

# Wide Area Ethernet

## Copper Ethernet Extension

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### CopperLink™...Going the Distance!

Model	Max. Distance	Max. Speed	Distance at Max. Speed	Rack Card	Photo	Pg
2172	1 mile (1.6 km)	50 Mbps	800 feet (244 m)	No		57
2168	1.1 miles (1.8 km)	16.6 Mbps	3,125 feet (953 m)			58
2158	0.75 miles (1.2 km)	12 Mbps	4,000 feet (1,219 m)			59
2157	5.7 miles (9.1 km)	4.6 Mbps	2 miles (3.2 km)	No		60
2156	5.7 miles (9.1 km)	2.3 Mbps	3.1 miles (5 km)	No		61
2155	5 miles (8.0 km)	144 kbps	5 miles (8 km)	No		62

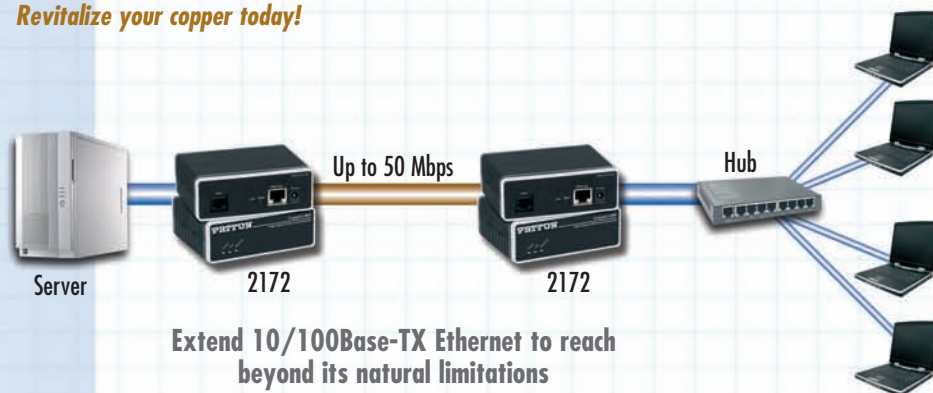
### Other Ethernet Extension Applications

- ✓ Campus LAN Connectivity
- ✓ Secure IP Networks (Dark Fiber)
- ✓ Metropolitan IP Networks
- ✓ Mission-Critical IP Links
- ✓ City LANs
- ✓ Multi-Dwelling, Multi-Tenant IP Services

### Our Full Range of CopperLink Ethernet Extenders

Extend your Ethernet connectivity over existing copper infrastructures with Patton's CopperLink Ethernet Extenders. Whether your requirement is sending Ethernet data over long distances or at high speeds, there is a Patton CopperLink Ethernet Extender for you. Use the table above to select the best model for you.

*Revitalize your copper today!*





**50 Mbps Multi-Rate CopperLink™ Ethernet Extender**  
**Model 2172**

The CopperLink 2172 breaks both distance and speed barriers with up to 50-Mbps full-duplex and distances of up to 5,500 feet (1,700 meters). Now a single twisted-pair can go the distance without sacrificing speed or cost.



The CopperLink™ Model 2172 Ultra-High-Speed Ethernet Extender leverages existing copper infrastructure to deliver high-speed Ethernet extension. Providing data rates up to 50 Mbps in each direction for an aggregated full-duplex speed of 100 Mbps, the Model 2172 is the perfect solution for delivering triple-play communications services and other bandwidth-intensive applications. CopperLink™ Ethernet Extenders easily inter-connect remote devices or remote networks to a central LAN for such applications as medical imaging, video-conferencing, Ethernet bridging, Triple Play, and VoIP.

Six user-selectable settings for symmetrical and asymmetrical rates provide the flexibility required to achieve the optimal speed-distance combination for each and every connection. Multi-rate symmetrical line rates allow each connection to be tuned for the length and gauge of the copper wire, in order to achieve the maximum possible data rate for the environment. Multi-rate asymmetrical line rates make the Model 2172 the ideal solution for service providers who want to differentiate their services or extend the reach of their customer base.

Get near-fiber performance without the expense with Patton's Ultra High-Speed CopperLink™ Ethernet Extender!

**SPECIFICATIONS**

**CopperLink line interface:** RJ-45 (pin 4 = ring; pin 5 = tip)  
**Ethernet interface:** 8-position shielded RJ-45. Auto-sensing 10/100Base-T with half or full-duplex operation. DIP switch capable of disabling 100-Mbps full-duplex for equipment that does not support 802.3X (Pause Packets)  
**Protocol:** Transparent to high layer protocol. Supports 802.1Q VLAN tagging  
**Modulation:** Quadrature Amplitude Modulation (QAM) 4-band  
**Duplexing Method:** FDD (Frequency Division Duplexing)  
**Frequency Range:** CopperLink: 0–12 MHz  
**Transmission:** CopperLink line rate: Up to 50 Mbps

**Surge suppression:** CopperLink line maximum current surge: 20kA (8/20µs) gas tube  
**Front Panel Indicators:** Power, Link, Ethernet  
**Power Supply:** External AC and DC options: 120VAC, and universal input (UI)—100–240 VAC, or optional -48 VDC, -24 VDC, or -12 VDC  
**Compliance:** FCC Part 15A, CE Mark, EMC Directive 89/336/EEC, Low-Voltage Directive 73/23/EEC  
**Environment:** Temp.: 32–122°F (0–50°C)  
**Humidity:** Up to 90% non-condensing  
**Dimensions:** 1.5H x 4.13W x 3.75D in. (3.81H x 10.5W x 9.53D cm)  
**Weight:** 0.4 lbs (0.18 kg) without power supply

**FEATURES & BENEFITS**

- ✓ Operates Over Twisted Pair—Reduces the cost and hassles of new installations. Utilizes installed voice-grade twisted pairs to eliminate the expense of fiber or Cat5e cabling.
- ✓ Full-duplex data-line rate of 100 Mbps—Provides near fiber performance for bandwidth intensive applications such as Triple Play services.
- ✓ Plug and Play—No configuration or cable hassles during installation with auto-sensing 10/100, full or half duplex, and auto MDI-X.
- ✓ Multiple Line Rates Supported—Switch-selectable line rates ensure the best possible line rate for each application

**ORDERING INFORMATION**

- 2172/EUI: 50-Mbps Ethernet Extender, 100–240 VAC\*
- 2172/EUI-2PK\*\*: 50-Mbps Ethernet Extender K, 100–240 VAC\*

**Environmentally Hardened 50 Mbps CopperLink Ethernet Extender; 100–240 VAC**

- ET2172/UI: Extended Temp -40 to 85°C Remote Extender
- EC2172/UI: Environmentally Controlled 0 to 85°C Remote Extender
- EHA2172/UI: Environmentally Hardened 0 to 50°C Remote Extender
- EHA2172/UI: Environmentally Hardened (external connector), 0 to 50°C Remote Extender

\* -12, -24, and -48 VDC power options available.  
 \*\*You must specify a country specific power cord

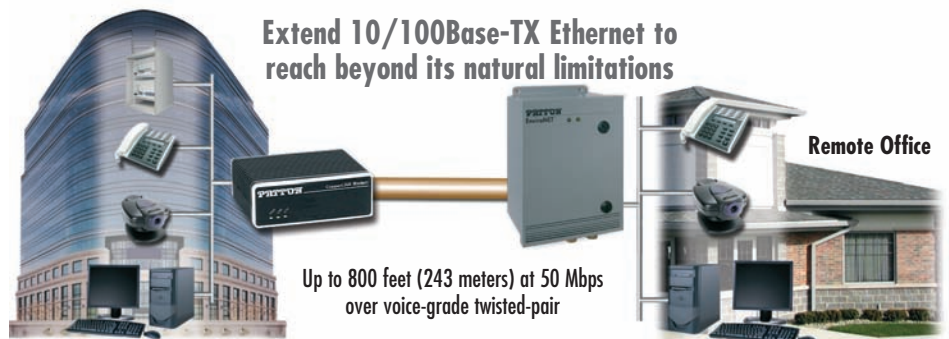
**Model 2172 Extension Distances**

DS/US* Line Settings	Throughput	26 AWG (0.4 mm)	24 AWG (0.5 mm)	22 AWG (0.6 mm)	19 AWG (0.9 mm)
50/50 Mbps	48 Mbps	600 feet (184 m)	800 (245 m)	1,000 (306 m)	1,500 (460 m)
25/25 Mbps	24.5 Mbps	1,500 feet (458 m)	2,000 (610 m)	2,500 (763 m)	2,750 (1,144 m)
10/10 Mbps	10 Mbps	3,000 feet (900 m)	4,000 (1,200 m)	5,000 (1,500 m)	7,500 (2,250 m)
4/1 Mbps	3.75/1 Mbps	4,500 feet (1,373 m)	6,000 (1,830 m)	7,500 (2,288 m)	11,250 (3,430 m)
16/2 Mbps	15/2 Mbps	3,000 feet (900 m)	4,000 (1,200 m)	5,000 (1,500 m)	7,500 (2,350 m)
50/2 Mbps	48/2 Mbps	1,500 feet (458 m)	2,000 (610 m)	2,500 (763 m)	3,750 (1,144 m)

**Workgroup Ethernet extension application**

Model 2172 Extenders provide Ethernet to remote buildings beyond the 328-foot (100-meter) distance limit of Ethernet. 100 Mbps throughput eliminates bandwidth concerns experienced

with other copper wired transmission technologies. By using existing voice grade copper pairs the expense and hassle of installing low capacitance or fiber cable is no longer required.



**Extend 10/100Base-TX Ethernet to reach beyond its natural limitations**

Up to 800 feet (243 meters) at 50 Mbps over voice-grade twisted-pair

### 16.67 Mbps Multi-Rate CopperLink™ Ethernet Extender

#### Model 2168

Multi-rate high speed Ethernet extension over voice-grade wire.



The Patton Model 2168 Multi-Rate CopperLink Ethernet Extender enables the utilization of existing copper infrastructure for high speed Ethernet extensions at data rates up to 16.67 Mbps. The Model 2168 Ethernet Extender includes seven asymmetrical and symmetrical settings which provide the flexibility to increase the distance or speed of the Ethernet connections.

CopperLink applications include Ethernet extension, medical imaging, video-conferencing, Ethernet Bridging, and inter-con-

necting remote devices or remote networks to a central LAN. The multi-rate symmetrical line rates ensure the highest possible data rate is achieved over various lengths and types of copper wire and environments. Multi-rate asymmetrical line rates make the Model 2168 the ideal solution for service providers who want to differentiate their services or extend the reach of their customer base. The Model 2168 allows service providers to offer unparalleled performance for such applications as always on Internet access, real time bi-directional video streaming, and various multimedia applications.

If you want to take your network and voice connections farther and faster over existing copper and eliminate the expense of fiber, Patton's CopperLink Ethernet Extenders are the products for you!

Just plug it in, power it on, and play!



#### FEATURES & BENEFITS

- ✓ Low cost/plug and play solution for campus wide network extension and delivery of last-mile ISP services over Ethernet
- ✓ Switch selectable asymmetrical or symmetrical line rates up to 16.67 Mbps!
- ✓ Auto-sensing 10Base-T/100Base-TX port
- ✓ Supports full or half-duplex Ethernet
- ✓ Transparent LAN bridging (Passes 802.1Q (VLAN) packets)
- ✓ Automatic learning, aging, & filtering source address table
- ✓ Stand alone and rack mount versions

#### Symmetric or asymmetric variable-rate VDSL

Line rates can be set on the standalones and rack cards to differentiate services and increase the distance of the individual links.

##### Asymmetric

Line Rates		Distance
<b>Upstream</b>	<b>Downstream</b>	<b>26 AWG (0.4 mm)</b>
1.56 Mbps	4.17 Mbps	6,000 feet (1,829 m)
1.56 Mbps	9.38 Mbps	5,500 feet (1,676 m)
2.34 Mbps	16.67 Mbps	5,000 feet (1,524 m)

##### Symmetric

Line Rates		Distance
<b>Upstream</b>	<b>Downstream</b>	<b>26 AWG (0.4 mm)</b>
6.25 Mbps	6.25 Mbps	4,500 feet (1,372 m)
9.38 Mbps	9.38 Mbps	4,150 feet (1,265 m)
12.50 Mbps	12.50 Mbps	4,000 feet (1,220 m)
16.67 Mbps	16.67 Mbps	3,300 feet (1,006 m)

#### ORDERING INFORMATION

**16.67 Mbps Ethernet Extender; 100–240 VAC**

**2168/L/EUI:** Local Extender; RJ45 Line

**2168/R/EUI:** Remote Extender; RJ45 Line

**2168/L/TB45/EUI:** Local Extender; RJ45 Line + Terminal Block

**2168/R/TB45/EUI:** Remote Extender; RJ45 Line + Terminal Block

**16.67 Mbps Ethernet Extender Kit; 100–240 VAC**

**2168/EUI-2PK:** Local & Remote Extenders; RJ45 Line

**2168/TB45/EUI-2PK:** Local & Remote; RJ45 Line + Terminal Block

**Environmentally Hardened 16.67 Mbps CopperLink Ethernet Extender; 100–240 VAC**

**ET2168/R/UI:** Extended Temp -40 to 85°C Remote Extender

**EC2168/R/UI:** Environmentally Controlled 0 to 85°C Remote Extender

**EHA2168/R/UI:** Environmentally Hardened 0 to 50°C Remote Extender

**16.67 Mbps Ethernet Extender Rack Card**

**2168RC/L:** Local Extender; RJ45/TB line

**2168RC/R:** Remote Extender; RJ45/TB line

#### Workgroup Ethernet extension application



#### Ethernet Extender allows copper instead of fiber for vertical Ethernet spans!

These multi-rate Ethernet Extenders are ideal for bridging Ethernet spans inside buildings that are beyond the 328-foot (100-meter) distance limit of Ethernet.

For example, connecting workgroups located on different floors in a building no longer requires expensive switches or the installation of low capacitance cable.

#### SPECIFICATIONS

**Line Interface:** RJ-45 or terminal block

**Ethernet Interface:** Shielded RJ-45

**POTS-ISDN Interface:** RJ-45 (pin 4=ring, pin5=tip)

**Transmission:** Switch selectable async. and sync. line rates up to 16.67 Mbps

**Surge suppression:** CopperLink 20kA (8/20<sub>μs</sub>) gas tube

**Power Supply:** External AC: UI (100–240); DC: -48, -24, and -12; DC power supplies are optional

**Dimensions:**  
1.5H x 4.13W x 3.75D in.  
3.81H x 10.5W x 9.53D cm  
**Weight:** 0.4 lbs (0.18 kg) without power supply



## 12.5 Mbps CopperLink™ Ethernet Extender

### Model 2158

Efficient and cost-effective Ethernet extension over voice-grade wire.



The Patton CopperLink™ Ethernet Extender offers the fastest, most efficient and reliable solution for connecting 10/100Base-TX Ethernet LANs. With a line rate of 12.5 Mbps, the Patton Model 2158 offers premium performance

over your existing voice-grade telephone wire, eliminating the cost of installing new LAN-grade cable or expensive fiber.

CopperLink™ Ethernet Extenders are compact, easy to install, and transparent to higher layer protocols. The CopperLink Ethernet Extenders will auto-sense and configure for 10Base-T or 100Base-TX as well as full or half-duplex Ethernet operation. No configuration is required!

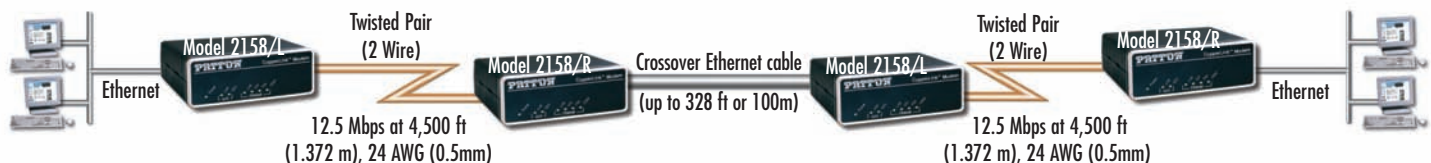
Whether you are looking to make your network connections go farther and faster, increase the efficiency of your existing wiring infrastructure, or just simply extending your LAN, Patton's CopperLink™ Ethernet Extender is one of the most simple and cost-effective solutions around!

### FEATURES & BENEFITS

- ✓ Overcomes the 328-ft (100-m) limitations of Ethernet
- ✓ 12.5 Mbps line rate
- ✓ Auto-sensing 10/100Base-TX port
- ✓ Transparent LAN Bridging
- ✓ Supports 802.1 Q VLAN tagging
- ✓ Auto-sensing full or half duplex
- ✓ 100% Plug-and-Play!

Approximate Distances at 12.5 Mbps	
Wire Gauge	Distance
26 AWG (0.4 mm)	3856 feet (1.18 km)
24 AWG (0.5 mm)	4656 feet (1.42 km)
22 AWG (0.6 mm)	5256 feet (1.60 km)
20 AWG (0.8 mm)	5556 feet (1.69 km)
18 AWG (1.00 mm)	5756 feet (1.75 km)
16 AWG (1.29 mm)	5856 feet (1.78 km)

### Back-to-Back Extension Application



### SPECIFICATIONS

**CopperLink Interface:** RJ-45 (pin 4=TX; pin 5=RING) and two-position terminal block (supports 19–26 AWG)

**Ethernet Interface:** Shielded RJ-45. Auto-sensing 10/100Base-TX with half or full-duplex operation

**Protocol:** Transparent to high layer protocols. Supports 802.1Q VLAN tagging

**Transmission:** CopperLink line rate: 12.5 Mbps; Data rate: 10 Mbps

**Surge Suppression:** CopperLink maximum current surge: 20kA (8/20µs) gas tube

**External Power Supply Options:**

- Universal Power Supply (100–240 VAC)
- DC: -48 VDC, -24 VDC, and -12 VDC (optional upon request)

**Compliance:** FCC Part 15 Class A; EMC Directive 89/336/EEC, Low Voltage Directive 73/23/EEC; CE Mark

**Op. Temp.:** 32–122°F (0–50°C)

**Dimensions:**

- Standalone: 1.5H x 4.13W x 3.75D in. (3.81H x 10.5W x 9.53D cm)

- Rack card: 3.0H x 0.83W x 7.84D in. (7.6H x 2.1W x 19.9D cm)

**Weight:**

- Standalone: 0.4 lbs (0.18 kg) without power supply
- Rack card: 0.3 lbs (0.14 kg) with rear card

### ORDERING INFORMATION

#### 12.5 Mbps CopperLink Ethernet Extender

**2158/L/EUI:** Local Extender; RJ45 Line; 100–240VAC

**2158/R/EUI:** Remote Extender; RJ45 Line; 100–240VAC

#### 12.5 Mbps CopperLink Ethernet Extender Kit

**2158/EUI-2PK:** Local & Remote Extenders; RJ45 Line; 100–240 VAC

#### Environmentally Hardened 12.5 Mbps CopperLink Ethernet Extender

**EHA2158/UL:** Environmentally Hardened (external connector), 0 to 50°C Remote Extender; 100–240 VAC

#### Rack Card 12.5 Mbps CopperLink Ethernet Extender

**2158RC/L:** Local Extender; RJ45/TB line

**2158RC/R:** Remote Extender; RJ45/TB line



I'm John, one of Patton's Ethernet Extenders Product Group Managers. If you do not find what you need at [www.patton.com](http://www.patton.com) or in this catalog please call me at +1 301.975.1000, x160. You can also send e-mail to [jgrant@patton.com](mailto:jgrant@patton.com).



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### 2.3 & 4.6 Mbps CopperLink™ Ethernet Extenders with Auto-Rate Adaptation

#### Models 2156 & 2157

High speed/long-distance LAN extension over copper wires.

LAN extension doesn't have to be expensive or difficult. The Auto-Rate Adaptive LAN Extenders are easy to use and take advantage of the existing copper twisted-pair infrastructure to connect LANs at rates up to 4.6 Mbps.

Whether it's connecting corporate LANs or remote offices, the CopperLink is the simple solution for ensuring the best combination of speed and distance in the industry. Many LAN extenders are set for a single rate, or require difficult configurations in order to connect LANs at different distances. With its auto-rate adaptation feature, the Models 2157 and 2156 ensure that users get the highest speed possible for the distances they are trying to reach. To make it even simpler to use, the Models 2157 and 2156 come with a built-in MDI-X switch to allow easy connection to LANs or PCs with no need for worrying about whether you



have a cross-over cable or not. Setup consists of connecting the Ethernet port, connecting the copper twisted pair, and powering up the units!



#### ORDERING INFORMATION

**2156/L/EUI:** CopperLink Ethernet Extender, (Local unit), 90–260 VAC UI

**2156/R/EUI:** CopperLink Ethernet Extender, (Remote unit), 90–260 VAC UI

**2156/EUI-2PK:** CopperLink Ethernet Extender, (Local and Remote units), 90–260 VAC UI

**2157/L/EUI:** Auto-Rate CopperLink Ethernet Extender, (Local unit), 90–260 VAC UI

**2157/R/EUI:** Auto-Rate CopperLink Ethernet Extender, (Remote unit), 90–260 VAC UI

**2157/EUI-2PK:** Auto-Rate CopperLink Ethernet Extender, (Local and Remote units), 90–260 VAC UI

#### FEATURES & BENEFITS

- ✓ Auto-rate adaptation gives the highest rate possible for the extension distance of your network
- ✓ Model 2156: 2.3 Mbps over just a single twisted pair of copper
- ✓ Model 2157: 4.6 Mbps over just a single twisted pair of copper
- ✓ Extension distances up to 32,000 feet (10 km)
- ✓ Auto-sensing 10/100 Ethernet port
- ✓ Integrated MDI-X switch to allow easy connection to any computer or LAN
- ✓ Auto-sensing full or half-duplex operation
- ✓ Support for 802.1 Q VLAN tagged packet transmission

#### SPECIFICATIONS

**Protocol:** Transparent to higher layer protocols. Supports 802.1 Q VLAN tagged packet transmission

**Transmission Line:** Single twisted pair

**Line Rates:** 2156: Auto-Rate adaptive from 64 kbps to 2.3 Mbps • 2157: Auto-Rate adaptive from 64 kbps to 4.6 Mbps

**DTE Rates:** 2156: All 64k steps from 64 to 2304 kbps • 2157: All 64k steps from 64 to 4608 kbps

**Line Coding:** TC-PAM

**LED Status Indicators:** WAN: Link, TD, RD, Ethernet: Link, 10/100, TD, RD, Power

**Connectors:** RJ-11 on copper line side, RJ-45 for Ethernet connection, shielded male IEC320 power connector.

**Power:** External 90–260 VAC, 50–60 Hz (Universal Input), 10 W external 40–60 VDC, 10W (DC option)

**Line Interface:** Transformer coupled, 1500 VAC isolation.

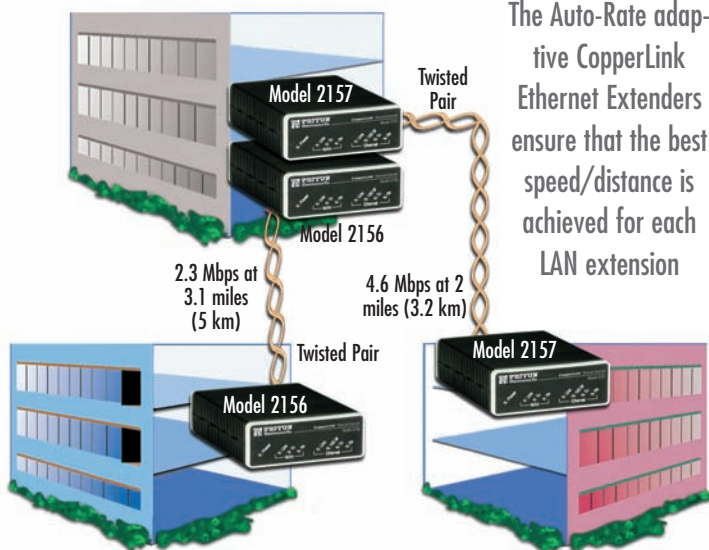
**Compliance:** FCC Part 15, CE Mark per EMC directive 89/336/EEC and Low Voltage Directive 73/23/EEC, UL1950 UL and cUL listed (Rev A: Listing in process)

**Op. Temp.:** 32–122°F (0–50°C)

**Humidity:** 5–95%, non-condensing  
**Altitude:** 0–15,000 ft (0–4,600 m)  
**Dimensions:** 7.3 x 6.6 x 1.62 in. (185 x 168 x 41 mm)

**Weight:** 2.0 lbs (1.0 kg)

#### Corporate Campus application



#### Models 2156 & 2157 Extension Distances

DSL line rate	No Noise										
	26g (0.4 mm)		24g (0.5 mm)		22g (0.6 mm)		20g (0.8 mm)		19g (0.9 mm)		
N	kbps	miles	km	miles	km	miles	km	miles	km	miles	km
3	200	4.4	7.2	5.7	9.4	8.0	13.1	10.3	16.8	12.1	19.7
6	392	4.0	6.6	5.4	8.8	7.5	12.3	8.7	15.8	10.8	17.5
8	520	3.8	6.2	5.1	8.3	7.1	11.6	9.2	14.9	9.7	15.8
12	776	3.5	5.6	4.6	7.5	6.0	9.8	7.8	12.7	8.8	14.3
18	1160	3.0	4.9	4.0	6.4	5.2	8.4	6.7	11.0	7.5	12.3
24	1544	2.8	4.6	3.7	6.1	4.9	7.9	6.4	10.3	6.7	11.0
32	2056	2.5	4.0	3.3	5.3	4.2	6.9	5.6	9.0	5.9	9.6
36	2312	2.3	3.8	3.1	5.0	4.0	6.6	5.3	8.6	5.6	9.1
42	2696	2.3	3.7	3.0	5.0	4.0	6.4	5.2	8.4	5.5	8.9
48	3080	2.2	3.6	3.0	4.8	3.9	6.3	5.0	8.2	5.4	8.7
54	3464	2.1	3.4	2.7	4.5	3.6	5.8	4.7	7.6	4.9	8.8
60	3848	1.9	3.1	2.5	4.1	3.3	5.3	4.3	7.0	4.5	7.4
66	4232	1.7	2.8	2.3	3.7	2.9	4.8	3.9	6.3	4.1	6.6
72	4616	1.5	2.5	2.0	3.3	2.6	4.2	3.4	5.5	3.6	5.9



**144 kbps, LAN Extender**

**Model 2155**

*The perfect LAN extender for those long haul applications.*

There are many applications for long distance LAN extension that do not require ultra-high rates. The Model 2155 is perfect for just those applications. You can connect these modems up to 5 miles (8 km) apart on a single copper twisted-pair without changing the data rate. Just plug them in and power them up, and they take care of the rest. Lots of LAN extenders require you to set up the rate and vary the data rate based on the distance. Not these modems—connect them up and you get the maximum rate at any distance up to their maximum reach of 8 miles (8 km).

The 2155 LAN extenders are completely transparent to higher level protocols, like VLAN tagging, enabling these extenders to fit into almost any location where cost-effective LAN



extension is needed. If there is ever a problem, the easy-to-read LEDs and built-in diagnostics make it a snap to verify operation. When you need the same connection to all your remote LANs, use the Patton 2155.

**FEATURES & BENEFITS**

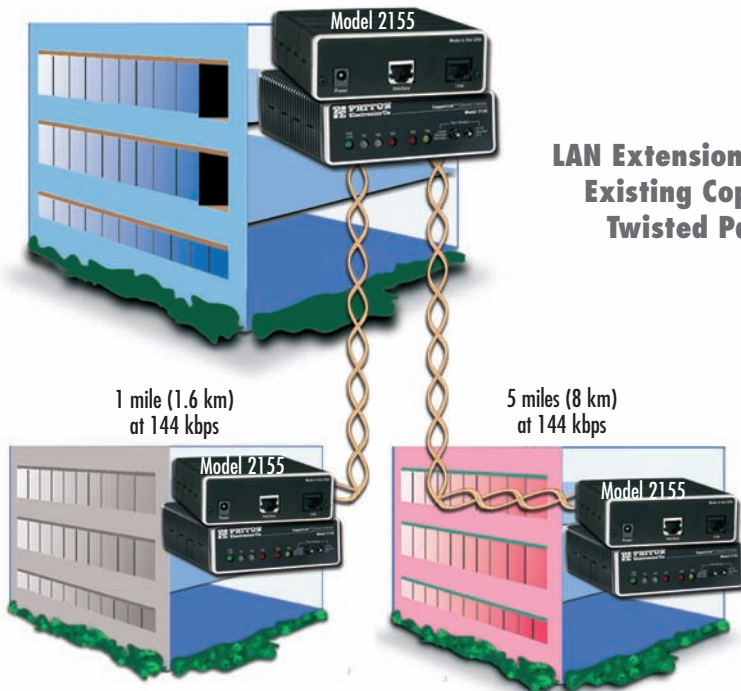
- ✓ Extend your network up to 5 miles (8 km)
- ✓ 144 kbps using twisted pair of copper
- ✓ Plug-and-play—No configuration necessary!
- ✓ 10Base-T full or half-duplex Ethernet port
- ✓ Support for 802.1 Q VLAN tagged packet transmission
- ✓ LEDs provide quick status at a glance
- ✓ Test mode switch makes troubleshooting easy
- ✓ Convenient standalone desktop model

**SPECIFICATIONS**

**Data Rate:** 144 kbps  
**Diagnostics:** V52 compliant (511/511E) pattern generator and detector with error injection mode and Remote Loopback control by a single front panel switch.  
**LED Status:** Copper Link, 10BT Link, Ethernet Status, No Signal, Error, Test Mode  
**Power:** External desk top transformer, 90–260 VAC, 50–60 Hz (Universal Input), 10 W or –48 VDC; shrouded male IEC-320 power connector  
**Transmission Line:** Single Twisted Pair of Copper  
**Line Coding:** 2B1Q  
**Line Interface:** Transformer coupled, 1500 VAC isolation  
**Physical Connection:** RJ-45, 2 wire, polarity insensitive pins 4 and 5  
**LAN Connection:** RJ-45, 10Base-T 802.3 Ethernet  
**Protocol:** Transparent to higher layer protocols. Supports 802.1 Q VLAN tagged packet transmission

**Address Aging:** Entries are deleted after 8 minutes of inactivity  
**LAN Address Table:** 4096 MAC Addresses  
**Frame Latency:** 1 Frame  
**Frame Buffer:** 512 Frames  
**Physical Connection:** RJ-45, pin 1 Tx Data +, pin 2 Tx Data -, pin 3 Rx Data +, pin 6 Rx Data -+pins 4,5,7,8 no connection  
**Compliance:** FCC Part 15, CE Mark per EMC directive 89/336/EEC and Low Voltage Directive 73/23/EEC, CTR 1, UL1950 UL and cUL listed (Rev A: Listing in process)  
**Op. Temp.:** 32–122°F (0–50°C)  
**Dimensions:** 4.1 x 5.5 x 1.6 in. (105 x 140 x 41 mm)  
**Weight:** 1.6 lbs (0.7 kg)

**Typical applications**



**LAN Extension Using Existing Copper Twisted Pair**

2-Wire Distance Table in miles (km)				
Data Rate	AWG Wire Gauge (mm)			
	19 (0.9)	22 (0.6)	24 (0.5)	26 (0.4)
All rates	10.8 (17.2)	7.2 (11.5)	7.2 (11.5)	5.0 (8.0)

**ORDERING INFORMATION**

- 2155/L/UI:** CopperLink 144 kbps Ethernet Extender, (local unit), 90–260 VAC UI
- 2155/R/UI:** CopperLink 144 kbps Ethernet Extender, (Remote unit), 90–260 VAC UI
- 2155/UI-2PK:** CopperLink 144 kbps Ethernet Extender, Local and Remote units), 90–260 VAC UI

### IP Network Camera Extender

#### Model 1173

Patton's plug-and-play IP Network Camera Extender enables users to place IP cameras almost 20 times farther away than the standard distance of 328 ft (100 meters) over standard phone-grade twisted-pair.



The Patton Model 1173 IP Network Camera Extender enables streaming video rates of up to 50 Mbps over ordinary phone grade twisted pair. Unlike wireless, wire-

line extension provides a secure and reliable connection without needing a clear line of sight. Dependable performance and streaming rates up to 50 Mbps, the Model 1173 is the perfect solution for transporting high resolution security video footage.

While the device is plug-and-play, the Model 1173 features three user-selectable settings for line rates providing flexibility in achieving the optimal video resolution-distance combination. The Model 1173 is completely transparent to protocols, codecs, and applications ensuring compatibility with any IP camera and its management software.

#### SPECIFICATIONS

**CopperLink line interface:** RJ-45 (pin 4 = ring; pin 5 = tip)

**Ethernet interface:** 8-position shielded RJ-45. Auto-sensing 10/100Base-T with half or full-duplex operation. DIP switch capable of disabling 100-Mbps full-duplex for equipment that does not support 802.3X (Pause Packets)

**Protocol:** Transparent to high layer protocol. Supports 802.1Q VLAN tagging

**Modulation:** Quadrature Amplitude Modulation (QAM) 4-band

**Duplexing Method:** FDD (Frequency Division Duplexing)

**Frequency Range:** CopperLink: 0–12 MHz

**Transmission:** CopperLink line rate: Up to 50 Mbps

**Surge suppression:** CopperLink line maximum current surge: 20 kA (8/20 µs) gas tube

**Front Panel Indicators:** Power, Link, Ethernet

**Power Supply:** External AC and DC options: 120 VAC, and universal input (UI)—100–240 VAC, or optional -48 VDC, -24 VDC, or -12 VDC

**Compliance:** FCC Part 15A, CE Mark, EMC Directive 89/336/EEC, Low-Voltage Directive 73/23/EEC

**Environment:** Temp: -10 to 70°C

**Humidity**

**Standard:** Up to 90% non-condensing  
**Conformal Coated:** 85% condensing humidity from -10 to 35°C

**Dimensions:**

1.5H x 4.13W x 3.75D in.  
(3.81H x 10.5W x 9.53D cm)

**Weight:** 0.4 lbs (0.18 kg) without power supply

#### FEATURES & BENEFITS

- ✓ Extend high resolution IP video up to 6,000 feet (1,829 meters) over telephone-grade twisted-pair cabling
- ✓ Fully compatible with any IP camera and its managing software
- ✓ Fully transparent to compression schemes such as WMV, MPEG-4 and MJPEG
- ✓ Fully transparent to your camera's application software
- ✓ Wall or DIN mountable
- ✓ Plug and Play
- ✓ Operating temperature of -10 to 70°C

#### Line Rates (AWG 24/0.5 mm)

Mbps	Distance in feet (meters)
4	6,000 (1,830)
16	4,000 (1,200)
50	2,000 (610)

#### ORDERING INFORMATION

**Model 1173R/EUI-2PK:** IP Network Camera Extender Kit -10 to 70°C; UI

**Model 1173R/C/EUI-2PK:** IP Network Camera Extender Kit -10 to 70°C, conformal coated (humidity 85% condensing from -10 to +35°C); UI

### USB 1.1 Extender Kit

#### Model 110

Extends the distance of a USB device to a host computer up to 196 feet (60 m) over Cat5e cable

Patton's Model 110 overcomes USB length limitations of 16 feet so that you have the flexibility to locate your USB printer, camera, web cam or any other USB device where you want them. The Model 110 extends the distance of a USB device to a host computer up to 196ft (60m) over Cat5e. The 110 is plug-and-play with absolutely no special software or drivers to install.

#### ORDERING INFORMATION

**110-KIT:** USB Extender Kit

**0805XXX:** USB Power Supply



#### FEATURES & BENEFITS

- ✓ Fully compliant with USB 1.1 specifications
- ✓ Provides support for any full speed (12 Mbps) or low speed (1.5 Mbps) USB devices
- ✓ No software required
- ✓ USB LED indicator for quick glance status checks

#### SPECIFICATIONS

**USB:** Fully compliant to USB 1.1

**Rates:** Full speed (12 Mbps)/Low speed (1.5 Mbps)

**Connector:**

- Local Unit: USB Type A Male; RJ-45
- Remote Unit: USB Type A Female; RJ-45

**Active Pins:** Power 1 & 4; Data 2 & 3

**Distances:**

- **Cat 5:** non-powered 98 ft (30m)

- **Cat 5:** powered 165ft (50m)

- **Cat 5e/6:** non-powered 196 feet (60 m)

- **Cat 5e/6:** powered 263 feet (80 m)

**Operating temp.:** 32 to 104°F (0 to 40°C)

**Storage temp.:** -40 to 185°F (-40 to 85°C)



**CopperLink™-T T1/E1 Extender**

**Models 2113 & 2115**

*This transparent, plug-and-play T1/E1 Extender solves the distance and wire limitations of TDM technology by tripling the reach and halving the number of required wire pairs.*



Model 2113

Model 2113 & 2115 T1/E1 Extenders are the perfect choice for enterprises, integrators, and service providers needing to extend T1 and E1 circuits beyond their typical reach while conserving the number of wire pairs used.

With the CopperLink™-T extenders, zero configuration is required. They operate in clear-channel mode, thereby facilitating the transparent extension of data and voice bearing circuits—including the F-bit on T1 circuits. The two active pins on the RJ connector are polarity insensitive, so you don't even need to worry about which wire you connect on the line interface. Simply take them out of the box, put

them on either side of the dry copper pair, connect your T1 or E1 device and the circuit will light up immediately!

The Model 2113 extends E1 circuits to 16,100 feet (4,900 meters, nearly 5 km) while the Model 2115 extends T1 circuits to more than 3.5 miles (18,500 feet or 5,600 meters). Both models require only two wires (one pair) to extend the TDM circuits, thereby conserving and minimizing the copper plant resources used.

For these reasons, the CopperLink™-T extenders are the ideal solution for most popular applications such as T1/E1 backhaul from a remote site, T1/E1 relocation, T1/E1 extension across a campus or between buildings, and last-mile TDM delivery.



Model 2115

**FEATURES & BENEFITS**

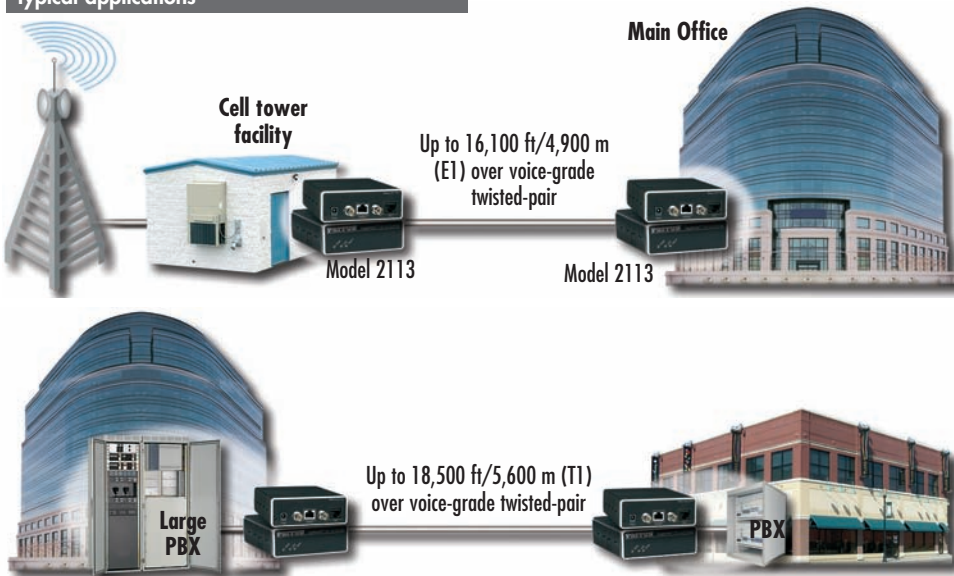
- ✓ Triple the Distance—Extend T1s to over 3 miles and E1s to almost 5 km over one pair of wires.
- ✓ Half the Wires—The T1/E1 extenders only require one pair of wires to operate.
- ✓ Voice and Data Extension—The T1/E1 Extenders operate in clear channel mode allowing the transparent passing of both voice and data.
- ✓ Plug and Play—Plug them in and the link comes up in seconds. The line interface is even polarity insensitive, making it easier to get running.
- ✓ Line Tests—V.52 511/511E Pattern generator with remote digital loopback (RDL); local analog loopback (LAL).
- ✓ Front Panel Status Indicators—Front panel LEDs provide users with quick feedback on unit operation.

**SPECIFICATIONS**

**Circuit Connector:** Model 2113 E1 Extender: Dual 75-Ohm female BNC and single 120-Ohm female RJ-48C • Model 2115 T1 Extender: Single female RJ-48C  
**Supported Line Tests:** V.52 511/511E Pattern Generator with RDL; LAL  
**Clocking:** CO unit preset for Network Clock, CPE unit preset for Receive Recover  
**Line Coding:** 16-constellation TC-PAM  
**Line Interface:** Female RJ-11 using pins 2 & 3; Two wires (single twisted-pair)  
**Front Panel Indicators:**  
**Power**—Solid green indicates unit is powered up. Slow blinking indicates unit is in POST. Fast blinking indicates unit failed POST. Dark indicates unit does not have power.

**Link**—Solid green indicates end-to-end link. Flashing indicates unit is training. Dark indicates link is down.  
**Frame**—Solid green indicates valid framing. Flashing indicates signal being received, but no link established.  
**Power Supply:** External power supply options: Universal 90–260 VAC operating from 50–60 Hz; 120 VAC/60 Hz; 240 VAC/60Hz; -48 VDC  
**Compliance:** FCC Part 15A, CE Mark, EMC Directive 89/336/EEC, Low-Voltage Directive 73/23/EEC  
**Operating Temp.:** 32–122°F (0–50°C)  
**Humidity:** 5–90% non-condensing  
**Dimensions:** 4.7 x 1.52 x 5.0 in. (10.6 x 3.9 x 12.7 cm)

**Typical applications**



*I'm Emily, one of Patton's Electrical Engineers designing CopperLink™ Ethernet Extenders. To buy one of these state-of-the-art devices, call +1 301.975.1000 or send e-mail to sales@patton.com.*

**ORDERING INFORMATION**

- 2113/EUJ-2PK: CopperLink-T, E1 Extender, 2 pack
- 2113/L/EUJ: CopperLink-T E1 Extender, Local unit
- 2113/R/EUJ: CopperLink-T E1 Extender, Remote Unit
- 2115/EUJ-2PK: CopperLink-T T1 Extender, 2 pack
- 2115/L/EUJ: CopperLink-T T1 Extender, Local unit
- 2115/R/EUJ: CopperLink-T T1 Extender, Remote unit

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See Pg 134

# RACKABLE

## Compact Ethernet-over-E1 WAN Bridge

### NetLink 2701/I EtherRocket & 2701RC Rack Card

These devices, available in low-cost standalone or rack-mountable versions, terminate G.703/G.704 NTU with on-board transparent Ethernet Bridge extend branch-office LAN segments over E1/FE1 simply and affordably.



Patton Electronics introduces a new way of interconnecting remote branches to a Main Office LAN using the Model 2701/I Ethernet-over-E1 Bridge. Called "Remote Router Porting" (RRP), it offers network managers and integrators a simple and economical way for LAN-to-LAN deployments.

At the branch office, RRP replaces the traditional router and CSU/DSU solution with Patton's Ethernet-over-E1 Bridge, which includes integrated E1 and 10Base-T transparent bridging. This unit allows for high-speed PPP data connections across the Wide Area Network at scalable data rates of nx56/nx64kbps up to 2.048 Mbps, and also connects directly to the 10Base-T branch office LAN at 10Mbps. The 2701/I transparently forwards Ethernet packets to a headquarters LAN based on their destination MAC address.

At headquarters, RRP builds on the bridging capabilities of a router to extend their serial or WAN ports across town or across the country. In order for the central routed network to connect to a remote branch Ethernet network, the serial or WAN interface of the router needs to be configured as a PPP IP half-bridge. In this configuration, the Ethernet-over-E1 Bridge sends bridge packets (BPDUs) to the router's WAN interface. The router will then look at the layer-3 address information and will forward these packets based on its IP address. The router's port, connected through the E1 network and Ethernet-over-E1 Bridge, appears as a virtual interface at the branch office network.

The Model 2701/I Ethernet-over-E1 Bridge supports G.704 framing, and AMI and HDB3 line coding. Data rates, framing, and coding options are programmed by DIP switches or from a VT-100 terminal with menu-driven software. A full range of system and diagnostic features make setup simple and quick.



## FEATURES & BENEFITS

- ✓ Terminates E1/Fractional E1 service
- ✓ 10Base-T Ethernet-over-E1 Bridge
- ✓ Available in low-cost standalone or rack-mountable (2701RC) versions
- ✓ PPP (Point-to-Point Protocol, RFC 1661) with BCP (Bridge Control Protocol, RFC 1638)
- ✓ 2 Mbps E1 Line Rate with n x 64 kbps timeslot selection
- ✓ Switch-selectable AMI or HDB3 line encoding options
- ✓ 75-ohm dual coax and 120-ohm twisted-pair G.703 connections
- ✓ Local and remote loopback diagnostics
- ✓ Internal and G.703 network timing
- ✓ Conforms to ONP requirements CTR 12 and CTR 13 for connection to international Telecom networks
- ✓ Rack cards fit into Model 1001 access rack system

## ORDERING INFORMATION

**2701/I/U:** G.703/G.704 NTU, Ethernet interface; 120–220 VAC PS

**2701/I/48:** G.703/G.704 NTU, Ethernet interface; 48 VDC power supply (PS)

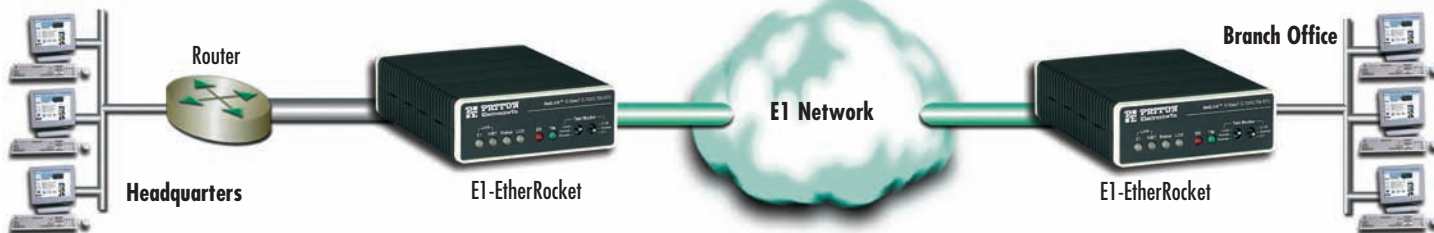
**2701RC/A/I:** G.703/G.704 NTU Card, V.35 interface

**2701RC/C/IA:** G.703/G.704 NTU, Ethernet/RJ-45 interface

**2701RC/D/D:** G.703/G.704 NTU Card, X.21 interface

**2701RC/D/V:** G.703/G.704 NTU Card, X.21 interface

## Remote Router Porting with Patton's Ethernet-over-E1 Bridge



## SPECIFICATIONS

### 2701/I

**Line Rate:** 2 Mbps with nx64 kbps timeslot selection  
**Network Connector:** RJ-48C and Dual Coaxial  
**DTE Interface:** 10Base-T Ethernet  
**Line Coding:** AMI or HDB3  
**Line Framing:** G.703 (unframed) or G.704/G.732 (framed)

**Clocking:** Internal or Receive Recover  
**DTE Rates:** 10 Mbps (10Base-T)  
**Indicators:** E1 Link Status, TD, RD, Loss of Sync, Error, Test Mode, Ethernet Status  
**Diagnostics:** Local/Remote Loop, 511 pattern  
**Line Isolation:** 1500VRMS

**Compliance:** CE Mark, G.703, G.704, G.723, G.832, CTR-12 and CTR-13  
**Environment:** Temp.: 32–122°F (0–50°C) • Humidity: 5–90% non-condensing  
**Dimensions:** 5.84L x 4.16W x 1.51H in. (14.84L x 10.6W x 3.84H cm)  
**Weight:** 2.225 lbs (1.02 Kg)

### 2701RC

**Data Rate:** Smooth Clock 2.048 Mbps  
**Network Connector:** RJ-48C (all versions); Dual Coaxial (X.21 & Ethernet)  
**DTE Interface:** EIA-530, X.21/V.11, V.35, or 10Base-T Ethernet  
**Line Coding:** AMI or HDB3  
**Line Framing:** G.703 (unframed) or G.704/G.732 (framed)

**Clocking:** Internal, External or Receive Recover  
**DTE Rates:** nx64kbps (EIA-530, X.21/V.11, V.35); 10Mbps (10Base-T)  
**Indicators:** E1 Link Status, TD, RD, Loss of Sync, Error, Test Mode, Ethernet Status (on 10Base-T Version)  
**Diagnostics:** Local/Remote Loop, 511  
**Line Isolation:** 1500VRMS

**Compliance:** CE Mark, G.703, G.704, G.723, G.832, CTR-12 and CTR-13  
**Environment:** Temp.: 32–122°F (0–50°C) • Humidity: 5 to 90% non-condensing  
**Dimensions:** 5.84L x 4.16W x 1.51H in. (14.84L x 10.6W x 3.84H cm)  
**Weight:** 2.225 lbs (1.02 Kg)

## Ethernet MicroBridges (X.21, RS-232, RS-530, & V.35)

Models 2121, 2124, 2130, 2135, & 2135C

Patton's MicroBridge products are the cost-effective solution for expanding your LAN—without using a router!



The Patton Ethernet MicroBridge provides a cost-effective solution for connecting multiple local or remote network segments. The Patton MicroBridges feature a wide variety of serial interfaces to make your WAN connections easy. All models are equipped with an 802.3 10Base-T Ethernet RJ-45 jack, which allows a direct connection to your network equipment.

The Ethernet MicroBridge works on the MAC-layer addresses and operates independent of higher layer protocols. This functionality enables Patton Ethernet MicroBridges to pass higher-layer broadcast, multicast, unicast, and data frames over the WAN with minimal to no configuration by the end-user. The MicroBridges are PPP ready supporting standards based layer-2 protocol interfacing. The MicroBridges are fully compatible with each other as well as Patton's full line of bridging products. Using PPP, the MicroBridges have the flexibility to be used in conjunction with all other third-party PPP compliant equipment.

Whether you are looking to add additional LANs, increase the efficiency of your WAN connection, or extending your router's interface, Patton's Ethernet MicroBridge is the most simple and cost-effective solution around!

### FEATURES & BENEFITS

- ✓ PPP Bridging Control Protocol (RFC 1638) with auto detection for compatibility with existing Patton Bridge Products and standard third-party equipment
- ✓ Transparent LAN bridging enables the MicroBridge to pass higher layer protocols and VLAN tagged frames.
- ✓ Industry standard, shielded RJ-45 Ethernet connection
- ✓ 802.3 Ethernet supported by transparent LAN bridging
- ✓ 1 Mbyte RAM; 128 kbyte FLASH
- ✓ Automatic learning and aging with support for up to 4,096 MAC addresses
- ✓ Nine LEDs monitor power, LAN link, and DTE interface signals
- ✓ Variety of WAN interfaces available (X.21, RS-232, RS-530, and V.35)
- ✓ Transparent to VLAN.Q tagged packets

### ORDERING INFORMATION

2121/DM-X/UI: Ethernet MicroBridge, X.21 DTE with DB-15 Male, Serial Cable, 100–240 VAC

2121/DM-X/48: Ethernet MicroBridge, X.21 DTE with DB-15 Male, Serial Cable, -48 VDC

2124/AM-X/UI: Ethernet MicroBridge, V.24 DTE with DB-25 Male, Serial Cable, 100–240 VAC

2124/AM-X/48: Ethernet MicroBridge, V.24 DTE with DB-25 Male, Serial Cable, -48 VDC

2130/BM-X/UI: Ethernet MicroBridge, EIA-530 DTE with DB-25 Male, Serial Cable, 100–240 VAC

2130/BM-X/48: Ethernet MicroBridge, EIA-530 DTE with DB-25 Male, Serial Cable, -48 VDC

2135C/CM-X/UI: Ethernet MicroBridge, V.35 DTE with M/34 Male, Serial Cable, 100–40 VAC

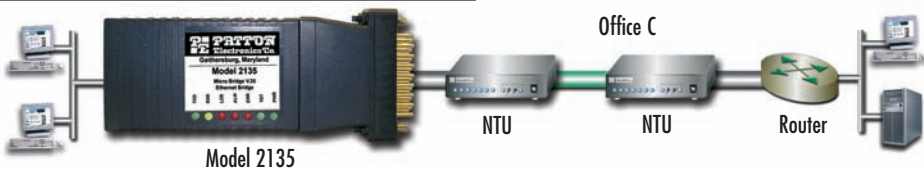
2135C/CM-X/48: Ethernet MicroBridge, V.35 DTE with M/34 Male, Serial Cable, -48 VDC

2135/CM/UI: Ethernet MicroBridge, V.35 DTE with M/34 Male (No Serial Cable), 100–240 VAC

2135/CM/48: Ethernet MicroBridge, V.35 DTE with M/34 Male (No Serial Cable), -48 VDC

**Note:** X = "L" 6-foot (182.88cm) Serial Cable or "S" 6-inch (15.24cm) Serial Cable. **Example:** 2121/DM-S/UI Ethernet MicroBridge, X.21 DTE w/DB-15 Male, 6" (15.24cm) Serial Cable, UI

### Remote Router Porting



Patton's Ethernet MicroBridge Series are compliant with the RFC 1661 standard for PPP half-bridging, so you can connect our bridge to a router (instead of another bridge) which saves you money!

### SPECIFICATIONS

**DTE Interface:** X.21, V.35, RS-232, or RS-530

**Network Interface:** IEEE 802.3 10Base-T (RJ-45)

**Transmission:** Synchronous up to 10 Mbps

**Protocol:** PPP (RFC 1661) with Bridging Control Protocol (RFC 1638)

**Memory:** 1MB RAM, 128KB FLASH memory

**MAC Address Table Size:** 4096 entries

**MAC Address Aging:** MAC addresses deleted after eight minutes inactivity

**LEDs LAN Side:** (1) yellow, general status; (1) green, link integrity

**LEDs DTE Side:** TXD, RXD and Power, (green); DTR, DCD, CTS and CLK, (yellow)

**Power Supply Input:** 100–240 VAC, 50–60 Hz, 0.4A; or optional -48 VDC

**Power:** 500mA at 5 VDC

**Temperature:** 32–122°F (0–50°C)

**Altitude:** 0–15,000 ft (0–4,572 m)

**Humidity:** Up to 90% R.H., non-condensing

**Dimensions:** 3.5 L X 2.1 W X 0.78 H inch (9.0 L X 5.3 W X 2.0 H cm)

**Weight:** 0.72 lbs (0.32 kg)

**Compliance:** FCC Part 15A; CE Mark per EEC Directive: 89/336/EEC; Low Voltage Directive: 73/23/EEC