

TCG220

USER MANUAL

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Chapter 1: Introduction

Chapter 1: Introduction

EMTA Features

- Full Band Capture Front End.
- Increases performance with 50% increase in CPU speed.
- Adds Applications CPU to run Linux applications.
- Supports DBDC (Dual Band Dual Concurrent).
- Lowers Power with Advanced Power Management.
- Advanced Processor architecture.
- High-Speed Memory architecture.
- DOCSIS 1.0/1.1/2.0/3.0 Standard Compliant.
- PacketCable 1.0/1.5 NCS Standard Compliant
- Support Multiple Provisioning Mode.
- 4 ports Standard RJ-45 connector for 10/100/1000BaseT Ethernet with auto-negotiation and MDIX functions; Support maximum Ethernet cable(Category 5e) length up to 100m.
- 2 ports RJ-11 Foreign Exchange Station (FXS) port for IP telephony; Support a maximum line length between themselves and an end-receiver (handset, etc.) of up to 500 feet.
- Support simultaneous voice and data communications.
- Echo Cancellation.
- Voice Active Detection (VAD).
- DTMF detection and generation.
- Comfort Noise Generation (CNG).
- Support V.90 fax and modem services.
- 56 bits DES and 128 bits AES data encryption security.
- SNMP network management support.
- 802.11a/b/g/n supported, 20/40MHz bandwidth, supports 2 × 2 antennas for data rates up to 600Mbps.
- Fully IEEE 802.11a/b/g/n legacy compatibility with enhanced performance.
- Support Web pages and private DHCP server for status monitoring.
- The NTP (Network Termination Point) should be able to operate with an Loading of at least 5 REN.
- Propane™ technology supported, enabling the connection of more Internet users without additional network bandwidth.

Chapter 1: Introduction

Computer Requirements

Personal computer attached to the WiFi Voice Gateway must meet the minimum system requirements as below.

Note: The minimum requirements may vary by the cable company.

	IBM PC COMPATIBLE	MACINTOSH**
CPU	Pentium preferred	PowerPC or higher
System RAM	512MB (1024MB preferred)	512MB (1024MB preferred)
Operating System	Windows* NT/2000/Me/XP/7/Vista, Linux	Mac OS** 7.6.1 or higher
Sound Card	Required for audio on CD-ROM	N/A
Video	VGA or better (SVGA preferred)	VGA or better (SVGA built-in preferred)
CD-ROM Drive	Required	Required
Ethernet	10BaseT or 100BaseT	10BaseT or 100BaseT
	An Ethernet card and driver MUST be installed in your computer properly. A standard Ethernet cable is also required for connecting the Ethernet card to the EMTA.	
Software	TCP/IP network protocol installed for each machine Microsoft Internet Explorer 4.0 or later or Netscape Navigator 4.0 or later. (5.0 and 4.7 or later, respectively, are strongly recommended.)	

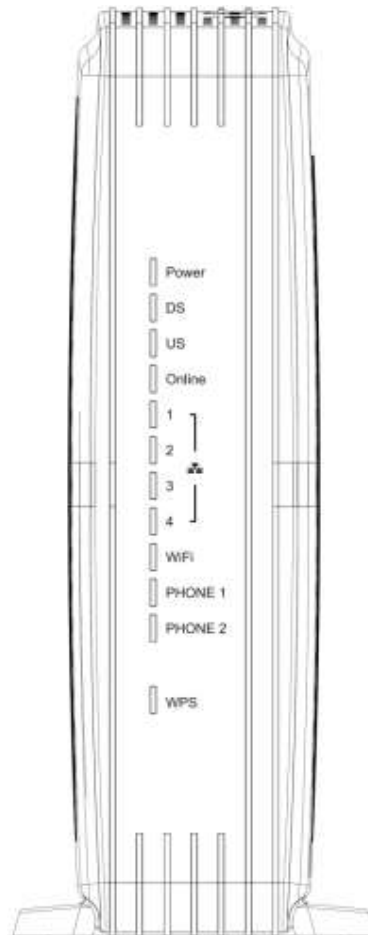
**Windows is a trademark of Microsoft Corporation.*

***Macintosh and the Mac OS are trademarks of Apple Computer, Inc.*

Chapter 2: Overview

Chapter 2: Overview

Front Panel



The following illustration shows the front panel of the EMTA:

Power - Indicates the Power status.

DS - Indicates the status of Data reception by the cable modem from the Network (Downstream Traffic).

US - Indicates the status of Data transmission by the cable modem to the Network (Upstream Traffic).

Online - Displays the status of your cable connection. The light is **off** when no cable connection is detected and **fully lit** when the modem has established a connection with the network and data can be transferred.

Ethernet - Indicates the state of Ethernet ports.

WIFI - Indicates the traffic on the wireless network.

Phone1 - Indicates the status of the telephone Phone 1.

Phone2 - Indicates the status of the telephone Phone 2.

WPS - Indicates the status of the WPS functionality.

Chapter 2: Overview

LED Behavior

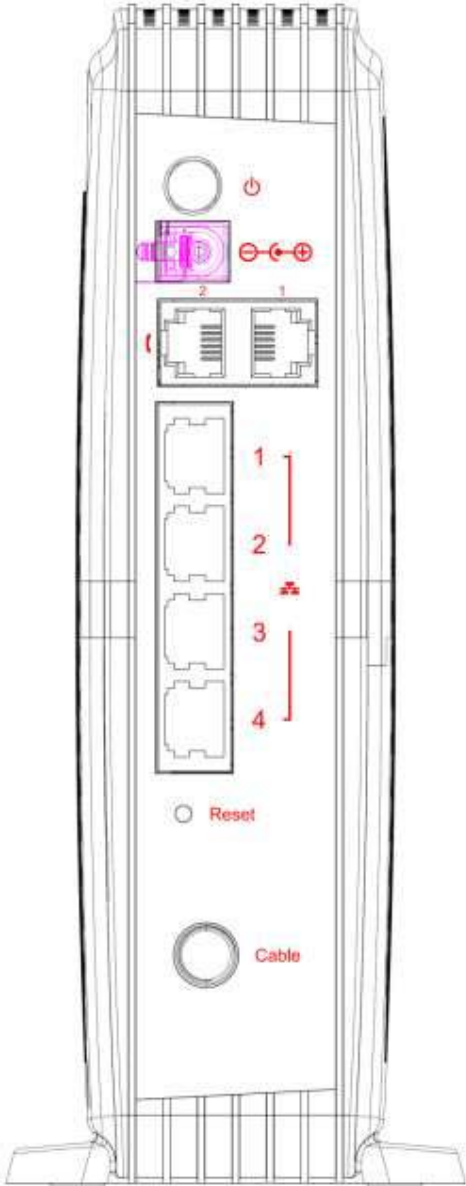
There will be 12 LEDs on TCG220. Looking at LED from TOP to Bottom: Power, DS, US, Online, LAN1, LAN2, LAN3, LAN4, WiFi, PHONE1, PHONE2, WPS. "ON" = the LED is light, "OFF" = the LED is gray, "FLASH" = the LED is blinking.

BCM93383WVG	Power	Internet			LAN				Wi-Fi	Phone1	Phone2	WPS	Description	
		DS	US	Online	1	2	3	4						
Boot-up Operation	ON	ON	ON	ON	ON	ON	ON	ON	X	ON	ON	X	Power on 0.25 sec	
	On	0.25 second												
	ON	FLASH	FLASH	FLASH	X	X	X	X	X	X	X	X	From power ON to system initialization complete	
	ON	ON	ON	ON	X	X	X	X	X	X	X	X	Following system initialization complete to (before)	
	1 second			DS scanning										
DOCSIS Start-up Operation	ON	FLASH	OFF	OFF	X	X	X	X	X	X	X	X	During DS scanning and acquiring SYNC	
	ON	ON	FLASH	OFF	X	X	X	X	X	X	X	X	From SYNC completed, receiving UCD to ranging completed	
	ON	ON	ON	FLASH	X	X	X	X	X	X	X	X	During DHCP, configuration file download, registration, and Baseline Privacy initialization	
	ON	ON	ON	ON	X	X	X	X	X	X	X	X	Operational (NACO=ON)	
	ON	FLASH	FLASH	OFF	X	X	X	X	X	X	X	X	Operational (NACO=OFF)	
MTA initialization	ON	ON	ON	ON	X	X	X	X	X	FLASH	OFF	X	MTA DHCP	
	ON	ON	ON	ON	X	X	X	X	X	OFF	FLASH	X	MTA SNMP/TFTP	
	ON	ON	ON	ON	X	X	X	X	X	FLASH	FLASH	X	RSIP for NCS/Register for SIP	
CPE Operation	ON	X	X	X	OFF	OFF	OFF	OFF	X	X	X	X	No Ethernet Link	
					ON	ON	ON	ON					Ethernet Link	
					FLASH	FLASH	FLASH	FLASH					TX/RX Ethernet Traffic	
	ON	X	X	X	X	X	X	X	OFF	X	X	X	Wireless is disable	
									ON				Wireless initiate success or enable	
									FLASH				TX/RX Wireless Traffic	
SW Download Operation	ON	FLASH	FLASH	ON	X	X	X	X	X	X	X	X	A software download and while updating the FLASH memory	
WPS Operation	ON	<CM Normal Operation>									X	X	Flash	(long press, > 5 seconds) WPS WiFi association during client and AP linking process, WPS LED Green color light Blinking.
													ON	After link established WPS LED Green color light ON
													Flash	Timeout to link.

Chapter 2: Overview

Rear Panel

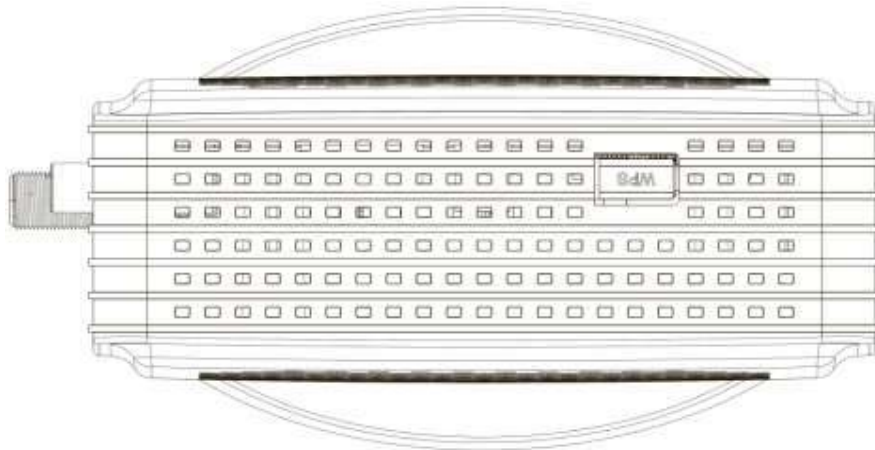
The following illustration shows the rear panel of the EMTA:




Slot	Description
CABLE	F-Connector
RESET	Reset/Reboot this Cable modem
ETHERNET 1 2 3 4	Ethernet 10/100/1000 BaseT RJ-45 connector
TEL 1 2	Telephony RJ-11 connector
12VDC	12V DC-IN Power connector
DC Power switch	Power ON/ OFF switch

Chapter 2: Overview

Top Side Panel for WPS



 **WPS** – Indicates the status of the WPS (Wi-Fi Protected Setup™) functionality.

There is one WPS button on the Top Side Panel of TCG220 and is designed to have multiple function. This button can be used to:

Securely and Simply Get WiFi Client Connected: WPS button can be used to pairing WiFi client which also supports WPS function. A long press (press more than 2 seconds) on the WPS button will enable TCG220 scan for any available WPS device. *Note: You must ensure that the WiFi client device supports WPS function in order to use this WPS function on TCG220.*

WiFi On/Off Switch: a short press on the button can switch the WiFi Interface ON or OFF

Chapter 2: Overview

Important Information

- The cable service to your home supports DOCSIS compliant two-way modem access.
- Your internet account has been set up.
- A cable outlet near your PC and it is ready for cable modem service.

Note: It is important to supply power to the modem at all times. Keeping your modem plugged in will keep it connected to the Internet. This means that it will always be ready when you are. Your cable company should always be consulted before installing a new cable outlet. Do not attempt any rewiring without contacting your cable company first.

Chapter 3: Connections and setup

Chapter 3: Connections and setup

Connecting the EMTA to Computer

This section explains the way to attach Cable TV wire to EMTA and to connect your EMTA to the Ethernet port on your personal computer and install the necessary software.

Attaching the Cable TV Wire to EMTA

You may find the Cable TV wire one of the following ways:

- Connected directly to a TV, a Cable TV converter box, or VCR. The line will be connected to the jack with which should be labeled either IN, CABLE IN, CATV, CATV IN, etc.
- Connected to a wall-mounted cable outlet.

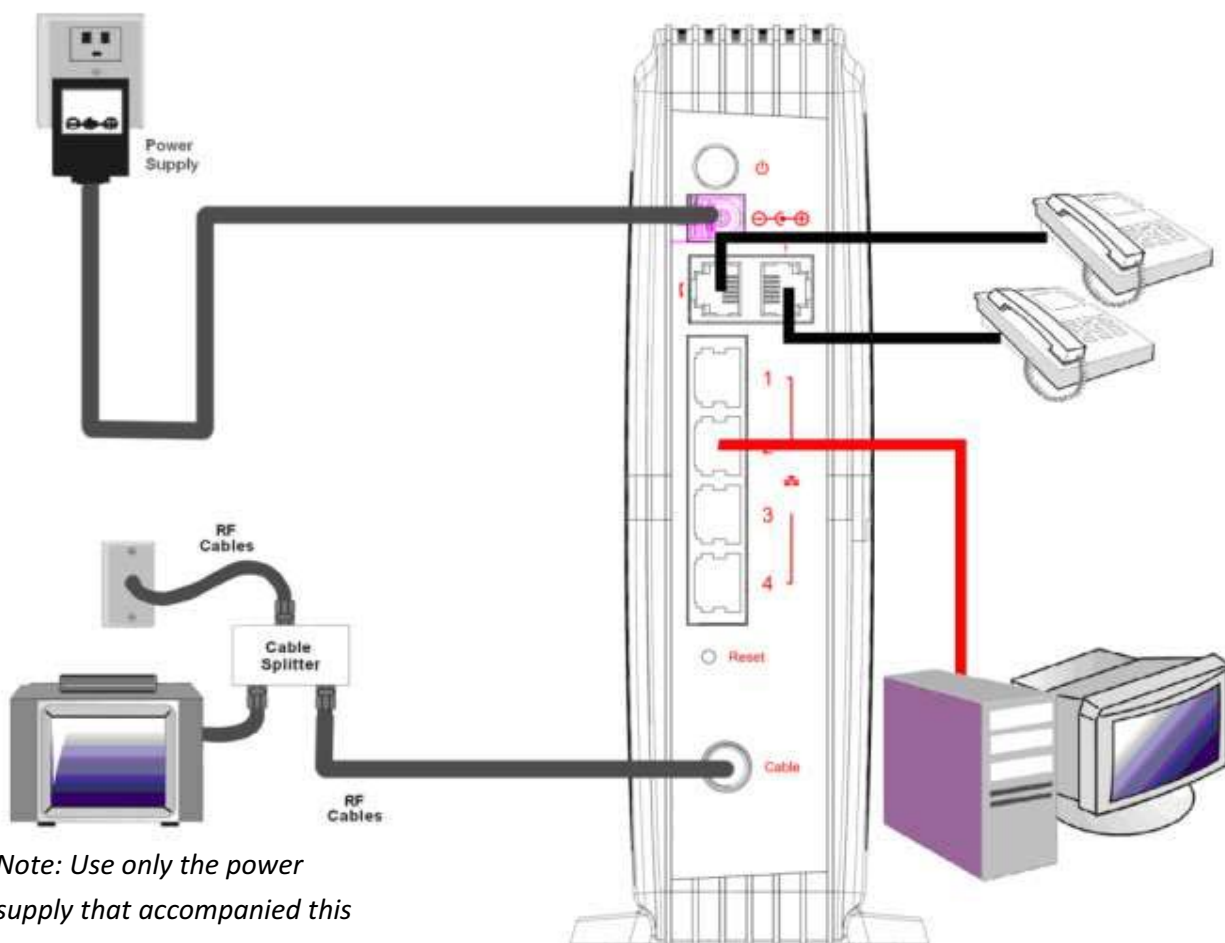
Connect one end of the coaxial cable to the cable connection in the wall, and the other end to the CABLE jack on the EMTA.

Chapter 3: Connections and setup

Connection to Computer and Telephone

Make the connections to modem in the following sequence:

- Connect the plug from the AC power supply into the POWER AC ADAPTER jack on the EMTA, and plug the power supply into an AC outlet in the wall.
- Connect one end of the Ethernet cable to the Ethernet port on the back of your computer, and the other end to the ETHERNET port on the EMTA.



Note: Use only the power supply that accompanied this unit. Using other adapters may damage the unit.

Fig. 1: How to Setup Your Device

Chapter 3: Connections and setup

Activating the EMTA

After you install the EMTA and turn it on for the first time (and each time the modem is reconnected to the power), it goes through several steps before it can be used. Each of these steps is represented by a different pattern of flashing lights on the front of the modem.

Note: All indicators flash once prior to the initialization sequence.

If all of the lights are flashing sequentially, it means the EMTA is automatically updating its system software. Please wait for the lights to stop flashing. You cannot use your modem during this time. Do not remove the power supply or reset the EMTA during this process.

To make sure that you can access the Internet successfully, please check the following first.

1. Make sure the connection (through Ethernet) between the EMTA and your computer is OK.
2. Make sure the TCP/IP protocol is set properly.
3. Subscribe to a Cable Company.

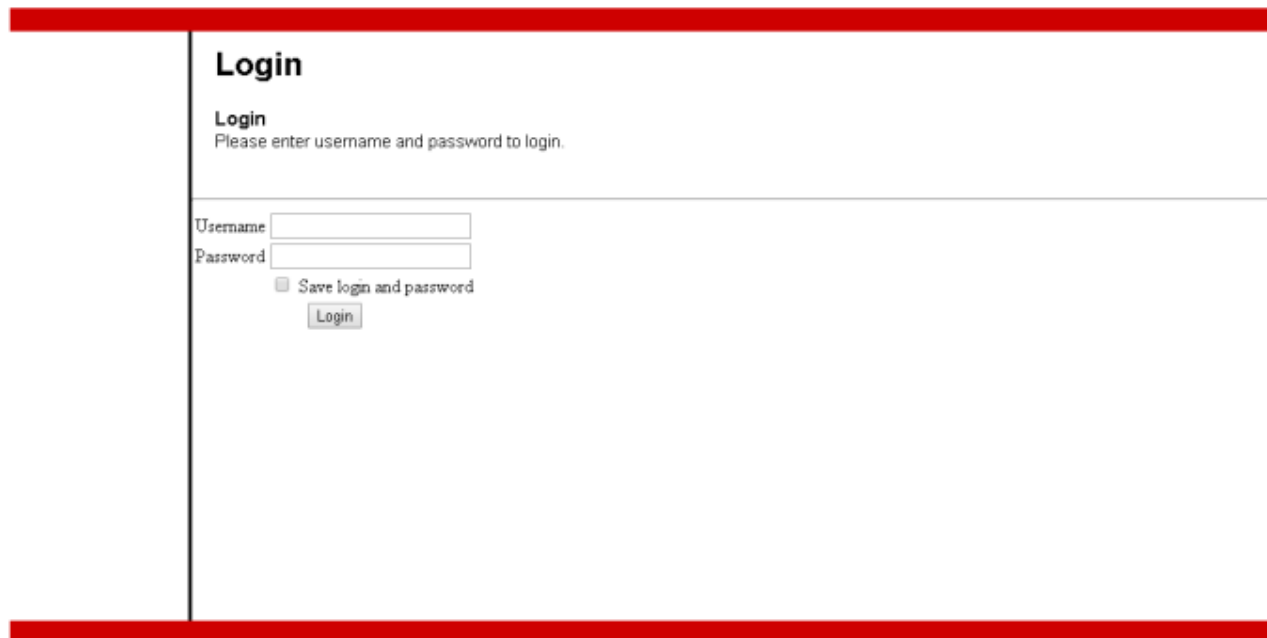
Chapter 3: Connections and setup

Accessing the Internet

If enabled by your service provider; please proceed as follows:

1. Once your host PC is properly configured.
2. Start your web browser and type the CM IP address on the URL field.

After connecting to the URL, you can see the login page. Please enter the username, password and then press **Login** button. The default username is "**admin**" and password is "**password**".



The screenshot shows a web browser window with a red header bar. The page content is titled "Login" and includes the following elements:

- Login** (Section Header)
- Login** (Text)
- Please enter username and password to login. (Text)
- Username: [Text Input Field]
- Password: [Text Input Field]
- Save login and password (Checkbox)
- Login (Button)

Fig. 2: Login Page

Note: If forget your username and password, you may Press "Reset" button on the rear panel more than 6seconds to restore the username and password to default.

Chapter 3: Connections and setup

Status Web Page Group

Connection

This page reports current connection status containing startup procedures, downstream and upstream status, CM online information, and so on. The information can be useful to your cable company's support technician if you're having problems.

Status

Connection

This page displays information on the status of the cable modem's HFC and IP network connectivity.

Startup Procedure			
Procedure	Status	Comment	
Acquire Downstream Channel	619000000 Hz	Locked	
Connectivity State	OK	Operational	
Boot State			
Configuration File	OK		
Security	Disabled	Disabled	

Downstream Bonded Channels								
Channel	Lock Status	Modulation	Channel ID	Frequency	Power	SNR	Correctables	Uncorrectables
1		QAM256		619000000 Hz	2.9 dBmV	47.3 dB	0	0
2		QAM256		611000000 Hz	3.0 dBmV	47.4 dB	1	0
3		QAM256		603000000 Hz	3.3 dBmV	46.4 dB	0	0
4		QAM256		627000000 Hz	2.5 dBmV	45.4 dB	1	0
5		QAM256		635000000 Hz	2.4 dBmV	43.2 dB	0	0
6		QAM256		643000000 Hz	2.2 dBmV	46.4 dB	0	0
7		QAM256		651000000 Hz	2.0 dBmV	46.7 dB	0	0
8		QAM256		659000000 Hz	1.8 dBmV	45.5 dB	0	0

Total Correctables	Total Uncorrectables
2	0

Upstream Bonded Channels							
Channel	Lock Status	US Channel Type	Channel ID	Symbol Rate	Frequency	Power	
1		ATDMA		5120 Ksym/sec	27408000 Hz	34.5 dBmV	
2		ATDMA		5120 Ksym/sec	14608000 Hz	33.7 dBmV	
3		ATDMA		5120 Ksym/sec	21008000 Hz	34.0 dBmV	
4		ATDMA		2560 Ksym/sec	8208000 Hz	34.5 dBmV	

CM IP Address	Duration	Expires
	D:-- H:-- M:-- S:--	-----

Current System Time: Thu Mar 26 14:39:28 2015

Fig. 3: Connection Status

Chapter 3: Connections and setup

Software

The information section shows the hardware and software information about your gateway.

The status section of this page shows how long your gateway has operated since last time being powered up, and some key information the Cable Modem received during the initialization process with your cable company. If Network Access shows “Allowed,” then your cable company has configured your gateway to have Internet connectivity. If not, you may not have Internet access, and should contact your cable company to resolve this.

Status

Software

This page displays information on the current system software.

Information	
Standard Specification Compliant	DOCSIS 3.0
Hardware Version	1.0
Software Version	B5510mp2-N-US-D215-141215
Cable Modem MAC Address	00:90:00:11:13:01
EMTA MAC Address	00:90:00:11:13:02
Cable Modem Serial Number	54321123461246
CM certificate	Not installed

Status	
System Up Time	0 days 02h 50m 44s
Network Access	Allowed
Cable Modem IP Address	---

Fig. 4: Software Status

Chapter 3: Connections and setup

Security

By default, the username is “admin” and the password is “password”.

This is set by different actions (non exhaustive list):

- at the manufactory level,
- following a reset factory on the modem,
- following a reset from the operator,
- following a change by the user who wants to come back to the default setting after using its own settings

When the current password is the default one, the user is strongly encouraged to change the default web password.

At your first connection or while the password is the default one, a warning message is displayed on the top banner of each Web configuration page. We want to encourage you to change the password in order to enforce the security of your modem.

The password can be a maximum of 8 characters and is case sensitive. In addition, this page can be used to restore the gateway to its original factory settings. Use this with caution, as all the settings you have made will be lost. To perform this reset, set **Restore Factory Defaults** to **Yes** and click **Apply**. This has the same effect as a factory reset using the rear panel reset switch, where you hold on the switch for 5 seconds, then release it.

Note: We are always suggesting you to modify the password. This is a basic protection against wrongful access to the Gateway Web pages.



Fig. 5: Security Settings.

Chapter 3: Connections and setup

Diagnostics

This page offers basic diagnostic tools for you to use when connectivity problems occur. When you ping an Internet device, you send a packet to its TCP/IP stack, and it sends one back to yours. To use the ping Test, enter the information needed and press Start Test; the Result will be displayed in the lower part of the window. Press Abort Test to stop, and Clear Results to clear the result contents. Note: Firewalls may cause pings to fail but still provide you TCP/IP access to selected devices behind them. Keep this in mind when ping a device that may be behind a firewall. Ping is most useful to verify connectivity with PCs which do not have firewalls, such as the PCs on your LAN side.

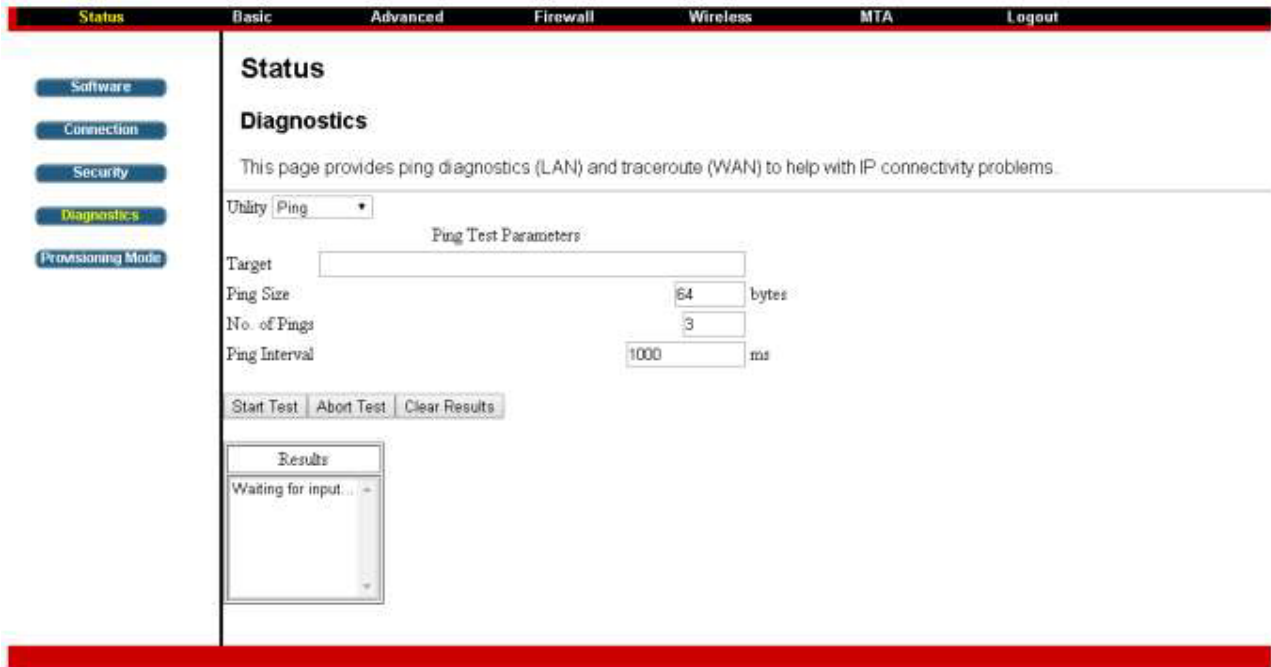


Fig. 6: Diagnostics Settings

Chapter 3: Connections and setup

Provisioning Mode

This page allows set the eRouter IP provisioning mode. Default Provisioning mode is "RG". You can also configure this as "Bridge" mode. Configure TCG220 to Bridge mode will lost most of the Router function.

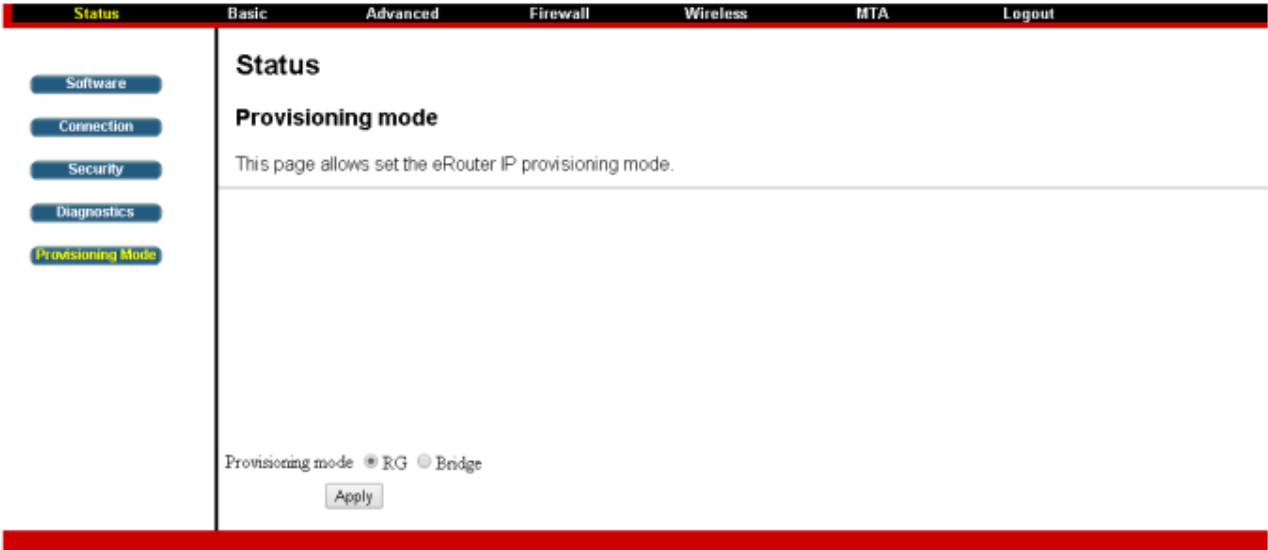


Fig. 7: Provisioning mode settings.

Chapter 3: Connections and setup

Basic Web Page Group

Setup

This page allows configuration of the basic features of the broadband gateway related to your ISP's connection.

LAN: Configure the LAN IP Address for TCG220.

Interface/Prefix: IPv6 related information.

WAN: TCG220 WAN interface information. Do NOT change the configuration setting which may cause severe performance impact, or Client PC may not be able to get internet connected.

Basic Setup

This page allows configuration of the basic features of the broadband gateway related to your ISP's connection.

Network Configuration

LAN

IP Address: 192 . 168 . 1 . 1
IP Mask: 255 . 255 . 255 . 0
MAC Address: 00:1b:9e:de:ad:05

Interface/Prefix

None Specified

WAN

IP Address: 10.10.146.52
MAC Address: 00:1b:9e:de:ad:03
Duration: D: 00 H: 23 M: 36 S: 15
Expires: Fri Mar 27 11:15:54 2015
IPv4 DNS Servers: 10.10.159.253

Release WAN Lease Renew WAN Lease

WAN Connection Type: DHCP

IPv4 MTU Size: 0 (256-1500 octets, 0 = use default)

Spoofed MAC Address: 00 : 00 : 00 : 00 : 00 : 00

Apply

Fig. 8: Basic Setup Settings

Chapter 3: Connections and setup

DHCP

This page allows configuration and status of the optional internal DHCP server for the LAN.

You can activate the DHCP server function for the LAN on this page, with this function activated,

- your cable company's DHCP server provides one IP address for your gateway,
- and your gateway's DHCP server provides IP addresses to your PCs. A DHCP server leases an IP address with an expiration time that can be configured.

DHCP Server: Select "Yes" or "No" to enable or disable a simple DHCP server for LAN.

Number of CPEs: Configure the how many client device can be connected to the Gateway.

Lease Time: Configure the IP address lease time with "Lease time" for DHCP server. Default value is 3600 seconds.

DHCP Clients: Displays the PC(clients) connected and the related DHCP lease information.

Force Available: You can force the DHCP server to release one of the specific IP address as available and a new client is possible to get that IP address, assigned by DHCP server. You need to select and then press "Force Available".

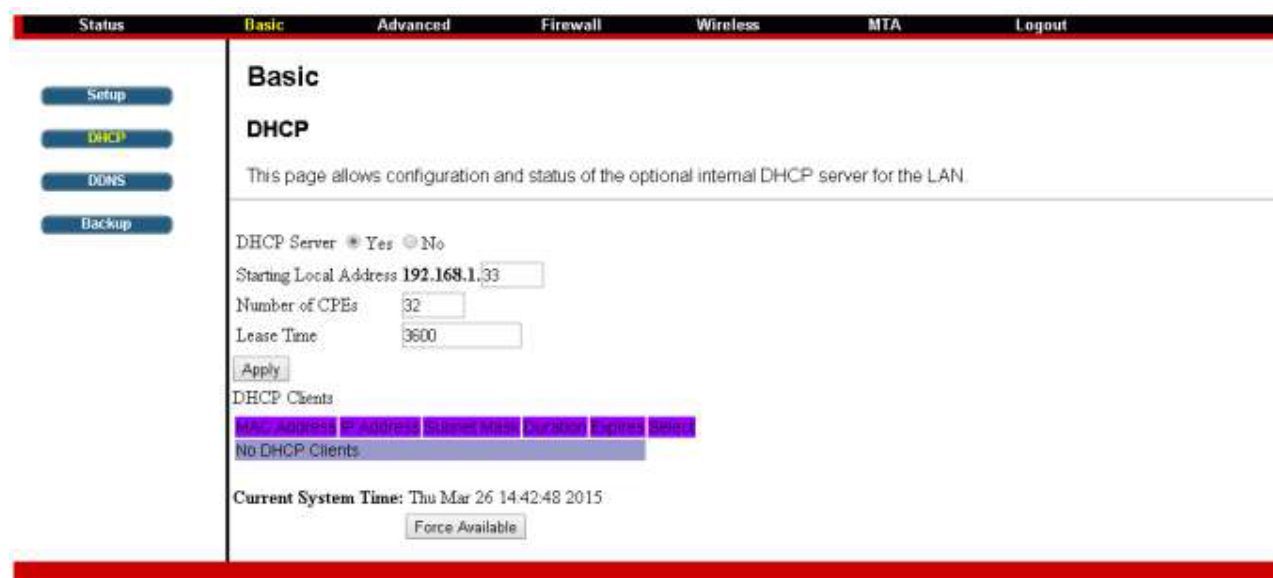


Fig. 9: DHCP Settings

Chapter 3: Connections and setup

DDNS

This page allows setup of Dynamic DNS service.

- **DDNS Service**- Choose Enabled (www.DynDNS.org) to enable the basic setting. Choose Disabled to close the basic setting.
 - **Username**- The username that you registered with your DDNS provider.
 - **Password**- The password that you registered with your DDNS provider
 - **Host Name**- The domain name or host name that is registered with your DDNS provider
 - **Status**- It shows the DDNS service status whether it is enabled or disabled.
- Click Apply to save the changes.

The screenshot shows a web interface for configuring DDNS. At the top, there is a navigation bar with tabs: Status, Basic (selected), Advanced, Firewall, Wireless, MTA, and Logout. On the left side, there is a sidebar with buttons for Setup, DHCP, DDNS (highlighted), and Backup. The main content area is titled 'Basic' and 'DDNS'. It contains the following fields and information:

- DDNS Service: Disabled (dropdown menu)
- User Name: [text input field]
- Password: [text input field]
- Host Name: [text input field]
- IP Address: 10.10.146.52
- Status: DDNS service is not enabled.
- [Apply button]

Fig. 10: DDNS Settings

Chapter 3: Connections and setup

Backup

This page allows you to save your current settings locally on your PC, or restore settings previously saved. Customer may backup their settings on TCG220. And restore the configuration if necessary.

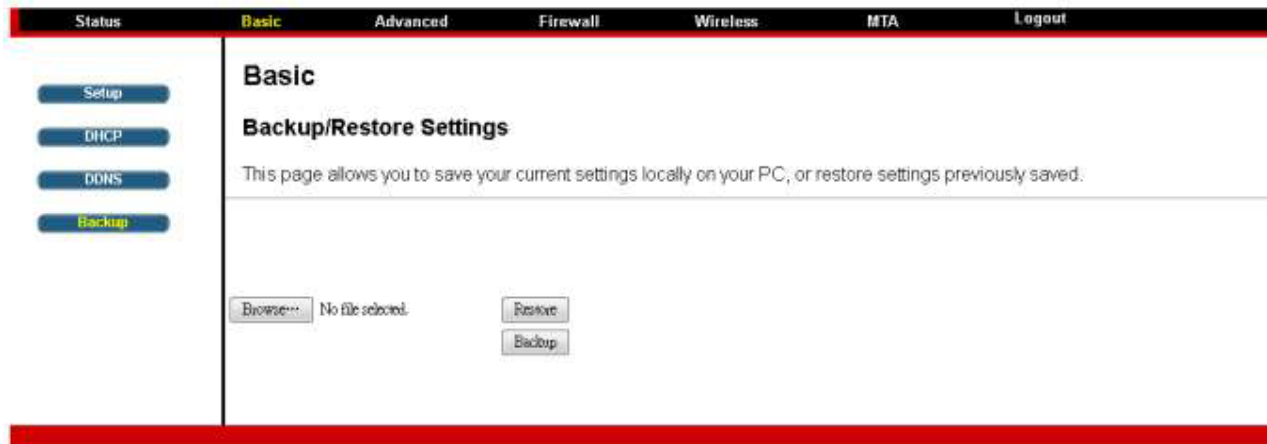


Fig. 11: Backup Settings

Chapter 3: Connections and setup

Advance Web Page Group

Option

This page allows configuration of advanced features of the broadband gateway.



Fig. 12: Options Configuration

WAN Blocking prevents others on the WAN side from being able to ping your gateway. With WAN Blocking enabled, your gateway will not respond to pings it receives, effectively "hiding" your gateway.

Chapter 3: Connections and setup

IPsec PassThrough enables IPsec type packets to pass between WAN and LAN. IPsec (IP Security) is a security mechanism used in Virtual Private Networks (VPNs).

PPTP PassThrough enables PPTP type packets to pass between WAN and LAN. PPTP (Point to Point Tunneling Protocol) is another mechanism sometimes used in VPNs.

Remote Config Management makes the configuration web pages in your gateway accessible from the WAN side. Note that page access is limited to only those who know the gateway access password. When accessing your gateway from a remote location, you must use HTTP port 8080 and the WAN IP address of the gateway. e.g., if the WAN IP address is 157.254.5.7, you would navigate to <http://157.254.5.7:8080> to reach your gateway.

Multicast Enable enables multicast traffic to pass through WAN and LAN. You may need to enable this to see some types of broadcast streaming and content on the Internet.

UPnP Universal Plug and Play (UPnP) helps devices, such as Internet appliances and computers, access the network and connect to other devices as needed. UPnP devices can automatically discover the services from other registered UPnP devices on the network.

NAT ALG enable NAT ALG (application layer gateways) allows customized NAT traversal filters to be plugged into the gateway to support address and port translation for certain application layer "control/data" protocols such as RSVP, FTP, TFTP, Kerb88, NetBios, IKE, RTSP, Kerb1293, H225, PPTP, MSN, SIP, ICQ, IRC666x, ICQTalk, Net2Phone, IRC7000, IRC8000 file transfer in IM applications etc. In order for these protocols to work through NAT or a firewall, either the application has to know about an address/port number combination that allows incoming packets, or the NAT has to monitor the control traffic and open up port mappings (firewall pinhole) dynamically as required. Legitimate application data can thus be passed through the security checks of the firewall or NAT that would have otherwise restricted the traffic for not meeting its limited filter criteria.

Chapter 3: Connections and setup

IP Filtering

This page enables you to enter the IP address ranges of PCs on your LAN that you don't want to have outbound access to the WAN. These PCs can still communicate with each other on your LAN, but packets they send to WAN addresses are blocked by the gateway.

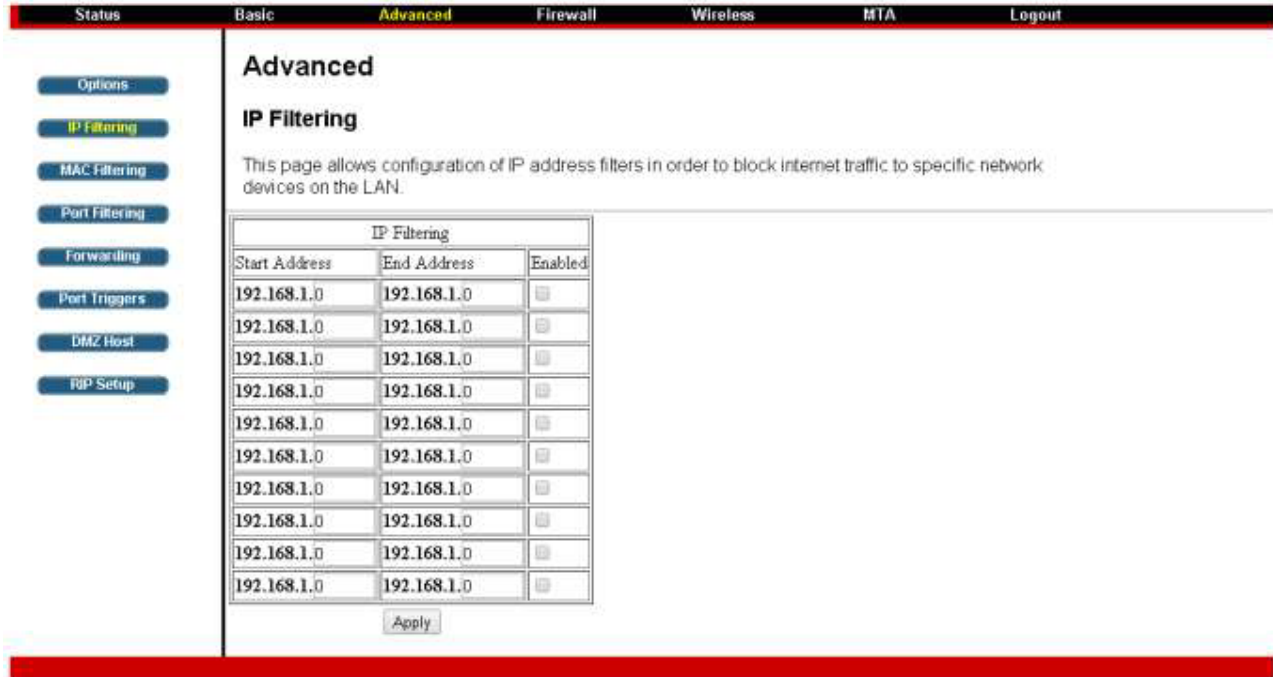


Fig. 13: IP Filtering Settings

Chapter 3: Connections and setup

MAC Filtering

This page allows configuration of MAC address filters in order to block internet traffic to specific network devices on the LAN. This feature only applies to IPv4 traffic.



Fig. 14: MAC Filtering Settings

Chapter 3: Connections and setup

Port Filtering

This 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 POP-3 port 110). To enable port filtering, set Start Port and End Port for each range, and click Apply. To block only one port, set both Start and End ports with the same value.

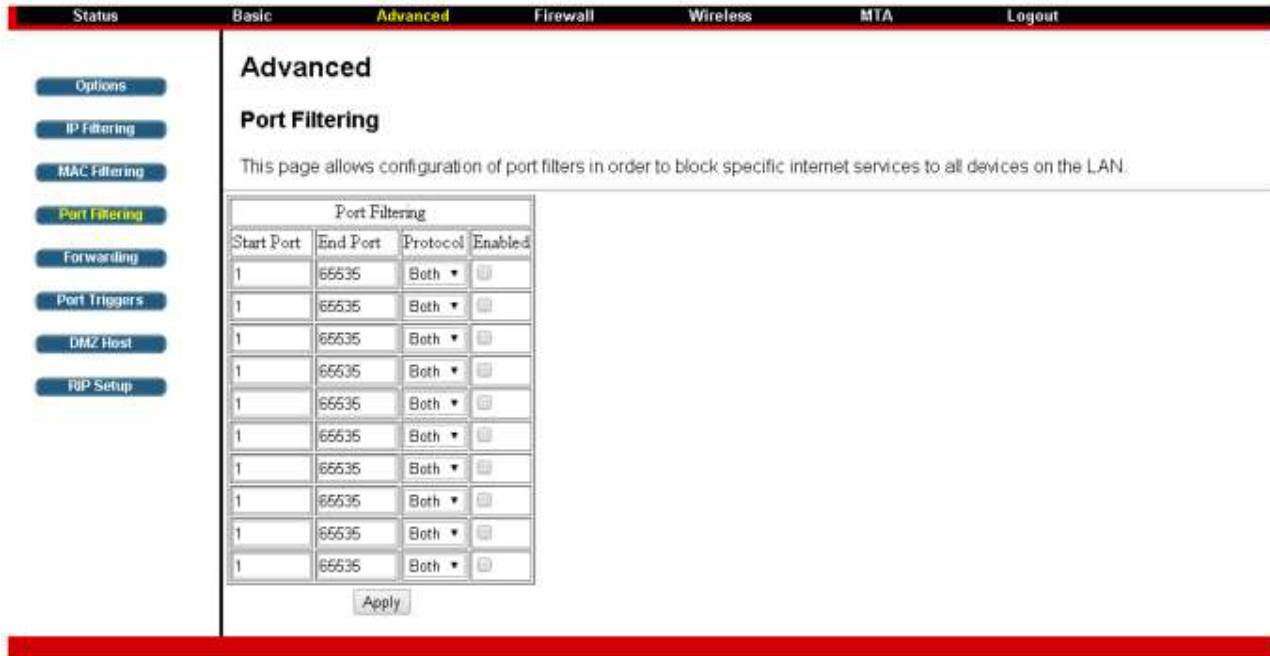


Fig. 15: Port Filtering Settings

Chapter 3: Connections and setup

Forwarding

For LAN ↔ WAN communications, the gateway 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.

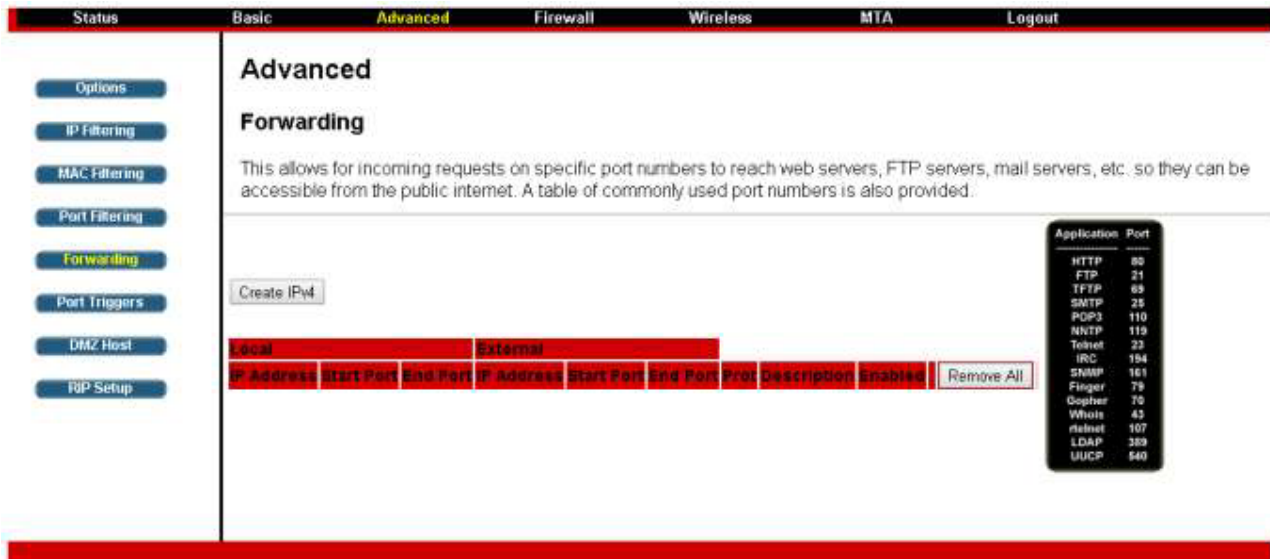


Fig. 16: Forwarding Settings

Chapter 3: Connections and setup

Port Triggers

Some Internet activities, such as interactive gaming, require that a PC on the WAN side of your gateway be able to originate connections during the game with your game playing PC on the LAN side. You could use the Advanced-Forwarding web page to construct a forwarding rule during the game, and then remove it afterwards (to restore full protection to your LAN PC) to facilitate this. Port triggering is an elegant mechanism that does this work for you, each time you play the game.

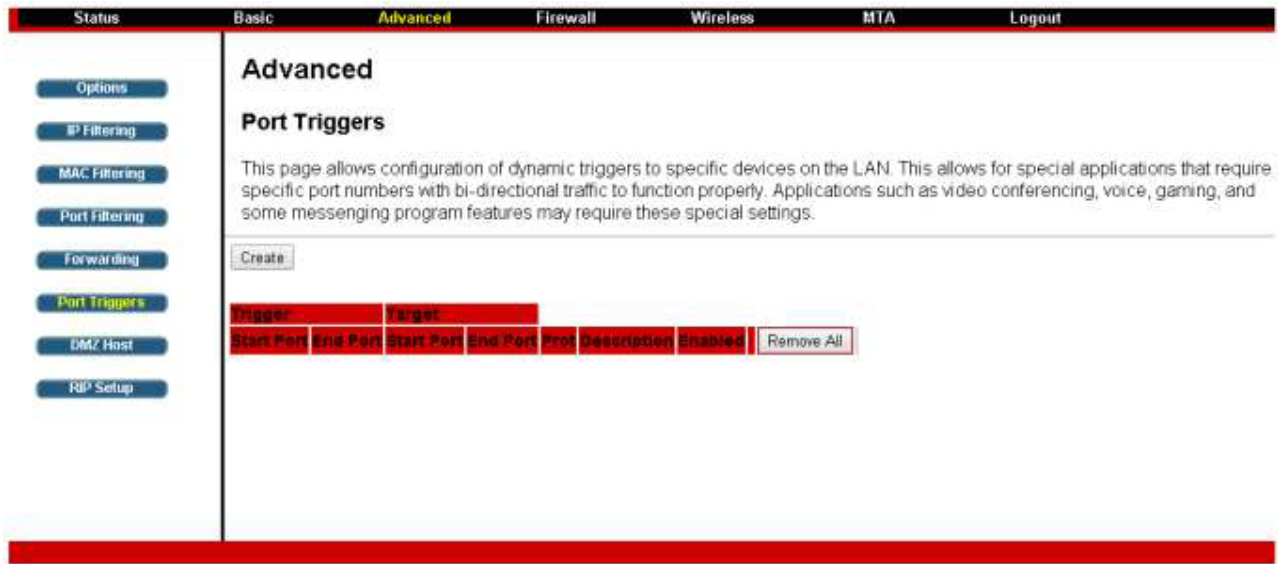


Fig. 17: Port Triggers Settings

Chapter 3: Connections and setup

DMZ Host

Use this page to designate one PC on your LAN that should be left accessible to all PCs from the WAN side, for all ports. e.g., if you put an HTTP server on this machine, anyone will be able to access that HTTP server by using your gateway IP address as the destination. A setting of "0" indicates NO DMZ PC. "Host" is another Internet term for a PC connected to the Internet.

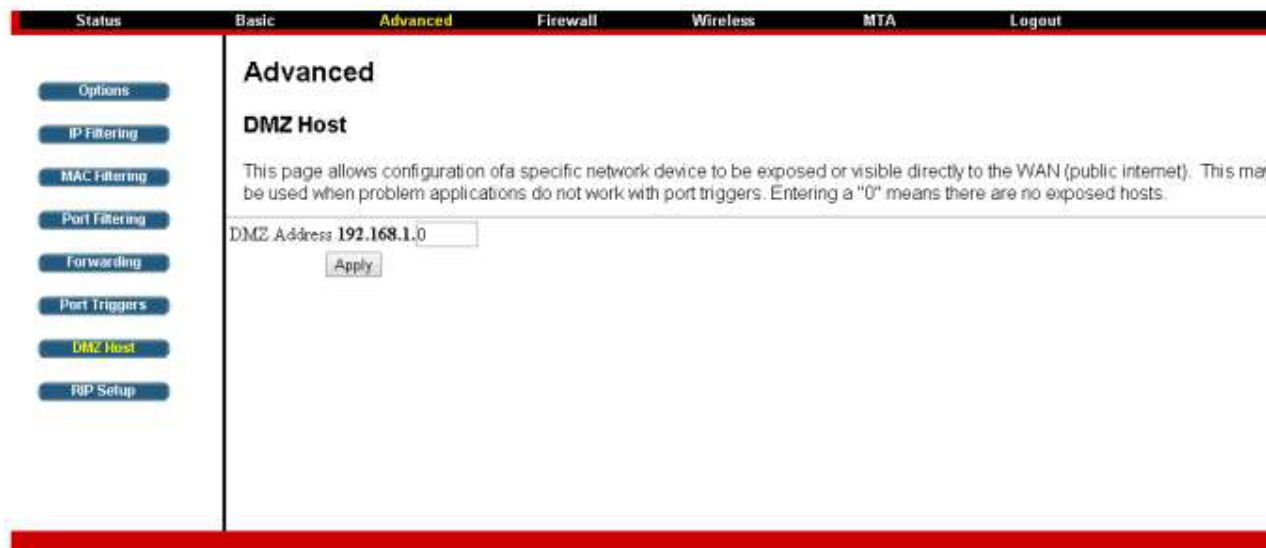


Fig. 18: DMZ Host Setup

Chapter 3: Connections and setup

RIP (Routing Information Protocol Setup)

This feature enables the gateway to be used in small business situations where more than one LAN (local area network) is installed. The RIP protocol provides the gateway a means to “advertise” available IP routes to these LANs to your cable operator, so packets can be routed properly in this situation. Your cable operator will advise you during installation if any setting changes are required here.

The screenshot shows a web interface with a navigation bar at the top containing tabs: Status, Basic, **Advanced**, Firewall, Wireless, MTA, and Logout. On the left side, there is a vertical menu with buttons for: Options, IP Filtering, MAC Filtering, Port Filtering, Forwarding, Port Triggers, DMZ Host, and **RIP Setup**. The main content area is titled "Advanced" and "Routing Information Protocol Setup". Below the title, there is a descriptive paragraph: "This page allows configuration of RIP parameters related to authentication, destination IP address/subnet mask, and reporting intervals. RIP automatically identifies and uses the best known and quickest route to any given destination address." The configuration fields are as follows: "RIP Authentication" with a checked checkbox labeled "Enable"; "RIP Authentication Key" with an empty text input field; "RIP Authentication Key ID" with a text input field containing "0"; "RIP Reporting Interval" with a text input field containing "30" and the unit "seconds"; "RIP Destination IP Address" with four text input fields, each containing "0"; and "RIP Destination IP Subnet Mask" with four text input fields, each containing "255". An "Apply" button is located at the bottom of the configuration section.

Fig. 19: RIP Setup

Chapter 3: Connections and setup

Firewall Web Page Group

Basic

This page allows configuration of Firewall features. It is highly recommended that the Firewall is left enabled at all times for protection against Denial of Service attacks.

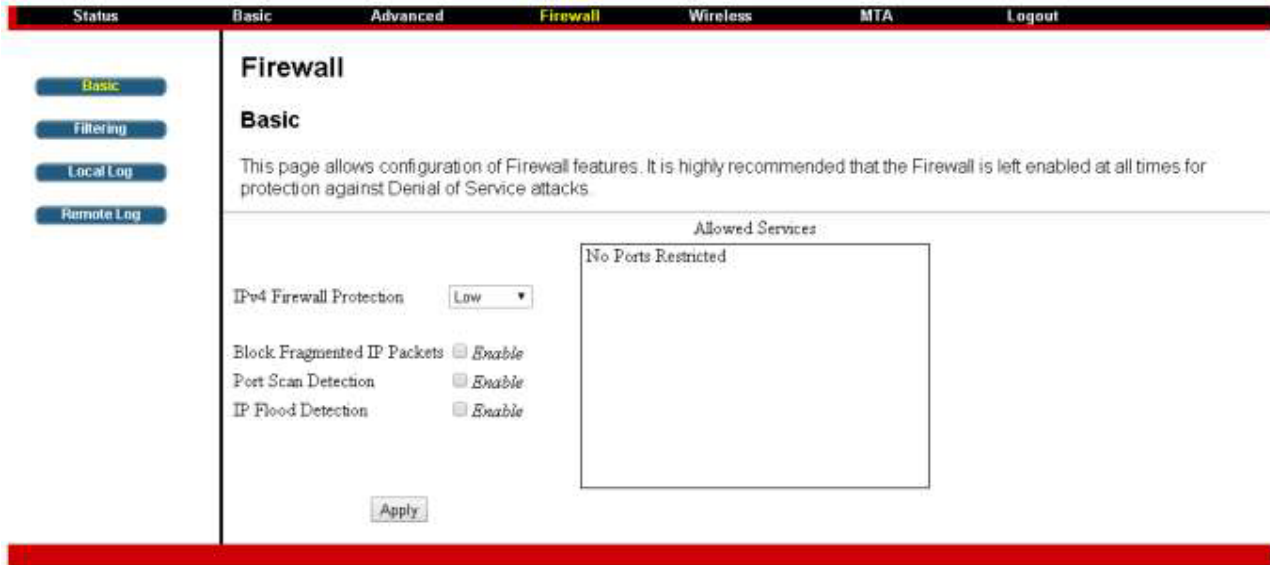


Fig. 20: Firewall Basic configuration

Chapter 3: Connections and setup

Filtering

This page allows the filtering of outbound connections, restricting or granting access to specific MAC Addresses. Filters with no MAC Address entered will apply to ALL MAC Addresses. The URL field is intended to be used to block or allow access to specific sites (cnn.com, google.com, etc.). Filters with no ports entered will apply to ALL ports.



Fig. 21: Filtering configuration

Chapter 3: Connections and setup

Local Log

The gateway builds a log of firewall blocking actions that the firewall has taken. Using the Local Log page lets you specify an email address to which you want the gateway to email this log. You must also tell the gateway your outgoing (i.e. SMTP) email server's name, so it can direct the email to it. Enable Email Alerts has the gateway forward email notices when Firewall protection events occur. Click **E-mail Log** to immediately send the email log. Click **Clear Log** to clear the table of entries for a fresh start. The log of these events is also visible on the screen. For each blocking event type that has taken place since the table was last cleared, the table shows Description, Count, Last Occurrence, Target, and Source.



Fig. 22: Local Log Configuration

Chapter 3: Connections and setup

Remote Log

The Remote Log page allows you to specify the IP address where a SysLog server is located on the LAN Side and select different types of firewall events that may occur. Then, each time such an event occurs, notification is automatically sent to this log server.

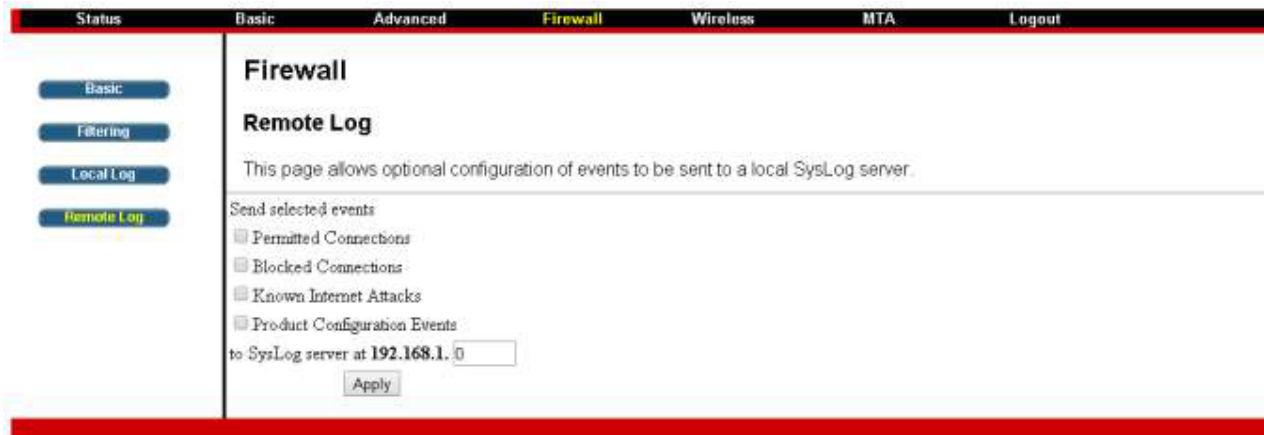


Fig. 23: Remote Log Configuration

Chapter 3: Connections and setup

Wireless Web Page Group

Radio

To set the basic configuration for the wireless features, click RADIO from the Wireless menu. These must match the settings you make on your wireless-equipped PC on the LAN side.

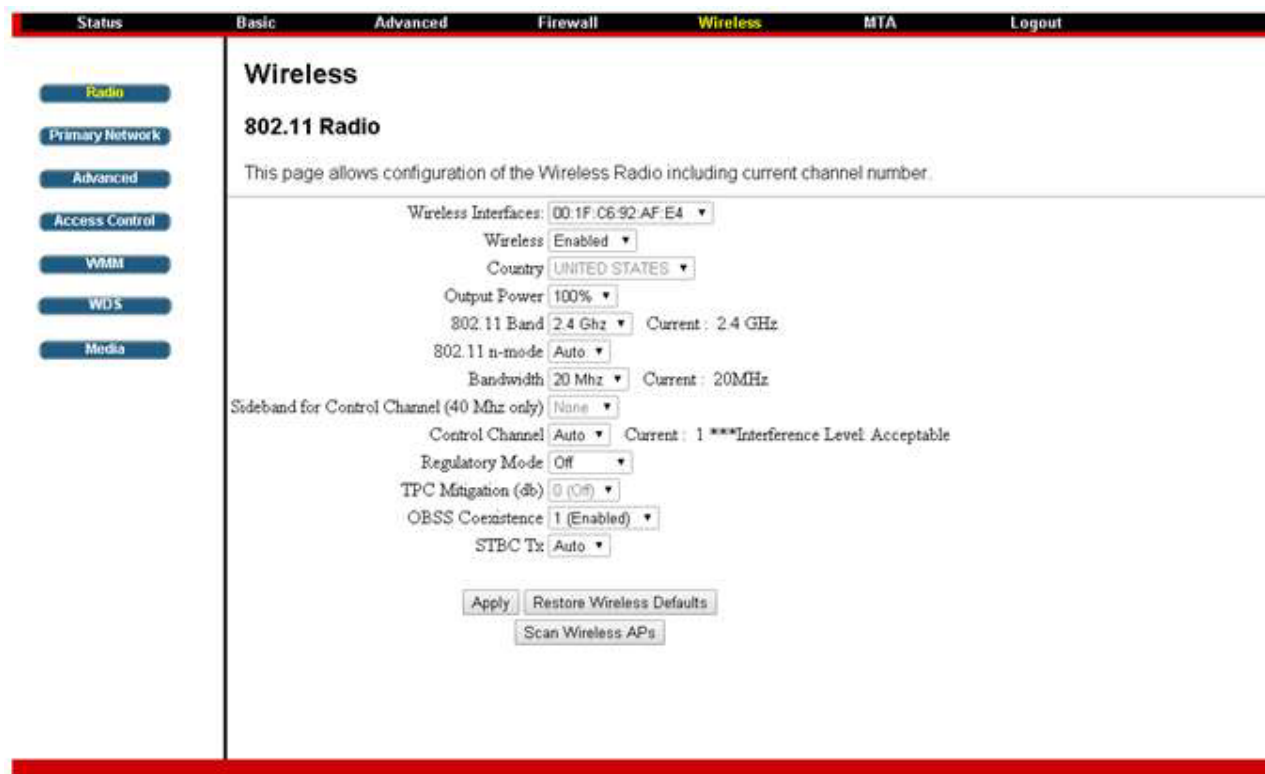


Fig. 24: Radio configuration

Wireless Interface:

Choose the wireless interface on the EMTA.

Wireless:

Enable or disable the wireless function.

Country:

Display the country code you currently use.

Output Power:

Choose output power of the device.

802.11 Band:

Choose 2.4 GHz for 802.11 b/g/n, 5 GHz for 802.11a

802.11 N Support Required:

Enable 802.11n support under 802.11 band 2.4 GHz.

Chapter 3: Connections and setup

Bandwidth:

For wireless signal of this AP

Sideband for Control Channel (40 MHz only):

If Bandwidth is 40 MHz this function will be enabled.

Control channel:

Choose the wireless channel to use.

Regulatory Mode:

802.11d and 802.11h for choose.

OBSS (Overlap Basic Service Set) Coexistence:

Overlapping Basic service set coexistence, enable or disable this function.

STBC Tx:

Space–time block coding is a technique used in wireless communications to transmit multiple copies of a data stream across a number of antennas and to exploit the various received versions of the data to improve the reliability of data-transfer. Default was “Auto”.

Restore Wireless defaults:

To recover to the default settings, press this button to retrieve the settings then click Apply.

Chapter 3: Connections and setup

Primary Network

This page allows configuration of the Primary Wireless Network and its security settings. Supports WPA/WPA2, WPA-PSK/WPA2-PSK, WEP 64-bits, WEP 128-bits and WPS Securities.

The screenshot shows a web-based configuration interface for a wireless network. At the top, there is a navigation bar with tabs: Status, Basic, Advanced, Firewall, **Wireless**, MTA, and Logout. On the left side, there is a vertical sidebar with buttons for: Radio, **Primary Network**, Advanced, Access Control, WMM, WDS, and Media. The main content area is titled 'Wireless' and '802.11 Primary Network'. Below the title, there is a sub-header 'Turbonet2G_ABCD (00:1F:C6:92:AF:E4)'. The configuration is organized into several sections: 'Primary Network' with fields for Network Name (SSID), Closed Network, Mode Required, AP Isolate, WPA, WPA-PSK, WPA2, and WPA2-PSK; 'Automatic Security Configuration' with a WPS dropdown, WPS Config State, and Device Name; 'WPS Setup AP' with fields for UUID, PIN, and a 'Generate AP PIN' button; 'WPS Add Client' with fields for Client PIN and Authorized Client MAC; and 'WPA/WPA2 Encryption' with fields for WPA Pre-Shared Key, RADIUS Server, RADIUS Port, RADIUS Key, Group Key Rotation Interval, and WPA/WPA2 Re-auth Interval. At the bottom, there is a 'WEP Encryption' section with fields for Network Key 1-4, Current Network Key, and PassPhrase, along with a 'Generate WEP Keys' button and an 'Apply' button.

Fig. 25: primary Network configuration

Chapter 3: Connections and setup

WPA (Wi-Fi Protected Access)/WPA2:

It must be used in connection with an authentication server such as RADIUS to provide centralized access control and management. It can provide stronger encryption and authentication solution than none WPA modes. **WPA2** is the second generation of **WPA** security. There are two types for choose **AES** and **TKIP+AES**.

TKIP (Temporal Key Integrity Protocol): Takes the original master key only as a starting point and derives its encryption keys mathematically from this mater key. Then it regularly changes and rotates the encryption keys so that the same encryption key will never be used twice.

AES (Advanced Encryption Standard): This Provides security between client workstations operating in ad hoc mode. It uses a mathematical ciphering algorithm that employs variable key sizes of 128, 192 or 256 bits.

RADIUS (Remote Authentication Dial In User Service) Server:

a protocol for carrying authentication, authorization, and configuration information between a Network Access Server which desires to authenticate its links and a shared Authentication Server. Please key in the IP Address for the RADIUS Server.

RADIUS (Remote Authentication Dial In User Service) Port:

Besides the IP address of the RADIUS Server, you have to enter the port number for the server. Port 1812 is the reserved RADIUS-authentication port described in RFC 2138. Earlier AP (RADIUS clients) use port 1945. The default value will be shown on this box. You can keep and use it.

RADIUS (Remote Authentication Dial In User Service) Key:

A RADIUS Key is like a password, which is used between IAS and the specific RADIUS client to verify identity. Both IAS and the RADIUS client must be use the same RADIUS Key for successful communication to occur. Enter the RADIUS Key.

Group Key Rotation Interval:

Key in the time for the WAP group key rotation interval. The unit is second. With increasing rekey interval, user bandwidth requirement is reduced

WPA/WPA2 Re-auth Interval:

When a wireless client has associated with the Wireless Voice Gateway for a period of time longer than the setting here, it would be disconnected and the authentication will be executed again. The default value is 3600, you may modify it

WPA-PSK (WPA-Pre-Shared Key) /WPA2-PSK:

Its useful for small places without authentication servers such as the network at home. It allows the use of manually-entered keys or passwords and is designed to be easily set up for home users.

Please type the key to be between 8 and 63 characters, or 64 hexadecimal digits. Only the devices with a matching key that you set here can join this network.

WEP (Wired Equivalent Privacy) Encryption:

There are two types encryption to choose 64-bit or 128-bit. If you choose Disabled, the Network

Chapter 3: Connections and setup

Keys will not be shown on this page. If selected, the data is encrypted using the key before being transmitted.

Shared Key Authentication:

Decide whether to set the shared key Optional or Required by selecting from the drop-down menu.

Network Key 1 to 4:

This allows you to enter four sets of the WEP key. For 64-bit WEP mode, the key length is 5 characters or 10 hexadecimal digits. As for 128-bit WEP mode, the key length is 13 characters or 26 hexadecimal digits

Current Network Key:

Select one set of the network key (from 1 to 4) as the default one

Passphrase:

You can enter ASCII codes into this field. The range is from 8 characters to 64 characters. For ASCII characters, you can key in 63 characters in this field. If you want to key in 64 characters, only hexadecimal characters can be used

Generate WEP Keys:

Click this button to generate the Passphrase

Chapter 3: Connections and setup

Automatic Security Configuration:

Right side on the page, Auto Security Configuration can be enabled with **WPS** (Wi-Fi Protect Setup™).

Automatic Security Configuration

WPS ▼

WPS Config State: Configured

The physical button on the AP will provision wireless clients using Wi-Fi Protected Setup (WPS)

Device Name

BroadcomAP

WPS Setup AP

UUID:e59fe5b161b336403ad8c9f64c9d7530

PIN: 12345670

Generate AP PIN

Configure by External Registrar Allow ▼

WPS Add Client

Add a client: Add

Client PIN:

Authorized Client MAC:

WPS (Wi-Fi Protect Setup™):

Its easy and secure way of configuring and connecting, make the CM is the AP and the connect PC is STA. When configuring your Wireless Network via WPS, Messages are exchanged between the STA and AP in order to configure the Security Settings on both devices

Device Name:

Change the factory default to a name of your choice which is up to 32 characters long as like SSID

WPS Setup AP:

UUID (Universally Unique Identifier) to Identifier this device, generate AP PIN for STA to connect.

WPS Add Client:

There are two methods "Push-Button" and "PIN". Select the method you want. But, the default selection will be "PIN"

Apply:

After proper configuration, click Apply to invoke the settings

Chapter 3: Connections and setup

802.11 Advanced

This page allows configuration of data rates and Wi-Fi thresholds.

CAUTION: *It is not recommended that these settings be modified without direct knowledge or instructions to do so. Modifying these settings inappropriately could seriously degrade network performance.*

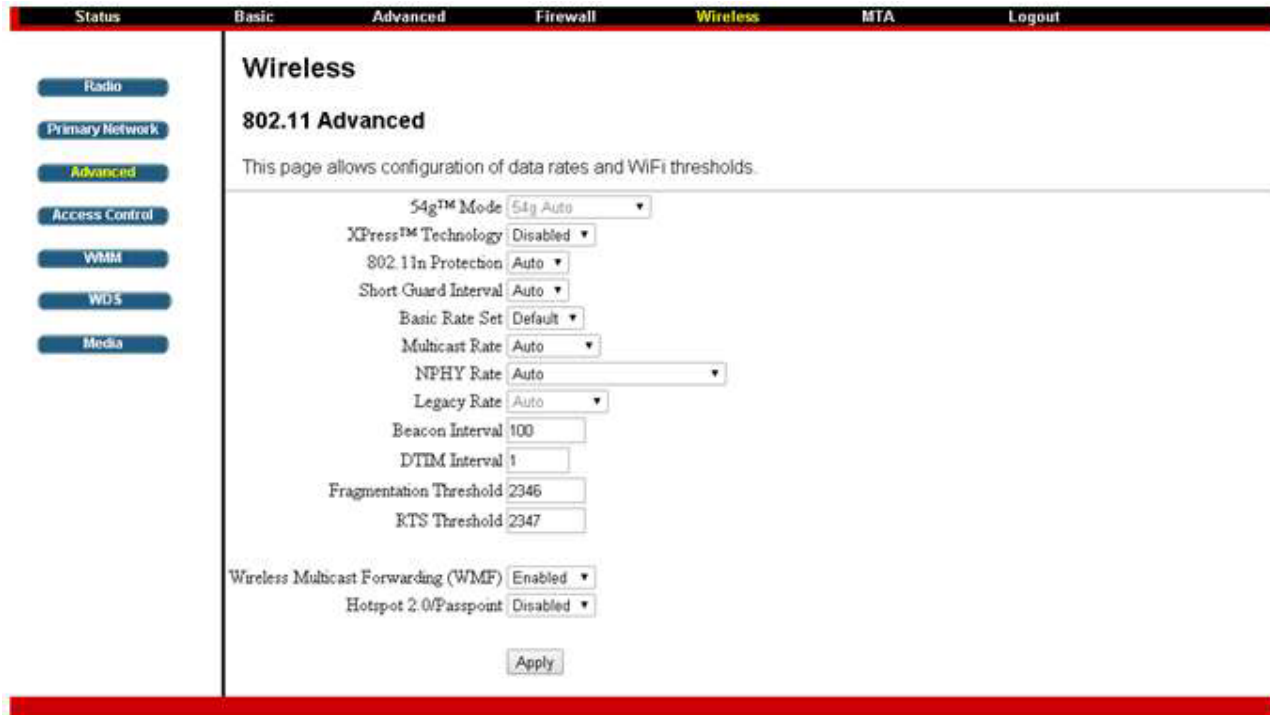


Fig. 26: 802.11 Advanced Settings

54g™ Mode:

Under 802.11n-mode OFF this option to choose 54g mode or force 802.11b only.

XPress™ Technology:

Increase aggregate throughput improve by up to 27% in 802.11g-only networks, and up to 75% in mixed networks comprised of 802.11g and 802.11b standard equipment

802.11n Protection:

This option allow 802.11g and 802.11b devices co-exist in the same network without "speaking" at the same time.

Short Guard Interval:

For 802.11n added optional to increase data rate. This provides an 11% increase in data rate.

Basic Rate Set:

For all clients to associate with, "**Default**" or "**All**" for all 802.11 b/g/n users.

Chapter 3: Connections and setup

Multicast Set:

For users, in order to connect to the AP, set the baseline level to deliver. Lower multicast rates mean weaker, farther signals are allowed to connection. Higher multicast rates mean that only close, strong signals are allowed.

NPHY Rate:

Set Physical Layer rate, only applicable when the 802.11n-mode set as auto.

Legacy Rate:

When AP released to share the band with existing legacy device, 802.11g/b/a devices. It provided ways of ensuring coexistence between legacy and successor devices.

Beacon Interval:

This is the time interval between beacon transmissions. The measure unit is "time units" (TU) of 1024 microseconds. (Value range: 1~65535)

DTIM (Delivery Traffic Indication Message) Interval:

The value set here which informs the clients about the presence of buffered multicast/broadcast data on the AP. It define CM will be delivered and how often that delivery occurs. (Value range: 1~255)

Fragmentation Threshold:

This option division of the MTU (Maximum transmission unit), default is 2346.

RTS (Request to Send) Threshold:

Sending RTS frames does not occur unless the packet size exceeds this threshold, default is 2347.

Chapter 3: Connections and setup

802.11 Access Control

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

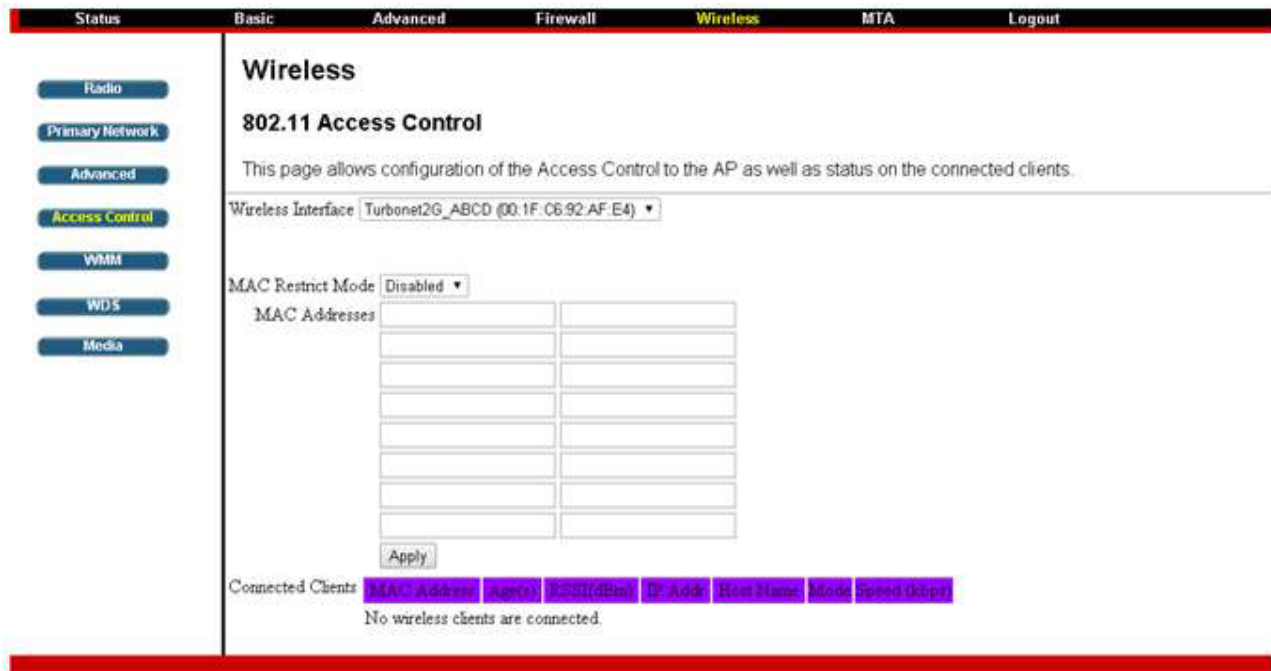


Fig. 27: 802.11 Access Control configurations

MAC Restrict Mode: Restrict specific client cannot allow access the AP by MAC address. Select "Disabled" to welcome all of the clients on the network; select "Allow" to permit only the clients on the list to access the cable modem; or select "Deny" to prevent the clients on the list to access this device.

MAC Address: Your Gateway identifies wireless PCs by their Wireless MAC Address. This address consists of a string of 6 pairs of numbers 0-9 and letters A-F, such as 00 90 4B F0 FF 50. It is usually printed on the Wireless card of the device (e.g. the PCMCIA card in a laptop) or at the button of the laptop. Enter the MAC address of the connected clients into the fields, and then click **Apply** to add them to the list for access control.

Apply: After proper configuration, click **Apply** to invoke the settings.

Connected Clients: The information of currently connected clients will be displayed here.

Chapter 3: Connections and setup

WMM

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

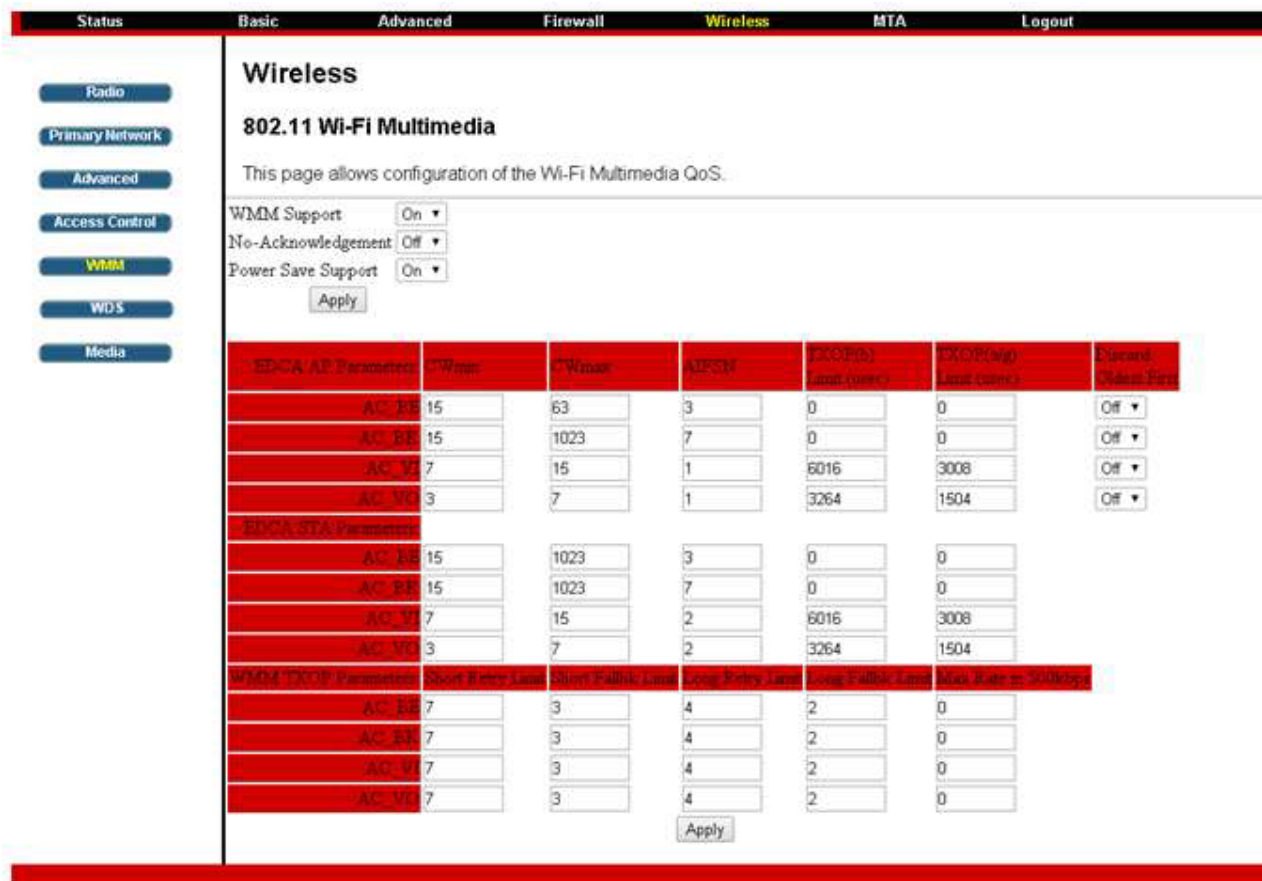


Fig. 28: 802.11 WMM configurations

WMM Support: This field allows you to enable WMM to improve multimedia transmission.

No-Acknowledgement: This field allows you to enable WMM No-Acknowledgement. Enable this avoids retransmission on highly time-critical data.

Power Save Support: This field allows you to enable WMM Power-Save-Support.

EDCA AP parameters: Specifies the transmit parameter for traffic transmitted from the AP to the STA for the 4 Access Priority Categories: Best effort (**AC_BE**), Background (**AC_BK**), Video (**AC_VI**) and voice (**AC_VO**). Transmit parameters include contention window (**CWmin** **CWmax**), arbitration Inter Frame Spacing Number **AIFS**, and Transmit opportunity Limit (**TXOP limit**).

Admission Control specifies if admission control is enforced for the Access categories. **Discard Oldest first** specified the discard policy for the queues, "On" discards the oldest first; "Off" discards the newest first.

EDCA STA parameters: Specifies the transmit parameter for traffic transmitted from STA to the AP for the 4 Access Priority Categories: Best effort (**AC_BE**), Background (**AC_BK**), Video (**AC_VI**)

Chapter 3: Connections and setup

and voice (**AC_VO**). Transmit parameters include contention window (**CWmin CWmax**), arbitration Inter Frame Spacing Number AIFSN, and Transmit opportunity Limit (**TXOP limit**).

WMM TXOP parameters: Specifies the TXOP parameter for the 4 Access Priority Categories :Best effort (**AC_BE**), Background (**AC_BK**), Video (**AC_VI**) and voice(**AC_VO**). WMM Transmit parameters include Short Retry Limit , Short Fallbk Limit , Long Retry Limit , Long Fallbk Limit. Those retry limit defines how many times the MAC retries to send different types of packets. If the number of retries reach their limit, the frame is discarded. Also we can set the Max Rate in 500kbps.

Chapter 3: Connections and setup

WDS

This page allows configuration of WDS (Wireless Distribution System) features.



Fig. 29: WDS configuration

TCG220 can allow to communicate with other "extender" wireless access points either exclusively or mixed with communications to local PCs. Use this page to designate the remote devices, the gateway is allowed to communicate with, and to select the WDS mode. You will need to configure the same SSID, WiFi encryption mode and also the pass phrases for both TCG220 and remote WiFi gateway before you can extend the WiFi network together.

WDS:

Choose "Disabled" to shut down this function; select Enabled to turn on the function of WDS.

Remote APs:

Enter the MAC Addresses of the remote devices to relay the signals for each other.

Apply:

After proper configuration, click Apply to invoke the settings.

Chapter 3: Connections and setup

Media

This page allows configuration of Wireless Media features.



Fig. 30: 802.11 Media Advanced Feature Configuration

Band Steering is a new feature that TCG220 has and will balancing the WiFi loading and performance on both 2.4G and 5G band. When enabled, TCG220 will send 5G enabled client which connected on 2.4G to the 5G interface (since TCG220 is a Dual Band Dual Concurrent Cable Voice WiFi Gateway), vice versa. This will also requires the support from WiFi Client. Airtime Fairness is a new feature that TCG220 has. If enabled, this will balance the WiFi performance when High Throughput device such as 802.11n device and legacy 802.11b/g device connected on the same channel. CG220 will dynamically allocate the time for transmission to each device so that the performance to High Throughput device will not be severely affected by the legacy device.

Chapter 3: Connections and setup

MTA Web Page Group

Status

This page displays initialization status of the MTA.

The screenshot shows a web interface with a top navigation bar containing 'Status', 'Basic', 'Advanced', 'Firewall', 'Wireless', 'MTA', and 'Logout'. The 'MTA' tab is selected. On the left, there are two buttons: 'Status' and 'Event Log'. The main content area is titled 'MTA Status' and includes a sub-header 'Status' with the text 'This page displays initialization status of the MTA.' Below this, there are two tables. The first table, 'Startup Procedures', lists tasks and their statuses. The second table, 'MTA Line State', lists lines and their states.

Task	Status
Telephony DHCP	Completed
Telephony Security	Disabled
Telephony TFTP	In Progress
Telephony Call Server Registration	L1: No Security Association / L2: No Security Association
Telephony Registration Complete	In Progress

Lines	State
Line 1	N/A (Endpoint Disabled) [Error: FAIL] [Error: FAIL]
Line 2	N/A (Endpoint Disabled) [Error: FAIL] [Error: FAIL]

Fig.31: MTA Status

Event Log

This page displays the MTA Event Log.

The screenshot shows the same web interface as Fig. 31, but with the 'Event Log' button selected. The main content area is titled 'MTA Event Log' and includes a sub-header 'Event Log' with the text 'This page displays the MTA Event Log.' Below this, there is a table with columns for Time, Priority, ID, and Text.

Time	Priority	ID	Text
2015-03-26 07:04:13	5-Information	4000950601	SNMPv2c: INFORM transmitted, Waiting for SNMPv2c: GET and/or SNMPv2c: SET messages 1302.saelpkt1.com/10.10.146.57

Fig. 32: MTA Event Log

Chapter 3: Connections and setup

Logout Web Page Group

This page warning you are logged out, click "Back to Login" return to Login page.

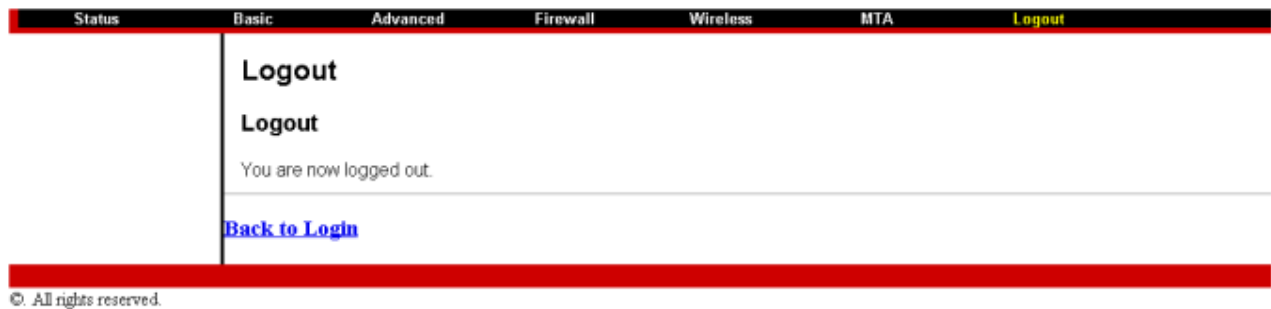


Fig. 33: Logout Page

Chapter 4: Additional Information

Chapter 4: Additional Information

General Troubleshooting

You can correct most problems you have with your product by consulting the troubleshooting list that follows.

I cannot access the Internet.

Check all of the connections to your EMTA.

Your Ethernet card may not be working well. Check the documentation for more information.

The Network Properties of your operating system may not be setting correctly. Check with your ISP or cable company.

All of the lights are flashing in sequence.

This means the EMTA is automatically updating its system software. Please wait for the lights to stop flashing. The updating process typically lasts less than one minute.

Do not remove the power supply or reset the EMTA during this process.

I can't get the modem to establish an Ethernet connection.

Even new computers don't always have Ethernet capabilities – be sure to verify that your computer has a properly installed Ethernet card and the driver software to support it.

Check to see that you are using the right type of Ethernet cable.

The modem won't register a cable connection (CABLE LINK light not on continuously).

If the modem is in Initialization Mode, the INTERNET light will be flashing. Call your cable company if it has not completed this 5-step process within 30 minutes.

The modem should work with a standard RG-6 coaxial cable, but if you're using a cable other than one your cable company recommends, or if the terminal connections are loose, it may not work. Check with your cable company to determine whether you're using the correct cable.

If you subscribe to video service over cable, the cable signal may not be reaching the modem. Confirm that good quality cable television pictures are available to the coaxial connector you are using by connecting a television to it. If your cable outlet is "dead", call your cable company.

Verify that the EMTA service is DOCSIS compliant by calling your cable provider.

I don't hear a dial tone when I use a telephone.

Telephone service is not activated. If the rightmost light on the EMTA stays on while others flash, check with your TSP or cable company.

Chapter 4: Additional Information

If the EMTA is connected to existing house telephone wiring, make sure that another telephone service is not connected. The other service can normally be disconnected at the Network Interface Device located on the outside of the house.

If using the second line on a two-line telephone, use a 2-line to 1-line adapter cable.

Chapter 4: Additional Information

Service Information

If you purchased or leased your EMTA directly from your cable company, then warranty service for the EMTA may be provided through your cable provider or its authorized representative. For information on the following, please contact your cable company. See the enclosed warranty card if you purchased your EMTA from a retailer.

- 1) Ordering Service,
- 2) Obtaining Customer Support
- 3) Additional Service Information

Chapter 4: Additional Information

Glossary

10BaseT – Unshielded, twisted pair cable with an RJ-45 connector, used with Ethernet LAN (Local Area Network). "10" indicates speed (10 Mbps), "Base" refers to baseband technology, and "T" means twisted pair cable.

Authentication - The process of verifying the identity of an entity on a network.

DHCP (Dynamic Host Control Protocol) – A protocol with which allows a server to assign IP addresses dynamically to hosts on the fly.

DOCSIS (Data Over Cable Service Interface Specifications) – A project with the objective of developing a set of necessary specifications and operations support interface specifications for cable modems and associated equipment.

Ethernet card – A plug-in circuit board installed in an expansion slot of a personal computer. The Ethernet card (sometimes called a Network Interface Card or NIC) takes parallel data from the computer, converts it to serial data, puts it into a packet format, and sends it over the 10BaseT or 100BaseT LAN cable.

F Connector – A type of coaxial connector, labeled CABLE IN on the rear of the cable modem that connects the modem to the cable system.

HTTP (HyperText Transfer Protocol) – Invisible to the user, HTTP is used by servers and clients to communicate and display information on a web browser.

Hub – A device used to connect multiple computers to the cable modem.

IP Address – A unique, 32-bit address assigned to every device in a network. An IP (Internet Protocol) address has two parts: a network address and a host address. This modem receives a new IP address from your cable operator via DHCP each time it goes through Initialization Mode.

Key exchange - The swapping of mathematical values between entities on a network in order to allow encrypted communication between them.

MAC Address – The permanent "identity" for a device programmed into the Media Access Control layer in the network architecture during the modem's manufacturing.

NID - Network Interface Device, the interconnection between the internal house telephone wiring and a conventional telephone service provider's equipment. These wiring connections are normally housed in a small plastic box located on an outer wall of the house. It is the legal demarcation between the subscriber's property and the service provider's property.

PacketCable – A project with the objective of developing a set of necessary telephony specifications and operations support interface specifications for cable modems and associated equipment used over the DOCSIS-based cable network.

PSTN (Public Switched Telephone Network) – The worldwide voice telephone network which provides dial tone, ringing, full-duplex voice band audio and optional services using standard telephones.

Provisioning - The process of enabling the Media Terminal Adapter (MTA) to register and provide services over the network.

Chapter 4: Additional Information

TCP/IP (Transmission Control Protocol/Internet Protocol) – A networking protocol that provides communication across interconnected networks, between computers with diverse hardware architectures and various operating systems.

TFTP - Trivial File Transfer Protocol, the system by which the Media Terminal Adapter's configuration data file is downloaded.

TSP - Telephony Service Provider, an organization that provides telephone services such as dial tone, local service, long distance, billing and records, and maintenance.

Chapter 4: Additional Information

CAUTION for UL(Check caution label on gift box)

North American Cable Installer:

This reminder is provided to call your attention to Article 820.93 of the National Electrical Code (Section 54 of the Canadian Electrical Code, Part 1) which provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building as close to the point of cable entry as practical.

Chapter 4: Additional Information

Federal Communication Commission Interference Statement

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.

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.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

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

Chapter 4: Additional Information

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.

Note: The country code selection is for non-US model only and is not available to all US model. Per FCC regulation, all WiFi product marketed in US must fixed to US operation channels only.