USER MANUAL

GIGABIT WEB SMART SWITCH, 10-PORT

BLACK BOX

TABLE OF CONTENTS

NEED HELP?
LEAVE THE TECH TO US
LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

TABLE OF CONTENTS

NEED HELP?
LEAVE THE TECH TO US
LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

SAFETY INFORMATION

Read this section before using the Gigabit Web Smart Switch, 10-Port.

Failure to follow these precautions and warnings might cause the switch to malfunction, electrical shock, or even fire. If the switch is working abnormally (for example, generating smoke), stop using it immediately.

DO NOT install this switch under the conditions listed below:

- DO NOT install this switch in an environment with conditions exceeding its specified operating environment.
- DO NOT install this switch in an environment that is subjected to direct sunlight or near any heating equipment.
- DO NOT install this switch in an environment with extreme temperature changes. Extreme temperature changes, even within the switch's operating temperature range, may cause malfunctions.
- DO NOT install this switch in a location near any sources of water or liquid.
- DO NOT stack this switch with other network devices directly on top of one another. Stacking network devices directly without using a mounting rack will cause this switch to overheat.
- DO NOT install this switch on an unstable surface. Doing so might cause the switch to fall, resulting in damage and/or malfunction.

Product Maintenance Guide:

- DO NOT disassemble this switch. Doing so might cause malfunction and void your product's warranty.
- We recommend that you keep your switch clear of dust. To remove dust from your switch, use a dry brush and brush it off gently.
- When not using this switch, store it in an environment with low humidity, cool temperature, and free of dust. Failure to do so might cause malfunction.
- Before powering on this switch, make sure that the electric power source meets the switch's requirement. DO NOT use other power adapters if this switch comes with its own power adapter in the package.

WARNING: Laser. If using an optical fiber SFP adapter when connecting to a Black Box switch or other device, the user must observe precautions for working with a Class 1 laser product.

CHAPTER 1: SPECIFICATIONS

NEED HELP?
LEAVE THE TECH TO US
**LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269**

TABLE 1-1. SWITCH SPECIFICATIONS

Connectors	
10/100/1000BASE RJ-45 Ports	(8)
100/1000BASE-X SFP Cage	(2)
System Performance	
Packet Buffer	512 KB
MAC Address Table Size	8 K
Switching Capacity	20 Gbps
Forwarding Rate	14,880 Mbps
L2 Features	
Auto-Negotiation	Yes
Auto MDI/MDI-X	Yes
Flow Control (Duplex)	802.3x (Full) Backpressure (Half)
VLAN	VLAN Group: 16 Tagged Based Port-based
Link Aggregation	IEEE 802.3ad with LACP Static Trunk Max. LACP Link Aggregation Group: 9
IGMP Snooping v1/v2	Yes
Jumbo Frame Support	9.6 KB
QoS Features	
Number of priority queue	8 queues/port
CoS	IEEE 802.1p DSCP
Security	
Management System User Name/ Password Protection	Yes
Management	
Web-based Management	Yes
Firmware Upgrade via HTTP	Yes
Configuration Download/Upload	Yes
SNMP (v1/v2c)	Yes
Port Mirroring	Yes

CHAPTER 1: SPECIFICATIONS

NEED HELP?
LEAVE THE TECH TO US

**LIVE 24/7
TECHNICAL
SUPPORT**
1.877.877.2269

TABLE 1-1 (CONTINUED). SWITCH SPECIFICATIONS

General	
Power Input	100–240 VAC
Max. Power Consumption	15 W
Indicators	(19) LEDs: 　Per unit: (1) Power; 　Per TP port: (1) 1000 M, (1) Link/Act; 　Per SFP slot: (1) FX LED
Operating Temperature	32 to 113°F (0 to 45°C)
Operating Humidity	5 to 90%, noncondensing
Dimensions	1.7"H x 9.1"W x 4.9"D x (4.4 x 23.0 x 12.4 cm)
Weight	2.2 lb. (0.98 kg)
Standards	
IEEE 802.3	10BASE-T
IEEE 802.3u	100BASE-TX
IEEE 802.3ab	1000BASE-T
IEEE 802.3z	1GBASE-SX/LX
IEEE 802.3az	Energy Efficient Ethernet (EEE)
IEEE 802.1q	VLAN
IEEE 802.1p	Class of Service
IEEE 802.3ad	Link Aggregation Control Protocol (LACP)

CHAPTER 2: OVERVIEW

2.1 INTRODUCTION

This Gigabit Web Smart Switch, 10-Port has eight 10/100/1000M and two Gigabit SFP open slots. It is designed for medium or large network environments.

2.2 FEATURES

- (2) Gigabit SFP Open Slots: The switch supports (2) Gigabit SFP open slots to uplink to servers, storage, or other switching devices for long loop reach applications.

- High-Speed Networking and Jumbo Frames Support:

- Expand your Gigabit network with the switch. Connect it to servers, workstations and other attached devices. The switch uses 9.6 K Jumbo Frames to support large file transfers quickly.

- Exceptionally Smart: The switch provides Smart features that are ideal for simple QoS/CoS applications and basic monitoring tools to improve network efficiency. It has advanced security and management features, such as VLAN (IEEE 802.1Q VLAN tagging and port-based VLAN). Through a Web-based interface, an administrator can set up VLANs to segregate traffic, QoS to prioritize mission-critical data and link aggregation to create fat traffic pipelines. All of these features offer extra protection on the network edge. You can access the password-protected configuration interface remotely.

- Non-Blocking: This switch receives and forwards traffic seamlessly with non-blocking wire-speed. Every port simultaneously supports up to 2000 Mbps of bandwidth in full-duplex mode. This feature provides full wire speed to the connected devices.

- Store and Forward: The switch uses this feature to maximize network performance while minimizing the propagation of bad network packets

2.3 WHAT'S INCLUDED

Your package should include the following items. If anything is missing or damaged, contact Black Box Technical Support at 877-877-2269 or info@blackbox.com.

- (1) Gigabit Web Smart Switch, 10-Port
- (1) power cord
- (1) rackmount kit: (2) rackmount brackets and (8) screws

CHAPTER 2: OVERVIEW

NEED HELP?
LEAVE THE TECH TO US
**LIVE 24/7
TECHNICAL
SUPPORT**
1.877.877.2269

2.4 HARDWARE DESCRIPTION

This section describes the switch hardware.

2.4.1 FRONT PANEL

The front panel of this switch has (8) 10/100/1000BASE-TX RJ-45 ports and (2) Gigabit SFP uplink ports. SFP modules (not included) install in the uplink ports. The LED Indicators are also located on the front panel. Figure 2-1 shows the front panel of the switch and Table 2-1 describes its components.
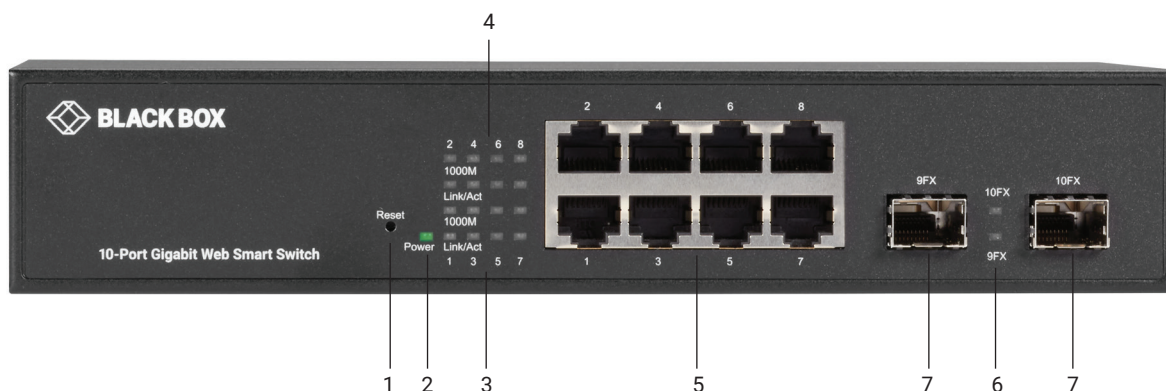

FIGURE 2-1. FRONT PANEL

TABLE 2-1. FRONT-PANEL COMPONENTS

NUMBER IN FIGURE 2-1	COMPONENT	DESCRIPTION
1	Reset button	Press to reset the switch.
2	(1) Power LED	ON: Lights amber when power to the switch is on. ON: Lights green when valid link is established. OFF: Power is off.
3	(8) Link/Act LEDs: (1) per RJ-45 port 1–8	ON: 10/100/1000 Link is connected. Flashing: Passing data
4	(8) 1000M LEDs: (1) per RJ-45 ports 1–8	ON: Gigabit link is connected. OFF: Gigabit link is not connected.
5	(8) RJ-45 ports	Links to devices or segments.
6	(2) FX LEDs: (1) per SFP slot	(2) FX LEDs: (1) per SFP slot ON: SFP module is connected OFF: SFP module is not connected
7	(2) SFP open slots	Holds SFP modules. See Table 2-3 for compatible modules from Black Box.

CHAPTER 2: OVERVIEW

NEED HELP?
LEAVE THE TECH TO US

LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

2.4.2 BACK PANEL

The back panel of this switch has a fan, power switch, and power connector. Figure 2-2 shows the back panel. Table 2-2 describes its components.

FIGURE 2-2. BACK PANEL

TABLE 2-2. BACK-PANEL COMPONENTS

NUMBER IN FIGURE 2-2	COMPONENT	DESCRIPTION
1	(1) 3-prong power connector	Links to 100–240 VAC power source

NEED HELP?
LEAVE THE TECH TO US

**LIVE 24/7
TECHNICAL
SUPPORT**
1.877.877.2269

2.4.3 COMPATIBLE SFP MODULES

The following SFPs are available from Black Box to operate with the switch.

TABLE 2-2. COMPATIBLE SFPS

PRODUCT CODE	DESCRIPTION
LFP401	SFP - 155-Mbps, Extended Diagnostics, 850-nm Multimode Fiber, 2-km, LC
LFP402	SFP - 155-Mbps, Extended Diagnostics, 1310-nm Multimode Fiber, 2-km, LC
LFP403	SFP - 155-Mbps, Extended Diagnostics, 1310-nm Single-Mode Fiber, 30-km, LC
LFP404	SFP - 155-Mbps, Extended Diagnostics, 1310-nm Single-Mode Fiber, 60-km, LC
LFP411	SFP - 1250-Mbps, Extended Diagnostics, 850-nm Multimode Fiber, 550-m, LC
LFP412	SFP - 1250-Mbps, Extended Diagnostics, 1310-nm Multimode Fiber, 2-km, LC
LFP413	SFP - 1250-Mbps, Extended Diagnostics, 1310-nm Single-Mode Fiber, 10-km, LC
LFP414	SFP - 1250-Mbps, Extended Diagnostics, 1310-nm Single-Mode Fiber, 30-km, LC
LFP416	SFP - 1250-Mbps, Extended Diagnostics, 10/100/1000BASE-T, SGMII Interface, RJ-45
LFP418	SFP - 1250-Mbps, Extended Diagnostics, 1550-nm Single-Mode Fiber, 80-km, LC
LFP420	SFP - 1250-Mbps, Extended Diagnostics, 1550-nm TX, 1310-nm RX, Simplex, Single-Mode Fiber, 10-km, LC
LFP421	SFP - 1250-Mbps, Extended Diagnostics, 1310-nm TX, 1550-nm RX, Simplex Single-Mode Fiber, 10-km, LC
LFP441	SFP Transceiver - 1.25-Gb, 850-nm Multimode Fiber, 550-m, LC
LFP442	SFP Transceiver- 1.25-Gb, 1310-nm Single-Mode Fiber, 20-km, LC
LFP443	SFP Transceiver - 1.25-Gb 10/100/1000 BASE-T, SGMII Interface, 100-m, RJ-45

CHAPTER 3: HARDWARE INSTALLATION

NEED HELP?
LEAVE THE TECH TO US
LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

To install this switch, place it on a large flat surface with a power socket nearby. This surface should be clean, smooth, and level. Make sure that there is enough space around the switch for RJ-45 cables, the power cord, and ventilation.

If you're installing this switch in a 19-inch rack, use the rackmount kit (L brackets) and screws included in the product package. Fasten all screws so the rackmount kit and the switch are tightly conjoined before installing it in a 19-inch rack.

3.1 ETHERNET CABLE

The wiring cable types are:

- 10BASE-T: 2-pair UTP/STP CAT3, 4, 5, 5e, 6, 7 cable, EIA/TIA-568 100-ohm (Max. distance = 328 ft. [100 m])
- 100BASE-TX: 2-pair UTP/STP CAT5, 5e, 6, 7 cable, EIA/TIA-568 100-ohm (Max. distance = 328 ft. [100 m])
- 1000BASE-T: 4-pair UTP/STP CAT5, 5e, 6, 7 cable, EIA/TIA-568 100-ohm (Max. distance = 328 ft. [100 m])

3.2 INSTALLING THE SFP MODULES

Before installing an SFP module in the switch, make sure the SFP type of the two ends is the same and the transmission distance and wavelength of the fiber cable meets your requirements. We recommend purchasing SFP transceivers from Black Box.

WARNING: Laser. If using an optical fiber SFP adapter when connecting to a Black Box switch or other device, the user must observe precautions for working with a Class 1 laser product.

Follow these steps to install the SFP module:

1. Plug in the SFP fiber transceiver first. The SFP transceiver has two plugs for fiber cable, one is TX (transmit), the other is RX (receive).

2. Cross-connect the transmit channel at each end to the receive channel at the opposite end of the fiber link.

For more information about product safety, refer to the safely information at the beginning of this manual.

NEED HELP?
LEAVE THE TECH TO US
LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

CHAPTER 4: PREPARING FOR MANAGEMENT

This section will explain how to manage the switch via the management web page.

PREPARATION FOR WEB INTERFACE

The management web page allows you to use a web browser (such as Microsoft® Internet Explorer®, Google® Chrome™, or Mozilla® Firefox®) to configure and monitor the switch from anywhere on the network.

Before using the web interface to manage your switch, verify that your switch and your PC are on the same network.

Follow these steps configure your PC properly:

1. Verify that the network interface card (NIC) of your PC is operational and properly installed, and that your operating system supports TCP/IP protocol.

2. Connect your PC to the switch via an RJ-45 cable.

3. The default IP address of the switch is 192.168.2.1. The switch and your PC should be located within the same IP subnet. Change your PC's IP address to 192.168.2.X, where X can be any number from 2 to 254.

NOTE: The IP address you've assigned to your PC cannot be the same as the switch's IP address.
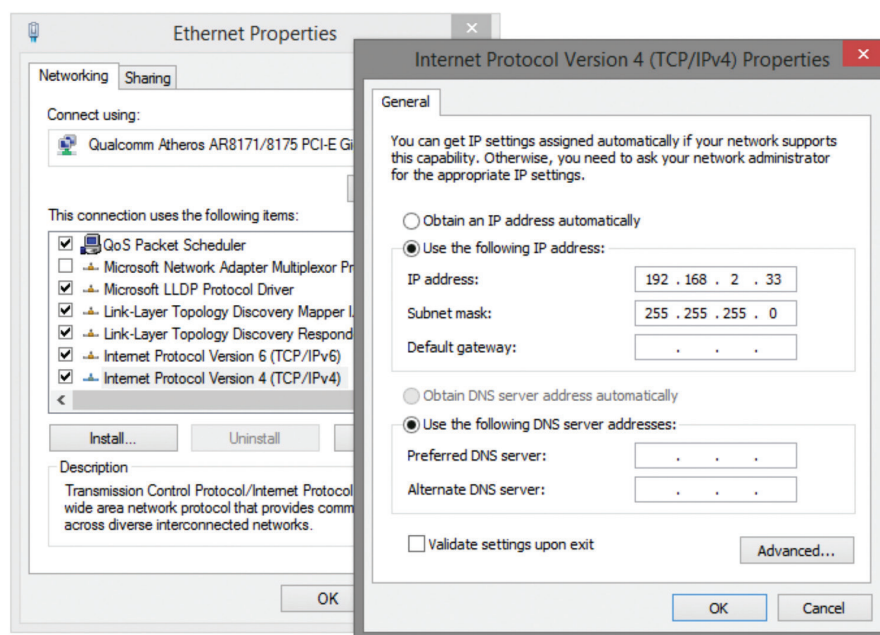

FIGURE 4-1. IP ADDRESS SCREEN

4. Launch the web browser (IE, Firefox, or Chrome) on your PC.

5. Type 192.168.2.1 (or the IP address of the switch) in the web browser's URL field, and press Enter.
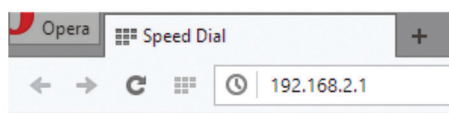

FIGURE 4-2. WEB BROWSER URL FIELD

6. The web browser will prompt you to log in. The default password for the configuration web page is admin.

Please enter password to login

Password: [   ]

Apply

FIGURE 4-3. LOGIN SCREEN

For more information, refer to Appendix A: IP Configuration for Your PC.

CHAPTER 5: WEB MANAGEMENT

NEED HELP?
LEAVE THE TECH TO US
LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

In Web Management:

As mentioned in Chapter 4, this switch has a web-based management interface. You can make all settings and monitor system status with this management web page.

Configuration/Monitor options included in the management web page can be divided into the following three categories, which will be discussed in detail in this chapter:

- Web Management — Configuration
- Web Management — Monitoring
- Web Management — Maintenance

5.1 WEB MANAGEMENT — OVERVIEW

Configuration

System

Ports

VLANs

Aggregation

IGMP Snooping

Mirroring

LLDP

Quality of Service

Monitoring

Statistics Overview

Detailed Statistics

IGMP Status

LLDP Statistics

LLDP Table

Ping

Maintenance

Warm Restart

Factory Default

Software Upload

Configuration File Transfer

Logout

FIGURE 5-1. SWITCH SETTINGS OPTIONS

NEED HELP?
LEAVE THE TECH TO US

LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

As shown in the screen on the previous page, this switch's setting options can be divided into three main categories:

- Configuration: Here you can make system configurations. The settings you can configure here include changing the IP address of the switch, setting the rate limit of each port, VLAN, IGMP Snooping, and Quality of Service (QoS).

- Monitoring: Here you can monitor system status, or perform system diagnostics with VeriPHY and Ping.

- Maintenance: This section allows you to reboot your switch, reset settings (except the switch's IP address) to default values, upload switch firmware, and download/upload system setting values.

The following sections will discuss all the functions in detail.

5.2 WEB MANAGEMENT — CONFIGURATION

5.2.1 CONFIGURATION — SYSTEM

MAC Address	00-03-ce-12-34-56
S/W Version	Luton10 3.03 150224
H/W Version	1.0
Active IP Address	192.168.2.1
Active Subnet Mask	255.255.255.0
Active Gateway	0.0.0.0
DHCP Server	0.0.0.0
Lease Time Left	0 secs

FIGURE 5-2. SYSTEM CONFIGURATION SCREEN

- MAC Address: Displays the unique hardware address assigned by the manufacturer (default).

- S/W Version: Displays the switch's firmware version.

- H/W Version: Displays the switch's hardware version.

- Active IP Address: The current active IP address of the switch.

- Active Subnet mask: The current active subnet mask of the IP Address.

- Active Gateway: The current active gateway of the switch.

- DHCP Server: The IP of the DHCP Server. Displays after the DHCP client is enabled.

- Lease Time Left: The lease time received from the DHCP server. Displays after the DHCP Client is enabled.

NEED HELP?
LEAVE THE TECH TO US

LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

DHCP Enabled	☐
Fallback IP Address	192.168.2.1
Fallback Subnet Mask	255.255.255.0
Fallback Gateway	192.168.2.254
Management VLAN	1
Name	
Password	
Inactivity Timeout (secs)	0
SNMP enabled	☑
SNMP Trap destination	0.0.0.0
SNMP Read Community	public
SNMP Write Community	private
SNMP Trap Community	public

Apply Refresh

FIGURE 5-3. SYSTEM CONFIGURATION SCREEN (CONTINUED)

- DHCP Enabled: Click the box to enable the DHCP client mode.

NOTE: After enabling this function, you will have to reboot the switch by switching it off and on to apply the setting.

- Fallback IP address: Manually assign the IP address that the network is using. The default IP is 192.168.2.1.

NOTE: After changing the IP address, you will have to reboot the switch by switching it off and on to apply the setting.

- Fallback Subnet Mask: Assign the subnet mask to the IP address.

- Fallback Gateway: Assign the network gateway for the switch. The default gateway is 192.168.2.254.

- Management VLAN: ID of a configured VLAN (1–4094) through which you can manage the switch. By default, all ports on the switch are members of VLAN 1. If you change the management VLAN, the management station must be attached to a port belonging to this VLAN.

- Name: Type in the new user name information.

- Password: Type in the new password (the default value of the switch is admin).

- Inactive Timeout: Here you can set the inactive timeout in seconds.

- SNMP Enabled: You can enable the SNMP (Simple Network Management Protocol) with the checkbox.

- SNMP Trap Destination: Input the SNMP trap destination IP address here.

- SNMP Read Community: Indicates the community read access string to permit access to the SNMP agent.

- SNMP Write Community: Indicates the community write access string to permit access to the SNMP agent.

- SNMP Trap Community: Indicates the community access string when sending an SNMP trap packet.

Buttons

- Apply: Click to apply and save all the settings you've made on this page.

- Refresh: Click to refresh the page.

NEED HELP?
LEAVE THE TECH TO US
LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

5.2.2 CONFIGURATION — PORTS

Port Configuration

Enable Jumbo Frames ☐

PERFECT_REACH/Power Saving Mode:	Disable ˅

Port	Link	Mode	Flow Control
1	Down	Auto Speed ˅	☐
2	1000FDX	Auto Speed ˅	☐
3	Down	Auto Speed ˅	☐
4	Down	Auto Speed ˅	☐
5	Down	Auto Speed ˅	☐
6	Down	Auto Speed ˅	☐
7	Down	Auto Speed ˅	☐
8	Down	Auto Speed ˅	☐
9	Down	Auto Speed ˅	☐
10	Down	Auto Speed ˅	☐

FIGURE 5-4. PORT CONFIGURATION SCREEN

- Enable Jumbo Frames: This switch provides more efficient throughput for large sequential data transfers by supporting jumbo frames on Gigabit Ethernet ports up to 9216 bytes. Compared to standard Ethernet frames that run only up to 1.5 KB, using jumbo frames significantly reduces the per-packet overhead required to process protocol encapsulation fields.

- Power Saving Mode: Adjusts the power provided to ports based on the length of the cable used to connect to other devices. Only sufficient power is used to maintain connection requirements.

- Mode: You can manually set the port speed, such as Auto, 10 half, 10 Full, 100 Half, 100 Full, 1000 Full or Disabled. Press the Apply button to complete the configuration procedure.

- Flow Control: You can manually enable or disable the Flow Control feature. Click the checkbox of the specific ports to enable and press the Apply button to complete the configuration procedure.

- Drop frames after excessive collisions: If enabled, the switch will drop frames if excessive collisions happen.

- Enable 802.3az EEE mode: EEE (Energy-Efficient Ethernet) is a power-saving option that reduces the power usage when there is low or no traffic use by powering down circuits when there is no traffic. You can enable this function to save power.

Buttons

- Apply: Apply and save all the settings you've made on this page.
- Refresh: Refresh the page.

NEED HELP?
LEAVE THE TECH TO US
LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

5.2.3 CONFIGURATION — VLANS

Add a VLAN

VLAN ID	

Add

FIGURE 5-5. ADD A VLAN

VLAN stands for Virtual LAN, which is a logical network grouping that limits the broadcast domain and allows you to isolate network traffic so that only the members of the same VLAN group can communicate with each other.

- VLAN ID: ID of configured VLAN (1–4094, no leading zeroes). Type the new ID and click Add. The web UI is directed to the VLAN Setup screen.

- Add: After inputting the VLAN ID, press this button to add a new VLAN with the VLAN ID you inputted.

VLAN Setup

VLAN ID: 2			
Port	Member	Port	Member
Port 1	☐	Port 6	☐
Port 2	☐	Port 7	☐
Port 3	☐	Port 8	☐
Port 4	☐	Port 9	☐
Port 5	☐	Port 10	☐

Apply   Refresh

FIGURE 5-6. VLAN SETUP SCREEN

- Member: Check the checkbox of the port that you would like to add to the VLAN. Press the Apply button to save the settings you've made.

VLAN Configuration List

1 ⦿							

Modify   Delete   Refresh

Port Config

FIGURE 5-7. VLAN CONFIGURATION LIST SCREEN

- VLAN Configuration List: Lists all the current VLAN groups created for this system. Up to 16 VLAN groups can be defined. VLAN 1 is the default untagged VLAN.

NEED HELP?
LEAVE THE TECH TO US

LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

◆ Modify: Press this button to modify the VLAN member port of the selected VLAN.

◆ Delete: Press this button to delete the selected VLAN.

◆ Refresh: Press this button to refresh the web page.

◆ Port Config: Press this button to enter the VLAN Per Port Configuration.

VLAN Per Port Configuration

Port	VLAN aware Enabled	Packet Type	Pvid
Port 1	☐	⦿ All ◯ Tagged Only	1 ∨
Port 2	☐	⦿ All ◯ Tagged Only	1 ∨
Port 3	☐	⦿ All ◯ Tagged Only	1 ∨
Port 4	☐	⦿ All ◯ Tagged Only	1 ∨
Port 5	☐	⦿ All ◯ Tagged Only	1 ∨
Port 6	☐	⦿ All ◯ Tagged Only	1 ∨
Port 7	☐	⦿ All ◯ Tagged Only	1 ∨
Port 8	☐	⦿ All ◯ Tagged Only	1 ∨
Port 9	☐	⦿ All ◯ Tagged Only	1 ∨
Port 10	☐	⦿ All ◯ Tagged Only	1 ∨

Apply   Cancel

FIGURE 5-8. VLAN PER PORT CONFIGURATION SCREEN

◆ VLAN Aware Enabled: Click the checkbox to enable the VLAN Aware function.

◆ Packet Type: Here you can set if the port will accept all packets or only packets that are tagged with the set PVID.

◆ PVID: Click the scroll-down menu to select an existing VLAN as the PVID.

5.2.4 CONFIGURATION — AGGREGATION

Aggregation/Trunking Configuration

Group\Port	1	2	3	4	5	6	7	8	9	10
Normal	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿
Group 1	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Group 2	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Group 3	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Group 4	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Group 5	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Group 6	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Group 7	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Group 8	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯

Apply   Refresh

FIGURE 5-9. AGGREGATION/TRUNKING CONFIGURATION SCREEN

NEED HELP?
LEAVE THE TECH TO US

LIVE 24/7
TECHNICAL
SUPPORT

1.877.877.2269

Port trunk allows multiple links to be bundled together and act as a single physical link for increased throughput. It provides load balancing,and redundancy of links in a switched inter-network. The link does not have an inherent total bandwidth equal to the sum of its component physical links. Traffic in a trunk is distributed across an individual link within the trunk in a deterministic method that called a hash algorithm. The hash algorithm automatically applies load balancing to the ports in the trunk. A port failure within the trunk group causes the network traffic to be directed to the remaining ports. Load balancing is maintained whenever a link in a trunk is lost or returned to service.

Aggregation/Trunking Configuration

To assign the ports to a trunk, click on the ports that you would like to set as the same aggregation/trunking group, and click the Apply button to save the settings you've made.

5.2.5 CONFIGURATION — IGMP SNOOPING

FIGURE 5-10. IGMP CONFIGURATION SCREEN

IGMP Snooping is the process of listening to IGMP network traffic. IGMP Snooping, as implied by the name, is a feature that allows a Layer 2 switch to "listen in" on the IGMP conversation between hosts and routers by processing the layer3 IGMP packets sent in a multicast network.

When IGMP Snooping is enabled in a switch, it analyzes all IGMP packets between hosts connected to the switch and multicast routers in the network. When a switch hears an IGMP report from a host for a given multicast group, the switch adds the host's port number to the multicast list for that group. When the switch hears an IGMP Leave, it removes the host's port from the table entry.

Prevents flooding of IP multicast traffic, and limits bandwidth intensive video traffic to only the subscribers.

- IGMP Enabled: When enabled, the switch will monitor network traffic to determine which hosts want to receive multicast traffic.
- Router Ports: Set if ports are connecting to the IGMP administrative routers.
- Unregistered IPMC Flooding enabled: Set the forwarding mode for unregistered (not-joined) IP multicast traffic. The traffic will flood when enabled and forward to router-ports only when disabled.
- IGMP Snooping Enabled: When enabled, the port will monitor network traffic to determine which hosts want to receive the multicast traffic.
- IGMP Querying Enabled: When enabled, the port can serve as the Querier, which is responsible for asking hosts if they want to receive multicast traffic.

CHAPTER 5: WEB MANAGEMENT

NEED HELP?
LEAVE THE TECH TO US

LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

5.2.6 CONFIGURATION — MIRRORING

Mirroring Configuration

Port	Mirror Source
1	☐
2	☐
3	☐
4	☐
5	☐
6	☐
7	☐
8	☐
9	☐
10	☐

Mirror Port	1 ∨

Apply   Refresh

FIGURE 5-11. MIRRORING CONFIGURATION SCREEN

Port Mirroring is used on a network switch to send a copy of network packets seen on one port (or an entire VLAN) to a network monitoring connection on another switch port. This is commonly used for network appliances that require monitoring of network traffic, such as an intrusion-detection system.

- Port to Mirror to: The port that will "duplicate" or "mirror" the traffic on the source port. Only incoming packets can be mirrored. Packets will be dropped when the available egress bandwidth is less than the ingress bandwidth.
- Ports to Mirror: Select the ports that you want to mirror from this section of the page. A port will be mirrored when the "Mirroring Enabled" checkbox is checked.

5.2.7 CONFIGURATION — LLDP

Transmitted TLVs	
Port Description	✔
System Name	✔
System Description	✔
System Capabilities	✔
Management Address	✔

FIGURE 5-12. TRANSMITTED TLVS SCREEN

- Port Description: When checked, the "port description" is included in the LLDP information transmitted.
- System Name: When checked, the "system name" is included in the LLDP information transmitted.
- System Description: When checked, the "system description" is included in the LLDP information transmitted.
- System Capabilities: When checked, the "system capability" is included in the LLDP information transmitted.
- Management Address: When checked, the "management address" is included in the LLDP information transmitted.

Parameters	
Tx Interval	10
Tx Hold	4
Tx Delay	2
Reinit Delay	2

FIGURE 5-13. PARAMETERS SCREEN

- Tx Interval: The switch periodically transmits LLDP frames to its neighbors to keep the network discovery information up-to-date. The interval between each LLDP frame is determined by the Tx Interval value.

- Tx Hold: Each LLDP frame contains information about how long the information in the LLDP frame will be considered valid. The LLDP information valid period is set to Tx Hold multiplied by Tx Interval seconds.

- Tx Delay: If some configuration is changed (e.g. the IP address), a new LLDP frame is transmitted, but the time between the LLDP frames will always be at least the value of the Tx Delay seconds. Tx Delay cannot be larger than 1/4 of the Tx Interval value.

- Reinit Delay: When a port is disabled, LLDP is disabled or the switch is rebooted, an LLDP shutdown frame is transmitted to the neighboring units, signaling that the LLDP information isn't valid anymore. Tx Reinit controls the amount of seconds between the shutdown frame and a new LLDP initialization.

Port	LLDP State
1	Rx and Tx
2	Rx and Tx
3	Rx and Tx
4	Rx and Tx
5	Rx and Tx
6	Rx and Tx
7	Rx and Tx
8	Rx and Tx
9	Rx and Tx
10	Rx and Tx

Apply   Refresh

FIGURE 5-14. PORT LLDP STATE SCREEN

LLDP State

Select LLDP mode here. The modes here available here include:

- Rx and Tx: The switch will send out LLDP information, and will analyze LLDP information received from neighbors.

- Rx only: The switch will not send out LLDP information, but LLDP information from neighbor units is analyzed.

- Tx only: The switch will drop LLDP information received from neighbors, but will send out LLDP information.

- Disabled: The switch will not send out LLDP information, and will drop LLDP information received from neighbors.

CHAPTER 5: WEB MANAGEMENT

NEED HELP?
LEAVE THE TECH TO US

LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

5.2.8 CONFIGURATION — QUALITY OF SERVICE

FIGURE 5-15. QOS MODE MENU

This switch supports IEEE 802.1p and DSCP for QoS. Click the QoS Mode scroll-down menu to choose the QoS mode you would like to apply, and the QoS Configuration will change according.

QoS IEEE 802.1p

FIGURE 5-16. 802.1P CONFIGURATION SCREEN

Packets are prioritized using the 802.1p field in the VLAN tag. This field is three bits long, representing the values 0–7. When the QoS Mode is set to 802.1p, the 802.1p Configuration table appears, allowing you to map each of the eight 802.1p values to a local priority queue (low, normal, medium or high).

When the QoS Mode is set to 802.1p, the 802.1p Configuration table is displayed. The Custom Prioritize Traffic is the default and suggested value.

NEED HELP?
LEAVE THE TECH TO US
LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

QoS DSCP

QoS Configuration

QoS Mode	DSCP ▾
Prioritize Traffic	All High Priority ▾

DSCP Configuration

DSCP Value(0..63)	Priority
	high ▾
	high ▾
	high ▾
	high ▾
	high ▾
	high ▾
	high ▾
All others	high ▾

APPLY   CANCEL

FIGURE 5-17. QOS CONFIGURATION SCREEN

In DSCP mode, packets are prioritized using the DSCP (Differentiated Services Code Point) value. The Differentiated Services Code Point (DSCP) is a six-bit field that is contained within an IP (TCP or UDP) header. The six bits allow the DSCP field to take any value in the range 0–63. When QoS Mode is set to DSCP, the DSCP Configuration table is displayed, allowing you to map each of the DSCP values to a hardware output queue (low, normal, medium or high). The default settings map all DSCP values to the high priority egress queue.

You can use the Prioritize Traffic drop-down list to quickly set the values in the DSCP Configuration table to a common priority queue. Use Custom if you want to set each value individually.

When the QoS Mode is set to DSCP, the DSCP Configuration table is displayed.

- Strict: Services the egress queues in sequential order, transmitting all traffic in the higher priority queues before servicing lower priority queues.
- WRR: Weighted Round-Robin shares bandwidth at the egress ports by using scheduling weights with default values of 1, 2, 4, 8 for queues 0 through 7, respectively. (This is the default selection.)

NOTE: WRR can only be selected if Jumbo Frame mode is disabled on the Port Configuration page.

5.3 WEB MANAGEMENT — MONITORING

5.3.1 MONITORING — STATISTICS OVERVIEW

Statistics Overview for all ports

Clear | Refresh

Port	Tx Bytes	Tx Frames	Rx Bytes	Rx Frames	Tx Errors	Rx Errors
1	61193	0	3858	29	0	0
2	30871	47	66294	275	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0

FIGURE 5-18. STATISTICS OVERVIEW FOR ALL PORTS SCREEN

This page displays the TX/RX Bytes/Frames/Errors of the switch.

Buttons

◆ Clear: Clear all the counters listed here.

◆ Refresh: Refresh the page.

5.3.2 MONITORING — DETAILED STATISTICS

Statistics for Port 1

Clear Refresh | Port 1 | Port 2 | Port 3 | Port 4 | Port 5 | Port 6 | Port 7 | Port 8 |
Port 9 | Port 10 | Port 11 | Port 12 | Port 13 | Port 14 | Port 15 | Port 16 |

Receive Total		Transmit Total	
Rx Packets	37	Tx Packets	0
Rx Octets	4370	Tx Octets	72357
Rx High Priority Packets	-	Tx High Priority Packets	-
Rx Low Priority Packets	-	Tx Low Priority Packets	-
Rx Broadcast	0	Tx Broadcast	292
Rx Multicast	8	Tx Multicast	424
Rx Broad- and Multicast	-	Tx Broad- and Multicast	-
Rx Error Packets	0	Tx Error Packets	0

Receive Size Counters		Transmit Size Counters	
Rx 64 Bytes	38	Tx 64 Bytes	99
Rx 65-127 Bytes	1	Tx 65-127 Bytes	545
Rx 128-255 Bytes	0	Tx 128-255 Bytes	59
Rx 256-511 Bytes	6	Tx 256-511 Bytes	13
Rx 512-1023 Bytes	0	Tx 512-1023 Bytes	0
Rx 1024- Bytes	0	Tx 1024- Bytes	0

Receive Error Counters		Transmit Error Counters	
Rx CRC/Aligment	0	Tx Collisions	0
Rx Undersize	0	Tx Drops	0
Rx Oversize	0	Tx Overflow	-
Rx Fragments	0		
Rx Jabber	0		
Rx Drops	0		

FIGURE 5-19. STATISTICS FOR PORT 1 SCREEN

This page displays the detailed information for each port of the switch.

- Ports: Press the hyperlink listed to display detailed information regarding to each port.

Buttons

- Clear: Clear all the counters listed here.
- Refresh: Refresh the page.

5.3.3 MONITORING — IGMP STATUS

IGMP Status

VLAN ID	Querier	Queries transmitted	Queries received	v1 Reports	v2 Reports	v3 Reports	v2 Leaves
1	Idle	0	0	0	0	0	0
2	Idle	0	0	0	0	0	0

Refresh

FIGURE 5-20. IGMP STATUS SCREEN

- VLAN ID: VLAN ID number.
- Querier: Show whether Querying is enabled.
- Queries transmitted: Show the number of transmitted Query packets.
- Queries received: Show the number of received Query packets.
- v1 Reports: Show the number of received v1 Report packets.

* v2 Reports: Show the number of received v2 Report packets.
* v3 Reports: Show the number of received v2 Report packets.
* v3 Leave: Show the number of v3 leave packets received.

Buttons

* Refresh: Refresh the page.

5.3.4 MONITORING — LLDP STATISTICS

LLDP Statistics

Port	Tx Frames	Rx Frames	Rx Error Frames	Discarde Frames	TLVs discarded	TLVs unrecognized	Org. TLVs discarded	Ageouts
1	222	0	0	0	0	0	0	0
2	223	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0

Refresh

FIGURE 5-21. LLDP STATISTICS SCREEN

* Tx Frames: The number of LLDP frames transmitted on the port.
* Rx Frames: The number of LLDP frames received on the port.
* Rx Error: The number of received LLDP frames containing some kind of error.
* Discarded Frames: If an LLDP frame is received on a port, and the switch's internal table has run full, the LLDP frame is counted and discarded. This situation is known as "Too Many Neighbors" in the LLDP standard. LLDP frames require a new entry in the table when the Chassis ID or Remote Port ID is not already contained within the table. Entries are removed from the table when a given port's link is down, an LLDP shutdown frame is received, or when the entry ages out.
* TLVs Discarded: Each LLDP frame can contain multiple pieces of information, known as TLVs (TLV is short for "Type Length Value"). If a TLV is malformed, it is counted and discarded.
* TLVs Unrecognized: The number of well-formed TLVs, but with an unknown type value.
* Org. TLVs Discarded: The number of organizationally received TLVs.
* Ageouts: Each LLDP frame contains information about how long the LLDP information is valid (age-out time). If no new LLDP frame is received within the age-out time, the LLDP information is removed, and the age-out counter is incremented.

CHAPTER 5: WEB MANAGEMENT

NEED HELP?
LEAVE THE TECH TO US

LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

5.3.5 MONITORING — LLDP TABLE

LLDP Neighbour Table

Local Port	Chassis Id	Remote Port ID	System Name	Port description	System Capabilities	Management Address
			No entries in table			

Refresh

FIGURE 5-22. LLDP NEIGHBOR TABLE SCREEN

- Local Port: The port on which the LLDP frame was received.

- Chassis ID: The Chassis ID is the identification of the neighbor's LLDP frames.

- Remote Port ID: The Remote Port ID is the identification of the neighbor port.

- System Name: System Name is the name advertised by the neighbor unit.

- Port Description: Port Description is the port description advertised by the neighbor unit.

- System Capabilities: System Capabilities describes the neighbor unit's capabilities. The possible capabilities are:

  1. Other

  2. Repeater

  3. Bridge

  4. WAN Access Point

  5. Router

  6. Telephone

  7. DOCSIS cable device

  8. Station only

  9. Reserved

  When a capability is enabled, the capability is followed by (+). If the capability is disabled, the capability is followed by (-).

- Management Address: Management Address is the neighbor unit's address that is used for higher layer entities to assist discovery by the network management. This could, for instance, hold the neighbor's IP address.

CHAPTER 5: WEB MANAGEMENT

NEED HELP?
LEAVE THE TECH TO US
LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

5.3.6 MONITORING — PING

Ping Parameters

Target IP address	
Count	1 v
Time Out (in secs)	1 v

Apply

Ping Results

Target IP address	0.0.0.0
Status	Test complete
Received replies	0
Request timeouts	0
Average Response Time (in ms)	0

Refresh

FIGURE 5-23. PING PARAMETERS SCREEN

- Target IP Address: IP address of the host
- Count: Number of packets to send. (Range: 1–20)
- Time Out: Sets the time period when the host will be Pinged.
- Normal response: The normal response occurs in one to ten seconds, depending on network traffic.
- Destination does not respond: If the host does not respond, a "timeout" appears in ten seconds.
- Destination unreachable: The gateway for this destination indicates that the destination is unreachable.
- Network or host unreachable: The gateway found no corresponding entry in the route table.

5.4 WEB MANAGEMENT — MAINTENANCE

5.4.1 MAINTENANCE — WARM RESTART

Warm Restart

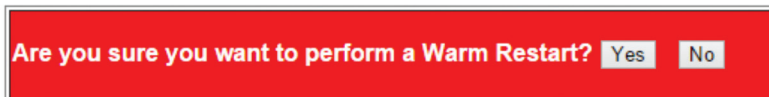Are you sure you want to perform a Warm Restart? Yes No

FIGURE 5-24. WARM RESTART SCREEN

Here you can reboot the switch.

Buttons

- Yes: Reboot the switch.
- No: Cancel switch rebooting.

5.4.2 MAINTENANCE — FACTORY DEFAULT

Factory Default

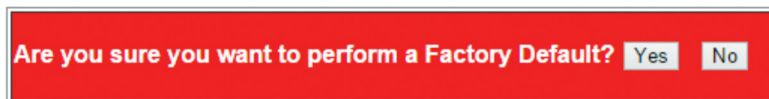Are you sure you want to perform a Factory Default? Yes No

FIGURE 5-25. FACTORY DEFAULT SCREEN

You can reset all current settings back to the switch's factory default settings.

NOTE: The switch must be ON while resetting.

Buttons

- Yes: Reset all settings of the switch back to the factory default settings, including the switch's IP address and system administrator password.
- No: Cancel resetting all settings back to the factory default settings.

CHAPTER 5: WEB MANAGEMENT

NEED HELP?
LEAVE THE TECH TO US

LIVE 24/7
TECHNICAL
SUPPORT

1.877.877.2269

5.4.3 MAINTENANCE — SOFTWARE UPLOAD

Software Upload

Choose File | No file chosen

Upload

FIGURE 5-26. SOFTWARE UPLOAD SCREEN

Here you can upload firmware from your PC to the switch.

Buttons

- Choose File: Press this button to choose the firmware file you would like to upload to the switch.
- Upload: After choosing the firmware file, press this button to upload the firmware.

NOTE: The switch MUST BE ON during the uploading process. Turning the switch's power off during the uploading process might cause the system to malfunction. We highly recommend the you reset your switch's settings back to the factory default after uploading the firmware.

5.4.4 MAINTENANCE — CONFIGURATION FILE TRANSFER

Configuration Upload

Choose File | No file chosen

Upload

Configuration Download

Download

FIGURE 5-27. CONFIGURATION UPLOAD SCREEN

Here you can upload a pre-saved configuration file, or save all the current settings as a "*.cfg" file.

Configuration Upload

Buttons

- Choose File: Press this button to choose the pre-saved configuration file.
- Upload: After choosing the configuration file, press this button to upload the file.

NOTE: The switch MUST BE ON during the uploading process. Turning the switch's power off during the uploading process might cause the system to malfunction.

CHAPTER 5: WEB MANAGEMENT

NEED HELP?
LEAVE THE TECH TO US
LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

Configuration Download

Buttons

• Download: Press this button to save all the current settings as a "*.cfg" file.

5.4.5 MAINTENANCE — LOGOUT

Maintenance

Warm Restart
Factory Default
Software Upload
Configuration File Transfer
Logout

FIGURE 5-28. CONFIGURATION UPLOAD SCREEN

Press the "Logout" option on the management web page to logout. We highly recommend that you logout after using the switch's management web page. The system will automatically logout if the management web page is not active after a set time.

NEED HELP?
LEAVE THE TECH TO US
LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

APPENDIX A: IP CONFIGURATION FOR YOUR PC

This appendix describes how to set the IP address of your PC so you can connect to the switch's configuration web page. The configuration web page allows you to set system variables or monitor system status.

The following section will explain how to set the IP address properly in a Microsoft® Windows® 8 environment. Setting the IP address in another Microsoft operating system (such as Windows Vista or Windows 7) is similar.

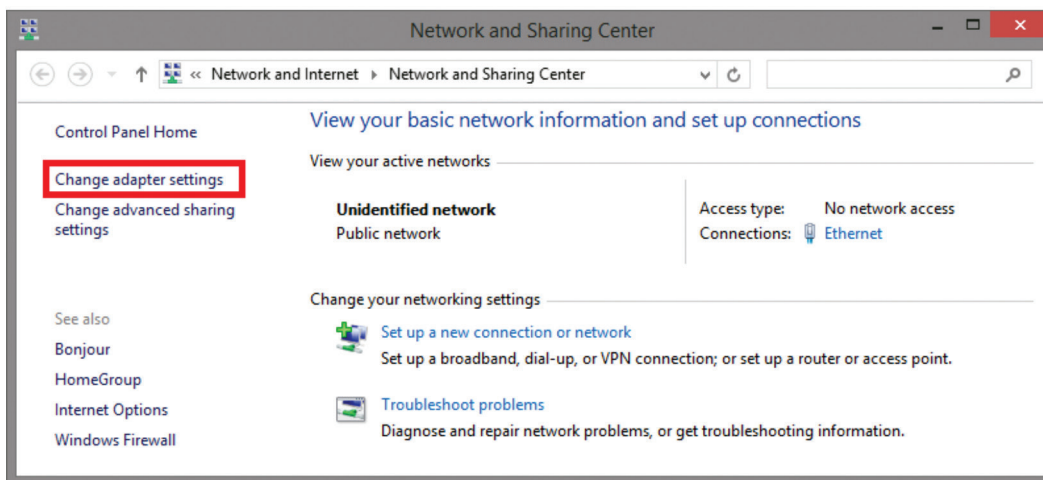1. Open Network and Sharing Center in Control Panel, and click on Change adapter settings.

FIGURE A-1. NETWORK AND SHARING CENTER SCREEN

2. A Network Connections window will pop up, showing all the network connections available on your PC. Double-click on the network connection you are using to connect the device.
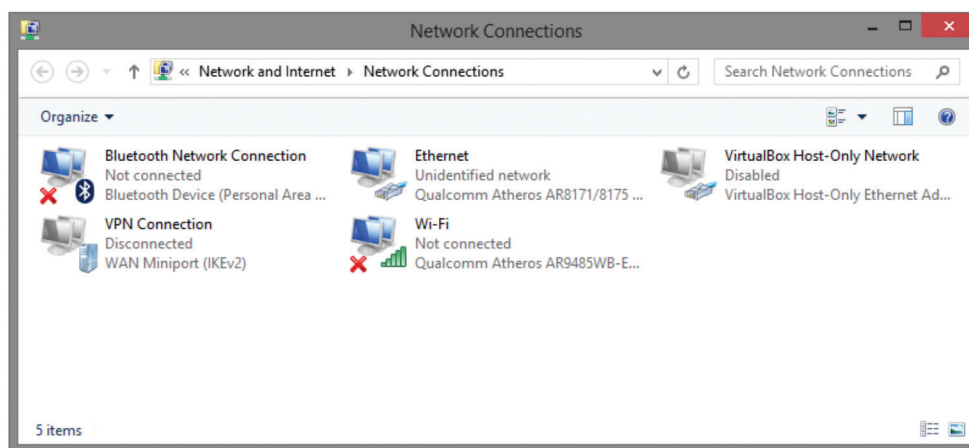

FIGURE A-2. NETWORK CONNECTIONS SCREEN

APPENDIX A: IP CONFIGURATION FOR YOUR PC

3. An Ethernet Status window will pop up. Click on the Properties button.
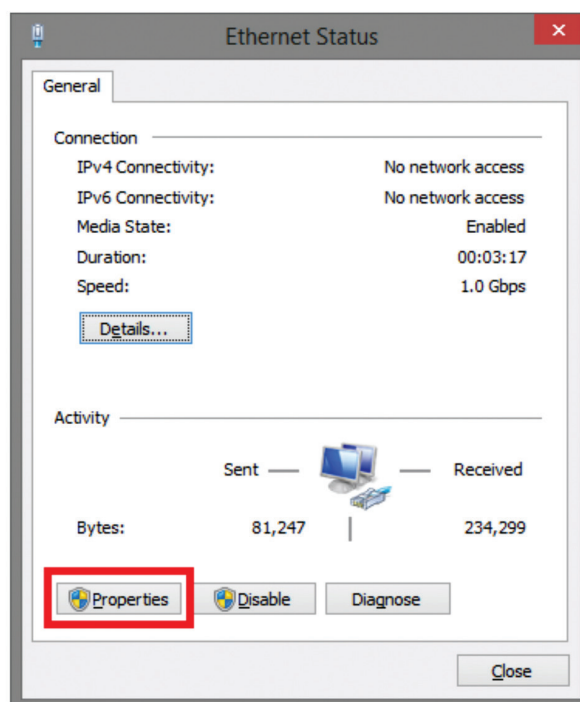

FIGURE A-3. ETHERNET STATUS SCREEN

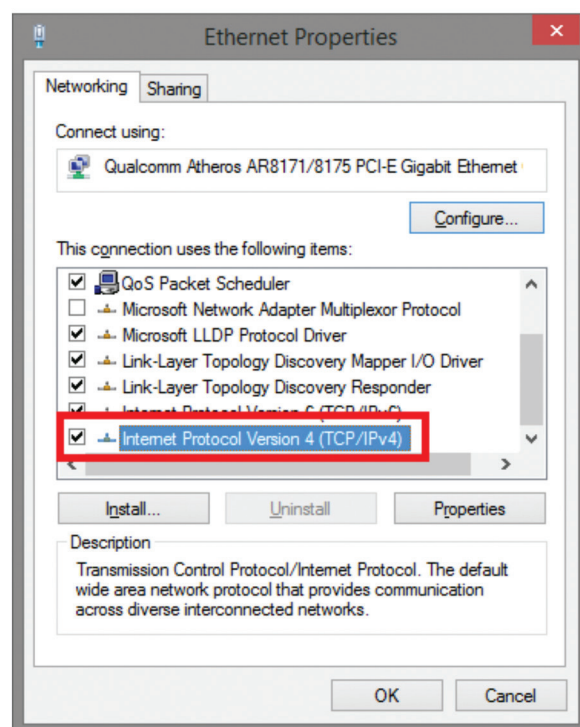4. An Ethernet Properties window will pop up. Double-click on the Internet Protocol Version 4 (TCP/IPv4).

FIGURE A-4. ETHERNET PROPERTIES SCREEN

5. An Internet Protocol Version 4 (TCP/IPv4) Properties window will pop up. Set your PC's IP address and subnet mask.

By default, your switch's IP address should be 192.168.2.1. You can set any IP address for the PC as long as it's not the same as your switch's IP address and is in the same network segment with your switch's IP address.

Press OK to apply the TCP/IPv4 settings you just made. Now you can connect to your product using a web browser (i.e., Internet Explorer, Chrome, or Firefox).
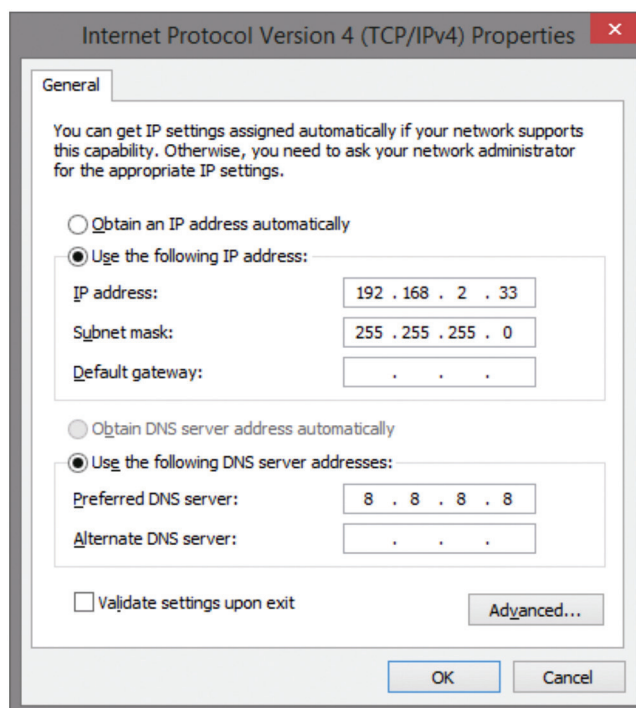

FIGURE A-5. TCP/IPV4 PROPERTIES SCREEN

NEED HELP?
LEAVE THE TECH TO US
LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

APPENDIX B: REGULATORY INFORMATION

B.1 FCC CLASS A STATEMENT

This equipment generates, uses, and can radiate radio-frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

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

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

B.2 CE NOTICE

This product complies with CE certifications.

APPENDIX B: REGULATORY INFORMATION

NEED HELP?
LEAVE THE TECH TO US
LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

B.3 NOM STATEMENT

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.

2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.

3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.

4. Todas las instrucciones de operación y uso deben ser seguidas.

5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.

6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.

7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.

8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.

9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.

10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.

11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.

13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.

14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.

15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.

16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.

17. Cuidado debe ser tomado de tal manera que objetos liquidos no sean derramados sobre la cubierta u orificios de ventilación.

18. Servicio por personal calificado deberá ser provisto cuando:
    A: El cable de poder o el contacto ha sido dañado; u
    B: Objectos han caído o líquido ha sido derramado dentro del aparato; o
    C: El aparato ha sido expuesto a la lluvia; o
    D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
    E: El aparato ha sido tirado o su cubierta ha sido dañada.

NEED HELP?
LEAVE THE TECH TO US
LIVE 24/7
TECHNICAL
SUPPORT
1.877.877.2269

APPENDIX C: DISCLAIMER/TRADEMARKS

C.1 DISCLAIMER

Black Box Corporation shall not be liable for damages of any kind, including, but not limited to, punitive, consequential or cost of cover damages, resulting from any errors in the product information or specifications set forth in this document and Black Box Corporation may revise this document at any time without notice.

C.2 TRADEMARKS USED IN THIS MANUAL

Black Box and the Black Box logo type and mark are registered trademarks of Black Box Corporation.

Google and the Google logo are registered trademarks, and Chrome is a trademark, of Google LLC.

Microsoft Internet Explorer, Microsoft, and Windows are registered trademarks of Microsoft Corporation in the United States and other countries.

Mozilla, Firefox and the Firefox logo are trademarks of the Mozilla Foundation in the U.S. and other countries.

Any other trademarks mentioned in this manual are acknowledged to be the property of the trademark owners.

NOTES

NEED HELP?
LEAVE THE TECH TO US
**LIVE 24/7
TECHNICAL
SUPPORT**
1.877.877.2269