



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 LEAST 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/adaptor 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/adaptor 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.

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Table of Contents

- Table of Contents4
- 1. Overview6
 - Intended audience7
 - Easy setup7
 - Network connection types7
 - Powerful features in a single unit7
 - Typical application8
 - Security9
 - Firewall10
 - DMZ11
 - Wireless Security11
 - Virtual Private Networks11
- 2. The Motorola Cellular Gateway NC800 and its accessories12
 - Package Contents12
 - The Motorola Cellular Gateway NC800's Front Panel13
 - The Motorola Cellular Gateway NC800's Back Panel14
 - The Power Adapter15
 - Ethernet Cable15
 - External CDMA Antenna15
- 3. Installation16
 - Before you begin16
 - Precautions16
 - Signing up for Service16
 - System Requirements for Computers Connected to the WLAN or Ethernet LAN16
 - Installation Considerations17
 - Connecting the Motorola Cellular Gateway NC800 to your network18
 - Connecting the Motorola Cellular Gateway NC800 to the CDMA Network18
 - Mounting the external antenna18
 - Wired Connections to the Motorola Cellular Gateway NC800 – Direct connection19
 - Wired Connections to the Motorola Cellular Gateway NC800 – Connections via other network devices19
 - Wireless Connections to the Motorola Cellular Gateway NC80019
- 4. Setting up the PCs21
 - Configuring Windows 98 and Millennium (ME) PCs21
 - Configuring Windows 2000 PCs22
 - Configuring Windows XP PCs24
- 5. Motorola Cellular Gateway NC800 Configuration26
 - Computer System Requirements for Motorola Cellular Gateway NC800 Configuration26
 - Logging In26
 - Using the Motorola Cellular Gateway NC800's Configuration Utility27
 - Factory Default Settings for the Motorola Cellular Gateway NC80028
- 6. Detailed Motorola Cellular Gateway NC800 Configuration29
 - Setup Wizard29
 - Wizard-> Welcome page30
 - Wizard-> Location Specific Information30
 - Wizard-> Gateway Administration31
 - Wizard-> Internet Account Information31
 - Wizard-> Internet Network Information32
 - Wizard-> Internet Security33
 - Wizard-> Wireless LAN Security34
 - Wizard-> Summary35
 - Signal Strength36
 - Gateway37
 - Gateway-> Basic Gateway Settings37
 - Gateway-> LAN Interface39
 - Gateway-> DHCP Leases40
 - Gateway-> Universal Plug and Play42



Gateway-> LAN STP.....	43
Gateway-> Login Settings.....	44
Network	45
Network-> Dynamic Routing	46
Network-> Static Routing	47
Network-> System Time.....	48
Network-> VLAN	49
WAN	50
WAN-> IP Settings	50
WAN-> PPP Settings	52
WAN-> OTA Provisioning	53
Wireless LAN.....	54
Wireless LAN-> WLAN Basic.....	54
Wireless LAN-> WLAN Advanced	56
Wireless LAN-> MAC Restriction.....	57
Wireless LAN-> WEP Security.....	58
Wireless LAN-> WPA Security.....	60
Wireless LAN-> RADIUS Server.....	62
Wireless LAN-> Authenticated Stations.....	62
Firewall	64
Firewall-> Permanent Port Forwarding.....	64
Firewall-> Application Triggered Port Forwarding	66
Firewall-> MAC Address Filtering	68
Firewall-> Port Filtering	69
Firewall-> DMZ Host	70
Logging.....	71
Logging-> Statistics Logging.....	71
Logging-> Internet Site Logging.....	73
Logging-> System Log Messages	74
Administration.....	75
Administration-> Status.....	76
Administration-> Support Server Registration	78
Administration-> Firmware Upload	79
Administration-> Restore	81
Diagnostics	82
Diagnostics-> Internet Access	82
Diagnostics-> LAN Access.....	83
Appendix A: Motorola Limited Warranty	84
Appendix B: Troubleshooting	87
Appendix C: Glossary	93
Appendix D: Upgrading the Motorola Cellular Gateway NC800 firmware using TFTP	107
Appendix E: Technical Specifications.....	108



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 NC800 should 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 meters¹ 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.

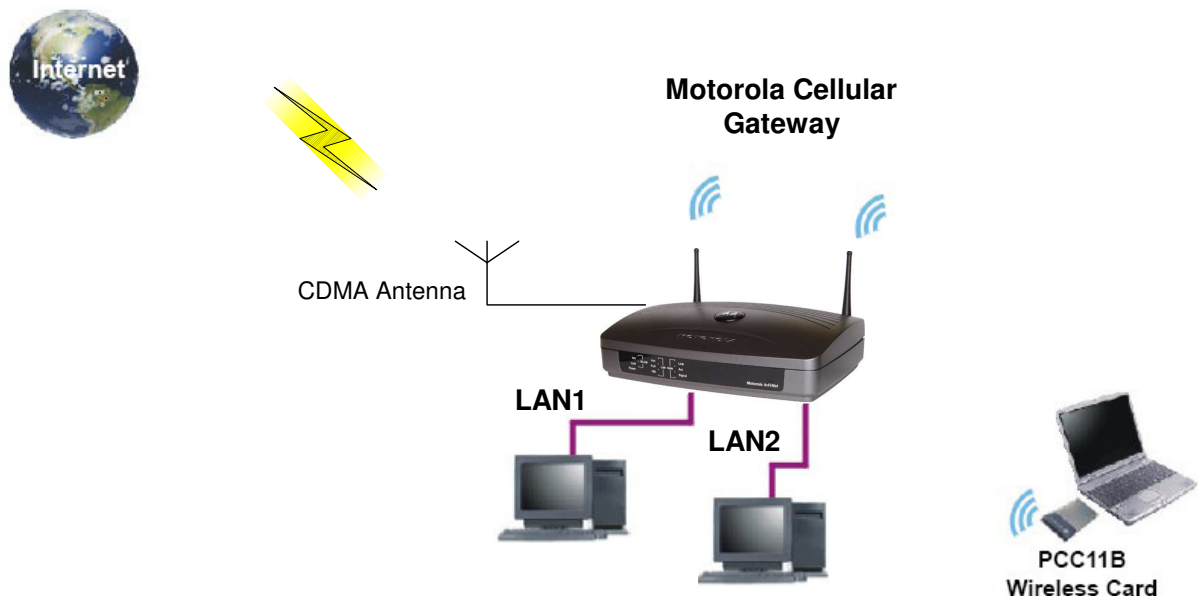


Figure 1. Typical home office configuration.

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.

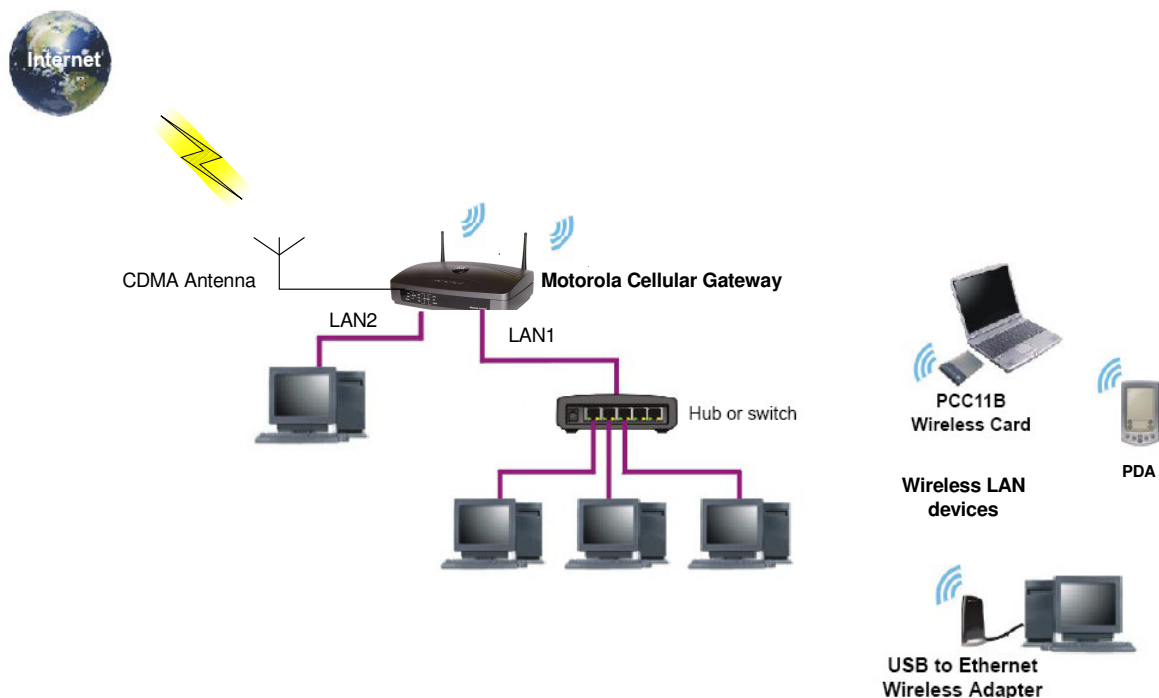


Figure 2. Typical application of a Motorola Cellular Gateway NC800 in a small office environment.

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.

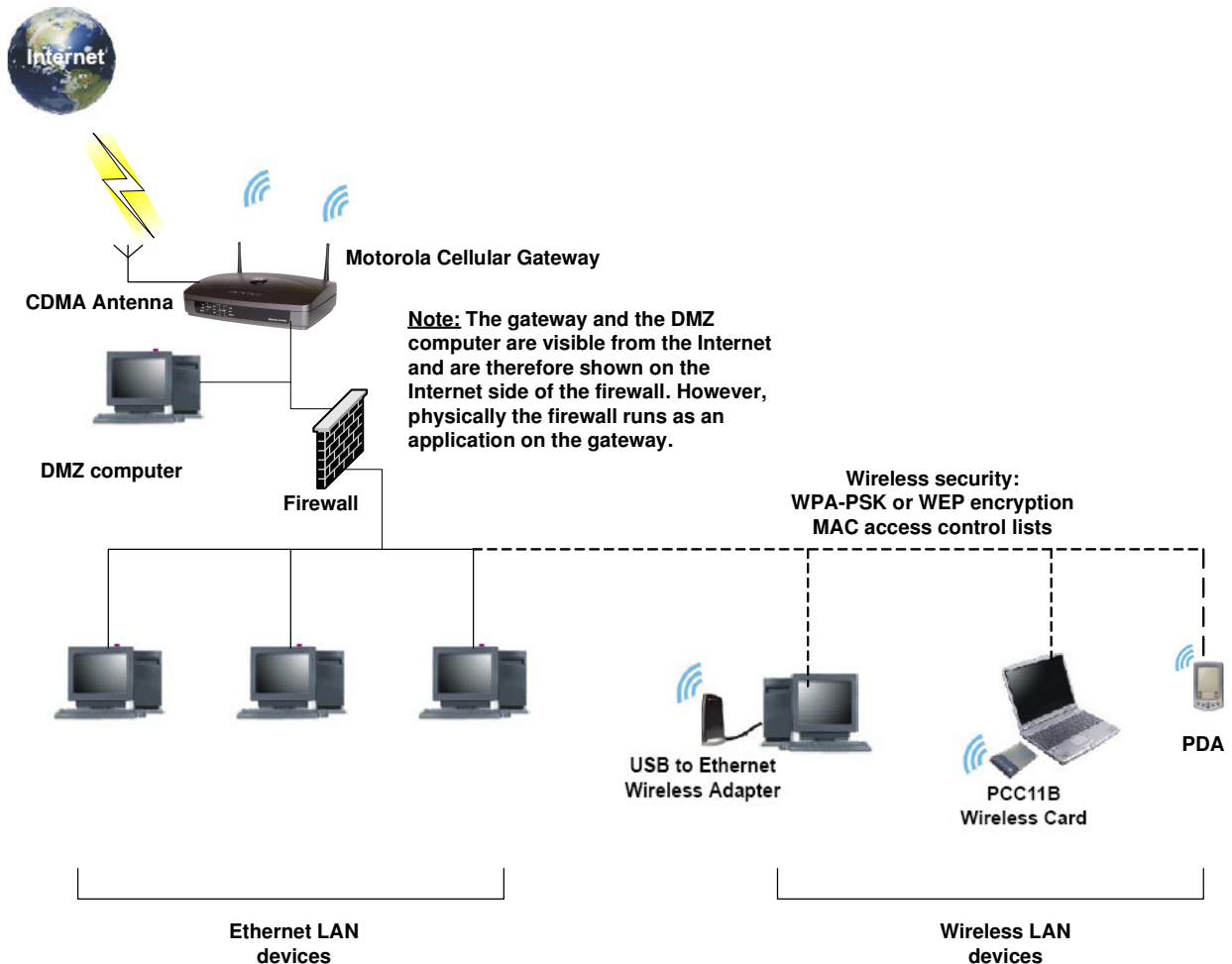


Figure 3. Motorola Cellular Gateway NC800 security measures shown in a logical network diagram

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.



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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

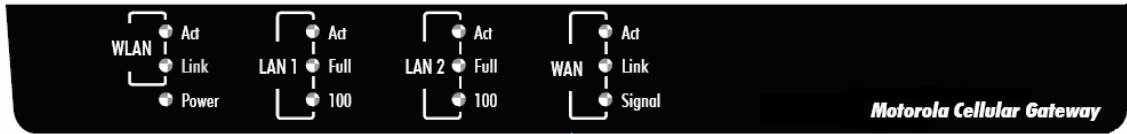


Figure 5. Motorola Cellular Gateway NC800 front panel

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.



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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: <ul style="list-style-type: none">• 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.



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

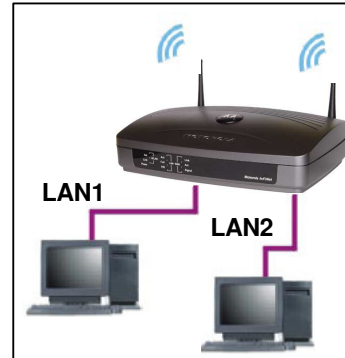


Wired Connections to the Motorola Cellular Gateway NC800 – Direct connection

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.

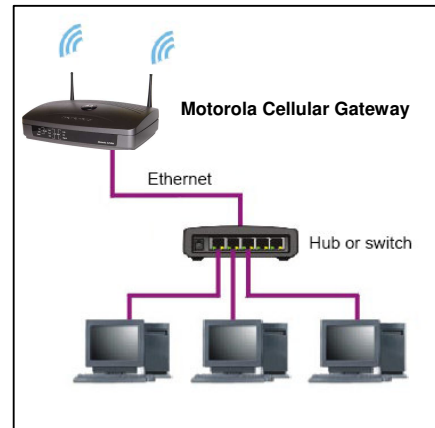
Each computer on the Ethernet LAN requires an Ethernet network interface card (NIC) and driver software installed.

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.

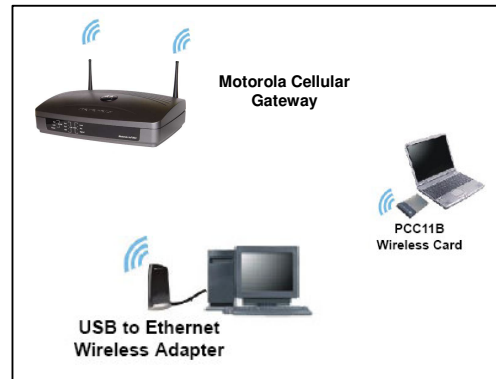


Wireless Connections to the Motorola Cellular Gateway NC800

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.



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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.

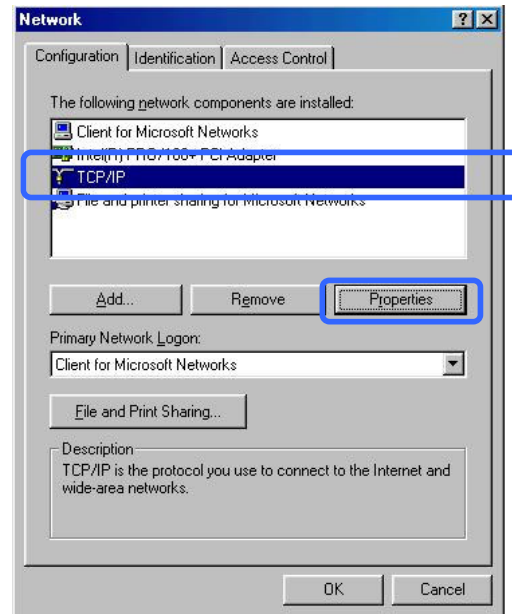
Configuring Windows 98 and Millennium (ME) PCs

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

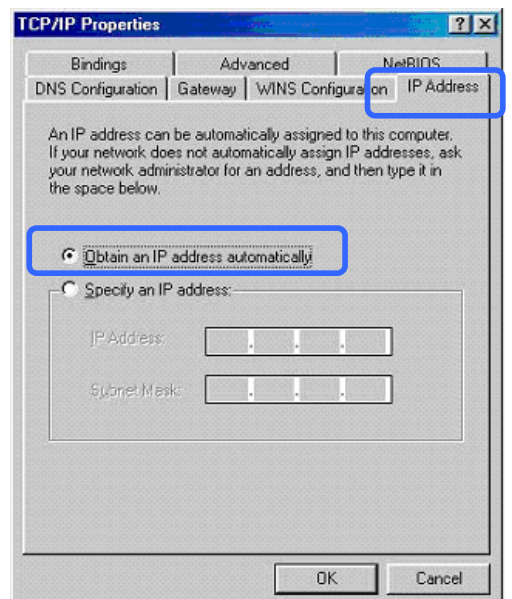


2. Double click on the Network icon.

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

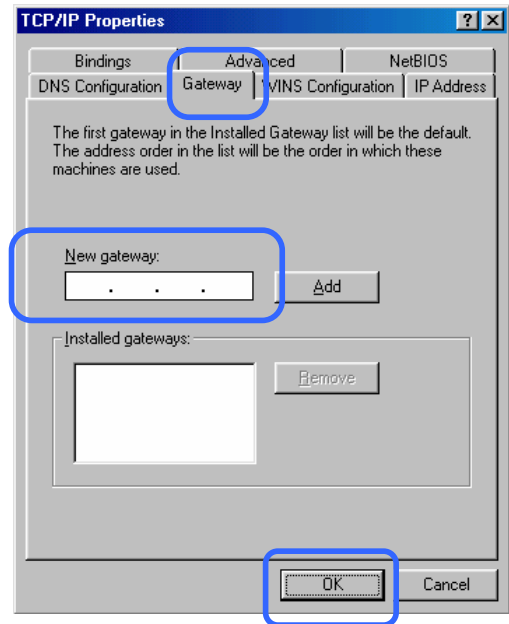


4. Select the **IP Address** tab. Select **Obtain IP address automatically**.






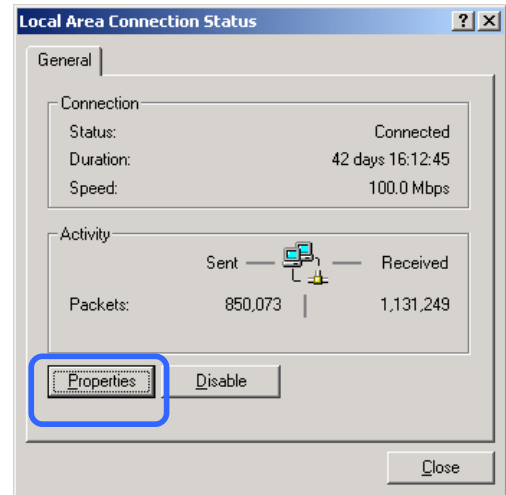
- Next, click on the **Gateway** tab and ensure that the Installed Gateway field is blank. The Motorola Cellular Gateway NC800 IP address will be automatically obtained when the DHCP protocol is executed.
- Click on **OK** to apply the changes.
- When the **Network** dialog box re-appears, click on **OK** to close it.
- 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.
- Windows may also ask you to restart the PC – please do so. If Windows does not ask you to restart, do so anyway.



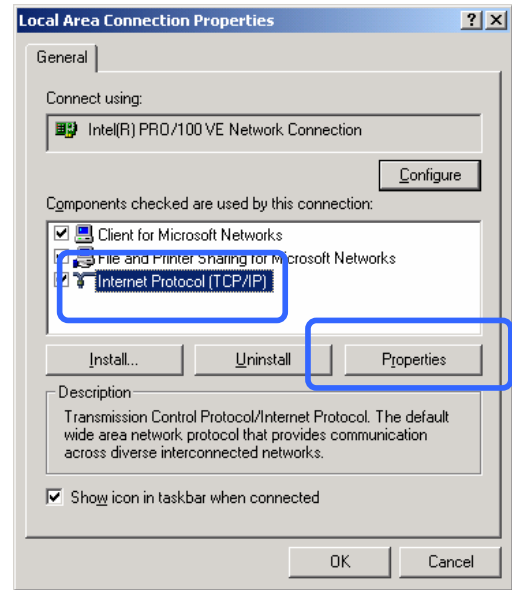
Configuring Windows 2000 PCs

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

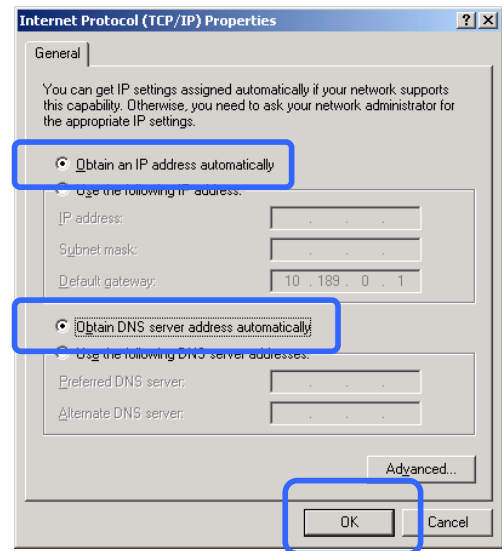
- Click on the  button. Select **Settings->Control Panel**. Double click on **Network and Dial-up Connections**.
- Double click on the  **Local Area Connection** for the applicable Ethernet adapter.
- The **Local Area Connection Status** dialog box is displayed:
- Click on the **Properties** button.



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**.



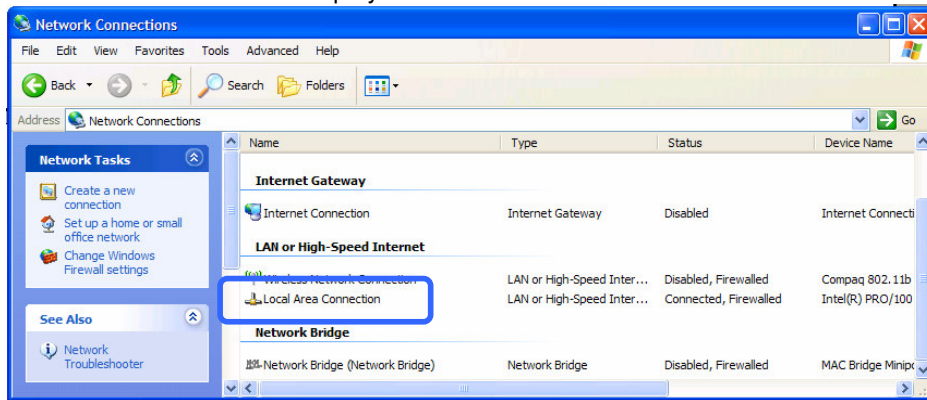
6. Click on **OK** to close the Internet Protocol (TCP/IP) Properties page.
7. On the Local Area Connection Properties dialog box, click on **OK** to close it.



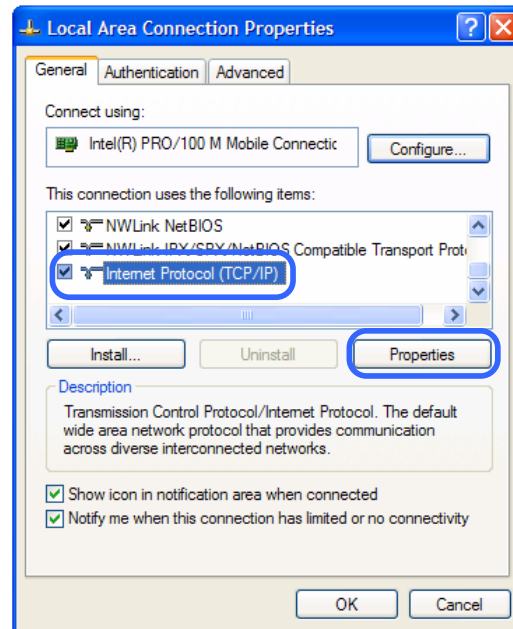
Configuring Windows XP PCs

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 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.



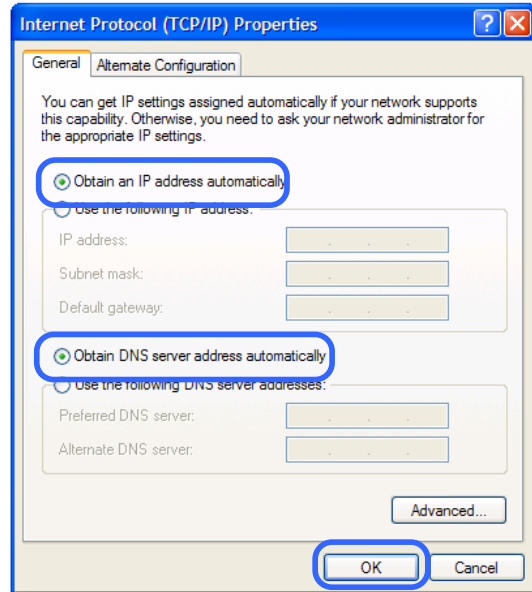


6. The Internet Protocol (TCP/IP) Properties screen is displayed.

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.

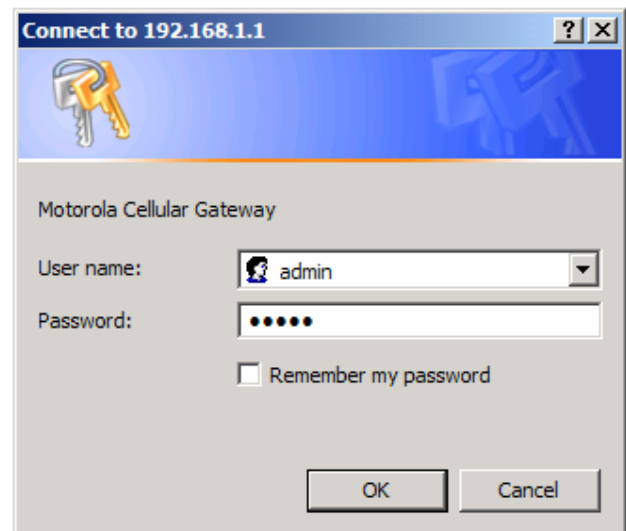
Computer System Requirements for Motorola Cellular Gateway NC800 Configuration

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.



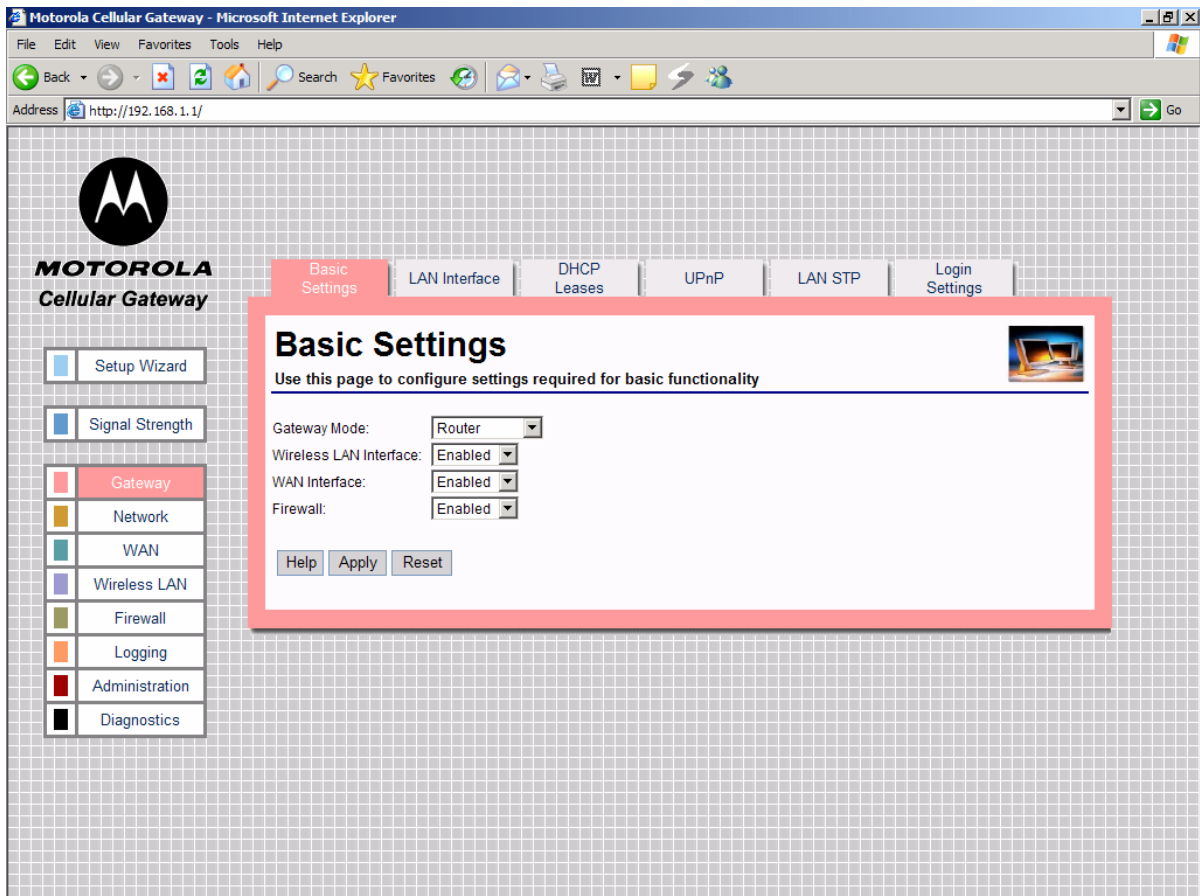
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Remember to change your Motorola Cellular Gateway NC800's **Username** and **Password** values for security reasons. Un-authorized users accessing your gateway can change the configuration settings - potentially disrupting network connectivity.

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



- Firewall** encryption, performance and compatibility.
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:



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.



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.



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 (<i>lower case</i>)
Password	admin (<i>lower case</i>)

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.