# GWR-I Cellular Router Series User Manual

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## **Description of the GWR-I Cellular Router Series**

GWR-I router series represents a group of industrial graded routers specially designed for expansion of existing industrial networks, remote telemetry and data acquisition in harsh environments. Low transmission delay and very high data rates offered by existing cellular networks completely eliminate the need for very complex installation of wired infrastructure in industrial environments. Easy to install, reliable and high performance router models from GWR-I series introduce a completely new dimension into industrial networking area.



Figure 1 – GWR-I Router

The complete series inherited the basic concept of GWR cellular router series – **RELIABILITY COMES FIRST**. Therefore all router models have dual SIM card support. The form factor of the router is adjusted to industrial environments and DIN rail mounting kit is part of standard equipment for GWR-I series.

Many useful features make GWR-I cellular routers a perfect solution for wide variety of industrial applications:

- Dual SIM card support increases the reliability of the router and provides a solution for those applications where failure of one mobile network must not result in system downtime. Automatic failover feature will detect the failure of primary connection and automatically switch to alternative connection. When the connectivity over primary connection is restored GWR router will perform switchover to primary connection.
- The whole set of advanced WAN settings allow a user to specify desired parameters in order to meet the requirements of specific cellular network. GWR-I routers proved themselves to be reliable and high performance devices in so many countries around the world. All advanced parameters included represent the result of detailed analysis of large number of different cellular networks. In few simple steps it is possible to optimize the performance of the router on almost any cellular network.



- VPN (GRE, IPsec and OpenVPN) tunnel support provides powerful options for network expansion and secure data transfer over the cellular network.
- With Serial-to-IP feature it is possible to connect, control and perform data acquisition from almost any device with serial RS232 port. In addition to this feature, GWR-I router series implements ModbusRTU-to-ModbusTCP functionality designed to support expansion of Modbus SCADA networks over the cellular networks.
- Easy to use web interface, extended CLI (Command Line Interface), detailed log, SMS control feature, partial and full configuration Export/Import and remote management and monitoring software provide wide range of management functionalities. All those features and tools empower a user with full control over GWR-I routers.

## **Typical application**

#### Data collection and system supervision

- Extra-high voltage equipment monitoring
- Running water, gas pipe line supervision
- Centralized heating system supervision
- Environment protection data collection
- Flood control data collection
- Alert system supervision
- Weather station data collection
- Power Grid
- Oilfield
- Light Supervision
- Solar PV Power Solutions

#### Financial and department store

- Connection of ATM machines to central site
- Vehicle based bank service
- POS
- Vending machine
- Bank office supervision

#### Security

- Traffic control
- Video Surveillance Solutions

#### Other

- Remote Office Solution
- Remote Access Solution

There are numerous variations of each and every one of above listed applications. Therefore GENEKO formed highly dedicated, top rated support team that can help you analyze your requirements and existing system, chose the right topology for your new system, perform initial configuration and tests and monitor the complete system after installation. Enhance your system performance and speed up the ROI with high quality cellular routers and all relevant knowledge of GWR support team behind you.



## **Technical Parameters**

Directive 2004/108/EC			2004/108/EC			
	EMC	EN 301 489-1 V1.6.1(2005-09)				
		EN 301 489-7 V1.3.1(2005-07)				
Complies with standards	LVD		0-1:2001(1st Ed.) and/or EN 60950-1:2001			
	110	Directive 1999/05/EC				
	R&TTE	ETSI EN 301 511 V9.0.2				
	1.00112		EN 301 908-1 & EN 301 908-2(v2.2.1)			
		Directive 2002/95/EC				
	RoHS		mission 2005/618/EC, 2005/717/EC, 2005/747/EC,			
	10110		0/EC, 2006/690/EC, 2006/691/EC and 2006/692/EC			
	Connector I	Connector RJ-45				
	Standard: II					
Ethernet interface	Physical lay		Base-T			
	Speed: 10/1 Mode: full c		lov			
		4	RS422 – RJ45 (+/- 15KV ESD protection)			
			RS422 - DB9 (+/-15KV ESD protection)			
Other interfaces			VDC;1.5KV isolation)			
	1 x digital o	utput (700)	mA@60VDC; 1.5KV isolation)			
			Tri-band: 900/1800/1900			
	GWR-I202	GPRS	GPRS multi-slot class 10, mobile station class B			
			GPRS DL: 85.6Kbps, UL: 42.8Kbps			
		GPRS EDGE	Quad band: GSM 850/900/1800/1900MHz			
	GWR-I252		GPRS/EDGE multi-slot class 12, mobile station class B EDGE DL: 236.8Kbps, UL: 236.8Kbps			
			GPRS DL: 85.6Kbps, UL: 85.6Kbps			
<b>RF</b> characteristics			UMTS/HSDPA/HSUPA: Quad band,			
Ri characteristics			850/900/1900/2100MHz			
		GPRS EDGE UMTS HSPA	GSM/GPRS/EDGE: Quad band,			
			850/900/1800/1900MHz			
	GWR-I352		GPRS/EDGE multi-slot class 12, mobile station class B HSUPA DL: 7.2Mbps, HSDPA: UL: 5.76Mbps			
			UMTS DL: 384Kbps, UL: 384Kbps			
			EDGE DL: 236.8Kbps, UL: 236.8Kbps			
			GPRS DL: 85.6Kbps, UL: 85.6Kbps			
<b>RF</b> Connector	SMA, $50\Omega$					
	Ethernet act	ivity/netw	vork traffic			
	Power on					
Status LED	GSM link activity					
	Signal quality Reset					
Power requirements	12 - 48VDC					
	Operating to	emperatur	e: -25° C to 70° C (-13° F to 158° F)			
	Storage temperature: $-40^{\circ}$ C to $+75^{\circ}$ C ( $-40^{\circ}$ F to $+167^{\circ}$ F)					
Environmental	Relative humidity: 5% to 95% (non-condensing)					

#### **USER MANUAL**

Dimensions and weight	Width: 50mm Length: 104mm Height: 135mm Weight: 500g	
Housing and mounting options	Robust metal housing DIN rail mounting kit	

Table 1 - Technical parameters

## **Protocols and features**

Features	Short description		
Network			
Routing	Static		
DHCP Server:			
Static lease reservation	DHCP Server support		
<ul> <li>Address exclusions</li> </ul>			
DID	The Routing Information Protocol is a dynamic routing		
RIP protocol used in local and wide area networks			
Port forwarding	IP, TCP, UDP packets from WAN to LAN		
	DMZ, or Demilitarized Zone, is a physical or logical		
DN/Z	subnetwork that contains and exposes an organization's		
DMZ support	external services to a larger untrusted network, usually the		
	Internet.		
	Simple Network Management Protocol is used in network		
SNMPv1,2c	management systems to monitor network-attached devices for		
	conditions that warrant administrative attention		
	The Network Time Protocol is a protocol for synchronizing		
NTP(RFC1305)	the clocks of router		
	Dynamic DNS (DDNS) is a domain name service allowing to		
Der DNC	link dynamic IP addresses to static hostname. To start using		
DynDNS	this feature firstly you should register to DDNS service		
	provider.		
Firewall:			
• NAT	IP address / Network filtering		
• PAT	IP address / Network filtering		
• IP filtering			
Serial-to-IP	Serial to Ethernet converter		
Modbus RTU-to-TCP gateway	Modbus to Ethernet converter.		
VPN			
	Generic Routing Encapsulation is a tunneling protocol that can		
GRE	encapsulate a wide variety of network layer protocol packet		
	types inside IP tunnels		
GRE Keepalive	Keepalive for GRE tunnels		
IPSec pass-through	ESP tunnels		
	Internet Protocol Security is a suite of protocols for securing IP		
IPsec	communications by authenticating and encrypting each IP		
	packet of a data stream		
OpenVPN	OpenVPN site to site graphical user interface (GUI)		
opentiti	implementation allows connecting two remote networks via		



	point-to-point encrypted tunnel. OpenVPN implementation offers a cost-effective simply configurable alternative to other
IPSec IKE failover	VPN technologies. Feature that allows a user to specify number of unsuccessful retries to establish PPP connection before routers switches to another SIM.
IPSec tunnel failover	Quality control mechanism of IPSec tunnel.
Management	
WEB Application	HTTP based
<b>Command Line Interface</b>	Serial console, telnet and SSH
GWR connection wizard	Initial setup utility.
SMS Control	Control the basic router functionalities by SMS.
Remote management and monitoring software	Additional software for management and control of large number of remote GWR/GWR-I routers.
Detailed system log	Advanced monitoring and diagnostics of the device.
Default reset	Reset the router to a factory default settings.
Firmware upload	Upgrade the firmware version on the router.
Configuration Export/Import	Partial or Full Export/Import of router configuration.

Table 2 – GWR-I Router features



#### **USER MANUAL**

#### **Product Overview**

## Front panel

On the front panel (*Figure 2*) the following connectors are located:

- one RJ45 connector Ethernet port for connection into local computer network;
- one RJ45 connector for RS232 serial communication;
- one DB9 connector for RS232/422/485 serial communication;
- reset button;

Ethernet connector LED:

- ACT (yellow) on Network traffic detected (off when no traffic detected).
- Network Link (green LED) on Ethernet activity or access point engaged.

LED Indicator Description:

- 1. Reset (red LED) on the GWR-I Router reset state.
- 2. Power status (green LED) on Power supply. Power status LED will blink when the GWR Router is in initializing state.
- 3. Link (red LED) will blink when connection is active.
- 4. Signal strength LED indicator:
  - -107 to -98 dBm = Weak (LED I)
  - -98 to -80 dBm = Moderate (LED II)
  - -80 or better dBm = Excellent (LED III).
  - 0 is not known or not detectable (running LED)

Signal strength LED will blink when GPRS/EDGE/HSPA/HSPA+/LTE connection is not active. When connection is active Signal strength LED is on. Reset condition will be indicated by blinks of the first and last Signal strength LED. When signal quality is not known or not detectable there will be running LED indication.



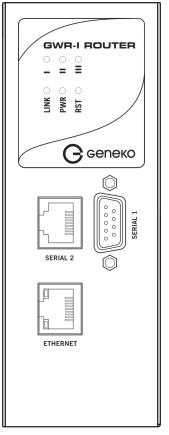


Figure 2 - GWR-I Router front panel

## Top Panel

On the top panel following connectors are located:

- SMA connector for connection of the GSM/UMTS antenna
- Grounding connector
- 1 x digital input (0/48VDC;1.5KV isolation)
- 1 x digital output (700mA@60VDC; 1.5KV isolation)
- Detachable screw terminal for 9 48VDC power supply
- Reset button

The Reset button can be used for a warm reset or a reset to factory defaults.

**Warm reset:** If the GWR-I Router is having problem connecting to the Internet, press and hold the reset button for a second using the tip of a pen.

**Reset to Factory Defaults:** To restore the default settings of the GWR-I Router, hold the RESET button pressed for a few seconds. Restoration of the default configuration will be signaled by blinks of the first and last signal strength LED on the top panel. This will restore the factory defaults and clear all custom settings of the GWR-I Router. You can also reset the GWR-I Router to factory defaults using the Maintenance > Default Settings screen.



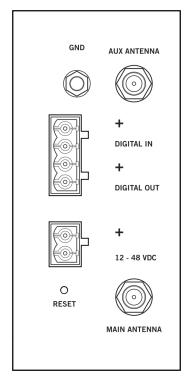


Figure 3 – GWR-I Router top panel side

## Putting Into Operation

Before putting the GWR-I Router in operation it is necessary to connect all components needed for the operation:

- GSM antenna;
- Ethernet cable and
- SIM card must be inserted.

And finally, device should have powered up external power supply.

NOTE: Since the router is dedicated for operation in rough environments SIM card slots are located within the router chassis. In order to insert the SIM card please remove the screws pointed on the following image. SIM slots are located directly on the PCB of the router. After the SIM cards are inserted and before the router is put in the operation make sure that router box is properly sealed.



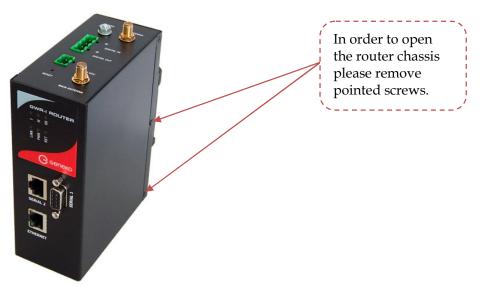


Figure 4 – Inserting the SIM card

SIM card must not be changed, installed or taken out while device operates. This procedure is performed when power supply is not connected.



Declaration of conformity



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## **Device Configuration**

There are two methods which can be used to configure the GWR-I Router. Administrator can use following methods to access router:

- Web browser
- Command line interface

Default access method is by web interface. This method provides administrator full set of privileges for configuring and monitoring the router. Configuration, administration and monitoring of the GWR-I Router can be performed through the web interface. The default IP address of the router is 192.168.1.1. Another method is by command line interface. This method has limited options for configuring the GWR-I Router but still represents a very powerful tool when it comes to router setup and monitoring. Another document deals with CLI commands and instructions.

## Device configuration using web application

The GWR-I Router's web-based utility allows you to set up the Router and perform advanced configuration and troubleshooting. This chapter will explain all of the functions in this utility.

For local access to the GWR-I Router's web-based utility, launch your web browser, and enter the Router's default IP address, 192.168.1.1, in the address field. A login screen prompts you for your User name and Password. Default administration credentials are admin/admin.

If you want to use web interface for router administration please enter IP address of router into web browser. Please disable *Proxy server* in web browser before proceed.

	GWR ROUTER - CONFIGURATION CONSOLE
Login	
	Username
	Password Login

http://www.geneko.co.rs/

Figure 5 - User authentication

After successfully finished process of authentication of *Username/Password* you can access *Main Configuration Menu*.

You can set all parameters of the GWR-I Router using web application. All functionalities and parameters are organized within few main tabs (windows).



## NOTE

#### Add/Remove/Update manipulation in tables

To Add a new row (new rule or new parameter) in the table please do following:

- Enter data in fields at the bottom row of the table (separated with a line).
- After entering data in all fields click Add link.

To **Update** the row in the table:

• Change data directly in fields you want to change

To **Remove** the row from the table:

• *Click* **Remove** *link* to remove selected row from the table.

#### Save/Reload changes

To save all the changes in the form press **Save** button. By clicking **Save** data are checked for validity. If they are not valid, error message will be displayed. To discard changes press the **Reload** button. By clicking **Reload**, previous settings will be loaded in the form.

#### Status Information

The GWR-I Router's Status menu provides general information about router as well as real-time network information. Status information is divided into following categories:

- General Information,
- Network Information (LAN),
- WAN Information.

#### Status - General

*General Information* Tab provides general information about device type, device firmware version, kernel version, CPU vendor, Up Time since last reboot, hardware resources utilization and MAC address of LAN port. Screenshot of General Router information is shown at *Figure 6*. Data in Status menu are read only and cannot be changed by user. If you want to refresh screen data press *Refresh* button.

SIM Card detection is performed only at time booting the system, and you can see the status of SIM slot by checking the Enable SIM Card Detection option.



#### **USER MANUAL**

	General Information		
us Seneral	General mormation		
Jerieral Jetwork Information WAN Information	Router Information		
ings	Model	GWR-I202-C	
letwork )HCP Server	Firmware Version	2.1.9.29.28_202_c_raz_12_ind	
VAN Settings	Kernel Version	2.6.21.5-geneko_v1	
Routing			
ynamic Routing Protocol RIP	CPU Vendor	CirrusLogic ARM9 EP9302 200MHz	
PN Settings	UP Time	02:15:01	
GRE	Total Memory	94600K	
IPSec OpenVPN	Used Memory	28544K	
P Filtering	Free Memory	66056K	
OynDNS Serial Port 1			
Serial Port 2	MAC Address	00:1e:5c:11:22:33	
SMS			Refre
GPIO ntenance			helle
Device Identity Settings			
Administrator Password			
Date/Time Settings			
Diagnostics Update Firmware			
Settings Backup			
Default Settings			
Reboot			
agement Command Line Interface			
emote Management			
Remote Management Connection Manager			
Connection Manager SNMP			
Connection Manager			

Figure 6 - General router information

Status - Network Information

*Network Information* Tab provides information about Ethernet port and Ethernet traffic statistics. Screenshot of Network Router information is shown in *Figure 7*.

#### Status - WAN Information

*WAN Information* Tab provides information about GPRS/EDGE/HSPA connection and traffic statistics. *WAN information menu* has three submenus which provide information about:

- GPRS/EDGE/HSPA mobile module(manufacturer and model);
- Mobile operator and signal quality;
- Mobile traffic statistics.

Screenshot of WAN information from the router is shown in Figure 8.

Network Statistics			
Network Technology IP Address	Ethernet	MAC Address MTU Size	00:1e:5c:00:0c:60
Netmask	255.255.255.0	Broadcast	10.0.255
Data Received	3207198	RX Packets	32083
RX Error Packets Data Transmitted	0 1078797	RX Dropped Packets TX Packets	0 1186
TX Error Packets	0	TX Dropped Packets	0
DHCP Server status	stopped		
			Refi

Figure 7 - Network Information



WAN Information									
Mobile Information									
Modem Manufacturer		huawei							
Modem Model		EM770W							
Modem Serial Number		3570300274	163781						
Revision		11.126.10.8	5.00						
Mobile Connection									
Operator									
Cell ID		7DD3							
Signal Strength		-95dBm							
Mobile Statistics									
Protocol	Point-Point Pro	tocol		Activity Time		03:24:52			
WAN Address	172.24.72.165			PPP Address		10.64.64.64			
Primary DNS Address	195.178.38.3			Second DNS A	ddress	195.178.38.8			
Data Received 13	<b>.</b>	RX Packets	7	RX Error Packets	0		0		
Data Received 13 Data Transmitted 19		RA Packets TX Packets	9	TX Error Packets	0	RX Dropped Packets	0		
Data Transmitted	ь	IX Packets	9	TX Error Packets	U	TX Dropped Packets	U		
								Ref	fresh
			Copyright @ 2008 Gene						

Figure 8 - WAN Information



## Settings - Network

Click *Network* Tab, to open the LAN network screen. Use this screen to configure LAN TCP/IP settings.

	Network Tab Parameters
Label	Description
Use the following IP address	Choose this option if you want to manually configure TCP/IP parameters of Ethernet port.
IP Address	Type the IP address of your GWR-I Router in dotted decimal notation. 192.168.1.1 is the factory default IP address.
Subnet Mask	The subnet mask specifies the network number portion of an IP address. The GWR-I Router support sub-netting. You must specified subnet mask for your LAN TCP/IP settings.
Local DNS	Type the IP address of your local DNS server.
Reload	Click <i>Reload</i> to discard any changes and reload previous settings.
Save	Click <i>Save</i> button to save your changes back to the GWR-I Router. Whether you make changes or not, router will reboot every time you click <i>Save</i> .

Table 3 - Network parameters

In the *Figure 9* you can see screenshot of *Network* Tab configuration menu.

Network				🕐 Help
Network Settings				
O Obtain an IP address	automatically using DHCP			
⊙ Use the following IP a	ddress			
IP Address	192.168.1.1			
Subnet Mask	255.255.255.0			
Local DNS	195.78.6.36			
Changes to IP Address, se	ubnet mask and local DNS require a reboot to take r	ffect.		Reload Save

Figure 9 - Network parameters configuration page



#### Settings - DHCP Server

The GWR-I Router can be used as a DHCP (Dynamic Host Configuration Protocol) server on your network. A DHCP server automatically assigns available IP addresses to computers on your network. If you choose to enable the DHCP server option, all of the computers on your LAN must be set to obtain an IP address automatically from a DHCP server. (By default, Windows computers are set to obtain an IP automatically.)

To use the GWR-I Router as your network's DHCP server, click *DHCP Server* Tab for DHCP Server setup. The GWR-I Router has built-in DHCP server capability that assigns IP addresses and DNS servers to systems that support DHCP client capability.

	DHCP Server Parameters
Label	Description
Enable DHCP Server	DHCP (Dynamic Host Configuration Protocol) allows individual clients (workstations) to obtain TCP/IP configuration at startup from a server. When configured as a server, the GWR-I Router provides TCP/IP configuration for the clients. To activate DHCP server, click check box <i>Enable DHCP Server</i> . To setup DHCP server fill in the IP Starting Address and IP Ending Address fields. Uncheck <i>Enable DHCP Server</i> check box to stop the GWR-I Router from acting as a DHCP server. When Unchecked, you must have another DHCP server on your LAN, or else the computers must be manually configured.
IP Starting Address (From)	This field specifies the first of the contiguous addresses in the IP address pool.
IP Ending Address (To)	This field specifies last of the contiguous addresses in the IP address pool.
Lease Duration	This field specifies DHCP session duration time.
Primary DNS, Secondary DNS	This field specifies IP addresses of DNS server that will be assigned to systems that support DHCP client capability. Select <i>None</i> to stop the DHCP Server from assigning DNS server IP address. When you select None, computers must be manually configured with proper DNS IP address. Select <i>Used by ISP</i> to have the GWR-I Router assign DNS IP address to DHCP clients. DNS address is provided by ISP (automatically obtained from WAN side). This option is available only if GSM connection is active. Please establish GSM connection first and then choose this option. Select <i>Used Defined</i> to have the GWR-I Router assign DNS IP address to DHCP clients. DNS address is manually configured by user.
Static Lease Reservation	This field specifies IP addresses that will be dedicated to specific DHCP Client based on MAC address. DHCP server will always assign same IP address to appropriate client.
Address Exclusions	This field specifies IP addresses that will be excluded from the pool of DHCP IP address. DHCP server will not assign this IP to DHCP clients.
Add	Click <i>Add</i> to insert (add) new item in table to the GWR-I Router.
Remove	Click <i>Remove</i> to delete selected item from table.
Save	Click <i>Save</i> to save your changes back to the GWR-I Router.
Reload	Click <i>Reload</i> to discard any changes and reload previous settings.

Table 4 - DHCP Server parameters



DHCP Server			🕐 Help
DHCP Server Settings			
Enable DHCP server			
IP Address range	Lease duration	1 days 0 hrs 0 mins	
From			
То			
Primary DNS	Secondary DNS		
None	None		
O Used by ISP	O Used by ISP		
O User defined	O User defined		
Static Lease Reservations			
IP addresses that will be dedicated to specific DHCP Client based on MAC addre			
Enable IP Address MAC Address Action	888		
Add			
Address Exclusions			
Exclude these address from the DHCP IP address pool			
Enable Start Address End Address Action			
Add			
* MAC Address format: x00000000000			
<sup>a</sup> The IP address pool must specify addresses that are in the subnetwork of the GWR Router. The DHCP serv <sup>a</sup> A reservation IP address must not be the same as the IP address of the DHCP server itself. It must be a vali			Reload Save
reservation that does not meet these requirements. A n IP address exclusion range must specify valid IP addresses in the subnetwork of the DHCP server. The I			
An in address exclusion range most speony value in addresses in the subnetwork of the DHUP server. The L	prior server will ignore an exclusion t	nat oves not meet uns requirement.	
Copyright @ 2008 Geneko. A	All rights reserved.		

Figure 10 - DHCP Server configuration page



## Settings - WAN Setting

Click *WAN Settings* Tab, to open the Wireless screen. Use this screen to configure the GWR-I Router GPRS/EDGE/HSPA/HSPA+/LTE parameters (Figure 11).

WAN Settings				<ul> <li>Help</li> </ul>
SIM 1			SIM 2	
Enabled  Provider  Authentication Username  Password  APN  Dial string  Number of retry  PIN enabled  Enable network locking  Advanced	Telekom PAP-CHAP ▼ mts 064 genekogwr ATD*99***1# 6 1234		Enabled  Provider  Authentication Username  Password  APN  Dial string  Number of retry  PIN enabled  Enable network locking  Enable failover  Advanced	VIP CHAP v vipmobile vipmobile ATD*99***1# 6 1234 after 15 mins
Connection settings				
Persistent connection Reboot after failed connections Enable SIM 1 keepalive Enable SIM 2 keepalive SIM 1 connection type SIM 2 connection type	Only GSM 💌			
	7 1410			
				Reload Save
Mobile status				
Mobile device EM770W	Mobile communication EDGE Attached	Mobile pr mts	ovider Interfac	e
Current SIM card Current WAN address Connection up time Connection status	SIM 1 172.27.234.26 01:04:25 connected			

Switch SIM Refresh Disconnect

Figure 11 - WAN	Settings	configuration	page
-----------------	----------	---------------	------

	WAN Settings
Label	Description
Provider	This field specifies name of GSM/UMTS ISP. You can setup any name for provider.
Authentication	This field specifies password authentication protocol. Select the appropriate protocol from drop down list. (PAP, CHAP, PAP - CHAP).
Username	This field specifies Username for client authentication at GSM/UMTS network. Mobile provider will assign you specific username for each SIM card.
Password	This field specifies Password for client authentication at GSM/UMTS network. Mobile provider will assign you specific password for each SIM card.
APN	This field specifies APN.



Dial String	This field specifies Dial String for GSM/UMTS modem connection initialization. In most cases you have to change only APN field based on parameters obtained from Mobile Provider. This field cannot be altered.
Enable Failover	Check this field in order to enable failover feature. This feature is used when both SIM are enabled. You specify the amount of time after which Failover feature brings down current WAN connection (SIM2) and brings up previous WAN connection (SIM1).
Enable network locking	Option that allows a user to lock a SIM card for a desired operator by specifying PLMN id of the operator. This option is very useful in border areas since you can avoid roaming expenses.
Persistent connection	Keep connection alive, after Do not exit after a connection is terminated. Instead try to reopen the connection
Reboot after failed connections	Reboot after n consecutive failed connection attempts.
Enable SIM1/SIM2 keepalive	Make some traffic periodically in order to maintain connection active. You can set keepalive interval value in minutes
Ping target	This field specifies the target IP address for periodical traffic generated using ping in order to maintain the connection active.
Ping interval	This field specifies ping interval for keepalive option.
Advanced ping interval	This field specifies the time interval of advanced ping proofing.
Advanced ping wait for a response	This field specifies the timeout for advanced ping proofing.
Maximum number of failed packets	This field specifies maximum number of failed packets in percent before keepalive action is performed.
Keepalive action	This menu provides a choice between two possible keepalive actions in case maximum number of failed packets is exceeded. If Switch SIM option is selected router will try to establish the connection using the other SIM card after the maximum number of failed packets is exceeded. If Current SIM option is selected router will only restart the PPP connection.
Connection type	Specifies the type of connection router will try to establish. There are three available options: only GSM, only UMTS and AUTO. For example, if you select Only GSM option, router will not try to connect to UMTS, instead router will automatically try to connect to GSM. By selecting AUTO option, router will first try to establish UMTS connection and if it fails, router will go for GSM connection.
Mobile status	Displays data related to mobile connection. (current WAN address, uptime, connection status)
Reload	Click <i>Reload</i> to discard any changes and reload previous settings.
Save	Click <i>Save</i> to save your changes back to the GWR-I Router.
Switch SIM	Click Switch SIM try to establish the connection using the other SIM card.
Refresh	Click <i>Refresh</i> to see updated mobile network status.
Connect/ Disconnect	Click <i>Connect/Disconnect</i> to connect or disconnect from mobile network.

Table 5 - WAN parameters

*Figure 11* shows screenshot of GSM/UMTS tab configuration menu. GSM/UMTS menu is divided into two parts.

- Upper part provides all parameters for configuration GSM/UMTS connection. These parameters can be obtained from Mobile Operator. Please use exact parameters given from Mobile Operator.
- Bottom part is used for monitoring status of GSM/UMTS connection (create/maintain/destroy GSM/UMTS connection). Status line show real-time status: connected/disconnected.

If your SIM Card credit is too low, the GWR-I Router will performed periodically connect/disconnect actions.

	WAN Settings(advanced)
Label	Description
Enable	This field specifies if Advanced WAN settings is enabled at the GWR-I Router.
Accept Local IP Address	With this option, pppd will accept the peer's idea of our local IP address, even if the local IP address was specified in an option.
Accept Remote IP Address	With this option, pppd will accept the peer's idea of its (remote) IP address, even if the remote IP address was specified in an option.
Idle time before disconnect ( sec)	Specifies that pppd should disconnect if the link is idle for $n$ seconds. The link is idle when no data packets are being sent or received.
Refuse PAP	With this option, pppd will not agree to authenticate itself to the peer using PAP.
Require PAP	Require the peer to authenticate using PAP (Password Authentication Protocol) authentication.
Refuse CHAP	With this option, pppd will not agree to authenticate itself to the peer using CHAP.
Require CHAP	Require the peer to authenticate using CHAP (Challenge Handshake Authentication Protocol) authentication.
Max. CHAP challenge transmissions	Set the maximum number of CHAP challenge transmissions to $n$ (default 10).
CHAP restart interval sec	Set the CHAP restart interval (retransmission timeout for challenges) to <i>n</i> seconds (default 3).
Refuse MS-CHAP	With this option, pppd will not agree to authenticate itself to the peer using MS-CHAP.
Refuse MS-CHAPv2	With this option, pppd will not agree to authenticate itself to the peer using MS-CHAPv2.
Refuse EAP	With this option, pppd will not agree to authenticate itself to the peer using EAP.
Connection debugging	Enables connection debugging facilities. If this option is selected, pppd will log the contents of all control packets sent or received in a readable form.
Maximum Transmit Unit ( bytes)	Set the MTU (Maximum Transmit Unit) value to $n$ . Unless the peer requests a smaller value via MRU negotiation, pppd will request that the kernel networking code send data packets of no more than $n$ bytes through the PPP network interface.
Maximum Receive Unit (bytes)	Set the MRU (Maximum Receive Unit) value to $n$ . Pppd will ask the peer to send packets of no more than $n$ bytes. The value of $n$ must be between 128 and 16384; the default is 1500.



VJ-Compression	Disable Van Jacobson style TCP/IP header compression in both directions.
VJ-Connection-ID Compression	Disable the connection-ID compression option in Van Jacobson style TCP/IP header compression. With this option, pppd will not omit the connection-ID byte from Van Jacobson compressed TCP/IP headers.
Protocol Field Compression	Disable protocol field compression negotiation in both directions.
Address/Control Compression	Disable Address/Control compression in both directions.
Predictor-1 Compression	Disable or enable accept or agree to Predictor-1 compression.
BSD Compression	Disable or enable BSD-Compress compression.
Deflate Compression	Disable or enable Deflate compression.
Compression Control Protocol negotiation	Disable CCP (Compression Control Protocol) negotiation. This option should only be required if the peer is buggy and gets confused by requests from pppd for CCP negotiation.
Magic Number negotiation	Disable magic number negotiation. With this option, pppd cannot detect a looped-back line. This option should only be needed if the peer is buggy.
Passive Mode	Enables the "passive" option in the LCP. With this option, pppd will attempt to initiate a connection; if no reply is received from the peer, pppd will then just wait passively for a valid LCP packet from the peer, instead of exiting, as it would without this option.
Silent Mode	With this option, pppd will not transmit LCP packets to initiate a connection until a valid LCP packet is received from the peer (as for the "passive" option with ancient versions of pppd).
Append domain name	Append the domain name $d$ to the local host name for authentication purposes.
Show PAP password in log	When logging the contents of PAP packets, this option causes pppd to show the password string in the log message.
Time to wait before re- initiating the link (sec)	Specifies how many seconds to wait before re-initiating the link after it terminates. The holdoff period is not applied if the link was terminated because it was idle.
LCP-Echo-Failure	If this option is given, pppd will presume the peer to be dead if $n$ LCP echo- requests are sent without receiving a valid LCP echo-reply. If this happens, pppd will terminate the connection. This option can be used to enable pppd to terminate after the physical connection has been broken (e.g., the modem has hung up) in situations where no hardware modem control lines are available.
LCP-Echo-Interval	If this option is given, pppd will send an LCP echo-request frame to the peer every <i>n</i> seconds. Normally the peer should respond to the echo-request by sending an echo-reply. This option can be used with the <i>lcp-echo-failure</i> option to detect that the peer is no longer connected.
Use Peer DNS	With this option enabled, router resolves addresses using ISP's DNS servers.
Modem Initialization String	This field provides an option to directly specify AT commands.
Roaming Mode	By enabling this option router will be able to connect to roaming network.

Table 6 - Advanced WAN Settings

#### **USER MANUAL**

#### Settings – Routing

The static routing function determines the path that data follows over your network before and after it passes through the GWR-I Router. You can use static routing to allow different IP domain users to access the Internet through the GWR-I Router. Static routing is a powerful feature that should be used by advanced users only. In many cases, it is better to use dynamic routing because it enables the GWR-I Router to automatically adjust to physical changes in the network's layout.

The GWR-I Router is a fully functional router with static routing capability. *Figure* 12 shows screenshot of Routing page.

<b>?</b> H												outing
										js	able Setting	outing Ta
										1	static routes	Current s
						Interface	Metric	Gateway	Netmask			Enable
						eth0	0	1.0.0	255.255.0 0.0	) 2!	192.168.1.0	
					Action	Interface	Metric	Gateway	e routing table Netmask		-	Apply the
					Rem	ppp_0 🗸	1		I.O *	0.	0.0.0.0	
					Add	eth0 🔽						<b>V</b>
,	Interface Action	Earward to port	Forward to IP	ation Port	k Dectin	ion Notmas		-	external networks to		ble Network	Forward
-	eth0 V Add		Forward to iF		K Desui	on neunas	Desultau	Desulation	Source neuliask	30urce ir	TCP V	
			Forward to IP	ation Port	k Destin	ion Netmas		-	external networks to Source Netmask	onnections fro Source IF	Protocol	Enable

Figure 12 - Routing configuration page

Use this menu to setup all routing parameters. Administrator can perform following operations:

- Create/Edit/Remove routes (including default route),
- Port translation Reroute TCP and UPD packets to desired destination inside the network.

Routing Settings							
Label	Description						
	Routing Table						
Enable	This check box allows you to activate/deactivate this static route.						
Source IP	Source IP address from which portforwarding is allowed, all other traffic is denied						
Source Netmask	Subnet mask for allowed IP subnet						
Dest Network	This parameter specifies the IP network address of the final destination. Routing is always based on network number. If you need to specify a route to a single host, use a subnet mask of 255.255.255.255 in the subnet mask field to force the network number to be identical to the host ID.						
Netmask	This parameter specifies the IP netmask address of the final destination.						
Gateway	This is the IP address of the gateway. The gateway is a router or switch (next hope) on the same network segment as the device's LAN or WAN port. The gateway helps forward packets to their final destinations. For every routing rule enter the IP address of the gateway. Please notice that <i>ppp0</i> interface has only one default gateway (provided by Mobile operator) and because of that that there is no option for gateway when you choose <i>ppp0</i> interface.						



Metric	Metric represents the "cost" of transmission for routing purposes. IP routing uses hop count as the measurement of cost, with a minimum of 1 for directly connected networks. Enter a number that approximates the cost for this link. The number need not be precise, but it must be between 1 and 15. In practice, 2 or 3 is usually a good number.						
Interface	Interface represents the "exit" of transmission for routing purposes. In this case <i>Eth0</i> represents LAN interface and <i>ppp0</i> represents GSM/UMTS mobile interface of the GWR-I Router.						
	TCP/UDP Traffic forwarding						
Enable	This check box allows you to activate/deactivate this static port translation.						
Protocol	Choose between TCP and UDP protocol.						
Destination IP	This field specifies IP address of the incoming traffic.						
Destination Netmask	This field specifies netmask for the previous address.						
Destination Port	This is the TCP/UDP port of application.						
Forward to IP	This filed specifies IP address where packets should be forwarded.						
Forward to port	Specify TCP/UDP port on which the traffic is going to be forwarded.						
Interface	Select interface where portforwarding is done. Portforwarding from outside (WAN) interface to inside (LAN) interface is done on PPP, and in reverse direction on Ethernet interface						
Add	Click <i>Add</i> to insert (add) new item in table to the GWR-I Router.						
Remove	Click Remove to delete selected item from table.						
Reload	Click <i>Reload</i> to discard any changes and reload previous settings.						
Save	Click <i>Save</i> to save your changes back to the GWR-I Router. After pressing <i>Save button</i> it make take more than 10 seconds for router to save parameters and become operational again.						

Table 7 - Routing parameters

#### Port translation

For incoming data, the GWR-I Router forwards IP traffic destined for a specific port, port range or GRE/IPsec protocol from the cellular interface to a private IP address on the Ethernet "side" of the GWR-I Router.

## Settings – Dynamic Routing Protocol

Dynamic routing performs the same function as static routing except it is more robust. Static routing allows routing tables in specific routers to be set up in a static manner so network routes for packets are set. If a router on the route goes down the destination may become unreachable. Dynamic routing allows routing tables in routers to change as the possible routes change.

#### Routing Information Protocol (RIP)

The Routing Information Protocol (RIP) is a dynamic routing protocol used in local and wide area networks. As such it is classified as an interior gateway protocol (IGP) using the distance-vector routing



algorithm. The Routing Information Protocol provides great network stability, guaranteeing that if one network connection goes down the network can quickly adapt to send packets through another connection.

Click *RIP* Tab, to open the Routing Information Protocol screen. Use this screen to configure the GWR-I Router RIP parameters (*Figure 13*).

Routing Information Protocol		<ul><li>Pelp</li></ul>
Routing Manager		
Hostname Password Enable log	Router zebra	
Port to bind at		
Ouser defined		
RIPD		
Hostname Password Port to bind at Ouser defined To Default (2602)	ripd zebra	
C Default [2002]		
		Reload Save
Routing Information Protocol Status		
Status	stopped	
		Start Stop Restart
	Copyright © 2008 ⊙eneko. All rights reserved.	

Figure 13 - RIP configuration page



RIP Settings							
Label	Description						
Routing Manager							
Hostname	Prompt name that will be displayed on telnet console.						
Password	Login password.						
Enable log	Enable log file.						
Port to bind atLocal port the service will listen to.							
	RIPD						
Hostname	Prompt name that will be displayed on telnet console of the Routing Information Protocol Manager.						
Password	Login password.						
Port to bind at	Local port the service will listen to.						
	Routing Information Protocol Status						
Start	Start RIP.						
Stop	Stop RIP.						
Restart	Restart RIP.						
Save	Click <i>Save</i> to save your changes back to the GWR-I Router.						
Reload Click Reload to discard any changes and reload previous settings.							

Table 8 - RIP parameters

#### RIP routing engine for the GWR-I Router

Use telnet to enter in global configuration mode.

```
telnet 192.168.1.1 2602 // telnet to eth0 at TCP port 2602///
```

To enable RIP, use the following commands beginning in global configuration mode:

router# router rip

To associates a network with a RIP routing process, use following commans:

router# network [A.B.C.D/Mask]

By default, the GWR-I Router receives RIP version 1 and version 2 packets. You can configure the GWR-I Router to receive an send only version 1. Alternatively, tou can configure the GWR-I Router to receive and send only version 2 packets. To configure GWR-I Router to send and receive packets from only one version, use the following command:

```
router# rip version [1|2] // Same as other router //
```

Disable route redistribution:

```
router# no redistribute kernel
router# no redistribute static
router# no redistribute connected
```



Disable RIP update (optional):

router# passive-interface eth0
router# no passive-interface eth0

Routing protocols use several timer that determine such variables as the frequency of routing updates, the length of time before a route becomes invalid, an other parameters. You can adjust these timer to tune routing protocol performance to better suit your internetwork needs. Use following command to setup RIP timer:

router# timers basic [UPDATE-INTERVAL] [INVALID] [TIMEOUT] [GARBAGE-COLLECT]
router# no timers basic

Configure interface for RIP protocol

router# interface greX
router# ip rip send version [VERSION]
router# ip rip receive version [VERSION]

Disable rip authentication at all interface.

Router(interface)# no ip rip authentication mode [md5|text]

Debug commands:

router# debug rip
router# debug rip events
router# debug rip packet
router# terminal monitor



#### Settings – VPN Settings

Virtual private network (VPN) is a communications network tunneled through another network and dedicated to a specific network. One common application of VPN is secure communication through the public Internet, but a VPN need not have explicit security features, such as authentication or content encryption. VPNs, for example, can be used to separate the traffic of different user communities over an underlying network with strong security features.

A VPN may have best-effort performance, or may have a defined Service Level Agreement (SLA) between the VPN customer and the VPN service provider. Generally, a VPN has a topology more complex than point-to-point. The distinguishing characteristics of VPNs are not security or performance, but that they overlay other network(s) to provide a certain functionality that is meaningful to a user community.

## Generic Routing Encapsulation (GRE)

Originally developed by Cisco, generic routing encapsulation (GRE) is now a standard, defined in RFC 1701, RFC 1702, and RFC 2784. GRE is a tunneling protocol used to transport packets from one network through another network.

If this sounds like a virtual private network (VPN) to you, that's because it theoretically is: Technically, a GRE tunnel is a type of a VPN – but it isn't a secure tunneling method. However, you can encrypt GRE with an encryption protocol such as IPSec to form a secure VPN. In fact, the point-to-point tunneling protocol (PPTP) actually uses GRE to create VPN tunnels. For example, if you configure Microsoft VPN tunnels, by default, you use PPTP, which uses GRE.

Solution where you can use GRE protocol:

- You need to encrypt multicast traffic. GRE tunnels can carry multicast packets just like real network interfaces as opposed to using IPSec by itself, which can't encrypt multicast traffic. Some examples of multicast traffic are OSPF, EIGRP. Also, a number of video, VoIP, and streaming music applications use multicast.
- You have a protocol that isn't routable, such as NetBIOS or non-IP traffic over an IP network. You could use GRE to tunnel IPX/AppleTalk through an IP network.
- You need to connect two similar networks connected by a different network with different IP addressing.

Click *VPN Settings* Tab, to open the VPN configuration screen. In the *Figure 14* you can see screenshot of *GRE* Tab configuration menu.

VPN Settings / GRE Tunneling Parameters									
Label	Description								
<i>Enable</i> This check box allows you to activate/deactivate VPN/GRE traffic.									
Local Tunnel Address	This field specifies IP address of virtual tunnel interface.								
Local Tunnel Netmask	This field specifies the IP netmask address of virtual tunnel. This field is unchangeable, always 255.255.255.252								
Tunnel Source	This field specifies IP address or hostname of tunnel source.								
Tunnel Destination	This field specifies IP address or hostname of tunnel destination.								
Interface	This field specifies GRE interface. This field gets from the GWR-I Router.								
KeepAlive Enable	Check for keepalive enable.								
Period	Defines the time interval (in seconds) between transmitted keepalive packets. Enter a number from 3 to 60 seconds.								
Retries	Defines the number of times retry after failed keepalives before determining that								



	the tunnel endpoint is down. Enter a number from 1 to 10 times.
Add	Click <i>Add</i> to insert (add) new item in table to the GWR-I Router.
Remove	Click <i>Remove</i> to delete selected item from table.
Reload	Click <i>Reload</i> to discard any changes and reload previous settings.
Save	Click <i>Save</i> to save your changes back to the GWR-I Router.

Table 9 - GRE parameters

Settings								1
nable	Local Tunnel Address	Local Tunnel Netmask	Tunnel Source	Tunnel Destination	Interface KeepAlive Enable	Period	Retries Action	
		255.255.255.25;	IP 🖌	IP 👻			Add	
Addres	s: IP Address of virtual tunnel inte	rface						
ma	sk: (Unchangeable, always 255.25) Idress of tunnel source							Rela

Figure 14 - GRE tunnel parameters configuration page

#### **GRE Keepalive**

GRE tunnels can use periodic status messages, known as keepalives, to verify the integrity of the tunnel from end to end. By default, GRE tunnel keepalives are disabled. Use the keepalive check box to enable this feature. Keepalives do not have to be configured on both ends of the tunnel in order to work; a tunnel is not aware of incoming keepalive packets. You should define the time interval (in seconds) between transmitted keepalive packets. Enter a number from 1 to 60 seconds, and the number of times to retry after failed keepalives before determining that the tunnel endpoint is down. Enter a number from 1 to 10 times.



#### Internet Protocol Security (IPSec)

Internet Protocol Security (IPSec) is a protocol suite for securing Internet Protocol communication by authenticating and encrypting each IP packet of a data stream.

Click *VPN Settings* Tab, to open the VPN configuration screen. At the *Figure 17* you can see IPSec Summary screen. This screen gathers information about settings of all defined IPSec tunnels. You can define up to 5 Device-to-Device tunnels. Two different firmware versions of GWR-I have slightly different IPSec Advanced options.

First firmware version provides single Negotiation mode:

• Main

Second version has IPSec Negotiation mode options:

- Aggressive
- Main
- Base

Router is delivered with first firmware version as more reliable and secure solution. Only with this version you have option to define IKE retry failover mechanism and log level of IPSec system messages. If you cannot use IP address as a peer identifier at one side of the tunnel (private IP subnet) aggressive mode has to be utilized (second version)

## Default firmware version (without Aggressive Mode)

IPSec Summary and IPSec Settings related with second firmware version are briefly displayed in following figures and tables

Int	ern	et Pro	otocol S	Security	,								Help
Su	mm	ary											
	Tunnels used:     1       Maximum number of tunnels:     5												
(	Add New Tunnel Log level none												
ſ	<b>١</b> ٥.	Name	Enabled	Status	Enc/Auth/Grp	Advanced	Local Group	Remote Group	Remote Gateway	Ac	tion	Connecti	on mode
	1	test	yes	waiting ppp_0	Ph1:3DES/MD5/2 Ph2:3DES/MD5/2	N/I	10.0.0.0 255.255.255.0	10.10.11.0 255.255.255.0	172.24.72.103	Edit	Delete	Connec	Wait
** Reco *** Tun s s c	1     test     yes     waiting PTL:30ES/MDS/2     N/I     255/255/256.0     172.24.72.103     Edit     Delete     Connec     Wait       ducing the MTU size on the client side, can help eliminate some connectivity problems occurring at the protocol level some description.     some description. <td>Refresh</td>						Refresh						

Figure 15 - IPSec Summary screen for second firmware version

VPN Settings / IPSec Summary							
Label	Description						
Tunnels Used	This is the number of IPSec tunnels being defined.						
<i>Maximum number of</i> This is the maximum number of tunnels which can be defined. <i>tunnels</i>							
No	This filed indicates the number of the IPSec tunnel.						
Name	Field shows the Tunnel Name that you gave to the IPSec tunnel.						
Enabled	This field shows if tunnel is enabled or disabled. After clicking on Start button,						



#### **USER MANUAL**

	only enabled tunnels will be started.						
Status	Field indicates status of the IPSec tunnel. Click on <i>Refresh</i> button to see current status of defined IPSec tunnels.						
Enc/Auth/Grp	This field shows both Phase 1 and Phase 2 details, Encryption method (DES/3DES/AES), Authentication method (MD5/SHA1), and DH Group number $(1/2/5)$ that you have defined in the IPSec Setup section.						
Advanced	Field shows the chosen options from IPSec Advanced section by displaying the first letters of enabled options.						
Local Group	Field shows the IP address and subnet mask of the Local Group.						
Remote Group	Field displays the IP address and subnet mask of the Remote Group.						
Remote Gateway	Field shows the IP address of the Remote Device.						
Connection mode	Field displays connection mode of the current tunnel <i>Connect -</i> IPSec tunnel initiating side in negotiation process <i>Wait -</i> IPSec tunnel responding side in negotiation process						
Log level	Set IPSec log level						
Delete	Click on this link to delete the tunnel and all settings for that particular tunnel.						
Edit	This link opens screen where you can change the tunnel's settings.						
Add New Tunnel	Click on this button to add a new Device-to-Device IPSec tunnel. After you hav added the tunnel, you will see it listed in the Summary table.						
Start	This button starts the IPSec negotiations between all defined and enabled tunnels. If the IPSec is already started, Start button is replaced with Restart button.						
Stop	This button will stop all IPSec started negotiations.						
Refresh	Click on this button to refresh the Status field in the Summary table.						

Table 10 - IPSec Summary for second firmware version

To create a tunnel click Add New Tunnel button. Depending on your selection, the Local Group Setup and Remote Group Setup settings will differ. Proceed to the appropriate instructions for your selection.



Device 2 Device Tunnel				<ul><li>Help</li></ul>
Add New Tunnel				
Tunnel Number	1			
Tunnel Name	test			
Enable				
Local Group Setup				
Local Security Gateway Type	SIM Card 💌			
Local occurry Galeway Type				
Custom Peer ID				
IP Address From	SIM 1			
Local Security Group Type	Subnet 💌			
IP Address	10.0.0.0			
Subnet Mask	255.255.255.0			
Remote Group Setup				
Remote Security Gateway Type	IP Only			
IP Address	172.24.72.103			
Custom Peer ID				
Remote Security Group Type	Subnet 💌			
IP Address	10.10.11.0			
Subnet Mask	255.255.255.0			
IPSec Setup				
Keying Mode	IKE with Preshared key			
Phase 1 DH Group	Group2			
Phase 1 Encryption	3DES 🔹			
Phase 1 Authentication	MD5 -			
Phase 1 SA Life Time	28800 sec			
Perfect Forward Secrecy				
Phase 2 DH Group	Group2 💌			
Phase 2 Encryption	3DES •			
Phase 2 Authentication	MD5 -			
Phase 2 SA Life Time	3600 sec			
	1234567890	*		
Preshared Key				
		~		
Failover				
Enable IKE Failover IKE SA Retry				
Restart PPP After IKE SA Retry Exceed	ds Specified Limit			
Enable Tunnel Failover				
Ping IP				
Ping Interval	sec			
Packet Size				
Advanced Ping Interval	sec			
Advanced Ping Wait For A Response	sec			
Maximum Number Of Failed Packets	%			
Advanced				
Compress (Support IP Payload Compress	sion Protocol (IPComp))			
☑ Dead Feel Detection (DFD) st				
Send Initial Contact				
			Back	Reload Save

Figure 16 - IPSec Settings for second firmware version



	VPN Settings / IPSec Settings
Label	Description
Tunnel Number	This number will be generated automatically and it represents the tunnel number.
Tunnel Name	Enter a name for the IPSec tunnel. This allows you to identify multiple tunnels and does not have to match the name used at the other end of the tunnel.
Enable	Check this box to enable the IPSec tunnel.
IPSec Setup	In order to establish an encrypted tunnel, the two ends of an IPSec tunnel must agree on the methods of encryption, decryption and authentication. This is done by sharing a key to the encryption code. For key management, the Router uses only IKE with Preshared Key mode.
Keying Mode	IKE with Preshared Key IKE is an Internet Key Exchange protocol used to negotiate key material for Security Association (SA). IKE uses the Preshared Key to authenticate the remote IKE peer. Both ends of IPSec tunnel must use the same mode of key management. Certificates This option will be available in future release
Phase 1 DH Group	Phase 1 is used to create the SA. DH (Diffie-Hellman) is a key exchange protocol used during Phase 1 of the authentication process to establish pre-shared keys. There are three groups of different prime key lengths. Group 1 is 768 bits, Group 2 is 1024 bits and Group 5 is 1536 bits long. If network speed is preferred, select Group 1. If network security is preferred, select Group 5.
Phase 1 Encryption	Select a method of encryption: DES (56-bit), 3DES (168-bit) or AES-128 (128-bit). The method determines the length of the key used to encrypt or decrypt ESP packets. AES-128 is recommended because it is the most secure. Make sure both ends of the IPSec tunnel use the same encryption method.
Phase 1 Authentication	Select a method of authentication: MD5 or SHA1. The authentication method determines how the ESP packets are validated. MD5 is a one-way hashing algorithm that produces a 128-bit digest. SHA1 is a one-way hashing algorithm that produces a 160-bit digest. SHA1 is recommended because it is more secure. Make sure both ends of the IPSec tunnel use the same authentication method.
Phase 1 SA Life Time	Configure the length of time IPSec tunnel is active in Phase 1. The default value is 28800 seconds. Both ends of the IPSec tunnel must use the same Phase 1 SA Life Time setting.
Perfect Forward Secrecy	If the Perfect Forward Secrecy (PFS) feature is enabled, IKE Phase 2 negotiation will generate new key material for IP traffic encryption and authentication, so hackers using brute force to break encryption keys will not be able to obtain future IPSec keys. Both ends of the IPSec tunnel must enable this option in order to use the function.
Phase 2 DH Group	If the Perfect Forward Secrecy feature is disabled, then no new keys will be generated, so you do not need to set the Phase 2 DH Group. There are three groups of different prime key lengths. Group 1 is 768 bits, Group 2 is 1024 bits, and Group 5 is 1536 bits long. If network speed is preferred, select Group 1. If network security is preferred, select Group 5. You do not have to use the same DH Group that you used for Phase 1, but both ends of the IPSec tunnel must use the same Phase 2 DH Group.
Phase 2 Encryption	Phase 2 is used to create one or more IPSec SAs, which are then used to key IPSec sessions. Select a method of encryption: NULL, DES (56-bit), 3DES (168-bit) or AES-128 (128-bit). It determines the length of the key used to encrypt or decrypt ESP packets. AES-128 is recommended because it is the most secure. Both ends of the IPSec tunnel must use the same Phase 2 Encryption setting.



Enable IKE failover	Enable IKE failover option which try periodically to reastablish security association.		
Subnet Mask	Enter the subnet mask.		
IP Address	Only the computer with a specific IP address will be able to access the tunnel.		
Remote Security Group Type	Select the remote LAN user(s) behind the Router at the other end that can use this IPSec tunnel. Select the type you want to use: IP or Subnet. <u>NOTE:</u> The Remote Security Group Type you select should match the Local Security Group Type selected on the IPSec device at the other end of the tunnel.		
Custom Peer ID	Authentication identity for one of the participant. Can be an IP address or fully- qualified domain name preceded by @		
IP Address	Only the computer with a specific IP address will be able to access the tunnel.		
Remote Security Gateway Type	Select the remote LAN user(s) behind the Router at the other end that can use this IPSec tunnel. Select the type you want to use: IP or Subnet. <u>NOTE:</u> The Remote Security Group Type you select should match the Local Security Group Type selected on the IPSec device at the other end of the tunnel.		
Subnet Mask	Enter the subnet mask.		
IP Address	Only the computer with a specific IP address will be able to access the tunnel.		
Local Security Group Type	Select the local LAN user(s) behind the Router that can use this IPSec tunnel. Select the type you want to use: IP or Subnet. <u>NOTE:</u> The Local Security Group Type you select should match the Remote Security Group Type selected on the IPSec device at the other end of the tunnel.		
IP Address From	Select SIM card over which the tunnel is established		
Custom Peer ID	Authentication identity for one of the participant. Can be an IP address or fully- qualified domain name preceded by @		
Local Security gateway type	When <b>SIM Card</b> is selected the WAN (or Internet) IP address of the Router automatically appears. If the Router is not yet connected to the GSM/UMTS network this field is without IP address.		
Preshared Key	This specifies the pre-shared key used to authenticate the remote IKE peer. Enter a key of keyboard and hexadecimal characters, e.g., Ay_%4222 or 345fa929b8c3e. This field allows a maximum of 1023 characters and/or hexadecimal values. Both ends of the IPSec tunnel must use the same Preshared Key. <u>NOTE:</u> It is strongly recommended that you periodically change the Preshared Key to maximize security of the IPSec tunnels.		
Phase 2 SA Life Time	Configure the length of time an IPSec tunnel is active in Phase 2. The default is 3600 seconds. Both ends of the IPSec tunnel must use the same Phase 2 SA Life Time setting.		
Phase 2 Authentication	Select a method of authentication: NULL, MD5 or SHA1. The authentication method determines how the ESP packets are validated. MD5 is a one-way hashing algorithm that produces a 128-bit digest. SHA1 is a one-way hashing algorithm that produces a 160-bit digest. SHA1 is recommended because it is more secure. Both ends of the IPSec tunnel must use the same Phase 2 Authentication setting. <u>NOTE:</u> If you select a NULL method of authentication, the previous Phase 2 Encryption method cannot be NULL.		
	<u>NOTE:</u> If you select a NULL method of encryption, the next Phase 2 Authentication method cannot be NULL and vice versa.		



IKE SA retry	Number of IKE retries, before failover.		
Enable tunnel failover	Enable tunnel failover. If there is more than one tunnel defined, this option will failover to other tunnel in case that selected one fails to established connection.		
Ping IP	IP address on other side of tunnel which will be pinged in order to determine current state.		
Ping interval	Specify time period in seconds between two ping		
Packet size	Specify packet size for ping message		
Advanced Ping Interval	Time interval between advanced ping packets.		
Advanced Ping Wait For A Response	Advanced ping proofing timeout.		
Maximum numbers of failed packets	Set percentage of failed packets until failover action is performed.		
Compress (IP Payload Compression Protocol (IP Comp))	IP Payload Compression is a protocol that reduces the size of IP datagram. Select this option if you want the Router to propose compression when it initiates a connection.		
Dead Peer Detection (DPD)	When DPD is enabled, the Router will send periodic HELLO/ACK messages to check the status of the IPSec tunnel (this feature can be used only when both peers or IPSec devices of the IPSec tunnel use the DPD mechanism). Once a dead peer has been detected, the Router will disconnect the tunnel so the connection can be re-established. Specify the interval between HELLO/ACK messages (how often you want the messages to be sent). The default interval is 20 seconds.		
NAT Traversal	Both the IPSec initiator and responder must support the mechanism for detecting the NAT router in the path and changing to a new port, as defined in RFC 3947. <u>NOTE:</u> If you select this mode the Aggressive mode will be automatically selected because it is obligatory option for NAT-T to work properly. <u>NOTE:</u> Keep-alive for NAT-T function is enabled by default and cannot be disabled. The default interval for keep-alive packets is 20 seconds.		
Send initial contact	The initial-contact status message may be used when one side wishes to inform the other that this is the first SA being established with the remote system. The receiver of this Notification Message might then elect to delete any existing SA's it has for the sending system under the assumption that the sending system has rebooted and no longer has access to the original SA's and their associated keying material.		
Back	Click <i>Back</i> to return on IPSec Summary screen.		
Reload	Click <i>Reload</i> to discard any changes and reload previous settings.		
Save	Click <i>Save</i> to save your changes back to the GWR-I Router. After that router automatically goes back and begin negotiations of the tunnels by clicking on the Start button.		

Table 11 - IPSec Parameters for second firmware version



# Alternative firmware version (Aggressive Mode supported)

IPSec Summary and IPSec Settings related with first firmware version are briefly displayed in following figures and tables below

Internet Protocol :	Securii	ty											🕐 Help
Summary													
Tunnels used: Maximum number of t	unnels:		:	1 5									
Add New Tunnel													
	No.	Name	Enabled	Status	Enc/Auth/Grp	Advanced Setup	Local Group	Remote Group	Remote Gateway	Act	ion		
	1	Test	yes	stopped	Ph1: 3DES/MD5/2 Ph2: 3DES/MD5/2	A/N/I	10.0.0.0 255.255.255.0	10.0.11.0 255.255.255.0	172.24.72.103	Edit	Delete		
	n clientsid heck IPSe - IPSec is	le 1300 c tunnels running a	status		nectivity problems occurri ther end to connect	ing at the protocol level					Start	Stop	Refresh
	- tunnel is - IPSec is		ng ortunnel	is not enab	ed								

Figure 17 - IPSec Summary screen for first firmware version

VPN Settings / IPSec Summary					
Label	Description				
Tunnels Used	This is the number of IPSec tunnels being defined.				
Maximum number of tunnels	This is the maximum number of tunnels which can be defined.				
No	This filed indicates the number of the IPSec tunnel.				
Name	Field shows the Tunnel Name that you gave to the IPSec tunnel.				
Enabled	This field shows if tunnel is enabled or disabled. After clicking on <i>Start</i> button, only enabled tunnels will be started.				
Status	Field indicates status of the IPSec tunnel. Click on <i>Refresh</i> button to see current status of defined IPSec tunnels.				
Enc/Auth/Grp	This field shows both Phase 1 and Phase 2 details, Encryption method (DES/3DES/AES), Authentication method (MD5/SHA1), and DH Group number $(1/2/5)$ that you have defined in the IPSec Setup section.				
Advanced	Field shows the chosen options from IPSec Advanced section by displaying the first letters of enabled options.				
Local Group	Field shows the IP address and subnet mask of the Local Group.				
Remote Group	Field displays the IP address and subnet mask of the Remote Group.				
Remote Gateway	Field shows the IP address of the Remote Device.				
Delete	Click on this link to delete the tunnel and all settings for that particular tunnel.				
Edit	This link opens screen where you can change the tunnel's settings.				
Add New Tunnel	Click on this button to add a new Device-to-Device IPSec tunnel. After you have added the tunnel, you will see it listed in the Summary table.				
Start	This button starts the IPSec negotiations between all defined and enabled tunnels. If the IPSec is already started, Start button is replaced with Restart button.				



USER MANUAL	GWR-I Cellular Router Series
Stop	This button will stop all IPSec started negotiations.
Refresh	Click on this button to refresh the Status field in the Summary table.

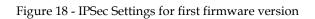
Table 12 - IPSec Summary for first firmware version

To create a tunnel click Add New Tunnel button. Depending on your selection, the Local Group Setup and Remote Group Setup settings will differ. Proceed to the appropriate instructions for your selection.

Add New Tunnel	
Tunnel Number	1
Tunnel Name	Test
Enable	
IPSec Setup	
Keying Mode	IKE with Preshared key 💙
Phase 1 DH Group	Group2 🗸
Phase 1 Encryption	3DES V
Phase 1 Authentication	MD5 V
Phase 1 SA Life Time	28800 sec
Perfect Forward Secrecy	
Phase 2 DH Group	Group2
Phase 2 Encryption	3DES 💌
Phase 2 Authentication	MD5
Phase 2 SA Life Time	3600 sec
	135780
Drack and Mary	
Preshared Key	
Local Group Setup	
Local Security Gateway Type	SIM Card
Looal Cooding Calorian Type	
IP Address From	SIM 1
Local ID Type	IP Address 💌
Local Security Group Type	Subnet 💌
IP Address	10.0.0
Subnet Mask	255.255.255.0
Subnet Mask	233,233,233,0
Remote Group Setup	
Remote Security Gateway Type	IP Only
Remote Security Gateway Type	IP Only
Remote Security Gateway Type IP Address	IP Only  172.24.72.103
IP Address	172.24.72.103
IP Address Remote ID Type	172.24.72.103
IP Address Remote ID Type Remote Security Group Type	172.24.72.103
IP Address Remote ID Type	172.24.72.103



Failover		
Enable Tunnel Failover		
Ping IP		
Ping Interval	sec	
Packet Size		
Advanced Ping Interval	sec	
Advanced Ping Wait For A Response	sec	
Maximum Number Of Failed Packets	%	
Advanced		
Auvanceu		
Negotiation Mode	Aggressive 👻	
Compression (IPComp)		
Dead Peer Detection (DPD)	sec	
🗹 NAT Traversal		
Send Initial Contact		
<u>L</u>		Back Beload Save



	VPN Settings / IPSec Settings				
Label	Description				
Tunnel Number	This number will be generated automatically and it represents the tunnel number.				
Tunnel Name	Enter a name for the IPSec tunnel. This allows you to identify multiple tunnels and does not have to match the name used at the other end of the tunnel.				
Enable	Check this box to enable the IPSec tunnel.				
IPSec Setup	In order to establish an encrypted tunnel, the two ends of an IPSec tunnel must agree on the methods of encryption, decryption and authentication. This is done by sharing a key to the encryption code. For key management, the Router uses only IKE with Preshared Key mode.				
Keying Mode	<b>IKE with Preshared Key</b> IKE is an Internet Key Exchange protocol used to negotiate key material for Security Association (SA). IKE uses the Preshared Key to authenticate the remote IKE peer. Both ends of IPSec tunnel must use the same mode of key management. <b>Certificates</b> This option will be available in future release				
Phase 1 DH Group	Phase 1 is used to create the SA. DH (Diffie-Hellman) is a key exchange protocol used during Phase 1 of the authentication process to establish pre-shared keys. There are three groups of different prime key lengths. Group 1 is 768 bits, Group 2 is 1024 bits and Group 5 is 1536 bits long. If network speed is preferred, select Group 1. If network security is preferred, select Group 5.				
Phase 1 Encryption	Select a method of encryption: DES (56-bit), 3DES (168-bit) or AES-128 (128-bit). The method determines the length of the key used to encrypt or decrypt ESP packets. AES-128 is recommended because it is the most secure. Make sure both ends of the IPSec tunnel use the same encryption method.				
Phase 1 Authentication	Select a method of authentication: MD5 or SHA1. The authentication method determines how the ESP packets are validated. MD5 is a one-way hashing algorithm that produces a 128-bit digest. SHA1 is a one-way hashing algorithm that produces a 160-bit digest. SHA1 is recommended because it is more secure. Make sure both ends of the IPSec tunnel use the same authentication method.				
Phase 1 SA Life Time	Configure the length of time IPSec tunnel is active in Phase 1. The default value is 28800 seconds. Both ends of the IPSec tunnel must use the same Phase 1 SA Life				



	Time setting.
Perfect Forward Secrecy	If the Perfect Forward Secrecy (PFS) feature is enabled, IKE Phase 2 negotiation will generate new key material for IP traffic encryption and authentication, so hackers using brute force to break encryption keys will not be able to obtain future IPSec keys. Both ends of the IPSec tunnel must enable this option in order to use the function.
Phase 2 DH Group	If the Perfect Forward Secrecy feature is disabled, then no new keys will be generated, so you do not need to set the Phase 2 DH Group. There are three groups of different prime key lengths. Group 1 is 768 bits, Group 2 is 1024 bits, and Group 5 is 1536 bits long. If network speed is preferred, select Group 1. If network security is preferred, select Group 5. You do not have to use the same DH Group that you used for Phase 1, but both ends of the IPSec tunnel must use the same Phase 2 DH Group.
Phase 2 Encryption	Phase 2 is used to create one or more IPSec SAs, which are then used to key IPSec sessions. Select a method of encryption: NULL, DES (56-bit), 3DES (168-bit) or AES-128 (128-bit). It determines the length of the key used to encrypt or decrypt ESP packets. AES-128 is recommended because it is the most secure. Both ends of the IPSec tunnel must use the same Phase 2 Encryption setting. <u>NOTE: If you select a NULL method of encryption, the next Phase 2 Authentication method cannot be NULL and vice versa.</u>
Phase 2 Authentication	Select a method of authentication: NULL, MD5 or SHA1. The authentication method determines how the ESP packets are validated. MD5 is a one-way hashing algorithm that produces a 128-bit digest. SHA1 is a one-way hashing algorithm that produces a 160-bit digest. SHA1 is recommended because it is more secure. Both ends of the IPSec tunnel must use the same Phase 2 Authentication setting. <u>NOTE:</u> If you select a NULL method of authentication, the previous Phase 2 Encryption method cannot be NULL.
Phase 2 SA Life Time	Configure the length of time an IPSec tunnel is active in Phase 2. The default is 3600 seconds. Both ends of the IPSec tunnel must use the same Phase 2 SA Life Time setting.
Preshared Key	This specifies the pre-shared key used to authenticate the remote IKE peer. Enter a key of keyboard and hexadecimal characters, e.g., Ay_%4222 or 345fa929b8c3e. This field allows a maximum of 1023 characters and/or hexadecimal values. Both ends of the IPSec tunnel must use the same Preshared Key. <u>NOTE:</u> It is strongly recommended that you periodically change the Preshared Key to maximize security of the IPSec tunnels.
Local Security gateway type	When <b>SIM Card</b> is selected the WAN (or Internet) IP address of the Router automatically appears. If the Router is not yet connected to the GSM/UMTS network this field is without IP address.
IP Address From	Select SIM card over which the tunnel is established
Local ID Type	How the of the participant should be identified for authentication; Can be an IP address, fully-qualified domain name (FQDN) or User FQDN name preceded by @ .
Local Security Group Type	Select the local LAN user(s) behind the Router that can use this IPSec tunnel. Select the type you want to use: IP or Subnet. <u>NOTE:</u> The Local Security Group Type you select should match the Remote Security Group Type selected on the IPSec device at the other end of the tunnel.
IP Address	Only the computer with a specific IP address will be able to access the tunnel.
Subnet Mask	Enter the subnet mask.
	Only the computer with a specific IP address will be able to access the tunnel.



Select the remote LAN user(s) behind the Router at the other end that can use this IPSec tunnel. Select the type you want to use: IP or Subnet. <u>NOTE:</u> The Remote Security Group Type you select should match the Local Security Group Type selected on the IPSec device at the other end of the tunnel.
Only the computer with a specific IP address will be able to access the tunnel.
How the of the participant should be identified for authentication; Can be an IP address, fully-qualified domain name (FQDN) or User FQDN name preceded by @
Select the remote LAN user(s) behind the Router at the other end that can use this IPSec tunnel. Select the type you want to use: IP or Subnet. <u>NOTE:</u> The Remote Security Group Type you select should match the Local Security Group Type selected on the IPSec device at the other end of the tunnel.
Only the computer with a specific IP address will be able to access the tunnel.
Enter the subnet mask.
Enable tunnel failover. If there is more than one tunnel defined, this option will failover to other tunnel in case that selected one fails to established connection.
IP address on other side of tunnel which will be pinged in order to determine current state.
Specify time period in seconds between two ping
Specify packet size for ping message
Time interval between advanced ping packets.
Advanced ping proofing timeout.
Set percentage of failed packets until failover action is performed.
This option enables selection from three IPSec modes: <b>Main, Aggressive</b> and <b>Base</b> . If option NAT Traversal is selected Aggressive mode is predefined.
IP Payload Compression is a protocol that reduces the size of IP datagram. Select this option if you want the Router to propose compression when it initiates a connection.
When DPD is enabled, the Router will send periodic HELLO/ACK messages to check the status of the IPSec tunnel (this feature can be used only when both peers or IPSec devices of the IPSec tunnel use the DPD mechanism). Once a dead peer has been detected, the Router will disconnect the tunnel so the connection can be re-established. Specify the interval between HELLO/ACK messages (how often you want the messages to be sent). The default interval is 20 seconds.
Both the IPSec initiator and responder must support the mechanism for detecting the NAT router in the path and changing to a new port, as defined in RFC 3947. <u>NOTE:</u> If you select this mode the Aggressive mode will be automatically selected because it is obligatory option for NAT-T to work properly. <u>NOTE:</u> Keep-alive for NAT-T function is enabled by default and cannot be disabled. The default interval for keep-alive packets is 20 seconds.
The initial-contact status message may be used when one side wishes to inform the other that this is the first SA being established with the remote system. The



	receiver of this Notification Message might then elect to delete any existing SA's is has for the sending system under the assumption that the sending system has rebooted and no longer has access to the original SA's and their associated keying material.				
Back	Click <i>Back</i> to return on IPSec Summary screen.				
Reload	Click <i>Reload</i> to discard any changes and reload previous settings.				
Save	Click <i>Save</i> to save your changes back to the GWR-I Router. After that router automatically goes back and begin negotiations of the tunnels by clicking on the Start button.				

Table 13 - IPSec Parameters for first firmware version



## OpenVPN

OpenVPN site to site allows connecting two remote networks via point-to-point encrypted tunnel. OpenVPN implementation offers a cost-effective simply configurable alternative to other VPN technologies. OpenVPN allows peers to authenticate each other using a pre-shared secret key, certificates, or username/password. When used in a multiclient-server configuration, it allows the server to release an authentication certificate for every client, using signature and Certificate authority. It uses the OpenSSL encryption library extensively, as well as the SSLv3/TLSv1 protocol, and contains many security and control features. The server and client have almost the same configuration. The difference in the client configuration is the remote endpoint IP or hostname field. Also the client can set up the keepalive settings. For successful tunnel creation a static key must be generated on one side and the same key must be uploaded on the opposite side.

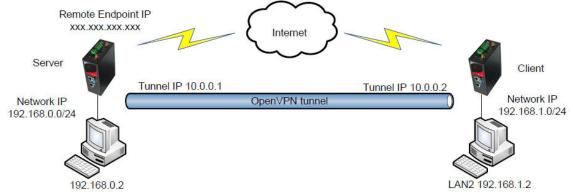


Figure 19 - OpenVPN example

OpenVPN							
Label Description							
IP Filtering							
Tunnel Number	Automatically assigned number of the tunnel.						
Tunnel Name	This field specifies tunnel name.						
Enable	le Check this setting in order to enable OpenVPN tunnel.						
	Allow access from the following devices						
Interface Type	Interface TypeThere are two modes of OpenVPN tunnel, routed and bridged mode.For routed mode select option TUN, and for bridged TAP						
For routed mode select option TUN, and for bridged TAPChoose one of the following options: - none (Select this option if you do not want to use any kind of authentication - pre-shared secret (Select this option if you want to use PSK as a authenticate method) - username/password (Select this option if you want to username/password along with CA Certificate as a authentication method) - X.509 cert. (client) (Select this option if you want to use X.509 certificates a authentication method in client mode) - X.509 cert. (server) (Select this option if you want to use X.509 certificates a authentication method in server mode)							



NOTE: Depending on the options selected in the previous steps	, some of the following options will be
available for configuration.	

available for configurat						
Protocol	Selection between TCP in server or client mode and UDP protocol in connect o wait mode.					
TCP/UDP port	Depending on the selected protocol, port number should be specified.					
LZO Compression	Check the box to enable fast adaptive LZO compression.					
NAT Rules	Enables NAT through the tunnel.					
Keep Alive	Check the box if you want to use keepalive.					
Ping Interval	This field specifies the target IP address for periodical traffic generated using ping in order to maintain the connection active.					
Ping Timeout	This field specifies ping interval for keepalive option.					
Pre-shared Secret	Generate or Paste the Pre-shared Secret. You have an additional option to Export the PSK.					
Max Fragment Size	If you select UDP protocol whether in connect or wait mode you must specify Max Fragment Size (default is 1300 bytes).					
Renegotiate interval	Specify renegotiate interval if username/password is selected as authentication method.					
CA Certificate	Specify the CA Certificate.					
Username	Specify the username.					
Password	Specify the password.					
Local Certificate	Specify the local certificate.					
Local Private Key	Specify the local private key.					
DH Group	Choose the DH Group from the following: 786 bits, 1024 bits, 1536 bits, 2048 bits.					
Remote Host or IP Address	Specify server IP address or hostname.					
Redirect Gateway	This option allows usage of OpenVPN tunnel as a default route.					
Tunnel Interface Configuration	Pull tunnel interface configuration from server side.					
Manual configuration						
Local Interface IP Address	Specify the IP address of the local VPN tunnel endpoint.					
Remote Interface IP Address	Specify the IP address of the remote VPN tunnel endpoint.					
Pull from server						

Table 14 - OpenVPN parameters



OpenVPN		Q Help
Add New Tunnel		
Tunnel Number	1	
Tunnel Name		
Enable		
OpenVPN Settings		
Interface Type	TUN 🗸	
Authenticate Mode	none	
Protocol	UDP connect	
UDP Port	1194	
LZO Compression		
NAT Rules		
Keep Alive		
Max Fragment Size	1300	bytes
On some GSM/UMTS networks, recomm	ended time for Keepalive Ping Interval is grater than	i 10 seconds.
Local / Remote Group Settings		
Remote Host or IP Adress		
Redirect Gateway		
Tunnel Interface Configuration	manual configuration 💌	
Local Interface IP Address		
Remote Interface IP Address		
		Back Reload Save

Figure 20 – OpenVPN configuration page

Local / Remote Group Settings	
Remote Host or IP Adress	
Redirect Gateway	
Tunnel Interface Configuration	pull from server 🛛 💌
Network Topology	p2p 🗸

Figure 21 - OpenVPN network topology



## Settings - IP Filtering

IP filtering is simply a mechanism that decides which types of IP datagram's will be processed normally and which will be discarded. By discarded we mean that the datagram is deleted and completely ignored, as if it had never been received. You can apply many different sorts of criteria to determine which datagram's you wish to filter; some examples of these are:

- Protocol type: TCP, UDP, ICMP, etc.
- Socket number (for TCP/UPD)
- Datagram type: SYN/ACK, data, ICMP Echo Request, etc.
- Datagram source address: where it came from
- Datagram destination address: where it is going to.

It is important to understand at this point that IP filtering is a network layer facility. This means it doesn't understand anything about the application using the network connections, only about the connections themselves. The IP filtering rule set is made up of many combinations of the criteria listed previously.

Use firewall option to set IP addresses from which is possible remote access on the GWR-I Router. Demilitarized Zone (DMZ) allows one IP Address to be exposed to the Internet. Because some applications require multiple TCP/IP ports to be open, DMZ provides this function by forwarding all the ports to one computer at the same time. In the other words, this setting allows one local user to be exposed to the Internet to use a special-purpose services such as Internet gaming, Video-conferencing and etc. It is recommended that you set your computer with a static IP if you want to use this function.

IP Filtering						
Label	Description					
	IP Filtering					
Disable all	This field specifies if Firewall and DMZ settings are disabled at the GWR-I Router.					
Enable Firewall	This field specifies if Firewall is enabled at the GWR-I Router.					
Enable DMZ	This field specifies if DMZ settings is enabled at the GWR-I Router.					
	Allow access from the following devices					
Enable	This check box allows/forbidden host to access to the GWR-I Router.					
IP address	This field specifies IP address of the host allow access to the GWR-I Router.					
Service	This field specifies service of the host allow access to the GWR-I Router.					
Protocol	This field specifies protocol of the host allow access to the GWR-I Router.					
Port	This field specifies port of the host allow access to the GWR-I Router.					
Add	Click <i>Add</i> to insert (add) new item in table to the GWR-I Router.					
Remove	Click <i>Remove</i> to delete selected item from table.					
	Allow access from the following networks					
Enable	This check box allows/forbidden host to access to the GWR-I Router.					
IP address	This field specifies IP address of the host allow access to the GWR-I Router.					
Subnet mask	This field specifies network mask of the network to allow access to the GWR-I Router.					

Service	This field specifies service of the host allow access to the GWR-I Router.					
Protocol	This field specifies protocol of the host allow access to the GWR-I Router.					
Port	This field specifies port of the host allow access to the GWR-I Router.					
Add	Click <i>Add</i> to insert (add) new item in table to the GWR-I Router.					
Remove	Click <i>Remove</i> to delete selected item from table.					
	Demilitarized Zone Host Settings					
DMZ Private IP Address	Demilitarized Zone Host Settings This check box allows/forbidden host to access to the GWR-I Router.					
	6					

# Table 15 - IP filtering parameters

IP Filtering	🕐 Help
General Settings	
© Disable all	
C Enable firewall	
© Enakle DMZ	
Firewall Settings	
Automatically allow access from all devices on the local subnet         Allow access from the following devices         Enable       IP Address         Service       Protocol         Port       Action         Allow access from the following networks         Enable       IP Address         Subnet Mack       Service         Protocol       Port         Action         Imable       IP Address         Subnet Mack       Service         York       TCPACP         105535       Address	
Caudion: Carefully review settings before applying changes. Incorrect settings can make the GWR Router inaccessible from the network. Demilitarized Zone Host Settings	
CMZ private P address	
	Reload Save
Copyright 9 2008 0 kn.eks. All right reserved. <u>Mitty /Meess activity of</u>	

Figure 22 - IP Filtering configuration page



# IP Filtering configuration example

This example configuration demonstrates how to secure a network with a combination of routers and a GWR-I Router.

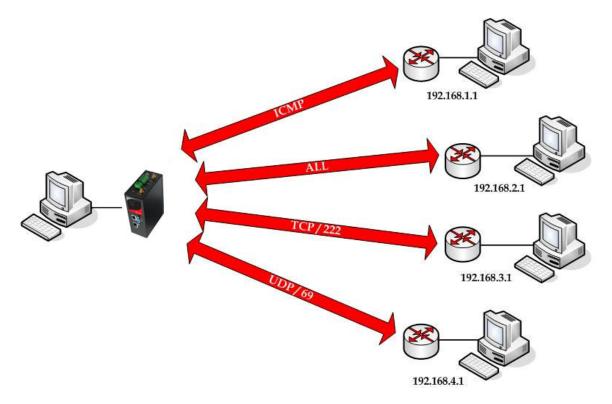


Figure 23 - IP Filtering configuration example

P Filterin	g					• He
eneral Se	ettings					
Disable	all					
Enable f	irewall					
Enable [	DMZ					
rewall S	ettings					
Allow ac	matically allow acces cess from the followin	ig devices				
Enable	IP Address 192.168.1.1	Service	Protocol	Port	Action	
_	192.168.2.1	All Traffic V	TCP/UDP	1.05525	Rem Rem	
	192.168.3.1	Custom V	TCP V	222	Rem	
_	192.168.4.1	Custom V	UDP V		Rem	
		All Traffic 🛩		1-65535	Add	
	cess from the followin	·				
Enable	IP Address	Subnet M		Service	Protocol	
			A	JI Traffic 💌	TCP/UDP	P 1-65535 Add
n: Carefulh	/ review settings before ap	plving changes. Inco	rrect settings	can make the 🤇	WR Router in	inaccessible from the network.
	ed Zone Host Settir					
4Z private	IP address					
						Reload Savi

Figure 24 - IP Filtering settings



## Settings – DynDNS

Dynamic DNS is a domain name service allowing to link dynamic IP addresses to static hostname. To start using this feature firstly you should register to DDNS service provider. Section of the web interface where you can setup DynDNS parameters is shown in Figure 25.

Dynamic DNS			🕐 Help
DynDNS Settings			
Enable DynDNS Client			
Service	dyndns 💌		
Custom server IP			
Custom server port	80		
Hostname	geneko.dyndns-work.com		
Username	geneko317		
Password	•••••		
Maximum interval	86400	sec	
Number of tries	10		
Timeout	120	sec	
Period	5	sec	
Status	started		
Click the Save button to start DynDNS synchronizing		Reload	Save

Figure 25 - DynDNS settings

DynDNS					
Label	Description				
Enable DynDNS Cilent	Enable DynDNS Client.				
Service	The type of service that you are using, try one of: dhs, pgpow, dyndns, dyndns- static, dyndns-custom, ods, easydns, dyns, justlinux and zoneedit.				
Custom Server IP	The server IP to connect to.				
Custom Server port	The server port to connect to.				
Hostname	String to send as host parameter.				
Username	User ID.				
Password	User password.				
Maximum interval	Max interval in seconds between updates, default and minimum is 86400.				
Number of tries	Number of tries (default: 1) if network problem.				
Timeout	The amount of time to wait on I/O (network problem).				
Period	Time between update retry attempts, default value is 1800.				



Reload Cl	Click <i>Reload</i> to discard any changes and reload previous settings.
Save Cl	Click <i>Save</i> to save your changes back to the GWR-I Router.

Table 16 - DynDNS parameters

## Settings - Serial Port 1

Using the router's serial port it is possible to perform serial-to-ethernet conversion (Serial port over TCP/UDP) and ModbusRTU-to-TCP conversion (Modbus gateway). Initial Serial Port Settings page is shown in figure bellow. By default above described features are disabled. Selecting one of two possible applications of Serial port opens up additional options available for configuration.

rial Port 1	
erial Port 1 Settings	
General Settings O Disable all	
O Serial port over TCP/UDP settings Modbus gateway settings	
Serial Port 1 Settings	
Standard Bits per second Data bits	RS-232 V 57600 V
Parity Stop bits	none V
Flow control	none 💌
Status	stopped

Figure 26 - Serial Port Settings initial menu

Following image shows PINOUT of the Serial Port 1.

1	RS-232 Mode	RS-485 4 Wires Mode	RS-485 2 Wires Mode
<sup>2</sup> O O <sup>6</sup> <sup>2</sup> O O <sup>7</sup> <sup>3</sup> O O <sup>8</sup> <sup>4</sup> O O <sup>9</sup> <sup>5</sup> O <sup>9</sup> <b>DSUB-9</b> Female	1 - Not Used 2 - TX (output) 3 - RX (input) 4 - DSR (input) 5 - GND 6 - DTR (output) 7 - CTS (input) 8 - RTS (output) 9 - Not Used	1 - Not Used 2 - TX+ 3 - RX+ 4 - Not Used 5 - GND 6 - Not Used 7 - RX- 8 - TX- 9 - Not Used	1 - Not Used 2 - DATA+ 3 - Not Used 4 - Not Used 5 - GND 6 - Not Used 7 - Not Used 8 - DATA- 9 - Not Used

Figure 27 - Serial Port Settings 1 PINOUT

# Serial port over TCP/UDP settings

The GWR-I Router provides a way for a user to connect from a network connection to a serial port. It provides all the serial port setup, a configuration file to configure the ports, a control login for modifying port parameters, monitoring ports, and controlling ports. The GWR-I Router supports RFC 2217 (remote control of serial port parameters).

	Serial Port over TCP/UDP Settings
Label	Description
Standard	Indicates the standard for serial connection (RS232, RS485 2W, RS485 4W).
Bits per second	The unit and attached serial device, such as a modem, must agree on a speed or baud rate to use for the serial connection. Valid baud rates are 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200.
Data bits	Indicates the number of bits in a transmitted data package.
Parity	Checks for the parity bit. None is the default.
Stop bits	The stop bit follows the data and parity bits in serial communication. It indicates the end of transmission. The default is 1.
Flow control	Flow control manages data flow between devices in a network to ensure it is processed efficiently. Too much data arriving before a device is prepared to manage it causes lost or retransmitted data. None is the default.
Protocol	Choose which protocol to use [TCP/UDP].
Mode	Select server mode in order to listen for incoming connection, or client mode to establish one.
Bind to TCP/UDP port	Number of the TCP/UDP port to accept connections for this device. (Only on server side)
Server IP address	Specify server IP address. (Only on client side)
Connect to TCP/UDP port	Number of the TCP/UDP port to accept connections from this device. (Only on client side)
Type of socket	Either <i>raw or telnet</i> . Raw enables the port and transfers all data like between the port and the log. Telnet enables the port and runs the telnet protocol on the port to set up telnet parameters.
Enable local echo	Enable the local echo feature.
Check TCP connection	Enable connection checking.
Kepalive idle time	Set keepalive idle time in seconds.
Kepalive interval	Set time period between checking.
Log level	Set importance level of log messages.



### **GWR-I Cellular Router Series**

## **USER MANUAL**

Reload	Click <i>Reload</i> to discard any changes and reload previous settings.
50770	Click <i>Save</i> button to save your changes back to the GWR-I Router and activate/deactivate serial to Ethernet converter.

Table 17 – Ser2IP parameters

Click *Serial Port* Tab to open the Serial Port Configuration screen. Use this screen to configure the GWR-I Router serial port parameters (*Figure 28*).

General Settings	
O Disable all	
Serial port over TCP/UDP settings	
O Modbus gateway settings	
Serial Port 1 Settings	
Standard	RS-232 🔽
Bits per second	57600 💌
Data bits	8 💌
Parity	none 💌
Stop bits	1 💌
Flow control	none 💌
TCP/UDP Settings	
Protocol	TCP 🔽
Mode	server 💌
Bind to TCP port	12345
Type of socket	raw 💌
🗹 Enable local echo	
Keepalive Settings	
Check TCP connection	
Kepalive idle time	sec
Kepalive interval	sec
Log Settings	
Log level	level 1 💌
Status	stopped

Figure 28 - Serial Port configuration page



	Serial Port Settings
Label	Description
Enable configuration console	Enable router configuration console. Default serial port parameters are: Serial port parameters: baud rate - 57600, data bits - 8, parity - none, stop bits - 1, flow control - none.
Enable serial-Ethernet converter	Enable serial to Ethernet converter. This provides a way for a user to connect from a network connection to a serial port.
Standard	Indicates the standard for serial connection (RS232, RS485 2W, RS485 4W).
Bits per second	The unit and attached serial device, such as a modem, must agree on a speed or baud rate to use for the serial connection. Valid baud rates are 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200.
Data bits	Indicates the number of bits in a transmitted data package.
Parity	Checks for the parity bit. None is the default.
Stop bits	The stop bit follows the data and parity bits in serial communication. It indicates the end of transmission. The default is 1.
Flow control	Flow control manages data flow between devices in a network to ensure it is processed efficiently. Too much data arriving before a device is prepared to manage it causes lost or retransmitted data. None is the default.
Bind to port	Number of the TCP/IP port to accept connections from for this device.
Type of socket	Either <i>raw, brawl</i> or <i>telnet. raw</i> enables the port and transfers all data as-is between the port and the long. <i>rawlp</i> enables the port and transfers all input data to device, device is open without any termios setting. It allows using printers connected to them. <i>telnet</i> enables the port and runs the telnet protocol on the port to set up telnet parameters. This is most useful for using telnet.
Reload	Click <i>Reload</i> to discard any changes and reload previous settings.
Save	Click <i>Save</i> button to save your changes back to the GWR-I Router and activate/deactivate serial to Ethernet converter.

Table 18 - Serial port parameters



## Modbus Gateway settings

The serial server will perform conversion from Modbus/TCP to Modbus/RTU, allowing polling by a Modbus/TCP master. The Modbus IPSerial Gateway carries out translation between Modbus/TCP and Modbus/RTU. This means that Modbus serial slaves can be directly attached to the unit's serial ports without any external protocol converters.

Click Serial Port Tab to open the Modbus Gateway configuration screen. Choose Modbus Gateway options to configure Modbus. At the Figure 28 you can see screenshot of Modbus Gateway configuration menu.

	Modbus Gateway Parameters
Label	Description
Standard	Indicates the standard for serial connection (RS232, RS485 2W, RS485 4W).
Bits per second	The unit and attached serial device, such as a modem, must agree on a speed or baud rate to use for the serial connection. Valid baud rates are 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200.
Data bits	Indicates the number of bits in a transmitted data package. Valid data bits are: 8 and 7.
Parity	Checks for the parity bit. Valid parity are: none, even and odd. None is the default.
Stop bits	The stop bit follows the data and parity bits in serial communication. It indicates the end of transmission. Valid stop bits are: 1 and 2. The default is 1.
Flow control	Flow control manages data flow between devices in a network to ensure it is processed efficiently. Too much data arriving before a device is prepared to manage it causes lost or retransmitted data. None is the default.
TCP accept port	This field determines the TCP port number that the serial server will listen for connections on. The value entered should be a valid TCP port number. The default Modbus/TCP port number is 502.
Connection timeout	When this field is set to a value greater than 0, the serial server will close connections that have had no network receive activity for longer than the specified period.
Transmission mode	Select RTU, based on the Modbus slave equipment attached to the port.
Response timeout	This is the timeout (in milliseconds) to wait for a response from a serial slave device before retrying the request or returning an error to the Modbus master.
Maximum number of retries	Should no valid response be received from a Modbus slave, the value in this field determines the number of times the serial server will retransmit request before giving up.
Log level	Set importance level of log messages.
Reload	Click <i>Reload</i> to discard any changes and reload previous settings.
Save	Click <i>Save</i> button to save your changes back to the GWR-I Router and activate/deactivate serial to Ethernet converter.

Table 19 - Modbus gateway parameters



O Disable all		
O Serial port over TCP/UDP settings		
Modbus gateway settings		
Serial Port 1 Settings		
Standard	RS-232	~
Bits per second	57600	~
Data bits	8	*
⊃arity	none	*
Stop bits	1	*
Flow control	none	*
Modbus Gateway Settings		
ICP accept port	502	
Connection timeout	60	sec
Modbus Serial Settings		
Fransmission mode	RTU	*
Response timeout	10	ms
Maximum number of retries	3	
Log Settings		
_og level	level 1	~

Figure 29 - Modbus gateway configuration page

Settings - Serial Port 2

Most of the settings related to Serial Port 2 are equivalent to the Serial Port 1 settings. The only difference is in type of connector and serial port standard. Namely, serial port 2 supports RS232 and RS485 4W standards.

Please find the PINOUT of the Serial Port 2 presented on the following image.

1 8	RS-232 Mode	RS-485 4 Wires Mode
	1 - Not Used 2 - Not Used	1 - Not Used 2 - TX-
	3 - TX (output)	3 - TX+
RJ-45	4 - GND	4 - GND
	5 - GND	5 - GND
	6 - RX (input)	6 - RX+
	7 - Not Used	7 - RX-
	8 - Not Used	8 - Not Used

Figure 30 - Serial Port Settings 1 PINOUT



Settings - SMS

SMS remote control feature allows users to execute a short list of predefined commands by sending SMS messages to the router. GWR-I router series implement following predefined commands:

1. In order to establish PPP connection, user should send SMS containing following string :PPP-CONNECT

After the command is executed, router sends a confirmation SMS with "OK" if the command is executed without errors or "ERROR" if something went wrong during the execution of the command.

2. In order to disconnect the router from PPP, user should send SMS containing following string :PPP-DISCONNECT

After the command is executed, router sends a confirmation SMS with "OK" if the command is executed without errors or "ERROR" if something went wrong during the execution of the command.

3. In order to reestablish (reconnect the router) the PPP connection, user should send SMS containing following string

```
:PPP-RECONNECT
```

After the command is executed, router sends a confirmation SMS with "OK" if the command is executed without errors or "ERROR" if something went wrong during the execution of the command.

4. In order to obtain the current router status, user should send SMS containing following string :PPP-STATUS

After the command is executed, router sends one of the following status reports to the user:

- CONNECTING
- CONNECTED, WAN\_IP: {WAN IP address or the router}
- DISCONNECTING
- DISCONNECTED

Remote control configuration page is presented on the following figure. In order to use this feature, user must enable the SMS remote control and specify the list of SIM card numbers that will be used for SMS remote control. The SIM card number should be entered in the following format: {Country Code}{Mobile Operator Prefix}{Phone Number} (for example **+38164111222**).

As presented on the Figure 31. configuration should be performed for separately for both SIM cards. After the configuration is entered, user must click on SAVE button in order to save the configuration.

SIM1 Settings	SIM2 Settings	
Enable Remote Control	Enable Remote Control	
Service Number	Service Number	
⊃hone Number 1	Phone Number 1	
Phone Number 2	Phone Number 2	
Phone Number 3	Phone Number 3	
Phone Number 4	Phone Number 4	
Phone Number 5	Phone Number 5	

Figure 31- SMS remote control configuration



## Settings - GPIO

GWR-I router series implements one digital input and one digital output. Numerous telemetry and data acquisition applications imply using digital input and output for providing simple control over certain system functionalities. GPIO (General Purpose Input Output) settings page is displayed on the image bellow:

General Purpose Input/Out	put		
Digital Input Settings			
Enable digital input			
Pin state	Action 1	Action 2	
Low	SMS 💌	none	~
High	SMS 💌	SMS	~
SMS Settings			
Destination phone 1			
Destination phone 2			
Destination phone 3			
Action 1 - Pin Low SMS Settin	gs		
SMS header	🗹 Hostname	🗹 IP address	🗹 Date/time
SMS text			
Action 1 - Pin High SMS Settin	qs		
		_	_
SMS header	🗹 Hostname	🗹 IP address	☑ Date/time
SMS text			
Action 2 - Pin High SMS Settin	gs		
SMS header	Hostname	IP address	Date/time
SMS text			Dutonino

Figure 32– GPIO settings page

GPIO settings			
Label	Description		
Enable digital input	Enable or disable digital input on the GWR-I		
Low (Action1/Action2)	Setup required action when router detects low level on digital input. It is possible to define two separate actions for this event. User can choose between sending an SMS alert on input change to LOW or setting up the digital output HIGH or LOW.		
High (Action1/Action2)	<i>n1/Action2</i> ) Setup required action when router detects high level on digital input. It is possible to define two separate actions for this event. User can choose betwee sending an SMS alert on input change to HIGH or setting up the digital output HIGH or LOW.		
Destination phone 1-3	Specify up to three mobile phone numbers that will receive SMS alert.		
SMS header	Define the content of SMS header. Following three options are available: Host name (name of the router defined in Device Identity Settings), IP address (router IP address) of the router and Date/Time.		
SMS text	Custom text of SMS message.		
Save	Click <i>Save</i> button to save your changes back to the GWR-I Router.		
Reload	Click <i>Reload</i> to discard any changes and reload previous settings.		

Table 20 - GPIO parameters



### Maintenance

The GWR-I Router provides administration utilities via web interface. Administrator can setup basic router's parameters, perform network diagnostic, update software or restore factory default settings.

### Maintenance - Device Identity Settings

Within *Device Identity Settings Tab* there is an option to define name, location of device and description of device function. These data are kept in device permanent memory. *Device Identity Settings* window is shown on *Figure 33*.

Device Identity Settings		
Label	Description	
Name	This field specifies name of the GWR-I Router.	
Description	This field specifies description of the GWR-I Router. Only for information purpose.	
Location	This field specifies location of the GWR-I Router. Only for information purpose.	
Save	Click <i>Save</i> button to save your changes back to the GWR-I Router.	
Reload	Click <i>Reload</i> to discard any changes and reload previous settings.	

#### Table 21 - Device Identity parameters

Device Identity Settings		<ul><li>Help</li></ul>
Settings		
Name Description	Test241 TestNewFW	]
Location	PPLab	Ĵ
		Reload Save

Figure 33 - Device Identity Settings configuration page

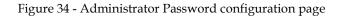
### Maintenance - Administrator Password

By *Administrator Password* Tab it is possible to activate and deactivates device access system through *Username* and *Password* mechanism. Within this menu change of authorization data Username/Password is also done. *Administer Password* Tab window is shown on *Figure 34*.

NOTE: The password cannot be recovered if it is lost or forgotten. If the password is lost or forgotten, you have to reset the Router to its factory default settings; this will remove all of your configuration changes.



Administrator Password		<ul> <li>Heip</li> </ul>
Password		
Enable Password Authentication		
User Name	admin	
Old Password		
New Password		
Confirm Password		
		Reload Save



Administrator Password			
Label	Description		
Enable Password Authentication	By this check box you can activate or deactivate function for authentication when you access to web/console application.		
Username	This field specifies Username for user (administrator) login purpose.		
Old Password	Enter the old password. The default is <i>admin</i> when you first power up the GWR-I Router.		
New Password	Enter a new password for GWR-I Router. Your password must have 20 or fewer characters and cannot contain any space.		
Confirm Password	Re-enter the new password to confirm it.		
Save	Click <i>Save</i> button to save your changes back to the GWR-I Router.		
Reload	Click <i>Reload</i> to discard any changes and reload previous settings.		

Table 22 - Administrator password

## Maintenance - Date/Time Settings

To set the local time, select *Date/Time Settings* using the Network Time Protocol (NTP) automatically or Set the local time manually. Date and time setting on the GWR-I Router are done through window Date/Time Settings.

Date/Time Settings		<ul> <li>Heip</li> </ul>
Current Date and Time		
Date Time	2011 / 07 / 16 11 : 33 : 45	
Date and Time Setup		
Update router date and tir	ne	
Manually		
From time server		
Date Time	2011 v / 07 v / 16 v 11 v : 33 v : 45 v	
Time protocol	NTP (RFC-1305) V	
Time protocol Time server address	77.105.37.0	
Time zone	(GMT +1:00 hours) CET(Central Europe Time), Belgrade, Copenhagen, Madrid, Paris	
Automatically synch		
Update time every	min	
		Svnc Clock Reload Save

Figure 35 - Date/Time Settings configuration page



Date/Time Settings			
Label	Description		
Manually	Sets date and time manually as you specify it.		
From time server	Sets the local time using the Network Time Protocol (NTP) automatically.		
Time/Date	This field species Date and Time information. You can change date and time by changing parameters.		
Sync Clock With Client	Date and time setting on the basis of PC calendar.		
Time Protocol	Choose the time protocol.		
Time Server Address	Time server IP address.		
Time Zone	Select your time zone.		
Automatically synchronize NTP	Setup automatic synchronization with time server.		
Update time every	Time interval for automatic synchronization.		
Save	Click <i>Save</i> button to save your changes back to the GWR-I Router.		
Reload	Click <i>Reload</i> to discard any changes and reload previous settings.		

Table 23 - Date/time parameters



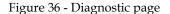
#### Maintenance - Diagnostics

The GWR-I Router provide built-it tool, which is used for troubleshooting network problems. The ping test bounces a packet of machine on the Internet back to the sender. This test shows if the GWR-I Router is able to connect the remote host. If users on the LAN are having problems accessing service on the Internet, try to ping the DNS server or other machine on network.

Click *Diagnostic* tab to provide basic diagnostic tool for testing network connectivity. Insert valid IP address in *Hostname* box and click *Ping*. Every time you click *Ping* router sends four ICMP packets to destination address.

Before using this tool make sure you know the device or host's IP address.

Diagnostics		Q Help
Ping Utility		
Ping the IP address of	a device in order to communicate with it.	
IP Address	192.168.1.20	]
Response	Average response time is 2.6ms Average response time is 1ms Average response time is 1.2ms Average response time is 1.8ms	
		Ping



#### Maintenance - Update Firmware

You can use this feature to upgrade the GWR-I Router firmware to the latest version. If you need to download the latest version of the GWR-I Router firmware, please visit Geneko support site. Follow the on-screen instructions to access the download page for the GWR-I Router.

If you have already downloaded the firmware onto your computer, click *Browse* button, on *Update firmware* Tab, to look for the firmware file. After selection of new firmware version through *Browse* button, mechanism the process of data transfer from firmware to device itself should be started. This is done by *Upload* button. The process of firmware transfer to the GWR-I device takes a few minutes and when it is finished the user is informed about transfer process success.

NOTE: The Router will take a few minutes to upgrade its firmware. During this process, do not power off the Router or press the Reset button.

Update Firmware		
Update		
2. Please don't close the win	e a few minutes, please wait and do not turn off the power or press the reset button. dow or disconnect the link, during the upgrade process. ware version it is necessary that the user performs system reset. er firmware update.	
Current firmware version Select firmware	2.1.9.30_352_test_2 Browse.	
		Linioad

Figure 37 - Update Firmware page

In order to activate new firmware version it is necessary that the user performs system reset. In the process of firmware version change all configuration parameters are lost and after that the system continues to operate with default values.



## Maintenance - Settings Backup

This feature allows you to make a backup file of complete configuration or some part of the configuration on the GWR-I Router. In order to backup the configuration, you should select the part of configuration you would like to backup. The list of available options is presented on the image 35. To use the backup file, you need to import the configuration file that you previously exported.

Settings Backup	
Import Configuration File	
Select file	Browse.
	Import
Export Configuration File	
The item to backup	Full Export
	Network DHCP
	WAN Settings Route
	RIP
	GRE
	OpenVPN
	IP Filtering DynDNS
	UnDING Serial Port
	Administrator Password
	Date/Time
	CLI SNMP
	Logs

Figure 38 - Export/Import the configuration on the router

## Import Configuration File

To import a configuration file, first specify where your backup configuration file is located. Click **Browse**, and then select the appropriate configuration file.

After you select the file, click Import. This process may take up to a minute. Restart the Router in order to changes will take effect.

## Export Configuration File

To export the Router's current configuration file select the part of the configuration you would like to backup and click *Export*.



u have chosen to op	ben	
🔊 confFile.bkg		
which is a: BKG	file	
from: http://10.	.0.10.150	
Vhat should Firefox	do with this file?	
Open with	Notepad (default)	~
○ FlashGot	,	
~		
O <u>S</u> ave File		
Do this autor	natically for files like this from now on	

Figure 39 - File download

Select the location where you want to store your backup configuration file. By default, this file will be called confFile.bkg, but you may rename it if you wish. This process may take up to a minute.

## Maintenance - Default Settings

Use this feature to clear all of your configuration information and restore the GWR-I Router to its factory default settings. Only use this feature if you wish to discard all the settings and preferences that you have configured.

Click *Default Setting* to have the GWR-I Router with default parameters. *Keep network settings* check-box allows user to keep all network settings after factory default reset. System will be reset after pressing *Restore* button.

Default Settings	
Settings	
Be carefull when restoring factory default settings. The factory settings will clear all current settings and reboot the system. Кеер network settings	
	Restore

Figure 40 - Default Settings page

### Maintenance - System Reboot

If you need to restart the Router, Geneko recommends that you use the Reboot tool on this screen. Click *Reboot* to have the GWR-I Router reboot. This does not affect the router's configuration.

Reboot	
System Reboot	
Click reboot button if you want to reboot the system. The reboot process need about 1 minute to complete.	
	Reboot

Figure 41 - System Reboot page



### Management - Command Line Interface

CLI (command line interface) is a user text-only interface to a computer's operating system or an application in which the user responds to a visual prompt by typing in a command on a specified line and then receives a response back from the system.

In other words, it is a method of instructing a computer to perform a given task by "entering" a command. The system waits for the user to conclude the submitting of the text command by pressing the "Enter" or "Return" key. A command-line interpreter then receives, parses, and executes the requested user command.

On router's Web interface, in Management menu, click on Command Line Interface tab to open the Command Line Interface settings screen. Use this screen to configure CLI parameters (Figure 42).

Command Line Interface				
Label	Description			
	CLI Settings			
Enable	Enable or disable CLI			
CLI on	Telnet, SSH, Serial			
View Mode Username	Login name for View mode			
View Mode Password	Password for View mode			
Confirm Password	Confirm password for View mode			
View Mode Timeout	Inactivity timeout for View mode in seconds. After timeout, user will be put in Main mode.			
Edit Mode Timeout	Inactivity timeout for Edit mode in seconds. Note that Username and Password for Edit mode are the same as Web interface login parameters. After timeout, user will be put in Main mode.			
Console Type	Windows, other.			
Save	Click <i>Save</i> to save your changes back to the GWR-I Router.			
Reload	Click <i>Reload</i> to discard any changes and reload previous settings.			

Table 24 - Command Line Interface parameters

Command Line Interface			
CLI Settings			
Enable			
CLI on	Telnet 🛩	_	
View Mode Username	admin		
View Mode Password	••••	]	
Confirm Password		]	
View Mode Timeout	180 sec		
Edit Mode Timeout	180 sec		
Console Type	other 💌		
			Reloa

Figure 42 - Command Line Interface

Detailed instructions related to CLI are located in other document (Command\_Line\_Interface.pdf file on CD that goes with the router). You will find detailed specifications of all commands you can use to configure the router and monitor routers performance.



### Management - Remote Management

Remote Management Utility is a standalone Windows application with many useful options for configuration and monitoring of GWR-I routers. More information about this utility can be found in other document (Remote\_Management.pdf). In order to use this utility user has to enable Remote Management on the router (Figure 43).

Remote Management		🕐 Help
Remote Management Settings		
🗷 Enable Remote Management		
Protocol	Geneko 💌	
Bind to	ppp 💌	
TCP port		
Usemame		
Password		
Remote Management Status		
Status	requesting status	
	Belgad	Save

Figure 43 – Remote Management

Command Line Interface			
Label	Description		
Enable Remote Management	Enable or disable Remote Management.		
Protocol	Choose between Geneko and Sarian protocol.		
Bind to	Specify the interface.		
TCP port	Specify the TCP port.		
Username	Specify the username.		
Password	Specify the password.		
Save	Click <i>Save</i> to save your changes back to the GWR-I Router.		
Reload	Click <i>Reload</i> to discard any changes and reload previous settings.		

Table 25 - Remote Management parameters

## Management - Connection Manager

Enabling Connection Manager will allow Connection Wizard (located on setup CD that goes with the router) to guide you step-by-step through the process of device detection on the network and setup of the PC-to-device communication. Thanks to this utility user can simply connect the router to the local network without previous setup of the router. Connection Wizard will detect the device and allow you to configure some basic functions of the router. Connection Manager is enabled by default on the router and if you do not want to use it you can simply disable it (Figure 44).



Connection Manager				🕐 Help
Connection Manager				
Enable Connection Manager				
Connection Manager Status				
Status	started			
				Reload Save

Figure 44 - Connection Manager

Getting started with the Connection Wizard:

Connection Wizard is installed through few very simple steps and it is available immediately upon the installation. After starting the wizard you can choose between two available options for configuration:

- **GWR-I Router's Ethernet port** With this option you can define LAN interface IP address and subnet mask.
- **GWR-I router's Ethernet port and GPRS/EDGE/HSPA network connection** Selecting this option you can configure parameters for LAN and WAN interface



Figure 45 - Connection Wizard - Initial Step

Select one of the options and click *Next*. On the next screen after Connection Wizard inspects the network (whole broadcast domain) you'll see a list of routers present in the network, with following information:

- Serial number
- Model
- Ethernet IP
- Firmware version
- Pingable (if Ethernet IP address of the router is in the same IP subnet as PC interface then this field will be marked, i.e. you can access router over web interface)



#### **GWR-I Cellular Router Series**

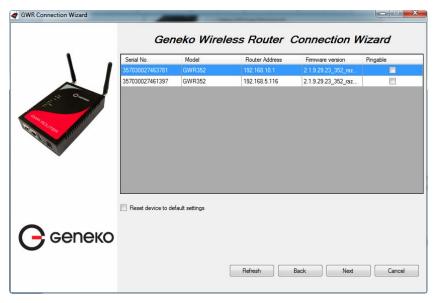


Figure 46 - Connection Wizard - Router Detection

When you select one of the routers from the list and click *Next* you will get to the following screen:

GWR Connection Wizard		X
71	Geneko Wireless Router Connection Wizard	
an an	IP address: 192.168.10.1	
and the second s	Subnet mask: 255 255 255 0	
<b>С</b> сепеко		
	Refresh Back Finish Car	ncel

Figure 47 - Connection Wizard - LAN Settings

If you selected to configure LAN and WAN interface click, upon entering LAN information click *Next* and you will be able to setup WAN interface.



GWR Connection Wizard			
	Genel	ko Wireless Router	Connection Wizard
	WAN Settings		
	Enabled		
and and	Provider:	Telekom	
	Authentication:	PAP-CHAP	•
A CONTRACT OF A	Usemame:	mts	
	Password:	064	
	Dial string:	ATD*99***1#	
	Initial string:	at+cgdcont=1,"IP","genekogwr"	
	Number of retry:	6	
Сепеко	Establish connec	tion	
Genero			
		Refresh	Back Finish Cancel

Figure 48 - Connection Wizard - WAN Settings

After entering the configuration parameters if you mark option *Establish connection* router will start with connection establishment immediately when you press *Finish* button. If not you have to start connection establishment manually on the router's web interface.

Management - Simple Management Protocol (SNMP)

SNMP, or Simple Network Management Protocol, is a network protocol that provides network administrators with the ability to monitor the status of the Router and receive notification of any critical events as they occur on the network. The Router supports SNMP v1/v2c and all relevant Management Information Base II (MIBII) groups. The appliance replies to SNMP Get commands for MIBII via any interface and supports a custom MIB for generating trap messages.

Simple Network Management Proto	bool	🕐 Help
SNMP Settings		
Enable SNMP		
Get Community Service Port O User Defined O Default (161)	public	
Service Access	All	
SNMP Status		
Status	started	
		Reload Save

Figure 49 - SNMP configuration page



	SNMP Settings
Label	Description
Enable SNMP	SNMP is enabled by default. To disable the SNMP agent, click this option to unmark.
Get Community	Create the name for a group or community of administrators who can view SNMP data. The default is <b>public</b> . It supports up to 64 alphanumeric characters.
Service Port	Sets the port on which SNMP data has been sent. The default is 161. You can specify port by marking on user defined and specify port you want SNMP data to be sent.
Service Access	Sets the interface enabled for SNMP traps. The default is Both.
Reload	Click <i>Reload</i> to discard any changes and reload previous settings.
Save	Click <i>Save</i> button to save your changes back to the GWR-I Router and enable/disable SNMP.

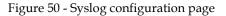
Table 26 - SNMP parameters

## Management - Logs

Syslog is a standard for forwarding log messages in an IP network. The term "syslog" is often used for both the actual syslog protocol, as well as the application or library sending syslog messages.

Syslog is a client/server protocol: the syslog sender sends a small (less than 1KB) textual message to the syslog receiver. Syslog is typically used for computer system management and security auditing. While it has a number of shortcomings, syslog is supported by a wide variety of devices and receivers across multiple platforms. Because of this, syslog can be used to integrate log data from many different types of systems into a central repository.

System Logger	Õ (	Help
Syslog Status		
<ul> <li>○ Disable</li> <li>○ Remote syslog</li> <li>④ Local syslog</li> </ul>		
Status	started	
Remote Syslog		
Service server IP Service port User defined O Default [514]	192.168.23.106	
Local Syslog		
Syslog file size Event log	1024 W KB All W	
Enable syslog saver Save log every	1 hours	
	Reload Save	,
System Log		





The GWR-I Router supports this protocol and can send its activity logs to an external server.

	Syslog Settings
Label	Description
Disable	Mark this option in order to disable Syslog feature.
Remote syslog	Mark this option in order to enable logging on remote machine.
Local syslog	Start logging facility locally.
Remote Syslog	Description
Service Serve IP	The GWR-I Router can send a detailed log to an external Syslog server. The Router's Syslog captures all log activities and includes this information about all data transmissions: every connection source and destination IP address, IP service, and number of bytes transferred. Enter the Syslog server name or IP address.
Service Port	Sets the port on which Syslog data has been sent. The default is 514. You can specify port by marking on user defined and specify port you want Syslog data to be sent.
User defined	Set manually port number.
Default	Use standard port number for this service. [514]
Local syslog	Description
Syslog file size	Set log size on one of the six predefined values. [10/20/50/100/200/500]kb
Event log	Choose which events to be stored. You can store System, Ipsec events or both of them.
Enable syslog saver	Save logs periodically on filesystem.
Save log every	Set time duration between two saves.
Reload	Click <i>Reload</i> to discard any changes and reload previous settings.
Save	Click <i>Save</i> button to save your changes back to the GWR-I Router and enable/disable Syslog.

Table 27 - Syslog parameters

## Logout

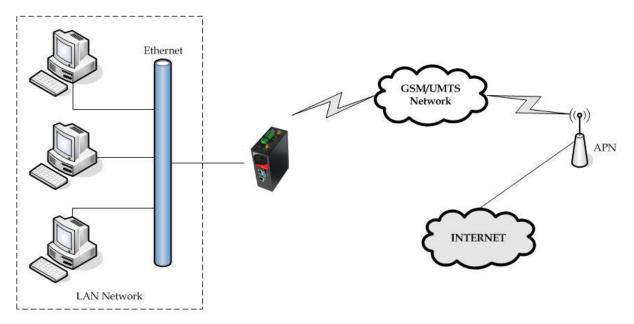
The *Logout* tab is located on the down left-hand corner of the screen. Click this tab to exit the webbased utility. (If you ex it the web-based utility, you will need to re-enter your User Name and Password to log in and then manage the Router.)

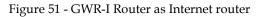


# **Configuration Examples**

## GWR-I Router as Internet Router

The GWR-I Routers can be used as *Internet router* for a single user or for a group of users (entire LAN). NAT function is enabled by default on the GWR-I Router. The GWR-I Router uses Network Address Translation (NAT) where only the mobile IP address is visible to the outside world. All outgoing traffic uses the GWR-I Router mobile IP address.





- Click *Network* Tab, to open the LAN NETWORK screen. Use this screen to configure LAN TCP/IP settings. Configure IP address and Netmask.
  - IP address: 10.1.1.1
  - Netmask: 255.255.255.0
- Press *Save* to accept the changes.
- Use SIM card with a dynamic/static IP address, obtained from Mobile Operator. (Note the default
  gateway may show, or change to, an address such as 10.0.0.1; this is normal as it is the GSM/UMTS
  provider's network default gateway).
- Click *WAN Settings* Tab to configure parameters necessary for GSM/UMTS connection. All parameters necessary for connection configuration should be provided by your mobile operator.
- Check the status of GSM/UMTS connection (*WAN Settings* Tab). If disconnected please click *Connect* button.
- Check *Routing* Tab to see if there is default route (should be there by default).
- Router will automatically adds default route via *ppp0* interface.
- Optionally configure IP Filtering and TCP service port settings to block any unwanted incoming traffic.
- Configure the GWR-I Router LAN address (10.1.1.1) as a default gateway address on your PCs. Configure valid DNS address on your PCs.



#### GRE Tunnel configuration between two GWR-I Routers

GRE tunnel is a type of a VPN tunnel, but it isn't a secure tunneling method. Simple network with two GWR-I Routers is illustrated on the diagram below (*Figure 52*). Idea is to create GRE tunnel for LAN to LAN (site to site) connectivity.

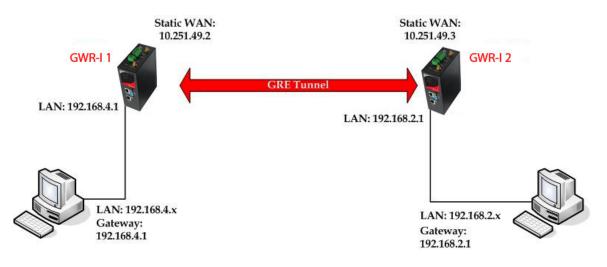


Figure 52 - GRE tunnel between two GWR-I Routers

The GWR-I Routers requirements:

- Static IP WAN address for tunnel source and tunnel destination address;
- Source tunnel address should have static WAN IP address;
- Destination tunnel address should have static WAN IP address;

**GSM/UMTS APN Type:** For GSM/UMTS networks GWR-I Router connections may require a Custom APN. A Custom APN allows for various IP addressing options, particularly static IP addresses, which are needed for most VPN connections. A custom APN should also support mobile terminated data that may be required in most site-to-site VPNs.

The GWR-I Router 1 configuration:

- Click Network Tab, to open the LAN NETWORK screen. Use this screen to configure LAN TCP/IP settings. Configure IP address and Netmask.
  - IP Address: 192.168.4.1
  - Subnet Mask: 255.255.255.0
  - Press *Save* to accept the changes.

				<ol> <li>Help</li> </ol>
Network Settings				
<ul> <li>Obtain an IP address</li> <li>Use the following IP ac</li> </ul>	automatically using DHCP Idress			
IP Address	192.168.4.1			
Subnet Mask	255.255.255.0			
Local DNS				
Caution: Changes to IP Address, su	bnet mask and local DNS require a reboot to ta	e effect.		Reload Save

Figure 53 - Network configuration page for GWR-I Router 1

• Use SIM card with a static IP address, obtained from Mobile Operator. (Note the default gateway may show, or change to, an address such as 10.0.0.1; this is normal as it is the GSM/UMTS



provider's network default gateway).

- Click *WAN Settings* Tab to configure parameters necessary for GSM/UMTS connection. All parameters necessary for connection configuration should be required from mobile operator.
- Check the status of GSM/UMTS connection (WAN Settings Tab). If disconnected please click Connect button.
- Click *VPN Settings* > *GRE* to configure GRE tunnel parameters:
  - Enable: yes
  - Local Tunnel Address: 10.10.10.1
  - Local Tunnel Netmask: 255.255.252 (Unchangeable, always 255.255.252)
  - Tunnel Source: 10.251.49.2 (select HOST from drop down menu if you want to use host name as peer identifier)
  - Tunnel Destination: 10.251.49.3 (select HOST from drop down menu if you want to use host name as peer identifier)
  - KeepAlive enable: no
  - Period:(none)
  - Retries:(none)
  - Press ADD to put GRE tunnel rule into GRE table.
  - Press *Save* to accept the changes.

'N Settir	ıgs -	GRE															🕐 He
eneric Rou	rting	Encapsulation (	GRE) T	unne	ling												
Enable	Lo	cal Tunnel Add	ess	Lo	cal Tunnel Netma	ask		Tu	nnel Source		Tunn	el Destination	Interface	KeepAlive Enable	Period	Retries	Action
		10.10.10.1	]		255.255.255.252		IP	~	10.251.49.2	IP	*	10.259.49.3	gre1				Rem
					255.255.255.252		IP	~		IP	~						Add
I Tunnel Netm el Source: IP .	ask: (U addres : IP ad s [3-60		255.255		12)										R	eload	Save

Figure 54 - GRE configuration page for GWR-I Router 1

- Click **Routing** on **Settings** Tab to configure GRE Route. Parameters for this example are:
  - Destination Network: 192.168.2.0
  - Netmask: 255.255.255.0
  - Interface: gre\_x

ble Settings					
tatic mutes					
Dest Network	Netmask	Gateway	Metric	Interface	
10.64.64.64	255.255.255.255	*	0	ppp_0	1
10.10.10.0	255.255.255.252	*	0	gre1	
192.168.3.0	255.255.255.0	*	1	gre1	
192.168.2.0	255.255.255.0	0.0.0.0	0	eth0	
0.0.0.0	0.0.0.0	*	1	ppp_0	
*		Catana	Matria	1	e Action
	1	Galeway	meuic		
192.168.2.0				-	
	255.255.255.0			gre1 💙	Rem
	tatic routes Dest Network 10.64.64.64 10.10.10.0 192.168.3.0 192.168.2.0 0.0.0 following static routi Dest Network 0.0.0	Dest Network         Netmask           10.64.64.64         255.255.255.255           10.10.10.0         255.255.255.25           192.168.3.0         255.255.255.0           0.0.0         0.0.0.0           rollowing static routes to the routing table         Dest Network           Dest Network         Netmask           0.0.0         0.0.0	Dest Network         Netmask         Gateway           10.64.64.64         255.255.255.55         *           10.10.10.0         255.255.255.25         *           192.166.3.0         255.255.255.0         *           192.168.3.0         255.255.255.0         *           0.0.0         0.0.0.0         *           on.0.0         0.0.0.0         *	Dest Network         Netmask         Gateway         Metric           10.64.64.64         (255.255.255.55         *         0           10.10.10.0         (255.255.255.25         *         0           192.168.3.0         (255.255.255.25         *         0           192.168.3.0         (255.255.255.0)         *         1           192.168.3.0         (255.255.55.0)         0.0.0.0         0           0.0.0         0.0.0.0         *         1           offlowing static routes to the routing table         Dest Network         Netmask         Gateway         Metric           0.0.0         (0.0.0)         *         1         1         1	Dest Network         Netmask         Gateway         Metric         Interface           10.64.64.64         255.255.255         *         0         ppp_0           10.10.10.0         255.255.255         *         0         gre1           192.166.3.0         255.255.255.25         *         1         gre1           192.166.3.0         255.255.255.25         *         0.0.0         eth0           0.0.0         0.0.0.0         *         1         gre1           192.166.2.0         255.255.25.0         *         1         gre1           100.0.0         0.0.0.0         *         1         ppp_0           following static routes to the routing table          Dest Network         Netmask         Gateway         Metric         Interface           00.0.0         0.0.0.0         *         1         ppp_0         *

Figure 55 - Routing configuration page for GWR-I Router 1

- Optionally configure IP Filtering and TCP service port settings to block any unwanted incoming traffic.
- On the device connected on GWR-I router 1 setup default gateway 192.168.4.1

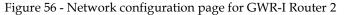
The GWR-I Router 2 configuration:

- Click *Network* Tab, to open the LAN NETWORK screen. Use this screen to configure LAN TCP/IP settings. Configure IP address and Netmask.
  - IP Address: 192.168.2.1



- Subnet Mask: 255.255.255.0
- Press *Save* to accept the changes.

		0	Help
Network Settings			
O Obtain an IP address	automatically using DHCP		
⊙ Use the following IP a	idress		
IP Address	192.168.2.1		
Subnet Mask	255.255.255.0		
Local DNS			
Changes to IP åddress si	ubnet mask and local DNS require a reboot to take effect.		
onanges to in Tradicio, si	ener man and room ener require a record to take eneor.	Reload Sa	ive



- Use SIM card with a static IP address, obtained from Mobile Operator. (Note the default gateway may show, or change to, an address such as 10.0.0.1; this is normal as it is the GSM/UMTS provider's network default gateway).
- Click *WAN Settings* Tab to configure parameters necessary for GSM/UMTS connection. All parameters necessary for connection configuration should be required from mobile operator.
- Check the status of GSM/UMTS connection (*WAN Settings* Tab). If disconnected please click *Connect* button.
- Click *VPN Settings* > *GRE* to configure GRE tunnel parameters:
  - Enable: yes
  - Local Tunnel Address: 10.10.10.2
  - Local Tunnel Netmask: 255.255.252 (Unchangeable, always 255.255.255.252)
  - Tunnel Source: 10.251.49.3 (select HOST from drop down menu if you want to use host name as peer identifier)
  - Tunnel Destination: 10.251.49.2 (select HOST from drop down menu if you want to use host name as peer identifier)
  - KeepAlive enable: no
  - Period:(none)
  - Retries:(none)
  - Press ADD to put GRE tunnel rule into GRE table.
  - Press *Save* to accept the changes.

PN Settin	gs -	GRE													🕐 Hel
eneric Rou	ting	Encapsulation (	GRE) T	unneling											
Enable	Lo	cal Tunnel Addr	ess	Local Tunnel Netmask		Tur	nel Source	T	unn	el Destination	Interface	KeepAlive Enable	Period	Retries	Action
		10.10.10.2		255.255.255.252	IP	~	10.251.49.3	IP	<	10.251.49.2	gre1				Rem
	[			255.255.255.252	IP	~		IP	~						Add
Tunnel Netma I Source: IP a	ddress IP ad [3-60]		255.255					• •					Re	load	Save

Figure 57 - GRE configuration page for GWR-I Router 2

- Configure GRE Route. Click *Routing* on *Settings* Tab. Parameters for this example are:
  - Destination Network: 192.168.4.0
  - Netmask: 255.255.255.0



uting Ta	able Settings						
Current :	static routes						
Enable		Netmask	Gateway	Metric	Interface		
<b>V</b>	10.64.64.64	255.255.255.255	*	0	ppp_0		
<ul> <li>Image: A set of the set of the</li></ul>	10.10.10.0	255.255.255.252	*	0	gre1		
<b>V</b>	192.168.3.0	255.255.255.0	*	1	gre1		
<ul> <li>Image: A set of the set of the</li></ul>	192.168.2.0	255.255.255.0	0.0.0.0	0	eth0		
$\checkmark$	0.0.0.0	0.0.0.0	*	1	ppp_0		
Apply th	•	es to the routing table Netmask	Gateway	Metric	Interface	Action	
	0.0.0.0	0.0.0.0	*	1	ppp_0 💌	Rem	
<b>V</b>							

Figure 58 - Routing configuration page for GWR-I Router 2

- Optionally configure IP Filtering and TCP service port settings to block any unwanted incoming traffic.
- On the device connected on GWR-I router 2 setup default gateway 192.168.2.1



## GRE Tunnel configuration between GWR-I Router and third party router

GRE tunnel is a type of a VPN tunnels, but it isn't a secure tunneling method. However, you can encrypt GRE packets with an encryption protocol such as IPSec to form a secure VPN.

On the diagram below (*Figure 59*) is illustrated simple network with two sites. Idea is to create GRE tunnel for LAN to LAN (site to site) connectivity.

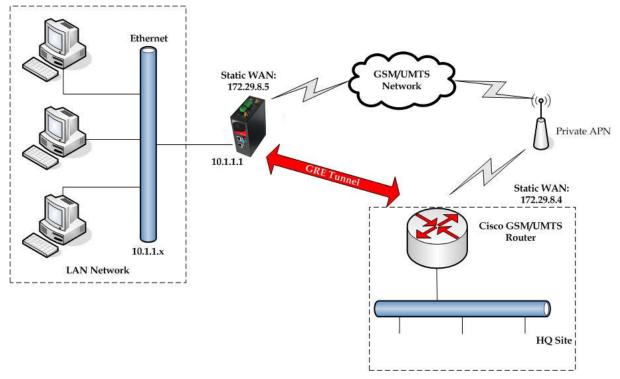


Figure 59 - GRE tunnel between Cisco router and GWR-I Router

GRE tunnel is created between Cisco router with GRE functionality on the HQ Site and the GWR-I Router on the Remote Network. In this example, it is necessary for both routers to create tunnel interface (virtual interface). This new tunnel interface is its own network. To each of the routers, it appears that it has two paths to the remote physical interface and the tunnel interface (running through the tunnel). This tunnel could then transmit unroutable traffic such as NetBIOS or AppleTalk.

The GWR-I Router uses Network Address Translation (NAT) where only the mobile IP address is visible to the outside. All outgoing traffic uses the GWR-I Router WAN/VPN mobile IP address. HQ Cisco router acts like gateway to remote network for user in corporate LAN. It also performs function of GRE server for termination of GRE tunnel. The GWR-I Router act like default gateway for Remote Network and GRE server for tunnel.

- 1. HQ router requirements:
  - HQ router require static IP WAN address;
  - Router or VPN appliance have to support GRE protocol;
  - Tunnel peer address will be the GWR-I Router WAN's mobile IP address. For this reason, a static mobile IP address is preferred on the GWR-I Router WAN (GPRS) side;
  - Remote Subnet is remote LAN network address and Remote Subnet Mask is subnet of remote LAN.
- 2. The GWR-I Router requirements:



- Static IP WAN address;
- Peer Tunnel Address will be the HQ router WAN IP address (static IP address);
- Remote Subnet is HQ LAN IP address and Remote Subnet Mask is subnet mask of HQ LAN.

**GSM/UMTS APN Type:** For GSM/UMTS networks GWR-I Router connections may require a Custom APN. A Custom APN allows for various IP addressing options, particularly static IP addresses, which are needed for most VPN connections. A custom APN should also support mobile terminated data that may be required in most site-to-site VPNs.

Cisco router sample Configuration:

```
Interface FastEthernet 0/1
ip address 10.2.2.1 255.255.255.0
description LAN interface
interface FastEthernet 0/0
ip address 172.29.8.4 255.255.255.0
description WAN interface
interface Tunnel0
ip address 10.1.1.1 255.255.255.0
tunnel source FastEthernet0/0
tunnel destination 172.29.8.5
```

ip route 10.1.1.0 255.255.255.0 tunnel0

The GWR-I Router Sample Configuration:

- Click *Network* Tab, to open the LAN NETWORK screen. Use this screen to configure LAN TCP/IP settings. Configure IP address and Netmask.
  - IP Address: 10.1.1.1
  - Subnet Mask: 255.255.255.0
  - Press *Save* to accept the changes.

Network			<ul> <li>Help</li> </ul>
Network Settings			
O Obtain an IP address	automatically using DHCP		
Use the following IP ac	Idress		
IP Address	10.1.1.1		
Subnet Mask	255.255.255.0		
Local DNS			
Caution: Unanges to IP Address, su	bnet mask and local DNS require a reboot to take effe	ict.	Reload Save

Figure 60 - Network configuration page

- Use SIM card with a dynamic/static IP address, obtained from Mobile Operator. (Note the default gateway may show, or change to, an address such as 10.0.0.1; this is normal as it is the GSM/UMTS provider's network default gateway).
- Click WAN Settings Tab to configure parameters necessary for GSM/UMTS connection. All
  parameters necessary for connection configuration should be required from mobile operator.
- Check the status of GSM/UMTS connection (WAN Settings Tab). If disconnected please click Connect button.
- Click VPN Settings > GRE Tunneling to configure new VPN tunnel parameters:
  - Enable: yes
  - Local Tunnel Address: 10.1.1.1
  - Local Tunnel Netmask: 255.255.255.252 (Unchangeable, always 255.255.252)
  - Tunnel Source: 172.29.8.5
  - Tunnel Destination: 172.29.8.4



-

- KeepAlive enable: no
- Period:(none)
- Retries:(none)
- Press ADD to put GRE tunnel rule into VPN table.
- Press *Save* to accept the changes.

VF	'N Setti	ngs - GRE													🕐 Help
Ge	neric Ro	uting Encapsulation (	GRE) 1	Funneling											
	Enable	Local Tunnel Addr	ess	Local Tunnel Netmask		Tu	nnel Source	Т	unn	el Destination	Interface	KeepAlive Enable	Period	Retries	Action
	<b>v</b>	10.10.10.1	]	255.255.255.252	IP	~	172.29.8.5	IP	<	172.29.8.4	gre1				Rem
			]	255.255.255.252	IP	~		IP	*						Add
Local T Tunne Tunne Period	unnel Netr Source: IP		255.266										R	eload	Save

Figure 61 - GRE configuration page

- Configure GRE Route. Click *Routing* on *Settings* Tab. Parameters for this example are:
  - Destination Network: 10.2.2.0
  - Netmask: 255.255.255.0

outing Ta	able Settings					
Current	static routes					
Enable	Dest Network	Netmask	Gateway	Metric	Interface	
1	10.64.64.64	255.255.255.255	*	0	ppp_0	
1	10.10.10.0	255.255.255.252	*	0	gre1	
<	192.168.3.0	255.255.255.0	*	1	gre1	
<	192.168.2.0	255.255.255.0	0.0.0.0	0	eth0	
1	0.0.0.0	0.0.0.0	*	1	ppp_0	
Apply th	e following static route	s to the routing table				
Enable	-	Netmask	Gateway	Metric	Interface	Action
<b>V</b>	0.0.0.0	0.0.0.0	*	1	ppp_0 💌	Rem
<b>&gt;</b>	10.2.2.0	255.255.255.0	*	1	gre1 💌	Rem
					eth0 💌	Add

Figure 62 - Routing configuration page

• Optionally configure IP Filtering and TCP service port settings to block any unwanted incoming traffic.

User from remote LAN should be able to communicate with HQ LAN.



## IPSec Tunnel configuration between two GWR-I Routers

IPSec tunnel is a type of a VPN tunnels with a secure tunneling method. Simple network with two GWR-I Routers is illustrated on the diagram below *Figure 63*. Idea is to create IPSec tunnel for LAN to LAN (site to site) connectivity.

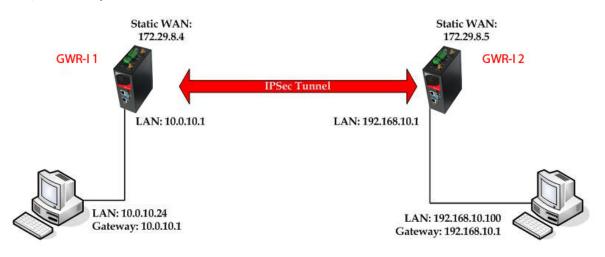


Figure 63 - IPSec tunnel between two GWR-I Routers

The GWR-I Routers requirements:

- Static IP WAN address for tunnel source and tunnel destination address
- Dynamic IP WAN address must be mapped to hostname with DynDNS service (for synchronization with DynDNS server SIM card must have internet access)

**GSM/UMTS APN Type:** For GSM/UMTS networks GWR-I Router connections may require a Custom APN. A Custom APN allows for various IP addressing options, particularly static IP addresses, which are needed for most VPN connections. A custom APN should also support mobile terminated data that may be required in most site-to-site VPNs

For the purpose of detailed explanation of IPSec tunnel configuration, two scenarios will be examined and network illustrated in the *Figure* 63 will be used for both scenarios.

## Scenario #1

Router 1 and Router 2, presented in the *Figure* 63, have firmware version that provides three modes of negotiation in IPSec tunnel configuration process:

- Aggressive
- Main
- Base

In this scenario, aggressive mode will be used. Configurations for Router 1 and Router 2 are listed below.



The GWR-I Router 1 configuration:

Click *Network* Tab, to open the **LAN NETWORK** screen. Use this screen to configure LAN TCP/IP settings. Configure IP address and Netmask:

- IP Address: 10.0.10.1
- Subnet Mask: 255.255.255.0
- Press *Save* to accept the changes.

Network		<ul> <li>Help</li> </ul>
Network Settings		
O Obtain an IP address	automatically using DHCP	
Ose the following IP ac	dress	
IP Address	10.0.10.1	
Subnet Mask	255.255.255.0	
Local DNS		
Caution: Changes to IP Address, su	bnet mask and local DNS require a reboot to take effect.	Reload

Figure 64 - Network configuration page for GWR-I Router 1

- Use SIM card with a static IP address, obtained from Mobile Operator.
- Click *WAN Settings* Tab to configure parameters necessary for GSM/UMTS connection. All parameters necessary for connection configuration should be required from mobile operator.
- Check the status of GSM/UMTS connection (*WAN Settings* Tab). If disconnected please click *Connect* button.
- Click *VPN Settings* > *IPSEC* to configure IPSEC tunnel parameters. Click *Add New Tunnel* button to create new IPSec tunnel. Tunnel parameters are:
  - Add New Tunnel
    - Tunnel Name: test
    - Enable: true
  - IPSec Setup
    - Keying Mode: IKE with Preshared key
    - Phase 1 DH group: Group 2
    - Phase 1 Encryption: 3DES
    - Phase 1 Authentication: MD5
    - Phase 1 SA Life Time: 28800
    - Perfect Forward Secrecy: true
    - Phase 2 DH group: Group 2
    - Phase 2 Encryption: DES
    - Phase 2 Authentication: MD5
    - Phase 2 SA Life Time: 3600
    - Preshared Key: 1234567890
  - Local Group Setup
    - · Local Security Gateway Type: SIM card
    - IP Address From: SIM 1 (WAN connection is established over SIM 1)
    - Local ID Type: IP Address
    - Local Security Group Type: Subnet
    - IP Address: 10.0.10.0
    - Subnet Mask: 255.255.255.0
    - Remote Group Setup
      - Remote Security Gateway Type: IP Only
      - IP Address: 172.29.8.5
      - Remote ID Type: IP Address
      - Remote Security Group Type: IP
      - IP Address: 192.168.10.1



#### Failover

- Enable Tunnel Failover: false
- Advanced
  - Negotiation Mode: Aggressive
  - Compress(Support IP Payload Compression Protocol(IPComp)): false
  - Dead Peer Detection(DPD): false
  - NAT Traversal: true
  - Send Initial Contact: true

Device to Device Tunnel		🗿 Help
Add New Tunnel		
Tunnel Number Tunnel Name Enable	1 test	
IPSec Setup		
Keying Mode Phase 1 DH Group Phase 1 Encryption Phase 1 Authentication Phase 1 SA Life Time Perfect Forward Secrecy	IKE with Preshared key V Group2 V 3DES V MD5 V S28000 sec	
Phase 2 DH Group Phase 2 Encryption Phase 2 Authentication Phase 2 SA Life Time	Group2	
Preshared Key		

Figure 65 - IPSEC configuration page I for GWR-I Router 1

Local Group Setup		
Local Security Gateway Type	SIM Card 🔽	
IP Address From	SIM 1	
1 10 7		
Local ID Type	IP Address	
Local Security Group Type	Subnet 💌	
IP Address	10.0.10.0	
Subnet Mask	255.255.255.0	j
Remote Group Setup		
Remote Security Gateway Type	IP Only	
IP Address	172.29.8.5	
Remote ID Type	IP Address 👻	
<i>,</i> ,		
Remote Security Group Type	IP 🗸	
		1
IP Address	192.168.10.1	]

Figure 66 - IPSec configuration page II for GWR-I Router 1



Failover		
Enable Tunnel Failover		
Ping IP		
Ping Interval	sec	
Packet Size		
Advanced Ping Interval	sec	
Advanced Ping Wait For A Response	sec	
Maximum Number Of Failed Packets	%	
Advanced		
Negotiation Mode	Aggressive 🕑	
Compression (IPComp)		
Dead Peer Detection (DPD)	sec	
NAT Traversal		
🗹 Send Initial Contact		
		Back Reload Save

NOTE : If option NAT Traversal is selected Aggressive mode is predefined.

Figure 67 - IPSec configuration page III for GWR-I Router 1

- Click Start button on Internet Protocol Security page to initiate IPSEC tunnel

Summary												
Tunnels used:				1								
Maximum number of tunne	els:		ę	5								
Add New Tunnel												
[	No.	Name	Enabled	Status	Enc/Auth/Grp	Advanced Setup	Local Group	Remote Group	Remote Gateway	Ac	tion	
	1	test	yes	started	Ph1: 3DES/MD5/2 Ph2: DES/MD5/2	A/I	10.0.10.0 255.255.255.0	192.168.10.1	172.29.8.5	Edit	Delete	
seducing the MTU size on the client side, can help eliminate some connectivity problems occurring at the protocol level Start Stop Refresh Tunnel atdw description Tunnel atdw description												
started - IPS	- IPSec is running and tunne's waiting for other end to connect											
	- tunnel is up											
established - tun	nerisi	• vomen is up										

Figure 68 – IPSec start/stop page for GWR-I Router 1

• On the device connected on GWR-I router 1 setup default gateway 10.0.10.1

The GWR-I Router 2 configuration:

- Click *Network* Tab, to open the LAN NETWORK screen. Use this screen to configure LAN TCP/IP settings. Configure IP address and Netmask.
  - IP Address: 192.168.10.1
  - Subnet Mask: 255.255.255.0 Press *Save* to accept the changes.



Network				🕐 Help
Network Settings				
O Obtain an IP address	automatically using DHCP			
⊙ Use the following IP a	ddress			
IP Address	192.168.10.1			
Subnet Mask	255.255.255.0			
Local DNS	195.78.6.36			
Caution: Changes to IP Address, se	ubnet mask and local DNS require a reboot to take e	Ye ot.		Reload Save

Figure 69 - Network configuration page for GWR-I Router 2

- Use SIM card with a static IP address, obtained from Mobile Operator.
- Click *WAN Settings* Tab to configure parameters necessary for GSM/UMTS connection. All parameters necessary for connection configuration should be required from mobile operator.
- Check the status of GSM/UMTS connection (*WAN Settings* Tab). If disconnected please click *Connect* button.
- Click *VPN Settings* > *IPSEC* to configure IPSEC tunnel parameters. Click *Add New Tunnel* button to create new IPSec tunnel. Tunnel parameters are:
  - Add New Tunnel
    - Tunnel Name: test
    - Enable: true
  - IPSec Setup
    - Keying Mode: IKE with Preshared key
    - Phase 1 DH group: Group 2
    - Phase 1 Encryption: 3DES
    - Phase 1 Authentication: MD5
    - Phase 1 SA Life Time: 28800
    - Perfect Forward Secrecy: true
    - Phase 2 DH group: Group 2
    - Phase 2 Encryption: DES
    - Phase 2 Authentication: MD5
    - Phase 2 SA Life Time: 3600
    - Preshared Key: 1234567890
  - Local Group Setup
    - Local Security Gateway Type: SIM card
    - IP Address From: SIM 1 (WAN connection is established over SIM 1)
    - Local ID Type: IP Address
    - Local Security Group Type: IP
    - IP Address: 192.168.10.1
  - Remote Group Setup
    - · Remote Security Gateway Type: IP Only
    - IP Address: 172.29.8.4
    - Remote ID Type: IP Address
    - Remote Security Group Type: Subnet
    - IP Address: 10.0.10.0
    - Subnet: 255.255.255.0
  - Failover
    - Enable Tunnel Failover: false
  - Advanced
    - Negotiation Mode: Aggressive
    - Compress(Support IP Payload Compression Protocol(IPComp)): false
    - Dead Peer Detection(DPD): false
    - NAT Traversal: true
    - Send Initial Contact: true

Press Save to accept the changes.



Device to Device Tunnel	<ul> <li>Help</li> </ul>
Add New Tunnel	
Tunnel Number Tunnel Name Enable	1 test
IPSec Setup	
Kaying Mode Phase 1 DH Group Phase 1 Encryption Phase 1 Authentication Phase 1 SA Life Time Perfect Forward Secrecy Phase 2 DH Group Phase 2 Encryption Phase 2 Authentication Phase 2 SA Life Time	IKE with Preshared key v         Group2 v         3DES v         3DES v         Room sec         V         Group2 v         Group2 v         DES v         MD5 v         3600 sec         1234567890
Preshared Key	

Figure 70 - IPSEC configuration page I for GWR-I Router 2

Local Group Setup		
Local Security Gateway Type	SIM Card 💙	
, -,,,,,		
IP Address From	SIM 1	
Local ID Type	IP Address 💙	
Local Security Group Type	IP 💌	_
IP Address	192.168.10.1	
Remote Group Setup		
Remote Security Gateway Type	IP Only	
IP Address	172.29.8.4	1
in Products	116.60.0.1	
Remote ID Type	IP Address 👻	
Remote Security Group Type	Subnet 💌	
IP Address	10.0.10.0	]
Subnet Mask	255.255.255.0	]

Figure 71 - IPSec configuration page II for GWR-I Router 2

Failover		
Enable Tunnel Failover		
Ping IP		
Ping Interval	sec	
Packet Size		
Advanced Ping Interval	sec	
Advanced Ping Wait For A Response	sec	
Maximum Number Of Failed Packets	%	
Advanced		
Negotiation Mode	Aggressive 💌	
Compression (IPComp)		
Dead Peer Detection (DPD)	sec	
NAT Traversal		
Send Initial Contact		
		 Back Reload Sa

NOTE : If option NAT Traversal is selected Aggressive mode is predefined.

Figure 72 - IPSec configuration page III for GWR-I Router 2



- Click Start button on Internet Protocol Security page to initiate IPSEC tunnel

Summary												
unnels used:			1									
Aaximum number of tunne	els:		5									
Add New Tunnel												
	No.	Name	Enabled	Status	Enc/Auth/Grp	Advanced Setup	Local Group	Remote Group	Remote Gateway	A	tion	
	1	test	yes	started	Ph1: 3DES/MD5/2 Ph2: DES/MD5/2	A/N/I	192.168.10.1	10.0.10.0 255.255.255.0	172.29.8.4	Edit	Delete	
Redwring the MTU size on the dient side, can help eliminate some connectivity problems occurring at the protocol level Start Stop Refresh " Trans Start Stop Refresh" " Trans Start Stop Refresh" " Trans Start Stop Refresh" " Trans Start Start Stop Refresh" " Start												
started - IPS	rted · IPSec is running and tunnel's waiting for other end to connect											
established - tun	- tunnel is up											
	tomer soup											

Figure 73 - IPSec start/stop page for GWR-I Router 2

• On the device connected on GWR-I router 2 setup default gateway 192.168.10.1.

## Scenario #2

Router 1 and Router 2, presented in the Figure 63, have firmware version that provides single mode of negotiation in IPSec tunnel configuration process – Main mode. Considering this, both routers will be in main mode and there will not be displayed option for Negotiation mode in IPSec configurations.

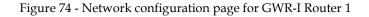
Configurations for Router 1 and Router 2 are listed below.

The GWR-I Router 1 configuration:

Click *Network* Tab, to open the LAN NETWORK screen. Use this screen to configure LAN TCP/IP settings. Configure IP address and Netmask:

- IP Address: 10.0.10.1
- Subnet Mask: 255.255.255.0
- Press *Save* to accept the changes.

Network		<ul> <li>Help</li> </ul>
Network Settings		
<ul> <li>Obtain an IP add</li> <li>Use the following</li> </ul>	Iress automatically using DHCP	
IP Address	10.0.10.1	
Subnet Mask Local DNS	255.255.255.0	
Local Gateway		
Caution: Changes to IP Add	ress, subnet mask and local DNS require a reboot to take effect.	Reload Save





- Use SIM card with a static IP address, obtained from Mobile Operator.
- Click *WAN Settings* Tab to configure parameters necessary for GSM/UMTS connection. All parameters necessary for connection configuration should be required from mobile operator.
- Check the status of GSM/UMTS connection (WAN Settings Tab). If disconnected please click Connect button.
- Click *VPN Settings* > *IPSEC* to configure IPSEC tunnel parameters. Click *Add New Tunnel* button to create new IPSec tunnel. Tunnel parameters are:
  - Add New Tunnel
    - Tunnel Name: test
    - Enable: true
  - IPSec Setup
    - Keying Mode: IKE with Preshared key
    - Phase 1 DH group: Group 2
    - Phase 1 Encryption: 3DES
    - Phase 1 Authentication: MD5
    - Phase 1 SA Life Time: 28800
    - Perfect Forward Secrecy: true
    - Phase 2 DH group: Group 2
    - Phase 2 Encryption: DES
    - Phase 2 Authentication: MD5
    - Phase 2 SA Life Time: 3600
    - Preshared Key: 1234567890
  - Local Group Setup
    - Local Security Gateway Type: SIM card
    - IP Address From: SIM 1 (WAN connection is established over SIM 1)
    - Custom Peer ID: false
    - Local Security Group Type: Subnet
    - IP Address: 10.0.10.0
    - Subnet Mask: 255.255.255.0
  - Remote Group Setup
    - Remote Security Gateway Type: IP Only
    - IP Address: 172.29.8.5
    - Custom Peer ID: false
    - Remote Security Group Type: IP
    - IP Address: 192.168.10.1
  - Failover
    - Eanble IKE failover: false
    - Enable Tunnel Failover: false
  - Advanced
    - Compress(Support IP Payload Compression Protocol(IPComp)): false
    - Dead Peer Detection(DPD): false
    - NAT Traversal: true
    - Send Initial Contact: true



Device 2 Device Tunnel		🕐 Help
Add New Tunnel		
Tunnel Number Tunnel Name Enable	1 test	
Local Group Setup		
Local Security Gateway Type	SIM Card 💌	
Custom Peer ID IP Address From	SIM 1	
Local Security Group Type IP Address	Subnet  10.0.10.0	
Subnet Mask	255.255.255.0	
Remote Group Setup		
Remote Security Gateway Type	IP Only	
IP Address	172.29.8.5	
Remote Security Group Type IP Address	IP V 192.168.10.1	



IPSec Setup	
Keying Mode	IKE with Preshared key
Phase 1 DH Group	Group2
Phase 1 Encryption	3DES 🗸
Phase 1 Authentication	MD5 💌
Phase 1 SA Life Time	28800 sec
Perfect Forward Secrecy	
Phase 2 DH Group	Group2 💌
Phase 2 Encryption	DES 💙
Phase 2 Authentication	MD5 💌
Phase 2 SA Life Time	3600 sec
	1234567890
Preshared Key	
Failover	
Enable IKE Failover	
IKE SA Retry	
Restart PPP After IKE SA Retry Ex	ceeds Specified Limit
Enable Tunnel Failover	
Ping IP	
Ping Interval	sec
Packet Size	
Advanced Ping Interval	sec
Advanced Ping Wait For A Response	
Maximum Number Of Failed Packets	%

Figure 76 - IPSEC configuration page II for GWR-I Router 1



Advanced	
Compress (Support IP Payload Compression Protocol (IPComp))     Dead Peer Detection (DPD) sec     NAT Traversal	
Send Initial Contact	Back Reload Save

Figure 77 - IPSEC configuration page III for GWR-I Router 1

NOTE: Firmware version used in this scenario also provides options for Connection mode of IPSec tunnel.

*If connection mode Connect is selected that indicates side of IPSec tunnel which sends requests for establishing of the IPSec tunnel.* 

If connection mode Wait is selected that indicates side of IPSec tunnel which listens and responses to IPSec establishing requests from Connect side.

nterr	net Pro	otocol Se	ecurity						<b>?</b> F	lelp		
umm	nary											
Max		umber of t	unnels:	1 5								
		Tunnel					Remote	Remote		Log	level lifecycl	
No.	Name	Enabled	Status	Enc/Auth/Grp	Advanced	Local Group	Group	Gateway	Action		Connection	n mode
1	test	yes	started	Ph1:3DES/MD5/2 Ph2:DES/MD5/2	N/I	10.0.10.0 255.255.255.0	192.168.10.1	172.29.8.5	Edit D	elete	Connec	Wait
ducing	the MTU	size on the	dient side,	can help eliminate som	e connectivity	problems occurring	at the protocol lev	el			Start	Stop
	ended M status des	TU size on d	ient side i	s 1300								Refresh

Figure 78 - IPSec start/stop page for GWR-I Router 1

Click Connect button and after that Start button on Internet Protocol Security page to initiate IPSEC tunnel

• On the device connected on GWR-I router 1 setup default gateway 10.0.10.1



The GWR-I Router 2 configuration:

- Click *Network* Tab, to open the LAN NETWORK screen. Use this screen to configure LAN TCP/IP settings. Configure IP address and Netmask.
  - IP Address: 192.168.10.1
  - Subnet Mask: 255.255.255.0

Press Save to accept the changes.

Network			Help
Network Settings			
○ Obtain an IP add	ress automatically using DHCP IP address		
IP Address	192.168.10.1		
Subnet Mask	255.255.255.0		
Local DNS			
Local Gateway			
Caution: Changes to IP Add	ess, subnet mask and local DNS require a reboot to take ef	fect.	Reload Save

Figure 79 - Network configuration page for GWR-I Router 2

- Use SIM card with a static IP address, obtained from Mobile Operator.
- Click *WAN Settings* Tab to configure parameters necessary for GSM/UMTS connection. All parameters necessary for connection configuration should be required from mobile operator.
- Check the status of GSM/UMTS connection (*WAN Settings* Tab). If disconnected please click *Connect* button.
- Click *VPN Settings* > *IPSEC* to configure IPSEC tunnel parameters. Click *Add New Tunnel* button to create new IPSec tunnel. Tunnel parameters are:
  - Add New Tunnel
    - Tunnel Name: test
    - Enable: true
  - IPSec Setup

•

- Keying Mode: IKE with Preshared key
- Phase 1 DH group: Group 2
- Phase 1 Encryption: 3DES
- Phase 1 Authentication: MD5
- Phase 1 SA Life Time: 28800
- Perfect Forward Secrecy: true
- Phase 2 DH group: Group 2
- Phase 2 Encryption: DES
- Phase 2 Authentication: MD5
- Phase 2 SA Life Time: 3600
- Preshared Key: 1234567890
- Local Group Setup
  - Local Security Gateway Type: SIM card
  - IP Address From: SIM 1 (WAN connection is established over SIM 1)
  - Custom Peer ID: false
  - Local Security Group Type: IP
  - IP Address: 192.168.10.1
- Remote Group Setup
  - Remote Security Gateway Type: IP Only
  - IP Address: 172.29.8.4
  - Custom Peer ID: false
  - Remote Security Group Type: Subnet



- IP Address: 10.0.10.0
- Subnet: 255.255.255.0
- Failover
  - Enable IKE failover: false
  - Enable Tunnel Failover: false
- Advanced
  - Compress(Support IP Payload Compression Protocol(IPComp)): false
  - Dead Peer Detection(DPD): false
  - NAT Traversal: true
  - Send Initial Contact: true

Press *Save* to accept the changes.

Device 2 Device Tunnel		🕜 Help
Add New Tunnel		
Tunnel Number Tunnel Name Enable	1 test	
Local Group Setup		
Local Security Gateway Type	SIM Card 💌	
Custom Peer ID IP Address From Local Security Group Type IP Address	SIM 1 IP 192.168.10.1	
Remote Group Setup		
Remote Security Gateway Type IP Address Custom Peer ID	IP Only  172.29.8.4	
Remote Security Group Type IP Address Subnet Mask	Subnet           10.0.10.0           255.255.255.0	

Figure 80 - IPSEC configuration page I for GWR-I Router 2



IPSec Setup	
Keying Mode	IKE with Preshared key 🔽
Phase 1 DH Group	Group2 🗸
Phase 1 Encryption	3DES 💌
Phase 1 Authentication	MD5 🕶
Phase 1 SA Life Time	28800 sec
Perfect Forward Secrecy	
Phase 2 DH Group	Group2 💌
Phase 2 Encryption	DES 💌
Phase 2 Authentication	MD5 💌
Phase 2 SA Life Time	3600 sec
	1234567890
Preshared Key	
r resilared recy	
	×
Failover	
Enable IKE Failover	
IKE SA Retry	
Restart PPP After IKE SA Re	try Exceeds Specified Limit
Enable Tunnel Failover	
Ping IP	
Ping Interval	sec
Packet Size	
Advanced Ping Interval	sec
Advanced Ping Wait For A	
Response	sec
Maximum Number Of Failed Packets	%

Figure 81 - IPSEC configuration page II for GWR-I Router 2

Advanced	
Compress (Support IP Payload Compression Protocol (IPComp))     Dead Peer Detection (DPD) sec	
<ul> <li>✓ NAT Traversal</li> <li>✓ Send Initial Contact</li> </ul>	
	Back Reload Save

Figure 82 - IPSEC configuration page III for GWR-I Router 2

NOTE: Firmware version used in this scenario also provides options for Connection mode of IPSec tunnel.

*If connection mode Connect is selected that indicates side of IPSec tunnel which sends requests for establishing of the IPSec tunnel.* 

If connection mode Wait is selected that indicates side of IPSec tunnel which listens and responses to IPSec establishing requests from Connect side.



umm	nary											
Tunn	nels use	ed:		1								
Max	imum n	number of t	unnels:	5								
Ad	dd New	Tunnel								Log	g level lifecy	cle
_		Tunnel Enabled		Enc/Auth/Grp Ph1:3DES/MD5/2	Advanced	Local Group	Remote Group 10.0.10.0	Remote Gateway	Act		g level lifecy Connecti	

Figure 83 – IPSec start/stop page for GWR-I Router 1

Click Wait button and after that Start button on Internet Protocol Security page to initiate IPSEC tunnel

• On the device connected on GWR-I router 2 setup default gateway 192.168.10.1.



## IPSec Tunnel configuration between GWR-I Router and Cisco Router

IPSec tunnel is a type of a VPN tunnels with a secure tunneling method. Diagram below illustrates simple network with GWR-I Router and Cisco Router. Idea is to create IPSec tunnel for LAN to LAN (site to site) connectivity.

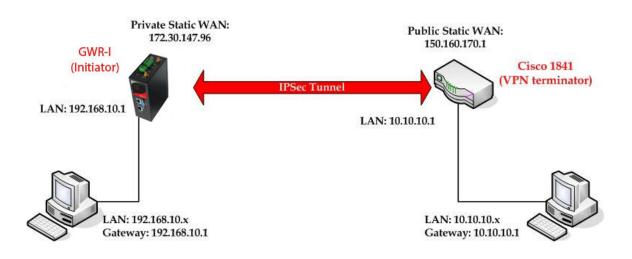


Figure 84 - IPSec tunnel between GWR-I Router and Cisco Router

The GWR-I Routers requirements:

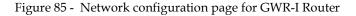
- Static IP WAN address for tunnel source and tunnel destination address
- Dynamic IP WAN address must be mapped to hostname with DynDNS service (for synchronization with DynDNS server SIM card must have internet access)

**GSM/UMTS APN Type:** For GSM/UMTS networks GWR-I Router connections may require a Custom APN. A Custom APN allows for various IP addressing options, particularly static IP addresses, which are needed for most VPN connections. A custom APN should also support mobile terminated data that may be required in most site-to-site VPNs.

The GWR-I Router configuration:

- Click Network Tab, to open the LAN NETWORK screen. Use this screen to configure LAN TCP/IP settings. Configure IP address and Netmask.
  - IP Address: 192.168.10.1
  - Subnet Mask: 255.255.255.0
    - Press *Save* to accept the changes.

Network								🕐 Help
Network Settings								
O Obtain an IP address	automatically using DHCP							
⊙ Use the following IP a	ddress							
IP Address	192.168.10.1							
Subnet Mask	255.255.255.0		]					
Local DNS	195.78.6.36		1					
Caution: Changes to IP Address, su	ubnet mask and local DNS require a reboot to tak	effect.	-			(	Reload	Save





- Click *WAN Settings* Tab to configure parameters necessary for GSM/UMTS connection. All parameters necessary for connection configuration should be required from mobile operator.
- Check the status of GSM/UMTS connection (WAN Settings Tab). If disconnected please click Connect button.
- Click *VPN Settings* > *IPSEC* to configure IPSEC tunnel parameters. Click *Add New Tunnel* button to create new IPSec tunnel. Tunnel parameters are:
  - Add New Tunnel
    - Tunnel Name: test
    - Enable: true
  - IPSec Setup
    - Keying Mode: IKE with Preshared key
    - Phase 1 DH group: Group 2
    - Phase 1 Encryption: 3DES
    - Phase 1 Authentication: SHA
    - Phase 1 SA Life Time: 28800
    - Perfect Forward Secrecy: true
    - Phase 2 DH group: Group 2
    - Phase 2 Encryption: 3DES
    - Phase 2 Authentication: SHA1
    - Phase 2 SA Life Time: 3600
    - Preshared Key: 1234567890
  - Local Group Setup
    - Local Security Gateway Type: SIM card
    - IP Address From: SIM 1 (WAN connection is established over SIM 1)
    - Local ID Type: IP Address
    - Local Security Group Type: Subnet
    - IP Address: 192.168.10.0
    - Subnet Mask: 255.255.255.0
  - Remote Group Setup
    - Remote Security Gateway Type: IP Only
    - IP Address: 150.160.170.1
    - Remote ID Type: IP Address
    - Remote Security Group Type: Subnet
    - IP Address: 10.10.10.0
    - Subnet Mask: 255.255.255.0
  - Failover
    - Enable Tunnel Failover: false
  - Advanced
    - \_ Negotiation Mode: Aggressive
    - Compress(Support IP Payload Compression Protocol(IPComp)): false
    - Dead Peer Detection(DPD): false
    - NAT Traversal: true
    - Send Initial Contact Notification: true

Press *Save* to accept the changes.



Device to Device Tunnel	🥑 Help
Add New Tunnel	
Tunnel Number Tunnel Name Enable	1 test
IPSec Setup	
Keying Mode Phase 1 DH Group Phase 1 Encryption Phase 1 SA Life Time Perfect Forward Secrecy	IKE with Preshared key V Group2 V 3DES V SHA1 V 26800 sec
Phase 2 DH Group Phase 2 Encryption Phase 2 Authentication Phase 2 SA Life Time Preshared Key	Group2 3DES SHA1 3600 sec 1234567890

Figure 86 - IPSEC configuration page I for GWR-I Router

Local Group Setup		
Local Security Gateway Type	SIM Card 💌	
Local Security Galeway Type	Sim Card	
IP Address From	SIM 1	
in videos rion	UNIT L	
Local ID Type	IP Address 💌	
Local Security Group Type	Subnet 💌	
IP Address	192.168.10.0	
Subnet Mask	255.255.255.0	
	L	
Remote Group Setup		
Remote Security Gateway Type	IP Only 🔽	
IP Address	150.160.170.1	
Remote ID Type	IP Address 💙	
inclusion of the states		
Remote Security Group Type	Subnet V	
IP Address	10.10.10.0	
Subnet Mask	255.255.255.0	

Figure 87 - IPSec configuration page II for GWR-I Router

Failover	
Enable Tunnel Failover	
Ping IP	
Ping Interval	sec
Packet Size	
Advanced Ping Interval	sec
Advanced Ping Wait For A Response	sec
Maximum Number Of Failed Packets	%
Advanced	
Parantosa	
Negotiation Mode Aggress	
Compression (IPComp)	
Dead Peer Detection (DPD)	sec
NAT Traversal	
Send Initial Contact	
	Back Reload Save

Figure 88 - IPSec configuration page III for GWR-I Router



- Click Start button on Internet Protocol Security page to initiate IPSEC tunnel

Summary													
Tunnels used:				1									
vlaximum number of tunn	iels:			5									
Add New Tunnel													
	No.	Name	Enabled	Status	Enc/Auth/Grp	Advanced Setup	Local Group	Remote Group	Remote Gateway	Acti	on		
	1	test	yes	started	Ph1: 3DES/SHA1/2 Ph2: 3DES/SHA1/2	A/N/I	192.168.10.0 255.255.255.0	10.10.10.0 255.255.255.0	150.160.170.1	Edit	Delete		
educing the MTU size on the cl ecommended MTU size on cli Press Refresh button to re-ched Tunnel status description:	ent sid	le 1300		e some co	nnectivity problems occurri	ng at the protocol level					Start	Stop	Refres
started - IP	Sec is	running	and tunnel's	waiting for	other end to connect								
established - tu	nnel is	s up											



• On the device connected on GWR-I router setup default gateway 192.168.10.1.

The Cisco Router configuration:

```
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
hostname Cisco-Router
boot-start-marker
boot-end-marker
no aaa new-model
no ip domain lookup
!--- Keyring that defines wildcard pre-shared key.
crypto keyring remote
   pre-shared-key address 0.0.0.0 0.0.0.0 key 1234567890
!--- ISAKMP policy
crypto isakmp policy 10
 encr 3des
 authentication pre-share
 group 2
 lifetime 28800
۱
!--- Profile for LAN-to-LAN connection, that references
!--- the wildcard pre-shared key and a wildcard identity
crypto isakmp profile L2L
   description LAN to LAN vpn connection
  keyring remote
  match identity address 0.0.0.0
crypto ipsec transform-set testGWR esp-3des esp-sha-hmac
!--- Instances of the dynamic crypto map
!--- reference previous IPsec profile.
crypto dynamic-map dynGWR 5
set transform-set testGWR
set isakmp-profile L2L
!--- Crypto-map only references instances of the previous dynamic crypto map.
1
```

```
crypto map GWR 10 ipsec-isakmp dynamic dynGWR
interface FastEthernet0/0
description WAN INTERFACE
 ip address 150.160.170.1 255.255.255.252
 ip nat outside
no ip route-cache
no ip mroute-cache
duplex auto
speed auto
crypto map GWR
interface FastEthernet0/1
description LAN INTERFACE
 ip address 10.10.10.1 255.255.255.0
ip nat inside
no ip route-cache
no ip mroute-cache
duplex auto
speed auto
ip route 0.0.0.0 0.0.0.0 150.160.170.2
ip http server
no ip http secure-server
ip nat inside source list nat_list interface FastEthernet0/0 overload
ip access-list extended nat_list
                                 192.168.10.0 0.0.0.255
deny ip 10.10.10.0 0.0.0.255
permit ip 10.10.10.0 0.0.0.255 any
access-list 23 permit any
line con 0
line aux 0
line vty 0 4
access-class 23 in
privilege level 15
login local
transport input telnet ssh
line vty 5 15
access-class 23 in
privilege level 15
 login local
transport input telnet ssh
end
```

Use this section to confirm that your configuration works properly. Debug commands that run on the Cisco router can confirm that the correct parameters are matched for the remote connections.

- **show ip interface** Displays the IP address assignment to the spoke router.
- show crypto isakmp sa detail Displays the IKE SAs, which have been set-up between the IPsec initiators.
- show crypto ipsec sa Displays the IPsec SAs, which have been set-up between the IPsec initiators.
- debug crypto isakmp Displays messages about Internet Key Exchange (IKE) events.
- debug crypto ipsec Displays IPsec events.
- **debug crypto engine** Displays crypto engine events.

IPSec Tunnel configuration between GWR-I Router and Juniper SSG firewall

IPSec tunnel is a type of a VPN tunnels with a secure tunneling method. On the diagram below *Figure 90* is illustrated simple network with GWR-I Router and Cisco Router. Idea is to create IPSec tunnel for LAN to LAN (site to site) connectivity.



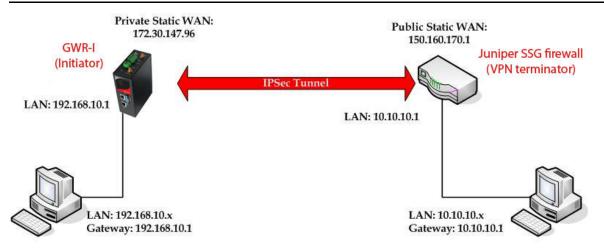


Figure 90 - IPSec tunnel between GWR-I Router and Cisco Router

The GWR-I Routers requirements:

- Static IP WAN address for tunnel source and tunnel destination address;
- Source tunnel address should have static WAN IP address;
- Destination tunnel address should have static WAN IP address;

**GSM/UMTS APN Type:** For GSM/UMTS networks GWR-I Router connections may require a Custom APN. A Custom APN allows for various IP addressing options, particularly static IP addresses, which are needed for most VPN connections. A custom APN should also support mobile terminated data that may be required in most site-to-site VPNs.

The GWR-I Router configuration:

- Click *Network* Tab, to open the LAN NETWORK screen. Use this screen to configure LAN TCP/IP settings. Configure IP address and Netmask.
  - IP Address: 192.168.10.1
  - Subnet Mask: 255.255.255.0
  - Press *Save* to accept the changes.

Network		Help
Network Settings		
<ul> <li>Obtain an IP addre</li> <li>Use the following IF</li> </ul>	ess automatically using DHCP	
IP Address	192.168.10.1	
Subnet Mask	255.255.255.0	
Local Gateway		
Caution: Changes to IP Addres	ss, subnet mask and local DNS require a reboot to take effect.	Reload Save

Figure 91 - Network configuration page for GWR-I Router

- Use SIM card with a static IP address, obtained from Mobile Operator.
- Click *WAN Settings* Tab to configure parameters necessary for GSM/UMTS connection. All parameters necessary for connection configuration should be required from mobile operator.
- Check the status of GSM/UMTS connection (*WAN Settings* Tab). If disconnected please click *Connect* button.



- Click *VPN Settings > IPSEC* to configure IPSEC tunnel parameters. Click *Add New Tunnel* button to create new IPSec tunnel. Tunnel parameters are:
  - Add New Tunnel
    - Tunnel Name: test
    - Enable: true
  - Local Group Setup
    - Local Security Gateway Type: IP Only
    - IP Address: 172.30.147.96
    - Local ID Type: Custom
    - Custom Peer ID: 172.30.147.96
    - Local Security Group Type: Subnet
    - IP Address: 192.168.10.0
    - Subnet Mask: 255.255.255.0
  - Remote Group Setup
    - Remote Security Gateway Type: IP Only
    - IP Address: 150.160.170.1
    - Remote ID Type: Custom
    - Custom Peer ID: 150.160.170.1
    - Remote Security Group Type: IP
    - IP Address: 10.10.10.0
    - Subnet Mask: 255.255.255.0
  - IPSec Setup
    - Keying Mode: IKE with Preshared key
    - Phase 1 DH group: Group 2
    - Phase 1 Encryption: 3DES
    - Phase 1 Authentication: SHA1
    - Phase 1 SA Life Time: 28800
    - Perfect Forward Secrecy: true
    - Phase 2 DH group: Group 2
    - Phase 2 Encryption: 3DES
    - Phase 2 Authentication: SHA1
    - Phase 2 SA Life Time: 3600
    - Preshared Key: 1234567890
  - Advanced
    - Aggressive Mode: true
    - Compress(Support IP Payload Compression Protocol(IPComp)): false
    - Dead Peer Detection(DPD): false
    - NAT Traversal: true
    - Press *Save* to accept the changes.



Device to Device Tunnel		Help
Add New Tunnel		
Tunnel Number Tunnel Name Enable	1 test ✓	
IPSec Setup		
Keying Mode Phase 1 DH Group Phase 1 Encryption Phase 1 Authentication Phase 1 SA Life Time Perfect Forward Secrecy	IKE with Preshared key  Group2 T 3DES SHA1 SHA1 Sec Sec	
Phase 2 DH Group	Group2   Group2  Group	
Phase 2 Encryption Phase 2 Authentication	SHA1	
Phase 2 SA Life Time	3600 sec	
Preshared Key	1234567890	

Figure 92 - IPSEC configuration page I for GWR-I Router

Local Group Setup		
Local Security Gateway Type	IP Only	
IP Address	172.30.147.96	
Local ID Type	Custom	
Custom Peer ID	172.30.147.96	
Local Security Group Type	Subnet 🔹	
IP Address	192.168.10.0	
Subnet Mask	255.255.255.0	
Remote Group Setup		
Remote Security Gateway Type	IP Only	
IP Address	150.160.170.1	
Pamata ID Tuna	Queters	
Remote ID Type	Custom	
Custom Peer ID	150.160.170.1	
Remote Security Group Type	Subnet 🔹	
IP Address	10.10.10.0	
Subnet Mask	255.255.255.0	

Figure 93 - IPSec configuration page II for GWR-I Router



Failover			
Enable Tunnel Failover			
Ping IP			
Ping Interval	sec		
Packet Size			
Advanced Ping Interval	sec		
Advanced Ping Wait For A Response	sec		
Maximum Number Of Failed Packets	%		
Advanced			
Negotiation Mode	Aggressive 💌		
Compression (IPComp)			
Dead Peer Detection (DPD)	sec		
NAT Traversal			
Send Initial Contact			
		Back Reload Sa	ave

Figure 94 - IPSec configuration page III for GWR-I Router

- Click *Start* button on *Internet Protocol Security* page to initiate IPSEC tunnel.

Inte	erne	t Prot	ocol Sec	curity						( <b>?</b> ) +	lelp
Sur	nmar	у									
Max			er of tunne nel	els:	1 5						
	No.	Name	Enabled	Status	Enc/Auth/Grp	Advanced Setup	Local Group	Remote Group	Remote Gateway	Action	
	1	test	yes	stopped	Ph1: 3DES/SHA1/2 Ph2: 3DES/SHA1/2	A/N/I	192.168.10.0 255.255.255.0	10.10.10.0 255.255.255.0	150.160.170.1	Edit Delete	
** Reco	mmend	led MTU	e on the clier size on clien	t side 1300	help eliminate some conne	ctivity problems occurri	ng at the protocol le	vel	Start	Stop Refres	h

Figure 95 – IPSec start/stop page for GWR-I Router

• On the device connected on GWR-I router setup default gateway 192.168.10.1.

The Juniper SSG firewall configuration:

#### Step1 - Create New Tunnel Interface

• Click Interfaces on Network Tab.

Įuniper°	List ALL(14) VInterfaces	s					New Tunnel IF
SSG-140	Name	IP/Netmask	Zone	Туре	Link	PPPoE	Configure
	ethernet0/0	10.0.250/24	Trust	Layer3	Up	-	Edit
	ethernet0/1		DMZ	Layer3	Up	-	Edit
ation	ethernet0/2		Untrust	Layer3	Up	-	Edit
	ethernet0/3	10.0.10.254/24	Trust	Layer3	Up	-	Edit
ng	ethernet0/4	0.0.0/0	Null	Unused	Down	12	Edit
<u></u>	ethernet0/5	0.0.0/0	Null	Unused	Down	-	Edit
<u>s</u>	ethernet0/6	0.0.0/0	Null	Unused	Down	15	Edit
aces	ethernet0/7	0.0.0/0	Null	Unused	Down	-	Edit
P IX	ethernet0/8	0.0.0/0	Null	Unused	Down		Edit
ng	ethernet0/9	0.0.0/0	Null	Unused	Down	-	Edit
P	tunnel.1	unnumbered	Untrust	Tunnel	Ready	-	Edit
-	tunnel.2	unnumbered	Untrust	Tunnel	Ready	-	Edit
2	tunnel.3	unnumbered	Untrust	Tunnel	Ready	-	Edit
	vlan1	0.0.0/0	VLAN	Layer3	Down	-	Edit
<u>olicies</u>							

Figure 96 - Network Interfaces (list)

- Bind New tunnel interface to Untrust interface (outside int with public IP addresss).
- Use unnumbered option for IP address configuration.

	Network > Interfaces > Edit	SSG140RBGE	?
	Interface: tunnel.3 (IP/Netmask: 0.0.0.0/0)	Back To Interfa	ce List
	Properties: Basic MIP <u>DIP IGMP NHTB Tunnel</u>		
	Tunnel Interface Name tunnel.3 Zone (VR) Untrust (trust-vr)		
Home Configuration Network Binding DNS	O Fixed IP         IP Address / Netmask:         0.000         / 0           O Unnumbered         O         O         O		
Zones Interfaces	O Unnumbered Interface ethernet0/2 (trust-vr) ▼		
DHCP 802.1X Routing	Maximum Transfer Unit(HTU) Admin MTU 1500 Bytes (Operating MTU: 1500; Default MTU: 1500)		
<ul> <li><u>NSRP</u></li> <li><u>PPP</u></li> </ul>	DNS Proxy		
Screening Policies MCast Policies	Traffic Bandwidth Egress Maximum Bandwidth 0 Kbps Guaranteed Bandwidth 0 Kbps		
VPNs     Objects	Ingress Maximum Bandwidth 0 Kbps		
<u>Reports</u> <u>Wizards</u>	OK Apply Canol		
+ Help_ Logout_			
Toggle Menu			

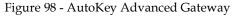
Figure 97 - Network Interfaces (edit)



#### Step 2 - Create New VPN IPSEC tunnel

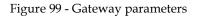
• Click VPNs in main menu. To create new gateway click Gateway on AutoKey Advanced tab.

Juniper*		1		Local ID	Security Level			
SSG-140	Dialup GW	Dialup	Address/ID/User Group	Local ID	Security Level Custom		Configure	
	GW-VPNtoUSSD	Static	Dialup Group		Custom	Edit	Xauth	-
	TestGWR	Dynamic	172.27.76.80	212.62.38.106	Custom	Edit	Xauth	
guration_	VPNtoTehnika	Static	1/2.27.76.80	212.62.38.106	Custom		Xauth	-
zk_ nding	VPNtoTehnika	Static		-	Custom	Edit	Xauth	_
HCP 12.1X string SRP pp ning_ sg								
tPalicies, itoKev JKE itoKev Advanced Gateway, P1 Proposal P2 Proposal XAuth settings VPN Groups anual Key. ITP onitor Status ts,								



- Click *New* button. Enter gateway parameters:
  - Gateway name: TestGWR
  - Security level: Custom
  - **Remote Gateway type:** Dynamic IP address( because your GWR-I router are hidden behind Mobile operator router's (firewall) NAT)
  - Peer ID: 172.30.147.96
  - **Presharedkey:** 1234567890
  - Local ID: 150.160.170.1

11.22	VENS > Autokey Advanceu > Gateway > Lott	330140KBGE	<b>1</b>
SSG-140	Gateway Name TexOV72 Security Level O Standard O Compatible O Basic O Custom		
* <u>Configuration</u> * <u>Network</u> * <u>Screening</u>	Static IP Address         IP Address/Hostname		
Policies MCast Policies VPNs	O Dynamic IP Address Peer ID 172.30.47.36 O Dialup User User User I In One III		
AutoKey IKE AutoKey Advanced	O Dialup User Group Oroup None  Preshared Key Use As Seed		
<u>Gateway</u> <u>P1 Proposal</u> <u>P2 Proposal</u>	Local ID 150.180.170.1] (optional) Outgoing Interface ethernet0/2		
<u>XAuth Settings</u> <u>VPN Groups</u> <u>Manual Key</u>	OK Cancel Advanced		
<u>L2TP</u> <u>Monitor Status</u> <u>Objects</u>			
<u>Reports</u> <u>Wizards</u>			
+ <u>Help</u> Logout			
Toggle Menu			





SSC140PBCE

- Click *Advanced* button.
  - Security level User Defined: custom
  - Phase 1 proposal: pre-g2-3des-sha
  - Mode: Agressive(must be aggressive because of NAT)
  - Nat-Traversal: enabled
  - Click *Return* and *OK*.

	VPNs > AutoKey Advanced > Gateway > Edit	SSG140RBGE	?
Juniper			
SSG-140	Security Level Predefined O Standard O Compatible O Basic User Defined O Custom Phase 1 Proposi		
Configuration Network Binding	pre-g2-3des-sha     V     None       None     V     None		
<u>DNS</u> <u>Zones</u> <u>Interfaces</u> <u>DHCP</u>	Mode (Initiator) Main (ID Protection) Aggressive Enable NAT-Traversal UDP Checksum Keepalive Frequency  Seconds (0~300 Sec)		
<u>802.1X</u> <u>Routing</u> <u>NSRP</u> <u>PPP</u>	Heartbeat         Hello         Seconds (1~3600, 0: disable)           Reconnect 0         Seconds (60~9999 Sec)         Threshold 3		
<u>Screening</u> <u>Policies</u> <u>MCast Policies</u> <u>VPNs</u>	Oppo         Interval         ©         Seconds (3~28800, 0: disable)           Retry         5         (1~128)           Always Send		
AutoKey IKE AutoKey Advanced Gateway P1 Proposal	Preferred Certificate(optional) Local Cert None Peer CA None Peer Type X509-SIG ✓		
P2 Proposal XAuth Settings VPN Groups Manual Key L2TP Monitor Status	Use Distinguished Name for Peer ID CN OU Organization Location State		
<u>Objects</u> <u>Wizards</u> <u>Wizards</u> <u>Help</u>	Container  Return Container  Return Container		
Logout_ Toggle Menu			

Figure 100 - Gateway advanced parameters

#### Step 3 - Create AutoKey IKE

- Click VPNs in main menu. Click AutoKey IKE.
- Click *New* button.

	List 20 💙 per page					
						C
SSG-140	Name	Gateway	Security	Monitor		Configure
	DialupVPN	Dialup GW	Custom	Off	Edit	-
<u>16</u>	LinkToTehnika	VPNtoTehnika	Custom	On	Edit	Remove
figuration	TestGWR	TestGWR	Custom	Off	Edit	Remove
work	VPNtoUSSD	GW-VPNtoUSSD	Custom	Off	Edit	Remove
Interfaces DHCP 802.1X Routing NSRP PPP reening						

Figure 101 - AutoKey IKE



AutoKey IKE parameters are:

- VPNname: TestGWR
- Security level: Custom
- Remote Gateway: Predefined
- Choose VPN Gateway from step 2

	VPNs > AutoKey IKE > Edit	SSG140RBGE	2
<u>∏Juni</u> per⁺			
SSG-140	VPN Name TestGWR		
	Security Level 🔿 Standard 🔿 Compatible 🔿 Basic 📀 Custom		
Home	Remote Gateway O Predefined TestGWR		
* Configuration	Create a Simple Gateway		
Network	Gateway Name		
Binding	Type O Static IP Address/Hostname		
* DNS			
Zones	O Dynamic IP		
Interfaces	O Dialup User User None	~	
DHCP	O Dialup Group Group None	~	
= 802.1X	Local ID (optional)		
+ Routing	Preshared Key Use As Seed		
+ NSRP	Security Level  Standard  Compatible  Basic		
+ ppp	Outgoing Interface   ethernet0/0		
* Screening			
Policies	OK Cancel Advanced		
MCast Policies			
- VPNs			
AutoKey IKE			
- AutoKey Advanced			
Gateway			
P1 Proposal			
P2 Proposal			
XAuth Settings			
VPN Groups			
- Manual Key			
± L2TP			
Monitor Status			
Objects			
Objects     Reports     Wizards			
Wizards			
Help			
Logout			
Toggle Menu			

Figure 102 - AutoKey IKE parameters

- Click *Advanced* button.
  - Security level User defined: custom
  - Phase 2 proposal: pre-g2-3des-sha
  - **Bind to Tunnel interface:** tunnel.3(from step 1)
  - **Proxy ID:** Enabled
  - LocalIP/netmask: 10.10.10.0/24
  - **RemoteIP/netmask:** 192.168.10.0/24
  - Click *Return* and *OK*.



	VPNs > AutoKey IKE > Edit	SSG140RBGE	?
6			
	Security Level		
SSG-140	Predefined O Standard O Compatible O Basic		
	User Defined 💿 Custom		
Home	Phase 2 Proposal		
+ Configuration	g2-esp-3des-sha 💌 None 🔍		
+ Network	None V None V		
* Screening			
Policies	Replay Protection		
MCast Policies	Transport Mode 🧧 (For L2TP-over-IPSec only)		
VPNs	Bind to O None		
AutoKey IKE	Unnel Interface     tunnel.3		
AutoKey Advanced	O Tunnel Zone Untrust-Tun V		
Gateway			
P1 Proposal	Proxy-ID 🗹		
P2 Proposal	Local IP / Netmask 10.10.10.0 / 24		
XAuth Settings	Remote IP / Netmask 192168.000 / 24		
VPN Groups	Service ANY V		
Manual Key	VPN Group None V Weight 0		
L2TP			
Monitor Status	VPN Monitor		
<u>Objects</u> Reports	Source Interface default v		
Company,	Optimized		
<u>Wizards</u>	Rekey		
+ <u>Help</u>			
Logout	Return Cancel		
Toggle Menu			

Figure 103 - AutoKey IKE advanced parameters

#### **Step 4 - Routing**

- Click *Destination* tab on *Routing* menu.
- Click **New** button. Routing parameters are:
  - **IP Address:** 192.168.10.0/24
  - **Gateway:** tunnel.3(tunnel interface from step 1)
  - Click OK.

Network > Routing > Routing Entries > Confi	uration	SSG140RBGE	?
Juniper'			
SSG-140 Virtual Router Na SSG-140			
Hone           Configuration         Next I           Network         Binding	PP ○ Virtual Router untrust-vr ▼ O Gateway		-
DNS     Zones     Interfaces	Interface tunnel.3 V Gateway IP Address 0000 Permanent		
Destination	Tag 0		
Source Interface MCast Routing	OK. Cancel		-
<u>PBR</u> <u>Virtual Routers</u> <u>NSRP</u> ppp			
Screening Policies			

Figure 104 - Routing parameters



#### **Step 5 - Policies**

- Click *Policies* in main menu.
- Click *New* button (from Untrust to trust zone)
  - Source Address: 192.168.10.0/24
  - Destination Address: 10.10.10.0/24
  - Services: Any
- Click OK.

	Policies (From Untrust To Trust)		SSG140RBGE	?
C				
SSG-140	Name (optional)			
<b>_</b>	Source Address	O New Address /		
<ul> <li><u>Home</u></li> <li><u>Configuration</u></li> </ul>		⊙ Address Book Entry 192.168.10.0/24 ▼ Multiple		
Network	Destination Address	New Address / Address Book Entry 10.0.0/24     Multiple		
Binding DNS				
Zones	Service			
Interfaces	Application	None		
DHCP 802.1X		WEB Filtering		
- Routing		Permit V Deep Inspection		
Destination	Antivirus Profile			
Source Interface	Antispam enable			
MCast Routing		VPN None		
• <u>PBR</u>	Tunnei			
<u>Virtual Routers</u> NSRP		Modify matching bidirectional VPN policy L2TP None		
• ppp				
Screening		✓ at Session Beginning ✓		
Policies MCast Policies	Position at Top			
- VPNs		OK Cancel Advanced		
AutoKey IKE AutoKey Advanced				
Gateway				
P1 Proposal				
<u>P2 Proposal</u> XAuth Settings				
VPN Groups				
Manual Key				
L2TP     Monitor Status				
* Objects				
Reports				

Figure 105 - Policies from untrust to trust zone

- Click *Policies* in main menu.
- Click *New* button (from trust to untrust zone)
  - Source Address: 10.10.10.0/24
  - Destination Address: 192.168.10.0/24
  - Services: Any
- Click OK.



## **GWR-I Cellular Router Series**

Polici	ies (From Trust To Untrust)	SSG140RBGE	
	Name (optional)		
	Source Address		
+ Configuration		⊙ Address Book Entry 10.0.0.0/24 💌 Mathple	
Network		O New Address /	
Binding	Destination Address	⊙ Address Book Entry 192.168.10.0/24   Multiple	
• DNS	Service	ANY Studigle	
Zones			
Interfaces	Application	None	
DHCP			
* 802.1X		WEB Filtering	
Routing		Permit V Deep Impection	
Destination			
Source	Antivirus Profile	None 💌	
Source Interface	Antispam enable		
MCast Routing	Turnel	VPN None Y	
+ PBR	Tumer		
Virtual Routers		Modify matching bidirectional VPN policy	
+ <u>NSRP</u>		L2TP None V	
• <u>ppp</u>	Logging	v at Session Beginning v	
Screening			
Policies	Position at Top		
MCast Policies —			
AutoKey IKE		OK Cancel Advanced	
- AutoKey Advanced			
Gateway			
P1 Proposal			
P2 Proposal			
XAuth Settings			
VPN Groups			
Manual Key			
L2TP			
Monitor Status			
Objects			
* Reports			
< >			

Figure 106 - Policies from trust to untrust zone



# Apendix

## A. How to Achieve Maximum Signal Strength with GWR-I Router?

The best throughput comes from placing the device in an area with the greatest Received Signal Strength Indicator (RSSI). RSSI is a measurement of the Radio Frequency (RF) signal strength between the base station and the mobile device, expressed in dBm. The better the signal strength, the less data retransmission and, therefore, better throughput.

RSSI information is available from several sources:

• The LEDs on the device give a general indication.

• Via the GWR-I Router local user interface.

Signal strength LED indicator:

- -101 or less dBm = Unacceptable (running LED)
- -100 to -91 dBm = Weak (1 LED)
- -90 to -81 dBm = Moderate (2 LED)
- -80 to -75 dBm = Good (3 LED)
- -74 or better dBm = Excellent (4 LED)
- 0 is not known or not detectable (running LED).

## Antenna placement

Placement can drastically increase the signal strength of a cellular connection. Often times, just moving the router closer to an exterior window or to another location within the facility can result in optimum reception.

Another way of increasing throughput is by physically placing the device on the roof of the building (in an environmentally safe enclosure with proper moisture and lightning protection).

- Simply install the GWR-I Router outside the building and run an RJ-45 Ethernet cable to your switch located in the building.
- Keep antenna cable away from interferers (AC wiring).

#### Antenna Options

Once optimum placement is achieved, if signal strength is still not desirable, you can experiment with different antenna options. Assuming you have tried a standard antenna, next consider:

- Check your antenna connection to ensure it is properly attached.
- High gain antenna, which has higher dBm gain and longer antenna. Many cabled antennas require a metal ground plane for maximum performance. The ground plane typically should have a diameter roughly twice the length of the antenna.

NOTE: Another way of optimizing throughput is by sending non-encrypted data through the device. Application layer encryption or VPN put a heavy toll on bandwidth utilization. For example, IPsec ESP headers and trailers can add 20-30% or more overhead.

