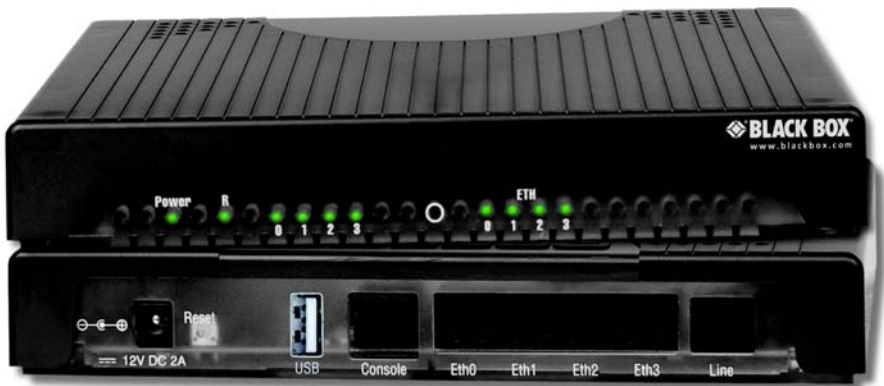# Ethernet Extender

Quick Start Guide

CE **Important**—This is a Class A device and is intended for use in a light industrial environment. It is not intended nor approved for use in an industrial or residential environment.

WARNING

- **This device contains no user serviceable parts. The equipment shall be returned to Patton Electronics for repairs, or repaired by qualified service personnel.**

- **The external power adapter shall be a listed Limited Power Source. The mains outlet that is utilized to power the device shall be within 10 feet (3 meters) of the device, shall be easily accessible, and protected by a circuit breaker.**

- **If an AC power adapter is used, ensure that the power cable used meets all applicable standards for the country in which it is to be installed, and that it is connected to a wall outlet which has earth ground.**

- **Hazardous network voltages are present in WAN ports regardless of whether power to the unit is ON or OFF. To avoid electric shock, use caution when near WAN ports. When detaching the cables, detach the end away from the device first.**

- **Do not work on the system or connect or disconnect cables during periods of lightning activity.**

1.0 Hardware Installation

1.1 Contents of Package

- LB52XA-R2 Ethernet Extender
- External power supply for LB52XA-R2 Ethernet Extender
- Ethernet cable with RJ45 plugs on each end (included)

1.2 What you will need

- Default Remote unit IP address: 192.168.200.10
- Default Local unit IP address: 192.108.200.11
- Default username: admin
- Default password: (no password)
- PC Computer

1.3 Identify the connector and attach the cables

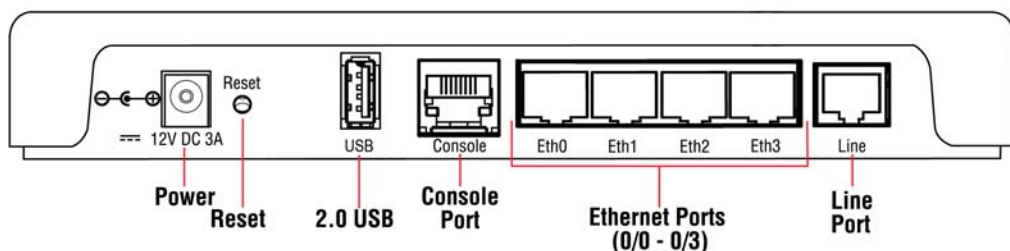All connectors are on the rear panel of the model LB52XA-R2 (see **figure 1**).

Figure 1. All connectors are on the rear panel of the LB52XA-R2 Ethernet Extender

Connect the Line Interface

To function properly, the LB52XA-R2 must be connected using a twisted-pair, uncondi-tioned, dry, metal wire, between 19 (0.9mm) and 26 AWG (0.4mm). Leased circuits that run through signal equalization equipment are not acceptable.

The Ethernet Extender is equipped with an RJ45 interface jack (*Line*), which conforms to the T568B standard. Any standard Category 5e cable can be used to directly connect two Ethernet Extenders. Depending on the Ethernet Extender model, it will have a two-wire, four-wire or eight-wire interface. Observe the signal/pin relationship on the LB52XA-R2's *Line* interface jack for each pair in **figure 2** on page 4. **Figure 4** on page 4 shows the proper way to wire a cable with an RJ-45 jack on one end and four RJ-11 jacks on the other.
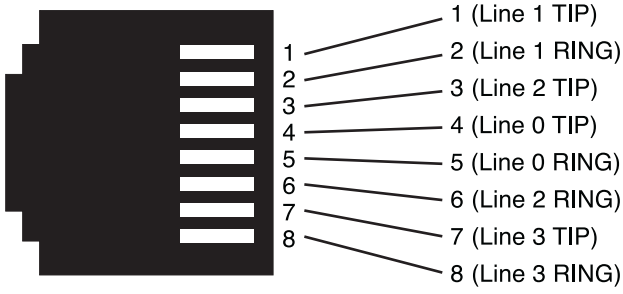
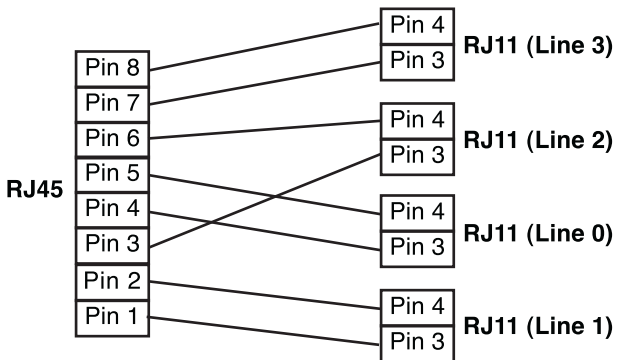**Figure 2.** LB52XA-R2 (RJ-45) twisted pair line interface

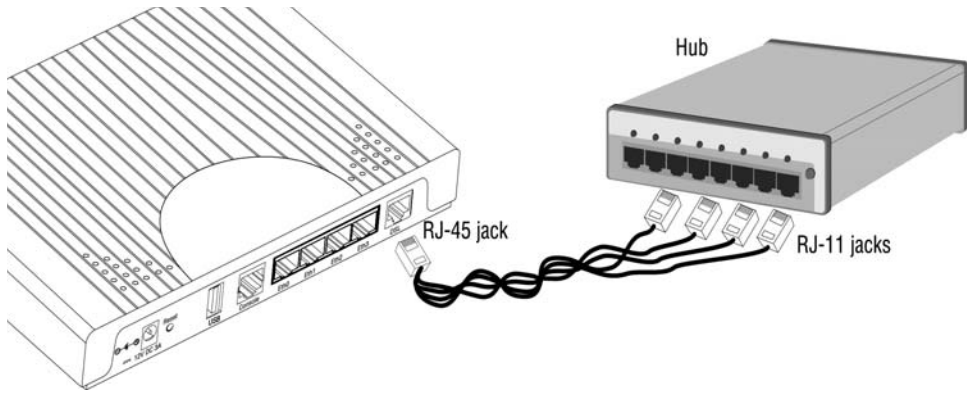**Figure 3.** Line pin-out for two devices

Figure 4. RJ-45 to RJ-11 cable

2.0 Connecting Interfaces

2.1 Connecting Console Interface

Install the supplied RJ-45-to-RJ-45 cable with the DB-9-to-RJ-45 adapter between the LB52XA-R2 RS-232 port and an open serial port on your computer. If you need to assemble your own cable, refer to the pin-out diagram in **figure 5**.
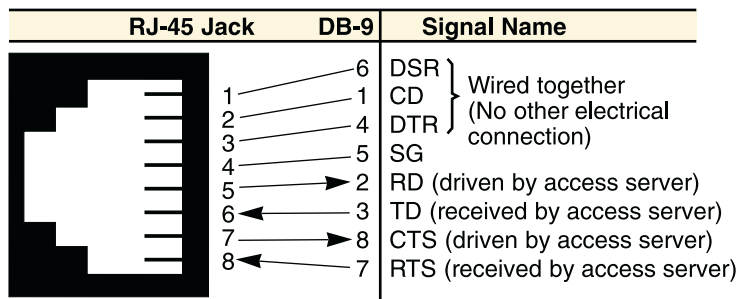
RJ-45 Jack	DB-9	Signal Name

1 — 6 DSR ⎫
2 — 1 CD ⎬ Wired together
3 — 4 DTR ⎭ (No other electrical connection)
4 — 5 SG
5 → 2 RD (driven by access server)
6 ← 3 TD (received by access server)
7 → 8 CTS (driven by access server)
8 ← 7 RTS (received by access server)

Figure 5. DB-9-to-RJ-45 cable diagram

2.2 Connect the Ethernet Interface

The Ethernet Extender has four unshielded RJ-45 auto-MDIX10/100Base-T interfaces. These are designed to connect directly to a 10/100Base-TX network. **Figure 6** shows the signal/pin relationships on this interface. You may connect this port to a hub or PC using a straight-through or crossover cable that is up to 328 ft long.
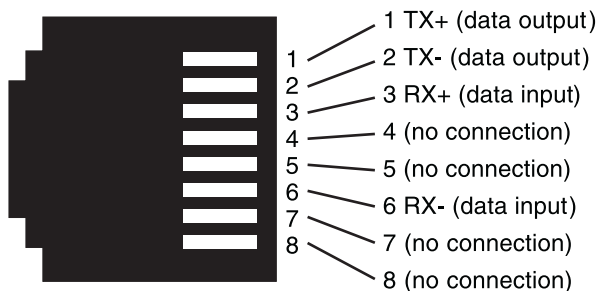
1 — 1 TX+ (data output)
2 — 2 TX- (data output)
3 — 3 RX+ (data input)
4 — 4 (no connection)
5 — 5 (no connection)
6 — 6 RX- (data input)
7 — 7 (no connection)
8 — 8 (no connection)

Figure 6. LB52XA-R2/100Base-T RJ-45 connector pin-out

2.3 Connect the Power Source

The Ethernet Extender does not have a power switch; it powers on once the device is plugged in.

The power connection is made via the barrel jack on the rear panel of the LB52XA-R2. No configuration is necessary for the power supply.

2.4 Ethernet Extender Status LEDs

The LEDs indicate the status of power, WAN, and Ethernet connections.

> **Note** When powered down, the LED indicators are clear; when powered on, the LED indicators are yellow.

Table 1. LB52XA-R2 front panel LEDs

| LED Name	LED Function	Description
Power	ON	Indicates power is applied.
CPE	OFF	WAN is configured as CO.
	ON	WAN is configured as CPE.
Line Pair (one LEAD for each port [1 on LB522A-R2, 2 on LB524A-R2, 4 on LB528A-R2])	OFF	Port is configured as DOWN.
	ON	Port is in data mode.
	SLOW BLINK	Port is in handshake mode (looking for a remote signal).
	FAST BLINK	Port is in training mode (active communication with remote).
Ethernet (0/0 - 0/3)	ON	Port is linked.
	OFF	Data is passing over the port.
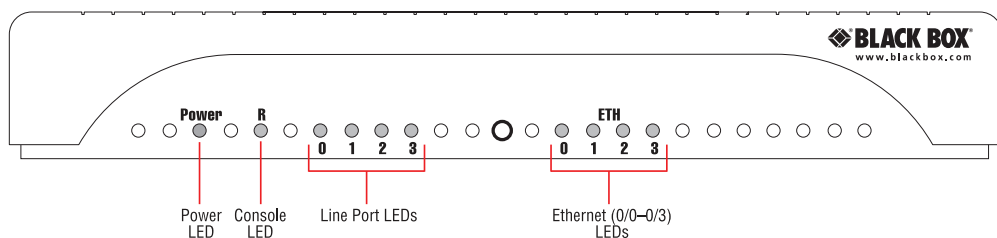
Figure 7. LB52XA-R2 front panel LEDs

3.0 Wizard Interface

The LB52XA-R2 provides a browser interface that allows you to configure and manage the Ethernet extender. After you set up the IP address for the LB52XA-R2, you can access the Web interface applications directly in your Web browser by entering the configured IP address. You can then use your Web browser to list and manage configuration parameters from a PC.

Note Earlier versions predating Internet Explorer 9.0 browser are not compatible with the LB52XA-R2

3.1 Connect with Web GUI

1. Connect the Ethernet cable.

2. Connect the power supply.

3. Connect via web browser to the default address 192.168.200.10 OR connect to 192.168.200.11 for 2 pack local units.

4. Login with the default username *admin* without a password.

Once the network connection is established, you will be able to reach the LB52XA-R2 Web GUI. Login to the Web GUI using the following credentials in **figure 8**.

• Username: *admin*
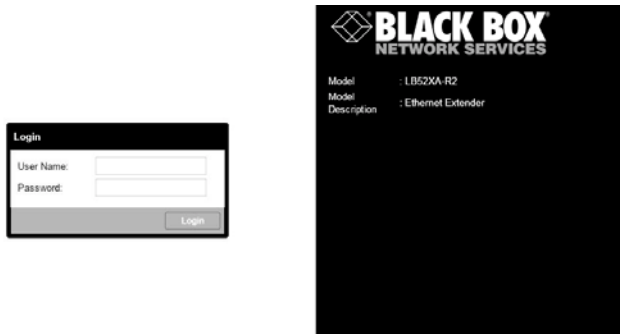• Password: [blank]

Figure 8. Login

The LB52XA-R2 includes a Wizard within the GUI. The icon to the wizard is in the top right corner of your browser as it displays in **figure 9**.

Figure 9. Wizard Homepage

Once the wizard icon is selected, you will have the options of supported set-ups as shown in **figure 11**. Click on LB52XA-R2 Basic Setup.
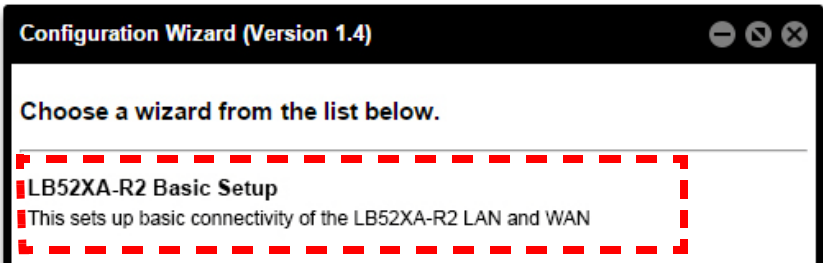

Figure 10. Choose Wizard

Clicking on the LB52XA-R2 Basic Setup will bring up the most common configurations used on the Ethernet Extenders.

Figure 11 depicts options to configure through the Basic Setup Wizard.

Figure 11. Basic Setup

- **User Access: (optional configuration)** Users may change the password for the admin user.
- **Management IP Setup**:
  - **Static:** create your own IP address, netmask, and gateway (optional: the gateway is required for remote management).

- **DHCP:** The LB52XA-R2 management port will accept an IP address from a DHCP server.

- **Both:** This choice will assign two IP addresses (one static and one DHCP to the management port.)

- **Management VLAN ID:** (optional) define a VLAN ID for management traffic.

• **Line Setup:** This is where you can manually set your options.

  Note The Ethernet Extenders by default are set for plug-and-play operation

- **Line Type (Local or Remote):** This will set the Ethernet Extender as Local or Remote. Local is typically used at the network, Remote is typically used at the remote device or remote network. Your LB52XA-R2when received in a 2-pack is already configured with one LB52XA-R2 as Local and one LB52XA-R2 as Remote.

- **Service Mode:** Configures the number of pairs (wires) you want to use. The LB52XA-R2 will default to the maximum number of wires available on your version of the CopperLink. LB522A-R2 (2-wire); LB524A-R2 (4-wire); LB528A-R2 (8-wire).

- **Annex:** Please consult support before changing this setting.

- **Line Rate Configuration:** This will increase the potential line rate of the LB52XA-R2. Your LB52XA-R2 is defaulted to automatically select the optimal rate based on the distance (adaptive).

  Note There are two mates: Normal (TCPAM16|32) and Extended (TCPAM64|128). Selecting the Extended mode will double the bandwidth, but will reduce the reach (distance) by half. Default is normal.

On the bottom right corner of the LB52XA-R2 Basic Configuration wizard page to preview configurations and reboot. **figure 12** on page 10 depicts what you can expect to see if you click on the preview tab.
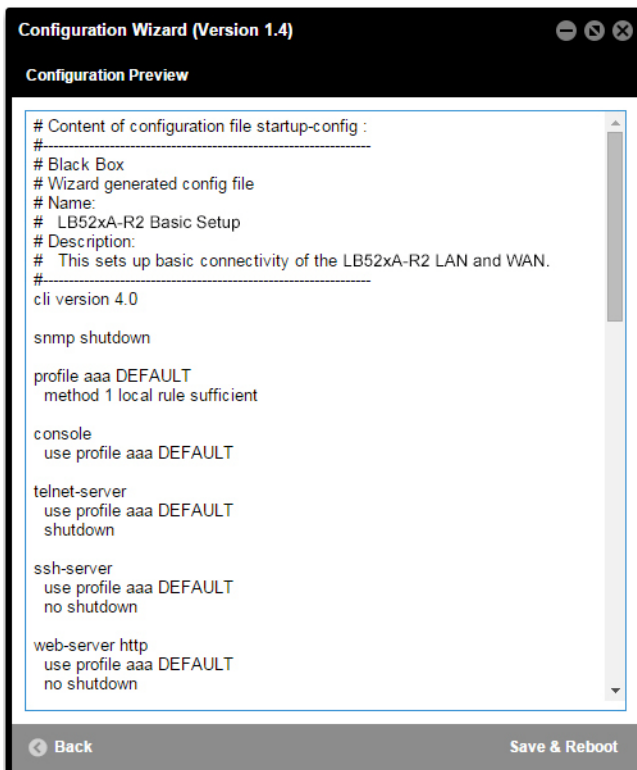
Figure 12. Configure Preview Option

When the user chooses the save and reboot option, a prompt will ask you to confirm. If the configuration is correct, select "Yes" as shown in **figure 13**.
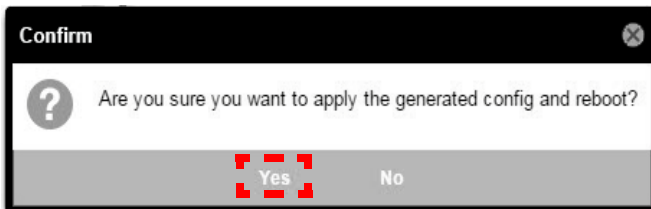

Figure 13. Confirmation

Typically the time to reboot and reestablish a Line link and pass traffic once again will be under 2 minutes.

4.0 CLI Operation and Configuration

You can connect a PC to configure the LB52XA-R2 using the CLI.

4.1 Connect with SSH

1. Connect the Ethernet cable.

2. Connect the power supply.

3. Connect via SSH to the extender through remote or local IP addresses
   — Default remote IP address: 192.168.200.10
   — Default local IP address: 192.168.200.11

4. Login with the default username *admin* and no password.

4.2 Connect with Console

1. Connect the RS232 Console cable. (8-N-1 19200)

2. Connect the power supply.

3. Login with the default username *admin* and no password.

4.3 Change the IP address (default: 192.168.200.10)

Follow the command sequence below.

```
node~>enable
node~#configure
node~(cfg)#context ip router
node~(ctx-ip)[router]#interface LAN
node~(if-ip)[router.LAN]#no ipaddress 192.168.200.10/24
node~(if-ip)[router.LAN]#ipaddress <new address>/<new
   mask>
```

4.4 Change the default username

The default username will be removed once a new one is created.

Follow the command sequence below.

```
node~>enable
node~#configure
node~(cfg)#superuser <username> password <password>
```

4.5 Save the Configuration

Follow the command sequence below.

```
node~>enable
node~#configure
```

```
node~(cfg)#copy running-config startup-config
```

4.6 LINE Commands

Local and Remote: This will set the Ethernet Extender as Local or Remote. Local is typically used at the network, Remote is typically used at the remote device or remote network. Your LB52XA-R2 when received in a 2-pack is already configured one LB52XA-R2 as Local and one LB52XA-R2 as Remote.

```
node(cfg)# mode {local|remote}
```

Annex Type: Please consult support before changing this setting.

```
node~(pf-dsl)[<name>]# annex-type { b-g | a-f }
```

Line Rate Configuration: This will increase the line rate of the LB52XA-R2. Your LB52XA-R2 is defaulted to automatically select the optimal rate based on the distance (adaptive).

```
node(prt-line)[0/0]# payload-rate {adaptive [max
    <192..15296>] | <192..15296>}
```

Modulation Scheme: Note higher TC-PAM rates will increase maximum payload rates available but will decrease distance. Your LB52XA-R2 is defaulted to automatically select the optimal setting. Please consult manual for rate reach chart to determine your optimal setting if you choose to hard set this value. Higher TC-PAM rates are ideal for shorter cable runs offering max symmetrical (upstream/downstream) speeds of 11.4 Mbps (TCPAM64) and 15.3 Mbps (TCPAM128) per pair.

```
node(prt-line)[0/0]# tcpam {auto(16/32) | auto(64/128) |
    16 | 32 | 64 | 128}
```

Line Ports: The configurations below are used to configure various aspects of the line port(s).

```
node~(cfg)# port dsl 0 0
```

Signal to Noise Ratio: Configures the acceptable noise margin for adaptive rate. SNR is the relative strength of the DSL signal to Noise ratio. 6dB is generally the lowest dB recommended in order for the modem to be able to synch. Generally speaking, as over-all bandwidth increases, your signal to noise ratio decreases. The higher the number the better. Your LB52XA-R2 is defaulted at 6 giving you the highest likelihood to connect.

```
node(prt-line)[0/0]# snr-margin <-10..22>
```

Below 6dB	bad
6dB-10dB	fair
11dB-20dB	good

Description: This is the description of the port/line (line connection). (Ex: "This line goes to building 4") When entering a description with spaces in the text, the description must be in quotations.

```
node~(prt-dsl)[0/0]# description <description>
```

Use Profile: Configures the acceptable noise margin for adaptive rate. SNR is the relative strength of the DSL signal to Noise ratio. 6dB is generally the lowest dB recommended in order for the modem to be able to synch.

```
node~(prt-dsl)[0/0]# use profile <name>
```

Service Mode: Configures the number of pairs (wires) you want to use. The LB52XA-R2E will default to the maximum number of wires available on your version of the . LB522A-R2 (2-wire); LB524A-R2 (4-wire); LB528A-R2 (8-wire).

```
node~(prt-dsl)[0/0]# service-mode { 2-wire | 4-wire | 6-
    wire | 8-wire }
```

Shutdown: Disables or Enables line port(s).

```
node~(prt-dsl)[0/0]# [no] shutdown
```

Exit: Goes back to parent mode.

```
node~(prt-dsl)[0/0]# exit
```

Show: Displays all the configured options of the LB528A-R2 port(s)

```
node(cfg)# show prt-line 0
```

5.0 Compliance

5.1 EMC

- FCC Part 15, Class A
- EN55022, Class A
- EN55024

5.2 Safety

- UL 60950-1/CSA C22.2 NO. 60950-1
- IEC/EN60950-1
- AS/NZS 60950-1

5.3 PSTN Regulatory

- FCC Part 68
- CS-03

- AS/ACIF S043:2003

6.0 FCC Part 68 (ACTA) Statement

This equipment complies with Part 68 of FCC rules and the requirements adopted by ACTA. On the bottom side of this equipment is a label that contains—among other information—a product identifier in the format US: *AAAEQ##TXXXX*. If requested, this number must be provided to the telephone company.

The method used to connect this equipment to the premises wiring and telephone network must comply with the applicable FCC Part 68 rules and requirements adopted by the ACTA.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of the equipment. If this happens the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

If trouble is experienced with this equipment, for repair or warranty information, please contact our company. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

Connection to party line service is subject to state tariffs. Contact the state public utility commission, public service commission or corporation commission for information.

6.1 Industry Canada Notice

This equipment meets the applicable Industry Canada Terminal Equipment Technical Specifications. This is confirmed by the registration number. The abbreviation, IC, before the registration number signifies that registration was performed based on a Declaration of Conformity indicating that Industry Canada technical specifications were met. It does not imply that Industry Canada approved the equipment.

This Declaration of Conformity means that the equipment meets certain telecommunications network protective, operational 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 (telephone extension cord). The customer should be aware that compliance with the above condition may not prevent degradation of service in some situations. Repairs to some certified equipment should be made by an authorized main-

tenance facility designated by the 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 ground connections of the power utility, telephone lines and internal metallic water pipe system, are connected together. This protection may be particularly important in rural areas.

7.0 Radio and TV Interference (FCC Part 15)

This equipment generates and uses 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 and television reception. This equipment 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 from such interference in a commercial installation. However, there is no guarantee that interference will not occur in a particular installation. If the equipment causes interference to radio or television reception, which can be determined by disconnecting the cables, try to correct the interference by one or more of the following measures: moving the computing equipment away from the receiver, re-orienting the receiving antenna, and/or plugging the receiving equipment into a different AC outlet (such that the computing equipment and receiver are on different branches).

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