



January 2002

LE2801A
LE2801AE
LE2801A-BNC
LE2801AE-BNC
LE2801A-FO
LE2801AE-FO

Stackable MiniHub



Installation and User Guide

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MiniHub

Installation and User Guide

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AND
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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.

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Class B Digital Device. This equipment has been tested and found to comply with the limits for a Class B computing device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. If this equipment does cause harmful interference to radio or telephone reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

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- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an experienced radio/TV technician for help.

Caution:

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

To meet FCC requirements, shielded cables and power cords are required to connect this device to a personal computer or other Class B certified device.

This digital apparatus does not exceed the Class B limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of the Canadian Department of Communications.

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Normas Oficiales Mexicanas (NOM)
Electrical Safety Statement

INSTRUCCIONES DE SEGURIDAD

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 conectado 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 física 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 líneas de energía.
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 líquidos 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: Objetos 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.

Certification Notice for
Equipment Used in Canada

The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications-network protective, operation, and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single-line individual service may be extended by means of a certified connector assembly (extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility—in this case, your supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION:

Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The LOAD NUMBER (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices, subject only to the requirement that the total of the load numbers of all the devices does not exceed 100.

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1.0 Specifications

Compliance —	FCC Part 15 Class A and B, IC Class/classe B, VDE Class B
Standard —	IEEE 802.3 Ethernet v. 1.0/2.0
Interface —	LE2801A, LE2801AE: 10BASE-T; LE2801A-BNC, LE2801AE-BNC: 10BASE2; LE2801A-FO, LE2801AE-FO: 10BASE-FL
Data Rate —	10 Mbps
Partitioning —	Automatic after 32 consecutive collisions
Reconnection —	Occurs after 512 bits of error-free transmission
Maximum Segment Length —	UTP (unshielded 10BASE-T): 100 m (328 ft.); STP (shielded 10BASE-T): 150 m (492 ft.); AUI drop cable: 50 m (164 ft.); 10BASE2 ThinNet (BNC): 185 m (607 ft.); 10BASE5: 500 m (1,640 ft.); 10BASE-FL multi-mode fiberoptic: 2 km (6562 ft.)
User Controls —	Rear-mounted slide switch for straight-through vs. crossover (uplink) operation on port 8 Stackable switch to specify which hub is at the base of the stack
Indicators —	(19) Front-mounted recessed LEDs: (1) Power; (9) Link/TX (1 for each port); (9) Pol/RX (1 for each port)
Connectors —	LE2801A, LE2801AE: (8) front-mounted shielded-type RJ-45 female; (1) rear-mounted DB15 female AUI port; LE2801A-BNC, LE2801AE-BNC: same as LE2801A, plus (1) rear-mounted BNC with internal termination switch; LE2801A-FO, LE2801AE-FO: same as LE2801A, plus one rear fiber ST connector
Leads/Signals Supported —	Pins 1, 2, 3, and 6
Enclosure —	High-strength steel
Cooling Method —	Convection
Operating Temperature —	32 to 122° F (0 to 50° C)
Storage Temperature —	4 to 140° F (-20 to 60° C)
Humidity —	10 to 95% noncondensing
Power —	From wallmount power supply: LE2801A, LE2801A-BNC, LE2801A-FO: Input: 120 VAC, 60 Hz; LE2801AE, LE2801AE-BNC, LE2801AE-FO: Input: 230 VAC, 50 Hz; All models: Output: 12 VDC, 1 amp; All models: Consumption: 10 watts maximum
Size —	0.8"H x 5"W x 4.4"D (1.9 x 12.7 x 11.2 cm)
Weight —	Net: 1.3 lb. (0.6 kg); Net plus power supply: 2.3 lb. (1.05 kg)

1.2 Ordering Information

BLACK BOX® Personal Hubs	
<u>MODEL</u>	<u>DESCRIPTION</u>
LE2801A	Stackable Personal Hub with eight standard RJ-45 ports, one with up-link switch, plus one rear AUI port; external 115 vac 60 Hz power supply.
LE2801AE	Same as LE2801A, but with external 230 vac 50 Hz power supply.
LE2801A-BNC	Stackable Personal Hub with eight standard RJ-45 ports, one with up-link switch; one AUI plus 1 BNC port with internal termination switch; external 115 vac 60 Hz power supply.
LE2801AE-BNC	Same as LE2801AE-BNC except with external 230 vac 50 Hz power supply.
LE2801A-FO	Stackable Personal Hub with eight standard RJ-45 ports, one with up-link switch; one AUI plus one Fiber-ST port with LINK LED; external 115 vac 60 Hz power supply.
LE2801AE-FO	Same as LE2801A-FO except with external 230 vac 50 Hz power supply.

Black Box Corp. reserves the right to change specifications, performance characteristics and / or model offerings without notice.

2.0 INTRODUCTION

2.1 General Overview

The Stackable MiniHub is a workplace hub in a very compact package. It is simple to install and use in an office or lab environment, requiring no special rack cabinets or wiring-closet apparatus. It is a standard physical-layer Ethernet product and operates independently of all software.

Stackable MiniHubs provide a simple and inexpensive solution for networking a personal multi-system office using 10BASE-T twisted-pair cabling. They can expand from an eight-port hub up to 40 ports.

Six models are available:

- LE2801A, LE2801AE: Basic model, has eight shielded twisted-pair ports in the front and an AUI port in the rear. LE2801A has a 120-VAC powersupply, LE2801AE has a 230-VAC power supply.
- LE2801A-BNC, LE2801AE-BNC: Same as LE2801A, but has one additional BNC port in the rear.
- LE2801A-FO, LE2801AE-FO: Same as LE2801A, but has one additional fiber-ST port in the rear.

Stackable MiniHubs are also well suited for small-to-medium-size office or lab environments (two to 40 users) that need an independent Ethernet network. They operate as self-sufficient units to provide 10BASE-T Ethernet connectivity for local users and devices. Small independent networks built using the Stackable MiniHubs are easily expanded by taking advantage of the MiniHubs' stacking ability.

The small size of the Stackable MiniHubs make them very useful for demonstration situations in conference rooms and in exhibitions where a temporary or expansion network is needed. The MiniHubs are also handy as a piece of test equipment that can be easily inserted into the network to provide a test port, and then removed after the testing is done. They take up minimal space and use minimal power, and are rugged enough to be carried in a coat pocket for emergencies.

Stackable MiniHubs fit easily into the workplace environment. They can be table-top- or shelf-mounted, or you can use the included Velcro® strip to mount MiniHubs on walls or on the back or side of a desk or cabinet. All of the wiring connectors are in the same plane so that wiring space is neat and minimal. The external power supply conveniently plugs into any available AC wall receptacle or power strip.

The Stackable MiniHub's RJ-45 ports support connection of up to eight workstations or other network devices over full-length 10BASE-T cable segments. Stackable MiniHubs fully comply with the IEEE 802.3 specification for repeater functionality: They perform signal amplification, retiming of data packets, and regeneration of preamble bits for each packet received. They will also detect collisions, extend collision fragments, and automatically partition and reconnect individual ports in order to keep problems on one segment from causing downtime elsewhere on the network.

Stackable MiniHubs have LINK and RX LEDs for each front-panel RJ-45 port, located above the corresponding ports (see the illustration below); one LED to the left of the LINK LED for (and located above) the rear-panel AUI port, and one LED for AC power, located at the rear above the external power-supply connection. This makes observing the operation and status of the ports easy.



Figure 2-1. Front Panel of the Stackable MiniHub.

The included external wallmount power supply uses AC input power of 120 VAC/60 Hz (A models) or 230 VAC/50 Hz (AE models). Its lightweight cord carries DC power to the barrel-type power jack on the rear panel (shown in **Figure 2-2**) of the MiniHub.

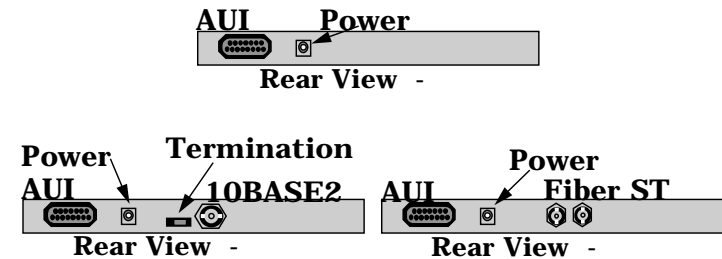


Figure 2-2. Rear Panel of the Stackable MiniHub.

2.2 Features and Benefits

- **Interconnectability with Existing Ethernet Networks**

Your Stackable MiniHub has a manual Up-Link switch that you can use to cross the pinning of its 8th port. In this setting, you can connect 10BASE-T cable from an existing Ethernet environment (such as the central hub for the building) to the MiniHub's 8th port.

- **Interoperability with Other Ethernet Devices**

Stackable MiniHubs are completely interoperable with other Ethernet-compliant network devices. Each is fully compliant with IEEE 802.3 specifications for 10-Mbps CSMA/CD operation. This allows Stackable MiniHubs to be integrated into any standard Ethernet network.

- **Installation Versatility**

You can easily install Stackable MiniHubs in almost any office or lab location. The tiny package is very unobtrusive and is typically mounted with Velcro.

- **Robust Network Operation**

Stackable MiniHubs use the "star" network topology and have automatic per-port partitioning and reconnection. A fault on one segment is isolated from the rest of the network, avoiding most network downtime.

- **Simple Network Diagnosis and Maintenance with LEDs**

Stackable MiniHubs are equipped with a full complement of LEDs to show the status of basic network activity. LINK LEDs for each port offer a very simple way to verify operational connections for each 10BASE-T segment.

- **Low-Cost Standalone 10BASE-T Connectivity**

Operating your Stackable MiniHub in a standalone environment as a self-sufficient device is a very low-cost method of providing small workgroups access to a variety of Ethernet networking services such as file sharing, email, printer sharing, and other computer information.

- **High-Quality Construction**

Stackable MiniHubs have rugged steel enclosures and are compliant with rigid Class B emission standards, making them suitable for commercial and home offices.

2.3 Applications

Expanding from one to multiple ports at an existing site is easy, and requires no modification to typical building wiring. Simply plug the existing networked device's network-cable segment into one of the Stackable MiniHub's front-mounted RJ-45 ports. With the MiniHub's rear-mounted Up-Link switch set to "X", run 10BASE-T cable from the existing network outlet to the MiniHub's 8th port. Then plug the DC power cord of the MiniHub's external power supply into the MiniHub's power jack, plug in the power supply's transformer, and there you are: In minutes, you have added eight new ports for other networked devices (see the illustration below).

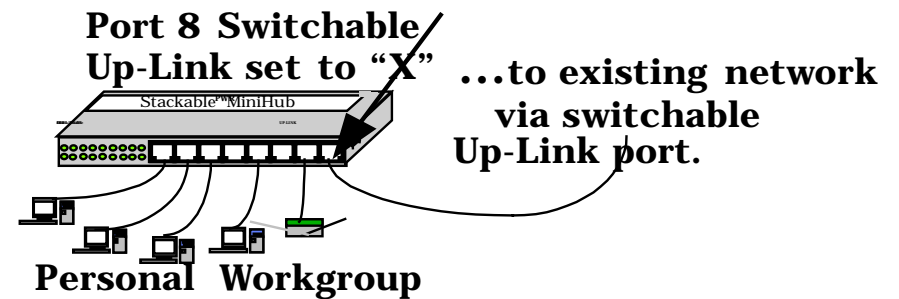


Figure 2-3. Connecting to an Existing Network.

Stackable MiniHubs may also be used standalone to network a local multi-user system, as shown below. Up to 8 RJ-45 user ports are available where only 10BASE-T wiring is used, and full-length Ethernet segments are supported on all segments. In this application, set the Up-Link switch to the straight-through or "==" position, so that the MiniHub's 8th port is a user port, not an up-link to another hub.

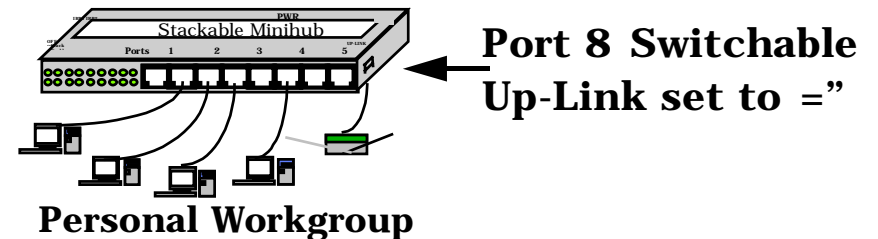


Figure 2-4. Using the Stackable MiniHub as a Standalone Hub.

3.0 Installation

3.1 Before You Install: Inspecting the Complete Package

Examine the shipping container for obvious damage before installing the MiniHub; notify the carrier of any damage which you believe occurred during shipment or delivery. Inspect the contents of this package for any signs of damage and make sure that you received these items:

- (1) Stackable MiniHub
- (1) External 120-VAC 60-Hz power supply
- (1) Velcro tape section, approximately 3 inches (7.6 cm) in length
- (2) Brackets for optional screw-mounting
- (1) 2-inch (5.1-cm) ribbon cable (stacking cable)
- (1) Copy of this manual

Remove the Stackable MiniHub from the shipping container. Keep the container in case you need to ship the unit later.

If any items are missing or damaged, contact Black Box. If you need to return the unit, see Sections 5.2 and 5.3.

3.2 The Installation Procedure

Installing a Stackable MiniHub is very simple. First, keeping in mind that it must be within 6 feet (1.8 m) of an AC outlet, decide how and where you're going to mount the MiniHub.

3.2.1 MOUNTING THE MINIHUB

Tabletop- or Shelf-Mounting

Stackable MiniHubs are easily mounted on a tabletop or shelf, and have four rubber feet to provide stability without scratching finished surfaces. A piece of Velcro may be used to add additional stability if desired. When properly installed, the top-mounted LED status indicators will be in plain view and easy to read.

The rugged steel case of the Stackable Hub will protect it from accidental damage in an office or lab. Keep an open area around the unit so that convection cooling can occur while the unit is operating.

Wall (or Vertical-Surface) Mounting

The Stackable MiniHub comes with a piece of Velcro mounting tape. You can use this to mount a Stackable Hub in a vertical position. Stick one side of the Velcro to the bottom of the hub between the rubber feet. Stick the other side of the Velcro to the desired vertical mounting location. This permits the compact Stackable Hub to be mounted on a wall surface, on the side of a server cabinet, on the back of a desk, or in similar convenient locations in the workplace where the associated cables are out of the way.

As an alternative to Velcro for vertical-surface mounting, you can use the included small brackets to mount the MiniHub with screws, as shown below. You can use the metal screws in each side of the Stackable MiniHub's case to attach the brackets. With the brackets, you can mount the MiniHub in almost any desired position.

3.2.2 POWERING UP THE HUB

Once you've mounted the Stackable MiniHub, plug the included external power supply's DC power cord into the matching power jack on the Stackable MiniHub's rear panel. Plug the power supply's transformer into an AC receptacle that is six feet (2 meters) or less away. The green "PWR" LED should light up. Now you are ready to begin attaching Ethernet cable segments.

3.2.3 CONNECTING TWISTED-PAIR SEGMENTS TO THE FRONT-PANEL PORTS

1. Insert the male plug on one end of a standard 10BASE-T cable into one of the RJ-45 female ports on the front panel of the Stackable MiniHub. (Even though the MiniHub's connectors are shielded, they will accept, and operate properly with, either unshielded or shielded RJ-45 twisted-pair wiring plugs.)
2. Connect the other end of each network segment to a workstation or user device. If the MiniHub is getting AC power, it will light the "LINK" LED corresponding to each MiniHub port that has a powered-up and functional device attached to it.

3.2.4 USING THE 8TH PORT AND THE UP-LINK SWITCH

For the 8th RJ-45 port only, use the Up-Link crossover switch (also on the rear panel) to select either a normal 10BASE-T connection to a user device (switch in the "X" position) or a special network-uplink connection to another hub or concentrator (switch in the "X=" position). A special cross-pinned cable for uplinks is not needed with Stackable MiniHubs, because with the Up-Link switch in the "X=" position the pinning is crossed inside the MiniHub.

Insert the male plug on one end of a standard 10BASE-T cable into the 8th RJ-45 female port on the Stackable MiniHub. Connect the other end of the network segment to a workstation or user device if the Up-Link switch is in the "X=" position, or to a network hub or concentrator if the Up-Link switch is in the "X" position.

Even when the rear port is physically uplinked (cable runs from the port to a larger network), you can logically isolate the users and devices on the Stackable MiniHub by moving the Up-Link switch to the "==" position. In this situation, the uplink segment is inoperative and full bandwidth is available locally.

3.3 Stacking the MiniHubs

When you need increased network capacity, you can easily stack up to five Stackable MiniHubs to form a single logical repeater of up to 40 RJ-45 ports.

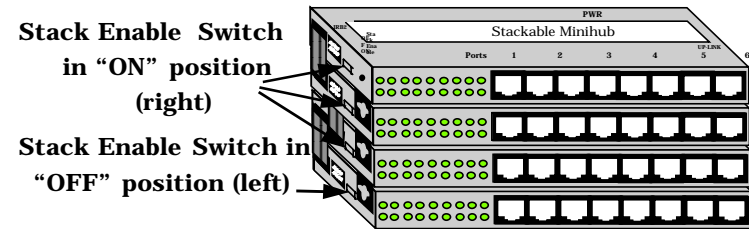


Figure 3-1. Stacking the MiniHubs.

NOTE:

Secure the units with the stacking/mounting brackets before making the following electrical connections. You cannot install the brackets while the connector cables are in place.

Follow these steps when stacking:

1. Switch the Stack Enable switch of the bottom Stackable MiniHub to the "OFF" position (left).
2. Switch all other units to the "ON" position (right).
3. Using the IRB ribbon cable, connect one end to either Inter-Repeater-Bus connector (IRB1 or IRB2) of the bottom Stackable MiniHub. Connect the other end of the cable to the corresponding IRB connector of the top Stackable MiniHub (i.e, the IRB cable connects from IRB1 to IRB1, or from IRB2 to IRB2).
4. If you will add more Stackable MiniHubs, connect another IRB cable from the unused IRB connector of the existing stack's top unit to the corresponding IRB connector of the Stackable MiniHub you will add. Make sure that the Stack Enable Switch of the added unit is set to the "ON" position. You can stack up to five Stackable MiniHubs in this way.
5. Each unit of the stack must be powered by its own external power supply.

Make sure that the PWR LED of each unit is lit to verify "Power On." If one unit of the stack is powered off, the rest of the stack will still function properly.

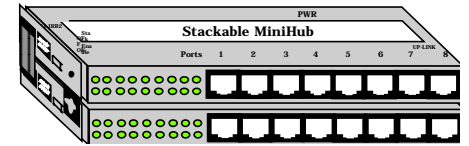


Figure 3-2. Two Stacked MiniHubs—16 RJ-45 Ports.

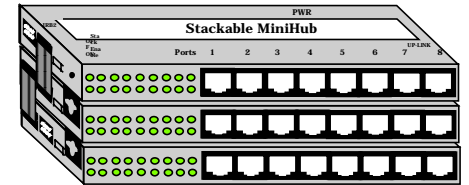


Figure 3-3. Three Stacked MiniHubs—24 RJ-45 Ports.

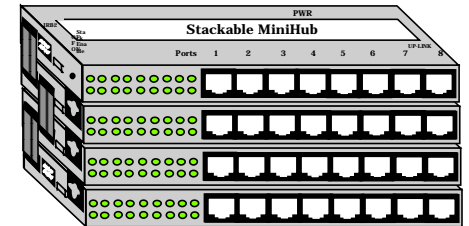


Figure 3-4. Four Stacked MiniHubs—32 RJ-45 Ports.

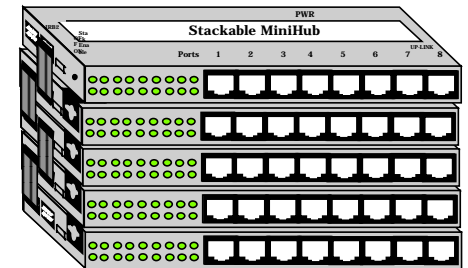


Figure 3-5. Five Stacked MiniHubs—40 RJ-45 Ports.

3.4 Cascading

You can cascade Stackable MiniHubs in order to expand networks. For example, you can set a MiniHub's Up-Link switch to the “=x=” position, then run 10BASE-T cable from the MiniHub's rear-panel port to any port of another 10BASE-T hub, as shown in the illustration below. Since each Stackable MiniHub provides full repeater functionality, cascaded units can operate together even though there may be a full segment of distance between them. To satisfy the “four-repeater rule” defined by Ethernet standards, you shouldn't place more than four hubs or repeaters in any path between two users on the same network.

NOTE

If you run cable between the rear ports of two 9-Port Personal Mini-Hubs, as shown with the upper two units in the illustration below, set the Up-Link switch of only *one* of the units to the “=x=” position—the other unit's switch must remain set to the “=== ” position for the link to work properly.

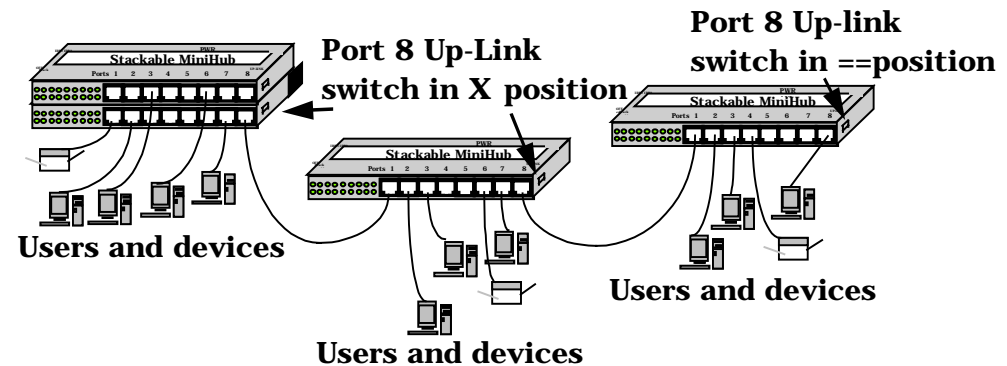


Figure 3-6. Cascading Stackable MiniHubs.

3.5 BNC Connection (LE2801A-BNC, LE2801AE-BNC only)

Connect the ThinNet coax cable to the BNC connector on the rear of the Stackable MiniHub in the same way as any standard BNC connection. The BNC port is specially equipped with an internal termination switch that eliminates the need to use a “tee” connector when the BNC cable is ending at the Stackable MiniHub. When the switch is in the right position, the connection is internally terminated. When switched to the left position, external termination (“tee” connector, not supplied) is required. Some applications may require a “tee” connector, used as a tap, to allow the 10BASE2 coax segment to continue on past the MiniHub port connection.

3.6 Fiberoptic Connection (LE2801A-FO, LE2801AE-FO only)

The following procedure applied to FOIRL and 10BASE-FL multi-mode applications using a Stackable MiniHub. (The primary difference between FOIRL and 10BASE-FL for users is the maximum distance allowed. 10BASE-FL is used for a fiber segment length of up to 2000 m (6561 ft.), while FOIRL is used for fiber segments of up to 1000 m (3280 ft.) in length.)

1. Before connecting the fiberoptic cable, remove the protective dust caps from the tips of the connectors on the Stackable MiniHub’s rear fiber port. Save these dust caps for future use.
2. Wipe clean the ends of the dual connectors with a soft cloth or lint-free lens tissue dampened in alcohol. Make certain the connectors are clean before connecting.

NOTE

One strand of the duplex fiberoptic cable is coded using color bands at regular intervals; you must use the color-coded strand on the associated ports at each end of the fiberoptic segment, for example, TX on one end and RX on the other end.

3. Connect the Transmit (TX) port (light colored post) of the Stackable MiniHub to the Receive (RX) port of the remote device. Use the color-coded strand of the cable for this first TX-to-RX connection.
4. Connect the Receive (RX) port (dark colored post) of the Stackable MiniHub to the Transmit (TX) port of the remote device. Use the non-color coded fiber strand for this connection.
5. The Link LED next to the rear fiber port will light when a proper connection has been established at both ends (and when power is ON in the unit). If LINK is not lit after cable connection, the normal cause is improper cable polarity. Swap the fiber cables at the Stackable MiniHub’s rear fiber port connectors to remedy this situation in most cases.

This chapter describes the LEDs and operating features of the Stackable MiniHubs. The Stackable MiniHubs are fully compliant with the Ethernet Version 2/IEEE 802.3 Repeater Specification for CSMA/CD 10-Mbps operation and will function accordingly.

4.0 Operation

4.1 LED Indicators

Power On (PWR) LED: Shines GREEN to show functional DC power.

Link Status (LINK) LEDs: Stackable MiniHubs have a LINK LED for each port, which shines GREEN when the MiniHub detects that a 10BASE-T segment is properly connected to that port. Each LINK LED will turn OFF independently if either end of the segment's cable comes loose or if the MiniHub or the device at the other end loses power.

Receive Packets (RX) LEDs: The RX LEDs, one for each RJ-45 port, flicker GREEN to show that data packets are being received from the segment connected to that port. These LEDs provide reassurance of normal network activity and help you diagnose abnormal activity.

4.2 Operating Features

Partitioning and Reconnection: Stackable MiniHubs will automatically partition any port where 32 consecutive collisions occur or after 6.5 ms of continuous transmissions. Network integrity is checked every 800 ms, and the segment is reconnected after one 512-bit packet is transmitted without an error.

Preamble Regeneration: As per Ethernet standards, the Stackable MiniHubs add bits to the preambles of output packets so that each output packet contains a minimum 64-bit preamble.

Collisions: When carrier is detected simultaneously on multiple ports, a jam pattern is generated on each port to create a collision condition. When a collision signal from one port is detected, it generates a jam pattern to other ports.

Fragment Extension: The Stackable MiniHubs will automatically add bits to a received data packet of less than 96 bits (a "fragment") so that the size of the packet sent on toward its destination is at least 96 bits.

5.0 Troubleshooting

Should problems develop during the installation or operation of your Stackable MiniHub, this chapter should help to locate, identify, and correct such problems. Please follow the suggestions listed in **Section 5.1** below. If nothing helps, contact Black Box; see **Section 5.2**.

5.1 Things to Check

1. If you a problem installing or operating the Stackable MiniHub, refer back to **Chapters 3 and 4**. Check to make sure that the various other components of the network are operable.
2. Check the attached cables to ensure that they have RJ-45-type connectors (not RJ-11 “telephone” type), that the cables have been properly connected, and that the cables or wires have not been crimped or damaged during installation.
3. Make sure that the DC-power cord is properly attached to the MiniHub, and that the external power supply is plugged into a functioning electrical outlet. Use the PWR LED to verify that the unit is receiving proper power.
4. If the problem is isolated to a network device other than the Stackable MiniHub, we recommended that you replace the problem device with a known-good device. Verify whether or not the problem goes away. If not, go to Step 5 below. If the problem goes away, the Personal Hub and its associated cables are functioning properly.
5. If the problem persists, contact Black Box for technical support. See **Section 5.2**.

5.2 Calling Black Box

If you determine that your Stackable MiniHub is malfunctioning, *do not attempt to alter or repair it*. Contact Black Box at 724-746-5500. The problem might be solvable over the phone.

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.

5.3 Shipping and Packaging

If you need to transport or ship your Stackable MiniHub:

- Package it carefully. We recommend that you use the original container.
- If you're shipping the MiniHub for repair, include its power supply. If you're returning the MiniHub, include everything you received with it.

Before you ship the MiniHub for repair or return, contact Black Box to get a Return Authorization (RA) number.

Ship the package to:

Black Box Corporation

1000 Park Drive

Lawrence, PA 15055

Phone: (724) 746-5500

Fax: (724) 746-0746

