# *CopperLink Model CL1300*
# Long Range Ethernet Extenders

## *User Manual*


Model CL1300 Model CL1300R

**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.

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### Warranty Information

Patton Electronics warrants all Model CL1300 components to be free from defects, and will—at our option—repair or replace the product should it fail within one year from the first date of shipment.

This warranty is limited to defects in workmanship or materials, and does not cover customer damage, abuse or unauthorized modification. If this product fails or does not perform as warranted, your sole recourse shall be repair or replacement as described above. Under no condition shall Patton Electronics be liable for any damages incurred by the use of this product. These damages include, but are not limited to, the following: lost profits, lost savings and incidental or consequential damages arising from the use of or inability to use this product. Patton Electronics specifically disclaims all other warranties, expressed or implied, and the installation or use of this product shall be deemed an acceptance of these terms by the user.

**Note** Conformity documents of all Patton products can be viewed online at www.patton.com under the appropriate product page.

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# About this guide

This guide describes installing and operating a Patton Electronics CopperLink™ Model CL1300 Long Range Ethernet Extender.

## Audience

This guide is intended for the following users:

- Operators
- Installers
- Maintenance technicians

## Structure

This guide contains the following chapters and appendices:

- Chapter 1 on page 14 provides information about CL1300 features and capabilities
- Chapter 2 on page 18 provides information for installing the CL1300
- Chapter 3 on page 34 describes how to configure the CL1300
- Chapter 4 on page 38 describes how use the browser interface that allows you to configure and manage the Ethernet extender
- Chapter 5 on page 43 describes how to connect a PC to configure the CopperLink CL1300 using the CLI
- Chapter 6 on page 47 contains information on contacting Patton technical support for assistance
- Appendix A on page 50 contains compliance information for the CL1300
- Appendix B on page 52 contains specifications for the CL1300
- Appendix C on page 56 lists factory replacement parts and accessories
- Appendix D on page 58 describes the CL1300's interface ports and pin-outs
- Appendix E on page 60 describes installing optional Connect-IT Model 552-GS2 High Speed Telco Surge Protectors

For best results, read the contents of this guide *before* you install the CL1300.

## Precautions

Notes, cautions, and warnings, which have the following meanings, are used throughout this guide to help you become aware of potential problems. ***Warnings*** are intended to prevent safety hazards that could result in personal injury. ***Cautions*** are intended to prevent situations that could result in property damage or impaired functioning.

**Note** A note presents additional information or interesting sidelights.


**The shock hazard symbol and WARNING heading indicate a potential electric shock hazard. Strictly follow the warning instructions to avoid injury caused by electric shock.**


**The alert symbol and WARNING heading indicate a potential safety hazard. Strictly follow the warning instructions to avoid personal injury.**


The shock hazard symbol and CAUTION heading indicate a potential electric shock hazard. Strictly follow the instructions to avoid property damage caused by electric shock.


The alert symbol and CAUTION heading indicate a potential hazard. Strictly follow the instructions to avoid property damage.

## *Safety when working with electricity*


- **Do not open the device when the power cord is connected. For systems without a power switch and without an external power adapter, line voltages are present within the device when the power cord is connected.**
- **For devices with an external power adapter, the 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 in compliance with local regulatory requirements.**
- **For AC powered devices, ensure that the power cable used meets all applicable standards for the country in which it is to be installed.**
- **For AC powered devices which have 3 conductor power plugs (L1, L2 & GND or Hot, Neutral & Safety/Protective Ground), the wall outlet (or socket) must have an earth ground.**
- **For DC powered devices, ensure that the interconnecting cables are rated for proper voltage, current, anticipated temperature, flammability, and mechanical serviceability.**
- **WAN, LAN & PSTN ports (connections) may have hazardous voltages present regardless of whether the device is powered ON or OFF. PSTN relates to interfaces such as telephone lines, FXS, FXO, DSL, xDSL, T1, E1, ISDN, Voice, etc. These are known as "hazardous network voltages" and to avoid electric shock use caution when working near these ports. When disconnecting cables for these ports, detach the far end connection first.**
- **Do not work on the device or connect or disconnect cables during periods of lightning activity.**


**This device contains no user serviceable parts. This device can only be repaired by qualified service personnel.**


**This device is NOT intended nor approved for connection to the PSTN. It is intended only for connection to customer premise equipment.**

In accordance with the requirements of council directive 2002/96/EC on Waste of Electrical and Electronic Equipment (WEEE), ensure that at end-of-life you separate this product from other waste and scrap and deliver to the WEEE collection system in your country for recycling.


Electrostatic Discharge (ESD) can damage equipment and impair electrical circuitry. It occurs when electronic printed circuit cards are improperly handled and can result in complete or intermittent failures. Do the following to prevent ESD:

- Always follow ESD prevention procedures when removing and replacing cards.
- Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. Connect the clip to an unpainted surface of the chassis frame to safely channel unwanted ESD voltages to ground.
- To properly guard against ESD damage and shocks, the wrist strap and cord must operate effectively. If no wrist strap is available, ground yourself by touching the metal part of the chassis.

### *General observations*

- Clean the case with a soft slightly moist anti-static cloth
- Place the unit on a flat surface and ensure free air circulation
- Avoid exposing the unit to direct sunlight and other heat sources
- Protect the unit from moisture, vapors, and corrosive liquids

## Typographical conventions used in this document

This section describes the typographical conventions and terms used in this guide.

### *General conventions*

The procedures described in this manual use the following text conventions::

Table 1. General conventions

| Convention | Meaning |
|---|---|
| Garamond blue type | Indicates a cross-reference hyperlink that points to a figure, graphic, table, or section heading. Clicking on the hyperlink jumps you to the reference. When you have finished reviewing the reference, click on the **Go to Previous View** button in the Adobe® Acrobat® Reader toolbar to return to your starting point. |
| Helvetica bold type | Commands and keywords are in **boldface** font. |
| Helvetica bold-italic type | Parts of commands, which are related to elements already named by the user, are in ***boldface italic*** font. |
| *Italicized Helvetica type* | Variables for which you supply values are in *italic* font |

Table 1. General conventions

| Convention | Meaning |
|---|---|
| Helvetica type | Indicates the names of fields or windows. |
| **Garamond bold type** | Indicates the names of command buttons that execute an action. |
| < > | Angle brackets indicate function and keyboard keys, such as <SHIFT>, <CTRL>, <C>, and so on. |
| [ ] | Elements in square brackets are optional. |
| {a \| b \| c} | Alternative but required keywords are grouped in braces ({ }) and are separated by vertical bars ( \| ) |
| `blue screen` | Information you enter is in `blue screen` font. |
| `screen` | Terminal sessions and information the system displays are in `screen font`. |
| # | An hash sign at the beginning of a line indicates a comment line. |

# Chapter 1 General information

### *Chapter contents*

## CopperLink Model CL1300 overview

The CL1300 Long Range Ethernet Extender series consists of the CL1300 Ethernet Extender and the CL1300R Industrial Grade Ethernet Extender (see figure 1). Both devices can be placed on a desk or table, but the ruggedized CL1300R can also be mounted on a DIN rail, operates at temperatures of -40 to 85°C, and is available with optional conformal coating to protect against condensing humidity and corrosion.


Figure 1. CopperLink Model CL1300 and CL1300R

The extenders leverage existing copper twisted-pair infrastructure to interconnect Ethernet devices and networks at high speeds over long distances. The extenders ensure hassle-free set-up and operation, while achieving the highest possible line rate for the required distance and electromagnetic environment. Users can let the modems select the best achievable rate or they can "hard-set" the desired line rate via DIP switches, console Telnet or HTTP.

The CL1300 devices come with a built-in four-port, auto-sensing, 10/100Base-TX Ethernet switch that provides automatic medium-dependent interface crossover capability (auto-MDIX). That means you can use cross-over or straight-through cables (whichever is handy) to connect up to four Ethernet devices. The auto-MDIX feature detects the polarity of the cabling on each port, and automatically configures the signaling to match. Absolutely no user-configuration is required.

The CL1300 extenders transparently pass all higher-layer protocols—including VLAN tagging, multicast addressing, VPN pass-through for IPsec, and all IP-video compression schemes. All common industrial protocols are also transparently supported, including MODBUS/TCP and PROFINET IO.

## Features

- High speed extension—Realize symmetrical line rates of over 30?Mbps.
- Multi-rate selection—Just plug the units in and select the ideal user-configurable rate for your application.
- Ethernet over 2 or 4 wires—Easy 2 or 4 wire (1 to 2 twisted pairs) connection via an RJ45 port. The additional pair offers additional bandwidth and failover.
- Built-in 4-port Ethernet switch—Connect up to four Ethernet devices using the integrated 4 X 10/100Base-T, auto-sensing, full/half-duplex Ethernet switch.
- Transparent LAN bridging—Transparently pass higher-layer protocols with support for 802.1Q VLAN tagging.
- Automatic learning, aging, and filtering—Keeps local traffic local, ensuring efficient utilization of the long-range link.
- Made in the USA—This Patton equipment is designed by Patton engineers and built in our Gaithersburg, Maryland facility.

## Power input connector

Depending on the SKU, the CopperLink device comes with an included AC power supply or it can be connected to a DC power supply that is not included. (See section "Power" on page 54.)

- The power connection to the CL1300R is a terminal block (see figure 2).
- The power connection to the CL1300 is shown in figure 3 on page 17
- Rated voltage: 5 VDC
- Rated current: 1 A

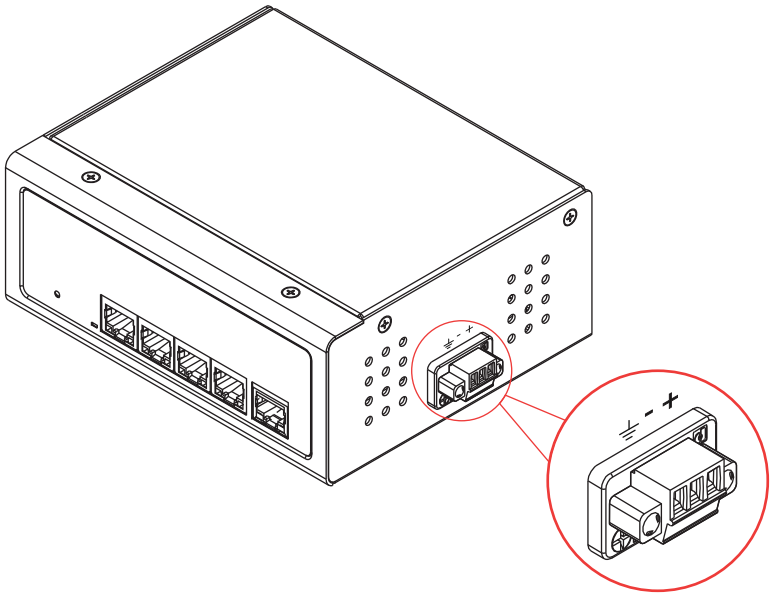

Figure 2. CL1300R terminal block power connection

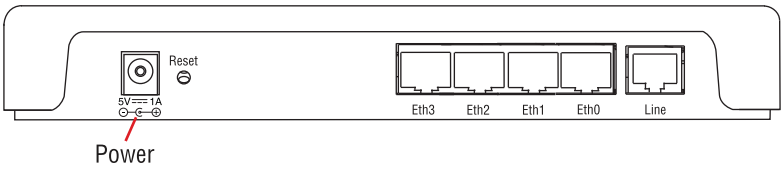


Figure 3. CL1300 power connection

### External AC universal power supply

For additional specifications, see section "Power" on page 54.

- Output from power supply: 5 VDC, 2 A
- Input to power supply: universal input 100–240 VAC 50/60 Hz 0.3A

CAUTION

The external AC adapter shall be a listed limited power source that incorporates a disconnect device and shall be positioned within easy reach of the operator. Ensure that the AC power cable 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.

### External 48 VDC power supply

CAUTION

The external DC adapter shall be a listed limited power source that incorporates a disconnect device and shall be positioned within easy reach of the operator. The interconnecting cables shall be rated for the proper voltage, current, anticipated temperature, flammability, and mechanical serviceability

Refer to section "Power" on page 54 for additional specifications.

- Input:
  - Rated voltage: 36–60 VDC
  - Rated current: 0.25 A DC
  - 3-pin locking connector, 3.5 mm pitch
  - Transient over-voltage protection, 100VDC at 2 ms
- Output:
  - Rated voltage: 5 VDC ± 5%, 5W
  - Rated current; 1 A DC

# Chapter 2 Installation

### *Chapter contents*

## Introduction

CAUTION

The Interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

To install the CL1300 Ethernet Extender, do the following:

1. If you will be configuring CL1300R DIP switches, see section "Configuring DIP Switch S2". Otherwise, go to step 2.

CAUTION

If you will be configuring the device using the DIP switches, do so ***before*** powering up the device

2. Install the Ethernet extender where it will be used ("Installing the device" on page 21)
3. Connect a cable to the CopperLink Line interface (see section "Connecting the Line Interface" on page 23)
4. Connect Ethernet cables to the Ethernet interfaces (see section "Connecting the 10/100Base-T Ethernet Interface" on page 27)
5. Connect the power supply cable to the power port (see section "Connecting Power" on page 27)

## Configuring DIP Switch S2

The DIP switches are located inside the device. They enable you to configure the TCPAM/Rate preset. These settings are applied when the device powers on, and they cannot be changed while the device is powered on. Keep this in mind if you plan on adjusting these settings later remotely, as the DIP switch settings at boot will always take priority.

1. Using a small cross-tip screwdriver, remove the protective cover located on the right side panel of the CL1300R (see figure 4 on page 20).

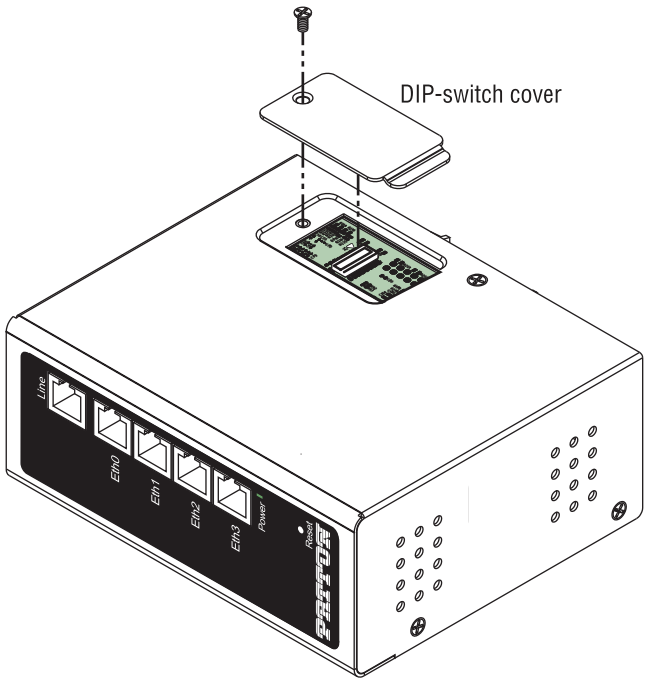


Figure 4. Removing DIP switch cover

2. figure 5 shows the orientation of the DIP switches in the On and Off positions.

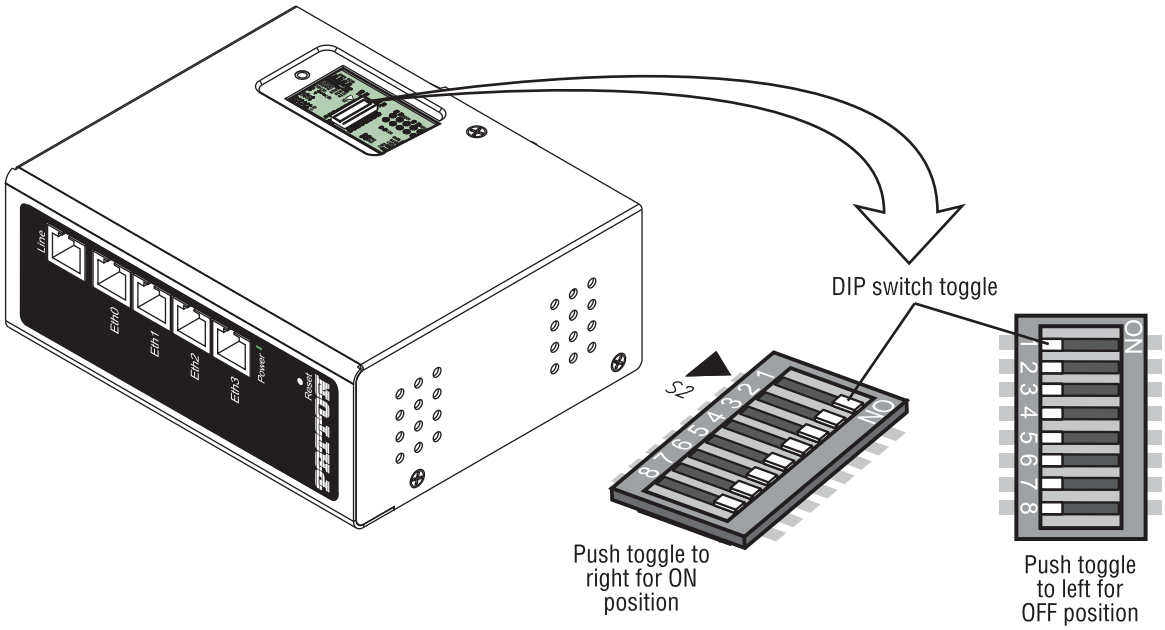


Figure 5. DIP switch S2 orientation

### *Hardware (DIP switch) configuration*

To disable the DIP switches:

1. Power-off the device.
2. Set all DIP switches to off (see figure 5 on page 20).

To enable the DIP switches:

1. Power-off the device.
2. Set DIP switches 2–5 to a TCPAM/Rate preset. When connecting two CopperLink devices, their speeds should be configured to match.

Table 2. TCPAM/Rates

| Switch 2 | Switch 3 | Switch 4 | Switch 5 | TCPAM/Rate Preset |
|---|---|---|---|---|
| ON | ON | ON | ON | TCPAM-16/32 Autorate |
| ON | ON | ON | - | TCPAM-64/128 Autorate |
| ON | ON | - | ON | TCPAM-4 192 kbps |
| ON | ON | - | - | TCPAM-4 2496 kbps |
| ON | - | ON | ON | TCPAM-8 192 kbps |
| ON | - | ON | - | TCPAM-8 5056 kbps |
| ON | - | - | ON | TCPAM-16 192 kbps |
| ON | - | - | - | TCPAM-16 3840 kbps |
| - | ON | ON | ON | TCPAM-32 768 kbps |
| - | ON | ON | - | TCPAM-32 5696 kbps |
| - | ON | - | ON | TCPAM-64 192 kbps |
| - | ON | - | - | TCPAM-64 12736 kbps |
| - | - | ON | ON | TCPAM-128 256 kbps |
| - | - | ON | - | TCPAM-128 15296 kbps |
| - | - | - | ON | RESERVED |

3. Set DIP switches 6–8 to off. These are reserved for future use.
4. Using a small cross-tip screwdriver, install the DIP switch cover.

The DIP switches are configured. Continue to section "Installing the device".

## Installing the device

If you are installing a CL1300R unit on a DIN rail, see section "DIN rail installation". Otherwise, place the unit on a desktop or similar sturdy surface that offers easy access to the cables. The unit should be installed in a dry environment with sufficient space to allow air circulation for cooling.

**Note** For proper ventilation, leave at least 2 inches (5 cm) on all sides of the device.

### *DIN rail installation*

1. The DIN rail mounting clip on the unit (see figure 6) can be attached to top hat NS 35/7.5 (35 H × 7.5 D mm) and NS 35/15 (35 H × 15 D mm) section types of DIN rail (see figure 7):

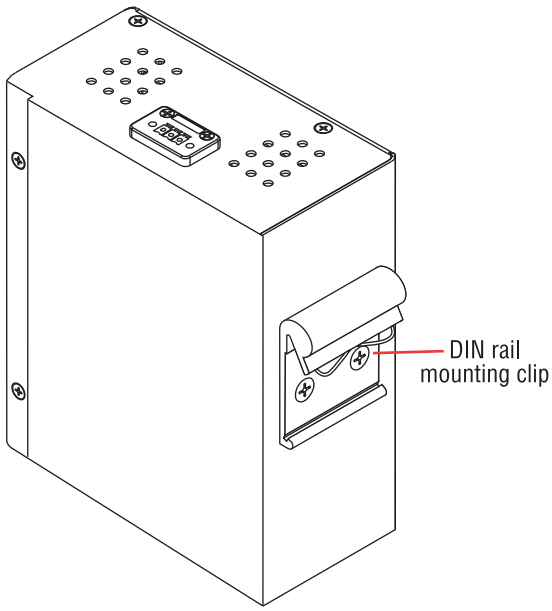


Figure 6. DIN rail mounting clip location

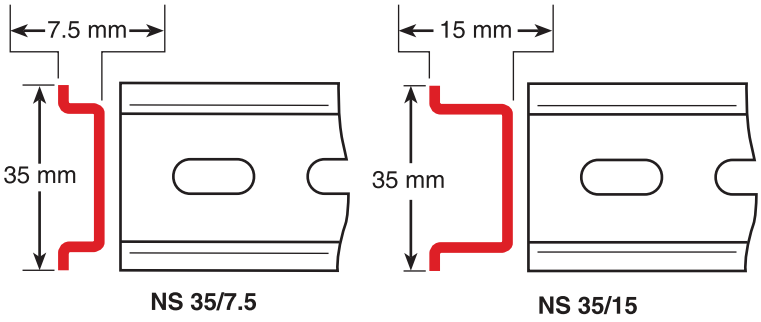


Figure 7. DIN rail types

2. Install the device onto the DIN rail by inserting the upper DIN rail lip into the upper DIN rail clip slot (see callout 1 on figure 8 on page 23).

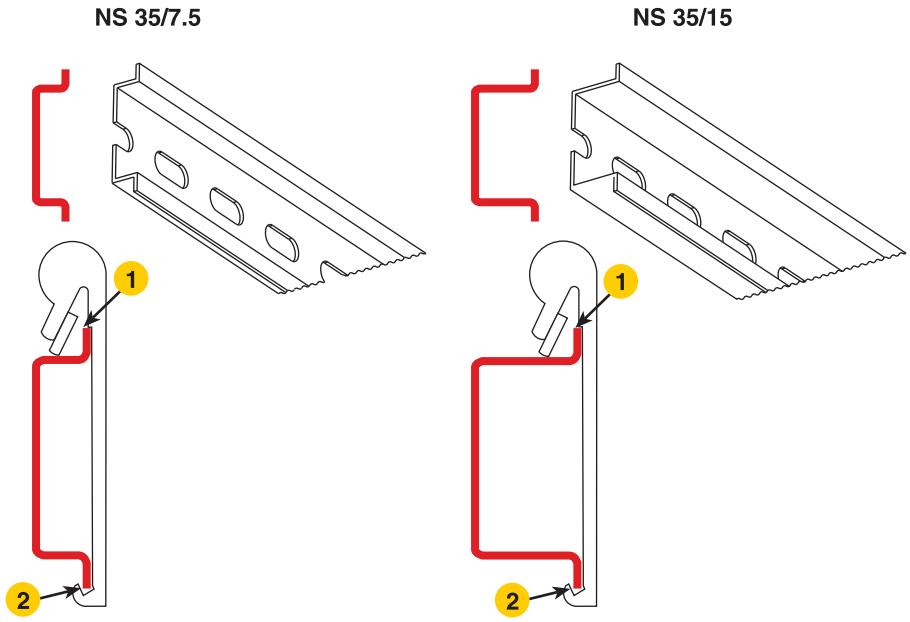


Figure 8. Installing the device onto the DIN rail

3. Rotate the device until the lower DIN rail lip snaps into the lower DIN rail clip slot (see callout 2 on figure 8).

The device has been installed on the DIN rail; proceed to section "Connecting the Line Interface".

## Connecting the Line Interface

To function properly, the CL1300 must be connected using a twisted-pair, unconditioned, 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 RJ-45 interface port *Line* (see figure 9 on page 23 for the CL1300 or figure 10 on page 24 for the CL1300R) that conform to the T568B standard. As such, any standard Category 5e cable can be used to directly connect two extenders. Depending on the extender model, it will have a two-wire or four-wire interface.

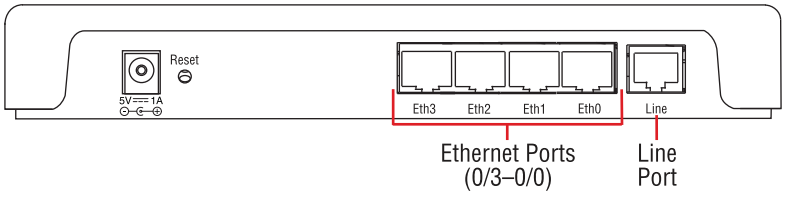


Figure 9. CL1300 ports

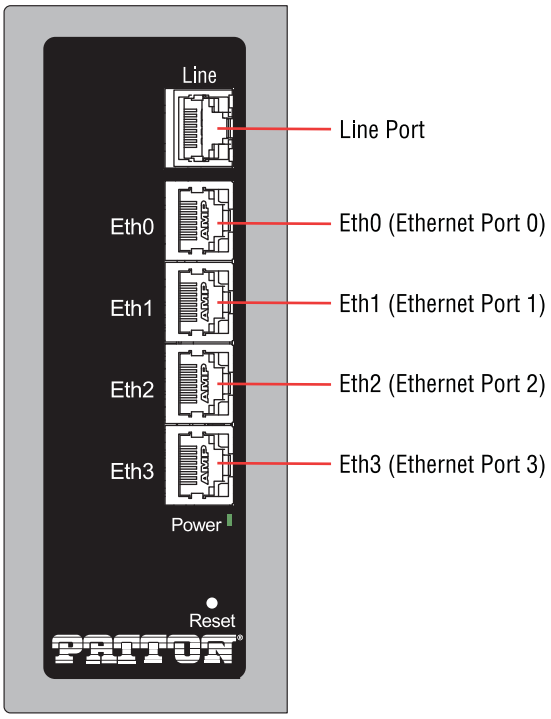


Figure 10. CL1300R ports

Observe the signal/pin relationship on the CL1300's *Line* interface jack for each pair in figure 11.

**Note** If you will be installing optional Connect-IT Model 552-E1 surge protectors to protect a CL1300R, refer to Appendix E on page 60 for instructions.

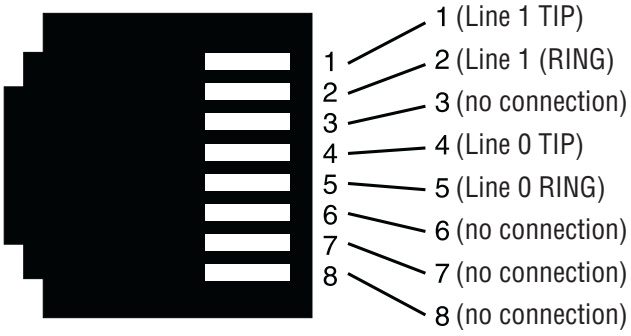


Figure 11. CL1300 (RJ-45) twisted pair line interfaces

Figure 12 on page 26 shows the topologies that are available for connecting CL1300 extenders. Keep the following in mind:

- The RJ-45 Line connector on the CL1314R's twisted pair interface is polarity insensitive and is wired for a 2-wire interface.

- The RJ-45 Line connector on the CL1300R's twisted pair interface is polarity insensitive and is wired for a 4-wire interface.
- The CL1300MDE port *C1* connects to port *C2* (CL1300MDE) or the *Line* port (CL1300/**R** or CL1300R/**R**)
- The CL1300MDE port *C2* connects to port *C1* (CL1300MDE) or the *Line* port (CL1300/**L** or CL1300R/**L**)

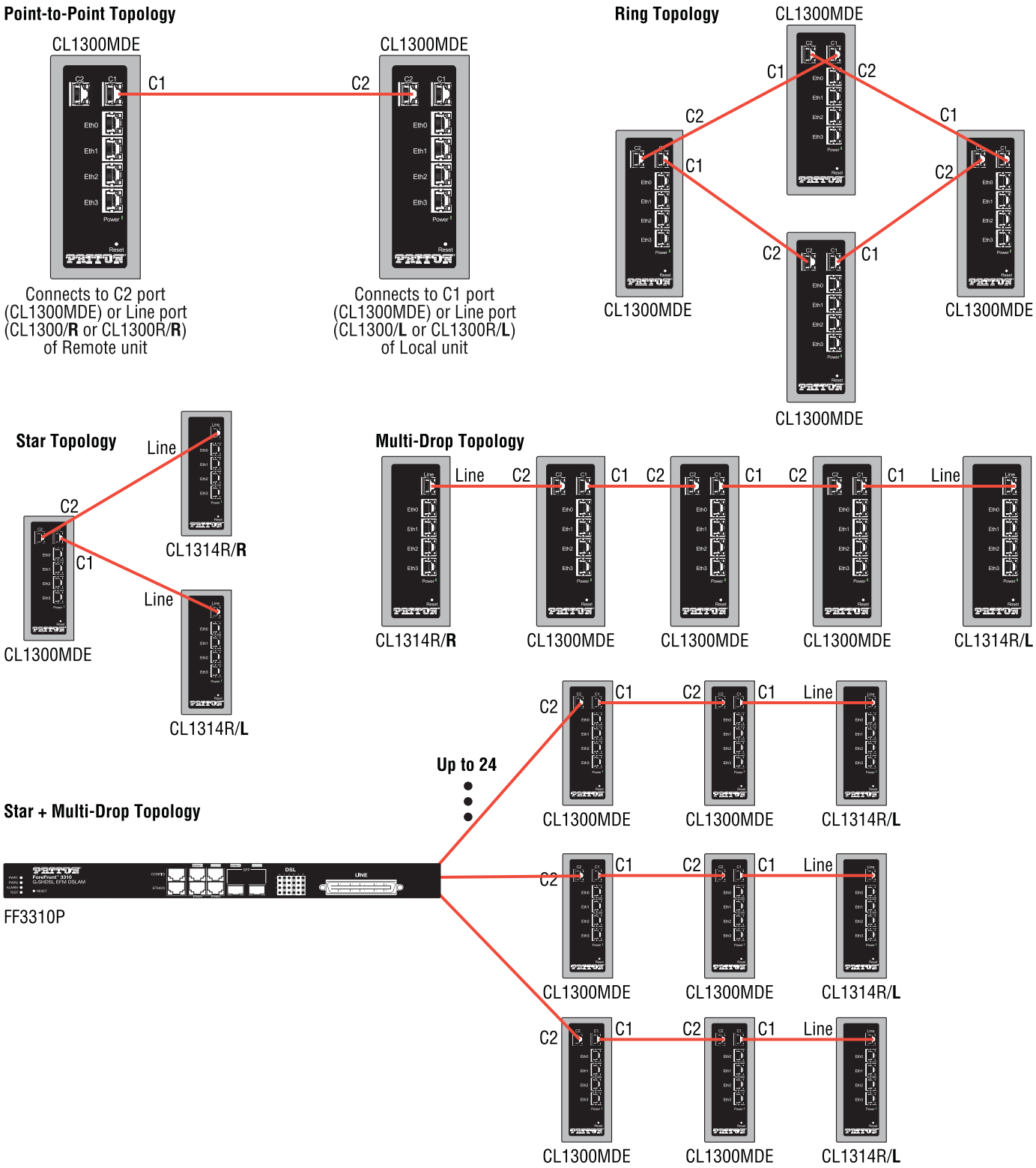


Figure 12. CL1300 Topologies

## Connecting the 10/100Base-T 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.

## Connecting Power

Refer to the appropriate section to connect power:

- Section "CL1300 Series" to install the AC power supply or optional DC power converter
- Section "CL1300R Series" on page 29 to install the AC power supply or connect to the internal DC power converter

### *CL1300 Series*

#### *AC power supply*

The CL1300 comes standard with an AC power supply:

- There is one fuse in the equipment rated at 250V, 500 mA, 2 sec.
- Rated voltage: 5 VDC
- Rated current: 1 A DC
- Output from power supply: 5 VDC, 2A
- Input to power supply: universal input 100–240 VAC 50/60 Hz 0.3A

Do the following:

1. Plug the AC switching power supply (see figure 13 on page 28) barrel jack into the CL1300 *Power* port (see figure 14 on page 28)
2. If it hasn't already been done, slide the AC plug that came with the AC switching power supply (see figure 13) onto the AC switching power supply.
3. Connect the AC plug end of the AC switching power supply into an AC power outlet.

Go to section "Ethernet Extender Status LEDs" on page 32.


Figure 13. AC Switching Power Supply

CAUTION

The external power adapter shall be a listed limited power source that incorporates a disconnect device and shall be positioned within easy reach of the operator. Ensure that the AC power cable 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.

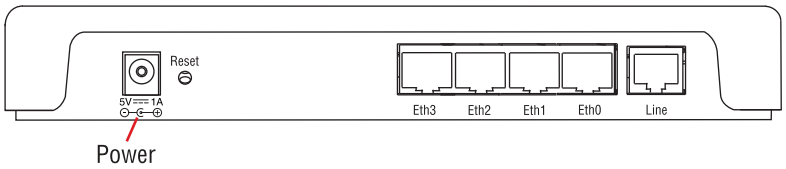


Figure 14. CL1300 Power port

### *DC power supply*

The CL1300 is available with an optional DC power converter (p/n 48V-PSM5)

- Input: Rated voltage:
  - 36–60 VDC
  - Rated current: 0.25 A DC
- Output:
  - Rated voltage: 5 VDC ± 5%, 5W
  - Rated current: 1 A DC
  - 6-inch cable terminated with 2.5 mm barrel plug, center positive

- Isolation: 500 VDC
- Environment: 0–40°C; 5–95% relative humidity, non-condensing

CAUTION

The external DC adapter shall be a listed limited power source that incorporates a disconnect device and shall be positioned within easy reach of the operator. The interconnecting cables shall be rated for the proper voltage, current, anticipated temperature, flammability, and mechanical serviceability.

1. Plug the DC power converter (see figure 15) barrel jack into the CL1300 *Power* port (see figure 14 on page 28)
2. Connect the DC power converter's red and black wires to the 36–60 VDC power source.


Figure 15. DC Power Converter (p/n 48V-PSM5)

Go to section "Ethernet Extender Status LEDs" on page 32.

## CL1300R Series

The CL1300R comes standard with an AC switching power supply or an internal DC power converter.

### *AC power supply*

The CL1300R comes standard with an AC power supply:

- There is one fuse in the equipment rated at 250V, 500 mA, 2 sec.
- Rated voltage: 5 VDC
- Rated current: 1 A DC
- Output from power supply: 5 VDC, 2A
- Input to power supply: universal input 100–240 VAC 50/60 Hz 0.3A

Do the following:

1. Plug the AC switching power supply (see figure 16) terminal block plug into the CL1300R terminal block (see figure 17 on page 31)

2. If it hasn't already been done, slide the AC plug that came with the AC switching power supply (see figure 16) onto the AC switching power supply.
3. Connect the AC plug end of the AC switching power supply into an AC power outlet.


Figure 16. AC Switching Power Supply with Terminal Block Plug

CAUTION

The external power adapter shall be a listed limited power source that incorporates a disconnect device and shall be positioned within easy reach of the operator. Ensure that the AC power cable 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.


Figure 17. CL1300R Terminal Block Plug

Go to section "Ethernet Extender Status LEDs" on page 32.

### *DC power supply*

The CL1300R has a built-in internal DC power converter:

- Input: Rated voltage:
  - 12–60 VDC
  - Rated current: 0.25 A DC

Do the following: Connect the 12–60 VDC power source wires to the CL1300R terminal block (see figure 18 on page 32) in the order shown in figure 19 on page 32.

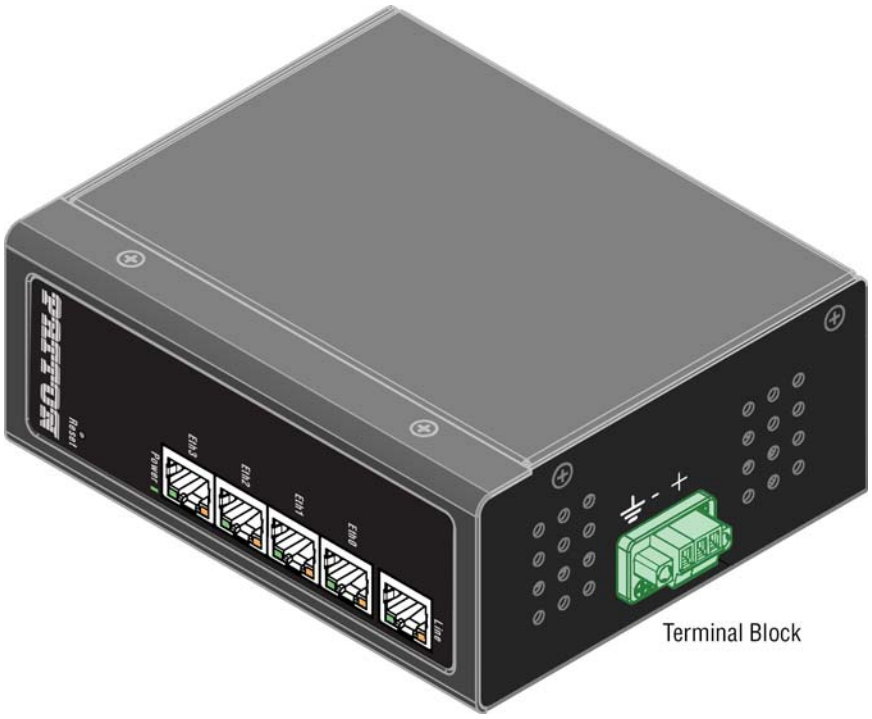


Figure 18. CL1300R Terminal Block

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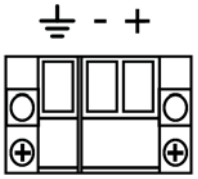

Figure 19. Terminal Block Label

Go to section "Ethernet Extender Status LEDs" on page 32.

## Ethernet Extender Status LEDs

The LEDs indicate the status of power, Line, and Ethernet connections (see figure 20 on page 33 for CL1300R or figure 21 on page 33 for CL1300).

**Note** When extinguished, the LED indicators are clear; when lit, the indicators are yellow.

Table 3. CL1300 front panel LEDs

| LED Name | LED Function | Description |
|---|---|---|
| Power | ON | Indicates power is applied. |
| CopperLink Pair<br>One LED for each port (1 on CL1314/CL1314R or 2 on CL1324/CL1324R) | 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<br>(0/0–0/3) | ON | Port is linked. |
| | OFF | Data is passing over the port. |

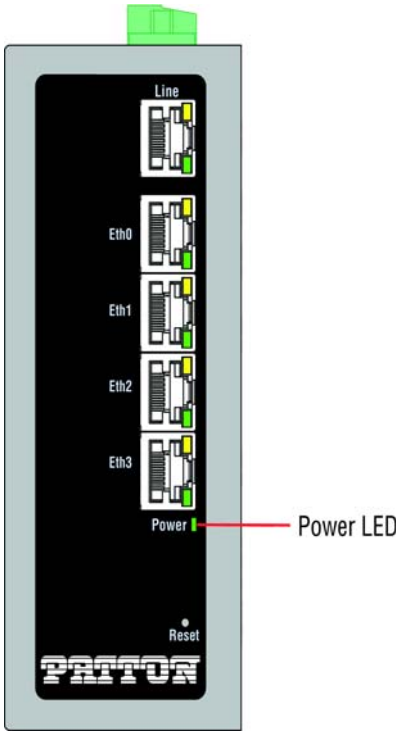


Figure 20. CL1300R Power LED

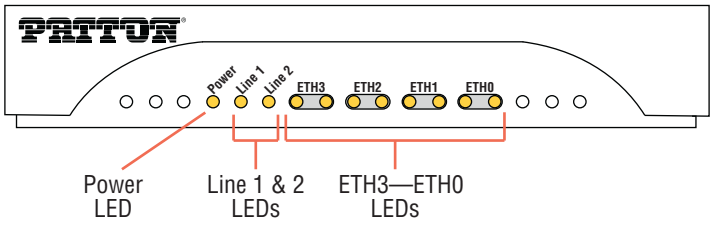


Figure 21. CL1300 Power LED

# Chapter 3 Configuration

### *Chapter contents*

## Introduction

Your CopperLink Ethernet Extenders are pre-configured to work in pairs. If the factory installed configuration needs to be adjusted, you can configure the device by using:

- DIP switches (while powered off) (see Section “DIP Switches” on page 36)
- Web Wizards through HTTP access (see Chapter 4, "Wizard Interface" on page 38)
- Command line interface (CLI) through SSH (see Chapter 5, "CLI Operation and Configuration" on page 43)
- A combination of the above.

For simple and common configurations, you may only need to use the DIP switches.

> **Note** If you will not have physical access to the device, it is best to leave the DIP switches disabled, as they will ***always*** override the other configuration access methods for some settings. This will be problematic if you need to change these settings remotely.

The factory installed configuration is shown below.

```
context ip ROUTER
  interface LAN
    ipaddress 192.168.200.11/24 #Remote units are set to 192.168.200.10/24
    ipaddress DHCP dhcp

context switch-group DEFAULT
  bind interface ROUTER LAN
  no shutdown

  interface ETHERNET_0_0

  interface ETHERNET_0_1

  interface ETHERNET_0_2

  interface ETHERNET_0_3

  interface LINE_0_0

port ethernet 0 0
  bind switch-group DEFAULT ETHERNET_0_0
  no shutdown

port ethernet 0 1
  bind switch-group DEFAULT ETHERNET_0_1
  no shutdown

port ethernet 0 2
  bind switch-group DEFAULT ETHERNET_0_2
  no shutdown

port ethernet 0 3
  bind switch-group DEFAULT ETHERNET_0_3
```

```
    no shutdown
  port line 0 0
    service-mode 2-wire
    mode local
    bind switch-group DEFAULT LINE_0_0
    no shutdown
```

## DIP Switches

The DIP switches enable you to configure the Local/Remote and TCPAM/Rate preset. These settings are applied when the device powers on, and they cannot be changed while the device is powered on. Keep this in mind if you plan on adjusting these settings later remotely, as the DIP switch settings at boot will always take priority.

To disable the DIP switches:

1. Power-off the device.
2. Set all DIP switches to OFF.

To enable the DIP switches:

1. Power-off the device.
2. Set DIP #1 to LOCAL or REMOTE. When connecting two CL1300 devices, one needs to be configured as Local, and the other Remote:
   - OFF = Local
   - ON = Remote
3. Set DIP #2–5 to a TCPAM/Rate Preset. When connecting two CL1300 devices, their speeds should be configured to match.

| #2 | #3 | #4 | #5 | TCPAM/Rate Preset |
|---|---|---|---|---|
| ON | ON | ON | ON | TCPAM-16/32 Autorate |
| ON | ON | ON | - | TCPAM-64/128 Autorate |
| ON | ON | - | ON | TCPAM-4 192 kbps |
| ON | ON | - | - | TCPAM-4 2496 kbps |
| ON | - | ON | ON | TCPAM-8 192 kbps |
| ON | - | ON | - | TCPAM-8 5056 kbps |
| ON | - | - | ON | TCPAM-16 192 kbps |
| ON | - | - | - | TCPAM-16 3840 kbps |
| - | ON | ON | ON | TCPAM-32 768 kbps |
| - | ON | ON | - | TCPAM-32 5696 kbps |
| - | ON | - | ON | TCPAM-64 192 kbps |
| - | ON | - | - | TCPAM-64 12736 kbps |
| - | - | ON | ON | TCPAM-128 256 kbps |
| - | - | ON | - | TCPAM-128 15296 kbps |
| - | - | - | ON | RESERVED |
| - | - | - | - | DISABLE DIP SWITCHES |

4. Set DIP #6–8 to OFF. These are reserved for future use.

# Chapter 4 Wizard Interface

### *Chapter contents*

## Introduction

The CL1300 provides a browser interface that allows you to configure and manage the Ethernet extender. After you set up the IP address for the CL1300, 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 CL1300.

## 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. Log in with the default username *admin* without a password.

Once the network connection is established, you will be able to reach the CL1300 Web GUI. Log into the Web GUI using the following credentials (see figure 22).

- username: admin
- password: [blank]

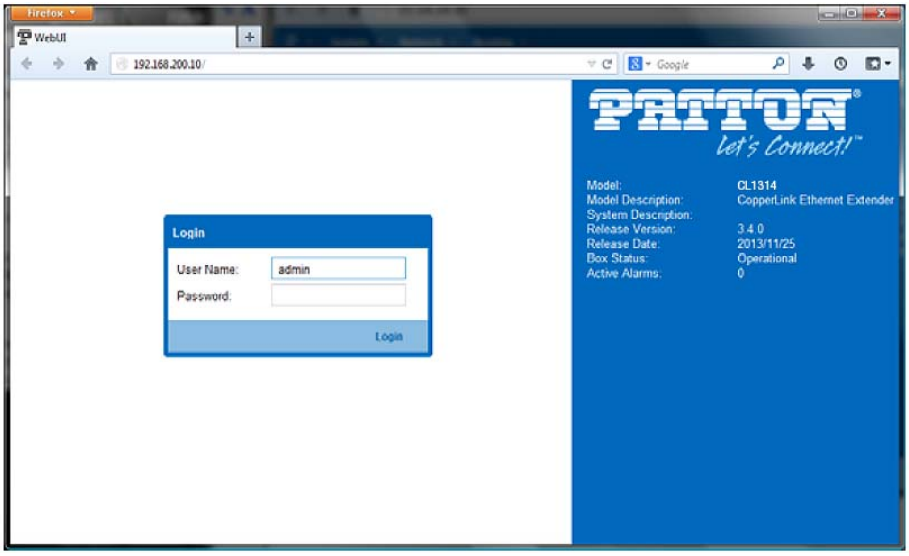


Figure 22. Login

The CL1300 includes a Web Wizard within the GUI. The Icon to the wizard is in the top right corner of your browser as shown in figure 23 on page 40.

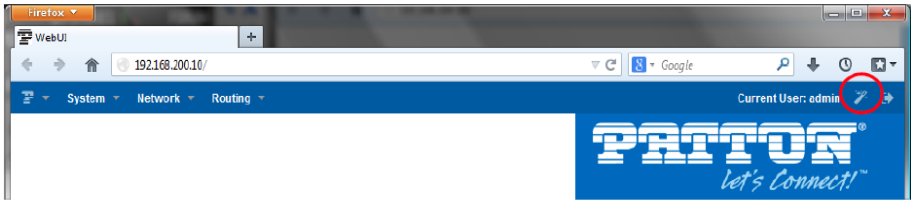


Figure 23. Web Wizard Home page

Once the wizard icon is selected, you will have the options of supported set-ups as shown in figure 24. Click on *CL1314 Basic Setup*.

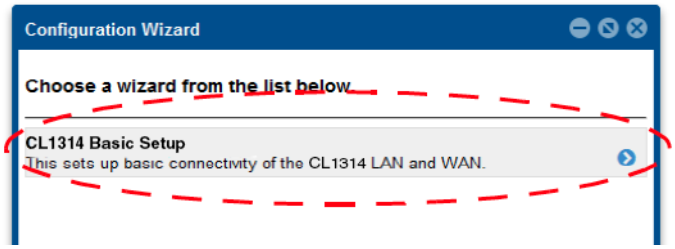


Figure 24. Choose Wizard

Clicking on the *CL1314 Basic Setup* will bring up the most common configurations used on the CopperLink Ethernet Extenders.

Figure 25 depicts options to configure through the Basic Setup wizard.

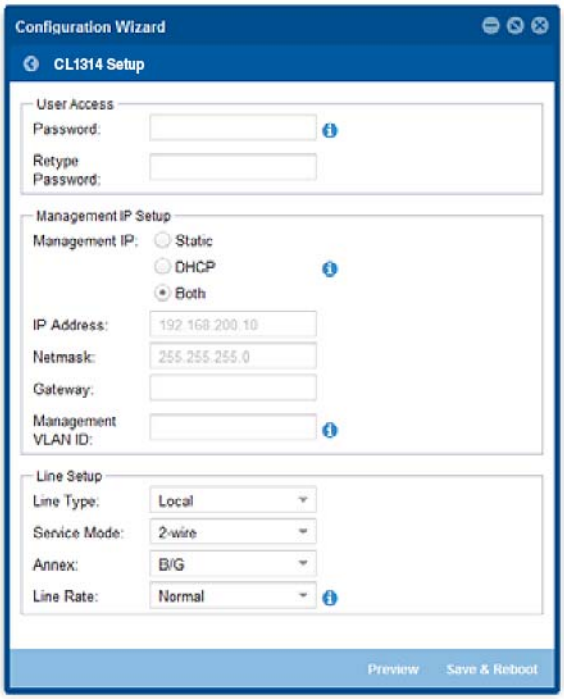


Figure 25. Basic Setup

**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 CL1314 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 where you can manually set your CopperLink line options.

> **Note** The CopperLink Ethernet Extenders by default are set to 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 CopperLink 1300 when received in a 2pk is already configured one CL1300 as Local and one CL1300 as Remote.
  - **Service Mode**: Configures the number of pairs (wires) you want to use. The CL1300 will default to the maximum number of wires available on your version of the CopperLink. CL1314 (2-wire) or CL1324 (4-wire).
  - **Annex**: Consult technical support before changing this setting.
  - **Line Rate Configuration**: This will increase the potential line rate of the CL1300. Your CopperLink 1300 is defaulted to automatically select the optimal rate based on the distance (adaptive).

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

On the bottom right corner of the CL1300 Basic Configuration wizard page to preview configurations and reboot. Figure 26 on page 42 depicts is what you can expect to see if you click on the preview tab.

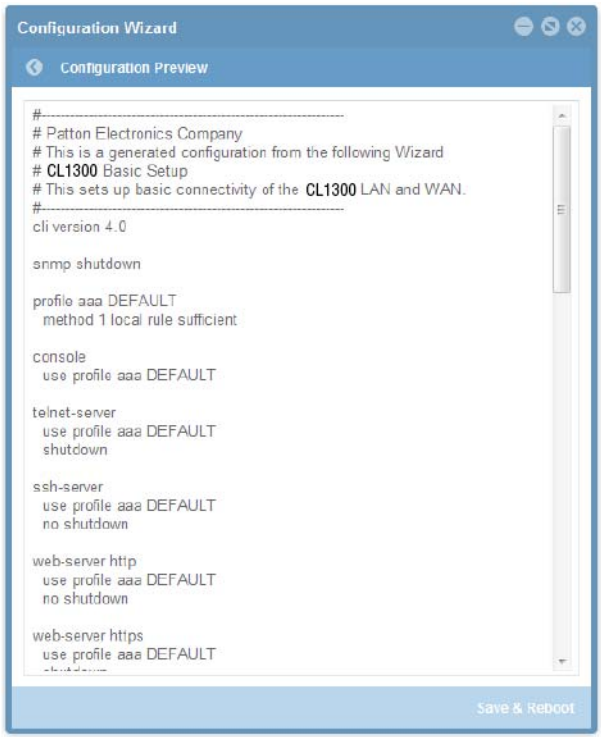


Figure 26. Configure Preview Option

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 27.

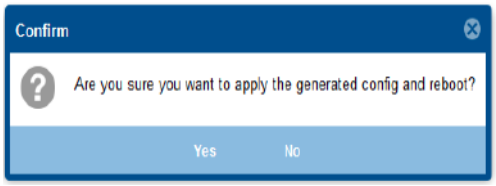


Figure 27. Confirmation

Typically the time to reboot and reestablish a CopperLink link so it can pass traffic will be less than 2 minutes.

# Chapter 5 CLI Operation and Configuration

### *Chapter contents*

## Introduction

You can connect a PC to configure the CopperLink 1300 using the CLI.

## 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.

## 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>
```

## 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>
```

## Save the Configuration

Follow the command sequence below:

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

## CopperLink 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 CopperLink 1300 when received in a 2pk is already configured one CL1300 as Local and one CL1300 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 CL1300. Your CopperLink 1300 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 CopperLink 1300 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}
```

### CopperLink Ports
The configurations below are used to configure various aspects of the CopperLink 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 overall bandwidth increases, your signal to noise ratio decreases. The higher the number the better. Your CL1300 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 (CopperLink 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>
```

### Service Mode
Configures the number of pairs (wires) you want to use. The CL1300 will default to the maximum number of wires available on your version of the CopperLink: CL1314 (2-wire) or CL1324 (4-wire).

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

### Shutdown
Disables or enables CopperLink 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 CL1300 CopperLink port(s)

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

# Chapter 6 Contacting Patton for assistance

### *Chapter contents*

## Introduction

This chapter contains the following information:

- "Contact information"—describes how to contact Patton technical support for assistance.
- "Warranty Service and Returned Merchandise Authorizations (RMAs)"—contains information about the warranty and obtaining a return merchandise authorization (RMA).

## Contact information

Patton Electronics offers a wide array of free technical services. If you have questions about any of our other products we recommend you begin your search for answers by using our technical knowledge base. Here, we have gathered together many of the more commonly asked questions and compiled them into a searchable database to help you quickly solve your problems.

### *Contacting Patton Technical Services for Free Support*

| REGION | North America | Western Europe | Central & Eastern Europe | Middle East North Africa |
|---|---|---|---|---|
| **Location** | **Maryland, USA** | **Bern, Switzerland** | **Budapest, Hungary** | **Beirut, Lebanon** |
| **Time Zone** | EST/EDT<br>UTC/GMT - 4/5 hours | CET/CEDT<br>UTC/GMT + 1/2 hours | CET/CEDT<br>UTC/GMT + 1/2 hours | EET/EEDT<br>UTC/GMT + 2/3 hours |
| **Business Hours** | Monday-Friday<br>8:00am to 5:00pm | Monday-Friday<br>09:00 to 12:00<br>13:30 to 17:30 | Monday-Friday<br>8:30 to 17:00 | Monday-Friday<br>8:00am to 5pm |
| **Email** | support@patton.com | support@patton.com | support@patton.com | support@patton.com |
| **Phone** | + 1 301 975 1007 | +41 31 985 25 55 | +36 439 3835 | +96 1 359 1277 |
| **Fax** | +1 301 869 9293 | +41 31 985 2526 | | |

## Warranty Service and Returned Merchandise Authorizations (RMAs)

Patton Electronics is an ISO-9001 certified manufacturer and our products are carefully tested before shipment. All of our products are backed by a comprehensive warranty program.

**Note** If you purchased your equipment from a Patton Electronics reseller, ask your reseller how you should proceed with warranty service. It is often more convenient for you to work with your local reseller to obtain a replacement. Patton services our products no matter how you acquired them.

### *Warranty coverage*

Our products are under warranty to be free from defects, and we will, at our option, repair or replace the product should it fail within one year from the first date of shipment. Our warranty is limited to defects in workmanship or materials, and does not cover customer damage, lightning or power surge damage, abuse, or unauthorized modification.

### *Out-of-warranty service*

Patton services what we sell, no matter how you acquired it, including malfunctioning products that are no longer under warranty. Our products have a flat fee for repairs. Units damaged by lightning or other catastrophes may require replacement.

### *Returns for credit*

Customer satisfaction is important to us, therefore any product may be returned with authorization within 30 days from the shipment date for a full credit of the purchase price. If you have ordered the wrong equipment or you are dissatisfied in any way, please contact us to request an RMA number to accept your return. Patton is not responsible for equipment returned without a Return Authorization.

### *Return for credit policy*

- Less than 30 days: No Charge. Your credit will be issued upon receipt and inspection of the equipment.
- 30 to 60 days: We will add a 20% restocking charge (crediting your account with 80% of the purchase price).
- Over 60 days: Products will be accepted for repairs only.

## *RMA numbers*

RMA numbers are required for all product returns. You can obtain an RMA by doing one of the following:

- Completing a request on the RMA Request page in the *Support* section at **www.patton.com**
- By calling **+1 (301) 975-1007** and speaking to a Technical Support Engineer
- By sending an e-mail to **returns@patton.com**

All returned units must have the RMA number clearly visible on the outside of the shipping container. Please use the original packing material that the device came in or pack the unit securely to avoid damage during shipping.

### *Shipping instructions*

The RMA number should be clearly visible on the address label. Our shipping address is as follows:

**Patton Electronics Company**
RMA#: xxxx
7622 Rickenbacker Dr.
Gaithersburg, MD 20879-4773 USA

Patton will ship the equipment back to you in the same manner you ship it to us. Patton will pay the return shipping costs.

\

# Appendix A Compliance information

### *Chapter contents*

# Compliance

### *EMC*

- FCC Part 15, Class A
- EN55032, Class A
- EN55024

### *Safety*

- UL 62368-1/CSA C22.2 N0. 62368-1
- IEC/62368-1
- AS/NZS 62368-1

## 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).

## EC Declaration of Conformity

We certify that the apparatus identified above conforms to the requirements of Council Directive 2014/30/EU on the approximation of the laws of the member states relating to electromagnetic compatibility; Council Directive 2014/35/EU on the approximation of the laws of the member states relating to electrical equipment designed for use within certain voltage limits; Council Directive 2011/65/EU as modified by Council Directive 2015/863/EU on the approximation of the laws of the member states relating to RoHS and REACH compliance; and Council Directive 2009/125/EC establishing a framework for the setting of ecodesign requirements for energy-related products.

## Authorized European Representative

Martin Green
**European Compliance Services Limited**
Milestone house
Longcot Road
Shrivenham
SN6 8AL, UK

# Appendix B Specifications

### *Chapter contents*

## Protocol

Transparent to higher layer protocols

## Transmission Line

CL1314—Single Twisted Pair (2-wire)

CL1324—Two Twisted Pair (4-wire)

CL1314—Single Twisted Pair (2-wire)

CL1324—Two Twisted Pair (4-wire)

## Line Rates

Rates from 192 kbps to ?15.3 Mbps, selectable in all 64 kbps ?increments starting at 192 kbps

## Front Panel LED Status Indicators

WAN: Link, LAN (Ethernet): Link/Act, Power.

## Line Coding

- CL1314 TC-PAM 16 rates up to 2.3 Mbps
- CL1314 TC-PAM 32 rates up to 5.7 Mbps
- CL1314 TC-PAM 64 rates up to 11.4 Mbps
- CL1314 TC-PAM 128 rates up to 15.3 Mbps
- CL1314R/CL1311R (1 Pair) TC-PAM 16 rates up to 2.3 Mbps; CL1324R (2 pair) rates up to 4.6 Mbps
- CL1314R/CL1311R (1 Pair) TC-PAM 32 rates up to 5.7 Mbps; CL1324R (2 pair) rates up to 15.3 Mbps
- CL1314R/CL1311R (1 Pair) TC-PAM 64 rates up to 11.4 Mbps; CL1324R (2 pair) rates up to 22.8 Mbps
- CL1314R/CL1311R (1 Pair) TC-PAM 128 rates up to 15.3 Mbps; CL1324R (2 pair) rates up to 30 Mbps

## Connectors

CL1300: RJ-45 on copper line side and 4 x 10/100 Ethernet, shrouded male IEC320 power connector

CL1300R: RJ-45 on copper line side and 2 x 10/100 Ethernet, terminal block power connector

## Ethernet Interface

CL1314R/CL1324R: Four RJ-45, 10/100Base-T, IEEE 802.3 Ethernet

CL1311R: One RJ-45, 10/100Base-T, IEEE 802.3 Ethernet

## Line Interface

Transformer coupled, 1500 VAC isolation

## Management

- DIP switch
- CLI (Telnet, SSH, Console Port)
- TFTP firmware upgrade
- Import/export config
- HTTP
- Patton Cloud
- restAPI

## MTBF

4.7 years

## Power

CL1300: External 90–260 VAC, 50–60 Hz (Universal Input)

CL1300R: External 90–260 VAC, 50–60 Hz (Universal Input); (Optional) Internal +12 to +48 VDC (10–52VDC) (3 position, Terminal Block)

## Power Consumption

0.8A@5V

## Operating Temp.

CL1300: 32 to 122°F (0 to 50°C)

CL1300R: -40 to 185°F (-40 to 85°C)

## Humidity

CL1300: 5 to 95%, non-condensing

CL1300R: 5 to 95%, non-condensing (CC option 85% condensing)

## Altitude

0 to 15,000 ft (0 to 4,600 m)

## Enclosure

Aluminum (designed to meet IP40)

## Dimensions

CL1300: 4.7 x 1.52 x 5.00 in. (106 x 390 x 127 mm)

CL1300R: 2.25W x 5.62H x 4.66D in. (5.7W x 14.27H x 11.83D mm)

## Weight

CL1300: 2.0 lbs (1.0 kg)

CL1300R: 0.7 lbs (0.3 kg)

## Compliance

- FCC Part 15A
- CE Mark per EMC directive 89/336/EEC and Low Voltage Directive 73/23/EEC

# Appendix C Factory replacement parts and accessories

### *Chapter contents*

# Factory replacement parts and accessories

| Power Supplies | |
|---|---|
| PS-03671H1-004 | 100-240VAC (12V, DC/2A) Wall mount power adapter with terminal block |
| **Power Adapters** | |
| 12-130 | European replacement plug |
| 12-129 | North American replacement plug |
| 12-131 | United Kingdom plug |
| 12-132 | Australian/Chinese replacement plug |
| 12-201 | Korean replacement plug |
| 12-202 | India/South Africa Type D replacement plug |

# Appendix D Interface pinouts

### *Chapter contents*

## CopperLink Line port

### *2-wire (CL1314R)*

RJ-45 connector

| Pin # | Signal |
|---|---|
| 1 | No connection |
| 2 | No connection |
| 3 | No connection |
| 4 | Tip |
| 5 | Ring |
| 6 | No connection |
| 7 | No connection |
| 8 | No connection |

### *4-wire (CL1324R)*

RJ-45 connector

| Pin # | Signal |
|---|---|
| 1 | Line 1 Tip |
| 2 | Line 1 Ring |
| 3 | No connection |
| 4 | Line 0 Tip |
| 5 | Line 0 Ring |
| 6 | No connection |
| 7 | No connection |
| 8 | No connection |

## Ethernet ports 0 to 3

Table 4. RJ45 socket 10/100Base-T

| Pin | Signal |
|---|---|
| 1 | TX+ |
| 2 | TX- |
| 3 | RX+ |
| 6 | RX- |

**Note** Pins not listed are not used.

# Appendix E Installing 552-GS2 High Speed Surge Protectors

### *Chapter contents*

## Introduction

The potential threats to CopperLink devices are vast: lightning, AC power induction, electrostatic discharge, ground potential differences, EMI/RFI interference and more. The Patton Model 552 has been designed to greatly reduce these risks.

Patton's Connect-IT Model 552 (see figure 28) is easy to install. It connects directly between twisted-pair CopperLink Line cables and their respective I/O ports. Grounding is accomplished using an external ground strap that provides a separate unit-ground to chassis-ground connection. By shunting threatening voltages directly to chassis ground, the Model 552-GS insures data integrity and protects connected equipment from damage.


Figure 28. Connect-IT Model 552-GS2

**Note** If you need additional information about the Model 552-GS2, such as specifications, refer to the user manual (07M552-E) at https://www.patton.com/manuals/index.asp?model=552.

## Installing the 552-GS2 surge protectors to CL1300R

Do the following:

1. If it is already connected, unplug (disconnect) the existing connection between the CopperLink Line cable and the CL1300R's *Line* port (see figure 29 on page 62).
2. Connect the Line cable to the side of the 552 labeled *UNPROTECTED*.
3. Connect the 6-inch (15.2 cm) modular patch cable (supplied) between the side of the 552 labeled *PROTECTED* and the CL1300R's *Line* port.
4. If possible, attach the braided ground strap's ring terminal to the same earth grounding source as the CL1300R is using. Otherwise use a grounding electrode such as a ground rod, water pipe, building steel, etc.

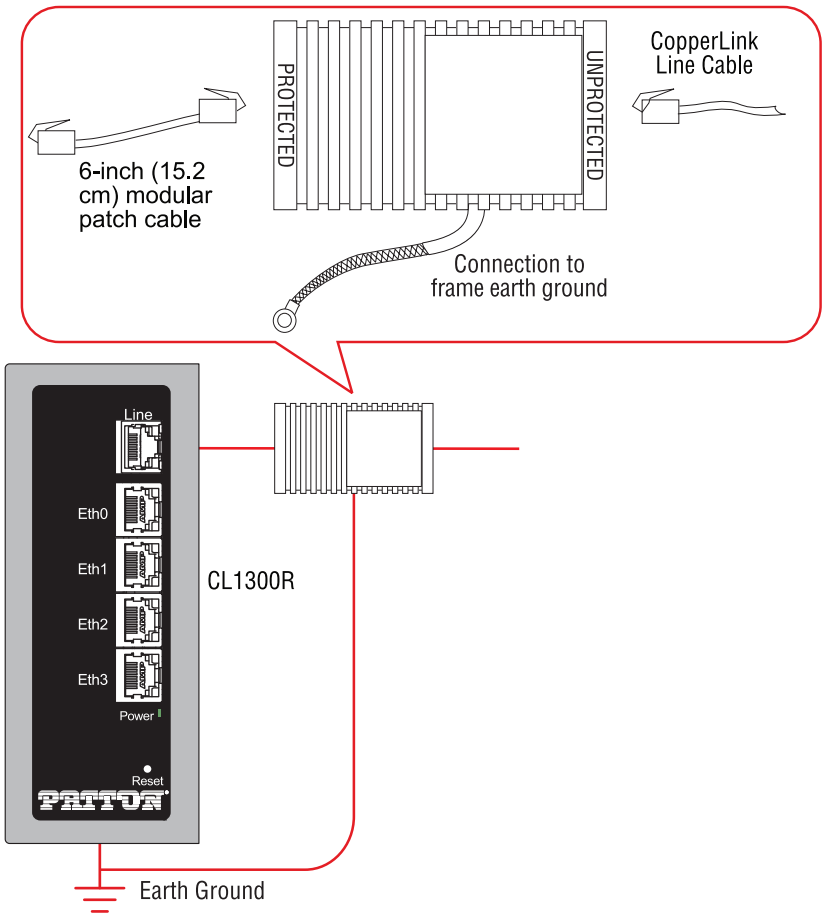


Figure 29. Connecting the 552-GS2 to a CL1300R

CAUTION

Do not over-tighten the ground connection.

Congratulations! The surge protector is installed.

If there are additional CL1300R devices to protect, repeat steps 1 through 4 until all 552-GS2 surge protectors have been installed according to the topology that is being used (see figure 12 on page 26). Then go to section "Connecting the 10/100Base-T Ethernet Interface" on page 27.