LGB5028A
LGB5052A

BLACK BOX®

24 + or 48 + 4-Port Gigabit Managed Switch with SFP+ 10G

Network Administrator's Installation and Getting Started Guide

The switches provide 24 or 48 ports of Gigabit connectivity plus 4 10G ports.

Customer Support Information

Order toll-free in the U.S.: Call 877-877-BBOX (outside U.S. call 724-746-5500)
FREE technical support 24 hours a day, 7 days a week: Call 724-746-5500 or fax 724-746-0746
www.blackbox.com • info@blackbox.com

Trademarks Used in this Manual

Black Box and the Double Diamond logo are registered trademarks of BB Technologies, Inc.

Intel is a registered trademark of Intel Corporation.

Xerox is a registered trademark of Xerox Corporation.

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

We're here to help! If you have any questions about your application
or our products, contact Black Box Tech Support at **724-746-5500**
or go to **blackbox.com** and click on "Talk to Black Box."
You'll be live with one of our technical experts in less than 60 seconds.

Federal Communications Commission and Industry Canada Radio Frequency Interference Statements

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.

Instrucciones de Seguridad
(Normas Oficiales Mexicanas Electrical Safety 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 objectos 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.

Network Administrator's Installation and Getting Started Guide

This guide gives specific information on how to operate and use the management functions of the switch.

The guide is intended for use by network administrators who are responsible for operating and maintaining network equipment; consequently, it assumes a basic working knowledge of general switch functions, the Internet Protocol (IP), and Simple Network Management Protocol (SNMP).

Conventions Used in this Manual

The following conventions are used throughout this guide:

NOTE: Emphasizes important information or calls your attention to related features or instructions.

CAUTION: Alerts you to a potential hazard that could cause loss of data, or damage the system or equipment.

WARNING: Alerts you to a potential hazard that could cause personal injury.

Safety Instructions

CAUTION: Circuit devices are sensitive to static electricity, which can damage their delicate electronics. Dry weather conditions or walking across a carpeted floor may cause you to acquire a static electrical charge.

To protect your device, always:

- Touch the metal chassis of your computer to ground the static electrical charge before you pick up the circuit device.
- Pick up the device by holding it on the left and right edges only.
- If you need to connect an outdoor device to the switch with cable, then you need to add an arrestor on the cable between the outdoor device and this switch.

NOTE: The switch is an indoor device; if it will be used in an outdoor environment or connect with an outdoor device, use a lightning arrestor to protect the switch.

Do not place the product outdoors in a sandstorm.

Before installation, make sure input power supply and product specifications are compatible with each other.

To reduce the risk of electric shock, disconnect all AC or DC power cords and RPS cables to completely remove power from the unit.

Before importing/exporting configuration, make sure the firmware version is updated.

After a firmware upgrade, the switch will reset the configuration automatically to the latest firmware version.

For specific information on how to operate and use the management functions of the switch, see the 24 + 4 or 48 + 4 Gigabit Managed Switch with (4) SFP and 10G User's Manual.

Table of Contents

1. Specifications

1.1 Physical Characteristics

Aggregate Bandwidth — LGB5028A: 28 Gbps;
LGB5052A: 52 Gbps

Buffer Architecture — 1392 KB on-chip frame buffer

Network Interface — LGB5028A: Ports 1–20: RJ-45 connector (Auto MDI-X);
10BASE-T: RJ-45 (100-ohm, UTP cable, Category 3 or better);
100BASE-TX: RJ-45 (100-ohm, UTP cable, Category 5 or better);
1000BASE-T: RJ-45 (100-ohm, UTP or STP cable, Category 5, 5e, or 6), Ports 21–24: RJ-45 connector/(100/1000M) SFP;
Ports 25–28: 1000M/10G SFP ports;
LGB5052A: Ports 1–44: RJ-45 connector (Auto MDI-X);
10BASE-T: RJ-45 (100-ohm, UTP cable, Category 3 or better);
100BASE-TX: RJ-45 (100-ohm, UTP cable, Category 5 or better);
1000BASE-T: RJ-45 (100-ohm, UTP or STP cable, Category 5, 5e, or 6, Ports 45–48: RJ-45 connector/(100/1000M) SFP,
Ports 45–48: RJ-45 connector/(100/1000M) SFP;
Ports 49–52: 1000M/10G SFP ports

Ports — LGB5028A: (20) 10/100/1000 Mbps twisted-pair, (4) 100M/1G SFP combo ports, (4) 1G/10Gbps fiber ports;
LGB5052A: (44) 10/100/100 Mbps twisted-pair, (4) 100M/1G SFP combo ports, (4) 1G/10Gbps fiber ports

Switching Database — 9K MAC address entries

Indicators — LEDs: System: Power; TP port: Status (LINK/ACT), 10/100/1000M;
SFP port: Status (LINK/ACT/SPD), 100/1000M

Temperature Tolerance — Operating: 32 to 104° F (0 to 40° C)

Humidity Tolerance — Operating: 5 to 90% (non-condensing(

Power — Input: 100–240 VAC, 50–60 Hz internal power supply;
Consumption: 60 watts maximum

Size — 1.8"H x 17.4"W x 11.8:D (4.4 x 44.2 x 30 cm)

Weight — LGB5028A: 8.6 lb. (3.9 kg);
LGB5052A: 9.1 lb. (4.1 kg)

1.2 Switch Features

Flow Control — Full-duplex: IEEE 802.3x;
Half-duplex: Backpressure

Forwarding Mode — Store-and-forward

Throughput — LGB5028A: 95.23 mpps (millions of packets per second) (64-byte packets), 128 Gbps (switching capacity);
LGB5052A: 130.95 mpps (64-byte packets), 136 Gbps (switching capacity);
Jumbo Frames: Frame sizes up to 9 KB supported on Gigabit interfaces

1.3 Management Features

In-Band Management — SSH/SSL, Telnet, SNMP, or HTTP

Out-of-Band Management — RS-232 (RJ-45 console port)

Software Loading — HTTP, TFTP in-band, console out-of-band

1.4 Standards

Standards — IEEE 802.3 10BASE-T Ethernet (twisted-pair copper), IEEEE 802.3u 100BASE-TX Ethernet (twisted-pair copper),
IEEE 802.3ab 1000BASE-TX Ethernet (twisted-pair copper),
IEEE 802.3z 1000BASE-X Ethernet,
IEEE 802.3x Flow Control Capability,
ANSI/IEEE 802.3 Auto-negotiation,
IEEE 802.1Q VLAN,
IEEE 802.1p Class of Service,
IEEE 802.1X Access Control,
IEEE 802.1D Spanning Tree,
IEEE 802.1w Rapid Spanning Tree,
IEEE 802.1s Multiple Spanning Tree,
IEEE 802.3ad Link Aggregation Control Protocol (LACP)
IEEEE 802.1AB Link Layer Discovery Protocol (LLDP)

1.5 Compliances

Compliance — EN55022 (CISPR 22) Class A EN 61000-3; FCC Class A

Immunity — EN 61000-4-2/3/4/5/6/8/11, EN 55024

2. Overview

2.1 Introduction

The 24 + 4 or 48 + 4 Managed Gigabit Switches with 4 SFP+ 10G are easy-to-implement managed Ethernet switches. Models have 24 or 48 ports of Gigabit Ethernet connectivity plus four 10G ports. These switches deliver more intelligent features to improve the availability of your critical business applications, protect your sensitive information, and optimize your network bandwidth to deliver information and applications more effectively. Both switches support advanced security management capabilities and network features including data, voice, security, and wireless technologies. These switches are easy to deploy and configure, providing the stable and quality performance network services your business needs. Typical applications include small business and enterprise.

2.2 Features

- Performs wire-speed, non-blocking switching to enable wire-speed transport of multiple packets at low latency on all ports simultaneously.
- Provides full-duplex capability on all ports, which effectively doubles the bandwidth of each connection.
- Uses store-and-forward technology to ensure maximum data integrity. With this technology, the entire packet must be received into a buffer and checked for validity before being forwarded. This prevents errors from being propagated throughout the network.
- You can also manage the switch over the network with a Web browser or Telnet application. Manage it in-band using SNMP or RMON (Groups 1, 2, 3, 9) protocols. Configure and monitor the switch out-of-band via a null-modem serial cable. (See Appendix B for wiring options.)

NOTE: For a detailed description of the management features, refer to the user's manual.

2.3 What's Included

Your package should include the following items. If anything is missing or damaged, contact Black Box Technical Support at 724-746-5500 or info@blackbox.com.

LGB5028A:

- 24 + 4 Managed Gigabit Switch with 4SFP+ 10G
- (4) adhesive rubber feet
- Mounting accessory (for 19" rack shelf, optional)
- (1) RS-232 to RJ-45 console cable
- (1) AC power cord
- (1) user's manual on CD-ROM
- This installation guide

LGB5052A:

- 48 + 4 Managed Gigabit Switch with 4SFP+ 10G
- (4) adhesive rubber feet
- Mounting accessory (for 19" rack shelf, optional)
- (1) RS-232 to RJ-45 console cable
- (1) AC power cord
- (1) user's manual on CD-ROM

• This installation guide

2.4 Hardware Description

2.4.1 LGB5028A

FIgures 2-1 and 2-2 show the front and back panels of the LGB5028A. Table 2-1 describes its components.

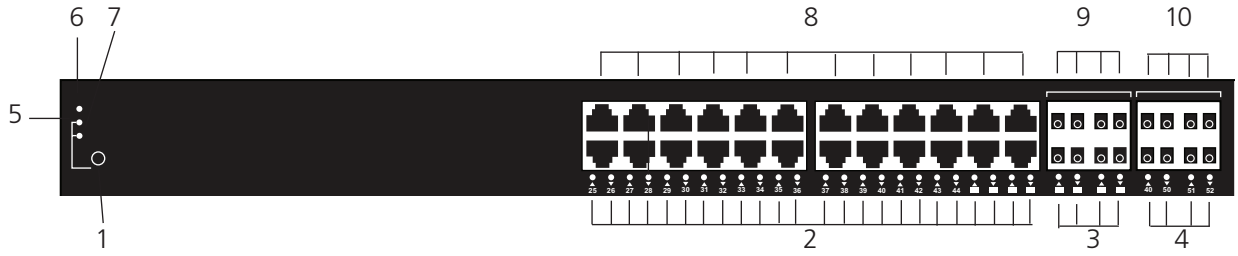

Figure 2-1. LGB5028A front panel.

Figure 2-2. LGB5028A back panel.

Table 2-1. LGB5028A components.

Number	Component	Description
1	Mode button	Switches between Link/Act mode and Speed mode.
2	Switch TP Port LEDs	In Speed mode, Link LED will light green (1000 Mbps) or amber (100 Mbps). In Link/Act mode, LED lights to show Link and blinks to show Act.
3	Switch combo port LEDs	In Speed mode, Link LED will light green (1000 Mbps) or amber (100 Mbps). In Link/Act mode, LED lights to show Link and blinks to show Act.
4	Switch SFP port LEDs	Light when Link is present; OFF when no link is present.
5	Link/Act LED	Lights when mode is set to Link/Act.
6	System LED	Lights when unit is powered ON.
7	Speed LED	Lights when mode is set to Speed.
8	(24) 10/100/1000BASE-T RJ-45 ports	Copper Ethernet ports.
9	100/1G SEP combo ports	1G/100 Mbps SFP ports
10	1G/10G SFP ports	10G/1G SFP ports
11	Console connector	DB9 male console port
12	AC power socket	IEC 320 power socket

2.4.2 LGB5052A

Figures 2-3 and 2-4 show the front and back panels of the LGB5052A. Table 2-2 describes its components.

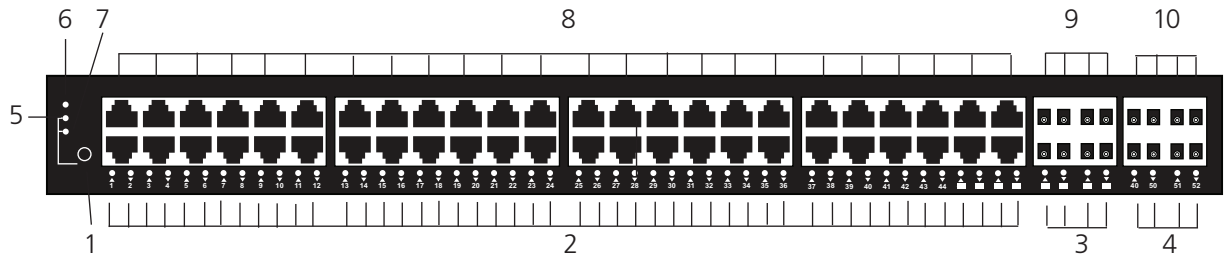

Figure 2-3. LGB5052A front panel.

Figure 2-4. LGB5052A back panel.

Table 2-2. LGB5052A components.

Number	Component	Description
1	Mode button	Switches between Link/Act mode and Speed mode.
2	Switch TP Port LEDs	In Speed mode, Link LED will light green (1000 Mbps) or amber (100 Mbps). In Link/Act mode, LED lights to show Link and blinks to show Act.
3	Switch combo port LEDs	In Speed mode, Link LED will light green (1000 Mbps) or amber (100 Mbps). In Link/Act mode, LED lights to show Link and blinks to show Act.
4	Switch SFP port LEDs	Light when Link is present; OFF when no link is present.
5	Link/Act LED	Lights when mode is set to Link/Act.
6	System LED	Lights when unit is powered ON.
7	Speed LED	Lights when mode is set to Speed.
8	(48) 10/100/1000BASE-T RJ-45 ports	Copper Ethernet ports.
9	100/1G SEP combo ports	1G/100 Mbps SFP ports
10	1G/10G SFP ports	10G/1G SFP ports
11	Console connector	DB9 male console port
12	AC power socket	IEC 320 power socket

3. Hardware Compatibility

3.1 1000BASE-T Ports

The switch contains 28 or 52 1000BASE-T RJ-45 ports. All RJ-45 ports support automatic MDI/MDI-X operation, autonegotiation, and IEEE 802.3x autonegotiation of flow control, so the switch selects the optimum data rate and transmission automatically.

3.2 SFP Transceiver Slots

The LGB2028A and LGB5052A support the Small Form Factor Pluggable (SFP) transceiver slots for RJ-45 Ports 20–24 or 45–48. In the default configuration, if an SFP transceiver (purchased separately) is installed in a slot and has a valid link on the port, the associated RJ-45 port is disabled.

Table 3-1 shows a list of transceiver types that have been tested with the switch. To order transceivers, contact Black Box Technical Support at 724-746-5500 or info@blackbox.com. For information on the recommended standards for fiber optic cabling, contact Black Box Technical Support at 724-746-5500 or info@blackbox.com.

Table 3-1. Supported SFP transceivers.

Media Standard	Fiber Diameter (microns)	Wavelength (nm)	Maximum Distance
1000BASE-SX	50/125	850	1760 feet (550 m)
1000BASE-SX	62.5/125	850	880 feet (275 m)
1000BASE-LX/LHX/XD/ZX	9/125	1310	6.2, 18.6 miles (10, 30 km)
1000BASE-LX/LHX/XD/ZX	9/125	1550	18.6, 31.1 miles (30, 50 km)
1000BASE-LX Single Fiber	9/125	TX: 1310/RX: 1550	6.2, 12.4 miles (10, 30 km)
1000BASE-LX Single Fiber	9/125	TX: 1550/RX: 1310	6.2, 12.4 miles (10, 30 km)
1000BASE-T	N/A	N/A	328 feet (100 m)
100-FX	62.5/125	1310	1.2 miles (2 km)
100-FX	9/125	1310	12.4, 24.8, 37.3 miles (20, 40, 60 km)

NOTE: The maximum distance may vary for different SFP vendors.

3.3 Port and System Status LEDs

The LGB5028A or LGB5052A switch includes a display panel for system and port indications that simplify installation and network troubleshooting. The LEDs are located on left hand side of the front panel for easy viewing. Details are shown in Figures 2-1 and 2-3 and described in Tables 3-2, 3-3, and 3-4.

Table 3-2. Port Status LEDs.

LED	Condition	Status
TP (Link/Act)	Green	Lights green when TP link is good.
	Blinking	Blinks when traffic is present.
TP SPEED	Green	Lights green when TP link speed is 1000 Mbps.
	Yellow	Lights yellow when TP link speed is 100 Mbps.
	Off	Off when TP link speed is 10 Mbps.
SFP (Link/Act)	Green	Lights green when the SFP link is good.
	Blinking	Blinks when traffic is present.
SFP SPEED	Blue	Lights blue when the SFP link speed is 10 Gbps.
	Green	Lights green when SFP link speed is 1000 Mbps.

Table 3-3. System Status LEDs.

LED	Condition	Status
System	Green	Lights green when the switch is powered on.
	OFF	Off when the power is off.

3.4 Power Supply Socket

The LGB5028A and LGB5052A switches have an a standard power socket for an AC power cord.

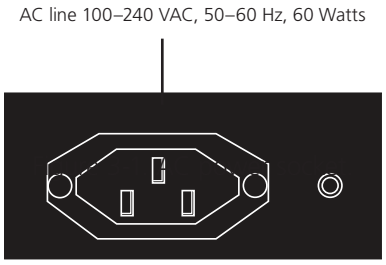

Figure 3-1. AC power socket.

3.5 Mode Status LEDs

The LGB5028A or LGB5052A switch provides a mode switch function. There are two modes for all of each port's LEDs. To switch from LINK/ACT mode to SPEED mode, press the MODE button. When the switch is in LINK/ACT mode, each port's LED shows the Link or Act status. When the switch is in SPEED mode, each port's LED shows the link speed status using different colors.

Table 3-4. Mode Status LED.

LED	Condition	Status
Link/ACT	Green	Lights green when the ports are in Link/ACT mode.
	Blinking	Blinks when traffic is present.
SPEED	Blue	Lights blue when the port speed is 10 Gbps.
	Green	Lights green when the port speed is 1000 Mbps.
	Yellow	Lights yellow when the port speed is 100 Mbps.
	Off	Off when the port speed is 10 Mbps.

4. Network Planning

4.1 Introduction to Switching

A network switch enables simultaneous transmission of multiple packets, and it can partition a network more efficiently than bridges or routers. The switch is one of the most important devices for today's networking technology.

When performance bottlenecks are caused by congestion at the network access point such as a file server, the device can be connected directly to a switched port. And, by using full-duplex mode, the bandwidth of the dedicated segment can be doubled to maximize throughput.

When networks are based on repeater (hub) technology, the distance between end stations is limited by a maximum hop count. However, a switch can subdivide the network into smaller and more manageable segments, linking them to the larger network so the hop count resets to zero and removes the limitation.

A switch can be easily configured in any Ethernet, Fast Ethernet, or Gigabit Ethernet network to significantly increase bandwidth while using conventional cabling and network cards.

4.2 Application Examples

The LGB5028A and LGB5052A have 28 or 52 Gigabit Ethernet TP ports with Auto MDI-X and 4 slots for removable SFP modules that support comprehensive types of fiber connection, such as LC and BiDi-LC modules. The switch is not only designed to segment your network, but also to provide a wide range of options in setting up network connections. Typical applications are described below.

Use the switch for the following applications:

- Remote site application in Enterprise or SMB.
- Peer-to-peer application in two remote offices.
- Office network.
- High-performance requirement environment.
- Advanced security for network safety applications.
- Data/voice and videoconference applications.

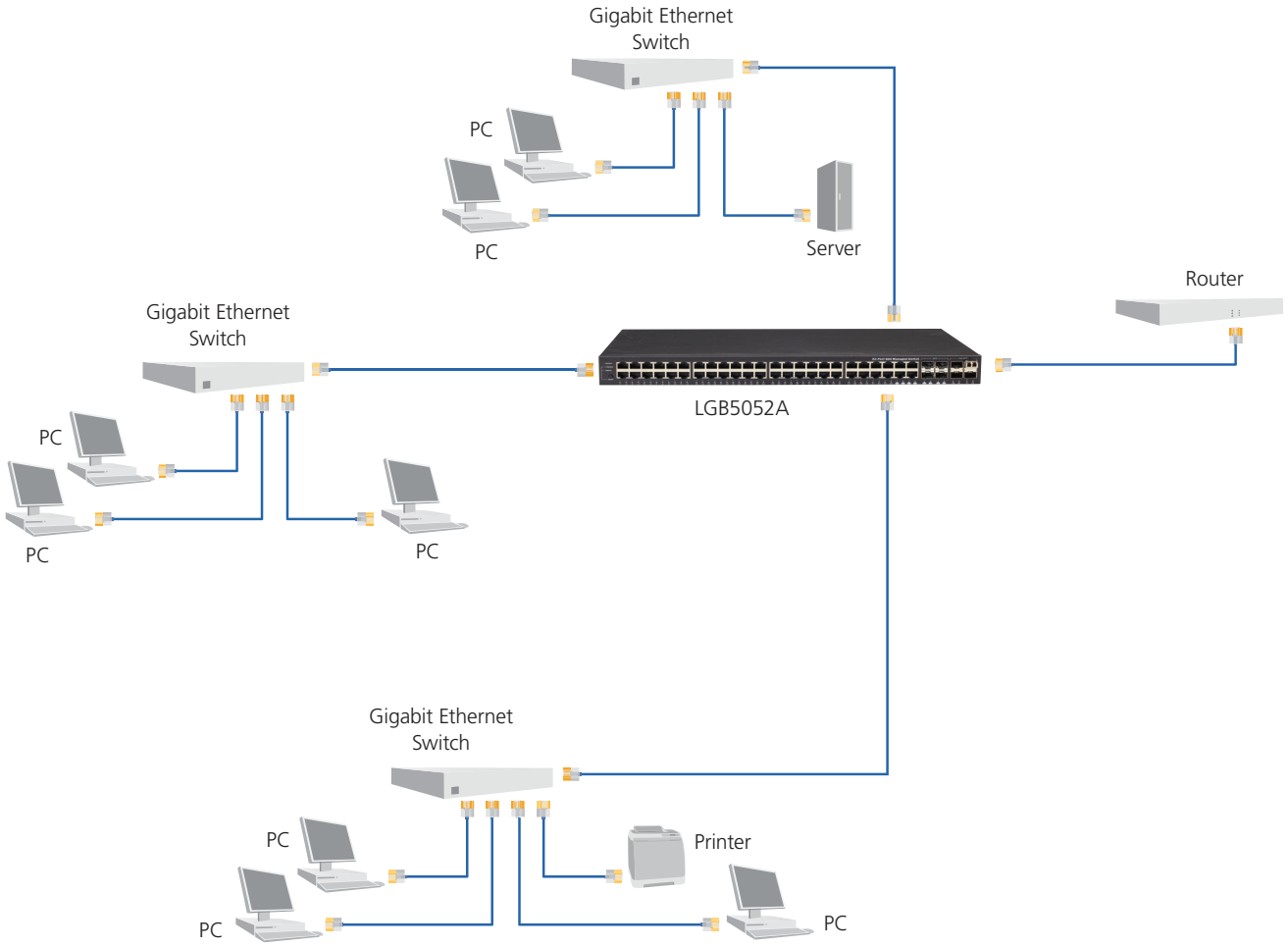

Figure 4-1. Network connection between remote site and central site.

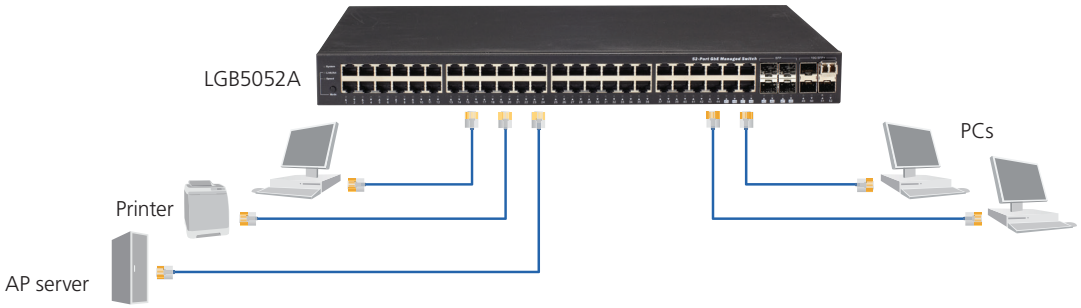

Figure 4-2. Peer-to-peer network connection.

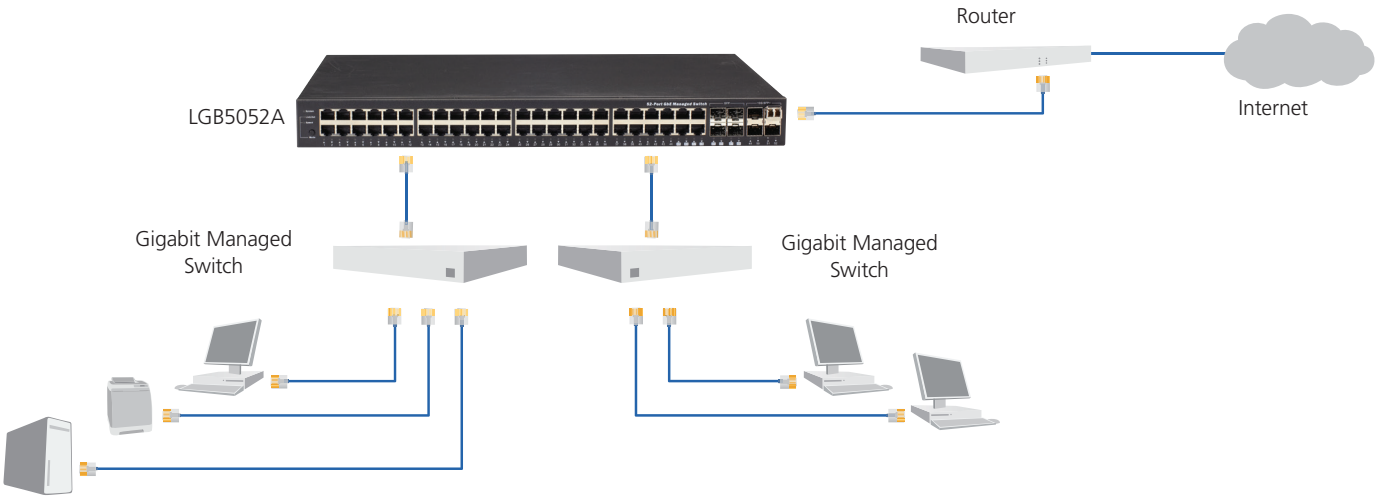

Figure 4-3 Office network connection.

5. Installing the Switch

5.1 Selecting a Site

Mount the switch in a standard 19-inch equipment rack (via an optional rackmount kit) or place it on a flat surface. Be sure to follow the guidelines below when choosing a location.

• The site should:

- Be at the center of all the devices you want to link and near a power outlet.

- Be able to maintain its temperature within 32 to 104° F (0 to 40° C) and its humidity within 10 to 90%, noncondensing.

- Be accessible for installing, cabling, and maintaining the devices.

- Enable the status LEDs to be clearly visible.

• Make sure the twisted-pair Ethernet cable is always routed away from power lines, radios, transmitters, or any other electrical interference.

• Make sure that the LGB5028A or LGB5052A switch is connected to a separate grounded power outlet that provides 100 to 240 VAC, 50 to 60 Hz.

5.2 Ethernet Cabling

To ensure proper operation when installing the switch in a network, make sure that the current cables are suitable for 100BASE-TX or 1000BASE-T operation. Check the following criteria against the current installation of your network:

• Cable type: Unshielded twisted pair (UTP) or shielded twisted pair (STP) cable with RJ-45 connectors; we recommend Category 5 or Category 5e with maximum length of 328 feet (100 meters) 100BASE-TX, and we recommend Category 5e or 6 with maximum length of 328 feet (100 meters) for 1000BASE-T.

• Protection from radio-frequency interference emissions.

• Electrical surge suppression.

• Separation of electrical wires and data-based network wiring.

• Safe connections with no damaged cables, connectors, or shields.

5.3 Equipment Checklist

After unpacking this switch, please check the contents to be sure you have received all the components. Then, before beginning the installation, be sure you have all other necessary installation equipment.

5.4 Package Includes

LGB5028A:

• 24 + 4 Managed Gigabit Switch with 4SFP+ 10G

• (4) adhesive rubber feet

• Mounting accessory (for 19" rack shelf, optional)

• (1) RS-232 to RJ-45 console cable

• (1) AC power cord

• (1) user's manual on CD-ROM

• This installation guide

LGB5052A:

• 48 + 4 Managed Gigabit Switch with 4SFP+ 10G

- (4) adhesive rubber feet
- Mounting accessory (for 19" rack shelf, optional)
- (1) RS-232 to RJ-45 console cable
- (1) AC power cord
- (1) user's manual on CD-ROM
- This installation guide

NOTE: Notify your sales representative immediately if any of the items listed above are missing or damaged.

WARNING: The mini-GBICs are Class 1 laser devices. Avoid direct eye exposure to the beam coming from the transmit port.

5.5 Mounting

The switch can be mounted in a standard 19-inch equipment rack or on a desktop or shelf. See the mounting instructions described next.

5.5.1 Rackmounting

Before rackmounting the switch, consider the following factors:

- Temperature: Since the temperature within a rack assembly may be higher than the ambient room temperature, check that the rack environment temperature is within the specified operating temperature range (32 to 104° F [0 to 40° C]).
- Mechanical Loading: Do not place any equipment on top of a rackmounted unit.
- Circuit Overloading: Make sure that the supply circuit to the rack assembly is not overloaded.
- Grounding: Rackmounted equipment should be properly grounded.

To rackmount devices:

STEP 1: Attach the brackets to the device using the screws included with the rackmounting kit.

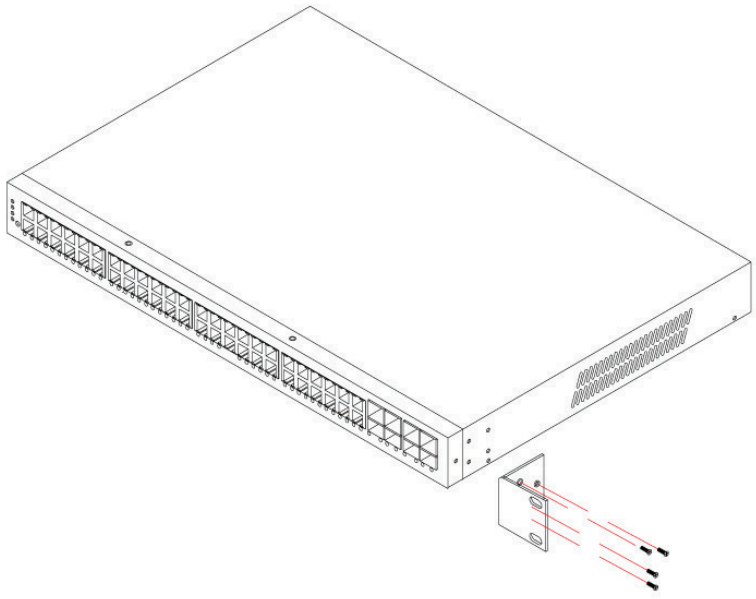

Figure 5-1. Attaching the brackets.

STEP 2: Mount the device in the rack (via the optional rackmount kit), using four rackmounting screws (not provided). Be sure to secure the lower rackmounting screws first to avoid bending the brackets by the weight of the switch.

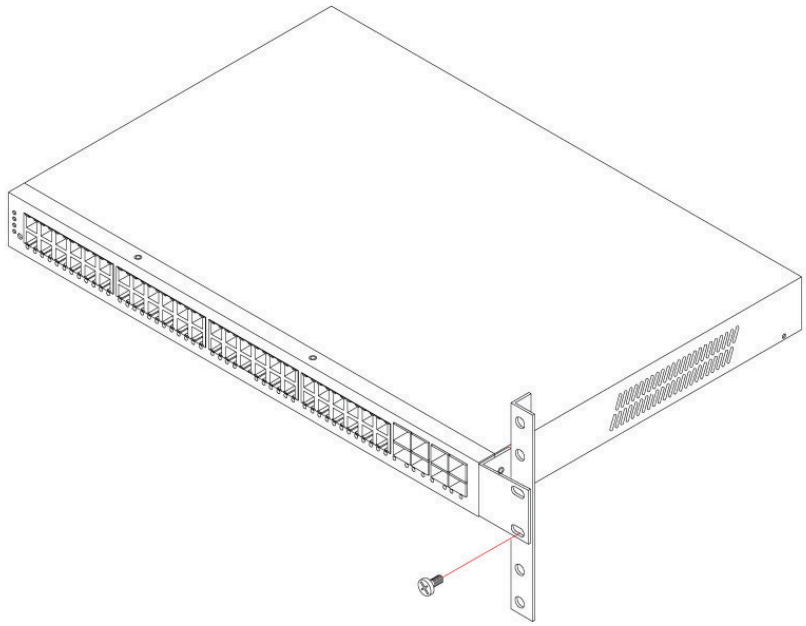

Figure 5-2. Installing the switch in a rack.

STEP 3: If installing a single switch only, see Section 5.7: Connecting to a Power Source.

STEP 4: If installing multiple switches, mount them in the rack, one below the other, in any order.

5.5.2 Desktop or Shelf Mounting

STEP 1: Attach the four adhesive rubber feet to the bottom of the first switch.

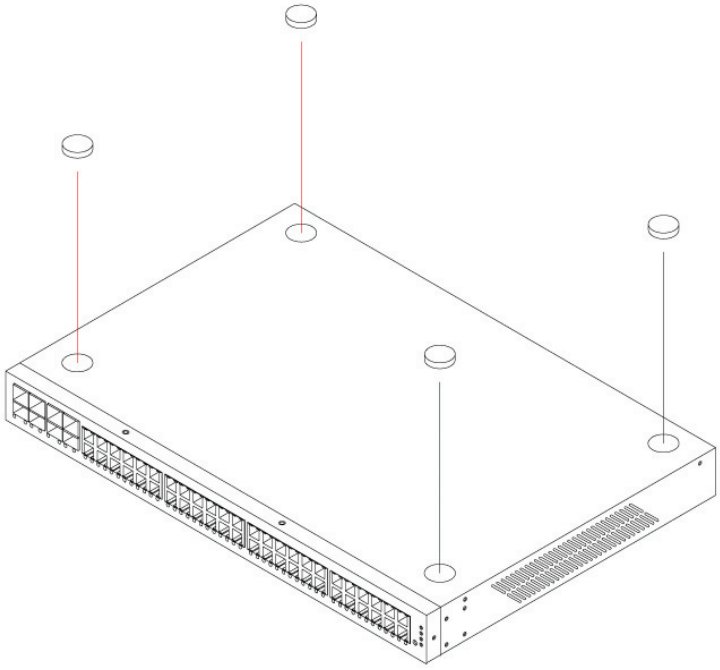

Figure 5-3. Attaching the adhesive rubber feet.

STEP 2: Place the device on a flat surface near an AC power source, making sure there are at least two inches of space on all sides for proper airflow.

STEP 3: If installing a single switch only, go to Section 5.7: Connecting to a Power Source.

STEP 4: If installing multiple switches, attach four adhesive feet to each one. Place each device squarely on top of the one below, in any order.

5.6 Installing an Optional SFP Transceiver

You can install or remove a mini-GBIC SFP from a mini-GBIC slot without having to power off the switch. Contact Black Box Technical Support at 724-746-5500 or info@blackbox.com to order the mini-GBIC SFPs.

NOTES:

1. *The mini-GBIC slots are shared with the two 10/100/1000BASE-T RJ-45 ports. If a mini-GBIC is installed in a slot, the associated RJ-45 port is disabled and cannot be used*
2. *The mini-GBIC ports operate only at full-duplex. Half-duplex operation is not supported.*
3. *Make sure the network cable is NOT connected when you install or remove a mini-GBIC.*

CAUTION: Use Black Box mini-GBICs. Other mini-GBICs might be incompatible with the switch, resulting in product malfunction.

The SFP slots support the following optional SFP transceivers. *Contact Black Box Technical Support at 724-746-5500 or info@blackbox.com to order the SFPs.*

Table 5-1. Supported SFP transceivers.

Description
1000BASE-SX GE SFP fiber module, LC multimode 850 nm
1000BASE-SX GE SFP fiber module, LC multimode 1310 nm, 2 km
1000BASE-LX GE SFP fiber module, LC single-mode 10 km
1000BASE-LX GE SFP fiber module, LC single-mode 30 km
1000BASE-LX GE SFP fiber module, LC single-mode 50 km
1000BASE-LX GE SFP fiber module, Bidirectional LC single-mode 10 km, 1310 nm
1000BASE-LX GE SFP fiber module, Bidirectional LC single-mode 10 km, 1550 nm
1000BASE-LX GE SFP fiber module, Bidirectional LC single-mode 20 km, 1550 nm
1000BASE-LX GE SFP fiber module, Bidirectional LC single-mode 20 km, 1310 nm
100BASE-FX FE SFP fiber module, LC multimode
100BASE-FX FE SFP fiber module, LC single-mode, 20 km

To install an SFP transceiver, follow these steps:

STEP 1: Consider network and cabling requirements to select an appropriate SFP transceiver type.

STEP 2: Insert the transceiver with the optical connector facing outward and the slot connector facing down.

NOTE: SFP transceivers are keyed so they can only be installed in one orientation.

STEP 3: Slide the SFP transceiver into the slot until it clicks into place.

NOTE: SFP transceivers are not included with the switch. Contact Black Box Technical Support at 724-746-5500 or info@blackbox.com to order the SFPs.

5.7 Connecting to a Power Source

To switch the power on and off, plug or remove the power cord from AC power socket, to switch the power on and off.

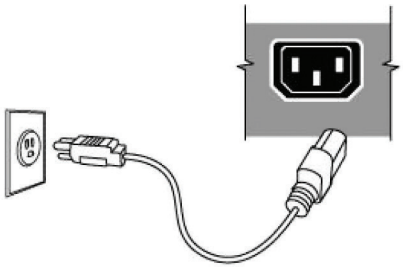

Figure 5-4. Inserting the power cord into the AC power socket.

STEP 1: Insert the power cable plug directly into the AC socket located on the back of the switch.

STEP 2: Plug the other end of the cable into a grounded, 3-pin, AC power source.

STEP 3: Check the front-panel LEDs as the device is powered on to be sure the SYSTEM LED is lit. If not, check that the power cable is correctly plugged in.

WARNING: For International use, you may need to change the AC line cord. You must use a line cord set that has been approved for the socket type in your country.

5.8 Connecting to the Console Port

The DB9 serial port on the switch's front panel is used to connect to the switch for out-of-band console configuration. The command-line-driven configuration program can be accessed from a terminal or a PC running a terminal emulation program. The pin assignments used to connect to the serial port are provided in Table 5-2.

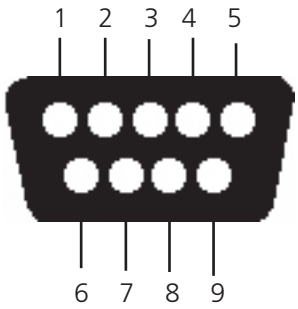

Figure 5-5. Serial port (DB9 DTE) Pinout.

Wiring Map for Serial Cable

The DB9 cable connects a terminal or terminal emulator to the switch's RS-232 port to access the command-line interface.

The table on the next page shows the pin assignments for the DB9 cable.

Table 5-2. Serial Cable wiring.

Function	Mnemonic	Pin
Carrier Detect	CD	1
Receive Data	RXD	2
Transmit Data	TXD	3
Data Terminal Ready	DTR	4
Signal Ground	GND	5
Data Set Ready	DSR	6
Request To Send	RTS	7
Clear To Send	CTS	8

NOTE: No other pins are used.

The terminal console port default values of the LGB5028A and LGB5052A are listed below:

The serial port's configuration requirements are as follows:

- Default Baud rate—115,200 bps
- Character Size—8 characters
- Parity—none
- Stop bit—1
- Data bits—8
- Flow control—none

6. Operation of Web-based Management

The default values of the managed switch are listed in the table below:

Table 6-1. Default values for Web-based management.

Value	Default
IP Address	192.168.1.1
Subnet Mask	255.255.255.0
Default	192.168.1.254
Username	admin
Password	blank (no password)

After you configure the managed switch in the CLI via the switch's serial interface, you can browse it. For instance, type http://192.168.1.1 in the address row in a browser; it will show the following screen and ask you to input a username and password to log in and access authentication. The default username is "admin" and the password is empty. The first time you use the switch, enter the default username and password, and then click on the "Enter" button. The login process is now completed.

Figure 6-1. LGB5052A Web user interface.

NOTE: To configure the switch, you can see the instructions in the User Guide. Or, access the Switch and click on the "help" button under the Web GUI. The switch's Help screens will pop up.

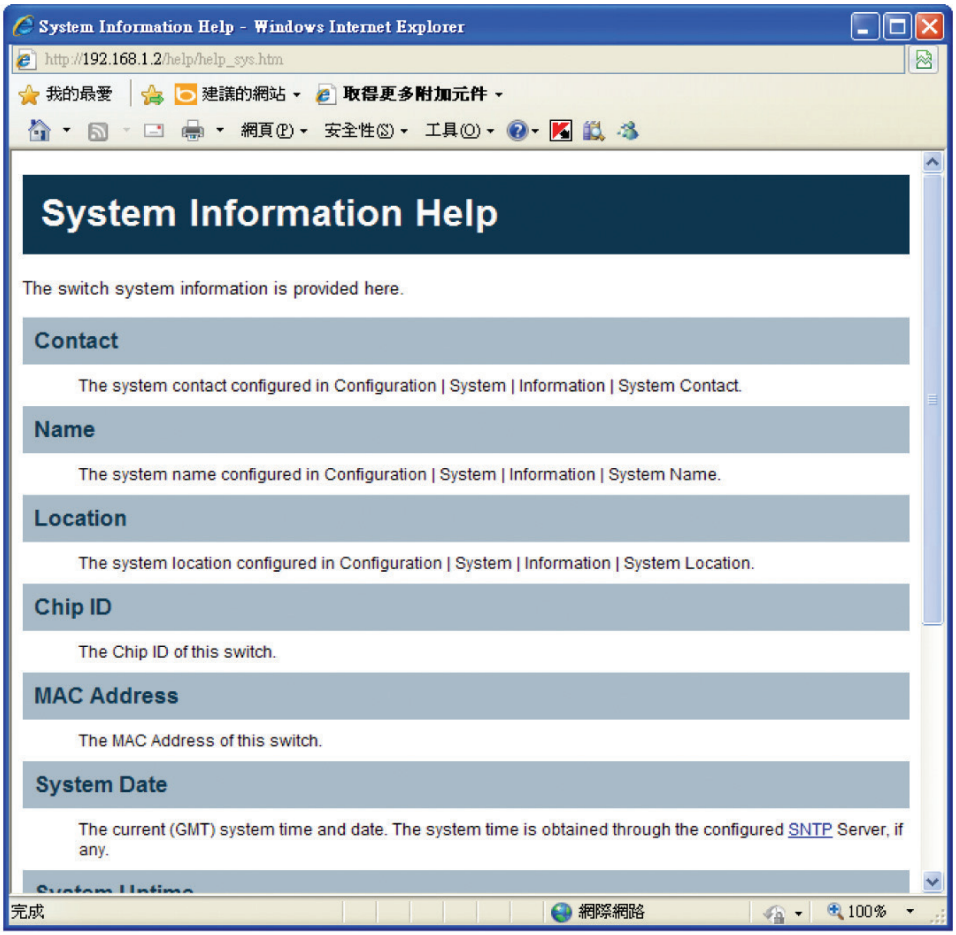

Figure 6-2. System Information Help screen.

7. Making Network Connections

7.1 Connecting Network Devices

You can connect the switch to 10-, 100-, or 1000-Mbps network cards in PCs and servers, as well as to other switches and hubs. It may also be connected to remote devices using optional SFP transceivers.

Twisted-Pair Devices

Each device requires an unshielded twisted-pair (UTP) cable with RJ-45 connectors at both ends. Use Category 5, 5e, or 6 cable for 1000BASE-T connections, Category 5 or better for 100BASE-TX connections.

7.2 Cabling Guidelines

The RJ-45 ports on the switch support automatic MDI/MDI-X pinout configuration, so you can use standard straight-through twisted-pair cables to connect to any other network device (PCs, servers, switches, routers, or hubs).

For further information on cabling, see Chapter 11.

CAUTION: Do not plug a phone jack connector into an RJ-45 port. This will damage the switch. Use only twisted-pair cables with RJ-45 connectors that conform to FCC standards.

7.3 Connecting to PCs, Servers, Hubs, and Switches

STEP 1: Attach one end of a twisted-pair cable segment to the device's RJ-45 connector.

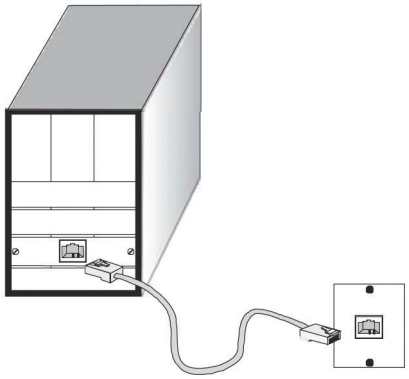

Figure 7-1. Making twisted-pair connections.

STEP 2: If the device is a network card, and the switch is in the wiring closet, attach the other end of the cable segment to a modular wall outlet that is connected to the wiring closet. (See Section 7.4: Network Wiring Connections). Otherwise, attach the other end to an available port on the switch.

Make sure each twisted-pair cable does not exceed 328 feet (100 m) in length.

NOTE: Avoid using flow control on a port connected to a hub unless it is actually required to solve a problem. Otherwise, backpressure jamming signals might degrade overall performance for the segment attached to the hub.

STEP 3: As each connection is made, the Link LED (on the switch) corresponding to each port will light green (1000 Mbps) or amber (100 Mbps) to indicate that the connection is valid.

7.4 Network Wiring Connections

A punchdown block, which is part of a patch panel, is an integral part of equipment racks. Follow these instructions to make connections in the wiring closet.

STEP 1: Attach one end of a patch cable to an available port on the switch and attach the other end to the patch panel.

STEP 2: If not already in place, attach one end of a cable segment to the back of the patch panel where the punchdown block is located and connect the other end to a modular wall outlet.

STEP 3: Label the cables to simplify future troubleshooting.

7.5 Fiber Optic SFP Devices

An optional Gigabit SFP transceiver can be used for a backbone connection between switches or for connecting to a high-speed server.

Each single-mode fiber port requires 9/125 micron single-mode fiber optic cable with an LC connector at both ends. Each multi-mode fiber optic port requires 50/125 or 62.5/125 micron multimode fiber optic cabling with an LC connector at both ends.

WARNING: This switch uses lasers to transmit signals over fiber optic cable. The lasers are inherently eye safe in normal operation. Never look directly at a transmit port when it is powered on.

WARNING: When selecting a fiber SFP device, make sure that it can function at a temperature that is less than the recommended maximum operational temperature of the product. You must also use an approved laser SFP transceiver.

STEP 1: Remove and keep the LC port's rubber plug. When not connected to a fiber cable, replace the rubber plug to protect the optics.

STEP 2: Make sure that the fiber terminators are clean. You can clean the cable plugs by wiping them gently with a clean tissue or cotton ball moistened with a little ethanol. Dirty fiber terminators on fiber optic cables will impair the quality of the light transmitted through the cable and lead to degraded performance on the port.

STEP 3: Connect one end of the cable to the LC port on the switch and the other end to the LC port on the other device. Since LC connectors are keyed, the cable can be attached in only one orientation.

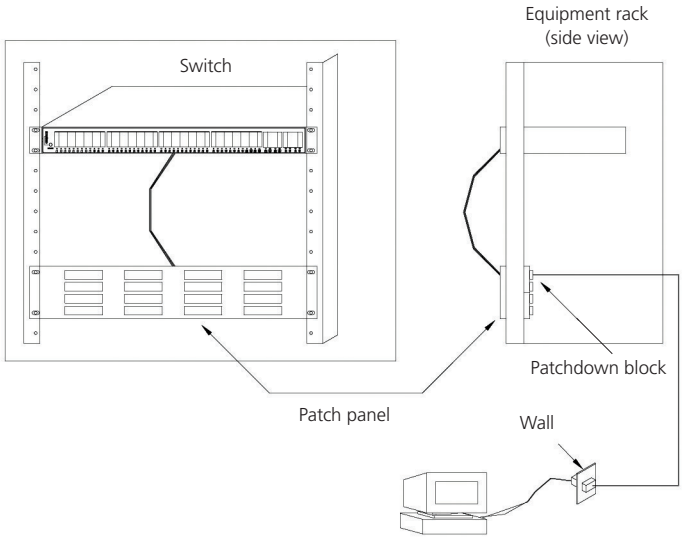

Figure 7-2. Making Fiber Port Connections.

STEP 4: As a connection is made, check the Link LED on the switch corresponding to the port to be sure that the connection is valid.

The fiber optic ports operate at 1 Gbps. The maximum length for fiber optic cable operating at Gigabit speed will depend on the fiber type as listed under Section 7.7: 1000-Mbps Gigabit Ethernet Collision Domain.

7.6 Connectivity Rules

NOTE: Because switches break up the path for connected devices into separate collision domains, when adding hubs to your network, you should not include the switch or connected cabling in your calculations for cascade length involving other devices.

7.7 1000-Mbps Gigabit Ethernet Collision Domain

All Category 5 UTP cables that are used for 100BASE-TX connections should also work for 1000BASE-T, providing that all four wire pairs are connected. We recommend that you use Category 5e or Category 6 cable for all critical connections, or any new cable installations. The Category 5e and 6 specifications include test parameters that are only recommendations for Category 5. Therefore, the first step in preparing existing Category 5 cabling for running 1000BASE-T is a simple test of the cable installation to be sure that it complies with the IEEE 802.3-2005 standards.

Table 7-1. Maximum 1000BASE-T Gigabit Ethernet cable length.

Cable Type	Maximum Cable Length	Connector
Category 5, 5e, or 6 100-ohm UTP or STP	328 feet (100 m)	RJ-45

Table 7-2. Maximum 1000BASE-SX Gigabit fiber cable lengths.

Fiber Size	Fiber Bandwidth	Maximum Cable Length	Connector
62.5/125 micron multimode fiber	160 MHz/km	722 ft. (2220 m)	LC
	200 MHz/km	902 ft. (275 m)	LC
50/125 micron multmode fiber	400 MHz/km	1641 ft. (500 m)	LC
	500 MHz/km	1805 ft. (550 m)	LC

Table 7-3. Maximum 1000BASE-LX/LHX/XD/ZA Gigabit fiber cable lengths.

Fiber Size	Fiber Bandwidth	Maximum Cable Length	Connector
9/125 micron single-mode fiber, 1310 nm	N/A	6.2 miles (10 km)	LC
9/125 micron multmode fiber, 1550 nm	N/A	18.64 miles (30 km)	LC
	N/A	31.06 miles (50 km)	LC

Table 7-4. Maximum 1000BASE-LX single-fiber Gigabit fiber cable lengths.

Fiber Size	Fiber Bandwidth	Maximum Cable Length	Connector
Single-mode fiber, TX: 1310 nm; RX: 1550 nm	N/A	12.42 miles (20 km)	BIDI
			LC
Single-mode fiber, TX: 1550 nm; RX: 1310 nm	N/A	12.42 miles (20 km)	BIDI
			LC

7.8 100-Mbps Fast Ethernet Collision Domain

Table 7-5. 100-Mbps Fast Ethernet cable length.

Cable Type	Maximum Cable Length	Connector
Category 5, 5e, or 6 100-ohm UTP or STP	328 feet (100 m)	RJ-45

8. Cable Labeling and Connection Records

When planning a network installation, label the opposing ends of cables and record where each cable is connected. This will allow you to easily locate interconnected devices, isolate faults, and change your topology quickly.

To best manage the physical implementations of your network, follow these guidelines:

- Clearly label the opposing ends of each cable.
- Using your building's floor plans, draw a map of the location of all network-connected equipment. For each piece of equipment, identify the devices to which it is connected.
- Note the length of each cable and the maximum cable length supported by the switch ports.
- Use a location-based key when assigning prefixes to your cable labeling.
- Use sequential numbers for cables that originate from the same equipment.
- Differentiate between racks by naming accordingly.
- Label each separate piece of equipment.
- Display a copy of your equipment map, including keys to all abbreviations at each equipment rack.

9. Troubleshooting

9.1 Basic Troubleshooting Tips

Most problems are caused by the following situations. Check for these items first when starting your troubleshooting:

Connecting to devices that have a fixed full-duplex configuration

The RJ-45 ports are configured as "Auto," that is, when connecting to the attached devices, the switch will operate in one of two ways to determine the link speed and the communication mode (half-duplex or full-duplex):

- If the connected device is also configured to Auto, the switch will automatically negotiate both link speed and communication mode.
- If the connected device has a fixed configuration, for example 100 Mbps, at half- or full-duplex, the switch will automatically sense the link speed, but will default to a communication mode of half-duplex.

Because the LGB5028A and LGB5052A switches comply with the IEEE 802.3 standard, if a device connected to the switch has a fixed configuration at full-duplex, the device will not connect correctly to the switch. The result will be high error rates and very inefficient communications between the switch and the device.

Make sure all devices connected to the LGB5028A and LGB5052A switches devices are configured to autonegotiate, or are configured to connect at half-duplex (all hubs are configured this way, for example).

Faulty or loose cables.

Look for loose or obviously faulty connections. If they appear to be OK, make sure the connections are snug. If that does not correct the problem, try a different cable.

Non-standard cables.

Non-standard and miswired cables may cause network collisions and other network problems, and can seriously impair network performance. Use a new correctly wired cable. For pinouts and correct cable wiring, see Chapter 11. We recommend using a Category 5 cable tester for every 100BASE-TX and 1000BASE-T network installation.

Improper network topologies.

Make sure you have a valid network topology. If you change your network topology and the switch does not work, the new topology is probably at fault. In addition, you should make sure that your network topology contains no data path loops.

Check the port configuration.

A port on your switch may not be operating as you expect because it has been put into a "blocking" state by Spanning Tree, GVRP (automatic VLANs), or LACP (automatic trunking).

NOTE: Normal operation of the Spanning Tree, GVRP, and LACP features may put the port in a blocking state. Or, the port just may have been configured as disabled through software.

Table 9-1. Troubleshooting chart.

Symptom	Action
System LED is OFF	Check connections between the switch, the power cord, and the wall outlet. Contact Black Box Technical Support at 724-746-5500 or info@blackbox.com for assistance.
Link LED is OFF	Verify that the switch and attached device are powered on. Make sure the cable is plugged into the switch and the corresponding device. If the switch is installed in a rack, check the connections to the punchdown block and patch panel. Verify that the proper cable type is used and its length does not exceed specified limits. Check the adapter on the attached device and cable connections for possible defects. Replace the defective adapter or cable if necessary.

9.2 Contacting Black Box

If you determine that your switch is malfunctioning, do not attempt to alter or repair the unit. It contains no user-serviceable parts. Contact Black Box Technical Support at 724-746-5500 or info@blackbox.com.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- the nature and duration of the problem.
- when the problem occurs.
- the components involved in the problem.
- any particular application that, when used, appears to create the problem or make it worse.

9.3 Shipping and Packaging

If you need to transport or ship your switch:

- Package it carefully. We recommend that you use the original container.
- If you are returning the unit, make sure you include everything you received with it. Before you ship for return or repair, contact Black Box to get a Return Authorization (RA) number.

10. Power and Cooling Problems

10.1 Installation

If the system indicator does not turn on when the power cord is plugged in, you may have a problem with the power outlet, power cord, or internal power supply. However, if the unit powers off after running for a while, check for loose power connections, power losses, or surges at the power outlet. If you still cannot isolate the problem, the internal power supply may be defective. Verify that all system components have been properly installed. If one or more components appears to be malfunctioning (such as the power cord or network cabling), test them in an alternate environment where you are sure that all the other components are functioning properly.

10.2 In-Band Access

You can access the management agent in the switch from anywhere within the attached network using Telnet or a Web browser. You must first configure the switch with a valid IP address, subnet mask, and default gateway. If you have trouble establishing a link to the management agent, check to see if you have a valid network connection. Then verify that you entered the correct IP address. Also, make sure the port through which you are connecting to the switch has not been disabled. If it has not been disabled, then check the network cabling that runs between your remote location and the switch.

NOTE: The management agent accepts up to four simultaneous Telnet sessions. If the maximum number of sessions already exists, an additional Telnet connection will not be able to log into the system.

11. Cables

11.1 Twisted-Pair Cable and Pin Assignments

For 10/100BASE-TX connections, the twisted-pair cable must have two pairs of wires. For 1000BASE-T connections, the twisted-pair cable must have four pairs of wires. Each wire pair is identified by two different colors. For example, one wire might be green and the other, green with white stripes. Also, an RJ-45 connector must be attached to both ends of the cable.

CAUTION: DO NOT plug a phone jack connector into any RJ-45 port. Use only twisted-pair cables with RJ-45 connectors that conform with FCC standards.

CAUTION: Each wire pair must be attached to the RJ-45 connectors in a specific orientation.

Figure 11-1 illustrates how the pins on the RJ-45 connector are numbered. Be sure to hold the connectors in the same orientation when attaching the wires to the pins.

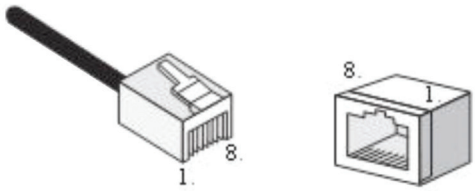

Figure 11-1. RJ-45 connector pin numbers.

11.2 10BASE-T/100BASE-TX Pin Assignments

Use unshielded twisted-pair (UTP) or shielded twisted-pair (STP) cable for RJ-45 connections: 100-ohm Category 3 or better cable for 10-Mbps connections, or 100-ohm Category 5 or better cable for 100-Mbps connections. Also be sure that the length of any twisted-pair connection does not exceed 328 feet (100 m).

The RJ-45 ports on the switch base unit support automatic MDI/MDI-X operation, so you can use straight-through cables for all network connections to PCs or servers, or to other switches or hubs. In straight-through cable, Pins 1, 2, 3, and 6 at one end of the cable are connected straight through to Pins 1, 2, 3, and 6 at the other end of the cable. When using any RJ-45 port on this switch, you can use either straight-through or crossover cable.

Table 11-1. 10/100BASE-TX MDI and MDI-X port pinouts.

Pin	MDI Signal Name	MDI-X Signal Name
1	Transmit Data plus (TD+)	Receive Data plus (RD+)
2	Transmit Data minus (TD-)	Receive Data minus (RD-)
3	Receive Data plus (RD+)	Transmit Data plus (TD+)
4	Receive Data minus (RD-)	Transmit Data minus (TD-)

NOTE: The "+" and "-" signs represent the polarity of the wires that make up each wire pair.

11.3 Straight-Through Wiring

If the twisted-pair cable will join two ports and only one of the ports has an internal crossover (MDI-X), the two pairs of wires must be straight-through. (When auto-negotiation is enabled for any RJ-45 port on this switch, you can use either straight-through or crossover cable to connect to any device type.)

You must connect all four wire pairs as shown in Figure 11-2 to support Gigabit Ethernet.

EIA/TIA 568B RJ-45 Wiring Standard, 10/100BASE-TX Straight-through Cable

Figure 11-2. Straight-through Wiring

11.4 Crossover Wiring

If the twisted-pair cable is to join two ports and both ports are labeled with an "X" (MDI-X) or neither port is labeled with an "X" (MDI), a crossover must be implemented in the wiring. (When autonegotiation is enabled for any RJ-45 port on this switch, you can use either straight-through or crossover cable to connect to any device type.)

You must connect all four wire pairs as shown in Figure 11-3 to support Gigabit Ethernet.

EIA/TIA 568B RJ-45 Wiring Standard, 10/100BASE-TX Crossover Cable

Figure 11-3. Crossover wiring.

11.5 1000BASE-T Pin Assignments

All 1000BASE-T ports support automatic MDI/MDI-X operation, so you can use straight-through cables for all network connections to PCs or servers, or to other switches or hubs.

Table 11-2 shows the 1000BASE-T MDI and MDI-X port pinouts. These ports require that all four pairs of wires be connected.

NOTE: For 1000BASE-T operation, all four pairs of wires are used for both transmit and receive.

Use 100-ohm Category 5, 5e, or 6 unshielded twisted-pair (UTP) or shielded twisted-pair (STP) cable for 1000BASE-T connections. Also be sure that the length of any twisted-pair connection does not exceed 328 feet (100 m).

Table 11-2. 1000BASE-T MDI and MDI-X port pinouts.

Pin	MDI Signal Name	MDI-X Signal Name
1	Bidirectional Pair A plus (BI_DA+)	Bidirectional Pair B plus (BI_DB+)
2	Bidirectional Pair A minus (BI_DA-)	Bidirectional Pair B minus (BI_DB-)
3	Bidirectional Pair B plus (BI_DB+)	Bidirectional Pair A plus (BI_DA+)
4	Bidirectional Pair C plus (BI_DC+)	Bidirectional Pair D plus (BI_DD+)
5	Bidirectional Pair C minus (BI_DC-)	Bidirectional Pair D minus (BI_DD-)
6	Bidirectional Pair B minus (BI_DB-)	Bidirectional Pair A minus (BI_DA-)
7	Bidirectional Pair D plus (BI_DD+)	Bidirectional Pair C plus (BI_DC+)
8	Bidirectional Pair D minus (BI_DD-)	Bidirectional Pair C minus (BI_DC-)

11.6 Cable Testing for Existing Category 5 Cable

Installed Category 5 cabling must pass tests for Attenuation, Near-End Crosstalk (NEXT), and Far-End Crosstalk (FEXT). This cable testing information is specified in the ANSI/TIA/EIA-TSB-67 standard. Additionally, cables must also pass test parameters for Return Loss and Equal-Level Far-End Crosstalk (ELFEXT). These tests are specified in the ANSI/TIA/EIA-TSB-95 Bulletin, "The Additional Transmission Performance Guidelines for 100 Ohm 4-Pair Category 5 Cabling."

NOTE: When testing your cable installation, be sure to include all patch cables between switches and end devices.

11.7 Adjusting Existing Category 5 Cabling to Run 1000BASE-T

If your existing Category 5 installation does not meet one of the test parameters for 1000BASE-T, there are basically three measures that can be applied to try to correct the problem:

1. Replace any Category 5 patch cables with high-performance Category 5e or Category 6 cables.

2. Reduce the number of connectors used in the link.

3. Reconnect some of the connectors in the link.

11.8 Fiber Standards

The International Telecommunication Union (ITU-T) has standardized various fiber types for data networks. These are summarized in Table 11-3.

Table 11-3. Fiber standards.

ITU-T Standard	Description	Application
G.651	Multimode fiber, 50-/125-micron core	Short reach connections in the 1300-nm or 850-nm band
G.652	Non-dispersion-shifted fiber, single-mode 9-/125-micron core	Longer spans and extended reach. Optimized for operation in the 1310-nm band, but can also be used in the 1550-nm band.
G.652.C	Low water peak non-dispersion-shifted fiber, single-mode, 9-/-125-micron core	Longer spans and extended reach. Optimized for wavelength-division multiplexing (WDM) transmission across wavelengths form 1285 to 1625 nm. The zero dispersion wavelength is in the 1310-nm region.
G.653	Dispersion-shifted fiber, single-mode, 9-/-125-micron core	Longer spans and extended reach. Optimized for operation in the 1500- to 1600-nm band.
G.654	1550-nm loss-minimized fiber, single-mode, 9-/125-micron core	Extended long-haul applications. Optimized for high-power transmission in the 1500- to 1600-nm region, with low loss in the 1550-nm band.
G.655	Non-zero dispersion-shifted fiber, single-mode, 9-/125-micron core	Extended long-haul applications. Optimized for high-power dense-wavelength-divison multiplexing (DWDM) operation in the region from 1500 to 1600 nm.

12. Glossary

10BASE-T — IEEE 802.3 specification for 10-Mbps Ethernet over two pairs of Category 3, 4, or 5 UTP cable.

100BASE-TX — IEEE 802.3u specification for 100-Mbps Ethernet over two pairs of Category 5 UTP cable.

1000BASE-LH — Specification for long-haul Gigabit Ethernet over two strands of 9/125-micron core fiber cable.

1000BASE-LX — IEEE 802.3z specification for Gigabit Ethernet over two strands of 50/125-, 62.5/125- or 9/125-micron core fiber cable.

1000BASE-SX — IEEE 802.3z specification for Gigabit Ethernet over two strands of 50/125- or 62.5/125-micron core fiber cable.

1000BASE-T — IEEE 802.3ab specification for Gigabit Ethernet over 100-ohm Category 5, 5e, or 6 twisted-pair cable (using all four wire pairs).

Autonegotiation — Signaling method allowing each node to select its optimum operational mode (for example, speed and duplex mode) based on the capabilities of the node to which it is connected.

Bandwidth — The difference between the highest and lowest frequencies available for network signals. Also synonymous with wire speed, the actual speed of the data transmission along the cable.

Collison Domain — Single CSMA/CD LAN segment.

CSMA/CD — CSMA/CD (Carrier Sense Multiple Access/Collision Detect) is the communication method employed by Ethernet, Fast Ethernet, and Gigabit Ethernet.

End Station — A workstation, server, or other device that does not forward traffic.

Ethernet — A network communication system developed and standardized by DEC, Intel®, and Xerox®, using baseband transmission, CSMA/CD access, logical bus topology, and coaxial cable. The successor IEEE 802.3 standard provides for integration into the OSI model and extends the physical layer and media with repeaters and implementations that operate on fiber, thin coax and twisted-pair cable.

Fast Ethernet — A 100-Mbps network communication system based on Ethernet and the CSMA/CD access method.

Full-Duplex — Transmission method that allows two network devices to transmit and receive concurrently, effectively doubling the bandwidth of that link.

Gigabit Ethernet — A 1000-Mbps network communication system based on Ethernet and the CSMA/CD access method.

IEEE — Institute of Electrical and Electronic Engineers.

IEEE 802.3 — Define carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications.

IEEE 802.3ab — Define CSMA/CD access method and physical layer specifications for 1000BASE-T Gigabit Ethernet. (Now incorporated in IEEE 802.3-2005.)

IEEE 802.3u — Define CSMA/CD access method and physical layer specifications for 100BASE-TX Fast Ethernet. (Now incorporated in IEEE 802.3-2005.)

IEEE 802.3x — Define Ethernet frame start/stop requests and timers used for flow control on full-duplex links. (Now incorporated in IEEE 802.3-2005.)

IEEE 802.3z — Define CSMA/CD access method and physical layer specifications for 1000BASE Gigabit Ethernet. (Now incorporated in IEEE 802.3-2005.)

LAN Segment — Separate LAN or collision domain.

LED — Light-emitting diode used for monitoring a device or network condition.

Local Area Network (LAN) — A group of interconnected computer and support devices.

Media Access Control (MAC) — A portion of the networking protocol that governs access to the transmission medium, facilitating the exchange of data between network nodes.

MIB — An acronym for Management Information Base. It is a set of database objects that contains information about the device.

Modal Bandwidth — Bandwidth for multimode fiber is referred to as modal bandwidth because it varies with the modal field (or core diameter) of the fiber. Modal bandwidth is specified in units of MHz per km, which indicates the amount of bandwidth supported by the fiber for a 1-kilometer distance.

Network Diameter — Wire distance between two end stations in the same collision domain.

RJ-45 Connector — A connector for twisted-pair wiring.

Switched Ports — Ports that are on separate collision domains or LAN segments.

TIA — Telecommunications Industry Association.

Transmission Control Protocol/Internet Protocol (TCP/IP) — Protocol suite that includes TCP as the primary transport protocol, and IP as the network layer protocol.

User Datagram Protocol (UDP) — UDP provides a datagram mode for the packet-switched communications. It uses the IP as the underlying transport mechanism to provide access to IP-like services. UDP packets are delivered just like IP packets—connection-less data grams that may be discarded before reaching their targets. UDP is useful when TCP would be too complex, too slow, or just unnecessary.

UTP — Unshielded twisted-pair cable.

Virtual LAN (VLAN) — A Virtual LAN is a collection of network nodes that share the same collision domain regardless of their physical location or connection point in the network. A VLAN serves as a logical workgroup with no physical barriers, allowing users to share information and resources as though located on the same LAN.

NOTES

Black Box Tech Support: FREE! Live. 24/7.

Great tech support is just 60 seconds away at 724-746-5500 or blackbox.com.

BLACK BOX®

About Black Box

Black Box provides an extensive range of networking and infrastructure products. You'll find everything from cabinets and racks and power and surge protection products to media converters and Ethernet switches all supported by free, live 24/7 Tech support available in 60 seconds or less.

© Copyright 2015. Black Box Corporation. All rights reserved.

LGB5028A Installation and Getting Started Guide, version 2