hellman groups determine the strength of the key used in	
	the key exchange process. Higher group numbers are more secure,	
	but require additional time to compute the key. Group with higher number provides more security, but requires more processing time.	
ESP Algorithm	Way of algorithm selection:	
5	 auto – encryption and hash alg. are selected automatically 	
	 manual – encryption and hash alg. are defined by the user 	

ESP Encryption	Encryption algorithm – DES, 3DES, AES128, AES192, AES256
ESP Hash	Hash algorithm – MD5 or SHA1
PFS	Ensures that derived session keys are not compromised if one of
	the private keys is compromised in the future
PFS DH Group	Diffie-Hellman group number (see IKE DH Group)
Key Lifetime	Lifetime key data part of tunnel. The minimum value of this parameter
	is 60s. The maximum value is 86400s.
IKE Lifetime	Lifetime key service part of tunnel. The minimum value of this
	parameter is 60s. The maximum value is 86400s.
Rekey Margin	Specifies how long before connection expiry should attempt to negotiate a
	replacement begin. The maximum value must be less than half the parameters IKE
	and Key Lifetime.
Rekey Fuzz	Specifies the maximum percentage by which should be randomly
	increased to randomize re-keying intervals
DPD Delay	Defines time after which is made IPsec tunnel verification
DPD Timeout	By parameter DPD Timeout is set timeout of the answer
Authenticate Mode	By this parameter can be set authentication:
	 Pre-shared key – shared key for both off-side tunnel. X 500 Cartificate – allows X 500 cartification is multiplication of an allows a statement of the statement of the
	X.509 Certificate – allows X.509 certification in multiclient mode
Pre-shared Key	Sharable key for both parties tunnel.
CA Certificate	This certificate is necessary to insert Authentication mode x.509.
Remote Certificate	This certificate is necessary to insert Authentication mode x.509.
Local Certificate	This certificate is necessary to insert Authentication mode x.509.
Local Private Key	This private key is necessary to insert Authentication mode x.509.
Local Passphrase	This Local Passphrase is necessary to insert Authentication mode x.509.
Extra Options	Use this parameter to define additional parameters of the IPsec
	tunnel, for example secure parameters etc.

The certificates and private keys have to be in PEM format.

The random time, after which it will exchange new keys, is defined as follows:

Lifetime - (Rekey margin + random value in range (from 0 to Rekey margin * Rekey Fuzz/100))

By default, the time for the exchange of keys is between:

- Minimum time: 1h (9m + 9m) = 42m
- Maximum time: 1h (9m + 0m) = 51m

In most cases, the settings should be left at their default values.

		IPsec Tunnel Configuration
Create 1st IPsec tur	nel	
Description *		
Remote IP Address *		
Remote ID *		
Remote Subnet *		
Remote Subnet Mask *		
Local ID *		
Local Subnet *		
Local Subnet Mask *		
Encapsulation Mode	tunnel 🔻]
NAT Traversal	disabled 🔻]
IKE Mode	main 🔻	
IKE Algorithm	auto 🔻	
IKE Encryption	3DES T	
IKE Hash	MD5 T	
IKE DH Group	2 🔻	j
ESP Algorithm	auto 🔻	
ESP Encryption	DES	
ESP Hash	MD5 T	
PFS	disabled 🔻	
PFS DH Group	2 🔻	j
Key Lifetime	3600	sec
IKE Lifetime	3600	sec
Rekey Margin	540	sec
Rekey Fuzz	100	96
DPD Delay *		sec
DPD Timeout *		sec
Authenticate Mode	pre-shared key	
Pre-shared Key		
CA Certificate		<i>h</i>
Remote Certificate		<i>"</i>
Local Certificate		//
Local Private Key		
Local Passphrase *		
Extra Options * * can be blank		
Apply		

Figure 388: IPsec tunnel configuration

Example of IPSec Tunnel configuration:

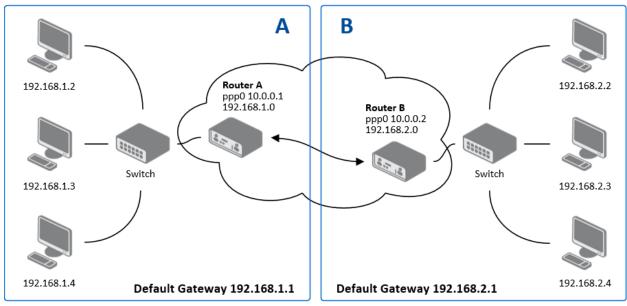


Figure 399: Example 8 - Network topology for IPsec tunneling

IPsec tunnel configuration:

Configuration	А	В
Remote IP Address	10.0.0.2	10.0.0.1
Remote Subnet	192.168.2.0	192.168.1.0
Remote Subnet Mask	255.255.255.0	255.255.255.0
Local Subnet	192.168.1.0	192.168.2.0
Local Subnet Mask:	255.255.255.0	255.255.255.0
Authenticate mode	pre-shared key	pre-shared key
Pre-shared key	test	test

Table 356: Example 8 - IPsec configuration

Examples of the different options for configuration and authentication of IPsec can be found in the IPsec tunnel configuration manual.

GRE TUNNELS CONFIGURATION

Select the *GRE* item in the menu to configure a GRE tunnel. GRE is a protocol which is used to create an unencrypted connection between two LANs. Up to 4 *GRE* tunnels may be created.

Table 367: Overview GRE tunnels

Item	Description
Create	This item enables the individual tunnels.
Description	This item displays the name of the tunnel specified in the configuration of the tunnel.
Edit	Configure the GRE tunnel.

	GRE Tunnels Configuration		
Create Description			
1st no 🖌	Edit		
2nd no 💌	Edit		
3rd no 💌	Edit		
4th no 💌	Edit		

Figure 400: GRE tunnels configuration

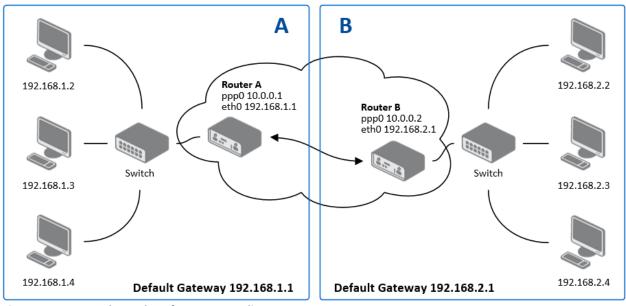
Table 378: GRE tunnel configuration

Item	Description
Description	Description of tunnel.
Remote IP Address	IP address of the remote side of the tunnel
Local Interface IP Address	IP address of the local side of the tunnel
Remote Interface IP Address	IP address of the remote side of the tunnel
Remote Subnet	IP address of the network behind the remote side of the tunnel
Remote Subnet Mask	Subnet Mask of the network behind the remote side of the tunnel
Pre-shared Key	An optional value that defines a 32 bit shared key for data encryption. This key must be the same on both routers.

GRE Tunnel Configuration		
Create 1st GRE tunnel		
Description *		
emote IP Address		
emote Subnet *		
emote Subnet Mask *		
ocal Interface IP Address *		
emote Interface IP Address *		
re-shared Key *		
can be blank		
Apply		
can be blank		

Figure 411: GRE tunnel configuration

Example of the GRE Tunnel configuration:





GRE tunnel Configuration:

Table 389: Example 9 - GRE tunnel configuration

Configuration	Α	В
Remote IP Address	10.0.0.2	10.0.0.1
Remote Subnet	192.168.2.0	192.168.1.0
Remote Subnet Mask	255.255.255.0	255.255.255.0

L2TP TUNNEL CONFIGURATION

Select the *L2TP* item in the menu to configure an L2TP tunnel. L2TP is a protocol which is used to create an unencrypted connection between two LANs. Only one *L2TP* tunnel may be created.

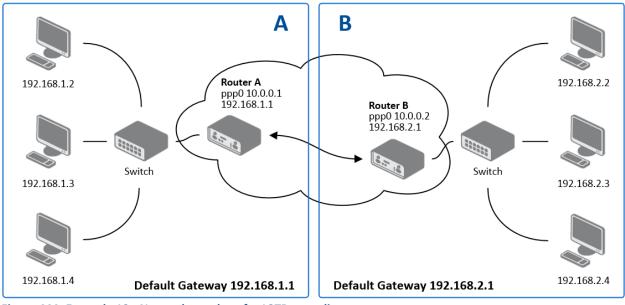
Table 4039: L2TP tunnel configuration

Table 4033. L2TP turner comparation		
Item	Description	
Mode	L2TP tunnel mode on the router side	
	• L2TP server - For a server, you must define the start and end IP address range offered by the server	
	L2TP client – For a client, you must enter the IP address of the server	
Server IP Address	IP address of server	
Client Start IP Address	Start IP address in range, which is offered by server to clients	
Client End IP Address	End IP address in range, which is offered by server to clients	
Local IP Address	IP address of the local side of the tunnel	
Remote IP Address	IP address of the remote side of the tunnel	
Remote Subnet	Address of the network behind the remote side of the tunnel	
Remote Subnet Mask	The mask of the network behind the remote side of the tunnel	
Username	Username for login to L2TP tunnel	
Password	Password for login to L2TP tunnel	

Press the Apply button to apply changes.

2		L2TP Tunnel Configuration	
Create L2TP tunnel	Create L2TP tunnel		
Mode	L2TP client		
Server IP Address			
Client Start IP Address			
Client End IP Address			
Local IP Address *			
Remote IP Address *			
Remote Subnet *			
Remote Subnet Mask *			
Username			
Password			
* can be blank			
Apply			

Figure 433: L2TP tunnel configuration



Example of the L2TP Tunnel configuration:

Figure 444: Example 10 - Network topology for L2TP tunneling

Configuration of the L2TP tunnel:

Table 4140: Example 10 - L2TP tunnel configuration

Configuration	Α	В
Mode	L2TP Server	L2TP Client
Server IP Address		10.0.0.1
Client Start IP Address	192.168.1.2	
Client End IP Address	192.168.1.254	

Local IP Address	192.168.1.1	
Remote IP Address		
Remote Subnet	192.168.2.0	192.168.1.0
Remote Subnet Mask	255.255.255.0	255.255.255.0
Username	username	username
Password	password	password

PPTP TUNNEL CONFIGURATION

Select the **PPTP** item in the menu to configure a PPTP tunnel. PPTP is a protocol which is used to create a secure connection between two LANs. Only one PPTP tunnel may be created.

PPTP Tunnel Configuration					
🔲 Create PPTP tunnel	Create PPTP tunnel				
Mode	PPTP client				
Server IP Address]			
Local IP Address					
Remote IP Address					
Remote Subnet *]			
Remote Subnet Mask *]			
Username]			
Password]			
* can be blank					
Apply					

Figure 455: PPTP tunnel configuration

Table 412: PPTP tunnel configuration

Item	Description	
Mode	PPTP tunnel mode on the router side	
	• PPTP server – For a server, you must define the start and end IP address range offered by the server	
	• PPTP client – For a client, you must enter the IP address of the server	
Server IP Address	IP address of server	
Local IP Address	IP address of the local side of the tunnel	
Remote IP Address	IP address of the remote side of the tunnel	
Remote Subnet	Address of the network behind the remote side of the tunnel	
Remote Subnet Mask	The mask of the network behind the remote side of the tunnel	
Username	Username for login to PPTP tunnel	
Password	Password for login to PPTP tunnel	

Press the Apply button to apply changes.

Example of the PPTP Tunnel configuration:

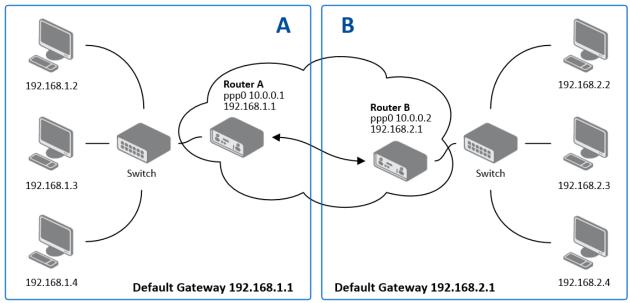


Figure 466: Example 11 - Network topology for PPTP tunneling configuration

Configuration of the PPTP tunnel:

Table 425. Example 11 TTTT tumer comgutation			
Configuration	Α	В	
Mode	PPTP Server	PPTP Client	
Server IP Address		10.0.0.1	
Local IP Address	192.168.1.1		
Remote IP Address			
Remote Subnet	192.168.2.0	192.168.1.0	
Remote Subnet Mask	255.255.255.0	255.255.255.0	
Username	username	username	
Password	password	password	

Table 423: Example 11 - PPTP tunnel configuration

DYNDNS CLIENT CONFIGURATION

For Dynamic DNS to function properly, the router's SIM card must have a public IP address assigned.

The router supports DynamicDNS using a DNS server on <u>www.dyndns.org</u>. DynDNS client Configuration can be called up by selecting option **DynDNS** item in the menu.

Table 434: DynDNS configuration

Item	Description		
Hostname	Third order domain registered on server <u>www.dyndns.org</u>		
Username	Username for login to DynDNS server		
Password	Password for login to DynDNS server		
Server	If you want to use a different DynDNS service than www.dyndns.org, enter the update server service in this parameter. If this item is left blank, the router uses the default server <i>members.dyndns.org</i> .		

Example of the DynDNS client configuration with domain conel.dyndns.org:

	DynDNS Configuration			
Enable DynDNS client				
Hostname	cone.dyndns.org			
Username	conel			
Password	conel			
Server *	Server *			
* can be blank				
Apply				

Figure 477: Example of DynDNS configuration

NTP CLIENT CONFIGURATION

NTP (Network Time Protocol) allows the router to set its internal clock using a network time server. The NTP client Configuration can be called up by selecting option **NTP** item in the menu.

If option *Enable local NTP service* is selected, the router will function as an NTP server for other devices on the LAN.

Table 445: NTP configuration

Item	Description	
Primary NTP Server Address	IP or domain address primary NTP server.	
Secondary NTP Server Address	IP or domain address secondary NTP server.	
Timezone	Sets the time zone of the router	
Daylight Saving	Define time shift:	
Time	 No - time shift is disabled Yes - time shift is allowed 	

Example of the NTP configuration with primary (ntp.cesnet.cz) and secondary (tik.cesnet.cz) NTP servers and with daylight saving time:

	NTP Configuration				
🗌 Enable local NTP se	rvice				
Synchronize clock v	with NTP server				
Primary NTP Server	ntp.cesnet.cz				
Secondary NTP Server	tik.cesnet.cz				
Timezone	GMT+01:00	~			
Daylight Saving Time	yes	~			
Apply					

Figure 488: Example of NTP configuration

SNMP CONFIGURATION

SNMP (Simple Network Management Protocol) provides status information about network elements such as routers or end computers. The router supports SNMP agent v1/v2 or v3 which sends information about the router and its expansion ports. To enter the **SNMP** Configuration, select the **SNMP** item from the configuration menu.

Table 456: SNMP agent configuration

Item	Description
Name	Designation of the router.
Location	Location of the router.
Contact	Person who manages the router together with information how to contact this person.

Enable SNMPv1/v2 with the *Enable SNMPv1/v2* access item. You will need to define a password for access to the SNMP agent (Community). "Public" is commonly used.

The *Enable SNMPv3* access item allows you to enable SNMPv3. Then you must define the following parameters:

Table 467: SNMPv3 configuration

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

In addition, you can continue with this configuration:

- By choosing Enable I/O extension option to monitor the binary input (I/O) on the router.
- By choosing Enable XC-CNT extension to monitor the status of the expansion port CNT inputs and outputs.
- By choosing Enable M-BUS extension and enter the Baud Rate, Parity and Stop Bits it is possible to monitor the meter status connected to the expansion port MBUS status.

Table 478: SNMP configuration (MBUS extension)

Item	Description	
Baud rate	Communication speed.	
Parity	Control parity bit:	
	 none – Data will be sent without parity. 	
	 even – Data will be sent with even parity. 	
	 odd - Data will be sent with odd parity. 	
Stop Bits	Number of stop bits.	

Parameters Enable XC-CNT extension and Enable M-BUS extension cannot be checked together.

By choosing *Enable reporting to supervisor system* and entering the IP Address and Period it is possible to send statistical information to the monitoring system, R-SeeNet.

Table 489: SNMP configuration (R-SeeNet)

Item	Description
IP Address	IP address
Period	Period of sending statistical information (in minutes)

Every monitor value is uniquely identified by a number identifier OID (Object Identifier). For the binary input and output the following range of OIDs is used:

Table 490: Object identifier for binary input and output

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

For the expansion port CNT, the following range of OID is used:

Table 501: Object identifier for CNT port

OID	Description
.1.3.6.1.4.1.30140.2.1.1.0	Analogy input AN1 (range 0-4095)
.1.3.6.1.4.1.30140.2.1.2.0	Analogy input AN2 (range 0-4095)
.1.3.6.1.4.1.30140.2.1.3.0	Counter input CNT1 (range 0-4294967295)
.1.3.6.1.4.1.30140.2.1.4.0	Counter input CNT2 (range 0-4294967295)
.1.3.6.1.4.1.30140.2.1.5.0	Binary input BIN1 (values 0,1)
.1.3.6.1.4.1.30140.2.1.6.0	Binary input BIN2 (values 0,1)
.1.3.6.1.4.1.30140.2.1.7.0	Binary input BIN3 (values 0,1)
.1.3.6.1.4.1.30140.2.1.8.0	Binary input BIN4 (values 0,1)
.1.3.6.1.4.1.30140.2.1.9.0	Binary output OUT1 (values 0,1)

The following range of OID is used for the expansion port M-BUS

Table 512: Object identifier for M-BOS port	
OID	Description
.1.3.6.1.4.1.30140.2.2. <address>.1.0</address>	IdNumber – meter number
.1.3.6.1.4.1.30140.2.2. <address>.2.0</address>	Manufacturer
.1.3.6.1.4.1.30140.2.2. <address>.3.0</address>	Version – specified meter version
.1.3.6.1.4.1.30140.2.2. <address>.4.0</address>	Medium – type of metered medium
.1.3.6.1.4.1.30140.2.2. <address>.5.0</address>	Status – errors report
.1.3.6.1.4.1.30140.2.2. <address>.6.0</address>	0. VIF – value information field
.1.3.6.1.4.1.30140.2.2. <address>.7.0</address>	0. measured value
.1.3.6.1.4.1.30140.2.2. <address>.8.0</address>	1. VIF – value information field
.1.3.6.1.4.1.30140.2.2. <address>.9.0</address>	1. measured value
.1.3.6.1.4.1.30140.2.2. <address>.10.0</address>	2. VIF – value information field
.1.3.6.1.4.1.30140.2.2. <address>.11.0</address>	2. measured value
.1.3.6.1.4.1.30140.2.2. <address>.12.0</address>	3. VIF – value information field
.1.3.6.1.4.1.30140.2.2. <address>.13.0</address>	3. measured value
.1.3.6.1.4.1.30140.2.2. <address>.100.0</address>	47. VIF – value information field
.1.3.6.1.4.1.30140.2.2. <address>.101.0</address>	47. measured value

Table 512: Object identifier for M-BUS port

The meter address can be from range 0..254 when 254 is broadcast.

Since firmware 3.0.4 all v2 routers with board RB-v2-6 and newer provide information about the internal temperature of the device (OID 1.3.6.1.4.1.30140.3.3) and power voltage (OID 1.3.6.1.4.1.30140.3.4).

Example of SNMP settings and readout:

		SNMP Configuration
🗹 Enable SNMP agent		
Name *	B&B Electronics	
Location *	Ottawa	
Contact *	Joe 8154335100	
€ Enable SNMPv1/v2 ac	cess	
Community	public	
Enable SNMPv3 acces	55	_
Username		
Authentication	MD5 T	
Authentication Password	ł	
Privacy	DES V	
Privacy Password		
Enable XC-CNT exten	sion	
	ion	
Baudrate	300 🔻	
Parity	even 🔻	
Stop Bits	1 🔻	
Enable reporting to supervisory system		
IP Address		
Period		min
* can be blank		
Apply		

Figure 499. Example of SNMP configuration

🚳 MG-SOFT MIB Browser Professional Edition	
File Edit View SNMP Action Tools Window Help	
● ?(② ≫ p# # ● i = LL Q ≥ # # ● a 3 ♥ A	
Query MIB Ping	
Emote SNMP agent Split	
192.168.2.250 🔽 🔀 🗹 Vertical	
MIB tree Query results	\equiv
Remote address: 192.168.2.250 port: 161 transport: IP/UDP Local address: 192.168.2.116 port: 4915 transport: IP/UDP Protocol version: SNMPv1 Operation: Get Request binding: 1: sysLocation.0 (DisplayString) null Response binding: 1: sysLocation.0 (DisplayString) Usti nad Orlici [66.73.74.69.20.6E.61.84.20.4F.72.6C.69.63.69 (her sysUpTime sysUpTime sysLocation.0 (DisplayString) Usti nad Orlici [66.73.74.69.20.6E.61.84.20.4F.72.6C.69.63.69 (her	ها الا
	-
OID 1.3.6.1.2.1.1.4 🛛 🖉 SNMPv1 🔍 🔍 🔵	Ø

Figure 500. Example of the MIB browser

It is important to set the IP address of the SNMP agent (router) in the field *Remote SNMP agent*. After entering the IP address, it is possible show object identifiers.

The path to the objects is: iso->org->dod->internet->private->enterprises->conel->protocols.

The path to information about the router is: iso->org->dod->internet->mgmt->mib-2->system

SMTP CONFIGURATION

The SMTP (Simple Mail Transfer Protocol) client is used to send emails.

Table 523: SMTP client configuration

Item	Description
SMTP Server Address	IP or domain address of the mail server.
Username	Name to email account.
Password	Password to email account.
Own Email Address	Address of the sender.

The mobile operator may block other SMTP servers. If this occurs, then you must use the SMTP server of the operator.

Example settings for the SMTP client:

SMTP Configuration		
SMTP Server Address	smtp.domain.com	
Username	name@domain.com	
Password	pass	
Own Email Address	name@domain.com	
Apply		

Figure 511. SMTP configuration

An E-mail can be sent from the Startup script. The following command is used to send emails with following parameters.

- -t receiver Email address
- -s subject
- -m message
- -a appendix
- -r number of attempts to send email (default set 2 attempts)

Commands and parameters can be entered only in lowercase.



Example to send email:

email -t name@domain.com -s "subject" -m "message" -a c:\directory\abc.doc -r 5

This command sends an e-mail message to address *jack@google.com* with the subject "*subject*", body message "message" and annex "abc.doc" right from the directory c:\directory\ and will attempt 5 times to send the message.

SMS CONFIGURATION

Note: The SPECTRE RT industrial router does not support SMS messaging configuration.

The SPECTRE cellular router can automatically send SMS messages to a cell phone or SMS message server when certain events occur. The SMS Configuration page allows the user to select which events will generate an SMS message.

Item	Description
Send SMS on power up	Send an SMS message when the router powers up
Send SMS on mobile network connect	Send an SMS message when the mobile network connection is active.
Send SMS on mobile network disconnect	Send an SMS message on mobile network disconnection.
Send SMS when datalimit exceeded	Send an SMS message when the data limit is exceeded.
Send SMS when binary input on I/O port (BINO) is active	Send an SMS message when the binary input on the I/O port (BINO) goes active. The text of the message is set using parameter BINO.
Send SMS when binary input on expansion port (BIN1- BIN4) is active	Send an SMS message when a binary input on the I/O expansion port (BIN1-BIN4) is active. The text of the message is set using parameters BIN1 - BIN4.
Add timestamp to SMS	Adds a time stamp to the sent SMS messages. The timestamp has the format YYYY-MM-DD hh:mm:ss.
Phone Number 1	
Phone Number 2	The telephone numbers that the SMS messages will be sent to.
Phone Number 3	
Unit ID	The name of the router that is included in the SMS messages.
BINO - SMS	User-defined Text field 0 for the SMS messages.
BIN1 - SMS	User-defined Text field 1 for the SMS messages.
BIN2 - SMS	User-defined Text field 2 for the SMS messages.
BIN3 - SMS	User-defined Text field 3 for the SMS messages.
BIN4 - SMS	User-defined Text field 4 for the SMS messages.

Table 534: Send SMS configuration

You can also control the function of the router by sending SMS messages to the device. The router can be commanded to go online or offline via an SMS message or to switch to the alternate SIM card or provider. The binary outputs can also be set or reset using SMS. The **Enable remote control via SMS** option must be selected to enable this feature. Up to three numbers can be configured for incoming SMS messages. If the **Enable remote control via SMS** option is set, all incoming SMS messages are processed by the router and deleted.

Table 545: Control via SMS configuration

Item	Description
Phone Number 1	
Phone Number 2	Allowed phone numbers for incoming SMS messages.
Phone Number 3	

Note: If no phone number is filled in, the router will accept incoming messages from all phone numbers. If any phone numbers are entered into the list, the router will only accept SMS messages which originate from those numbers.

Control SMS messages cannot change the router configuration. Any changes made to the router by an SMS message will only remain in effect until the router is restarted. After a reboot, the router configuration will return to the settings in non-volatile memory. For example, if the router is switched offline by an SMS message, the router will remain offline until the next time it is power cycled or re-booted.

To control the router using SMS, the message text must contain the control command. Table 48 lists the SMS control messages that are supported.

SMS Control Message	Description
go online sim 1	Switch to SIM1 card
go online sim 2	Switch to SIM2 card
go online	Switch router in online mode
go offline	Mobile network connection termination
set out0=0	Set binary I/O output to 0
set out0=1	Set binary I/O output to 1
set out1=0	Set binary output on port 1 to a 0
set out1=1	Set binary output on port 1 to a 1
set profile std	Set standard profile
set profile alt1	Set alternative profile 1
set profile alt2	Set alternative profile 2
set profile alt3	Set alternative profile 3
reboot	Router reboot
get ip	Router will send an SMS message back with the IP address from the SIM card.

Table 556: SMS control commands

You may send and receive SMS messages using either the serial expansion ports or a TCP connection over the Ethernet network. For serial communication, the baud rate must be set to match the attached host. Select option *Enable AT-SMS protocol on expansion port 1* to allow messages to be sent and received using serial port 1.

Table 567: Send SMS on serial PORT1 configuration

	Description
Baud rate	Communication speed expansion port 1

Select option *Enable AT-SMS protocol on expansion port 2* to allow messages to be sent and received using serial port 2.

Table 578: Send SMS on serial PORT2 configuration

Item	Description
Baud rate	Communication speed expansion port 2

It is also possible to send and receive SMS messages over a TCP/IP connection by choosing *Enable AT-SMS protocol* on *TCP port*. The TCP port used for sending and receiving SMS messages must be entered into the configuration field.

Table 589: Send SMS on Ethernet Port configuration

Item	Description
TCP Port	TCP port on which will be allowed to send/receive SMS messages.

SEND SMS

Standard AT commands are used to send and receive SMS messages over the serial ports or a TCP connection. They can be sent to the router using a terminal program such as Hyper Terminal. After establishing a connection with the router via the serial interface or Ethernet, AT commands are used to read and delete incoming messages and send outgoing messages. Table 52 lists the AT commands that are used for sending and receiving SMS messages.

Table 6059: AT commands to send and receive SMS messages

AT commands	5
AT commands AT+CGMI	Description
	Returns the manufacturer specific identity
AT+CGMM	Returns the manufacturer specific model identity
AT+CGMR	Returns the manufacturer specific model revision identity
AT+CGPADDR	Displays the IP address of the ppp0 interface
AT+CGSN	Returns the product serial number
AT+CIMI	Returns the International Mobile Subscriber Identity number (IMSI)
AT+CMGD	Deletes a message from the location
AT+CMGF	Sets the presentation format of short messages
AT+CMGL	Lists messages of a certain status from a message storage area
AT+CMGR	Reads a message from a message storage area
AT+CMGS	Sends a short message from the device to entered tel. Number
AT+CMGW	Writes a short message to SIM storage
AT+CMSS	Sends a message from SIM storage location value
AT+COPS?	Identifies the available mobile networks
AT+CPIN	Is used to query and enter a PIN code
AT+CPMS	Selects SMS memory storage types, to be used for short message operations
AT+CREG	Displays network registration status
AT+CSCA	Sets the short message service center (SMSC) number
AT+CSCS	Selects the character set
AT+CSQ	Returns the signal strength of the registered network
AT+GMI	Returns the manufacturer specific identity
AT+GMM	Returns the manufacturer specific model identity
AT+GMR	Returns the manufacturer specific model revision identity
AT+GSN	Returns the product serial number
ATE	Determines whether or not the device echoes characters

ATI Transmits the manufacturer specific information about the device

In order to send an SMS message, text mode must first be selected by sending the command **AT+CMGF=1** to the router.

Command: AT+CMGF=1

Response: OK

The SMS message is created and sent using the command **AT+CMGS="tel. number"** where **tel. number** is the telephone number to send the message to. After pressing the **Enter** button, the router will respond with a '>' prompt and the text of the SMS message can be entered. After entering the text, press **CTRL+Z** to send the message. It may take a few minutes for the SMS message to be sent depending on the network. You may cancel SMS text input by pressing **Esc**.

Example: To send "Hello World" to telephone number 712-123-4567

Сотта	nd: AT+CMGS="7121234567"	Press Enter	
Respons	se: >		
Enter SN	MS Text: <i>Hello World!</i>	Press CTRL+Z (keys combination)	
Respons	se: OK		
To see a	list of all incoming messages, type	:	
Comma	nd: AT+CMGL="ALL"	Press Enter	
•	Response: +CMGL: <index>, <status>,<sender number="">, ,<date>,<time> SMS text.</time></date></sender></status></index>		
where	<index> is ordinal number of the r</index>	nessage,	
	<status> is SMS status:</status>		
	REC UNREAD – SMS unrea REC READ – SMS read STO UNSENT – stored uns STO SENT – stored sent SI ALL – all SMS messages	sent SMS	
	<sender number=""> tel. number from</sender>	m which the SMS was received.	
	<date> date SMS message receive</date>	ed,	
	<time> time SMS message receive</time>	ed.	
Example	2:		
	+CMGL: 1,"REC UNREAD","+420721123456", ,"08/02/02, 10:33:26+04" Hello World!		

To read a single SMS message, use **AT+CMGR=<index>** where index is the number of the SMS message.

Example:

Command: AT+CMGR=1 Press Enter

Response: +CMGL: 1, "REC READ", "+420721123456", , "08/01/12, 9:48:04+04" Hello World!

To delete a received SMS message, use **AT+CMGD=**<**index>** where index is the number of the message to delete.

To delete message 1:

Command: AT+CMGD=1 Press Enter

Response: OK

The format of the Router Power-On SMS message is as follows:

Router (Unit ID) has been powered up. Signal strength -xx dBm.

The format of the Router mobile network connection SMS message is as follows:

Router (Unit ID) has established connection to mobile network. IP address xxx.xxx.xxx

After a mobile network disconnect, the router will send an SMS message in the form:

Router (Unit ID) has lost mobile network connection. IP address xxx.xxx.xxx

SMS Configuration Example:

SMS Configuration		
Send SMS on po	wer up	
Send SMS on PPP connect		
Send SMS on PPP disconnect		
	datalimit is exceeded	
	binary input on I/O port (BINO) is active	
	binary input on expansion port 1 (BIN1-BIN4) is active	
🗹 Add timestamp t		
Phone Number 1	723123456	
Phone Number 2	756858635	
Phone Number 3	603854758	
Unit ID *	Router	
BIN0 - SMS *	BIN0	
BIN1 - SMS *	BIN1	
BIN2 - SMS *	BIN2	
BIN3 - SMS *	BIN3	
BIN4 - SMS *	BIN4	
🗵 Enable remote d	ontrol via SMS	
Phone Number 1		
Phone Number 2		
Phone Number 3		
Enable AT-SMS p	protocol on expansion port 1	
Baudrate	9600	
Enable AT-SMS protocol on expansion port 2		
1		
Baudrate	9600	
Enable AT-SMS protocol over TCP		
TCP Port		
* can be blank		
Apply		

Figure 522. Example of SMS configuration 1

Router configuration for sending SMS messages via the serial interface on PORT1:

	SMS Configuration	
Send SMS on pov	ver up	
Send SMS on PPF	Send SMS on PPP connect	
	Send SMS on PPP disconnect	
	datalimit is exceeded	
	binary input on I/O port (BIN0) is active	
	binary input on expansion port 1 (BIN1-BIN4) is active	
Add timestamp to) SMS	
Phone Number 1		
Phone Number 2		
Phone Number 3		
Unit ID *		
BINO - SMS *		
BIN1 - SMS *		
BIN2 - SMS *		
BIN3 - SMS *		
BIN4 - SMS *		
Enable remote co	ontrol via SMS	
Phone Number 1		
Phone Number 2		
Phone Number 3		
🗷 Enable AT-SMS p	rotocol on expansion port 1	
Baudrate	9600 💌	
Enable AT-SMS protocol on expansion port 2		
Baudrate	9600 💌	
Enable AT-SMS protocol over TCP		
TCP Port		
* can be blank		
Apply		

Figure 533. Example of SMS configuration 2

Example of the router configuration for accepting SMS messages from every phone number:

	SMS Configuration	
Send SMS on powe	er up	
Send SMS on PPP connect		
Send SMS on PPP disconnect		
🔲 Send SMS when da	atalimit is exceeded	
	nary input on I/O port (BINO) is active	
	nary input on expansion port 1 (BIN1-BIN4) is active	
Add timestamp to s	SMS	
Phone Number 1		
Phone Number 2		
Phone Number 3		
Unit ID *		
BIN0 - SMS *		
BIN1 - SMS *		
BIN2 - SMS *		
BIN3 - SMS *		
BIN4 - SMS *		
Enable remote con	trol via SMS	
Phone Number 1 *		
Phone Number 2		
Phone Number 3		
Enable AT-SMS pro	tocol on expansion port 1	
Baudrate 9	600	
Enable AT-SMS protocol on expansion port 2		
Baudrate 9	600 -	
Enable AT-SMS protocol over TCP		
TCP Port		
* can be blank		
Apply		

Figure 544. Example of SMS configuration 3

Example of the router configuration for accepting SMS messages from two phone numbers:

SMS Configuration		
Send SMS on power up		
Send SMS on PPP connect		
Send SMS on PPP disconnect		
Send SMS when datalimit is exceeded		
Send SMS when binary input on I/O port (BINO) is active		
Send SMS when binary input on expansion port 1 (BIN1-BIN4) is active		
C Add timestamp to SMS		
Phone Number 1		
Phone Number 2		
Phone Number 3		
Unit ID *		
BINO - SMS *		
BIN1 - SMS *		
BIN2 - SMS *		
BIN3 - SMS *		
BIN4 - SMS *		
🗷 Enable remote control via SMS		
Phone Number 1 728123456		
Phone Number 2 766254864		
Phone Number 3		
Enable AT-SMS protocol on expansion port 1		
Baudrate 9600 -		
Enable AT-SMS protocol on expansion port 2		
Baudrate 9600 💌		
Enable AT-SMS protocol over TCP		
TCP Port		
* can be blank		
Apply		

Figure 555. Example of SMS configuration 4

EXPANSION PORT CONFIGURATION

You may send and receive data from a serial port on Auxiliary Port 1 or 2 using UDP or TCP protocol on the Ethernet network. This feature allows a computer on the network to send data to a serial device as if it was physically connected to the computer. You can also configure 2 routers to act as a serial port extender where they transmit data transparently across the Ethernet network between 2 serial devices as if the serial devices were cabled together.

You must be using a router which has the RS-232 or RS-485 option on Port 1 or 2.

	Description
Baud rate	Communication speed.
Data Bits	Number of data bits.

Table 61: Expansion PORT configuration

Parity	Control parity bit none even odd 	
Stop Bits	Number of stop bits.	
Split Timeout	Inter-character Timeout. If no characters are received within this amount of time, any buffered characters will be sent over the Ethernet port.	
Protocol	Protocol: • TCP • UDP	
Mode	 Mode of connection: TCP server - The router will listen for incoming TCP connection requests. TCP client - The router will connect to a TCP server on the specified IP address and TCP port. 	
Server Address	When set to TCP client above, it is necessary to enter the Server address and TCP port .	
TCP Port	The TCP port for connections.	

If the *Check TCP connection* is selected, the router will automatically send TCP keep-alive messages to verify that the connection is still valid.

Table 602: TCP Keep-Alive configuration

ltem	Description
Keepalive Time	Time between sending keep-alive packets
Keepalive Interval	Keep-alive Response Tiimeout
Keepalive Probes	Number of attempts before connection is down

It the option **Use CD as indicator of the TCP connection** is selected, the router will activate the DTR output when a TCP connection is active.

Table 613: CD signal description

CD	Description
Active	TCP connection is on
Nonactive	TCP connection is off

Select Use DTR as control of TCP connection to use DTR to control when TCP connections are allowed. (CD on the router).

Table 624: DTR signal description

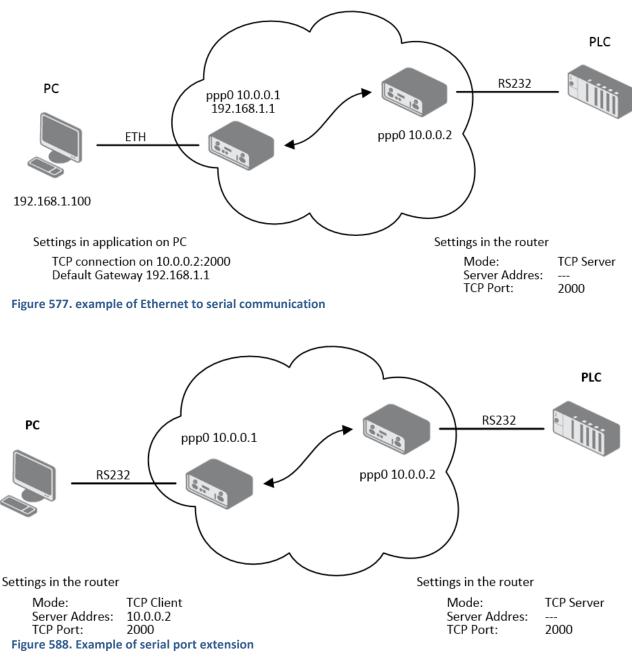
DTR	Description server	Description client
Active	The router will accept a TCP connection.	Router creates a TCP connection.
Nonactive	The router does not accept incoming TCP connections.	Router ends the TCP connection.

Press the *Apply* button to apply changes.

Expansion Port 1 Configuration			
Enable expansion port 1 access over TCP/UDP			
Port Type	None		
Baudrate	9600 🔻]	
Data Bits	8 🔻]	
Parity	none 🔻]	
Stop Bits	1 🔻]	
Split Timeout	20	msec	
Protocol	TCP 🔻		
Mode	server 🔻]	
Server Address			
TCP Port			
Check TCP conne	Check TCP connection		
Keepalive Time	3600	sec	
Keepalive Interval	10	sec	
Keepalive Probes	5		
Use CD as indicator of TCP connection Use DTR as control of TCP connection			
Apply			

Figure 56. Expansion port configuration

Example of external port configuration:



USB PORT CONFIGURATION

Select the **USB Port** item in the configuration menu to bring up the USB configuration page. A USB to RS-232 converter can be used to send data out of the serial port from the Ethernet network in the same manner as the RS-232 expansion port options.

Table 635: USB port configuration 1		
Item	Description	
Baud rate	Applied communication speed.	
Data Bits	Number of data bits.	
Parity	Control parity bit	
	• none	
	• even	
	• odd	
Stop Bits	Number of stop bit.	
Split Timeout	Inter-character Timeout (ms). If no characters are received within this amount of time, any buffered characters will be sent out of the USB port.	
Protocol	Communication protocol:	
	TCP - communication using a linked protocol TCP	
	UDP - communication using a unlinked protocol UDP	
Mode	Mode of connection:	
	• TCP server - The router will listen to incoming requests regarding the TCP connection.	
	• TCP client - The router will connect to a TCP server on the specified IP address and TCP port.	
Server Address	In mode TCP client it is necessary to enter the Server address and final TCP port.	
TCP Port	In both modes of connection it is necessary to specify the TCP port on which the router will communicate TCP connections.	

Table 635: USB port configuration 1

If the Check TCP connection is selected, the router will automatically send TCP keep-alive messages to verify that the connection is still valid.

Table 646: USB port configuration 2

Item	Description
Keepalive Time	Time between sending keep-alive packets
Keepalive Interval	Keep-alive Response Tiimeout
Keepalive Probes	Number of attempts before connection is down

It the option *Use CD as indicator of the TCP connection* is selected, the router will activate the DTR output when a TCP connection is active.

Table 657: CD signal description

CD	Description
Active	TCP connection is on
Nonactive	TCP connection is off

Select **Use DTR as control of TCP connection** to use DTR to control when TCP connections are allowed. (CD on the router).

Table 668: DTR signal description

DTR	Description server	Description client
Active	The router will accept a TCP connection.	Router creates a TCP connection.
Nonactive	The router does not accept incoming TCP connections.	Router ends the TCP connection.

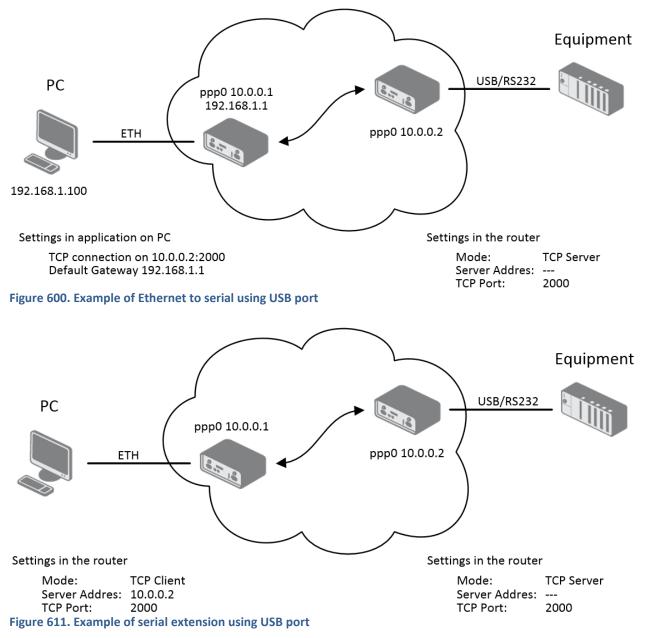
Supported USB/RS-232 converters:

- FTDI
- Prolific PL2303
- Silicon Laboratories CP210×

	USB Port Configuration		
Enable USB serial converter access over TCP/UDP			
Baudrate	9600 🔻		
Data Bits	8 🔻		
Parity	none 🔻		
Stop Bits	1 🔻		
Split Timeout	20	msec	
Protocol	TCP 🔻		
Mode	server 🔻		
Server Address			
TCP Port			
Check TCP conne	ection		
Keepalive Time	3600	sec	
Keepalive Interval	10	sec	
Keepalive Probes	5		
Use CD as indicator of TCP connection Use DTR as control of TCP connection			
Apply			

Figure 599. USB configuration





STARTUP SCRIPT

Use the *Startup Script* window to create your own scripts which will be executed after all of the initialization scripts are run.

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

Figure 622. Startup script

Any changes to the startup scripts will take effect the next time the router is power cycled or rebooted.

Example of Startup script: When the router starts up, stop syslogd program and start syslogd with remote logging on address 192.168.2.115 and limited to 100 entries.

Startup Script	
Startup Script	
<pre>#!/bin/sh # # This script will be executed *after* all the other init scripts. # You can put your own initialization stuff in here.</pre>	
killall syslogd syslogd -R 192.168.2.115 -S 100	
Apply	

Figure 633. Example of startup script

UP/DOWN SCRIPT

Use the **Up/Down Script** window to create scripts which will run when the PPP connection is started or goes down. Any scripts entered into the **Up script** window will run after a PPP/WAN connection is established. Script commands entered into the **Down Script** window will run when the PPP/WAN connection is lost.

Up/Down Script	
Up Script	
#!/bin/sh # # This script will be executed when PPP/WAN connection is established.	
Down Script #!/bin/sh # # This script will be executed when PPP/WAN connection is lost.	
Apply	



Example of UP/Down script: After establishing or losing a PPP connection, the router sends an email with information about the PPP connection.

Up/Down Script
Up Script
<pre>#!/bin/sh # # # This script will be executed when PPP/WAN connection is established. email -t name@domain.com -s "Conel router" -m "PPP connection is established."</pre>
Down Script
<pre>#!/bin/sh # # This script will be executed when PPP/WAN connection is lost. email -t name@domain.com -s "Conel router" -m "PPP connection is lost."</pre>
Apply

Figure 655. Example of Up/Down script

AUTOMATIC UPDATE CONFIGURATION

The SPECTRE router can be configured to automatically check for firmware updates from an FTP site or a web server and update its firmware or configuration information. Use the *Automatic update* menu to configure the automatic update settings. It is also possible to update the configuration and firmware through the USB host connector of the router.

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

Item	Description	
Source	 Select the location of the update files: <i>HTTP/FTP server</i> – Remote file server. <i>USB flash drive</i> - Router will check for firmware or configuration files in the root directory of the connected USB device. <i>Both</i> – Router will check for new firmware or configuration files in both places. 	
Base URL	Base URL or IP address from which the configuration file will be downloaded.	
Unit ID	Name of configuration. If the Unit ID of the router is not filled in, then the MAC address of the router will be used as the default file name. (The delimiter in a MAC address is a colon instead of a dot.)	
Update Hour	Automatic configuration update starts 5 minutes after turning on the router and then every 24 hours at the <i>Update Hour</i> .	

Table 679: Automatic update configuration

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

The firmware file name is named parameter Base URL, type of router and bin extension.

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

The following examples check for new firmware or configurations each day at 1:00 a.m. An example is given for the SPECTRE 3G router.

• Firmware:

- http://router.cz/spectre3g.bin
- Configuration file:
- http://router.cz/temelin.cfg

Automatic Update		
Enable automatic update of configuration		
✓ Enable automatic update of firmware		
Source	HTTP / FTP server	
Base URL	router.cz	
Unit ID *	temelin	
Update Hour * 1		
* can be blank		
Apply		

Figure 666. Example of automatic update 1

The following examples check for new firmware or configurations each day at 1:00 a.m. An example is given for the SPECTRE 3G router with MAC address 00:11:22:33:44:55.

- Firmware:
- Configuration file:

http://router.cz/spectre3g.bin http://router.cz/00.11.22.33.44.55.cfg

Automatic Update		
🗹 Enable aut	Enable automatic update of configuration	
Inable automatic update of firmware		
Source	HTTP/FTP server	
Base URL	router.cz	
Unit ID *		
Update Hour * 1		
* can be blank		
Apply		

Figure	677.	Example	of	automatic	update	2

USER MODULES

You may run custom software programs in the router to enhance the features of the router. Use the User Modules menu item to add new software modules to the router, to remove them, or to change their configuration. Programming, compiling, and uploading user software modules are described in the application programming guide.

	User Modules
MODBUS-TCP2RTU 1.0.5 (2013-05-22) Delete	
New Module	Browse Add or Update

Figure 688. User modules

CHANGE PROFILE

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

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

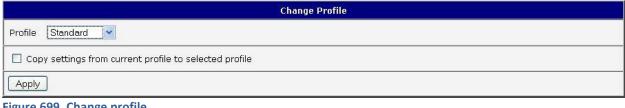


Figure 699. Change profile

CHANGE PASSWORD

You may change the router password using the *Change Password* menu item. The new password will be saved after pressing the *Apply* button.

The default password is "root". It is recommended that you change the password during initial setup for higher security.

Change Password		
New Password Confirm Password		
Apply		

Figure 700. Change password

SET REAL TIME CLOCK

The internal clock of the router can be altered by selecting the **Set Real Time Clock** menu item. Date and time can be manually set by changing the **Date** and **Time** items. The clock can also be adjusted by using a NTP server. This would require you to enter the IP address or domain name of the NTP Server and click **Apply** to set the clock.

Set Real Time Clock
NTP Server Address
Apply

Figure 711. Set real time clock

SET SMS SERVICE CENTER ADDRESS

Note: The SPECTRE RT industrial router does not support the Set SMS service center address option.

The SMS service center phone number is normally programmed into the SIM card by the carrier and does not need to be manually entered. However, in some cases, it may be necessary to set the phone number of the SMS service center in order to send SMS messages. This parameter cannot be set if the SIM card already contains the SMSC information. The phone number can be entered with or without an international prefix. For example: +420 xxx xxx xxx. If you are unable to send or receive SMS messages, contact your carrier to find out if this parameter is required. This parameter is provisioned automatically by the carrier on CDMA networks and does not need to be manually entered.

Set SMS Service Center Address		
Service Center Address		
Apply		

Figure 722. Set SMS service center address



UNLOCK SIM CARD

Note: The SPECTRE RT industrial router does not support the **Unlock SIM card** option.

You may lock the SIM card with a 4-8 digit PIN (Personal Identification Number) code to prevent unauthorized use of the SIM card. The PIN code must be entered each time that the SIM card is powered up. The SPECTRE cellular

router supports the use of a SIM card with a PIN number. Enter the PIN number into the SIM PIN field on the configuration page and select **Apply**.

Access to the SIM card is blocked if the PIN code is incorrectly entered 3 times. Contact your SIM card provider if it has been blocked.

Unlock SIM Card		
SIM PIN		
Apply		

Figure 733. Unlock SIM card

SEND SMS

Note: The SPECTRE RT industrial router does not support the Send SMS option.

You can send an SMS message from the router to test the cellular network. To send an SMS message, select **Send SMS** from the configuration menu. Enter the phone number and text of the message into the text boxes and click the **Send** button. It may take a few seconds to send the message.

Send SMS		
Phone number		
Message		
Send		

Figure 744. Send SMS

It is also possible to send an SMS message using an HTTP request in the form:

GET /send_exec.cgi?phone=%2B**420712345678**&message=**Test** HTTP/1.1 Authorization: Basic cm9vdDpyb290

The HTTP request will be sent to TCP connection on router port 80. Router sends an SMS message with text "*Test*". SMS is sent to phone number ""420712345678". Authorization is in the format "user:password" coded by BASE64. In the example is used for root:root.

BACKUP CONFIGURATION

You may save the current router configuration to a file using the *Backup Configuration* menu item. It is recommended that you save the current configuration before a firmware update.

RESTORE CONFIGURATION

You may restore the router configuration from a file using the *Restore Configuration* menu item.

4	Restore Configuration	
Configuration File	Procházet.	
Apply		
igure 755. Restore configuration		

UPDATE FIRMWARE

Select the *Update Firmware* menu item to view the current router firmware version and load new firmware into the router. To load new firmware, browse to the new firmware file and press the *Update* button to begin the update. **Do not turn off the router during the firmware update.**

Update Firmware		
Firmware Version : 2.0.7 (2010-12-16)		
New Firmware Browse		
Update		

Figure 766. Update firmware

During the firmware update, the router will show the following messages:

Uploading firmware to RAM... ok Programming FLASH..... ok

Reboot in progress

Continue here after reboot.

After the firmware update, the router will automatically reboot.



Note: Do not turn off the router during the firmware update.

REBOOT

The router can be rebooted remotely through the web interface. To reboot the router, select the *Reboot* menu item and then press the *Reboot* button.

Reboot

The reboot process will take about 15 seconds to complete.

Reboot

Figure 777: Reboot

2. ROUTER CONFIGURATION OVER TELNET

Monitoring of status, configuration and administration of the router can be performed over the Telnet interface. The default IP address of the modem is 192.168.1.1. Configuration may be performed only by the user "root" with initial password "root".

The following commands may be used to configure the router over Telnet:

Table 70: Telnet commands

Command	Description
cat	display file
ср	copy a file
date	show/change system time
df	Display information about file system
dmesg	kernel diagnostic messages
echo	string write
email	Email send
free	Display information about available memory
gsmat	Send an AT commend
gsminfo	Display information about signal quality
gsmsms	SMS send
hwclock	display/change time in RTC
ifconfig	display/change interface configuration
io	reading/writing input/output pins
ір	display/change route table
iptables	display/change NetFilter rules
kill	Kill a process
killall	Kill all processes
In	link create
ls	dump directory contents
mkdir	create directory
mv	Move file
ntpdate	synchronize system time with NTP server
passwd	password change
ping	ICMP ping
ps	display process information

pwd	display directory contents
reboot	Reboot
rm	file delete
rmdir	directory delete
route	display/change route table
service	start/stop a service
sleep	pause number of seconds
slog	display system log
tail	display file end
tcpdump	monitoring of network
touch	file create/change time stamp
vi	text editor

3. WI-FI CONFIGURATION

WI-FI ACCESS POINT

The SPECTRE 3G-W and LTE-W routers can provide wireless access to the network using a built-in 802.11bgn Wi-Fi module. Support for the Wi-Fi module is provided by a User Software module which is pre-loaded into the SPECTRE Wi-Fi router at the factory. Only access point functionality is provided by the router.

Select the **Wi-Fi** user module to view the **Wi-Fi AP** status and configuration. This link is located on the *User Modules* customization web page. The link to "*Wi-Fi* **AP**" information is in the "Status" section.

Table 7168: Wi-Fi AP state

Item	Description
hostapd state dump	Time stamp of actual Wi-Fi status.
num_sta	Number of associated stations.
num_sta_non_erp	Number of associated Non-ERP stations (i.e., stations using 802.11b in 802.11g BSS)
num_sta_no_short_slot_time	Number of associated stations, that do not support Short Slot Time
num_sta_no_short_preamble	Number of associated stations that do not support Short Preamble.

Data about connected clients is displayed as well.

Table 692: Wi-Fi client state

Item	Description
STA	MAC address of associated station.
AID	STA's unique AID (1 2007) or 0 if not yet assigned.

WiFi AP Status

WiFi AP Status

hostapd state dump - Thu Apr 12 11:23:58 2012 num_sta=1 num_sta_non_erp=0 num_sta_no_short_slot_time=0 num_sta_no_short_preamble=1

STA=00:b0:8c:01:0d:81
AID=1 flags=0xa23 [AUTH][ASSOC][AUTHORIZED][WMM]
capability=0x401 listen_interval=3
supported_rates=82 84 8b 96 0c 12 18 24 30 48 60 6c
timeout_next=NULLFUNC POLL

Figure 788: Wi-Fi AP status

Fig. 75: Wi-Fi AP Status

WLAN DHCP

The DHCP server provides automatic configuration of devices connected to the network managed by the router. The DHCP server assigns IP address, netmask, default gateway (IP address of router) and DNS server (IP address of router) to each device.

The following table lists the information that is displayed in the DHCP status window for each attached client.

Table 703: Lease address

Item	Description		
lease	Assigned IP address		
starts	Time of assignation of IP address		
ends	Time of termination IP address validity		
hardware ethernet	Hardware MAC (unique) address		
uid	Unique ID		
client-hostname	Computer name		

DHCP St	atus
Active DHCF	Leases
<pre>lease 192.168.3.2 { starts 4 2012/04/12 11:26:21; ends 4 2012/04/12 11:36:21; hardware ethernet 00:b0:8c:01:0d:81; uid 01:00:b0:8c:01:0d:81; client-hostname "felgr2"; }</pre>	

Figure 799. Wi-Fi DHCP status

WIRELESS NETWORK SCANNING

Press *Scan* to scan neighboring Wi-Fi networks. Scanning can only be performed if the access point (Wi-Fi AP) is OFF.

Table 714: Neighboring Wi-Fi networks

Item	Description	
BSS	MAC address of access point (AP).	
TSF	A Timing Synchronization Function (TSF) keeps the timers for all stations in the same Basic Service Set (BSS) synchronized. All stations shall maintain a local TSF timer.	
freq	Frequency band of access point (AP).	
beacon interval	Period of time synchronization [kus] (1,024ms).	
capability	List of access point (AP) characteristic.	
signal	Signal level of access point (AP).	
last seen	Last response time of access point (AP).	
SSID	Identifier for access point (AP).	
Supported rates	Supported rates of access point (AP).	
DS Parameter set	The channel on which broadcast access point (AP).	

WiFi Scan List of BSSs

```
BSS 00:3a:98:eb:5a:30 (on wlan0)
       TSF: 25078863769996 usec (290d, 06:21:03)
       freq: 2467
       beacon interval: 100
       capability: ESS Privacy ShortPreamble ShortSlotTime (0x0431)
       signal: -61.00 dBm
       last seen: 230 ms ago
       Information elements from Probe Response frame:
       SSID: conel
       Supported rates: 1.0* 2.0* 5.5* 6.0 9.0 11.0* 12.0 18.0
       DS Parameter set: channel 12
       ERP:
       RSN:
                * Version: 1
                * Group cipher: TKIP
                * Pairwise ciphers: CCMP TKIP
                * Authentication suites: PSK
                * Capabilities: 4-PTKSA-RC 4-GTKSA-RC (0x0028)
       Extended supported rates: 24.0 36.0 48.0 54.0
               * Parameter version 1
        WMM:
                * u-APSD
                * BE: CW 15-1023, AIFSN 3
                * BK: CW 15-1023, AIFSN 7
                * VI: CW 7-15, AIFSN 2, TXOP 6016 usec
```

* V0: CW 3-7, AIFSN 2, TXOP 3264 usec

Figure 800. Wi-Fi Scan

WI-FI START LOG

If there is some problem starting Wi-Fi connections, check the *"Start Log"* in the *"Status "* section. It will display error reports that correspond to one or more components of the Wi-Fi AP. The basic component Wi-Fi AP (hostapd) is the exception. This component writes its log entries to the System Log.

	WiFi AP Start Log
	WiFi AP Start Log
Start WiFi: ln: /var/wifi/dhcpd-wifi: File exists	

Figure 811. Wi-Fi AP start log

SYSTEM LOG

If there are problems with Wi-Fi connections you can view the system log by pressing the *"System Log"* menu item. You will see detailed reports from individual applications running in the router. Wi-Fi AP activity is indicated in rows starting "hostapd" or "dhcpd-wifi". Press the "Save" button to save the system log to the computer.

System Log			
System Messages			
2012-04-12 11:40:11 System log daemon started. 2012-04-12 11:40:15 pppsd[418]: pppsd started 2012-04-12 11:40:15 pppsd[418]: turning on module			
2012-04-12 11:40:15 pppsd[418]: selected SIM: primary 2012-04-12 11:40:15 dnsmasq[447]: started, version 2.59 cachesize 150 2012-04-12 11:40:15 dnsmasq[447]: cleared cache			
2012-04-12 11:40:16 sshd[483]: Server listening on 0.0.0.0 port 22. 2012-04-12 11:40:20 hostapd: Configuration file: /var/wifi/hostapd.conf 2012-04-12 11:40:21 hostapd: Using interface wlan0 with hwaddr 00:22:88:02:03:6e and ssid 'Vyroba - XC WIFI'			
2012-04-12 11:40:22 hostapd: wlan0: STA 00:b0:8c:01:0d:81 IEEE 802.11: authenticated 2012-04-12 11:40:22 hostapd: wlan0: STA 00:b0:8c:01:0d:81 IEEE 802.11: associated (aid 1) 2012-04-12 11:40:22 hostapd: AP-STA-CONNECTED 00:b0:8c:01:0d:81			
2012-04-12 11:40:27 dhcpd-wifi[751]: DHCPREQUEST for 192.168.3.2 from 00:b0:8c:01:0d:81 via wlan0 2012-04-12 11:40:27 dhcpd-wifi[751]: DHCPACK on 192.168.3.2 to 00:b0:8c:01:0d:81 via wlan0 2012-04-12 11:40:27 dhcpd-wifi[751]: DHCPREQUEST for 192.168.3.2 from 00:b0:8c:01:0d:81 via wlan0 2012-04-12 11:40:27 dhcpd-wifi[751]: DHCPREQUEST for 192.168.3.2 to 00:b0:8c:01:0d:81 via wlan0			
2012-04-12 11:40:28 pppsd[418]: SIM card not present or communication error			
Save			

Figure 822. System log

WI-FI ACCESS POINT CONFIGURATION

The configuration page for the Wi-Fi access point is displayed by selecting *Wi-Fi AP* item in **Configuration** section.

Enable Wi-Fi APIf this item is checked, Wi-Fi AP is enabled.SSIDIdentifier of Wi-Fi network.Broadcast SSIDMethod of broadcasting the SSID in beacon frames and response to a request for sending the beacon frame. • Enabled – SSID is broadcast in beacon frames. • Enabled – SSID is broadcast in beacon frames. • Enabled – SSID is broadcast in beacon frames. • Enabled – SSID is broadcast in beacon frames are ignored. • Clear – All SSID characters in beacon frames are ignored.Country CodeCode of the country where the router is installed. This code must be entered in ISO 3166-1 alpha-2 format. If a country code isn't specified and the router has not implemented a system to determine this code, it will use "US" as the default country code .HW ModeHW mode of Wi-Fi standard that will be supported by Wi-Fi access point. • IEE 802.11b+g • None - Authentication is not required. Free acces point. · Open - Authentication is not required. Free acce	Item	Description		
Broadcast SSID Method of broadcasting the SSID in beacon frames and response to a request for sending the beacon frame. • Enabled – SSID is broadcast in beacon frames. • Zero length – Beacon frame does not include SSID. Requests for sending beacon frame are ignored. • Clear – All SSID characters in beacon frames are replaced by 0. Original length is kept. Requests for sending beacon frames are ignored. Country Code Code of the country where the router is installed. This code must be entered in ISO 3166-1 alpha-2 format. If a country code isn't specified and the router has not implemented a system to determine this code, it will use "US" as the default country code. If no country code is specified or if the wrong country code is entered, then the router may violate country-specific regulations for the use of the Wi-Fi frequency bands. HW Mode HW mode of Wi-Fi standard that will be supported by Wi-Fi access point. • IEE 802.11b #	Enable Wi-Fi AP	If this item is checked, Wi-Fi AP is enabled.		
sending the beacon frame.• Enabled - SSID is broadcast in beacon frames.• Zero length - Beacon frame does not include SSID. Requests for sending beacon frame are ignored.• Clear - All SSID characters in beacon frames are replaced by 0. Original length is kept. Requests for sending beacon frames are ignored.Country CodeCode of the country where the router is installed. This code must be entered in ISO 3166-1 alpha-2 format. If a country code isn't specified and the router has not implemented a system to determine this code, it will use "US" as the default country code .HW ModeHW mode of Wi-Fi standard that will be supported by Wi-Fi access point.• IEE 802.11b+ g• IEE 802.11b+ g• IEE 802.11b+ g• IEE 802.11b+ g• IEE 802.11b+ g• IEE 802.11b+ g• IEE 802.05 for Wi-Fi networks is enabled by checking this item. This version doesn't guarantee network throughput. It is suitable for simple applications that require QOS.AuthenticationAccess control and durbrization of users in the Wi-Fi networks. 1. Open - Authentication using WEP key.AuthenticationType of data encryption in the Wi-Fi network is encryption AES.EncryptionType of data encryption in the Wi-Fi network 1. None - No data encryption. 4. WPA2-PSK authentication. 4. Type of WPA2-PSK authentication. 4. Type of WPA2-PSK authentication. 4. Type of WPA2-PSK authentication. 4. Type of WPA2-PSK authentication. 4. ACS - Improved encryption key management that can be used for WPA2-PSK authentication. 4. MPA2-PSK authentication. 4. ACS - Improved encryption key management that can be used for WPA2-PSK authentication.WEP Key TypeType of WPA for WEP encryption. <td>SSID</td> <td colspan="3">Identifier of Wi-Fi network.</td>	SSID	Identifier of Wi-Fi network.		
3166-1 alpha-2 format. If a country code isn't specified and the router has not implemented a system to determine this code, it will use "US" as the default country code .If no country code is specified or if the wrong country code is entered, then the router may violate country-specific regulations for the use of the Wi-Fi frequency bands.HW ModeHW mode of Wi-Fi standard that will be supported by Wi-Fi access point. 	Broadcast SSID	 sending the beacon frame. Enabled – SSID is broadcast in beacon frames. Zero length – Beacon frame does not include SSID. Requests for sending beacon frame are ignored. Clear – All SSID characters in beacon frames are replaced by 0. Original 		
IEE 802.11bIEE 802.11b+gIEE 802.11b+g+nChannelThe channel, where the Wi-Fi AP is transmitting.BW 40 MHzThe option for HW mode 802.11n which allows transmission on two standard 20MHz channels simultaneously.WMMBasic QoS for Wi-Fi networks is enabled by checking this item. This version doesn't guarantee network throughput. It is suitable for simple applications that require QoS.AuthenticationAccess control and authorization of users in the Wi-Fi network. 1. Open - Authentication is not required. Free access point. 2. Shared – Base authentication using WEP key. 3. WPA-PSK - Authentication using better authentication methods PSK-PSK. 4. WPA2-PSK - WPA-PSK using new encryption AES.EncryptionType of data encryption in the Wi-Fi network • None – No data encryption. • WEP – Encryption using static WEP keys. This encryption can be used for Shared authentication. • TKIP – Dynamic encryption key management that can be used for WPA2-PSK and WPA2-PSK authentication.WEP Key TypeType of WEP key for WEP encryption. • ASCII – WEP key in ASCII format • HEX – WEP key in hexadecimal format	Country Code	3166-1 alpha-2 format. If a country code isn't specified and the router has not implemented a system to determine this code, it will use "US" as the default country code .If no country code is specified or if the wrong country code is entered, then the router		
BW 40 MHzThe option for HW mode 802.11n which allows transmission on two standard 20MHz channels simultaneously.WMMBasic QoS for Wi-Fi networks is enabled by checking this item. This version doesn't guarantee network throughput. It is suitable for simple applications that require QoS.AuthenticationAccess control and authorization of users in the Wi-Fi network. 1. Open - Authentication using WEP key. 3. WPA-PSK - Authentication using better authentication methods PSK-PSK. 4. WPA2-PSK - WPA-PSK using new encryption AES.EncryptionType of data encryption in the Wi-Fi network • None – No data encryption. • WEP – Encryption using static WEP keys. This encryption can be used for Shared authentication. • TKIP – Dynamic encryption key management that can be used for WPA2-PSK and WPA2-PSK authentication.WEP Key TypeType of WEP key for WEP encryption. • ASCII – WEP key in ASCII format • HEX – WEP key in hexadecimal format	HW Mode	 IEE 802.11b IEE 802.11b+g 		
channels simultaneously.WMMBasic QoS for Wi-Fi networks is enabled by checking this item. This version doesn't guarantee network throughput. It is suitable for simple applications that require QoS.AuthenticationAccess control and authorization of users in the Wi-Fi network. 1. Open - Authentication is not required. Free access point. 2. Shared – Base authentication using WEP key. 3. WPA-PSK - Authentication using better authentication methods PSK-PSK. 4. WPA2-PSK - WPA-PSK using new encryption AES.EncryptionType of data encryption in the Wi-Fi network None – No data encryption. WEP – Encryption using static WEP keys. This encryption can be used for Shared authentication. TKIP – Dynamic encryption key management that can be used for WPA-PSK and WPA2-PSK authentication.WEP Key TypeType of WEP key for WEP encryption. ASCII – WEP key in ASCII format HEX – WEP key in hexadecimal format	Channel	The channel, where the Wi-Fi AP is transmitting.		
guarantee network throughput. It is suitable for simple applications that require QoS.AuthenticationAccess control and authorization of users in the Wi-Fi network. 1. Open - Authentication is not required. Free access point. 2. Shared – Base authentication using WEP key. 3. WPA-PSK - Authentication using better authentication methods PSK-PSK. 4. WPA2-PSK - WPA-PSK using new encryption AES.EncryptionType of data encryption in the Wi-Fi network • None – No data encryption. • None – No data encryption. • WEP – Encryption using static WEP keys. This encryption can be used for Shared authentication. • TKIP – Dynamic encryption key management that can be used for WPA-PSK and WPA2-PSK authentication.WEP Key TypeType of WEP key for WEP encryption. • ASCII – WEP key in ASCII format • HEX – WEP key in hexadecimal format	BW 40 MHz			
1. Open - Authentication is not required. Free access point.2. Shared - Base authentication using WEP key.3. WPA-PSK - Authentication using better authentication methods PSK-PSK.4. WPA2-PSK - WPA-PSK using new encryption AES.EncryptionType of data encryption in the Wi-Fi network• None - No data encryption.• WEP - Encryption using static WEP keys. This encryption can be used for Shared authentication.• TKIP - Dynamic encryption key management that can be used for WPA2-PSK and WPA2-PSK authentication.• AES - Improved encryption used for WPA2-PSK authentication.• AES - Improved encryption.• AES - Improved encryption.• ASCII - WEP key in ASCII format • HEX - WEP key in hexadecimal format	WMM	· -		
 None – No data encryption. WEP – Encryption using static WEP keys. This encryption can be used for Shared authentication. TKIP – Dynamic encryption key management that can be used for WPA-PSK and WPA2-PSK authentication. AES - Improved encryption used for WPA2-PSK authentication. WEP Key Type Type of WEP key for WEP encryption. ASCII – WEP key in ASCII format HEX – WEP key in hexadecimal format 	Authentication	 Open - Authentication is not required. Free access point. Shared – Base authentication using WEP key. WPA-PSK - Authentication using better authentication methods PSK-PSK. 		
WEP Key Type Type of WEP key for WEP encryption. • ASCII – WEP key in ASCII format • HEX – WEP key in hexadecimal format	Encryption	 None – No data encryption. WEP – Encryption using static WEP keys. This encryption can be used for Shared authentication. TKIP – Dynamic encryption key management that can be used for WPA-PSK and WPA2-PSK authentication. 		
	WEP Key Type	Type of WEP key for WEP encryption. • ASCII – WEP key in ASCII format		
	WEP Default Koy			

Table 725: Wi-Fi AP parameters

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WEP Key X	 Items for different 4 WEP keys. WEP key in ASCII format must be entered in quotes. This key can be specified in the following lengths. 5 ASCII characters (40b WEP key) 13 ASCII characters (104b WEP key) 16 ASCII characters (128b WEP key) WEP key must be entered in hexadecimal digits. This key can be specified in the following lengths. 10 hexadecimal digits (40b WEP key) 26 hexadecimal digits (128b WEP key) 32 hexadecimal digits (128b WEP key)
WPA PSK Type	 Type of key for WPA-PSK authentication. 256-bit secret ASCII passphrase PSK File
WPA PSK	 Key for WPA-PSK authentication. This key must be entered according to the selected WPA PSK type as follows. 256-bit secret - 64 hexadecimal digits ASCII passphrase - 8 to 63 characters PSK File - absolute path to the file containing the list of pairs (PSK key, MAC address)
Access List	 Mode of Access/Deny list. Disabled – Accept/Deny list is not used. Accept – Clients in Accept/Deny list can access the network. Deny – Clients in Access/Deny list cannot access the network.
Accept/Deny List	Accept or Deny list of client MAC addresses that set network access. Each MAC address is separated by new line.
Syslog Level	 Logging level, when system writes to the system log. Verbose debugging – The highest level of logging. Debugging Informational – Default level of logging Notification Warning – The lowest level of communicativeness.

🔲 Enable WiFi AF	2	
SSID		
Broadcast SSID	Enabled	*
Country Code *		
HW Mode	IEEE 802.11b	*
Channel	1	
BW 40 MHz WMM		
Authentication	Open 1	*
Encryption		~
WEP Key Type		~
WEP Default Key	1	~
WEP Key 1		
WEP Key 2		
WEP Key 3		
WEP Key 4		
WPA PSK Type	256-bit secret	~
WPA PSK		
Access List	Disabled	*
Accept/Deny List		
Syslog Level	Informational	~
Extra options *		
Apply		

Figure 833. Wi-Fi AP configuration page

WLAN CONFIGURATION

The Wi-Fi LAN and DHCP server page is displayed by selecting *"WLAN"* in the configuration section.

Item	Description		
Enable WLAN interface	If this item is checked, Wi-Fi LAN is enabled.		
IP Address	Fixed IP address of Wi-Fi network interface.		
Subnet mask	Subnet Mask of Wi-Fi network interface.		
Bridged	 No - Bridged mode is not allowed. WLAN network is not connected with LAN router. Yes - Bridged mode is allowed. WLAN network is connected with one or more LAN network in router. In this case, the setting of most items in this table is ignored. Instead, it takes setting of selected network interface (LAN). 		
Enable dynamic DHCP leases	If this option is checked, dynamic DHCP server is enabled.		
IP Pool Start	Start IP addresses space.		
IP Pool End	End IP addresses space		
Lease Time	Time in seconds that the IP Address is available to the client		

Table 73: WLAN parameter

WLAN Configuration
Enable WLAN interface
IP Address
Subnet mask
Bridged No
Enable dynamic DHCP leases
IP Pool Start
IP Pool End
Lease Time sec
Apply

Figure 844. WLAN configuration

WI-FI PORT LEDS

Table 747: Wi-Fi LED state indication

LED port indicator	
Green LED	Wi-Fi port is powered on.
Yellow LED	Permanently off.