

Product Model	Model 2168 Multi-Rate CopperLink Ethernet Extender		
Product Name	Multi-Rate CopperLink Ethernet Extender		
Product Manager	John Grant	Contact	Jgrant@patton.com

Who are the customers for the Model 2168?

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 includes seven asymmetrical and symmetrical settings, which provide the flexibility to increase the distance or speed of the Ethernet data links.

The Model 2168 is targeted to users or service providers that need high-speed Ethernet data links over their existing copper infrastructure. Primary customers the Model 2168 is targeted to include but are not limited to CLEC's, ISP's, Educational Facilities (Campus), MTU/MDU's, and corporate/government offices. Popular applications for the CopperLink include Ethernet extension, medical imaging, video-conferencing, Ethernet Bridging, and inter-connecting remote devices or remote networks to a central LAN. The variable symmetrical data rates ensure the highest possible data rate is achieved over various lengths and types of copper wire and environments. Variable 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 applications such as: always on Internet access, real time bi-directional video streaming, and various multimedia applications.



Model 2168

Typical applications include:

LAN-to-LAN Bridging: The Model 2168 connects remote LANs over a high-speed, symmetrical or asymmetrical link. The 2168/R unit is placed at the remote location and the 2168/L unit is placed at the central or primary site to provide a LAN-to-LAN connection over a voice-grade wire. This application will generally be made over a symmetrical link.

Ethernet Extension: The Model 2168 overcomes the 328 ft (100m) limitations of Ethernet with a symmetrical or asymmetrical data link at distances up to 6,656 ft (2.03 km) and speeds up to 16.67 Mbps. The Model 2168 point-to-point solution does not require the use of Ethernet repeaters. This application will generally be made over a symmetrical link.

Dedicated Internet Services: The Model 2168 CopperLink technology enables ISP's to deliver dedicated high-speed Internet access from a Point-of-Presence (POP) to a customer premise. A 2168/L is used at the POP and a 2168/R is used at the customer premise. The switch selectable rates (various asymmetrical and symmetrical settings) allow the ISP's to sell differentiated services as well increase the number of perspective customers due to a longer reach. This application generally will be made over an asymmetrical link.

MTU/MDU Services: Using the Model 2168 rack chassis and the standalone solution, data services can be extended to the hotel guest, apartment resident, and housing resident, etc. Patton's Model 2168 CopperLink Ethernet Extenders allow service providers to avoid the cost and trouble of wiring the individual hotel rooms with 4-wire twisted pair or Ethernet cabling by using the existing voice-grade 2-wire infrastructure. The service provider would place the 1001R rack system with multiple 2168RC/L rack cards and an Ethernet switch in the basement or closet and the standalone 2168/R in the individual hotel rooms. Once connected, the Model 2168 will automatically establish a high-speed Point-to-Point data link. Bandwidth can be limited or distance increased by choosing various asymmetrical /symmetrical data rates on the Local (L) and Remote (R) CopperLink Ethernet Extenders. This application generally will be made over an asymmetrical link.

Related Products

Patton Electronic's CopperLink Product Line

Patton provides a complete line of CopperLink Ethernet Extenders. Whether it's ultra-high speed connections with the Model 2172 or long distance Ethernet Extension with the Model 2156 Patton has the solution for you. Patton's CopperLink solutions include rack-card based solutions for MxU environments and standalone Ethernet Extenders for interconnection between remote LANs or remote network devices.

Max. Distance	Max. Speed	Distance at Max. Speed	CopperLink™ Model
1 mile	50 Mbps	800 feet	Model 2172
1.1 miles	16.6 Mbps	3,125 feet	Model 2168
0.75 mile	12 Mbps	4,000 feet	Model 2158
5.7 miles	4.6 Mbps	2.0 miles	Model 2157
5.7 miles	2.3 Mbps	3.1 miles	Model 2156
5 miles	144 kbps	5 miles	Model 2155

Model 2168 Features and Benefits	
High-Speed line rates up to 16.67 Mbps.	Fast and reliable data transmission.
Switch selectable Asymmetrical or Symmetrical line rate options	Differentiated services and ability to adapt to different environments, distances, and multimedia.
Extends Ethernet beyond its current 328 ft (100m) limitation.	Inexpensively links remote devices or extends LANs up to 6,652 ft (2.03 km).
Full service integration (voice, video, and data) services over voice-grade telephone wire.	Eliminates the need to install/upgrade to new LAN-grade cable or expensive fiber.
Operation transparent to high-layer protocols.	Lets higher-layer broadcast, cast and uni-cast data frames pass through, and supports VLAN tagged frames.
Auto-sensing 10 or 100Base-T and full or half-duplex Ethernet.	No configuration necessary, just Plug your Ethernet connections in and play.
Auto MDI-X	Automatically detects DCE/DTE eliminating the concern of which type of cable straight-through or crossover.
Seven status LEDs.	Monitoring your connection and operational status is made simple.

Switch Selectable Settings for the Model 2168:

Asymmetrical		
Line Rates		Distance (24 AWG)
Upstream (Mbps)	Downstream (Mbps)	
1.56	4.17	6,656' (2.03km)
1.56	9.38	5,756' (1.75km)
2.34	16.67	5,556' (1.69km)

Symmetrical		
Line Rates		Distance (24 AWG)
Upstream (Mbps)	Downstream (Mbps)	
6.25	6.25	4,956' (1.51km)
9.38	9.38	4,806' (1.46km)
12.50†	12.50	4,656' (1.42km)
16.67	16.67	3,956' (1.21km)

Optional parts for the Model 2168

- DC Power Supplies
- Rack cards are compatible with Patton's Model 1001R High-Density Telco Rack Chassis and Cluster Boxes.

Optional DC Power Supplies for Standalone Units

Part Number	Description
48V-PSM	-48 VDC power supply, 5VDC, 1A (optional)
24V-PSM	-24 VDC power supply, 5VDC, 1A (optional)
12V-PSM	-12 VDC power supply, 5VDC, 1A (optional)

If you require a DC power supply with the Model 2168, you must order the 2168 without power supplies and add the DC power supply as a separate line item.

EXAMPLE ORDER:

- 1 X 2168/E-2PK** Multi-Rate CopperLick Ethernet Extender Set (Local and Remote); No Power Supply
2 x 48V-PSM -48 VDC power supply, 5VDC, 1A

Shipping/Export Information

ECCN export number: 8517.50.1000

Country of origin: United States of America, NAFTA

Total weight boxed: .96lbs (.44kg) without power supply

Individual unit: .4lbs (.18kg); without power supply

MTBF/ Repair Information

MTBF: 126,000 Hrs. Calculation based on MIL-HDBK-217F, Notice 2 - "Parts Count Reliability Prediction"

Mean time to repair: 7–10 days

Warranty: 1-year parts and labor

Out of warranty repair rate: \$150, flat rate – contact Patton’s Tech Support for details.

Physical Specifications

Dimensions: **Standalone:** 1.5” H x 4.13” W x 3.75” D (3.81 H x 10.5 W x 9.53 D cm)
 Rack Card: 3.00” H x 0.83” W x 7.84” D (7.6 H x 2.1 W x 19.9 D cm)

Color: **Standalone:** **Case:** Black **Front and Back Panel:** Black with white letters
 Rack Card: **Front and Back Panel:** White with black letters

Case material: **Standalone:** Plastic, Fire retardant **Rack Card:** Iridite Aluminum

Environmental

Operating Temp: 32 to 122°F (0 to 50°C) **Storage Temp:** -40 to 185°F (-40 to +85°C)

Relative Humidity: Up to 90% RH, non-condensing

Altitude: 0 –15,000 feet (3,048 meters)

Ventilation requirements: None, units do not require cooling fans.

Approvals

Safety	Emissions	Telecommunications
CE Marked per EMC directive 89/336/EEC and low voltage directive 72/23/EEC. ESD EN61000-4-2	FCC part 15, Class A EN55022 Class A, conducted and radiated emissions	

Power Supplies

Standalone Units Only

AC: 120VAC, 50-60Hz, external or Universal input, 100-240VAC, 50-60Hz, external

DC: -48VDC, -24VDC, or -12VDC external (optional)

PATTON ELECTRONICS COMPANY
PRODUCT QUICK REFERENCE **GoCard**



Ordering Information-Model 2168	
Model	Description
2168/L/E	Local Multi-Rate CopperLink Ethernet Extender; No Power Supply
2168/R/E	Remote Multi-Rate CopperLink Ethernet Extender; No Power Supply
2168/L/EUI*	Local Multi-Rate CopperLink Ethernet Extender; 100-240VAC
2168/R/EUI*	Remote Multi-Rate CopperLink Ethernet Extender; 100-240VAC
2168/E-2PK	Multi-Rate CopperLink Ethernet Extender Set (Local and Remote); No Power Supply
2168/EUI-2PK*	Multi-Rate CopperLink Ethernet Extender Set (Customer Premise and Central Office); 100-240VAC
2168RC/L	Local Multi-Rate CopperLink Ethernet Extender Rack Card
2168RC/R	Remote Multi-Rate CopperLink Ethernet Extender Rack Card

- When ordering standalone units, it is recommended that the 2168 be ordered in sets: one 2168/L/E (Local) and one 2168/R/E (Remote). When ordering rack cards it is required to match a standalone R (Remote) with an L (Local) rack card and if you order the standalone L (Local), you must match it with an R (Remote) rack card.
- * =You must specify a country specific power cord

Environmentally Hardened Models	
Model	Description
ET2168/UI	Extended Temperature 16Mbps EnviroNET Ethernet Extender; 100-240VAC; -40 to 85C; NEMA4
EC2168R/UI	Environmentally Controlled 16Mbps EnviroNET Ethernet Extender; 100-240VAC; 0 to 85C; NEMA4
EH2168R/UI	Environmentally Hardened 16Mbps EnviroNET Ethernet Extender; 100-240VAC; 0 to 50C; NEMA4