



CONFIGURATION MANUAL

for v2 routers



Used symbols

-  Danger – important notice, which may have an influence on the user’s safety or the function of the device.
-  Attention – notice on possible problems, which can arise in specific cases.
-  Information, notice – information, which contains useful advice or special interest.

Firmware version

Actual version of firmware is 3.0.5 (12.6.2012).

GPL license

Source codes under GPL license are available free of charge by sending an email to info@conel.cz.



**Declared quality system
ISO 9001**



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Issue in CZ, 8/22/2012



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1. Configuration settings over web browser



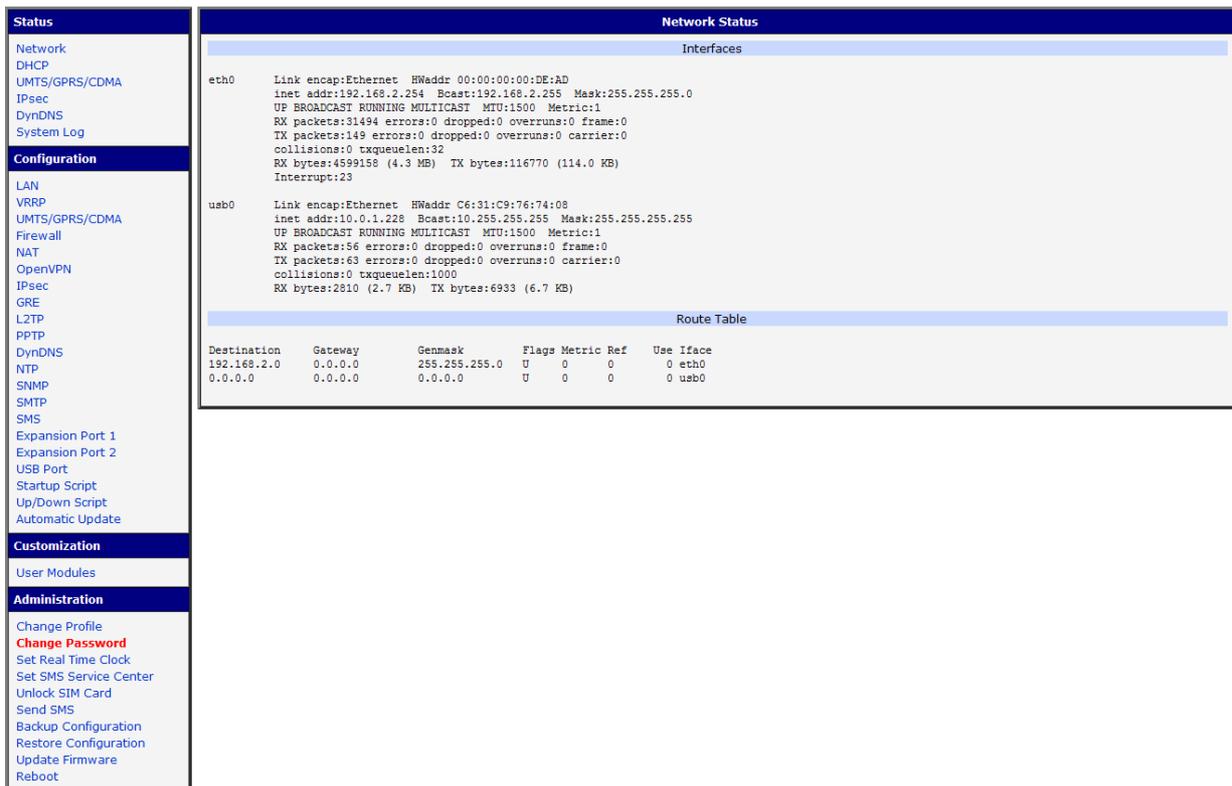
Attention! If the SIM card is not inserted in the router, then wireless transmissions will not work. The inserted SIM card must have activated GPRS. Insert the SIM card when the router is switched-off.

Monitoring of the status, configuration and administration of the router can be performed by means of the web interface, which is available after insertion of IP address of the modem into the web browser. 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 left part of the web interface contains the menu with pages for monitoring of the Status, Configuration and Administration of the router.

Name of the router is displayed depending on type of your router. Items' Name and Location displays the name and location of the router filled in the SNMP configuration (see SNMP Configuration).

For enhanced security of network managed router is must change the default password router. If the router's default password is set, the item "Change password" is highlighted in red.



Status		Network Status																														
<ul style="list-style-type: none"> Network DHCP UMTS/GPRS/CDMA IPsec DynDNS System Log 		<p>Interfaces</p> <pre>eth0 Link encap:Ethernet HWaddr 00:00:00:00:DE:AD inet addr:192.168.2.254 Bcast:192.168.2.255 Mask:255.255.255.0 UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1 RX packets:31494 errors:0 dropped:0 overruns:0 frame:0 TX packets:149 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:32 RX bytes:4599158 (4.3 MB) TX bytes:116770 (114.0 KB) Interrupt:23 usb0 Link encap:Ethernet HWaddr C6:31:C9:76:74:08 inet addr:10.0.1.228 Bcast:10.255.255.255 Mask:255.255.255.255 UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1 RX packets:56 errors:0 dropped:0 overruns:0 frame:0 TX packets:63 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000 RX bytes:2810 (2.7 KB) TX bytes:6933 (6.7 KB)</pre> <p>Route Table</p> <table border="1"> <thead> <tr> <th>Destination</th> <th>Gateway</th> <th>Genmask</th> <th>Flags</th> <th>Metric</th> <th>Ref</th> <th>Use</th> <th>Iface</th> </tr> </thead> <tbody> <tr> <td>192.168.2.0</td> <td>0.0.0.0</td> <td>255.255.255.0</td> <td>U</td> <td>0</td> <td>0</td> <td>0</td> <td>eth0</td> </tr> <tr> <td>0.0.0.0</td> <td>0.0.0.0</td> <td>0.0.0.0</td> <td>U</td> <td>0</td> <td>0</td> <td>0</td> <td>usb0</td> </tr> </tbody> </table>							Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface	192.168.2.0	0.0.0.0	255.255.255.0	U	0	0	0	eth0	0.0.0.0	0.0.0.0	0.0.0.0	U	0	0	0	usb0
Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface																									
192.168.2.0	0.0.0.0	255.255.255.0	U	0	0	0	eth0																									
0.0.0.0	0.0.0.0	0.0.0.0	U	0	0	0	usb0																									
<p>Configuration</p> <ul style="list-style-type: none"> LAN VRRP UMTS/GPRS/CDMA Firewall NAT OpenVPN IPsec GRE L2TP PPPT DynDNS NTP SNMP SMTP SMS Expansion Port 1 Expansion Port 2 USB Port Startup Script Up/Down Script Automatic Update 																																
<p>Customization</p> <ul style="list-style-type: none"> User Modules 																																
<p>Administration</p> <ul style="list-style-type: none"> Change Profile Change Password Set Real Time Clock Set SMS Service Center Unlock SIM Card Send SMS Backup Configuration Restore Configuration Update Firmware Reboot 																																

Fig. 1: Web configuration



After green LED starts to blink it is possible to restore initial settings of the router by pressing button RST on front panel. If press button RST, configuration is restored to default and it is reboot (green LED will be on).

1.1. Secured access to web configuration

To the web configuration can be accessed via a secure HTTPS protocol.

In the event of a default router IP address is a secure router configuration accessed by typing address `https://192.168.1.1` in the web browser. The first approach is the need to install a security certificate. If your browser reports a disagreement in the domain, this message can be prevented use the following procedure.

Since the domain name in the certificate is given the MAC address of the router (such separators are used dashes instead of colons), it is necessary to access the router under this domain name. For access to the router via a domain name, it is adding a DNS record in the DNS table, the operating system.

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

In addition to configuring the router with MAC address `00:11:22:33:44:55` is accessed to secure configuration by typing address `https://00-11-22-33-44-55` in the web browser. The first approach is the need to install a security certificate.

 When using self signing certificate must upload your files and `http_cert` `http_key` directory `/etc/certs` in the router.

1.2. Network status

To view the system information about the router operation, select the **Network** menu item. The upper part of the window displays detailed information about active interfaces:

Interface	Description
eth0	Networks interface
ppp0	Interface (active connection to GPRS/EDGE)
tun0	OpenVPN tunnel interface
ipsec0	IPSec tunnel interface
gre1	GRE tunnel interface

Table 1: Description of interface in network status

By each of the interfaces is then shown the following information:

Item	Description
HWaddr	Hardware (unique) address of networks interface
inet	IP address of interface
P-t-P	IP address second ends connection
Bcast	Broadcast address
Mask	Mask of network
MTU	Maximum size of packet, which is equipment able transmit
Metric	Number of routers, over which packet must go trough
RX	<ul style="list-style-type: none"> packets – received packets errors - number of errors dropped - dropped packets overruns – incoming packets lost because of overload frame – wrong incoming packets because of incorrect packet size
TX	<ul style="list-style-type: none"> packets – transmit packets errors - number of errors dropped - dropped packets overruns – outgoing packets lost because of overload carrier - wrong outgoing packets with errors resulting from the physical layer
collisions	Number of collisions on physical layer
txqueuelen	Length of front network device
RX bytes	Total number of received bytes
TX bytes	Total number of transmitted bytes

Table 2: Description of information in network status



It is possible to read status PPP connection from the network information. If the PPP connection is active, then it is in the system information shown as ppp0 interface.

```

Network Status
-----
Interfaces

eth0    Link encap:Ethernet  HWaddr 00:11:22:33:44:55
        inet addr:192.168.1.1  Bcast:192.168.1.255  Mask:255.255.255.0
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:407 errors:0 dropped:0 overruns:0 frame:0
        TX packets:461 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:32
        RX bytes:51793 (50.5 KB)  TX bytes:321807 (314.2 KB)
        Interrupt:23

ppp0    Link encap:Point-Point Protocol
        inet addr:10.169.80.137  P-t-P:10.0.0.1  Mask:255.255.255.255
        UP POINTOPOINT RUNNING NOARP MULTICAST  MTU:1500  Metric:1
        RX packets:35 errors:0 dropped:0 overruns:0 frame:0
        TX packets:46 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:3
        RX bytes:7772 (7.5 KB)  TX bytes:8716 (8.5 KB)

Route Table

Destination  Gateway      Genmask      Flags Metric Ref    Use Iface
10.0.0.1     0.0.0.0     255.255.255.255  UH    0      0      0 ppp0
192.168.1.0  0.0.0.0     255.255.255.0   U      0      0      0 eth0
0.0.0.0      10.0.0.1    0.0.0.0        UG    0      0      0 ppp0
    
```

Fig. 2: Network status

1.3. DHCP status

Information on the activities of the DHCP server can be accessed by selecting the **DHCP status**.

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

For each configuration, the DHCP status window displays the following information.

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

Table 3: DHCP status description

```

DHCP Status
-----
Active DHCP Leases

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";
}
    
```

Fig. 3: DHCP status



In the extreme, the DHCP status can display two records for one IP address. That could have been caused by resetting of network cards.

1.4. UMTS/GPRS/CDMA status

UMTS/GPRS/CDMA menu item contains actual information about connections.

Item	Description
PLMN	Code of operator
Cell	The cell to which the router is connected
Channel	The channel on which the router communicates
Level	The signal quality of the selected cell
Neighbours	Signal quality of neighboring hearing cells
Uptime	Time to establish PPP connection

Table 4: Description of GSM information item



If the neighbor cell is highlighted in red, risk of often switching between neighbor and actual cells.

The next section of this window displays information about the quality of the GPRS/UMTS connection in each period.

Period	Definition of the period
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. The interval must be set in the GPRS Configuration
Last period	Last accounting period. The interval must be set in the GPRS Configuration

Table 5: Description of period

Item	Description
Level Min.	Minimal signal strength
Level Avg.	Average signal strength
Level Max.	Maximal signal strength
Cells	Number of switch between cells
Availability	Availability of PPP connection

Table 6: Description of GSM statistic



Availability is information in percentage, that is calculated us ration of PPP connect time and router power on time.



After you place your cursor on the maximum or minimum signal strength, will show the last time when the signal strength reaching the router.

In the middle part of this window is contained information about transferred data for corresponding SIM cards. The third SIM card is used for CDMA and remaining SIM cards are standard for UMTS (for more information about both technologies in conjunction with this router can be found in the user's guide).

Item	Description
RX data	Total volume of received data
TX data	The total volume of data sent
Connections	Number of PPP connection establishment

Table 7: Description of Traffic Statistics 1st, 2nd, 3rd SIM card

The PPP Connection Log is in the bottom of window, where are information about the make-up of the PPP connection and problems in establishment.

UMTS/GPRS/CDMA Status

Mobile Network Information

```

PLMN      : 23001
Cell      : 69A6 (EDGE attached)
Channel   : 30
Level     : -77 dBm
Neighbours : -79 dBm (80), -84 dBm (57), -92 dBm (59), -93 dBm (58), -98 dBm (108)
Uptime    : 0 days, 0 hours, 29 minutes
    
```

Mobile Network Statistics

	Today	Yesterday	This Week	Last Week	This Period	Last Period
Level Min	-89 dBm	--- dBm	-89 dBm	-91 dBm	-91 dBm	-91 dBm
Level Avg	-74 dBm	--- dBm	-74 dBm	-74 dBm	-74 dBm	-76 dBm
Level Max	-67 dBm	---	-67 dBm	-67 dBm	-67 dBm	-70 dBm
Cells	79	0	79	394	472	506
Availability	97.9%	0.0%	97.9%	99.2%	99.1%	99.7%

Traffic Statistics for 1st SIM card

	Today	Yesterday	This Week	Last Week	This Period	Last Period
Rx Data	269 KB	0 KB	269 KB	423 KB	692 KB	206 KB
Tx Data	61 KB	0 KB	61 KB	499 KB	560 KB	180 KB
Connections	5	0	5	80	85	36

Traffic Statistics for 2nd SIM card

	Today	Yesterday	This Week	Last Week	This Period	Last Period
Rx Data	0 KB	0 KB	0 KB	0 KB	0 KB	0 KB
Tx Data	0 KB	0 KB	0 KB	0 KB	0 KB	0 KB
Connections	0	0	0	0	0	0

Traffic Statistics for 3rd SIM card

	Today	Yesterday	This Week	Last Week	This Period	Last Period
Rx Data	0 KB	0 KB	0 KB	0 KB	0 KB	0 KB
Tx Data	0 KB	0 KB	0 KB	0 KB	0 KB	0 KB
Connections	0	0	0	0	0	0

PPP Connection Log

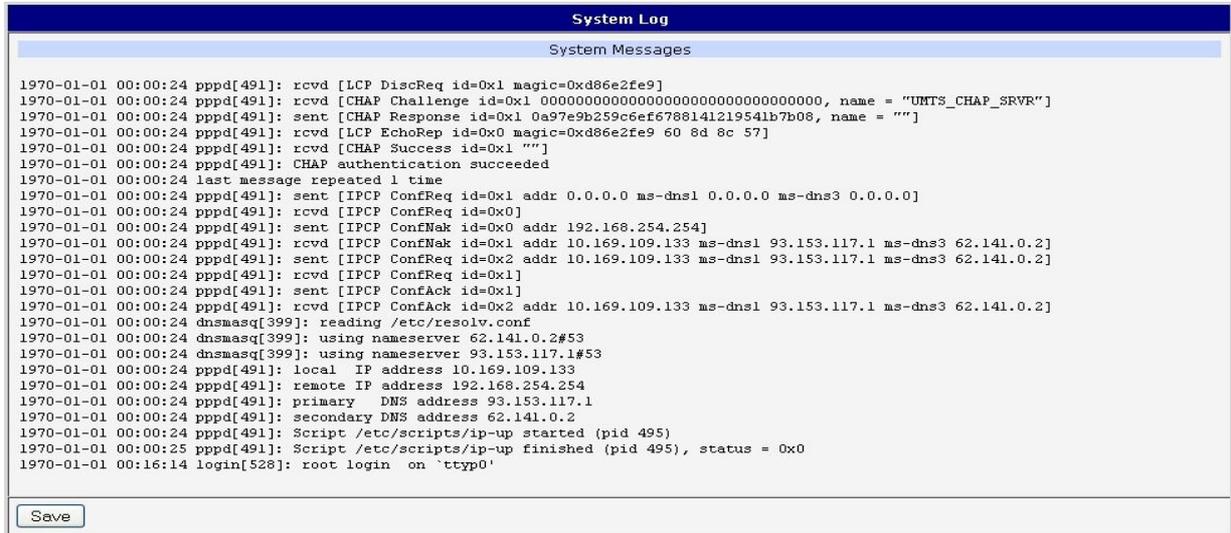
```

2011-05-09 11:49:55 Connection successfully established.
    
```

Fig. 4: UMTS/GPRS/CDMA status

1.7. System log

In case of any problems with connection to GPRS it is possible to view the system log by pressing the **System Log** menu item. In the window, are displayed detailed reports from individual applications running in the router. By the help of button **Save** it is possible to save the system log to the computer.



```

System Log
System Messages
1970-01-01 00:00:24 pppd[491]: rcvd [LCP DiscReq id=0x1 magic=0xd86e2fe9]
1970-01-01 00:00:24 pppd[491]: rcvd [CHAP Challenge id=0x1 000000000000000000000000, name = "UMTS_CHAP_SRVR"]
1970-01-01 00:00:24 pppd[491]: sent [CHAP Response id=0x1 0a97e9b259c6ef6788141219541b7b08, name = ""]
1970-01-01 00:00:24 pppd[491]: rcvd [LCP EchoRep id=0x0 magic=0xd86e2fe9 60 8d 8c 57]
1970-01-01 00:00:24 pppd[491]: rcvd [CHAP Success id=0x1 ""]
1970-01-01 00:00:24 pppd[491]: CHAP authentication succeeded
1970-01-01 00:00:24 last message repeated 1 time
1970-01-01 00:00:24 pppd[491]: sent [IPCP ConfReq id=0x1 addr 0.0.0.0 ms-dns1 0.0.0.0 ms-dns3 0.0.0.0]
1970-01-01 00:00:24 pppd[491]: rcvd [IPCP ConfReq id=0x0]
1970-01-01 00:00:24 pppd[491]: sent [IPCP ConfNak id=0x0 addr 192.168.254.254]
1970-01-01 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]
1970-01-01 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]
1970-01-01 00:00:24 pppd[491]: rcvd [IPCP ConfReq id=0x1]
1970-01-01 00:00:24 pppd[491]: sent [IPCP ConfAck id=0x1]
1970-01-01 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]
1970-01-01 00:00:24 dnsmasq[399]: reading /etc/resolv.conf
1970-01-01 00:00:24 dnsmasq[399]: using nameserver 62.141.0.2#53
1970-01-01 00:00:24 dnsmasq[399]: using nameserver 93.153.117.1#53
1970-01-01 00:00:24 pppd[491]: local IP address 10.169.109.133
1970-01-01 00:00:24 pppd[491]: remote IP address 192.168.254.254
1970-01-01 00:00:24 pppd[491]: primary DNS address 93.153.117.1
1970-01-01 00:00:24 pppd[491]: secondary DNS address 62.141.0.2
1970-01-01 00:00:24 pppd[491]: Script /etc/scripts/ip-up started (pid 495)
1970-01-01 00:00:25 pppd[491]: Script /etc/scripts/ip-up finished (pid 495), status = 0x0
1970-01-01 00:16:14 login[528]: root login on `tty0'
    
```

Save

Fig. 7: System log



The Syslog default size is 1000 lines. After completion of the 1000 lines will create new file for storing system log. After completion of the 1000 lines in the second file, the first file is deleted and creates a new one.

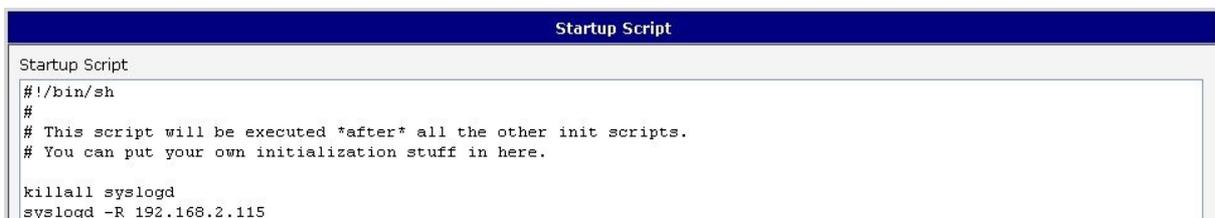


Program syslogd can be started with two options that modifies its behavior. Option "-s" followed by decimal number set maximal number of lines in one log file. Option "-r" followed by hostname or IP address enable logging to remote syslog daemon.

In the Linux must be enabled remote logging on the target computer. Typically running syslogd with the parameter "-r". On Windows must be installed the syslog server (for example Syslog Watcher).

For starting syslogd with these options you could modify script "/etc/init.d/syslog" or add lines "killall syslogd" and "syslogd <options> &" into Startup Script.

Example of logging into the remote daemon at 192.168.2.115



```

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

killall syslogd
syslogd -R 192.168.2.115
    
```

Fig. 8: Example program syslogd start with the parameter -r

1.8. LAN configuration

To enter the network configuration, select the **LAN** menu item. ETH network set in **Primary LAN** configuration, expansion PORT ETH set in **Secondary LAN** configuration.

Item	Description
DHCP Client	<ul style="list-style-type: none"> disabled – The router does not allow automatic allocation IP address from a DHCP server in LAN network. enabled – The router allows automatic allocation IP address from a DHCP server in LAN network.
IP address	Fixed set IP address of network interface ETH.
Subnet Mask	IP address of Subnet Mask.
Bridged	<ul style="list-style-type: none"> no – The router is not used as a bridge (default) yes – The router is used as a bridge
Media type	<ul style="list-style-type: none"> Auto-negation – The router selects the speed of communication of network options. 100 Mbps Full Duplex – The router communicates at 100Mbps, in the full duplex mode. 100 Mbps Half Duplex - The router communicates at 100Mbps, in the half duplex mode. 10 Mbps Full Duplex - The router communicates at 10Mbps, in the full duplex mode. 10 Mbps Half Duplex - The router communicates at 10Mbps, in the half duplex mode.
Default Gateway	IP address of Default gateway of router. When entering IP address of default gateway, all packets for which the record was not found in the routing table, sent to this address.
DNS server	IP address of DNS server of router. Address where they are forwarded to all DNS questions on the router.

Table 9: Configuration of network interface

There can be only one active bridge on the router at the moment. Only parameters *DHCP Client*, *IP address* and *Subnet Mask* can be used to configure bridge. Primary LAN has got higher priority in this respect when both interfaces (eth0, eth1) are added to the bridge. Other interfaces (wlan0 – wifi) can be added (or deleted) to (from) existing bridge at any moment. Moreover, the bridge can be created on demand of such interfaces but not configured by their respective parameters.

DHCP server assigns IP address, gateway IP address (IP address of the router) and IP address of the DNS server (IP address of the router) to the connected clients.

DHCP server supports static and dynamic assignment of IP addresses. Dynamic DHCP server assigns clients IP addresses from a defined address space. Static DHCP assigns IP addresses that correspond to the MAC addresses of connected clients.

Item	Description
Enable dynamic DHCP leases	If this option is checked, can enable a dynamic DHCP server.
IP Pool Start	Start IP addresses space to be allocated to the DHCP clients.
IP Pool End	End IP addresses space to be allocated to the DHCP clients.
Lease time	Time in seconds, after which the client can use IP address.

Table 10: Configuration of dynamic DHCP server

Item	Description
Enable static DHCP leases	If this option is checked, can enable a static DHCP server.
MAC Address	MAC address of a DHCP client.
IP Address	Assigned IP address.

Table 11: Configuration of static DHCP server



It is important not to overlap ranges of static allocated IP address with address allocated by the dynamic DHCP. Then risk collision of IP addresses and incorrect function of network.

Example of the network interface with dynamic DHCP server:

- The range of dynamic allocated addresses from 192.168.1.2 to 192.168.1.4.
- The address is allocated 600 second (10 minutes).

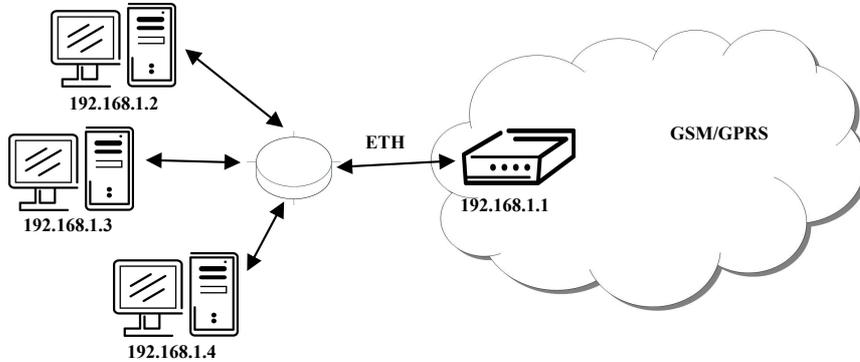


Fig. 9: Topology of example LAN configuration 1

LAN Configuration	
DHCP Client	Primary LAN: disabled Secondary LAN: disabled
IP Address	Primary LAN: 192.168.1.1 Secondary LAN:
Subnet Mask	Primary LAN: 255.255.255.0 Secondary LAN:
Bridged	Primary LAN: no Secondary LAN: no
Media Type	Primary LAN: auto-negotiation Secondary LAN: auto-negotiation
Default Gateway	
DNS Server	
<input checked="" type="checkbox"/> Enable dynamic DHCP leases	
IP Pool Start	192.168.1.2
IP Pool End	192.168.1.4
Lease Time	600 sec
<input type="checkbox"/> Enable static DHCP leases	
MAC Address	IP Address
<input type="button" value="Apply"/>	

Fig. 10: Example LAN configuration 1

Example of the network interface with dynamic and static DHCP server:

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

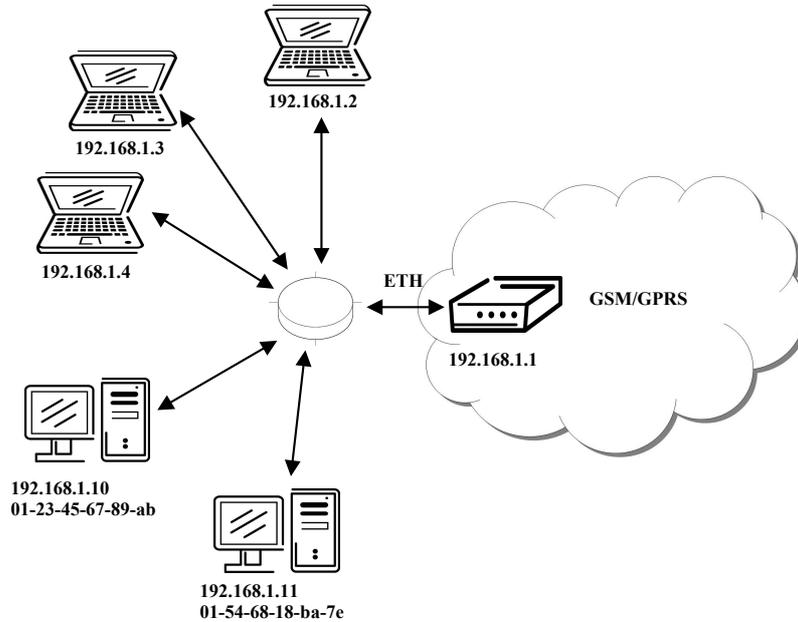


Fig. 11: Topology of example LAN configuration 2

LAN Configuration		
	Primary LAN	Secondary LAN
DHCP Client	disabled	disabled
IP Address	192.168.1.1	
Subnet Mask	255.255.255.0	
Bridged	no	no
Media Type	auto-negotiation	auto-negotiation
Default Gateway		
DNS Server		
<input checked="" type="checkbox"/> Enable dynamic DHCP leases		
IP Pool Start	192.168.1.2	
IP Pool End	192.168.1.4	
Lease Time	600	sec
<input checked="" type="checkbox"/> Enable static DHCP leases		
MAC Address	IP Address	
01:23:45:67:89:ab	192.168.1.10	
01:54:68:18:ba:7e	192.168.1.11	
<input type="button" value="Apply"/>		

Fig. 12: Example LAN configuration 2

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

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

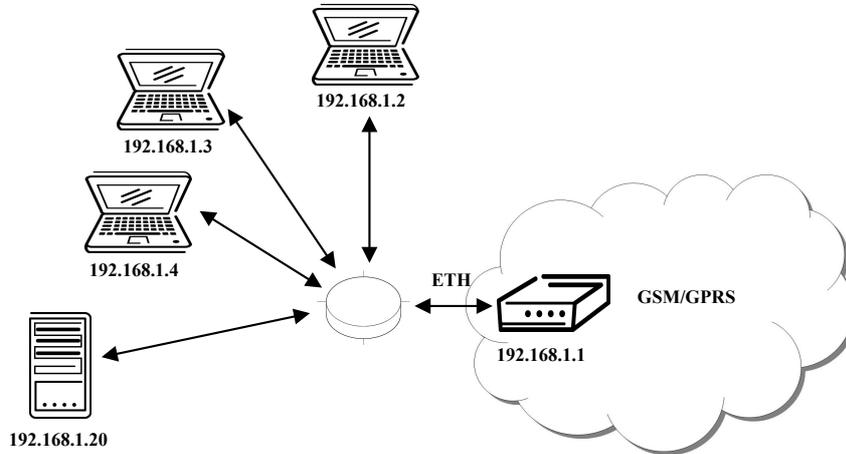


Fig. 13: Topology of example LAN configuration 3

LAN Configuration	
DHCP Client	Primary LAN: disabled Secondary LAN: disabled
IP Address	Primary LAN: 192.168.1.1 Secondary LAN:
Subnet Mask	Primary LAN: 255.255.255.0 Secondary LAN:
Bridged	Primary LAN: no Secondary LAN: no
Media Type	Primary LAN: auto-negotiation Secondary LAN: auto-negotiation
Default Gateway	192.168.1.20
DNS Server	192.168.1.20
<input checked="" type="checkbox"/> Enable dynamic DHCP leases	
IP Pool Start	192.168.1.2
IP Pool End	192.168.1.4
Lease Time	600 sec
<input type="checkbox"/> Enable static DHCP leases	
MAC Address	IP Address
<input type="text"/>	<input type="text"/>
<input type="button" value="Apply"/>	

Fig. 14: Example LAN configuration 3

1.9. VRRP configuration

To enter the VRRP configuration select the **VRRP** menu item. VRRP protocol (Virtual Router Redundancy Protocol) is a technique, by which it is possible to forward routing from main router to backup router in the case of the main router failure. If the **Enable VRRP** is checked, then it is possible to set the following parameters.

Item	Description
Virtual Server IP Address	This parameter sets virtual server IP address. This address should be the same for both routers. A connected device sends its data via this virtual address.
Virtual Server ID	Parameter <i>Virtual Server ID</i> distinguishes one virtual router on the network from others. Main and backup routers must use the same value for this parameter.
Host Priority	The router, with higher priority set by the parameter <i>Host Priority</i> , is the main router. According to RFC 2338 the main router has the highest possible priority - 255. The backup router has priority in range 1 – 254 (init value is 100). The priority value equals 0 is not allowed.

Table 12: VRRP configuration

It is possible to set **Check PPP connection** flag in the second part of the window. The currently active router (main/backup) will send testing messages to defined *Ping IP Address* at periodic time intervals (*Ping Interval*) with setting time of waiting for answer (*Ping Timeout*). The function check PPP connection is used as a supplement of VRRP standard with the same final result. If there are no answers from remote devices (*Ping IP Address*) for a defined number of probes (*Ping Probes*), then connection is switched to the other line.

Item	Description
Ping IP Address	Destinations IP address ping queries. Address can not specify as domain name.
Ping Interval	Time intervals between the outgoing pings.
Ping Timeout	Time to wait to answer.
Ping Probes	Number of failed ping requests, after which the route is considered to be impassable.

Table 13: Check PPP connection



Ping IP address is possible to use for example a DNS server of mobile operator as a test message (ping) IP address.

There's an additional way for evaluating the state of the active line. It is activated by selecting **Enable traffic monitoring** parameter. If this parameter is set and any packet different from ping is sent to the monitored line, then any answer to this packet is expected for *Ping Timeout*. If *Ping Timeout* expires with no answer received then process of testing the active line continues the same way like in the case of standard testing process after first test message answer drops out.

Example of the VRRP protocol:

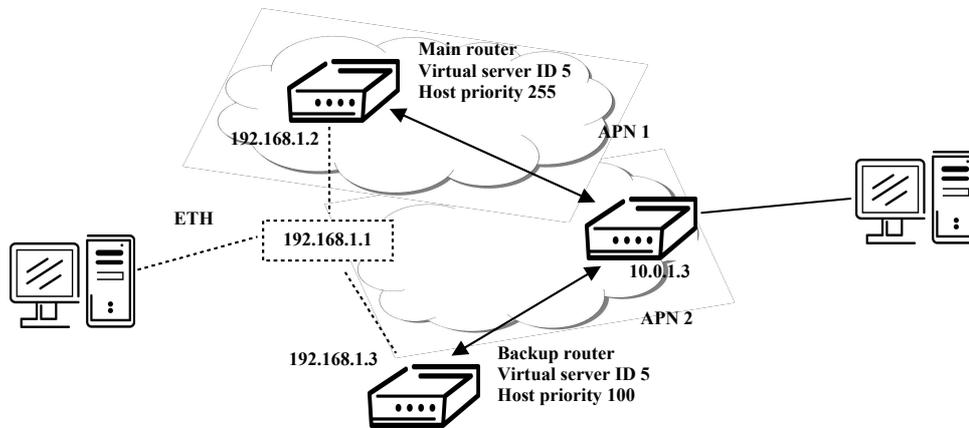


Fig. 15: Topology of example VRRP configuration

VRRP Configuration	
<input checked="" type="checkbox"/> Enable VRRP	
Virtual Server IP Address	192.168.1.1
Virtual Server ID	5
Host Priority	255
<hr/>	
<input checked="" type="checkbox"/> Check PPP connection	
Ping IP Address	10.0.1.3
Ping Interval	10 sec
Ping Timeout	5 sec
Ping Probes	10
<hr/>	
<input type="checkbox"/> Enable traffic monitoring	
<input type="button" value="Apply"/>	

Fig. 16: Example VRRP configuration – main router

VRRP Configuration	
<input checked="" type="checkbox"/> Enable VRRP	
Virtual Server IP Address	192.168.1.1
Virtual Server ID	5
Host Priority	100
<hr/>	
<input checked="" type="checkbox"/> Check PPP connection	
Ping IP Address	10.0.1.3
Ping Interval	10 sec
Ping Timeout	5 sec
Ping Probes	10
<hr/>	
<input type="checkbox"/> Enable traffic monitoring	
<input type="button" value="Apply"/>	

Fig. 17: Example VRRP configuration – backup router

1.10. UMTS/GPRS/CDMA configuration

To enter this configuration select the **UMTS/GPRS/CDMA** menu item.

1.10.1. Configuration of connection

If the **Create PPP connection** option is selected, the modem automatically tries to establish PPP connection after switching-on.

Item	Description
APN	Network identifier (Access Point Name) – Can't be set for the third SIM card!
Username	User name to log into the GSM network.
Password	Password to log into the GSM network.
Authentication	Authentication protocol in GSM network <ul style="list-style-type: none"> • 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.
IP Address	IP address of SIM card. The user sets the IP address, only in the case IP address was assigned of the operator.
Phone Number	Telephone number to dial GPRS or CSD connection. Router as a default telephone number used *99***1 #.
Operator	This item can be defined PLMN preferred carrier code
Network type	<ul style="list-style-type: none"> • Automatic selection – The router automatically selects a specific transmission method according to the availability of transmission technology. • Furthermore, according to the type of router - it is also possible to select a specific method of data transmission (GPRS, EDGE, UMTS ...). Can't be set for the third SIM card!
PIN	PIN parameter should be set only if it requires a SIM card router. SIM card is blocked in case of several bad attempts to enter the PIN.
MRU	Maximum Receiving Unit) – it is the identifier of the maximum size of packet, which is possible to receive in a given environment. Default value is 1500 bytes. Other settings may cause incorrect transmission of data.
MTU	(Maximum Transmission Unit) – it is the identifier of the maximum size of packet, which is possible to transfer in a given environment. Default value is 1500 bytes. Other settings may cause incorrect transmission of data.

Table 14: GPRS connection configuration



If the *IP address* field is not filled in, the operator automatically assigns the IP address when it is establishing the connection. If filled IP address supplied by the operator, router accelerate access to the network.



If the *APN* field is not filled in, the router automatically selects the APN by the IMSI code of the SIM card. If the PLMN (operator number format) is not in the list of APN, then default APN is "internet". The mobile operator defines APN.



Correct PIN must be filled. For SIM cards with two APN's there will be the same PIN for both APN's. Otherwise the SIM card can be blocked by false SIM PIN.

Items marked with an asterisk must be filled only if the information required by the operator.

In the case of a failed build a PPP connection is recommended to check the accuracy of entered data. Alternatively, try a different authentication method or network type.

1.10.2. DNS address configuration

The choice **Get DNS address from operator** is given for easier configuration on client side. If this field is filled in, then the router tries to get an IP address of primary and secondary DNS server from the operator automatically.

1.10.3. Check PPP connection configuration

If the **Check PPP connection** option is selected, it has active control of connection over PPP. The modem will automatically send the ping question to the selected domain name or IP address in periodic time intervals. If the PING failed, new ping be sent immediately. After three unsuccessfully pings on appropriate IP address the router terminates connection and tries to establish a new connection. It is possible to use, for example, the DNS server of a mobile operator as the ping IP address.

Item	Description
<i>Ping IP Address</i>	Destinations IP address or domain name of ping queries.
<i>Ping Interval</i>	Time intervals between the outgoing pings.

Table 15: Check PPP connection configuration

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



Attention! We recommend checking the PPP connection in case of uninterrupted running.

1.10.4. Data limit configuration

Item	Description
Data limit	With this parameter you can set the maximum expected amount of data transmitted (sent and received) over GPRS in one billing period (month).
Warning Threshold	Parameter <i>Warning Threshold</i> determine per cent of <i>Data Limit</i> in the range of 50% to 99%, which if is exceeded, then the router sends SMS in the form <i>Router has exceeded (value of Warning Threshold) o data limit.</i>
Accounting Start	Parameter sets the day of the month in which the billing cycle starts SIM card used. Start of the billing period defines the operator, which gives the SIM card. The router begin to count the transferred data since that day

Table 16: Data limit configuration



If the parameter *Switch to _____ when data limit is exceeded and switch to default SIM card when data limit isn't exceeded* (see next) or *Send SMS when datalimit is exceeded* (see SMS configuration) are not selected the data limit will not count.

1.10.5. Switch between SIM cards configuration

At the bottom of configuration it is possible to set rules for switching between three SIM cards (or between APNs). The third SIM card is used for CDMA and remaining SIM cards are standard for UMTS (for more information about both technologies in conjunction with this router can be found in the user's guide).

Item	Description
Default SIM card	This parameter sets default APN or SIM card, from which it will try to establish the PPP connection. If this parameter is set to <i>none</i> , the router launches in off-line mode and it is necessary to establish PPP connection via SMS message.

Table 17: Default SIM card configuration

Item	Description
Switch to other SIM card when connection fails	If PPP connection fails, then this parameter ensures switch to backup SIM card or APN of the SIM card. Failure of the PPP connection can occur in two ways. When I start the router, when three fails to establish a PPP connection. Or if it is checked Check the PPP connection, and is indicated by the loss of a PPP connection.
Switch to _____ when roaming is detected and switch to default SIM card when home network is detected	In case that the roaming is detected this parameter enables switching to selected SIM card or APN of the SIM card. If the home network is detected, this parameter enables switching back to default SIM card.
Switch to _____ when data limit is exceeded and switch to default SIM card when data limit isn't exceeded	This parameter enables switching to selected SIM card or APN of the SIM card, when the data limit of default APN is exceeded. This parameter also enables switching back to default SIM card, when data limit is not exceeded.
Switch to _____ when binary input is active switch to default SIM card when binary input isn't active	This parameter enables switching to selected SIM card or APN of the SIM card, when binary input 'bin0' is active. If binary input isn't active, this parameter enables switching back to default SIM card.
Switch to _____ when signal level drops below _____ -dBm (and is above _____ -dBm on target configuration) and switch to default SIM card when signal level is above _____ -dBm	This parameter enables switching to selected SIM card or APN of the SIM card, when the signal level drops below selected value (and is above selected value on target configuration). If the signal level is above <i>selected value</i> , this parameter enables switching back to default SIM card.
Switch to primary SIM card after timeout	This parameter defines the method, how the router will try to switch back to default SIM card or default APN.

Table 18: Switch between SIM card configurations

The following parameters define the time after which the router attempts to go back to the default SIM card or APN.

Item	Description
Initial timeout	The first attempt to switch back to the primary SIM card or APN shall be made for the time defined in the parameter Initial Timeout, range of this parameter is from 1 to 10000 minutes.
Subsequent Timeout	In an unsuccessful attempt to switch to default SIM card, the router on the second attempt to try for the time defined in the parameter Subsequent Timeout, range is from 1 to 10000 minutes.
Additive constants	Any further attempt to switch back to the primary SIM card or APN shall be made in time computed as the sum of the previous time trial and time defined in the parameter Additive constants range is 1-10000 minutes.

Table 19: Switch between SIM card configurations

Example: If parameter *Switch to primary SIM card after timeout* is checked and parameters are set as follows *Initial Timeout* – 60min. *Subsequent Timeout* – 30min a *Subsequent Timeout* - 20 min. The first attempt to switch the primary SIM card or APN shall be carried out after 60 minutes. Switched to a failed second attempt made after 30 minutes. Third after 50 minutes (30 +20). Fourth after 70 minutes (30 +20 +20).

1.10.6. PPPoE bridge mode configuration

If the *Enable PPPoE bridge mode* option selected, it 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. Allows you to create a PPPoE connection from the device behind router. For example from PC which is connected to ETH port router. There will be allot Ip address of SIM card to PC.

The changes in settings will apply after pressing the *Apply* button.

UMTS/GPRS/CDMA Configuration			
<input checked="" type="checkbox"/> Create PPP connection			
APN *	1st SIM card	2nd SIM card	3rd SIM card
Username *			orangefixedplus
Password *			orange
Authentication	PAP or CHAP	PAP or CHAP	PAP or CHAP
IP Address *			
Phone Number *			
Operator *			
Network Type	GPRS/EDGE	UMTS/HSPA	automatic selection
PIN *	4430		4784
MRU	1500	1500	1500 bytes
MTU	1500	1500	1500 bytes
<input checked="" type="checkbox"/> Get DNS addresses from operator			
<input type="checkbox"/> Check PPP connection (necessary for uninterrupted operation)			
Ping IP Address			
Ping Interval			sec
<input type="checkbox"/> Enable traffic monitoring			
Data Limit			MB
Warning Threshold			%
Accounting Start	1		
Default SIM card	1st		
<input type="checkbox"/> Switch to other SIM card when connection fails			
<input type="checkbox"/> Switch to offline mode when roaming is detected and switch to default SIM card when home network is detected			
<input type="checkbox"/> Switch to offline mode when data limit is exceeded and switch to default SIM card when data limit isn't exceeded			
<input type="checkbox"/> Switch to offline mode when binary input is active and switch to default SIM card when binary input isn't active			
<input checked="" type="checkbox"/> Switch to 3rd SIM card when signal level drops below 92 -dBm (and is above 80 -dBm on target configuration) and switch to default SIM card when signal level is above 90 -dBm			
<input checked="" type="checkbox"/> Switch to default SIM card after timeout			
Initial Timeout	60		min
Subsequent Timeout *			min
Additive Constant *			min
<input type="checkbox"/> Enable PPPoE bridge mode * can be blank			
<input type="button" value="Apply"/>			

Fig. 18: UMTS/GPRS/ configuration

Example of setting controls the PPP connection to the address 8.8.8.8 in the time interval of 60s for primary SIM card and to the address www.google.com in the time interval 80s for secondary SIM card. In the case of traffic on the PPP control pings are not sent, but the traffic on PPP is observed:

<input checked="" type="checkbox"/> Check PPP connection (<i>necessary for uninterrupted operation</i>)		
Ping IP Address	<input type="text" value="8.8.8.8"/>	<input type="text" value="www.google.com"/>
Ping Interval	<input type="text" value="60"/>	<input type="text" value="80"/> sec
<input checked="" type="checkbox"/> Enable traffic monitoring		

Fig. 19: Example of configuration 1

Example of switching to a backup SIM card after exceeding the data limits of 800MB Sending SMS warning when reaching 400MB. With the beginning billing day of the 1st of the month:

Data Limit	<input type="text" value="800"/>	MB
Warning Threshold	<input type="text" value="50"/>	%
Accounting Start	<input type="text" value="1"/>	
Default SIM card	<input type="text" value="1st"/>	
<input type="checkbox"/> Switch to other SIM card when connection fails		
<input type="checkbox"/> Switch to <input type="text" value="offline mode"/> when roaming is detected and switch to default SIM card when home network is detected		
<input checked="" type="checkbox"/> Switch to <input type="text" value="3rd SIM card"/> when data limit is exceeded and switch to default SIM card when data limit isn't exceeded		
<input type="checkbox"/> Switch to <input type="text" value="offline mode"/> when binary input is active and switch to default SIM card when binary input isn't active		
<input type="checkbox"/> Switch to <input type="text" value="offline mode"/> when signal level drops below <input type="text"/> -dBm (and is above <input type="text"/> -dBm on target configuration) and switch to default SIM card when signal level is above <input type="text"/> -dBm		
<input type="checkbox"/> Switch to default SIM card after timeout		
Initial Timeout	<input type="text" value="60"/>	min
Subsequent Timeout *	<input type="text"/>	min
Additive Constant *	<input type="text"/>	min

Fig. 20: Example of configuration 2

Example: Primary SIM card switch to offline modes, after router detection roaming. The first attempt to switch back to the default SIM card is done after 60 minutes, the second after 40 minutes, the third after 50 minutes (40 +10)...

Default SIM card	<input type="text" value="1st"/>	
<input type="checkbox"/> Switch to other SIM card when connection fails		
<input checked="" type="checkbox"/> Switch to <input type="text" value="offline mode"/> when roaming is detected and switch to default SIM card when home network is detected		
<input type="checkbox"/> Switch to <input type="text" value="offline mode"/> when data limit is exceeded and switch to default SIM card when data limit isn't exceeded		
<input type="checkbox"/> Switch to <input type="text" value="offline mode"/> when binary input is active and switch to default SIM card when binary input isn't active		
<input type="checkbox"/> Switch to <input type="text" value="offline mode"/> when signal level drops below <input type="text"/> -dBm (and is above <input type="text"/> -dBm on target configuration) and switch to default SIM card when signal level is above <input type="text"/> -dBm		
<input checked="" type="checkbox"/> Switch to default SIM card after timeout		
Initial Timeout	<input type="text" value="60"/>	min
Subsequent Timeout *	<input type="text" value="40"/>	min
Additive Constant *	<input type="text" value="10"/>	min

Fig. 21: Example of configuration 3

1.11. PPPoE configuration

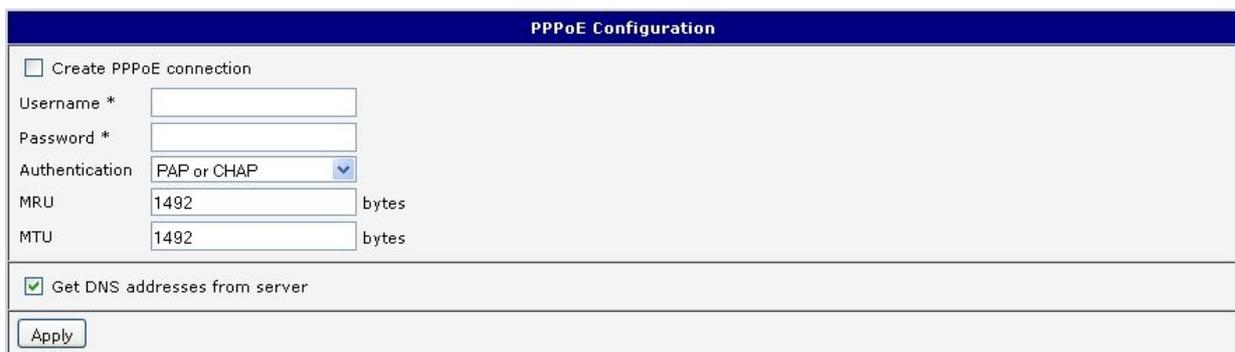


PPPoE for industrial router works in client mode. Router using connection to the PPPoE server or PPPoE bridge (for example ADSL modem).

To enter the PPPoE configuration select the **PPPoE** menu item. If the *Create PPPoE connection* option is selected, the router tries to establish PPPoE connection after switching-on. PPPoE (Point-to-Point over Ethernet) is a network protocol, which PPP frames encapsulating to the Ethernet frames. PPPoE client to connect devices that support PPPoE bridge or a server (typically ADSL router). After connecting the router obtains the IP address of the device to which it is connected. All communications from the device behind the PPPoE server is forwarded to industrial router.

Item	Description
Username	Username for secure access to PPPoE
Password	Password for secure access to PPPoE
Authentication	Authentication protocol in GSM network <ul style="list-style-type: none"> • 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) – it is the identifier of the maximum size of packet, which is possible to receive in given environment. Default value is set to 1492 bytes. Other settings may cause incorrect data transmission.
MTU	(Maximum Transmission Unit) – it is the identifier of the maximum size of packet, which is possible to transfer in given environment. Default value is set to 1492 bytes. Other settings may cause incorrect data transmission.

Table 20: PPPoE configuration



The screenshot shows the 'PPPoE Configuration' web interface. At the top, there is a blue header with the title 'PPPoE Configuration'. Below the header, there is a checkbox labeled 'Create PPPoE connection'. Underneath, there are several input fields: 'Username *' and 'Password *' are text boxes; 'Authentication' is a dropdown menu currently set to 'PAP or CHAP'; 'MRU' and 'MTU' are text boxes with '1492' entered, followed by the unit 'bytes'. At the bottom, there is a checked checkbox labeled 'Get DNS addresses from server' and an 'Apply' button.

Fig. 22: PPPoE configuration

1.12. Firewall configuration

By the help of a firewall it is possible to set IP addresses from which are possible to remotely access the router and internal network connected behind a router. The choice **Allow remote access only from specified hosts** is given for easier configuration of hosts. In this firewall configuration it is possible to set up to four remote accesses by the help of *Source*, *Source IP Address*, *Protocol* and *Target Port*.

Item	Description
Source	<ul style="list-style-type: none"> • single address - access allowed a single IP address defined in the Source IP Address • any address – allowed access to any IP address
Source IP address	IP address from which it is allowed to access the router.
Protocol	Specify protocol for remote access <ul style="list-style-type: none"> • 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 it is allowed to access the router.

Table 21: Firewall configuration



Caution! Firewall doesn't filter via Ethernet.

Example of the firewall configuration:

The router has allowed the following access:

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

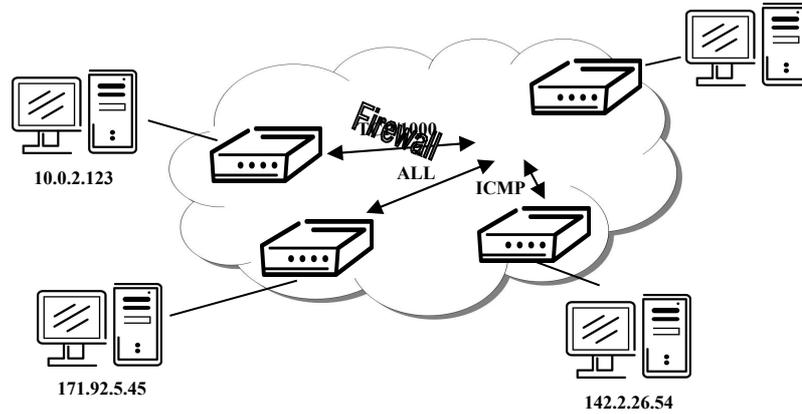


Fig. 23: Topology of example firewall configuration

Firewall Configuration			
<input checked="" type="checkbox"/> Allow remote access only from specified 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	
* can be blank			
<input type="button" value="Apply"/>			

Fig. 24: Example firewall configuration

1.13. NAT configuration

To enter the Network Address Translation configuration, select the **NAT** menu item. NAT (Network address Translation / Port address Translation - PAT) is a method of adjusting the network traffic through the router default transcript and/or destination IP addresses often change the number of TCP/UDP port for walk-through IP packets. The window contains sixteen entries for the definition of NAT rules.

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

Table 22: NAT configuration

If necessary set more than sixteen rules for NAT rules, then is possible insert into start up script following script:

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

Concrete IP address [IPADDR] and ports numbers [PORT_PUBLIC] and [PORT1_PRIVATE] are filled up into square bracket.

The following items are used to set the routing of all incoming traffic from the PPP to the connected computer.

Item	Description
Send all incoming packets to default server	By checking this item and setting the <i>Default Server</i> item it is possible to put the router into the mode in which all incoming data from GPRS will be routed to the computer with the defined IP address.
Default Server	Send all incoming packets to this IP addresses.

Table 23: Configuration of send all incoming packets

Enable the following options and enter the port number is allowed remote access to the router from PPP interface.

Item	Description
<i>Enable remote HTTP access on port</i>	If this item field and port number is filled in, then configuration of the router over web interface is possible.
<i>Enable remote HTTPS access on port</i>	If this item field and port number is filled in, then configuration of the router over web interface is possible.
<i>Enable remote FTP access on port</i>	Choice this item and port number makes it possible to access over <i>FTP</i> .
<i>Enable remote SSH access on port</i>	Choice this item and port number makes it possible to access over <i>SSH</i> .
<i>Enable remote Telnet access on port</i>	Choice this item and port number makes it possible to access over <i>Telnet</i> .
<i>Enable remote SNMP access on port</i>	Choice this item and port number makes it possible to access to <i>SNMP</i> agent.
<i>Masquerade outgoing packets</i>	Choice <i>Masquerade</i> (alternative name for the NAT system) item option turns the system address translation <i>NAT</i> .

Table 24: Remote access configuration

In this configuration equipment wired behind the router defines the address *Server IP Address*. The router replies, while PING on address of SIM card. Access on web interface of the equipment behind the router is possible by the help of Port Forwarding, when behind IP address of SIM is indicating public port of equipment on which we want to come up. At demand on port 80 it is surveyed singles outer ports (Public port), there this port isn't defined, therefore at check selection Enable remote http access it automatically opens the web interface router. If this choice isn't selected and is selected volition Send all remaining incoming packets to the default server fulfill oneself connection on induction IP address. If it is not selected selection *Send all remaining incoming packets to default server* and *Default server IP address* then connection requests a failure.

1.14. OpenVPN tunnel configuration

OpenVPN tunnel configuration can be called up by option **OpenVPN** item in the menu. OpenVPN tunnel allows protected connection of two networks LAN to the one which looks like one homogenous. In the **OpenVPN Tunnels Configuration** window are two rows, each row for one configured OpenVPN tunnel.

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	Configuration OpenVPN tunnel.

Table 25: Overview OpenVPN tunnels

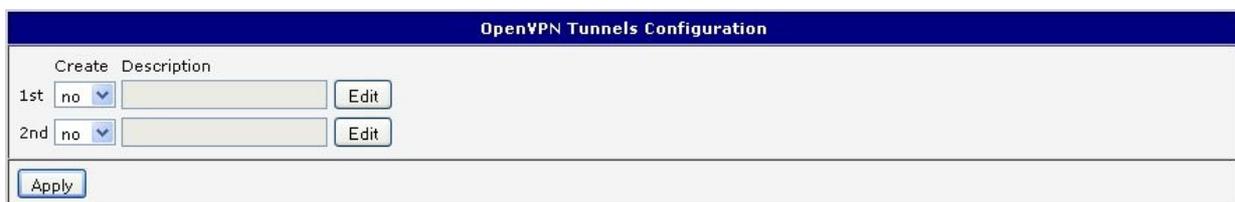


Fig. 29: OpenVPN tunnels configuration

Item	Description
Description	Description of tunnel.
Protocol	Protocol, by which the tunnel will communicate. <ul style="list-style-type: none"> • 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	By this parameter 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	This parameter defines the time period after which router sends a message to opposite side of tunnel, for check the existence of the tunnel.
Ping Timeout	<i>Ping Timeout</i> waits on message from off-side tunnel. For OpenVPN tunnel right verifies parameter <i>Ping Timeout</i> has to be bigger than <i>Ping Interval</i> .
Renegotiate Interval	This parameter sets renegotiate period (reauthorization) of the OpenVPN tunnel. This parameter is possible to set only at username/password authentication or at X.509 certificate using. After this time period, the router changes the encryption tunnel to ensure the continued safety of the tunnel.
Max Fragment Size	By parameter <i>Max Fragment Size</i> it is possible to define maximum sending packet size.
Compression	Sending data is possible compress <ul style="list-style-type: none"> • none – No compression is used. • LZO – Are used lossless LZO compressions. Compression has to be on both tunnel ends.
NAT Rules	By parameter NAT Rules it is possible to apply set NAT rules to OpenVPN tunnel. <ul style="list-style-type: none"> • not applied – NAT rules to OpenVPN is not applied. • applied – NAT rules to OpenVPN is applied.
Authenticate Mode	This parameter can be set authentication mode. <ul style="list-style-type: none"> • none – is used any authentication mode • Pre-shared secret – enables authentication using Pre-shared secret. This authentication set shared key for both off-side tunnel • 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 can be used in all offered authentication mode.
CA Certificate	This authentication certificate can be used in authentication mode Username/password and X.509 certificate.
DH Parameters	Protocol for exchange key 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

Password	used in the Authenticate Mode Username/Password.
Extra Options	By the help of parameter <i>Extra Options</i> it is possible to define additional parameters of the OpenVPN tunnel, for example DHCP options etc.

Table 26: OpenVPN configuration

The changes in settings will apply after pressing the *Apply* button.

OpenVPN Tunnel Configuration

Create 1st OpenVPN tunnel

Description *

Protocol

UDP port

Remote IP Address *

Remote Subnet *

Remote Subnet Mask *

Redirect Gateway

Local Interface IP Address

Remote Interface IP Address

Ping Interval * sec

Ping Timeout * sec

Renegotiate Interval * sec

Max Fragment Size * bytes

Compression

NAT Rules

Authenticate Mode

Pre-shared Secret

CA Certificate

DH Parameters

Local Certificate

Local Private Key

Username

Password

Extra Options *

* can be blank

Fig. 30: OpenVPN tunnel configuration

Example of the OpenVPN tunnel configuration:

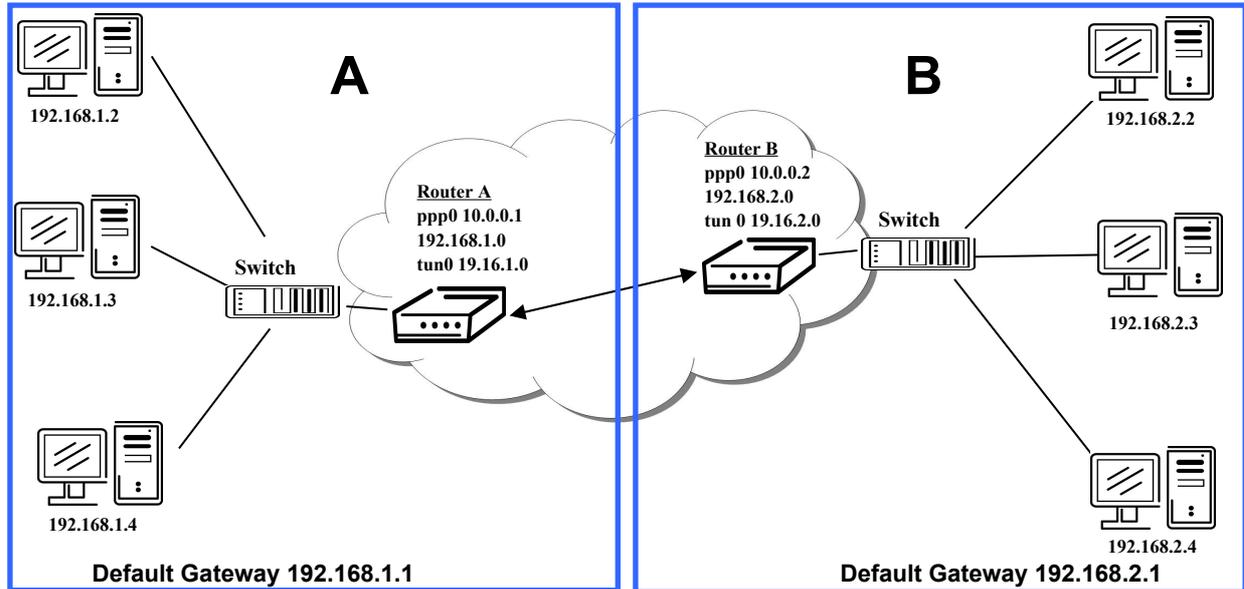


Fig. 31: Topology of example OpenVPN configuration

OpenVPN tunnel configuration:

Configuration	A	B
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

Table 27: Example OpenVPN configuration

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

1.15. IPsec tunnel configuration

IPsec tunnel configuration can be called up by option **IPsec** item in the menu. IPsec tunnel allows protected (encrypted) connection of two networks LAN to the one which looks like one homogenous. In the **IPsec Tunnels Configuration** window are four rows, each row for one configured one IPsec tunnel.

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	Configuration IPsec tunnel.

Table 28: Overview IPsec tunnels

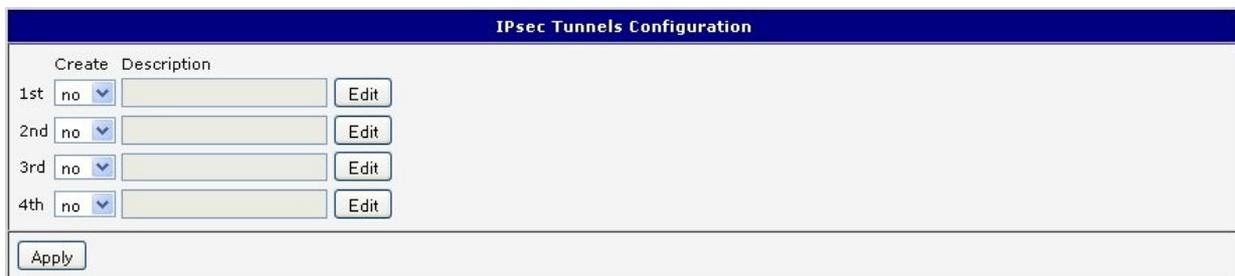


Fig. 32: IPsec tunnels configuration

Item	Description
Description	Description of tunnel.
Remote IP Address	IP address of opposite side tunnel. Can be used domain main.
Remote ID	Identification of opposite side tunnel. Parameters ID contain two parts: <i>hostname</i> and <i>domain-name</i> .
Remote Subnet	Address nets behind off - side tunnel
Remote Subnet Mask	Subnet mask behind off - side tunnel
Local ID	Identification of local side. Parameters ID contain two parts: <i>hostname</i> and <i>domain-name</i> .
Local Subnet	Local subnet address
Local subnet mask	Local subnet mask
Key Lifetime	Lifetime key data part of tunnel. The minimum value of this parameter is 60s. The maximum value is 86400 s.
IKE Lifetime	Lifetime key service part of tunnel. The minimum value of this parameter is 60s. The maximum value is 86400 s.
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 <i>DPD Timeout</i> is set timeout of the answer
NAT traversal	If address translation between two end points of the IPsec tunnel is used, it needs to allow NAT Traversal
Aggressive mode	If this parameter is enabled, establishing of IPsec tunnel will be faster, but encryption will set permanently on 3DES-MD5.

Authenticate Mode	Authentication is possible to set by parameter <i>Authenticate mode</i> , at choice are following possibilities: <ul style="list-style-type: none"> • Pre-shared key - shared key for both off-side tunnel. • X.509 Certificate -
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	By the help of this parameter it is possible to define additional parameters of the IPsec tunnel, for example secure parameters etc.

Table 29: IPsec tunnel configuration

 The certificates and private keys have to be in PEM format. As certificate it is possible to use only certificate which has start and stop tag certificate.

 Random time, after which it will re-exchange of new keys are defined:
*Lifetime - (Rekey margin + random value in range (from 0 to Rekey margin * Rekey Fuzz/100))*

By default, the repeated exchange of keys held in the time range:

- Minimal time: 1h - (9m + 9m) = 42m
- Maximal time: 1h - (9m + 0m) = 51m

When setting the times for key exchange is recommended to leave the default setting in which tunnel has guaranteed security. When set higher time, tunnel has smaller operating costs and smaller the safety. Conversely, reducing the time, tunnel has higher operating costs and higher safety of the tunnel.

The changes in settings will apply after pressing the *Apply* button.

IPsec Tunnel Configuration

Create 1st IPsec tunnel

Description *

Remote IP Address *

Remote ID *

Remote Subnet *

Remote Subnet Mask *

Local ID *

Local Subnet *

Local Subnet Mask *

Key Lifetime sec

IKE Lifetime sec

Rekey Margin sec

Rekey Fuzz %

DPD Delay * sec

DPD Timeout * sec

NAT Traversal ▾

Aggressive Mode ▾

Authenticate Mode ▾

Pre-shared Key

CA Certificate

Remote Certificate

Local Certificate

Local Private Key

Local Passphrase *

Extra Options *

* can be blank

Fig. 33: IPsec tunnel configuration

Example of the IPsec Tunnel configuration:

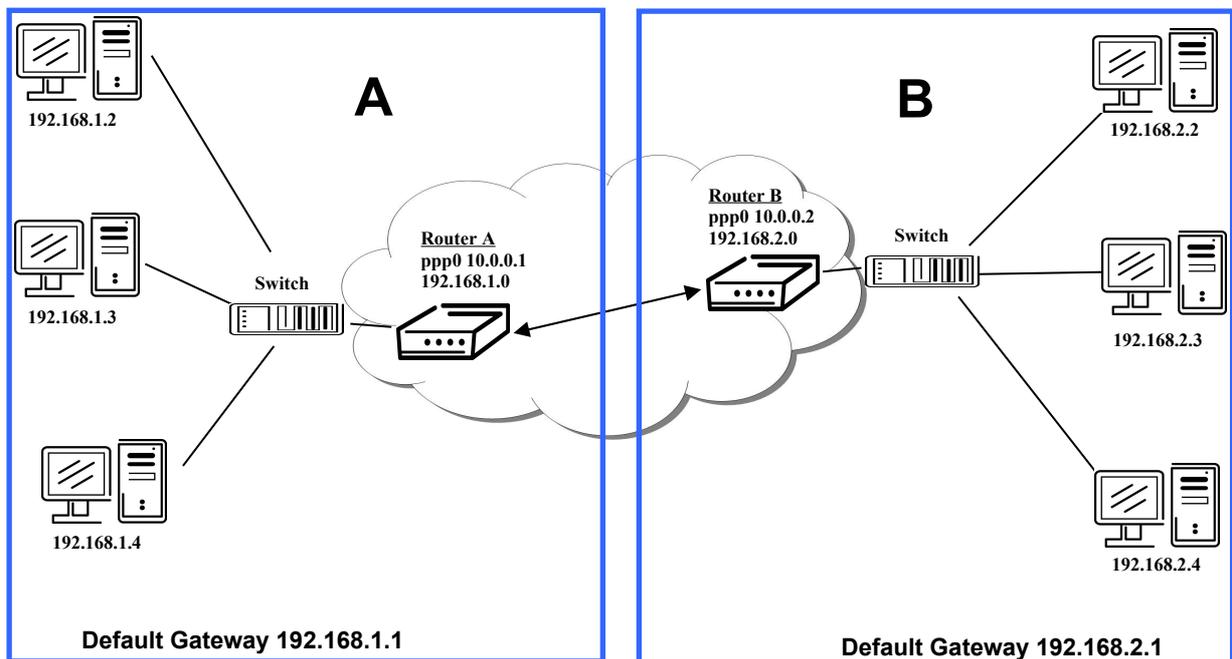


Fig. 34: Topology of example IPsec configuration

IPsec tunnel configuration:

Configuration	A	B
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 Mas:	255.255.255.0	255.255.255.0
Authenticate mode	pre-shared key	pre-shared key
Pre-shared key	test	test

Table 30: Example IPsec configuration

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

1.16. GRE tunnels configuration

To enter the GRE tunnels configuration, select the **GRE** menu item. The GRE tunnel is used for connection of two networks to one that appears as one homogenous. It is possible to configure up to four GRE tunnels. In the **GRE Tunnels Configuration** window are four rows, each row for one configured GRE tunnel.

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	Configuration GRE tunnel.

Table 31: Overview GRE tunnels

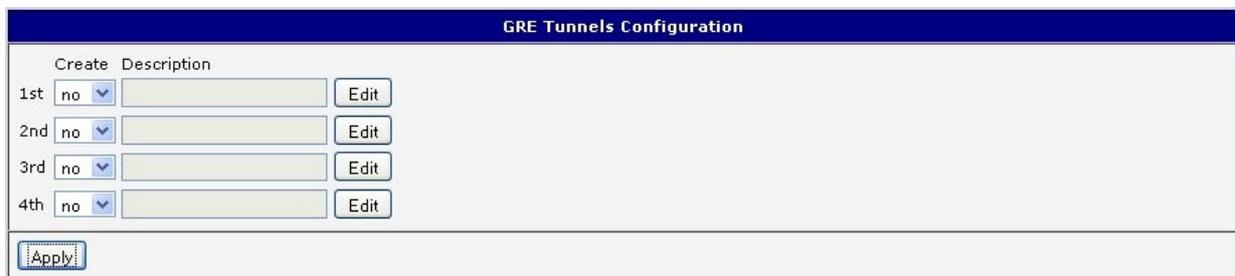


Fig. 35: GRE tunnels configuration

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	Mask of the network behind the remote side of the tunnel
Pre-shared Key	An optional value that defines the 32b shared key, through which the filtered data through the tunnel. This key must be defined on both routers as same, otherwise the router will drop received packets. Using this key, the data do not provide a tunnel through.

Table 32: GRE tunnel configuration



Attention, GRE tunnel doesn't connect itself via NAT.

The changes in settings will apply after pressing the *Apply* button.

GRE Tunnel Configuration

Create 1st GRE tunnel

Description *

Remote IP Address

Remote Subnet *

Remote Subnet Mask *

Local Interface IP Address *

Remote Interface IP Address *

Pre-shared Key *

* can be blank

Fig. 36: GRE tunnel configuration

Example of the GRE Tunnel configuration:

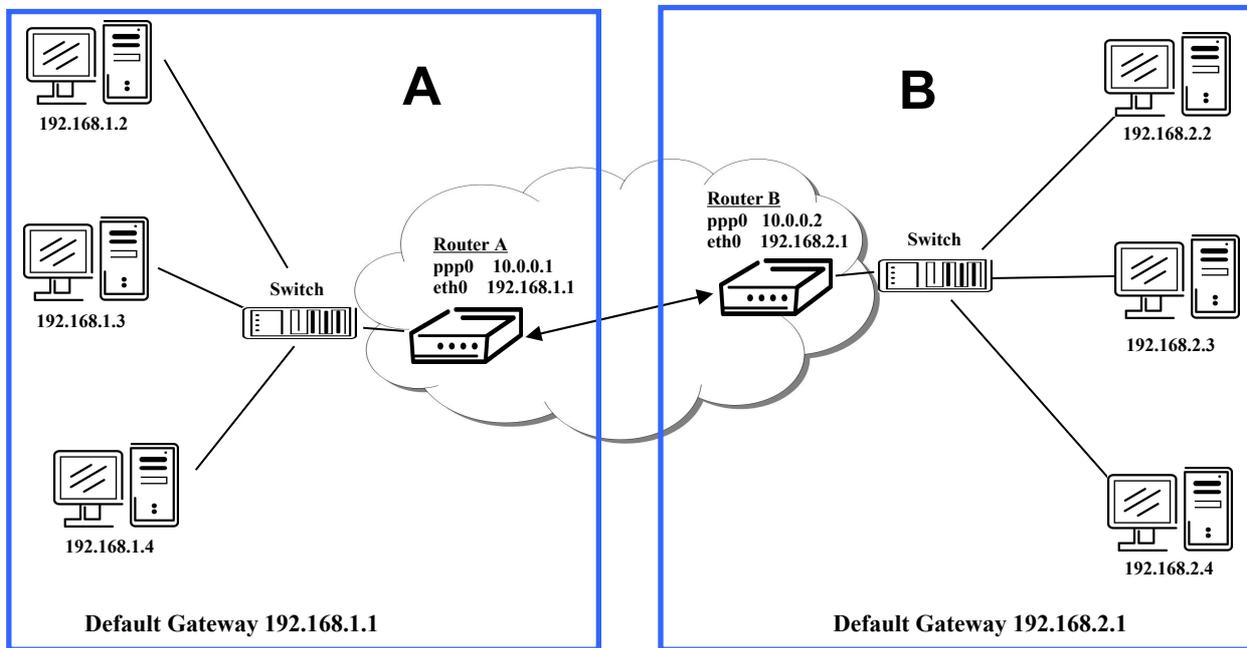


Fig. 37: Topology of GRE tunnel configuration

GRE tunnel Configuration:

Konfigurace	A	B
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

Table 33: Example GRE tunnel configuration

1.17. L2TP tunnel configuration

To enter the L2TP tunnels configuration, select the **L2TP** menu item. L2TP tunnel allows protected connection by password of two networks LAN to the one which it looks like one homogenous. The tunnels are active after selecting **Create L2TP tunnel**.

Item	Description
Mode	L2TP tunnel mode on the router side <ul style="list-style-type: none"> • L2TP server - in the case of a server must define the start and end IP address range offered by the server • L2TP client – in case of client must define 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

Table 34: L2TP tunnel configuration

The changes in settings will apply after pressing the *Apply* button.

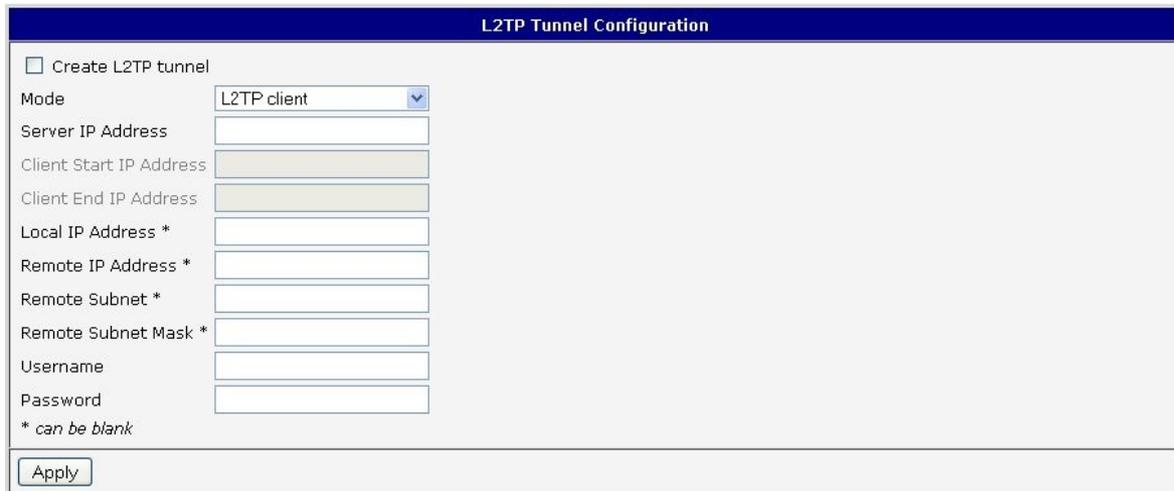


Fig. 38: L2TP tunnel configuration

Example of the L2TP Tunnel configuration:

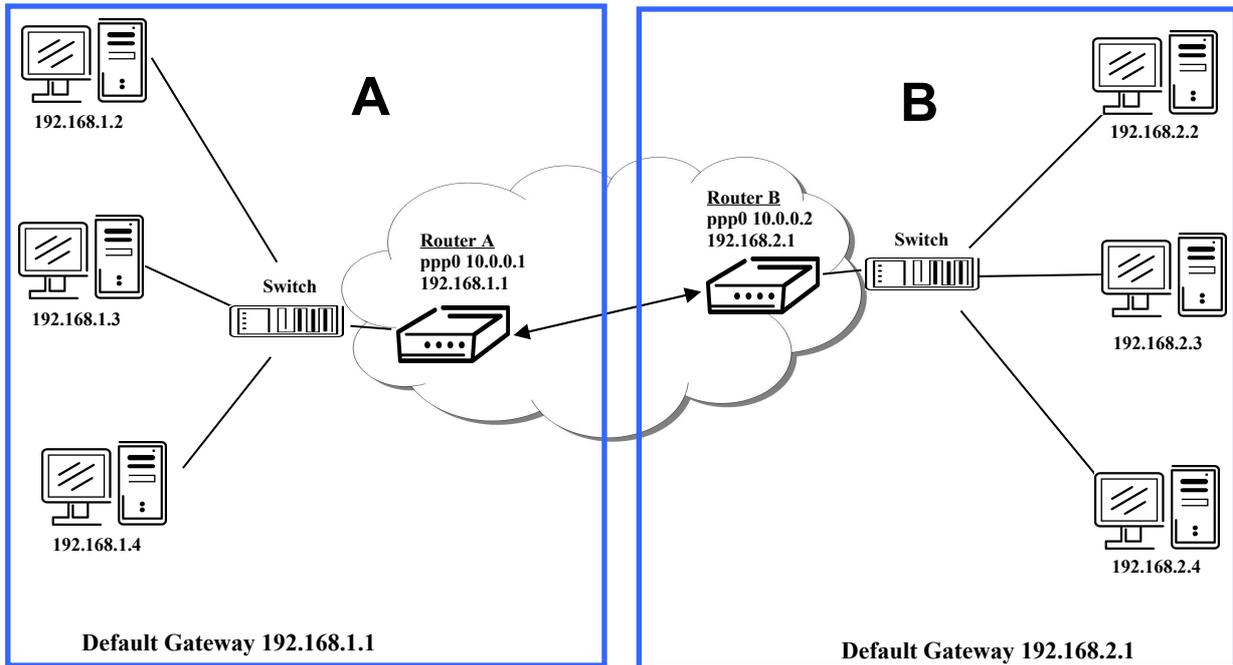


Fig. 39: Topology of example L2TP tunnel configuration

Configuration of the L2TP tunnel:

Konfigurace	A	B
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

Table 35: Example L2TP tunnel configuration

1.18. PPTP tunnel configuration

To enter the PPTP tunnels configuration, select the **PPTP** menu item. PPTP tunnel allows protected connection by password of two networks LAN to the one which it looks like one homogenous. It is a similar method of VPN execution as L2TP. The tunnels are active after selecting **Create PPTP tunnel**.

Item	Description
Mode	PPTP tunnel mode on the router side <ul style="list-style-type: none"> • PPTP server - in the case of a server must define the start and end IP address range offered by the server • PPTP client – in case of client must define 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

Table 36: PPTP tunnel configuration

The changes in settings will apply after pressing the *Apply* button.

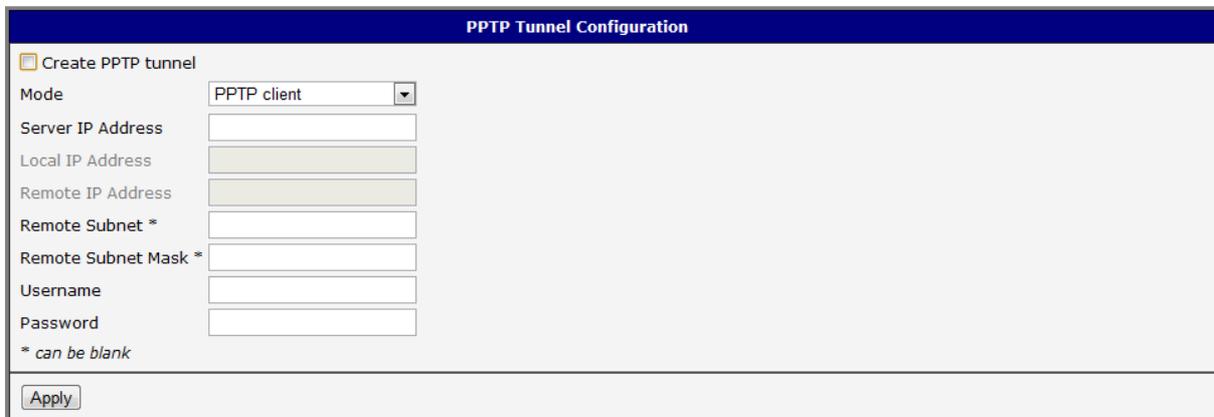


Fig. 40: PPTP tunnel configuration

Example of the PPTP Tunnel configuration:

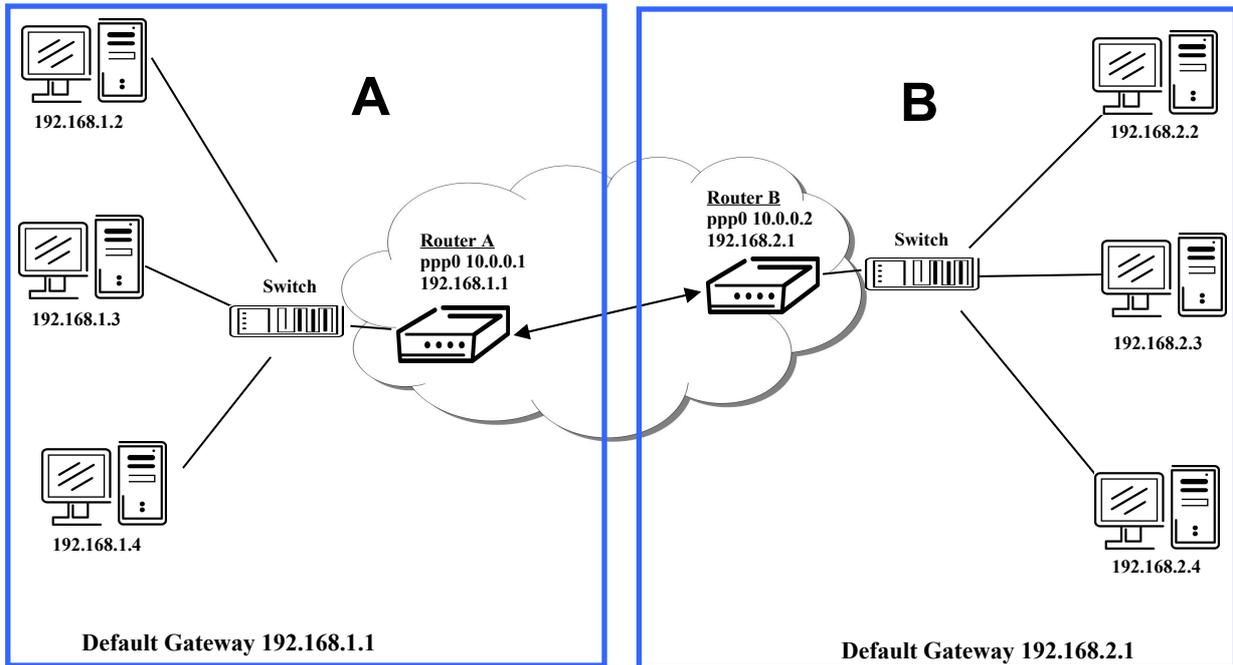


Fig. 41: Topology of example PPTP tunnel configuration

Configuration of the PPTP tunnel:

Konfigurace	A	B
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 37: Example PPTP tunnel configuration

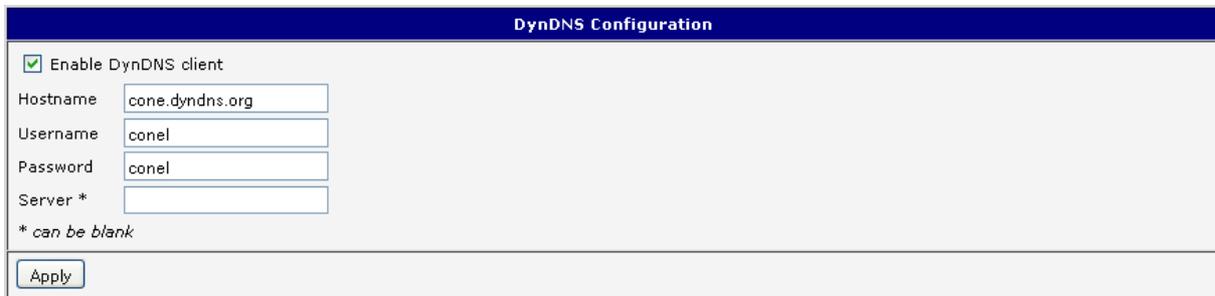
1.19. DynDNS client configuration

DynDNS client Configuration can be called up by option **DynDNS** item in the menu. In the window can be defined a third order domain registered on server www.dyndns.org

Item	Description
Hostname	Third order domain registered on server www.dyndns.org
Username	Username for login to DynDNS server
Password	Password for login to DynDNS server
Server	If you want to use another DynDNS service than www.dyndns.org , then enter the update server service to this item. If this item is left blank, it uses the default server members.dyndns.org .

Table 38: DynDNS configuration

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



The screenshot shows a window titled "DynDNS Configuration". It contains the following elements:

- A checked checkbox labeled "Enable DynDNS client".
- A "Hostname" field containing the text "conel.dyndns.org".
- A "Username" field containing the text "conel".
- A "Password" field containing the text "conel".
- A "Server *" field which is currently empty.
- A note below the fields: "* can be blank".
- An "Apply" button at the bottom left.

Fig. 42: Example of DynDNS configuration

1.20. NTP client configuration

NTP client Configuration can be called up by option **NTP** item in the menu. NTP (Network Time Protocol) allows set the exact time to the router from the servers, which provide the exact time on the network.

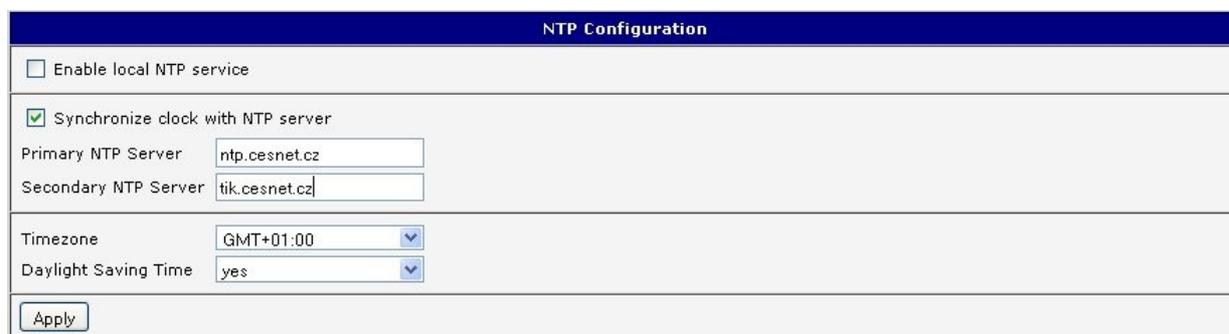
By parameter **Enable local NTP service** router is set to a mode in which it operates as an NTP server for other devices in the LAN behind the router.

By parameter **Enable local NTP service** it is possible to set the router in mode, that it can serve as NTP server for other devices.

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	By this parameter it is possible to set the time zone of the router
Daylight Saving Time	By this parameter is possible to define time shift: <ul style="list-style-type: none"> No - time shift is disabled Yes - time shift is allowed

Table 39: NTP configuration

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



The screenshot shows the 'NTP Configuration' web interface. It features a blue header with the title 'NTP Configuration'. Below the header, there are several configuration options:

- 'Enable local NTP service' is unchecked.
- 'Synchronize clock with NTP server' is checked.
- 'Primary NTP Server' is set to 'ntp.cesnet.cz' in a text input field.
- 'Secondary NTP Server' is set to 'tik.cesnet.cz' in a text input field.
- 'Timezone' is set to 'GMT+01:00' in a dropdown menu.
- 'Daylight Saving Time' is set to 'yes' in a dropdown menu.

At the bottom left, there is an 'Apply' button.

Fig. 43: Example of NTP configuration

1.21. SNMP configuration

To enter the **SNMP** Configuration it is possible with SNMP agent ver.1 configuration which sends information about the router, eventually about the status of the expansion port CNT or M-BUS.

SNMP (Simple Network Management Protocol) provides status information about network elements such as routers or end computers.

Item	Description
Community	Password for access to the SNMP agent.
Contact	Person who manages the router together with information how to contact this person.
Name	Designation of the router.
Location	Placing of the router.

Table 40: SNMP configuration

By choosing **Enable I/O extension** it is possible to monitor binary inputs I/O on the router.

By choosing **Enable XC-CNT extension** it is possible to monitor the expansion port CNT inputs and outputs status.

By choosing **Enable M-BUS extension** and enter the *Baudrate*, *Parity* and *Stop Bits* it is possible to monitor the meter status connected to the expansion port M-BUS status.

Item	Description
Baudrate	Communication speed.
Parity	Control parity bit: <ul style="list-style-type: none"> • 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 bit.

Table 41: SNMP configuration



Parameters *Enable XC-CNT extension* and *Enable M-BUS extension* can not be checked together.

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

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

Table 42: SNMP configuration

Every monitor value is uniquely identified by the help of number identifier **OID** - *Object Identifier*. For binary input and output the following range of OID is used:

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

Table 43: Object identifier for binary input and output

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

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)

Table 44: Object identifier for CNT port

For the expansion port M-BUS the following range of OID is used:

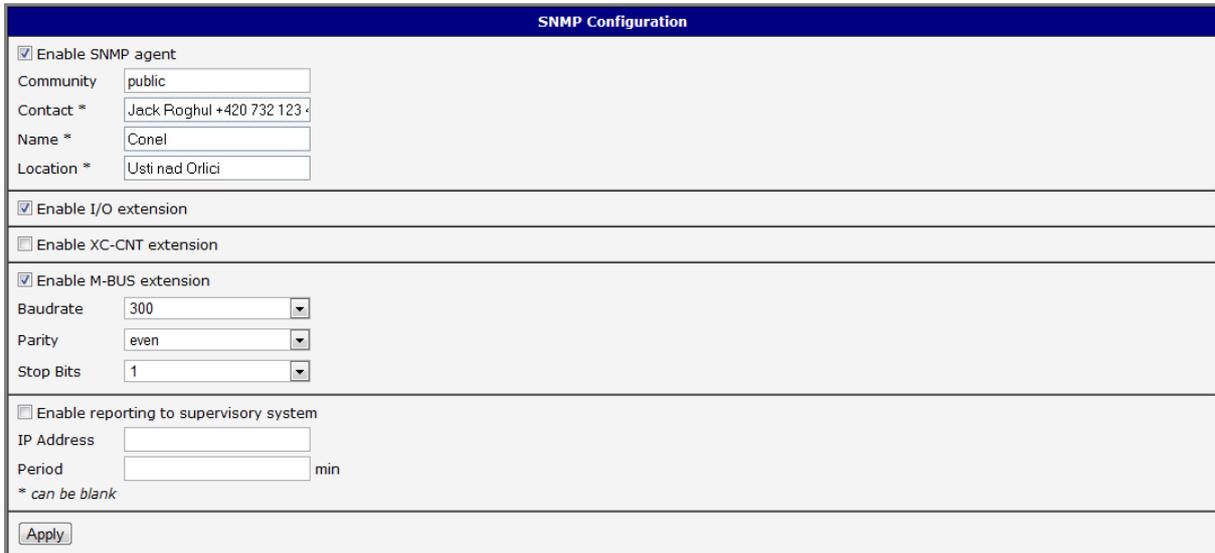
OID	Description
.1.3.6.1.4.1.30140.2.2.<address>.1.0	IdNumber – meter number
.1.3.6.1.4.1.30140.2.2.<address>.2.0	Manufacturer
.1.3.6.1.4.1.30140.2.2.<address>.3.0	Version – specified meter version
.1.3.6.1.4.1.30140.2.2.<address>.4.0	Medium – type of metered medium
.1.3.6.1.4.1.30140.2.2.<address>.5.0	Status – errors report
.1.3.6.1.4.1.30140.2.2.<address>.6.0	0. VIF – value information field
.1.3.6.1.4.1.30140.2.2.<address>.7.0	0. measured value
.1.3.6.1.4.1.30140.2.2.<address>.8.0	1. VIF – value information field
.1.3.6.1.4.1.30140.2.2.<address>.9.0	1. measured value
...	
.1.3.6.1.4.1.30140.2.2.<address>.100.0	47. VIF – value information field
.1.3.6.1.4.1.30140.2.2.<address>.101.0	47. measured value

Table 45: 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 internal temperature of 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

Community: public

Contact *: Jack Roghul +420 732 123 4

Name *: Conel

Location *: Usti nad Orlici

Enable I/O extension

Enable XC-CNT extension

Enable M-BUS extension

Baudrate: 300

Parity: even

Stop Bits: 1

Enable reporting to supervisory system

IP Address:

Period: min

* can be blank

Apply

Fig. 44: Example of SNMP configuration

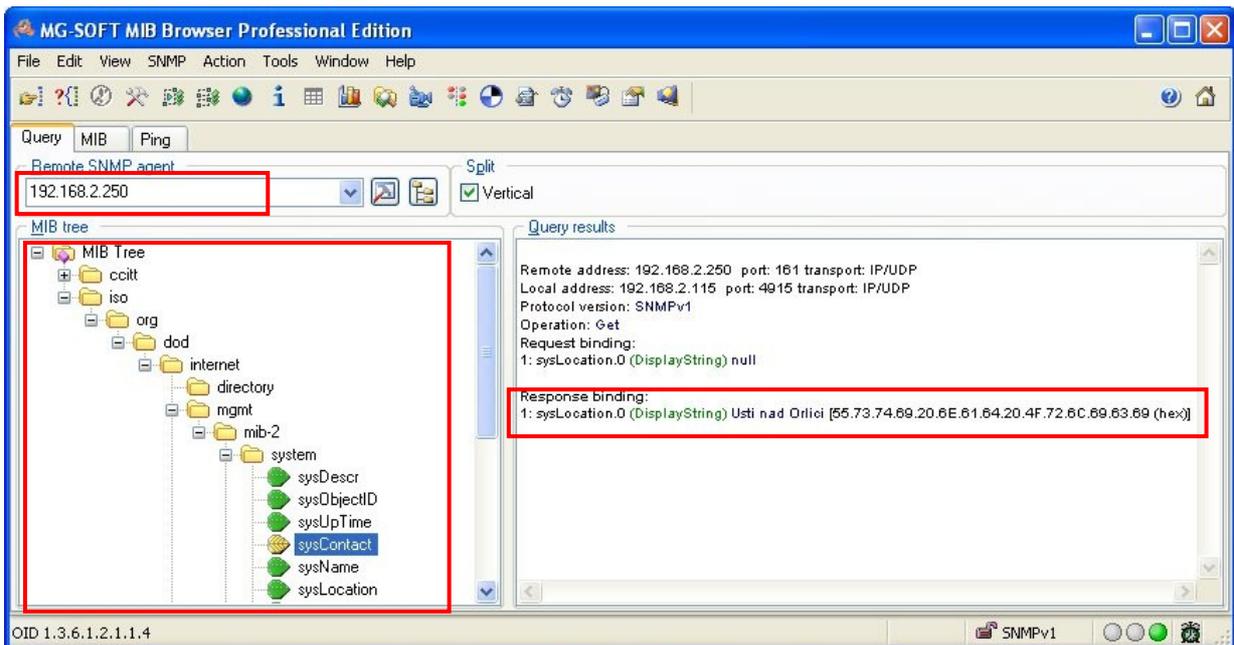


Fig. 45: Example of the MIB browser

It is important to set the IP address of the SNMP agent (router) in field *Remote SNMP agent*. After enter the IP address is in a *MIB tree* part is possible show object identifier.

The path to objects is:

iso->org->dod->internet->private->enterprises->conel->protocols.

The path to information about router is:

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

1.22. SMTP configuration

To enter the **SMTP** it is possible configure SMTP (Simple Mail Transfer Protocol) client, which is set by sending emails.

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.

Fig. 46: SMTP client configuration



Mobile operator can block other SMTP servers, then you can use only the SMTP server of operator.

Example settings SMTP client:

SMTP Configuration

SMTP Server Address	<input type="text" value="smtp.domain.com"/>
Username	<input type="text" value="name@domain.com"/>
Password	<input type="text" value="pass"/>
Own Email Address	<input type="text" value="name@domain.com"/>

Fig. 47: SMTP configuration

E-mail can be send from the Startup script. This command is used to email 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 e-mail to address *jack@google.com* with the subject "subject", body message "message" and annex "abc.doc" right from the directory *c:\directory* and 5 attempts to send.

1.23. SMS configuration

SMS Configuration can be called up by option **SMS** item in the menu. SMS configuration defines the options for sending SMS messages from the router at different defined events and states of the router. In the first part of window it configuration send SMS.

Item	Description
Send SMS on power up	Automatic sending of SMS messages after power up
Send SMS on PPP connect	Automatic sending SMS message after PPP connection.
Send SMS on PPP disconnect	Automatic sending SMS message after PPP disconnection.
Send SMS when datalimit exceeded	Automatic sending SMS message after datalimit exceeded.
Send SMS when binary input on I/O port (BIN0) is active	Automatic sending SMS message after binary input on I/O port (BIN0) is active. Text of message is intended parameter BIN0.
Send SMS when binary input on expansion port (BIN1-BIN4) is active	Automatic sending SMS message after binary input on expansion port (BIN1-BIN4) is active. Text of message is intended parameter BIN1 - BIN4.
Add timestamp to SMS	Adds time stamp to sent SMS messages. This stamp has a fixed format YYYY-MM-DD hh:mm:ss.
Phone Number 1	Telephone numbers for sending automatically generated SMS.
Phone Number 2	
Phone Number 3	
Unit ID	The name of the router that will be sent in an SMS.
BIN0 - SMS	SMS text messages when activate the binary input on the router.
BIN1 - SMS	SMS text messages when activate the binary input on the expansion port.
BIN2 - SMS	SMS text messages when activate the binary input on the router.
BIN3 - SMS	SMS text messages when activate the binary input on the router.
BIN4 - SMS	SMS text messages when activate the binary input on the router.

Table 46: Send SMS configuration

In the second part of the window it is possible to set function **Enable remote control via SMS**. After this it is possible to establish and close PPP connection by SMS message.

Item	Description
Phone Number 1	This control can be configured for up to three numbers. If is set <i>Enable remote control via SMS</i> , all incoming SMS are processed and deleted. In the default settings this parameter is turned on.
Phone Number 2	
Phone Number 3	

Table 47: Control via SMS configuration

If no phone number is filled in, then it is possible to restart the router with the help of SMS in the form of Reboot from any phone number. While filling of one, two or three numbers it is possible to control the router with the help of an SMS sent only from these numbers. While filling of sign "*" it is possible control the router with the help of an SMS sent from every numbers.





Control SMS message doesn't change the router configuration. If the router is switched to offline mode by the SMS message the router will be in this mode up to next restart. This behavior is the same for all control SMS messages.

It is possible to send controls SMS in the form:

SMS	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	PPP connection termination
set out0=0	Set output I/O connector on 0
set out0=1	Set output I/O connector on 1
set out1=0	Set output expansion port XC-CNT on 0
set out1=1	Set output expansion port XC-CNT on 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 send answer with IP address SIM card

Table 48: Control SMS

By choosing **Enable AT-SMS protocol on expansion port 1** and *Baudrate* it is possible to send/receive an SMS on the serial Port 1.

Item	Description
Baudrate	Communication speed expansion port 1

Table 49: Send SMS on serial PORT1 configuration

By choosing **Enable AT-SMS protocol on expansion port 2** and *Baudrate* it is possible to send/receive an SMS on the serial Port 2.

Item	Description
Baudrate	Communication speed expansion port 1

Table 50: Send SMS on serial PORT1 configuration

By choosing **Enable AT-SMS protocol on TCP port** and enter the *TCP port* it is possible to send/receive an SMS on the TCP port. SMS messages are sent by the help of a standard AT commands.

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

Table 51: Send SMS on ethernet PORT1 configuration

1.23.1. Send SMS

After establishing connection with the router via serial interface or Ethernet, it is possible to use AT commands for work with SMS messages.



The following table only lists the commands that are supported by Conel's routers. For other AT commands is always sent **OK** response. There is no support for treatment of complex AT commands, so in such a case router sends **ERROR** response.

AT Command	Description
AT+CGMI	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 centre (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

Table 52: List of AT commands



A detailed description and examples of these AT commands can be found in the application note *AT commands*.

After powering up the router, at introduction of the phone number comes SMS in the form of:

Router (Unit ID) has been powered up.GSM signal strength –xx dBm.

After PPP connect, at introduction of the telephone number comes SMS in the form:

Router (Unit ID) has established PPP connection. IP address xxx.xxx.xxx.xxx

After PPP disconnect, at introduction of the telephone number comes SMS in the form:

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

Configuration of sending this SMS is following:

SMS Configuration	
<input checked="" type="checkbox"/>	Send SMS on power up
<input checked="" type="checkbox"/>	Send SMS on PPP connect
<input checked="" type="checkbox"/>	Send SMS on PPP disconnect
<input checked="" type="checkbox"/>	Send SMS when datalimit is exceeded
<input checked="" type="checkbox"/>	Send SMS when binary input on I/O port (BIN0) is active
<input checked="" type="checkbox"/>	Send SMS when binary input on expansion port 1 (BIN1-BIN4) is active
<input checked="" type="checkbox"/>	Add timestamp to SMS
Phone Number 1	<input type="text" value="723123456"/>
Phone Number 2	<input type="text" value="756858635"/>
Phone Number 3	<input type="text" value="603854758"/>
Unit ID *	<input type="text" value="Router"/>
BIN0 - SMS *	<input type="text" value="BIN0"/>
BIN1 - SMS *	<input type="text" value="BIN1"/>
BIN2 - SMS *	<input type="text" value="BIN2"/>
BIN3 - SMS *	<input type="text" value="BIN3"/>
BIN4 - SMS *	<input type="text" value="BIN4"/>
<hr/>	
<input checked="" type="checkbox"/>	Enable remote control via SMS
Phone Number 1	<input type="text"/>
Phone Number 2	<input type="text"/>
Phone Number 3	<input type="text"/>
<hr/>	
<input type="checkbox"/>	Enable AT-SMS protocol on expansion port 1
Baudrate	<input type="text" value="9600"/>
<hr/>	
<input type="checkbox"/>	Enable AT-SMS protocol on expansion port 2
Baudrate	<input type="text" value="9600"/>
<hr/>	
<input type="checkbox"/>	Enable AT-SMS protocol over TCP
TCP Port	<input type="text"/>
* can be blank	
<input type="button" value="Apply"/>	

Fig. 48: Example of SMS configuration 1

Example of the router configuration for SMS sending via serial interface on the PORT1:

SMS Configuration	
<input type="checkbox"/>	Send SMS on power up
<input type="checkbox"/>	Send SMS on PPP connect
<input type="checkbox"/>	Send SMS on PPP disconnect
<input type="checkbox"/>	Send SMS when datalimit is exceeded
<input type="checkbox"/>	Send SMS when binary input on I/O port (BIN0) is active
<input type="checkbox"/>	Send SMS when binary input on expansion port 1 (BIN1-BIN4) is active
<input type="checkbox"/>	Add timestamp to SMS
Phone Number 1	<input type="text"/>
Phone Number 2	<input type="text"/>
Phone Number 3	<input type="text"/>
Unit ID *	<input type="text"/>
BIN0 - SMS *	<input type="text"/>
BIN1 - SMS *	<input type="text"/>
BIN2 - SMS *	<input type="text"/>
BIN3 - SMS *	<input type="text"/>
BIN4 - SMS *	<input type="text"/>
<input type="checkbox"/>	Enable remote control via SMS
Phone Number 1	<input type="text"/>
Phone Number 2	<input type="text"/>
Phone Number 3	<input type="text"/>
<input checked="" type="checkbox"/>	Enable AT-SMS protocol on expansion port 1
Baudrate	<input type="text" value="9600"/>
<input type="checkbox"/>	Enable AT-SMS protocol on expansion port 2
Baudrate	<input type="text" value="9600"/>
<input type="checkbox"/>	Enable AT-SMS protocol over TCP
TCP Port	<input type="text"/>
* can be blank	
<input type="button" value="Apply"/>	

Fig. 49: Example of SMS configuration 2

Example of the router configuration for controlling via SMS from every phone numbers:

SMS Configuration	
<input type="checkbox"/>	Send SMS on power up
<input type="checkbox"/>	Send SMS on PPP connect
<input type="checkbox"/>	Send SMS on PPP disconnect
<input type="checkbox"/>	Send SMS when datalimit is exceeded
<input type="checkbox"/>	Send SMS when binary input on I/O port (BIN0) is active
<input type="checkbox"/>	Send SMS when binary input on expansion port 1 (BIN1-BIN4) is active
<input type="checkbox"/>	Add timestamp to SMS
Phone Number 1	<input type="text"/>
Phone Number 2	<input type="text"/>
Phone Number 3	<input type="text"/>
Unit ID *	<input type="text"/>
BIN0 - SMS *	<input type="text"/>
BIN1 - SMS *	<input type="text"/>
BIN2 - SMS *	<input type="text"/>
BIN3 - SMS *	<input type="text"/>
BIN4 - SMS *	<input type="text"/>
<input checked="" type="checkbox"/>	Enable remote control via SMS
Phone Number 1	<input type="text" value="*"/>
Phone Number 2	<input type="text"/>
Phone Number 3	<input type="text"/>
<input type="checkbox"/>	Enable AT-SMS protocol on expansion port 1
Baudrate	<input type="text" value="9600"/>
<input type="checkbox"/>	Enable AT-SMS protocol on expansion port 2
Baudrate	<input type="text" value="9600"/>
<input type="checkbox"/>	Enable AT-SMS protocol over TCP
TCP Port	<input type="text"/>
* can be blank	
<input type="button" value="Apply"/>	

Fig. 50: Example of SMS configuration 3

Example of the router configuration for controlling via SMS from two phone numbers:

SMS Configuration	
<input type="checkbox"/>	Send SMS on power up
<input type="checkbox"/>	Send SMS on PPP connect
<input type="checkbox"/>	Send SMS on PPP disconnect
<input type="checkbox"/>	Send SMS when datalimit is exceeded
<input type="checkbox"/>	Send SMS when binary input on I/O port (BIN0) is active
<input type="checkbox"/>	Send SMS when binary input on expansion port 1 (BIN1-BIN4) is active
<input type="checkbox"/>	Add timestamp to SMS
Phone Number 1	<input type="text"/>
Phone Number 2	<input type="text"/>
Phone Number 3	<input type="text"/>
Unit ID *	<input type="text"/>
BIN0 - SMS *	<input type="text"/>
BIN1 - SMS *	<input type="text"/>
BIN2 - SMS *	<input type="text"/>
BIN3 - SMS *	<input type="text"/>
BIN4 - SMS *	<input type="text"/>
<input checked="" type="checkbox"/>	Enable remote control via SMS
Phone Number 1	<input type="text" value="728123456"/>
Phone Number 2	<input type="text" value="766254864"/>
Phone Number 3	<input type="text"/>
<input type="checkbox"/>	Enable AT-SMS protocol on expansion port 1
Baudrate	<input type="text" value="9600"/> ▾
<input type="checkbox"/>	Enable AT-SMS protocol on expansion port 2
Baudrate	<input type="text" value="9600"/> ▾
<input type="checkbox"/>	Enable AT-SMS protocol over TCP
TCP Port	<input type="text"/>
* can be blank	
<input type="button" value="Apply"/>	

Fig. 51: Example of SMS configuration 4

1.24. Expansion port configuration

Configuring of the expansion ports PORT1 and PORT2 can cause selecting **Expansion Port 1** or **Expansion Port 2**.

Item	Description
Baudrate	Applied communication speed.
Data Bits	Number of data bits.
Parity	Control parity bit <ul style="list-style-type: none"> • none - Will be sent without parity. • even - Will be sent with even parity. • odd - Will be sent with odd parity.
Stop Bits	Number of stop bit.
Split Timeout	Time to rupture reports. If you receive will identify the gap between two characters, which is longer than the parameter value in milliseconds. Then all of the received data compiled and sent the message.
Protocol	Protocol: <ul style="list-style-type: none"> • TCP - communication using a linked protocol TCP • UDP - communication using a unlinked protocol UDP
Mode	Mode of connection: <ul style="list-style-type: none"> • TCP server - The router will listen to incoming requests about TCP connection. • TCP client - The router will connect to a TCP server on the specified IP address and TCP port.
Server Address	In mode <i>TCP client</i> it is necessary to enter the <i>Server address</i> and final <i>TCP port</i> .
TCP Port	In both modes of connection is necessary to specify the TCP port on which the router will communicate TCP connections.

Table 53: Expansion PORT configuration 1

After check **Check TCP connection**, it activates established of TCP connection.

Item	Description
Keepalive Time	Time, after which it will carry out verification of the connection
Keepalive Interval	Waiting time on answer
Keepalive Probes	Number of tests

Table 54: Expansion PORT configuration 2

When you select items **Use CD as indicator of the TCP connection** is activated function indication TCP connection using signal CD (DTR on the router).

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

Table 55: CD signal description

When you select items **Use DTR as control of TCP connection** is activated function control TCP connection using signal DTR (CD on the router).

DTR	Description server	Description client
Active	The router allows establishing a TCP connection.	Router starts TCP connection.
Nonactive	The router does not permit establishing a TCP connection.	Router stops TCP connection.

Table 56: DTR signal description

The changes in settings will apply after pressing the *Apply* button.

Expansion Port 1 Configuration

Enable expansion port 1 access over TCP/UDP

Port Type:

Baudrate: ▼

Data Bits: ▼

Parity: ▼

Stop Bits: ▼

Split Timeout: msec

Protocol: ▼

Mode: ▼

Server Address:

TCP Port:

Check TCP connection

Keepalive Time: sec

Keepalive Interval: sec

Keepalive Probes:

Fig. 52: Expansion port configuration

Example of external port configuration:

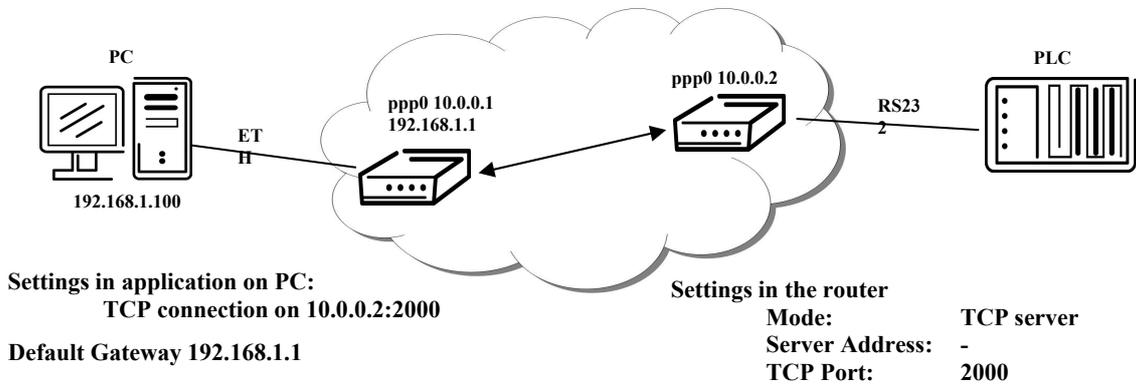


Fig. 53: Example of expansion port configuration 1

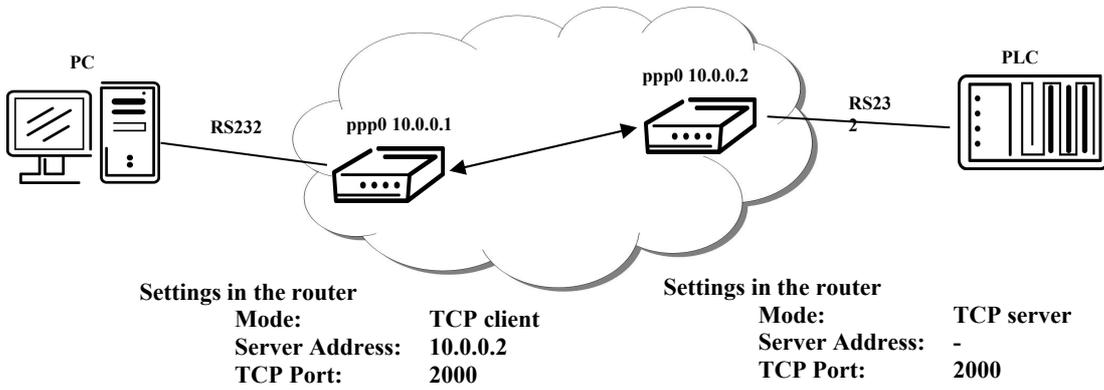


Fig. 54: Example of expansion port configuration 2

1.25. USB port configuration

The USB port configuration can be called up by airbrush option **USB Port** in menu. Configuration can be done, if we have USB/RS232 converter.

Item	Description
Baudrate	Applied communication speed.
Data Bits	Number of data bits.
Parity	Control parity bit <ul style="list-style-type: none"> • none - Will be sent without parity. • even - Will be sent with even parity. • odd - Will be sent with odd parity.
Stop Bits	Number of stop bit.
Split Timeout	Time to rupture reports. If you receive will identify the gap between two characters, which is longer than the parameter value in milliseconds. Then all of the received data compiled and sent the message.
Protocol	Communication protocol: <ul style="list-style-type: none"> • TCP - communication using a linked protocol TCP • UDP - communication using a unlinked protocol UDP
Mode	Mode of connection: <ul style="list-style-type: none"> • TCP server - The router will listen to incoming requests about TCP connection. • TCP client - The router will connect to a TCP server on the specified IP address and TCP port.
Server Address	In mode <i>TCP client</i> it is necessary to enter the <i>Server address</i> and final <i>TCP port</i> .
TCP Port	In both modes of connection is necessary to specify the TCP port on which the router will communicate TCP connections.

Table 57: USB port configuration 1

After check **Check TCP connection**, it activates verification of established TCP connection.

Item	Description
Keepalive Time	Time, after which it will carry out verification of the connection
Keepalive Interval	Waiting time on answer
Keepalive Probes	Number of tests

Table 58: USB PORT configuration 2

When you select items **Use CD as indicator of the TCP connection** is activated function indication TCP connection using signal CD (DTR on the router).

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

Table 59: CD signal description

When you select items **Use DTR as control of TCP connection** is activated function control TCP connection using signal DTR (CD on the router).

DTR	Description server	Description client
Active	The router allows establishing a TCP connection.	Router starts TCP connection.
Nonactive	The router does not permit establishing a TCP connection.	Router stops TCP connection.

Table 60: DTR signal description



Supported USB/RS232 converters:

- FTDI
- Prolific PL2303
- Silicon Laboratories CP210× (Podporován od firmware verze 3.0.1)

The changes in settings will apply after pressing the *Apply* button

USB Port Configuration

Enable USB serial converter access over TCP/UDP

Baudrate:

Data Bits:

Parity:

Stop Bits:

Split Timeout: msec

Protocol:

Mode:

Server Address:

TCP port:

Check TCP connection

Keepalive Time: sec

Keepalive Interval: sec

Keepalive Probes:

Fig. 55: USB configuration

Example of USB port configuration:

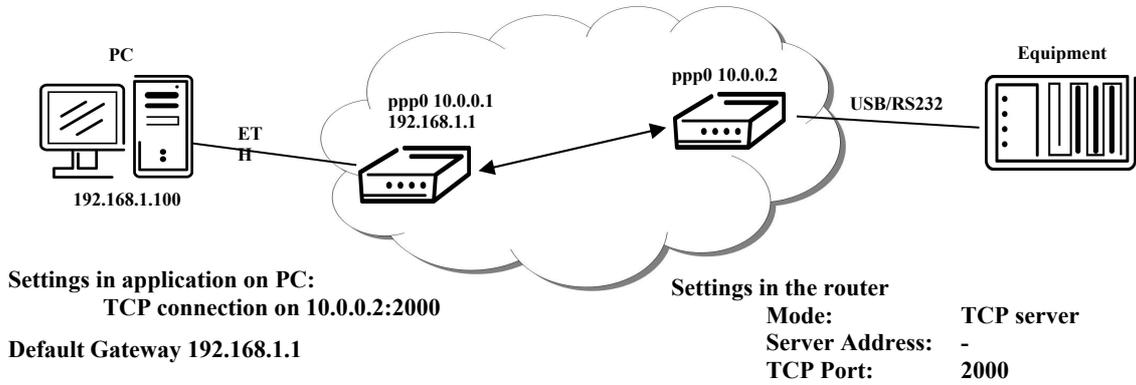


Fig. 56: Example of USB port configuration 1

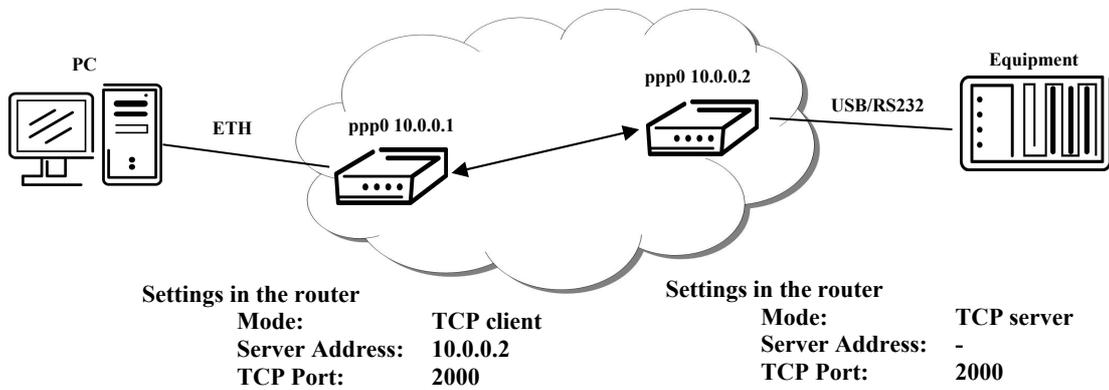


Fig. 57: Example of USB port configuration 2

1.26. Startup script

In the window **Startup Script** it is possible to create own scripts which will be executed after all initial scripts.

The changes in settings will apply after pressing the *Apply* button.



Fig. 58: Startup script

 Change take effect after shut down and witch on router by the help of button *Reboot* in web administration or by SMS message.

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

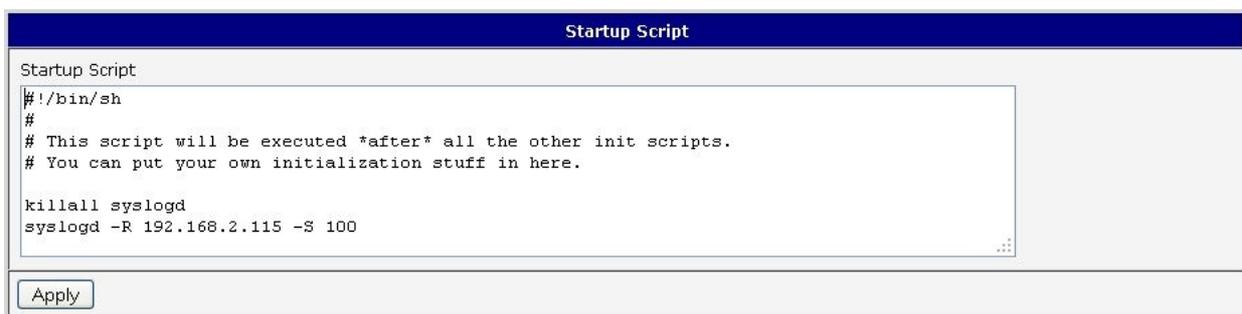
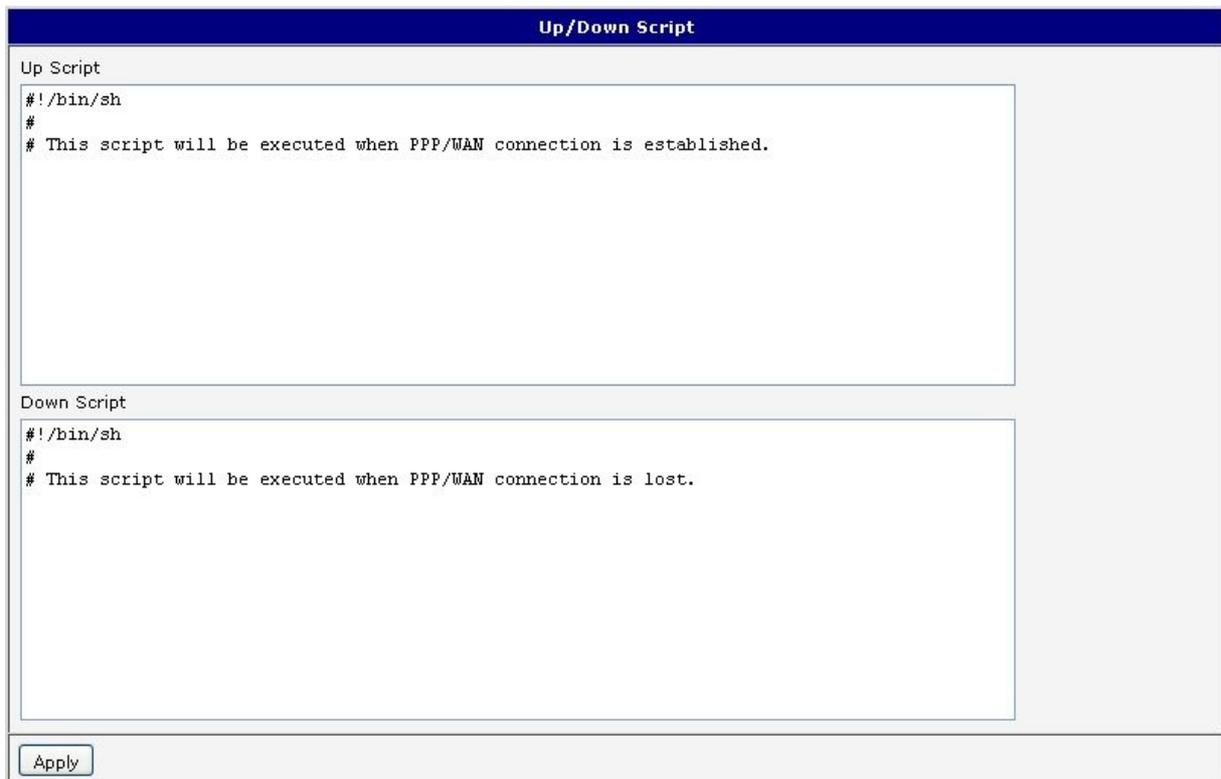


Fig. 59: Example of Startup script

1.27. Up/Down script

In the window **Up/Down Script** it is possible to create own scripts. In the item **Up script** is defined scripts, which begins after establishing a PPP/WAN connection. In the item **Down Script** is defines script, which begins after lost a PPP/WAN connection.

The changes in settings will apply after pressing the *Apply* button.



The screenshot shows a configuration window titled "Up/Down Script". It contains two text areas for scripts. The "Up Script" area contains the following text:

```
#!/bin/sh
#
# This script will be executed when PPP/WAN connection is established.
```

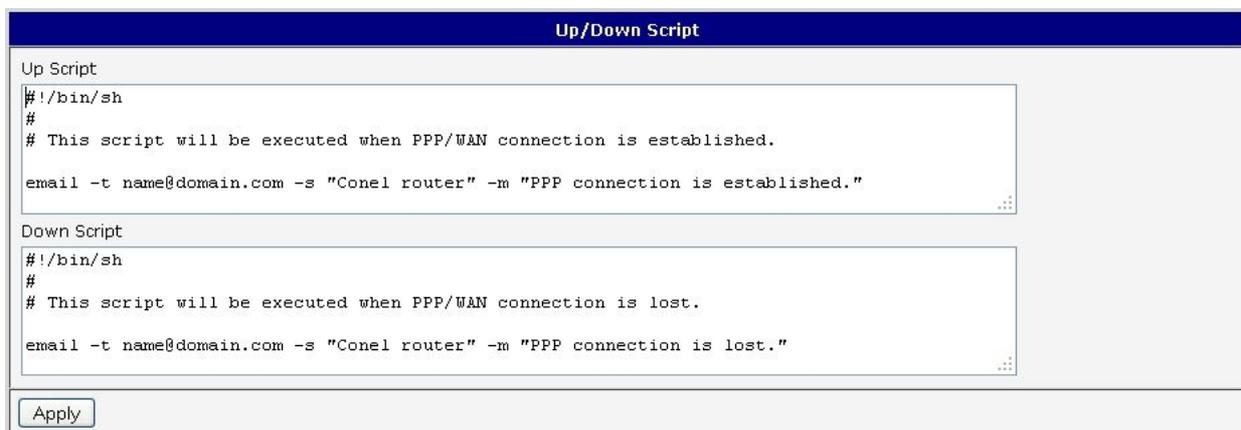
The "Down Script" area contains the following text:

```
#!/bin/sh
#
# This script will be executed when PPP/WAN connection is lost.
```

At the bottom of the window is an "Apply" button.

Fig. 60: Up/Down script

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



The screenshot shows the same "Up/Down Script" configuration window, but with example scripts. The "Up Script" area contains the following text:

```
#!/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."
```

The "Down Script" area contains the following text:

```
#!/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."
```

At the bottom of the window is an "Apply" button.

Fig. 61: Example of Up/Down script

1.28. Automatic update configuration

In the window **Automatic update** it is possible to set automatic configuration update. This choice enables that the router automatically downloads the configuration and the newest firmware from the server itself. The configuration and firmware are stores on the server.

By **Enable automatic update of configuration** it is possible to enable automatic configuration update and by **Enable automatic update of firmware** it is possible to enable firmware update.

Item	Description
Source	In the item source can be set, where new firmware download: <ul style="list-style-type: none"> • HTTP/FTP server - new firmware or configuration look at address in the Base URL item • USB flash drive - Router finds current firmware or configuration in the root directory of the connected USB device. • Both - looking for the current firmware or configuration from both sources.
Base URL	By parameter <i>Base URL</i> it is possible to enter base part of the domain or IP address, from which the configuration file will be downloaded.
Unit ID	Name of configuration. If the Unit ID is not filled, then as the file name used the MAC address of the router. (The delimiter is a colon is used instead of a dot.)
Update Hour	Automatic configuration update starts 5 minutes after turning on the router and then every 24 hours or it is possible to set the time of automatic configuration in parameter <i>Update Hour</i> . If the entered URL is different configuration than in the router then the router downloads this configuration and restarts itself.

Table 61: 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 is connected automatically and it isn't needed to enter this. By parameter *Unit ID* enabled it defines the concrete configuration name which will be download to the router. When using parameter *Unit ID*, hardware MAC address in configuration name will not be used.

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

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



The following examples find if there is a new firmware or configuration each day at 1:00 in the morning.

- Firmware: `http://router.cz/ucr11-v2.bin`
- Configuration file: `http://router.cz/temelin.cfg`

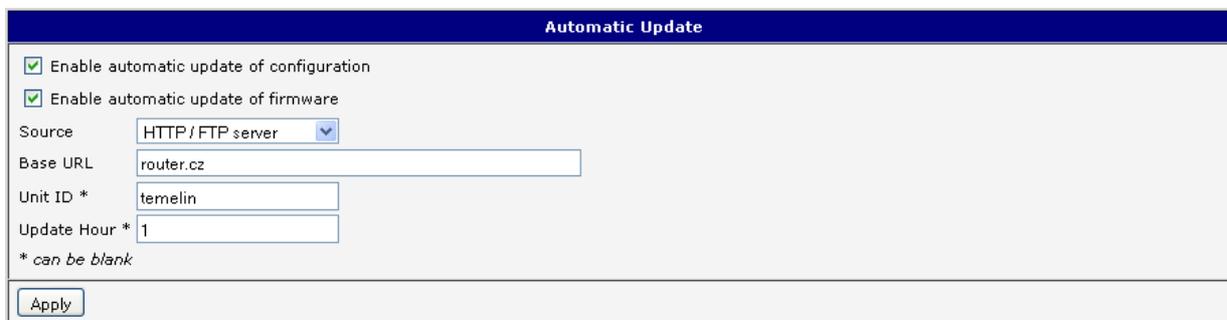


Fig. 62: Example of automatic update 1

The following examples find if there is a new firmware or configuration each day at 1:00 in the morning. An example is given on the router with MAC address 00:11:22:33:44:55.

- Firmware: `http://router.cz/ucr11-v2.bin`
- Configuration file: `http://router.cz/00.11.22.33.44.55.cfg`

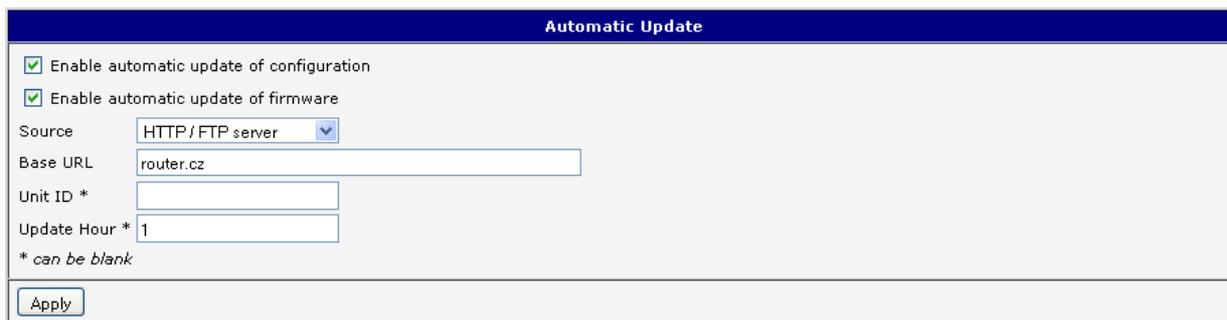


Fig. 63: Example of automatic update 2

1.29. User modules

Custom configuration of modules can be accessed by selecting the **Users Modules**. In the menu is possible add new software modules, remove them and move into their configuration. Programming, compiling and upload of user modules are described in the application programming guide.



Fig. 64: User modules

1.30. Change profile

To open the dialog box for changing profile select the **Change Profile** menu item. Profile switch is making by press the button *Apply*. Change take effect after restarting router by the help of button *Reboot* in web administration or by SMS message. It is possible select the standard profile or up to three alternative profiles. It is possible to copy actual configuration to selected configuration by selecting **Copy settings from current profile to selected profile** to selected profile.

Example of usage profiles: Profiles can be used for example to switch between different modes of operation of the router (router has compiled a PPP connection, the router has not compiled a PPP connection and the router creates a tunnel to the service center). Change the profile can then be done using a binary input, SMS or Web interface of the router.

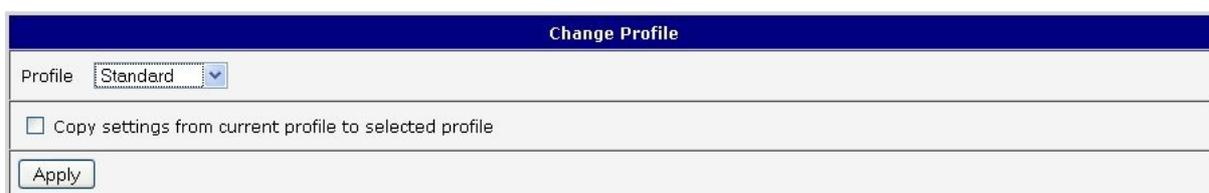


Fig. 65: Change profile

1.31. Change password

To open the dialog box for changing the access password select the **Change Password** menu item. The new password will be saved after pressing the *Apply* button.

In basic settings of the router the password is set on default form *root*. For higher security of your network we recommend changing this password.



Fig. 66: Change password

1.32. Set real time clock

One - shot inner clock of the router setting can be called up in option **Set Real Time Clock** *item* in the menu. Clocks are set according to the engaged NTP server after push-button operation *Apply*.

Set Real Time Clock	
NTP Server Address	<input type="text"/>
<input type="button" value="Apply"/>	

Fig. 67: Set real time clock

1.33. Set SMS service center address

In some cases it is needed to set the phone number of the SMS service centre because of SMS sending. This parameter can not be set when the SIM card has set phone number of the SMS service centre. The phone number can be formed without international prefix xxx xxx xxx or with international prefix for example +420 xxx xxx xxx.

Set SMS Service Center Address	
Service Center Address	<input type="text"/>
<input type="button" value="Apply"/>	

Fig. 68: Set SMS service center address

1.34. Unlock SIM card

Possibility to unlock SIM PIN is under **Unlock SIM Card** item. If the inserted SIM card is secured by a PIN number, enter the PIN to field *SIM PIN* and push-button *Apply*.

SIM card is blocked after three failed attempts to enter the PIN code.



Unlock SIM Card	
SIM PIN	<input type="text"/>
<input type="button" value="Apply"/>	

Fig. 69: Unlock SIM card

1.35. Send SMS

Sending SMS messages is possible in menu **Send SMS**. The SMS message will be sent after entering the **Phone number** and text SMS (**Message**) and by pushing button **Send**.



Fig. 70: Send SMS

SMS message sending via HTTP request is in the form:

```
GET /send_exec.cgi?phone=%2B420712345678&message=Test HTTP/1.1
Authorization: Basic cm9vdDpyb290
```

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.

1.36. Backup configuration

The router configuration is possible to save by help of the *Backup Configuration* menu item. After clicking on this menu it is possible to check a destination directory, where it will save the router configuration.

1.37. Restore configuration

In case it is needed to restore the router configuration, it is possible in **Restore Configuration** menu item to check configuration by help **Browse** button.



Fig. 71: Restore configuration

1.38. Update firmware

To view the information about the firmware version and instructions for its update select the **Update Firmware** menu item. New firmware is selected via Browse button and update the following pressing the Update button.



Fig. 72: Update firmware

After successful firmware updating the following statement is listed:

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

Reboot in progress

Continue [here](#) after reboot.

There is information about updating of the FLASH memory.



Upload firmware of different device can cause damage of the router!

During updating of the firmware permanent power supply has to be maintained.

1.39. Reboot

To reboot the router select the **Reboot** menu item and then press the *Reboot* button.



Fig. 73: Reboot

2. Configuration setting over Telnet



Attention! If the SIM card isn't inserted in the router, it is impossible for the router to operate. The Included SIM card must be activated for GPRS transmissions.

Monitoring of status, configuration and administration of the router can be performed by means of the Telnet interface. After IP address entry to the Telnet it is possible to configure the router by the help of commands. 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".

For Telnet exists the following commands:

Command	Description
cat	file contain write
cp	copy of file
date	show/change of system time
df	displaying of informations about file system
dmesg	displaying of kernel diagnostics messages
echo	string write
email	Email send
free	displaying of informations about memory
gsmat	AT commend send
gsminfo	displaying of informations about signal quality
gsmsms	SMS send
hwclock	displaying/change of time in RTC
ifconfig	displaying/change of interface configuration
io	reading/writing input/output pins
ip	displaying/change of route table
iptables	displaying/modification of NetFilter rules
kill	process kill
killall	processes kill
ln	link create
ls	dump of directory contain
mkdir	file create
mv	file move
ntpdate	synchronization of system time with NTP server
passwd	password change
ping	ICMP ping
ps	displaying of processes information
pwd	dump of actual directory
reboot	reboot
rm	file delete
rmdir	directory delete
route	displaying/change of route table
service	start/stop of service
sleep	pause on set seconds number
slog	displaying of system log
tail	displaying of file end
tcpdump	monitoring of network
touch	file create/actualization of file time stamp
vi	text editor

Table 62: Telnet commands