**VIDEO 54**

# MediaFlex 2501 Multimedia Wireless Adapter User's Guide

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**Federal Communications Commission (FCC) Compliance Notice: Radio Frequency Notice**

The device has met the FCC 15.247 requirement. In order to comply with the FCC RF exposure requirement, the user must keep 20cm away from the antenna.

This device 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 device 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 device does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.

• Increase the separation between the equipment and receiver.

• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

• Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**EN 55 022 Declaration of Conformance**

This is to certify that the MediaFlex 2501 Multimedia Wireless Adapter is shielded against the generation of radio interference in accordance with the application of Council Directive 89/336/EEC, Article 4a. Conformity is declared by the application of EN 55 022 Class B (CISPR 22).

# Contents

# Preface

This MediaFlex 2501 Multimedia Wireless Adapter User's Guide will help you understand the MediaFlex 2501 Multimedia Wireless Adapter, how to install it, and configure it using the Video54 Web Interface.

## Who Should Use this Guide

This User's Guide assumes that the reader has basic to intermediate computer and Internet skills. All the basic computer networking, Internet, and other information required to configure this device is provided herein.

## What You'll Find in this Guide

The following topics are covered:

- Chapter 1: "Introduction"
- Chapter 2: "Installation and Setup"
- Chapter 3: "Using the Video54 Web Interface"
- Appendix A: "Technical Specifications"

## Typographic conventions

This User's Guide uses the following typographic conventions:

**Table 1—Typographic conventions**

| Typeface or Symbol | Meaning | Example |
|---|---|---|
| *italics* | Emphasis, book titles, CD names, special terms.<br><br>Also used to denote optional input if surrounded by *<brackets>* | Read your *User's Guide* thoroughly.<br><br>Enter an address in the range `192.168.0.<2-253>` |
| **bold** | System menu names, user input | Open the **Control Panel**. |
| `fixed` | Screen text, URLs, IP addresses | Browse to the following IP address:<br>`http://192.168.0.254` |

## System Requirements

The MediaFlex 2501 Multimedia Wireless Adapter is compatible with most contemporary personal computers and operating systems that are configured for Internet and wireless networking.

The M2501 Adapter is accessed and configured via a Web browser interface. Any of the following Web browsers are supported:

- Microsoft Internet Explorer 5.0 and higher

- Netscape version 6.0 and higher

- Apple Safari 1.0 and higher

- Mozilla Firefox version 1.0 and higher

## Support and Warranty Information

See the *Warranty and Support* card for detailed information about contacting Technical Support, and the Warranty terms for your MediaFlex 2501 Multimedia Wireless Adapter.

# Chapter 1: Introduction

Congratulations on your purchase of the MediaFlex 2501 Multimedia Wireless Adapter (M2501 Adapter). The M2501 Adapter is a device that enables wireless multimedia networking for video, voice and data, without replacing existing routers, network adapters and media receivers.

A typical installation consists of a Video54, Inc. MediaFlex 2501 Multimedia Wireless Adapter connected to a set top box. The M2501 Adapter receives wireless signals from a MediaFlex 2900 Multimedia Access Point or other remote AP that is connected to a DSL router or cable modem. Video, data and voice traffic are distributed amongst TV, video appliances, and other wireless-enabled home entertainment appliances.
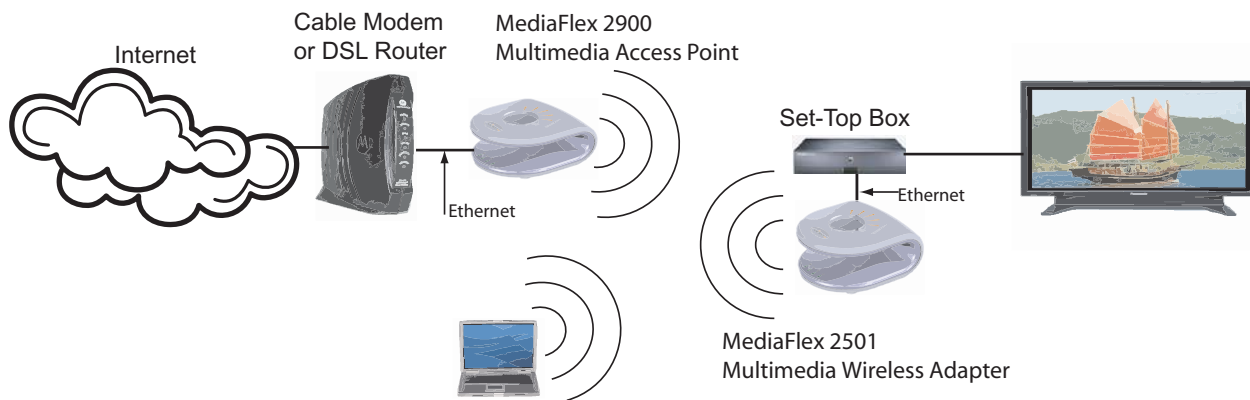


*Figure 1*—*The MediaFlex 2501 Multimedia Wireless Adapter in a Typical Home Network*

# MediaFlex™

MediaFlex™ is Video54, Inc.'s family of purpose-built, multimedia WiFi appliances that enable reliable wireless distribution of entertainment-quality, real-time media applications throughout the home. Media applications require consistent and uninterrupted bandwidth; however most wireless LANs (WLANs) cannot provide consistent service because of the variable nature of the wireless medium.

Video54, Inc.'s new, patent-pending Multicast TV-over-WLAN (TVoWLAN) technology differentiates multicast video frames from general multicast and broadcast traffic to provide robust wireless transport for IPTV streams—from the broadband gateway to the set top boxes.

To mitigate the performance impact of concurrent applications and interfering devices in a shared medium network, MediaFlex integrates Video54's new, patent-pending Media Quality of Service (QoS) technology to automatically classify video traffic and prioritize transmissions among applications.

# BeamFlex™

BeamFlex™ is Video54, Inc.'s patent-pending antenna technology that allows wireless signals to navigate around interference, extend wireless signal range, and increase speeds and capacity for 802.11b/g wireless networks. The BeamFlex™ antenna system consists of an array of six high-gain directional antenna elements, that allow the M2501 Adapter to find quality signal paths in a changing environment, and sustain the baseline performance required for supporting data, audio and video applications.

# Key Features

### BeamFlex™ Smart MIMO Antenna Maximizes Wireless Range and Performance

- Multi-In, Multi-Out (MIMO) technology supports real time learning of Radio Frequency, station, network and application conditions.

- On-the-fly adaptation to each receiving device in response to environmental changes such as interference to maximize signal quality, data rate and minimize packet errors and retransmissions.

- Internal driver software controls an antenna array with 6 high-gain, directional antenna elements and 63 unique antenna combinations.

- Expert system 802.11 driver controls data rate and retransmission policies on a per-packet basis.

### Media QoS Ensures Highest Video Quality

- Automatic traffic classification and Type-of-Service (TOS) tagging eliminates complex QoS configurations.

- Priority queuing for voice, video, best-effort and background traffic, per WiFi Alliance WiFi Multimedia (WMM) specifications.

- Strict priority with short (2 frames) hardware queue depth to ensure rapid feedback from the remote AP.

## Multiple Concurrent Video Streams with Simultaneous Data Traffic

- Delivers 15-20 Mbps of bandwidth at 99.9% availability throughout a typical 2500ft$^2$ (300m$^2$) home.

- Supports one MPEG-4/WMV stream, one DVD-quality MPEG-2 streams, or one 10Mbps+ high definition video stream at 50ft (18m), with simultaneous data traffic.

## Simple Configuration and Installation

- Simple Web-based user interface for easy configuration and customization of features such as SSID, WEP or WPA key, statistics monitoring and software upgrade.

## Standards-based Solution Protects User Investment, Minimizes Replacement Cost

- Compliant with 802.11b and 802.11g: supports 802.11g wireless networking at up to 108 Mbps; and can interoperate in 802.11g-only or mixed networks.

- Compliant with 802.1x (WEP and WPA with TKIP) and Wi-Fi Alliance WMM specifications.

- Supports Wi-Fi Protected Access-Pre-Shared Key (WPA-PSK) data encryption. WPA provides strong data encryption and authentication based on a pre-shared key.

- Supports 64-bit and 128-bit WEP encryption security. WEP keys can be generated manually or by passphrase.

- Attaches to television set-top box via Ethernet to optimize the reception of quality internet video over the WLAN.

- Forward compatible with the emerging 802.11n WLAN standard.

# Chapter 2: Installation and Setup

This chapter describes how to install your MediaFlex 2501 Multimedia Wireless Adapter, and how to set up your PC to connect to the Video54 Web Interface.

Topics covered in this chapter include:

- "Packing List" on page 12
- "MediaFlex 2501 Multimedia Wireless Adapter" on page 12
- "LED Status Lights" on page 13
- "Placement Guidelines" on page 15
- "Connecting to the M2501 Adapter" on page 16
- "Accessing the Web Interface" on page 18

## Packing List

1. MediaFlex 2501 Multimedia Wireless Adapter

2. AC power adapter

3. Category 5 (CAT5) Ethernet Cable

4. *MediaFlex 2501 Multimedia Wireless Adapter Quick Setup Guide*

## MediaFlex 2501 Multimedia Wireless Adapter

### Front View

Figure 2— "Front View of the MediaFlex 2501 Multimedia Wireless Adapter" shows the front view M2501 Adapter, with the LED indicators numbered. The numbers correspond to the labels describing LED behavior in Table 2— "LED Indicators and Meanings" on page 13.
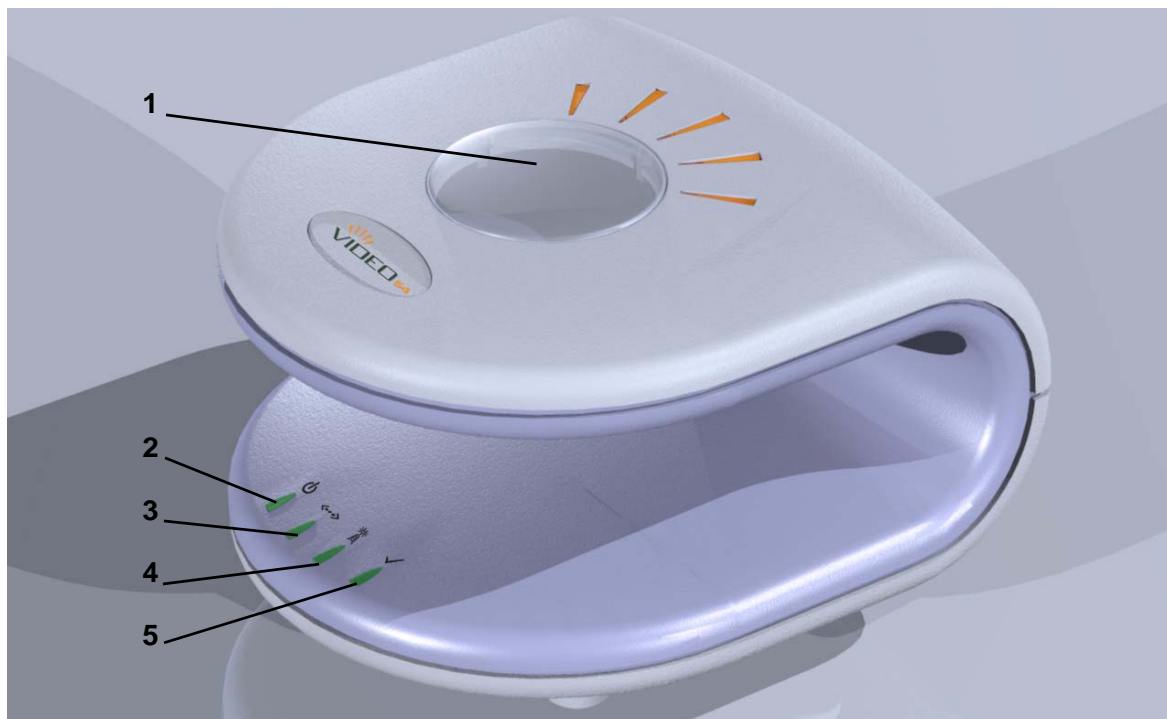


**Figure 2**—*Front View of the MediaFlex 2501 Multimedia Wireless Adapter*

## LED Status Lights

Table 2— "LED Indicators and Meanings" describes the LED lights on the front of the M2501 Adapter.

**Table 2—LED Indicators and Meanings**

| Label | LED | Activity | Description |
|-------|-----|----------|-------------|
| **1** | Antenna | All LEDs On Green Solid<br>Green Flashing randomly | The M2501 Adapter is booting.<br>The lit LEDs indicate which antennae are active. |
| **2** | Power | Green<br>Off | Power is supplied to the M2501 Adapter.<br>Power is not supplied to the M2501 Adapter. |
| **3** | LAN | Green Steady<br>Off | The M2501 Adapter has link.<br>The M2501 Adapter has no link. |
| **4** | Wireless | Green Flashing<br><br>Green Steady | The M2501 Adapter is transmitting data. The faster the flashing, the more data is being transmitted or received.<br>The Wireless port is initialized and enabled. |
| **5** | Air Quality | Green Steady<br><br>Green Flashing<br><br><br>Green intermittent Flashing | **Good Air Quality:** A steady Green LED indicates that the current environment will support quality video streaming.<br>**Maybe Acceptable Air Quality:** a flashing Green LED (on for 0.25 second, off 0.25 second) indicates that the current environment does not always meet the video standard. While video streaming is possible, the quality will vary.<br>**Bad Air Quality:** A briefly flashing Green LED (on for 0.03 second and off for 1 second) indicates that video streaming is not possible in the current environment. The brief flash also indicates that the device is still functioning. |

## Rear View



*Figure 3—Rear View of the M2501 Adapter*

**Table 3—Rear Ports and Adapters**

| Label | Description |
|---|---|
| **6** | AC Power Adapter (Input: DC 5V 2A) |
| **7** | 10/100 Mbps Auto-sensing, autonegotiating RJ-45 network port |
| **8** | Reset button. Used only if you need to reset the M2501 Adapter to its factory default settings. Insert the end of a paper clip or pin into the hole and hold it in for at least 4 seconds. |

# Placement Guidelines

You or your service provider or installer can determine the best placement for the M2501 Adapter by using the following guidelines.

## Establishing a good general location

Your M2501 Adapter should be placed:

- On a shelf or other elevated location away from any physical obstructions.
- Away from other sources of electromagnetic interference (for example, microwave ovens, and cordless phones).
- Away from large metal surfaces, pictures or mirrors.
- Away from large furniture or other physical obstructions.

*CAUTION:—Never connect the M2501 Adapter to a router, switch, or hub. Only connect it to another PC or a set top box.*

## Using the Air Quality Indicator to fine-tune the placement

Wireless environments are sensitive to the physical arrangement of both electronic devices and furniture in a room. You or your installer can observe the Air Quality Indicator LED to determine the best location. The Air Quality indicator LED is described in Table 2— "LED Indicators and Meanings" on page 13.

Your service provider or installer can guide you through a self-help troubleshooting session if video quality deteriorates after an installation. Or, you may be able to determine a solution to the problem on your own.

If "Bad" or "Maybe Acceptable," air quality is indicated, you can adjust the location of the M2501 Adapter and other devices until a steady green LED indicates "good" air quality.

# Connecting to the M2501 Adapter

Before using the M2501 Adapter, you have to configure it to work within your home network. Your service provider or installer will likely perform all installation tasks for you, or you may read the following section to understand how to configure it manually.

The default IP address of the MediaFlex 2501 Multimedia Wireless Adapter is `192.168.0.254.`

To gain administrative control of the unit, set your PC or laptop network IP address to an address within the same network as the M2501 Adapter's default IP address. Then, connect your PC to the M2501 Adapter using the provided Ethernet cable.

You can set your PC's IP address to an address within the network `192.168.0.<2-253>` (Example: `192.168.0.100`).

## Manually Configuring an IP Address on Your PC

1.  *Windows 2000:* **Start>Settings>Network and Dial-up Connections**
    *Windows XP:*     **Start>Settings>Control Panel>Network Connections**

2.  Double-click the icon for the Local Area Connection designated for your home network, then click the **Properties** button at the bottom of the screen. (This is not the same icon as your home wireless network.)

3.  In the Local Area Connection Properties window, select Internet Protocol (TCP/IP) and click the **Properties** button.
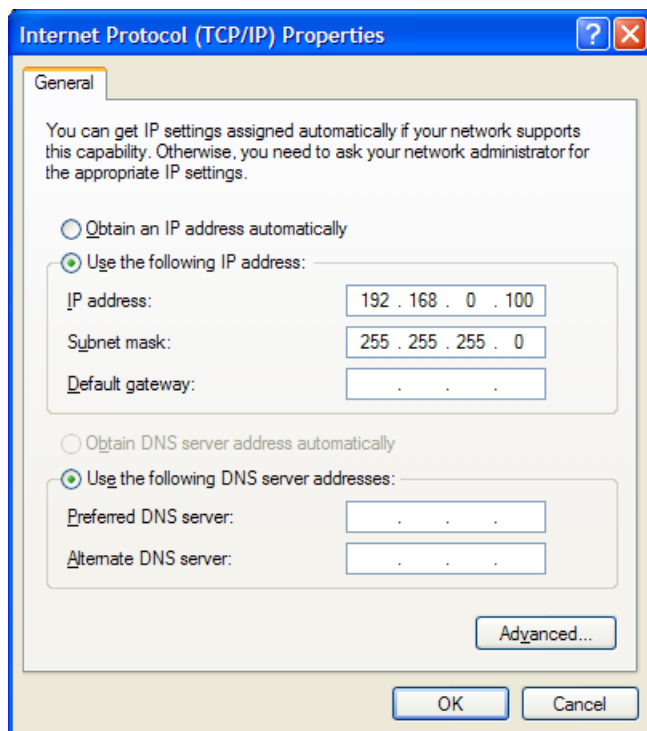


***Figure 4***—*Internet Protocol (TCP/IP Properties)*

4. Select the **Use the following IP address button**, and enter an IP address within the network as noted above.

5. Hit the Tab key and allow the Subnet mask address to auto-fill to **255.255.255.0.**

6. Click **OK** to exit the **TCP/IP Properties** window.

7. Click **OK** to exit the **Local Area Connection Properties** window.

## Connecting a PC to the M2501 Adapter

The following steps will guide you through connecting to your M2501 Adapter.

1. Remove the M2501 Adapter from the packaging and place it next to your PC or laptop.

2. Connect the AC Power Supply to the M2501 Adapter and plug into a power outlet.

3. Connect your PC or laptop to the Ethernet port on the M2501 Adapter using the supplied Ethernet cable.

4. On your PC, open a browser window. Enter the address `http://192.168.0.254`.

5. When the login screen appears, enter the username `admin` and leave the password field blank. Then click the **Logon** button.

*CAUTION:—Make sure to write down the new IP address, username, password and SSID. If you change the M2501 Adapter's default IP address to one outside the current address range of your PC, you will not be able to connect to the device after reboot until you reset your computer's IP address to be within the same network as the M2501 Adapter. See Table 5, "Wireless Network Settings Worksheet," on page 20 and Table 6, "M2501 Adapter Default and User Settings Worksheet," on page 21 for more information.*

You should now be able to find the default SSID "V54" of your M2501 Adapter over your wireless connection:

**Table 4—Default Wireless Settings**

| Wireless Feature | Setting |
|---|---|
| Network Name (SSID) | V54 |
| Security | Disabled |

## Accessing the Web Interface

The M2501 Adapter provides a Web-based user interface for configuration and monitoring. For information about using the Video54 Web Interface, read the next chapter.

To access the Video54 Web Interface, launch a Web browser and enter the M2501 Adapter's IP address. If this is the first time the access point is being configured, enter the default IP address: `192.168.0.254`

A login screen will appear. Use the default login information below for logging in:

> Username: `admin`
>
> Password: *<blank>*

After logging in, you will see the main information page. On the information page, there are two panes. The pane on the left shows major information or configuration points. Each major information or configuration area has a number of sub-menus. Clicking on the relevant menu will bring the relevant page onto the screen.

The system monitors the activities on the Web user interface. If you do not use the Web interface for more than five minutes, the system will time out, and you will be logged out automatically. You need to re-log in to access the interface.

> *CAUTION:—Any configuration changes will be lost unless you use the **Update** button. It is recommended that after each configuration screen you modify, you click the **Update** button.*

# Chapter 3: Using the Video54 Web Interface

This chapter describes the tasks you need to do to customize the M2501 Adapter to run on your wireless network.

Topics covered in this chapter include:

# Wireless Settings Worksheet

Before you modify any wireless settings on the M2501 Adapter, print Table 5— "Wireless Network Settings Worksheet" and record the following information about your wireless network. Your ISP or network administrator may provide you with this information. The wireless information recorded in this worksheet should be used to configure the M2501 Adapter's wireless settings.

**Table 5—Wireless Network Settings Worksheet**

| Item | Description and Your Network Setting |
|---|---|
| **M2501 Adapter SSID** | The M2501 Adapter will not provide Internet access like a home router or gateway. The SSID identifies the remote AP. Make sure to specify the SSID of the remote AP. *Do not specify a unique SSID for the* M2501 Adapter. You can use up to 32 alphanumeric characters. The SSID *is* case sensitive. |
| **Security** | If using WEP, circle the method used:   Open System      Shared Key   Auto <br><br> Circle the type of Shared key:          64-bit                128 bit <br><br> Passphrase method <br> • If using 64-bit WEP: use 10 hex digits (any combination of **0-9** or **a-f)** or 5 ascii characters <br> • If using 128-bit WEP, use 26 hex digits or 13 ascii characters <br> The WEP key values are *not* case-sensitive. <br><br> **Key 1** _____ <br><br> **Key 2** _____ <br><br> **Key 3** _____ <br><br> **Key 4** _____ |
| | If using WPA-PSK, write down the passphrase. The WPA-PSK passphrase *is* case-sensitive. <br><br> **WPA passphrase:** _____ |

## M2501 Adapter Settings Worksheet

Print Table 6, and record your personalized settings for configuring the M2501 Adapter. Enter the security settings you recorded in Table 5, "Wireless Network Settings Worksheet," on page 20.

*Remember—If the M2501 Adapter's device settings do not match the remote AP settings, the M2501 Adapter will not be able to find your network.*

Store this information in a safe place.

**Table 6—M2501 Adapter Default and User Settings Worksheet**

| Item | Default Setting | Your Setting |
|------|-----------------|--------------|
| **User Name** | admin | _____ |
| **Password** | *<none>* | _____ |
| **IP Address** | 192.168.0.254 | _____ |
| **Subnet Mask** | 255.255.255.0 | _____ |
| **SSID** | V54 | _____ |
| **Wireless Mode** | 802.11g&b | _____ |
| **Security** | Disabled | _____ |

# Video54 Web Interface Menus

The Video54 Web Interface menus are located on the left-hand navigation pane. To select a particular menu, simply click on the menu link.

## Common Buttons

The following buttons are commonly found in the Video54 Web Interface screens:

| | |
|---|---|
| **Logout** | Logs out the current session. |
| **Restore** | Restores the original configuration. |
| **Update** | Saves the new configuration. |
| **Next** | Progresses to the next menu. Only found in the Configuration menus. |
| **Back** | Reverts to the previous menu. Only found in the Configuration menus. |

# Air Quality Indicator

The Air Quality indicator icon depicts the current state of your Wireless connection. Air Quality is measured by the Received Signal Strength Indication (RSSI) value, which is a measurement of the wireless signal strength. A high RSSI value usually means that the wireless connection is stable, and quality video data can be transferred.

The Air Quality Indicator assesses the environment that surrounds a Video54, Inc. M2501 Adapter, and determines the amount of interference in the infrastructure. The Radio Frequency (RF) side of a wireless device is a combination of a receiver and a transmitter. Both receiver and transmitter provide feedback as they operate. The Air Quality indicator bases its evaluation on the Received Signal Strength Indication (RSSI) that is returned as part of the 802.11 transmission acknowledgement. As the adapter receives an 802.11 packet, it sends the RSSI value to the remote AP.

**Thumb Up: Good** air quality. The environment supports a quality video viewing experience.

**Thumb sideways: Maybe good** video signal strength. The current environment *may* support video viewing, but it is also possible that the video may be flawed.

**NOTE – Thumb down: Bad** video signal strength. The current environment does not support quality video viewing.

# Configuring the M2501 Adapter

This section describes the tasks and screens used to customize the M2501 Adapter configuration to run on your wireless network.

Review the following topics before you change any system configuration settings:

- "Connecting to the M2501 Adapter" on page 16
- "Accessing the Web Interface" on page 18."

## System Configuration

Table 6, "M2501 Adapter Default and User Settings Worksheet," on page 21 shows the default settings used to login to the device.

A minimum set of configurations is required to put the M2501 Adapter into operational mode. The system provides the default settings for these configuration items. You should change the default settings where necessary to match your own wireless network's configuration, and to protect your privacy.

A system reboot is required for configuration changes to take effect. Follow the following steps to configure the M2501 Adapter:

1. Enter your configuration changes in the appropriate fields.
2. Click the **Next** button to go to the next configuration screen.
3. Click the **Update** button to save your settings.

> ⚠️
>
> *CAUTION:—You must click the **Update** button to save any configuration changes. The Video54 Web Interface will timeout after 5 minutes of inactivity. If you let the system time out before clicking the **Update** button, any changes you made will be lost.*

4. Click the **Restore** button to cancel configuration changes.
5. Go to the **Boot** menu and click the **Reboot** button to reboot the device for configuration changes to take effect.

> ⚠️
>
> *CAUTION:—If, after having changed any default settings, you have forgotten what the new settings are, you may not be able to login to the M2501 Adapter. To regain access to the M2501 Adapter, you must reset the device to its factory default settings. Do this by inserting the end of a paper clip into the Reset Button.*

## Customizing the System Configuration

It is recommended that you customize the username and password so that you can control who can gain administrative access to the M2501 Adapter. You may also wish to change the default IP address if it conflicts with another device in your wireless network. Refer to Table 7 for details on each field.
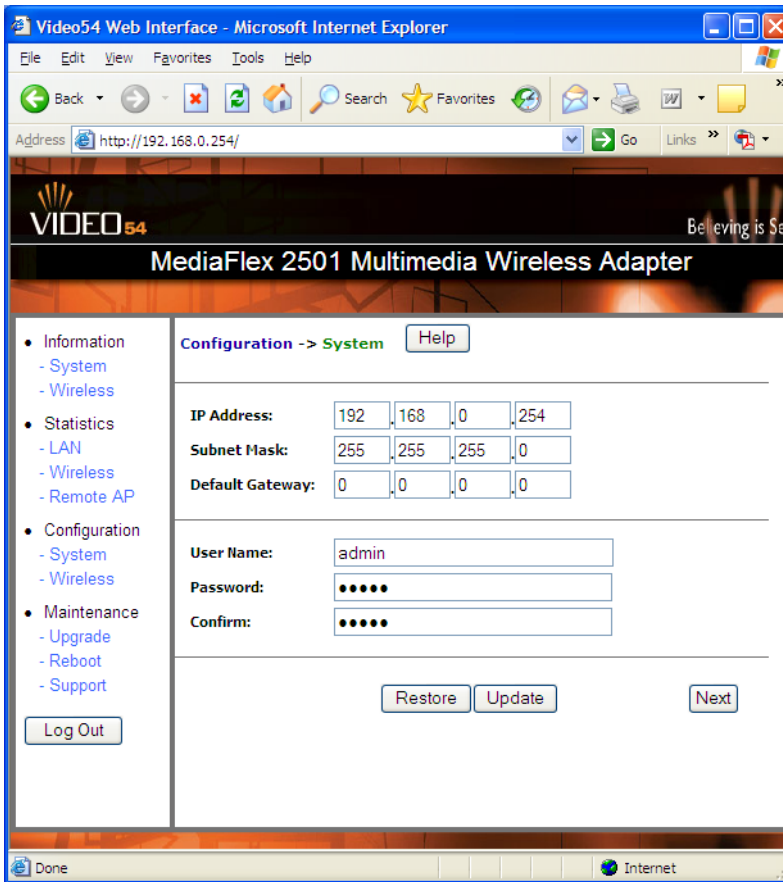


***Figure 5**—System Configuration*

**Table 7—System Configuration**

| Field | Description |
|---|---|
| IP Address | The IP address of the M2501 Adapter. This IP address is used only when you need to access the Video54 Web Interface to change configuration or view information about the M2501 Adapter. |
| Subnet Mask | The subnet mask of the M2501 Adapter. The default is 255.255.255.0. Changing the Subnet Mask field is not recommended for most installations. |
| Default Gateway Address | The IP address of default gateway. The default is 0.0.0.0. |

**Table 7—System Configuration (Continued)**

| Field | Description |
|---|---|
| User Name | The user name. The default user name is `admin`. If you change the user name, make sure to write it down for future reference. |
| Password / Confirm | The user password. The default is no password. If you change the password, make sure to write it down for future reference. |

## Configuring the Wireless Interface

It is recommended that you consult with your service provider to understand the wireless settings. Before changing any settings in the Wireless configuration menu, make sure you have recorded and verified the information in the following worksheets:

- "Wireless Network Settings Worksheet" on page 20
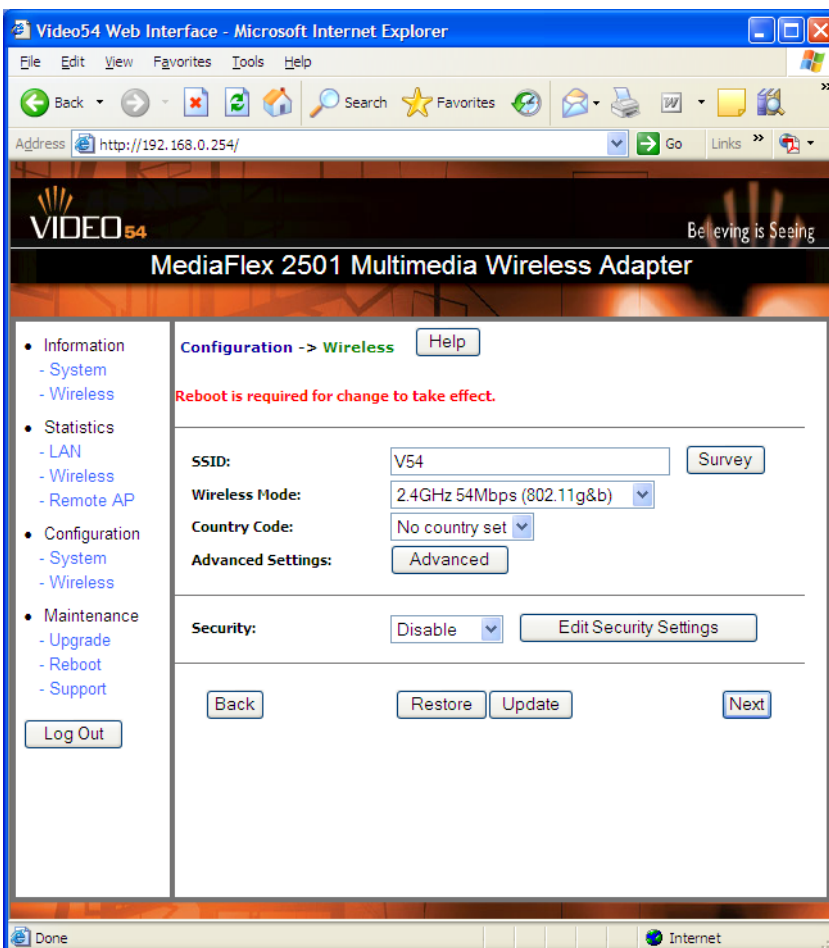- "M2501 Adapter Default and User Settings Worksheet" on page 21.



***Figure 6***—*Wireless Interface Configuration*

**Table 8—Wireless Interface configuration**

| Field | Description |
|---|---|
| **SSID** | The SSID (Service Set IDentifier) is the name of the wireless network. The default SSID is V54, but it is strongly recommended that you change your SSID. If there are other wireless networks in your area, you should give your wireless network a unique name. The SSID can consist of up to 32 characters. |
| **Wireless mode** | The wireless mode options are:<br><br>• **2.4GHz 54Mbps (802.11g&b)** - allows both 802.11g- and 802.11b-compliant devices to join the network. This is the default setting. |
| **Country Code** | Sets your country or region code. Selecting the incorrect country or region may result in violation of applicable law. The selectable countries or regions are United States, Europe, Hong Kong, and Japan.<br><br>**NOTE –** For M2501 Adapters shipped in the United States, the country code cannot be modified. The country code is pre-defined for **United States** only. |
| **Advanced Setting** | This button provides access to the advanced wireless settings. Advanced wireless settings are for advanced configuration or testing purposes only.<br><br>Changing the advanced settings may negatively affect the operation of the M2501 Adapter and is *not recommended*. |
| **Security** | The wireless security options are:<br><br>• **Disabled**: This setting disables all encryption, so traffic is sent in the clear. This setting is not recommended.<br>• **WEP**: This setting enables Wired Equivalent Privacy. WEP Shared Key authentication and WEP data encryption provides sufficient security in most cases.<br>• **WPA-PSK:** Wi-Fi Protected Access, Pre-Shared Key (WPA-PSK). Each packet of information is encrypted with a different key. Provides very strong security, but may not be supported on older systems. |
| **Edit Security Setting** | Click this button to edit the security setting of WEP keys or the WPA-PSK passphrase. |

## Advanced Wireless Configuration

The Advanced Wireless Configuration menu is preconfigured with the optimum settings. Changing the advanced settings may negatively affect the M2501 Adapter's operation, or completely disable it. For best results, leave the Advanced settings at their default values and do not change these settings unless directed by your technical support personnel.

**NOTE –** If you have modified the advanced settings and wish to revert to the original settings, you can restore the settings by clicking the **Restore** button, as long as you have not already clicked the **Update** Button.
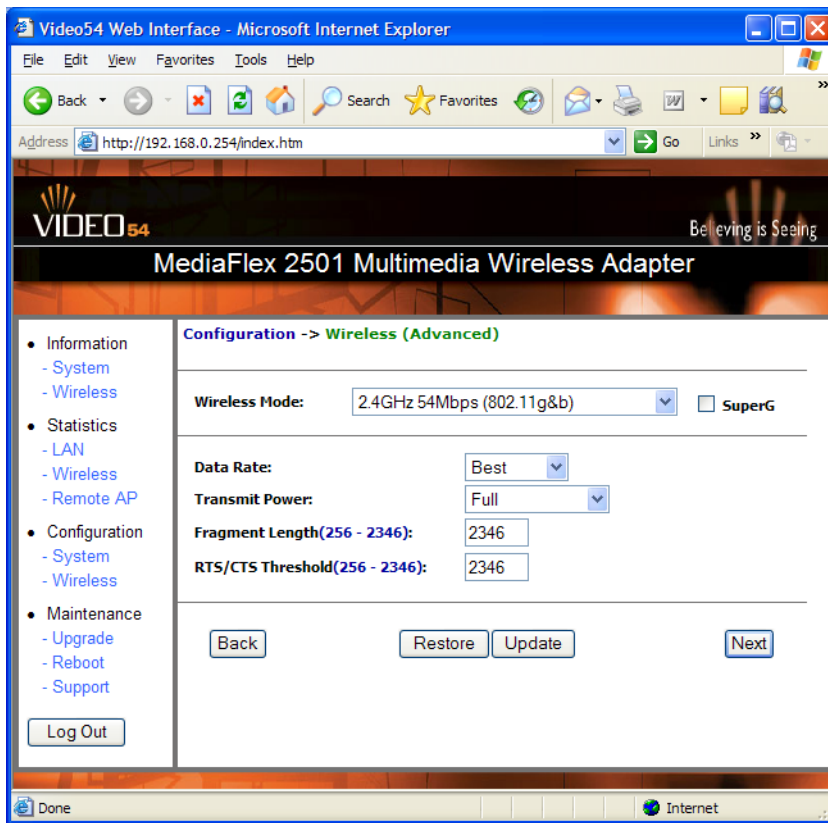


***Figure 7**—Advanced Wireless Configuration*

**Table 9—Advanced Wireless Configuration Parameters**

| Field | Description |
|---|---|
| **Wireless Mode** | Sets the wireless mode for the M2501 Adapter. The wireless mode determines the wireless speed of devices that are allowed to associate to the M2501 Adapter. Options are:<br>• 802.11g&b: stations running at either 802.11g (2.4GHz, 54Mbps) or 802.11b (2.4GHz 11Mbps) can associate to the M2501 Adapter. This is the default setting.<br>• 2.4GHz 54Mbps (802.11g only)<br>• 2.4GHz Auto 108Mbps (802.11g Turbo)<br>• 2.4GHz Only 108Mbps (802.11g Turbo) |
| **Super G** | This check box is used to enable the Super G mode, which engages advanced mechanisms when extra bandwidth is available and or required. By default, this option is not checked. |
| **Data Rate** | Select the desired data rate from the drop-down menu. The default is **Best**, which means the system will adjust the data rate automatically. |
| **Transmit Power** | Select the desired Adapter transmit power from the drop-down menu. In cases where you might want to limit your signal coverage range, such as in a small apartment or room, you can select a lower transmit power.<br>The options are:<br>• Full<br>• Half (-3 dB)<br>• Quarter (-6 dB)<br>• Eighth (-9 dB)<br>• Minimum<br>The default is **Full**. |

**Table 9—Advanced Wireless Configuration Parameters  (Continued)**

| Field | Description |
|-------|-------------|
| **Fragment length** | The fragment length. The range is between 256 and 2346 bytes. The default is **2346**. |
| | The M2501 Adapter uses fragmentation to divide 802.11 frames into smaller fragments which are sent separately to the destination. Only unicast frames can be fragmented. The fragment length can be between 256-2346 bytes. If the data that the M2501 Adapter is transmitting is larger than the threshold, it will trigger the fragmentation function. If the packet size is equal to or less than the threshold, the access point will not use fragmentation. In a good wireless environment, the larger the fragment, the more efficient the network operates. In a noisy environment, the fragment length should be adjusted to a smaller size to minimize retransmission and increase the reliability of the transmission. |
| **RTS/CTS Threshold** | The RTS-CTS threshold range. The range is between 256 and 2346. The default is **2346**. |
| | The RTS-CTS threshold is a value that determines at what frame length the request-to-send/clear-to-send (RTS-CTS) function is triggered. By default, this threshold is set at its highest value. A lower threshold value means that the RTS-CTS function is triggered for smaller frame lengths. |
| | A lower threshold may be necessary in environments with excessive signal noise or hidden nodes; but this may result in some performance degradation. |

# Configuring WEP Security

1. Click the **Configuration** ->**Wireless** link in the left-hand navigation pane.

2. Select **WEP** in the **Security** drop-down menu.

3. Click the **Edit Security Settings** button.

4. In the **Configuration->Security (WEP)** menu, select **open system**, **shared key**, or **Auto**. See Authentication below for more information.

5. Select the Key Entry Method: **Hexadecimal** or **Ascii Text**.

6. Select the Key length: **40 bit WEP** or **128 bit WEP**.

7. If your M2501 Adapter will be used with an M2900 AP, you may use the same passphrase to generate four unique keys. Enter a passphrase and press the Generate button. If using a remote AP from another manufacturer, you should manually enter the four WEP keys in the same order.

8. Click the **Update** button to save your settings.

### Authentication

WEP allows three authentication options: **open system**, **shared key**, or **automatic** selection of authentication method.

Under an **open system**, a shared key is not required for the adapter to authenticate to a remote AP such as the Video54, Inc. M2900 AP. However, a shared key must still be used to encrypt and decrypt data between the M2501 Adapter and the remote AP.

**Shared key** authentication adds another layer of security by requiring that the M2501 Adapter supply a shared key first to authenticate to the remote AP, and then supply the same shared key for encrypting and decrypting data.

### Using a passphrase to generate keys

The M2501 Adapter supports automatic generation of four keys from a passphrase.Make sure that the passphrase is the same as the passphrase used on the remote AP.

1. Enter a word or group of printable characters in the Passphrase box and click the Generate button. The passphrase is case sensitive; e.g. **MediaFlex** is not the same as **MEDIAFLEX**. The four key boxes will be automatically populated with key values.

2. Click the **Update** button to save your settings.
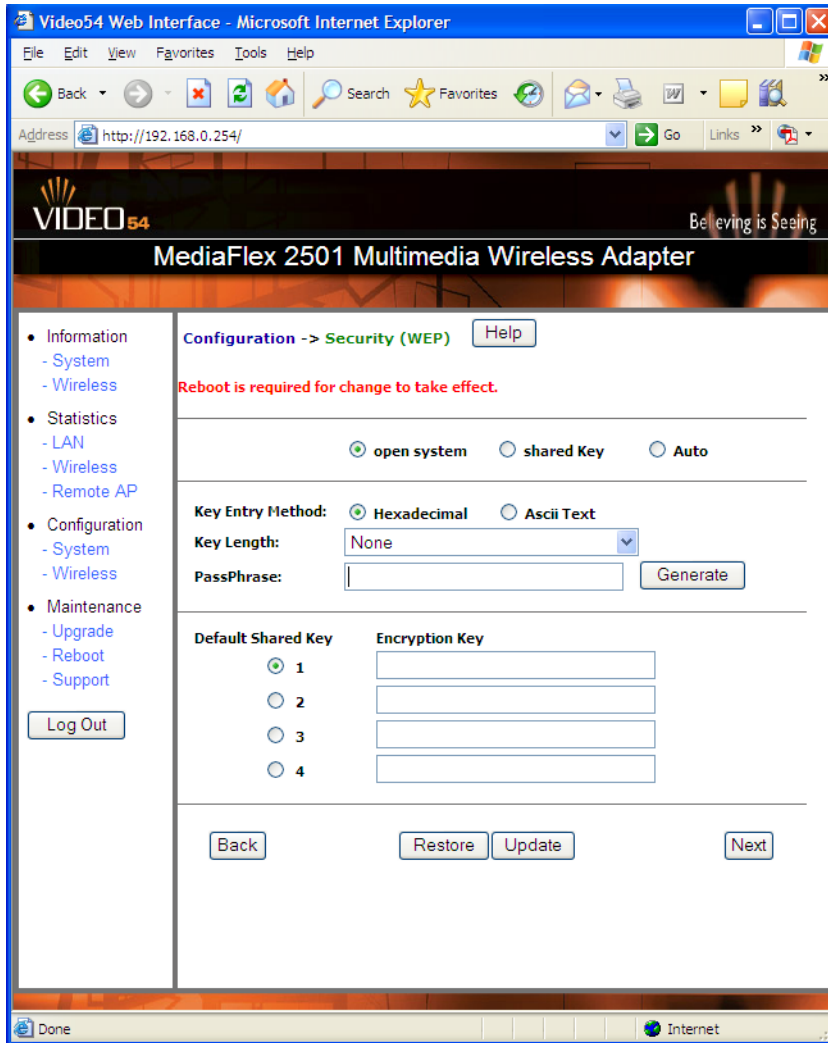
***Figure 8***—*WEP Configuration*

**Table 10—WEP Configuration**

| Open System | No authentication is enforced. |
|---|---|
| **Shared Key** | Authentication using a shared key. Shared Key authentication encrypts the SSID and data. |
| **Auto** | Automatically selects the authentication mode depending on the method used by the remote AP. |
| **Key Entry Method** | The key entry method options are:<br><br>• **Hexadecimal:** Accept entering encryption key with hexadecimal (0-9, A-F).<br>• **Ascii Text:** Accept entering encryption key with ASCII characters. |

**Table 10—WEP Configuration (Continued)**

| | |
|---|---|
| **Key Length** | The valid key length options are:<br><br>• **None**: No key.<br>• **40 bit WEP**: Key with 10 hexadecimal digits or 5 ASCII characters.<br>• **128 bit WEP**: Key with 26 hexadecimal digits or 13 ASCII characters. |
| **PassPhrase** | This allows automatic key generation. Enter the desired passphrase and click on the **Generate** button. The system will generate all four WEP keys automatically. |
| **Default Shared Key** | The default share key number. There are four shared keys; select one of these keys as the default. Make sure your M2501 Adapter uses the same default shared key as the remote AP. |
| **Encryption Keys** | These fields auto-fill if you use a passphrase to generate keys.<br><br>If your network doesn't use Video54, Inc. APs or adapters, enter each key manually according to the **Key Entry Methods** and **Key Length** settings. You may specify up to four different keys and select the desired default shared key. |

## Configuring WPA PSK

WPA PSK configuration menu allows automatic key generation based on a single passphrase. WPA PSK provides very strong security, but may not be supported on older systems.

If you configure the M2501 Adapter with WPA-PSK, the other devices in the network will not connect unless they, too are set to WPA-PSK, and are configured with the same passphrase.

1. Click the **Configuration** -**Wireless** link in the left-hand navigation pane.

2. Select **WPA-PSK** in the **Security** drop-down menu.

3. Click the **Edit Security Settings** button.

4. In the **Configuration ->Security (WPA-PSK)** menu, enter a passphrase and enter it again in the **Confirm** field.

5. Click the **Update** button to save your settings.
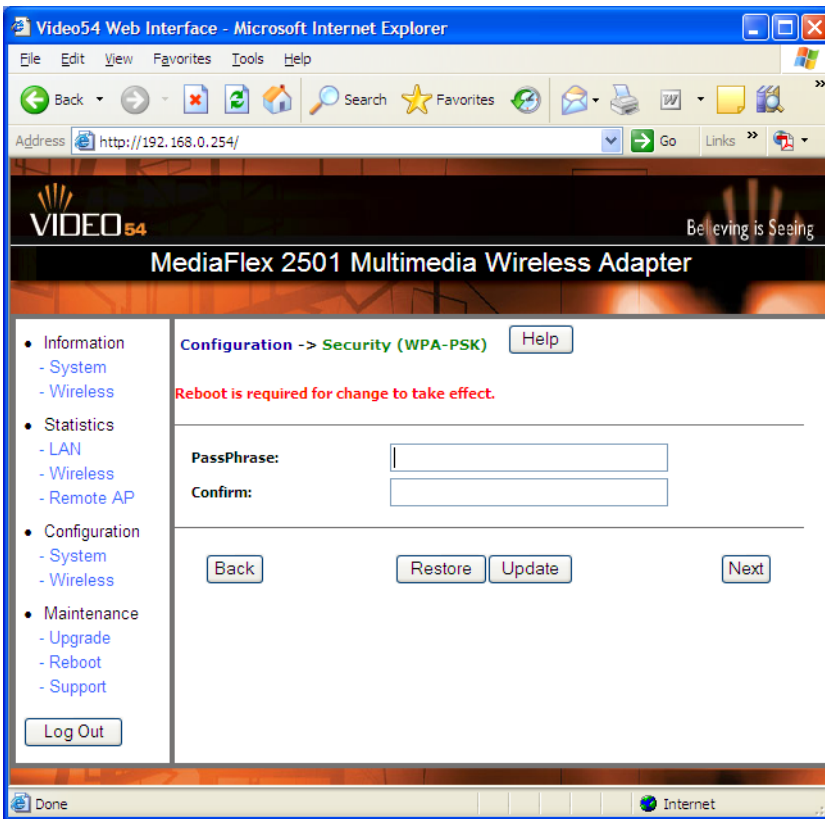
**Figure 9**—*WPA Configuration*

**Table 11—WPA Configuration**

| PassPhrase / Confirm | Enter a passphrase and enter it again in the **Confirm** field. |
|---|---|

# Viewing System Information

The Information Screens provide information the M2501 Adapter settings.

## System Information

The System Information screen is the first screen to appear once you login to the M2501 Adapter.
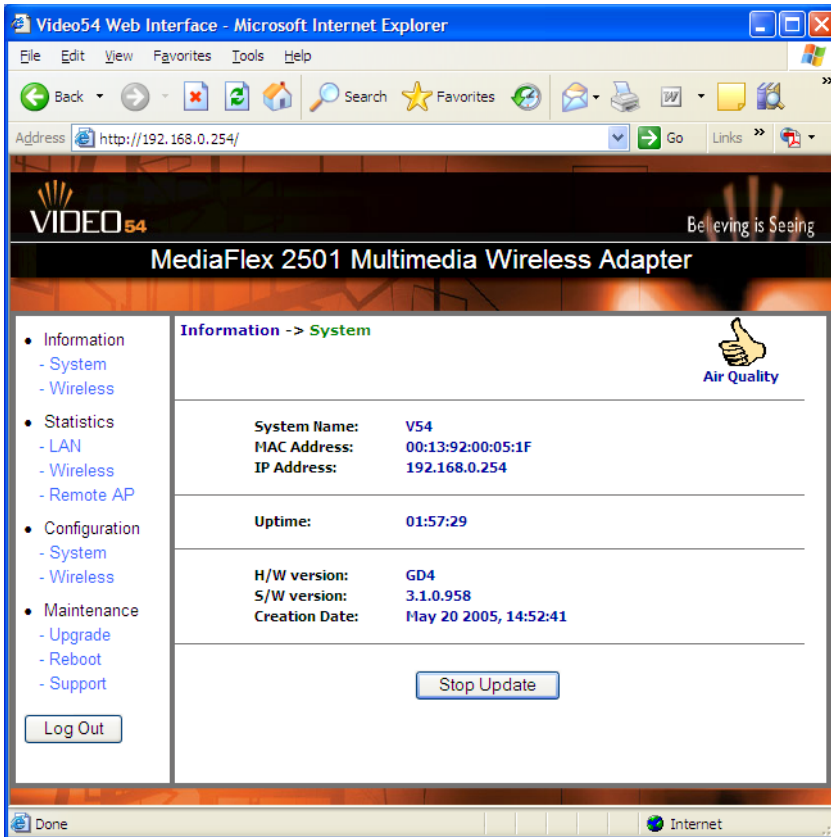


**Figure 10**—*System Information*

**Table 12—System Information**

| Field | Description |
|---|---|
| **System Name** | The local name for the M2501 Adapter. |
| **MAC Address** | The MAC address of the M2501 Adapter, or the station behind the adapter. |
| **IP Address** | The IP address of the M2501 Adapter. |
| **Uptime** | The system uptime since last reboot, displayed in HH:MM:SS (hours, minutes, seconds). |

**Table 12—System Information (Continued)**

| Field | Description |
| --- | --- |
| **H/W Version** | The hardware revision. |
| **S/W Version** | The firmware version that is currently operating. |
| **Creation Date** | The date/time that the firmware was created. |

# Viewing Wireless Information

The Wireless information menu shows the current wireless configurations for the M2501 Adapter.
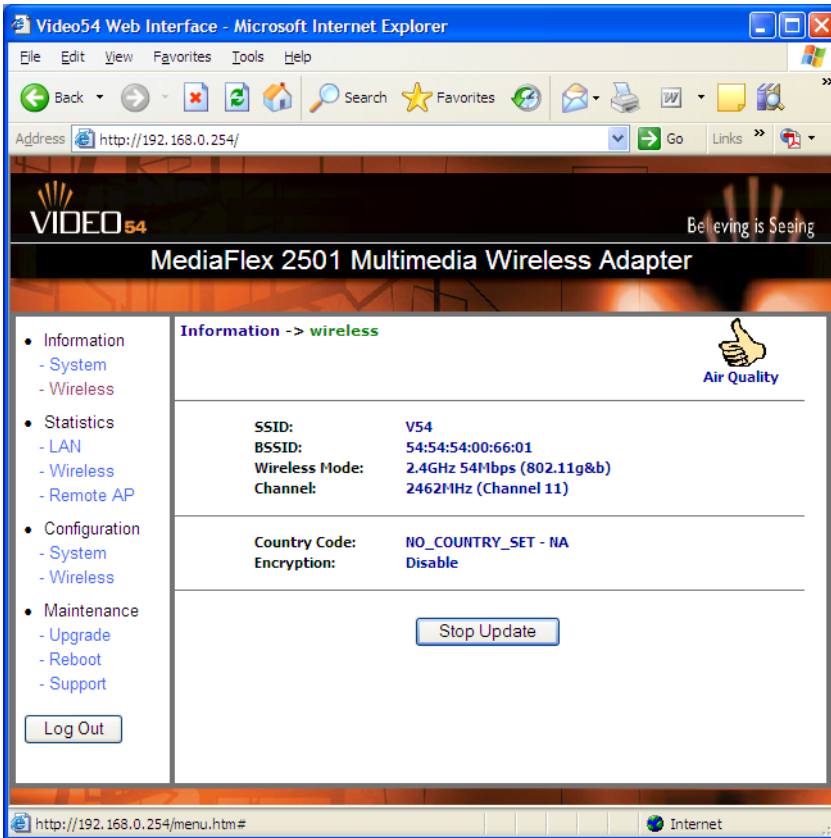


***Figure 11***—*Wireless Information*

**Table 13—Wireless Information**

| Field | Description |
|---|---|
| **SSID** | The SSID (Service Set Identifier) is the name of the wireless network. |
| **BSSID** | The BSSID is the MAC address of the remote AP that the M2501 Adapter associated to. |
| **Wireless Mode** | The wireless mode, such as **2.4 GHz 54Mbps (802.11b/g)** |
| **Channel** | The wireless channel number and operating frequency in MHz. |

**Table 13—Wireless Information**

| Field | Description |
|-------|-------------|
| **Country code** | The country in which the M2501 Adapter is operating.The country code will automatically select the Channels available for that country. |
| **Encryption** | Describes the encryption type currently in use. The encryption types are WEP, WPA-PSK, or disabled. For more information about each type of encryption, see Table 8— "Wireless Interface configuration" on page 26. |

# Viewing Statistics

The Statistics Screens provide statistics for a Local Area Network (LAN) interface, the wireless interface and wireless stations.

## Viewing LAN Interface Statistics

The LAN Interface statistics screens show information about packets traversing the LAN connected to the M2501 Adapter.
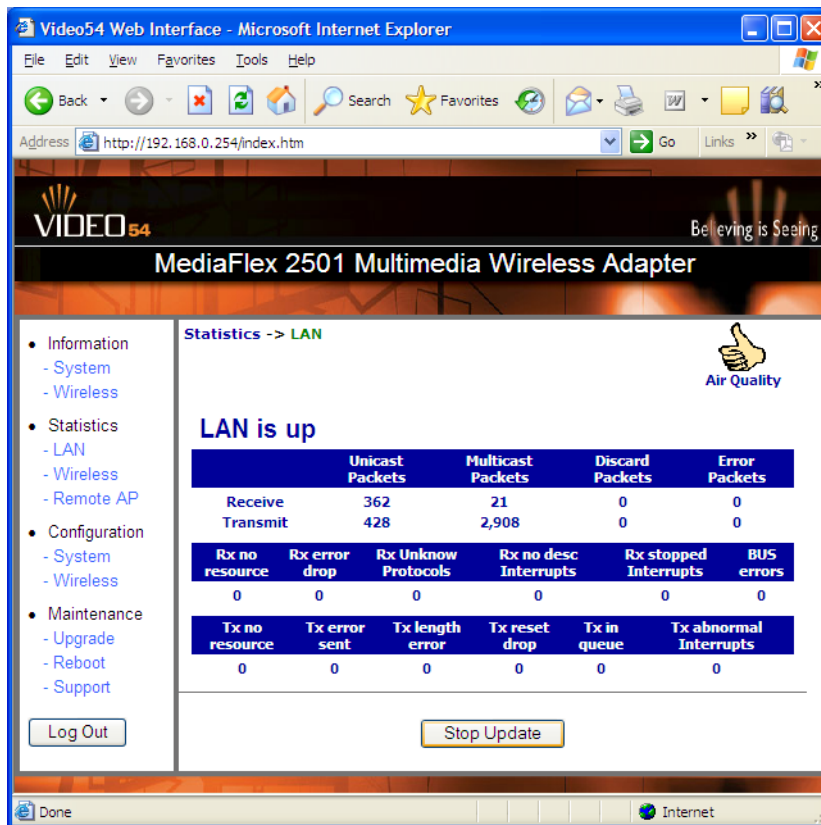


**Figure 12**—*LAN statistics*

**Table 14—LAN Statistics**

| Field | Description |
|---|---|
| **Unicast Packets** | The total number of unicast packets received or transmitted by the interface. |
| **Multicast Packets** | The total number of multicast packets received or transmitted by the interface. |
| **Discard Packets** | The total number of received packets that were discarded by the interface. |
| **Error Packets** | The total number of error packets received or transmitted by the interface. |

**Table 14—LAN Statistics  (Continued)**

| Field | Description |
|---|---|
| **Rx No Resource** | The number of received packets that are discarded by the interface due to no system resources. |
| **Rx Error Drop** | The number of received packets that are discarded by the interface due to a hardware error. |
| **Rx Unknown Protocols** | The number of received packets that are discarded by the interface due to an unknown protocol. |
| **RX No Desc Interrupts** | The number of received packets that are discarded by the interface due to no descriptor interrupt. |
| **RX Stopped Interrupts** | The number of received packets that are discarded by the interface due to stopped interrupts. |
| **BUS Error** | The number of received packets that are discarded by the interface due to a BUS error. |

### Viewing Wireless Statistics

The Wireless statistics menu shows the link, traffic, and security settings for the M2501 Adapter.

At the top of this menu, M2501 Adapter's MAC address will display as either **joined** or **disconnected** to the remote AP.

Click the **Auto Update** button to receive periodic updates to these statistics. The button will then display as **Stop Update**. Click the **Stop Update** button if you do not wish to receive periodic updates.
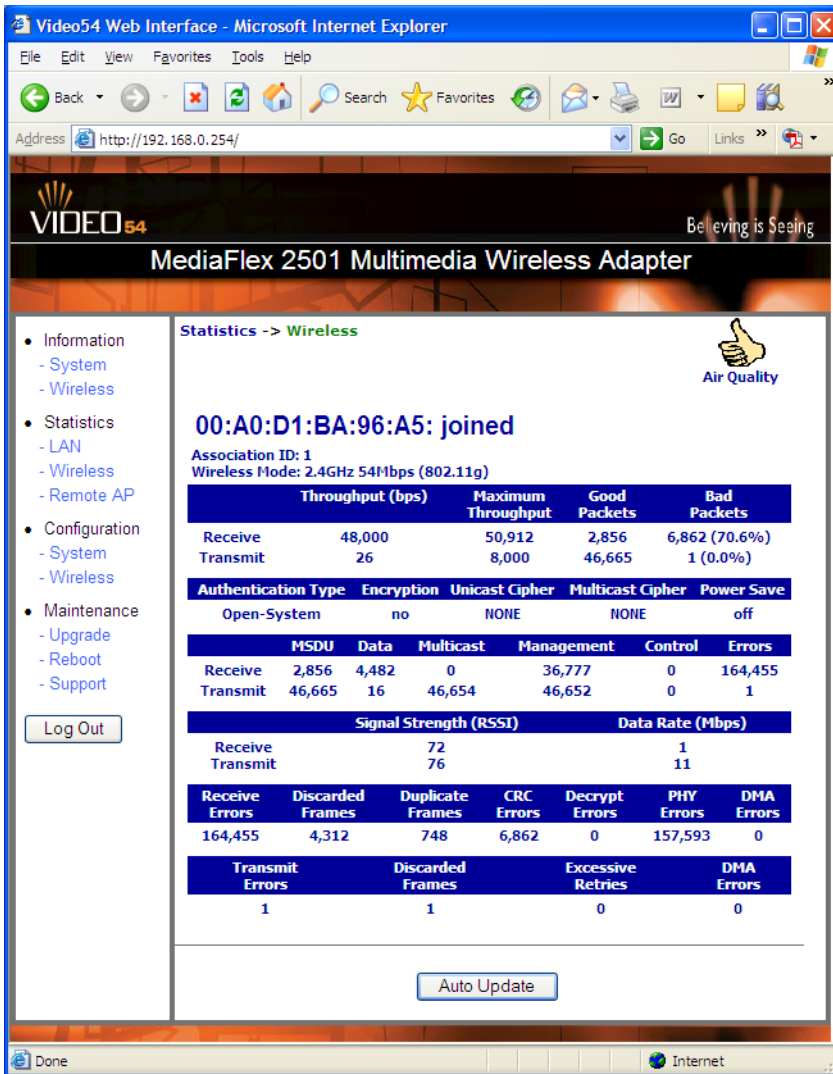
**Figure 13**—*Wireless Statistics*

**Table 15—Wireless Statistics**

| Field | Description |
| --- | --- |
| **Throughput (bps)** | The average receive or transmit throughput in bits-per-second. |
| **Maximum Throughput** | The high water mark receive or transmit throughput in bits-per-second. |
| **Good Packets** | The total number of good packets received or transmitted by the interface. |
| **Bad Packets** | The total number of good packets received or transmitted by the interface. |
| **Authentication Type** | The authentication type configured on the M2501 Adapter. |

**Table 15—Wireless Statistics  (Continued)**

| Field | Description |
|---|---|
| Encryption | The state of encryption configured on the M2501 Adapter. |
| Unicast Cipher | The type of unicast cipher used. |
| Multicast Cipher | The type of multicast cipher used. |
| Power Save | The state of power save mode: **on** or **off**. |
| MSDU | The number of MSDU (Mag Service Data Unit) received or transmitted by the interface. |
| Data | The number of data packets received or transmitted by the interface. |
| Multicast | The number of multicast packets received or transmitted by the interface. |
| Management | The number of management packets received or transmitted by the interface. |
| Control | The number of control packets received or transmitted by the interface. |
| Errors | The total number of error packets received or transmitted by the interface. |
| Signal Strength (RSSI) | The RSSI value received or transmitted by the interface. |
| Data Rate (Mbps) | The data rate in Mbps received or transmitted by the interface. |
| Receive Errors | The total number of error packets received by the interface. |
| Discarded Frames | The number of received or transmitted packets that were discarded by the interface. |
| Duplicate Frames | The number of duplicate packets received or transmitted by the interface. |
| CRC Errors | The number of packets with CRC error received or transmitted by the interface. |
| Decrypt Errors | The number of packets with decryption error received or transmitted by the interface. |
| PHY Errors | The number of packets with PHY error received or transmitted by the interface. |
| DMA Errors | The number of packets with DMA error received or transmitted by the interface. |
| Transmit Errors | The total number of error packets transmitted by the interface. |
| Discarded Frames | The total number of frames discarded by the interface |
| Excessive Retries | The total number of retries that exceed the predefined threshold. |
| DMA Errors | The number of packets with DMA error received or transmitted by the interface. |

## Viewing Remote AP Statistics

The Remote AP statistics menu shows statistics specific to a remote AP to which the M2501 Adapter is associated.
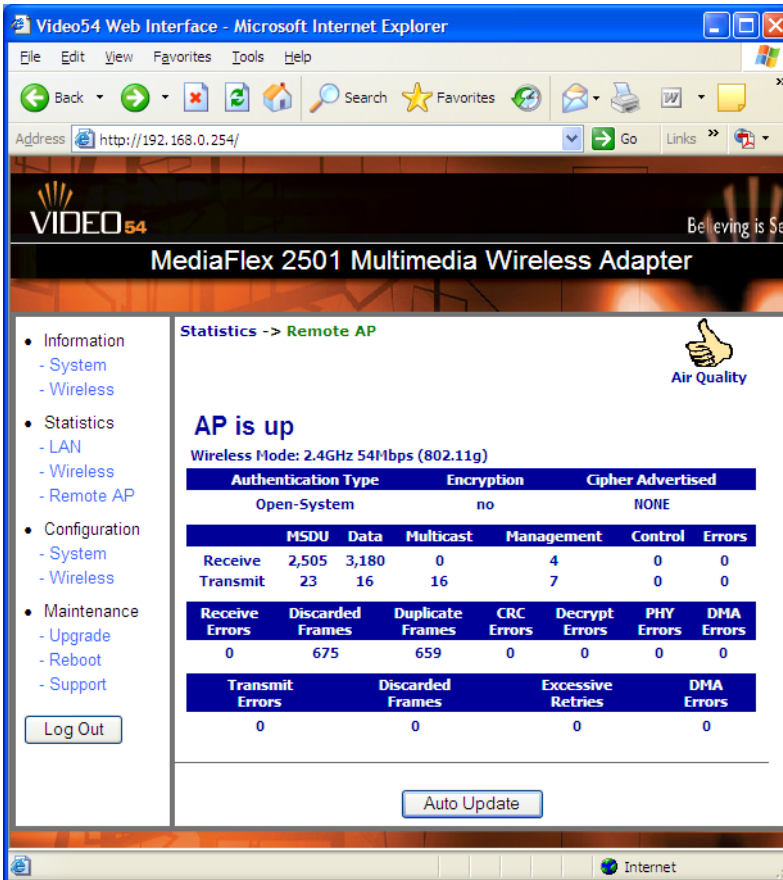


***Figure 14**—Remote AP Statistics*

**Table 16—Remote AP Statistics**

| Field | Description |
|---|---|
| **Authentication Type** | The authentication type used by the remote AP. |
| **Encryption** | The state of encryption used by the remote AP. |
| **Cipher Advertised** | The cipher advertised by the remote AP. |
| **MSDU** | The number of MSDUs (Mag Service Data Units) received or transmitted by the remote AP. |
| **Data** | The number of data packets received or transmitted by the remote AP. |
| **Multicast** | The number of multicast packets received or transmitted by the remote AP. |

**Table 16—Remote AP Statistics**

| Field | Description |
|---|---|
| Management | The number of management packets received or transmitted by the remote AP. |
| Control | The number of control packets received or transmitted by the remote AP. |
| Errors | The total number of error packets received or transmitted by the remote AP. |
| Receive Errors | The total number of error packets received or transmitted by the remote AP. |
| Discarded Frames | The number of received or transmitted packets that were discarded by the remote AP. |
| Duplicate Frames | The number of duplicate packets received or transmitted by the remote AP. |
| CRC Errors | The number of packets with CRC error received or transmitted by the remote AP. |
| Decrypt Errors | The number of packets with decryption error received or transmitted by the remote AP. |
| PHY Errors | The number of packets with phy error received or transmitted by the remote AP. |
| DMA Errors | The number of packets with DMA errors received or transmitted by the remote AP. |
| Transmit Errors | The number of packets with transmit errors received or transmitted by the remote AP. |
| Discarded Frames | The number of discarded frames received or transmitted by the remote AP. |
| Excessive Retries | The number of excessive retries received or transmitted by the remote AP. |
| DMA Errors | The number of packets with DMA errors received or transmitted by the remote AP. |

## Updating the Firmware

This menu provides a utility for updating the M2501 Adapter's firmware. A firmware update may be necessary or desirable to add new features, important fixes or enhancements to the M2501 Adapter.

Contact your service provider for more information about Web sites or TFTP/FTP sites used to store firmware images for the M2501 Adapter.

*CAUTION:—If you have recently made configuration changes to the M2501 Adapter, make sure to reboot the system (see "Rebooting the System" on page 47) first so that your changes are preserved. Then update the firmware.*

### Performing a Web Download

To download a firmware image from a Web site and use it to update the firmware on the M2501 Adapter:

1. Point your browser to the Web site where the M2501 Adapter's firmware is stored, and download the firmware image to a folder on your hard drive. Note the location of the downloaded image.

2. In the Video54 Web Interface, click the **Maintenance->Upgrade** menu.

3. Click the **Browse...** button to locate and select the firmware image.

4. Click the **Update Firmware** button to perform the update.

5. If the firmware has updated successfully, a green check mark will appear. Click the **Reboot** button.

6. If the firmware did not update, a **Failed: file type** error message will appear.

   A file type error indicates that the firmware image may be corrupt or invalid. Try downloading the firmware image again, and repeat the above steps.

### TFTP or FTP Download

To specify a specific trivial file transfer protocol (TFTP) or File Transfer Protocol (FTP) server from which to download a firmware image:

1. Choose the download method by selecting either the **TFTP** or **FTP** button.

2. Enter the IP address or Hostname of the server.

3. For FTP only: Enter the **User Name** and **Password** for the server.

4. Enter the name of the firmware image.

5. Click the **Update Firmware** button at the bottom of the screen to perform the upgrade.

6. If the firmware has updated successfully, a green check mark will appear. Click the **Reboot** button.

7. If the firmware did not update, a **Failed: file type** error message will appear.

   A file type error indicates that the firmware image may be corrupt or invalid. Check the TFTP/FTP server address and the firmware image name. Then try downloading the firmware image again, and repeat the above steps.
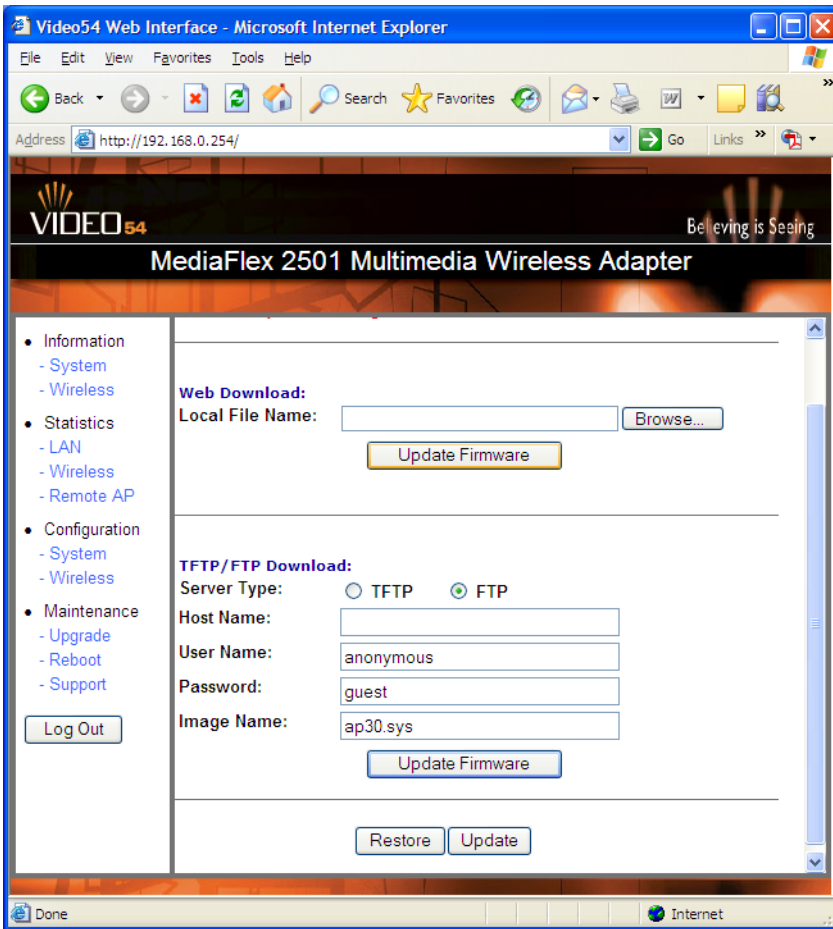
***Figure 15***—*Updating the Firmware*

**Table 17—Updating the Firmware**

| Field | Description |
|---|---|
| **Web Download** | If you have downloaded a Firmware image from a Web site and stored it locally on your PC, you can click the **Browse...** button to select the image. The path to the image will appear in the **Local File Name:** field. |
| | Click the **Update Firmware** button located below **Local File Name** field. |
| **TFTP/FTP Download** | Allows you to use a TFTP or FTP server to download a firmware image. |
| | • **Host Name:** enter the IP address of the server. <br> • **User Name:** enter the User Name that is used to access to the specified server. This is required only for an FTP server <br> • **Password:** enter the Password that is used to access to the specified server. This is required only for an FTP server. <br> • **Image Name:** enter the filename of the firmware image on the TFTP or FTP server. |
| | Click the **Update Firmware** button located below **Image Name** field. |

## Rebooting the System

You must reboot the system if you want your configuration changes to take effect.Two types of reboot are provided:

1.  **Reboot** button: re-starts the system. All the configurations that have been saved are preserved through the reboot. Rebooting is necessary in order to make your configuration changes permanent.

    *   If the system times out and you have to re-login before setting the reboot, you configuration changes will be saved, **as long as you have already clicked the Update button to save the current configuration.**

    *   If you have powered down or logged out of the M2501 Adapter before clicking the **Update** button and the **Reboot** button, your configuration changes will be lost.

2.  **Reboot to Factory Default** button: restarts the system with the factory default configurations. All previous configurations will be lost.



***Figure 16**—Reboot Menu*

***Figure 17—****Reboot in Process*

During a reboot, the antenna LEDs on the top of the M2501 Adapter will momentarily go out, then light up again.

**How to tell when the Wireless Adapter is ready?**

After about 18 seconds, the antenna LEDs will light up in solid green, followed by intermittent flashing. This indicates the M2501 Adapter is ready. The **Click here when Wireless Adapter is ready** link will open the main login page.

NOTE – If you have modified the device IP address, and then rebooted the device to factory default configuration, the above link will not work. Instead, click the **Logout** button, and then point your browser to the default IP address for the device.

# Taking a System Support Snapshot

The Support menu enables you to take a system snapshot for further analysis and troubleshooting. The system snapshot can be sent and saved to a TFTP or FTP server for analysis by a technical support engineer.

If you have not yet configured the TFTP or FTP server, click the **Maintenance->Update** link. In the **Firmware Update** menu, enter the TFTP or FTP server information. The same server is used for both upgrading the firmware and uploading the system snapshot.

Your service provider or technical support contact should provide you with information for configuring the TFTP or FTP server.

- Click on the **Refresh** button to get the current system snapshot.
- Click on the **Send To** button to send the `support.txt` file to the TFTP or FTP server. You can set the address for the TFTP or FTP server in the **Firmware Update** menu.
- Click the **Upload** link at the bottom of the page to upload to the specified server.



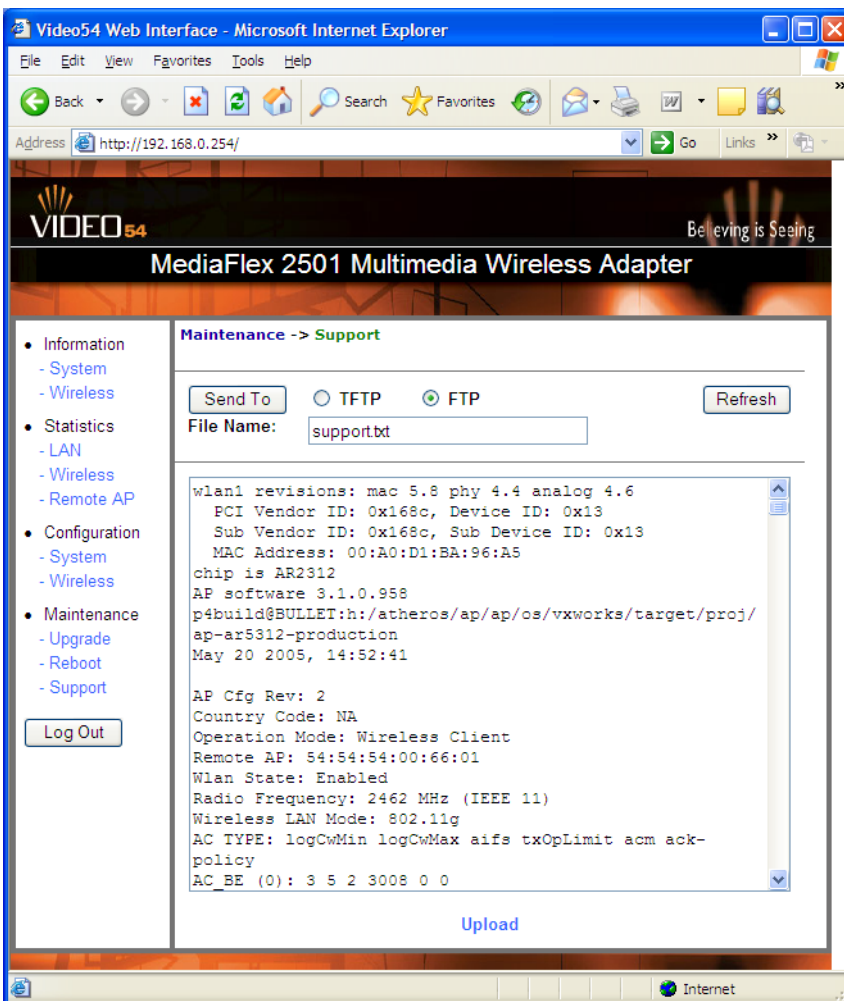***Figure 18**—Support Menu*

**Table 18—Support Menu**

| Field | Description |
|---|---|
| **Server Type** | Select the server type: TFTP or FTP. |
| **File Name** | Specify the file name for the system snapshot that is to be saved on a TFTP or FTP server. |

# Appendix A: Technical Specifications

## Physical Characteristics

| | |
|---|---|
| Power requirements | **M2501 Adapter:**<br>5V-18V 10Wb<br><br>**External power adapter:**<br>Input: 110-240V AC<br>Output: 5V DC, 2A |
| Physical size | 5.72 x 4.92 x 2.9 in (145 x 125 x 74 mm.) |
| Weight | 0.53 lbs (0.24 kg) |
| Antenna | Internal software-configurable antenna array with six directional, high-gain elements and 63 unique antenna patterns |
| Ethernet ports | 1 auto MDX, auto sensing 10/100 Mbps, RJ45 port |
| LED display | Antenna<br>Power<br>LAN<br>Wireless<br>Air Quality |
| Environmental conditions | Operating Temperature: $32^oF – 104^oF$ ($0^oC – 40^oC$)<br><br>Operating Humidity: 15% - 95% non condensing |
| Electromagnetic Emissions | Meets requirements of FCC Part 15 Class B |

## Performance and Supported Configurations

| | |
|---|---|
| Target UDP throughput | 15-20 Mbps sustainable throughout a typical 2500 ft$^2$ (300 m$^2$) home |
| Video streams | One MPEG-4/WMV stream, one DVD-quality MPEG-2 stream, or one 10Mbps+ high definition stream at 50ft (18m) with simultaneous background traffic |

Video clients                                  Video streaming to 802.11b clients not supported

## Traffic Management and QoS

Classes of service                             Voice, Video, Best Effort and Background

Number of hardware queues                      4

Number of software queues                      4

## Management

Configuration and monitoring interface         Video54 Web User Interface (WebUI)

Login                                          Username: **admin**

                                               Password: *<blank>*


Auto configuration                             Not available in this release

Statistics                                     LAN, wireless and associated remote APs

                                               Accessible via Video54 Web Interface

Software update                                Via FTP, TFTP, or Web download

                                               Accessible via Video54 Web Interface

Other Utilities                                System Support Snapshot

Others

Standards/Specifications                       802.11 b/g
                                               802.11u
                                               802.11e,
                                               Wi-Fi Alliance WMM
                                               802.1x

Channels                                       US/Canada: 1-11
                                               Europe (ETSI X30): 1-13
                                               Japan X41: 1-13

RF Power output                                17 dBm for 802.11b
                                               20 dBm for 802.11g

Certifications                                 FCC, IC-03, CE

Wireless Security                              802.1x WEP/WPA