

Ericsson L13

Mobile Broadband Router for Mobile Networks

User's Guide

Important Safety Information

Note: Read this information before using your Ericsson W37 Mobile Broadband Router for safe use.

- Read all instructions before installing and using your Mobile Broadband Router
- Keep these instructions for future reference
- Follow all warnings and directions

Product Care and Safety

Your Mobile Broadband Router is a highly sophisticated electronic device. To ensure proper use read the following text about product care, safety and efficient use.

Treat your product with care, keep it in a clean and dust free place

Do not expose the unit to liquid, moisture or humidity

Do not expose the unit to extreme high or low temperatures or install this unit near any heat sources such as radiators, heat registers, stoves or other apparatus that produce heat

Do not expose the unit to open flames or lit tobacco products

Do not drop, throw or try to bend the product since rough treatment could damage it

Do not install or use this product near any water source

Do not operate this product near any medical equipment

Do not attempt to disassemble your mobile broadband router

Unplug this unit during lightening storms or when unused for long periods of time

Radio Wave Exposure Information

The Ericsson W37 MBR is a low-power radio transmitter and receiver. During use, it emits low levels of radio frequency energy (also known as radio waves or radio frequency fields).

Specific Absorption Rate (SAR) is the unit of measurement for the amount of radio frequency energy absorbed by the body. The SAR level for this product was determined at the highest certified level in laboratory conditions using a measurement standard published.

Personal Medical Devices

Radio waves may affect the operation of cardiac pacemakers and other implanted equipment. If a minimum distance of 6 inches (15 cm) is kept between the antenna and the pacemaker, the risk of interference is limited. If you have any reason to suspect that interference is taking place, immediately move away from the MBR. Contact your cardiologist for more information.

For other medical devices, please consult the manufacturer of the device

Intended Use

This product is designed and approved for private and public use in an indoor location

Power Supply

Ensure that your AC power outlet is adequately grounded, is situated near the Ericsson W37 MBR, and easily accessible

Trademark List

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<i>Internet Explorer</i> [®]	Internet Explorer is a registered trademark of Microsoft Corporation.
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1 Introduction

This chapter describes the structure of this guide and provides a list of reference documents. This guide describes the L13 firmware (???).

1.1 Structure of this Guide

This *User’s Guide* contains information that is needed for an end-user to configure and manage the Ericsson Mobile Broadband Router (MBR) L13 product series.

The following chapters are included:

Chapter 1 – “Introduction” – provides information about this guide and a list of reference documents

Chapter 2 – “L13 Overview” gives an overview of the Ericsson L13 product

Chapter 3 – “Configuration and Management” – provides detailed information about how to perform the configuration and management of the Ericsson L13

Chapter 4 – “Appendix” – lists the acronyms used in this guide

Chapter 5 – “Glossary” – defines the abbreviations and technical terms used in this guide

2 L13 Mobile Broadband Router Overview

2.1 Introduction

The L13 Mobile Broadband Router (MBR) product facilitates protected, high-speed Internet access for multiple users in home or in small business environments. It includes capabilities such as router and switch functionality, as well as VoIP telephony services (where offered by operators). The L13 provides users with local area connectivity (wired Ethernet and/or Wireless LAN) while providing high speed broadband data access. The L13 can handle download data speed up to 50 Mbps and an up-link speed up to 25 Mbps (subject to operator network conditions and capabilities).

With its integrated mini-PBX, the L13 can support up to 5 local extensions (one analog and 4 VoIP extensions), it has a single VoIP line (where provided by the operator).

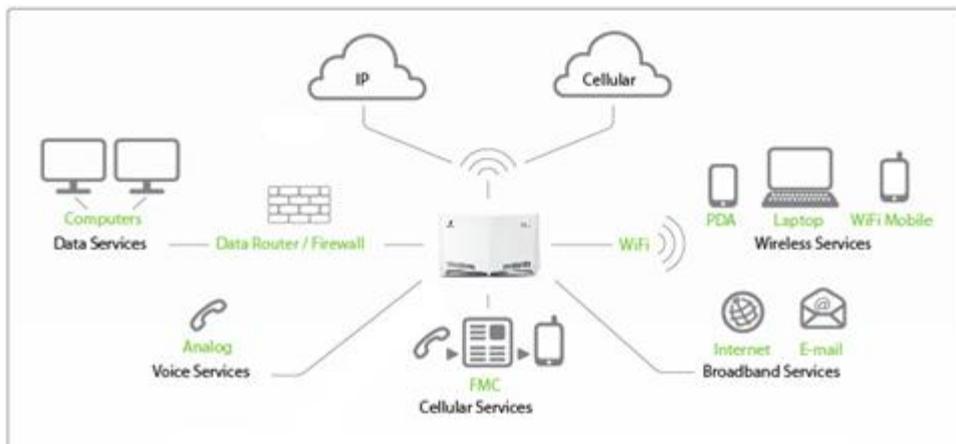


Figure 1: L13 Facilitates Access in Multiple Environments

2.2 Feature Summary

2.2.1 L13 Data Router

The L13 model includes a built in data router and firewall. It provides data capabilities such as data access (e.g. Internet) to multiple computers connected to the terminal using Ethernet or wireless LAN (WLAN). It also supports file and printer sharing via the USB port.

2.2.2 L13 Voice support

The L13 system supports high quality voice services via VoIP line where supported by the operator. A broad range of network related services such as CLI (Calling Line Identification), Call Waiting, Call Barring, Call Forwarding, and Multiparty Conference Calls may be available if supported by the operator.

The MBR system also features a built-in mini-PBX that includes: Up to 4 VoIP extensions and 1 FXS analogue extension; call routing capabilities; hunt groups and pickup groups; and an online Call Data Record tracker.

2.3 Housing



Figure 2: L13 – Designed to Sit on a Desk

2.3.1 Back Side Ports

The back side of the L13 includes the following interfaces:

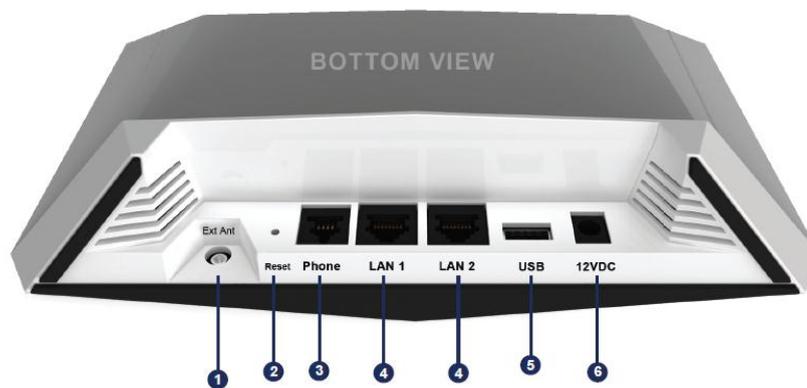


Figure 3: Ericsson L13 Back Side

The interfaces are described in the tables below.

Table 1: Ericsson L13 Back Side Interfaces

	Interface	Type	Description
1	Ext Ant	MCX	Optional MCX socket for external antenna connection.

2	Reset	Push Button/Switch	A small hole with a button inside. It is used to reset the L13 to its factory default configuration. Pressing the button for 30 seconds continuously while the power is on will reset the device to its factory default settings. Pressing the button for less than 30 seconds will reset the device.
3	Phone	RJ - 11	Phone port for connecting a standard analog phone (FXS).
4	LAN 1-2	2 x RJ-45	Ethernet LAN ports for connecting the unit to PCs or an Ethernet switch/hub.
5	USB	USB – type ‘A’	Usually used for connecting external storage devices and shared printers.
6	12 VDC	DC Jack	Power socket for connecting the provided power supply adapter. <i>Note: Do not use any other power adapter except the one that accompanies the unit. Use of other adapter could result in damage to the unit.</i>

2.3.2 Top Panel Interfaces

The top side of the L13 has a SIM card slot.



Figure 4: Ericsson L13 Top Panel

The table below describes the interfaces:

Table 2: L13 Top Panel Interface

Interface	Type	Description
SIM	SIM card slot	SIM card slot for inserting a SIM card. <i>Note: The L13 must be disconnected from the power mains when inserting or removing the SIM card.</i>

2.3.3 Front Panel

The front panel of the L13 includes signal quality indicator LED’s and indicators described in the table below.

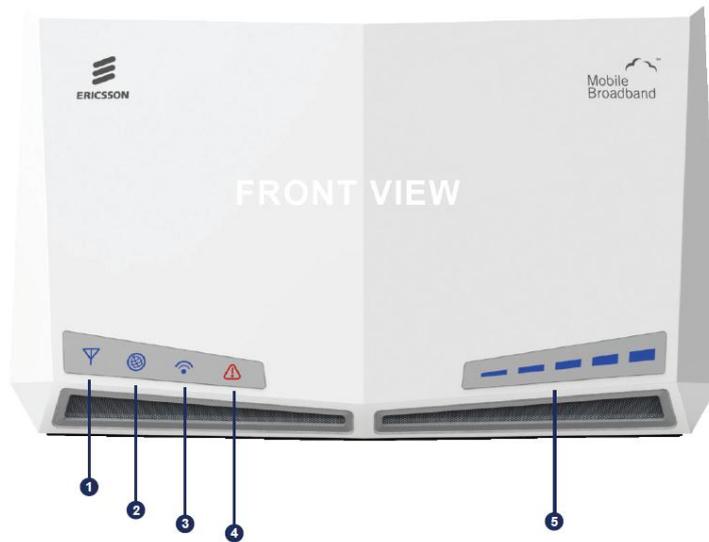


Figure 5: L13 Front Panel

The following LED indicators are visible on the front of the Ericsson L13:

Table 3: L13 Front Panel Indicators and LEDs

Number	Indicator	Description
1		Network Connection status indicator. Status “Fast Flashing” - attempting to connect Status “On” - registered at home network Status “Slow Flashing” - registered at roaming Status “Off” – not registered
2		Internet Connection status indicator Status ‘On’: A connection to the Internet has been established. Status ‘Off’: Internet connection has not been established.
3		Wireless Network status indicator Status ‘On’: The WiFi is available. Status ‘Off’: The WiFi LAN is not available.
4		Alarm indicator. When the Alarm LED is “OFF”, there are no alarms in the system. A blinking Alarm LED indicates a problem with the device/system. Go to System>Monitor in the WBM. A description of the problem will be displayed at the bottom of the screen.
5		The signal quality indicator shows the quality of the signal of the mobile network. The more lights displayed, the stronger the signal.

When the “Network Connection” symbol is unlit and the segment bar displays signal, there is a connection to a network.

2.3.3.1 Built-in Ethernet Indicators

The L13 Ethernet LAN (Ethernet 1- 2) has two built-in LED indicators each. The left indicator shows the speed of data traffic between the Ericsson L13 and the connected client. If the speed is 100 Mbps, the indicator is green. When the indicator is unlit, the speed is 10 Mbps.

The indicator to the right is yellow when a LAN connection is established and flashes to show data traffic activity.

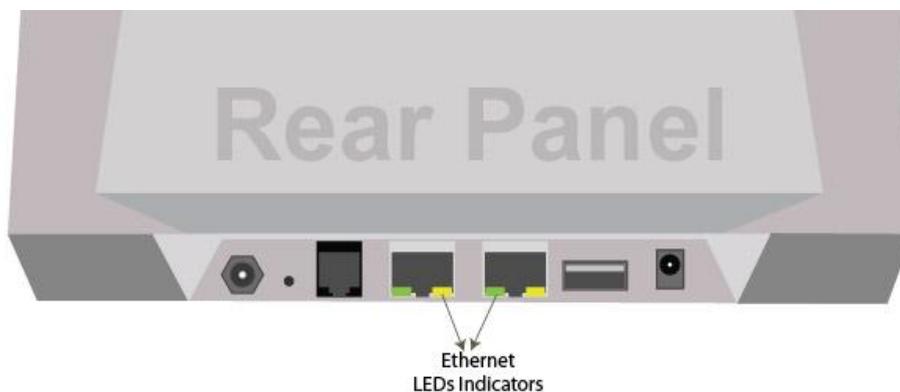


Figure 6: Rear Panel Ethernet LEDs Indicators

3 Configuration and Management

When the installation of the L13 is complete (as described in the Quick Installation Guide), the internal Web Based Management User Interface (WBM) is available for configuration and status control. This chapter provides detailed information about configuration options and management of the L13 using the WBM.

3.1 Access and Login to the Web User Interface

The WBM can be accessed locally from a PC connected via the Ethernet LAN port or via the WiFi interface.

Note: First time setup must be done via an Ethernet LAN port as the WiFi interface in the L13 is secured by default.

When accessing the WBM, the following Web browsers are supported:

Internet Explorer® 5.0 or higher

Safari® 1.3 or higher

Firefox® 1.0 or higher

Opera® 8 or higher

Start a Web browser on a PC connected to the L13 and type or <http://192.168.1.1> in the Address (URL) field.

Note: If you change the internal IP address (192.168.1.1) on the L13, you will then need to use the new address to access the Web pages.

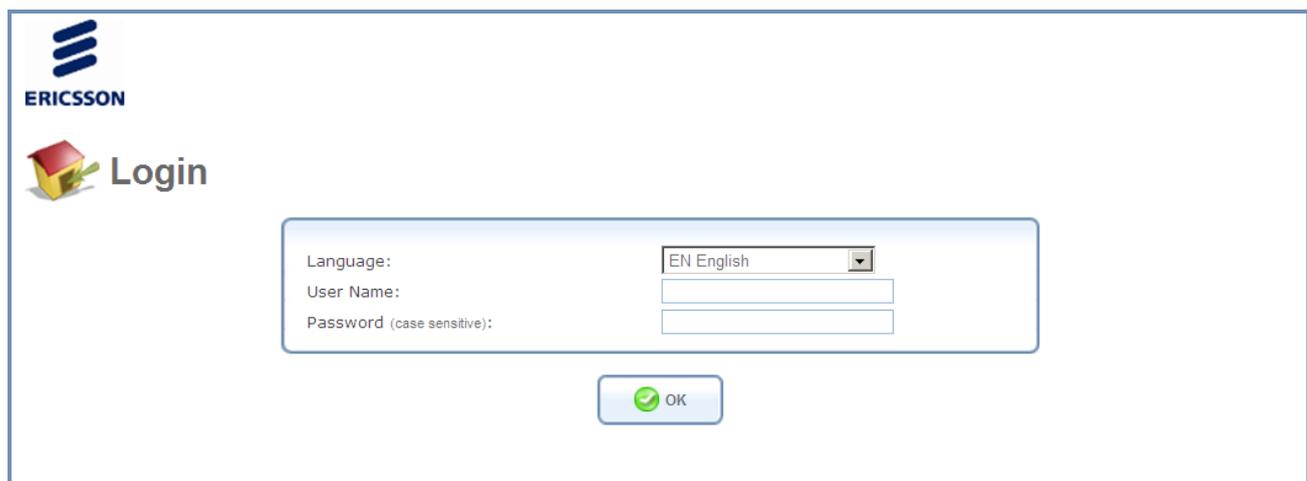


Figure 7: L13 WBM Login Screen

Enter your username and password, and then click **OK**. The user name is **user**, and user’s default password is “1234”. You are logged into the WBM, and your main menu screen appears.

Note: The user name and the password parameters are case sensitive.

Your session automatically times out after a few minutes of inactivity. If you try to operate the WBM after the session has expired, the **Login** screen appears and you will have to re-enter your user name and password before proceeding. This feature helps to prevent unauthorized users from accessing the WBM and changing the gateway's settings.

Note: If your computer is running an operating system that supports UPnP, such as Windows XP, you can easily add the computer to your home network and access the WBM directly from within Windows.

The first attempt to enter to the WBM from a computer connected to L13 will display the installation wizard. To setup your gateway, follow the wizard procedure steps.

3.1.1 Installation Wizard

Once L13 is physically connected, an Installation wizard will be started, and it will automatically analyze your network environment and configure its components. As explained in the first screen, the installation wizard is a step-by-step procedure that guides you through establishing an Internet connection, a cellular network connection, setting up the WiFi and the external VoIP line. The wizard progress box, located at the right hand side of the screen, lists all of the wizard’s steps and indicates the current step.



Figure 8: First Login Installation Wizard

To start the installation wizard, click **Next**. The installation process will commence, performing the steps listed in the progress box consecutively and stopping only if a step fails or if input is required. The following sections describe the wizard steps along with their success/failure scenarios. If a step fails, use the **Retry** or **Skip** buttons to continue.

3.1.1.1 Step 1: Cellular setup

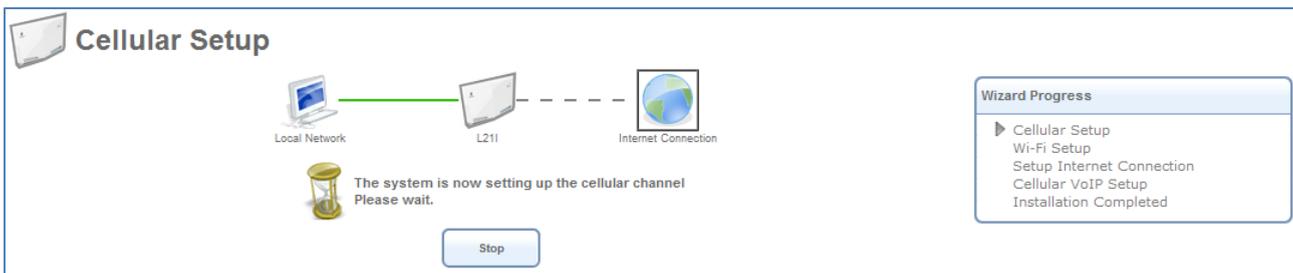


Figure 9: Cellular Setup

This step is configuring your cellular connection. The L13 will register automatically to the network. You may be asked to enter a 4 digit SIM card PIN code provided by your operator.

Check that the SIM card is installed in the SIM card holder

Enter the PIN code, permit roaming, etc.

If the PIN code is required, you will be notified during the wizard and redirected to a different screen where you will have to enter the missing parameters. The screen looks like this:

The screenshot shows a multi-section configuration form for cellular settings. The sections are: Name (with a text box containing 'Cellular Line'), Network (with a red error message 'Registration denied', 'Status:', 'Operator Name:', and two unchecked checkboxes for 'Roaming enable' and 'Network Lock enable'), IMEI/IMSI (with the value '354155040009379'), SIM Lock (with four unchecked checkboxes for 'CCID Lock enable', 'MCC Lock enable', 'MNC Lock enable', and 'MSIN Lock enable'), Security (with 'PIN' and 'PUK' labels, a 'Change PIN' checkbox, and two empty text boxes), and Cellular Channel Settings (with 'Frequency Band Selection' set to 'Auto' and 'Reset Period' set to 'No reset').

Figure 10: Entering Missing Parameters

Once you have entered all the required parameters, usually only a PIN code is needed and confirming the action by clicking “OK”. You will then be redirected back to the wizard.

3.1.1.2 Step 2: WiFi Setup

This step configures your WiFi network. The L13’s default SSID is "MBR_L13". You may of course change this name according to your preference. Select the WiFi security level and password if required, and the WiFi network key if required and then click **Next**.

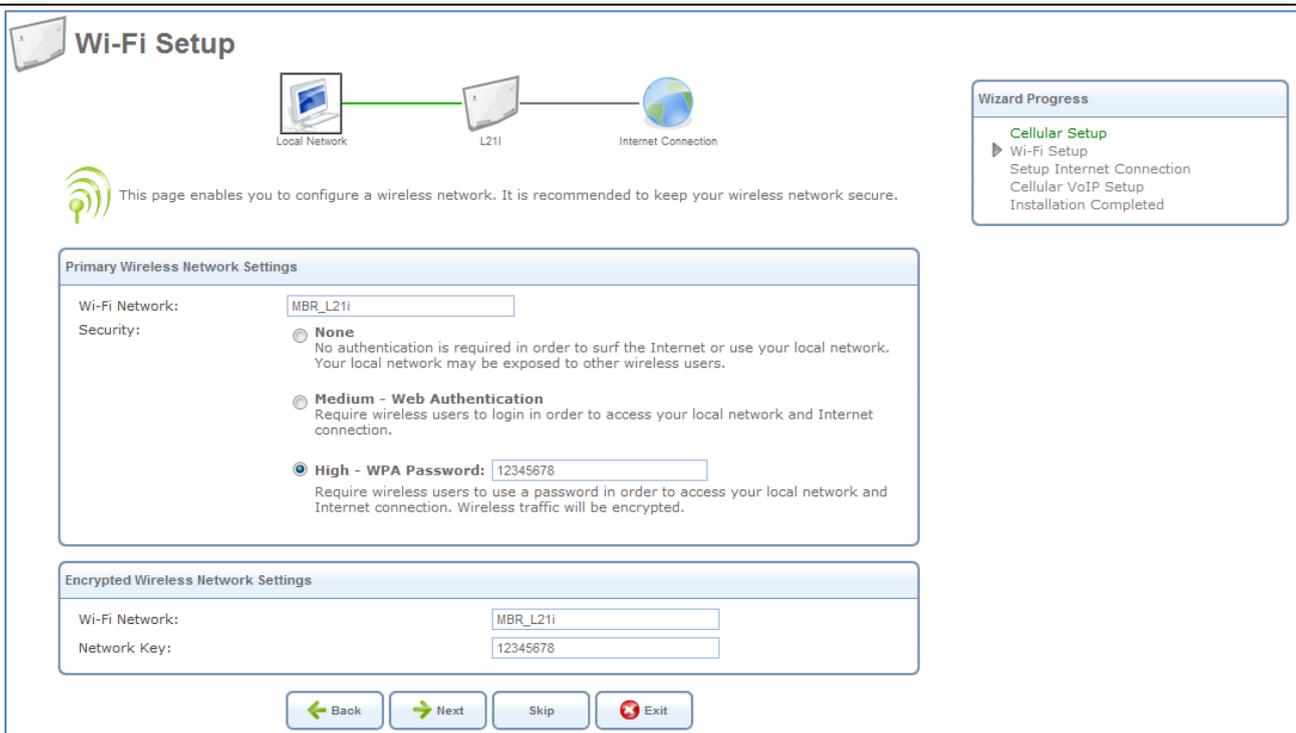


Figure 11: Installation Wizard Wireless Setup

3.1.1.3 Step 3: Internet Connection Setup

In this step the L13 will connect to the internet automatically.

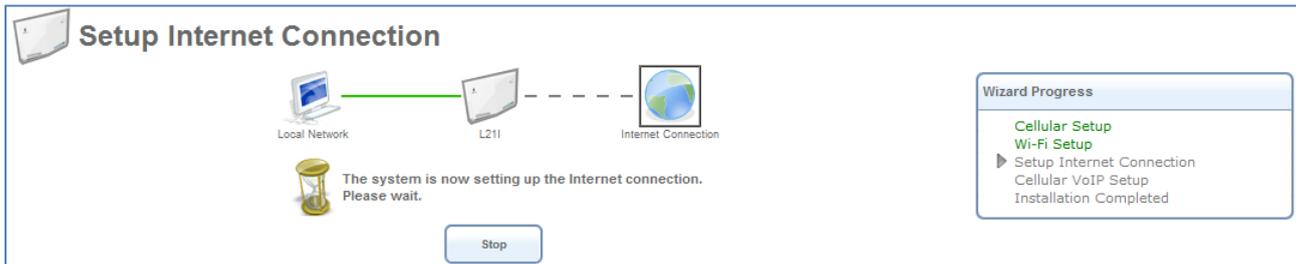


Figure 12: Internet Connection Setup

Click the “Next” button to continue.

3.1.1.4 Step 4: Cellular VoIP Setup

Your L13 telephony service is based on VoIP (Voice over Internet Protocol or Voice over IP). In order to use this feature of the L13:

1. VoIP service must be offered by your service provider.
2. Your L13 VoIP line must be configured by the service provider and register with the service over the internet connection.
3. Public/Fixed IP based SIM card may be required by your service provider.

Internal calls between local extensions are always enabled regardless of the availability of VoIP service. You will always get a dial tone when using an analog phone connected to the phone port of the L13.

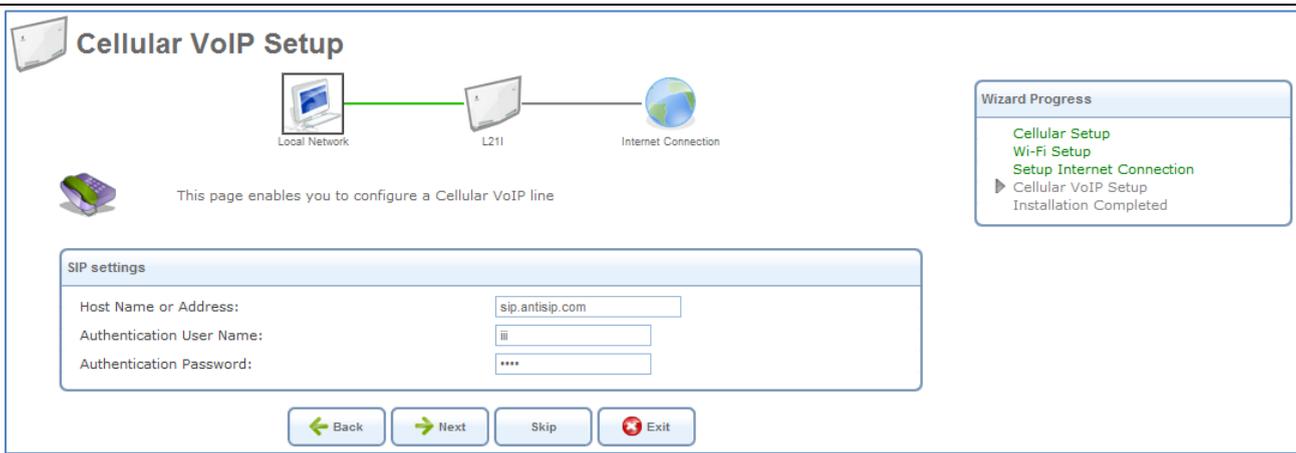


Figure 13 cellular VoIP Line Configuration

In order to setup a cellular VoIP line, you need to enter the following parameters, which need to be obtained from your mobile service provider*:

-SIP Server IP, Authentication User Name and Authentication Password

* Public/Fixed IP based SIM card may be required.

Click the “Next” button to continue, or “Skip” button if you prefer to skip this step.

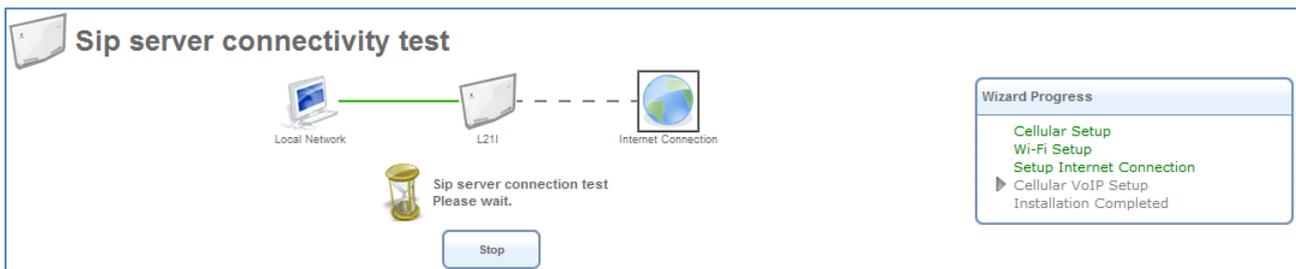


Figure 14 SIP Server Connectivity Test

The system performs an automatic connectivity test to the SIP server. It is recommended to allow the test complete, but you can click “Stop” to abort the test and continue with the next step.

3.1.1.5 Step 5: Installation Completed

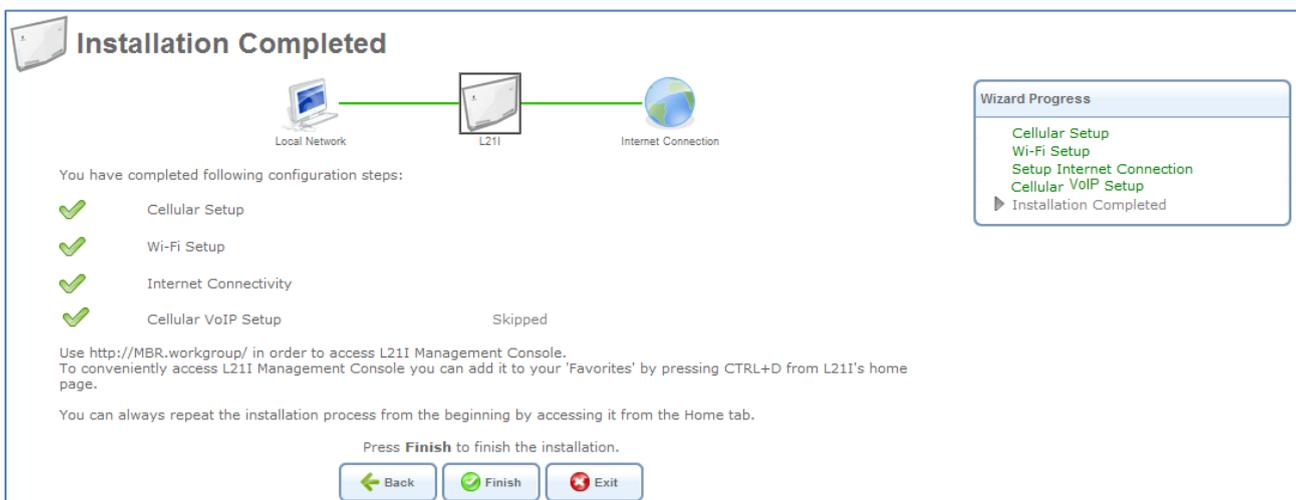


Figure 15: Installation Completed Screen

This screen provides a summary of all the previous steps and the results. Click **Finish** to complete the wizard procedure.

3.2 Navigational Aids

The Web-Based Management (WBM) is a Web site that can be explored with any Web browser. This section illustrates the WBM's page structure and describes its navigational components and their hierarchical relationships.

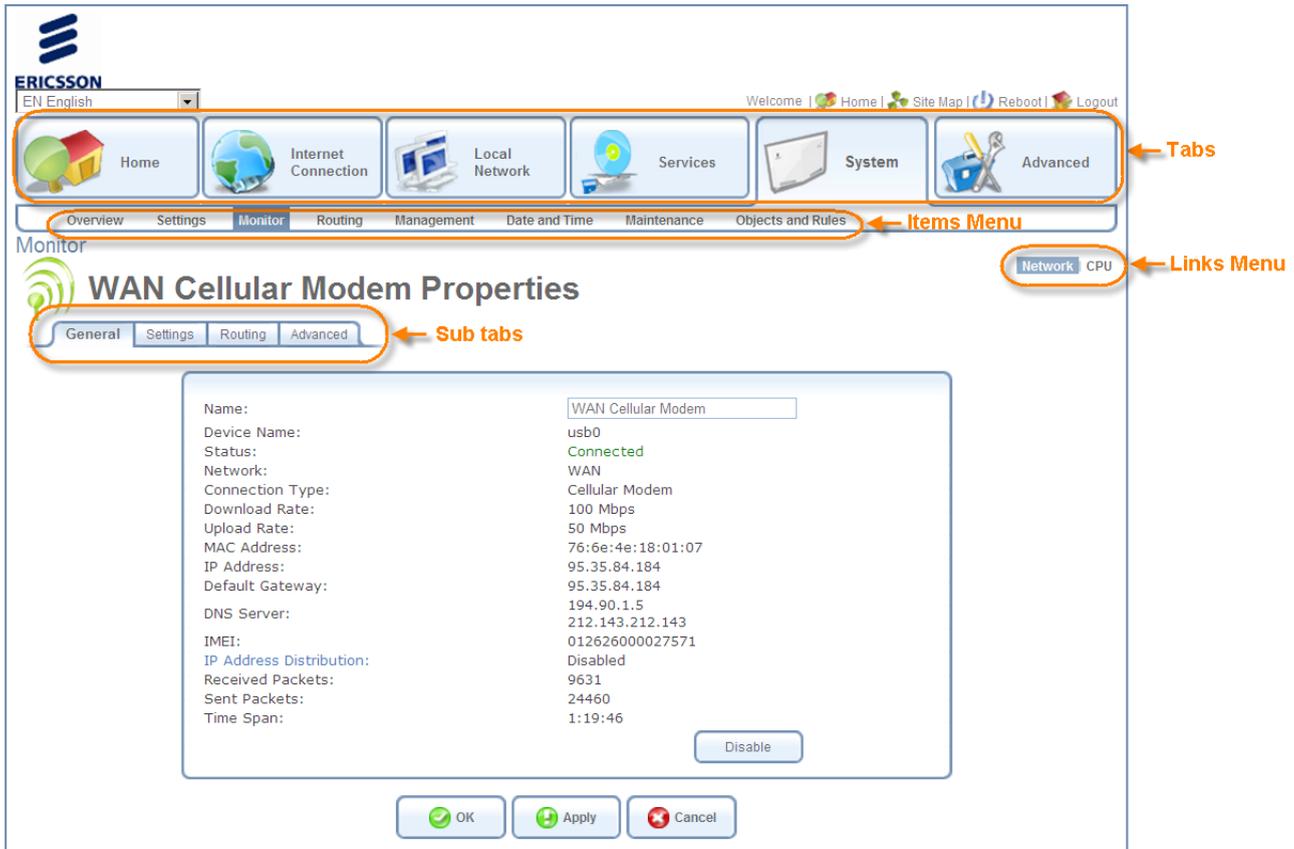


Figure 16: Navigation Components

1. The top level navigational aids are the *tabs*, which group the WBM screens into several main categories.
2. Each tab has an *Items Menu* that lists the menu items relevant for the category.
3. A menu item may have a *Links Menu*, located at the top-right of the screen. These links further divide the menu item into different subjects.
4. A page may have an optional set of *sub-tabs*, providing a form or another set of tabs. Some feature-properties pages contain sub-tabs.

A link bar appears at the top of every WBM page at all times. This bar provides shortcuts to information and action controls, including the Site Map, Restart, and Logout.



Figure 17: Link Bar

3.3 Managing Tables

Tables are used throughout the WBM to display and handle user-defined entries relating to elements such as connection status, local servers, restrictions, and configurable parameters. The principles outlined in this section apply to all tables in the WBM.

Voice

 **Outgoing Calls**

Fixed Numbers Dialing

Dial Plan					
Dial Pattern	Line Group to Use	Number of Digits to Remove	Digits to Add	Class of Service	Action
*	VoIP Lines			Default Class of Service	 
#.	VoIP Lines			Default Class of Service	 
X.	VoIP Lines			Default Class of Service	 
New Dial Plan Entry					

Figure 18: Typical Table Structure

This figure illustrates a typical table. Each row defines an entry in the table. The following buttons, located in the **Action** column, are used to perform various actions on the table entries.



Add icon to add a row to the table.



Edit icon to edit a row in the table.



Remove icon to remove a row from the table.



Download icon to download a file from the table.



Copy icon to copy an item to the clipboard.



Move Up icon to move a row one step up in the table.



Move Down icon to move a row one step down in the table.

3.4 Home Tab

3.4.1 Overview

The Overview screen presents the status of L13 various modules and parts in one convenient location. You can quickly and efficiently view and configure your WAN and LAN networks, as well as hardware peripherals, Internet connection, IP PBX and bandwidth consuming applications, or computers.

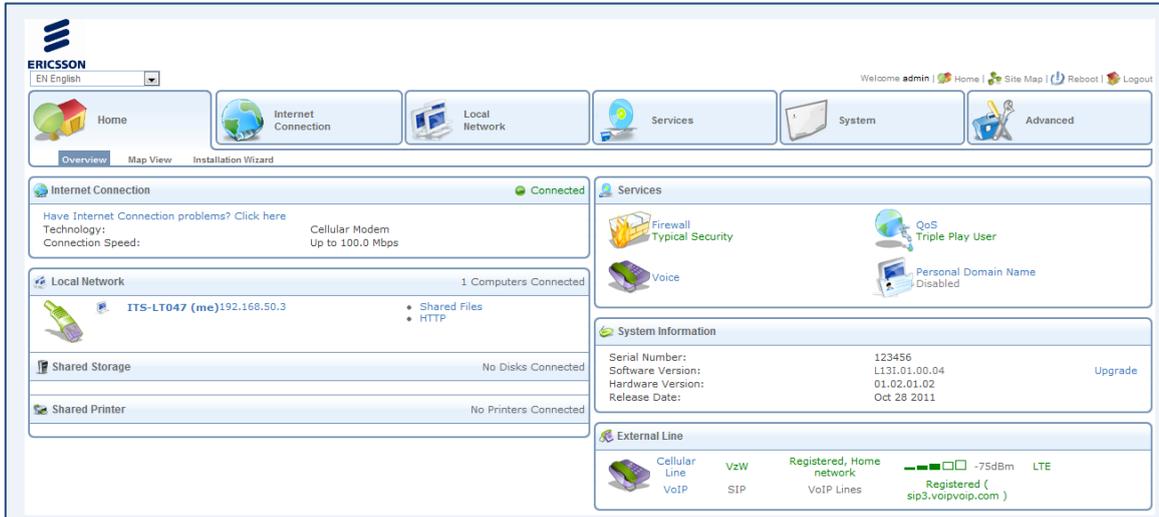


Figure 19: Home Tab – Overview

The **Home** tab is not only informative, but also provides shortcuts to different features and their configurations.

For example, the **Local Network** link provides you with access to the **Device** screen under **Local Network**. This enables you to view and configure the settings of the L13’s various LAN devices. When a LAN host is connected to a MBR, its link automatically appears in this screen section. Clicking the link redirects you to the **Host Information** screen which enables you to view the host's detailed information and to perform various LAN host management tasks.

Among its information, the **Home** tab also displays the system's status, which includes the following details:

The Internet connection's type, speed capability, and data transmission mode

System information, including the gateway's serial number, software version and hardware version

3.4.2 Map View

The Network Map screen (**Home -> Map View**) displays a graphical network map.

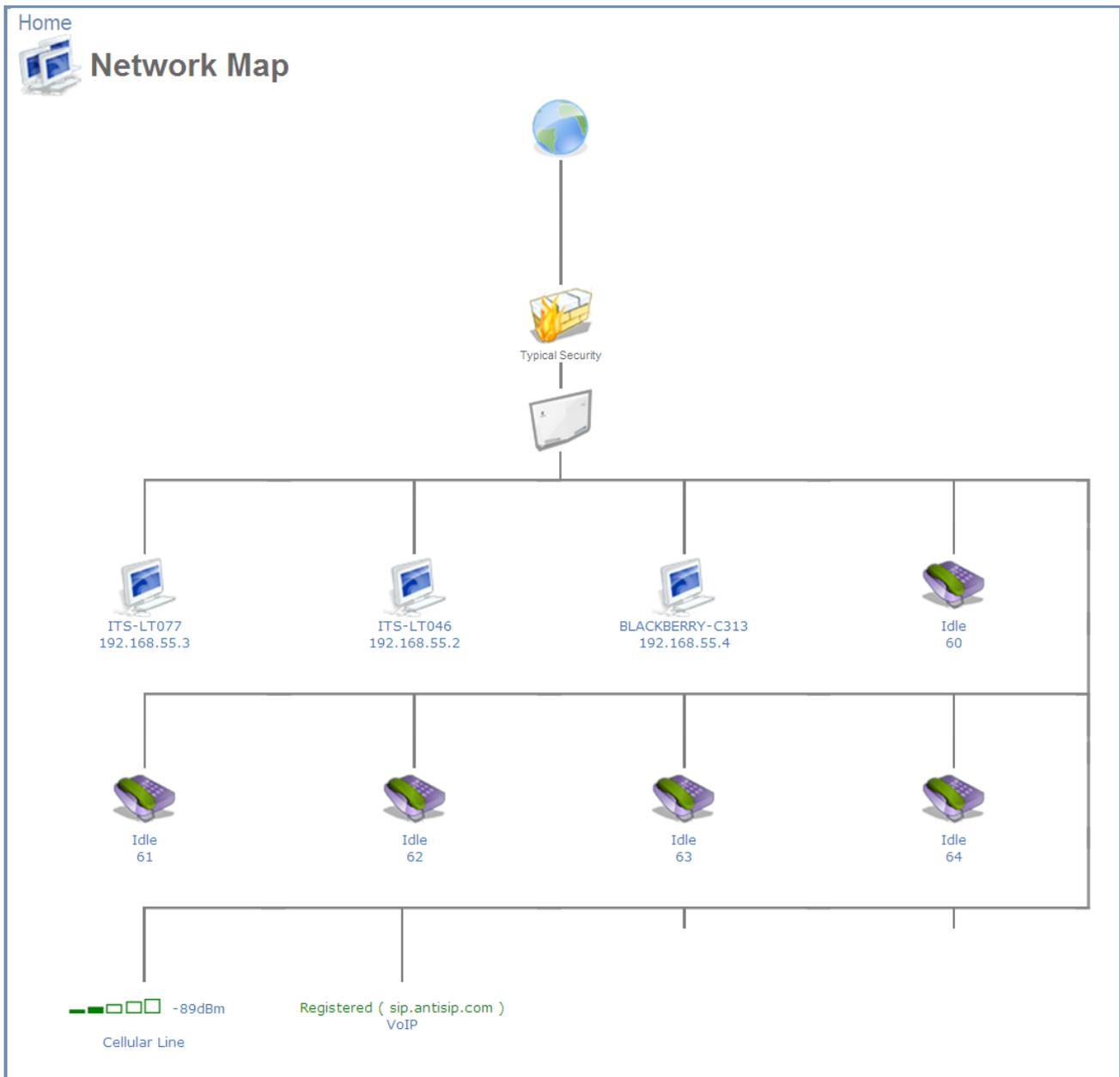


Figure 20: The Network Map

The network map depicts the various network elements, such as the Internet connection, firewall, gateway, and local network computers and peripherals.



Represents the Internet



Represents the gateway's Firewall. Click this icon to configure your security settings.



Represents your gateway

The network map dynamically represents the network objects connected to your system. The system recognizes SIP and analog phones, computers, and other network devices. These objects are represented by icons, as follows:



Represents a computer (host) connected to the gateway. This host is either a DHCP client that has received an IP lease from L13, or a host with a static IP address that was auto-detected by L13. Note that L13 will recognize a physically connected host and display it in the Network Map only after network activity from that host has been detected (e.g. trying to browse to the WBM or to surf the Internet). Click this icon to view network information for the corresponding host.



Represents a host whose DHCP lease has expired and was not renewed. The DHCP lease is renewed automatically unless the host is no longer physically connected to MBR. This icon also represents a static IP host that has no network activity.



Represents a telephone connected to your gateway.



Represents a USB flash memory stick (external memory) connected to your gateway.



Represents a cellular line and indicates the strength of the connection.

3.5 Internet Connection Tab

3.5.1 Settings

The Internet-Connection Settings screen (**Internet Connection-> Settings**) provides general information regarding your WAN Internet connection, including the connection’s status, protocol, speed, duration, and Internet address. Refer to this screen for a quick status reference.

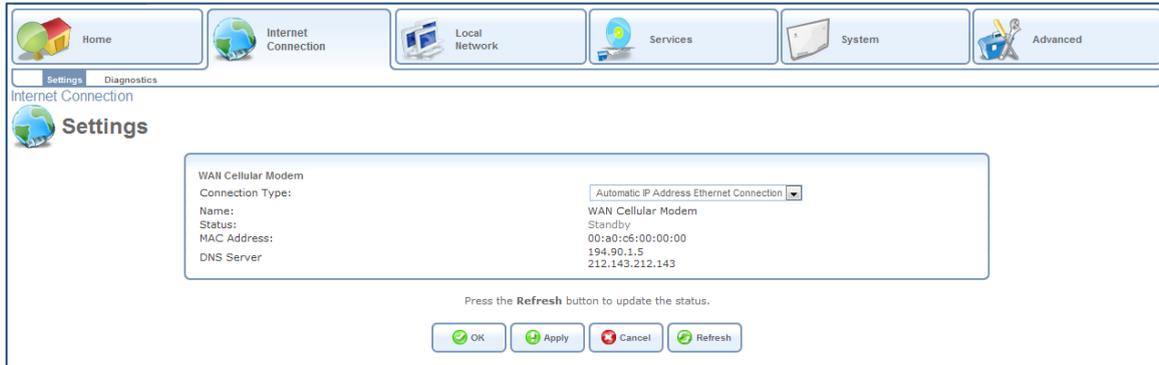


Figure 21: Internet Connection – Settings

The Settings screen provides basic information and configuration options for the Internet connection supported by the L13.

⇒ **To enable or disable the Internet connection:**

1. Select your WAN connection type based on the method by which you are connected to the Internet. The internet connection can be disabled by choosing “No Internet Connection” for this field.
2. Press the ‘Apply’ and then the ‘OK’ buttons.

3.6 Local Network Tab

3.6.1 Settings

The Local-Network Overview screen presents a summary of the L13 network, including a list of all connected devices: computers, shared disks and printers. When this screen is opened, L13 begins the process of automatically detecting the network services available on connected computers (hosts). The screen then refreshes, displaying each computer's network services.

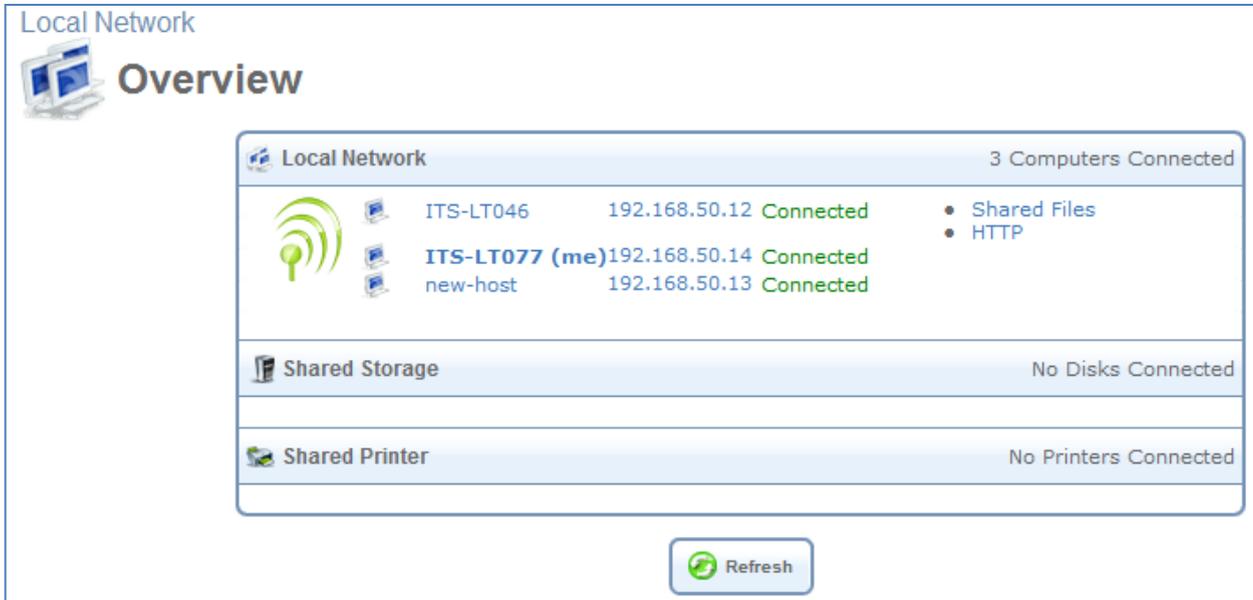


Figure 22: Network Services Detection

⇒ **To view more information on a specific computer:**

Click its link. The Host Information screen appears.

Local Network

Host Information

Services

Shared Files Enabled

HTTP Disabled

FTP Disabled

Telnet Disabled

Remote Desktop Disabled

VNC Disabled

[Add Access Control Rule](#)

[Add Port Forwarding Rule](#)

Connection Information

Host: ITS-LT077

Active: 3166 Days 8 Hours

MAC Address: 00:27:10:7c:99:94

IP Address: 192.168.55.3

Subnet Mask: 255.255.255.0

Network Connection: Bridge

Lease Type: Dynamic

Ping Test:

ARP Test:

Statistics

Transmitted: 91 Packets, 4.5 Kbytes

Received: 0 Packets, 0.0 Kbytes

Blocked: 0 Packets

Active Connections: 14

Approximate Max. Connections: 149144

Connection List

Number	Protocol	LAN IP:Port	L211 IP:Port	WAN IP:Port	Direction	Action
1	TCP	192.168.55.3:49678	95.35.108.189:49678	100.100.100.20:389	Outgoing	
2	TCP	192.168.55.3:49487	95.35.108.189:49487	100.100.100.20:389	Outgoing	

Figure 23: Host Information

This screen presents all of the information relevant to the connected computer, such as connection information, available services, traffic statistics, and connection list. It also enables you to perform connectivity tests with the computer. The following sections are included in the screen:

Section	More Info
Services	<p>This section lists the services on the computer that are available to other computers, either from the LAN, via Web access, or both. Services are accessible only when enabled on the computer. When a service is accessible from the LAN, you can activate it by clicking either its name or the URL that appears (see Figure 23). When a service is accessible via Web access, you can activate it by clicking the Web Access link that appears. Available services are:</p> <p>Shared Files - Access the computer's shared files directory.</p> <p>HTTP - Access the computer's HTTP server (if available).</p> <p>FTP - Open an FTP session with the computer.</p> <p>Telnet - Open a Telnet session with the computer.</p> <p>Remote Desktop - Remotely control a Windows based computer with the Remote Desktop utility.</p> <p>VNC – Indicates if Virtual Network Computing is supported by the host.</p> <p>Add Access Control Rule - Block access to Internet services from the computer, or allow access if the firewall is set to a "High" security level (for more information, refer to section 3.7.1.2.)</p> <p>Add Port Forwarding Rule - Expose services on the computer to external Internet users (for more information, refer to section 3.7.1.3).</p>
Connection Information	<p>This section displays various details regarding the computer's connection settings. To view the connection's properties, click the network connection type (Bridge in the above example). The relevant properties screen appears. In addition, you can run a Ping or ARP test by clicking the respective Test Connectivity button. The tests are performed in the Diagnostics screen (refer to section 3.7.1.9).</p>
Statistics	<p>This section displays the computer's traffic statistics, such as the number and size of transmitted and received packets.</p>
Connection List	<p>This section displays the list of connections opened by the computer on the L13 firewall. The table displays the computer's source LAN IP address and port, the gateway's IP address and port to which it is translated, and the destination WAN IP address and port.</p>

3.6.2 WiFi

The L13 system can be used as a WiFi router, connecting to wireless devices according to the IEEE 802.11b/g/n standards. The WLAN interface can be enabled or disabled. The preferred WLAN data rate can be configured to be either B-G-MIXEDMODE, B-G-N-MIXEDMODE, G-MODE-ONLY, B-MODE-ONLY or N-MODE-ONLY. The wireless access to the L13 may be allowed or denied for specific wireless clients’ MAC addresses.

3.6.2.1 Overview Screen

To see an overview of the WiFi settings, navigate to **Local Network → Wi-Fi**.

Enable Wi-Fi:	<input checked="" type="checkbox"/> Enabled	
Wi-Fi Network (SSID):	<input type="text" value="MBR_L21i"/>	
<input checked="" type="checkbox"/> SSID Broadcast		
802.11 Mode:	802.11b/g/n	
Channel:	Automatic (FCC)	
Channel Width Mode:	20 MHz only	
Network Authentication:	Open System Authentication	
MAC Filtering Mode:	Disable	

MAC Filtering Table		
	MAC Address	Action
New MAC Address		

Security	WPA	
Authentication Method:	Pre-Shared Key	
Pre-Shared Key:	<input type="text" value="12345678"/>	ASCII
Encryption Algorithm:	TKIP	
<input checked="" type="checkbox"/> Group Key Update Interval	<input type="text" value="900"/>	Seconds

Wi-Fi QoS (WMM)	<input type="checkbox"/> Enabled
-----------------	----------------------------------

Transmission Rate:	Auto
Transmit Power:	<input type="text" value="100"/> %
CTS Protection Mode:	None
CTS Protection Type:	cts-only
Frame Burst - Max Number:	<input type="text" value="3"/>
Frame Burst - Burst Time:	<input type="text" value="2"/>
Beacon Interval:	<input type="text" value="100"/> ms
DTIM Interval:	<input type="text" value="1"/> ms
Fragmentation Threshold:	<input type="text" value="2346"/>
RTS Threshold:	<input type="text" value="2346"/>

Figure 24: Wi-Fi Overview

3.6.2.2 General Wi-Fi Settings

The general Wi-Fi settings appear at the top of the Wi-Fi screen.

Enable Wi-Fi:	<input checked="" type="checkbox"/> Enabled	
Wi-Fi Network (SSID):	<input type="text" value="MBR_L21i"/>	
<input checked="" type="checkbox"/> SSID Broadcast		
802.11 Mode:	802.11b/g/n	
Channel:	Automatic (FCC)	
Channel Width Mode:	20 MHz only	
Network Authentication:	Open System Authentication	
MAC Filtering Mode:	Disable	

Figure 25: WiFi Overview - General Section

Configure the fields as follows:

Parameter	More Info
Enable WiFi	Check or uncheck this box to enable or disable the WiFi connection
WiFi Network (SSID)	The L13 supports a single SSID. The system arrives with a default preconfigured SSID that may be manually changed in this field. Note: The SSID is case sensitive.
SSID Broadcast	By default, the SSID is broadcast so that all wireless client devices within range of it can detect it. You can choose to hide the SSID. If you do so, only client devices that know the SSID will be able to connect to L13, and the SSID will have to be entered manually on each device in order for it to connect. Clear this option to turn off broadcasting of the SSID.
802.11 Mode	Select the type of connection. Choose from B-G-MODE, G-MODE-ONLY, B-G-N-MODE, G-N-MODE, N-MODE-ONLY
Channel	A specific wireless channel, over which the system will operate, can be chosen. It may also be set up automatically.
Channel Width Mode	This option appears on platforms supporting 802.11n only. At this point make sure you always work in "20 MHz only".
Network Authentication	Only the 'Open System Authentication' option is available in this version.
MAC Filtering Mode	To enable MAC address filtering, select either “Allow” or “Deny”. If you select “Allow,” only devices whose MAC addresses appear in the MAC Filtering Table (defined in the next section) are allowed to connect to the Wi-Fi network. If you select “Deny,” devices whose MAC addresses appear in the MAC Filtering Table are not allowed to connect to the Wi-Fi network (all other devices are allowed to connect).

3.6.2.3 MAC Filtering Settings

The MAC Filtering Table contains a list of MAC addresses for filtering. The filtering rule is defined above, under “MAC Filtering Mode”.



Figure 26: MAC Filtering Table

⇒ **To define filtering for a MAC address:**

1. Click 'New MAC Address'. The 'MAC Filtering Settings' screen appears.

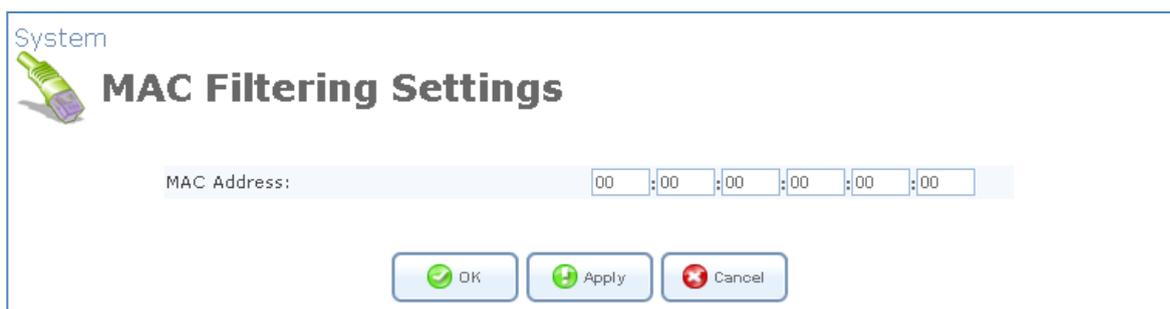


Figure 27: MAC Filtering Settings

2. Enter the MAC address to be filtered and click the 'OK' button. The MAC address is added to the list.



Figure 28: MAC Filtering Table

3.6.2.4 Security Settings

The Wi-Fi security settings are defined under **Security**.

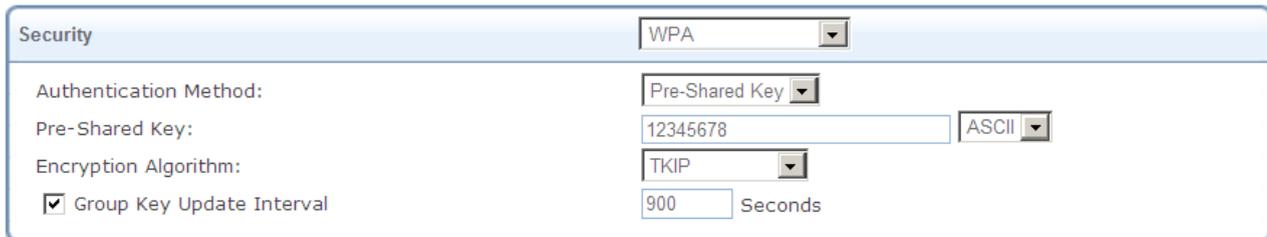


Figure 29: Security Section

⇒ **To configure the security settings:**

1. Select the security type for the connection: None, Authentication Only, or Password Protected (WEP, WPA, WPA2, or WPA and WPA2 combined).
2. If you selected WEP, define one or more encryption keys as follows:

Parameter	More Info
Active	Select the key you want to use at this time.
Encryption Key	Enter your encryption key. Note: The pre-shared key is case-sensitive
Entry Method	Choose whether the encryption key you specified is an ASCII or Hex value.
Key Length	Select the desired key length (40 or 104 bits).

3. If you selected WPA, WPA2, or WPA and WPA2, configure the other parameters as follows:

Parameter	More Info
Authentication Method	Select “Pre-Shared Key”.
Pre-Shared Key	Enter your encryption key. You can use either an ASCII or a Hex value by selecting the value type in the drop-down menu provided. Note: The pre-shared key is case-sensitive
Encryption Algorithm	Select either Temporal Key Integrity Protocol (TKIP) or Advanced Encryption Standard (AES). Note: TKIP can be used in mixed 802.11g/n or 802.11b/g/n modes.
Group Key Update Interval	Defines the time interval in seconds for updating a group key.

3.6.2.5 Wi-Fi QoS Option

The Wi-Fi QoS setting are defined under **WiFi QoS**.

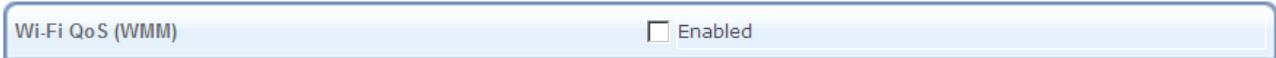


Figure 30: Security Section

If required, enable WiFi QoS by selecting the checkbox next to “Enabled”.

3.6.2.6 Transmission Settings

The transmission settings appear in the bottom section of the Wi-Fi screen.

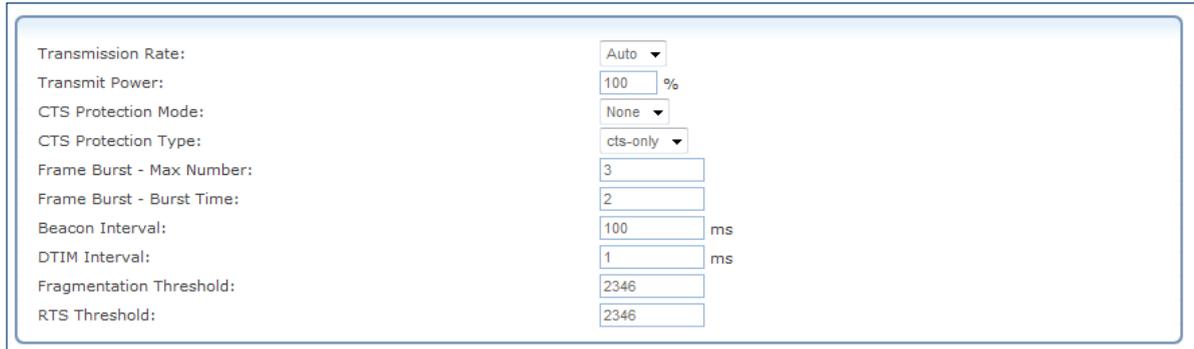


Figure 31: Transmission Properties Section

Configure the transmission properties as follows:

Parameter	More Info
Transmission Rate	The transmission rate is set according to the speed of your WiFi connection. Select the transmission rate from the drop-down menu, or select 'Auto' to have L13 automatically use the fastest possible data transmission rates (the only option when using 802.11ng). Note that if your wireless connection is weak or unstable, it is best to select a low transmission rate.
Transmit Power	The percentage of maximum transmission power.
CTS Protection Mode	CTS Protection Mode boosts your gateway's ability to intercept 802.11g and 802.11b transmissions. Conversely, CTS Protection Mode decreases performance. Leave this feature disabled unless you encounter severe communication difficulties between the gateway and 802.11g products. If enabling, select "Always". Select "Auto" to have L13 decide automatically whether or not to use this feature.
CTS Protection Type	Select the type of CTS protection—CTS-only or RTS-CTS.
Frame Burst	<p>This feature (also known as <i>packet bursting</i>) increases the speed of a 802.11g-based wireless network by unwrapping short packets and rebundling them into a larger one.</p> <p>Frame Burst – Max Number - At any given time, only one wireless client can communicate with the access point. Therefore, clients, competing for air time, transmit data in frame bursts. Use this field to determine the maximum number of frames that L13 will allow clients to transmit in a single frame burst.</p> <p>Frame Burst – Burst Time - The maximum length of a frame burst. Limit the time of a frame burst to avoid large frames from taking communication precedence.</p>

Beacon Interval	A beacon is a packet broadcast by L13 to synchronize the wireless network. The Beacon Interval value indicates how often the beacon is sent
DTIM Interval	The Delivery Traffic Indication Message (DTIM) is a countdown value that informs wireless clients of the next opportunity to receive multicast and broadcast messages. This value ranges between 1 and 16384.
Fragmentation Threshold	Packets that are larger than this threshold are fragmented into multiple packets. Try to increase the fragmentation threshold if you encounter high packet error rates. Do not set the threshold too low, as this can result in reduced networking performance.
RTS Threshold	L13 sends Request to Send (RTS) packets to the wireless client in order to negotiate the dispatching of data. The wireless client responds with a Clear to Send (CTS) packet, signaling that transmission can commence. If the number of packets is less than the preset threshold, then the RTC/CTS mechanism will not be active. If you encounter inconsistent data flow, try a minor reduction of the RTS threshold size.

3.6.3 Shared Storage

You can connect an external storage to your L13 and share this storage with all the devices on your home network (LAN and WLAN). The external storage can be connected via the USB port. Once the external storage is connected, it appears on the home screen. The Shared Storage overview screen can be accessed via its link on the home page or via **Local Network → Shared Storage**. In the management screen, you can see more information about the disk and also check or format each of the disk partitions.

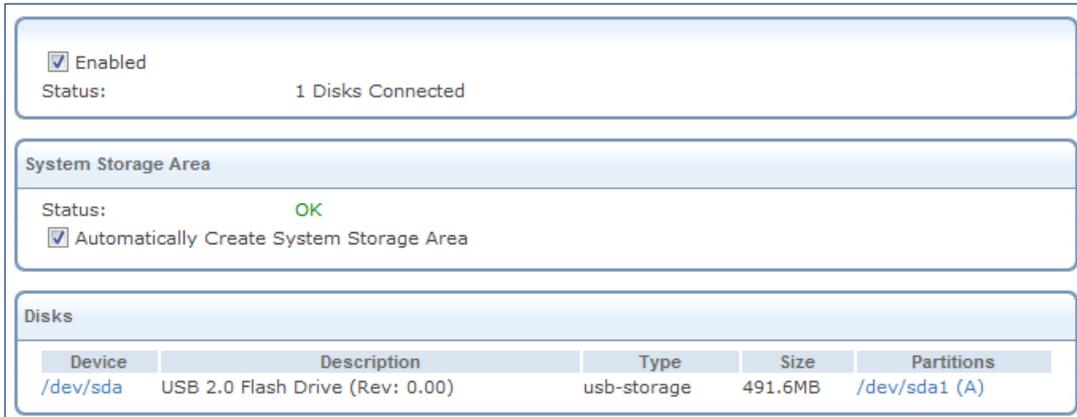


Figure 32: Shared Storage overview

Parameter	More Info
Enabled	Select this option to enable the shared storage option, or clear it to disable it.
Automatically Create System Storage Area	Select if the system storage area should be created automatically.

3.6.4 Shared Printer

With your L13, you can print documents and pictures from any computer in your local network. When connecting a printer to the L13 USB port, it appears in the **Home → Overview** screen with a status “Connected”.

Note: When disconnecting the printer from L13, it remains in the list with status “disconnected”.

Make sure that the printer is recognized on the computer connected to the LAN before printing (use the printer network path for that), and that the printer’s driver is installed on the computer from which you wish to send the printing job.

⇒ **To connect a printer:**

1. Connect the printer to the L13 USB port. It will automatically appear in the overview screen.



Figure 33: Shared Printer

2. On every computer connected to your LAN or WLAN, click on the “Start” button and type “\\mbr” in the run field.
3. A Windows Explorer window will open and the printer will appear in it.
4. Double click on the printer icon. An installation window will appear.

5. If the driver is not found, you will be notified asked to point on the location of the driver. Once you install the driver, you will have to repeat step number 4. For more information about installing a printer driver, refer to the documentation of the operating system.
6. Now the printer screen will be opened. This means the driver is installed properly and the computer is connected to the printer. You can now use the printer to print from the computer.

To monitor all the printing jobs, go to **Local Network** → **Shared Printer**. Click on the printer name. The following screen will appear. From here, you can monitor all the printer jobs online.

Name: Officejet4500G510nz

IPP URL: http://MBR.workgroup:631/printers/Officejet4500G510nz

Model: HP Officejet 4500 G510n-z

Status: Connected

Jobs Printed: 2 (220.6KB)

Create Default Device Mode

Print Jobs

Name	From	Spoiled	Printed	Size	Status	Action
Remote Downlevel Document	192.168.3.10	100%	82%	120KB	sending data to printer	✖
Remote Downlevel Document	192.168.3.10	100%	0%	120KB	waiting for printer to become available	✖
Untitled - Notepad	192.168.3.9	100%	0%	4.939KB	waiting for printer to become available	✖
Remote Downlevel Document	192.168.3.10	1.289KB	0 bytes		waiting for printer to become available	✖

Figure 34: Online Print Jobs

3.7 Services Tab

The Services Overview screen (see Figure 35) presents a summary of L13 services and the current status (enabled/disabled). These services are configurable via their respective tabs under the **Services** main tab.



Figure 35: Services Overview

3.7.1 Firewall

The L13 gateway security suite includes security services: State-full Packet Inspection Firewall, user-authentication protocols, and password protection mechanisms. These features together allow users to connect their computers to the Internet and simultaneously be protected from the security threats of the Internet. The firewall, the cornerstone of your gateway's security suite, has been tailored to the needs of the residential/office user and has been pre-configured to secure your LAN.

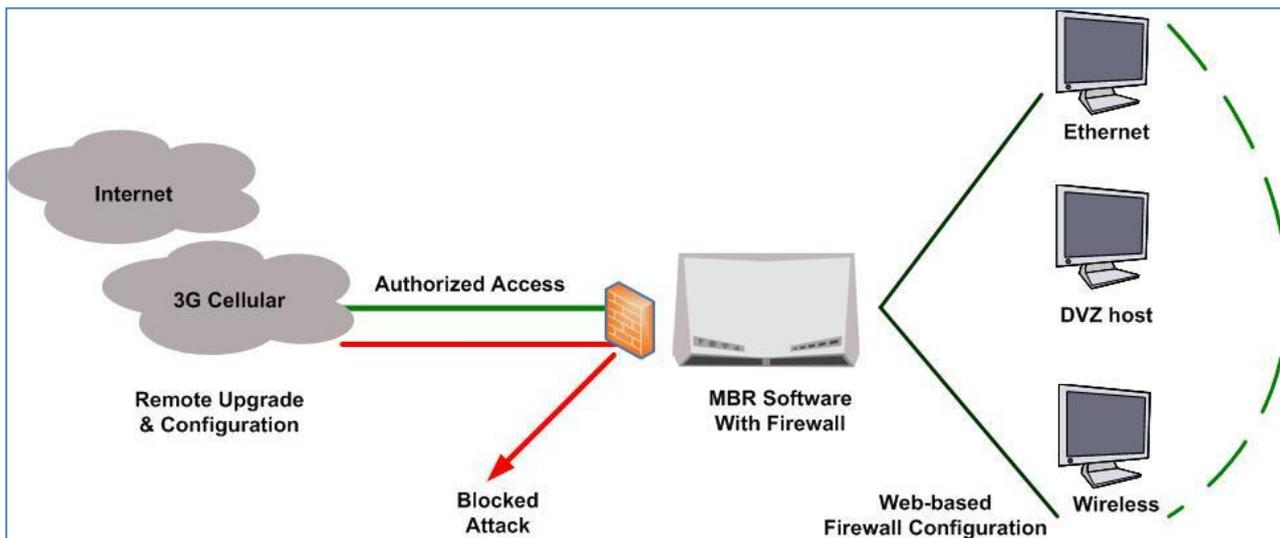


Figure 36: L13 Firewall in Action

L13 secures the use of interactive applications, such as Internet gaming and video-conferencing.

Additional features, including Web site restrictions and access control, can also be configured locally by the user through the L13 WBM or remotely by a service provider. The L13 firewall supports advanced filtering, which is designed to allow control over the firewall's behavior. You can define specific input and output rules, control the order of logically similar sets of rules and make a distinction between rules that apply to WAN and LAN network devices.

The Firewall service includes the following management screens:

An Overview screen allowing you to choose the security level for the firewall (refer to section 3.7.1.1).

An Access Control screen that can be used to restrict access from the home network to the Internet (refer to section 3.7.1.2).

A Port Forwarding screen that can be used to enable access from the Internet to specified services provided by computers in the home network and special Internet applications (refer to section 3.7.1.3).

A Gaming screen that can be used to earmark one computer on the local network for gaming (refer to section 3.7.1.4).

A DMZ Host screen that allows you to configure a LAN host to receive all traffic arriving at your gateway that does not belong to a known session (refer to section 3.7.1.5).

A Port triggering screen that allows you to define port triggering entries and dynamically open the firewall for some protocols or ports (refer to section 3.7.1.6).

A Website Restrictions screen that allows you to block LAN access to a certain host or Web site on the Internet (refer to section 3.7.1.7).

The NAT screen allows you to manually control the translation of network addresses and ports (refer to section 3.7.1.8).

The Connections screen allows you to view all the connections that are currently open (refer to section 3.7.1.9).

The Advanced Filtering screen allows you to implicitly control the firewall setting and rules (refer to section 3.7.1.10).

3.7.1.1 Overview

The firewall regulates the flow of data between the local network and the Internet. Both incoming and outgoing data are inspected and then either accepted (allowed to pass through the L13) or rejected (barred from passing through

the L13) according to a flexible and configurable set of rules. These rules are designed to prevent unwanted intrusions from the outside while allowing home users access to the Internet services that they require.

The firewall rules specify what types of services available on the Internet may be accessed from the local network and what types of services available in the local network may be accessed from the Internet. Each request for a service that the firewall receives, whether originating in the Internet or from a computer in the home network, is checked against the set of firewall rules to determine whether the request should be allowed to pass through the firewall. If the request is permitted to pass, then all subsequent data associated with this request (a "session") will also be allowed to pass, regardless of its direction.

For example, when you point your Web browser to a Web page on the Internet, a request is sent out to the Internet for this page. When the request reaches the L13, the firewall will identify the request type and origin—HTTP and a specific PC in your home network in this case. Unless you have configured access control to block requests of this type from this specific computer, the firewall will allow the request to pass onto the Internet. When the Web page is returned from the Web server, the firewall will associate it with this session and allow it to pass, regardless of whether HTTP access from the Internet to the home network is blocked or permitted. The important issue to note here is that it is the *origin of the request*, not subsequent responses to this request, that determines whether a session can be established or not.

These services include Telnet, FTP, HTTP, HTTPS, DNS, IMAP, POP3 and SMTP. The list of allowed services at **Maximum Security** mode can be edited in the Access Control page. Note: Some applications (such as some Internet messengers and Peer-To-Peer client applications) tend to use these ports if they cannot connect with their own default ports. When opening those ports, these applications will not be blocked outbound, even at Maximum Security Level.

⇒ **To configure L13 basic security settings:**

1. Navigate to **Services → Firewall** (or **Home → Firewall**).



Figure 37: Firewall - General

2. Choose between the three predefined security levels described in the table above.
3. Select **Block IP Fragments** to protect the local network from a common type of hacker attack that could make use of fragmented data packets to sabotage your home network. Note that VPN over IPSec and some UDP-

based services make legitimate use of IP fragments. You should be careful not to block IP fragments from the local network if you want to make use of these select services.

4. Click **OK** to save the settings.

Note: Using the Minimum Security setting may expose the home network to significant security risks, and therefore should only be used when necessary and only for short periods of time.

3.7.1.2 Access Control

You may want to block specific computers within the local network (or even the whole network) from accessing certain services on the Internet. For example, you may want to prohibit one computer from surfing the Web, another computer from transferring files using FTP, and the whole network from receiving incoming e-mail. Access Control defines restrictions on the types of requests that may pass from the local network out to the Internet, and thus may block traffic flowing in both directions. It can also be used to allow specific services when maximum security is configured. In the e-mail example given above, you may prevent computers in the local network from receiving e-mail by blocking their *outgoing* requests to POP3 servers on the Internet. There are numerous services you may want to consider blocking, such as popular games and file sharing servers.

Note: When Web Filtering is enabled, HTTP services cannot be blocked by Access Control.

⇒ **To allow or restrict services:**

1. In the Firewall menu, click the **Access Control** link. The Access Control screen appears.

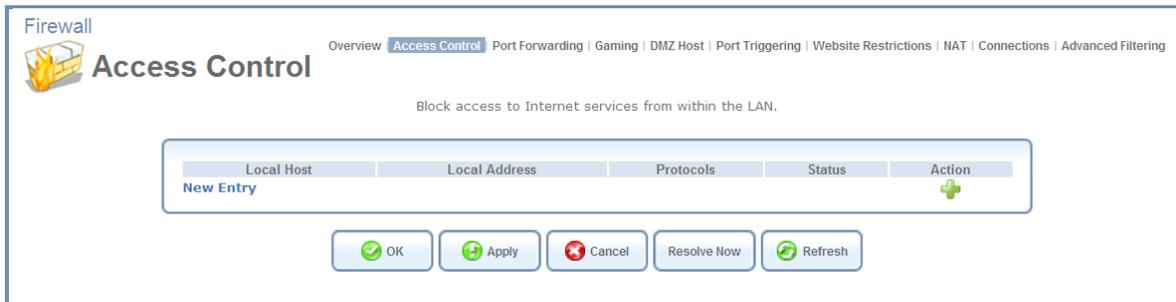


Figure 38: Firewall - Access Control

2. Click the **New Entry** link. The Add Access Control Rule screen appears.

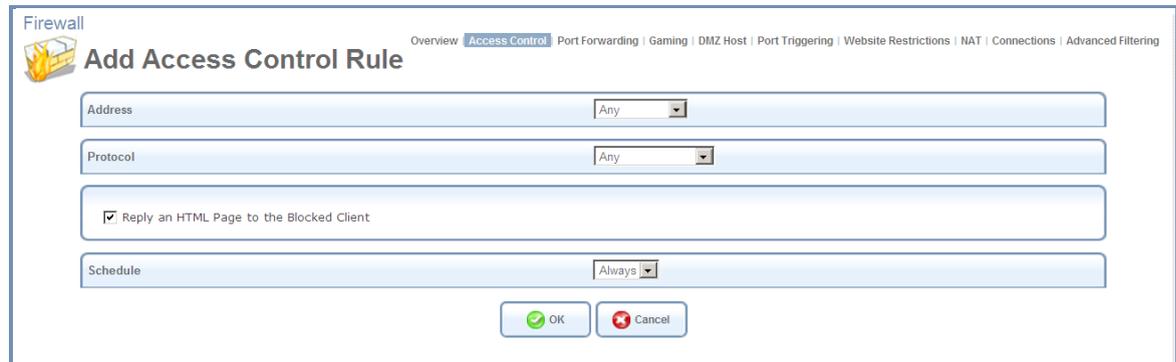


Figure 39: Add Access Control Rule

3. Under **Address**, select the computer or group of computers on which you would like to apply the access-control rule. Select an address or a name from the list, or **any** to apply the rule on all the hosts that are connected to L13 local network.
4. Under **Protocol**, select the type of protocol to use.

To expand the list of available protocols, select **Show All Services**.

Note: When Web Filtering is enabled, HTTP services cannot be blocked.

5. To display the following message to the client: “Access Denied – this computer is not allowed to surf the WAN. Please contact your admin,” select **Reply an HTML page to the blocked client**. When this option is cleared, the client's packets are simply ignored and no notification is issued.
6. Under **Schedule**, select a schedule rule that defines the time period during which the access-control rule is to be applied.
7. Click **OK**. The Access Control screen displays a list of all the rules that are currently defined, including the rule you added.



Figure 40: Firewall - Access Control Rules

Once an access-control rule has been defined, you can edit it as necessary.

⇒ **To modify an access-control rule:**

1. In the Access Control screen, click the action icon of the rule. The Edit Access Control Rule screen appears (see Figure 41: Edit Access Control Rule).

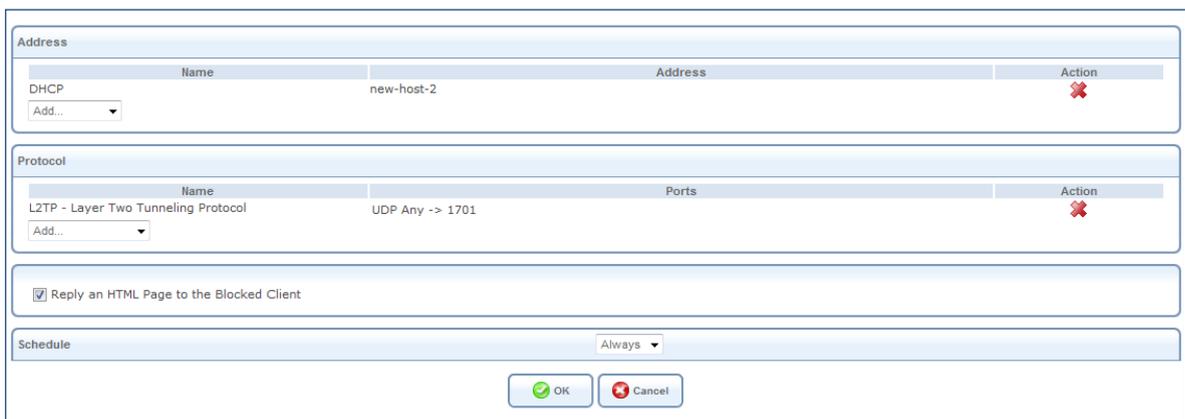


Figure 41: Edit Access Control Rule

2. Edit the parameters as necessary.
3. Click the **OK** button to save your changes and return to the Access Control screen.

You can disable an access control rule in order to make a service available without having to remove the rule from the Access Control screen. This may be useful if you wish to make the service available only temporarily and expect that you will want to reinstate the restriction in the future.

⇒ **To temporarily disable a rule:**

Clear the check box next to the service name.

⇒ *To reinstate a rule at a later time*

Reselect the check box.

⇒ *To remove a rule:*

Click the  action icon for the service. The service will be permanently removed.

3.7.1.3 Port Forwarding

In its default state, the L13 blocks all external users from connecting to or communicating with your network. Therefore the system is safe from hackers who may try to intrude on the network and damage it. However, you may want to expose your network to the Internet in certain limited and controlled ways in order to enable some applications to work from the LAN (game, voice and chat applications, for example) and to enable Internet-access to servers in the local network. The Port Forwarding feature supports both of these functionalities. If you are familiar with networking terminology and concepts, you may have encountered this topic referred to as "Local Servers".

The **Port Forwarding** screen enables you to define the applications that require special handling by the L13. All you have to do is select the application's protocol and the local IP address or name of the computer that will be using or providing the service. If required, you may add new protocols in addition to the most common ones provided by L13. For example, if you wanted to use a File Transfer Protocol (FTP) application on one of your PCs, you would simply select **FTP** from the list and enter the local IP address or host name of the designated computer. All FTP-related data arriving at the L13 from the Internet will henceforth be forwarded to the specified computer.

Similarly, you can grant Internet users access to servers inside your local network, by identifying each service and the PC that will provide it. This is useful, for example, if you want to host a Web server inside your local network. When an Internet user points his/her browser to the L13 external IP address, the gateway will forward the incoming HTTP request to your Web server.

However, there is a limitation that must be considered. With one external IP address (the L13 main IP address), different applications can be assigned to your LAN computers, however each type of application is limited to use one computer. For example, you can define that FTP will use address X to reach computer A and Telnet will also use address X to reach computer A, but attempting to define FTP to use address X to reach both computers A and B will fail. L13 therefore provides the ability to add additional public IP addresses to port forwarding rules, which you must first obtain from your ISP and enter into the **NAT IP Addresses Pool** (refer to Section 3.7.1.8). You will then be able to define FTP to use address X to reach computer A and address Y to reach computer B.

Additionally, port forwarding enables you to redirect traffic to a different port instead of the one to which it was designated. For example, you have a Web server running on your PC on port 8080 and you want to grant access to this server to anyone who accesses L13 via HTTP. To accomplish this, you will have to define a port forwarding rule for the HTTP service, with the PC's IP or host name, as well as specify 8080 in the **Forward to Port** field. All incoming HTTP traffic will now be forwarded to the PC running the Web server on port 8080.

When setting a port forwarding service, you must ensure that the port is not already in use by another application, which may stop functioning. A common example is when using SIP signaling in Voice over IP—the port used by the gateway's VoIP application (5060) is the same port on which port forwarding is set for LAN SIP agents.

⇒ *To add a new port forwarding service:*

1. In the WBM, select the **Firewall** menu item under the **Services** tab, and click the **Port Forwarding** link. The **Port Forwarding** screen appears.

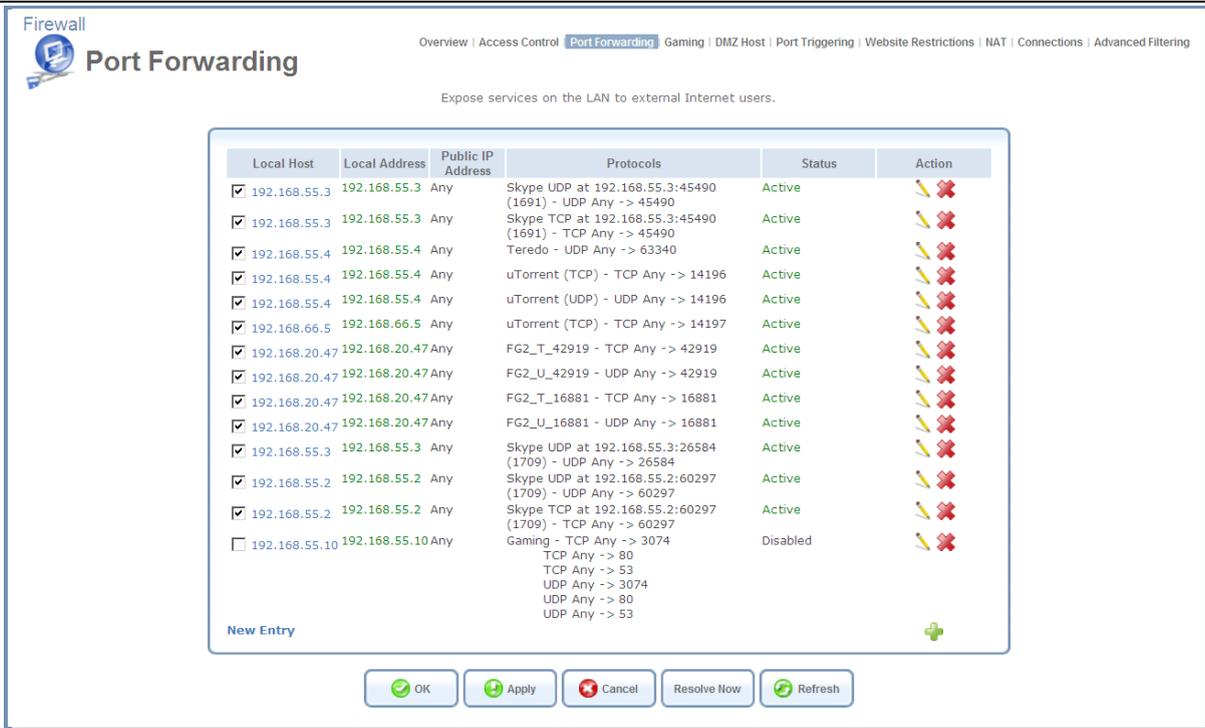


Figure 42: Port Forwarding

2. Click the **New Entry** link. The **Add Port Forwarding Rule** screen appears.

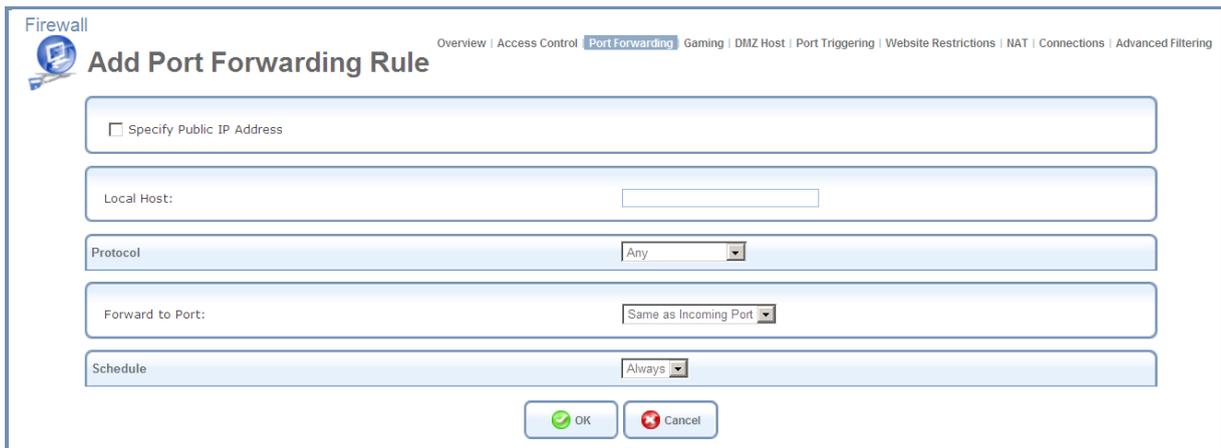


Figure 43: Add Port Forwarding Rule

3. Select the **Specify Public IP Address** check box if you would like to apply this rule on the L13 non-default IP address defined in the **NAT** screen (refer to Section 3.7.1.8.1). The screen refreshes.

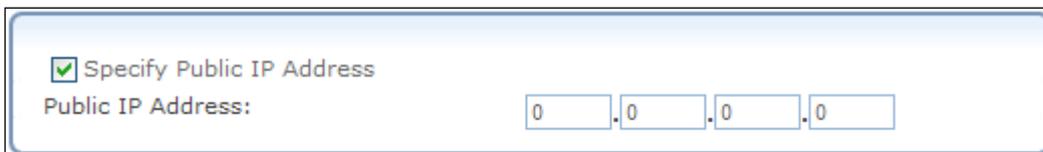


Figure 44: Specify Public IP Address

4. Enter the additional external IP address in the **Public IP Address** field.
5. The **Local Host** drop-down menu lists your available LAN computers. Select a computer that will provide the service (the "server"). Note that unless an additional external IP address has been added, only one LAN computer can be assigned to provide a specific service or application.
6. The **Protocol** drop-down menu lets you select or specify the type of protocol that will be used. Selecting the **Show All Services** option expands the list of available protocols. Select a protocol.

- By default, the L13 will forward traffic to the same port as the incoming port. If you wish to redirect traffic to a different port, select the **Specify** option in the **Forward to Port** drop-down menu. The screen refreshes, and an additional field appears, enabling you to enter the port number.

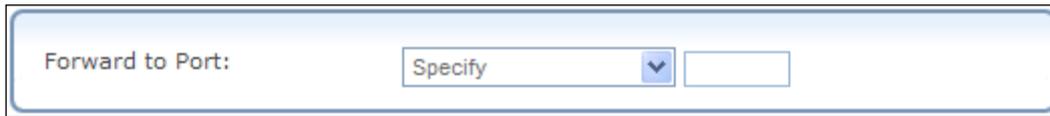


Figure 45: Forward to a Specific Port

- By default, the rule will always be active. However, you can configure scheduler rules by selecting **User Defined**, in order to define time segments during which the rule may be active. Once a scheduler rule(s) is defined, the **Schedule** drop-down menu will allow you to choose between the available rules.
- Click the **OK** button to save your changes. The **Port Forwarding** screen displays a summary of the rule that you have just added.

You can edit a port-forwarding rule as necessary.

⇒ **To edit a port-forwarding rule:**

Click its entry under the **Local Host** column in the **Port Forwarding** screen.

You can disable a rule in order to make a service unavailable without having to remove the rule from the **Port Forwarding** screen. This may be useful if you wish to make the service unavailable only temporarily with plans to reinstate it in the future.

⇒ **To temporarily disable a rule:**

Clear the check box next to the service name.

To reinstate it at a later time, simply reselect the check box.

⇒ **To remove a rule:**

Click the action  icon for the service. The service will be permanently removed.

3.7.1.4 Gaming

Most games and gaming consoles only require UPnP (Universal Plug-n-Play) to be turned on. L13 is preconfigured with UPnP “ON”, as the default. Some games or other applications also require port forwarding in order for them to be able to access internet services. Most use the common gaming ports.

The Gaming feature allows you to select one computer on the local network for gaming activities. Port forwarding on this computer will automatically be set up on this computer for the common gaming ports.

⇒ **To designate a computer for gaming:**

- In the WBM, select the **Firewall** menu item under the **Services** tab, and click the **Gaming** link. The **Gaming** screen appears.

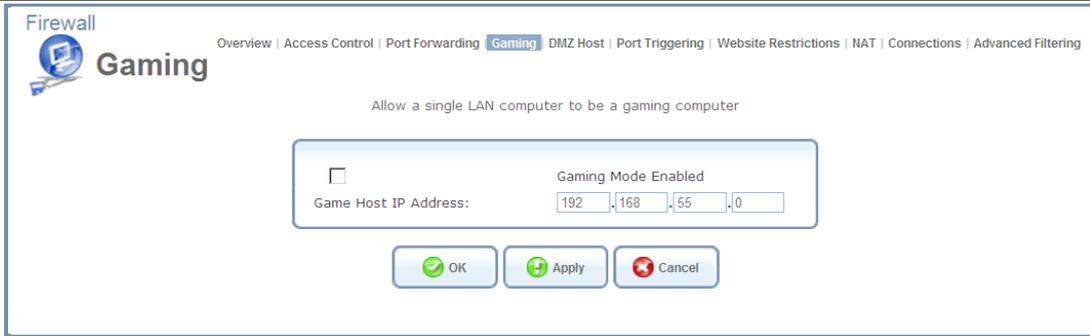
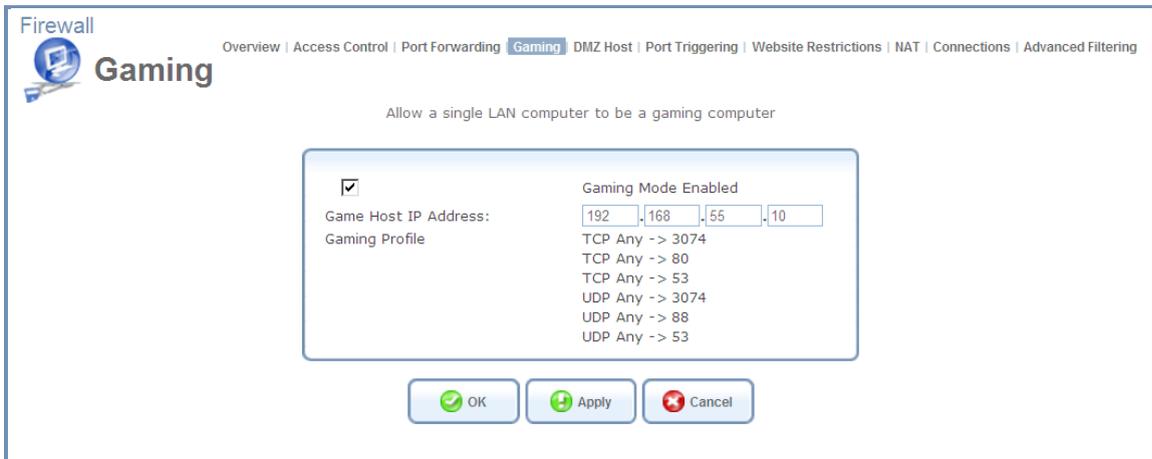


Figure 46: Gaming

2. Select the **Gaming Mode Enabled** checkbox.
3. Under **Game Host IP Address**, enter the IP address of the gaming computer. The port forwarding settings of the gaming computer are displayed under **Gaming Profile**.



4. Click **OK**. The settings are saved.

3.7.1.5 DMZ Host

The DMZ (Demilitarized) Host feature allows one of the local computers to be exposed to the Internet. Designate a DMZ host when:

- ⇒ You wish to use a special-purpose Internet service, such as a video-conferencing program, that is not present in the Port Forwarding list and for which no port range information is available.
- ⇒ You are not concerned with security and wish to expose one computer to all services without restrictions.

Warning: A DMZ host is not protected by the firewall and may be vulnerable to attack. Designating a DMZ host may also put other computers in the local network at risk. When designating a DMZ host, you must consider the security implications and protect it if necessary.

An incoming request for access to a service in the local network, such as a Web server, is fielded by the L13. The L13 will forward this request to the DMZ host (if one is designated) unless the service is being provided by another PC in the local network (assigned in Port Forwarding), in which case that PC will receive the request instead.

⇒ **To designate a local computer as a DMZ Host:**

1. Click **DMZ Host** under the Firewall menu. The **DMZ Host** screen appears.



Figure 47: DMZ Host

2. Enter the local IP address of the computer that you would like to designate as a DMZ host and select the check box. Note that only one LAN computer may be a DMZ host at any time.
3. Click **OK** to save the settings.

You can disable the DMZ host so that it will not be fully exposed to the Internet, but keep its IP address recorded on the **DMZ Host** screen. This may be useful if you wish to disable the DMZ host but expect that you will want to enable it again in the future.

⇒ *To disable the DMZ host so that it will not be fully exposed to the Internet:*

Clear the check box next to the DMZ IP designation, and click OK. To reinstate it at a later time, simply reselect the check box.

3.7.1.6 Port Triggering

Port triggering can be used for dynamic port forwarding configuration. By setting port triggering rules, you can allow inbound traffic to arrive at a specific LAN host using ports different than those used for the outbound traffic. This is called port triggering since the outbound traffic triggers to which ports inbound traffic is directed.

For example, consider a gaming server that is accessed using UDP protocol on port 2222. The gaming server responds by connecting the user using UDP on port 3333 when starting gaming sessions. In such a case you must use port triggering, since this scenario conflicts with the following default firewall settings:

- The firewall blocks inbound traffic by default.
- The server replies to L13 IP, and the connection is not sent back to your host, since it is not part of a session.

In order to solve this you need to define a Port Triggering entry, which allows inbound traffic on UDP port 3333 only after a LAN host generated traffic to UDP port 2222. This will result in accepting the inbound traffic from the gaming server and sending it back to the LAN Host which originated the outgoing traffic to UDP port 2222. Select the **'Port Triggering'** tab in the **Security** management screen. The **Port Triggering** screen will appear (see Figure 48: *Port Triggering*). This screen will list all of the port triggering entries.

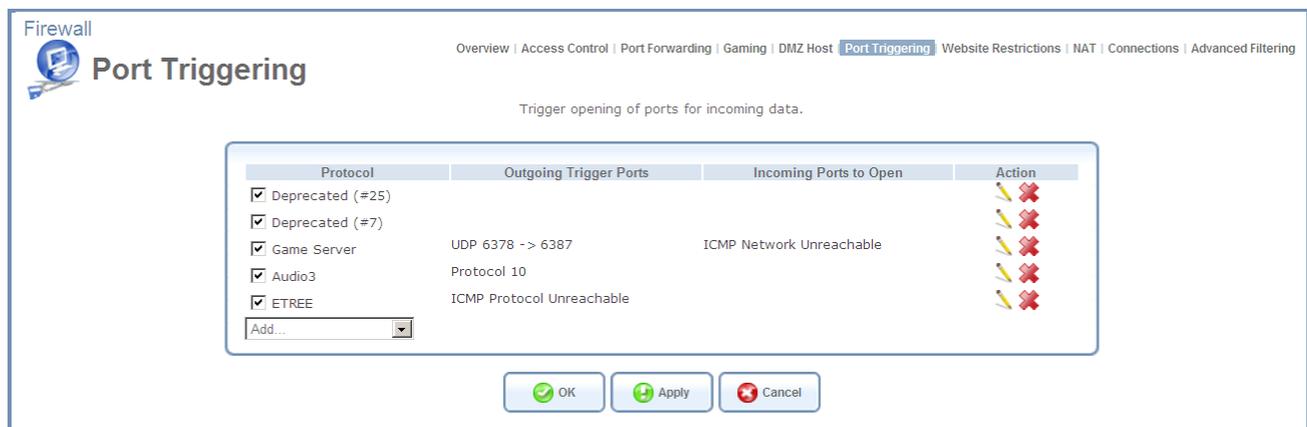


Figure 48: Port Triggering

⇒ *To add an entry for the gaming example above:*

1. Select the **User Defined** option in the **Protocol** column to add an entry. The **Edit Port Triggering Rule** screen will appear.



Figure 49: Edit Port Triggering Rule

2. Enter a name for the service (e.g. "game_server")
3. Click the **New Trigger Ports** link. The **Edit Service Server Ports** screen will appear.



Figure 50: Edit Service Server Ports

4. In the Protocol combo-box, select UDP. The screen will refresh, providing source and destination port options.
5. Leave the Source Ports combo-box at its default "Any".
6. In the Destination Ports combo-box, select "Single".
7. The screen will refresh again, providing an additional field in which you should enter "2222" as the destination port.

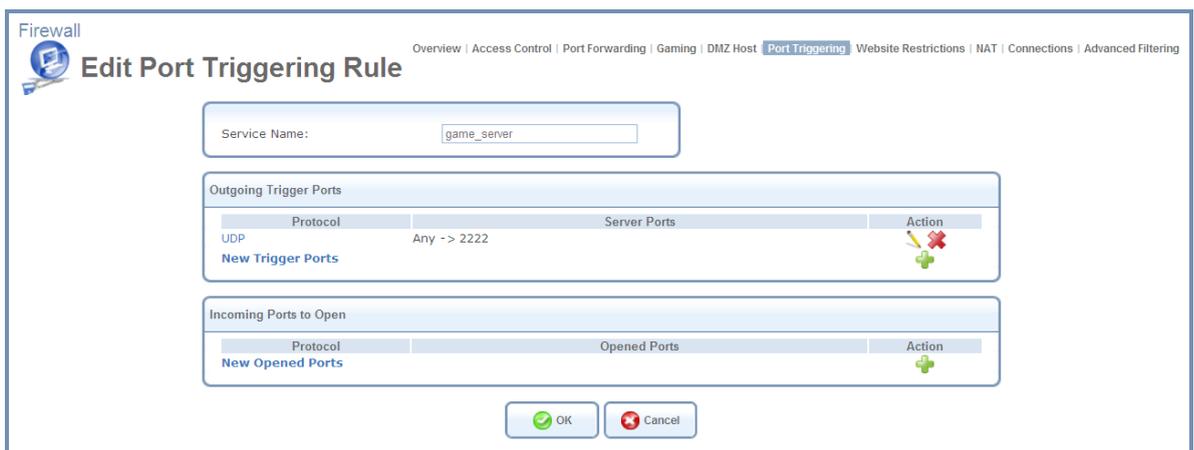


Figure 51: Edit Service Server Ports

8. Click **OK** to save the settings.
9. Back in the **Edit in** Outgoing Trigger Ports table new added entry screen; click the **New Opened Ports** link. The **Edit Service Opened Ports** screen will appear.

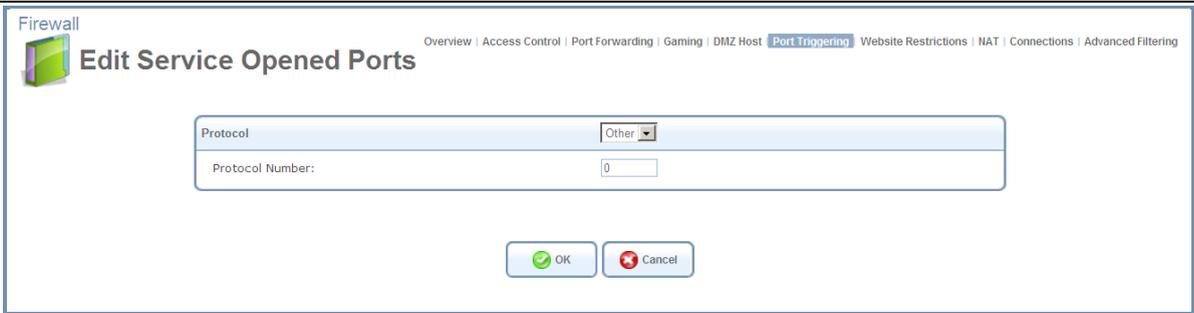


Figure 52: Edit Service Opened Ports

- Similar to the trigger ports screen, select UDP as the protocol, leave the source port at "Any", and enter a 3333 as the single destination port.



Figure 53: Edit Service Opened Ports

- Click **OK** to save the settings.

You can disable a port triggering rule without having to remove it from the **Port Triggering** screen. To temporarily disable a rule, clear the check box next to the service name. To reinstate it at a later time, simply reselect the check box. To remove a rule, click the  action icon for the service. The service will be permanently removed.

Note: There may be a few default port triggering rules listed when you first access the port triggering screen. Please note that disabling these rules may result in non-existent gateway functionality.

3.7.1.7 Website Restrictions

You may configure the L13 to block specific Internet Web sites so that they cannot be accessed from computers in the local network. Furthermore, restrictions can be applied to a comprehensive and automatically-updated table of sites to which access is not recommended.

⇒ **To block access to a Website:**

- Click the **Website Restrictions** link of the **Firewall** menu item under the **Services** tab.

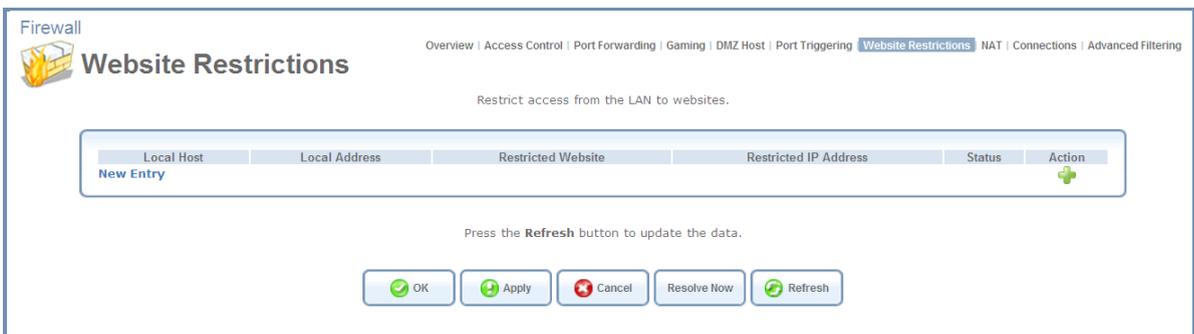


Figure 54: Website Restrictions

- Click the **New Entry** link. The **Restricted Website** screen appears.

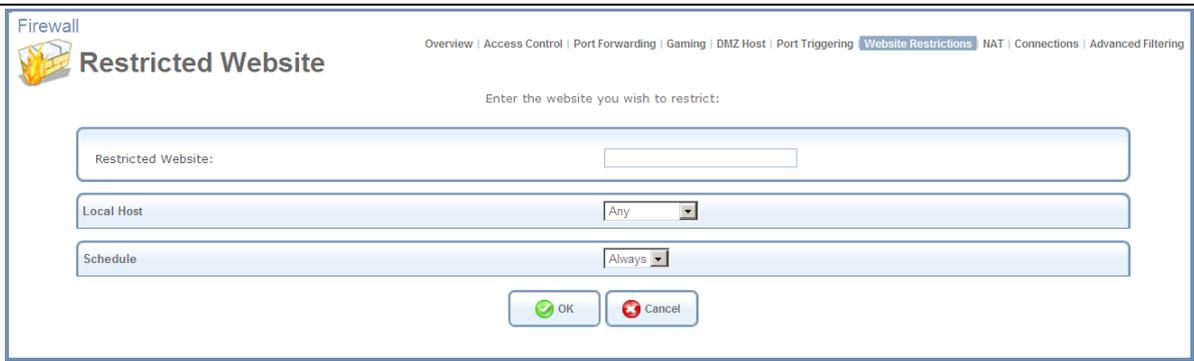


Figure 55: Restricted Website

3. Enter the URL that you would like to make inaccessible from your local network (all Web pages within this URL will also be blocked). If the URL has multiple IP addresses, the L13 will resolve all additional addresses and automatically add them to the restrictions table.
4. The **Local Host** drop-down menu provides you the ability to specify the computer or group of computers on which you would like to apply the Web site restriction. Select an address or a name from the list to apply the rule on the corresponding host, or **any** to apply the rule on all L13 LAN hosts.
5. By default, the rule will always be active. However, you can configure scheduler rules by selecting **User Defined** in order to define time segments during which the rule may be active. Once a scheduler rule(s) is defined, the **Schedule** drop-down menu will allow you to choose between the available rules.
6. Click **OK** to save the settings. You will be returned to the previous screen while the L13 attempts to find the site.
7. **Resolving...** will appear in the Status column while the site is being located (the URL is **resolved** into one or more IP addresses).

Local Host	Local Address	Restricted Website	Restricted IP Address	Status	Action
<input checked="" type="checkbox"/> ITS-LT077 New Entry	ITS-LT077	www.facebook.com	www.facebook.com (Unresolved)	Resolving...	

Figure 56: Resolving

8. Click the **Refresh** button to update the status if necessary. If the site is successfully located then **Active** will appear in the status bar.

Local Host	Local Address	Restricted Website	Restricted IP Address	Status	Action
<input checked="" type="checkbox"/> ITS-LT077 New Entry	ITS-LT077	www.facebook.com	www.facebook.com	Active	

Figure 57: Active Status

Note: If the site wasn’t successfully located, **Hostname Resolution Failed** will appear. When the L13 fails to locate the Website, do the following:

Use a Web browser to verify that the Website is available. If it is, then you probably entered the Website address incorrectly. If the Website is not available, then return to the **Website Restrictions** screen at a later time and click the **Resolve Now** button to verify that the Website can be found and blocked by MBR.

You may edit the Website restriction by modifying its entry under the **Local Host** column in the **Website Restrictions** screen.

⇒ **To modify a rule:**



1. Click the  action icon for the restriction. The **Restricted Website** screen appears (see Figure 54: Website Restrictions).
2. Modify the Website address, group or schedule as necessary.
3. Click the **OK** button to save your changes and return to the **Website Restrictions** screen.
4. To ensure that all current IP addresses corresponding to the restricted Websites are blocked, click the **Resolve Now** button. The L13 will check each of the restricted Website addresses and ensure that all IP addresses at which this Website can be found are included in the IP addresses column.

You can disable a restriction in order to make a Website available again without having to remove it from the **Website Restrictions** screen. This may be useful if you wish to make the Website available only temporarily and plan to block it again in the future.

⇒ **To modify an entry:**

1. Clear the check box next to the service name.
2. To reinstate it at a later time, simply reselect the check box.

⇒ **To modify a rule:**



Click the  action icon for the service. The service will be permanently removed.

3.7.1.8 Network Address Translation (NAT)

The L13 features a configurable Network Address Translation (NAT) and Network Address Port Translation (NAPT) mechanism, allowing you to control the network addresses and ports of packets routed through your gateway. When enabling multiple computers on your network to access the Internet using a fixed number of public IP addresses, you can statically define which LAN IP address will be translated to which NAT IP address and/or ports.

By default, the L13 operates in NAPT routing mode (refer to Section 3.7.1.8.1). However, you can control your network translation by defining static NAT/NAPT rules. Such rules map LAN computers to NAT IP addresses. The NAT/NAPT mechanism is useful for managing Internet usage in your LAN and for complying with various application demands. For example, you can assign your primary LAN computer with a single NAT IP address, in order to assure its permanent connection to the Internet. Another example is when an application server with which you wish to connect, such as a security server, requires that packets have a specific IP address – you can define a NAT rule for that address.

⇒ **To Configure the Network Address Translation:**

1. Click the **NAT** link of the **Firewall** menu item under the **Services** tab. The **NAT** screen appears.

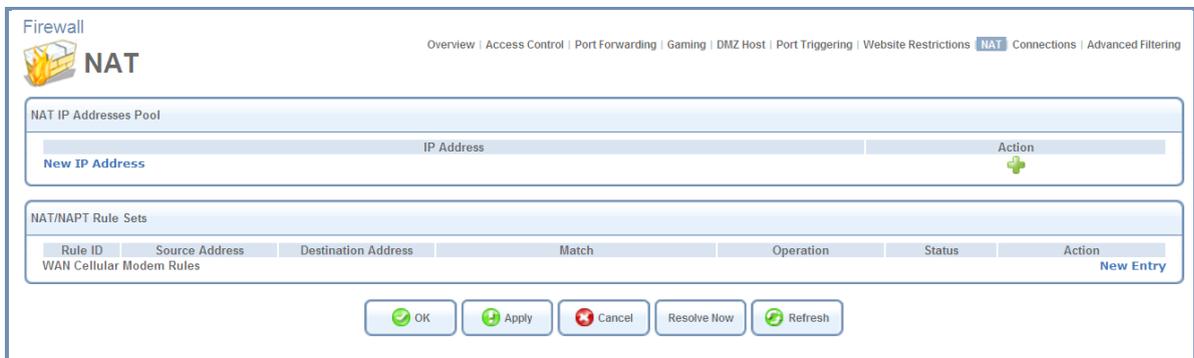


Figure 58: Network Address Translation

2. Before configuring NAT/NAPT rules, you must first enter the additional public IP addresses obtained from your ISP as your NAT IP addresses in the **NAT IP Addresses Pool** section. The primary IP address used by the WAN device for dynamic NAPT should not be added to this table.

- To add a NAT IP address, click the **New IP Address** link. The **Edit Item** screen appears.



Figure 59: Edit Item

- Select from IP address, IP Subnet, IP Range or the DHCP option in the **Network Object Type** drop-down menu. Enter the information respectively and click **OK** to save the settings.
- To add a new NAT/NAPT rule, click the **New Entry** link in the **NAT/NAPT Rule Sets** section of the **NAT** screen. The **Add NAT/NAPT Rule** screen appears.

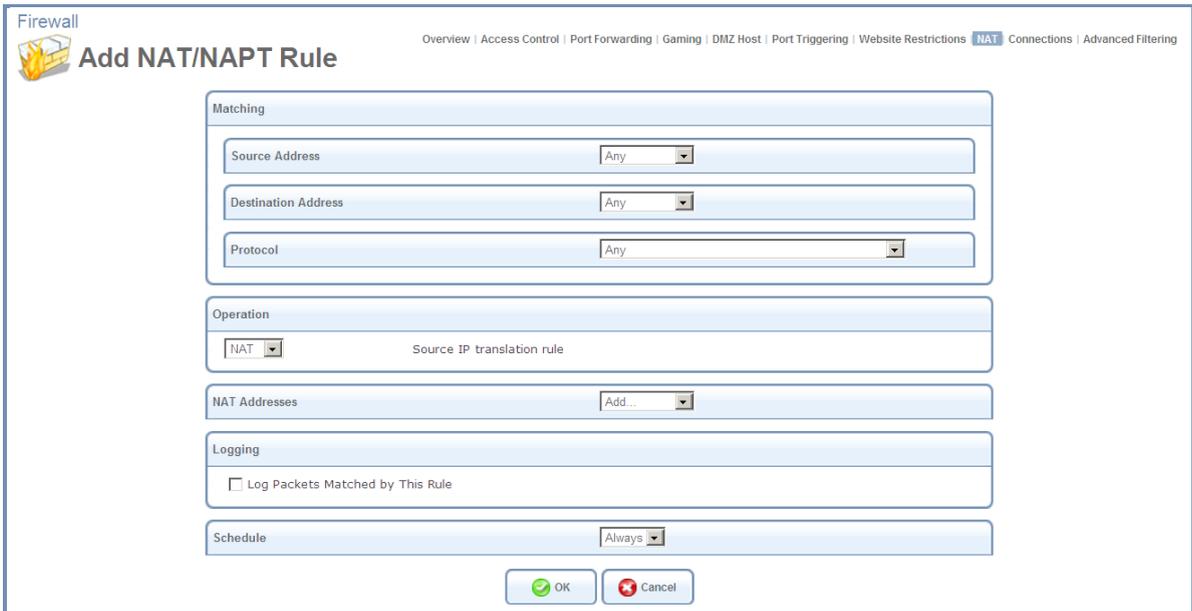


Figure 60: Add NAT/NAPT Rule

This screen is divided into two main sections: **Matching** and **Operation**. The **Matching** section defines the LAN addresses to be translated to the external addresses which are defined in the **Operation** section.

- Matching** Use this section to define characteristics of the packets matching the rule.

Source Address The source address of packets sent or received by the L13. The drop-down menu provides you the ability to specify the computer or group of computers on which you would like to apply the rule. Select an address or a name from the list to apply the rule on the corresponding host, or **Any** to apply the rule on all L13 LAN hosts.

Destination Address The destination address of packets sent or received by MBR. This address can be configured in the same manner as the source address. This entry enables further filtration of the packets.

Protocol You may also specify a traffic protocol. Selecting the **Show All Services** option from the drop-down menu expands the list of available protocols. Select a protocol.

- Operation** - Use this section to define the operation that will be applied on the IP addresses matching the criteria defined above. The operations available are NAT or NAPT. Selecting each from the drop-down menu refreshes the screen accordingly.

Figure 61: Add NAT Rule

NAT Addresses The NAT address into which the original IP address will be translated. The drop-down menu displays all of your available NAT addresses/ranges from which you can select an entry.

Figure 62: Add NAPT Rule

NAPT Address The NAPT address into which the original IP address will be translated. The drop-down menu displays all of your available NAPT addresses/ranges from which you can select an entry. Note, however, that in this case the network object may only be an IP address since NAPT is port-specific.

NAPT Ports Specify the port(s) of the IP address to which the original IP address will be translated. Enter a single port or select **Range** in the drop-down menu. The screen refreshes, enabling you to enter a range of ports.

Figure 63: Add NAPT Rule

8. **Logging** section allows you to monitor the rule.
 - Log Packets Matched by This Rule** Select this check box to log the first packet from a connection that was matched by this rule.
9. **Schedule** By default, the rule will always be active. However, you can configure scheduler rules by selecting **User Defined**, in order to define time segments during which the rule may be active. Once a scheduler rule(s) is defined, the **Schedule** drop-down menu will allow you to choose between the available rules.

3.7.1.8.1 Using NAT/NAPT

This section demonstrates the NAT/NAPT usage and capabilities by creating several rules and observing their implementation.

⇒ [To Add NAT/NAPT IP Addresses](#)

In the following examples, LAN IP addresses are marked 192.168.1.X, while NAT addresses are marked 192.168.71.X. Assuming your obtained public IP addresses are **192.168.71.12 through 192.168.71.20**, add them as NAT IP addresses to the WAN Ethernet settings, as follows:

1. Click the **NAT** link of the **Firewall** menu item under the **Services** tab. The **NAT** screen appears.
2. Click the **New IP Address** link in the **NAT IP Addresses Pool** section. The **Edit Item** screen appears (see Figure 64: Edit Item).
3. Select the IP address option and enter 192.168.71.12.

Network Object Type: IP Address

IP Address: 192 . 168 . 71 . 12

Figure 64: Edit Item

4. Click **OK** to save the settings.
5. Click the **New IP Address** link again to add an additional Public IP to NAT IP Addresses Pool. This sequence is for demonstration purposes; you may enter your public IP addresses in the method that suits you.
6. Select the IP range option and enter 192.168.71.13 through 192.168.71.20.

Network Object Type: IP Range

From IP Address: 192 . 168 . 71 . 13

To IP Address: 192 . 168 . 71 . 20

Figure 65: Edit Item

7. Click **OK** to save the settings. The new IP addresses are displayed in the **NAT IP Addresses Pool** section.

NAT IP Addresses Pool	
IP Address	Action
192.168.71.12	 
192.168.71.13 - 192.168.71.20	 
New IP Address	

Figure 66: NAT IP Addresses

8. Click **OK** to save the settings.

You can now add NAT/NAPT rules based on these IP addresses.

⇒ **To add a NAT/NAPT rule:**

1. Click the **New Entry** link in the **NAT/NAPT Rule Sets** section. The **Add NAT/NAPT Rule** screen appears.

The screenshot shows the 'Add NAT/NAPT Rule' configuration window. At the top left, there is a 'Firewall' logo and the title 'Add NAT/NAPT Rule'. A breadcrumb trail at the top right includes: Overview | Access Control | Port Forwarding | Gaming | DMZ Host | Port Triggering | Website Restrictions | NAT | Connections | Advanced Filtering. The configuration is organized into several sections:

- Matching:** Contains three dropdown menus: 'Source Address' (set to 'Any'), 'Destination Address' (set to 'Any'), and 'Protocol' (set to 'Any').
- Operation:** Contains a dropdown menu set to 'NAT' and the text 'Source IP translation rule'.
- NAT Addresses:** Contains a dropdown menu set to 'Add...'. There is also a 'Log...' button next to it.
- Logging:** Contains a checkbox labeled 'Log Packets Matched by This Rule', which is currently unchecked.
- Schedule:** Contains a dropdown menu set to 'Always'.

At the bottom of the window are two buttons: 'OK' (with a green checkmark icon) and 'Cancel' (with a red 'X' icon).

Figure 67: Add NAT/NAPT Rule

2. Follow the example to create the required NAT/NAPT rules.

Example 1: Translate the address 192.168.1.10 to 192.168.71.12

In this example, we assume that LAN addresses (192.168.1.X) are not yet connected. Therefore, they do not appear as drop-down menu options, and network objects must be created in order to represent them.

1. Select **User Defined** in the **Source Address** drop-down menu. The **Edit Network Object** screen appears.

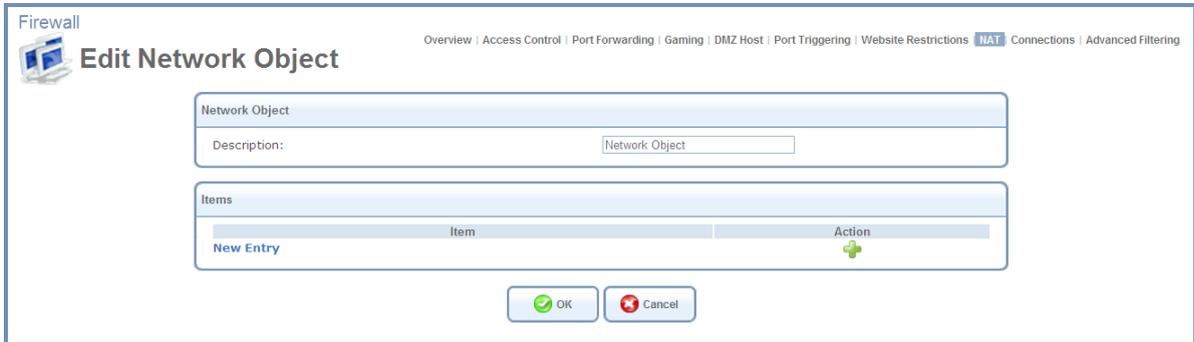


Figure 68: Edit Network Object

2. Click **New Entry**. The **Edit Item** screen appears.



Figure 69: Edit Item

3. In the **Network Object Type** drop-down menu, select **IP Address**, and then enter 192.168.1.10.
4. Click **OK** to save the settings.
5. Click **OK** once more in the **Edit Network Object** screen.
6. Back in the **Add NAT/NAPT Rule** screen, in the **NAT Addresses** drop-down menu, select the **192.168.71.12** option. The screen refreshes, adding this address as a NAT IP address.
7. Click **OK** to save the settings. The NAT rule is displayed in the **NAT** screen.

NAT/NAPT Rule Sets						
Rule ID	Source Address	Destination Address	Match	Operation	Status	Action
WAN Ethernet Rules						
<input checked="" type="checkbox"/> 0	192.168.1.10	Any		NAT -> 192.168.71.12	Active	
New Entry						

Figure 70: NAT/NAPT Rule Sets

This rule translates one LAN IP address to one NAT IP address which means that this LAN computer will have WAN access at all times. The status is therefore set to "Active".

Example 2: Translate the range 192.168.1.11-192.168.1.15 to 192.168.71.12-192.168.71.15

Define this NAT rule in the same manner depicted above with the exception of selecting **IP Range** (instead of **IP Address**) as the network object type. Since neither range is predefined (and therefore not found in the drop-down menu options), network objects must be created in order to represent them. This is done with the **User Defined** option. The rule is displayed in the **NAT** screen.

NAT/NAPT Rule Sets						
Rule ID	Source Address	Destination Address	Match	Operation	Status	Action
WAN Ethernet Rules						
<input checked="" type="checkbox"/> 0	192.168.1.10	Any		NAT -> 192.168.71.12	Active	
<input checked="" type="checkbox"/> 1	192.168.1.11 - 192.168.1.15	Any		NAT -> 192.168.71.12 - 192.168.71.15	Active	
New Entry						

Figure 71: NAT/NAPT Rule Sets

This rule translates five new LAN IP addresses to four NAT IP addresses, which would normally mean that only four of the five LAN computers may have WAN access at the same time. However, note that the NAT address 192.168.71.12 is already in use by the first rule. The L13 will therefore allow these five LAN computers to use only the three remaining IP addresses: 71.13, 71.14 and 71.15. The status is set to "Active".

Example 3: Translate the range 192.168.1.21-192.168.1.25 to 192.168.71.13-192.168.71.14

1. Define this NAT rule in the same manner depicted above. The following attention message is displayed.



Figure 72: Attention

2. Click **OK**. The rule is displayed in the **NAT** screen.

NAT/NAPT Rule Sets						
Rule ID	Source Address	Destination Address	Match	Operation	Status	Action
WAN Ethernet Rules						
<input checked="" type="checkbox"/> 0	192.168.1.10	Any		NAT -> 192.168.71.12	Active	
<input checked="" type="checkbox"/> 1	192.168.1.11 - 192.168.1.15	Any		NAT -> 192.168.71.12 - 192.168.71.15	Active	
<input checked="" type="checkbox"/> 2	192.168.1.21 - 192.168.1.25	Any		NAT -> 192.168.71.13 - 192.168.71.14	Error	
New Entry						

Figure 73: NAT/NAPT Rule Sets

This rule translates five new LAN IP addresses to two NAT IP addresses, both of which are already in use by the second rule. L13 is therefore unable to resolve this situation and the rule's status is set to "Error". Notice that had this rule been defined as the second rule, all three rules would be valid. This is because the NAT address 192.168.71.15 would still be available for rule number 1. This can easily be amended: You can use the green arrow icons to move a rule entry up or down, changing its priority relative to the other rules. Click this

rule's  action icon once. All rules will now be set to "Active".

NAT/NAPT Rule Sets						
Rule ID	Source Address	Destination Address	Match	Operation	Status	Action
WAN Ethernet Rules						
<input checked="" type="checkbox"/> 0	192.168.1.10	Any		NAT -> 192.168.71.12	Active	
<input checked="" type="checkbox"/> 2	192.168.1.21 - 192.168.1.25	Any		NAT -> 192.168.71.13 - 192.168.71.14	Active	
<input checked="" type="checkbox"/> 1	192.168.1.11 - 192.168.1.15	Any		NAT -> 192.168.71.12 - 192.168.71.15	Active	
New Entry						

Figure 74 NAT/NAPT Rule Sets

Note: Rule number 1 now maps five LAN addresses to one NAT address. L13 subtracts all previously used NAT addresses, requested by previous rules, from the requested NAT addresses of the current rule. The requested range of addresses does not determine how many will be available; the number of available addresses is determined by the previous rules configuration and order. Rules will appear as "Active" even if they only have one usable NAT address.

Example 4: Translate the address 192.168.1.5 to 192.168.71.16 to ports 1024-1050

1. Define this NAPT rule in the same manner depicted above, with the following exception:
Select the **NAPT** option in the **Operation** section drop-down menu. The screen refreshes.

Operation

Source IP and port translation rule.

NAPT ▼

NAPT Address Add... ▼

NAPT Ports: Range ▼ 1024 - 65535

Figure 75: Add NAPT Rule

2. Add a NAPT address by selecting the **User Defined** option.
3. Enter 1024-1050 as the range of ports in the **NAPT Ports** section.
4. Click **OK** to save the settings. The rule is displayed in the **NAT** screen.

NAT/MAPT Rule Sets						
Rule ID	Source Address	Destination Address	Match	Operation	Status	Action
WAN Ethernet Rules						
<input checked="" type="checkbox"/> 0	192.168.1.10	Any		NAT -> 192.168.71.12	Active	
<input checked="" type="checkbox"/> 2	192.168.1.21 - 192.168.1.25	Any		NAT -> 192.168.71.13 - 192.168.71.14	Active	
<input checked="" type="checkbox"/> 1	192.168.1.11 - 192.168.1.15	Any		NAT -> 192.168.71.12 - 192.168.71.15	Active	
<input checked="" type="checkbox"/> 3	192.168.1.5	Any		NAPT -> 192.168.71.16 ports 1024- 1050	Active	
New Entry						

Figure 76: NAT/NAPT Rule Sets

This rule translates a LAN IP address to a NAT IP address with specific ports. Its status is set to "Active".

3.7.1.9 Connections (Firewall)

The connection list displays all the connections that are currently open, as well as various details and statistics. You can set this list to close an undesired connection by clicking its action icon. The basic display includes the name of the protocol, the different ports it uses, and the direction in which the connection was initiated.

Figure 77: Connection List

Click the **Advanced** button to display the following details:

- The connection's time-to-live
- The number of kilobytes and packets received and transmitted
- The device type
- The routing mode

Use the **Connections per Page** combo box to select the number of connections to display at once.

The **“Approximate Max. Connections”** value represents the number of additional concurrent connections possible.

3.7.1.10 Advanced Filtering

Advanced filtering is designed to allow comprehensive control over the firewall's behavior. You can define specific input and output rules, control the order of logically similar sets of rules, and make a distinction between rules that apply to WAN and LAN devices.

To view the L13 advanced filtering options, click the **Advanced Filtering** link of the **Firewall** menu item under the **Services** tab. The **Advanced Filtering** screen appears.

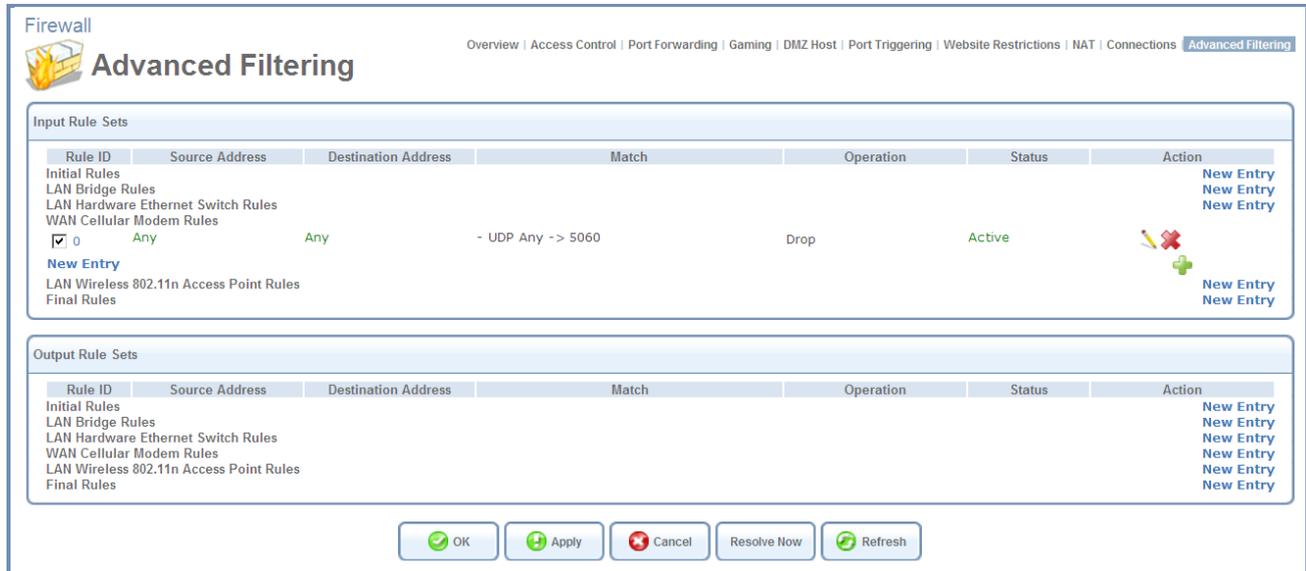


Figure 78: Advanced Filtering

3.7.1.10.1 Input and Output Rule Sets

The first two sections of the **Advanced Filtering** screen—'Input Rule Sets' and 'Output Rule Sets', are designed for configuring inbound and outbound traffic respectively. Each section is comprised of subsets which can be grouped into three main subjects:

- ⇒ Initial rules – rules defined here will be applied first, on all gateway devices
- ⇒ Network device rules – rules can be defined for each gateway device
- ⇒ Final rules – rules defined here will be applied last, on all gateway devices

The order of the rules appearance represents both the order in which they were defined and the sequence by which they will be applied. You may change this order after your rules are defined (without having to delete and then re-add them), by using the  and  action icons.

Input Rule Sets						
Rule ID	Source Address	Destination Address	Match	Operation	Status	Action
Initial Rules						
<input checked="" type="checkbox"/> 0	192.168.71.20	Any		Drop	Active	  
<input checked="" type="checkbox"/> 1	192.168.71.25	Any		Drop	Active	  
New Entry						

Figure 79: Move Up and Move Down Action Icons

There are numerous rules that are automatically inserted by the firewall in order to provide improved security and block harmful attacks.

⇒ **To an advanced filtering rule:**

1. Choose the traffic direction and the device on which to set the rule.
2. Click the appropriate **New Entry** link. The **Add Advanced Filter** screen appears.

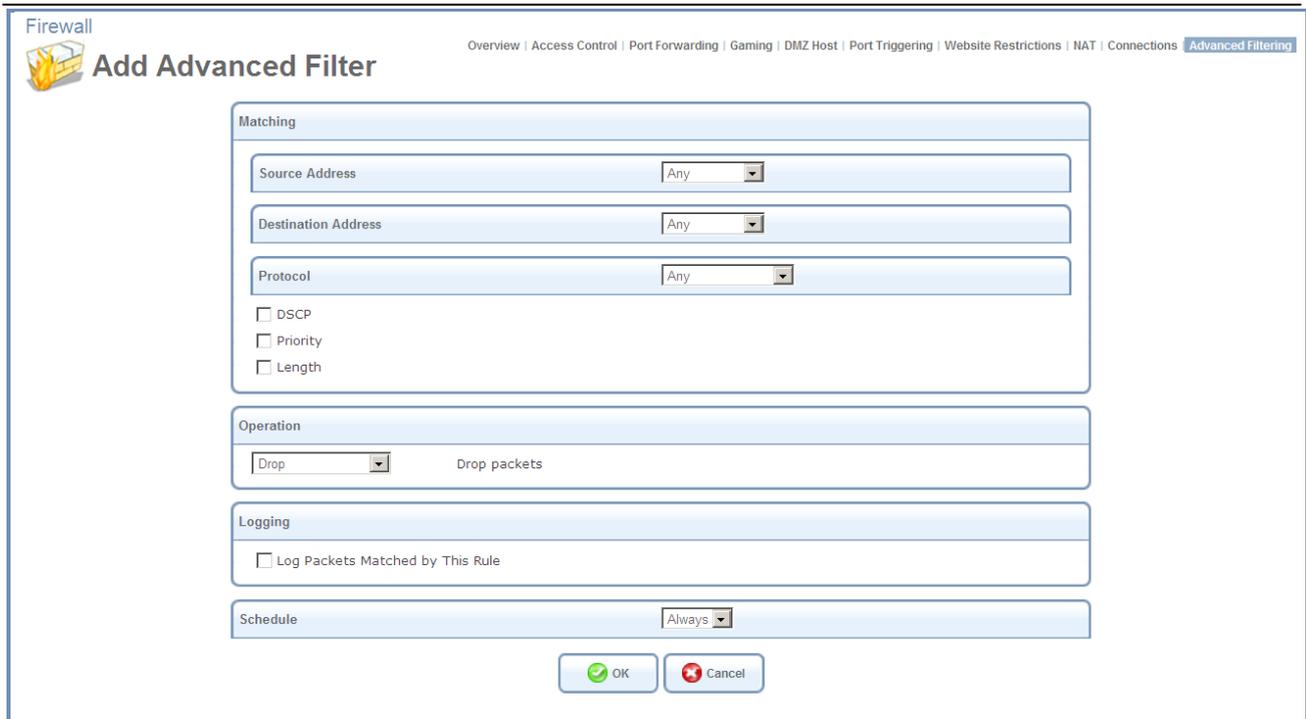


Figure 80: Add Advanced Filter

The **Matching** and **Operation** sections of this screen define the operation to be executed when matching conditions apply.

- Use the **Matching Section** to define characteristics of the packets matching the rule.

Source Address The source address of packets sent or received by the L13. The drop-down menu provides the ability to specify the computer or group of computers on which you would like to apply the rule. Select an address or a name from the list to apply the rule on the corresponding host, or click **Any** to apply the rule on all L13 LAN hosts.

Destination Address The destination address of packets sent or received by L13. This address can be configured in the same manner as the source address. This entry enables further filtration of the packets.

Protocol You may also specify a traffic protocol. Selecting the Show All Services option from the drop-down menu expands the list of available protocols. Select a protocol or add a new one using the User Defined option. This will initiate a sequence that will add a new Service representing the protocol.

Using a protocol requires observing the relationship between a client and a server in order to distinguish between the source and destination ports. For example, let's assume you have an FTP server in your LAN, serving clients inquiring from the WAN. You want to apply a QoS rule on incoming packets from any port on the WAN (clients) trying to access FTP port 21 (your server) and the same for outgoing packets from port 21 trying to access any port on the WAN.

- You must set the following Traffic Priority rules in the **Operation Section**:



Figure 81: Restricted Website

Operation Section options:

Drop	Deny access to packets that match the source and destination IP addresses and service ports defined above.
Reject	Deny access to packets that match the criteria defined and send an ICMP error or a TCP reset to the origination peer.
Accept Connection	Allow access to packets that match the criteria defined. The data transfer session will be handled using Stateful Packet Inspection (SPI), meaning that other packets matching this rule will be automatically allowed access.
Accept Packet	Allow access to packets that match the criteria defined. The data transfer session will not be handled using SPI, meaning that other packets matching this rule will not be automatically allowed access. This can be useful, for example, when creating rules that allow broadcasting.

5. Click **OK** to save the settings.
6. Define a QoS output rule in the same way as the input rule.
7. **Logging** section helps you to monitor the rule.

Log Packets Matched by This Rule - Select this check box to log the first packet from a connection that was matched by this rule.

8. By default, the rule will always be active. However, you can configure scheduler rules by selecting **User Defined** to define time segments during which the rule may be active. Once a scheduler rule(s) is defined, the **Schedule** drop-down menu will allow you to choose between the available rules.

3.7.2 Quality of Service

Quality of Service refers to the capability of a network device to provide better service to a selected network traffic. This is achieved by shaping the traffic and processing higher priority traffic before lower priority traffic.

The Broadband Connection to the Internet is typically the most significant bottleneck of the network. This is where the high speed LAN (100 Mbps) meets limited broadband bandwidth of few Mbps. Special QoS mechanisms must be built into routers to ensure that this sudden drop in connectivity speed is taken into account when prioritizing and transmitting real-time service-related data packets.

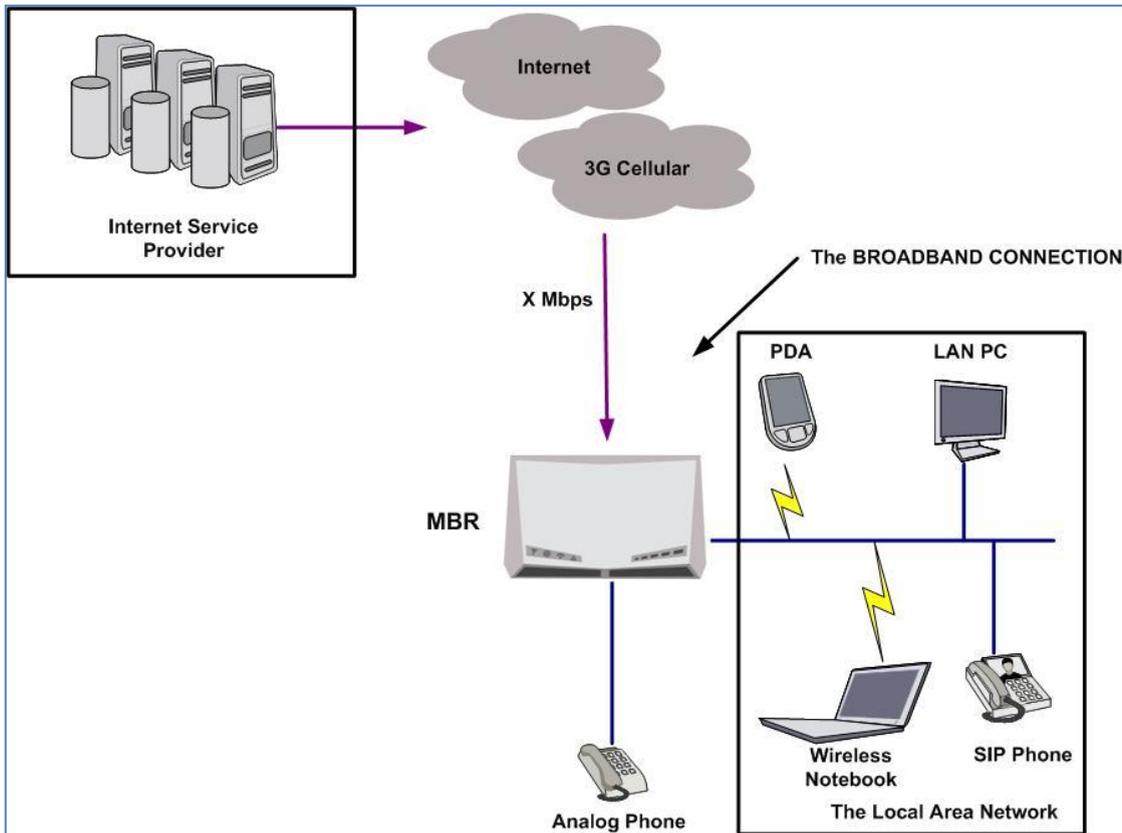


Figure 82: End-to-end QoS Challenge Areas

3.7.2.1 General

The **General** screen provides a Quality of Service "wizard" with which you can configure your QoS parameters according to predefined profiles and in just a few clicks. A chosen QoS profile will automatically define QoS rules, which you can view and edit in the rest of the QoS tab screens, described later.

Note: Selecting a QoS profile will cause all previous QoS configuration settings to be permanently lost.

Click the QoS tab under **Services**. The **Overview** screen appears.

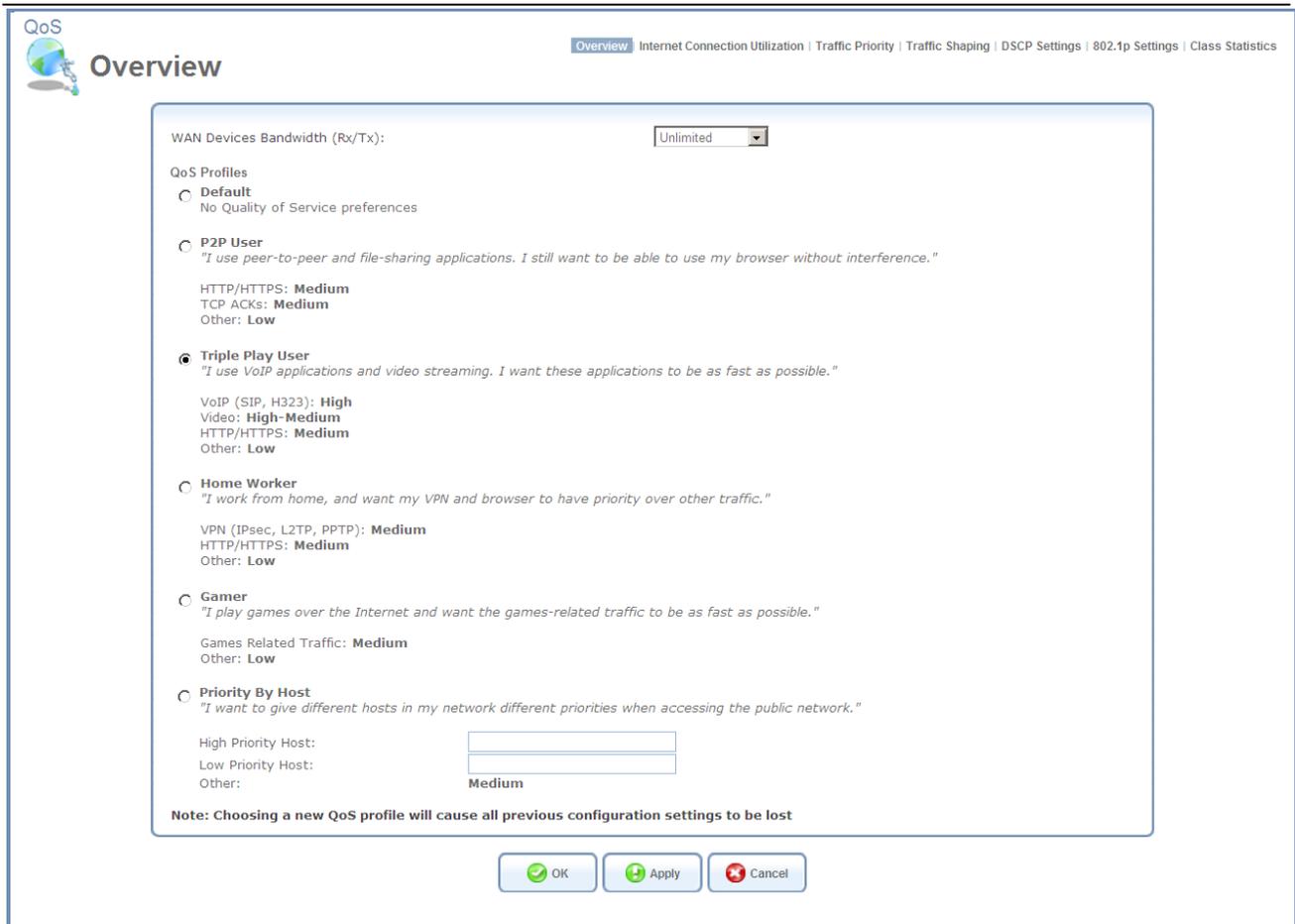


Figure 83: Overview

WAN Devices Bandwidth (Rx/Tx) Before selecting the QoS profile that most suits your needs, select your bandwidth from this drop-down menu. If you do not see an appropriate entry, select **User Defined**, and enter your Tx and Rx bandwidths manually.

Tx Bandwidth This parameter defines the gateway’s outbound transmission rate. Enter your Tx bandwidth in Kbits per second.

Rx Bandwidth This parameter defines the gateways’ Internet traffic reception rate. Enter your Rx bandwidth in Kbits per second.

Note: Entering inaccurate Tx/Rx values will cause incorrect behavior of the QoS module. It is important to set these fields as accurately as possible.

QoS Profiles. Select the profile that most suits your bandwidth usage. Every profile entry displays a quote describing what the profile is best used for and the QoS priority levels granted to each bandwidth consumer in this profile.

Default	No QoS profile, however the device is limited by the requested bandwidth, if specified.
P2P User	Peer-to-peer and file sharing applications will receive priority.
Triple Play User	VoIP and video streaming will receive priority.
Home Worker	VPN and browsing will receive priority.

Gamer	Game-related traffic will receive priority.
Priority By Host	<p>This entry provides the option to configure which computer in your LAN will receive the highest priority and which the lowest. If you have additional computers, they will receive medium priority.</p> <p>High Priority Host - Enter the host name or IP address of the computer to which you would like to grant the highest bandwidth priority.</p> <p>Low Priority Host - Enter the host name or IP address of the computer to which you would like to grant the lowest bandwidth priority.</p>

3.7.3 Voice Service

There are two modes of work. One is with a single analog extension and no PBX functionality. The second is with the internal PBX and up to five extensions including some PBX features: call routing, hunt group, pickup call, Class Of service, etc.

The following table describes some of the calling operations which can be performed by the extensions.

Note: Call transfer, call switching, and 3-way conference calls are only available if the cellular provider provides call-waiting functionality.

Calling operation	VoIP Extension	Analog Extension
Placing/Recalling a call to/from hold	Using “hold” function	Hitting on hook/flash button.
Supervised call transfer - Where the call is placed on hold, a call is placed to another party, a conversation can take place privately before the caller on hold is connected to the new destination	Use a “Transfer” function on the SIP phone. Call the wanted extension. Once the person on the destination extension answered and agreed to accept the call, hook on.	Use a “Flash” or “Hook flash” function on the analog phone to put the current call on hold. After hearing the dial tone, establish another call. Once the person on the destination extension answered and agreed to accept the call, hook on.
Blind call transfer - Where the call is transferred to the other destination with no intervention (the other destination could ring out and not be answered for instance)	Use a “Transfer” function on the SIP phone. Call the wanted extension and hook on once you hear the dial tone.	Use a “Flash” or “Hook flash” function on the analog phone to put the current call on hold. After hearing the dial tone, establish another call. Once you hear a dial tone, hook on.
Switching between waiting calls	While hearing a waiting call tone, use an appropriate function on the SIP phone to put the current call on hold and switch to a new call.	While hearing a waiting call tone, use “Flash” or “Hook Flash” to put the current call on hold and switch to a new call.
3-way conference	Put the current call on hold by choosing an appropriate function on the SIP phone. After hearing the dial tone, establish another call. Once the second call established, use the appropriate function on your SIP phone for 3-way conference.	Use “Flash” or “Hook Flash” to put the current call on hold and to hear a dial tone. Establish another call, and use “Flash” or “Hook Flash” for 3-way conference.
Pickup group membership – pick up a ringing call in a group.	*8	*8

3.7.3.1 Extensions

Analog Extension - There is one analog FXS port extension in the system.

SIP Extensions - A VoIP SIP local extension is a device that supports VoIP (Voice over IP) services using the Session Initialization Protocol (SIP). It can be a hardware SIP phone unit, a PC with software SIP phone application (SIP soft-phone) installed, a wireless Wi-Fi phone with SIP client firmware installed, or a cellular phone with SIP client software installed.

A SIP device can be connected to the 3L13 unit directly using a wired LAN connection or a Wi-Fi wireless connection. L13 can handle up to 4 VoIP SIP extensions.

⇒ **To view existing PBX phone numbers:**

Click the **Services** tab, and select **Voice** service (or navigate to **Home** → **Voice**). The Extensions screen appears.

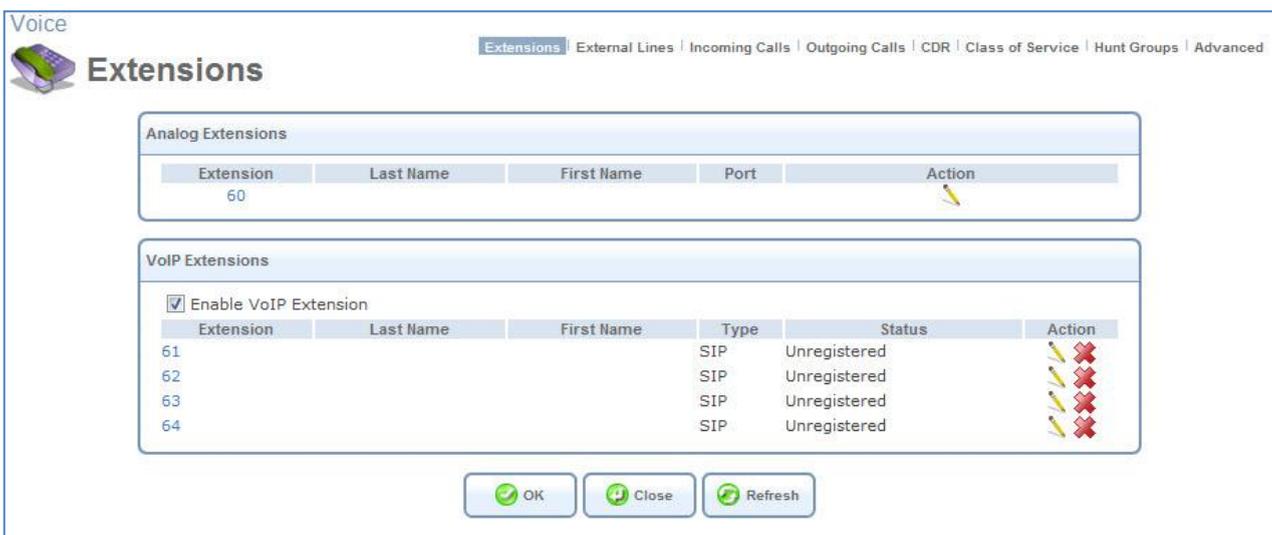


Figure 84: Voice – Extensions

⇒ **To open the analog extension settings screen:**

1. Navigate to Services → Voice (or Home → Phones).

The **Analog Extensions** section shows L13 physical telephone port, for which the L13 PBX functions as an Analog Telephone Adaptor (ATA) device.



Figure 85: Analog Extension

⇒ **To modify the analog port extensions and other settings:**

1. Click the extension number or its ✎ action icon. The **Edit Extension** screen appears.

The screenshot shows the 'Edit Extension' configuration page. At the top left is the 'Voice' logo. A navigation bar at the top right contains links: 'Extensions', 'External Lines', 'Incoming Calls', 'Outgoing Calls', 'CDR', 'Class of Service', 'Hunt Groups', and 'Advanced'. The main content area is divided into several sections:

- Extension Information:** Fields for 'Extension Number' (containing '61'), 'Last Name', and 'First Name'.
- Class of Service:** A section with three checkboxes: 'Default Class of Service' (checked), 'Management', and 'Production'.
- Calling Features:** A section with one checkbox: 'Enable Do Not Disturb' (unchecked).
- Advanced SIP Settings:** A section with two checkboxes: 'Require Authentication' (unchecked) and 'Optimize RTP Path Using re-INVITE' (checked).

At the bottom of the form are two buttons: 'OK' (with a green checkmark icon) and 'Cancel' (with a red 'X' icon).

Figure 86: Edit Extension Screen

2. Configure the parameters as follows:

Parameter	Description
Extension Number	Specify the extension number as it was set on the device (the SIP phone). The PBX supports extension numbers containing 3 to 9 digits.
Last Name, First Name	You can specify the last name and first name of the extension's owner.
Class of Service	Select the classes of service to apply to the extension. Selecting a Class of Service applies the functionality associated with that Class of Service to the extension. For example, a Class of Service can specify a particular dial plan for outgoing calls.
Enable Do Not Disturb	Select this checkbox to prevent calls from reaching your extension.
Require Authentication	Select this checkbox to set a specified user name and password for the extension. The SIP device will only be able to use the extension if it supplies these values to the L13. When you select this option, the screen refreshes, and Authentication User Name and Authentication Password fields are added. Enter the required user name and password in these fields.
Optimize RTP Path Using re-INVITE	Select this option to enable the LAN device and the SIP proxy to exchange Real Time Protocol (RTP) traffic directly. Note that in order for this feature to work, it must also be enabled for the VoIP line through which the call is routed.

⇒ *To enable/disable the VoIP extensions:*

1. Click the extension number or its  action icon. The **Edit Extension** screen appears.
2. Check or uncheck the **Enable VoIP Extension**.



Figure 87: Enable VOIP Extension

⇒ *To Configure a SIP Phone*

This section provides general information about how to configure a SIP phone to work with MBR. It also includes information about SIP phone devices.

Configure the phone with the following settings. Refer to the device's documentation if necessary.

It is highly recommended to configure a SIP phone as described below:

1. The SIP phone must be configured to get an IP address automatically when it is connected directly to the L13 LAN port. In this case, the appropriate IP address will be of the form 192.168.1.XXX, where XXX is an address provided by the L13’s internal DHCP server.
2. The SIP phone must be configured to perform the SIP registration procedure with the L13 PBX. For this purpose, the SIP phone must create SIP registration parameters (“User name” and “Password”), which must correspond to the SIP extension’s account in L13. (See the next paragraph.) The IP address of the L13 unit must be set as the SIP server registration point for the SIP phone. For a SIP phone that is connected directly to the LAN, the SIP server IP address is 192.168.1.1.
3. A wireless (Wi-Fi) SIP device must first establish a Wi-Fi connection with the L13 wireless network, and then run the SIP registration procedure.

⇒ *To enter the SIP VoIP extension’s parameters:*

1. Navigate to **Services** → **Voice**. The Extensions screen opens. The **VoIP Extensions** section displays a list of the VoIP extensions that are available in your L13. SIP devices connected directly to the gateway's LAN must be configured to use 192.168.1.1 as their SIP server IP address and an extension account number.
2. Click **New VoIP Extension**. The Edit Extension screen opens.

Figure 88 Edit Extension Screen

3. Configure the parameters as follows:

Parameter	Description
Extension Number	Specify the extension number as it was set on the device (the SIP phone). The PBX supports extension numbers containing 3 to 9 digits.
Last Name, First Name	Enter the last name and first name of the extension's owner.
Class of Service	Select the classes of service to apply to the extension. Selecting a Class of Service applies the functionality associated with that Class of Service to the extension. For example, a Class of Service can specify a particular dial plan for outgoing calls.
Enable Do Not Disturb	Select this check box to prevent calls from reaching your extension. The caller will be forwarded to voice mail provided by your cellular operator.
Require Authentication	Select this check-box to secure your telephony network. By default, SIP devices register with L13 as their proxy by identifying themselves using extension numbers that are pre-configured on both the devices and on the L13. (You must configure the device's proxy field with the L13 IP address in order for this to work.) If you select the Require Authentication option, L13 will require more than the extension number as identification. In addition to the extension number, it will require a user name and password. This protects your telephony network from unauthorized intruders. For example, this will prevent someone from

	<p>outside your home or office from disguising a Wi-Fi SIP phone as one of your office extensions and making free phone calls at your expense.</p> <p>When this option is selected, the screen refreshes, providing user name and password fields.</p>
Authentication User Name	The user name used for SIP device authentication. Note that this user name must first be configured on the SIP device.
Authentication Password	The password used for SIP device authentication. Note that this password must first be configured on the SIP device.
Optimize RTP Path Using re-INVITE	Select this option if you would like the L13 to attempt to enable the telephony LAN device and the SIP proxy to exchange Real Time Protocol (RTP) traffic (the audio stream) directly, which is more efficient. Note that in order for this feature to work, it must also be enabled for the VoIP line through which the call is routed.

3.7.3.2 External Lines

The L13 telephony service is based on VoIP (Voice over Internet Protocol or Voice over IP). In order to establish external voice calls VoIP line must be configured additionally to the cellular line configuration. The basic VoIP parameters can be configured during the installation wizard process. Additional parameters can be configured in **Services → Voice → External Lines → Edit VoIP Line**. Before configuring the VoIP related parameters, make sure the Cellular Line Parameters are configured.

⇒ *To configure the external line:*

Navigate to **Services → Voice → External Lines** (or Home → External Lines). The External Lines screen appears:

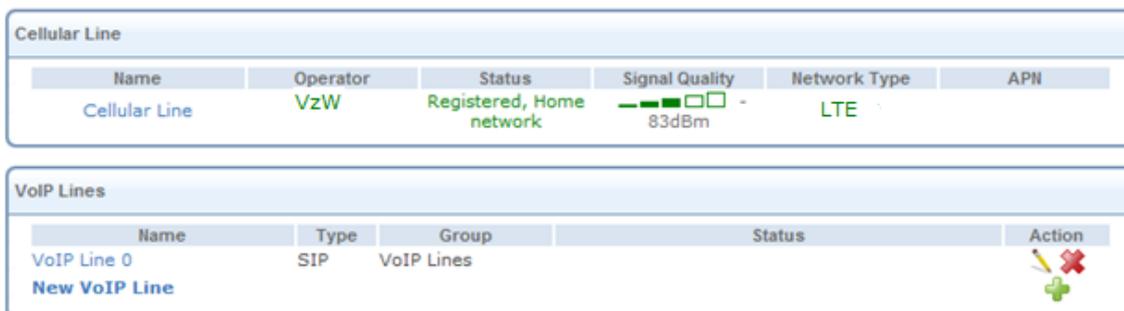


Figure 89: External Lines Screen

When an active SIM card is installed in the unit and there is an adequate cellular network coverage (if not, an external antenna can be connected), Internet connection and VoIP line are configured, L13 can create external line voice calls.

⇒ *To configure cellular related parameters:*

1. Information about the cellular related parameters appears in the **Cellular Line** section of the screen (Figure 91: Cellular Line Configuration Screen), including the status of each cellular channel, cellular operator identification information, and its reception level.

Cellular Line					
Name	Operator	Status	Signal Quality	Network Type	APN
Cellular Line	Cellcom	Registered, Home network	█ █ █ █ -73dBm	HSDPA/HSUPA	

Figure 90: Cellular Lines Section

Note: If the cellular line status is ‘Not registered’, check the following:

1. The SIM card is installed and the PIN code is either disabled or specified correctly. If a PIN code was set manually via the WBM, the system has to be restarted and the WBM screen must be refreshed.
2. It is highly recommended that the cellular channel reception level be no less than 90 dB. Sometimes an external antenna should be connected to L13 to reach this reception level. The reception level is represented in the “Overview” screen.

2. Click the name of a cellular line. The line’s configuration screen opens:

Name:

Network

Status: Registered, Home network

Operator Name: Vzi

Roaming enable

Network Lock enable

IMEI: 990000560045884

IMSI: 425020356747542

SIM Lock

CCID Lock enable

MCC Lock enable

MNC Lock enable

MSIN Lock enable

Security

PIN PUK

Change PIN

Cellular Channel Settings

Frequency Band Selection: All bands ▼

Reset Period: All bands

LTE ALL
CDMA ALL

Figure 91: Cellular Line Configuration Screen

Note: Some cellular line parameters can only be viewed and modified by users with Administrator permissions.

3. The screen contains the following fields:

Parameter	Description
Name	Enter a name for the cellular channel (free text).
Status	Displays the status of the network.

Parameter	Description
Operator Name	The name of the service provider that is associated to the SIM card is referenced here.
Roaming enabled	Select the checkbox to allow the cellular channel to automatically connect to any available cellular network, even if the network is not part of the SIM operator’s network. Uncheck the checkbox to disable roaming.
Network Lock enabled	<p>Select the checkbox to lock cellular functionality to a specific network. Typically, you will want to choose the SIM card’s home network.</p> <p>When you select the checkbox, the system automatically begins to scan the area for available networks. The scanning process can take several minutes. When the scan is completed, a dropdown list of available networks is added to the screen (see <i>Operator Name</i> below).</p> <p>Note: Only the Administrator can change this parameter.</p>
IMEI	<p>International Mobile Equipment Identity, used to identify an individual mobile station within a GSM or UMTS network.</p> <p>Note: The IMEI number is displayed when the MBR is registered to the cellular network.</p>
IMSI	The SIM’s International Mobile Subscriber Identity is referenced here.
SIM Lock	<p>This section is used to limit the activation of external cellular lines to SIM cards that meet certain criteria. If the installed SIM card does not meet these requirements, then the L13 will not use it to establish an external line.</p> <ul style="list-style-type: none"> <p>CCID Lock enable: Select this option to limit activation of external lines to SIM cards whose Integrated Circuit Card ID (ICC-ID) is within a specified range. When you select this option, From and To fields are added to the screen. Specify the range for these fields.</p> <p>Note: Each SIM card is internationally identified by its ICC-ID. ICC-IDs are stored in the SIM cards and are also engraved or printed on the SIM card body. The number can contain 18 or 19 digits.</p> <p>MCC Lock enable: Select this option to limit activation of external lines to SIM cards whose Mobile Country Code (MCC) matches the specified code. When you select this option, a text field is added to the screen. Specify the MCC code in this field. The code contains three digits.</p>

Parameter	Description
	<p>Note: MCC is part of the International Mobile Subscriber Identity (IMSI) number.</p> <ul style="list-style-type: none"> MNC Lock enable: Select this option to limit activation of external lines to SIM cards whose Mobile Network Code (MNC) matches the specified code. When you select this option, a text field is added to the screen. Specify the MNC code in this field. The code can contain two or three digits. <p>Note: A “0” at the beginning of the code is ignored. Thus, for example, the codes “01,” “001,” and “1” are all equivalent.</p> <p>Note: MNC is part of the International Mobile Subscriber Identity (IMSI) number.</p> <ul style="list-style-type: none"> MSIN Lock enable: Select this option to limit activation of external lines to SIM cards whose Mobile Station Identification Number (MSIN) is within a specified range. When you select this option, From and To fields are added to the screen. Specify the range in these fields. The numbers can contain up to ten digits. <p>Note: MSIN is a unique number that identifies subscribers in a mobile network. It is part of the International Mobile Subscriber Identity (IMSI) number.</p> <p>Note: These settings can only be viewed and modified by users who belong to the <i>Distributor</i> permission group. Other users do not see this section at all.</p> <p>Note: Only the Administrator can change this parameter.</p>
PIN	Enter the PIN (Personal Identification Number) code of the installed SIM card (up to 6 digits), if required.
Change PIN	The PIN code can be changed, click on the “Change PIN” checkbox and enter a new PIN code.
PUK	Enter the PUK code (Personal Unblocking Key) of the installed SIM card, if required.
Frequency Band Selection	Select the cellular network’s frequency, or select Default for automatic detection.

⇒ **To configure a VoIP line:**

In the External Lines screen, under **VoIP Lines**, click the Edit icon (). The Edit Line screen opens.

Name:

Limit Number of Simultaneous Calls

Line Group:

SIP Account

User Name:

Authentication User Name:

Authentication Password:

SIP Proxy

Host Name or Address:

Port:

Register with Proxy

Register Expires: seconds

Use Proxy Address as User Agent Domain

Outbound Proxy

Use Outbound Proxy

Advanced SIP Settings

DTMF Transmission Method:

Compatibility Mode:

Optimize RTP Path Using re-INVITE

Codecs

pcmu

pcma

g729

Figure 92: Edit VoIP Line Screen

The screen contains the following fields:

Parameter	Description
Name	Enter a name for the VoIP line.
Limit number of simultaneous calls	Select this option if you want to control the maximum number of simultaneous calls put through the VoIP line. This is useful, for example, if your proxy account has a call limit. When you select this option, the screen refreshes, and the Maximum Number of Simultaneous Calls field is added to the screen. Enter the call limit.

Parameter	Description
Line Group	Select VoIP Lines .
User Name	Enter the SIP Server user name.
Authentication User Name	Enter the login name used for authentication on the SIP Server.
Authentication Password	Enter the password used for authentication on the SIP Server.
Host name or address	Specify the external SIP Server host name or IP address.
Port	Enter the port number of the External SIP Server.
Register with proxy	Select this option to enable registration with the SIP Server. When you select this option, the screen refreshes and the Register Expires field is added to the screen. Specify how often you want the registration to be renewed, in seconds.
Register expires	Specify how often you want the registration to be renewed, in seconds.
Use proxy address as user agent domain	Select this option to use the proxy’s host name or IP address as a domain name specified in the outgoing SIP messages. When you clear this option, the screen refreshes and the User Agent Domain field is added to the screen.
User Agent Domain	Use this field to specify another proxy address to use as the user agent domain.
Use outbound proxy	N/A
DTMF Transmission Method	Select the method by which DTMFs (the tones generated by your telephone's keypad) should be transmitted, as follows: In-Band The DTMF keypad tones are sent within the voice stream. Out-of-Band Always (RFC2833) The DTMF keypad tones are represented by the keypad number and are sent as separate packets. This is a more reliable transmission method. Out-of-Band by Negotiation (RFC2833) This method allows negotiation with the remote party. DTMF tones will be sent either in-band or out-of-band, depending on the remote party's preference. SIP INFO The keypad tones are sent in a separate SIP message.
Compatibility Mode	If you are using Broadsoft as your SIP provider, select Broadsoft. Otherwise, select Off.
Optimize RTP Path Using re-INVITE	Select this option if you would like L13 to let the SIP proxy and a telephony LAN device exchange Real Time Protocol (RTP) traffic (the audio stream) directly. This is the most efficient way to transmit the audio stream.
CODECs	Shows the list of supported codecs in order of priority. To change the order, select a codec and use the arrows to move it up or down in the list.

3.7.3.3 Incoming Call Routing

L13 can receive calls from the cellular line. Such calls are automatically routed to the PBX through their respective lines. Incoming calls can be routed directly to a particular extension or to a hunt group.

⇒ **To configure incoming call handling:**

1. On the main PBX screen (**Services → Voice → Incoming Calls** or **Home → Services → Voice**), click the **Incoming Calls** tab. The Incoming Calls screen appears.



Figure 93: Incoming Calls Screen

The Incoming call routing is enabled by default. You can enable or disable this functionality by checking or clearing the **Incoming Call’s Routing** checkbox. By default, external lines are configured to **transfer a call to a default hunt group**. You can modify the settings as necessary.

⇒ **To transfer the call to a specific extension:**

1. Click the name of the external line (or the  action icon). The Edit Incoming Call Handling screen appears.

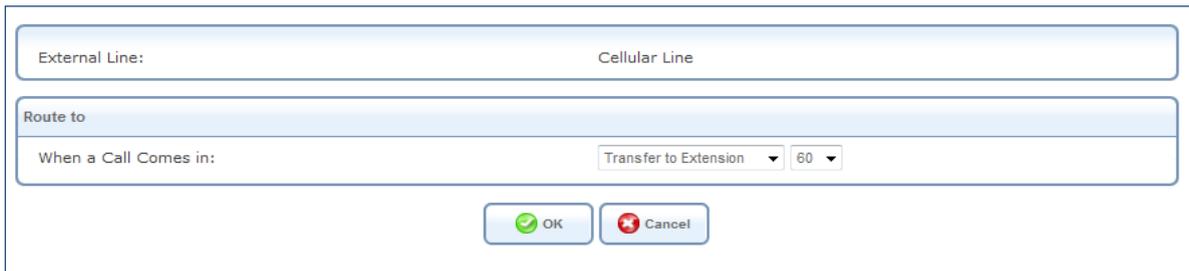


Figure 94: Edit Incoming Call Handling Screen

2. Under **Route To**, select and configure the actions that will occur when a call arrives as follows.

When a Call Comes in	<p>Transfer to Extension - When this option is selected, the screen refreshes. The second drop-down menu then displays a list of the available extensions. Select the extension to which you would like to route the call to.</p> <p>Transfer to Hunt Group - When this option is selected, the screen refreshes. A second drop-down menu then displays a list of the available hunt groups. Select the hunt group to which you would like to route the call. This option will be available only if at least one hunt group is defined on the L13.</p>
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3.7.3.4 Outgoing Call Routing

L13 PBX provides a sophisticated mechanism called a *dial plan* for handling outgoing calls. A *dial plan* is a set of rules you define for routing outgoing calls. Each dial plan rule is referred to as a *dial plan entry*. You can add, edit, or remove dial-plan entries as required.

The dial-plan mechanism enables you to manipulate the number dialed by the caller by adding or omitting digits. This can be used for various purposes, such as connecting to an external line, replacing telephony proxy dialing codes, and even defining speed-dial shortcuts.

⇒ **To define a new dial-plan entry:**

1. Navigate to the External Lines screen (**Services → Voice → External Lines** or **Home → External Lines**).
2. At the top right of the External Lines screen, click **Outgoing Calls**. The Outgoing Calls screen appears and displays a list of the existing dial-plan entries.

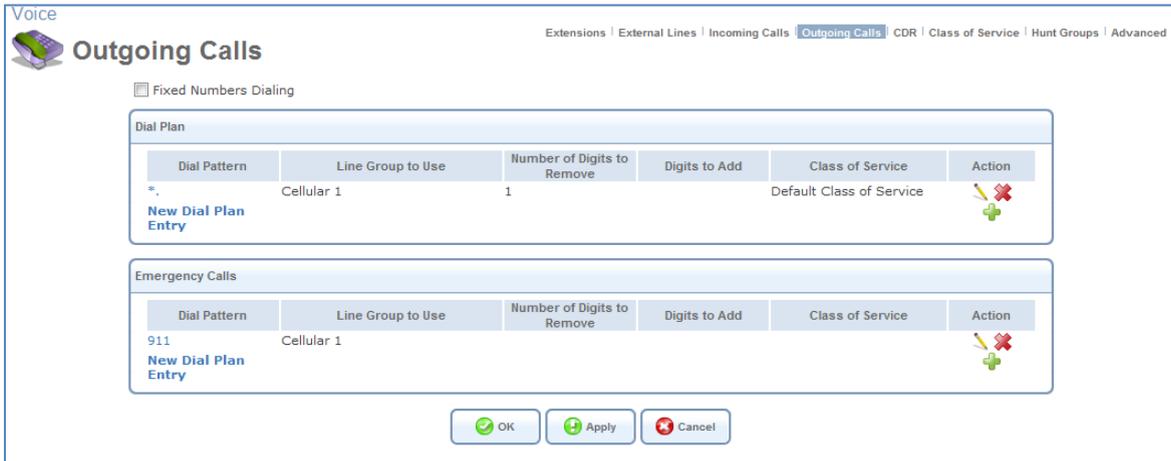


Figure 95: Outgoing Calls Screen

3. Click the **New Dial Plan Entry** link. The Edit Dial Plan Entry screen appears:

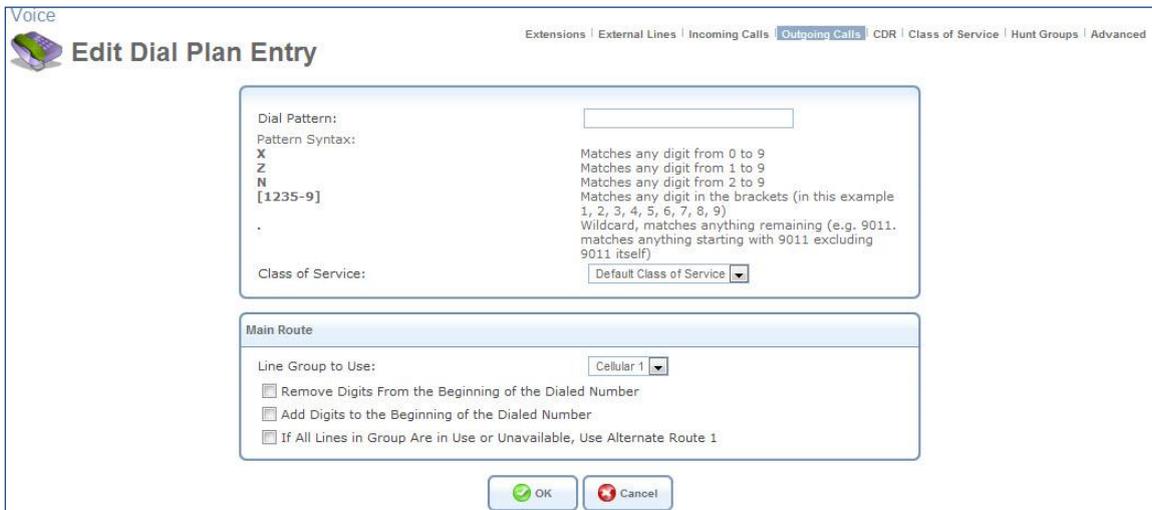


Figure 96: Edit Dial Plan Entry Screen

4. Fill in the fields as follows:

Dial Plan Parameter	Description
Dial Pattern Syntax	Type the digits pattern. Use the pattern syntax described below the field to define the pattern. The new dial-plan rule will only be applied to outgoing calls and to destination numbers that match the specified pattern.
Class of Service	Select the Class of Service to which the entry should be applied. The entry will only be applied to outgoing calls from extensions that

	belong to the selected Class of Service.
Line Group to Use	Show available external line interface to route the call through a cellular line (Cellular 1).
Remove Digits From the Beginning of the Dialed Number	Select this option to remove one or more of the digits from the beginning of the target phone number before dialing the number. When this option is selected, the screen refreshes, and the following field is added: Number of Digits to Remove – Enter the number of digits to remove from the number.
Add Digits to the Beginning of the Dialed Number	Select this option to add digits before dialing the telephone number. When this option is selected, the screen refreshes, and the following field is added: Digits to Add – Specify the digits to be added at the beginning of the telephone number.

3.7.3.5 CDR

The CDR (Call’s Detailed Records) section (**Service → Voice → CDR**) provides a list of incoming and outgoing telephony calls that took place.

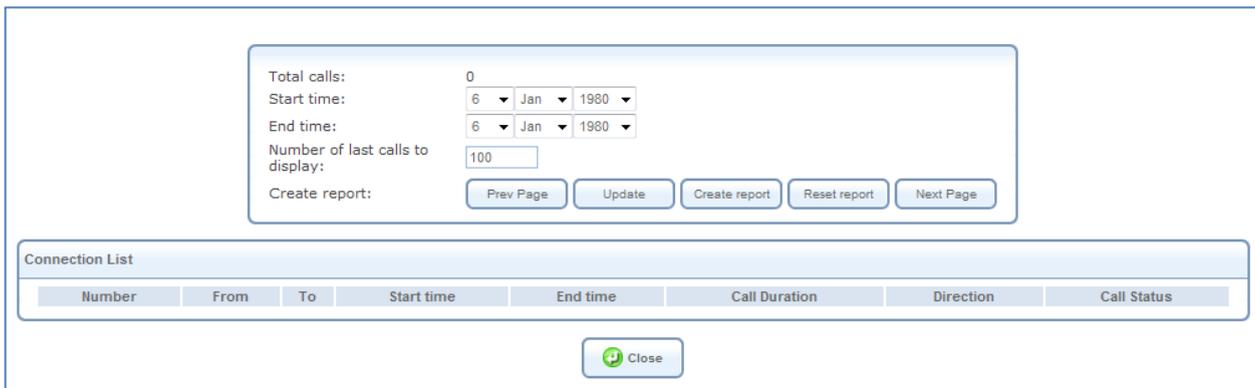


Figure 97: CDR screen

The box at the top of the screen provides the following information about the list of calls that appears in the table below it.

Total Calls	The total number of calls released during the specified time period (see <i>Start time/End time</i> below).
Start time / End time	Specify the time period to include in the CDR report.
Number of last calls to display	Specify the maximum number of report lines to display on the screen.
CDR Files	After the CDR report is generated, the report files appear on this line. The number of files depends on the report size and the time period covered by the report.

Prev Page/Next Page buttons	If the report is longer than one page, use these buttons to navigate between the pages.
Update button	Click this button to refresh the CDR report presentation.
Create Report button	Click this button to start generating the report. When this button is clicked, the report files are listed on the CDR Files line.
Reset Report button	Click this button to renew the report in the system.

Connection List							
Number	From	To	Start time	End time	Call Duration	Direction	Call Status
1	0545677468	900	2011-03-13 11:12:02	2011-03-13 11:12:13	0:00:11	Incoming	ANSWERED
2	501	900	2011-03-13 11:11:39	2011-03-13 11:11:49	0:00:10	Outgoing	ANSWERED
3	900	503	2011-03-13 11:11:17	2011-03-13 11:11:25	0:00:08	Local	ANSWERED
4	0545677468	501	2011-03-13 11:10:50	2011-03-13 11:10:57	0:00:07	Incoming	ANSWERED
5	500	900	2011-03-13 11:10:18	2011-03-13 11:10:25	0:00:07	Local	ANSWERED
6	60	503	2011-03-13 11:10:05	2011-03-13 11:10:24	0:00:19	Outgoing	ANSWERED

Figure 98: CDR table

The CDR table includes the following fields:

Number	The number of the telephony events in the list.
From	The Caller ID of the call – the number from which it originated. This number may be a registered extension number, an external cellular subscriber number, or a VoIP line number. Note that if a Caller ID is not detected, <i>No Number</i> will appear in this field.
To	The destination number of the call.
Start Time	The start date and time of the call, in YYYY – MM – YY HH:MM:SS format.
End Time	The end date and time of the call, in YYYY – MM – YY HH:MM:SS format.
Call Duration	The specific call duration.
Status	The final status of the call. Possible values: <i>Answered, No Answer, Failed</i> .

All call-record information is stored in the **csv** files listed under **CDR Files** in the upper section of the screen. The name of each CDR file includes the date covered by the report date and a file number. These files can be downloaded to the PC for handling by external applications such as MS Excel.

⇒ **To download a csv file:**

Right-click the name of the file and specify the storage place on the PC or in a shared directory on the network.

3.7.3.6 Class of Service

A Class of Service is used to group PBX extensions. This simplifies the process of assigning telephony functionality, such as dial plans, to extensions. Each set of telephony options is applied to a Class of Service instead of individual extensions. The PBX allows you to create up to 9 classes of services. More than one Class of Service can be applied to a single extension.

For information about applying a Class of Service to an extension, see the Analog Extensions and VoIP Extensions sections.

For information about assigning a Class of Service to a dial plan, see outgoing calls routing section.

⇒ **To create a new Class of Service:**

1. Navigate to **Services → Voice → Class of Service**. The Class of Service screen appears.



Figure 99 Class of Service Screen

2. Click the **New Class** link. The Edit Class screen appears.

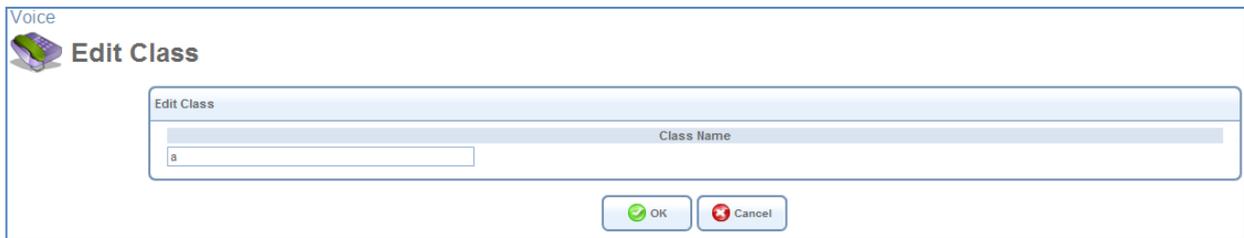


Figure 100: Edit Class Screen

3. Under **Class Name**, enter a name for the new Class of Service. The name can contain up to 32 characters.
4. Click **OK**. The Edit Class screen closes, and the Class of Service screen is displayed again. The new Class of Service appears in the list of classes. It can be applied to extensions and assigned to dial plans.

3.7.3.7 Hunt Groups

The L13 PBX features *Hunt Groups* for automatic distribution of incoming calls to two or more extensions. This allows you to set up groups of extensions to handle different types of operations. In this case, **Transfer to Hunt Group** is added as a menu option in the Edit Incoming Call Routing screen (see section 3.7.3.3).

⇒ **To define a hunt group:**

1. In the main IP-PBX screen (**Services → Voice**), click the **Hunt Groups** tab. The Hunt Groups screen appears.

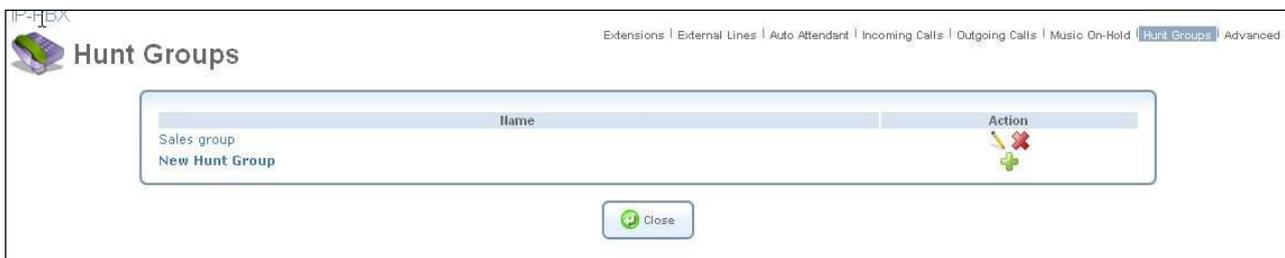


Figure 101: Hunt Groups screen

2. Click the **New Hunt Group** link to create new hunt group. The Hunt Group Parameters screen appears.

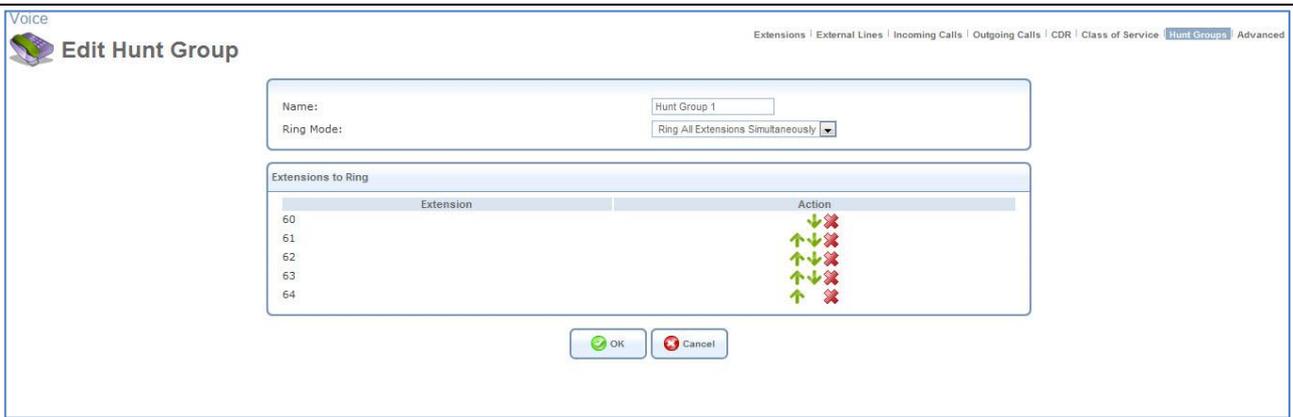


Figure 102: Hunt Group Parameters Screen

3. Set the parameters as follows:

Parameter	Description
Name	Specify a name for the hunt group.
Ring Mode	Select whether to ring all extensions at once when a call arrives, (where the first extension that answers, accepts the call), or to ring one extension at a time. Selecting the second choice will refresh the screen.
Extensions to Ring	Select the extensions to include in this hunt group. The drop-down menu displays all available extensions. Note that this step is mandatory; otherwise the hunt group is empty. If you chose to ring one extension at a time as your ring mode, by default the ring will be routed between the extensions in their order of appearance in this table. When adding multiple extensions, the  and  action icons appear. Use these icons to move the selected extension up or down in the list. If you chose simultaneous ringing, the order of extensions is not relevant.

3.7.3.8 Advanced Telephony Options

This section (**Services → Voice → Advanced**) provides advanced options intended for a technician or a system administrator.

⇒ **To Enable / Disable Voice Services(administrator only):**

In the **Voice Services** section, set the checkbox in accordance with the required functionality.



Figure 103: Advanced – Voice Services

⇒ **To set the local SIP port for IP mini PBX (administrator only):**

The local SIP port is the port on L13 that listens to SIP requests from the proxy. By default, port 5060 is used for SIP signaling of phones connected to the gateway. A common problem occurs when using a SIP agent on the LAN

(for example, an IP phone). A SIP agent requires port forwarding configuration (refer to Section Port Forwarding, which uses the same port—5060. This multiple use of the port causes failure of either or both services. Therefore, when configuring port forwarding for a SIP agent, you must change L13 SIP port value (for example, to 5062). Note that the calling party must be made aware of this value when initiating a direct call (not using a proxy).



Figure 104: Advanced – SIP

Set SIP related parameters:

Parameter	Description
Local SIP Port	L13 SIP protocol signaling port.
SIP Reconnect Timeout	The timeout for reconnecting the L13 SIP server from each VoIP extension.
Use Strict SIP Message Checking	By default, L13 uses strict SIP message checking, which includes checking of tags in headers, international character conversions in URIs, and multiline formatted headers. There are cases in which this option should be disabled to ensure interoperability with certain service providers or third party user agents (SIP endpoints).
Enable Silence Suppression	Enables optimization when no speech is detected. With this feature enabled, L13 is able to detect the absence of audio and conserve bandwidth by preventing the transmission of "silent packets" over the network. By default this option is selected in L13.

⇒ **To change the RTP start port (administrator only):**

The voice stream is transmitted in Real Time Protocol (RTP) packets, which require a range of open ports. If the default ports are required for another application, you can enter a different start port, thereby creating a new range.

Under the **Local RTP Port Range**, specify the first port in the range of 16 ports to reserve for Real Time Protocol (RTP) voice transport.

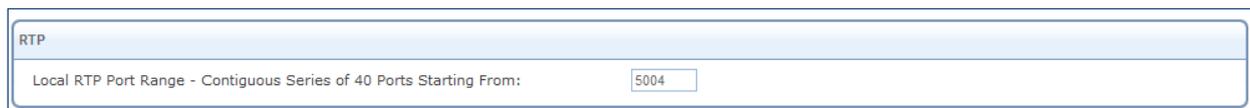


Figure 105: Advanced – RTP

⇒ **To configure the QoS parameters (administrator only):**

Quality of Service (QoS) is aimed at improving the quality of voice traffic over VoIP external line.

In the **Quality of Service** section, configure the following options:

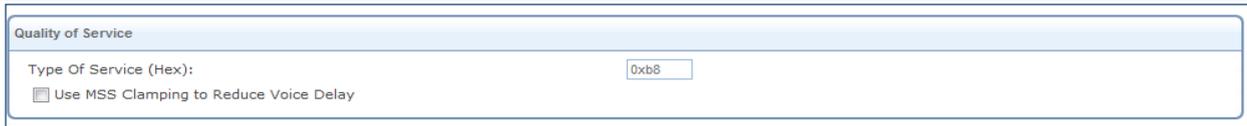


Figure 106: Advanced – Quality of Service

<p>Type of Service (HEX)</p>	<p>This is a part of the IP header that defines the type of routing service to be used to tag outgoing voice packets originated from MBR. It is used to tell routers along the way that this packet should get specific QoS. Leave this value as 0XB8 (default) if you are unfamiliar with the Differentiated Services IP protocol parameter.</p>
<p>Use MSS Clamping to Reduce Voice Delay</p>	<p>When using Maximum Segment Size (MSS) Clamping, TCP streams routed via L13 when a voice call is active, will have a smaller segment size. This will cause RTP to receive better priority, and will help prevent high voice jitter that is caused by slow upstream transmission rate, and which is common with most WAN connections (DSL, DOCSIS, etc.). When checking this option, the Maximum Segment Size (MSS) field appears. Change the maximal segment size as necessary.</p>

⇒ *To manage voice CODECs (administrator only)*



Figure 107: Voice-CODECs selection

⇒ *To add a codec(administrator only):*

The **CODECS** section enables you to add a voice codec for VoIP connections and specify the priority level of each codec.

1. In the CODECS section, at the lower left, open the Add CODEC dropdown menu. All available voice codecs that were not already selected appear in the menu.
2. Select the codec you want to add. The codec is added to the list of supported codecs.

⇒ *To change the order of priority of the supported codecs (administrator only):*

Use the arrow action icons.

⇒ *To remove a codec from the list of supported codecs (administrator only):*

Click the  action icon.

⇒ **To Improve Voice Reception with Echo Cancellation (administrator only)**

Echo cancellation is the elimination of reflected signals (echoes) made noticeable by delay in the network. This also improves the bandwidth of the line. When the delay of a voice call exceeds acceptable limits, L13 will protect the far end from receiving any echo generated at the local end and sent back through the network.

To improve voice reception with echo cancellation, click the **Advanced** link under the **Voice** item menu. In the **Echo Cancellation** section, configure the following options.

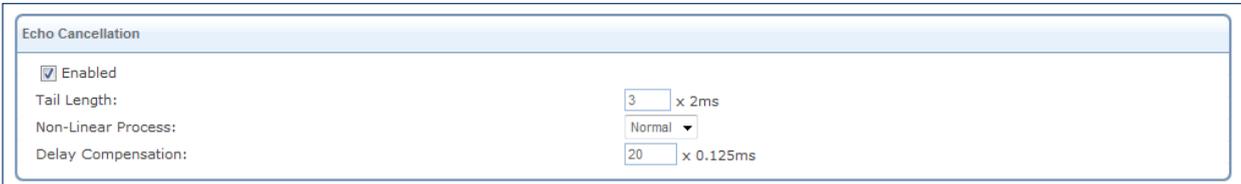


Figure 108: Advanced – Echo Cancellation

Parameter	Description
Enabled	Select or deselect this check box to enable or disable this feature.
Tail Length	Defines the length of the elapsed time frame used for calculating the extrapolation of the echo cancellation. A long tail improves the echo cancellation, but increases the load on the Digital Signal Processor (DSP).
Non-Linear Process (NLP)	Determines the type of calculation that is used for removing the echo effect. You can set this feature to Normal, High or Off. Using high NLP improves the echo cancellation, but increases the load on the DSP.
Delay Compensation	A time delay compensating the echo cancellation.

⇒ **To configure the DSP settings (administrator only):**

The DSP table enables you to adjust the analog port’s FXS gain / volume parameters.

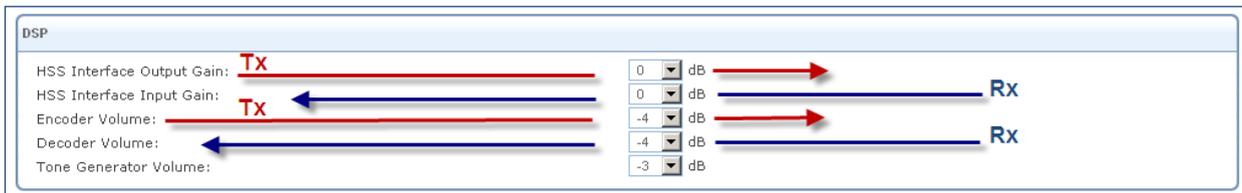


Figure 109: Analog Ports FXS/FXO Gain Parameters configuration table

Parameter	Description
HSS Interface Output Gain /	These parameters adjust the output (Tx) volume.

Encoder Volume	
HSS Interface Input Gain / Decoder Volume	These parameters adjust the input (Rx) volume.
Tone generator Volume	This parameter adjusts the volumes of all progressive telephony tones that are used in PBX calls: Busy tone, dial tone, call progress tone, etc.

⇒ **To activate the call-waiting audio notification for analog extension (administrator only):**

Under **Call Waiting**, select **Enable ACK Spoofing for Caller ID Call Waiting**.

Figure 110 Call Waiting table

Note: *Time From the End of CAS to the Start of Data* is a technical parameter that should only be set by authorized technical-support staff.

⇒ **To Change the FXS Ports Settings (administrator only)**

The **FXS Ports** section contains advanced electronic settings for the FXS (analog) port, which should only be modified by an experienced administrator or technician.

Figure 111: Advanced – FXS Ports

The following settings can be modified:

Parameter	Description
Select country	Select the pre-defined FXS /POTS line configuration from the list of countries which responds to your region.

Ring Voltage	The ringing voltage, in volts.
Ring Frequency	The ringing frequency, in hertz.
Ring Waveform	The ringing waveform – sinusoid or trapezoid.
On-Hook Voltage	The voltage of an idle handset, in volts.
Off-Hook Current	The current of an active handset, in mili-amperes.
Two-Wire Impedance	Select the voice band impedance, in ohms, to be synthesized by the SLIC.
Transmit Gain	The transmit gain, in decibels.
Receive Gain	The receive gain, in decibels.
Interdigit Timeout	The inter-digit dialing time interval of the FXS extension. The system starts to transmit the digits it receives when the timeout period has passed.
Dial Tone Timeout	The headset’s Hang Off dial tone providing maximum time. Connection will be aborted when the time expired.
Congestion Tone Timeout	Specifies the maximum Congestion tone playback time interval. Specified time expiring indicates to system rejecting exiting conversation.
Hook Flash	The PBX switch Hook flash time interval.
End of Dialed Number Key	Dialing option which indicates to PBX that the destination number’s dialing is finished and can be transmitted to the destination.

3.7.4 Personal Domain Name (DDNS)

Typically, when you connect to the Internet, your service provider assigns an unused IP address from a pool of IP addresses. This type of address, called a dynamic IP address, is only assigned to you for the duration of the connection. Each time you connect to the Internet, a different IP address is assigned to you. Dynamically assigning addresses extends the usable pool of available IP addresses. However, since in this configuration the computers have no fixed IP addresses, the access to those computers from the Internet with a specific IP address is not possible.

A Dynamic DNS (DDNS) service enables you to alias a dynamic IP address to a static hostname. When you use a DDNS service, each time the IP address provided by your ISP changes, the DNS database is updated to reflect the change. Regardless of the IP address assigned to your computer, it will have a constant domain name. This way, even though your IP address may change often, your domain name will remain constant and your computer will be accessible.

Note: In order to use the L13 DDNS feature, you must first obtain a DDNS account. You can open a free account at <http://www.dyndns.com/account/create.html>. When applying for an account, you will need to specify a user name and password. Then create the free DNS host and activate it. Please have them readily available when you activate the L13 DDNS support.

⇒ **To activate L13 DDNS support:**

1. Navigate to **Home** → **Personal Domain Name**. The Personal Domain Name overview screen appears.



Figure 112: Personal Domain Name Overview Screen

2. Click the **New Dynamic DNS Entry** link to add a new DDNS entry. The **Personal Domain Name** settings screen appears:

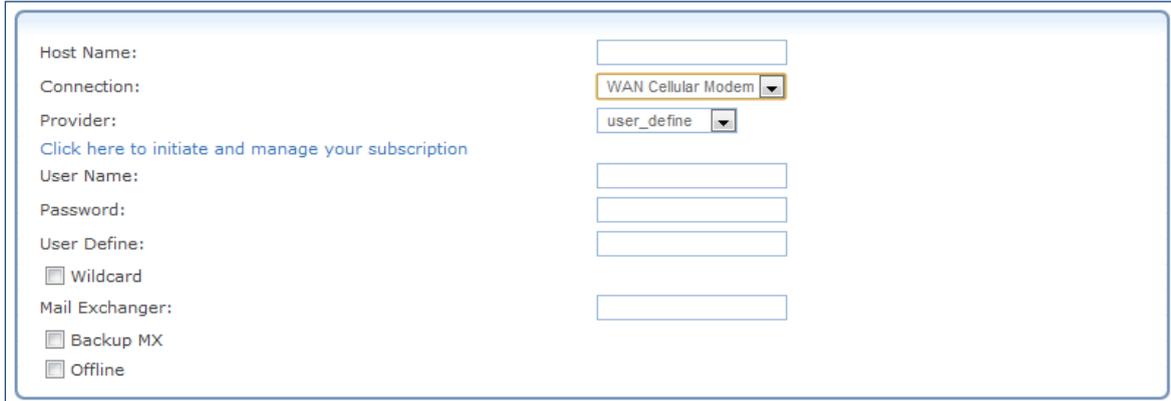


Figure 113: Personal Domain Name Settings Screen

3. Specify the DDNS parameters as follows:

Parameter	More Info
Host Name	Enter your full DDNS domain name.
Connection	Select the connection to which you would like to couple the DDNS service. In L13 there is only one option – “WAN Cellular Modem”.
Provider	Select your DDNS service provider. The screen will refresh, displaying the parameters required by each provider.
Click Here to Initiate and Manage your Subscription	Click this link to open the selected provider's account creation Web page. For example, when dyndns.org is selected, the following page will open: http://www.dyndns.com/account/ .
User Name	Enter your DDNS user name.
Password	Enter your DDNS password.
User Define	Currently not in use
Wildcard	Select this checkbox to enable the use of special links such as http://www.<your host>.dyndns.com
Mail Exchanger	To redirect all e-mails arriving at your DDNS address to your mail server, enter your mail exchange server address.
Backup MX	Select this check-box to designate the mail exchange server to be a backup server.
Offline	If you wish to temporarily take your site offline (to prevent traffic from reaching your DDNS domain name), check this box to enable redirection of DNS requests to an alternative URL, predefined in

your DDNS account. The availability of this feature depends on your account's level and type of service.

4. Click **Close**. The Personal Domain Name screen appears, and the DDNS entry you defined is listed in the table.

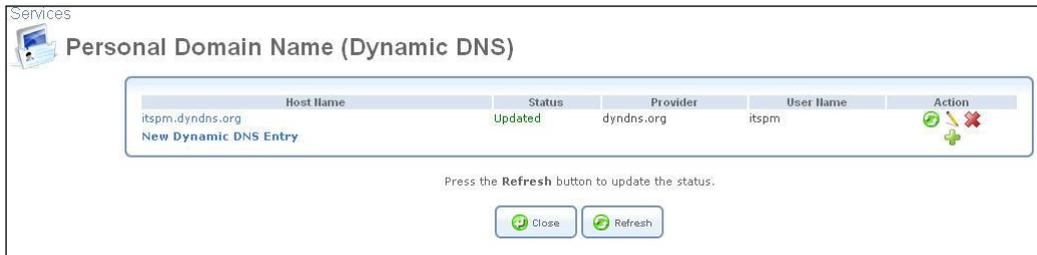


Figure 114: Dynamic DNS Activated

L13 can handle more than one DDNS hostname. You can define more than one hostname for a single WAN connection by simply repeating the procedure above for the same connection.

When you have finished activating the DDNS service, you can verify that it was activated correctly.

⇒ **To verify that DDNS is activated for a hostname:**

Browse to the hostname (e.g., <http://itspm.dyndns.org>). If the hostname is resolved correctly, the L13 WBM login page opens.

3.7.5 DNS Server

Domain Name System (DNS) provides a service that translates domain names into IP addresses and vice versa. The gateway's DNS server is an auto-learning DNS, which means that when a new computer is connected to the network the DNS server learns its name and automatically adds it to the DNS table. Other network users may immediately communicate with this computer using either its name or its IP address. In addition your gateway's DNS:

- Shares a common database of domain names and IP addresses with the DHCP server.
- Supports multiple subnets within the LAN simultaneously.
- Automatically appends a domain name to unqualified names.
- Allows new domain names to be added to the database using L13 WBM.
- Permits a computer to have multiple host names.
- Permits a host name to have multiple IPs (which is needed when a host has multiple network cards).

The DNS server does not require configuration. However, you may wish to view the list of computers known by the DNS, edit the host name or IP address of a computer on the list, or manually add a new computer to the list.

⇒ **To view the list of computers stored in the DNS table:**

Navigate to **Services** → **DNS Server**.

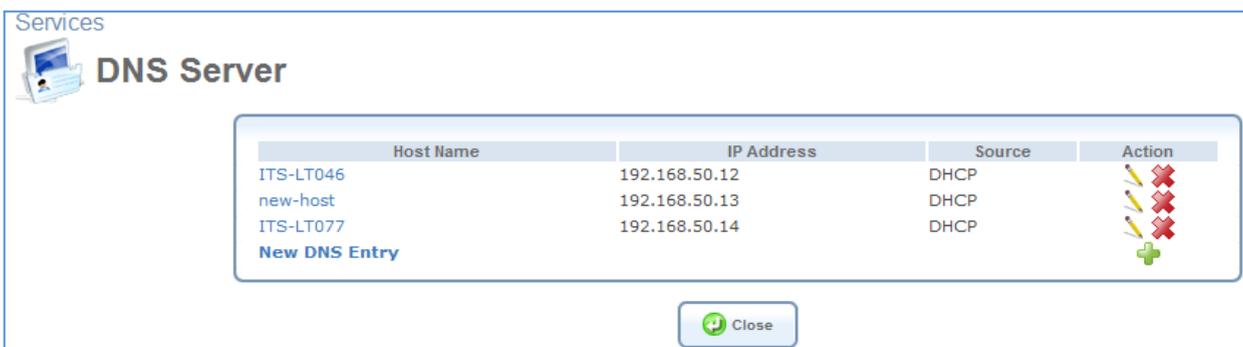


Figure 115: DNS Table

⇒ **To add a new entry to the list:**

1. Click the **New DNS Entry** button. The DNS Entry screen will appear (see Figure 116).
2. Enter the computer's host name and IP address.
3. Click **OK** to save the settings.



Figure 116: Add or Edit a DNS Entry

⇒ **To edit the host name or IP address of an entry:**

1. Click the **Edit** button that appears in the Action column. The DNS Entry screen appears.

If the host was manually added to the DNS Table, then you may modify its host name and/or IP address, otherwise you may only modify its host name.

2. Click **OK** to save the settings.

⇒ **To remove a host from the DNS table:**

Click the **Delete** button that appears in the Action column. The entry is removed from the table.

3.7.6 DHCP Server

Your gateway’s Dynamic Host Configuration Protocol (DHCP) server makes it possible to easily add computers that are configured as DHCP clients to the local network. It provides a mechanism for allocating IP addresses and delivering network configuration parameters to such hosts. L13 default DHCP server is the LAN bridge. A client (host) sends out a broadcast message on the LAN requesting an IP address for itself. The DHCP server then checks its list of available addresses and leases a local IP address to the host for a specific period of time while simultaneously designating this IP address as ‘taken’. At this point the host is configured with an IP address for the duration of the lease. The host can choose to renew an expiring lease or let it expire. If it chooses to renew a lease, then it will also receive current information about network services, as it did with the original lease, allowing it to update its network configurations to reflect any changes that may have occurred since it first connected to the network. If the host wishes to terminate a lease before its expiration, it can send a release message to the DHCP server, which will then make the IP address available for use by others.

Services
DHCP Server

Name	Service	Subnet Mask	Dynamic IP Range
LAN Bridge	DHCP Server	255.255.255.0	192.168.1.1 - 192.168.1.254

Internet Protocol: Use the Following IP Address

IP Address: 192 . 168 . 1 . 1
 Subnet Mask: 255 . 255 . 255 . 0

DNS Server: Use the Following DNS Server Addresses

Primary DNS Server: 0 . 0 . 0 . 0
 Secondary DNS Server: 0 . 0 . 0 . 0

IP Address Distribution: DHCP Server

Start IP Address: 192 . 168 . 1 . 1
 End IP Address: 192 . 168 . 1 . 254
 Subnet Mask: 255 . 255 . 255 . 0
 WINS Server: 0 . 0 . 0 . 0
 Lease Time in Minutes: 60
 Provide Host Name If Not Specified by Client

OK Apply Close Connection List

Figure 117: DHCP Server

Your gateway's DHCP server:

- Defines the range of IP addresses that can be allocated in the LAN.
- Defines the length of time for which dynamic IP addresses are allocated.
- Provides the above configurations for each LAN device and can be configured and enabled/disabled separately for each LAN device.
- Can assign a static lease to a LAN PC so that it receives the same IP address each time it connects to the network, even if this IP address is within the range of addresses that the DHCP server may assign to other computers.
- Provides the DNS server with the host name and IP address of each PC that is connected to the LAN.

Additionally, L13 can act as a DHCP relay, escalating DHCP responsibilities to a WAN DHCP server. In this case, the L13 will act merely as a router, while its LAN hosts will receive their IP addresses from a DHCP server on the WAN.

3.7.6.1 IP Address distribution / DHCP Server Settings

IP Address Distribution: DHCP Server

Start IP Address: 192 . 168 . 50 . 12
 End IP Address: 192 . 168 . 50 . 254
 Subnet Mask: 255 . 255 . 255 . 0
 WINS Server: 0 . 0 . 0 . 0
 Lease Time in Minutes: 60
 Provide Host Name If Not Specified by Client

Figure 118: IP Address Distribution

Note: If a device is listed as **Disabled** in the **Service** column, then DHCP services are not being provided to hosts connected to the network through that device. This means that the gateway will not assign IP addresses to these computers, which is useful if you wish to work with static IP addresses only.

⇒ *To edit the DHCP server settings for a device:*

1. In the Service section, in the **IP Address Distribution** combo-box, select the DHCP service:
 - **Disabled** Disable the DHCP server for this device.
 - **DHCP Server** Enable the DHCP server for this device.
 - **DHCP Relay** Set this device to act as a DHCP relay (refer to section 3.7.6.2).
2. Assuming you have chosen DHCP Server, complete the following fields:
 - **Start IP Address** The first IP address that may be assigned to a LAN host. Since the gateway's default IP address is 192.168.1.1, this address must be 192.168.1.2 or greater.
 - **End IP Address** The last IP address in the range that can be used to automatically assign IP addresses to LAN hosts.
 - **Subnet Mask** A mask used to determine what subnet an IP address belongs to. An example of a subnet mask value is 255.255.0.0.
 - **WINS Server** OpenRG can operate as a Windows Internet Naming Service (WINS) server, handling name registration requests from WINS clients and registering their names and IP addresses. WINS is a name resolution software from Microsoft that converts NetBIOS names to IP addresses. Windows machines that are named as PCs in a workgroup rather than in a domain, use NetBIOS names which must be converted to IP addresses if the underlying transport protocol is TCP/IP.
 - **Lease Time In Minutes** Each device will be assigned an IP address by the DHCP server for this amount of time when it connects to the network. When the lease expires, the server will determine if the computer has disconnected from the network. If it has, the server may reassign this IP address to a newly-connected computer. This feature ensures that IP addresses that are not in use will become available for other computers on the network.
 - **Provide Host Name If Not Specified by Client** If the DHCP client does not have a host name, the gateway will automatically assign one for him.
1. Click **OK** to save the settings.

3.7.6.2 IP Address distribution / DHCP Relay Settings

⇒ *To configure a device as a DHCP relay:*

1. In the Local IP Settings combo-box, select **Obtain an IP Address Automatically**.
2. In the **IP Address Distribution** combo-box, select the **DHCP Relay** option (see Figure 119: Settings for DHCP relay).

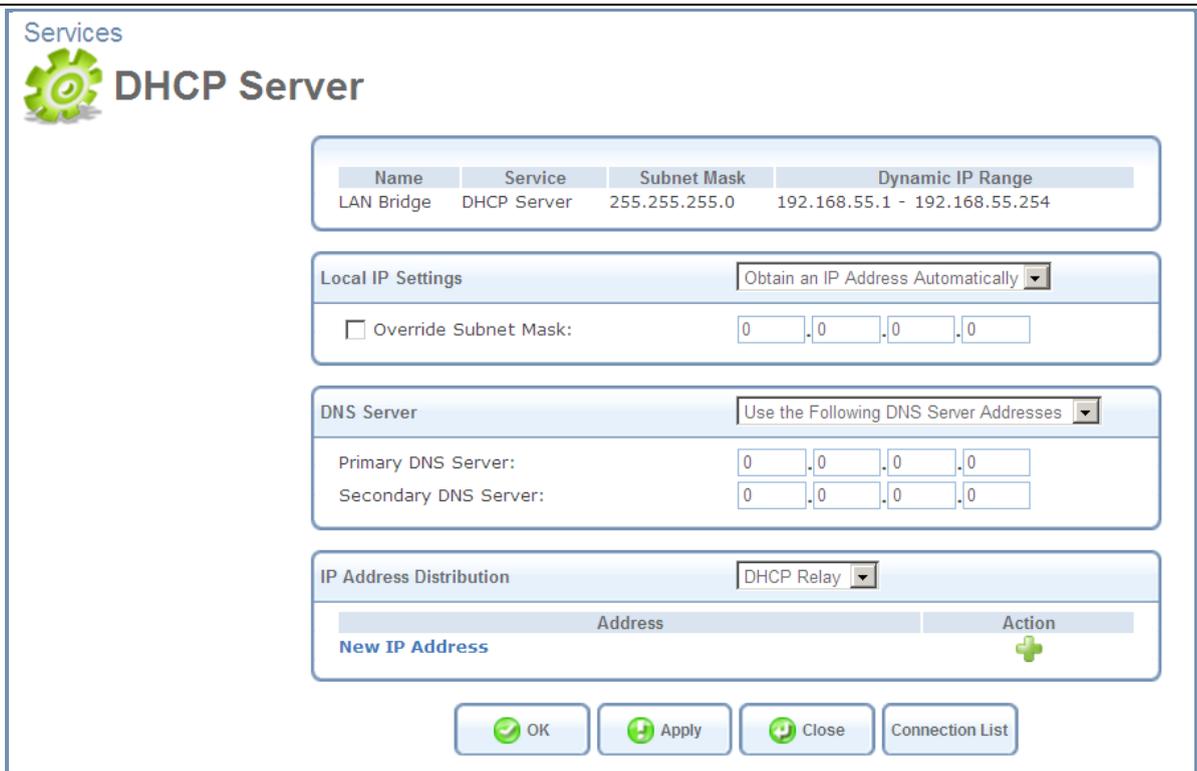


Figure 119: Settings for DHCP relay

3. Click the **New IP Address** link. The DHCP Relay Server Address screen appears:

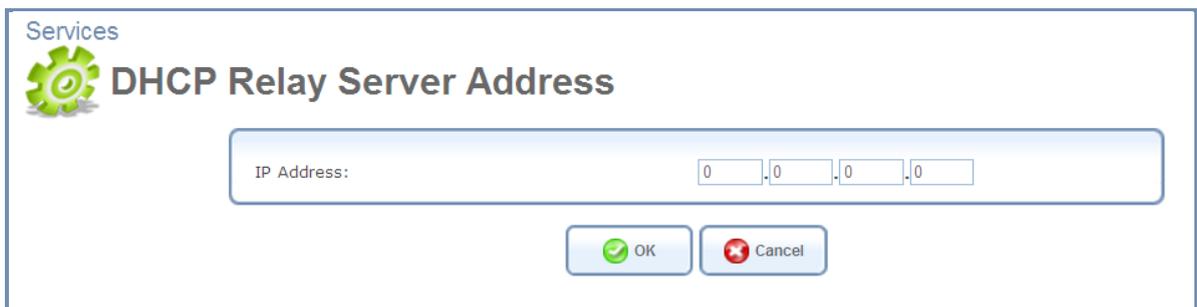


Figure 120: DHCP Relay Server Address

4. Specify the IP address of the DHCP server.
5. Click **OK** to save the settings.
6. Click **OK** once more in the DHCP Settings screen.

3.7.6.3 DHCP Connections

⇒ *To view a list of computers currently recognized by the DHCP server:*

Click the **Connection List** button that appears at the bottom of the DHCP Server screen (see Figure 118). The DHCP Connections screen appears:

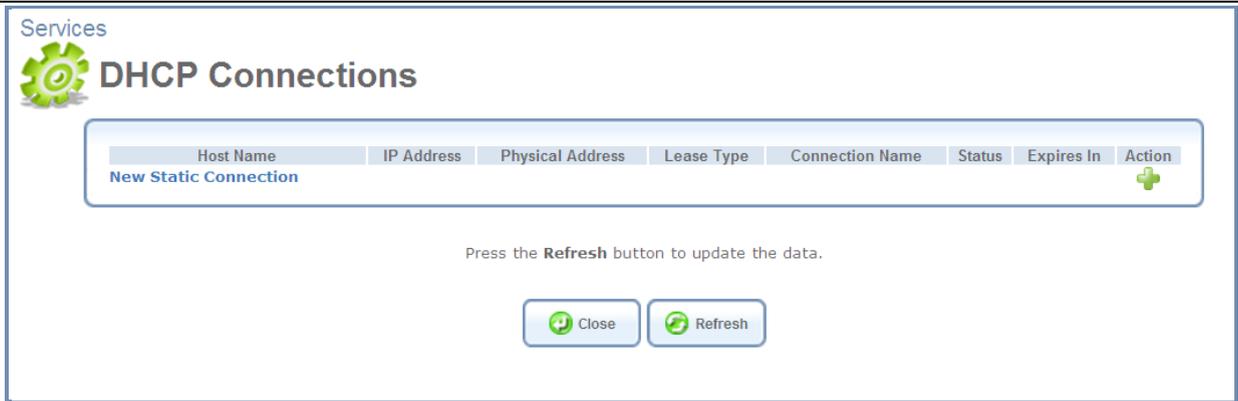


Figure 121: DHCP Connections

⇒ **To define a new connection with a fixed IP address:**

1. Click the **New Static Connection** link. The DHCP Connection Settings screen appears:

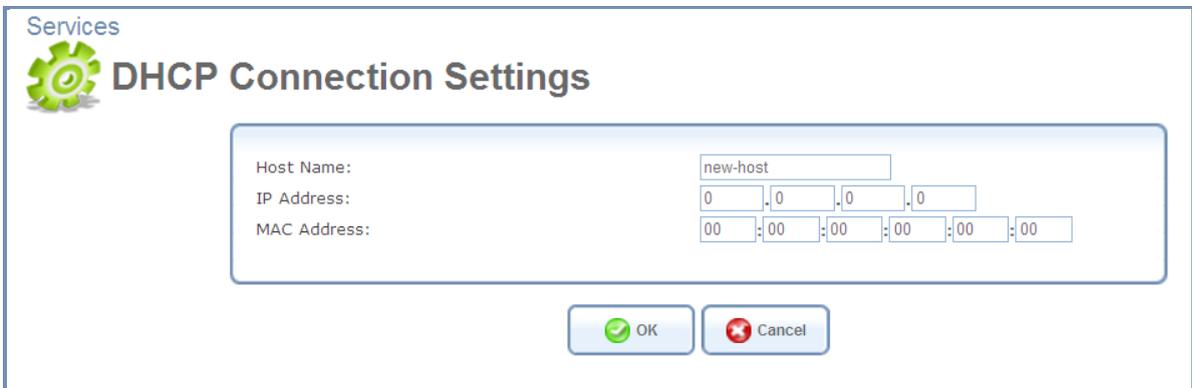


Figure 122: DHCP Connection Settings

2. Enter a host name for this connection.
3. Enter the fixed IP address that you would like to have assigned to the computer.
4. Enter the MAC address of the computer's network card.

Note: A device's fixed IP address is actually assigned to the specific MAC address installed on the LAN computer. If you replace this network card, then you must update the device's entry in the DHCP Connections list with the new network card's MAC address.

5. Click OK to save the settings.

The DHCP Connections screen will reappear (see Figure 123), displaying the defined static connection. This connection can be edited or deleted using the standard action icons.

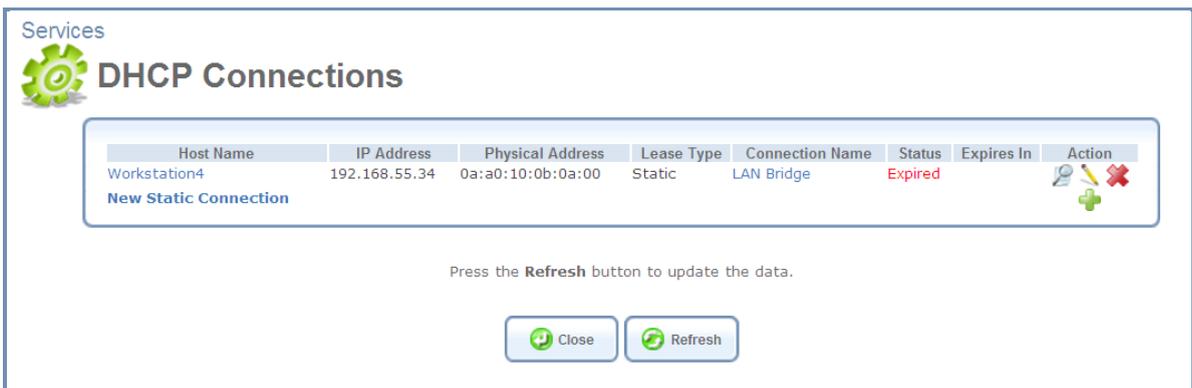


Figure 123: DHCP Connections

3.8 System

3.8.1 Overview

The Overview screen presents a summary of the L13 system’s status indicators. This includes various details such as version number, release date, type of platform and wireless network status information. In addition, there is an option to upgrade the software version by clicking **Upgrade** link.

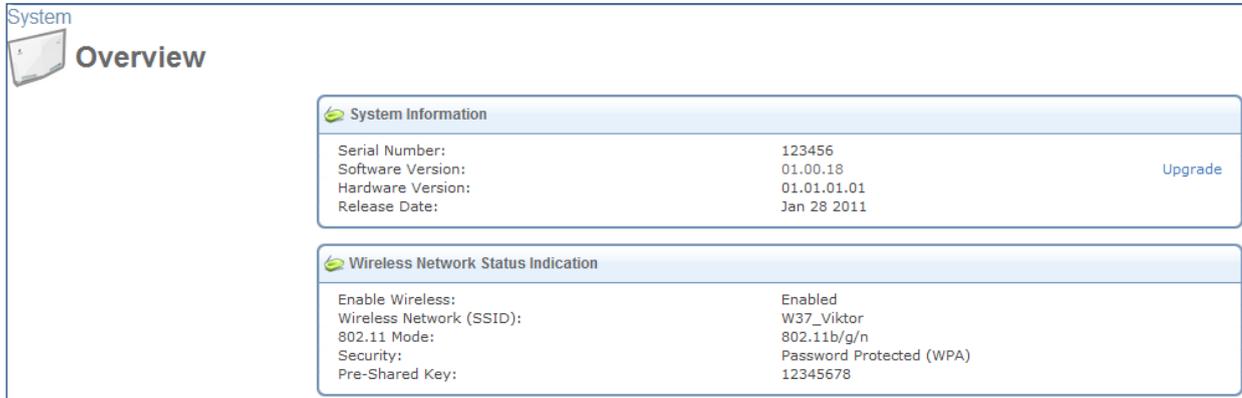


Figure 124: Overview screen

3.8.2 Monitor

3.8.2.1 Network

The Monitoring screen (**System**→**Monitor**) displays a table summarizing connection data (see Figure 125) and alarm notifications. L13 constantly monitors traffic within the local network and between the local network and the Internet. You can view statistical information about data received from and transmitted to the Internet (WAN) and to computers in the local network (LAN).

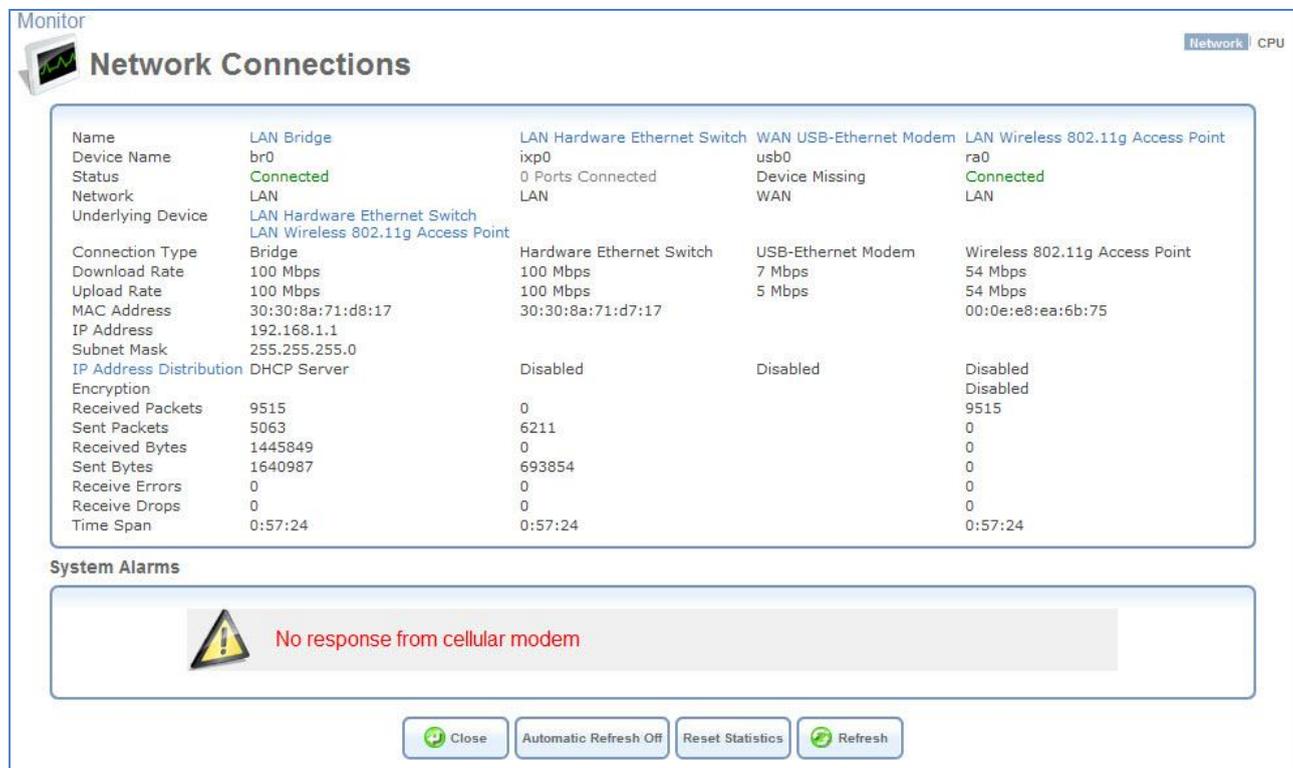


Figure 125: Monitoring Connections

Click the **Refresh** button to update the display or press the **Automatic Refresh On** button to constantly update the displayed parameters.

3.8.2.2 System Alarms

The Network Connections screen (**System**→**Monitor**) displays system alarms. When a red alarm led is “on” on the unit’s housing, this screen describes the alarm. Here is a list of all the possible alarms:

- 1 **“No SIM card detected”** - There is no SIM card inserted, or the SIM card is not correctly inserted.
- 2 **“Invalid SIM card inserted”** - The inserted SIM card is invalid
- 3 **“No PIN code entered”** - No PIN code has been entered to activate the Internet and voice services.
- 4 **“Incorrect PIN code entered”** - The entered PIN code is incorrect.
- 5 **“SIM card blocked”** - The SIM card has been blocked (due to entering the wrong PIN code three times). The PUK is required to unblock the SIM card.
- 6 **“SIM card permanently blocked”** - The SIM card has been permanently blocked (due to entering the wrong PUK code ten times). A new SIM card is required.

3.8.2.3 CPU

The CPU screen (see Figure 126) displays the following system parameters:

Load Average (1 / 5 / 15 mins.) - This is the average number of processes that are either in a running or uninterruptible state. A process in the running state is either using the CPU or waiting to use the CPU. A process in the uninterruptible state is waiting for I/O access, e.g. waiting for the disk. The averages are taken over three time intervals. The meaning of the load average value varies according to the number of CPUs in the system. For example, a

load average of 1 on a single-CPU system means that the CPU was loaded all the time, while on a 4-CPU system this would mean that the CPU was idle 75% of the time.

Processes - This is a list of processes currently running on MBR and their virtual memory usage. The amount of memory granted for each process is presented with the help of the following parameters:

- **Total Virtual Memory (VmData)** - The amount of memory currently utilized by the running process.
- **Heap size (VmSize)** - The total amount of memory allocated for the running process.

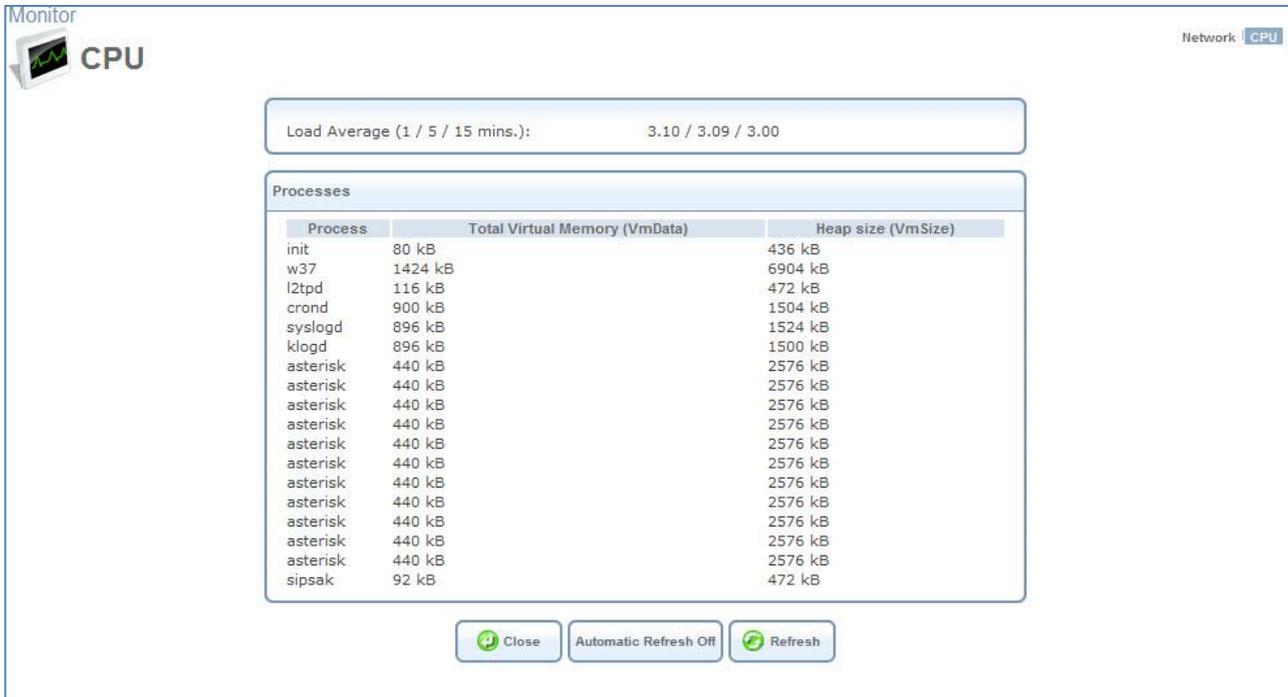


Figure 126: CPU Monitoring

Note: Some processes have several sub-processes. The sub-processes may be displayed under the same name as the parent processes and use the same memory address space.

By default, the screen is automatically refreshed. You may change this by clicking **Automatic Refresh Off**.

3.8.3 Routing

You can access the L13 routing settings by navigating to **System**→**Routing**. The Routing screen initially appears in its basic view.



Figure 3127: Routing – Basic View

⇒ **To add a routing rule:**

1. Click the **New Route** link or the action icon. The Route Settings screen appears.



Figure 128: Route Settings

2. Fill in the fields as follows:

Name Select the network device.

Destination Enter the destination host, subnet address, network address, or default route. The destination for a default route is 0.0.0.0.

Netmask The network mask is used in conjunction with the destination to determine when a route is used.

Gateway Enter the gateway’s IP address.

Metric Indicate the route’s priority level. Typically, the lowest metric is the most preferred route. If multiple routes have the same metric value, the default route will be the first in the order of appearance.

3. Click **OK**. The route is added to the routing table.

3.8.4 Management

3.8.4.1 Universal Plug and Play

Universal Plug-and-Play is a networking architecture that provides compatibility among networking equipment, software and peripherals. L13 UPnP-enabled products can seamlessly connect and communicate with other Universal Plug-and-Play enabled devices, without the need for user configuration, centralized servers, or product-specific device drivers. This technology leverages existing standards and technologies, including TCP/IP, HTTP 1.1 and XML, facilitating the incorporation of Universal Plug-and-Play capabilities into a wide range of networked products for the home. Universal Plug-and-Play technologies are rapidly adopted and integrated into widely-used consumer products such as Windows 7. Therefore it is critical that today’s Residential Gateways be UPnP-compliant. Your gateway is at the forefront of this development, offering a complete software platform for UPnP devices. This means that any UPnP-enabled *control point* (client) can dynamically join the network, obtain an IP address and exchange information about its capabilities and those of other computers on the network. They can subsequently communicate with each other directly, thereby further enabling peer-to-peer networking. And this all happens automatically, providing a truly zero-configuration network.

3.8.4.2 UPnP on L13

If your computer is running an operating system that supports UPnP, such as *Windows XP*, you can add the computer to your home network and access the Web-based Management directly from within Windows.

⇒ **To add a UPnP-enabled computer to the home network:**

1. Connect the PC to the gateway.
2. The PC will automatically be recognized and added to the home network. L13 will be added to **My Network Places** as the Internet Gateway Device and will allow configuration via a standard Windows interface.
3. A message appears on the notification area of the Taskbar notifying that the PC has been added to the network.

⇒ **To access the WBM directly from Windows:**

1. Open the **My Network Places** window by double-clicking its desktop icon.
2. Double-click the **Internet Gateway Device** icon. The WBM login screen appears in a browser window. This method is similar to opening a browser window and typing in **192.168.1.1**.

3.8.4.3 UPnP Configuration

The UPnP feature is enabled by default. Access its settings either from the **Management** tab under the System screen or by clicking the **Universal Plug and Play** icon in the Advanced screen. The Universal Plug and Play settings screen appears:



Figure 129: Universal Plug and Play

- **Allow Other Network Users to Control Network Features** Select this check-box to enable the UPnP feature. This will enable you to define UPnP services on any of the LAN hosts.

- **Enable Automatic Cleanup of Old Unused UPnP Services** Select this check-box to enable automatic cleanup of invalid rules. This feature checks the validity of all UPnP services every 5 minutes, and removes old and obsolete services unless a user-defined rule depends on them.
- **WAN Connection Publication** L13 will publish only one WAN connection.

3.8.4.4 Remote Administration

It is possible to access and control L13 not only from within the home network, but also from the Internet. This allows you to view or change settings while travelling. It also enables you to allow your ISP to change settings or help you troubleshoot functionality or communication issues from a remote location.

Note: Remote Web Administration disabled in default system configuration

Remote access to L13 is blocked by default to ensure the security of your home network. However, remote access is supported by the following services, and you may use the Remote Administration screen to selectively enable these services if they are needed.

To view L13 remote administration options, click the **Management** menu item under the **System** tab, or the **Remote Administration** icon in the Advanced screen. The Remote Administration screen appears.

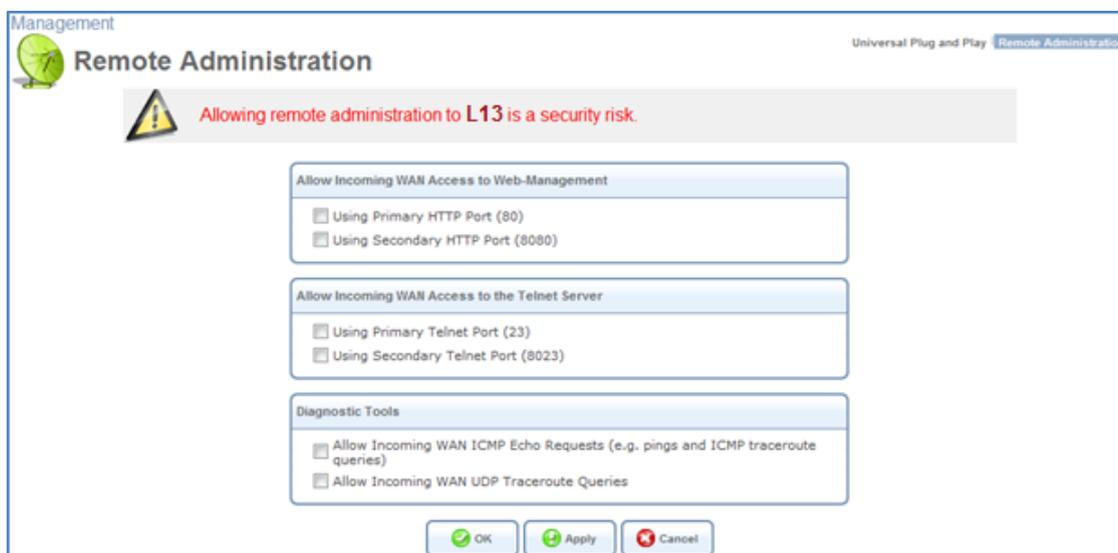


Figure 130: Remote Administration

Allow Incoming Access to Web-Management - Used to obtain access to the WBM and to all system settings and parameters using a browser. Both secure (HTTPS) and non-secure (HTTP) access is available.

Allow Incoming Access to the Telnet Server - Used to create a command-line session and gain access to all system settings and parameters (using a text-based terminal).

Note: Web Management and Telnet may be used to modify settings of the firewall or disable it. The user may also change local IP addresses and other settings, making it difficult or impossible to access the gateway from the home network. Therefore, remote access to Telnet or HTTP services should be blocked and should only be permitted when it is absolutely necessary.

Diagnostic Tools – The tool is used for troubleshooting and remote system management by you or your Internet Service Provider. The utilities that can be used are Ping and Traceroute (over UDP).

3.8.4.5 TR-069

CWMP (TR-069) defines an application layer protocol for remote management of L13 and provides the communication between a Customer Premises Equipment (CPE –L13) and an Auto Configuration Server (ACS).

Go to **System > Management > TR-069** to configure CWMP capabilities on the L13 system.

Figure 131 TR-069 configuration screen

Parameter	Description
CWMP enable	The remote management by TR 069 can be enabled or disabled
ACS URL	The configuration server URL
ACS User Name	The configuration server User Name for authentication
ACS Password	The configuration server Password for authentication
MBR Port for ACS access	The port that the configuration server will use to access the L13
CPE Username	The user name that the configuration server will use to access the L13
CPE Password	The password that the configuration server will use to access the L13
Enable Periodic Info Exchange	Enable/Disable periodic information exchange between the L13 and the remote configuration server

3.8.5 Date and Time (Administrator Only)

The gateway can be configured to update the date and time automatically, either from a cellular network or an NTP server. If you choose to use an NTP server, you must enter the URLs of one or more NTP servers, select the local time zone, and specify the dates in which daylight savings time is in force. If you choose to use a cellular network, these settings are set automatically.

⇒ *To configure the gateway to update the date and time automatically:*

- 1 Click the **Date and Time** link. (Alternatively click the Date and Time icon in the “Advanced” screen of the WBM.) The Date and Time settings screen appears.

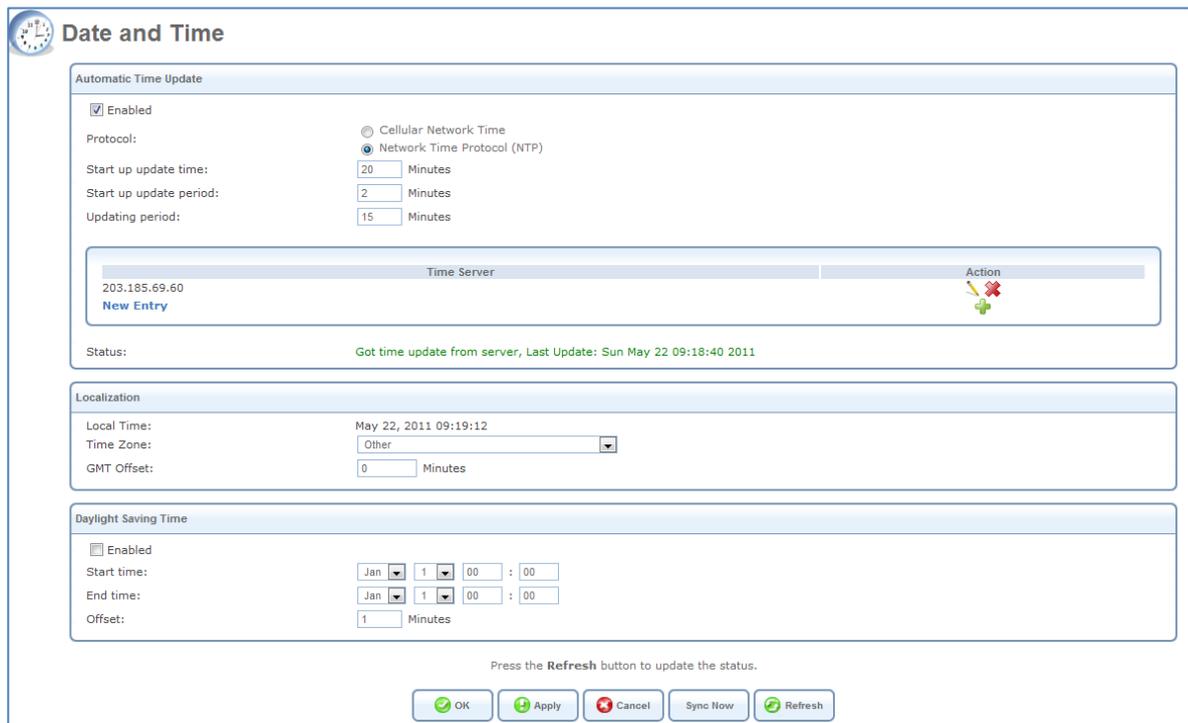
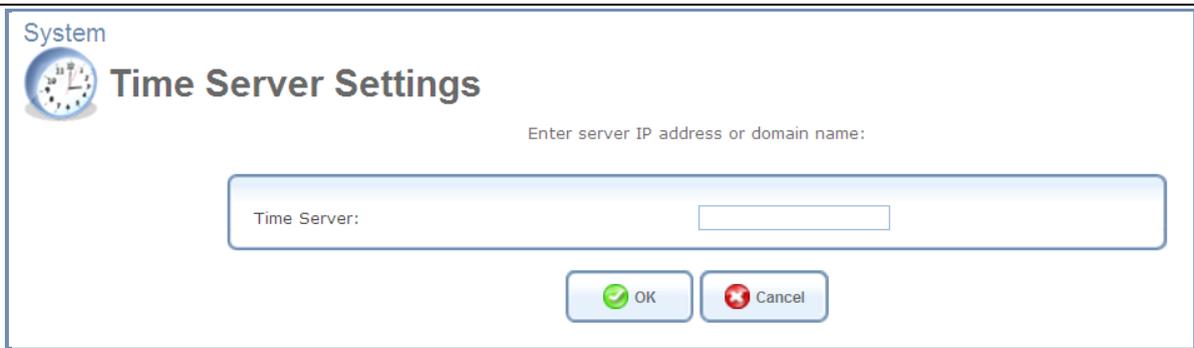


Figure 132 - Date and Time Screen

- 2 Select the **Enabled** check box under the **Automatic Time Update** section.
- 3 Select the protocol to be used to perform the time update.
- 4 In the **Timing parameters fields**, specify the time intervals of performing the update:
 - 4.1 ‘Start up update time’ – specifies the L13 system start up initialization time interval. This time interval starts from the system cold or power resets.
 - 4.2 “Start up update period” – specifies the interval between retries when attempting to update the time during the system startup.
 - 4.3 ‘Updating period’ – specifies the interval between retries when attempting to update the time after the system startup is finished.
5. If you selected the NTP protocol, under **Time Server**, click the **New Entry** link. The Time Server Settings screen opens.



6. Enter the URL of the NTP server, and then click **OK**. The URL is added to the list of NTP time servers in the Date and Time screen.
7. If you selected the NTP protocol, under **Localization**, select the time zone.
8. If you selected the NTP protocol, under **Daylight Saving Time**, fill in the fields as follows:
 - **Enabled:** Select this option to enable the automatic implementation of daylight savings time in accordance with the settings below.
 - **Start Time:** Specify the first day of daylight savings time.
 - **End Time:** Specify the last day of daylight savings time.
 - **Offset:** Indicate the number of minutes that must be added to standard time to set daylight time.
9. Click **OK** to save the new settings.

3.8.6 Maintenance

3.8.6.1 Configuration File

L13 enables you to view, save and load its configuration file in order to backup and restore your current configuration.

Access this feature either from the **Maintenance** tab under the System screen, or by clicking its icon in the Advanced screen. The Configuration File screen appears.

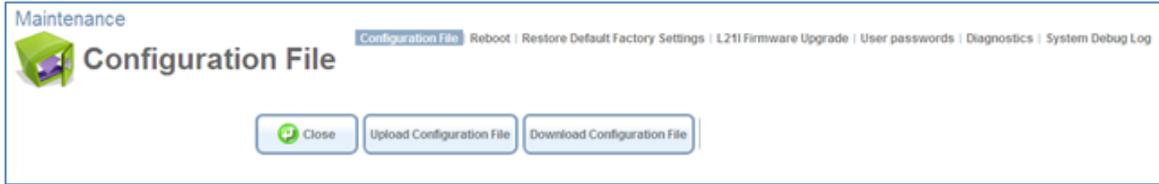


Figure 133: Configuration File

Click the **Upload Configuration File** button to restore your configuration from a file and restart L13 (Administrator Only).

Click the **Download Configuration File** button to back up your current configuration to a file.

3.8.6.2 Reboot

⇒ *To restart L13:*

1. Access this feature either from the **Maintenance** tab under the System screen, or by clicking its icon in the Advanced screen. The Restart screen appears:

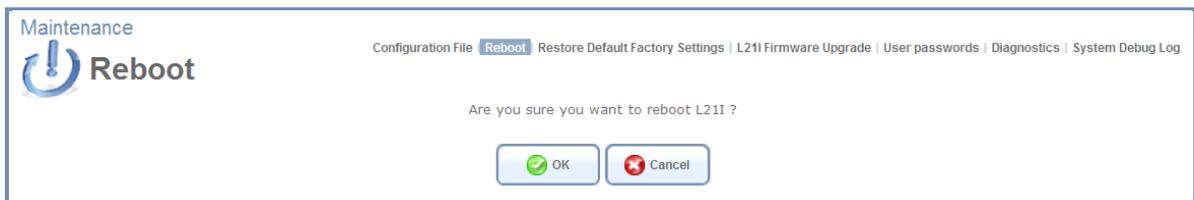


Figure 134: Restart

2. Click **OK** to restart L13. This may take up to one minute.
3. To re-enter the WBM after restarting the gateway, click the browser’s **Refresh** button.

3.8.6.3 Restore Default Factory Settings

Restoring L13 default factory settings removes all of the configuration changes made to MBR. This is useful, for example, when you wish to build a new network from scratch, or when you cannot recall changes made to the network and wish to go back to the default configuration.

⇒ *To restore the factory settings:*

1. Access this feature either from the **Maintenance** menu item under the **System** tab or by clicking its icon in the Advanced screen. The Restore Defaults screen appears.

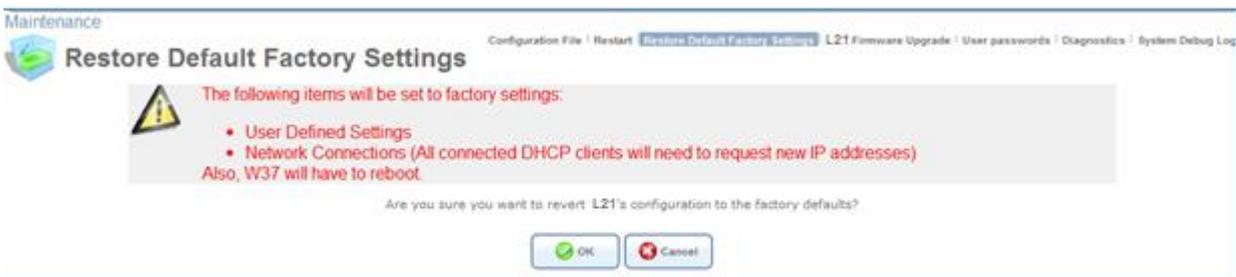


Figure 135: Restore Factory Settings

2. Click **OK** to restore L13 factory settings.

Note: All L13 settings and parameters, not only those in the **Advanced** section, will be restored to their default values. This includes the administrator password; a user-specified password will no longer be valid.

3.8.6.4 L13 Firmware Upgrade

L13 offers a built-in mechanism for upgrading its software image without losing any of your custom configurations and settings. In order to upgrade the firmware, you must receive an authorized software image file from your operator. The file should have an **rmt** extension. Make sure the firmware file is on your PC, on a CD loaded on your PC, or on another PC on the network, before you begin the upgrade process.

⇒ **To upgrade the firmware using a locally available .rmt file:**

1. Access this feature either from the **Maintenance** tab under the System screen, or by clicking its icon in the “Advanced” screen. The L13 Firmware Upgrade screen appears.



Figure 136: L13 Firmware Upgrade

2. Click the **Update Now** button.
3. Locate the authorized L13 firmware file by using the **Browse** button.
4. Click **OK**. The file starts loading from your PC to the gateway. When loading is completed, a confirmation screen appears, asking if you would like to upgrade to the new version.
5. Click **OK** to confirm. When the upgrade process ends, L13 automatically restarts, and the login screen of the updated image is displayed. Your configuration and settings are retained.

3.8.6.5 User Passwords

The User passwords screen shows existing L13 Web access users accounts and can assist you to change their Web login passwords.

Note: If you are logged into the Use account, you can only change the password for the User account. If you are logged in as the Administrator, you can change the password for either account.

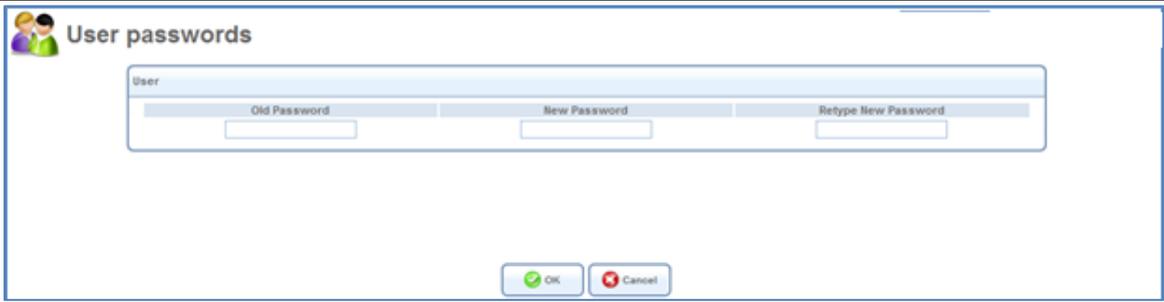


Figure 137: User password screen

⇒ **To change a password:**

1. Type the existing and new passwords for each user.
2. Click **OK**.

3.8.6.6 Diagnostics

The Diagnostics screen can assist you in testing network connectivity and viewing statistics, such as the number of packets transmitted and received, round-trip time and success status.

⇒ **To access the Diagnostics screen:**

In the **Maintenance** menu, select **Diagnostics**, or click the **Diagnostics** icon in the Advanced screen.

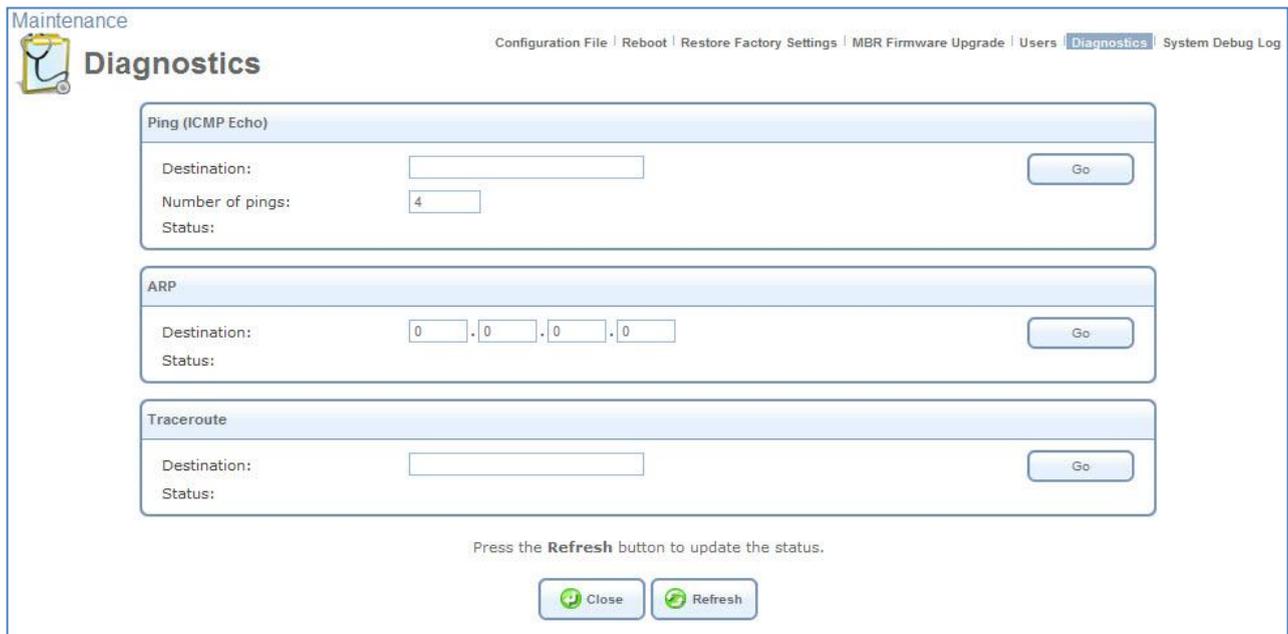


Figure 138: Maintenance – Diagnostics screen

⇒ **To diagnose network connectivity:**

1. Under the **Ping** section, enter the IP address or URL to be tested in the **Destination** field.
2. Enter the number of pings you would like to run.
3. Click **Go**. In a few moments, diagnostic statistics will be displayed. If no new information is displayed, click **Refresh**.

The Address Resolution Protocol (ARP) test is used to query the physical address (MAC) of a host.

⇒ *To run the ARP test:*

1. In the **Destination** field, enter the IP address of the target host.
2. Click **Go**. In a few moments, diagnostic statistics will be displayed. If no new information is displayed, click **Refresh**.

⇒ *To run a trace-route test:*

1. Under the **Traceroute** section, enter the IP address or URL to be tested in the **Destination** field.
2. Click **Go**. The traceroute test begins, constantly refreshing the screen.
3. To stop the test and view the results, click **Cancel**.

3.8.6.7 System Debug log

The system debug log page allows tracing system events and creating reports which can be downloaded to a remote PC during a Web administration session.

⇒ *To open the System Debug log:*

Navigate to **Maintenance** → **System Debug Log**.

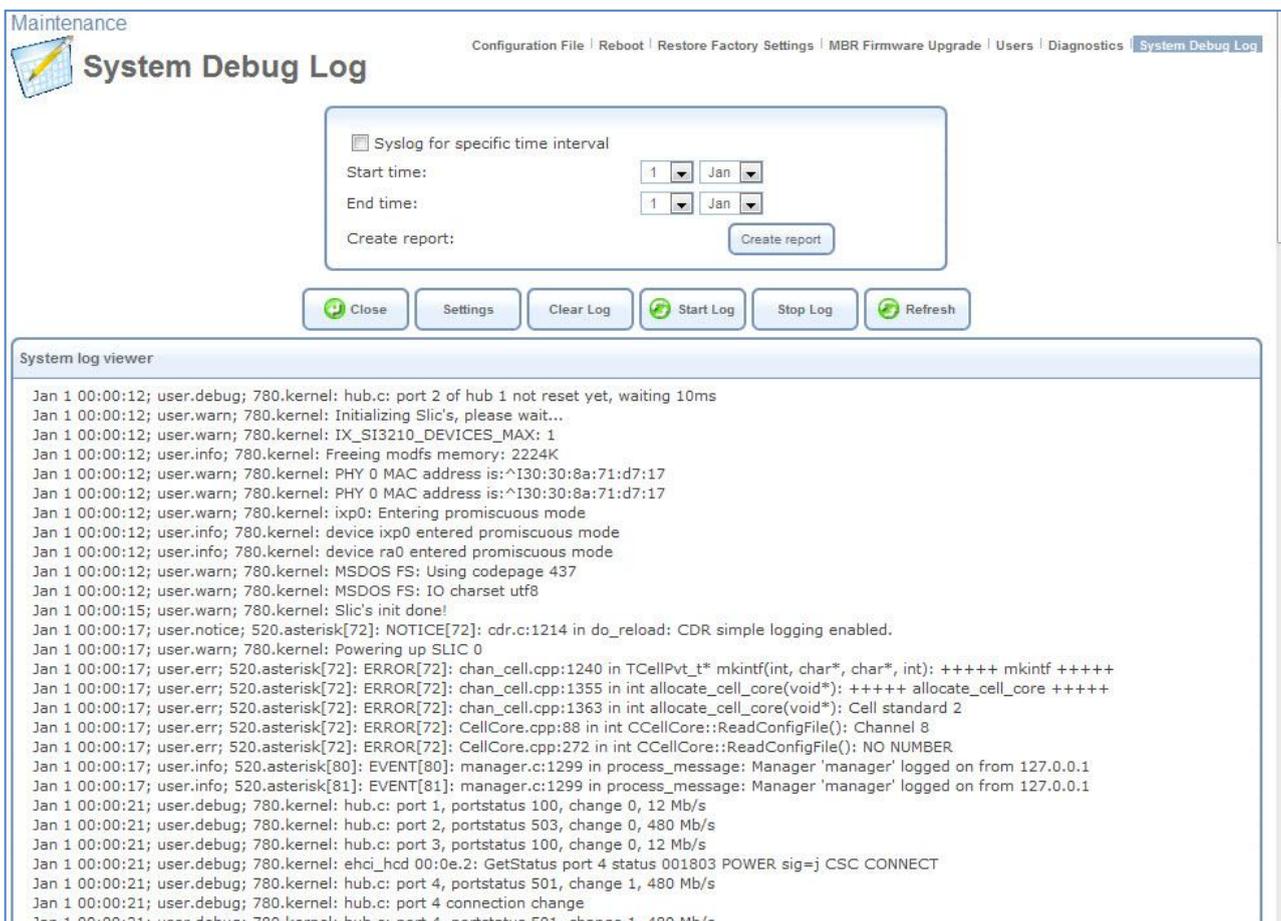


Figure 139: System Debug Log screen

⇒ *To select a time period to include in the log:*

1. At the top of the screen, select the **Syslog for specific time interval** checkbox.
2. Under **Start Time** and **End Time**, specify the first and last days of the time period you want to include in the display.
3. Click **Create Report**. The log for the time period you specified is displayed in the **System log viewer**.

⇒ **To display all available log entries:**

1. At the top of the screen, clear the **Syslog for specific time interval** checkbox.
2. Click **Create Report**. All available log entries are displayed in the System log viewer.

⇒ **To erase all log entries:**

Click **Clear Log**.

⇒ **To turn on logging:**

Click **Start Log**.

⇒ **To turn off logging:**

Click **Stop Log**.

⇒ **To configure the system-debugging functionality:**

1. Click the **Settings** button. The System Debug configuration screen appears. It provides a list of debug parameters:

Parameter	Description
Log level	Specifies the level of detail in the debugging trace file. Range: 1-8.
Remote logging	Activate this option to forward debugging information to an external <i>System log</i> server software application.
Remote IP address	The IP address of the network PC where the external <i>System log</i> server software application is installed.
Remote port	The port on the external <i>Sys log</i> server for forwarding debugging data.
PBX Logging	Start PBX activity tracing.
Debug level	Specifies the level of detail in the debugging trace file. Range: 1-8.
Verbose Level	Specifies the level of detail in the PBX activity used protocols debugging trace file. Range: 1-12.
Create syslog file	Activate saving trace in the debug report file.
Max size of log	Specifies the maximum size of the debug file. File continue to fill information in FIFO mode when size expired.

Note: The external server application must have an option to receive the system log network information via an IP connection. An example of an application that is compatible is **TFTPd32**.

2. Click **OK** or **Apply**. You are returned to the System Debug Log screen, which displays the debug file in the viewer window.

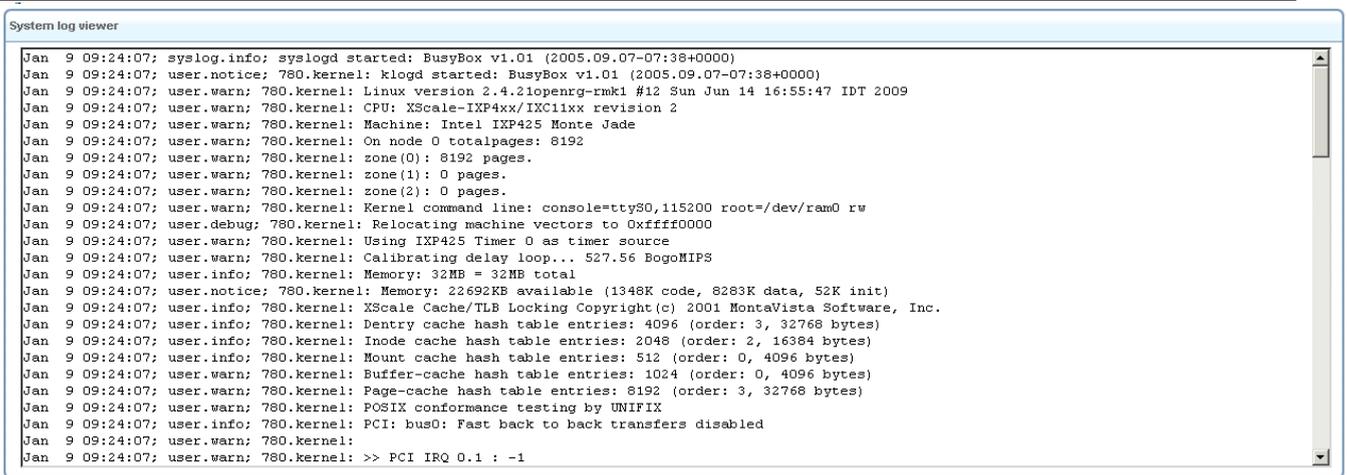


Figure 140: Internal Trace debugging viewer

3.9 Advanced

This section of the Web-based Management offers shortcuts to L13 frequently used features. The different icons redirect to their respective screens that are described throughout this manual. Note that changes to advanced settings may adversely affect the operation of L13 and your home network; they should be made with caution.



Figure 141: Advanced Tab

This screen enables you to quickly access the configuration screens for the following features:



DHCP server – Modify the behavior of the DHCP server for each LAN device and view a list of DHCP clients in the local network. This icon redirects to the **DHCP** menu item under the **Services** tab (refer to section 3.7.6)



DNS Server - View and Modify the DNS Table. This icon redirects to the **DNS server** menu item under **Services** tab (refer to section 3.7.5)



Firewall – Monitor and define firewall rules. This icon redirects to the Firewall menu item under Services tab (refer to section 3.7.1)



Internet Connection – Configure WAN Cellular Internet connection parameters. This icon redirects to the **Settings** menu **Internet Connection** tab (refer to section 3.5)



Restart – Restart MBR. This icon redirects to the **Maintenance** menu item under the **System** tab (refer to section 3.8.6.2)



Restore Default Factory Settings – Restore the gateway’s default factory settings. This icon redirects to the **Maintenance** menu item under the **System** tab (refer to section 3.8.6.3)



System Backup – Provide an option to download existing configuration file from L13 and save it on a remote PC (refer to section 3.8.6.1).



System Restore – Provide an option to upload a previously saved configuration file from the PC to the MBR (refer to section 3.5.1).



User Password – Configure L13 users passwords. This icon redirects to the **User Passwords** menu item under the **System** tab (refer to section 3.8.6.5).



Voice – Manage the Voice services. This icon redirects to the Voice menu item under the System tab (refer to section 3.8.6.5)



Wi-Fi – Configure wireless LAN parameters. This icon redirects to the **WiFi** menu item under the **Local Network** tab (refer to section 3.6.2).

1 Regulatory Information

This device must be installed and used in strict accordance with the manufacturer’s instructions that comes with the product. In some situations or environments, the use of wireless devices may be restricted by the proprietor of the building or responsible representatives of the organization. These situations may for example include: Using the Wireless equipment in an environment where the risk of interference to other devices or services is perceived or identified as harmful.

If you are uncertain of the policy that applies on the use of wireless equipment in a specific organization or environment you are encouraged to ask for authorization to use this device prior to turning on the equipment. The manufacturer is not responsible for any interference caused by unauthorized modification of the devices included with this kit, or the substitution or attachment of connecting cables, antennas and equipment other than specified by the manufacturer. The correction of interference caused by such unauthorized modification, substitution or attachment will be the responsibility of the user. The manufacturer and its authorized resellers or distributors are not liable for any damage or violation of government regulations, regulatory approvals and misuse of any kind failing to comply with these guidelines.

FCC Statement of Conformity

This device complies with Part 15 of the FCC Rules and with RSS-210 of Industry Canada. The Cellular module within the device was certified with Part 22 and 24 of the FCC Rules and the Wi-Fi module within the device was certified with Part 15 sub part C. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

FCC Part 15 Statement Note

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution

To comply with FCC and Industry Canada RF exposure compliance requirements when using the roof, window or built-in antenna, a separation distance of at least 20 cm (8 inches) between the equipment and the body must be maintained. 3/1551-CRH 102 168 Uen Rev B 2009-03-27 7

NOTICE

Changes or modifications made to this equipment not expressly approved by Ericsson, Inc. may void the FCC authorization to operate this equipment.

Canada Statement

This product meets the applicable Industry Canada technical specifications. The cellular module within the device was certified with RSS-132 and RSS-133 and the Wi-Fi module within the device was certified with RSS-210.

In addition, for the power adapter:

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB003 du Canada.

Note: Shielded Ethernet cables must be used in order to comply with emission standards

2 Appendix

2.1 List of Acronyms

Acronym	Definition
ALG	Application-Level Gateway
API	Application Programming Interface
CPE	Customer Premise Equipment
DHCP	Dynamic Host Configuration Protocol
DMZ	Demilitarized Zone
DNS	Domain Name System
DOCSIS	Data Over Cable Service Interface Specification
DSL	Digital Subscriber Line
FTP	File Transfer Protocol
HomePNA	Home Phone line Network Alliance
HTTP	HyperText Transport Protocol
IAD	Integrated Access Device
ICMP	Internet Control Message Protocol
IGMP	Internet Group Multicast Protocol
IP	Internet Protocol
IPSec	IP Security

Acronym	Definition
LAN	Local Area Network
MAC	Media Access Control
MTU	Maximum Transmission Unit
NAPT	Network Address Port Translation
OAM	Operations and Maintenance
OEM	Original Equipment Manufacturer
PDA	Personal Digital Assistant
POP3	Post Office Protocol 3
PPP	Point-to-Point Protocol
PPTP	Point-to-Point Tunneling Protocol
RIP	Routing Information Protocol
SPI	Stateful Packet Inspection
TCP	Transmission Control Protocol
TFTP	Trivial File Transfer Protocol
UDP	User Datagram Protocol
UPnP	Universal Plug and Play
URL	Universal Resource Locator

Acronym	Definition
USB	Universal Serial Bus
VPN	Virtual Private Network
WAN	Wide Area Network

3 Glossary

100Base-T Also known as "Fast Ethernet," an Ethernet cable standard with a data transfer rate of up to 100 Mbps.

10Base-T An older Ethernet cable standard with a data transfer rate of up to 10 Mbps.

802.11, 802.11b A family of IEEE (Institute of Electrical and Electronics Engineers)-defined specifications for wireless networks. Includes the 802.11b standard, which supports high-speed (up to 11 Mbps) wireless data transmission.

802.3 The IEEE (Institute of Electrical and Electronics Engineers - defined specification that describes the characteristics of Ethernet (wired) connections.

Access point A device that exchanges data between computers on a network. An access point typically does not have any Firewall or NAT capabilities.

Ad hoc network A solely wireless computer-to-computer network. Unlike an infrastructure network, an ad hoc network does not include a gateway router.

Adapter Also known as a "network interface card" (NIC). An expansion card or other device used to provide network access to a computer, printer, or other device.

Administrator A person responsible for planning, configuring, and managing the day-to-day operation of a computer network. The duties of an administrator include installing new workstations and other devices, adding and removing individuals from the list of authorized users, archiving files, overseeing password protection and other security measures, monitoring usage of shared resources, and handling malfunctioning equipment.

Authentication The process of identifying an individual usually based on a username and password. In security systems, authentication is distinct from authorization, which is the process of giving individuals access to system objects based on their identity. Authentication merely ensures that the individual is who he or she claims to be, but says nothing about the access rights of the individual.

Bandwidth The amount of information, or size of file, that can be sent through a network connection at one time. A connection with more bandwidth can transfer information more quickly.

Bridge A device that forwards packets of information from one segment of a network to another. A bridge forwards only those packets necessary for communication between the segments.

Broadband connection A high-speed connection, typically 256 Kbps or faster. Broadband services include cable modems and DSL.

Broadband modem A device that enables a broadband connection to access the Internet. The two most common types of broadband modems are cable modems, which rely on cable television infrastructure, and DSL modems, which rely on telephone lines operating at DSL speeds.

Broadcast Broadcasting sends a message to everyone on the network whereas multicasting sends a message to a select list of recipients.

Bus A set of hardware lines used for data transfer among the components of a computer system. A bus essentially allows different parts of the system to share data. For example, a bus connects the disk-drive controller, memory, and input/output ports to the microprocessor.

Cable modem A device that enables a broadband connection to access the Internet. Cable modems rely on cable television infrastructure, in other words, the data travels on the same lines as your cable television.

CAT 5 cable Abbreviation for "Category 5 cable." A type of Ethernet cable that has a maximum data rate of 100 Mbps.

Channel A path or link through which information passes between two devices.

CHAP Challenge Handshake Authentication Protocol, a type of authentication in which the authentication agent (typically a network server) sends the client program a random value, that is used only once, and an ID value. The sender and peer must share a predefined secret key.

Client Any computer or program that connects to, or requests the services of, another computer or program on a network. For a local area network or the Internet, a client is a computer that uses shared network resources provided by a server.

Client/server network A network of two or more computers that rely on a central server to mediate the connections or provide additional system resources. This dependence on a server differentiating a client/server network from a peer-to-peer network.

Computer name A name that uniquely identifies a computer on the network so that all its shared resources can be accessed by other computers on the network. One computer name cannot be the same as any other computer or domain name on the network.

Crossover cable A type of cable that facilitates network communications. A crossover cable is a cable that is used to interconnect two computers by "crossing over" (reversing) their respective pin contacts.

DHCP Acronym for *Dynamic Host Configuration Protocol*. A TCP/IP protocol that automatically assigns temporary IP addresses to computers on a local area network (LAN). L13 supports the use of DHCP. You can use DHCP to share one Internet connection with multiple computers on a network.

Dial-up connection An Internet connection of limited duration that uses a public telephone network rather than a dedicated circuit or some other type of private network.

DMZ Acronym for *demilitarized zone*. A collection of devices and subnets placed between a private network and the Internet to help protect the private network from unauthorized Internet users.

DNS Acronym for *Domain Name System*. A data query service chiefly used on the Internet for translating host names into Internet addresses. The DNS database maps DNS domain names to IP addresses so that users can locate computers and services through user-friendly names.

Domain In a networked computer environment, a collection of computers that share a common domain database and security policy. A domain is administered as a unit with common rules and procedures and each domain has a unique name.

Domain name An address of a network connection that identifies the owner of that address in a hierarchical format: server.organization.type. For example, <http://www.whitehouse.gov> identifies the Web server at the WhiteHouse, which is part of the U.S. government.

Drive An area of storage that is formatted with a file system and has a drive letter. The storage can be a floppy disk (which is often represented by drive A), a hard disk (usually drive C), a CD-ROM (usually drive D), or another type of disk. You can view the contents of a drive by clicking the drives icon in Windows Explorer or My Computer. Drive C (also known as the hard disk), contains the computers operating system and the programs that have been installed on the computer. It also has the capacity to store many of the files and folders that you create.

Driver Within a networking context, a device that mediates communication between a computer and a network adapter installed on that computer.

DSL Acronym for *Digital Subscriber Line*. A constant, high-speed digital connection to the Internet that uses standard copper telephone wires.

DSL modem A device that enables a broadband connection to access the Internet. DSL modems rely on telephone lines that operate at DSL speeds.

Duplex A mode of connection. Full-duplex transmission allows for the simultaneous transfer of information between the sender and the receiver. Half-duplex transmission allows for the transfer of information in only one direction at a time.

Dynamic IP address The IP address assigned (using the DHCP protocol) to a device that requires it. A dynamic IP address can also be assigned to a gateway or router by an ISP.

Edge computer The computer on a network that connects the network to the Internet. Other devices on the network connect to this computer. The computer running the most current, reliable operating system is the best choice to designate as the edge computer.

Encryption The translation of data into a secret code. Encryption is the most effective way to achieve data security. To read an encrypted file, you must have access to a secret key or password that enables you to decrypt it.

Ethernet Networking standard that uses cables to provide network access. Ethernet is the most widely-installed technology to connect computers together.

Ethernet cable A type of cable that facilitates network communications. There are a couple of types of Ethernet cables: the twisted pair and the coax Ethernet cables. Each of these allow data to travel at 10Mbit per second.

Firewall A security system that helps protect a network from external threats, such as hacker attacks, originating outside the network. A hardware Firewall is a connection routing device that has specific data checking settings and that helps protect all of the devices connected to it.

Firmware Software information stored in nonvolatile memory on a device.

Flash memory A type of memory that does not lose data when power is removed from it. Flash memory is commonly used as a supplement to or replacement for hard disks in portable computers. In this context, flash memory either is built in to the unit or, more commonly, is available as a PC Card that can be plugged in to a PCMCIA slot.

FTP Acronym for *File Transfer Protocol*. The standard Internet protocol for downloading, or transferring, files from one computer to another.

Gateway A device that acts as a central point for network devices, receives transmitted messages, and forwards them. L13 can link many computers on a single network and can share an encrypted Internet connection with wired and wireless devices.

Gateway address The IP address you use when you make a connection outside your immediate network.

Hexadecimal A numbering system that uses 16 rather than 10 as the base for representing numbers. It is therefore referred to as a base-16 numbering system. The hexadecimal system uses the digits 0 through 9 and the letters A through F (uppercase or lowercase) to represent the decimal numbers 0 through 15. For example, the hexadecimal letter D represents the decimal number 13. One hexadecimal digit is equivalent to 4 bits, and 1 byte can be expressed by two hexadecimal digits.

HomePNA An industry standard that ensures that through existing telephone lines and a registered jack, computer users on a home network can share resources (such as an Internet connection, files, and printers) without interfering with regular telephone service. HomePNA currently offers data transmission speeds of up to 10 Mbps.

HomeRF An industry standard that combines 802.11b and portable phone standards for home networking. It uses frequency hopping (switching of radio frequencies within a given bandwidth to reduce the risk of unauthorized signal interception). HomeRF offers data transmission speeds of up to 1.6 Mbps at distances of up to 150 feet.

Host name The DNS name of a device on a network, used to simplify the process of locating computers on a network.

Hub A device that has multiple ports and that serves as a central connection point for communication lines from all devices on a network. When data arrives at one port, it is copied to the other ports.

IEEE Acronym for *Institute of Electrical and Electronics Engineers*. A society of engineering and electronics professionals that develops standards for the electrical, electronics, computer engineering, and science-related industries. The IEEE (Eye-triple-E) is a non-profit, technical professional association of more than 377,000 individual members in 150 countries. The full name is the Institute of Electrical and Electronics Engineers, Inc., although the organization is most popularly known and referred to by the letters I-E-E-E.

Infrastructure network A network configuration in which wireless devices connect to a wireless access point (such as an MBR) instead of connecting to each other directly.

Internet domain In a networked computer environment, a collection of computers that share a common domain database and security policy. A domain is administered as a unit with common rules and procedures, and each domain has a unique name.

Intranet A network within an organization that uses Internet technologies (such as a Web browser for viewing information) and protocols (such as TCP/IP), but is available only to certain people, such as employees of a company. It is also called a private network. Some intranets offer access to the Internet, but such connections are directed through a Firewall.

IP Acronym for *Internet Protocol*. The protocol within TCP/IP that is used to send data between computers over the Internet. More specifically, this protocol governs the routing of data messages which are transmitted in smaller components called packets.

IP address Acronym for *Internet Protocol address*. IP is the protocol within TCP/IP that is used to send data between computers over the Internet. An IP address is an assigned number used to identify a computer that is connected to a network through TCP/IP. An IP address consists of four numbers (each of which can be no greater than 255) separated by periods, such as 192.168.1.1.

ISO/OSI reference model Abbreviation for *International Organization for Standardization Open Systems Interconnection reference model*. An architecture that standardizes levels of service and types of interaction for computers that exchange information through a communications network. The ISO/OSI reference model separates computer-to-computer communications into seven protocol layers, or levels; each builds on and relies on the standards contained in the levels below it. The lowest of the seven layers deals solely with hardware links; the highest deals with software interactions at the program level. It is a fundamental blueprint designed to help guide the creation of hardware and software for networks.

ISP Acronym for *Internet service provider*. A company that provides individuals or companies access to the Internet.

Kbps Abbreviation of *kilobits per second*. Data transfer speed, as through a modem or on a network, measured in multiples of 1,000 bits per second.

LAN Acronym for *local area network*. A group of computers and other devices dispersed over a relatively limited area (for example, a building) and connected by a communications link that enables any device to interact with any other on the network.

MAC address Abbreviation for *media access control address*. The address that is used for communication between network adapters on the same subnet. Each network adapter is manufactured with its own unique MAC address.

MAC layer Abbreviation for *Media Access Control layer*. The lower of two sub layers that make up the data-link layer in the ISO/OSI reference model. The MAC layer manages access to the physical network, so a protocol like Ethernet works at this layer.

mapping A process that allows one computer to communicate with a resource located on another computer on the network. For example, if you want to access a folder that resides on another computer, you "map to" that folder, as long as the computer that holds the folder has been configured to share it.

Mbps Abbreviation of *megabits per second*. A unit of bandwidth measurement that defines the speed at which information can be transferred through a network or Ethernet cable. One megabyte is roughly equivalent to eight megabits.

Modem A device that transmits and receives information between computers.

MPPE Microsoft Point to Point Encryption (MPPE) is a means of representing Point to Point Protocol (PPP) packets in an encrypted form.

Multicast Transmit a single message to a select group of recipients. A simple example of multicasting is sending an e-mail message to a mailing list. Teleconferencing and videoconferencing also use multicasting, but require more robust protocols and networks.

NAT Acronym for *network address translation*. The process of converting between IP addresses used within a private network and Internet IP addresses. NAT enables all of the computers on a network to share one IP address.

Network A collection of two or more computers that are connected to each other through wired or wireless means. These computers can share access to the Internet and the use of files, printers, and other equipment.

Network adapter Also known as a *network interface card* (NIC). An expansion card or other device used to provide network access to a computer, printer, or other device.

Network name The single name of a grouping of computers that are linked together to form a network.

Network printer A printer that is not connected directly to a computer, but is instead connected directly to a network through a wired or wireless connection.

Packet A unit of information transmitted as a whole from one device to another on a network.

PAP Password Authentication Protocol, the most basic form of authentication, in which a user’s name and password are transmitted over a network and compared to a table of name-password pairs. Typically, the passwords stored in the table are encrypted. The Basic Authentication feature built into the HTTP protocol uses PAP.

PC Card A peripheral device that adds memory, mass storage, modem capability, or other networking services to portable computers.

PCI Acronym for *Peripheral Component Interconnect*. A specific bus type designed to be used with devices that have high bandwidth requirements.

PCI card A card designed to fit into a PCI expansion slot in a personal computer. PCI cards provide additional functionality; for example, two types of PCI cards are video adapters and network interface cards. See PCI.

PCI expansion slot A connection socket designed to accommodate PCI cards.

PCMCIA Acronym for *Personal Computer Memory Card International Association*. A nonprofit organization of manufacturers and vendors formed to promote a common technical standard for PC Card-based peripherals and the slot designed to hold them, primarily on portable computers and intelligent electronic devices.

Peer-to-peer network A network of two or more computers that communicate without using a central server. This lack of reliance on a server differentiates a peer-to-peer network from a client/server network.

PING A protocol for testing whether a particular computer is connected to the Internet by sending a packet to the computers IP address and waiting for a response.

Plug and Play A set of specifications that allows a computer to automatically detect and configure various peripheral devices, such as monitors, modems, and printers.

Port A physical connection through which data is transferred between a computer and other devices (such as a monitor, modem, or printer), a network, or another computer. Also, a software channel for network communications.

PPPoE Acronym for *Point-to-Point Protocol over Ethernet*. A specification for connecting users on an Ethernet network to the Internet by using a broadband connection (typically through a DSL modem).

PPTP Point-to-Point Tunneling Protocol, a technology for creating Virtual Private Networks (VPNs). Because the Internet is essentially an open network, the Point-to-Point Tunneling Protocol (PPTP) is used to ensure that messages transmitted from one VPN node to another are secure. With PPTP, users can dial in to their corporate network via the Internet.

PPTP IP Security, a set of protocols developed to support secure exchange of packets at the IP layer. IPsec has been deployed widely to implement Virtual Private Networks (VPNs).

Profile A computer-based record that contains an individual network’s software settings and identification information.

Protocol A set of rules that computers use to communicate with each other over a network.

Resource Any type of hardware (such as a modem or printer) or software (such as an application, file, or game) that users can share on a network.

Restore factory defaults The term used to describe the process of erasing your base stations current settings to restore factory settings. You accomplish this by pressing the Reset button and holding it for five or more seconds. Note that this is different from resetting the base station.

RJ-11 MBRr An attachment used to join a telephone line to a device such as a modem or the external telephone lines.

RJ-45 MBRr An attachment found on the ends of all Ethernet cables that connects Ethernet (wired) cables to other devices and computers

Server A computer that provides shared resources, such as storage space or processing power, to network users.

Shared folder A folder (on a computer) that has been made available for other people to use on a network.

Shared printer A printer (connected to a computer) that has been made available for other people to use on a network.

Sharing To make the resources associated with one computer available to users of other computers on a network.

SNTP Acronym for *Simple Network Time Protocol*. A protocol that enables client computers to synchronize their clocks with a time server over the Internet.

SSID Acronym for *Service Set Identifier*, also known as a "wireless network name." An SSID value uniquely identifies your network and is case sensitive.

Static IP address A permanent Internet address of a computer (assigned by an ISP).

Straight-through cable A type of cable that facilitates network communications. There are two types of Ethernet cables: the twisted pair and coax Ethernet cables. Each of these allow data to travel at 10Mbit per second. Unlike the Crossover cable, straight-through cable has the same order of pin contacts on each end-plug of the cable.

Subnet A distinct network that forms part of a larger computer network. Subnets are connected through routers and can use a shared network address to connect to the Internet.

Subnet mask Typically, a subnet may represent all the machines at one geographic location, in one building, or on the same local area network (LAN). Having an organization’s network to be divided into subnets, allows it to be connected to the Internet with a single shared network address. This is similar in form to an IP address and typically provided by an ISP. An example of a subnet mask value is 255.255.0.0.

Switch A central device that functions similarly to a hub, forwarding packets to specific ports rather than broadcasting every packet to every port. A switch is more efficient when used on a high-volume network.

Switched network A communications network that uses switching to establish a connection between parties.

Switching A communications method that uses temporary rather than permanent connections to establish a link or to route information between two parties. In computer networks, message switching and packet switching allow any two parties to exchange information. Messages are routed (switched) through intermediary stations that together serve to connect the sender and the receiver.

TCP/IP Acronym for *Transmission Control Protocol/Internet Protocol*. A networking protocol that allows computers to communicate across interconnected networks and the Internet. Every computer on the Internet communicates by using TCP/IP.

Throughput The data transfer rate of a network, measured as the number of kilobytes per second transmitted.

USB Acronym for *Universal Serial Bus*. USB (Universal Serial Bus) is a plug-and-play interface between a computer and add-on devices (such as audio players, joysticks, keyboards, telephones, scanners, and printers). With USB, a new device can be added to your computer without having to add an adapter card or even having to turn the computer off.

USB adapter A device that connects to a USB port.

USB MBRr The plug end of the USB cable that is connected to a USB port. It is about half an inch wide, rectangular and somewhat flat.

USB port A rectangular slot in a computer into which a USB MBRr is inserted.

UTP Acronym for *Unshielded Twisted Pair*. A cable that contains one or more twisted pairs of wires without additional shielding. It is more flexible and takes less space than a shielded twisted pair (STP) cable, but has less bandwidth.

Virtual server One of multiple Web sites running on the same server, each with a unique domain name and IP address.

VPN A Virtual Private Network (VPN) is a private Network that makes use of the public telecommunication infrastructure, maintaining privacy through the use of a tunneling Protocol and security procedures.

WAN Acronym for *Wide Area Network*. A geographically widespread network that might include many linked local area networks.

Wi-Fi A term commonly used to mean the wireless 802.11b standard.

Wireless Refers to technology that connects computers without the use of wires and cables. Wireless devices use radio transmission to connect computers on a network to one another. Radio signals can be transmitted through walls, ceilings, and floors, so you can connect computers that are in different rooms in the house without physically attaching them to one another.

Wireless access point A device that exchanges data between wireless computers or between wireless computers and wired computers on a network.

Wireless network name The single name of a grouping of computers that are linked together to form a network.

Wireless security A wireless network encryption mechanism that helps to protect data transmitted over wireless networks.

WLAN Acronym for *Wireless Local Area Network*. A network that exclusively relies on wireless technology for device connections.

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	<p>fdisk.c -- Partition table manipulator for Linux. Copyright (C) 1992 A. V. Le Blanc (LeBlanc@mcc.ac.uk) This program is free software. You can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation: either version 1 or (at your option) any later version.</p> <p>For detailed old history, see older versions. Contributions before 2000 by faith@cs.unc.edu, Michael Bischoff, LeBlanc@mcc.ac.uk, martin@cs.unc.edu, leisner@sdsu.xerox.com, esr@snark.thyrsus.com, aeb@cw.nl, quinlan@yggdrasil.com, fasten@cs.bonn.edu, orschaer@cip.informatik.uni-erlangen.de, jj@sunsite.mff.cuni.cz, fasten@shw.com, ANeuper@GUUG.de, kgw@suse.de.</p> <p>Modified, Sun Feb 20 2000, kalium@gmx.de Added fix operation allowing to reorder primary/extended partition entries within the partition table. Some programs or OSes have problems using a partition table with entries not ordered according to their positions on disk. Munged this patch to also make it work for logical partitions. aeb, 2000-02-20. Wed Mar 1 14:34:53 EST 2000 David Huggins-Daines <dhuggins@linuxcare.com> Better support for OSF1 disklabels on Alpha. 2000-04-06, Michal Jaegermann (michal@ellpspace.math.ualberta.ca) fixed and added some alpha stuff</p>
	<p>Berkeley last for Linux. Currently maintained by poe@daimi.aau.dk at ftp:ftp.daimi.aau.dk/pub/linux/poeadmutl</p> <p>Copyright (c) 1987 Regents of the University of California. All rights reserved.</p> <p>Redistribution and use in source and binary forms are permitted provided that the above copyright notice and this paragraph are duplicated in all such forms and that any documentation, advertising materials, and other materials related to such distribution and use acknowledge that the software was developed by the University of California, Berkeley. The name of the University may not be used to endorse or promote products derived from this software without specific prior written permission. THIS SOFTWARE IS PROVIDED "AS IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. 1999-02-22 Arkadiusz Mi. kiewicz <misiek@misiek.eu.org> - added Native Language Support</p>

MBR L13 – User’s Guide

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