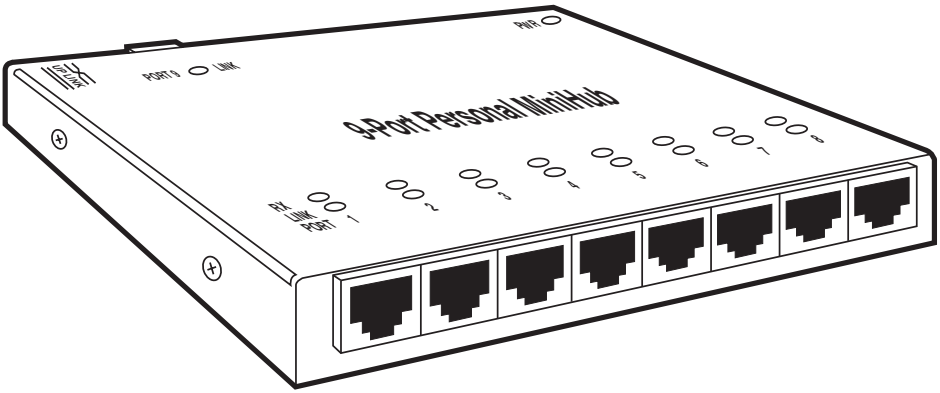
BLACK BOX®
NETWORK SERVICES

DECEMBER 2000
LE2690A

9-Port Personal MiniHub



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**
Mailing address: **Black Box Corporation**, 1000 Park Drive, Lawrence, PA 15055-1018
Web site: **www.blackbox.com** • E-mail: **info@blackbox.com**

FEDERAL COMMUNICATIONS COMMISSION and CANADIAN DEPARTMENT OF COMMUNICATIONS RADIO FREQUENCY INTERFERENCE STATEMENT

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:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult 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.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe B prescrites dans le Règlement sur le brouillage radioélectrique publié par le ministère des Communications du Canada.

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 parato 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 equio 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.

CE Approval

CE This unit is CE approved.

TRADEMARKS USED IN THIS MANUAL

Velcro is a registered trademark of Velcro USA.

Contents

1. Specifications

Compliance —	FCC Part 15 Class A and B, DOC Class/MDC classe B, VDE Class B
Standard —	IEEE 802.3 Ethernet v. 1.0/2.0
Interface —	10BASE-T
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.)
User Controls —	Rear-mounted slide switch for straight-through vs. crossover (uplink) operation
Indicators —	(18) Top-mounted recessed LEDs: (1) Power; (9) Link (1 for each port); (8) RX (1 for each front-panel port)
Connectors —	Shielded-type RJ-45 female: (8) front-mounted, (1) rear-mounted
Leads/Signals Supported —	Pins 1, 2, 3, and 6; On front ports and (when set for straight-through operation) the rear port: Receive +, Receive –, Transmit +, and Transmit – respectively; On rear port (set for crossed operation): Transmit +, Transmit –, Receive +, and Receive – respectively

Power —	From wallmount power supply: Input: 120 VAC, 60 Hz; Output: 12 VDC, 1 amp; Consumption: 10 watts maximum
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
Size —	0.8"H x 5"W x 4.4"D (1.9 x 12.7 x 11.2 cm)
Weight —	Net: 1 lb. (0.5 kg); Net plus power supply: 2 lb. (0.9 kg)

2. Introduction

2.1 General Overview

The 9-Port Personal 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.

Personal MiniHubs provide a simple and inexpensive solution for networking a personal multi-system office using 10BASE-T twisted-pair cabling. They can expand an existing single-network-port outlet to provide up to eight extra ports in the immediate office or lab area.

Personal MiniHubs are also well suited for small-to-medium-size office or lab environments (two to eight 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 9-Port Personal MiniHubs are easily expanded by taking advantage of the MiniHubs' uplink-switchable port to add hubs of equal or greater capacity in a cascade (see **Section 3.3**).

The small size of the Personal 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 possible emergencies.

Personal 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 an available AC wall receptacle or power strip.

The 9-Port Personal MiniHub's RJ-45 ports support connection of up to nine workstations or other network devices over full-length 10BASE-T cable segments. Personal 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 automatially partition and reconnect individual ports in order to keep problems on one segment from causing downtime elsewhere on the network.

Personal MiniHubs have LINK and RX LEDs for each front-panel RJ-45 port, located above the corresponding ports (see the illustration below), one LINK LED for (and located above) the rear-panel 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.

The included extemal wallmount power supply uses AC input power of 120 VAC/60 Hz. Its lightweight cord carries DC power to the barrel-type power jack on the rear panel (shown below) of the MiniHub.

2.2 Features and Benefits

- **Interconnectability with Existing Ethernet Networks**
  Your 9-Port Personal MiniHub has a manual Up-Link switch that you can use to cross the pinning of its rear 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 rear port.

- **Interoperability with Other Ethernet Devices**
  Personal 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 Personal MiniHubs to be integrated into any standard Ethernet network.

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

- **Robust Netork Operation**
  Personal 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**
  Personal 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.

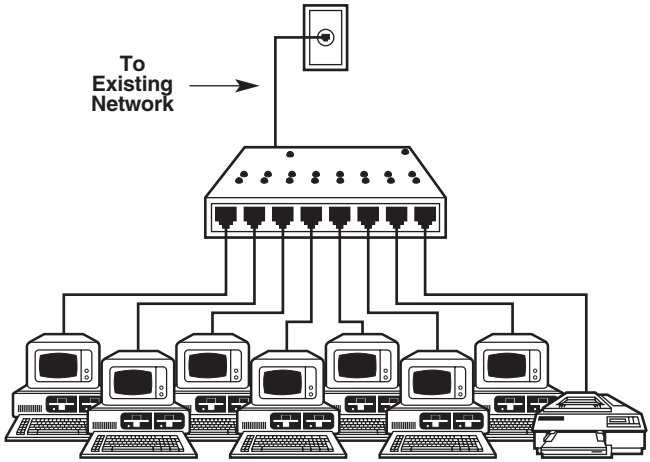
- **Low-cost Standalone 10BASE-T Connectivity**
  Operating your Personal MiniHub in a standalone environment as a self-sufficient device is a very low-cost method of providing small workgroups access to a variety of Ethernet networking services such as file sharing, email, printer sharing, and other computer information.

- **High-Quality Construction**
  Personal MiniHubs have rugged steel enclosures and are compliant with rigid Class B emission standards, making them suitable for commercial and home offices.

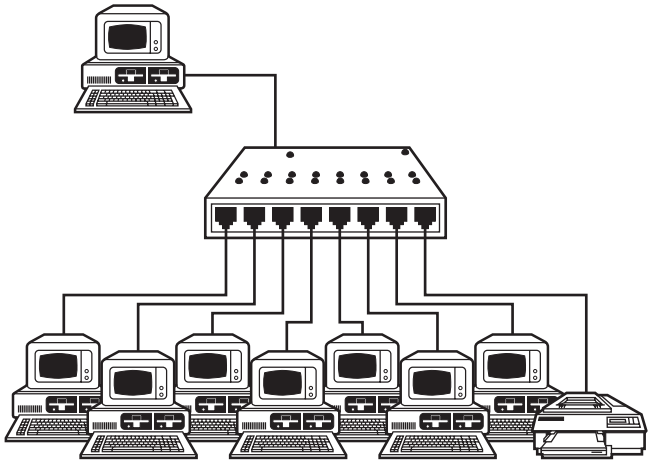
2.3 Applications

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 9-Port Personal MiniHub's front-mounted RJ-45ports. With the MiniHub's rear-mounted Up-Link switch set to "><", run 10BASE-T cable from the existing network outlet to the MiniHub's rear 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 at the top of the next page).

9-PORT PERSONAL MINIHUB



9-Port Personal MiniHubs may also be used standalone to network a local personal multi-user system, as shown below. Up to nine 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 rear port is a user port, not an up-link to another hub.



3. Installation

3.1 Before You Install: Inspecting the Complete Package

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

- (1) 9-Port Personal 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) Copy of this manual

Remove the 9-Port Personal 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 your supplier. If you need to return the unit, see **Sections 5.2 and 5.3**.

3.2 The Installation Procedure

Installing a 9-Port Personal 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

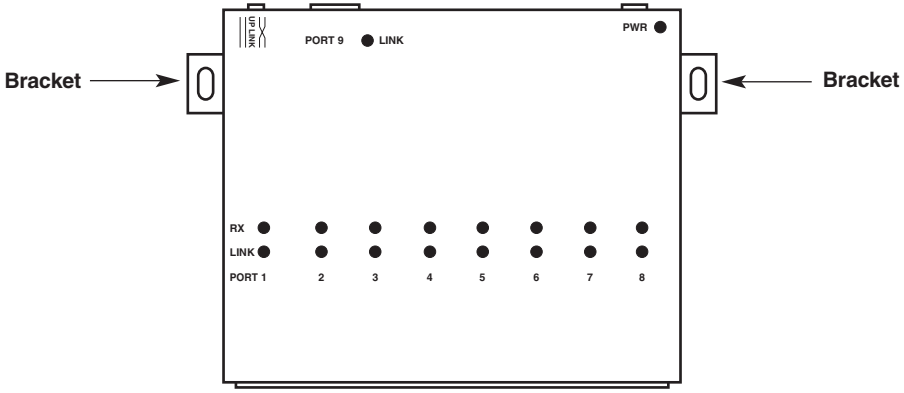
9-Port Personal MiniHubs are easily mounted on a tabletop or shelf, and have four rubber feet to provide stability without scratching finished surfaces. A piece of Velcro may be used to add additional stability if desired. When properly installed, the top-mounted LED status indicators will be in plain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

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

Wall (or Vertical-Surface) Mounting

The 9-Port Personal Hub comes with a piece of Velcro mounting tape. You can use this to mount a Personal 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 Personal 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 Personal MiniHub's case to attach the brackets. With the brackets, you can mount the MiniHub in almost any desired orientation or position.



3.2.2 Powering Up the Hub

Once you've mounted the 9-Port Personal MiniHub, plug the included external power supply's DC power cord into the matching power jack on the Personal 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 9-Port Personal MiniHub. (Even though the MiniHub's connectors are shielded, they will accept, and operate properly with, either unshielded- or shielded-type 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 Rear-Panel Port and the Up-Link Switch

For the rear-panel 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 "═" position) or a special network-uplink connection to another hub or concentrator (switch in the "><" position). A special cross-pinned cable for uplinks is not needed with Personal MiniHubs, because with the Up-Link switch in the "><" position the pinning is crossed inside the MiniHub.

Insert the male plug on one end of a standard 10BASE-T cable into the RJ-45 female port on the rear panel of the 9-Port Personal MiniHub. Connect the other end of the network segment to a workstation or user device if the Up-Link switch is in the "═" position, or to a network hub or concentrator if the Up-Link switch is in the "><" position.

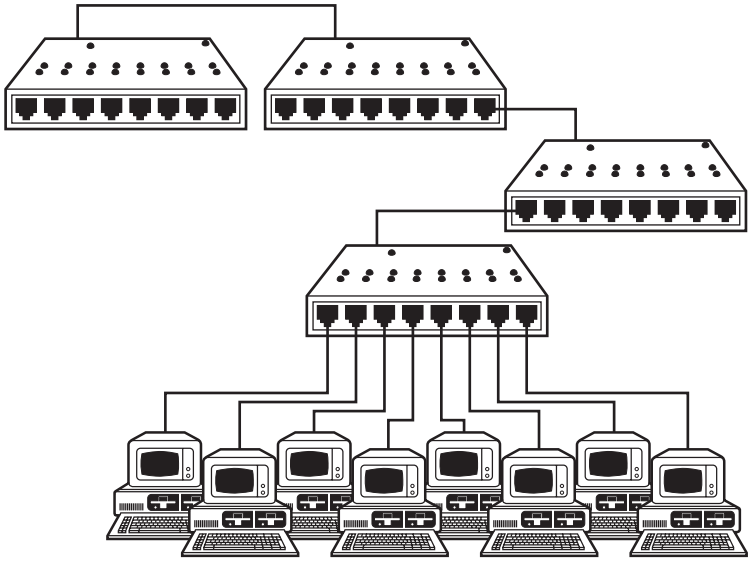
Even when the rear port is physically uplinked (cable runs from the port to a larger network), you can logically isolate the users and devices on the 9-Port Personal MiniHub by moving the Up-Link switch to the "═" position. In this situation, the uplink segment is inoperative and full bandwidth is available locally.

3.3 Cascading

You can cascade 9-Port Personal MiniHubs in order to expand networks. For example, you can set a MiniHub's Up-Link switch to the "⋊" 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 9-Port Personal 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 "⋊" position—the other unit's switch must remain set to the "═" position for the link to work properly.



4. Operation

This chapter describes the LEDs and operating features of the 9-Port Personal MiniHubs. The 9-Port Personal MiniHubs are fully compliant with the Ethemet Version 2/IEEE 802.3 Repeater Specification for CSMA/CD 10-Mbps operation and will function accordingly.

4.1 LED Indicators

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

Link Status (LINK) LEDs: 9-Port Personal 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.

NOTE

When the rear port is physically uplinked (cabled) to another hub, the LINK LED will normally be ON when the Up-Link switch is set to the "><" position. If you isolate the MiniHub for full-bandwidth local operation by moving the Up-Link switch to the "==" position, the LINK LED will be OFF because the up-link is logically disabled.

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: Personal 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 segment reconnection occurs after one 512-bit packet is transmitted without an error.

Prenmble Regeneration: As per Ethernet standards, the 9-Port Personal 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 9-Port Personal 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. Troubleshooting

Should problems develop during the installation or operation of your 9-Port Personal 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 your supplier; see **Section 5.2**.

5.1 Things to Check

1. If you a problem installing or operating the 9-Port Personal 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/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 9-Port Personal 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 your supplier for technical support. See **Section 5.2**.

5.2 Calling Your Supplier

If you determine that your 9-Port Personal MiniHub is malfunctioning, *do not attempt to alter or repair it*. Contact your supplier. The problem might be solvable over the phone.

Before you do, make a record of the history of the problem. Your supplier 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 9-Port Personal 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 your supplier to get a Return Materials Authorization (RMA) number.

NOTES

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