DCM-604 Series

PacketCable 1.5 and DOCSIS/EURODOCSIS 2.0 Compliant
4 Ports Ethernet Cable Modem with Wireless and EMTA
User's Manual

Revision 1.0
Jan 2008

FCC Statement

This device complies with Class B Part 15 of the FCC Rules. The device generates, uses and can radiate radio frequency energy and, if not installed and used as instructed, may cause harmful interference to radio communication. Only Coaxial cables are to be used with this device in order to ensure compliance with FCC emissions limits. Accessories connected to this device by the user must comply with FCC Class B limits. The manufacturer is not responsible for any interference which results from use of improper cables, or which results from unauthorized changes or modifications to the device.
"A Minimum 26 AWG Line Core should be used for connection to the cable modem"

Warranty

Items sold by manufacturer/distributor/agent, hereinafter called "Seller", are warranted only as follows: Except as noted below Seller will correct, either by repair or replacement at its option, any defect of material or workmanship which develops within one year after delivery of the item to the original Buyer provided that evaluation and inspection by Seller discloses that such defect developed under normal and proper use. Repaired or replaced items will be further warranted for the unexpired term of their original warranty. All items claimed defective must be returned to Seller, transportation charges prepaid, and will be returned to the Buyer with transportation charges collect unless evaluation proves the item to be defective and that the Seller is responsible for the defect. In that case, Seller will return to Buyer with transportation charge prepaid. Seller may elect to evaluate and repair defective items at the Buyer's site. Seller may charge Buyer a fee (including travel expenses, if needed) to cover the cost of evaluation if the evaluation shows that the items are not defective or that they are defective for reasons beyond the scope of this warranty.

The Seller makes no warranty concerning components or accessories not manufactured by it. However, in the event of failure of such a part, Seller will give reasonable assistance to Buyer in obtaining from the manufacturer whatever adjustment is reasonable in light of the manufacturer's own warranty. Seller will not assume expense or liability for repairs made outside the factory by other than Seller's employees without Seller's written consent.

SELLER IS NOT RESPONSIBLE FOR DAMAGE TO ANY ASSOCIATED EQUIPMENT, NOR WILL SELLER BE HELD LIABLE FOR INCIDENTAL, CONSEQUENTIAL, OR OTHER DAMAGES. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED INCLUDING THE IMPLIED WARRANTY OF "MERCHANTABILITY" AND "FITNESS FOR PARTICULAR PURPOSE."

Trademarks

All trademarks are the property of their respective owners.

FEDERAL COMMUNICATIONS COMMISSION

This device complies with Part 15 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.

Federal Communication Commission Interference Statement

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

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

This device complies with Part 15 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.

Information to User

To assure continued compliance, (example - use only shielded interface cables when connecting to computer or peripheral devices) any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Only Coaxial cables are to be used with this device in order to ensure compliance with FCC emissions limits. Accessories connected to this device by the user must comply with FCC Class B limits. The manufacturer is not responsible for any interference which results from use of improper cables, or which results from unauthorized changes or modifications to the device.

"A Minimum 26 AWG Line Core should be used for connection to the cable modem"

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Table of Contents

1. Introduction

The DCM-604 is a Voice over IP Wireless Residential Gateway integrated with Cable Modem which allows you implement your VoIP phone call directly through Cable Modem Broadband Network service with its built-in PacketCable 1.5 and DOCSIS/EURODOCSIS 2.0 compliant specification.

Equipped with two standard phone ports, DCM-604 series could easily provide end-users low-cost, long-distance calling, faxing, and a host of advanced service including DCM-604-to-Phone, Phone-to-DCM-604, and DCM-604-to-DCM-604.

And with the integration of 4 ports switch and IEEE 802.11g wireless functionality, the DCM-604 series could also be used as a Wireless Cable Modem Residential Gateway in your home or small office. The ability to route data information into your broadband network could help you easily extend your local network via wire or wireless.

The DCM-604 is MGCP/SIP compliant and has been tested with most major VoIP Softswitch vendors' Call Management systems. And it also has voice support that includes hardware based Quality of Service (QoS), voice compression (popular voice CODECs G.711, G.729A, G.723.1, and so on), echo cancellation, dynamic latency (jitter) buffers, silence suppression, and comfort noise generator.

1.1 Features

- PacketCable 1.5 standard compliant
- DOCSIS /EURODOCSIS 2.0 standard compliant.
- Support PacketCable MGCP (Media Gateway Control Protocol)
- SIP (Session Initiation Protocol) compliant
- 4 standard RJ45 connector for 10/100BaseT Ethernet with auto-negotiation MDIX functions
- USB 1.1 12Mbps
- Two Rj11 Foreign Exchange Station (FXS) ports for IP telephony
- QoS enhancement
- MSO SNMPv3 remote network management
- Provide MIBs DOCSIS 1.0/1.1/2.0
- Support simultaneous voice and data communications
- Echo Cancellation
- Voice Active Detection (VAD)
- Comfort Noise Generation (CNG)
- Web Browser Management auto detect network status
- Build-in IEEE802.11g module as AP with miniPCI form factor

1.2 System Requirements

- IBM Compatible, Macintosh or other workstation supports TCP/IP protocol.
- An Ethernet port supports 10Base-T/100Base-TX Ethernet connection or USB-equipped PC.
- Subscribed to a Cable Television company for Cable Modem services.

1.3 Unpacking and Inspection

Included in the kit is the following:

- 1 x EMTA DCM-604
- 1 x Quick Installation Guide
- 1 x RJ-45 CAT 5 Cable
- 1 x 15V/1.0A Power Supply Adaptor
- 1 x CD-ROM containing USB Driver & User's Manual
- 1 x 6P4C Telephone Cord
- 1 x USB Cable

If any of above items lost or damaged, please contact your retailer or ISP for assistance.

1.4 Safety Precautions

For your protection, observe the following safety precautions when setting up and using your equipment. Failure to observe these precautions can result in serious personal injury and damage to your equipment.

- Make sure the voltages and frequency of the power outlet matches the electrical rating labels on the AC Adapter.
- Do not place any object on top of the device or force it into a confined space.
- Never push objects of any kind through openings in the casing. Dangerous voltages may be present. Conductive foreign objects could produce a short circuit that could cause fire, electrical shock, or damage to the equipment.
- Whenever there is danger of lightning, disconnect the power cable and the Hybrid-Fiber Coax cable from the cable modem to prevent damage to the unit. The use of an AC protection device will not completely protect the cable modem product from damage caused from the transmission across the Hybrid-Fiber Coax network.

2. Hardware Overview

2.1 Front Panel and LEDs

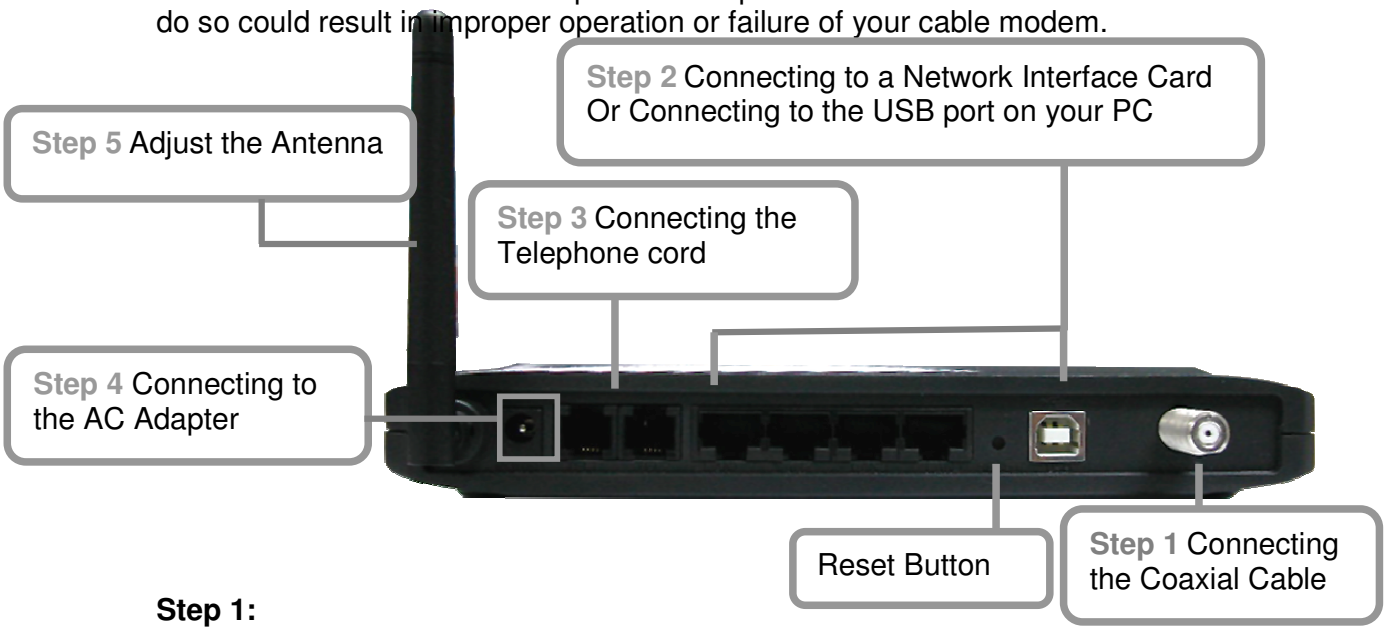
There are fourteen Light-Emitting-Diodes (LEDs) located on the front panel top provide status information to the user.

LED	NAME	COLOR	MODE	STATUS
⏻	Power	Green	On	Connected with power
			Off	Power failure or disconnect
	Cable	Green	Blinking	TFTP/DHCP in process
			On	Cable connected
⬆	Tx	Green	On	Upstream Data traffic
			Off	Without data
⬇	Rx	Green	On	Downstream Data traffic
1	LAN 1	Green	Blinking	Connecting
			On	Ethernet port 1 linked
			Off	Disconnected
2	LAN 2	Green	Blinking	Connecting
			On	Ethernet port 2 linked
			Off	Disconnected
3	LAN 3	Green	Blinking	Connecting
			On	Ethernet port 3 linked
			Off	Disconnected
4	LAN 4	Green	Blinking	Connecting
			On	Ethernet port 4 linked
			Off	Disconnected
⇄	USB	Green	Blinking	USB activity
			On	USB linked
✉	Voice Message	Green	Blinking	Off hook
			On	VoIP linked
1	TEL1	Green	Blinking	New voice message or in calling
			On	Line 1 is registered in the network
			Off	Line 1 is not registered in the network
2	TEL2	Green	Blinking	New voice message or in calling
			On	Line 2 is registered in the network
			Off	Line 2 is not registered in the network

	Wifi	Green	Blinking	No phone call
			On	Connecting
WPS	WPS	Blue	Blinking	WPS Activating
			On	WPS Connected
			Off	No WPS Connection

2.2 Rear Panel and Hardware Connection

This chapter describes the proper steps for connecting your cable modem. Please be sure to follow the steps in the sequence outlined below. Failure to do so could result in improper operation or failure of your cable modem.



Step 1:
Connect a cable by feeding the F-connector on the back of the cable modem. Ensure the center conductor of the 75 ohm coaxial cable is inserted directly into the center of the F-connector. Secure the coaxial cable by carefully threading the outer shell of the coaxial cable connector onto the F-connector in a clockwise direction until tight. Be careful not to over-tighten the connector or you may damage either the connector or the cable modem.

Step2: Connect the cable modem to an IEEE 802.3 10BaseT / 802.3u 100Base-TX Network using a RJ-45 male-terminated Ethernet cable or an USB cable to the PC. This cable modem equips with two Ethernet ports, you can connect two PCs to the cable modem at the same time if necessary.

Step 3: Connect the telephone sets to TEL1 and TEL2. Use RJ-11 telephone line to connect TEL1/TEL2 port on the cable modem and telephone socket on telephone.

Step 4: Connect the AC Adapter to the cable modem by inserting the barrel-shaped connector into the mating power connector on the back of the cable modem. Exercise carefully to ensure the connectors are properly aligned prior to insertion and ensure the two connectors engage completely. The cable modem is shipped with an AC adapter. Remember to use only power adapter that came with the cable modem. Other power adapters might have voltages

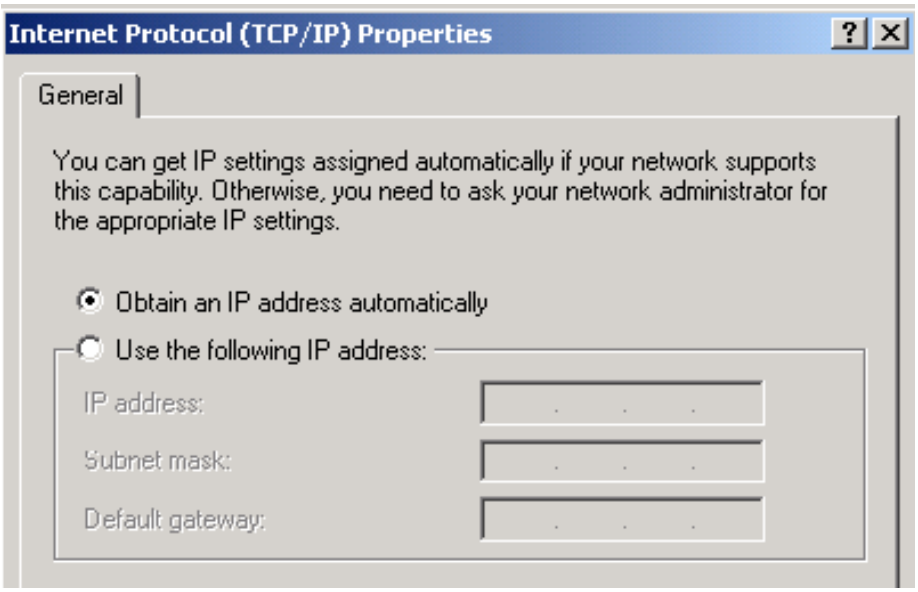
that are not correct for your particular cable modem. Using a power adapter with the wrong voltage can damage the cable modem.

Step 5: Adjust the antenna if necessary.

- This product can be mounted on wall, There are two holes in the lower case , you can use the screw to mount it.

3. Ethernet Installation

The LAN port you are using is auto-negotiating 10/100Mbps (Switch) Ethernet Interface. You can use the Ethernet port to connect to the Internet with an Ethernet network device such as NIC/Hub/Switch through RJ45.
Before you connect to and install the cable modem, please set the IP address to "Obtain an IP address automatically" as below and do ensure the TCP/IP protocol is installed on your system and configured correctly in your PC.



Following is an example of configuring the TCP/IP Protocol on Windows 98 Operating Systems:

1. Click **Start→Settings→Control Panel**. Double click on the **Network** icon click **Properties**.
2. A list of installed network components appears. Look for an entry named TCP/IP. This entry may be followed by an arrow and a description of the NIC hardware device installed in the computer. If you don't see "TCP/IP" listed anywhere in the "The following network components are installed" box, click the **Add** button, choose **Protocol**, and click the **Add** button. Select "Microsoft" as the manufacturer and then scroll down in the list on the right to find "TCP/IP". If you see "TCP/IP" listed, proceed to step 4.
3. Click the **OK** button. You will be prompted to insert the Windows 98 installation/upgrade CD.
4. Scroll down in the box until you find a line that says "TCP/IP -> " followed by the name of your Ethernet adapter. Click on **Properties** and choose "Obtain an address automatically" which means that your PC has been configured to use DHCP (Dynamic Host Configuration Protocol).
5. Click **OK**.

Congratulations! You have successfully set up your cable modem.

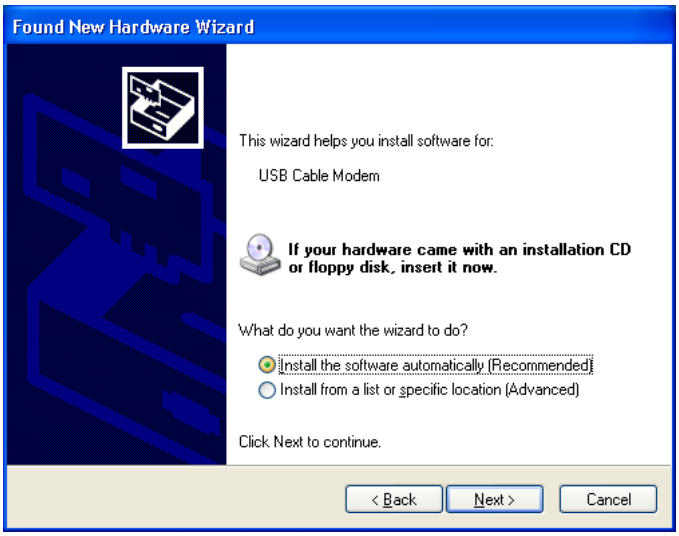
4. USB Driver Installation

Using the USB port to connect to the Internet allows you to install the cable modem more quickly and easily than connecting to the Internet using the Ethernet port, since you do not need to install a network interface card (NIC).

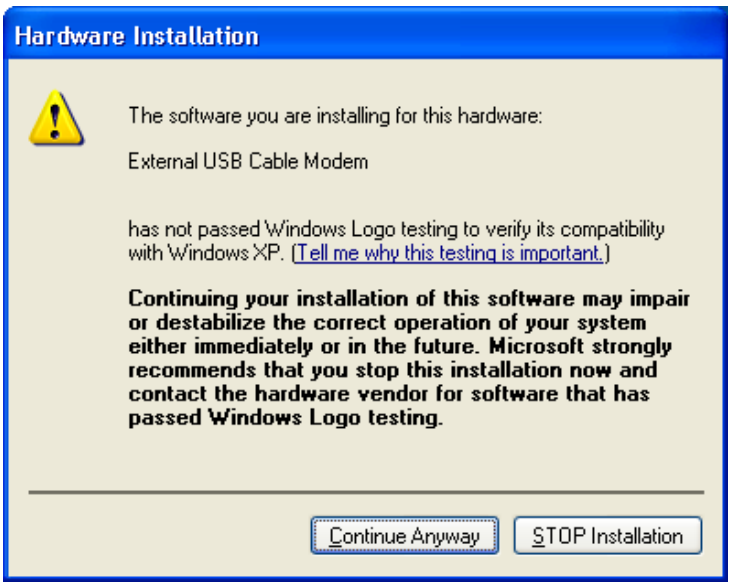
4.1 Windows XP

1. Connect USB cable from PC to cable modem.
2. Connect RF cable and power on Cable Modem. Wait until it register, it will take about 40 seconds to 4 minutes depends on network traffic. Cable Modem may reboot if you previously connect it through Ethernet port.
3. Windows will prompt new hardware found, insert the Driver CD into your CD-ROM drive.
4. You may seed this window if you had update your Windows XP to Service Pack 2. Select "Yes, this time only" and then click **Next**.

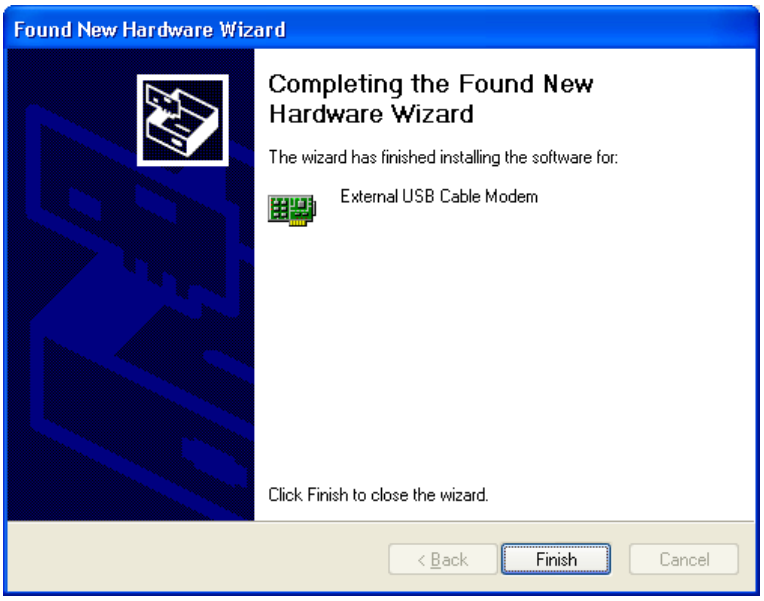
5. Select "Install the software automatically (Recommended)" and then click **Next**.



6. Windows will locate the driver automatically. Please click **Continue Anyway** to continue the installation process.



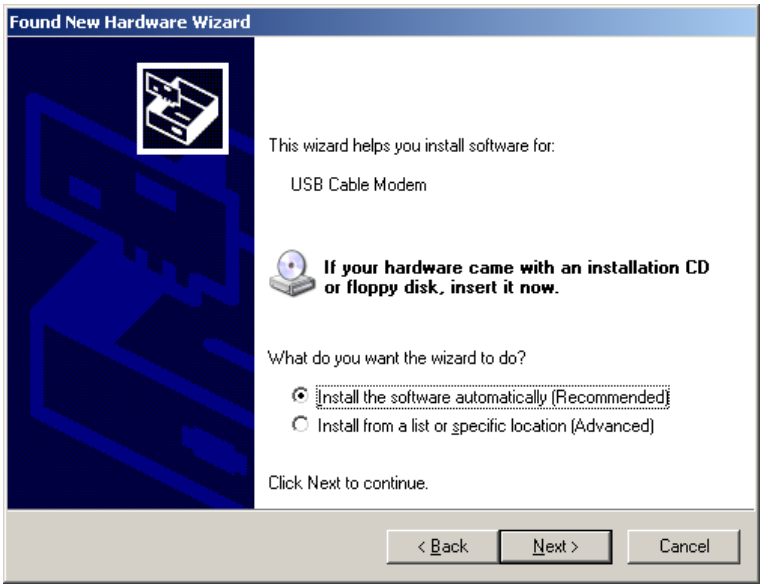
7. Windows shall find the location of USB driver and complete the installation. Click **Finish**.



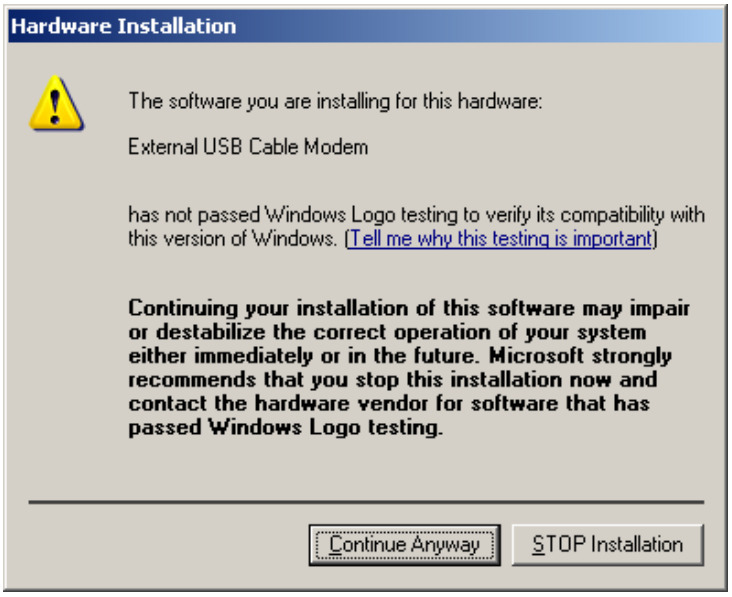
4.2 Windows 2003

1. Connect USB cable from PC to cable modem.
2. Connect RF cable and power on Cable Modem. Wait until it register, it will take about 40 seconds to 4 minutes depends on network traffic. Cable Modem may reboot if you previously connect it through Ethernet port.
3. Windows will prompt new hardware found, insert the Driver CD into your CD-ROM drive.
4. Select "Yes, this time only" and then click **Next**.

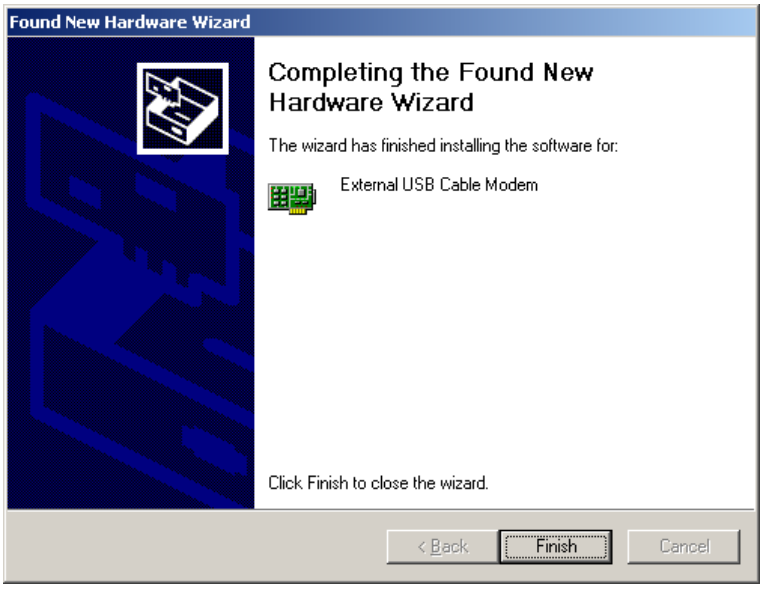
5. Select "Install the software automatically (Recommended)" and then click **Next**.



6. Windows will locate the driver automatically. Please click **Continue Anyway** to continue the installation process.

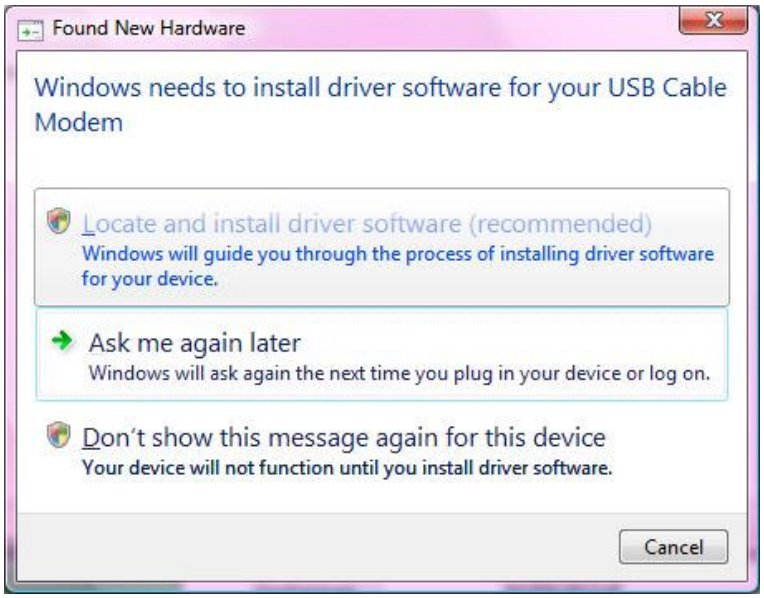


7. Windows shall find the location of USB driver and complete the installation. Click **Finish**.

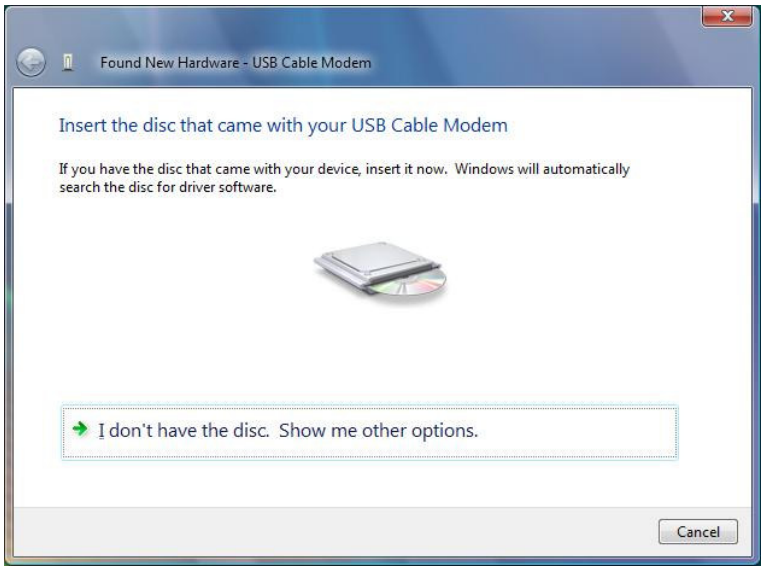


4.3 Windows Vista

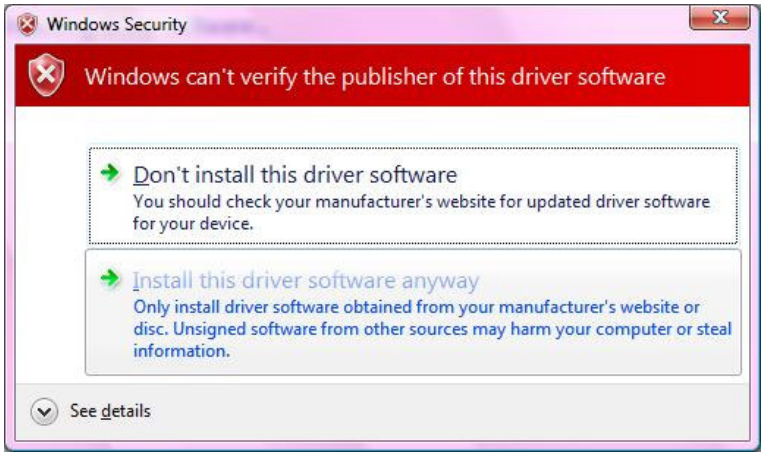
1. Connect USB cable from PC to cable modem.
2. Connect RF cable and power on Cable Modem. Wait until it register, it will take about 40 seconds to 4 minutes depends on network traffic. Cable Modem may reboot if you previously connect it through Ethernet port.
3. Windows will prompt new hardware found, insert the Driver CD into your CD-ROM drive.
4. Click "Locate and install driver software (recommended)" item



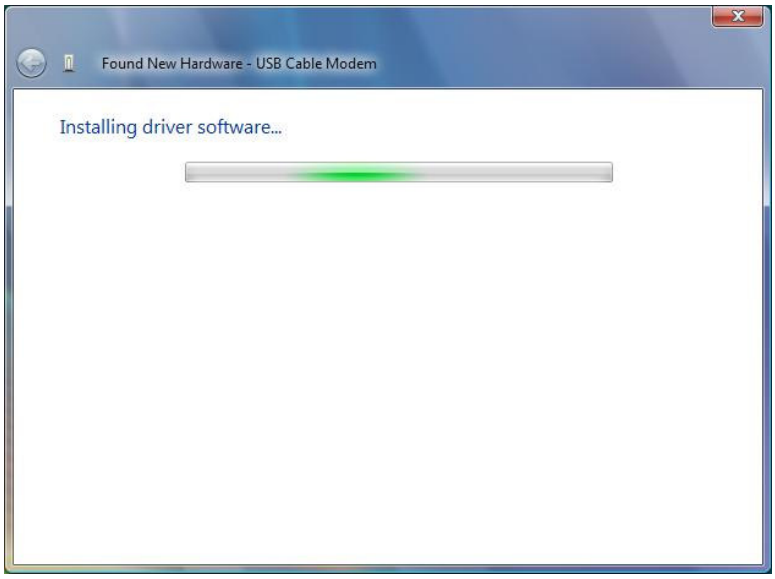
5. Insert the Driver disk that came with your cable modem into your CD-ROM drive. Windows Vista will automatically searched and found this driver.



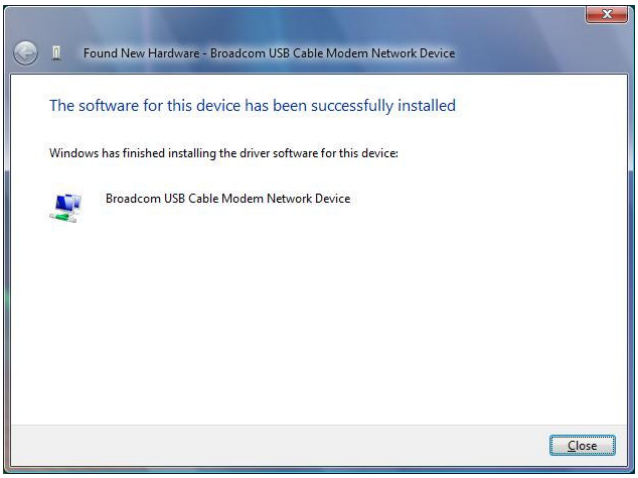
6. During the driver installation, your system may pop-up a dialogue as below window, just click “Install this driver software anyway”.



7. During the driver installation, your system may pop-up a dialogue as below window, just click “Install this driver software anyway”.



8. Click “Close” button to finish the driver installation.



5. Web Management

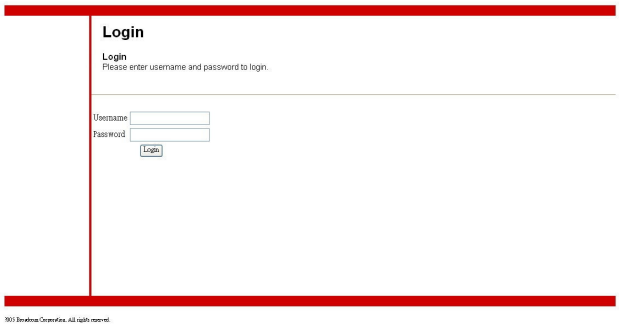
For easy-changing the default setting or quick-checking diagnostics for troubleshooting, a Web-based GUI is built-in for your access.

5.1 Enter Modem's IP address

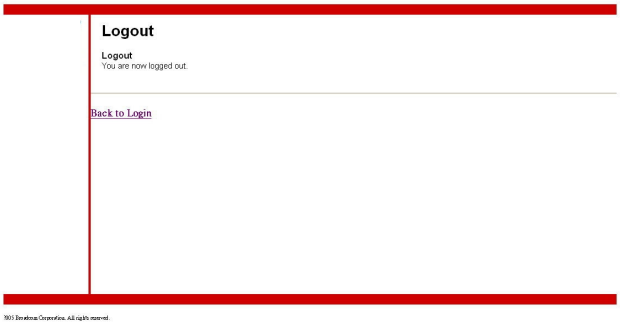
Use the following procedures to login to your DCM-604.

1. Open your web browser.
   You may get an error message. This is normal. Continue on to the next step.
2. Type the default IP address of the DCM-604 (e.g. **192.168.100.1**) and press Enter.

3. The Log In page appears. Type the user name (**admin**) and your password (**password**) in the respective fields.



4. click the Logout button to leave the application.



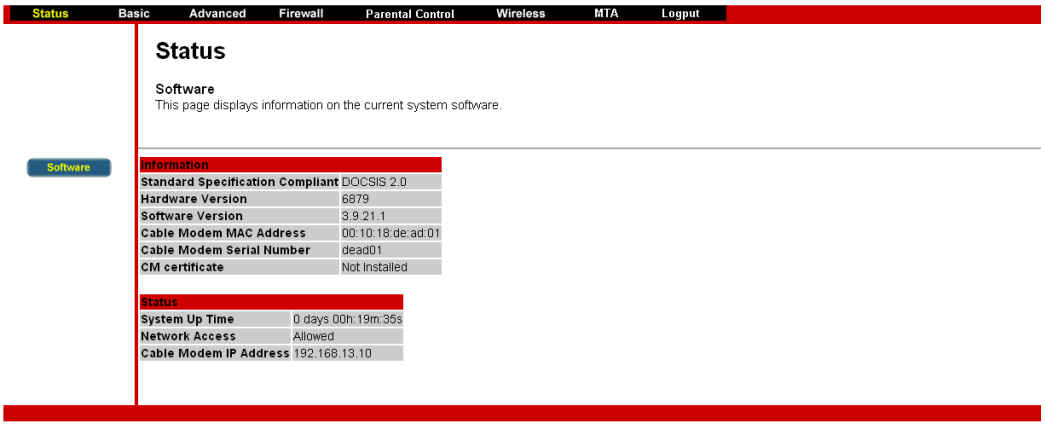
There are seven categories in this web management including Status, Basic, Advanced and Firewall. The following sections describe their details.

5.2 Status

The Status page shows hardware and software information about the DCM-604 that may be useful to your cable service provider.

5.2.1 Software Status

The Software page shows how long the DCM-604 has operated since last being powered up, and some key information the DCM-604 received during the initialization process with your cable service provider.



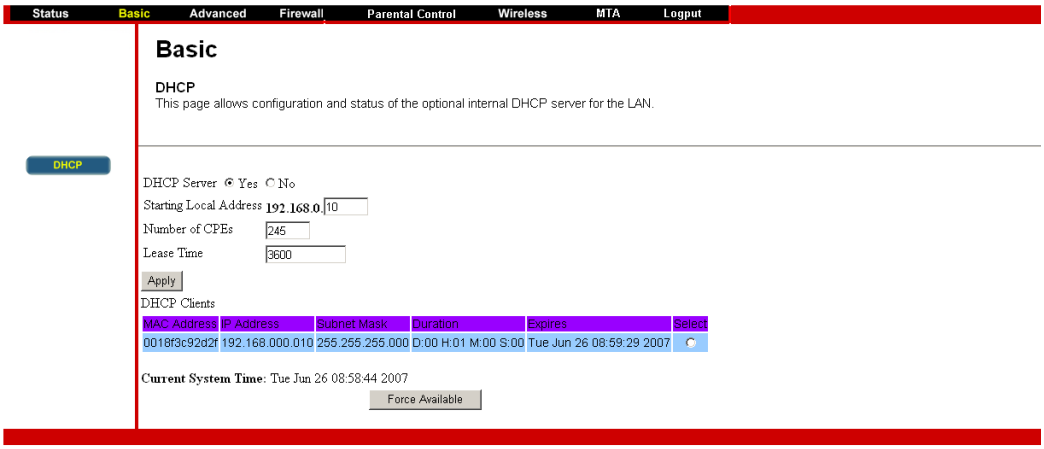
If Network Access shows "Allowed," then your cable service provider has configured the DCM-604 to have Internet connectivity. If Network Access shows otherwise, you may not have Internet access, and please contact your cable service provider for assistance.

5.3 Basic

The Basic page contains the basic features of DCM-604 including Setup, DHCP and Backup

5.3.1 DHCP

The DHCP page allows you to activate/deactivate the DHCP server function of the DCM-604, and, if the DHCP server is activated, to see DHCP leases it has provided.



With this function activated, your cable service provider's DHCP server provides one IP address for the DCM-604, and the DCM-604's DHCP server provides IP addresses, starting at the address you set in **Starting Local Address** field, to your PCs. A DHCP server leases an IP address with an expiration time.

To set the maximum number of PCs to which the DCM-604 will issue IP addresses, enter it in the **Number of CPEs** box and then click **Apply**. (CPE is another term sometimes used for PC.)

The table on the bottom of this page shows the information of DHCP clients including the IP and MAC addresses of each PC. Since MAC addresses are unique and permanently fixed into hardware, you can identify any PC listed by its MAC address. The DCM-604 provides leases for 3600 seconds (default), and has an automatic renewal mechanism that will keep extending a lease as long as the associated PC remains active.

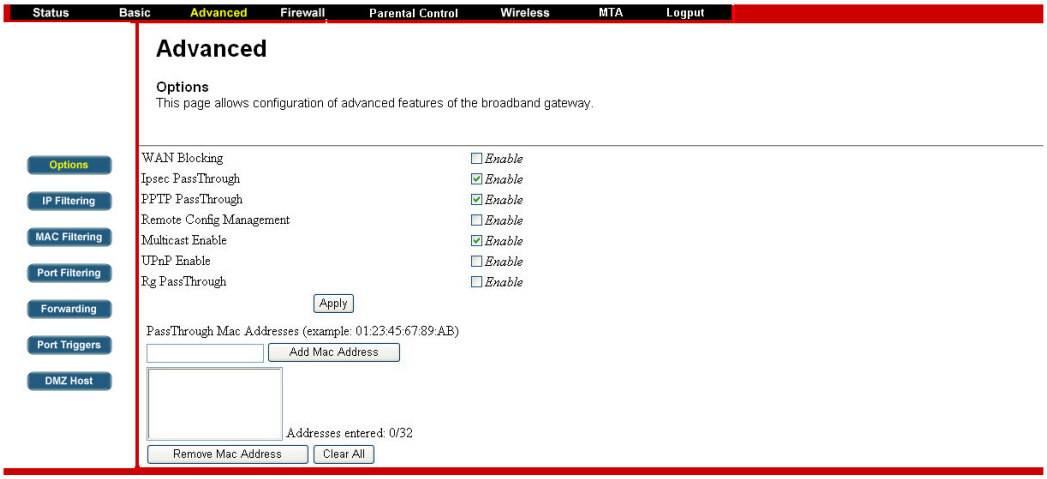
You can cancel an IP address lease by selecting it in the DHCP Client Lease Info list and then clicking the **Force Available** button. If you do this, you may have to perform a DHCP Renew on that PC, so it can obtain a new lease.

5.4 Advanced

The Advanced page allows you to enable/disable some advanced features of the DCM-604.

5.4.1 Options

The Options page allows you to enable/disable some advanced features supported by DCM-604.

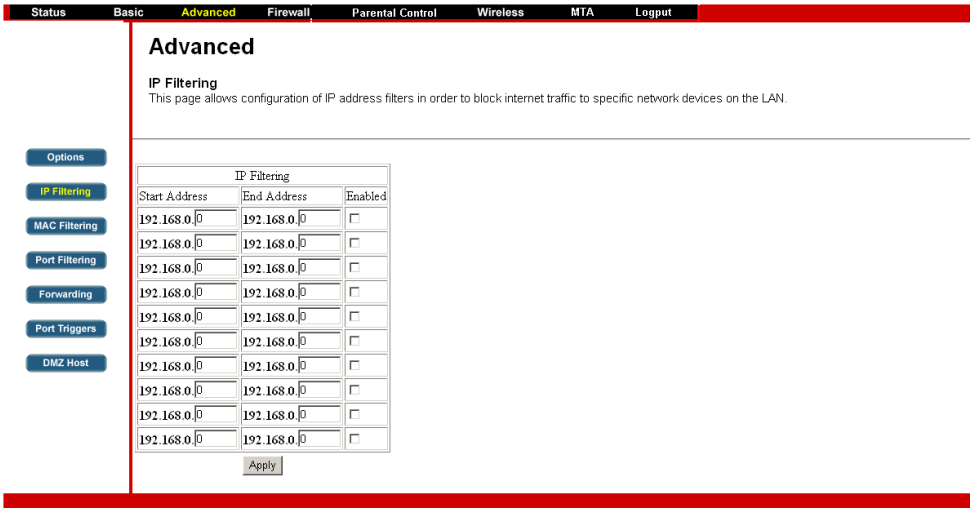


Check the option you want to use and click **Apply** button to enable the function(s).

- **WAN Blocking:** To prevent others on the WAN side from being able to ping your DCM-604. With WAN Blocking on, your DCM-604 will not respond to pings it receives, effectively "hiding" your gateway.
- **Ipsec PassThrough:** To enable IpSec type packets to pass through between WAN and LAN.
- **PPTP PassThrough:** To enable PPTP type packets to pass through between WAN and LAN.
- **Remote Config Management:** To make the Web Management pages of your DCM-604 accessible from the WAN side. Page access is limited to only those who know the DCM-604 access password you set in the **Status--Security** page.
  When accessing the DCM-604 from a remote location, you must use HTTP port 8080 and your IP address. This is the "WAN IP address" that appears at the **Basic--Setup** page. For example, if this IP address were 211.20.15.28, you would navigate to http:// 211.20.15.28:8080 to reach the DCM-604's Web Management page from a remote location.
- **Multicast Enable:** To enable multicast traffic to pass through between WAN and LAN. You may need to enable this to see some types of broadcast streaming and content on the Internet, such as webcasting of a popular live event.
- **UPnP Enable:** UPnP (Universal Plug and Play) offers pervasive peer-to-peer network connectivity of PCs of all form factors, intelligent appliances, and wireless devices. UPnP architecture leverages TCP/IP and the Web to enable seamless proximity networking in addition to control and data transfer among networked devices in the home, office, and everywhere in between.

5.4.2 IP Filtering

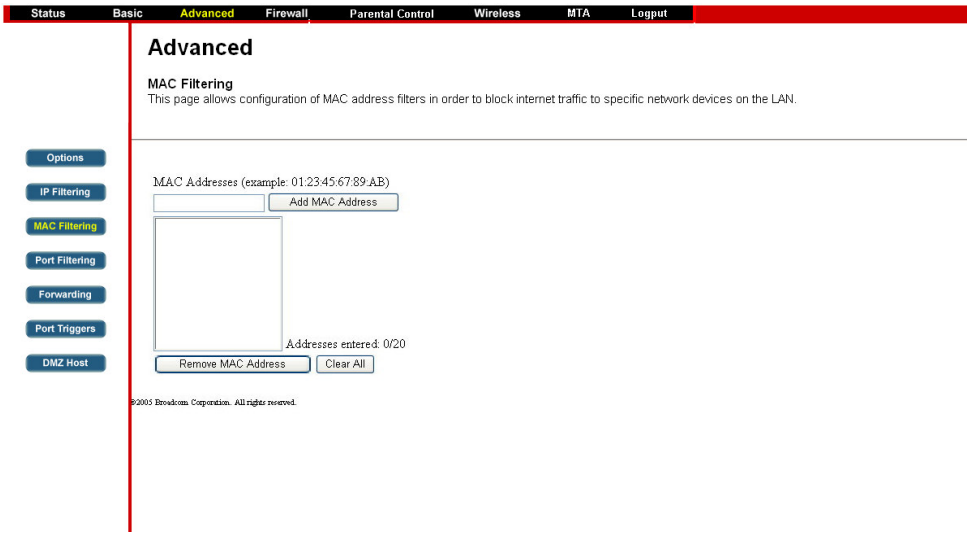
The IP Filtering page enables you to enter the IP address ranges of PCs on your LAN that you don't permit to have outbound access ability to the WAN. These PCs can still communicate with each other on your LAN, but packets they originate to WAN addresses are blocked by the DCM-604.



To enable IP Filtering feature of DCM-604, check the **Enable** box and click **Apply** button.

5.4.3 MAC Filtering

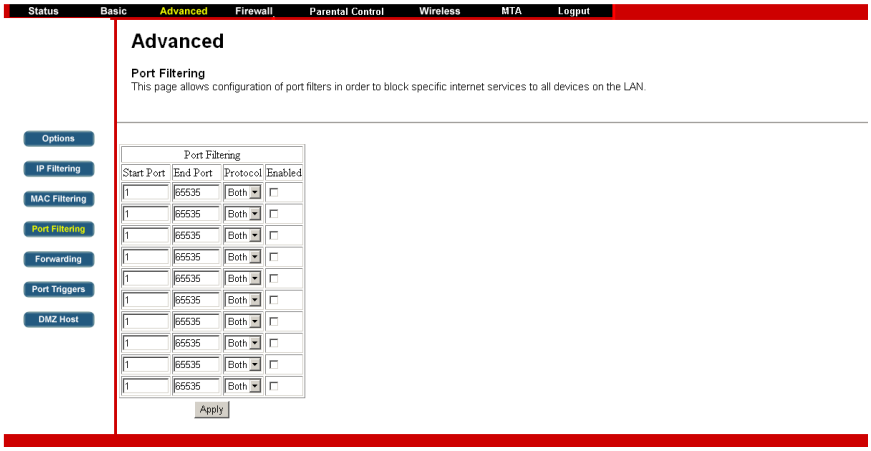
The MAC Filtering page enables you to enter the MAC address of specific PCs on your LAN that you don't permit to have outbound access ability to the WAN. These PCs can still communicate with each other through the DCM-604, but packets they send to WAN addresses are blocked.



To enable MAC filtering feature of DCM-604, enter the MAC address of the LAN device and click **Apply** button.

5.4.4 Port Filtering

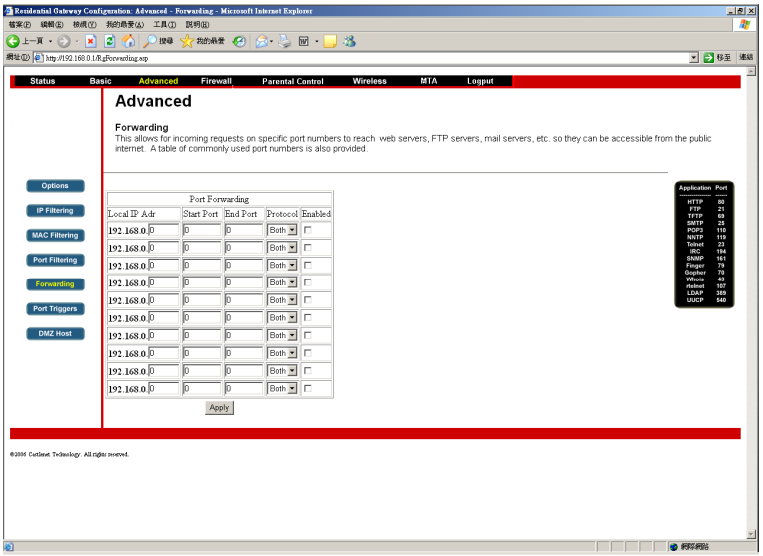
The Port Filtering page allows you to enter ranges of destination ports (applications) that you don't want your LAN PCs to send packets to. Any packets your LAN PCs send to these destination ports will be blocked. For example, you could block access to worldwide web browsing (HTTP port 80) but still allow email service (SMTP port 25 and POP3 port 110).



To enable port filtering, enter the **Start port** and **End port** for each range. Then select its protocol form the drop-down list and check the **Enable** box, and click **Apply** button. To block only one port, set both Start and End ports the same.

5.4.5 Forwarding

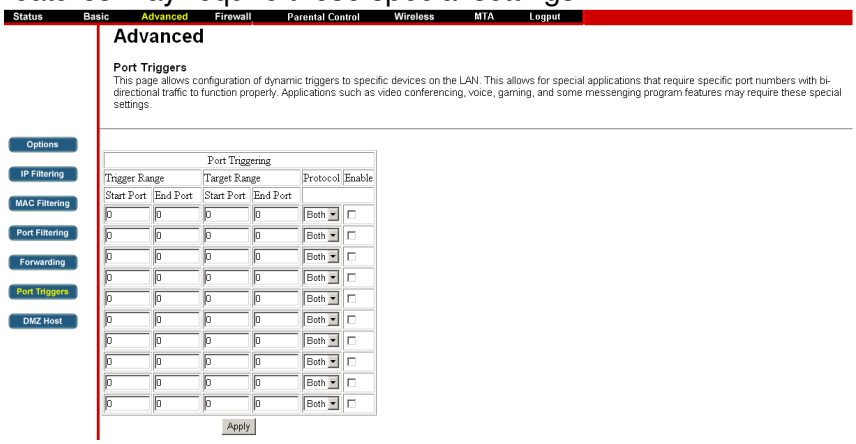
For communications between LAN and WAN, the DCM-604 normally only allows you to originate an IP connection with a PC on the WAN; it will ignore attempts of the WAN PC to originate a connection onto your PC. This protects you from malicious attacks from outsiders. However, sometimes you may wish for anyone outside to be able to originate a connection to a particular PC on your LAN if the destination port (application) matches one you specify.
The Forwarding page allows you to specify up to 10 rules.



Using the Port Forwarding page, you can provide local services (web servers, FTP servers, mail servers, etc) for people on the Internet or play Internet games. A table of commonly used port numbers is also provided.

5.4.6 Port Triggers

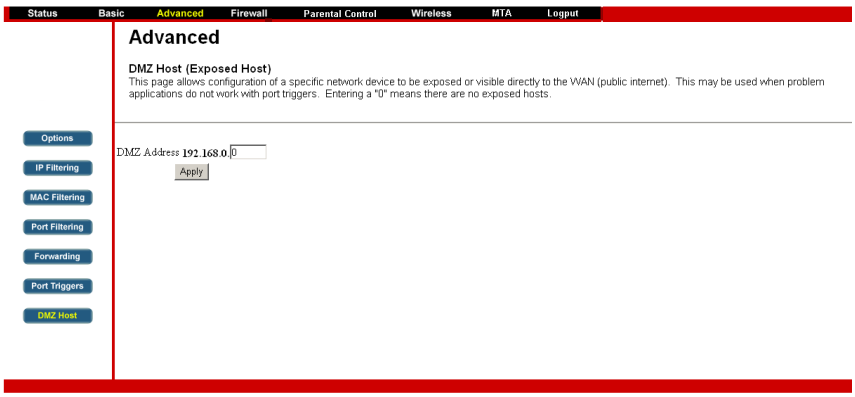
The Port Triggers page allows you to configure dynamic triggers to specific devices on the LAN. This allows for special applications that require specific port numbers with bi-directional traffic to function properly. Applications such as video conferencing, voice, gaming, and some messenging program features may require these special settings.



Port Triggering is an elegant mechanism that does the forwarding for you, each time you play the game.
You can specify up to 10 port ranges on which to trigger.

5.4.7 DMZ Host

The DMZ page allows you to configure a specific network device to be exposed or visible directly to the WAN (public Internet). Setting a host on your local network as demilitarized zone (DMZ) forwards any network traffic that is not redirected to another host via the port forwarding feature to the IP address of the host (PC). This designates one PC on your LAN that should be left accessible to all PCs from the WAN side for all ports. For example, if you locate a HTTP server on this machine, anyone will be able to access that HTTP server by using your DCM-604's IP address as the destination. This may be used when problem applications do not work with port triggers. The setting of "0" indicates NO DMZ PC.



5.5 Firewall

The DCM-604 provides built-in firewall functions, enabling you to protect the system against denial of service (DoS) attacks and other unwelcome or malicious accesses to your LAN.

5.5.1 Local Log

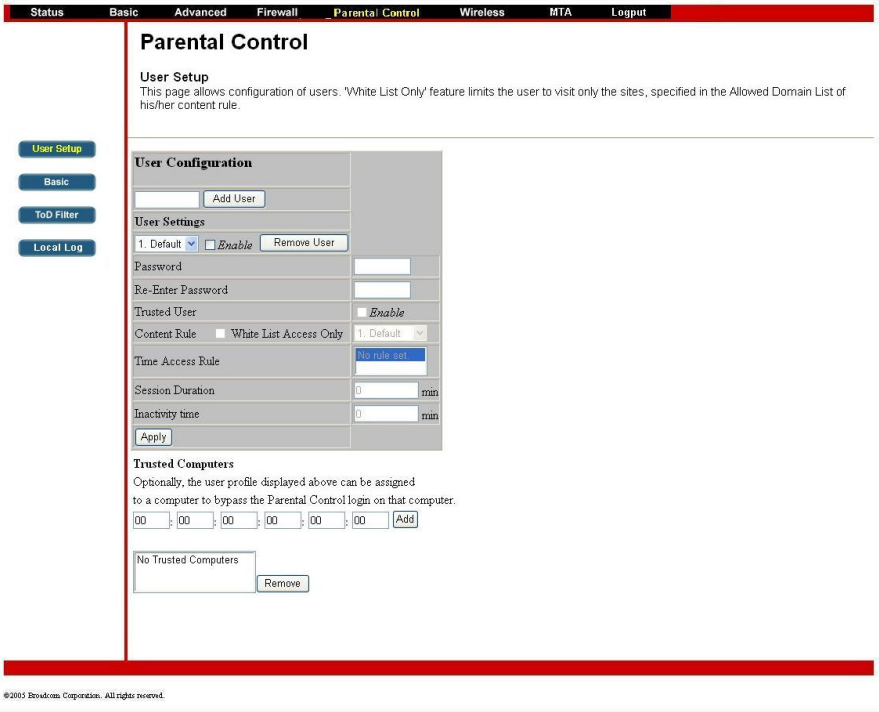
The Local Log page allows you to configure the firewall event log reported via email alert, and these attack records are also visible in the table on the bottom of this page.

Specifies the e-mail address and its SMTP of the administrators who should receive notices of any attempted firewall violations. Type the addresses in standard Internet e-mail address format, for example, yourname@onecompany.com. Then check the **Enable** box to enable the alert feature.
Click **E-mail Log** to immediately send the email log. Click **Clear Log** to clear the table of entries for a fresh start.

5.6 Parental Control

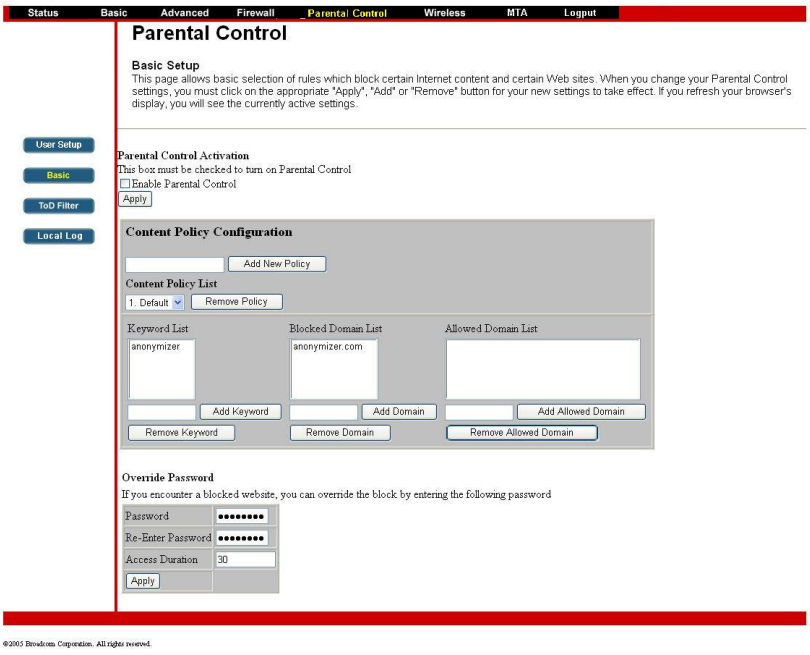
5.6.1 User Setup

This page allows configuration of users. "White List Only" feature limits the user to visit only the sites, specified in the Allowed Domain List of his/her content rule.



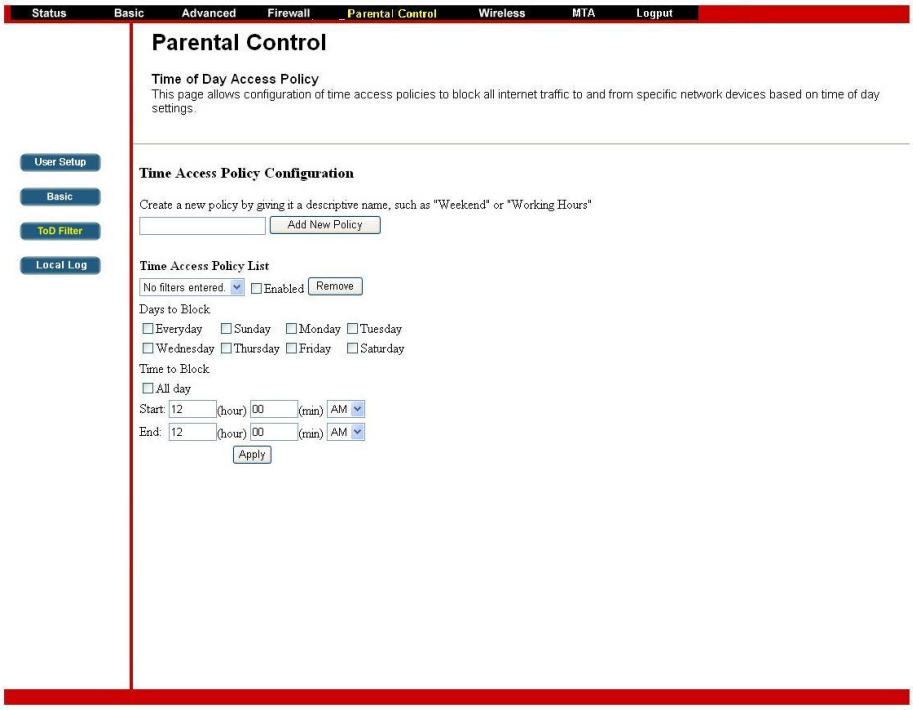
5.6.2 Basic Setup

This page allows basic selections of rules which block certain Internet content and certain Web sites. When you change your Parental Control settings, you must click on the appropriate "Apply", "Add" or "Remove" button for your new setting to take effect. If you refresh your browser's display, you will see the currently active settings.



5.6.3 Time of Day Access Policy

This page allows configuration of time access policies to block all internet traffic to and from specific network devices based on time of day setting.



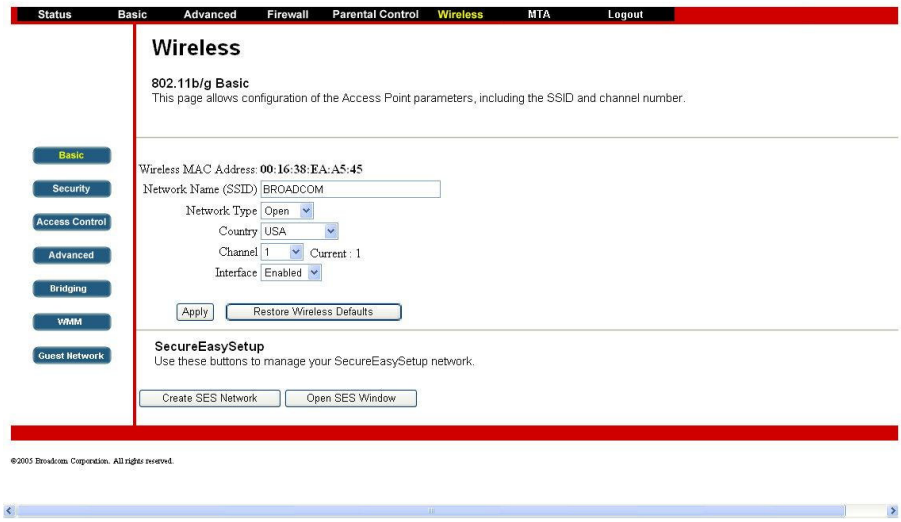
5.6.4 Event Log

This page displays Parental Control event log reporting.

5.7 Wireless

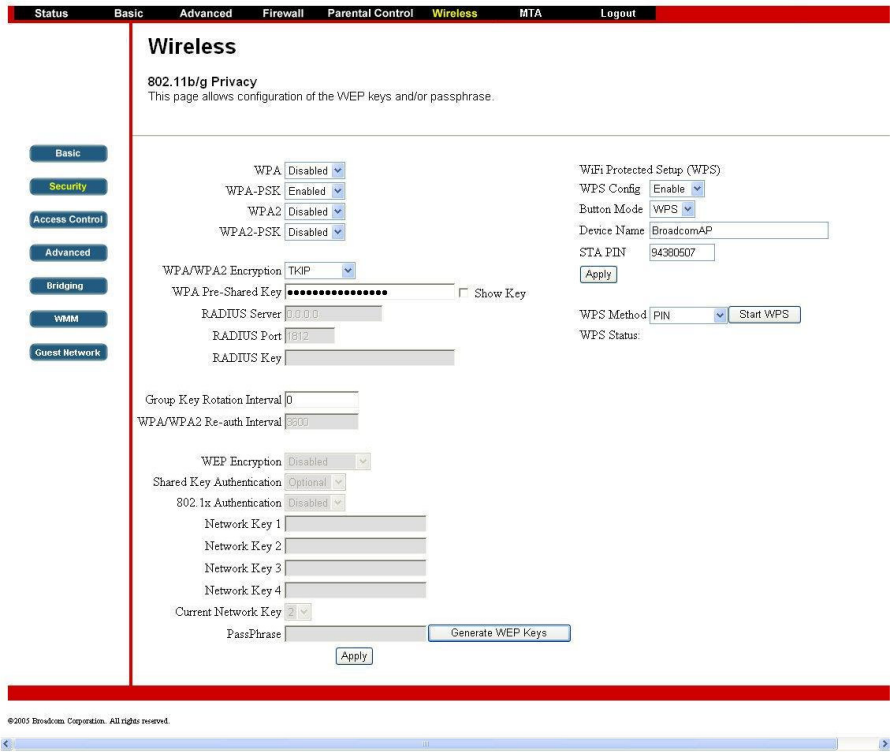
5.7.1 Basic

The Wireless Connection Status page allows configuration of the Access Point parameters including the SSID and channel number.



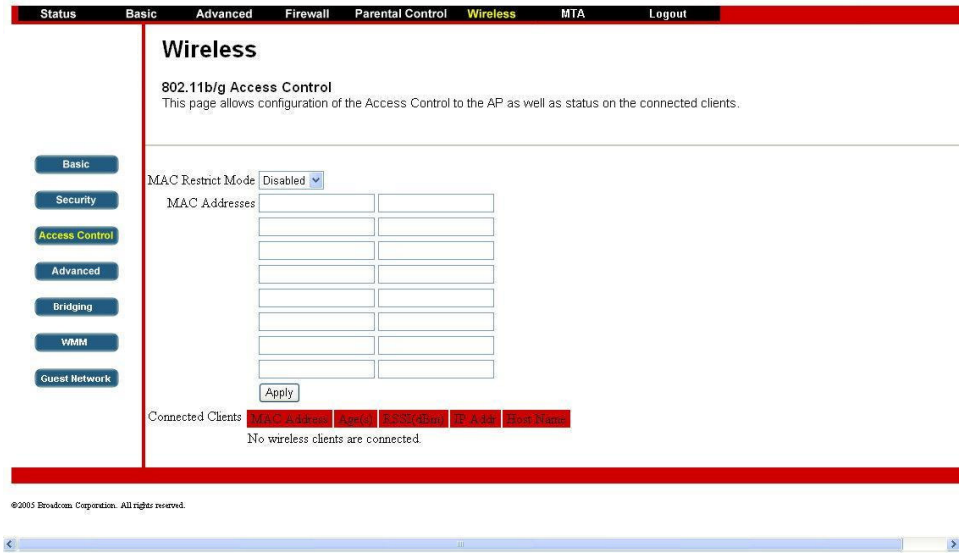
5.7.2 Security

This page allows configuration of the WEP keys and/or passphrase.



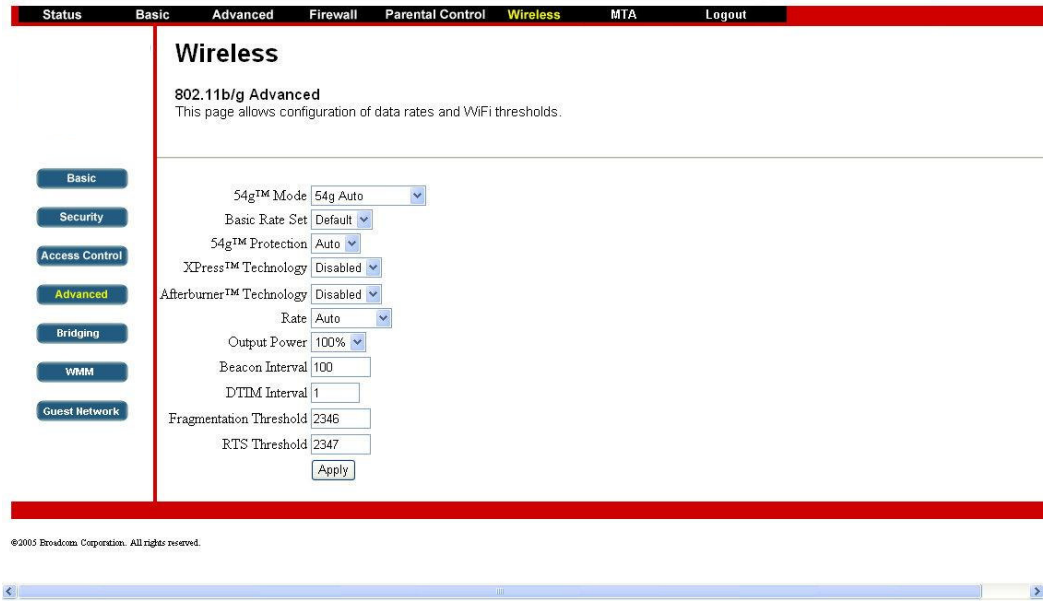
5.7.3 Access Control

This page allows configuration of the Access Control to the AP as well as on the connected clients.



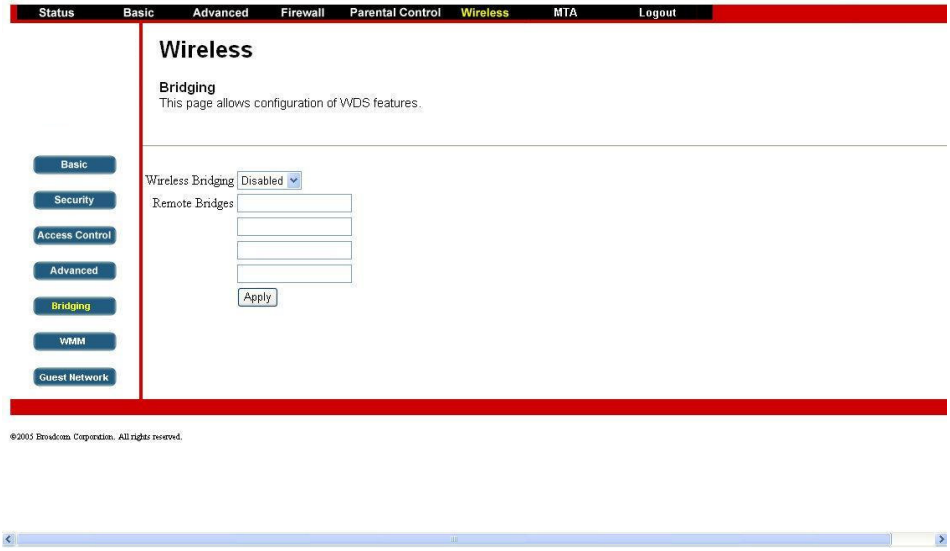
5.7.4 Advanced

This page allows configuration of data rates and WiFi thresholds.



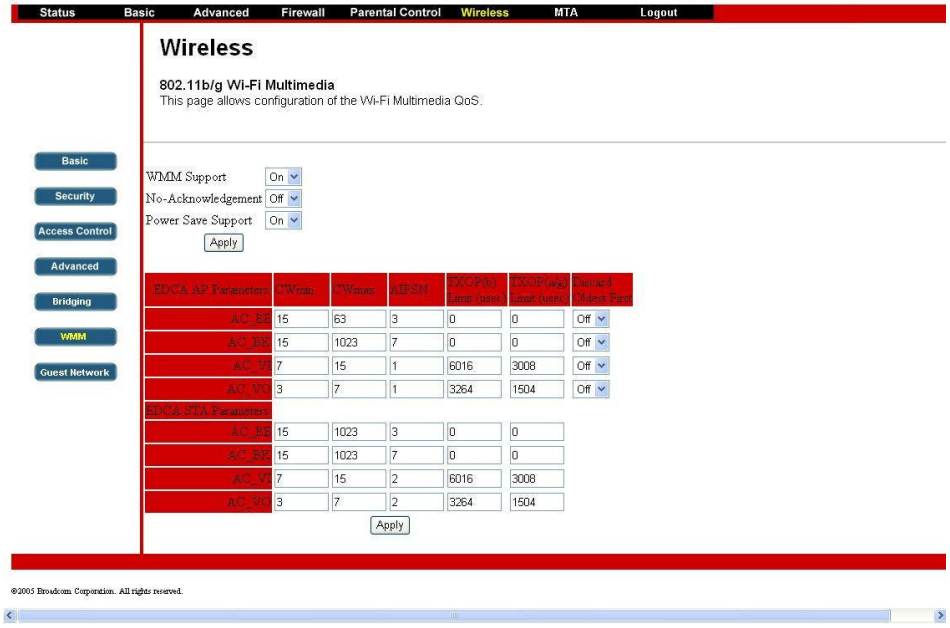
5.7.5 Bridging

This page allows configuration of WDS features.



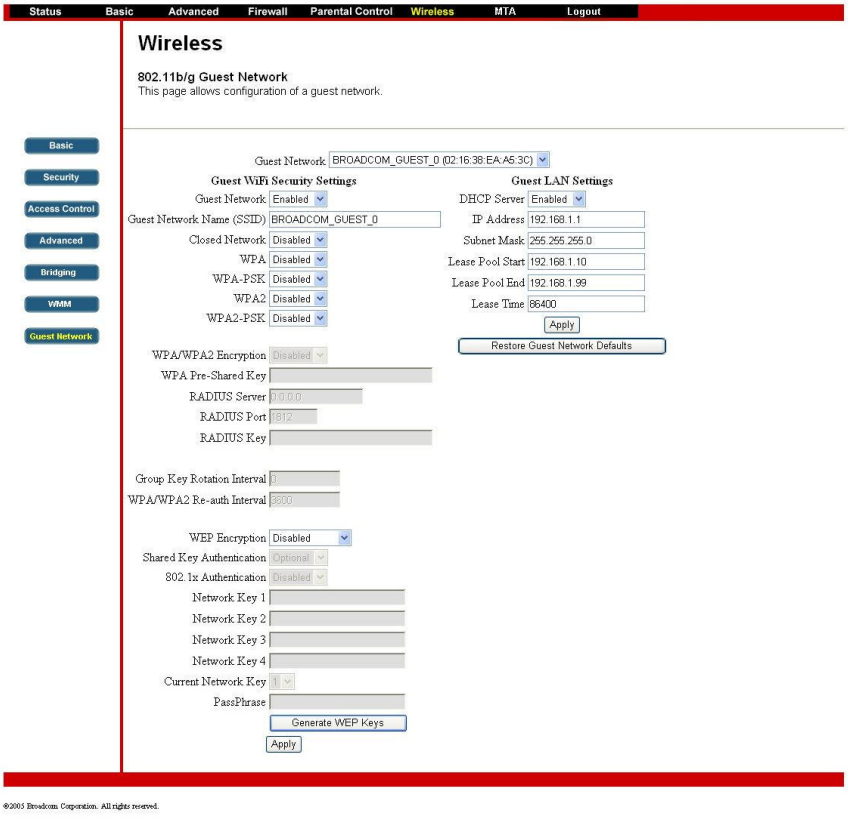
5.7.6 WMM

This page allows configuration of the Wi-Fi Multimedia QoS.



5.7.7 Guest Network

This page allows configuration of a guest network..

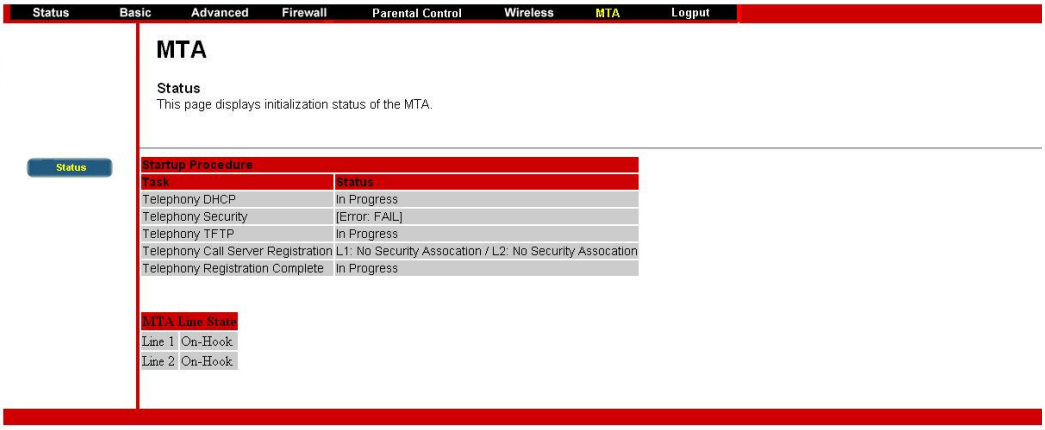


5.8 MTA

Section MTA has 5 sub-items, which indicate the status of MTA. These information can help you to understand the parameters of MTA operation.

5.8.1 Status

This page displays initialization status of the MTA.



Appendix: Cable Modem Specification

Table 1. RF Downstream Specification (DOCSIS)

Parameter	Value	Notes
Frequency range	88 MHz to 860 MHz +/- 30 kHz	
Demodulation	64QAM. 256QAM	
Input power range	-15 dBmV to +15 dBmV	One Channel
Symbol Rate	5.056941 Msym/sec (30 Mbps) 5.360537 Msym/sec (43 Mbps)	64QAM 256QAM
Bandwidth	6 MHz	
Total Input Power	<30 dBmV	
Input Impedance	75 Ohms	

Table 2. RF Upstream Specification (DOCSIS)

Parameter	Value	
Frequency Range	5 MHz to 42 MHz	
Modulation	QPSK, 8QAM, 16QAM, 32QAM, 64QAM, 128QAM (SCDMA only)	
Symbol Rate	**TDMA**: 160K, 320K, 640K, 1280K, 2560K, 5120Ksym/sec **S-CDMA**: 1280K, 2560K, 5120Ksym/sec	
Bandwidth	**TDMA:** 200K, 400K, 800K, 1600K, 3200K, 6400KHz S-CDMA: 1600K, 3200K, 6400KHz	
Output power	TDMA	QPSK: 8 ~ 58 dBmV 8/16QAM: 8 ~ 55 dBmV 32/64QAM: 8 ~ 54 dBmV
	S-CDMA	QPSK, 8/16/32/64/128QAM: 8 ~ 53 dBmV
Output Impedance	75 Ohms	

Table 3. RF Downstream Specification (for EuroDOCSIS system)

Parameter	Value	Notes
Frequency Range	108 MHz to 862 MHz	
Demodulation	64QAM. 256QAM	
Input power range	+13dBmV to -17dBmV (65QAM) +17dBmV to -13dBmV (256QAM)	
Symbol Rate	056941 Msym/sec (30 Mbps) 5.360537 Msym/sec (43 Mbps)	64QAM 256QAM
Bandwidth	8MHz	
Total Input Power	<30 dBmV	
Input Impedance	75 Ohms	

Table 4. RF Upstream Specification (for EuroDOCSIS system)

Parameter	Value	
Frequency Range	5 MHz to 65 MHz	
Modulation	QPSK, 8QAM, 16QAM, 32QAM, 64QAM, 128QAM (TCM only)	
Symbol Rate	**TDMA**: 160K, 320K, 640K, 1280K, 2560K, 5120Ksym/sec **S-CDMA**: 1280K, 2560K, 5120Ksym/sec	
Bandwidth	**TDMA**: 200K, 400K, 800K, 1600K, 3200K, 6400KHz **S-CDMA**: 1600K, 3200K, 6400KHz	
Output power	TDMA	QPSK: 8 ~ 58 dBmV 8/16QAM: 8 ~ 55 dBmV 32/64QAM: 8 ~ 54 dBmV
	S-CDMA	QPSK, 8/16/32/64/128QAM: 8 ~ 53 dBmV
Output Impedance	75 Ohms	

Table 5. Electrical Specification

Parameter	Measured Value	Notes
Input Voltage	15VDC/1A	
Power consumption	< 9.5W	With AC adaptor

Table 6. Physical Specification

Parameter	Value
Size	155 mm (L) x 37mm(W) x 260 mm (H)
Weight	360g +/- 10g (Modem only)

Table 7. Environmental Specification

Parameter	Value
Operating Temperature	0 ℃ to +40 ℃
Operating Relative Humidity	10% to 90% (Non-condensing)
Operating Altitude	-100 to +7,000 feet
Storage Temperature	-10 ℃ to +60 ℃