MOTOROLA

Motorola Cellular Gateway NC800
User Guide

Version 2.0

WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS PRODUCT TO RAIN OR MOISTURE. THE UNIT MUST NOT BE EXPOSED TO DRIPPING OR SPLASHING. DO NOT PLACE OBJECTS FILLED WITH LIQUIDS, SUCH AS VASES, ON THE UNIT.

CAUTION: DO NOT CONNECT THE PLUG INTO AN EXTENSION CORD, RECEPTACLE, OR OTHER OUTLET UNLESS THE PLUG CAN BE FULLY INSERTED WITH NO PART OF THE BLADES EXPOSED.

CAUTION: TO ENSURE REGULATORY AND SAFETY COMPLIANCE, USE ONLY THE PROVIDED POWER AND INTERFACE CABLES.

CAUTION: TO ENSURE REGULATORY AND SAFETY COMPLIANCE, USE ONLY THE PROVIDED EXTERNAL ANTENNA.

CAUTION: DO NOT OPEN THE UNIT. DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN THE INSTALLATION AND TROUBLESHOOTING INSTRUCTIONS. REFER ALL SERVICING TO QUALIFIED SERVICE PERSONNEL.

CAUTION: CHANGES AND MODIFICATIONS NOT EXPRESSLY APPROVED BY MOTOROLA FOR COMPLIANCE COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

CAUTION: EXPOSURE TO RADIO FREQUENCY RADIATION. TO COMPLY WITH THE FCC RF EXPOSURE COMPLIANCE REQUIREMENTS, THE SEPARATION DISTANCE BETWEEN THE ANTENNA AND ANY PERSON'S BODY (INCLUDING HANDS, WRISTS, FEET AND ANKLES) MUST BE AT LEASE 20 CM (8 INCHES).

This device complies with Part 15 sub b of the FCC Rules. 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.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 sub b 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 of the radio or television.
- 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.

This device must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

Postpone Motorola Cellular Gateway NC800 installation until there is no risk of thunderstorm or lightning activity in the area.

Do not overload outlets or extension cords, as this can result in a risk of fire or electric shock. Overloaded AC outlets, extension cords, frayed power cords, damaged or cracked wire insulation, and broken plugs are dangerous. They may result in a shock or fire hazard.

Route power supply cords so that they are not likely to be walked on or pinched by items placed upon or against them. Pay particular attention to cords where they are attached to plugs and convenience receptacles, and examine the point where they exit from the product.

Place this equipment in a location that is close enough to an electrical outlet to accommodate the length of the power cord.

Place this equipment on a stable surface.

When using this device, basic safety precautions should always be followed to reduce the risk of fire, electric shock and injury to persons, including the following:

- Read all of the instructions (listed here and/or in the user manual) before you operate this equipment. Give particular attention to all safety precautions. Retain the instructions for future reference.
- Comply with all warning and caution statements in the instructions. Observe all warning and caution symbols that are affixed to this equipment.
- Comply with all instructions that accompany this equipment.

- *Avoid using this product during an electrical storm.* There may be a risk of electric shock from lightning. For added protection for this product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet. This will prevent damage to the product due to lightning and power surges.
- Operate this product only from the type of power source indicated on the product's marking label. If you are not sure of the type of power supplied to your home, consult your dealer or local power company.
- Upon completion of any service or repairs to this products, ask the service technician to perform safety checks to determine that the product is in safe operating condition.

It is recommended that the customer install an AC surge protector in the AC outlet to which this device is connected. This is to avoid damaging the equipment by local lightning strikes and other electrical surges.

Different types of cord sets may be used for connections to the main supply circuit. Use only a main line cord that complies with all applicable product safety requirements of the country of use.

Installation of this product must be in accordance with national wiring codes.

Place unit to allow for easy access when disconnecting the power cord/adapter of the device from the AC wall outlet.

Wipe the unit with a clean, dry cloth. Never use cleaning fluid or similar chemicals. Do not spray cleaners directly on the unit or use forced air to remove dust.

This product was qualified under test conditions that included the use of the supplied cables between system components. To be in compliance with regulations, the user must use these cables and install them properly. Connect the unit to a grounding type AC wall outlet (100-240 V AC) using the standard power cord/adapter as supplied with the unit.

Do not cover the device, or block the airflow to the device with any other objects. Keep the device away from excessive heat and humidity and keep the device free from vibration and dust.

Installation must at all times conform to local regulations.

This product is provided with a separate *Regulatory, Safety, Software License, and Warranty Information* card. If one is not provided with this product, please ask your service provider or point-of-purchase representative, as the case may be.

- THIS PRODUCT IS IN COMPLIANCE WITH ONE OR MORE OF THE STANDARDS LISTED ON THE *REGULATORY, SAFETY, SOFTWARE LICENSE, AND WARRANTY INFORMATION* CARD. NOT ALL STANDARDS APPLY TO ALL MODELS.
- NO WARRANTIES OF ANY KIND ARE PROVIDED BY MOTOROLA WITH RESPECT TO THIS PRODUCT, EXCEPT AS STATED ON THE *REGULATORY, SAFETY, SOFTWARE LICENSE, AND WARRANTY INFORMATION* CARD. MOTOROLA'S WARRANTIES DO NOT APPLY TO A PRODUCT THAT HAS BEEN REFURBISHED OR REISSUED BY YOUR SERVICE PROVIDER.

Table of Contents

1. Overview

Thank you for purchasing the Motorola® Cellular Gateway NC800. The Motorola Cellular Gateway NC800 is particularly well suited for the Small Office Home Office (SOHO) environment since it provides wireless access to the Internet. Applications where the Motorola Cellular Gateway NC800 is especially useful include:

- Households having multiple computers requiring connection to the Internet and each other.
- Small businesses or home offices requiring secure wireless Internet access.
- Internet gamers wanting easier setup for
  - Programs such as DirectX®
  - Sites such as MSN Games
  - Video conferencing with programs such as NetMeeting®
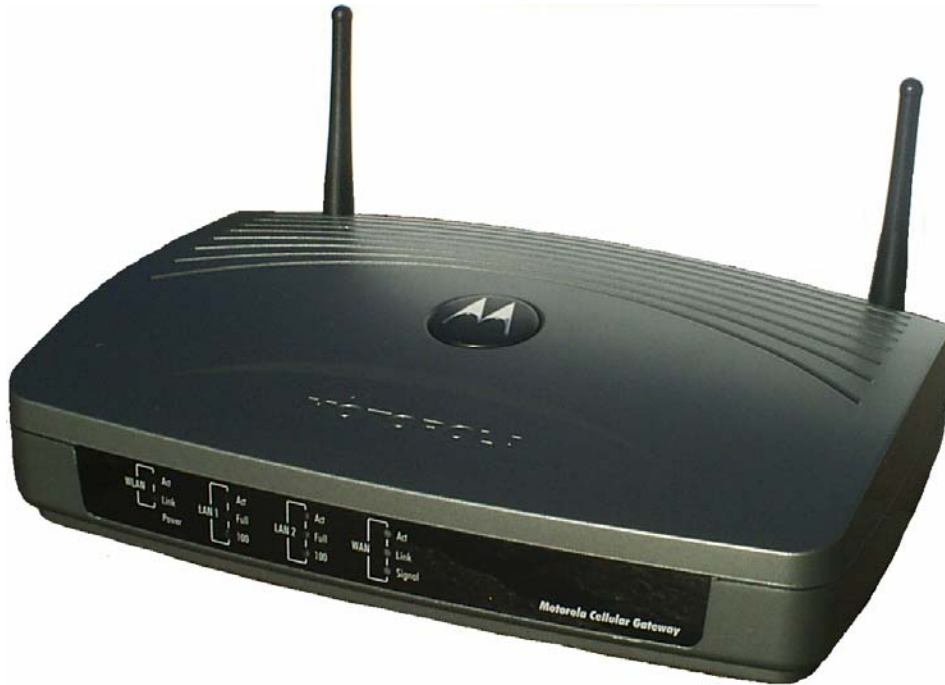
The features and physical appearance of your Motorola Cellular Gateway NC800 may differ slightly from the picture

A home or internal network enables you to share information between two or more computers. You can connect your home network to the Internet through the Motorola Cellular Gateway NC800. The Motorola Cellular Gateway NC800 is the central connection point between your computers and the Internet. It directs (routes) information between the computers connected to your home network. A built-in CDMA wireless modem transmits information between your home network and the Internet. The Motorola Cellular Gateway NC800:

- Combines four separate products — a CDMA wireless modem, IEEE 802.11b/g wireless access point, Ethernet 10/100 Base-T connections, and firewall — in one compact unit.
- Enables you to create a custom network sharing a single broadband connection, files, and peripherals, with or without wires
- Has an advanced firewall for enhanced network security for wired and wireless users
- Provides easy setup

This product is subject to change. Not all features described in this guide are available on all Motorola Cellular Gateway NC800 models. For the most recent documentation, visit the Cable Modems and Gateways page on the Motorola website http://motorola.com/

Intended audience

This document provides detailed information regarding the Motorola Cellular Gateway NC800. It describes its features, provides some background information on the technology used in the product and it gives detailed instructions on how to set up the Motorola Cellular Gateway NC800should you have advanced requirements.
The typical deployment of the Motorola Cellular Gateway NC800 will not have any additional setup requirements. Most users will therefore be able to set up and use the Motorola Cellular Gateway NC800 by using only the Quick Installation Guide provided with the product.
The remainder of this User Guide is therefore intended for users that have advanced requirements and for the interested reader.

Easy setup

It is much easier to configure a local area network (LAN) using a Motorola Cellular Gateway NC800 than using traditional networking equipment:
- The Web-based Setup Wizard provides a graphical user interface (GUI) for quick and easy configuration of **required** wireless, Ethernet, gateway, Dynamic Host Configuration Protocol (DHCP), and security settings. In most cases you can set up the Motorola Cellular Gateway NC800 via the Setup Wizard using the information in the Quick Installation Guide.
- For basic operation, most default settings require no modification.
- For the user with more advanced requirements, this user guide provides detailed information on how to configure the Motorola Cellular Gateway NC800 using the Web-based configuration utility.

Network connection types

The Motorola Cellular Gateway NC800 provides different network connection types for your computers to exchange data. The connection between your computers and the Motorola Cellular Gateway NC800 may be with a wireless or a wired connection or a combination of the two. Your network can use one or any combination of the following network connections:
- Ethernet local area network (LAN). Two connections are provided.
- Wireless LAN (IEEE 802.11g that also supports IEEE 802.11b wireless clients)

Powerful features in a single unit

A Motorola Cellular Gateway NC800 combines high-speed Internet access, networking, and computer security for a home or small-office LAN. The Motorola Cellular Gateway NC800 provides:

- An integrated high-speed wireless modem, which provides **continuous access** to the Internet and other online services.
- A single broadband connection to multiple computers to surf the Web; all computers on the LAN communicate as if they were connected to the same physical network.
- It is an IEEE 802.11b/g WLAN certified **wireless access point,** which allows wireless enabled laptop users to remain connected while moving around the home or small office or to connect desktop computers without installing network wiring. Depending on distance, wireless connection speeds can match that of the Ethernet at up to 22 Mbps.
- A **single interface** for multiple computers to surf the web; all computers on the Ethernet and wireless LANs communicate as if they were connected to the same physical network and access the Internet through the Motorola Cellular Gateway NC800 using only **a single external IP address**. Cellular technology is used to access the Internet via the WAN interface.
- A built-in **DHCP server** to assign IP addresses on a combined **wired and/or wireless Class C private LAN** automatically.
- A two-port 10/100Base-T Ethernet hub supporting:
  - Half- or full-duplex connection
  - Auto-MDIX
- A built-in **firewall** with IP and MAC Address filtering, UDP and TCP Port filtering and forwarding.

- The firewall supports:
  - Stateful inspection
  - DMZ
  - Network Address Translation (NAT)
- Enhanced wireless **security** with WLAN Protected Access Pre-Shared Key (WPA-PSK) support. Weaker encryption is also supported via 64 and 128-bit Wired Equivalent Privacy (WEP) encryption.
- A built-in gateway using **Routing Information Protocol (RIP v1 and v2)** - up to 10 static routes.
- Support for **Virtual Private Network (VPN)** using Internet Protocol Security (IPSec) packets and Point-to-Point Tunneling Protocol (PPTP).
- *Wireless range of 100 meters[1] indoors, 300 meters outdoors*
- Easy to use **Web-based configuration**.

Typical application

Figure 1 shows a typical use of the Motorola Cellular Gateway NC800 in a home or home office environment. Access to the Motorola Cellular Gateway NC800 from local PCs and notebooks is either by the 802.11b/g WLAN interface, or the Ethernet LAN interface. In this example, the PC is connected to the Ethernet LAN and the notebook is connected via the WLAN interface.

The 802.11g WLAN interface supports an effective data transmission rate of up to 22Mbps. Note that if devices are present on the WLAN that support 802.11b, the effective data transmission rate drops to 11 Mbps. The Ethernet LAN interface supports data transmission rates of 10/100 Mbps.

Access from the Motorola Cellular Gateway NC800 to the Internet is achieved by using CDMA2000 EV-DO / 1xRTT technology. The Code Division Multiple Access (CDMA) antenna is placed up to six feet from the Motorola Cellular Gateway NC800, and connects to the CDMA infrastructure via a local CDMA base station. The CDMA2000 EV-DO supports downlink data rates of up to 2.4576 Mbps and uplink data rates of 154 kbps.
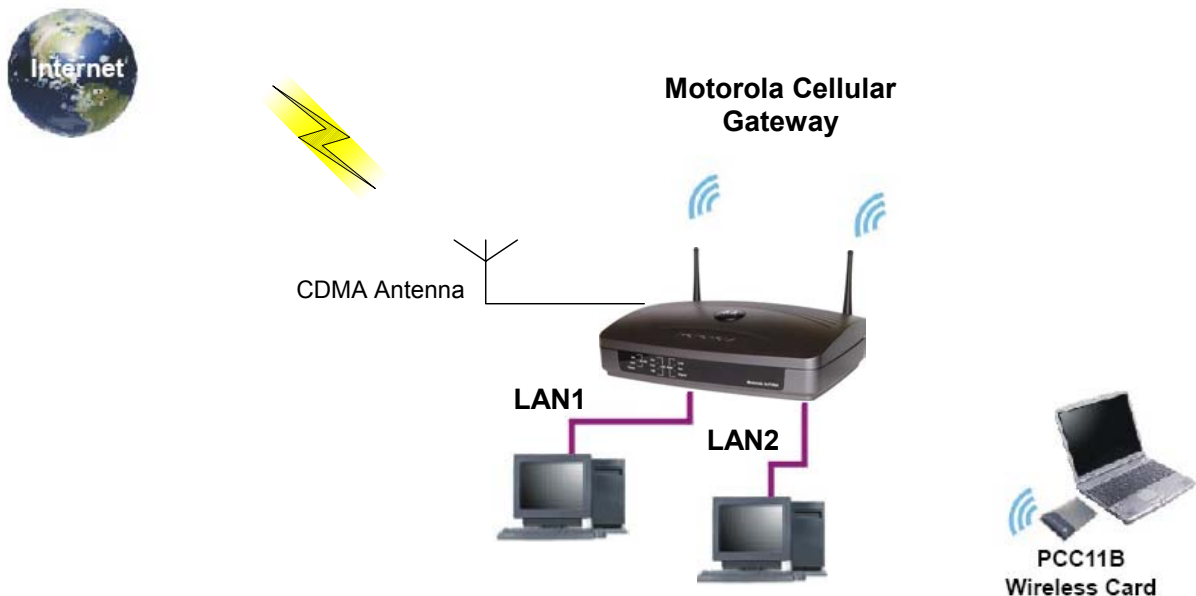
Figure 1. Typical home office configuration.

---

[1] Architectural and environmental factors may adversely affect range.

The sample application shown in Figure 2 is slightly more complex and is more typical of a small office environment. It contains the following devices, all protected by the Motorola Cellular Gateway NC800 firewall:

- A PDA connected through the wireless IEEE 802.11b connection.
- One desktop PC on a wireless connection. A Motorola USB 802.11b Wireless Adapter (an optional PC accessory available from Motorola) or any other 802.11b/g wireless adapter can be used to connect your PC USB port to the Motorola Cellular Gateway NC800 via a wireless connection.
- A laptop PC on a wireless connection. The wireless connection can be made using a Motorola PCC11b Wireless Card or any other 802.11b/g wireless card in the PCMCIA slot of the laptop (the PCC11b Wireless Card is an optional laptop accessory available from Motorola).
- Three computers connected to the LAN 1 Ethernet port via a hub or switch.
- A fourth computer connected to the LAN 2 Ethernet port. This could be a De-Militarized Zone (DMZ) computer.
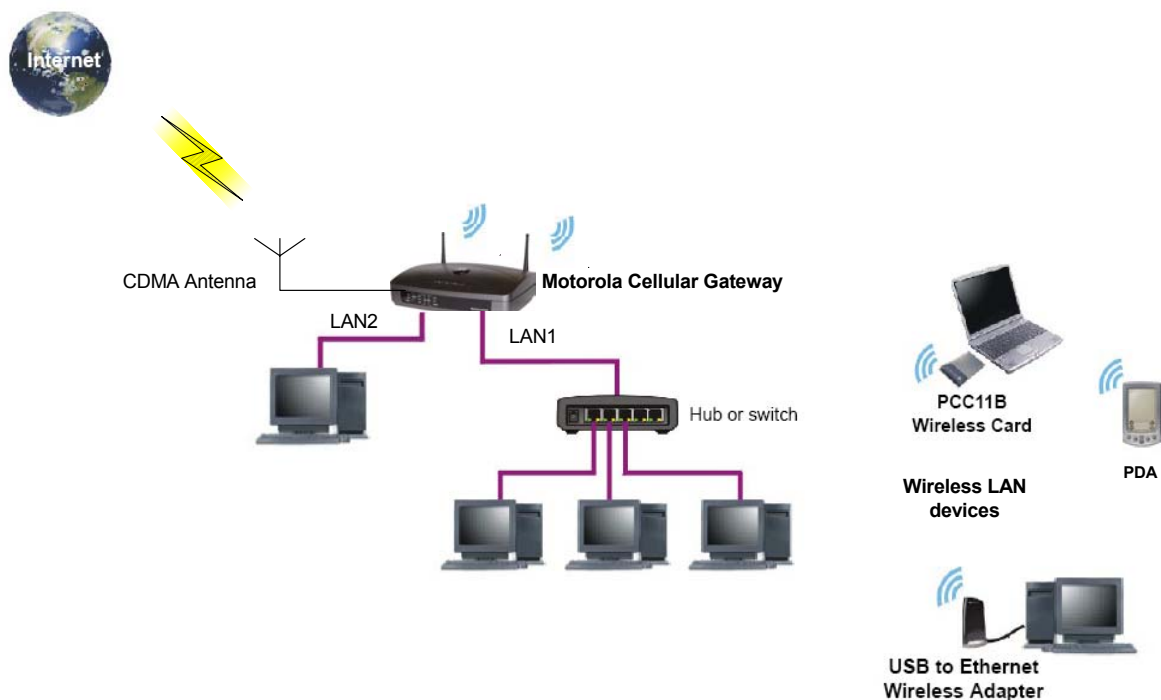
Figure 2. Typical application of a Motorola Cellular Gateway NC800 in a small office environment.

Security

The Motorola Cellular Gateway NC800 provides the following security mechanisms:

- A firewall to protect the Motorola Cellular Gateway NC800 LAN from undesired attacks over the Internet
- The capability to set up a DMZ
- Security measures to prevent eavesdropping of wireless data (including WEP / WPA-PSK encryption and authentication)
- Multiple tunnel Virtual Private Network (VPN) pass-through operation
- Access control to configure the Motorola Cellular Gateway NC800.

The subsections below provide some introductory information regarding the security technology listed above. More details are provided in the relevant subsections of the Detailed Motorola Cellular Gateway NC800 Configuration section as well as in the relevant Glossary entries. *A full discussion of network security is beyond the scope of this document.*

Note that the Setup Wizard guides you to set the Motorola Cellular Gateway NC800 up with a reasonable level of security. If you have more stringent security requirements, the instructions in this user guide provide detailed information on how to set up the relevant security fields.

Figure 3 illustrates the security measures provided by the Motorola Cellular Gateway NC800. *This is a logical network diagram and therefore does not necessarily correspond to the network cabling. The Ethernet LAN and the WLAN are shown as a single logical network. No hubs or switches are shown.* Logically, only the Motorola Cellular Gateway NC800 and the computer in the DMZ are exposed to the Internet (are on the Internet side of the firewall). Physically, the firewall is implemented on the Motorola Cellular Gateway NC800.
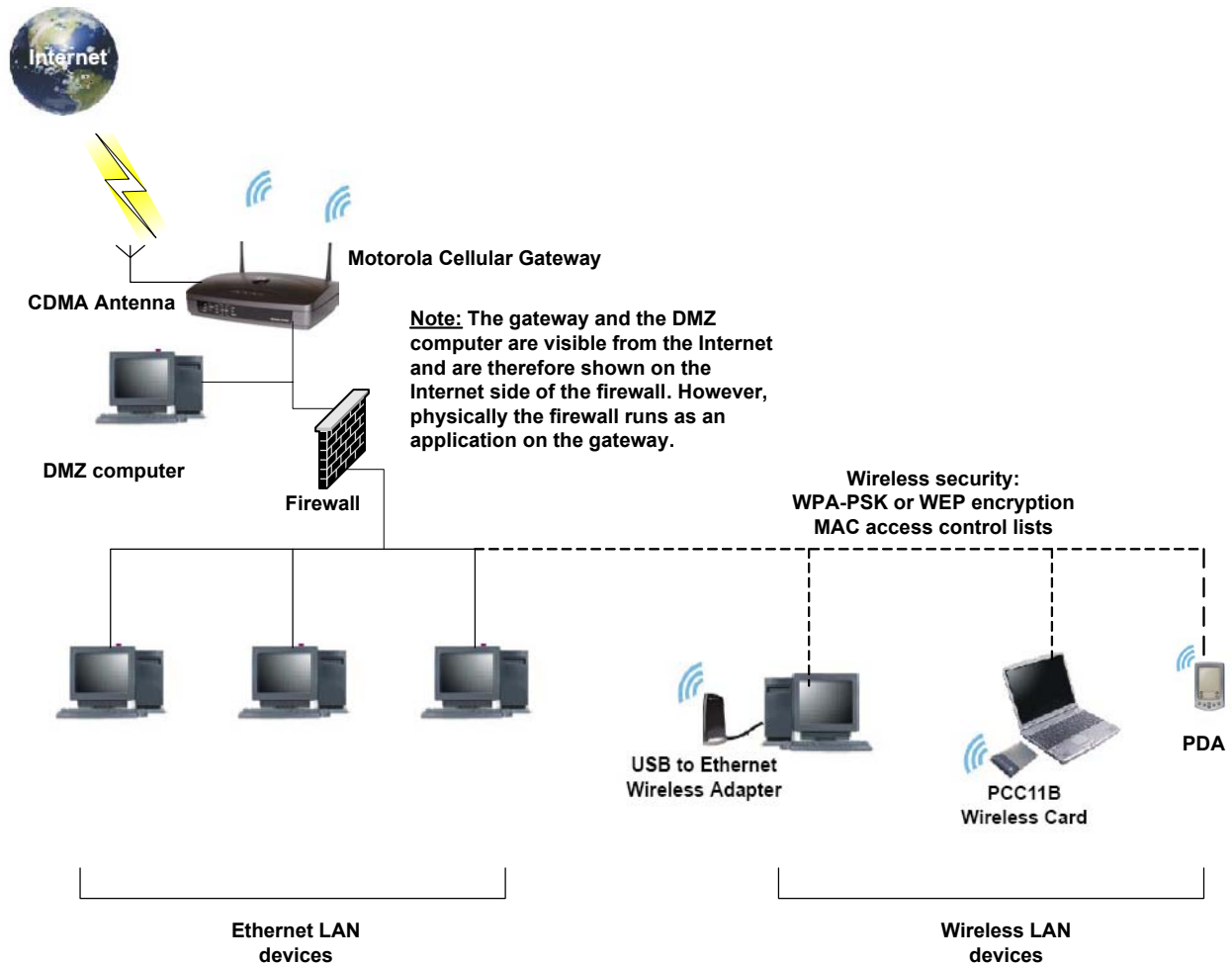
Figure 3. Motorola Cellular Gateway NC800 security measures shown in a logical network diagram

---

Firewall

The Motorola Cellular Gateway NC800 firewall protects the Motorola Cellular Gateway NC800 LAN from undesired attacks and other intrusions from the Internet. It provides an advanced integrated stateful-inspection firewall. The firewall:
- Maintains state data for every TCP/IP session on the OSI network and transport layers
- Monitors all incoming and outgoing packets and applies the firewall policy to each one
- Provides comprehensive logging for all rejected internal and external connection requests
- You can configure the firewall filters to set rules for port usage and to block specific IP domains and networks.

DMZ

A de-militarized zone (DMZ) has one or more computers logically located outside the firewall between a Motorola Cellular Gateway NC800 LAN and the Internet. A DMZ prevents direct access by outside users to private data. You can use a DMZ to set up a web server without exposing confidential data on your network. A DMZ is also useful for people playing games that have a problem running a computer game's protocol through a firewall. DMZ provides the person playing games a way to expose a single host directly to the Internet and thus overcome any problems where the firewall rules might cause packets to this computer to be blocked.

Wireless Security

To prevent unauthorized eavesdropping of data transmitted over the wireless LAN, you must enable wireless security.

802.11b/g supports two subtypes of network authentication services: **Open System and Shared key**. Under open system authentication, any wireless station can connect to the Motorola Cellular Gateway NC800 provided that it knows the Service Set Identifier (SSID) of the Motorola Cellular Gateway NC800. If the Motorola Cellular Gateway NC800 is broadcasting this information, then any wireless client can access the Motorola Cellular Gateway NC800. Under **Shared Key** authentication the Motorola Cellular Gateway NC800 generates a random 128-bit challenge. The station returns the challenge, encrypted with a shared key—a "secret" key configured into both the station and the Motorola Cellular Gateway NC800. The Motorola Cellular Gateway NC800 decrypts the challenge, using a CRC to verify its integrity. If the decrypted frame matches the original challenge, the station is considered authentic. The challenge/response handshake is repeated in the opposite direction for mutual authentication.

By default the Motorola Cellular Gateway NC800 is set to open system authentication, which provides no security for transmitted data. You can use either the Setup Wizard or the instructions in this guide to enable a reasonable level of security by configuring a WEP key on the Motorola Cellular Gateway NC800. The same key must also be configured on the wireless LAN clients (stations).

For even better security, the relatively new WLAN Protected Access Pre-Shared Key (WPA-PSK) option is also supported by the Motorola Cellular Gateway NC800. However, in order to use WPA-PSK, you must ensure that it is also supported on the wireless LAN clients.

A RADIUS server may also be used to do centralized authentication for WPA if PSK is not used.

You can also define a MAC access control list to restrict wireless LAN access to specified clients based on the Client MAC address.

Virtual Private Networks

The Motorola Cellular Gateway NC800 allows multiple tunnel VPN pass-through operation to securely connect remote computers over the Internet through the Motorola Cellular Gateway NC800. The Motorola Cellular Gateway NC800:
- Identifies and forwards Point to Point Tunneling Protocol (PPTP) packets
- Identifies and forwards **certain** IPSec packets.

PPTP enables the implementation of secure, multi-protocol VPNs through private "tunnels" over the public Internet. Through PPTP, it is possible for remote users to access their corporate networks and applications from anywhere on the Internet. The Motorola Cellular Gateway NC800 identifies and forwards PPTP packets.

IPSec is a suite of protocols used to implement secure exchange of packets at the IP layer. VPNs using Encapsulating Security Payload (ESP) in tunnel mode are supported. VPNs using Authentication Header (AH) are not supported.

![Motorola logo]

2. The Motorola Cellular Gateway NC800 and its accessories

This section describes the physical features of the Motorola Cellular Gateway NC800, as well as the other items received with the Motorola Cellular Gateway NC800.

Package Contents

The following items should be present in the Motorola Cellular Gateway NC800 package:

- ✓ Motorola Cellular Gateway NC800.
- ✓ Power Adapter – 220 / 110 VAC, 50/60 Hz input, 12VDC, 1.8A output.
- ✓ Ethernet Cable.
- ✓ External CDMA Antenna.
- ✓ A CD containing this manual as well as the logging scripts (the logging scripts are described in section 7).
- ✓ Quick Installation Guide.

Figure 4. Motorola Cellular Gateway NC800 packout

The Motorola Cellular Gateway NC800's Front Panel

Figure 5. Motorola Cellular Gateway NC800 front panel

The status of the Motorola Cellular Gateway NC800 is displayed via the LEDs on the front panel (from left to right):

- **Power**   *Green*   The Power LED is permanently on (green) when there is power to the Motorola Cellular Gateway NC800.

WLAN Indicators

- **Act**   *Green*   When the Act LED flickers there is activity on the wireless network.
- **Link**   *Green*   This is the link operational indicator, and it is off when the Wireless LAN is not active, and is permanently on when the Wireless LAN is active.

LAN 1 Indicators

- **Act**   *Green*   This LED serves as the link operational indicator and as the activity indicator. It is permanently on (green) when there is a valid LAN connection with no activity, and flickers when there is LAN activity.
- **Full**   *Green*   This LED is permanently on (green) for a full duplex mode connection, and is off for a half duplex mode connection.
- **100**   *Green*   This LED lights up when a successful 100Mbps connection is made through the corresponding port. If the LED is not on, then the connection made through this port is 10Mbps.

LAN 2 Indicators

- **Act**   *Green*   This LED serves as the link operational indicator and as the activity indicator. It is permanently on (green) when there is a valid LAN connection with no activity, and flickers when there is LAN activity.
- **Full**   *Green*   This LED is permanently on (green) for a full duplex mode connection, and is off for a half duplex mode connection.
- **100**   *Green*   This LED lights up when a successful 100Mbps connection is made through the corresponding port. If the LED is not on, then the connection made through this port is 10Mbps.

WAN Indicators

- **Act**   *Green*   When the Act LED flickers there is activity on the WAN interface.
- **Link**   *Green*   This is the link operational indicator, and it is off when the WAN link is not in data mode, and is permanently on (green) when the WAN is in data mode.
- **Signal** *Green*   This LED conveys the signal strength. It is permanently on (green) if the signal strength is good to excellent, it flickers if the signal strength is poor and it is off if there is no signal present.

![Motorola logo]

The Motorola Cellular Gateway NC800's Back Panel

Figure 6. Motorola Cellular Gateway NC800 back panel

The Motorola Cellular Gateway NC800's back panel contains the following connectors (*from left to right*):

WLAN antenna	A WLAN antenna is connected to either side of the Motorola Cellular Gateway NC800. These antennas provide wireless access to the Motorola Cellular Gateway NC800 for devices equipped with 802.11b/g modules.
Reset Button	The **Reset** button can be used in one of two ways:

- Reboot the Motorola Cellular Gateway NC800 while keeping all of its settings. This is similar to pressing the **Reset** button on your PC to reboot it.
- Restore the Motorola Cellular Gateway NC800's factory default settings. If you are experiencing problems with the Motorola Cellular Gateway NC800 and have tried all other troubleshooting measures, press the **Reset Button** and hold it down for **10 seconds**. This will restore all settings, including your new password and IP address, to the factory default settings. Refer to **Factory Default Settings for the Motorola Cellular Gateway NC800** for more detail.

DIAG 1 Port	A diagnostics port for maintenance support use only.
DIAG 2 Port	A diagnostics port for maintenance support use only.
WAN Antenna	This is a connector for the external CDMA antenna. It provides access to the Internet through a CDMA base station. CAUTION: Only the provided external antenna should be mounted.
LAN 1 Port	This is an 802.3 10/100Mbps Full/Half Duplex LAN interface. It provides wired access to the Motorola Cellular Gateway NC800 for devices equipped with 802.3 LAN modules. Use this port to connect to network devices such as a computer, printer, hub, switch or gateway. You can connect either a straight-through or crossover cable to the port – the Motorola Cellular Gateway NC800 will detect the cable configuration and reconfigure itself accordingly.
LAN 2 Port	This is an 802.3 10/100Mbps Full/Half Duplex LAN interface. It provides wired access to the Motorola Cellular Gateway NC800 for devices equipped with 802.3 LAN modules. Use this port to connect to network devices such as a computer, printer, hub, switch or gateway. You can connect either a straight-through or crossover cable to the port – the Motorola Cellular Gateway NC800 will detect the cable configuration and reconfigure itself accordingly.
Power	This is where you connect the power adapter. Please make sure that you use only the power adapter that is shipped with the Motorola Cellular Gateway NC800.
WLAN antenna	A WLAN antenna is connected to either side of the Motorola Cellular Gateway NC800. These antennas provide wireless access to the Motorola Cellular Gateway NC800 for devices equipped with 802.11b/g modules.

The Power Adapter

Warning: Using a power supply with a different voltage rating to the adapter included with the Motorola Cellular Gateway NC800 may cause damage to the Motorola Cellular Gateway NC800 and void the warranty for this product. **Please use the adapter with Limited Power Source or Class II output only!**

Ethernet Cable

Ethernet cable specifications:
Cable: CAT5E 24AWG UTP 4T/P stranded round cable; Outside Diameter 5.3mm
Connector: RJ-45 8P8C plug; contact: plated gold 50U
PVC: Color: gray

External CDMA Antenna

The external CDMA antenna can either be wall-mounted using the bracket supplied with the antenna, or it can be attached to a glass or metal surface using the suction cups. The bracket and the suction cups slide into the receptacles at the back of the casing of the antenna.
Note: The direction in which the antenna should be mounted is indicated on the casing of the antenna.

3. Installation

Before you begin

Check the package contents as described in the previous section.

Precautions

Postpone the Motorola Cellular Gateway NC800 installation until there is no risk of thunderstorm or lightning activity in the area.

To avoid potential shock, always unplug the power cord from the wall outlet or other power source before disconnecting it from the Motorola Cellular Gateway NC800 rear panel.

When removing the power to the Motorola Cellular Gateway, leave the device powered down for at least 10 seconds before re-applying the power.

To prevent overheating the Motorola Cellular Gateway NC800, do not block the ventilation holes on the top and bottom of the unit.

Do not open the unit. Refer all service to your Motorola service agent.

Wipe the unit with a clean, dry cloth. Never use cleaning fluid or similar chemicals. Do not spray cleaners directly on the unit or use forced air to remove dust.

Warning: Electrostatic discharges (ESD) to the Motorola Cellular Gateway could cause the device to require a manual reset.

Signing up for Service

In order to access the Internet and other online services, you must be activated with a CDMA service provider.
To activate your service, call your local CDMA service provider.
You should ask your CDMA service provider the following questions:

- Do you have any special system requirements?
- When can I begin to use my Motorola Cellular Gateway NC800?
- Are there any files I need to download after I am connected?
- Do I need a user name or password to access the Internet or use e-mail?
- Do I need to configure a WAN IP address?
- What is my Data Access Number (the number that must be dialed to set up the cellular connection)?

System Requirements for Computers Connected to the WLAN or Ethernet LAN

The Motorola Cellular Gateway NC800 supports the following:

Operating Systems:
- Microsoft Windows (WIN2000 or higher)
- MAC OS (version X or above)
- Linux Red Hat (version 9.0 or above).

Web Browsers:
- Microsoft® Internet Explorer browser (version 6.0 or above)
- Netscape Navigator® browser (version 7.0 or above)
- Opera (version 7.4 or above)
- Mozilla (version 1.7.3 or above)
- Mozilla Firefox (version 1.0 or above)

The LAN will operate with computers that:
- Are Web-enabled
- Have *at least one* of the following adapters:

  Ethernet   10Base-T or 10/100Base-T Ethernet adapter with proper NIC driver software installed

  IEEE 802.11b/g   Any IEEE 802.11b/g adapter

Installation Considerations

The Motorola Cellular Gateway NC800 is designed to let you access your network using a wireless connection from virtually anywhere. Please keep in mind that the number, thickness and location of walls, ceilings or other objects that the wireless signals must pass through may limit the range.

To maximize the Motorola Cellular Gateway NC800's wireless range:

1. Keep the number of walls and ceilings between the Motorola Cellular Gateway NC800 and your receiving device to a minimum – each wall or ceiling can reduce your Motorola Cellular Gateway NC800's range from 1-30 meters.
2. Building materials make a difference – metal or aluminum objects may have a negative effect on range. Try to position the Motorola Cellular Gateway NC800 and computers with wireless adapters (clients) so that the signal passes through thin walls or open doorways and not other materials.
3. Use the signal strength indicator present in most wireless adapters' software to experiment with the signal strength in various positions in the building where you are going to use the Motorola Cellular Gateway NC800.
4. Keep the Motorola Cellular Gateway NC800 away (at least 1-2 meters) from electrical devices that generate Radio Frequency (RF) noise.

For the average home or office, signal range should not be an issue. If you experience low or no signal strength in areas of your home or office that you wish to access, consider positioning the wireless Motorola Cellular Gateway NC800 in a location directly between the computers with wireless adapters. Additional wireless gateways can be connected to provide better coverage in rooms or offices where the signal does not appear as strong as desired.

LAN capacity:

The **theoretical** upper limit of the number of devices connected to a class C Ethernet and/or wireless LAN is 253. This upper limit is due to the IP address structure of a class C network. (Please refer to the Glossary for more details on the IP address structure.) However, several factors should be kept in mind when designing your network:

1. The devices on the network share the available bandwidth on the WAN link if simultaneous WAN access is required.
2. As many as 32 wireless devices can be attached to the WLAN. However, it must be kept in mind that each wireless client of the Motorola Cellular Gateway NC800 shares the available bandwidth on the WLAN with all the other wireless clients on the WLAN.
3. The bandwidth on the Ethernet LAN would be shared if a device such as a hub is connected to the Motorola Cellular Gateway NC800 to create a wired LAN with multiple devices.

Connecting the Motorola Cellular Gateway NC800 to your network

The Motorola Cellular Gateway NC800 has **three network interfaces,** namely the **WAN**, **LAN** and **WLAN** interfaces. This section describes how to connect your network devices to the Motorola Cellular Gateway NC800 using these interfaces.

Connecting the Motorola Cellular Gateway NC800 to the CDMA Network

The following procedure is for assembling and powering up the Motorola Cellular Gateway NC800:

1. Be sure the Motorola Cellular Gateway NC800 is unplugged (not powered on).
2. Place the Motorola Cellular Gateway NC800 in a position that is close enough to the surface where the external antenna for CDMA access will be mounted. The distance between the antenna and the Motorola Cellular Gateway NC800 is determined by the length of the cable attached to the antenna.
3. Screw in the loose end of the cable into the antenna connector on the rear panel of the Motorola Cellular Gateway NC800.
4. Mount the external antennas as described in the next section.
5. Plug the power cord into the power connector on the rear panel of the Motorola Cellular Gateway NC800.
6. Plug the power adapter into the electrical outlet. This turns on the Motorola Cellular Gateway NC800.
7. Verify that the lights on the front panel cycle through the following sequence:
   - The **Power** light turns on when AC power is connected to the Motorola Cellular Gateway NC800 and indicates that the power supply is working properly.
   - The **Signal** light indicates the presence of a CDMA signal. Good signal strength will make the light appear solid green.
   - The **Link** light turns on indicating a connection on the WAN interface.
   - The **Act** light flashes when there is activity on the WAN link.

Mounting the external antenna

The external antenna can be mounted on a wall using suitable screws and anchors or directly on the glass of a window using the supplied suction caps.

Window mounting the antenna directly on glass
- Clip the supplied rubber suction caps into the mounting holes of the antenna mounting bracket.
- Affix the antenna mounting bracket to the glass by gently pressing the suction cups against the glass pane of the window until the suction cups grip the glass.
- Align the antenna alongside the mounting bracket and gently slide it down until it locks in position on the mounting bracket.

Mounting the antenna on a wall
- Locate a suitable mounting position on a wall made of wood, concrete, masonry, or a wooden stud.
- Using the antenna mounting bracket as a template, drill 2 suitable holes for a pair of anchors and screws to fasten the antenna mounting bracket securely onto the wall.
- Align the antenna alongside the mounting bracket and gently slide it down until it locks in position on the mounting bracket.

Warning: The CDMA antenna must be located more than 20 cm (8 inches) from the WLAN antennas.

Warning: Before drilling holes, check the structure for potential damage to water, gas, or electric lines.

Wired Connections to the Motorola Cellular Gateway NC800 – Direct connection

The Motorola Cellular Gateway NC800 has two RJ-45 LAN connectors available for direct connection to a computer on your network. You can use either a straight through or a crossover cable between the computer and the Motorola Cellular Gateway NC800 – the Motorola Cellular Gateway NC800 will automatically detect the cable configuration. Use category 5 cabling for all Ethernet connections.

Each computer on the Ethernet LAN requires an Ethernet network interface card (NIC) and driver software installed.

The physical wiring arrangement has no connection to the logical network allocation of IP addresses.

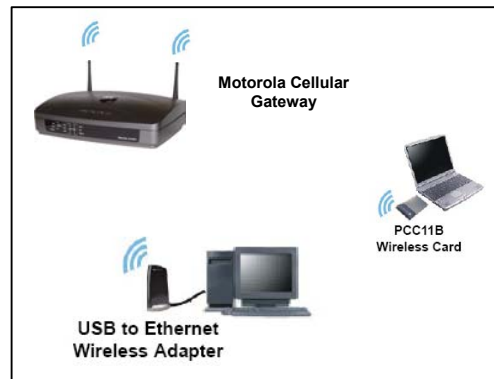**Wired Connections to the Motorola Cellular Gateway NC800 – Connections via other network devices**

If you need to connect to another network via another gateway or need to expand the number of Ethernet ports by using a hub or a switch you can connect one of these devices directly to the Motorola Cellular Gateway NC800 using the LAN port. The port is designed to automatically detect and handle both straight through and crossover cables.
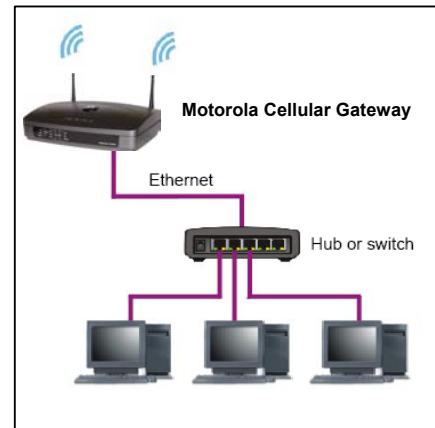
Wireless Connections to the Motorola Cellular Gateway NC800

Wireless communication occurs over radio waves rather than a wire. Like a cordless telephone, a wireless LAN uses radio signals instead of wires to exchange data. A wireless network eliminates the need for expensive and intrusive wiring to connect computers throughout the home or office. Mobile users can remain connected to the network even when carrying their laptops to different locations in the home or office.
Each computer on a wireless LAN requires an adapter for access to the WLAN:

- For wireless laptop connections, a Motorola PCC11b Wireless Card can be used in the PCMCIA slot.
- For wireless desktop connections, a Motorola USB11b Wireless Adapter can be used to connect your PC USB port.

You can connect any combination of 802.11g or 802.11b wireless clients to the Motorola Cellular Gateway NC800.

Please note that if WLAN security is enabled on the Motorola Cellular Gateway NC800 then each wireless client must be configured using the Motorola Cellular Gateway NC800's Service Set Identifier (SSID) and Wired Equivalent Privacy (WEP) or WLAN Protected Access Pre-Shared Key (WPA-PSK) security settings before it can connect to the Motorola Cellular Gateway NC800 – see the **Detailed Configuration** section.

As many as **32** wireless clients can be connected to a Motorola Cellular Gateway NC800. However, remember that each client is sharing the available bandwidth with all the other clients on the wireless network. Too many clients will degrade the overall performance of the *wireless* network.

4. Setting up the PCs

This section describes the steps to set up your PCs to connect to the Motorola Cellular Gateway NC800. The setup procedure should be the same for both **LAN** and **WLAN** connections. Refer to your Wireless adapter's installation manual for detailed information about Wireless connections.
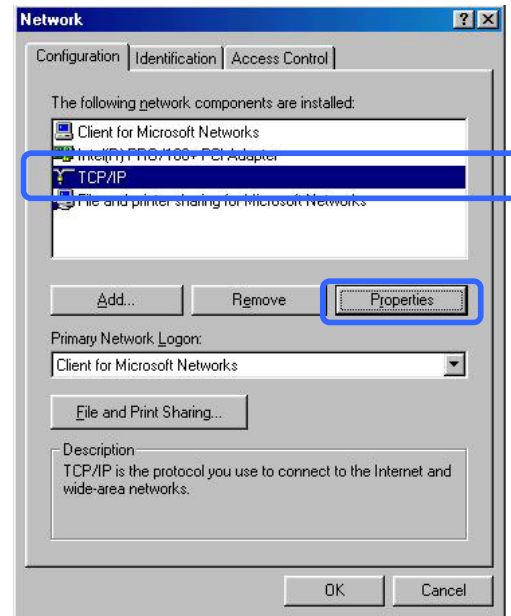
Configuring Windows 98 and Millennium (ME) PCs

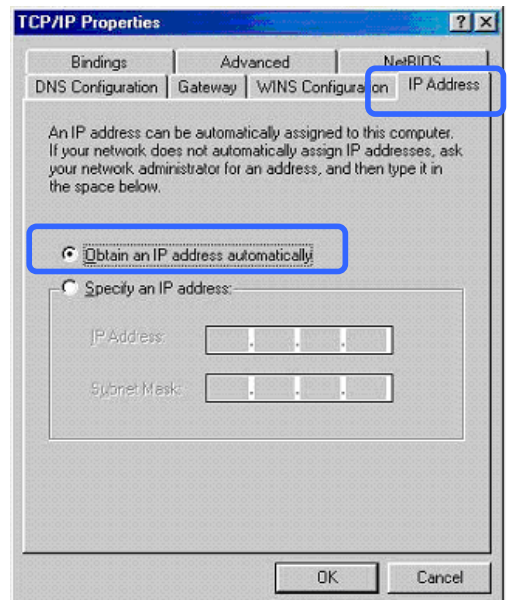1. Click on the **Start** button. Select **Settings**->**Control Panel**.
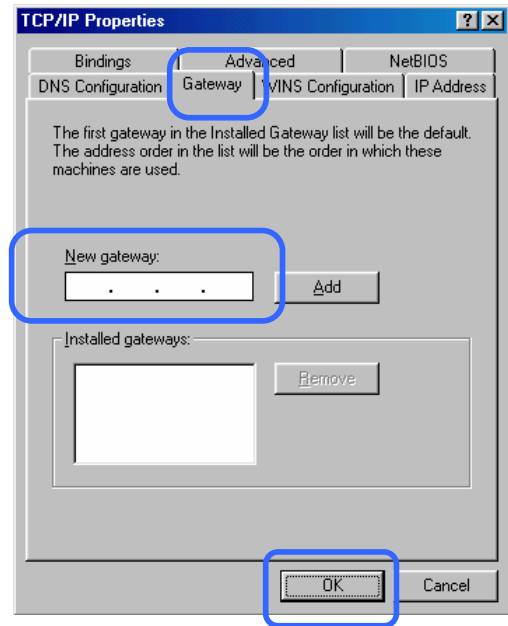
2. Double click on the **Network** icon.

3. In the Network dialog box, select TCP/IP for the applicable Ethernet adapter. Click on the **Properties** button.

4. Select the **IP Address** tab. Select **Obtain IP address automatically.**

5. Next, click on the **Gateway** tab and ensure that the Installed Gateway field is blank. The Motorola Cellular Gateway NC800 IP address will be automatically obtained when the DHCP protocol is executed.
6. Click on **OK** to apply the changes.
7. When the **Network** dialog box re-appears, click on **OK** to close it.
8. Windows may ask for the original Windows disk. Insert your Windows CD into your CD-ROM drive and let Windows finish installing / updating the necessary files.
9. Windows may also ask you to restart the PC – please do so. If Windows does not ask you to restart, do so anyway.

Configuring Windows 2000 PCs

Use the following procedure to configure Windows 2000 PCs to connect to the Motorola Cellular Gateway NC800:

1. Click on the **Start** button. Select **Settings**->**Control Panel**. Double click on **Network and Dial-up Connections**.
2. Double click on the **Local Area Connection** for the applicable Ethernet adapter.
3. The **Local Area Connection Status** dialog box is displayed:

4. Click on the **Properties** button.
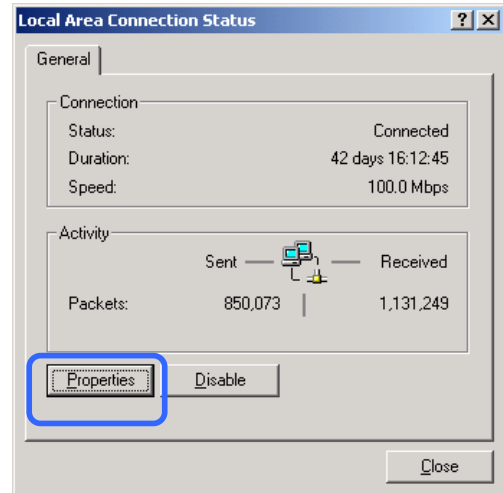
Ensure that the check box next to **Internet Protocol (TCP/IP)** is selected. Select **Internet Protocol (TCP/IP)** and click on the **Properties** button:
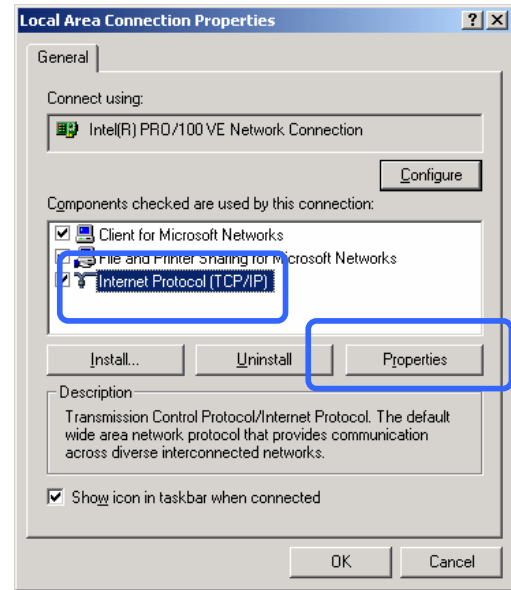
5. Select **Obtain an IP address automatically** and **Obtain DNS server address automatically**.
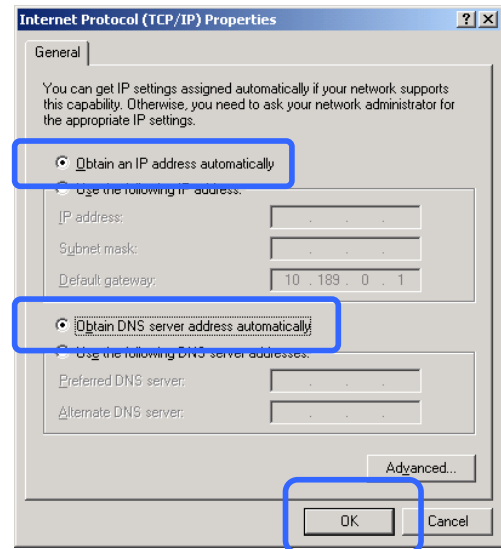
6. Click on **OK** to close the Internet Protocol (TCP/IP) Properties page.
7. On the Local Area Connection Properties dialog box, click on **OK** to close it.

Configuring Windows XP PCs

Windows XP introduced a new interface look and feel called the Category View. If you are using the Windows XP Classic View interface settings, use the following instructions. There is not much difference between the views except that the dialog boxes, menus and dialog items are drawn slightly different. The *content* of the dialog boxes and menus are almost the same. The computer is configured to respond to the Motorola Cellular Gateway NC800 as a DHCP server as follows.

1. Click on the ![start] button. Select ![Control Panel]. Double click on ![Network Connections].

2. The Network Connections Screen is displayed.
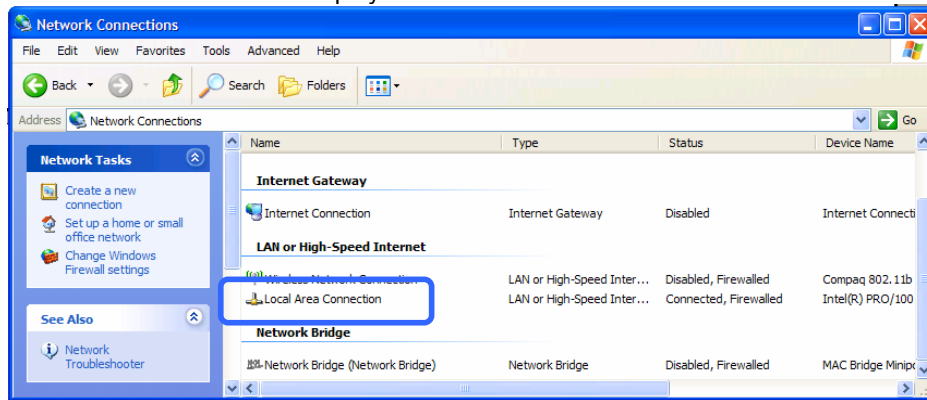
3. Check that the applicable ![Local Area Connection] adapter is enabled. If not, right click and **Enable** the applicable Local Area Connection by selecting **Enable** from the pop-up list.

4. Right click on ![Local Area Connection] for the applicable Ethernet adapter. Choose the **Properties** entry at the bottom of the pop-up list. This will lead to the Local Area Connection Properties sheet.

5. The Local Area Connection Properties screen is displayed. Ensure that the **Internet Protocol (TCP/IP)** is enabled (the box to the left of it should be checked). Highlight **Internet Protocol (TCP/IP)** and click on the **Properties** button.
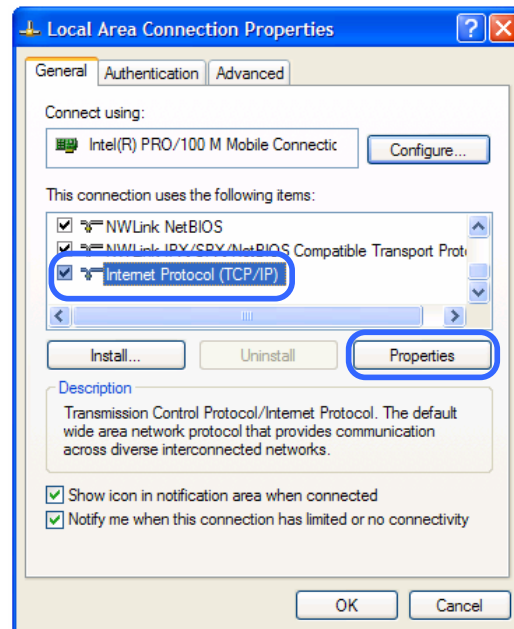
6. The Internet Protocol (TCP/IP) Properties screen is displayed.

    The computer must be configured to **Obtain an IP address automatically** and also **Obtain DNS server address automatically**.

7. Click **OK** to complete.

    Click OK on the Local Area Connection Properties screen, and **Close** on any other screens still left open.
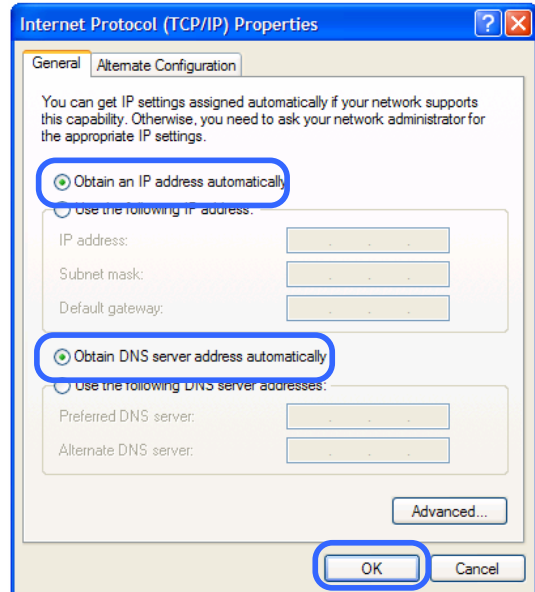
5. Motorola Cellular Gateway NC800 Configuration

Motorola Cellular Gateway NC800 configuration is done via a Web-based configuration utility. This means that you can change the Motorola Cellular Gateway NC800's settings from any PC with a web browser that supports HTML version 4.0. The Motorola Cellular Gateway NC800 has been optimized for Internet Explorer (version 6.0 or above) or Netscape Navigator (version 7.0 or above). You only need to configure the Motorola Cellular Gateway NC800 once.

Computer System Requirements for Motorola Cellular Gateway NC800 Configuration

In order to configure the Motorola Cellular Gateway NC800, you need:
- A Web-enabled PC.
- Any of the previously mentioned Web Browsers, with JavaScript enabled.
- Either:
  - A wireless adapter compatible with the 802.11b or 802.11g standard and enabled as described previously.
  - A LAN connection via the Ethernet adapter from the Gateway to the PC. It is preferable to use a wired connection to LAN 1.

Logging In

- Open a browser to the default address of the Motorola Cellular Gateway NC800: **http://192.168.1.1**. If you have already changed the IP address of the Motorola Cellular Gateway NC800 then use the new IP address instead of the default address.

- When prompted for a user name and password type **admin** in both the **User Name** and **Password** fields. If you have already changed the **HTTP Username** and **Password**, then use the new values. [2]

- The initial page of the Motorola Cellular Gateway NC800 Configuration will open showing the **Basic Gateway Settings** page.

---
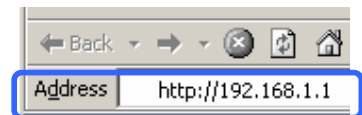
[2] By asking for a **Username** and **Password** the gateway is preventing unauthorized persons from changing the gateway settings. It is important that you remember the gateway's username and password. If you forget either the Username or Password you will have to restore the gateway's default settings by pressing the Reset button for about 10 seconds, login using the default username and password and re-setup all the gateway's settings.

Remember to change your Motorola Cellular Gateway NC800's **Username** and **Password** values for security reasons. Un-authorized users accessing your gateway can change the configuration settings - potentially disrupting network connectivity.

Using the Motorola Cellular Gateway NC800's Configuration Utility

Once you have logged in to the Motorola Cellular Gateway NC800's configuration utility you can easily configure the Motorola Cellular Gateway NC800 using this web-based tool. The initial Motorola Cellular Gateway NC800 configuration screen is shown below.
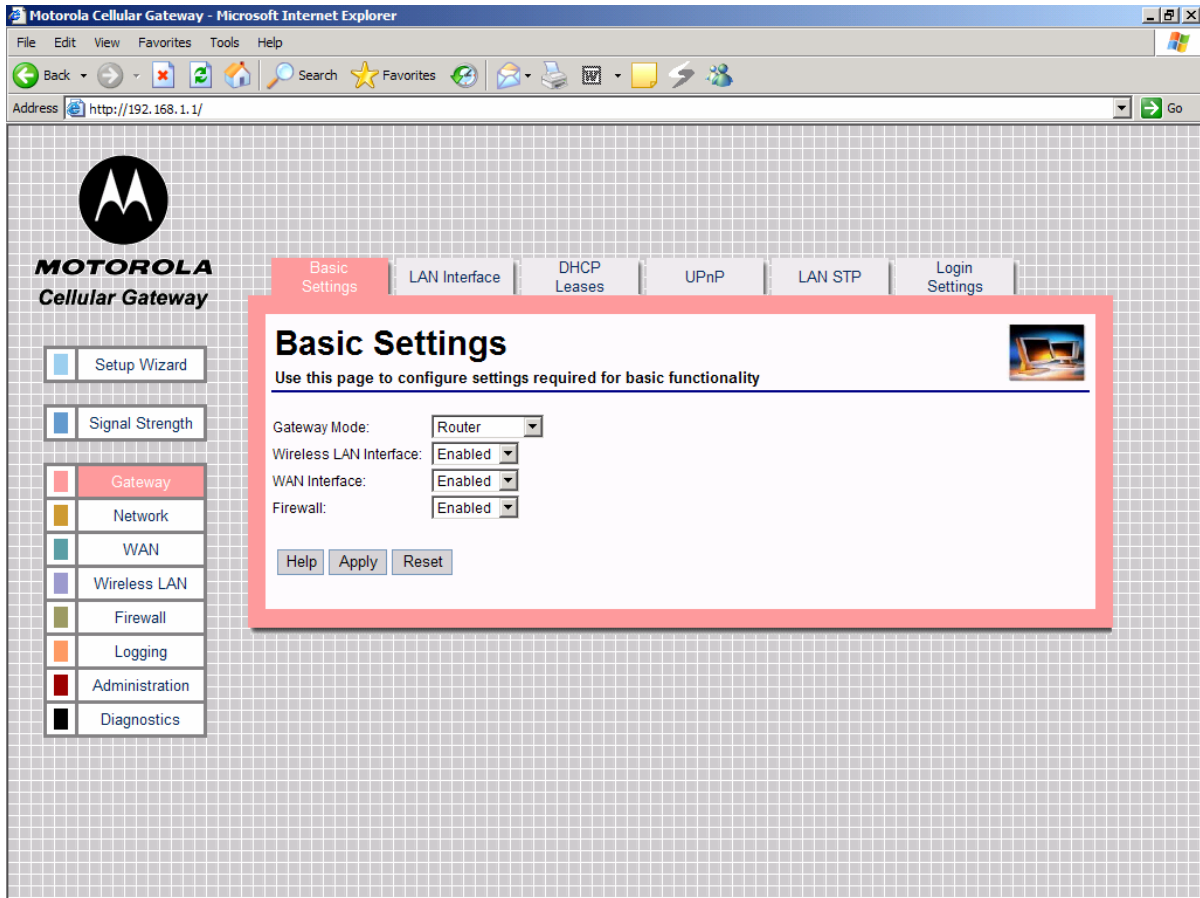
The Motorola Cellular Gateway NC800's settings are organized according to the following main categories (stack of buttons on the left of the page):

Setup Wizard   This wizard helps you to perform the necessary changes to the default settings of the Motorola Cellular Gateway NC800 to prepare it for your personal use. If you have more specialized requirements, the detailed configuration screens accessible via the remaining buttons are available for more advanced configuration.

Signal Strength   This option enables you to monitor the CDMA signal strength.

Gateway   Contains settings required for basic gateway operation. You can also view the Current status of the Motorola Cellular Gateway NC800 and see the current DHCP leases.

Network   Contains the Network setup and configuration parameters such as routing, VLAN and network time settings.

WAN   Use this heading to change settings to allow you to connect to the Internet via your ISP.

Wireless LAN   This heading allows you to configure the wireless interface. It includes settings related to

	encryption, performance and compatibility.
Firewall	The Motorola Cellular Gateway NC800 contains extensive mechanisms to protect your network against intruders and abuse. Use the settings under this heading to prevent certain types of packets from entering / leaving your network and also to restrict access to specific users.
Logging	Access to all logging screens.
Administration	Restore factory defaults and upgrade the Motorola Cellular Gateway NC800's firmware.
Diagnostics	Access to Diagnostics pages. Usually triggered when prompted by service personnel

You can move into more detailed configuration settings by selecting a specific category.

Important buttons:

Help	Every page has a **Help** button. Press this button to have the Motorola Cellular Gateway NC800 open a new window containing detailed help on the current configuration page.
Apply	Most pages have an **Apply** button. Once you have made all the changes that you require click on this button to apply the new settings. The Motorola Cellular Gateway NC800 verifies the settings and lets you know if there are any problems. Applying settings typically takes about **5 seconds** to complete as the Motorola Cellular Gateway NC800 needs to re-initialize parts of its software according to the changes that you have made. Closing or moving on to other menus will not apply the modified settings.
Reset	Most pages have a **Reset** button. If you have made any changes that you do not want to save, click on the **Reset** button to reset the settings on the current page to those that were there when you entered the page.

Factory Default Settings for the Motorola Cellular Gateway NC800

Please take note of the following factory default settings. Out of the box, the Motorola Cellular Gateway NC800 is configured with these commonly used settings. If you ever need to use the Motorola Cellular Gateway NC800's **Administration->Restore** function, these are the settings that will be restored (this can also be achieved by pressing the reset button on the rear panel and holding it down for 10 seconds):

Gateway Mode	Router
LAN Spanning Tree	Enabled
Firewall	Enabled
Wireless Interface	Enabled
WAN Interface	Enabled
LAN DHCP Server	Enabled
IP Address	192.168.1.1
SSID	Motorola
Channel	11
Country	Worldwide
Network Authentication	Disabled
Data Encryption	Off
Station Filtering	Disabled
User Name	admin *(lower case)*
Password	admin *(lower case)*

Table 1: Default settings for the Motorola Cellular Gateway NC800.

Warning: The settings above are the commonly used defaults. These may differ from one service provider to another. Please refer to any additional material provided by your service provider.

6. Detailed Motorola Cellular Gateway NC800 Configuration

This section provides a detailed description of each of the Motorola Cellular Gateway NC800 configuration pages accessible via the options on the left hand side of the main configuration screen.

In the typical application only a few fields are user-specific and need to be set. The Setup Wizard can be used to ensure that you fill in all the required fields. If you have any further user-specific requirements, you may use the other configuration screens at any time to set the specific fields.

The first time the user accesses the configuration pages, the **Setup Wizard** is automatically started.

If the **Setup Wizard** does not automatically start the first time you access the configuration pages, it can be manually invoked by clicking on the **Setup Wizard** button on the upper-left portion of the configuration screen. The **Setup Wizard** can be activated at any time by clicking this button.

Setup Wizard

The Setup Wizard has the following screens:

Wizard-> Welcome page	This page describes the purpose of the wizard and how to use it.
Wizard-> Location Specific Information	The Motorola Cellular Gateway NC800 location determines aspects such as the time zone and channels that may be used.
Wizard-> Gateway Administration	The username and password are used to access the Gateway's configuration screens. For security reasons, the default username and password should be changed.
Wizard-> Internet Account Information	The username and password to access the Internet are entered here if required by your ISP.
Wizard-> Internet Network Information	The IP address used to access the Motorola Cellular Gateway NC800 from the Internet is entered here, unless the Motorola Cellular Gateway NC800 obtains it automatically from the ISP.
Wizard-> Internet Security	Restrictions on external access from the Internet may be specified here.
Wizard-> Wireless LAN security	This page is used to specify whether the wireless LAN connections should be encrypted.
Wizard-> Summary	This page displays the values set by you for confirmation before the changes are applied.

Wizard-> Welcome page

Click **Next** on Setup Wizard's introduction page to proceed to the **Location Specific Information** page.
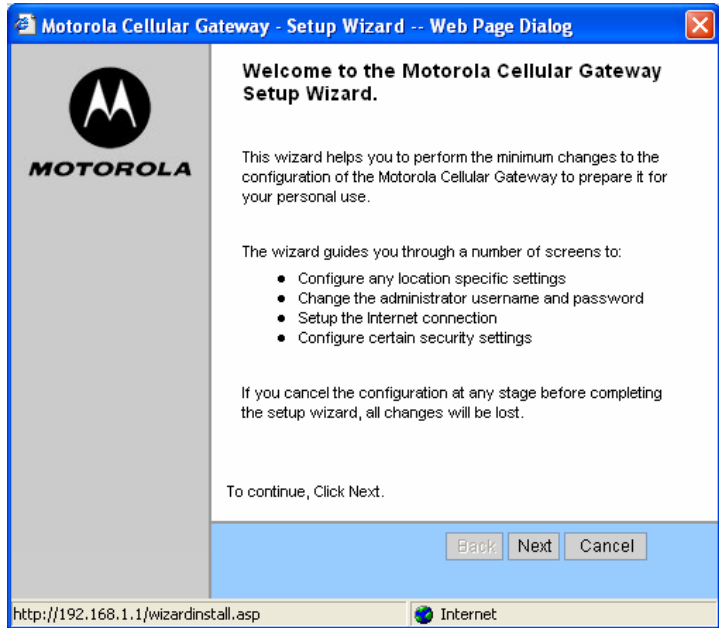
Wizard-> Location Specific Information

On this page select the country that you are operating the Motorola Cellular Gateway NC800 in and the time zone.

It is necessary to select the appropriate country due to channel restrictions on wireless networks in certain countries. If the desired country is not in the list, then channel restrictions do not apply and Worldwide may be selected.

The time zone needs to be selected in order to make sure that the logging information provided by the Motorola Cellular Gateway NC800 contains the correct date and time.

If there is daylight saving in the Time Zone specified, it will automatically be enabled. If daylight saving is not applicable to the selected Time Zone no time adjustment will be made throughout the year.
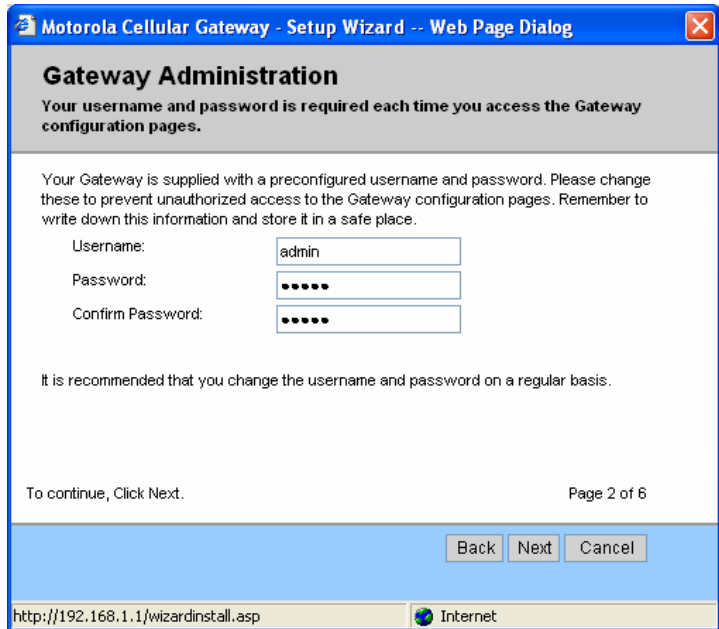
Click **Next** to continue.
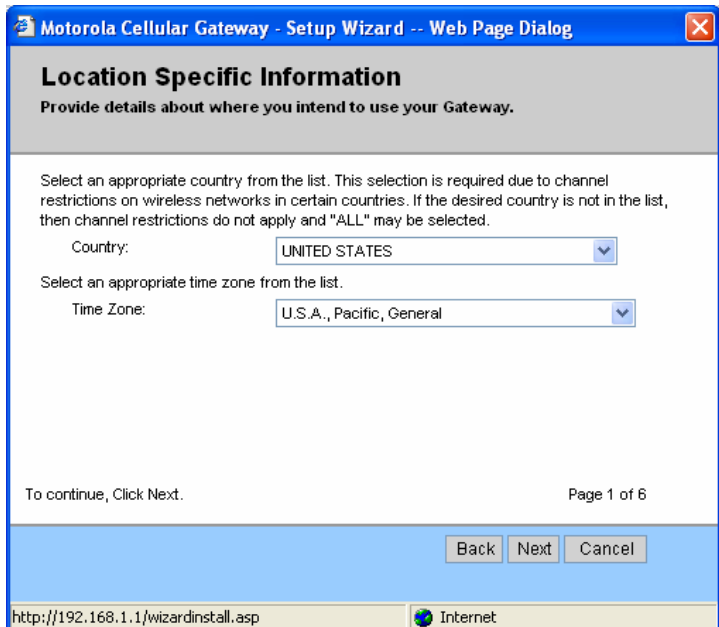
Wizard-> Gateway Administration

The *Gateway Administration* page allows you to set the username and password that is required to access the configuration utility. The default factory settings for username and password are *admin* and *admin* respectively. You should assign a different username and password to prevent unauthorized access to the Motorola Cellular Gateway NC800 configuration tool.

Click *Next* to continue.

Wizard-> Internet Account Information

The *Internet Account Information* allows you to configure your username and password to access your Internet account. You also need to enter the data access number that must be dialed to setup the cellular connection. Enter your account details as supplied by your ISP (Internet Service Provider), as well as the data access number. A maximum of 10 characters are allowed for the data access number.

Note: Some service providers do not require a username and password. In this case – leave the entries blank.

Click *Next* to continue.

Wizard-> Internet Network Information

The *Internet Network Information* screen appears. This is used to indicate how the Motorola Cellular Gateway NC800 obtains its IP address. The default is automatic, which means the Motorola Cellular Gateway NC800 automatically obtains its IP settings from the ISP (i.e. the check box is ticked).
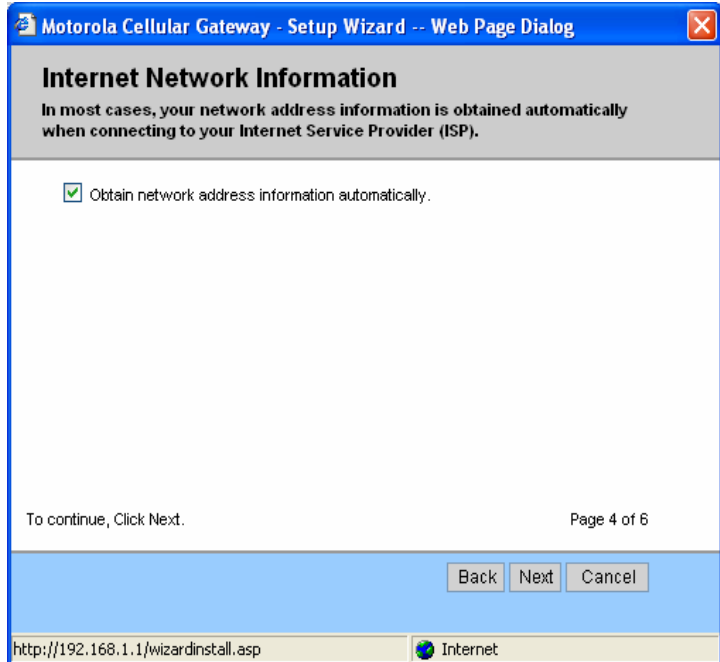
If however, your ISP provides specific IP information that is required to be configured, untick the *automatic* option and enter the details supplied by your ISP.

Click *Next* to continue.
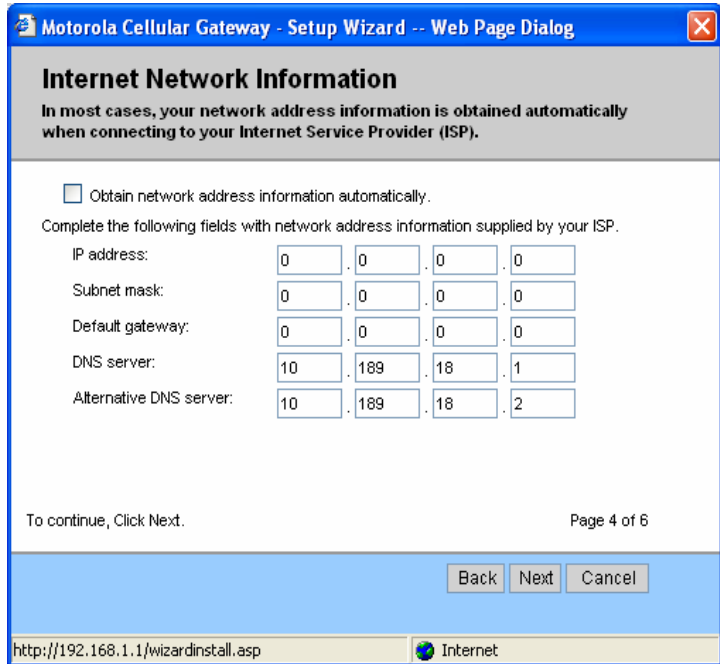
Wizard-> Internet Security

The *Internet Security* provides protection from unauthorized external internet access to your local network. The recommended setting is *High*. Select *High* to completely secure your network.

If you have applications such as games or MS NetMeeting, you will need to allow access to one of your specific computers from the outside the firewall.

Select the *Medium* setting and specify the IP address of the particular computer to which connections will be made. With the *Medium* setting, only FTP, HTTP and SMTP connections will be allowed through the firewall to the selected IP address. The computer at this address is regarded as a DMZ computer.

By selecting *Low*, all traffic is allowed to the selected IP address. Any computer at this point is completely open to the internet and is regarded as a DMZ computer

Click *Next* to continue.

Internet Security
You will need to protect your Gateway from unauthorized Internet access.

Select the Internet security level required to protect your network. If you have applications such as NetMeeting or certain network games you will need to allow access to one of your computers from the outside world by selecting the Low security level.

○ High [Recommeded]
○ Medium
◉ Low

All possible services on a particular computer are exposed to the Internet. The IP address of the computer exposing the services is required.

IP address: 192.168.1 [99]

To continue, Click Next.   Page 5 of 6

[Back] [Next] [Cancel]

http://192.168.1.1/wizardinstall.asp   Internet

Wizard-> Wireless LAN Security

The Wireless LAN security options are presented. The default is no security between your wireless enabled computers and the Motorola Cellular Gateway NC800 (not recommended). This default is selected to reduce the risk of not being able to connect to the Motorola Cellular Gateway NC800 for the first time.

If security is required between your wireless enabled computers and the Motorola Cellular Gateway NC800, tick the option and then specify a 5 character security key. This security key should match that of your previously configured wireless enabled computers (all have to use the same key). Otherwise, generate a random one by clicking on the *Auto-generate* button.

Wireless LAN Security
Unless certain security precautions are applied, any computer in the vicinity of your Gateway can intrude on your wireless LAN.

Wireless LAN security is achieved by encrypting the connections between wireless-enabled computers and the Gateway. The preconfigured setting is no security. It is recommended to enable WEP encryption.

☑ Enable WEP encryption

WEP encryption requires a security key to be configured on the Gateway. This key must match the keys used on each wireless-enabled computer. A random key can be generated by clicking on the Auto-generate button.

Security Key (5 Characters) [MVWBM] [Auto-generate]

To continue, Click Next.   Page 6 of 6

[Back] [Next] [Cancel]

http://192.168.1.1/wizardinstall.asp   Internet

The WEP key entered on this page corresponds to Network Key 1 on the Wireless LAN->WEP Security web page.

If no security is required, then un-tick the encryption option.

Click *Next* to continue.

⚠️ **Warning:** Ensure that all wireless enabled computers accessing the Motorola Cellular Gateway NC800 have the same WEP encryption key configured.

💡 WEP encryption is not the most secure encryption method offered by the Motorola Cellular Gateway NC800, but not all wireless adapters support the more advanced encryption techniques. If you wish to use more secure encryption, please refer to the **Wireless LAN ->Security** section.

Wizard-> Summary

The initial configuration of your *Motorola Cellular Gateway NC800* is now complete. Review the summary of all the settings (possibly Print the settings for future reference) and then click on *Finish* to finalize the settings.

If you don't click *Finish* you will lose all changes. If you *Cancel*, you can restart the wizard by selecting *Setup Wizard* again from the list of options on the left hand side of the main configuration screen.
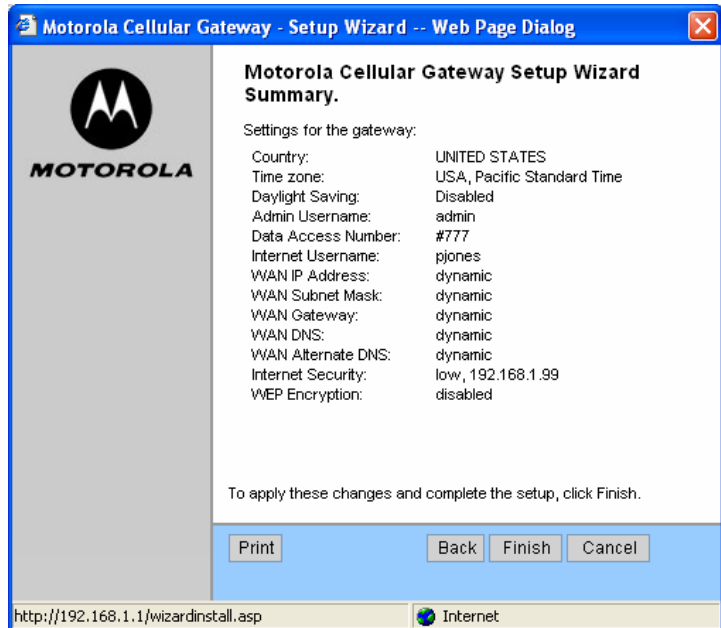
Signal Strength

You can use this screen as an aid to find the optimal position for the CDMA antenna and to check the current CDMA signal strength. The signal strength is shown on a scale from Poor to Excellent.
To stop monitoring the signal strength, click on the Quit button.
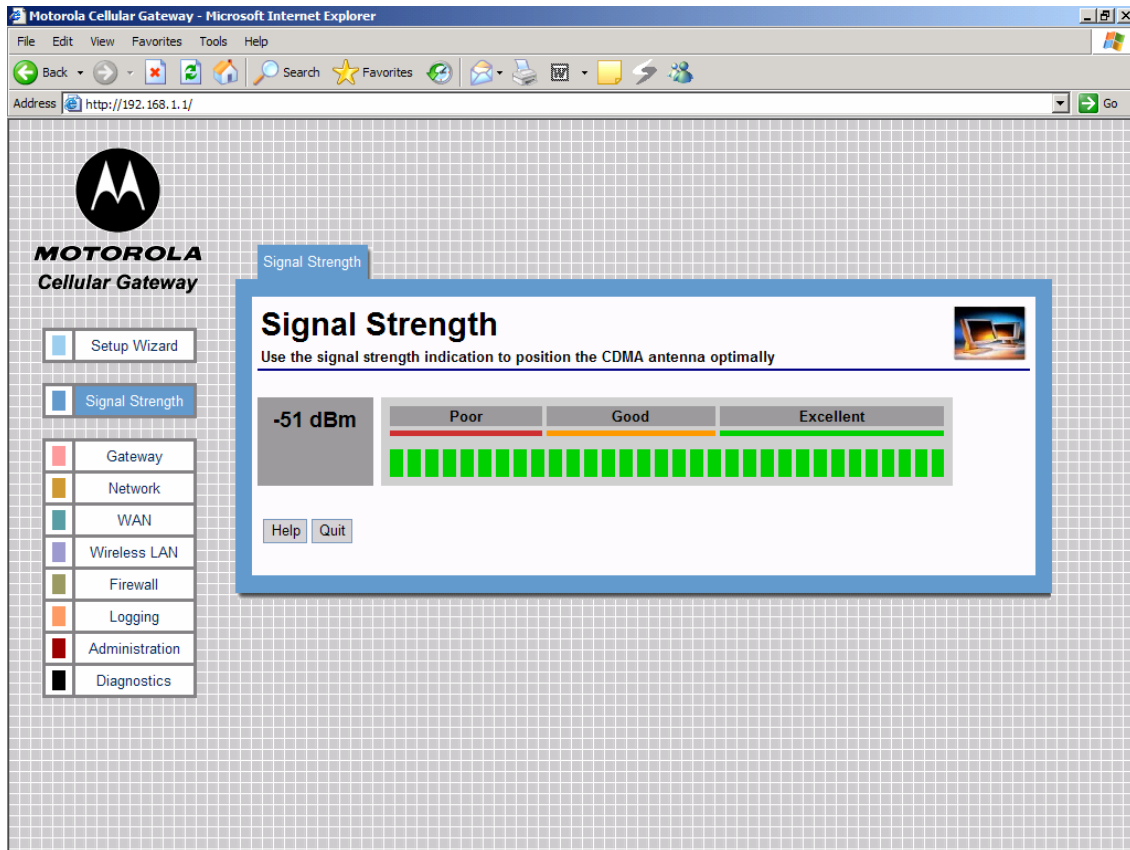
Figure 7. Excellent CDMA signal strength
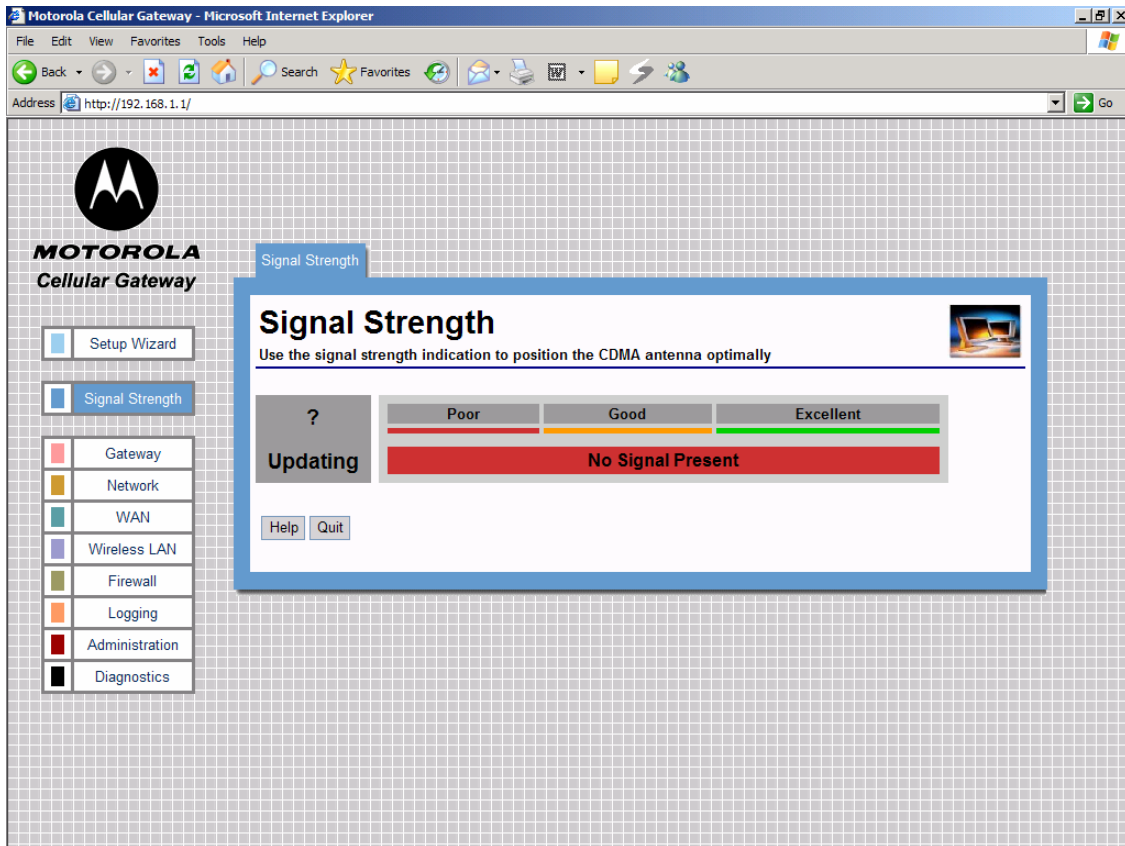
Figure 8. No CDMA signal

Gateway

The Gateway category of screens allows you to specify the general settings of the Motorola Cellular Gateway NC800.

Gateway-> Basic Settings   The various interfaces are enabled/disabled on this page. This affects the availability of options on pages in the other main categories.

Gateway-> LAN Interface   The Motorola Cellular Gateway NC800's LAN-specific properties, e.g. its IP address as seen by the other devices on the LAN, are specified here.

Gateway-> DHCP leases   This page displays the status of the current DHCP leases.

Gateway-> UPnP   Universal Plug and Play capabilities are enabled on this page.

Gateway-> LAN STP   The various settings to do with LAN Spanning Tree Protocol.

Gateway-> Login Settings   This page allows the user login and password to be changed

Gateway-> Basic Gateway Settings

This is the very first page that you see when the Motorola Cellular Gateway NC800's configuration utility opens. The settings on this page determine whether certain options on subsequent pages will be available. These dependencies are highlighted on the relevant pages.

The default values displayed on this page will generally be sufficient. The purpose of each field is described below in order to assist you to fill in appropriate values if you have more advanced requirements.
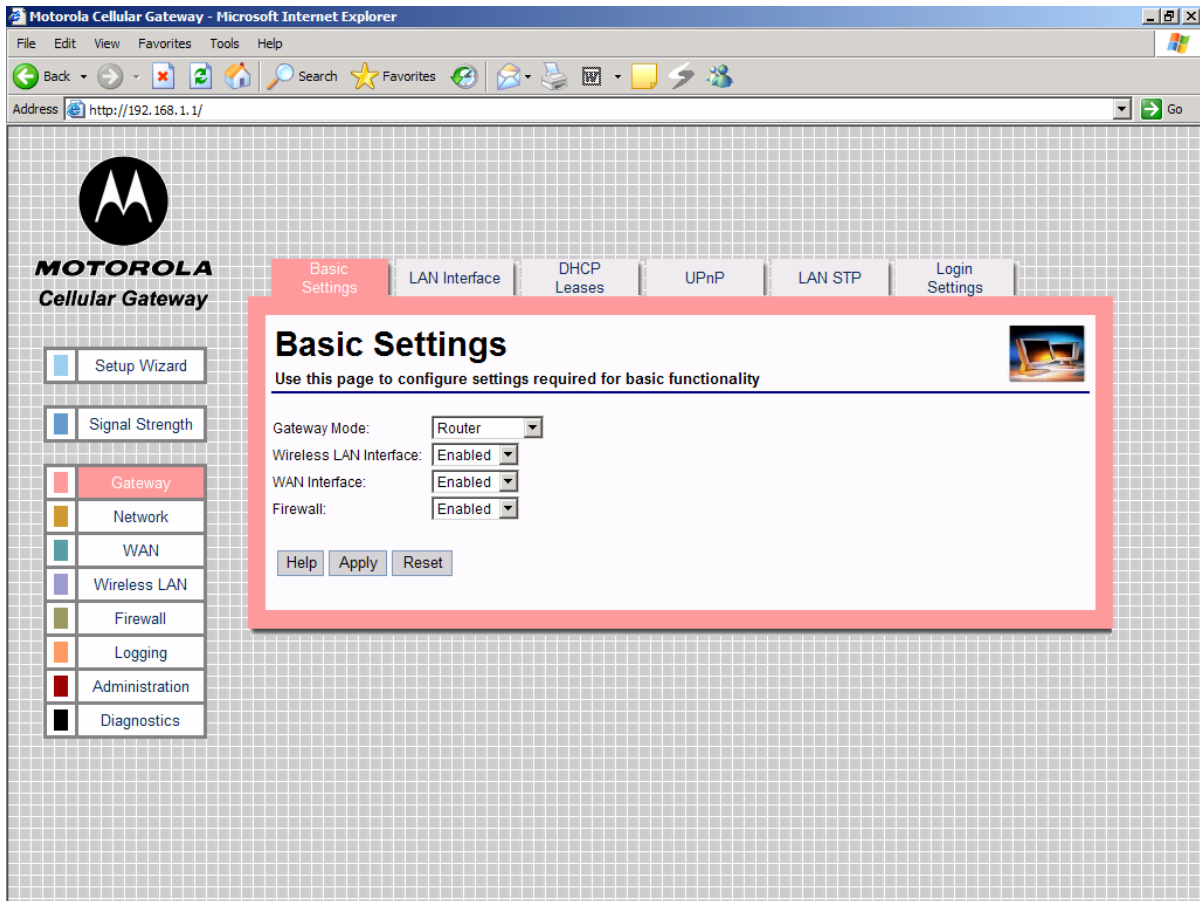
- **Gateway Mode** – If the device operates in router mode, the WAN interface is enabled and the DHCP Server and Spanning Tree protocols can be enabled. If the device acts as an access point, it offers only wireless and wired LAN connectivity to clients (stations). The WAN interface, the LAN DHCP Server and the Spanning Tree Protocol are automatically disabled.
- **Wireless LAN Interface** – In order to utilize the Motorola Cellular Gateway NC800 wireless functions, select **Enabled**. If you do not wish to utilize any wireless functions, make sure **Disabled** is selected. (*Note: No other wireless functions will be available unless you enable this setting*.) .
- **WAN Interface** – The WAN interface can be enabled or disabled. If the WAN interface is disabled, there is no access to the Internet via the cellular network. *(**Note:** No other WAN functions on subsequent pages will be available unless you enable this setting.)*
- **Firewall** – If you do not want the Motorola Cellular Gateway NC800 to filter any packets you can disable the Firewall feature entirely. The Motorola Cellular Gateway NC800 will then **allow all packets** to travel through it. If the Firewall is enabled you will not be able to ping the Motorola Cellular Gateway NC800's WAN interface from the Internet – see the note below. You will, however still be able to ping Internet addresses from the LAN or WLAN.

It's a good idea to **keep the firewall enabled** if you are connecting to the Internet. The firewall makes it difficult for outsiders to detect your network. It prevents outsiders from "ping-ing" your network by blocking all ping requests originating from *outside* your network. Only those IP addresses and ports that you specify are opened to traffic originating from the Internet.

Gateway-> LAN Interface

This page is used to configure the LAN settings of the Motorola Cellular Gateway NC800.

The default values displayed on this page will generally be sufficient. The purpose of each field is described below to assist you to fill in appropriate values if you have more advanced requirements.
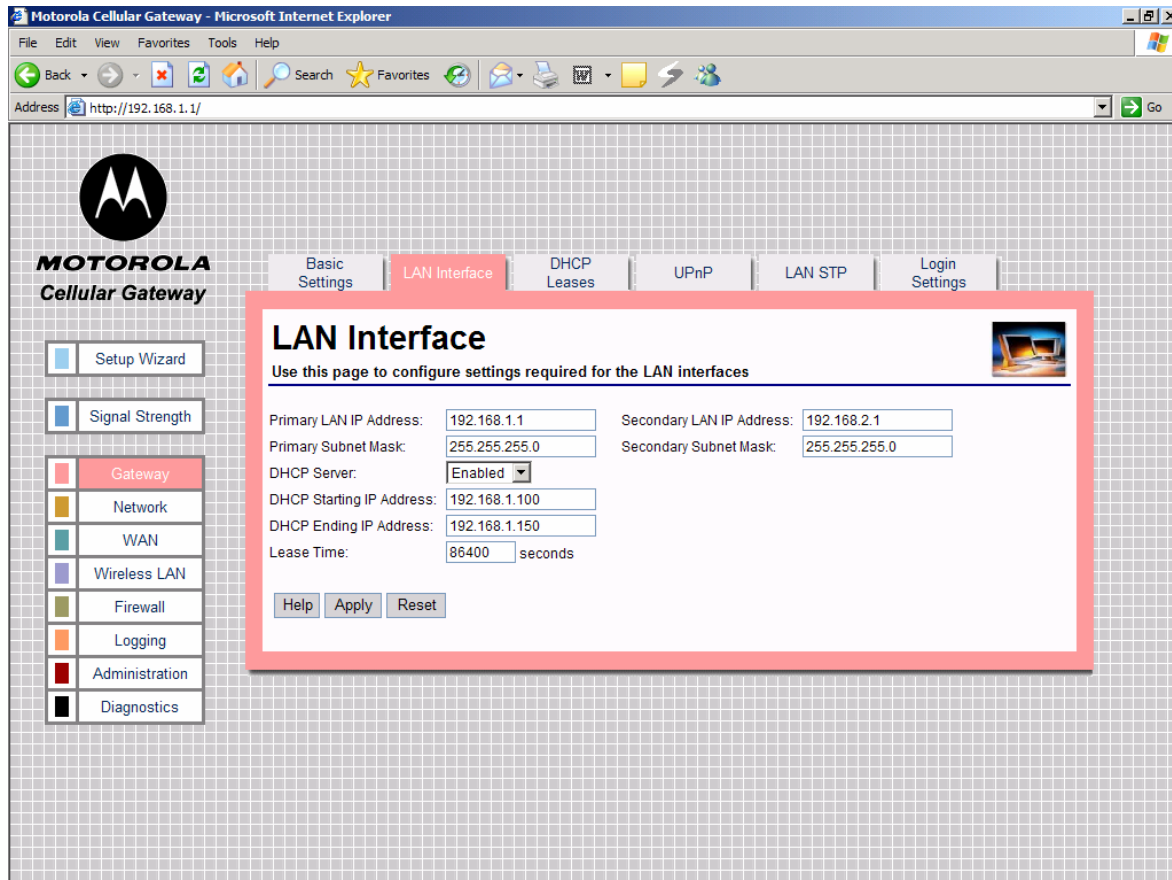
- **Primary LAN IP Address** – You have to assign a unique static IP address to the Motorola Cellular Gateway NC800's LAN 1 local interface. Being static, this IP address will not dynamically change and will be the default Motorola Cellular Gateway NC800 address for all computers connecting to this Motorola Cellular Gateway NC800 on the LAN 1 interface or WLAN interface. The default IP address for this Motorola Cellular Gateway NC800 is **192.168.1.1**. The dotted-decimal notation must be used. The interested reader is referred to the glossary for more detailed information on IP addressing and subnet masks. The LAN 1 interface is the wired Ethernet port on the back panel labeled LAN 1 and is bridged together with the WLAN interface.
- **Primary LAN Subnet Mask** – IP network mask of the Motorola Cellular Gateway NC800 on the LAN 1 interface, e.g. 255.255.255.0**.** If you are intentionally using a different subnet mask on your local network, enter the appropriate subnet mask. The dotted-decimal notation must be used. The interested reader is referred to the glossary for more detailed information on IP addressing and subnet masks.
- **DHCP Server**
  - o **Enable** – The Motorola Cellular Gateway NC800 acts as a DHCP server by assigning IP addresses to computers on the local area network.

    Important: The DHCP server setting should not be enabled if any other DHCP servers have been setup on the LAN network**.**

- o **Disable** – The Motorola Cellular Gateway NC800 does not assign IP addresses to computers on the LAN. Select this setting if another DHCP server already exists on the network or if static IP addresses are assigned. Please note that the Motorola Cellular Gateway NC800 itself must have a statically assigned IP address because it is acting as a gateway to the LAN network, so its IP address must be known and not change.
- **LAN DHCP** (only available if LAN DHCP Server is set to Enabled)
  - o **DHCP Starting IP Address** – Specifies the start of the address range that the DHCP server will use, e.g. 192.168.1.100. The DHCP server will only assign IP addresses within the Start - End range. IP addresses outside the range are assumed to be static IP addresses and can be used by computers on the network that have a reserved IP address. The maximum number of IP addresses that can be issued is 253. These addresses should fall within the address ranges reserved for private Internets, unless the address range specified here has been assigned to you by IANA. Please refer to the IP address structure entry in the glossary for more detail regarding the allowable ranges.
  - o **DHCP Ending IP Address** – Specifies the end of the address range that the DHCP server will use, e.g. 192.168.1.150.
  - o **Lease Time** – Specifies the number of seconds DHCP leases should be valid for. The maximum lease time can be set to 86400 seconds. A short duration (e.g. 1 hour) is recommended if there are more users than addresses. If users need to keep their addresses while the DHCP Server is unavailable, then the duration should be set to longer than a possible DHCP Server outage. If it is desirable to retain IP addresses even when devices are powered down, then the duration should be set longer than any likely period of inactivity. See also the discussion in the section describing the **Gateway-> DHCP Leases** screen.
- **Secondary LAN IP Address** – You have to assign a unique static IP address to the Motorola Cellular Gateway NC800's LAN 2 local interface. Being static, this IP address will not change and will be the default Motorola Cellular Gateway NC800 address for all computers connecting to this Motorola Cellular Gateway NC800 on the LAN 2 interface. The default IP address for this Motorola Cellular Gateway NC800 is **192.168.2.1**. The dotted-decimal notation must be used. The interested reader is referred to the glossary for more detailed information on IP addressing and subnet masks. The LAN 2 interface is the wired Ethernet port on the back panel labeled LAN 2.
- **Secondary LAN Subnet Mask** – IP network mask of the Motorola Cellular Gateway NC800 on the LAN 2 interface, e.g. 255.255.255.0. If you are intentionally using a different subnet mask on your local network, enter the appropriate subnet mask. The dotted-decimal notation must be used. The interested reader is referred to the glossary for more detailed information on IP addressing and subnet masks.

Gateway-> DHCP Leases
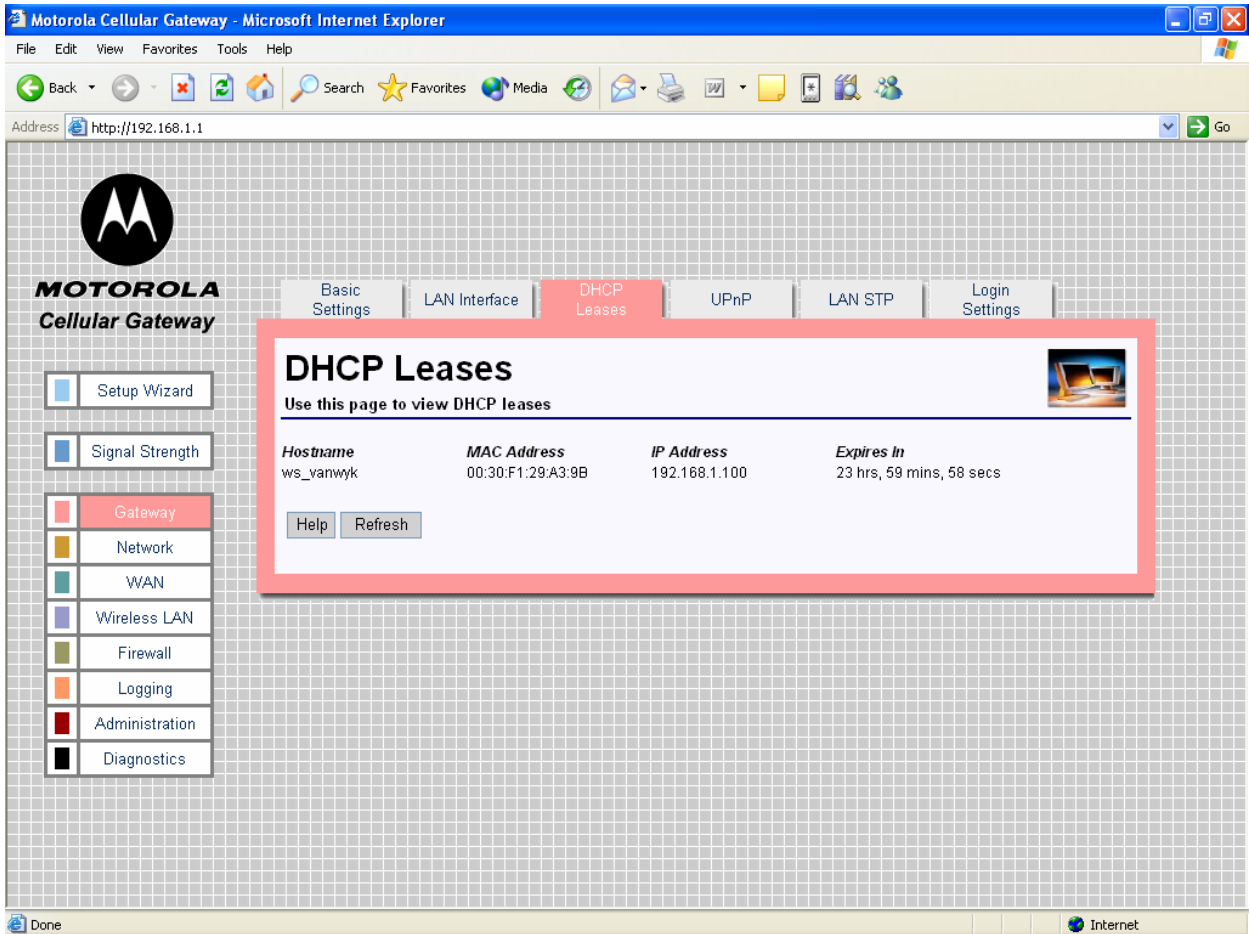
The Motorola Cellular Gateway NC800 is acting as a DHCP server if it automatically assigns IP addresses to the computers connecting to it. The Motorola Cellular Gateway NC800 builds up a table of MAC addresses and the IP address assigned to it. In a sense, a MAC address is "leasing" an IP address for a period of time. The computer requesting an IP address from the Motorola Cellular Gateway NC800 will periodically "renew" the IP address. The Motorola Cellular Gateway NC800 will then re-assign an IP address to it – in most cases this will be the same address that was assigned to the computer previously.

If the computer does not renew its IP lease then the DHCP lease will expire. The Motorola Cellular Gateway NC800 is then free to re-assign the IP address to the next computer requesting an IP address.

The DHCP leases page displays the current DHCP leases table. This page is for information only. No values can be set on this page. In order to change DHCP related fields you need to go to the **Gateway -> LAN Interface** page.
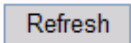
- **Host Name** – The name of the computer that requested the IP address.
- **MAC Address** – The MAC address of the computer that requested an IP address.
- **IP Address** – The IP address that was assigned to the requesting MAC address.
- **Expires In** – The remaining period that the IP address is reserved for the specific MAC address.

Special Buttons:

Refresh   Refreshes the list to the most recently assigned IP addresses

---
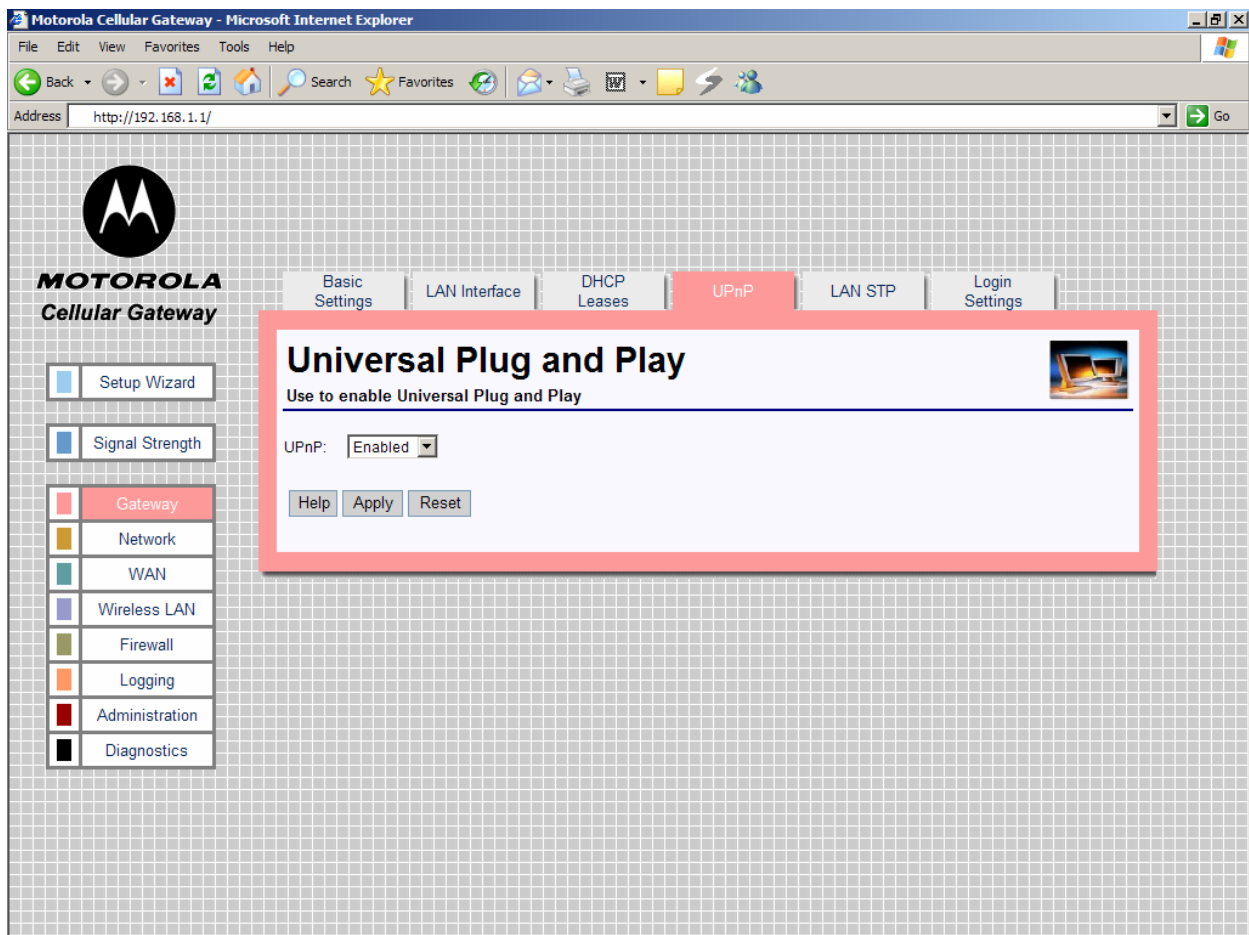
Gateway-> Universal Plug and Play

The Motorola Cellular Gateway NC800 supports the UPnP Internet Gateway Device (IGD) 1.0 specification.

UPnP defines a set of common services (protocols) that devices can use to join a network and describe themselves and their capabilities, enabling other devices to use them without a complicated set-up or configuration.

The default values displayed on this page will generally be sufficient. The purpose of each field is described below in order to assist you to fill in appropriate values if you have more advanced requirements.
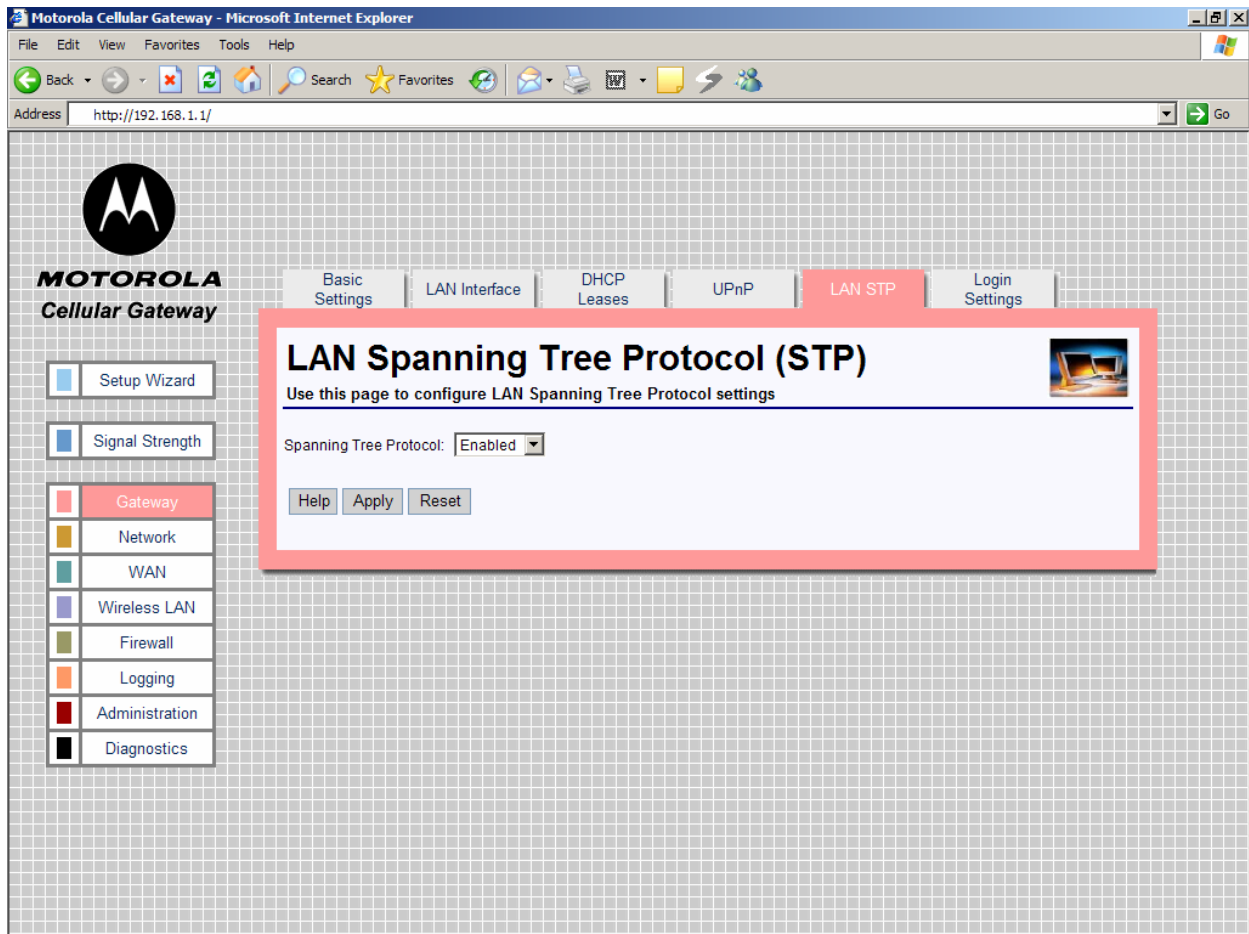
- **UPnP** (Enabled / Disabled) – Enable or disable Universal Plug and Play on the Motorola Cellular Gateway NC800. Disabling UPnP does not cause additional configuration to be required on the Motorola Cellular Gateway NC800. Enabling UPnP merely has the advantage that a UPnP enabled machine will be able to detect the Motorola Cellular Gateway NC800 on the LAN.

Gateway-> LAN STP

The Motorola Cellular Gateway NC800 supports LAN Spanning Tree 802.1d specification.

The default values displayed on this page will generally be sufficient. The purpose of each field is described below in order to assist you to fill in appropriate values if you have more advanced requirements.

- **Spanning Tree Protocol** (Enabled / Disabled) – Spanning Tree Protocol, supported on most bridges and switches, is the tried and tested method for providing path redundancy while eliminating loops in bridged networks. Loops create never-ending data paths, resulting in excessive system overhead. Select Enabled if you want to enable this protocol.

Gateway-> Login Settings

This page is used to configure the Login settings of the Motorola Cellular Gateway NC800.
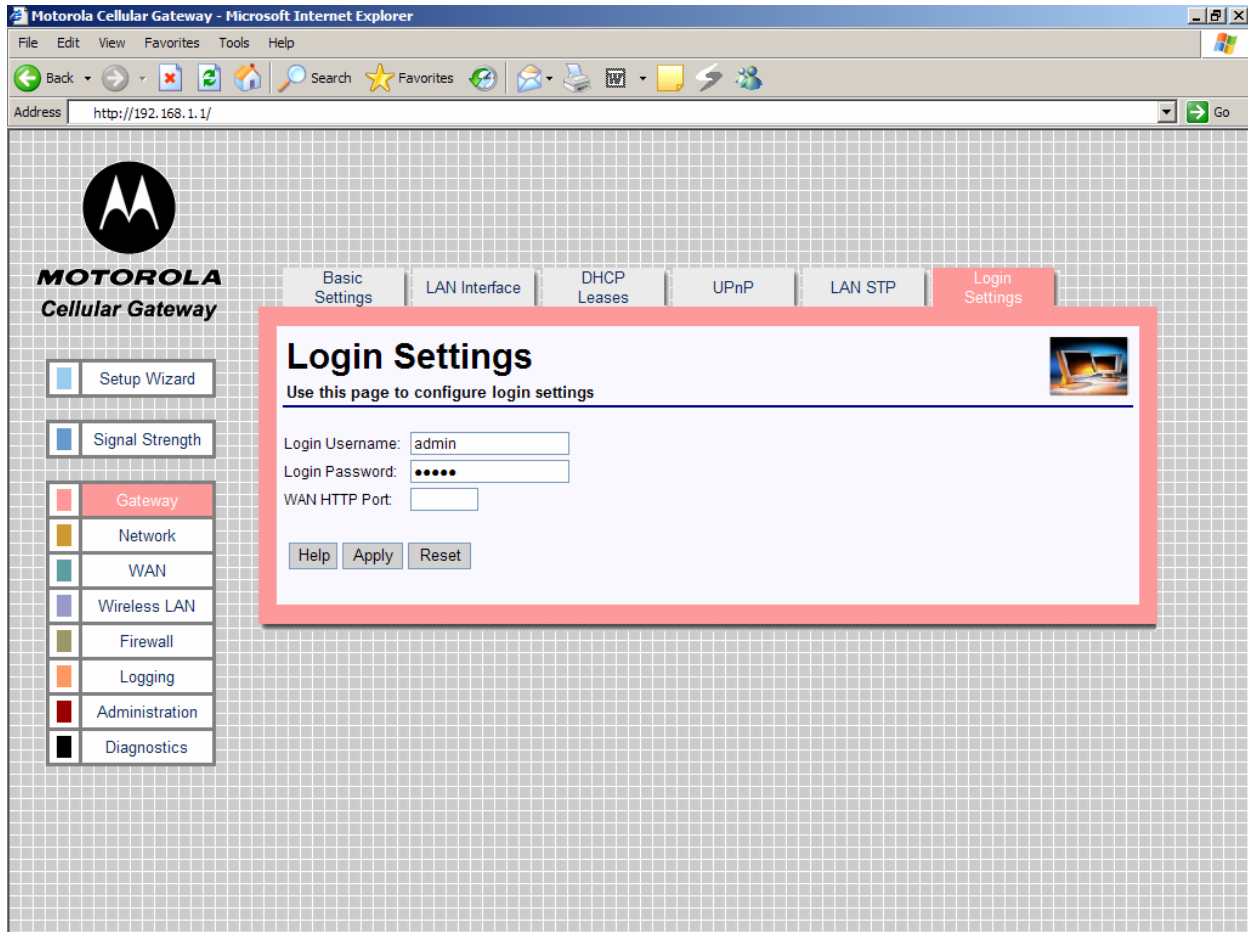
The HTTP server allows you to configure the Motorola Cellular Gateway NC800 via a web browser. Access to the Motorola Cellular Gateway NC800 configuration is controlled via the following parameters:

- **Login Username** – Enter the username required to access configuration web pages. The maximum length of the username that you can enter is 63 characters.
- **Login Password –** Enter the password required to access the configuration pages. The password can be up to 63 characters in length
- **Gateway WAN Port –** The port number required to access the configuration pages remotely via the WAN interface. This can be a number between 0 and 65535. **Leave this field empty** if you do not want the Motorola Cellular Gateway NC800 to be configurable via the WAN interface. The default is <blank>.

If you specify a port number (for example 8080) in the **Gateway WAN Port** field you can access the Motorola Cellular Gateway NC800 configuration pages from the Internet by specifying the port number when typing the Motorola Cellular Gateway NC800's address. For example, if your Motorola Cellular Gateway NC800's WAN IP address is 192.168.10.50 then the URL that you should use to open the configuration pages is **http://192.168.10.50:8080**.

It is recommended to change the default username and default password for security reasons

Warning: If you specify a Motorola Cellular Gateway NC800 WAN HTTP Port anyone who knows the Motorola Cellular Gateway NC800's Internet IP address and password will be able to alter the Motorola Cellular Gateway NC800's settings.

Network

There are four pages in the Routing category:

Network-> Dynamic Routing   This page contains enables and disables the RIP protocol.
Network-> Static Routing   This page contains parameters that can be set to have static routing between networks.
Network-> System Time   This page allows the system time and date to be set as well as the country settings.
Network-> VLAN   This page sets the VLAN parameters which logically groups stations on different LAN ports together.

The two screens in the routing category are mutually exclusive. If the Motorola Cellular Gateway NC800 Ethernet LAN interface is connected to a device that supports RIP, dynamic routing can be enabled on the **Network-> Dynamic Routing** page. Otherwise static routes should be defined for devices on a LAN segment that are different to the one served by the Motorola Cellular Gateway NC800 (if there is such a remote LAN segment). This is done on the **Network-> Static Routing** page.

The diagram below shows an example topology where a static route would need to be defined if RIP was **not** supported on the router.
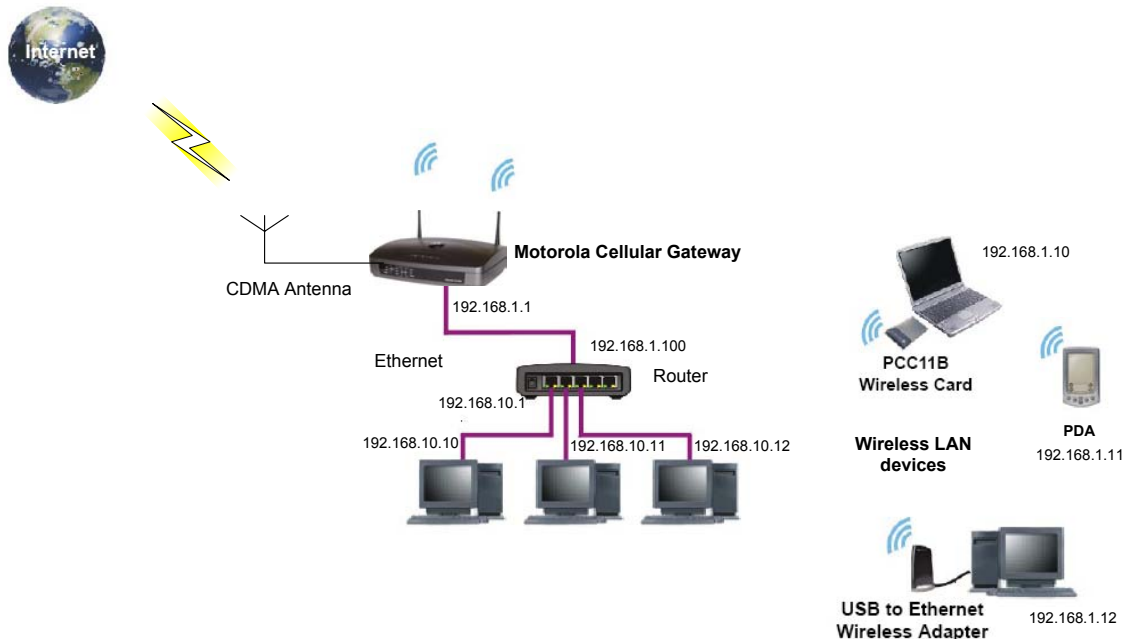
In the diagram the three PCs connected to the router are located in the LAN segment with the address range 192.168.10.0 thru 192.168.10.255. The LAN segment between the Motorola Cellular Gateway NC800 and the switch has the address range 192.168.1.0 thru 192.168.1.255. In order to route packets from the WLAN laptop to the PC with IP address 192.168.10.10, a route to 192.168.10.0 must be defined in the Motorola Cellular

Gateway NC800. The router is a device on the Ethernet LAN of the Motorola Cellular Gateway NC800 and in this example its address is 192.168.1.100. The following routing entry is therefore specified (refer to the next section for a description of each field):

IP address	Subnet Mask	Gateway	Metric	Interface
192.168.10.0	255.255.255.0	192.168.1.100	1	LAN 1

If a user on the Internet wants to access the PC at 192.168.10.10, that user needs to specify the WAN IP address of the Motorola Cellular Gateway NC800 in order to reach the PC. When the packet arrives at the Motorola Cellular Gateway NC800, it routes it to the router which in turn routes it to the PC. The Motorola Cellular Gateway NC800 uses its port forwarding tables to determine where to route the packet. Port forwarding is described in the Firewall section of this document. If access from the Internet is a requirement, then the WAN IP address of the Motorola Cellular Gateway NC800 would have to be made known to the user requiring such access. A static IP address would therefore be preferable in such a situation.

Network-> Dynamic Routing

This page provides detailed settings for Dynamic Routing.

Dynamic Routing allows the Motorola Cellular Gateway NC800 to automatically adjust to physical changes in the network's layout. The Motorola Cellular Gateway NC800, using the RIP v1 and v2 protocol, determines the network packets' route based on the fewest number of hops between the source and the destination. The RIP protocol regularly broadcasts routing information to other routers on the network.

- **Dynamic IP Routing** – Enabled / Disabled dynamic routing of data between networks connected to the Motorola Cellular Gateway NC800. If Disabled, no routing updates (RIP) are sent to or received from other networks.

Network-> Static Routing

This page provides detailed settings for Static Routing.

If the Motorola Cellular Gateway NC800 is connected to more than one network, it may be necessary to set up a static route between them. A static route is a pre-determined pathway that the IP packet must travel to reach a specific host or network.
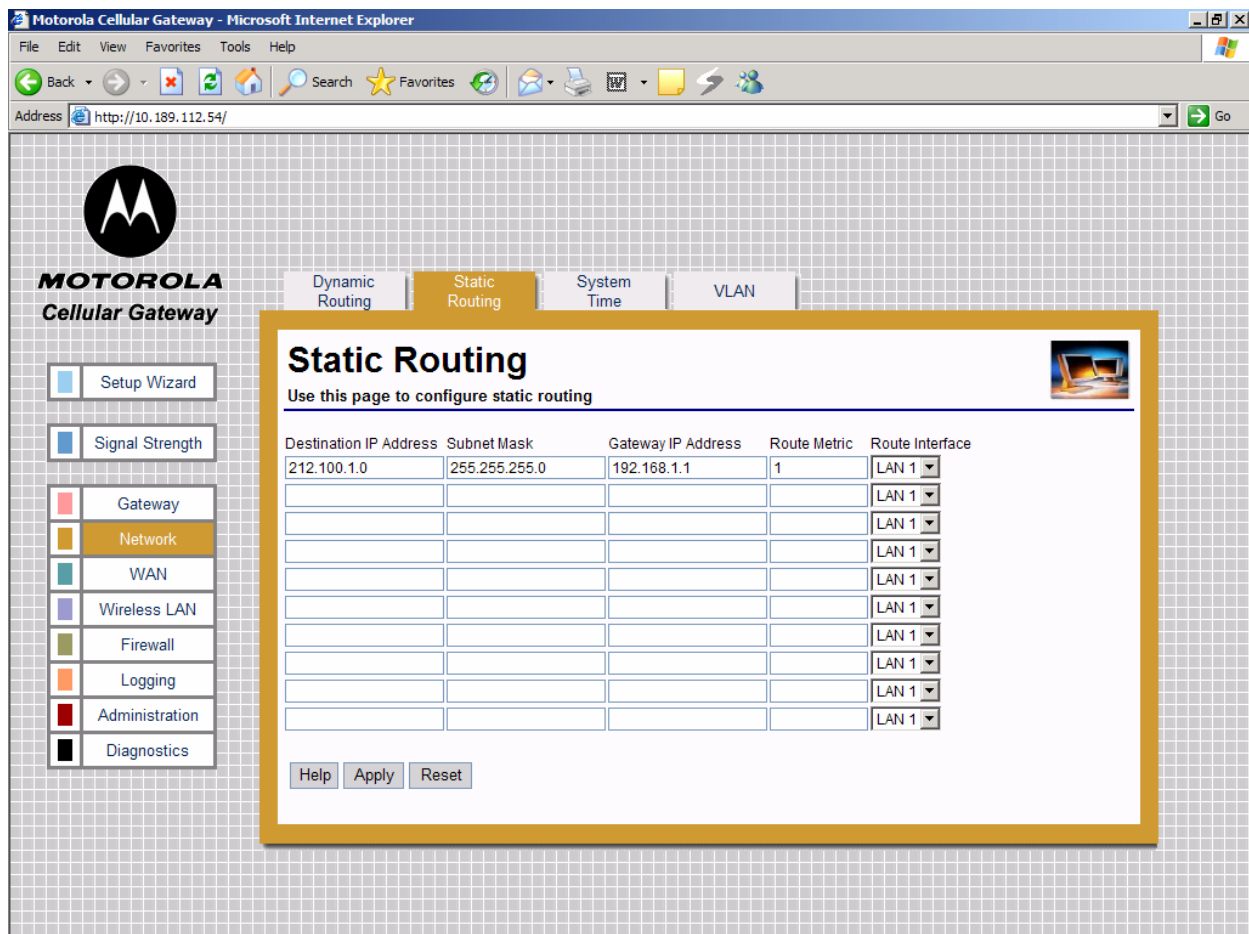
The Motorola Cellular Gateway NC800 supports up to 10 static routes. For every route that you want to define you must supply the following information:

- **Destination IP address** – The destination IP address of the remote network or host to which to assign a static route. If you are building a route to an entire network, be sure that the host portion of the IP address is set to zero. For example, if the router on the remote network has an IP address of 212.100.1.1 and if you wanted to route to the entire network, rather than just to the router, you would you would enter the IP address 212.100.1.0 as the destination IP address.
- **Subnet Mask** – The subnet mask indicates which portion of the destination IP Address is the network portion and which is the host portion. If, for instance, you use a Subnet Mask of 255.255.255.0 (Class C network) with the example shown above for destination IP, then this would indicate that the first three numbers of a network IP address identifies this particular network, while the last number in the network address (from 1 to 254) would identify the specific host.

- **Gateway IP address** – IP address of the Motorola Cellular Gateway NC800 on the local network segment to which packets destined for the remote network should be forwarded.
- **Route Metric:** The number of nodes that a data packet passes through before reaching its destination. A node is any device on a network, such as switches, PCs, etc. Enter a decimal number between 0 and 15. The default value is 1.
- **Route Interface** – Select the appropriate interface to use when forwarding packets destined for the remote network. Valid values are:
  - LAN 1 - Destination is on the Primary LAN network.
  - LAN 2 - Destination is on the Secondary LAN network.
  - WAN - Destination is on another IP network. In most cases it will not be necessary to enter a routing entry for WAN access.

It is usually not necessary to create a routing entry manually for WAN access to the Internet. WAN routing information is obtained automatically by the Motorola Cellular Gateway NC800 when it communicates with the ISP.

Network-> System Time

This page provides detailed settings for Time and Date settings.

This function synchronizes the Motorola Cellular Gateway NC800's date and time with a Network Time Protocol (NTP) server or date and time supplied by the CDMA module. This functionality is necessary to time stamp logging information.
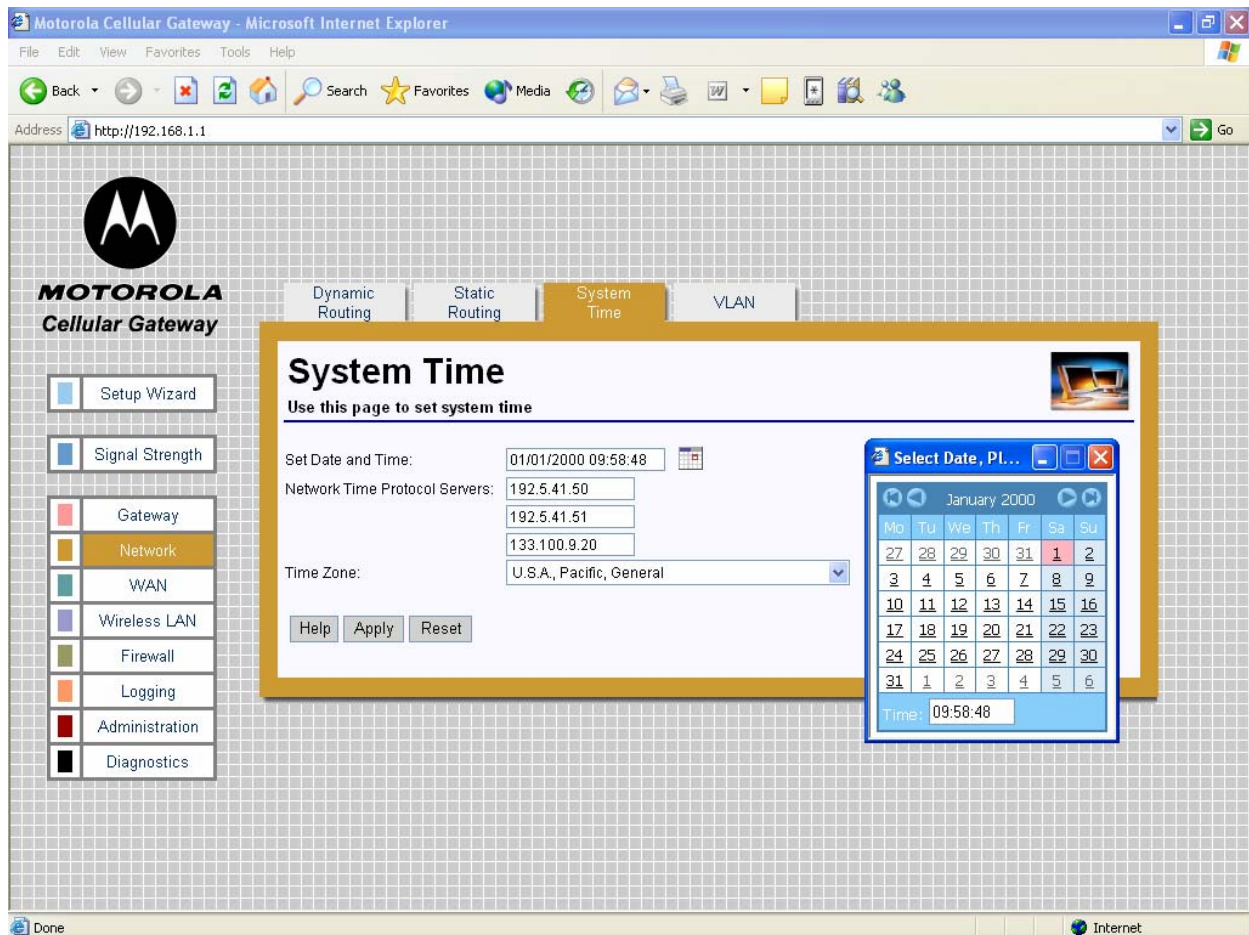
- **Set Date and Time** – Manually set date and time or click the calendar icon to choose date and time. When pressing the calendar icon, a pop-up appears as shown

---

- **Network Time Protocol Server** – The IP address of the NTP server (3 can be specified) that the NTP client connects to. Decimal number specified in dotted notation.
- **Time Zone** – Select the time-zone closest to you. The Motorola Cellular Gateway NC800 uses this information to format the current time as returned by the Network Time Protocol Server. If there is daylight saving in the time zone specified, it will automatically be enabled. If daylight saving is not applicable to the selected Time Zone no time adjustment will be made throughout the year.
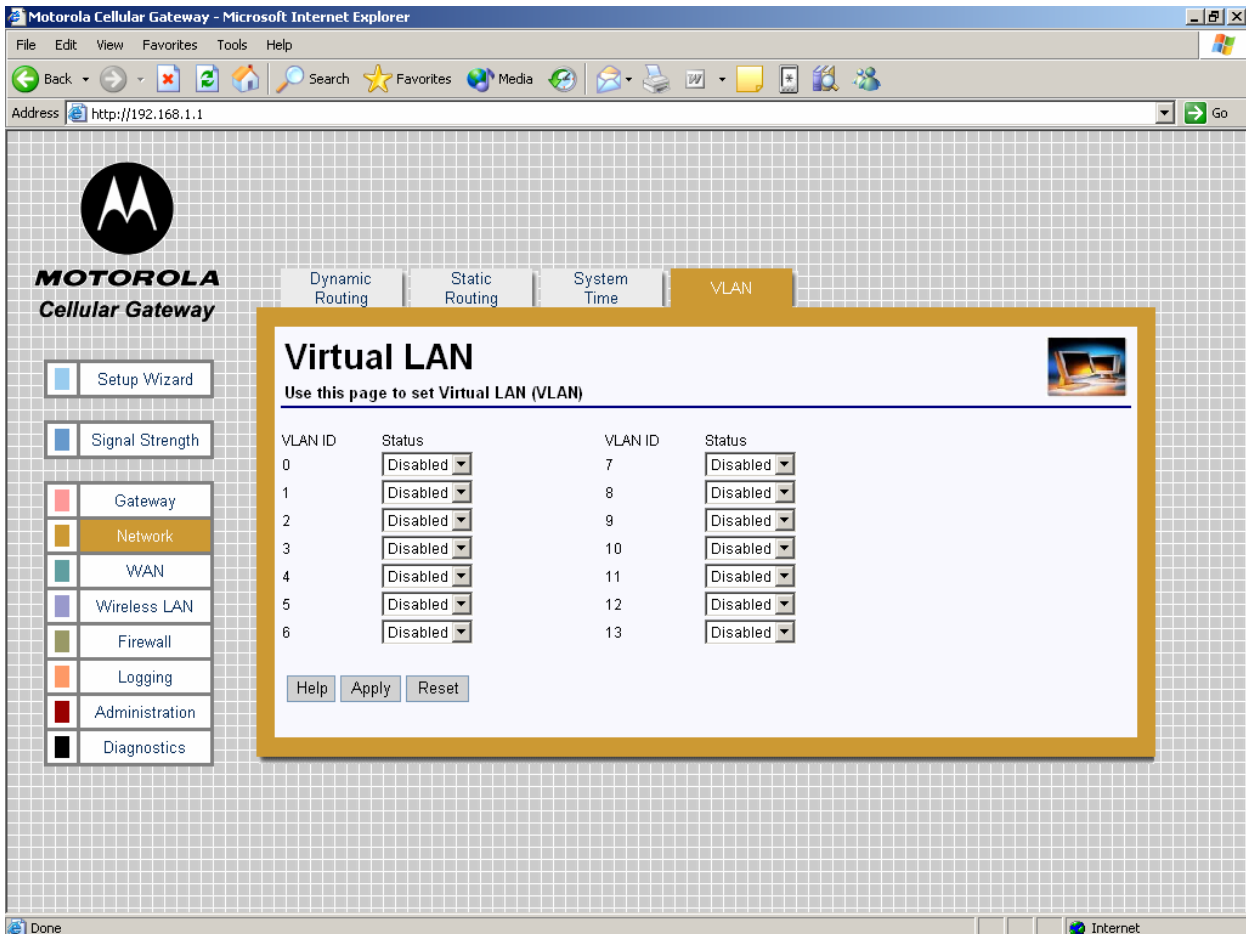
Network-> VLAN

This page provides detailed settings for VLAN settings.

The VLAN concept logically groups stations on different LAN ports together (i.e. stations can see each other even though they are on physically different LANs). All stations with the same VLAN identifier can "see" each other.

Warning: The packets sent between the two PC's are sent as VLAN **tagged** packets, therefore the stations communicating over the VLAN must be able to handle VLAN **tagged** packets.

- **VLAN ID** – ID of the VLAN to enable or disable on the gateway. If enabled, the gateway will retransmit all received tagged packets (with corresponding VLAN IDs) on both LAN1 and LAN2. If disabled, the tagged packet will be dropped by the gateway.

WAN

There are two pages that affect the setup of the WAN interface of the Motorola Cellular Gateway NC800:

WAN-> IP Settings   If the ISP specifies a static IP address for the Motorola Cellular Gateway NC800, then that address and other related information provided by the ISP must be filled in on this page.

WAN-> PPP Settings   The ISP account information is filled in on this page.

WAN-> IP Settings

Use this page to configure the WAN interface if your ISP has assigned a static IP address to you. They will provide most if not all information. For those fields that they do not provide information, leave the default values in place.

Warning: The settings on this page become effective only if the **WAN Interface** is set to **Enable** on the **Gateway-> Basic Settings** page.

The default values displayed on this page will be sufficient if the ISP assigns the IP address automatically to the Motorola Cellular Gateway NC800. (A default value of 0.0.0.0 means that no IP address is configured.) The purpose of each field is described below in order to assist you to fill in appropriate values if the ISP specifies a static IP address for the Motorola Cellular Gateway NC800.

- **WAN IP Address** – This is the Motorola Cellular Gateway NC800's IP Address as seen by external users on the Internet (including your ISP). The default is 0.0.0.0 (i.e. dynamically assigned).
- **WAN Subnet Mask –** This is the Motorola Cellular Gateway NC800's subnet mask on the WAN interface. The default is 0.0.0.0 (i.e. dynamically assigned).
- **Default Gateway –** You should enter your ISP server's IP address here. The Motorola Cellular Gateway NC800 will route all packets bound for the Internet to this address. Your ISP will then route the packets onto the Internet. Please check with your ISP for the address to use here. The default is 0.0.0.0 (ie dynamically assigned).
- **DNS Servers –** You only need to enter one DNS server address here. If your ISP has supplied you with more than one DNS server address you can enter them in here. The first DNS server is the preferred DNS server meaning that DNS lookups will first be sent to this address before the alternate DNS servers are used as backups. The default is a blank field. Up to three DNS servers can be entered.

You can test your ability to access the Internet by connecting to a well-known Internet web site such as www.motorola.com.

WAN-> PPP Settings

Point to Point Protocol (PPP) is used by ISPs to establish Internet connections. In order to activate the Motorola Cellular Gateway NC800's WAN interface you have to:

- Select **Enable** for the **WAN Interface** on the **Gateway-> Basic Settings** page.
- Fill in the entries on the **WAN-> IP Settings** page.
- Configure the Internet account information using the **WAN->PPP Settings** (this) page.

Warning: The settings on this page become effective only if the **WAN Interface** is set to **Enable** on the **Gateway-> Basic Settings** page.

Apart from the **Data Access Number**, **PPP Username** and **PPP Password** fields, the default values displayed on this page will generally be sufficient. The purpose of each field is described below in order to assist you to fill in appropriate values if you have more advanced requirements.

- **Data Access Number** – The data access number supplied by your ISP that must be dialed to setup the cellular connection. Maximum of 10 characters.
- **PPP Username** – Your ISP will provide you with a user name to use. Maximum of 255 characters per field. This field can be left blank if you did not receive a username from your ISP.
- **PPP Password** – Your ISP will provide you with a password to use. Maximum of 255 characters per field. This field can be left blank if you did not receive a password from your ISP.
- **PPP MRU – Maximum Receive Unit (MRU)** is the maximum size in bytes of the PPP receive packet. It is a number between 128 and 16384. Default is 1500.

- **PPP MTU – Maximum Transmission Unit (MTU)** is the maximum size in bytes of the PPP transmit packet. It is a number between 128 and 16384. Default is 1500.

WAN-> OTA Provisioning

The user can provision the WAN module by requesting provisioning information from the network via the Over-the-Air (OTA) provisioning facility. The OTA provisioning number is specified by the user, and once the provisioning process is initiated, the WAN module uses this dial number to request provisioning information from the network.

- **OTA Provisioning Number** – The access number that must be dialed for the WAN module to perform OTA provisioning. The number has a maximum length of 10 characters and is provided by the ISP. **Apply** must be used to set the number as the provisioning number.

Important: Do not interrupt the provisioning process in any way or power down the Motorola Cellular Gateway NC800 while the provisioning process is in progress as this could damage the Motorola Cellular Gateway NC800.

Special Buttons:

Provision   Starts the OTA provisioning process.

Wireless LAN

The Wireless LAN category contains the following pages:

Wireless LAN-> WLAN Basic   This page is used to set the basic WLAN settings.
Wireless LAN-> WLAN Advanced   This page is used to set the advanced WLAN settings.
Wireless LAN-> MAC Restriction   This page is used to control wireless access to the Motorola Cellular Gateway NC800.
Wireless LAN-> WEP Security   This page is used to set the WEP configuration settings of the Motorola Cellular Gateway NC800.
Wireless LAN-> WPA Security   This page is used to set the WPA configuration settings of the Motorola Cellular Gateway NC800.
Wireless LAN-> Radius Server   This page sets the RADIUS server settings.
Wireless LAN-> Authenticated Stations This page displays the authenticated WLAN stations.

Wireless LAN-> WLAN Basic

This page provides detailed settings for the Wireless Interface.

Warning: The settings on this page become effective only if the **Wireless LAN Interface** is set to **Enable** on the **Gateway-> Basic Settings** page.

The default values displayed on this page will generally be sufficient. The purpose of each field is described below in order to assist you to fill in appropriate values if you have more advanced requirements.
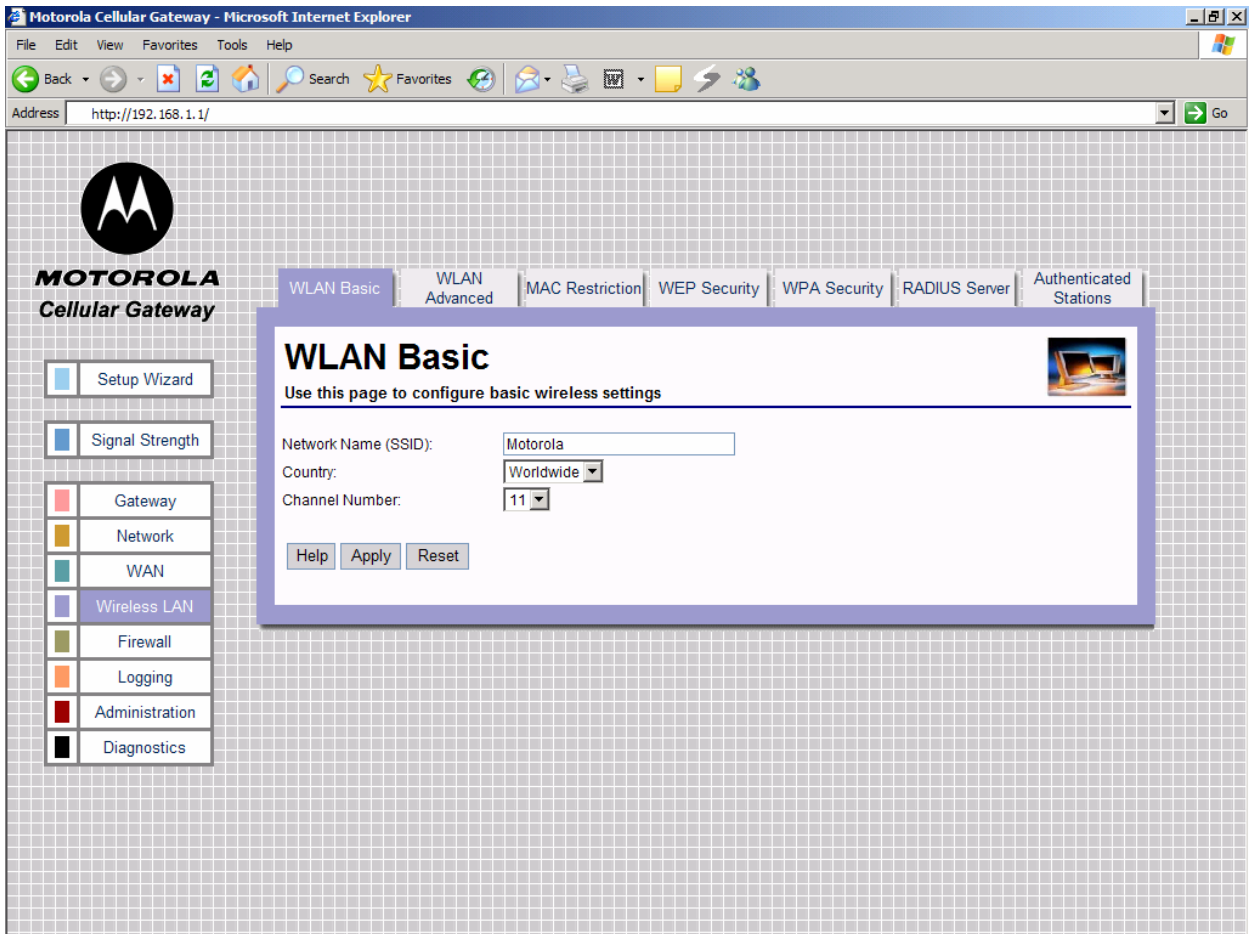
- **Network Name (SSID)** – The SSID is a unique name for your wireless network. It is case sensitive and must not exceed 32 characters. The default SSID is **"Motorola"** but you should change this to a personal wireless network name. It is recommended that you change the SSID for security reasons. **All wireless points in your network must use the same SSID.** Verify that you are using the correct SSID and click the **Apply** button to set it.
- **Country** – Select your country from the drop-down list. This will influence the number of channels that are available to you due to regulatory restrictions in some countries. If your country is not present in the list, select "All".
- **Channel Number** – Select the appropriate channel for your network from the list provided. All wireless points (PC's with wireless LAN, wireless routers and hubs) in your network must use the same channel in order to function properly. If you have multiple Motorola Cellular Gateway NC800s in your network, then each Motorola Cellular Gateway NC800 must use a different channel. The channel number can be Auto, or a decimal number between 1 and 14 (depending on the Country setting, the range may from 1 to 11, 1 to 13 or 1 to 14). Set this after selecting the country.

Wireless LAN-> WLAN Advanced

This page provides more advanced settings for the Wireless Interface.

⚠️ **Warning:** The settings on this page become effective only if the **Wireless LAN Interface** is set to **Enable** on the **Gateway-> Basic Settings** page.

💡 The default values displayed on this page will generally be sufficient. The purpose of each field is described below in order to assist you to fill in appropriate values if you have more advanced requirements.

The Motorola Cellular Gateway NC800 supports 802.11g Wireless LAN interface to allow PCs or notebooks equipped with a Wireless LAN card to access the Motorola Cellular Gateway NC800. The 802.11g Wireless LAN is backwards compatible with the 802.11b specification.
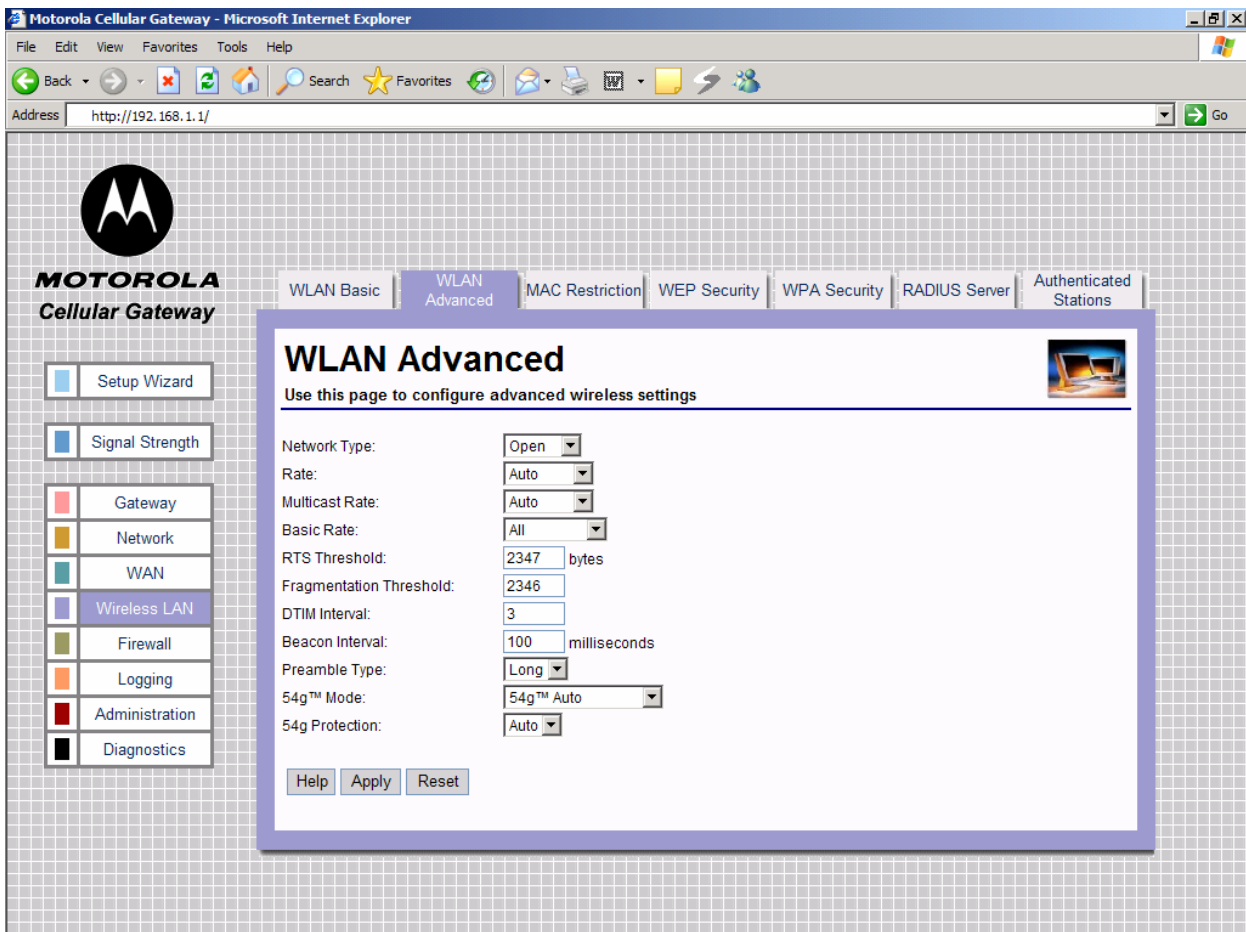
- **Network Type**: Selecting **Closed** disables the broadcast of the SSID to all wireless devices within range of the Motorola Cellular Gateway NC800. Selecting **Open** enables the broadcast of the SSID to all wireless devices within range of the Motorola Cellular Gateway NC800.

⚠️ **Warning:** The SSID must be configured manually on the wireless adapter of your PC / laptop if the **Network Type** field is set to **Closed**.

- **Rate** – Transmission rate in bps (bits per second) at which the access point communicates with the client. Valid values are Auto, 1 Mbps, 2 Mbps, 5.5 Mbps, 6 Mbps, 9 Mbps, 11 Mbps, 12 Mbps, 18 Mbps, 24 Mbps, 36 Mbps, 48 Mbps, and 54 Mbps.
- **Multicast Rate** – Transmission rate in bps at which the Motorola Cellular Gateway NC800 communicates with the client. Valid values are Auto, 1 Mbps, 2 Mbps, 5.5 Mbps, 6 Mbps, 9 Mbps, 11 Mbps, 12 Mbps, 18 Mbps, 24 Mbps, 36 Mbps, 48 Mbps, and 54 Mbps.
- **Basic Rate** – Selects the basic rates that wireless clients must support. Valid values are Default, Auto and 1 & 2 Mbps.
- **RTS Threshold** – This setting should remain at its default of 2347 which means that RTS mechanism is not used . If you encounter inconsistent data flow, you may make small changes to this value in the range of 0 to 2347.
- **Fragmentation Threshold** – This value indicates how much of the Motorola Cellular Gateway NC800's resources are devoted to recovering packet errors. The value should remain at its default setting of 2346. If you have decreased this value and experience high packet error rates, you can increase it again within the range of 256 to 2346, but it is likely to decrease overall network performance. Only minor modifications of this value are recommended.
- **DTIM Interval** – This value indicates the interval of the Delivery Traffic Indication Message (DTIM). A DTIM field is a count-down field informing clients of the next window for listening to broadcast and multicast messages from the Motorola Cellular Gateway NC800. When the Motorola Cellular Gateway NC800 has buffered broadcast or multicast messages for associated clients, it sends the next DTIM with a DTIM Interval value. Clients of the Motorola Cellular Gateway NC800 hear the beacons and awaken to receive the broadcast and multicast messages. This value should remain at its default value of 3 but the valid range is 1 to 255.
- **Beacon Interval** – Specify a Beacon Interval between 1 and 65535 milliseconds. The default of 100 milliseconds is the recommended value. Beacons are packets broadcast by the Motorola Cellular Gateway NC800 to synchronize a wireless network. A beacon includes the wireless LAN service area, the IP address, the broadcast destination address, a time stamp, Delivery Traffic Indicator Maps and the Traffic Indicator Message (TIM).
- **Preamble Type** – Sets the preamble type used for 802.11b only. Valid options are to use either a short or long preamble.
- **54g™ Mode** – Sets the mode in which the 802.11g driver should operate.
  - 54g™ Auto - For widest compatibility
  - 54g™ Performance - For fastest performance amongst certified 54g equipment.
  - 54g™ LRS - When experiencing difficulty with legacy 802.11b equipment.
  - 802.11b only - Only 802.11b equipment
- **54g™ Protection** – Sets the mode in which the 802.11g protection should operate.
  - Auto - For 802.11g best performance in mixed 802.11g/802.11b networks.
  - Off - To maximize 802.11g throughput under most conditions.

Wireless LAN-> MAC Restriction

This page provides more advanced settings for allowing and disallowing specific MAC addresses of wireless LAN points.

This feature allows you to prevent users on the LAN network from using the Motorola Cellular Gateway NC800's resources based on their MAC addresses.

A MAC address is a 12-digit code assigned to a unique piece of hardware for identification. The MAC address component is fixed and is independent of the component's IP address. This means that you can block a specific component irrespective of the component's IP address.

Warning: The settings on this page become effective only if the **Wireless LAN Interface** is set to **Enable** on the **Gateway-> Basic Settings** page.

The default values displayed on this page will generally be sufficient. The purpose of each field is described below in order to assist you to fill in appropriate values if you have more advanced requirements.
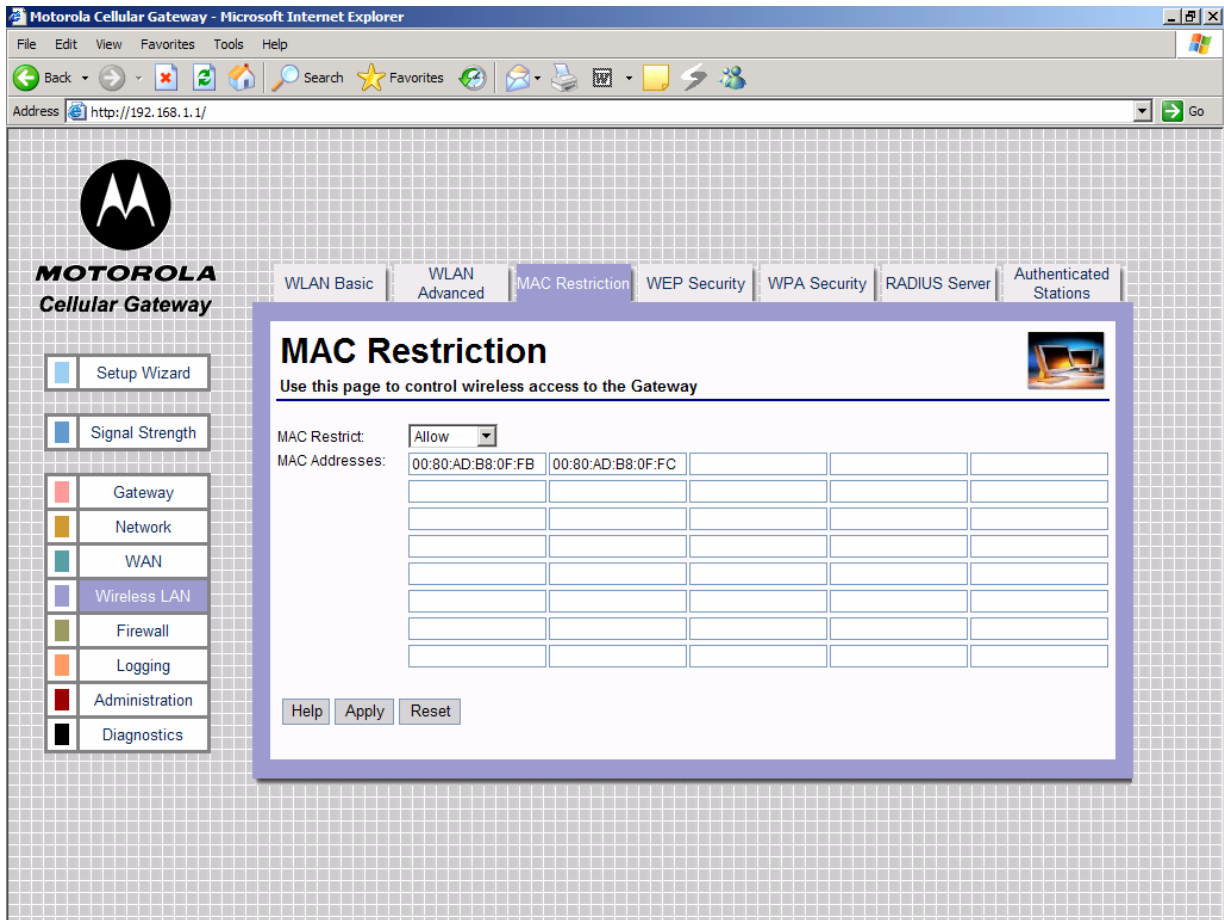
The Motorola Cellular Gateway NC800 supports up to 20 MAC filtering entries.

- **MAC Filter Mode**
  - **Disabled -** Filtering is ignored. All packets are allowed through.
  - **Allow** – Only the specified MAC addresses are allowed through. This is the most secure method, but requires you to add each MAC address individually. It has the advantage that all unknown MAC addresses are blocked.
  - **Deny** – The specified MAC addresses are blocked. Use this method to block specific users.
- **MAC Addresses** – The MAC addresses to block/allow for users on the LAN. MAC Addresses must be in the format XX:XX:XX:XX:XX:XX where XX are Hexadecimal digits.

Important: If the MAC address list is empty you must set the MAC Filter Mode to **Disabled** or **Deny**. An empty MAC address table does not allow WLAN workstations to communicate with the Motorola Cellular Gateway NC800 if the MAC Filter Mode field is set to **Allow**

Wireless LAN-> WEP Security

This page allows you to configure the Motorola Cellular Gateway NC800's WEP Security settings.

Warning: The settings on this page become effective only if the **Wireless LAN Interface** is set to **Enable** on the **Gateway-> Basic Settings** page.

802.11b/g supports two types of WEP security services: **Open System and Shared key**. Under open system authentication, any wireless station can connect to the Motorola Cellular Gateway NC800 provided that it knows the SSID of the Motorola Cellular Gateway NC800. If the Motorola Cellular Gateway NC800 is broadcasting this information, then any wireless client can access the Motorola Cellular Gateway NC800. Under **Shared Key** the Motorola Cellular Gateway NC800 generates a random 128-bit challenge. The station returns the challenge, encrypted with a shared key—a "secret" key configured into both the station and the Motorola Cellular Gateway NC800. The Motorola Cellular Gateway NC800 decrypts the challenge, using a CRC to verify its integrity. If the decrypted frame matches the original challenge, the station is considered authentic. The challenge/response handshake is repeated in the opposite direction for mutual authentication.

WEP data encryption is a weaker encryption method than that used by WPA-PSK. Either 64-bit or 128-bit keys can be specified. If either WEP **Data Encryption** or **Shared-Key Authentication** is required, one or more WEP encryption keys must be provided. Note that WEP data encryption can be provided even if shared-key authentication is not required and vice versa.
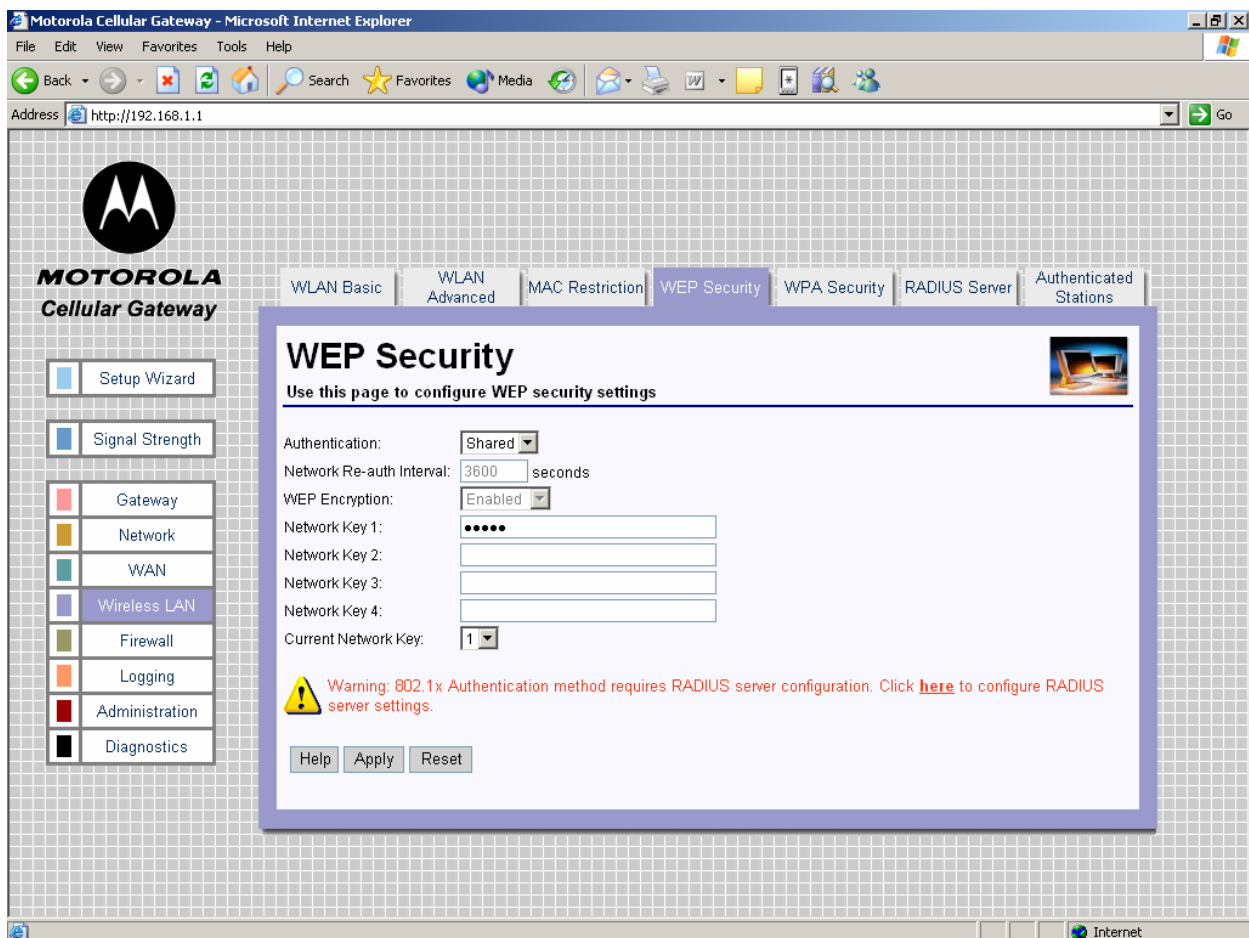
- **Authentication.** - Selects the WEP authentication method.
  - **Open** – all stations are granted access. The default value is Open.
  - **Shared Key** – stations possessing the WEP key are allowed access.
  - **802.1X** – 802.1X is used to perform authentication using a RADIUS server and WEP key distribution.

Warning: 802.1x Authentication method requires RADIUS server configuration.

- **Network Re-auth interval** – The interval in seconds at which the Motorola Cellular Gateway NC800 distributes a new WEP key. This parameter is valid only if WEP Authentication = 802.1X. The default value is 36000.
- **WEP Encryption**
  - o **Enabled** – data packets are WEP-encrypted.
  - o **Disabled** – WEP encryption is performed.

  If WEP Authentication = 802.1X, then WEP Encryption = Enabled.
  The default is Disabled.
- **Network Key (1 – 4)** – Enter up to four different network keys. Only one is in use as determined by the "**Current Network Key**" setting. You can choose between 128-bit or 64-bit WEP encryption. Both allow you to specify up to four keys, but only the selected "**Current Network Key**" is used. If you are using 64-bit WEP encryption, then the key must be exactly 10 hexadecimal or 5 ASCII characters in length. If you are using 128-bit WEP encryption, then the key must be exactly 26 hexadecimal or 13 ASCII characters in length. Valid hexadecimal digits are "0"-"9" and "A"-"F". This is only valid if WEP authentication is not Open, or WEP encryption is enabled. Default is blank for all keys.
  Note: When Authentication is set to 802.1X, only Network Keys 2 or 3 can be used.
- **Current Network Key** – The secret key selected for encrypting outbound traffic and/or authenticating clients. Decimal number between 1 and 4. This is only valid if WEP authentication is not Open, or WEP encryption is enabled. Default is 1.
  Note: When Authentication is set to 802.1X, only Network Keys 2 or 3 can be selected.

Warning: The security settings on the WLAN adapters on the workstations or laptops need to be set up to match the security settings on the Motorola Cellular Gateway NC800. The wireless links between the workstations/laptops and the Motorola Cellular Gateway NC800 need to be restarted after the security settings have been changed.

| Wireless LAN-> WPA Security |
|---|
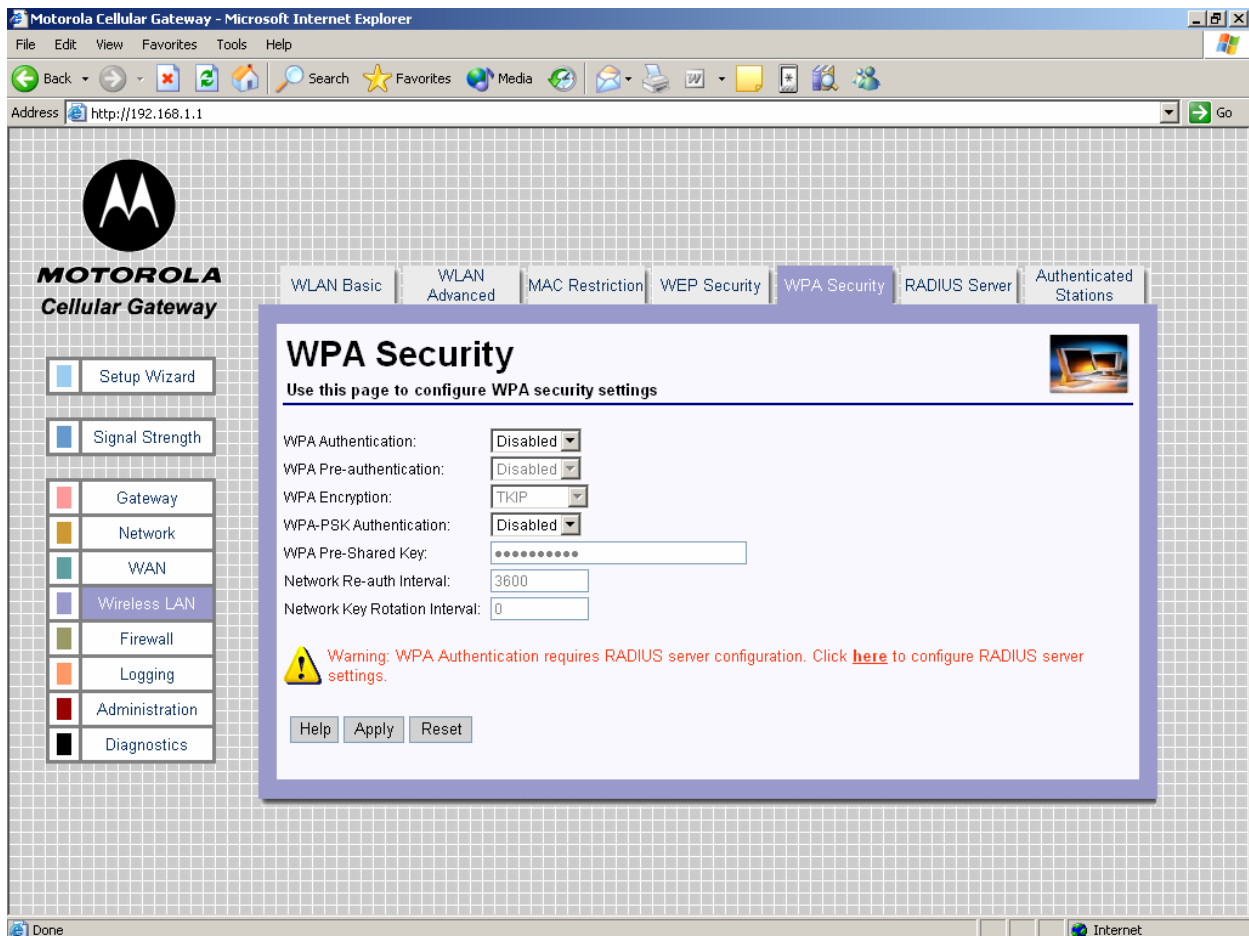
This page allows you to configure the Motorola Cellular Gateway NC800's WPA Security settings.

Warning: The settings on this page become effective only if the **Wireless LAN Interface** is set to **Enable** on the **Gateway-> Basic Settings** page and Authentication is set to **Open** on the **Wireless LAN-> WEP security**.

The Motorola Cellular Gateway NC800 supports WLAN Protected Access (WPA), WPA2 (an extension of WPA, based on 802.11i) and WPA Pre-Shared Key (WPA-PSK) authentication methods. WPA, WPA2 and WPA-PSK are all more secure than WEP. The encryption methods that can be used are Temporal Key Integrity Protocol (TKIP) or Advanced Encryption Standard (AES) or both. AES is more secure, but is only supported by newer WLAN devices.

If the authentication method is WPA-PSK, a pre-shared key is entered into the Cellular Gateway NC800, and an external RADIUS server is not needed. If the authentication method is not WPA-PSK, an external RADIUS server is required to perform authentication and key distribution.

- **WPA Authentication**– Enables or Disables WPA/WPA2 authentication method.
- **WPA Pre-authentication**
  - o Enabled: Allows a WPA2 client to pre-authenticate with the Gateway toward which it is moving, while maintaining a connection to the Gateway it's moving away from.
  - o Disabled: Pre-authentication is disabled.
- **WPA Encryption**
  - o TKIP - Temporal Key Integrity Protocol
  - o AES - Advanced Encryption Standard
  - o TKIP+AES - both enabled
- **WPA-PSK Authentication**
  - o Enabled – Authentication is by possession of a pre-shared key.
  - o Disabled – Authentication requires the use of a higher-layer authentication method supported by a remote authentication server (RADIUS server).
- **WPA Pre-Shared Key –** Sets the WPA Pre-Shared Key (PSK). The key must be between 8 and 63 ASCII characters or 64 hexadecimal digits. Valid hexadecimal digits are "0"-"9" and "A"-"F". This parameter is valid if WPA PSK Authentication is Enabled.
- **Network Re-auth Interval** – The interval, in seconds, at which the gateway will request the WLAN client to re-authenticate itself.
- **Network Key Rotation Interval** – The interval, in seconds, at which a new group key (GTK) is distributed. A value of 0 means there is no periodic GTK distribution.

⚠ **Warning:** The security settings on the WLAN adapters on the workstations or laptops need to be set up to match the security settings on the Motorola Cellular Gateway NC800. The wireless links between the workstations/laptops and the Motorola Cellular Gateway NC800 need to be restarted after the security settings have been changed. WPA-PSK can only be used on the Motorola Cellular Gateway NC800 if the clients support it.

Wireless LAN-> RADIUS Server

This page allows you to configure the Motorola Cellular Gateway NC800's RADIUS Server Security settings.

⚠️ **Warning:** The settings on this page become effective only if the **Wireless LAN Interface** is set to **Enable** on the **Gateway-> Basic Settings** page.

If WPA is enabled but PSK Authentication is disabled, or if the WEP authentication method is 802.1X, then an external RADIUS server is required to perform authentication. Settings here have to match those on the external RADIUS Server.
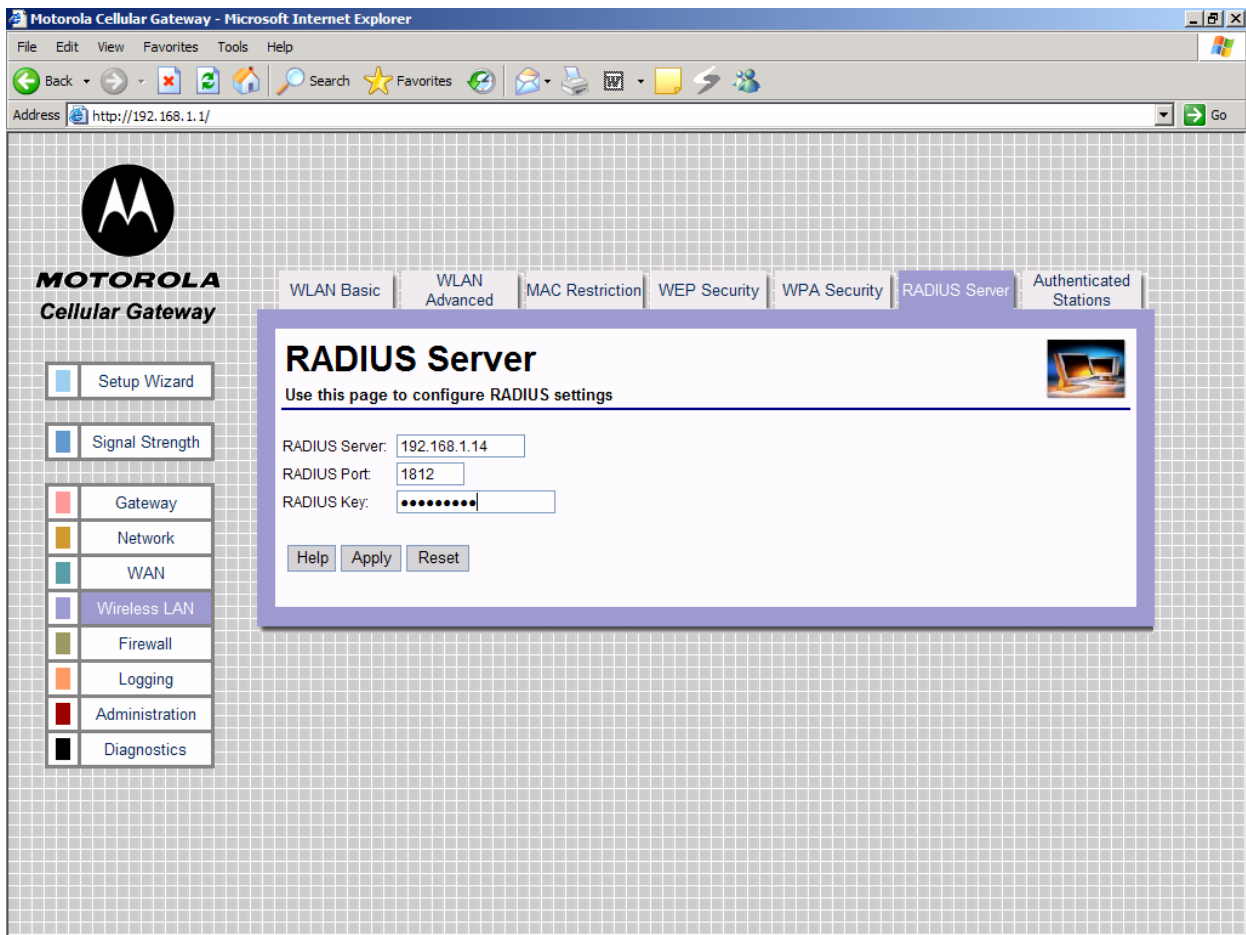
- **RADIUS Server** – Sets IP address of the RADIUS server, which acts as the Authentication Server. Decimal numbers are specified in dotted notation.
- **RADIUS Port** – Sets the UDP port number of the RADIUS server. Decimal number between 0 and 65535.
- **RADIUS Key –** The shared secret key for the RADIUS connection. Maximum 255 characters.
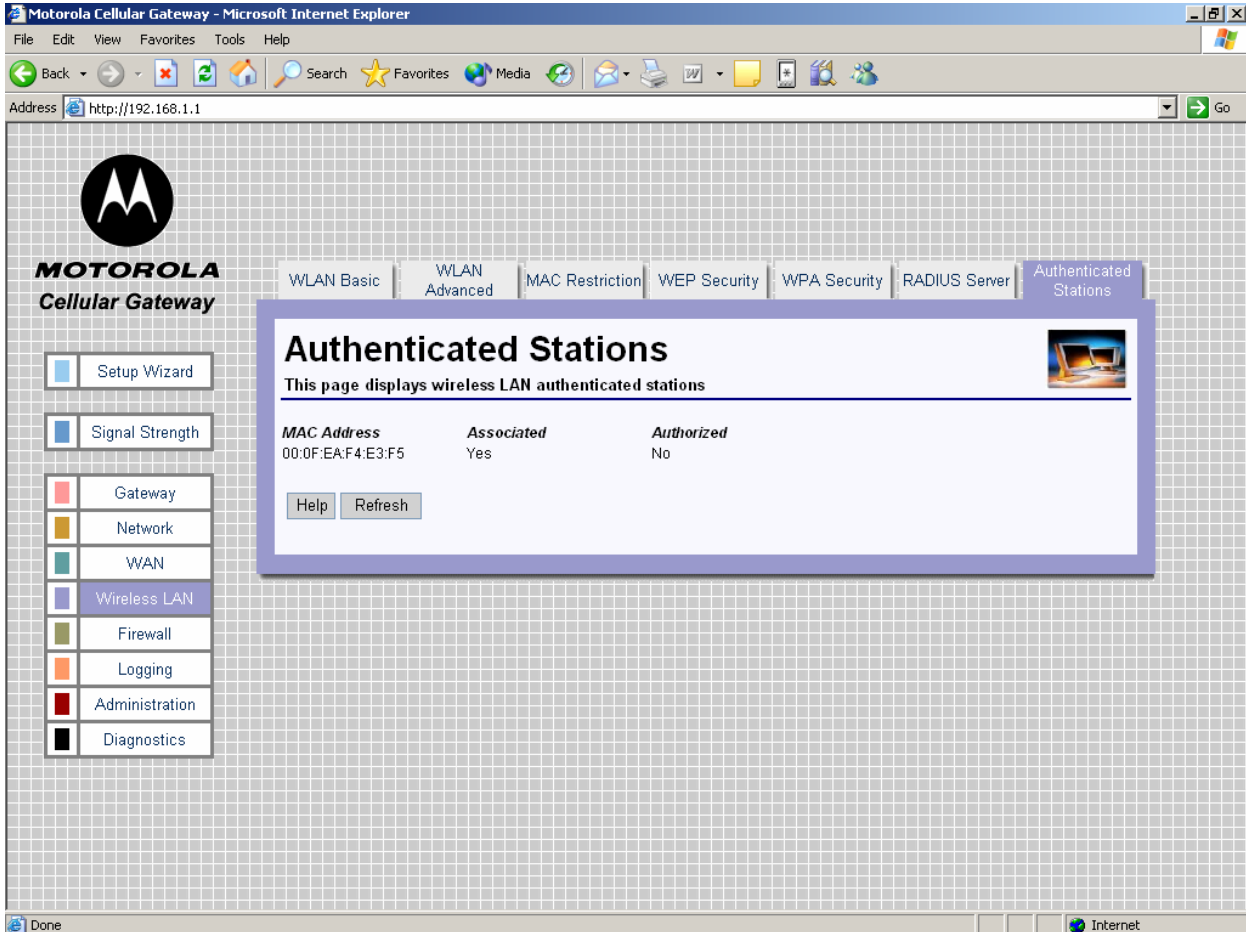
Wireless LAN-> Authenticated Stations

This page allows you to configure the Motorola Cellular Gateway NC800's Authenticated Stations Security settings.

![Motorola logo]

> **⚠ Warning:** The information on this page is only updated when the **Wireless LAN Interface** is set to **Enable** on the **Gateway-> Basic Settings** page.

The Motorola Cellular Gateway NC800 displays a list of authenticated WLAN stations. This is a display of the current WLAN status. No settings can be made on this page.

- **MAC Address** – The MAC address of the WLAN station.
- **Associated – Yes** or **No** is used to indicate whether WLAN station has been associated with the Motorola Cellular Gateway NC800. A WLAN station becomes associated with the Gateway when the user selects the Gateway's SSID.
- **Authorized** – **Yes** or **No** is used to indicate whether WLAN station has been authorized to use LAN resources. A WLAN station becomes authorized when it successfully completed WPA or 802.1x authentication. If WPA and 802.1x are disabled on the Gateway this field will always be No, even when the client has successfully connected to the Gateway.

Special Buttons:
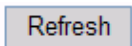
Refresh	Refreshes the list to the most recent status.

Firewall

The firewall on the Motorola Cellular Gateway NC800 is a security software system that enforces an access control policy between the Internet and the Motorola Cellular Gateway NC800 LAN. A firewall determines which information passes in and out of the network.

There are five pages in the Firewall category:

Firewall-> Permanent Port Forwarding	If external users from the Internet need to have access to certain services on the LAN connected to the Motorola Cellular Gateway NC800, then the relevant ports and the addresses of the devices providing those services are specified on this page.
Firewall-> Application Port Forwarding	Some services provided to external users from the Internet need to use different ports for inbound and outbound traffic. The relevant ports and the addresses of the devices where these applications are running are specified on this page.
Firewall-> MAC Address Filtering	If certain devices on the LAN must be prevented from accessing the Motorola Cellular Gateway NC800, then their MAC addresses can be specified on this page.
Firewall-> Port Filtering	If access to the Internet must be restricted, then the relevant information is entered on this page.
Firewall-> DMZ Host	If a DMZ host is provided, its IP address is specified on this page.

Firewall-> Permanent Port Forwarding

This function allows external users from the Internet to have WAN access to public services on the LAN network. These public services are specialized Internet applications such as Web servers, FTP servers and e-mail servers. These types of requests from the external users are forwarded by the Motorola Cellular Gateway NC800 to the appropriate computer on the LAN network.

No port forwarding takes place unless at least one entry exists in the port forwarding table. Any incoming packet that does not match the port numbers on the incoming WAN interface is dropped.
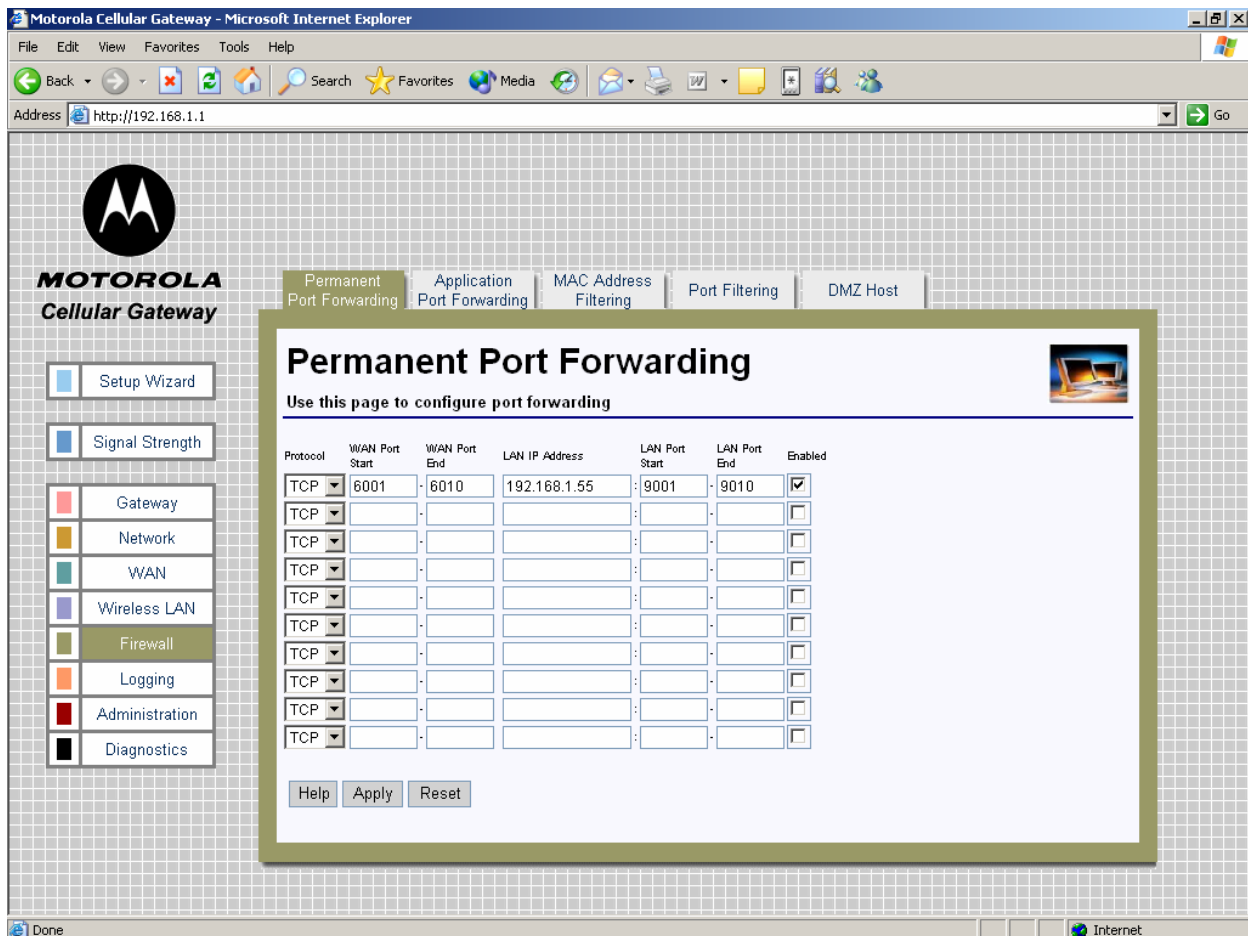
You can specify up to 10 port forwarding entries:

- **Protocol** – Select TCP or UDP for the protocol to be forwarded.
- **WAN Port Start** – The start of the range of port numbers at the incoming WAN interface. To configure a single port number, leave the starting or ending port number empty. Decimal numbers between 0 and 65535.
- **WAN Port End** – The end of the range of port numbers at the incoming WAN interface. To configure a single port number, leave the starting or ending port number empty. Decimal numbers between 0 and 65535.
- **LAN IP Address** – The IP address of the server on the LAN to forward the packet to. Decimal number specified in dotted notation.
- **LAN Port Start** – The start of the range of port numbers at the outgoing LAN interface. Decimal numbers between 0 and 65535.
- **LAN Port End** – The end of the range of port numbers at the outgoing LAN interface. To configure a single port number leave the starting or ending port number empty. Decimal numbers between 0 and 65535.
- **Enabled** – Tick this box to activate the entry.

Port forwarding is an advanced function. No changes should be made to the settings without a thorough understanding of the relevant networking concepts.

Any PC exposed to the Internet using the Permanent Port Forwarding feature should have its DHCP client functionality disabled and should have a new static IP address assigned to it. This is because its IP address may change when using the DHCP function.

Firewall-> Application Triggered Port Forwarding

Some programs, such as Internet games and videoconferencing, require multiple ports for data transmission. Data transmitted using File Transfer Protocol (FTP), for example, is sent from your computer via one port and related data (e.g. an acknowledgement of receipt of data) returns via another port. These multiple port transmissions may cause problems with network address translation (NAT) because the NAT service anticipates that packets related to data sent via one port will return to the same port.

If you are having trouble running a particular program on your network, you may need to establish application-triggered port forwarding for that program. Essentially, application-triggered port forwarding tells the Motorola Cellular Gateway NC800 how to direct traffic across networks.
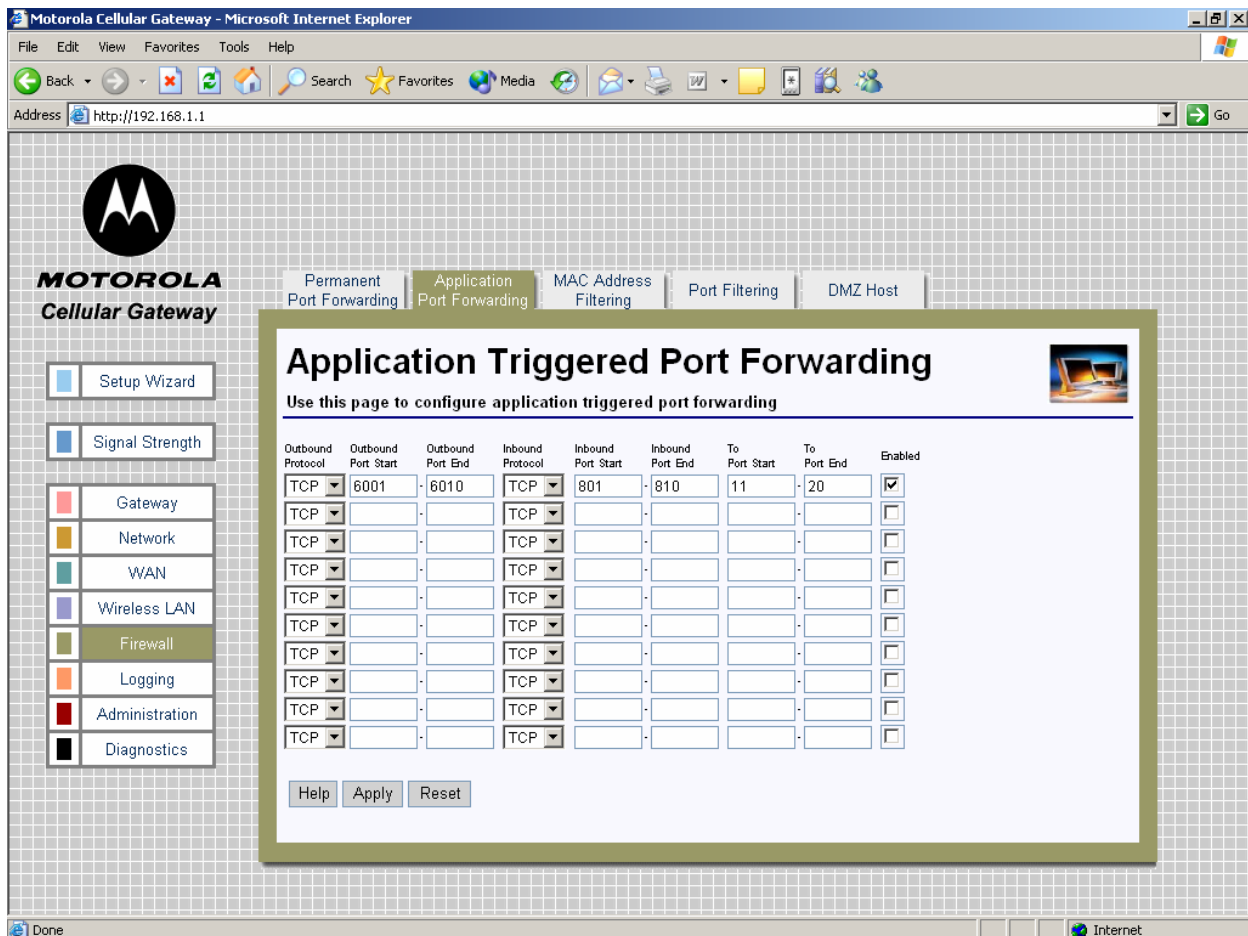
To configure port forwarding for a specific program, you must specify the protocol that the application uses, the outbound port from which data associated with that particular protocol should be sent, and the inbound port or ports to which related data will return. When the Motorola Cellular Gateway NC800 receives a data packet from the wide area network that uses the specified protocol, it sends the packet to the client on your network that is currently using the program.

The inbound ports that you specify will open only when data is sent from the corresponding outbound port. These ports will close again after a certain amount of time has elapsed with no data sent to the inbound port. You can specify one port or a range of ports.

You can only establish application-triggered port forwarding for programs that use the Transmission Control Protocol (TCP) or User Datagram Protocol (UDP).

To identify the protocol that a program uses and the ports to which the data should be sent, consult the documentation for that program.

The Motorola Cellular Gateway NC800 additionally allows Inbound port(s) to be mapped to the actual application inbound ports. These mapped ports are configured in the **To Port** fields.

You can specify up to 10 Application Triggered port forwarding entries.

- **Outbound Protocol** – The outbound protocol (TCP or UDP) used by the application.
- **Outbound Port Start** – The start of the range of outbound port numbers used by the application. Valid values are 0 – 65535.
- **Outbound Port End** – The end of the range of outbound port numbers used by the application. To configure a single mapped port number leave the starting or ending mapped port number empty. Valid values are 0 – 65535.
- **Inbound Protocol** – The inbound protocol (TCP or UDP) used by the application.
- **Inbound Port Start** – The start of the range of port numbers on which responses can be received. Valid values are 0 – 65535.
- **Inbound Port End** – The end of the range of port numbers on which responses can be received. To configure a single UDP port number, leave the starting or ending inbound port number empty.
- **To Port Start** – The start of the range of application port numbers to which the inbound ports are mapped. This mapping is optional. Valid values are 0 – 65535.
- **To Port End –** The end of the range of application port numbers to which the inbound ports are mapped. This mapping is optional. To configure a single mapped port number leave the starting or ending mapped port number empty. Valid values are 0 – 65535.
- **Enabled –** Tick this box to activate the entry.

Port forwarding is an advanced function. No changes should be made to the settings without a thorough understanding of the relevant networking concepts.

Any PC exposed to the Internet using the Application Triggered Port Forwarding feature should have its DHCP client functionality disabled and should have a new static IP address assigned to it. This is because its IP address may change when using the DHCP function.

Firewall-> MAC Address Filtering

If you want to block specific users from accessing the Motorola Cellular Gateway NC800 via the LAN interface then you can use the **MAC Address Filtering** feature.

A MAC address is a 12-digit code assigned to a unique piece of hardware for identification, like a social security number. The MAC address component is fixed and is independent of the component's IP address. This means that you can block a specific component irrespective of the component's IP address.
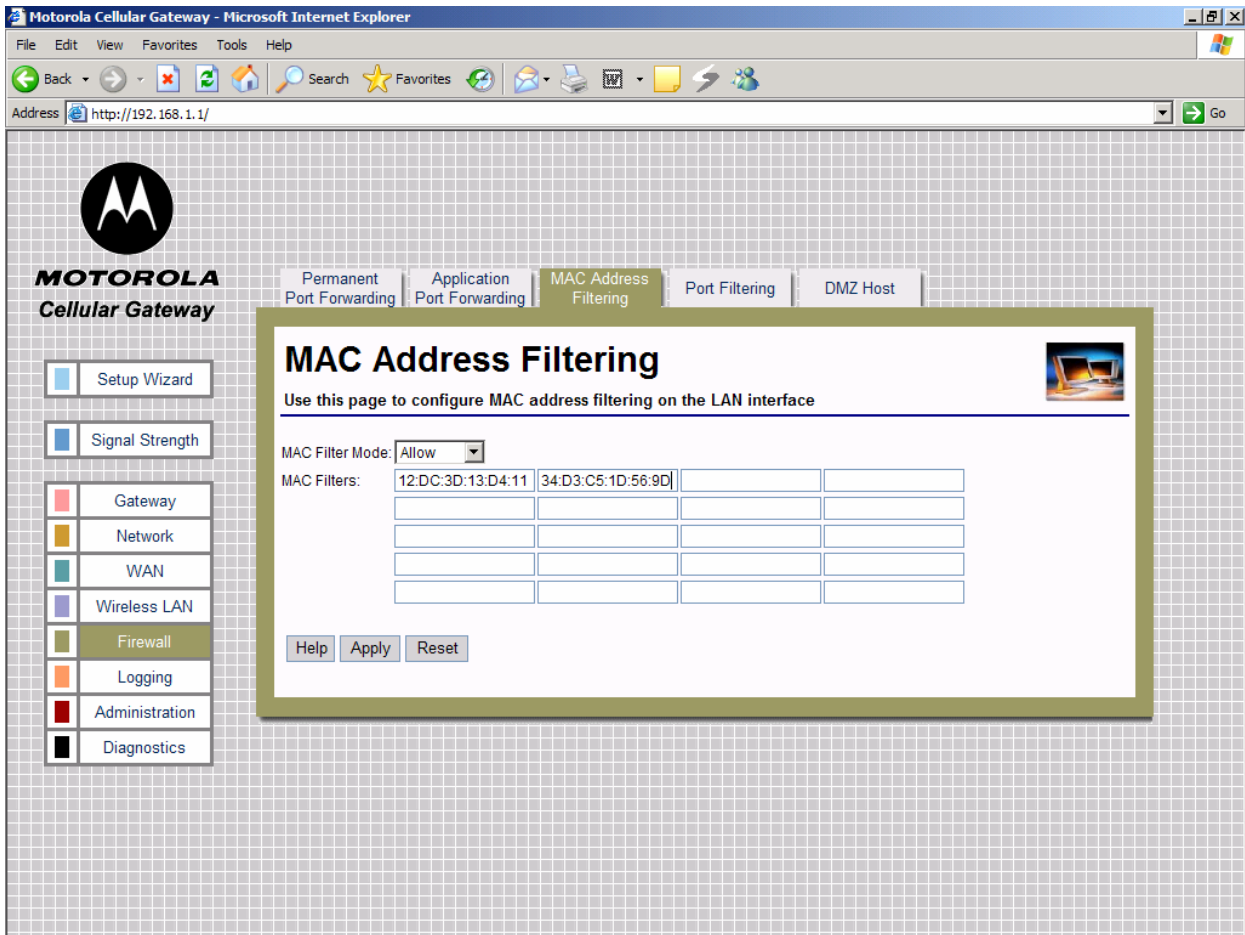
The Motorola Cellular Gateway NC800 supports up to 20 MAC filtering entries.

- **MAC Filter Mode**
  - **Disabled –** No MAC filtering is done.
  - **Allow –** Allow only the specified MAC addresses access to the LAN interface. This is the most secure method, but requires you to add each MAC address individually. It has the advantage that all unknown MAC addresses are blocked.
  - **Deny –** Prevent the specified MAC addresses from accessing the LAN interface. Use this method to block specific users.

- **LAN MAC Filters –** You can specify a list of up to 20 MAC addresses that will be filtered according to the MAC Filter Mode. MAC Addresses must be in the format xx:xx:xx:xx:xx:xx where xx are Hexadecimal digits.
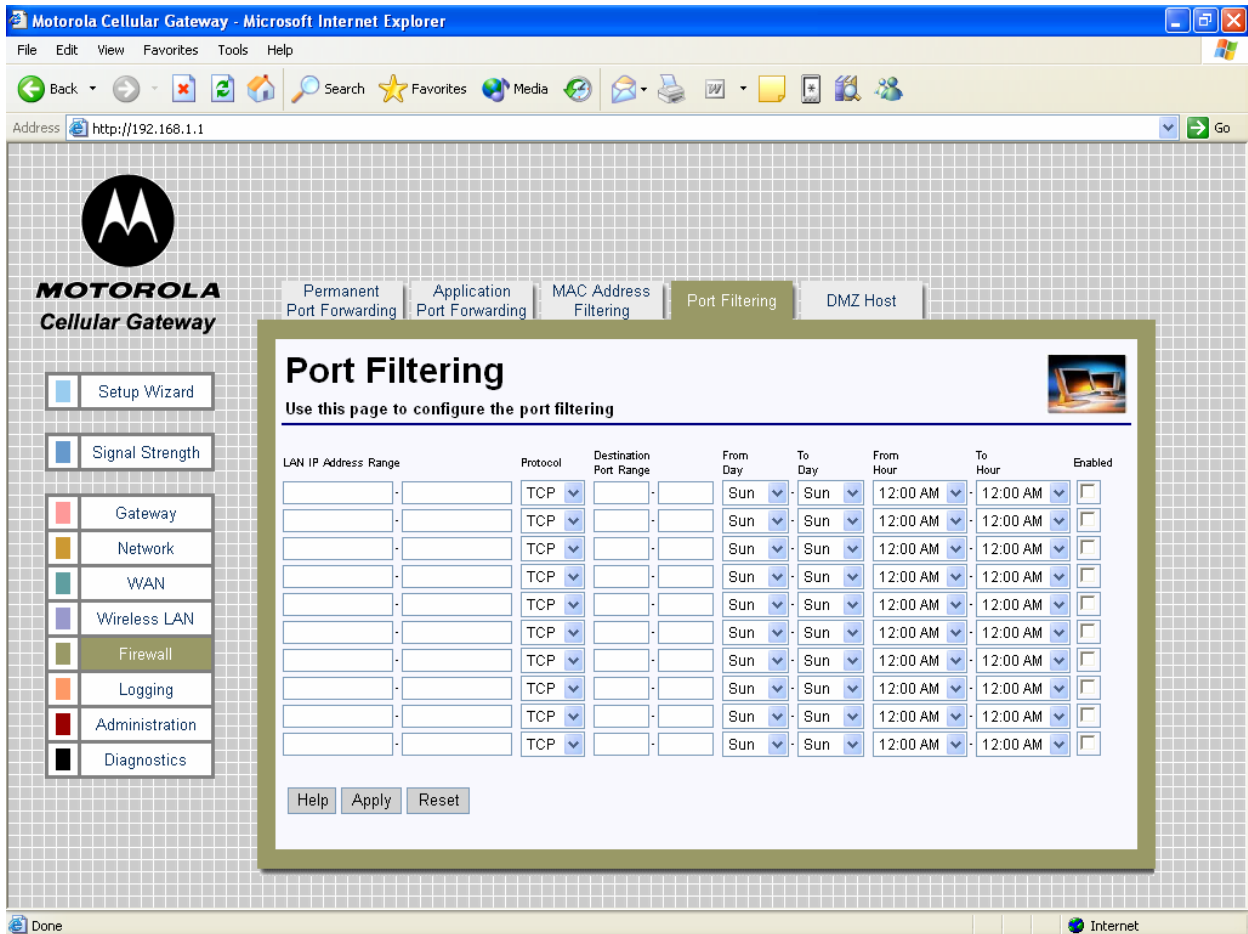
If the MAC address list is empty you must set the **MAC Filter Mode** to **Disabled** or **Deny.** An empty MAC address table does not allow LAN workstations to communicate with the Motorola Cellular Gateway NC800 if the **MAC Filter Mode** field is not set to **Disabled** or **Deny**.

Firewall-> Port Filtering

This function blocks specific internal users (on the LAN side) from accessing the Internet (on the WAN side). TCP and/or UDP packets are filtered on any combination of the following:

- The source IP address
- The destination port number (UDP or TCP)
- Day of the Week
- Time of the Day

You can specify up to 10 TCP/UDP packet filters.

- **LAN IP Address Range** – The IP address range of LAN users to block. To configure a single IP address leave the first or second entry empty. To block TCP/UDP ports for all LAN users type * in the IP address fields. Dotted-Decimal notation must be used.
- **Protocol** – The protocol type (TCP or UDP) for this LAN IP Address Range.
- **Destination Port Range** – The start and end port numbers of the range of ports to block for LAN users. Decimal numbers between 0 and 65535 only.
- **From Day** – Select the day of the week to activate the filter.
- **To Day** – Select the day of the week to deactivate the filter (the filter is still active for this day, but not from the next day onwards).
- **From Hour** – Select the hour of the day to activate the filter.
- **To Hour** – Select the hour of the day to deactivate the filter (the filter is still active for this hour, but not from the next hour onwards).
- **Enabled –** Tick this box to activate the entry.

Firewall-> DMZ Host

This feature allows *a single* computer on your local network to be exposed to all users on the Internet allowing unrestricted two-way communication. The host computer therefore exists in a demilitarised zone (DMZ) and bypasses all the firewall security. You may want to expose a single computer to allow certain applications such as internet-gaming and video conferencing using for example Microsoft's NetMeeting.
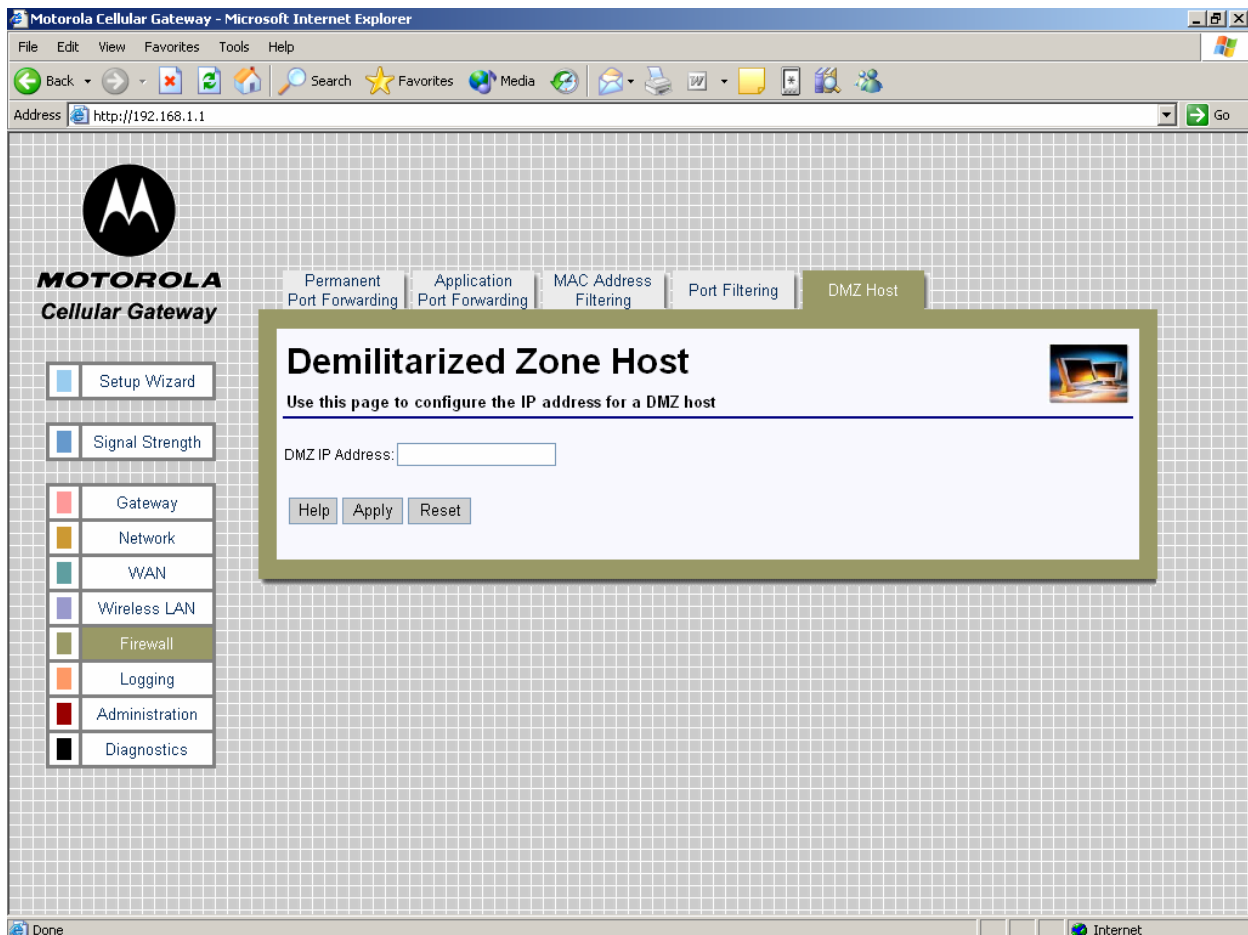
DMZ hosting forwards all the ports (TCP and UDP) at the same time to one specified computer.

- **DMZ IP Address –** The only setting required is the IP address of the computer to expose to the Internet. The exposed computer will receive all data packets that are sent to the Motorola Cellular Gateway NC800's WAN IP address. Leave this blank if you do not want to specify a DMZ Host. Decimal number specified in dotted notation.

Important: DMZ Hosting is an Advanced function. No changes should be made without a thorough understanding of networking concepts.

Warning: Any Internet user who knows this address can connect to the exposed computer. There are methods to scan for open ports on the exposed computer so using this feature is a security risk.

Any PC exposed to the Internet using the DMZ Host feature should have its DHCP client functionality disabled and should have a new static IP address assigned to it. This is because its IP address may change when using the DHCP function.

Logging

There are three pages in the Logging category:

Logging-> Statistics Logging   This page is used to start statistics collection.
Logging-> Internet Site Logging   This page is used to start logging of connections
Logging-> System Log Messages   This page is used to start logging of system messages.

Logging-> Statistics Logging

You can configure the Motorola Cellular Gateway NC800 to periodically log Statistic Information to a web-server running a script that is supplied on the CD accompanying the Motorola Cellular Gateway NC800. Refer to Section 7 in this document for a description of the contents of the statistics files that are generated if the feature on this page is enabled. Section 7 also provides more information on how to set up a Web server.

The statistics logging server URL will be provided to you by your ISP if it has not already been configured by default on the Motorola Cellular Gateway NC800.

- **Server URL** – the full URL of the script that is used for statistics logging. You should set this to be: http://<IP>/Moto3G/gateway_stats.asp where <IP> is the IP address of the server that is running the statistics logging script and **Moto3G** is the name of the directory on the web server where the script is stored. Maximum of 4095 characters beginning with the string "http://". The Statistics Server can be located on the local LAN or anywhere on the Internet.
- **Logging Interval** – The interval in seconds between logging of statistics. Decimal value between 60 and 65535. Default is 3600 seconds (1 hour).

Special Buttons:

Stats   Send the statistics information immediately.

Logging-> Internet Site Logging

You can configure the Motorola Cellular Gateway NC800 to periodically log all incoming and outgoing URLs accessed through the Motorola Cellular Gateway NC800 to a web-server running a script that is supplied on the CD accompanying the Motorola Cellular Gateway NC800. Refer to Section 7 in this document for a description of the contents of the logging files that are generated if the feature on this page is enabled. Section 7 also provides more information on how to set up a Web server.

The Internet Site logging server URL will be provided to you by your ISP if it has not already been configured by default on the Motorola Cellular Gateway NC800.

- **Server URL** – the full URL of the script that is used for statistics logging. You should set this to be: http://<IP>/Moto3G/gateway_stats.asp where <IP> is the IP address of the server that is running the statistics logging script and **Moto3G** is the name of the directory on the web server where the script is stored. Maximum of 4095 characters beginning with the string "http://". The Statistics Server can be located on the local LAN or anywhere on the Internet.
- **Logging Interval** – The interval in seconds between logging of statistics. Decimal value between 60 and 65535. Default is 3600 seconds (1 hour).
- **Internet Site Log Level**
  - **Disabled –** Do not log any information.
  - **Denied –** Log only those connections that are denied by the Motorola Cellular Gateway NC800's firewall.
  - **Accepted –** Log only those connections that are accepted by the firewall.
  - **Both –** Log all denied and accepted connections.

- **Logging Timer Interval** – The interval in seconds between logging of statistics. Decimal value between 60 and 65535. Default is 3600 seconds (1 hour).
- **Connection Log** – Display the current contents of the connection log. This log contains a maximum of 16KB of information. If the log is full, the oldest information is overwritten.

Special Buttons:

| Log | Send the log information immediately.

Logging-> System Log Messages

The Motorola Cellular Gateway NC800 generates system log messages that contain information on Motorola Cellular Gateway NC800 events and errors.

You can log these messages to a server that is running a program that can receive and process the messages. Under Linux this program is called a Syslog Daemon. Windows does not natively support syslog messages, but you can download and install programs from the Internet to process syslog messages. Refer to Section 7 in this document for an example of system log messages that are generated if the feature on this page is enabled. Section 7 also provides more information on how to set up a Syslog Interpreter.

> The system logging server URL will be provided to you by your ISP if it has not already been configured by default on the Motorola Cellular Gateway NC800.
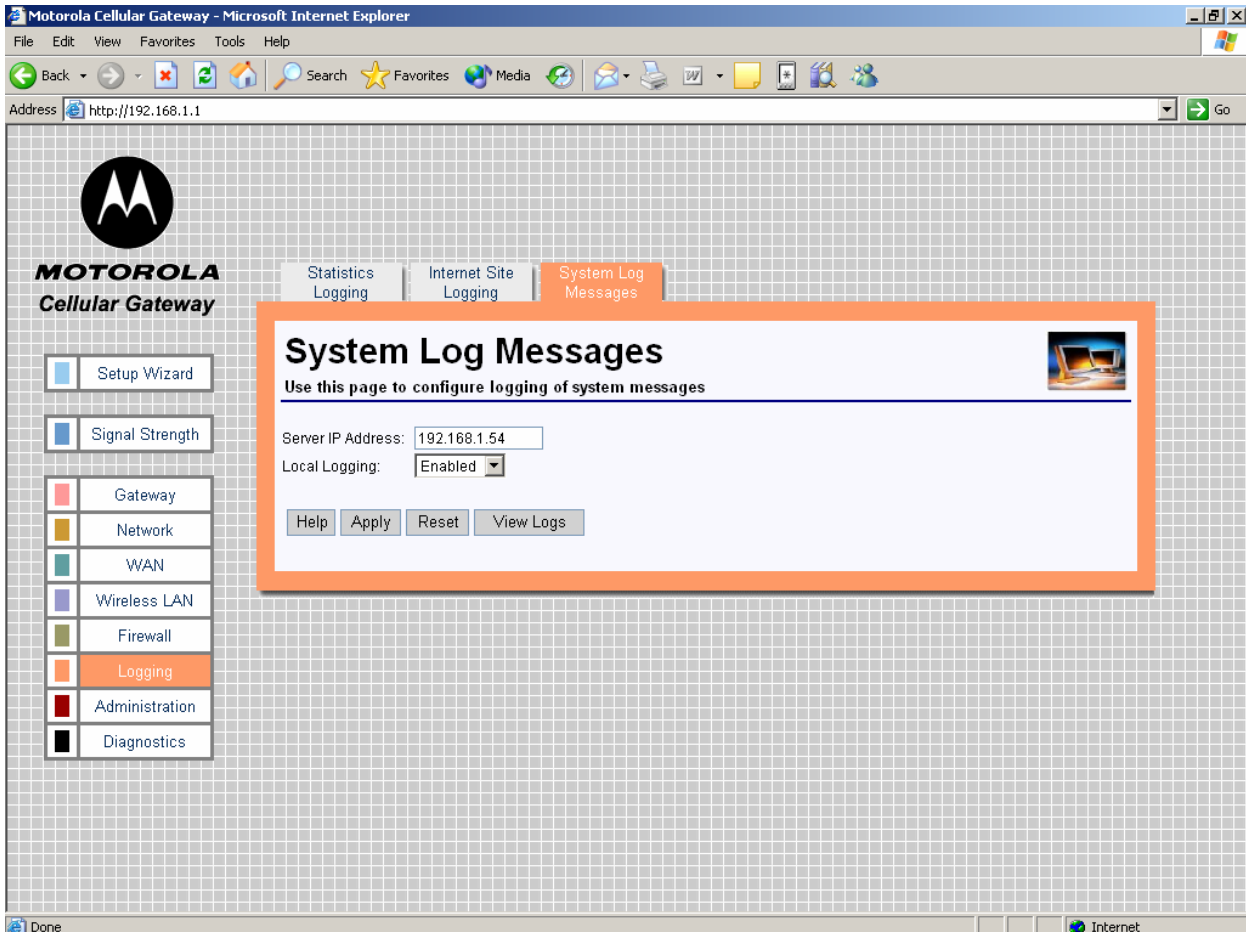
- **Server IP Address** – The IP address of the system log server. If you do not want to log any system messages, leave this field empty. The server should be on the same subnet as the LAN network.
- **Local Logging**
  - **Enabled** – All events and alarms are written to a circular buffer which can be displayed on the Motorola Cellular Gateway NC800 upon request.
  - **Disabled** – No circular logging takes place.

A popular Windows Syslog program can be downloaded from: www.kiwisyslog.com
For a comprehensive description of the syslog protocol, see: www.rfc-archive.org/getrfc.php?rfc=3164

Special Buttons:

View Logs	Shows a log of recent events on the Motorola Cellular Gateway NC800.
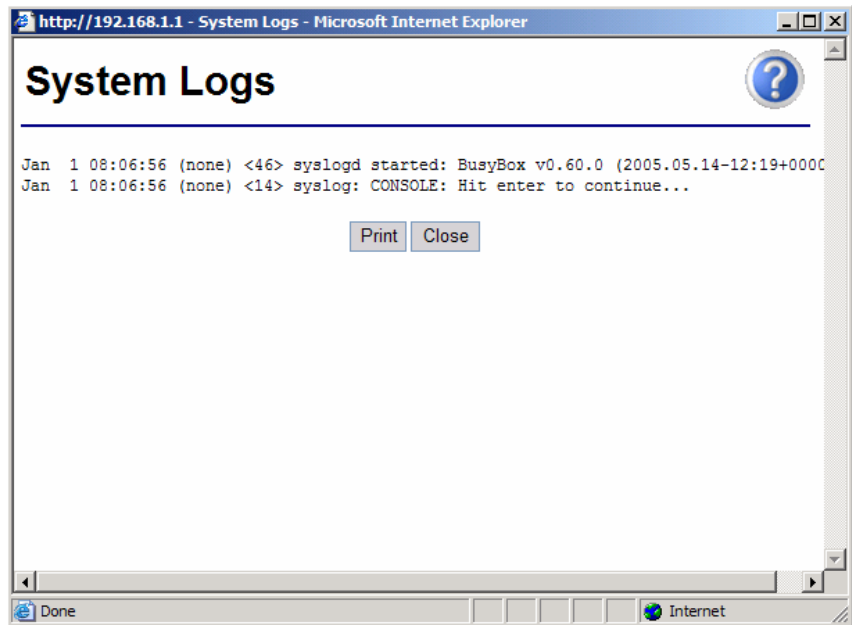
Administration

There are four pages in the Administration category:

Administration-> Status	This page shows a summary of the current Motorola Cellular Gateway NC800 status.
Administration-> Support Server Registration	This page allows the Support Server Registration to be set.
Administration-> Firmware Upload	A firmware upgrade is initiated from this page.
Administration-> Restore	This returns all the Motorola Cellular Gateway NC800 settings to the factory defaults.

Administration-> Status

This page displays a summary of the current Motorola Cellular Gateway NC800 status; it reflects the data and selections you've entered using the various setup pages.
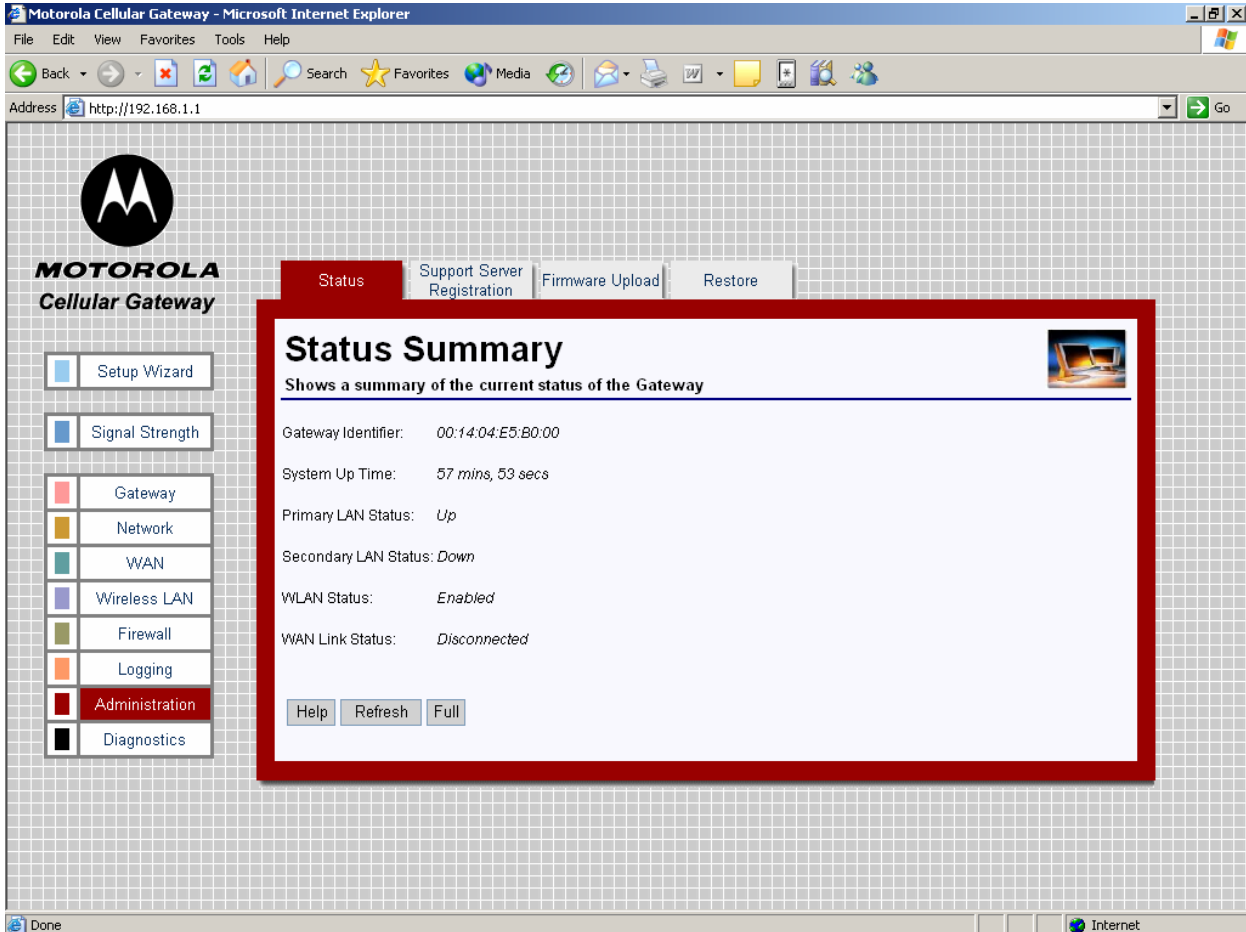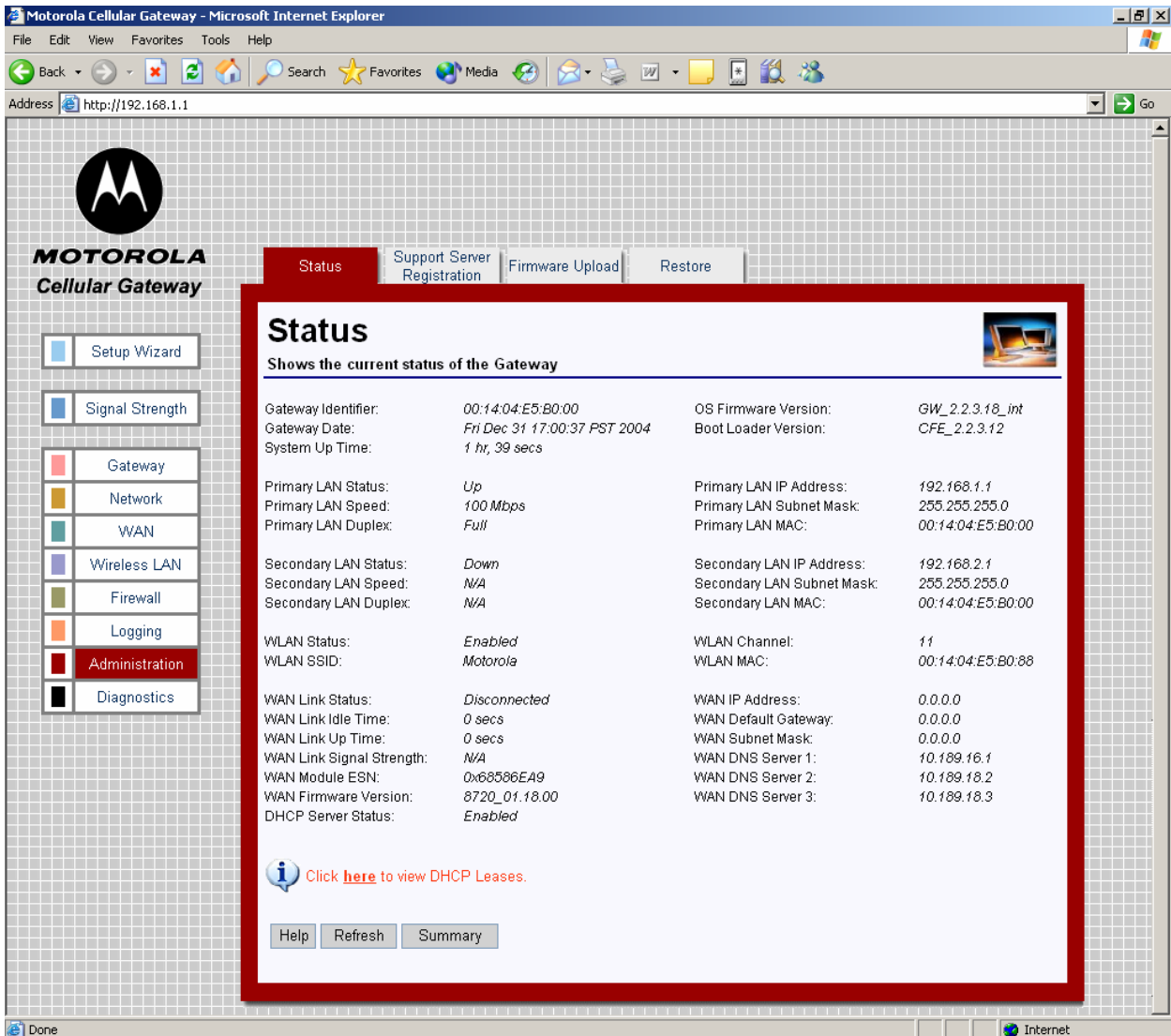
- **Gateway Identifier** – The MAC address of the primary LAN interface is used as the Motorola Cellular Gateway NC800 identifier.
- **System Up Time** – The up time of the system since the Motorola Cellular Gateway NC800 was booted.
- **Primary LAN Status** – Indicates whether the Ethernet link on the primary LAN interface is up or down.
- **Secondary LAN Status** – Indicates whether the Ethernet link on the secondary LAN interface is up or down.
- **WLAN Status** – The current state of the wireless LAN interface (Enabled / Disabled).
- **WAN Link Status** – The current state of the WAN link. If there is a WAN connection then this will show "Connected".

Special Buttons:

Refresh   Refreshes the list to the most recent status.

Full   Displays the Full Status Information. (see next page)

- **Gateway Identifier** – The MAC address of the primary LAN interface is used as the Motorola Cellular Gateway NC800 identifier.
- **Gateway Date** – The current date and time on the gateway.
- **System Up Time** – The up time of the system since the Motorola Cellular Gateway NC800 was booted.
- **OS Firmware Version** – The version of the firmware currently running on the gateway.
- **Boot Loader Version** – The version of the boot loader currently running on the gateway.
- **Primary LAN Status** – Indicates whether the Ethernet link on the primary LAN interface is up or down.
- **Primary LAN Speed** – The speed of the primary LAN interface (10 Mbps / 100 Mbps).
- **Primary LAN Duplex** – The data transmission mode of the primary LAN interface (Half / Full).
- **Primary LAN IP Address** – The IP address assigned to the primary LAN interface.
- **Primary LAN Subnet Mask** – The Subnet Mask for the primary LAN interface.
- **Primary LAN MAC** – The MAC address of the primary LAN interface.
- **Secondary LAN Status** – Indicates whether the Ethernet link on the secondary LAN interface is up or down.
- **Secondary LAN Speed** – The speed of the secondary LAN interface (10 Mbps / 100 Mbps).
- **Secondary LAN Duplex** – The data transmission mode of the secondary LAN interface (Half / Full).
- **Secondary LAN IP Address** – The IP address assigned to the secondary LAN interface.
- **Secondary LAN Subnet Mask** – The Subnet Mask for the secondary LAN interface.
- **Secondary LAN MAC** – The MAC address of the secondary LAN interface.
- **WLAN Status** – The current state of the wireless LAN interface (Enabled / Disabled).

- **WLAN SSID** – The SSID being used by the wireless interface.
- **WLAN Channel** – The current wireless LAN channel being used.
- **WLAN MAC** – The MAC address of the WLAN interface.
- **WAN Link Status** – The state of the WAN link. If there is a WAN connection then this will show "Connected".
- **WAN Link Idle Time** – The time that the WAN link was idle i.e. total time PPP connection was idle.
- **WAN Link Up Time** – The time that the WAN link was in a connected state i.e. total time PPP connection is established.
- **WAN Link Signal Strength** – The last read signal strength for the WAN (CDMA) module obtained when the WAN module was not in data mode.
- **WAN Module ESN** – The ESN of the WAN module.
- **WAN Firmware Version** – The version of the WAN firmware currently running on the gateway.
- **WAN IP Address** – The IP address of the WAN interface.
- **WAN Default Gateway** – The IP address of the default Gateway for the current WAN connection.
- **WAN Subnet Mask** – The WAN Subnet Mask.

> If WAN IP Settings are **statically** configured, the **WAN IP Address**, **WAN Default Gateway** and **WAN Subnet Mask** fields display the values configured on the WAN->IP Settings page. For **dynamic** WAN IP settings, the **WAN IP Address**, **WAN Default Gateway** and **WAN Subnet Mask** fields will only get set once the **WAN Link** is in the **Connected s**tate.

- **WAN DNS Server 1** – The first DNS server IP address.
- **WAN DNS Server 2** – The second DNS server IP address.
- **WAN DNS Server 3** – The third DNS server IP address.
- **DHCP Server Status** – The status of the DHCP server (Enabled / Disabled).

Special Buttons:

Summary   Displays the Summarized status Information.

Administration-> Support Server Registration

This function allows the Motorola Cellular Gateway NC800 to register itself with a remote support server. If an acknowledgement to the HTTP Post message is not received, the Motorola Cellular Gateway NC800 periodically re-sends the message until the acknowledgement is received.

> The support server registration URL will be provided to you by the Cellular Carrier or ISP if it has not been configured by default on the Motorola Cellular Gateway NC800.
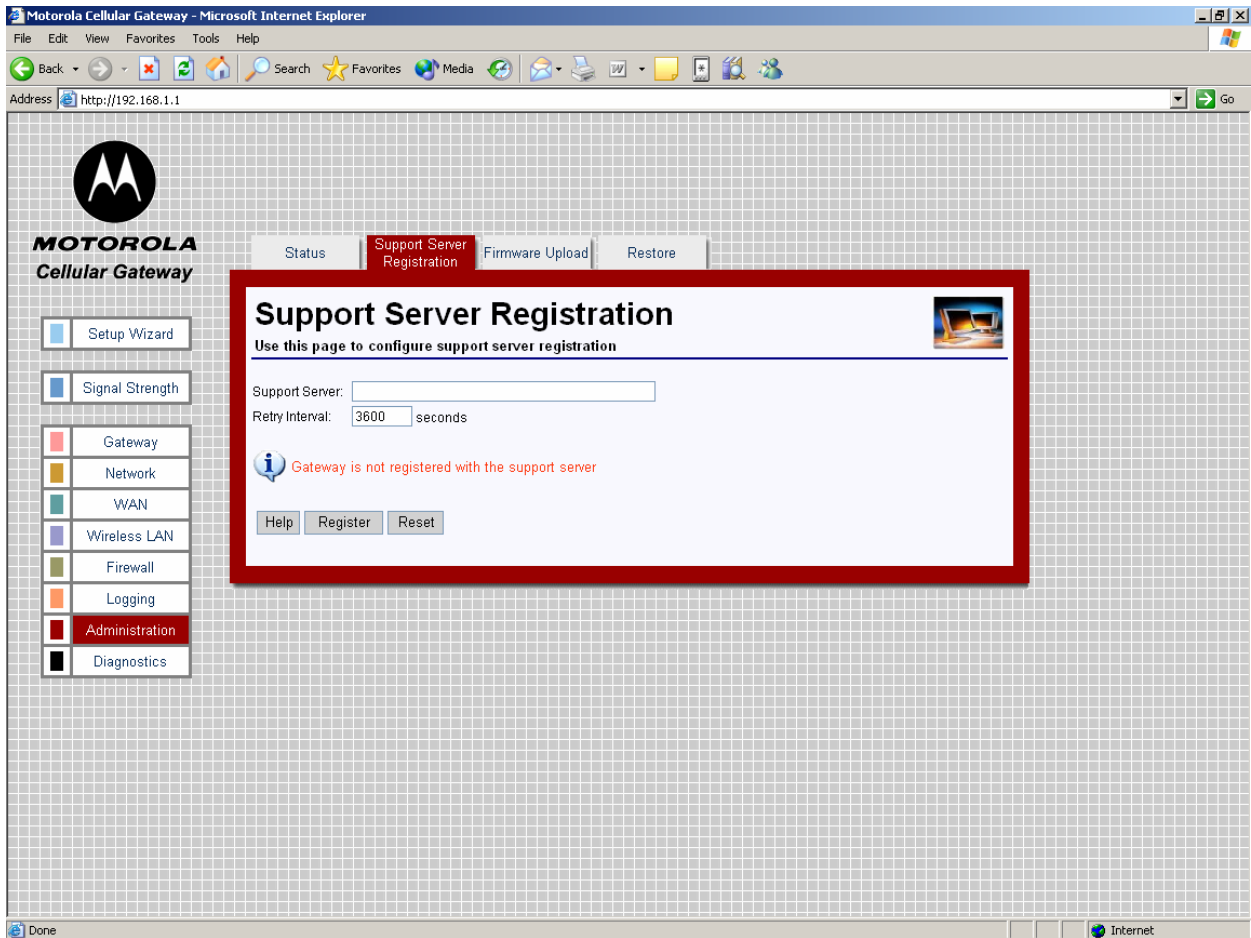
- **Support Server** – The URL of the support server registration script. You should set this to be: http://<IP>/Moto3G/gateway_register.asp where <IP> is the IP address of the server that is running the statistics logging script and **Moto3G** is the name of the directory on the web server where the script is stored. Maximum of 4095 characters beginning with the string "http://". The Registration Server can be located anywhere on the Internet.
- **Retry Interval** – Period between 60 and 65535 seconds at which the Post message is resent in case of failure.

Special Buttons:

| Register | Initiates the contact with the Support Server |

Administration-> Firmware Upload

You have two options to upgrade the firmware of the Motorola Cellular Gateway NC800:

- Use Firmware Upgrade screen in the web-based configuration utility.
- Use a TFTP client.

See Appendix D for more information on using a TFTP client to upgrade the Motorola Cellular Gateway NC800 firmware.
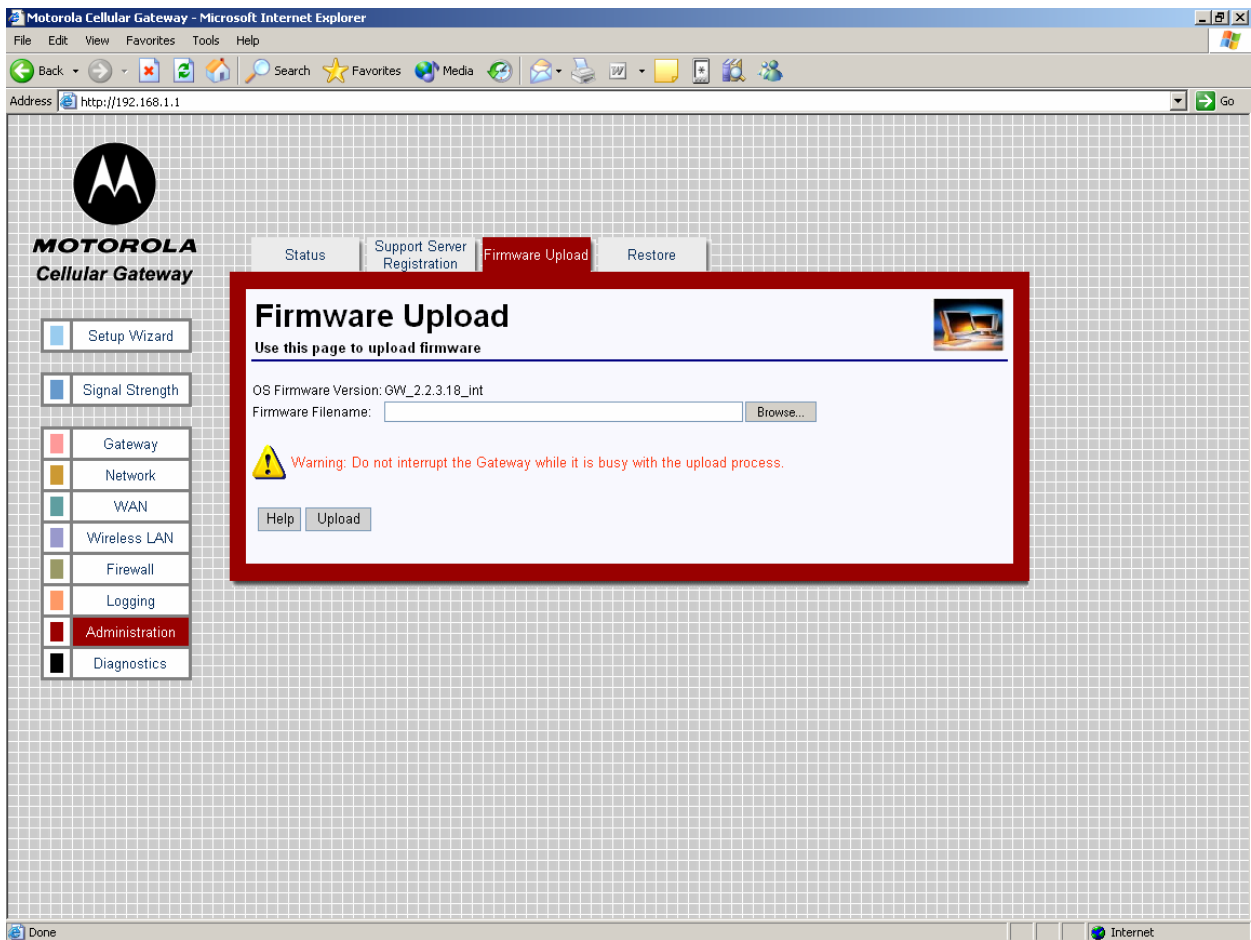
Web-based firmware upload:

- **OS Firmware Version** – Current version of operating system in the Motorola Cellular Gateway NC800.
- **Firmware Filename** – URL of the new firmware image file. Click on the "Browse" button to browse to the image file on your machine. Firmware files are files having a **.trx** extension – for example **linux.trx** is a valid firmware filename. Typically, firmware files are roughly 2.5 MB in size, however, this may differ for newer versions of the firmware.

Warning: Do NOT interrupt the upload process. Doing so may cause the firmware in the Motorola Cellular Gateway NC800 to become corrupted. If this happens your only option is to use a TFTP client to repair the firmware. See Appendix D for more information on using a TFTP client to upgrade the Motorola Cellular Gateway NC800's firmware.

Special Buttons:
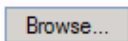
Browse...	Allows the user to browse the local computer file system for a file to upload.
Upload	Once you have selected a new firmware file to download to the Motorola Cellular Gateway NC800, click on the **Upload** button. The upload process takes a few minutes to complete. The Motorola Cellular Gateway NC800 will let you know when the upload has completed. After the upload, the Motorola Cellular Gateway NC800 automatically reboots using the new firmware.
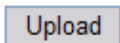
Administration-> Restore

If you want to restore the Motorola Cellular Gateway NC800's factory default settings you can do this via the Web Configuration utility.
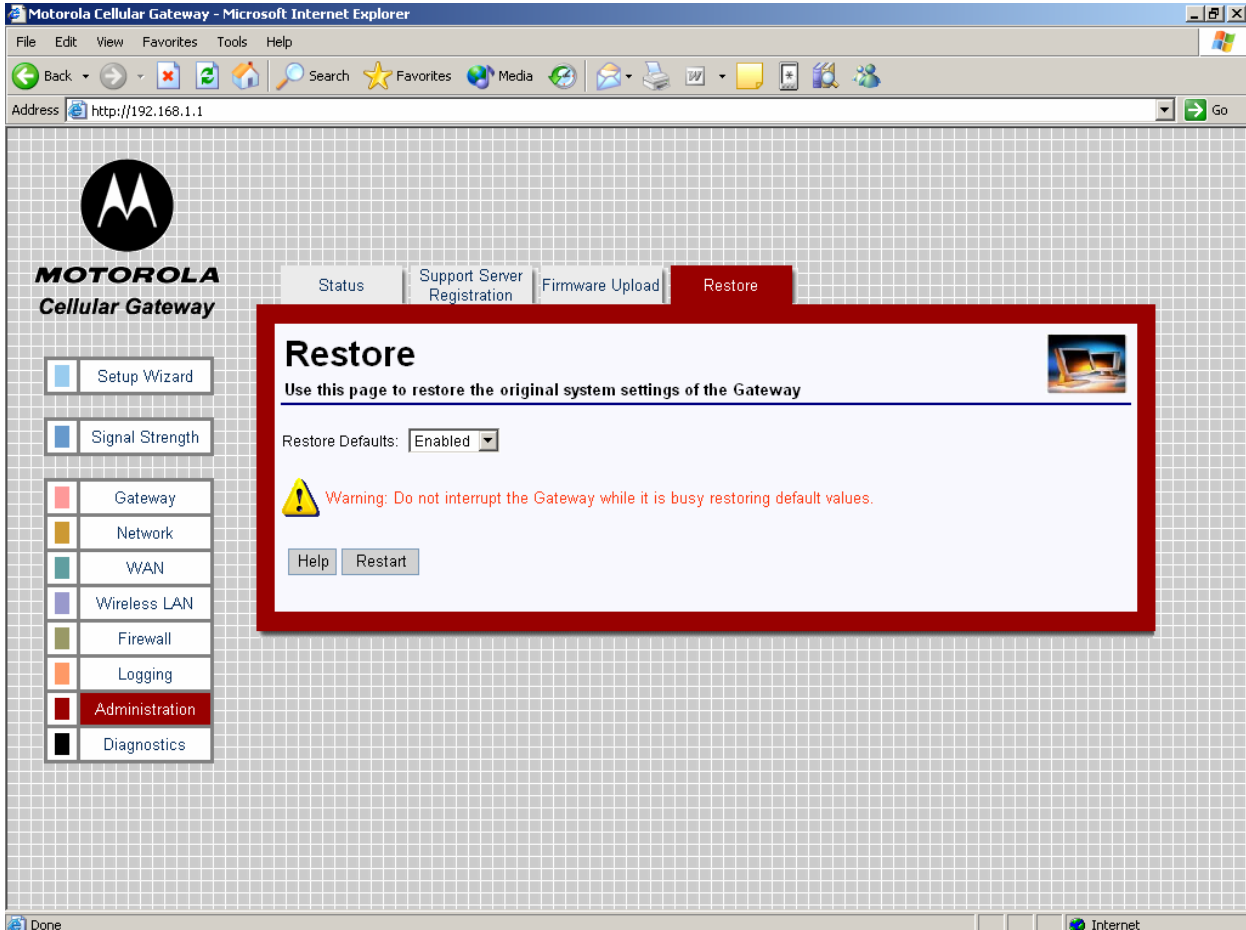
- **Restore Defaults** – When **Enabled** the Motorola Cellular Gateway NC800 will restart with the Default Settings when the **Restart** button is pressed.

Special Buttons:

Restart   Click on the button to restart the Motorola Cellular Gateway NC800. If the Restore Defaults parameter is **Enabled,** the Motorola Cellular Gateway NC800's defaults are restored. The process will take approximately 10 seconds to complete.

Warning: Any settings you have saved will be lost if the default settings are restored.
Please note – the Motorola Cellular Gateway NC800's IP address reverts back to the default of **192.168.1.1** so you will need to point your browser to that address after the restore

---

Diagnostics

There are two pages in the Diagnostics category:

Diagnostics-> Internet Access   This page is used to troubleshoot problems related to Internet Access.

Diagnostics-> LAN Access   This page is used to troubleshoot problems related to LAN Access.

Diagnostics-> Internet Access

This page allows the user to debug errors related to CDMA coverage, CDMA network registration and status, establishment of a PPP connection, IP routing, and DNS lookup.
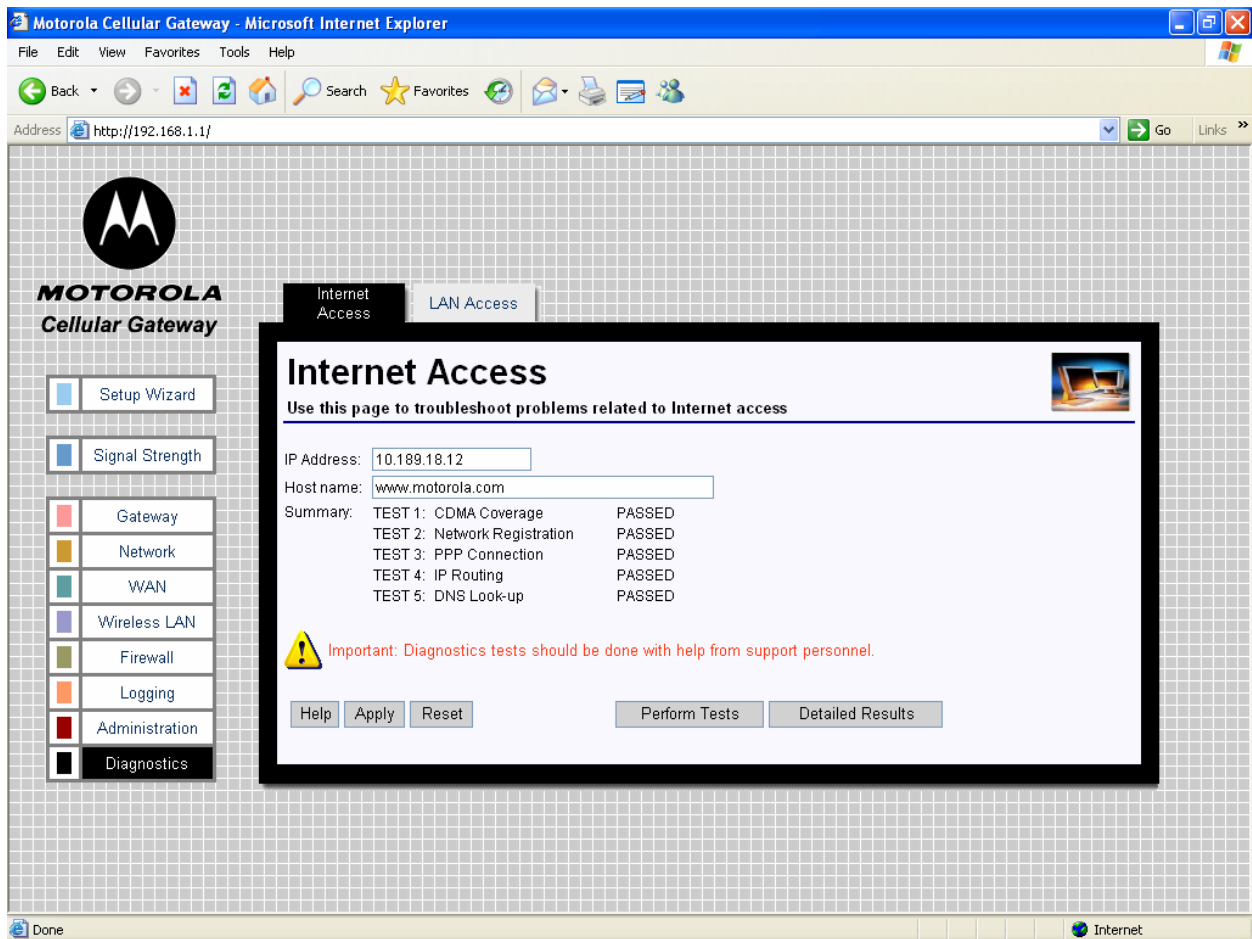
- **IP Address** – Sets the IP address to use for the IP routing diagnostics test.
- **Host name** – The name of the target server that is used to verify the DNS lookup during the diagnostics test.

   Special Buttons:

   Perform Tests   Let the Motorola Cellular Gateway NC800 perform the tests

   Detailed Results   Display the results of the tests

Important: Diagnostics tests should be done with help from support personnel. The detailed results page is not intended for the home user.

Diagnostics-> LAN Access

This page allows the user to debug errors related to LAN access.
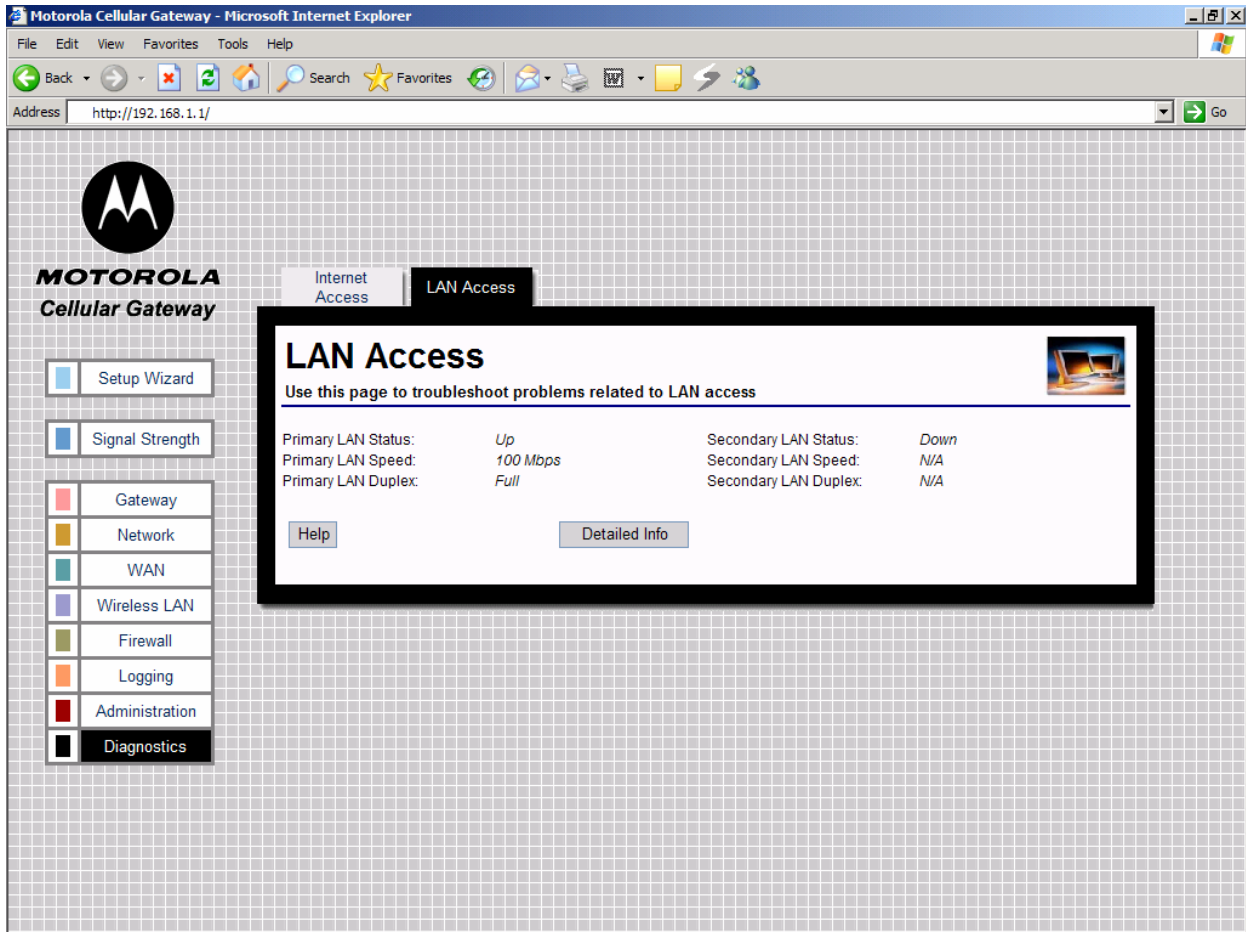
This screen displays the summarized info of the LAN status.

Special Buttons:
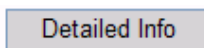
Detailed Info   Display the detailed information about the LAN.

Important: Diagnostics tests should be done with help from support personnel. The detailed information page is not intended for the home user.

Appendix A: Motorola Limited Warranty

What Does this Warranty Cover?

Subject to the exclusions contained below, Motorola, Inc. warrants its Cellular Gateway NC800s, Motorola-branded or certified accessories sold for use with these Products ("Accessories") and Motorola software contained on CD-ROMs or other tangible media and sold for use with these Products ("Software") to be free from defects in materials and workmanship under normal consumer usage for the period(s) outlined below.

This limited warranty is a consumer's exclusive remedy, and applies as follows to new Motorola Products, Accessories and Software purchased by consumers, which are accompanied by this written warranty:

Products and Accessories
Products Covered Length of Coverage Products and Accessories as defined above, unless otherwise provided below.

One (1) year from the date of purchase by the first consumer purchaser of the product unless otherwise provided for below.

Exclusions
Normal Wear and Tear. Periodic maintenance, repair and replacement of parts due to normal wear and tear are excluded from coverage.

Abuse & Misuse. Defects or damage that result from: (a) improper operation, storage, misuse or abuse, accident or neglect, such as physical damage (cracks, scratches, etc.) to the surface of the product resulting from misuse; (b) contact with liquid, water, rain, extreme humidity or heavy perspiration, sand, dirt or the like, extreme heat, or food; (c) use of the Products or Accessories for commercial purposes or subjecting the Product or Accessory to abnormal usage or conditions; or (d) other acts which are not the fault of Motorola, are excluded from coverage.

Use of Non-Motorola Products and Accessories. Defects or damage that result from the use of Non-Motorola branded or certified Products, Accessories, Software or other peripheral equipment are excluded from coverage.

Products and Accessories that are Repaired or Replaced. The balance of the original warranty or for ninety (90) days from the date returned to the consumer, whichever is longer.

Products Covered Length of Coverage Unauthorized Service or Modification. Defects or damages resulting from service, testing, adjustment, installation, maintenance, alteration, or modification in any way by someone other than Motorola, or its authorized service centers, are excluded from coverage.

Altered Products. Products or Accessories with (a) serial numbers or date tags that have been removed, altered or obliterated; (b) broken seals or that show evidence of tampering; (c) mismatched board serial numbers; or (d) nonconforming or non-Motorola housings, or parts, are excluded from coverage.

Communication Services. Defects, damages, or the failure of Products, Accessories or Software due to any communication service or signal you may subscribe to or use with the Products Accessories or Software is excluded from coverage.

Software Exclusions
Software Embodied in Physical Media. No warranty is made that the software will meet your requirements or will work in combination with any hardware or software applications provided by third parties, that the operation of the software products will be uninterrupted or error free, or that all defects in the software products will be corrected.

Software NOT Embodied in Physical Media. Software that is not embodied in physical media (e.g. software that is downloaded from the internet), is provided "as is" and without warranty.

Products Covered Length of Coverage Software. Applies only to physical defects in the media that embodies the copy of the software (e.g. CD-ROM, or floppy disk). **Ninety (90) days** from the date of purchase.

Who Is Covered?

This warranty extends only to the first consumer purchaser, and is not transferable.

What Will Motorola Do?

Motorola, at its option, will at no charge repair, replace or refund the purchase price of any Products, Accessories or Software that does not conform to this warranty. We may use functionally equivalent reconditioned/refurbished/pre-owned or new Products, Accessories or parts. No data, software or applications added to your Product, Accessory or Software will be reinstalled.

How to Obtain Warranty Service or Other Information

Please review the website and/or phone numbers listed below for the product with which they are used. You will receive instructions on how to ship the Products, Accessories or Software, at your expense, to a Motorola Authorized Repair Center. To obtain service, you must include: (a) a copy of your receipt, bill of sale or other comparable proof of purchase; (b) a written description of the problem; (c) the name of your service provider, if applicable; (d) the name and location of the installation facility (if applicable) and, most importantly; (e) your address and telephone number.

www.hellomoto.com
Select "Services"

Latin America:
Centro de Atencion Motorola
Argentina: 0800-666-8676
Chile: 0800-201-442
Columbia: 01-800-700-1504
Mexico: 01-800-021-0000
Peru: 0-800-52-470
Venezuela: 0800-100-4289

Brazil:
Motorola Industrial Ltda.
Rodovia SP-340 - km 128,7 - Bairro Tanquinho
CEP 13820-000 - JaguariŽ na - SP
Central de Relacionamento Motorola
Capitais e Regiões Metropolitanas: 4002-1244
Demais Localidades: 0800-773-1244

North America
Canada: 800-461-4575
US: 800-331-6456

Hong Kong
(852) 2506-3888

China
800-810-5050

For **Accessories** and **Software**, please review the website and/or phone numbers listed above for the product with which they are used. You will receive instructions on how to ship the Products, Accessories or Software, at your expense, to a Motorola Authorized Repair Center. To obtain service, you must include: (a) a copy of your receipt, bill of sale or other comparable proof of purchase; (b) a written description of the problem; (c) the name of your service provider, if applicable; (d) the name and location of the installation facility (if applicable) and, most importantly; (e) your address and telephone number.

What Other Limitations Are There?

ANY IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL BE LIMITED TO THE DURATION OF THIS LIMITED WARRANTY, OTHERWISE THE REPAIR, REPLACEMENT, OR REFUND AS PROVIDED UNDER THIS EXPRESS LIMITED WARRANTY IS THE EXCLUSIVE REMEDY OF THE CONSUMER, AND IS PROVIDED IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. IN NO EVENT SHALL MOTOROLA BE LIABLE, WHETHER IN CONTRACT OR TORT (INCLUDING NEGLIGENCE) FOR DAMAGES IN EXCESS OF THE PURCHASE PRICE OF THE PRODUCT, ACCESSORY OR SOFTWARE, OR FOR ANY INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY KIND, OR LOSS OF REVENUE OR PROFITS, LOSS OF BUSINESS, LOSS OF INFORMATION OR DATA, SOFTWARE OR APPLICATIONS OR OTHER FINANCIAL LOSS ARISING OUT OF OR IN CONNECTION WITH THE ABILITY OR INABILITY TO USE THE PRODUCTS, ACCESSORIES OR SOFTWARE TO THE FULL EXTENT THESE DAMAGES MAY BE DISCLAIMED BY LAW.

Some states and jurisdictions do not allow the limitation or exclusion of incidental or consequential damages, or limitation on the length of an implied warranty, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights, and you may also have other rights that vary from state to state or from one jurisdiction to another.

Laws in the United States and other countries preserve for Motorola certain exclusive rights for copyrighted Motorola software such as the exclusive rights to reproduce and distribute copies of the Motorola software. Motorola software may only be copied into, used in, and redistributed with, the Products associated with such Motorola software. No other use, including without limitation disassembly of such Motorola software or exercise of the exclusive rights reserved for Motorola, is permitted.

Information from the World Health Organization

Present scientific information does not indicate the need for any special precautions for the use of mobile phones. If you are concerned, you may want to limit your own or your children's RF exposure by limiting the length of calls or by using handsfree devices to keep mobile phones away from your head and body.
Source: WHO Fact Sheet 193
Further information: http://www.who.int./peh-emf

Product Registration

Online Product Registration: http://www.motorola.com/warranty
Product registration is an important step toward enjoying your new Motorola product. Registering helps us facilitate warranty service, and permits us to contact you should your product require an update or other
service. Registration is for U.S. residents only and is not required for warranty coverage. Please retain your original dated sales receipt for your records. For warranty service of your Motorola Product you will need to provide a copy of your dated sales receipt to confirm warranty status. Thank you for choosing a Motorola product.

Appendix B: Troubleshooting

This section discusses possible problems and outlines possible solutions.

1. I cannot access the Motorola Cellular Gateway NC800's web-based Configuration utility.
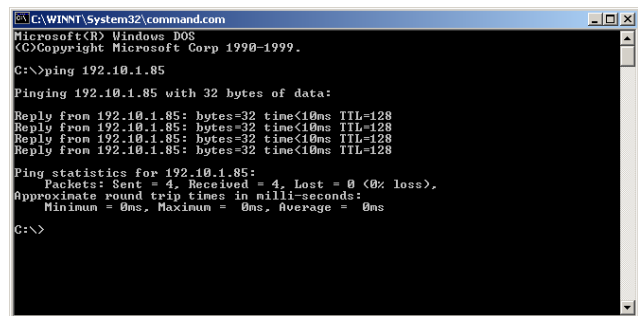
It is recommended, but not required, that you configure the Motorola Cellular Gateway NC800 via a computer that is directly connected to the Motorola Cellular Gateway NC800's LAN interface.

- Check that the Motorola Cellular Gateway NC800 is properly installed and is powered ON.
- Check that there is a network connection between the Motorola Cellular Gateway NC800 and the computer that is being used to configure the Motorola Cellular Gateway NC800.
  o Check that the computer is connected to the Motorola Cellular Gateway NC800, either directly or via another network path for example via a hub or a switch.
  o Check that the computer's Ethernet adapter is working correctly.
    ▪ Ensure that the drivers for the network adapters are installed correctly.
    ▪ Check the status of the network connection. It should say "connected" or indicate the speed of the connection e.g. 10 Mbps or 100 Mbps.
  o Check that the PC's IP address is in the same range and subnet as that of the Motorola Cellular Gateway NC800.
  o Try to ping the Motorola Cellular Gateway NC800 to make sure that it is responding. Open a command console window (Go to **Start -> Run.** Type in **cmd** (if you are using Windows 98 / ME type in **command**). When the console window opens, type in **ping 192.168.1.1**. If you have changed the IP address of the Motorola Cellular Gateway NC800 then use that address instead. The Motorola Cellular Gateway NC800 should respond with four replies.
- Check the Security Level set on the Browser. Depending on the browser, a High Security Level might prevent Javascripts from being executed on the PC. On the browser configuration, set the Internet Security to Low and ensure that Javascripting is enabled.

A quick way to check a network connection is to use the **ping** command. Type in **ping xxx.xxx.xxx.xxx** where xxx is the IP Address that you want to test. The command then sends test packets to the destination address. If there exists a network connection to the address, you should see four replies.
Be sure to use the correct IP address.

2. How do I check that my LAN Ethernet adapter is working correctly?

- Select **Control Panel** from **My Computer**. Go to **Network Connections** and double-click on the Ethernet Adapter.
- If your network card is working correctly:
  o The Status will be **Connected.**
  o The Sent and Received byte counter will increase as data is sent and received via the network adapter.
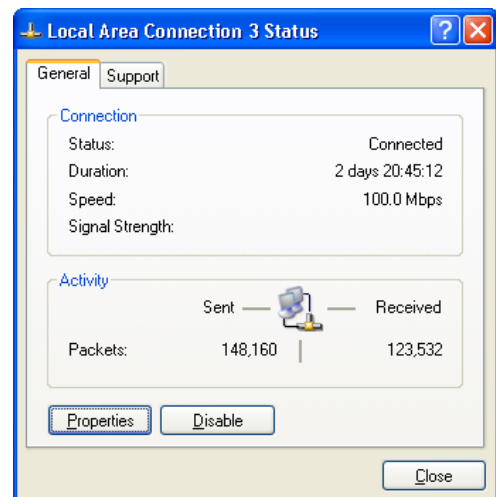
3. I cannot establish a wireless connection to the Motorola Cellular Gateway NC800.

Please consult the user guide of your computer's WLAN adaptor when configuring any of the settings discussed below.

- Check that you are using the same SSID and channel number as the Motorola Cellular Gateway NC800. If either one is not the same then the wireless data packets will be ignored by the Motorola Cellular Gateway NC800.
- If the Motorola Cellular Gateway NC800 is set to use WEP encryption then ensure that the wireless adapter on the client is also set accordingly. Make sure the encryption level (i.e. whether a 64-bit or 128-bit key is used) is set to the same level on both the client and the Motorola Cellular Gateway NC800. Also check that the encryption keys are the same.

4. My wireless LAN connection is being dropped intermittently.

- Please refer to the **Installation Considerations** section for more information on how to optimally position wireless network devices.
- Check the antenna orientation on the Motorola Cellular Gateway NC800.
- Check to see if other electronic equipment is not interfering with the wireless data transmissions.
- Use the laptop or workstation's signal strength indicator to see what the signal strength is at the current location. It could be that the signal strength is just too low for a reliable connection. In this case you need to move the wireless adapter closer to the Motorola Cellular Gateway NC800 for increased signal strength.

5. The network is configured correctly, but the Motorola Cellular Gateway NC800 is not responding

- Check to see if any of the lights (LEDs) on the Motorola Cellular Gateway NC800 are flickering at all.
- If the is no flickering for an extended period of time then you can try to reset the Motorola Cellular Gateway NC800 by pressing the **Reset** button at the back of the Motorola Cellular Gateway NC800. Do not hold the Reset button in, only press it once and release it again. This will reset the Motorola Cellular Gateway NC800.

6. I do not know the IP address / User name / Password of the Motorola Cellular Gateway NC800 anymore.

In some cases, the IP address / User Name / Password of the Motorola Cellular Gateway NC800 may not be known anymore, making it impossible to connect to the web-based Configuration Utility.

- After you have tried all other methods of trouble shooting, you can restore the Motorola Cellular Gateway NC800's factory default settings.
  - o Locate the Reset button on the back of the Motorola Cellular Gateway NC800.
  - o Press the Reset button and hold it down for 10 seconds.
  - o Release the Reset button.
  - o The Motorola Cellular Gateway NC800 will reboot and all the settings will be set according to the factory default settings.
  - o You will have to redirect any open web browser to the Motorola Cellular Gateway NC800's default IP address: 192.168.1.1, using the default user name (admin) and password (admin).

7. When using DHCP on the LAN interface, the IP address that my computer receives is not correct.

- Ensure that there is no other DHCP server active on the same LAN segment that the Motorola Cellular Gateway NC800 is located on. If more than one DHCP server is active on your network you could see that some computers receive IP addresses from the first DHCP server and the rest of the computers from the next. This will cause major network problems and should be avoided by only having ONE DHCP server active on a network.
- Check that the Motorola Cellular Gateway NC800's DHCP starting and ending DHCP IP address ranges are correct.

8. **I cannot connect to the Internet via the Motorola Cellular Gateway NC800.**

- If your Cellular Carrier or ISP is using PPP, then check that the **WAN-> PPP Config** settings are configured correctly.
- Try to ping the WAN Interface port IP address.
- Try to ping your ISP's default Motorola Cellular Gateway NC800 – check to see if the modem's activity lights are flickering when you do this.
- Try to ping a well-known Internet IP address such as www.motorola.com.

9. **I need to access the Motorola Cellular Gateway NC800's configuration remotely.**

To access the Motorola Cellular Gateway NC800's web-based configuration utility from the Internet you need to:
- Under **Gateway-> Login Settings** specify a Gateway WAN Port.
- A good value to use is 8080.
- To open the web-based utility, open a browser to http://<IP>:8080 where <IP> is the IP address of the Motorola Cellular Gateway NC800's WAN Interface.
- You get the WAN Interface IP address from the **WAN->IP Settings** pages.
- When prompted, type in the same username and password that you would normally use when opening the web-based configuration utility.

10. **I do not see the full 54 Mbps throughput when using the wireless interface.**

As with any wireless protocol, 802.11g has overhead associated with it that limits performance. While signaling data rates of up to 54 Mbps may be achieved, like most shared media (e.g. Ethernet) throughput will be significantly less.
There are two scenarios for 802.11g performance. In an environment with only 802.11g clients, throughput of up to 23 Mbps is expected. This performance is equal to that of 802.11a, although 802.11g is usually available over a greater range - distance - from the Motorola Cellular Gateway NC800. The second scenario is when 802.11b clients are present. RTS/CTS flow control (a signaling technique used by the 802.11 standard) must be used to allow 802.11b clients to recognize and establish communications with 802.11g access points. This leads to delays in transmission and drops peak throughput to about 10 Mbps. 802.11g performance is still well in excess of the maximum measured speeds of 4-5 Mbps for 802.11b.

The use of RTS/CTS is important because it provides determinism to the wireless network, ensuring a minimum bandwidth for each user. Like Ethernet, 802.11 LANs normally use a "carrier sense media access" mechanism to signal transmission without asking for permission from the network. As the network becomes highly loaded, collisions occur more frequently, and the network can become saturated with packet retransmission attempts that eventually make it impossible for any data to get through. RTS/CTS provide a more formalized flow-control mechanism that avoids this problem.

For optimal throughput keep the following in mind:
- Refer to the section on "Installation Considerations" for information on how to optimally position the Motorola Cellular Gateway NC800.
- Do not connect more than 32 wireless clients to the Motorola Cellular Gateway NC800. Rather spread the wireless clients over more than one Motorola Cellular Gateway NC800.
- Try to keep the number of 802.11b wireless clients to a minimum. The Motorola Cellular Gateway NC800 is compatible with 802.11b clients, but this degrades the overall wireless performance of the network. If at all possible, try to use only 802.11g wireless adapters in your network.

11. I need to set a static IP address on a PC.

The Motorola Cellular Gateway NC800 provides a DHCP server that automatically assigns IP numbers to PCs on the network. Sometimes, you need to assign a specific IP address to a computer e.g. when you want to configure a DMZ Host.

To assign a static IP address to a PC:

For Windows 98 and ME:

1. Click on the [Start] button. Select **Settings**->**Control Panel**.

2. Double click on the Network icon.

3. In the Network dialog box, select the TCP/IP for the applicable Ethernet adapter. Click on the **Properties** button.
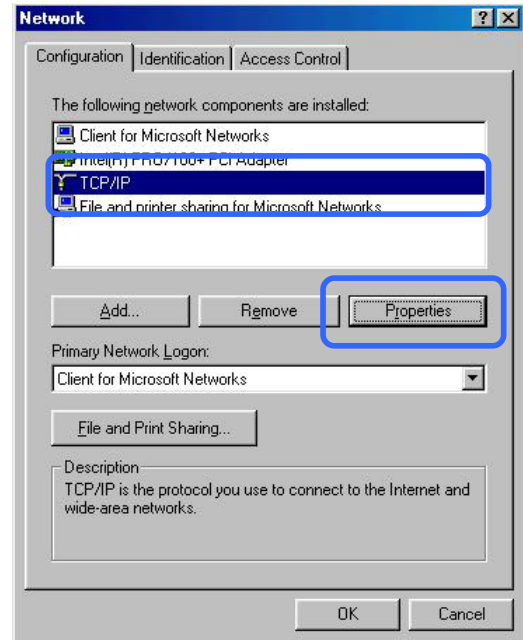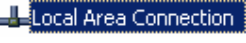
4. Select the **IP Address** tab. Select **Specify an IP address.**
5. Choose an IP address that is in the same subnet as the Motorola Cellular Gateway NC800. If you are using the Motorola Cellular Gateway NC800's default IP address of 192.168.1.1 then you have to choose an IP address in the **192.168.1.x** range.
6. Type in a subnet mask. In most cases this will be **255.255.255.0**.

---
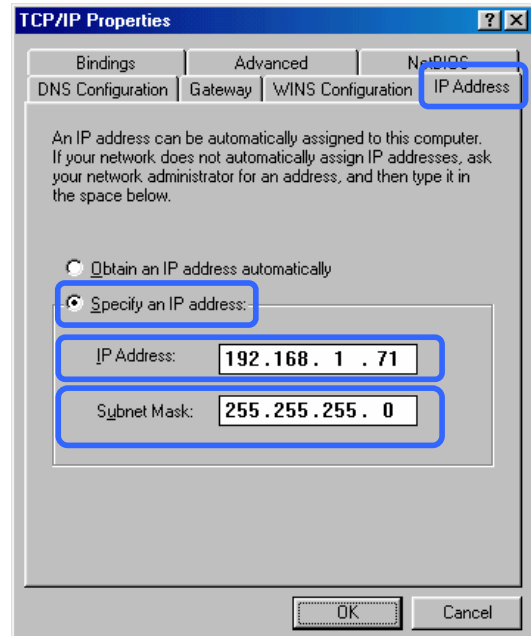
7. Click on the **Gateway** tab.
8. Type in the Motorola Cellular Gateway NC800's IP address in the **New Gateway** field and click on **Add**.
9. Click on **OK** to apply your changes and to close the dialog box.
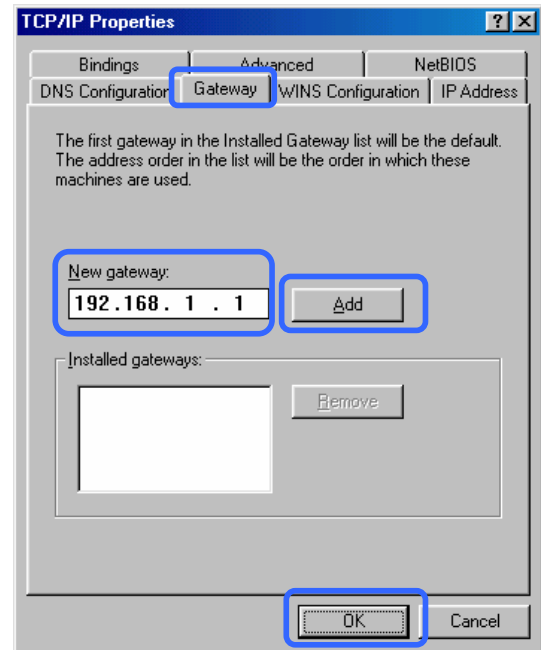
For Windows 2000 and XP:

1. Click on the [Start] button. Select **Settings->Control Panel**. Double click on **Network and Dial-up Connections**.
2. Double click on the [Local Area Connection] for the applicable Ethernet adapter.
3. The **Local Area Connection Status** dialog box are displayed:
4. Click on the **Properties** button.
5. Ensure that the check box next to **Internet Protocol (TCP/IP)** is selected. Select **Internet Protocol (TCP/IP)** and click on the **Properties** button.
6. Select "**Use the following IP address**". Type in a unique IP address that is not used by any other computer on the network.
7. Type in a **subnet mask**, e.g. 255.255.255.0.
8. Type in the **Default Gateway** for this computer. In most cases this should be the IP address of the Motorola Cellular Gateway NC800. If you are using the Motorola Cellular Gateway NC800's default IP address this will be **192.168.1.1**.
9. Select "**Use the following DNS server addresses**". Type in the IP addresses of the Preferred and Alternate DNS servers.

---
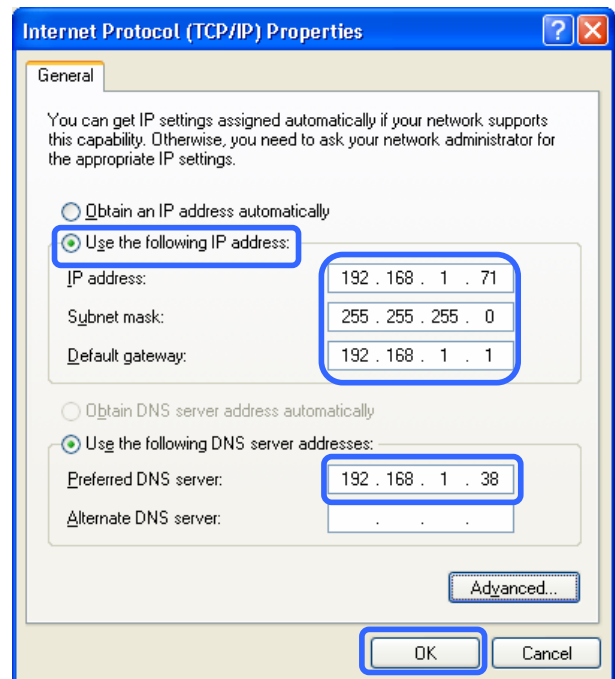
12. How do I determine a computer's MAC address?
- Open a command console window (Go to **Start -> Run.** Type in **cmd** (if you are using Windows 98 / ME type in **command**). When the console window opens, type in **ipconfig /all**.
- The following information will be displayed:
  - o IP address
  - o Subnet mask
  - o Default Gateway
  - o Host Name
  - o **MAC Address** (Physical Address)

```
C:\WINDOWS\System32\cmd.exe                                          _ □ ×

Ethernet adapter Local Area Connection 2:

        Connection-specific DNS Suffix  . :
        Description . . . . . . . . . . . : National Semiconductor Corp. DP83820
 Gigabit Network Controller
        Physical Address. . . . . . . . . : 00-30-F1-29-A3-9B
        Dhcp Enabled. . . . . . . . . . . : Yes
        Autoconfiguration Enabled . . . . : Yes
        IP Address. . . . . . . . . . . . : 192.168.1.100
        Subnet Mask . . . . . . . . . . . : 255.255.255.0
        Default Gateway . . . . . . . . . : 192.168.1.1
        DHCP Server . . . . . . . . . . . : 192.168.1.1
        DNS Servers . . . . . . . . . . . : 192.168.1.1
        Lease Obtained. . . . . . . . . . : 02 June 2005 02:22:25 PM
        Lease Expires . . . . . . . . . . : 03 June 2005 02:22:25 PM

C:\>
```

Appendix C: Glossary

This section provides more background information on some of the terms and acronyms that are encountered when dealing with wireless gateways.

10/100 Ethernet Card	A card that is installed in a computer to facilitate the connection to an Ethernet based LAN. It will support up to 100 megabits per second of data transmitted over a UTP cable. This is also called a Network Interface Card (NIC).
54g™	Broadcom's 54 Mbps implementation of the draft specification for IEEE 802.11g wireless networks. It is 802.11b-compliant and provides laptops, handheld computers and other devices with wireless connectivity at nearly five times the speed of existing technologies operating in the 2.4 GHz radio frequency range, while providing backwards compatibility to the base of more than 30 million installed 802.11b devices.

A

AP	A device that provides wireless LAN connectivity to wireless clients (stations). The Motorola Cellular Gateway NC800 acts as a wireless access point.
Adapter	A device or card that connects a computer, printer, or other peripheral device to the network or to some other device. A *wireless adapter* connects a computer to the wireless LAN.
Address translation	See *NAT.*
AH	Authentication Header.
ALG	Application level gateway triggers are required by some file transfer (for example, FTP), game, and video conferencing applications to open one or more ports to enable the application to operate properly.
ANSI	The American National Standards Institute is a non-profit, independent organization supported by trade organizations, industry, and professional societies for standards development in the United States. This organization defined ASCII and represents the United States to the International Organization for Standardization.
ARP	Address Resolution Protocol broadcasts a datagram to obtain a response containing a MAC address corresponding to the host IP address. When it is first connected to the network, a client sends an ARP message. The Motorola Cellular Gateway NC800 responds with a message containing its MAC address. Subsequently, data sent by the computer uses the Motorola Cellular Gateway NC800 MAC address as its destination.
ASCII	The American Standard Code for Information Interchange refers to alphanumeric data for processing and communication compatibility among various devices; normally used for asynchronous transmission.
authentication	The process a station uses to announce its identity to another station. IEEE 802.11 specifies two forms of authentication: Open System and Shared Key.
Auto-MDIX	Automatic medium-dependent interface crossover detects and corrects cabling errors by automatically reversing the send and receive pins on any port. It enables the use of straight-through wiring between the Motorola Cellular Gateway NC800 Ethernet ports and any computer, printer, or hub.

AWG   American Wire Gauge - A standard system used to designate the size of electrical conductors; gauge numbers are inverse to size.

B

bandwidth   The amount of data that can be transferred in a given amount of time. It is usually measured in bits per second (bps).

beacon   Small packets that are sent at regular intervals by a wireless gateway to synchronize the wireless network.

binary   A numbering system that uses two digits, 0 and 1.

Bit rate   The number of bits (digital 0s and 1s) transmitted per second in a communications channel. It is usually measured in bits per second bps.

bps   Bits per second.

bridge   An OSI layer 2 networking device that connects two LANs using similar protocols. It filters frames based on the MAC address to reduce the amount of traffic. A bridge can be placed between two groups of hosts that communicate frequently together, but not so much with the hosts in the other group. The bridge examines the destination of each packet to determine whether to transmit it to the other side. See also *switch*.

broadband   High bandwidth network technology that multiplexes multiple, independent carriers to carry voice, video, data, and other interactive services over a single cable. A communications medium that can transmit a relatively large amount of data in a given time period.

broadcast   Simultaneous transmission to multiple network devices; a protocol mechanism supporting group and universal addressing. See also *multicast* and *unicast*.

C

CDMA   Code Division Multiple Access.

Circuit-switched   Network-connection scheme used in the traditional PSTN telephone network where each connection requires a dedicated path for its duration. An alternative is packet-switched.

Class C network   An IP network containing up to 253 hosts. Class C IP addresses are in the form network.network.network.host.

client   In a client/server architecture, a client is a computer that requests files or services such as file transfer, remote login, or printing from the server. On an IEEE 802.11b wireless LAN, a client is any host that can communicate with the access point. Also called a CPE. A wireless client is also called a station.

CNR   Carrier to Noise Ratio.

CPE   Customer premise equipment, typically computers, printers, etc., are connected to the gateway at the subscriber location. CPE can be provided by the subscriber or the service provider. Also called a client.

Crossover cable   A cable in which the receive and transmit lines (input and output) are crossed. Crossover cables are often used to connect hubs together.

crosstalk   Undesired signal interfering with the desired signal.

CSMA/CD   Carrier Sense Multiple Access with Collision Detection.

D

datagram   In RFC 1594, a datagram is defined as a self-contained, independent entity of data carrying sufficient information to be routed from the source to the destination computer without reliance on earlier exchanges between the source and destination computer and the transporting network. For the most part, it has been replaced by the term packet.

Default gateway   The gateway used to forward all traffic that is not addressed to a station within the local subnet.

Default route   The route by which packets are forwarded when other routes in the routing table do not apply.

DHCP   Dynamic Host Configuration Protocol - A protocol that lets network administrators manage centrally and automate the assignment of Internet Protocol (IP) addresses in an organization's network. Each machine that can connect to the Internet needs a unique IP address. When an organization sets up its computer users with a connection to the Internet, an IP address must be assigned to each machine. Without DHCP, the IP address must be entered manually at each computer and if computers move to another location in another part of the network, a new IP address must be entered. DHCP lets a network administrator supervise and distribute IP addresses from a central point and automatically sends a new IP address when a computer is plugged into a different place in the network. DHCP uses the concept of a "lease" or amount of time that a given IP address will be valid for a computer. The lease time can vary depending on how long a user is likely to require the Internet connection at a particular location. It's especially useful in education and other environments where users change frequently. Using very short leases, DHCP can dynamically reconfigure networks in which there are more computers than there are available IP addresses. DHCP supports static addresses for computers containing Web servers that need a permanent IP address. DHCP enables the automatic reuse of unused IP addresses. The Motorola Cellular Gateway NC800 contains a built-in DHCP server that assigns private IP addresses to clients.

Directional antenna   An antenna that concentrates transmission power into a direction, thereby increasing coverage distance at the expense of coverage angle. Directional antenna types include yagi, patch and parabolic dish.

Diversity antennas   Two identical antennas located a small distance apart to reduce multipath distortion and improve wireless reception. Properly placed diversity antennas improve Motorola Cellular Gateway NC800 wireless reception.

DNS   The Domain Name System is the Internet system for converting domain names to IP addresses. A domain name is a meaningful and easy-to-remember "handle" for an Internet address. A DNS server contains a table matching domain names such as Internetname.com to IP addresses such as 192.169.9.1. When you access the world-wide web, a DNS server translates the URL displayed on the browser to the destination website IP address. The DNS lookup table is a distributed Internet database; no one DNS server lists all domain name to IP address matches.

Domain name   A unique name, such as motorola.com, that maps to an IP address. Domain names are typically much easier to remember than are IP addresses.

Dotted-decimal notation   Method of representing an IP address or subnet mask using four decimal numbers called octets. Each octet represents eight bits. In a class C IP address, the octets are network.network.network.host. The first three octets together represent the network address and the final octet is the host address. In the Motorola Cellular Gateway NC800 LAN default

---

configuration, 192.168.100 represents the network address. In the final octet, the host address can be from 2 to 254. See *IP Addresses*.

download   To copy a file from one computer to another. You can use the Internet to download files from a server to a computer.

downstream   In a CDMA network, the direction of data received by the computer from the Internet.

driver   A software program that allows a computer to use and communicate with equipment or peripherals installed on the computer. For example, network interface cards (NICs) require drivers to allow the computer to communicate with the network through the NIC.

DSSS   Direct Sequence Spread Spectrum is an IEEE 802.11b RF modulation protocol. It combines a data signal at the sending station with a higher data rate bit sequence, which many refer to as a chip sequence (also known as processing gain). A high processing gain increases the signal's resistance to interference. The minimum processing gain that the FCC allows is 10, and most products operate under 20.

DTIM   Delivery Traffic Indication Message.
Dynamic IP   An IP address that is automatically assigned to a client station in a TCP/IP network,
address   typically by a DHCP server. Network devices that serve multiple users, such as servers and printers, are usually assigned static IP addresses.

E

encapsulate   To include data into some other data unit to hide the format of the included data.

encode   To alter an electronic signal so that only an authorized user can unscramble it to view the information.

encrypt   To encode data.

endpoint   A VPN endpoint terminates the VPN at the gateway so that computers on the Motorola Cellular Gateway NC800 LAN do not need VPN client software to tunnel through the Internet to the VPN server.

ESP   Encapsulating Security Payload.

Ethernet   The most widely used LAN type, also known as IEEE 802.3. The most common Ethernet networks are 10Base-T, which provide transmission speeds up to 10 Mbps, usually over unshielded, twisted-pair wire terminated with RJ-45 connectors. Fast Ethernet (100Base-T) provides speeds up to 100 Mbps. Base means baseband technology and T means twisted pair cable. Each Ethernet port has a physical address called the MAC address.
                  Token Ring is another method to access a LAN, but not widely used. Ethernet can be used on a shared network, where all clients share the bandwidth or on a switched network where each sender and receiver pair has the full bandwidth. Ethernet uses a technology that broadcasts each frame onto a medium such as wire or fiber. All computers, on the network, are listening. The computer with the matching destination address accepts the frame and checks for errors. Ethernet was invented in 1973 by Robert Metcalfe and David Boggs of Xerox. It ran at 2.93 megabits per second (Mbps). Today Ethernet devices are available that communicate at 1 gigabits per second (Gbps).

F

Fast Ethernet An Ethernet Network that will support up to 100 megabits per second of data transfer.

FCS   Frame Check Sequence.

FHSS   Frequency Hopping Spread Spectrum - Takes the data signal and modulates it with a carrier signal that hops from frequency to frequency as a function of time over a wide band of frequencies.

firewall   A security software system on the Motorola Cellular Gateway NC800 that enforces an access control policy between the Internet and the Motorola Cellular Gateway NC800 LAN. A firewall determines which information passes in and out of a network.

firmware   Code that is written onto programmable read-only memory (PROM) or more recently FLASH memory. Once firmware has been written onto the PROM or FLASH memory, it is retained even when the device is turned off.

frequency   Number of times an electromagnetic signal repeats an identical cycle in a unit of time, usually one second, measured in Hz, kHz, mHz, or GHz.

FTP   File Transfer Protocol - A member of the TCP/IP suite of protocols, used to copy files between two computers on the Internet. Both computers must support their respective FTP roles: one must be an FTP client and the other an FTP server. See also TCP/IP.

Full duplex   The ability to simultaneously transmit and receive data. See also *half-duplex*.

G

gateway   A device that enables communication between networks using different protocols. The Motorola Cellular Gateway NC800 enables multiple computers supporting IEEE 802.11b/g and/or Ethernet to share a single Internet connection. A gateway is often included as part of a network switch. A gateway can also be implemented as software on a computer.

GHz   Gigahertz, which equals 1 billion cycles per second.

GUI   Graphical User Interface.

H

Half duplex   Network where only one device at a time can transmit data. See also *full-duplex*.

header   The data at the beginning of a packet that identifies what is in the packet.

hexadecimal   A base-sixteen numbering system that uses sixteen sequential numbers (0 to 9 and the letters A to F) as base units before adding a new position. On computers, hexadecimal is a convenient way to express binary numbers.

hub   A hub offers a single collision domain among multiple wired users. When one user's Ethernet NIC sends data, all other stations connected to the LAN will hold off sending data until the medium is idle. A traditional wireless access point (AP) most closely resembles a hub. A hub performs no data filtering. See also *bridge* and *gateway*.

hop   The interval between two gateways on an IP network. The number of hops a packet traverses toward its destination (called the hop count) is saved in the packet header. For example, a hop count of six means the packet has traversed six gateways. The packet hop count increases as the time-to-live (TTL) value decreases.

host   In IP, a host is any computer supporting end-user applications or services with full two-way network access. Each host has a unique host number that combined with the network number forms its IP address. Host also can mean:

- A computer running a web server that serves pages for one or more web sites belonging to organization(s) or individuals
- A company that provides this service
- In IBM environments, a mainframe computer

html   Hyper Text Markup Language

http   Hypertext Transfer Protocol - the standard computer programming language computers linked to the World Wide Web use to communicate with each other.

Hz   Hertz - one cycle per second. The unit to measure the frequency that an alternating electromagnetic signal cycles through its highest and lowest states. Used to define the bands of the electromagnetic spectrum used in voice and data communications, or to define the bandwidth of a transmission medium.

I

IANA   The Internet Numbering Address Authority (IANA) is an organization under the Internet Architecture Board (IAB) of the Internet Society that oversees IP address allocation. It is under a contract from the U.S. government.

IEEE   The Institute of Electrical and Electronics Engineers. The IEEE describes itself as "the world's largest technical professional society, promoting the development and application of electro technology and allied sciences for the benefit of humanity, the advancement of the profession, and the well-being of our members." The IEEE fosters the development of standards that often become national and international standards. The organization publishes a number of journals, has many local chapters, and several large societies in special areas, such as the IEEE Computer Society. The IEEE (http://www.ieee.org) is accredited by ANSI.

IEEE 802.3   See *Ethernet*.

IEEE 802.11b One of the IEEE standards for wireless networking hardware. Products that adhere to a specific IEEE standard will work with each other, even if they are manufactured by different companies. The 802.11b standard specifies a maximum data transfer rate of 11Mbps, an operating frequency of 2.4GHz, and WEP encryption for security.
It uses Direct Sequence Spread Spectrum modulation in the unlicensed 2.4 GHz frequency band also used by cordless phones and microwave ovens, therefore range and throughput are affected by 2.4 GHz phones and microwave ovens operating in the vicinity. 802.11b networks are also referred to as WLAN networks.

IEEE 802.11g Refers to the extension of the IEEE 802.11 standard for wireless networking. The 802.11g specification used by the Motorola Cellular Gateway NC800 specifies a maximum data transfer rate of 54Mbps using OFDM modulation, an operating frequency of 2.4GHz, backward compatibility with IEEE 802.11b devices and WEP encryption as well as WPA-PSK for security.
The higher speed comes from using Orthogonal Frequency Division Multiplexing (OFDM) modulation. It is backwards compatible with 802.11b because it also uses the 2.4 GHz frequency and is therefore also affected by 2.4 GHz phones and microwave ovens operating in the vicinity.

IETF   The Internet Engineering Task Force (http://www.ietf.org) is an open international community of network designers, operators, vendors, and researchers to develop and maintain Internet architecture. Technical working groups issue working documents called Internet-Drafts. The IETF publishes review versions of the drafts called requests for comments (RFCs).

Internet A worldwide collection of interconnected networks using TCP/IP.

internetwork A collection of interconnected networks allowing communication between all devices connected to any network in the collection.

IP Internet Protocol is a set of standards that enable different types of computers to communicate with one another and exchange data through the Internet. IP provides the appearance of a single, seamless communication system and makes the Internet a virtual network.

IP address In the most widely installed level of the Internet Protocol (IP) today, an IP address is a 32-binary digit number that identifies each sender or receiver of information that is sent in packets across the Internet. When you request an HTML page or send e-mail, the Internet Protocol part of TCP/IP includes your IP address in the message (actually, in each of the packets if more than one is required) and sends it to the IP address that is obtained by looking up the domain name in the Uniform Resource Locator you requested or in the e-mail address you're sending a note to. At the other end, the recipient can see the IP address of the Web page requester or the e-mail sender and can respond by sending another message using the IP address it received.
TCP/IP networks therefore route messages based on the destination IP address. An IP address has two parts:
- The network address is assigned by IANA.
- A host address.

The Motorola Cellular Gateway NC800 network administrator assigns a host address to each host connected to the Motorola Cellular Gateway NC800. This is done either via a static IP address or automatically using its DHCP server. For a Class C network, the first 24 bits are the network address and the final 8 bits are the host address; in dotted-decimal format it appears as network.network.network.host.

IPSec The Internet Protocol Security protocols are described in IETF authentication and encryption standards for secure packet exchange over the Internet. IPSec consists of a suite of protocols used to implement secure exchange of packets at the IP layer (i.e. OSI layer 3). IPSec supports two basic modes: Transport and Tunnel. Transport encrypts the payload of each packet, leaving the header untouched, while Tunnel mode encrypts both the header and the payload and is therefore more secure.

ISM Bands Industrial, scientific, and medicine bands - Radio frequency bands that the Federal Communications Commission (FCC) authorized for wireless LANs. The ISM bands are located at 902 MHz, 2.400 GHz, and 5.7 GHz.

ISO The International Organization for Standardization (http://www.iso.ch) is a worldwide federation of national standards bodies from approximately 140 countries. ISO is a non-governmental organization established in 1947 to promote the development of standardization and related activities in the world with a view to facilitating the international exchange of goods and services, and to developing cooperation in the spheres of intellectual, scientific, technological, and economic activity.

ISP An ISP (Internet Service Provider) is a *company* that provides individuals and companies access to the Internet and other related services such as Web site building and virtual hosting. An ISP can serve IP addresses dynamically, or assign static (fixed) IP addresses to individual computers.

ITU International Telecommunications Union

J

Javascript A scripting language designed by Netscape to enable Web designers to add dynamic

---

content to their sites. Contrary to its name, it was developed separately from Java. It is an open source language.

K, L

LAN   A LAN (Local Area Network) is a 2 – 1000 Mbps communications network that extends no more than a few hundred meters, usually using Ethernet as the physical layer.

layer   In networks, layers are software protocol levels. Each layer performs functions for the layers above it. OSI is a reference model having seven functional layers.

LED   Light Emitting Diode - Small lights that are typically used to indicate status on electronic equipment. They come in almost any color with the most common being red, green, yellow and recently, blue.

loopback   A test that loops the transmit signal to the receive signal. Usually the loopback test is initiated on a network device. The test is used to verify a path or to measure the quality of a signal on that path.

M

MAC   The Media Access Control address is a unique, 48-bit value permanently saved in ROM at the factory to identify each Ethernet network device. It is expressed as a sequence of 12 hexadecimal digits. Also called an Ethernet address, physical address, hardware address, or NIC address.

MB   One megabyte; equals 1,024 x 1,024 bytes, 1,024 kilobytes, or about 8 million bits.

Mbps   Million bits per second (megabits per second). A rate of data transfer.

media   The various physical environments through which signals pass; for example, coaxial, unshielded twisted-pair (UTP), or fiber-optic cable.

MHz   Megahertz. One million cycles per second. A measure of radio frequency.

MRU   The MRU (Maximum Receive Unit) sets the maximum number of bytes that PPP is capable of receiving in one PPP packet. Generally, the bigger the better.

MTU   The Maximum Transmission Unit is the largest amount of data that can be transmitted in one discrete message on a given physical network. The MTU places an upper bound on the size of a message that can be transferred by the network in a single frame. Messages exceeding the MTU must be fragmented before transmission, and reassembled at the destination.

multicast   A data transmission sent from one sender to multiple receivers. See also *broadcast* and *unicast*.

N

NAT   Network Address Translation - An Internet standard that enables a local-area network (LAN) to use one set of IP addresses for internal traffic and a second set of IP addresses for external traffic. A NAT box located where the LAN meets the Internet makes all necessary IP address translations. NAT provides some security
because the IP addresses of the LAN computers are invisible on the Internet.

NAPT   Network Address Port Translation is the most common form of address translation between

---

public and private IP addresses. NAPT is a mapping of one public IP address to many private IP addresses.

NEC National Electrical Code (United States) . The regulations for construction and installation of electrical wiring and apparatus, suitable for mandatory application by a wide range of state and local authorities.

network Two or more computers connected to communicate with each other. Networks have traditionally been connected using some kind of wiring.

Network driver Software packaged with a NIC that enables the computer to communicate with the NIC.

Network layer Layer 3 in the OSI architecture that provides services to establish a path between open systems. The network layer knows the address of the neighboring nodes, packages output with the correct network address data, selects routes, and recognizes and forwards to the transport layer incoming messages for local host domains.

NIC A network interface card converts computer data to serial data in a packet format that it sends over the LAN. A NIC is installed in an expansion slot or can be built-in. Every Ethernet NIC has a MAC address permanently saved in its ROM.

node On a LAN, a generic term for any network device.

Network mask See *Subnet Mask*.

O

Omni-directional antenna An antenna that provides a 360-degree transmission pattern. These types of antennas are used when coverage in all directions is required.

OFDM Developed for wireless applications, Orthogonal Frequency Division Multiplexing technology offers superior performance increased data rates and more reliable transmissions than previous technologies, such as DSSS. OFDM is a scheme in which numerous signals of different frequencies are combined to form a single signal for transmission on the medium. OFDM works by breaking one high-speed data stream into a number of lower speed data streams, which are then transmitted in parallel. Each lower speed stream is used to modulate a sub carrier. Essentially, this creates a multi-carrier transmission by dividing a wide frequency band or channel into a number of narrower frequency bands or sub-channels. OFDM is also used for other applications, including power line networking.

Open Systems Authentication The IEEE 802.11 default authentication method is a two-step process. First, the station wanting to authenticate with another station sends an authentication management frame containing the sending station's identity. The receiving station then sends back a frame alerting whether it recognizes the identity of the authenticating station.

OSI The Open Systems Interconnection reference model is an illustrative model describing how data moves from an application on the source host through a network to an application on the destination host. It is a conceptual framework developed by ISO that is now the primary model for intercomputer communications. OSI is a model *only*; it does not define a specific networking interface.

P

packet The unit of data that is routed between the sender and destination on the Internet or other packet-switched network. When data such as an e-mail message or other file is sent over the Internet, IP on the sender divides the data into uniquely-numbered packets.The packet

---

header contains the source and destination IP addresses. The individual packets may travel different routes. When all packets arrive at the destination, the IP at that end reassembles the packets. The header and the data can vary in length. Packet and datagram are similar in meaning.

Packet-switched
A scheme to handle transmissions on a connectionless network such as the Internet. An alternative is circuit-switched.

PCMCIA
The Personal Computer Memory Card International Association sets international standards for connecting peripherals to portable computers. Laptop computers typically have a PCMCIA slot that can hold one or two PC Cards to provide features such as Ethernet connectivity.

PDA
Personal Digital Assistant

Physical layer
Layer 1 in the OSI architecture. It provides services to transmit bits or groups of bits over a transmission link between open systems. It entails the electrical, mechanical, and handshaking procedures.

PING
A network utility that tests host reachability by sending a small packet to the host and waiting for a reply. If you PING a computer IP address and receive a reply, you know the computer is reachable over the network. It also stands for Packet InterNet Groper.

port
On a computer or other electronic device, a port is a socket or plug used to physically connect it to the network or to other devices. In TCP/IP, a port is a number from 0 to 65536 used logically by a client program to specify a server program. Ports 0 to 1024 are reserved

POTS
The plain old telephone service offered through the PSTN; basic analog telephone service. POTS uses the lowest 4 kHz of bandwidth on twisted pair wiring.

PPP
PPP (Point to Point Protocol) is a protocol for communication between computers using a serial interface, typically a personal computer connected by phone line to a server.

PPPoE
Point to Point Protocol over Ethernet.

PPTP
Point-to-Point Tunneling Protocol encapsulates other protocols. It is a protocol that allows corporations to extend their own corporate network through private "tunnels" over the public Internet. Effectively, a corporation uses the wide-area network to create a large virtual private network.

Private IP address
An IP address assigned to a computer on the Motorola Cellular Gateway NC800 LAN by the DHCP server on the Motorola Cellular Gateway NC800 for a specified lease time. Private IP addresses are used by the Motorola Cellular Gateway NC800 LAN only; they are invisible to devices on the Internet. See also *public IP address*.

protocol
A formal set of rules and conventions for exchanging data. Different computer types (for example PC, UNIX, or mainframe) can communicate if they support common protocols.

Proxy server
A piece of software that sits between a client application (such as a Web browser) and the Internet. It intercepts all traffic flowing between the two and analyzes them. This allows proxy servers to do two important things. One is to boost Internet access speeds for groups of users. Since the proxy server stores a "cache" of recently downloaded Web sites, any user that tries to access a Web site that has recently been accessed by another user is simply sent the cached version from the proxy server. The other important function is filtering. A proxy server can be set up to filter all attempts by users to access specific Web sites.

PSTN
The public switched telephone network is the traditional circuit-switched, voice-oriented telephone network. See also *POTS*.

Q, R

RFC Request for Comments published on the IETF or other websites. Many RFCs become international standards.

RIP Routing Information Protocol - A common type of routing protocol. RIP bases its routing path on the distance (number of hops) to the destination. RIP maintains optimum routing paths by sending out routing update messages if the network topology changes. For example, if a gateway finds that a particular link is faulty, it will update its routing table, and then send a copy of the modified table to each of its neighbors.

RJ-11 The most common type of connector for household or office phones.

RJ-45 A connector for Cat 5 or Cat 5e cable, with 8 pins. It looks similar to a typical telephone wire connector that only has 4 or 6 pins, but it is larger in size.

roaming A feature of some access points or gateways that allow users to move through a facility while maintaining an unbroken connection to the LAN.

routing table A table listing available routes that is used by a gateway to determine the best route for a packet.

RTS Request To Send.

S

scope The set of IP addresses that a DHCP server can lease to clients.

server A host computer that stores information and software programs used by other computers in a network (it "serves" the programs and information to other computers). Examples of services are file transfer, remote login and printing services.

Shared key authentication A type of authentication that assumes each station has received a secret shared key through a secure channel independent from an 802.11 network. Stations authenticate through shared knowledge of the secret key. Use of Shared Key authentication requires implementation of the 802.11 Wireless Equivalent Privacy (WEP) algorithms.

SOHO Small Office Home Office

spectrum A specified range of frequencies used for transmission of electromagnetic signals.

spectrum allocation An allocation of portions of the available electromagnetic spectrum for specific services, such as AM, FM, or personal communications.

SSID Service Set Identifier - An identification name that wireless devices use to make connections. In order for wireless devices to communicate, they must all be set to the same channel and they all must use the same SSID. For instance, if you are using an access point to connect two computers using wireless devices, the access point and each of the wireless devices must use the same SSID. Even if they are set to the same channel, they cannot communicate unless the SSID is the same.

Stateful inspection A type of firewall that tracks each connection traversing all firewall interfaces to ensure validity. In addition to examining the source and destination in the packet header based on static rules, a stateful inspection firewall:
- Examines packet headers on context established by previous packets that traversed the firewall
- Monitors the connection state and saves it in a table
- Closes ports until a connection to a specific port is requested
- May examine the packet contents up through the application layer to determine

more than just the source and destination
A stateful-inspection firewall is more advanced than a static filter firewall.

Static filter　A type of firewall that examines the source and destination in the packet header based on administrator-defined rules *only*.

Static IP Address　A permanent IP address that is assigned to a host in a TCP/IP network. Normally, a static IP address must be assigned manually. The opposite of dynamic IP address.

Static route　A manually-defined route.

station　IEEE 802.11b term for wireless client.

Subnet　A network segment connected by hubs or repeaters. Subnets can stand alone or can be connected to other subnetworks onto a larger network. When subnetting is used, the host portion of the IP address is divided into a subnet and host number. Hosts and gateways use the subnet mask to identify the bits used for the network and subnet number.

Subnet mask　The method used for splitting IP networks into a series of subgroups, or subnets. The mask is a binary pattern that is logically ANDed with the IP address to turn part of the host ID address field into a field for subnets. A gateway routes packets using the network prefix and the subnet number part of the IP address.

switch　A switch is more sophisticated than a hub and connects one user to another without blocking access of other users. The switch improves throughput because of the smaller resulting collision domains. Users don't have to wait until others are finished before sending data.

SYSLOG　A de-facto UNIX standard for logging system events.

T

TCP　Transmission Control Protocol - A method (protocol) used along with the IP (Internet Protocol) to send data in the form of message units (datagram) between network devices over a LAN or WAN. Transmission Control Protocol on OSI transport layer four, provides reliable transport over the network for data transmitted using IP (network layer three). It is an end-to-end protocol defining rules and procedures for data exchange between hosts on top of connectionless IP. TCP uses a timer to track outstanding packets, checks errors in incoming packets, and retransmits packets if requested.TCP is known as a "connection oriented" protocol due to requiring the receiver of a packet to return an acknowledgment of receipt to the sender of the packet resulting in transmission control.

TCP/IP　Transmission Control Protocol/Internet Protocol - The basic communication language or set of protocols for communications over a network (developed specifically for the Internet). TCP/IP defines a suite or group of protocols and not only TCP and IP.

TFTP　Trivial File Transfer Protocol is a scaled down version of the well known FTP protocol commonly used for file transfer over the Internet. Being a scaled down protocol, it is ideal for use in an embedded environment such as a wireless gateway. It is used to upload new firmware to the Motorola Cellular Gateway NC800.

Transparent bridging　A method to enable all hosts on the wired Ethernet LAN and IEEE 802.11b wireless LAN to communicate as if they were all connected to the same physical network.

Transport layer　Layer of the OSI concerned with protocols for error recognition and recovery. This layer also regulates information flow.

TTL　The time to live is the number of gateways (or hops) a packet can traverse before being

discarded. When a gateway processes a packet, it decreases the TTL by 1. When the TTL reaches zero, the packet is discarded.

tunnel To place packets inside other packets to send over a network. The protocol of the enclosing packet is understood by each endpoint, or tunnel interface, where the packet enters and exits the network. VPNs rely on tunneling to create a secure network.Tunneling requires the following protocol types:

- A carrier protocol, such as TCP, used by the network that the data travels over
- An encapsulating protocol, such as IPSec, L2F, L2TP, or PPTP, that is wrapped around the original data
- A passenger protocol, such as IP, for the original data.

U

UDP User Datagram Protocol - A method (protocol) used along with the IP (Internet Protocol) to send data in the form of message units (datagrams) between network devices over a LAN or WAN. UDP is an OSI layer four protocol, while IP is a layer three protocol. UDP is known as a "connection-less" protocol due to NOT requiring the receiver of a packet to return an acknowledgment of receipt to the sender of the packet (as opposed to TCP).

unicast A point-to-point data transmission sent from one sender to one receiver. This the normal way you access websites. See also *broadcast* and *multicast*.

URL Universal Resource Locator - URLs are the Internet equivalent of addresses. How do they work? Like other types of addresses, they move from the general to the specific (from zip code to recipient, so to speak). Take this URL, for example: www.motorola.com/CellularGateway/index.html. First you have the *protocol*: **http:/** then the *server address or domain*: **/www.motorola.com** and finally the *directory*: **/CellularGateway/** in which the file **index.html** resides.

USB Universal Serial Bus is a computer interface for add-on devices such as printers, scanners, mice, modems, or keyboards. USB supports data transfer rates of 12 Mbps and plug-and-play installation. You can connect up to 127 devices to a single USB port.

UTP Unshielded Twisted Pair. Also referred to as 10BASE-T or 100BASE-T network cable.

V

VLAN A virtual local area network is group of devices on different LAN segments that are logically configured to communicate as if they are connected to the same wire.

VoIP Voice over Internet Protocol is a method to exchange voice, fax, and other information over the Internet. Voice and fax have traditionally been carried over traditional telephone lines of the PSTN using a dedicated circuit for each line. VoIP enables calls to travel as discrete data packets on shared lines. VoIP is an important part of the convergence of computers, telephones, and television into a single integrated information network.

VPN Virtual Private Network - Virtual Private Networks allows computers to use the public Internet backbone as a channel for private data communication. With encryption and encapsulation technology, a VPN creates a private passageway (tunnel) through the Internet. VPNs allow remote offices, company road warriors, and even businesses' customers to use the Internet, rather than pricey private lines, to reach company networks. A VPN connection provides security and performance similar to a dedicated link (for example, a leased line), but at much lower cost.

W

WAN Wide Area Network. A wide-area network provides a connection over a large geographic area, such as a country or the whole world. The bandwidth depends on need and cost, but is usually much lower than for a LAN.

WAP Wireless Access Point or Wireless Access Protocol. See also *access point*.

WECA Wireless Ethernet Compatibility Alliance - An alliance of companies throughout the world that promote the use of the IEEE 802.11 standard in wireless technology. It is a trade organization that works to ensure that all wireless IEEE 802.11b Wi-Fi devices such as computer cards, laptops, air gateways, PDAs, etc. can communicate with each other.

WEP Wired Equivalent Privacy encryption protects the privacy of data transmitted over a wireless LAN. WEP uses keys to encrypt and decrypt transmitted data. The access point must authenticate a client before it can transfer data to another client. WEP is part of IEEE 802.11b. It is based on a 64- or 128- bit shared key algorithm, as described in the IEEE 802.11b standard.

WEP network key A network key is a key used for network encryption under the WEP algorithm. Under 802.11, a wireless station can be configured with up to four network keys, with the key index values being 1, 2, 3, and 4. When an access point or a wireless station transmits an encrypted message using a key that is stored in a specific key index, the transmitted message indicates the key index that was used to encrypt the message body. The receiving access point or wireless station can then retrieve the key that is stored at the key index and use it to decode the encrypted message body.

Wi-Fi Wireless Fidelity - The IEEE 802.11 High Rate Standard used in wireless technology. The Wi-Fi (pronounced y-phi) seal of approval assures the end customer of interoperability with other network cards and access points which also bear the Wi-Fi logo. Wi-Fi is the brand name applied to products supporting IEEE 802.11 or WLAN.

WINS Short for *Windows Internet Naming Service,* a system that determines the IP address http://www.webopedia.com/TERM/W/IP_address.html associated with a particular network computer. This is called *name resolution.* WINS supports network client and server computers running Windows and can provide name resolution for other computers with special arrangements. Determining the IP address for a computer is a complex process when DHCP servers assign IP addresses dynamically. For example, it is possible for DHCP to assign a different IP address to a client each time the machine logs on to the network. WINS uses a distributed database that is automatically updated with the names of computers currently available and the IP address assigned to each one. DNS is an alternative system for name resolution suitable for network computers with fixed IP addresses.

Wireless network interface Couples the digital signal from the end-user appliance to the wireless medium, which is air.

WLAN Wireless Local Area Network - A group of computers and associated devices that communicate with each other wirelessly. Wireless LANs are used increasingly in both home and office environments.

WWW World Wide Web - The Internet's multimedia service containing countless areas of information, documentation, entertainment, as well as business and personal home pages. It is an interface to the Internet that you use to navigate and hyperlink to information.

Appendix D: Upgrading the Motorola Cellular Gateway NC800 firmware using TFTP

Trivial File Transfer Protocol (TFTP) is a scaled down version of the well-known FTP protocol commonly used for file transfer over the Internet. Being a scaled down protocol, it is ideal for use in an embedded environment such as a wireless gateway. It offers an alternative method of firmware upgrading to the web-based method.

The Motorola Cellular Gateway NC800 accepts TFTP file transfers only during the **first three seconds after boot up**.

To upgrade the Motorola Cellular Gateway NC800's firmware using TFTP follow these steps:

- o Open a TFTP compatible client on a PC connected to the primary LAN of the Gateway. The PC must be configured with a static IP address on the same subnet as the Gateway (The user must be able to successfully ping the Gateway's primary LAN IP address from the PC).
- o Specify the Gateway's Primary LAN IP address in the TFTP client.
- o Specify binary mode for file transfer.
- o Type **PUT firmware.trx** where firmware.trx is the full path to the new firmware file.
- o Reset the Motorola Cellular Gateway NC800 by pressing the **Reset** button at the back of the Motorola Cellular Gateway NC800.
- o Hit the **Enter** button to issue the **PUT firmware.trx** command.
- o The TFTP client reports the progress / result of the file transfer.
- o If successful, the Motorola Cellular Gateway NC800 reboots using the new firmware image after approximately 30 seconds (it first writes the new image to FLASH once it has been transferred).

Appendix E: Technical Specifications

Standards

Standard	Description
IEEE 802.3	Ethernet MAC interface
IEEE 802.1D	MAC Bridging
IEEE 802.11b/g	Wireless LAN
RFC 0768	User Datagram Protocol
RFC 0791	Internet Protocol
RFC 0793	Transmission Control Protocol
RFC 1035	DNS, Domain Names – Implementation and Specification
RFC 1661	PPP
RFC 1812	IPv4 Routing
RFC 2131	DHCP
RFC 2453	RIP v2
RFC 2663	NAT/Masquerading
IS-95A	CDMA Protocol between Mobile and Base Station
J-STD-008	PCS protocol between Mobile and Base station
TIA/EIA/IS-98-D	CDMA2000 Mobile Devices Performance Standards
IS-707-A.5	CDMA Packet Data Service
FCC Class B	Complies with Part 15 of the FCC Rules

Connectors
- o Internet   - One port for CDMA antenna
- o LAN 1& 2   - Two 10/100 RJ-45 (UTP) Port
- o Power   - 12VDC, 1.8A (from included power brick)
- o DIAG 1   - Debug port (for maintenance only)
- o DIAG 2   - Debug port (for maintenance only)

Button
- o One Reset Button

Network Management
- o Web-based Configuration Interface

Cabling Type
- o Category 5 Ethernet Network Cabling or better

WLAN Transmit Power

o   18 dBm

Modulation
o   802.11b: CCK, DQPSK, DBPSK (Direct Sequence Spread Spectrum)
o   802.11g: OFDM (Orthogonal Frequency Division Multiplexing)

WLAN Transmission Rates
o   802.11b   1, 2, 5.5, 11 Mbps
o   802.11g   6, 9, 12, 18, 24, 36, 48, 54 Mbps

WLAN Antenna Type
o   2 dBi dipole antenna with diversity

CDMA Antenna
o   Dimensions   (170mm L x 20mm B x 15mm D)

CDMA
o   Dual Band 800/1900 MHz
o   CDMA 1xRTT / EV-DO

WLAN Frequency Range
o   2.4 – 2.4835 GHz (ISM Band)

Wireless Range
o   **Indoors**   100 meters
o   **Outdoors**   300 meters

LED Indicators
o   Power
o   WLAN   Act, Link
o   LAN 1   Act, Full, 100
o   LAN 2   Act, Full, 100
o   WAN   Link, Act, Signal

Environmental
o   Dimensions   (240mm L x 160mm W x 70mm H)
o   Unit Weight   Approx. 450g (1 lb)
o   Certifications   FCC Class B, CE Mark
o   Operating Temp.   0°C to 40°C (32°F to 104°F)
o   Storage Temp.   -20°C to 70°C (-4°F to 158°F)
o   Operating Humidity   10% to 85%, Non-Condensing
o   Storage Humidity   5% to 90%, Non-Condensing

External power - Provided by an AC adapter

o   Input: 100-250Volts AC, 47-63Hz, 0.4Amps

o   Output: 12V DC, 1.8A

Software License

Motorola, Inc., Broadband Communications Sector (Motorola), 101 Tournament Drive, Horsham, PA 19044
IMPORTANT: PLEASE READ THIS SOFTWARE LICENSE CAREFULLY BEFORE YOU INSTALL,
DOWNLOAD OR USE ANY APPLICATION SOFTWARE, USB DRIVER SOFTWARE, FIRMWARE AND RELATED
DOCUMENTATION (SOFTWARE) PROVIDED WITH MOTOROLA'S CELLULAR GATEWAY NC800 PRODUCT (THE
MOTOROLA CELLULAR GATEWAY NC800 PRODUCT). BY USING THE MOTOROLA CELLULAR GATEWAY NC800 PRODUCT
AND/OR INSTALLING, DOWNLOADING OR USING ANY OF THE SOFTWARE, YOU INDICATE YOUR ACCEPTANCE OF EACH
OF THE TERMS OF THIS LICENSE. UPON
ACCEPTANCE, THIS LICENSE WILL BE A LEGALLY BINDING AGREEMENT BETWEEN YOU AND MOTOROLA.
THE TERMS OF THIS LICENSE APPLY TO YOU AND TO ANY SUBSEQUENT USER OF THIS SOFTWARE.
IF YOU DO NOT AGREE TO ALL OF THE TERMS OF THIS LICENSE (I) DO NOT INSTALL OR USE THE SOFTWARE
AND (II) RETURN THE MOTOROLA CELLULAR GATEWAY NC800 PRODUCT AND THE SOFTWARE (COLLECTIVELY,
PRODUCT), INCLUDING ALL COMPONENTS, DOCUMENTATION AND ANY OTHER MATERIALS PROVIDED WITH THE
PRODUCT, TO YOUR POINT OF PURCHASE OR SERVICE PROVIDER, AS THE CASE MAY BE, FOR A FULL REFUND.
The Software includes associated media, any printed materials, and any on-line or electronic documentation, as well as
any updates, revisions, bug fixes, or drives obtained by you from Motorola or your service provider. Software provided by
third parties may be subject to separate end-user license agreements from the manufacturers of such Software.
The Software is never sold. Motorola licenses the Software to the original customer and to any subsequent licensee for
personal use only on the terms of this License. Motorola and its 3rd party licensors retain the ownership of the Software.
You may:
USE the Software only in connection with the operation of the Product.
TRANSFER the Software (including all component parts and printed materials) permanently to another person, but only if
the person agrees to accept all of the terms of this License. If you transfer the Software, you must at the same time transfer
the Product and all copies of the Software (if applicable) to the same person or destroy any copies not transferred.
TERMINATE this License by destroying the original and all copies of the Software (if applicable) in whatever form.
You may not:
(1) Loan, distribute, rent, lease, give, sublicense or otherwise transfer the Software, in whole or in part, to any other person,
except as permitted under the TRANSFER paragraph above. (2) Copy or translate the User Guide included with the
Software, other than for personal use. (3) Copy, alter, translate, decompile, disassemble or reverse engineer the Software,
including but not limited to, modifying the Software to make it operate on non-compatible hardware. (4) Remove, alter or
cause not to be displayed, any copyright notices or startup message contained in the Software programs or
documentation. (5) Export the Software or the Product components in violation of any United States export laws.
The Product is not designed or intended for use in on-line control of aircraft, air traffic, aircraft navigation or aircraft
communications; or in design, construction, operation or maintenance of any nuclear facility. MOTOROLA AND ITS 3RD
PARTY LICENSORS DISCLAIM ANY EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR SUCH USES. YOU
REPRESENT AND WARRANT THAT YOU SHALL NOT USE THE PRODUCT FOR SUCH PURPOSES.
Title to this Software, including the ownership of all copyrights, mask work rights, patents, trademarks and all other
intellectual property rights subsisting in the foregoing, and all adaptations to and modifications of the foregoing shall at all
times remain with Motorola and its 3rd party licensors. Motorola retains all rights not expressly licensed under this
License. The Software, including any images, graphics, photographs, animation, video, audio, music and text
incorporated therein is owned by Motorola or its 3rd party licensors and is protected by United States copyright laws and
international treaty provisions. Except as otherwise expressly provided in this License, the copying, reproduction, distribution
or preparation of derivative works of the Software, any portion of the Product or the documentation is strictly prohibited
by such laws and treaty provisions. Nothing in this License constitutes a waiver of Motorola's rights under United States
copyright law.
This License and your rights regarding any matter it addresses are governed by the laws of the Commonwealth of
Pennsylvania, without reference to conflict of laws principles. THIS LICENSE SHALL TERMINATE AUTOMATICALLY if
you fail to comply with the terms of this License.
Motorola is not responsible for any third party software provided as a bundled application, or otherwise, with the
Software.
U.S. GOVERNMENT RESTRICTED RIGHTS
The Product and documentation is provided with RESTRICTED RIGHTS. The use, duplication or disclosure by the
Government is subject to restrictions as set forth in subdivision (c)(1)(ii) of The Rights in Technical Data and Computer
Software clause at 52.227-7013. The contractor/manufacturer is Motorola, Inc., Global Telecom Solutions Sector, 1475
W. Shure Drive, Arlington Heights, IL 60004.