

# WAP-5940

## Wireless Video Bridge

### User Manual



## Preface

This manual provides information related to the installation and operation of this device. The individual reading this manual is presumed to have a basic understanding of telecommunications terminology and concepts.

If you find the product to be inoperable or malfunctioning, please contact technical support for immediate service by email at [INT-support@comtrend.com](mailto:INT-support@comtrend.com)

For product update, new product release, manual revision, or software upgrades, please visit our website at <http://www.comtrend.com>

## Important Safety Instructions

With reference to unpacking, installation, use, and maintenance of your electronic device, the following basic guidelines are recommended:

- Do not use or install this product near water, to avoid fire or shock hazard. For example, near a bathtub, kitchen sink or laundry tub, or near a swimming pool. Also, do not expose the equipment to rain or damp areas (e.g. a wet basement).
- Do not connect the power supply cord on elevated surfaces. Allow it to lie freely. There should be no obstructions in its path and no heavy items should be placed on the cord. In addition, do not walk on, step on, or mistreat the cord.
- Use only the power cord and adapter that are shipped with this device.
- To safeguard the equipment against overheating, make sure that all openings in the unit that offer exposure to air are not blocked.
- Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightening. Also, do not use the telephone to report a gas leak in the vicinity of the leak.
- Never install telephone wiring during stormy weather conditions.

### CAUTION:

- To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cord.
- Always disconnect all telephone lines from the wall outlet before servicing or disassembling this equipment.



### WARNING

- Disconnect the power line from the device before servicing.
- Power supply specifications are clearly stated in [Appendix A - Specifications](#).

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## Protect Our Environment



This symbol indicates that when the equipment has reached the end of its useful life, it must be taken to a recycling centre and processed separate from domestic waste.

The cardboard box, the plastic contained in the packaging, and the parts that make up this router can be recycled in accordance with regionally established regulations. Never dispose of this electronic equipment along with your household waste; you may be subject to penalties or sanctions under the law. Instead, please be responsible and ask for disposal instructions from your local government.

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## Chapter 1 Introduction

The WAP-5940 is an 802.11ac 4T4R wireless video bridge, with two Giga Ethernet ports. WAP-5940 performs AP to transmission package TCP/UDP to client, also supporting station mode, receiving packets and forwarding to the Ethernet port.

WAP-5940 has a high power wireless design which supports 802.11ac 5Ghz band 4T4R and is backward compatible 802.11n, 802.11a.

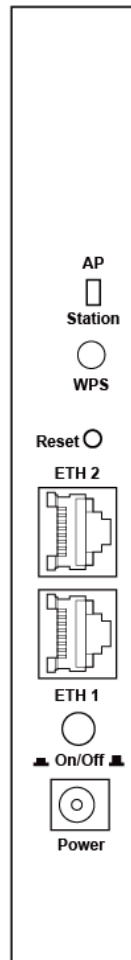
## Chapter 2 Installation

### 2.1 Hardware Setup

Follow the instructions below to complete the hardware setup.

#### BACK PANEL

The figure below shows the back panel of the device.



### **Power ON**

Press the power button to the OFF position (OUT). Connect the power adapter to the power port. Attach the power adapter to a wall outlet or other AC source. Press the power button to the ON position (IN). If the Power LED displays as expected then the device is ready for setup (see section [2.2 LED Indicators](#)).

**Caution 1:** If the device fails to power up, or it malfunctions, first verify that the power cords are connected securely and then power it on again. If the problem persists, contact technical support.

**Caution 2:** Before servicing or disassembling this equipment, disconnect all power cords and telephone lines from their outlets.

### **Ethernet (LAN) Ports**

Use 1000-BASE-T RJ-45 cables to connect two network devices to a Gigabit LAN, or 10/100BASE-T RJ-45 cables for standard network usage. These ports are auto-sensing MDI/X; so either straight-through or crossover cable can be used.

### **Reset Button**

To reboot the device press the Reset button for 1-5 seconds. Restore the default parameters of the device by pressing the Reset button for more than 5 seconds. After the device has rebooted successfully, the front panel should display as expected (see section [2.2 LED Indicators](#) for details).

### **WPS Button**

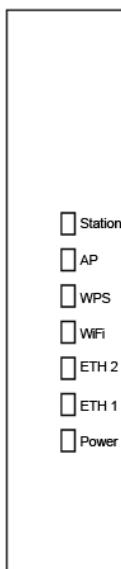
Press and release the WPS button to start the WPS connection process with the other device. The connection duration is 2 minutes during which the WPS LED will blink. If there is no client connection the WPS led will turn off. If connection is successful the WPS LED will stay on.

### **AP/Station Switch**

Select the desired option.

## 2.2 LED Indicators

The front panel LED indicators are shown below and explained in the following table. This information can be used to check the status of the device and its connections.



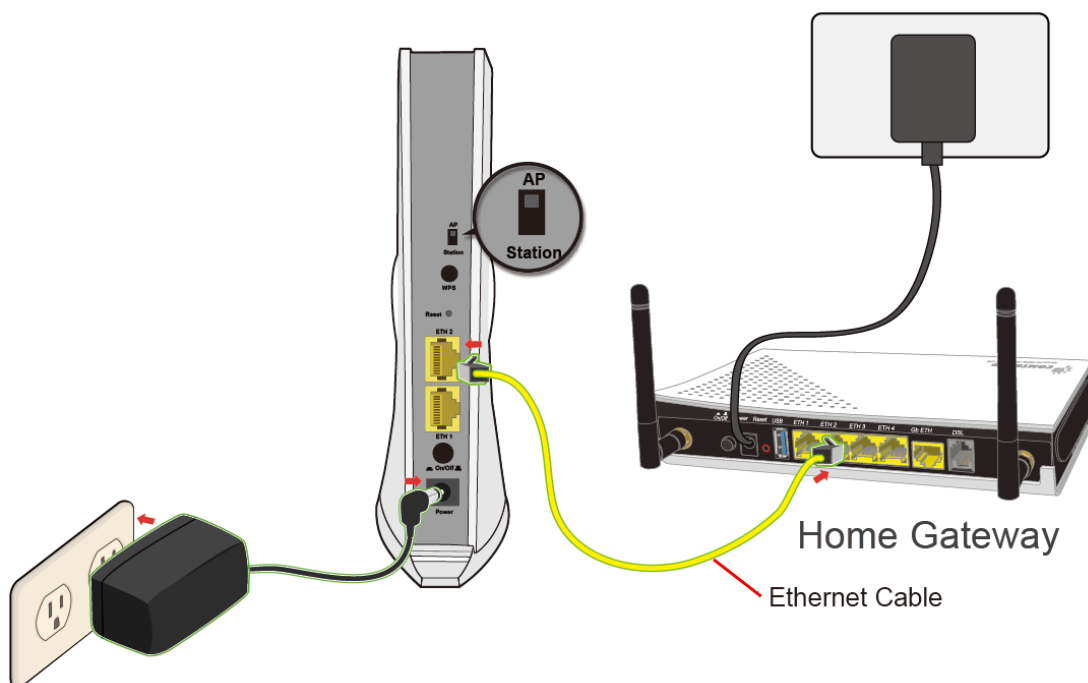
LED	Color	Mode	Description
POWER	GREEN	On	Power on
		Off	Power off
ETH1	GREEN	On	Ethernet connected
		Off	Ethernet not connected
		Blink	Ethernet is transmitting/receiving
ETH2	GREEN	On	Ethernet connected
		Off	Ethernet not connected
		Blink	Ethernet is transmitting/receiving
WiFi	GREEN	On	Wi-Fi enabled
		Off	Wi-Fi disabled
		Blink	When no client connected
WPS	GREEN	On	WPS connection successful
		Off	No WPS (5G) association process ongoing
		Blink	WPS (5G) connection in progress
AP	GREEN	On	WAP-5940 working in AP mode
		Off	WAP-5940 working in Station mode
Station	GREEN	On	WAP-5940 working in Station mode
		Off	WAP-5940 working in AP mode



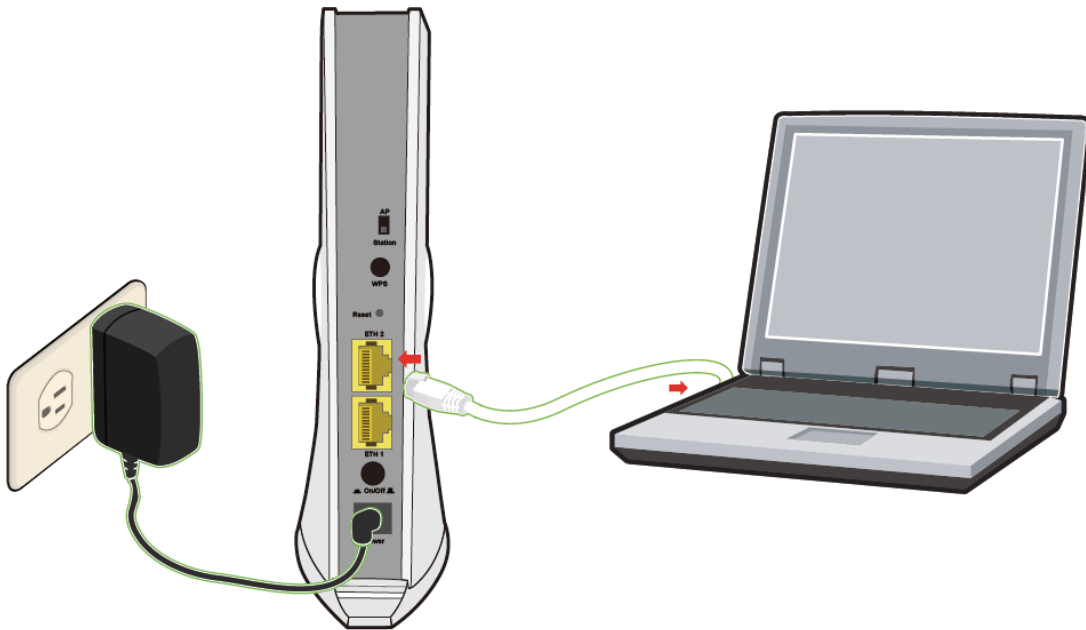
## 2.3 Initial Device Setup

### Device Setup

1. Setup the first Wireless Video Bridge by plugging in the power adapter and press the **Power Button** to the ON position (IN). Set the Wireless Video Bridge to AP Mode by sliding the **AP/Station Switch** to the up position.
2. Connect the Wireless Video Bridge to a Network Device (Gateway, Router, etc.) with an Ethernet (RJ-45) cable. You can use either Ethernet ports of the Wireless Video Bridge to make this connection.
3. After you select AP mode thus the Ethernet port (ETH1) will be WAN port, another Ethernet port (ETH2) is LAN side.



4. After you select station mode thus two Ethernet ports (ETH1, ETH2) are LAN side.



## Chapter 3 Web User Interface

This section describes how to access the device via the web user interface (WUI) using an Internet browser such as Internet Explorer (version 6.0 and later).

### 3.1 Default Settings

The factory default settings of this device are summarized below.

- LAN IP address AP: 10.0.0.2
- LAN IP address STA: 10.0.0.10
- LAN subnet mask: 255.255.255.0
- Administrative access (username: **root**, password: **12345**)

**Caution:** The LAN setting default is DHCP mode, if a device connects to the DHCP network, the LAN IP will be changed by the DHCP server assigned.

#### Technical Note

During power on, the device initializes all settings to default values. It will then read the configuration profile from the permanent storage section of flash memory. The default attributes are overwritten when identical attributes with different values are configured. The configuration profile in permanent storage can be created via the web user interface or telnet user interface, or other management protocols. The factory default configuration can be restored either by pushing the reset button for more than ten seconds until the power indicates LED blinking or by clicking the Restore Default Configuration option in the Restore Settings screen.

## 3.2 IP Configuration

### STATIC IP MODE

In static IP mode, you assign IP settings to your PC manually.

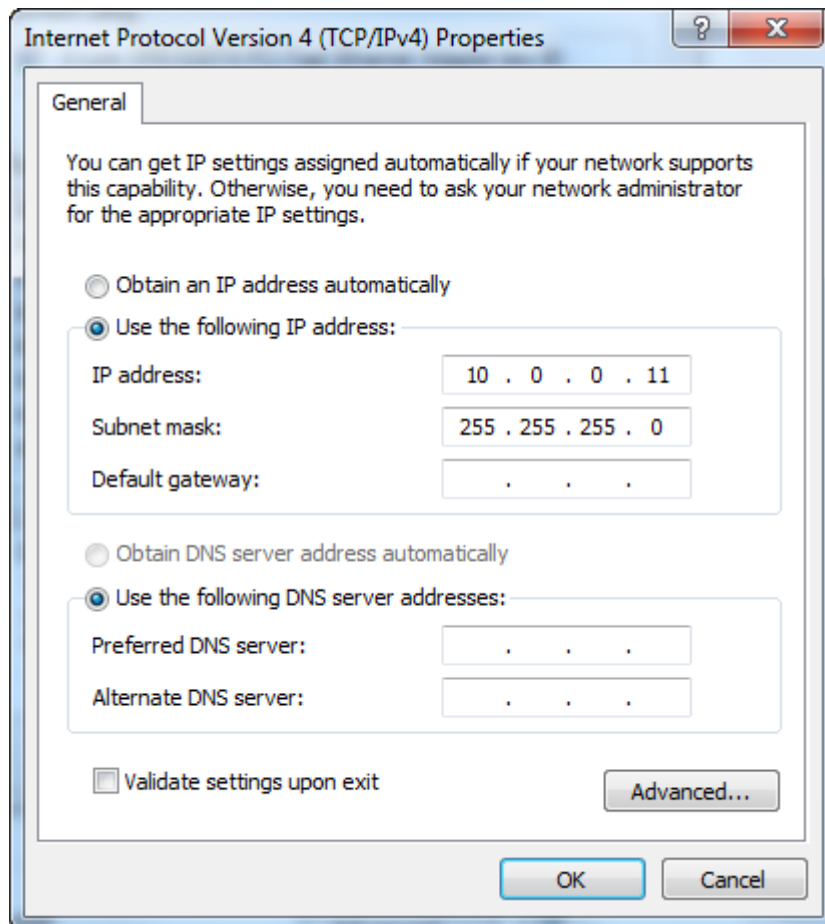
Follow these steps to configure your PC IP address to use subnet 10.0.0.x.

**NOTE:** The following procedure assumes you are running Windows. However, the general steps involved are similar for most operating systems (OS). Check your OS support documentation for further details.

**STEP 1:** From the Network Connections window, open Local Area Connection (*You may also access this screen by double-clicking the Local Area Connection icon on your taskbar*). Click the **Properties** button.

**STEP 2:** Select Internet Protocol (TCP/IP) **and click the** Properties button.

**STEP 3:** Change the IP address to the 10.0.0.x (10<x<254) subnet with subnet mask of 255.255.255.0. The screen should now display as shown below.



**STEP 4:** Click **OK** to submit these settings.

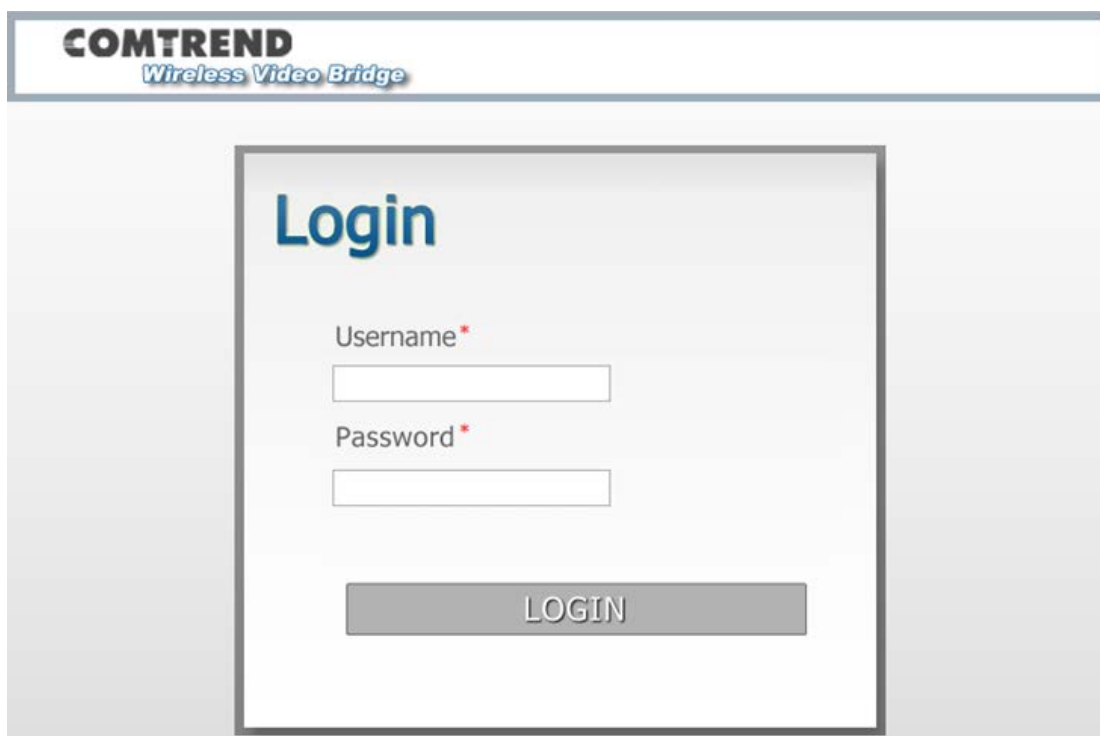
## 3.3 Login Procedure

Perform the following steps to login to the web user interface.

**NOTE:** The default settings can be found in section [3.1 Default Settings](#).

**STEP 1:** Start the Internet browser and enter the default IP address for the device in the Web address field. For example, if it is the AP device default IP is 10.0.0.2, type <http://10.0.0.2>

**STEP 2:** A dialog box will appear, such as the one below. Enter the default username and password, as defined in section [3.1 Default Settings](#).



The screenshot shows a login dialog box for the COMTREND Wireless Video Bridge. The dialog box has a title bar with the COMTREND logo and the text "Wireless Video Bridge". The main content area is titled "Login" and contains two input fields: "Username\*" and "Password\*". Below the input fields is a "LOGIN" button.

Click **LOGIN** to continue.

**STEP 3:** After successfully logging in for the first time (AP device in this example), you will reach the Status - Device screen **AP** (Access Point) shown here.

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*Wireless Video Bridge*


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<b>Status</b>	<h2>STATUS - DEVICE</h2> <table><tr><td>Device Name:</td><td>WAP-5940</td></tr><tr><td>Software Version:</td><td>EM51-3671361CTU-C01_R03</td></tr><tr><td>Uptime:</td><td>1min</td></tr><tr><td>Device Mode:</td><td><input checked="" type="checkbox"/> Access Point (AP) <input type="checkbox"/> Station (STA)</td></tr></table>	Device Name:	WAP-5940	Software Version:	EM51-3671361CTU-C01_R03	Uptime:	1min	Device Mode:	<input checked="" type="checkbox"/> Access Point (AP) <input type="checkbox"/> Station (STA)
Device Name:		WAP-5940							
Software Version:	EM51-3671361CTU-C01_R03								
Uptime:	1min								
Device Mode:	<input checked="" type="checkbox"/> Access Point (AP) <input type="checkbox"/> Station (STA)								
Device Wireless Networking WDS MBSS									
<b>Config</b>									
Wireless WPS MAC Filter Networking WDS MBSS ACS									
<b>Tools</b>									
Log Admin Restore									
<b>System</b>									
Upgrade Reboot									

## Chapter 4 Status

### 4.1 Status - Device

This screen shows the status of the device.



**Status**

[Device](#)  
[Wireless](#)  
[Networking](#)  
[WDS](#)  
[MBSS](#)

**Config**

[Wireless](#)  
[WPS](#)  
[MAC Filter](#)  
[Networking](#)  
[WDS](#)  
[MBSS](#)  
[ACS](#)

**Tools**

[Log](#)  
[Admin](#)  
[Restore](#)

**System**

[Upgrade](#)  
[Reboot](#)

### STATUS - DEVICE

Device Name: WAP-5940

Software Version: EM51-3671361CTU-C01\_R03

Uptime: 1min

Device Mode:  Access Point (AP)  Station (STA)

Menu Item	Description	Options	Detail
<b>Device Name</b>	Name of the Comtrend device		
<b>Software Version</b>	Gets the software version of the current system		The version number of the current firmware


<b>Uptime</b>	Displays the uptime of the device		There are two types of display, one kind is minutes and days, another kind is XX:XX(hours:minutes)
<b>Device Mode</b>	AP or STA mode	Access Point(AP) Station(STA)	Device Acts as Access Point or Station. The [X] indicates the current device mode.



## 4.2 Status – Wireless

This screen shows the wireless status of the device in AP mode.

### 4.2.1 AP Mode



**Status**

[Device](#)  
[Wireless](#)  
[Networking](#)  
[WDS](#)  
[MBSS](#)

**Config**

[Wireless](#)  
[WPS](#)  
[MAC Filter](#)  
[Networking](#)  
[WDS](#)  
[MBSS](#)  
[ACS](#)

**Tools**

[Log](#)  
[Admin](#)  
[Restore](#)

**System**

[Upgrade](#)  
[Reboot](#)

### STATUS - WIRELESS

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Wifi Interface: wifi0(00:26:86:F0:3)

---

Device Mode: Access Point (AP)

Wireless Band: 802.11ac

Bandwidth: 80 MHz

AP Mac Address (BSSID): 00:26:86:F0:30:81

Channel: 36

Associated Devices Count: 0 Association Table

Packets Received Successfully: 0

Bytes Received: 0

Packets Transmitted Successfully: 4

Bytes Transmitted: 676

---

Refresh

Menu Item	Description	Options	Detail
<b>WiFi Interface</b>	Real wireless device name and MAC Address in CPE		
<b>Device Mode</b>	AP or STA mode	Access Point(AP) Station (STA)	Device Acts as Access Point or Station

<b>Wireless Band</b>	Current system Band	802.11a or 802.11an or 802.11ac	802.11an supports 802.11n and is backward compatible with 802.11a
<b>Bandwidth</b>	Per the 802.11a or 802.11an or 802.11ac standard	20 MHz	20 MHz operation
	Per 802.11an or 802.11ac standard	40 MHz	40 MHz operation
	Per the 802.11ac standard	80MHz	80 MHz operation
<b>AP Mac Address (BSSID)</b>	The current associated BSSID of the Wi-Fi system		In AP mode, it will be the same as the Wireless MAC address
<b>Channel</b>	Available 5Ghz channels based on region setting	36-48, 149-165	5.150-5.250, 5.725-5.850 GHz are the supported frequency ranges
<b>Associated Devices Count</b>	The connected devices number		The number of devices connecting to the AP. Clicking the "Association Table" will link to the Association Table page and display information of all the connected devices.
<b>Packets Received Successfully</b>	Wireless packets which are received successfully		
<b>Bytes Received</b>	The total bytes received successfully		

<b>Packets Transmitted Successfully</b>	Wireless packets transmitted		
<b>Bytes Transmitted</b>	Total bytes transmitted successfully		

This screen shows the information of all station devices which are connecting with the wifi0 of the AP.

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*Wireless Video Bridge*

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### ASSOCIATION TABLE

	Station	VAP	RSSI	Rx Bytes	Tx Bytes	Bw	Time Associated
1	00:26:86:F0:30:83	wifi0	-13 dbm	0	1029512	80	10
2	00:26:86:01:14:43	wifi0	-13 dbm	774	1105666	80	297

## 4.2.2 STA Mode

This screen shows the wireless status of the device that acts as a STA.

This STA mode is mainly with other client bridge, Not directly used as a client.

**COMTREND**  
*Wireless Video Bridge*

Status	STATUS - WIRELESS	
<div style="background-color: #0056b3; color: white; padding: 2px;">Device</div> <div style="background-color: #0056b3; color: white; padding: 2px;">Wireless</div> <div style="background-color: #0056b3; color: white; padding: 2px;">Networking</div>	<div style="background-color: #0056b3; color: white; padding: 2px;">Device Mode:</div> <div style="background-color: #0056b3; color: white; padding: 2px;">Wireless Band:</div> <div style="background-color: #0056b3; color: white; padding: 2px;">Bandwidth:</div> <div style="background-color: #0056b3; color: white; padding: 2px;">AP Mac Address (BSSID):</div> <div style="background-color: #0056b3; color: white; padding: 2px;">Channel:</div> <div style="background-color: #0056b3; color: white; padding: 2px;">Association Status:</div> <div style="background-color: #0056b3; color: white; padding: 2px;">RSSI:</div> <div style="background-color: #0056b3; color: white; padding: 2px;">Packets Received Successfully:</div> <div style="background-color: #0056b3; color: white; padding: 2px;">Bytes Received:</div> <div style="background-color: #0056b3; color: white; padding: 2px;">Packets Transmitted Successfully:</div> <div style="background-color: #0056b3; color: white; padding: 2px;">Bytes Transmitted:</div>	<div style="background-color: #0056b3; color: white; padding: 2px;">Station (STA)</div> <div style="background-color: #0056b3; color: white; padding: 2px;">802.</div> <div style="background-color: #0056b3; color: white; padding: 2px;">80 MHz</div> <div style="background-color: #0056b3; color: white; padding: 2px;">Not Associated</div> <div style="background-color: #0056b3; color: white; padding: 2px;">165</div> <div style="background-color: #0056b3; color: white; padding: 2px;">Not Associated</div> <div style="background-color: #0056b3; color: white; padding: 2px;">Not Associated</div> <div style="background-color: #0056b3; color: white; padding: 2px;">0</div> <div style="background-color: #0056b3; color: white; padding: 2px;">0</div> <div style="background-color: #0056b3; color: white; padding: 2px;">0</div> <div style="background-color: #0056b3; color: white; padding: 2px;">0</div>
<div style="background-color: #0056b3; color: white; padding: 2px;">Config</div> <div style="background-color: #0056b3; color: white; padding: 2px;">Wireless</div> <div style="background-color: #0056b3; color: white; padding: 2px;">WPS</div> <div style="background-color: #0056b3; color: white; padding: 2px;">Networking</div> <div style="background-color: #0056b3; color: white; padding: 2px;">ACS</div>	<div style="background-color: #0056b3; color: white; padding: 2px; border: 1px solid #ccc;">Association Table</div>	
<div style="background-color: #0056b3; color: white; padding: 2px;">Tools</div> <div style="background-color: #0056b3; color: white; padding: 2px;">Log</div> <div style="background-color: #0056b3; color: white; padding: 2px;">Admin</div> <div style="background-color: #0056b3; color: white; padding: 2px;">Restore</div>	<div style="background-color: #0056b3; color: white; padding: 2px; border: 1px solid #ccc;">Refresh</div>	
<div style="background-color: #0056b3; color: white; padding: 2px;">System</div> <div style="background-color: #0056b3; color: white; padding: 2px;">Upgrade</div> <div style="background-color: #0056b3; color: white; padding: 2px;">Reboot</div>		


Menu Item	Description	Options	Detail
<b>Device Mode</b>	AP or STA mode	Access Point(AP) Station (STA)	Device Acts as Access Point or Station
<b>Wireless Band</b>	Current system Band	802.11a or 802.11an or 802.11ac	802.11an supports 802.11n and is backward compatible with 802.11a
<b>Bandwidth</b>	Per the 802.11a or 802.11an or	20 MHz	20 MHz operation

	802.11ac standard		
	Per 802.11an or 802.11ac standard	40 MHz	40 MHz operation
	Per the 802.11ac standard	80MHz	80 MHz operation
<b>AP Mac Address (BSSID)</b>	The current associated BSSID of the Wi-Fi system		In AP mode, it will be the same as the Wireless MAC address
<b>Channel</b>	Available 5Ghz channels based on region setting	36-48, 149-165	5.150-5.250, 5.725-5.850 GHz are the supported frequency ranges
<b>Association Status</b>	The connected devices number		The number of devices connecting to the AP. Clicking the "Association Table" will link to the Association Table page and display information of all the connected devices.
<b>RSSI</b>	Received Signal Strength Indication		A measurement of the power present in a received radio signal. The value is the current RSSI in dBm for the association.
<b>Packets Received Successfully</b>	Wireless packets which are received successfully		

<b>Bytes Received</b>	The total bytes received successfully		
<b>Packets Transmitted Successfully</b>	Wireless packets transmitted		
<b>Bytes Transmitted</b>	Total bytes transmitted successfully		

## 4.3 Status – Networking

This screen shows the status of the networking.



Status	STATUS - NETWORKING
<ul style="list-style-type: none"> <li>Device</li> <li>Wireless</li> <li>Networking</li> <li>WDS</li> <li>MBSS</li> </ul>	<p>IP Address: 10.0.0.2</p> <p>Netmask: 255.0.0.0</p> <p>Ethernet0 MAC Address: 00:26:86:F0:2F:B9</p> <p>Ethernet1 MAC Address: 02:26:86:F0:2F:B9</p> <p>Wireless MAC Address: 00:26:86:F0:30:81</p> <p>BSSID: 00:26:86:F0:30:81</p>
<div style="background-color: #0056b3; color: white; padding: 2px 5px; margin-bottom: 5px;">Config</div> <ul style="list-style-type: none"> <li>Wireless</li> <li>WPS</li> <li>MAC Filter</li> <li>Networking</li> <li>WDS</li> <li>MBSS</li> <li>ACS</li> </ul>	<input type="button" value="Refresh"/>
<div style="background-color: #0056b3; color: white; padding: 2px 5px; margin-bottom: 5px;">Tools</div> <ul style="list-style-type: none"> <li>Log</li> <li>Admin</li> <li>Restore</li> </ul>	
<div style="background-color: #0056b3; color: white; padding: 2px 5px; margin-bottom: 5px;">System</div> <ul style="list-style-type: none"> <li>Upgrade</li> <li>Reboot</li> </ul>	

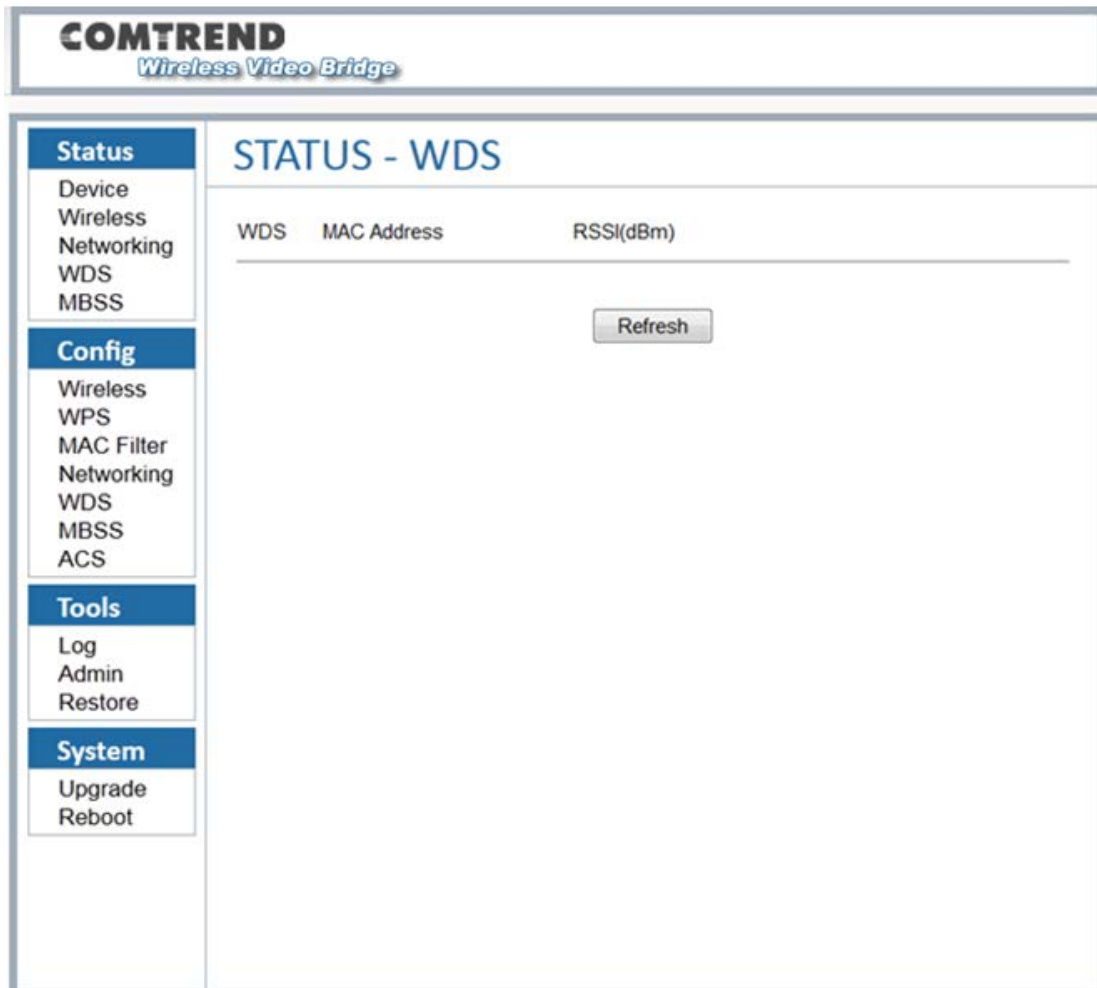
Menu Item	Description	Options	Detail
<b>IP Address</b>	The IP Address of the system		Logged into the web GUI with this IP address. It can be changed in the Config Networking page.
<b>Netmask</b>	The netmask of the IP address		
<b>Ethernet MAC Address</b>	This is the IEEE compliant MAC address of the Ethernet interface		The internal network bridge uses this MAC address

<b>Wireless MAC Address</b>	This is the IEEE compliant MAC address of the Wi-Fi interface		The WLAN MAC address
<b>BSSID</b>	The current associated BSSID of the Wi-Fi system		<p>In AP mode: this will be the SAME as the Wireless MAC address.</p> <p>In STA mode and associated to an AP: this will be the value of the AP's MAC address.</p> <p>If the STA is not associated, this will state: "Not-Associated".</p>



## 4.4 Status – WDS

This screen shows the status of the WDS links.



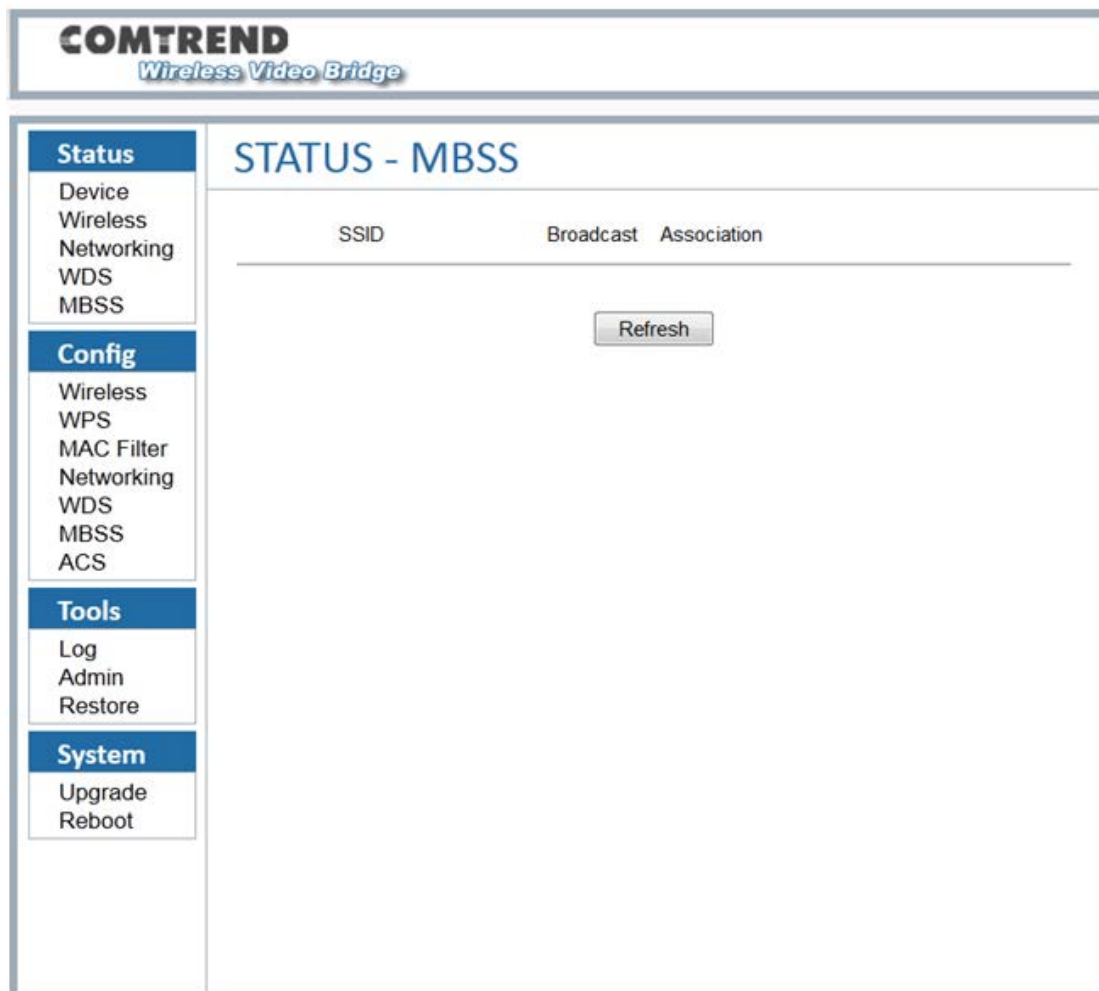
The screenshot displays the COMTREND Wireless Video Bridge web interface. The top header shows the COMTREND logo and the product name "Wireless Video Bridge". The main content area is titled "STATUS - WDS". On the left, there is a navigation sidebar with four sections: "Status" (containing Device, Wireless, Networking, WDS, MBSS), "Config" (containing Wireless, WPS, MAC Filter, Networking, WDS, MBSS, ACS), "Tools" (containing Log, Admin, Restore), and "System" (containing Upgrade, Reboot). The main content area contains a table with the following headers: "WDS", "MAC Address", and "RSSI(dBm)". Below the table is a "Refresh" button.

This typical WDS link status includes:

- The interface name of the WDS link, the name is managed by the system automatically, usually it is: WDS0/WDS1/WDS2...so on.
- The WDS peer MAC address of the opposite side, this MAC address is same as the address which you are using when creating WDS links.
- The WDS link quality.

## 4.5 Status – MBSS

Displays the information of multiple Basic Service Set Identifiers (BSSIDs) created on the device: SSID, Broadcast, Association count and details of the station connected. This option is not available if the device is configured as a STA. For instructions on setting up WAP-5940 as a WDS using AP mode, please refer to [Appendix B](#).



Menu Item	Description	Options	Detail
<b>SSID</b>	SSID of the MBSS		This will be the SSID of the wireless network.
<b>Broadcast</b>	Enabled or disabled SSID broadcast	TRUE	SSID will be broadcasted
		FALSE	Wi-Fi devices can't scan out this SSID
<b>Association</b>	Associated client	> =0	The number of

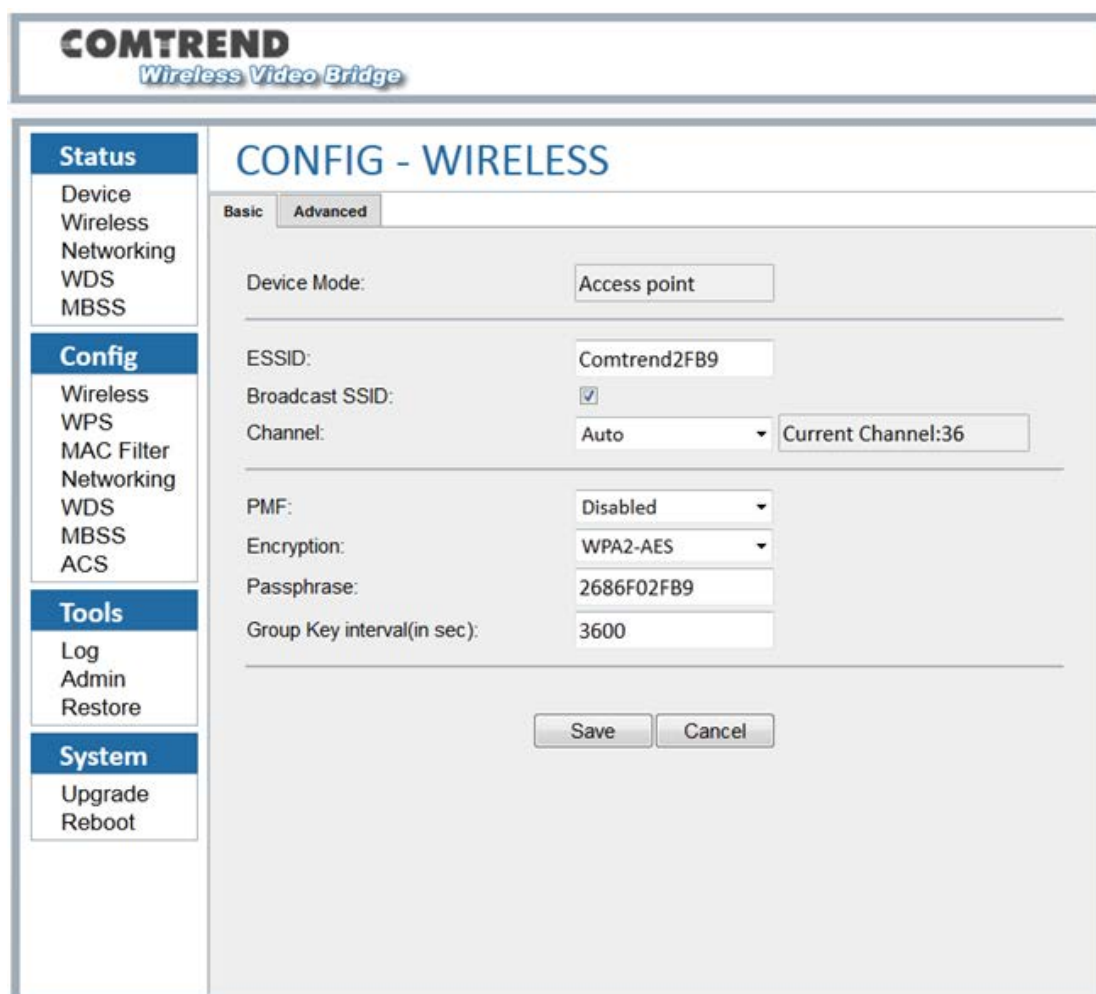
	number		client which are connected to the Virtual AP
--	--------	--	--

## Chapter 5 Config

### 5.1 Config – Wireless

This screen has two tab pages, “Basic” and “Advanced”.

#### Basic



**COMTREND**  
*Wireless Video Bridge*

**CONFIG - WIRELESS**

Basic | Advanced

Device Mode: Access point

ESSID: Comtrend2FB9

Broadcast SSID:

Channel: Auto | Current Channel:36

PMF: Disabled

Encryption: WPA2-AES

Passphrase: 2686F02FB9

Group Key interval(in sec): 3600

Save | Cancel

**Status**  
Device  
Wireless  
Networking  
WDS  
MBSS

**Config**  
Wireless  
WPS  
MAC Filter  
Networking  
WDS  
MBSS  
ACS

**Tools**  
Log  
Admin  
Restore

**System**  
Upgrade  
Reboot

Menu Item	Description	Options	Detail
Device Mode	AP or STA mode	Access Point	Device Acts as Access Point
		Station	Device Acts as Station

<b>ESSID</b>	SSID of the AP	Can be set to desired SSID name	This will be the SSID of the wireless network.
<b>Channel</b>	Available 5Ghz channels based on region setting	36-48, 149-165	5.150-5.250, 5.725-5.850 GHz are the supported frequency ranges
<b>PMF</b>	Protected Management Frames		Sets the 802.11w / PMF capability. Applies to AP
<b>Encryption</b>	802.11 compliant authentication and encryption	WPA2/AES	
		NONE-OPEN	Disables encryption (OPEN mode)
		WPA2 + WPA (Mixed mode)	
		WPA2/AES Enterprise	
		WPA2 + WPA Enterprise	
<b>Passphrase</b>	The current passphrase. Applies to AP only.		
<b>Group Key interval(in sec)</b>	Group key renewal interval for enterprise security	Group key interval needs to be between 0 and 43200	This is the interval at which the group key is renewed for clients associated to this SSID

**Advanced**

**COMTREND**  
*Wireless Video Bridge*

**Status**

[Device](#)  
[Wireless](#)  
[Networking](#)  
[WDS](#)  
[MBSS](#)

**Config**

[Wireless](#)  
[WPS](#)  
[MAC Filter](#)  
[Networking](#)  
[WDS](#)  
[MBSS](#)  
[ACS](#)

**Tools**

[Log](#)  
[Admin](#)  
[Restore](#)

**System**

[Upgrade](#)  
[Reboot](#)

## CONFIG - WIRELESS

Basic
Advanced

Wireless Band: 802.11ac ▼

Bandwidth: 80MHz ▼

---

NSS: Auto ▼

TX Rate: Auto ▼

Priority: 0 ▼

Beacon Interval (in ms): 100

DTIM Period: 2

Short GI:

VLAN:

Save
Cancel

Menu Item	Description	Options	Detail
<b>Wireless Band</b>	Frequency Band to be used	802.11a	802.11a 5 GHz operation
		802.11an	802.11an 5 GHz operation
		802.11ac	802.11ac 5 GHz operation
<b>Bandwidth</b>	Per the 802.11a or 802.11an or 802.11ac standard	20 MHz	20 MHz operation
		40 MHz	40 MHz operation
		80MHz	80 MHz operation


	standard		
<b>NSS</b>	The maximum number of spatial streams	Auto 1 2 3 4	
<b>Tx Rate</b>	Transmitted data rate	Not supported for 802.11a standard	
		Auto or MCS0 ~MCS76 for 802.11an standard	Auto Rate Control, MCS 0-76
		Only Auto option available for 802.11ac standard when NSS is set to Auto. When NSS is not set to Auto, MCS0~MCS9 options are available.	
<b>Priority</b>	The priority is used to differentiate traffic between different SSIDs	0~3	
<b>Beacon Interval</b>	Set the interval of the beacon		How often the device sends a Beacon. The interval should be between 25 and 5000. The default value is 100.
<b>DTIM Period</b>	Delivery Traffic Indication Message		The DTIM period indicates how often clients serviced by the access point

			should check for buffered data awaiting pickup on the access point. The value should be between 1 and 15.
<b>Short GI</b>	Guard Intervals	Checked	The 802.11n draft specifies two guard intervals: 400ns (short) and 800ns (long). The GI is 400ns.
<b>VLAN</b>	Virtual Lan for different interface	1-4096	



## 5.2 Config – WPS

Connect to without selecting an SSID and inputting a Passphrase.



**Status**

[Device](#)  
[Wireless](#)  
[Networking](#)  
[WDS](#)  
[MBSS](#)

**Config**

[Wireless](#)  
[WPS](#)  
[MAC Filter](#)  
[Networking](#)  
[WDS](#)  
[MBSS](#)  
[ACS](#)

**Tools**

[Log](#)  
[Admin](#)  
[Restore](#)

**System**

[Upgrade](#)  
[Reboot](#)

### CONFIG - WPS

Wifi Interface:

---

WPS State:

WPS PBC:

WPS PIN:

WPS AP PIN:


---

Menu Item	Description	Options	Detail
<b>WPS State</b>	Set WPS states	Disabled	WPS disabled
		Not configured	WPS enabled User can remotely change AP's wireless settings...SSID, Encryption and Passphrase for example.

		Configured	User needs to fill certain parameters to start WPS connection
<b>WPS PBC</b>	WPS push button		Push button to start WPS connection
<b>WPS PIN</b>	For Web UI pin WPS pin mode	Character string	This will be the PIN used for Web UI WPS pin mode.
<b>WPS AP PIN</b>			Client must have same PIN within 2 minutes. It is recommended to use the external WPS push button on the device.

## 5.3 Config – MAC Filter

This screen shows the MAC addresses filtering configurations that are used for the AP.



**Status**

- Device
- Wireless
- Networking
- WDS
- MBSS

**Config**

- Wireless
- WPS
- MAC Filter
- Networking
- WDS
- MBSS
- ACS

**Tools**

- Log
- Admin
- Restore

**System**

- Upgrade
- Reboot

### MAC ADDRESS LIST

Wifi Interface:

---

MAC Address Filtering:

MAC Address:

---

No results

Menu Item	Description	Options	Detail
<b>Wifi Interface</b>	Real wireless device name and MAC Address in CPE		
<b>MAC Address Filtering</b>	The device filter MAC address	NONE	The AP can block a selected station from associating based on its MAC (hardware interface) address.

			"NONE" = Disable MAC address filtering.
		White list mode	Accept a client association request unless the MAC address for that client has been blocked
		Black list mode	Block a client association request unless the MAC address for that client has been authorized
<b>MAC Address</b>	Verify the MAC address		Checks whether the MAC address can be validated
<b>MAC Address List</b>	List the authorized or denied MAC addresses		<p>According to the MAC address filter</p> <p>"Authorize if not denied" filter lists the denied MAC addresses.</p> <p>"Deny if not authorized" filter lists the authorized MAC addresses.</p>

## 5.4 Config – Networking

These screens show the networking configuration.

### DHCP

**COMTREND**  
*Wireless Video Bridge*

### CONFIG - NETWORKING

DHCP:  Static IP:

IP Address:

Netmask:

Ethernet0 MAC Address:

Ethernet1 MAC Address:

Wireless MAC Address:

BSSID:

**Status**

- Device
- Wireless
- Networking
- WDS
- MBSS

**Config**

- Wireless
- WPS
- MAC Filter
- Networking
- WDS
- MBSS
- ACS

**Tools**

- Log
- Admin
- Restore

**System**

- Upgrade
- Reboot

## Static IP

**COMTREND**  
*Wireless Video Bridge*

**Status**

Device  
Wireless  
Networking  
WDS  
MBSS

**Config**

Wireless  
WPS  
MAC Filter  
Networking  
WDS  
MBSS  
ACS

**Tools**

Log  
Admin  
Restore

**System**

Upgrade  
Reboot

### CONFIG - NETWORKING

DHCP: 
Static IP:

IP Address:

Netmask:

Ethernet0 MAC Address:

Ethernet1 MAC Address:

Wireless MAC Address:

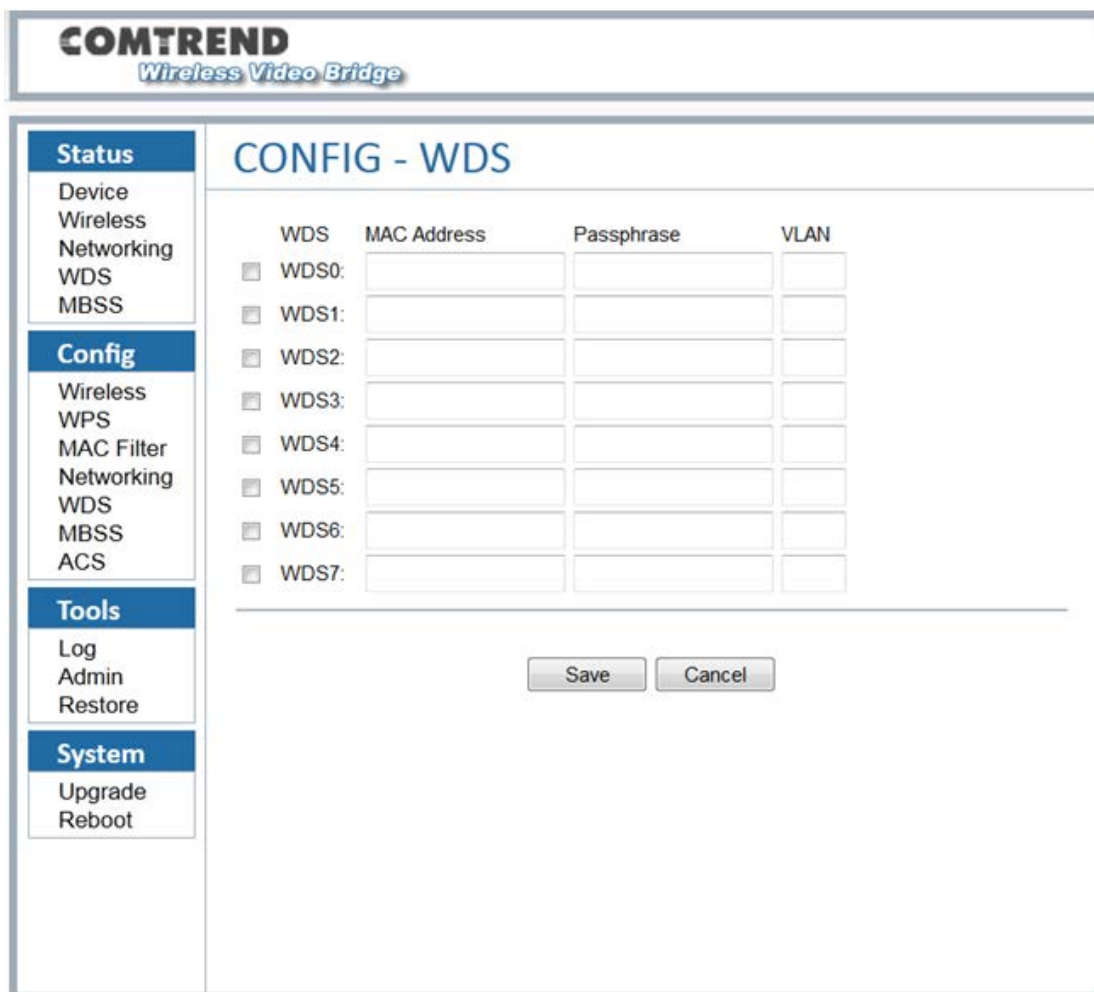
BSSID:

Menu Item	Description	Options	Detail
<b>DHCP or Static IP</b>	Set the network configuration to DHCP or Static IP	DHCP	The device will try to get its IP address with DHCP from a device like a router
		Static IP	The device will use the static IP address
<b>IP Address</b>	The IP Address of the system		This can be changed from this interface, by editing this field.  If the device is using DHCP, the IP

			<p>address is not allowed to change.</p> <p><b>CAUTION:</b> After selecting "Save", the IP Address will change IMMEDIATELY. The Web UI must be pointed at the new address in order to continue your Web UI Session.</p>
<b>Netmask</b>	Netmask of the IP address		
<b>Ethernet MAC Address</b>	This is the IEEE compliant MAC address of the Ethernet interface		The internal network bridge uses this MAC address. This cannot be changed.
<b>Wireless MAC Address</b>	This is the IEEE compliant MAC address of the Wi-Fi interface.		The WLAN MAC address. This cannot be changed.
<b>BSSID</b>	The current associated BSSID of the Wi-Fi system.		this will be the SAME as the Wireless MAC address.

## 5.5 Config – WDS

This screen shows the configuration of the WDS links.



The screenshot shows the 'CONFIG - WDS' page in the COMTREND Wireless Video Bridge web interface. On the left is a navigation menu with sections: Status (Device, Wireless, Networking, WDS, MBSS), Config (Wireless, WPS, MAC Filter, Networking, WDS, MBSS, ACS), Tools (Log, Admin, Restore), and System (Upgrade, Reboot). The main area is titled 'CONFIG - WDS' and contains a table for configuring WDS links. Each row represents a WDS link (WDS0 through WDS7) with a checkbox, a MAC Address field, a Passphrase field, and a VLAN field. Below the table are 'Save' and 'Cancel' buttons.

WDS	MAC Address	Passphrase	VLAN
<input type="checkbox"/> WDS0:	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> WDS1:	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> WDS2:	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> WDS3:	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> WDS4:	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> WDS5:	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> WDS6:	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> WDS7:	<input type="text"/>	<input type="text"/>	<input type="text"/>

This option is not available if the device is configured as a STA.


Menu Item	Description	Options	Detail
<b>WDS checkbox</b>	To determine if the WDS link is enabled	Checked	The WDS link will be stored to a file after clicking the Save Button
		Not Checked	The WDS link will be discarded after clicking the Save Button
<b>MAC Address</b>		48bit MAC address	The WDS peer MAC



			address on the opposite side
<b>Passphrase</b>		64 ASCII PSK	Wi-Fi devices can see the SSID in scan. Now the passphrase string is displayed as "*****" instead.
		Empty	The WDS link does not have security
<b>VLAN</b>	Virtual Lan for different interface	1-4096	

## 5.6 Config – MBSS

One can create multiple Basic Service Set Identifiers (BSSIDs) on a device initially configured as an access point (AP). This capability is not available on a device configured as a STA. The first step in creating an additional BSSID is to create the wireless interface device for that BSSID.



Status	Device Wireless Networking WDS MBSS
Config	Wireless WPS MAC Filter Networking WDS MBSS ACS
Tools	Log Admin Restore
System	Upgrade Reboot

### CONFIG - MBSS

1: <input type="checkbox"/>	SSID: <input type="text"/> PMF: <span>Disabled</span>	VLAN: <input type="text"/> Encryption: <span>NONE-OPEN</span>	Broadcast: <input type="checkbox"/>	Priority: <span>0</span>
2: <input type="checkbox"/>	SSID: <input type="text"/> PMF: <span>Disabled</span>	VLAN: <input type="text"/> Encryption: <span>NONE-OPEN</span>	Broadcast: <input type="checkbox"/>	Priority: <span>0</span>
3: <input type="checkbox"/>	SSID: <input type="text"/> PMF: <span>Disabled</span>	VLAN: <input type="text"/> Encryption: <span>NONE-OPEN</span>	Broadcast: <input type="checkbox"/>	Priority: <span>0</span>
4: <input type="checkbox"/>	SSID: <input type="text"/> PMF: <span>Disabled</span>	VLAN: <input type="text"/> Encryption: <span>NONE-OPEN</span>	Broadcast: <input type="checkbox"/>	Priority: <span>0</span>
5: <input type="checkbox"/>	SSID: <input type="text"/> PMF: <span>Disabled</span>	VLAN: <input type="text"/> Encryption: <span>NONE-OPEN</span>	Broadcast: <input type="checkbox"/>	Priority: <span>0</span>
6: <input type="checkbox"/>	SSID: <input type="text"/> PMF: <span>Disabled</span>	VLAN: <input type="text"/> Encryption: <span>NONE-OPEN</span>	Broadcast: <input type="checkbox"/>	Priority: <span>0</span>
7: <input type="checkbox"/>	SSID: <input type="text"/> PMF: <span>Disabled</span>	VLAN: <input type="text"/> Encryption: <span>NONE-OPEN</span>	Broadcast: <input type="checkbox"/>	Priority: <span>0</span>
<input type="button" value="Save"/> <input type="button" value="Cancel"/>				

Menu Item	Description	Options	Detail
<b>SSID</b>	SSID of the MBSS		This will be the SSID of the wireless network.
<b>VLAN</b>	Virtual Lan for different interface	1-4096	
<b>Broadcast</b>	Enabled or disabled SSID broadcast	Checked	SSID will be broadcast
		Unchecked	Wi-Fi devices can see the SSID in scan
<b>Priority</b>	The priority is used to differentiate traffic between different SSIDs	0 is highest priority. 3 is lowest priority.	
<b>PMF</b>	Protected Management Frames		Sets the 802.11w / PMF capability. Applies to AP
<b>Encryption</b>	802.11 compliant encryption	NONE-OPEN	Disables encryption (OPEN mode)
		WPA2/AES	
		WPA2+WPA (mixed mode)	
<b>Passphrase</b>	The passphrase applies to this MBSS SSID		

## 5.7 Config – ACS

WAN Management Protocol CWMP (TR-069) allows an Auto-Configuration Server (ACS) to perform auto-configuration, provision, collection, and diagnostics to this device. Select desired values and click **SAVE** to configure TR-069 options.

**COMTREND**  
*Wireless Video Bridge*

**Status**

Device

Wireless

Networking

WDS

MBSS

**Config**

Wireless

WPS

MAC Filter

Networking

WDS

MBSS

ACS

**Tools**

Log

Admin

Restore

**System**

Upgrade

Reboot

## CONFIG - ACS

Enable:  Disable:

URL:

Username:

Password:

Periodic Inform: Enable:  Disable:

Interval:

Connection Request URL:

Connection Request Username:

Connection Request Password:

---

STUN: Enable:  Disable:

Server Address:

Server Port:

Username:

Password:

Maximum Keep Alive Period:

Minimum Keep Alive Period:

---

Menu Item	Description	Options	Detail
<b>Enable</b>	Enable TR-069 daemon connection to ACS	Select to enable	
<b>Disable</b>	Disable TR-069 daemon connection to ACS	Select to disable	
<b>URL</b>	IP address and port the device uses to connect to the ACS		
<b>Username</b>	Username used to authenticate on ACS		

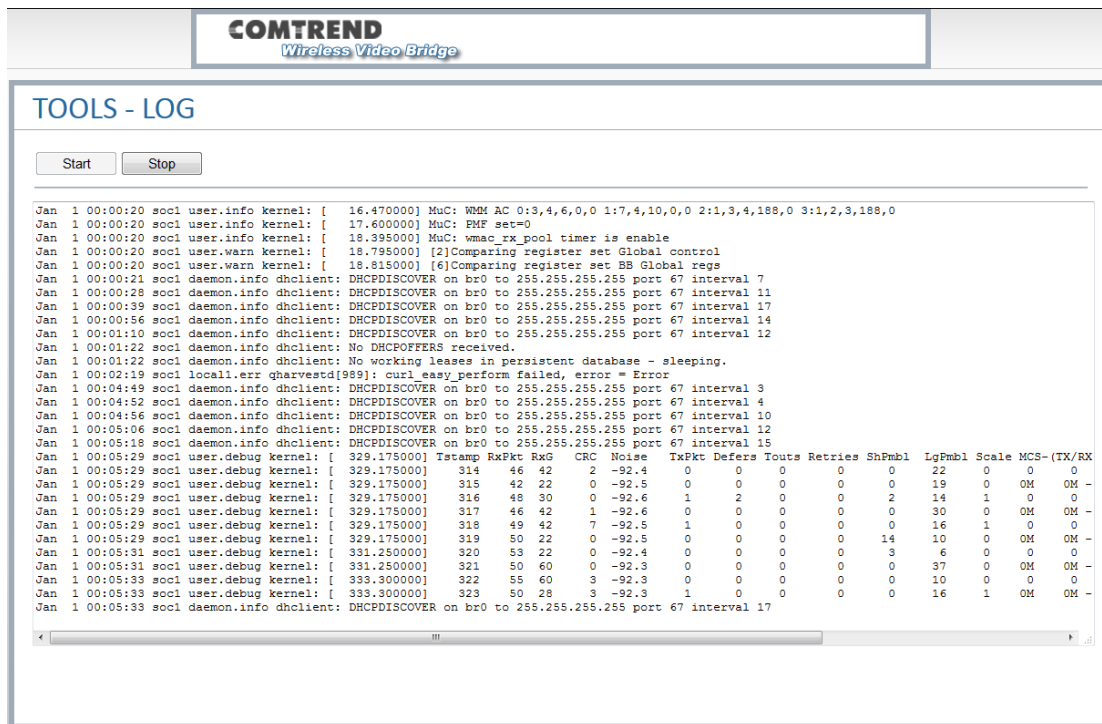
<b>Password</b>	Password used to authenticate on ACS		
<b>Periodic Inform</b>	Activate / Deactivate the info message to ACS server		Unit is second(s)
<b>Interval</b>	Periodic time interval of sending the info message		
<b>Connection Request URL</b>	The path for the connection from the ACS to the CPE. It is recommended to keep the default setting.		
<b>Connection Request Username</b>	Username used to authenticate an ACS making a Connection Request to the CPE		
<b>Connection Request Password</b>	Password used to authenticate an ACS making a Connection Request to the CPE		
<b>STUN</b>	Activate the TR-111 function	Select to enable	
	Deactivate the TR-111 function	Select to disable	
<b>Server Address</b>	IP address of device used to connect to the ACS which support STUN		
<b>Server Port</b>	Port of device used to connect to the		

	ACS which support STUN		
<b>Username</b>	Username used to authenticate on ACS which support STUN		
<b>Password</b>	Password used to authenticate on ACS which support STUN		
<b>Maximum Keep Alive Period</b>	The maximum connect duration to the ACS server		Unit is second(s)
<b>Minimum Keep Alive Period</b>	The minimum connect duration to the ACS server		Unit is second(s)

## Chapter 6 Tools

### 6.1 Tools – Log

This page has the ability to directly view the PHY statistics of the device.



Pressing the “Start” button will start a 10 second polling log. This data can be useful to assist in debugging the system.

After selecting “Start”, the page will look similar to the image above. The logging will stop after pressing the “Stop” button. If the IP address is changed or if the device is shut off, this page will give an error message if logging was in progress. To recover the session, please press the “Start” button again.

This interface takes data from an internal OS file, so intermittently; there may be management messages that show up in this log.

Metric	Description	Comments
<b>Tstamp</b>	This is the system time of the measurement taken from the internal system clock	
<b>RxPkts</b>	This represents the number of packets that were successfully received over 1 second intervals. Each line represents 1 second of time.	
<b>RxGain</b>	This is the higher receiver gain value that was recorded on successfully received packets during this measurement interval. If no packets were received, this may be an invalid number.	The maximum value of RxGain is 62
<b>CRC</b>	This is the number of CRC errors received over the 1 second measurement interval	If (CRC/Rx Packets) > 10-20%, then the channel condition or link quality is poor. This is possibly due to interference, another Wi-Fi network or being too far for the current configuration to be reliable.
<b>Noise</b>	This is the MAX receiver noise floor as measured over this 1 second interval	This value is an internal noise calculation, not external. In normal operation it will vary between 20 and 70.
<b>TxPkts</b>	This is the number of successfully transmitted packets over the last 1 second interval.	



<b>Defers</b>	<p>This number counts the number of times an attempted transmission was deferred due to the medium being busy.</p> <p>This is helpful in determining if an environment is very busy.</p>	<p>Defers are common in busy WiFi environments</p>
<b>Tout</b>	<p>This is an indicator of Tx packet timeout</p>	<p>Timeouts are not common. The Packet could not find a time slot to transmit.</p>
<b>Retries</b>	<p>This counts the number of transmission retries that have occurred over the last one second.</p> <p>This is primarily due to the lack of acknowledgements from the partner device.</p>	<p>On the transmit side, note that the general packet flow for error is as follows:</p> <p>Defer Retry Timeout</p>
<b>ShPre</b>	<p>This counts the number of Short Preamble Detection Errors</p>	<p>These are very common in high throughput conditions</p>
<b>LgPre</b>	<p>This counts the number of Long Preamble Detection errors</p>	<p>The wireless received a signal which passed the short preamble, but failed the more complex long preamble. These are less common than short preamble errors.</p>
<b>Rate</b>	<p>This is a legacy measurement for rate and is not currently used</p>	

## 6.2 Tools – Admin

This page is for administration of the user passwords.

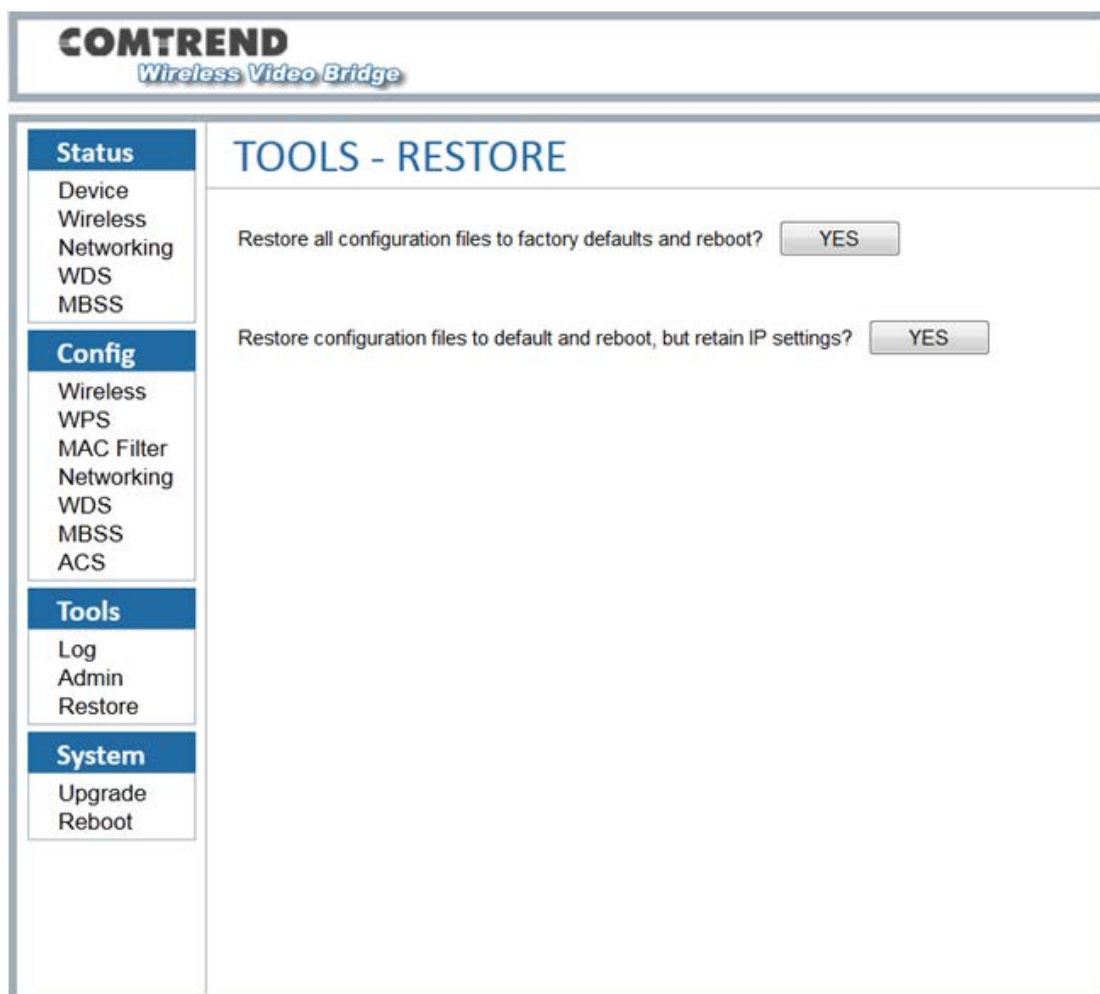
**COMTREND**  
*Wireless Video Bridge*

<div style="background-color: #0056b3; color: white; padding: 2px; margin-bottom: 5px;"><b>Status</b></div> Device Wireless Networking WDS MBSS <div style="background-color: #0056b3; color: white; padding: 2px; margin-bottom: 5px;"><b>Config</b></div> Wireless WPS MAC Filter Networking WDS MBSS ACS <div style="background-color: #0056b3; color: white; padding: 2px; margin-bottom: 5px;"><b>Tools</b></div> Log Admin Restore <div style="background-color: #0056b3; color: white; padding: 2px; margin-bottom: 5px;"><b>System</b></div> Upgrade Reboot	<h3 style="margin: 0;">TOOLS - ADMIN</h3> <div style="margin-top: 10px;"> User Name: <input style="width: 100%;" type="text" value="root"/>  Old Passphrase: <input style="width: 100%;" type="text"/>  New Passphrase: <input style="width: 100%;" type="text"/>  New Passphrase Again: <input style="width: 100%;" type="text"/> </div> <hr style="border: 0.5px solid gray; margin: 10px 0;"/> <div style="text-align: center; margin-top: 20px;"> <input type="button" value="Save"/> </div>
--	--

Menu Item	Description	Notes
<b>User Name</b>	The user name for login	Only for the login privilege
<b>Old Passphrase</b>	Enter the original password of the user name	
<b>New Passphrase</b>	Enter the new passphrase	
<b>New Passphrase Again</b>	Enter the new passphrase again	It should be the same as the "New Passphrase"

## 6.3 Tools – Restore

The Tools Restore page is for users to restore all the configurations of the device to factory defaults. There is also the option to restore the configuration files and reboot whilst retaining the IP settings.



The screenshot displays the web interface for a COMTREND Wireless Video Bridge. The page title is "TOOLS - RESTORE". On the left, there is a navigation menu with four main sections: "Status" (Device, Wireless, Networking, WDS, MBSS), "Config" (Wireless, WPS, MAC Filter, Networking, WDS, MBSS, ACS), "Tools" (Log, Admin, Restore), and "System" (Upgrade, Reboot). The main content area contains two restore options, each with a "YES" button:

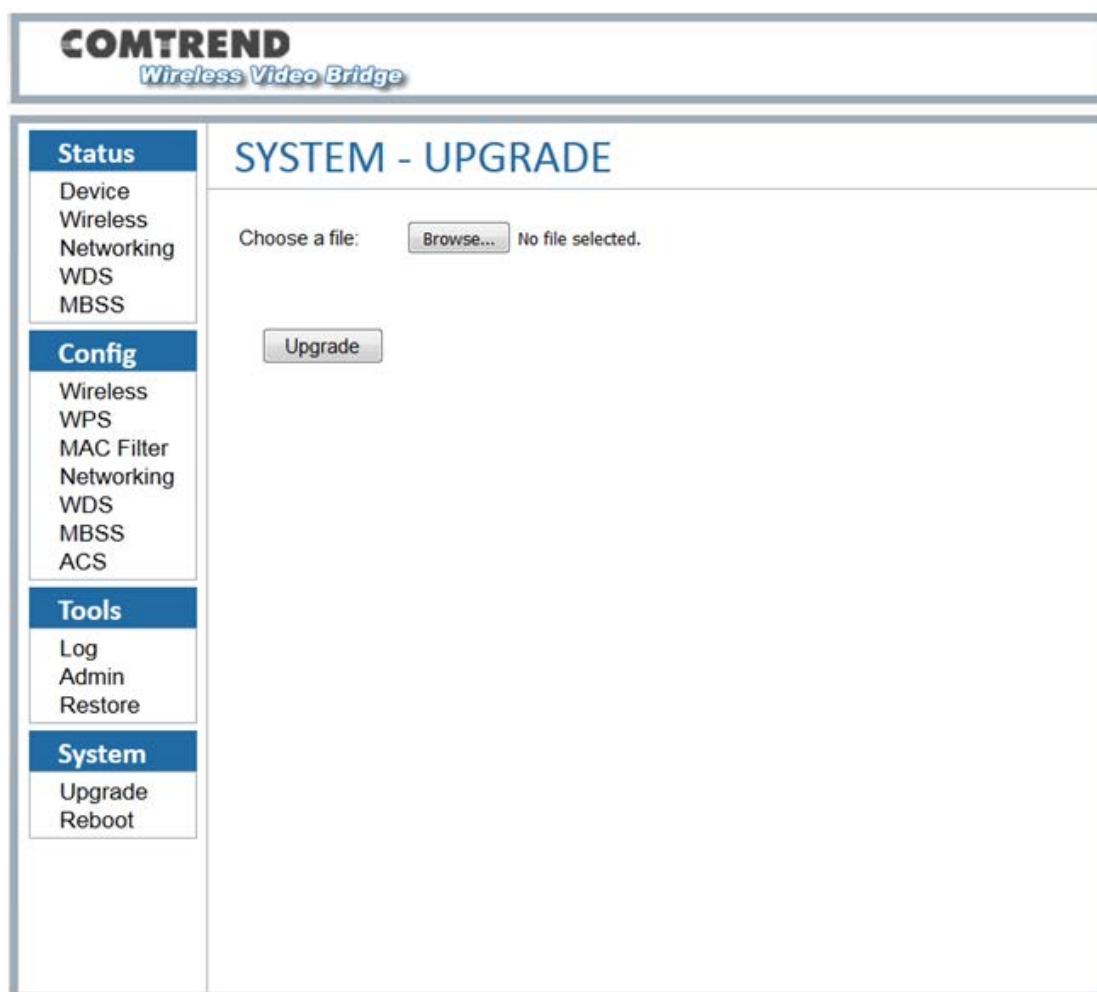
- Restore all configuration files to factory defaults and reboot?
- Restore configuration files to default and reboot, but retain IP settings?

The Restore function also restores the password of the login user.

## Chapter 7 System

### 7.1 System – Upgrade

The System Upgrade page is for users to update the firmware on the device.



This page will upload a binary image file. **Please use bin file to upgrade which is named like "WAP-5940-EM51-3671361CTU-CXX\_RXX.bin".**

When you select the file and click "Upgrade", the "Upgrade" button will be disabled and the page will display "Loading the image file.....Please wait", please wait for 2 minutes. **Please be patient and do not power off the unit during this process. Do not close the upgrade webpage.**

**COMTREND**  
*Wireless Video Bridge*

Status	SYSTEM - UPGRADE
Device Wireless Networking WDS MBSS	Choose a file: <input type="text" value="C01_R02IWAP-5940-EM51-3671361CTU-C01_R02.bin"/> <input type="button" value="Browse..."/>
<b>Config</b> Wireless WPS MAC Filter Networking WDS MBSS ACS	<input type="button" value="Upgrade"/>
<b>Tools</b> Log Admin Restore	
<b>System</b> Upgrade Reboot	

When the firmware has been upgraded successfully, you will be automatically directed to the reboot page.

## 7.2 System – Reboot

The System Reboot page is for users to reboot the device.

**COMTREND**  
*Wireless Video Bridge*

<b>Status</b> Device Wireless Networking WDS MBSS	<h3>SYSTEM - REBOOT</h3> <p>Are you sure to reboot?</p> <p><input type="button" value="YES"/></p>
<b>Config</b> Wireless WPS MAC Filter Networking WDS MBSS ACS	
<b>Tools</b> Log Admin Restore	
<b>System</b> Upgrade Reboot	

## SYSTEM - REBOOT

---

Rebooting....

Click **here** if you are not redirected automatically after 60s

## Appendix A - Specifications

### Hardware Interface

- AP/Station Switch x 1
- RJ-45 X 2 for Giga Ethernet port
- Reset Button X 1
- WPS button X 1
- 4x internal MIMO antenna
- Power switch X 1
- Power Jack X 1

### Standard

- 802.11a/n/ac
- 802.11i (WEP, WPA/WPA2, RADIUS)
- 802.11d
- 802.11e (WMM, WMM-PS)
- 802.11w
- 802.11h
- 802.11k
- 802.11r
- 802.11s (Draft)

### Rates are for 256 QAM

- 80MHz: 1.7Gbps
- 40MHz: 800Mbps
- 20MHz: 346.8Mbps

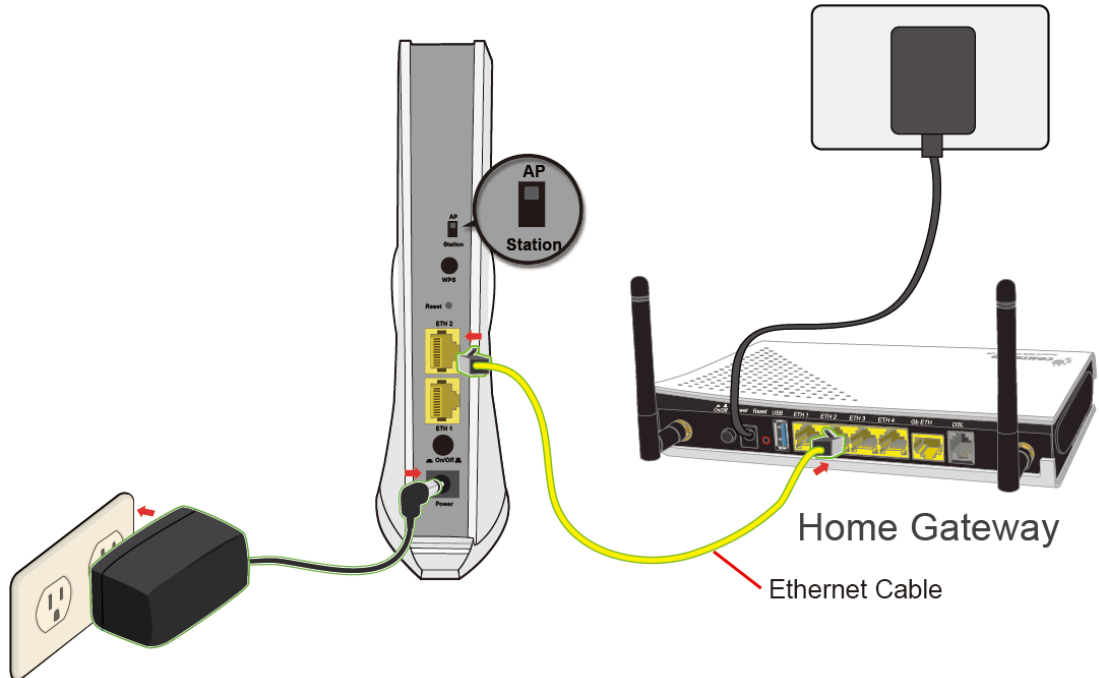
### Environment Condition

Operating temperature .....0 ~ 40 degrees Celsius

<b>NOTE:</b> Specifications are subject to change without notice.
---

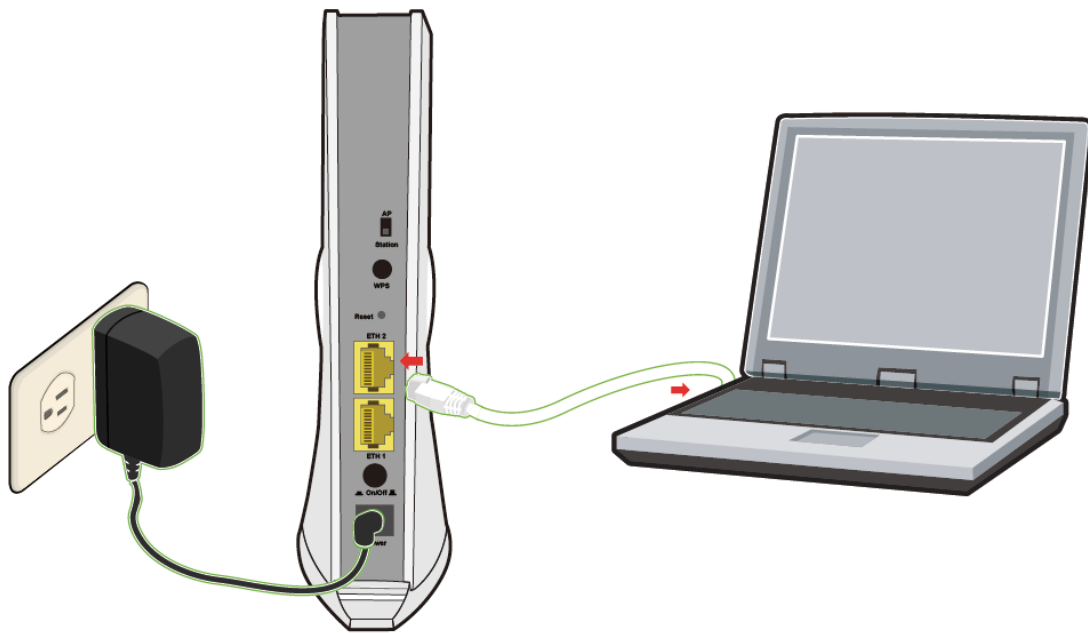
## Appendix B - AP / Station

After you select AP mode thus the Ethernet port (ETH1) will be WAN port, another Ethernet port (ETH2) is LAN side.





After you select station mode thus two Ethernet ports (ETH1, ETH2) are LAN side.



# Warnings Guide

## FCC Statements

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 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.

**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 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.

### **IMPORTANT NOTE:**

#### **FCC Radiation Exposure Statement:**

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

## ISED Statements

This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

1. This device may not cause interference, and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

*Cet appareil est conforme à la norme RSSs Industrie Canada exempts de licence norme(s). Son fonctionnement est soumis aux deux conditions suivantes:*

1. *Cet appareil ne peut pas provoquer d'interférences et*
2. *Cet appareil doit accepter toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement du dispositif.*

### **IMPORTANT NOTE:**

#### **IC Radiation Exposure Statement:**

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

*Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.*

Users should also be advised that high-power radars are allocated as primary users (i.e. priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

### **Other Statements**

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

The device for operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

This device is restricted to ***indoor*** use.