



"Your Trusted Partner in SPE Testing"

**Model 4960 Series
8-Channel Spur Cable Emulator
Industrial Ethernet Testing Solution**

Ideal for testing 10Base-T1L and PoDL



Model 4960-001 (8 Channels, 125m Fixed Length Each Channel)

Introducing the world's first commercially available Spur Cable Emulator.

Telebyte's Model 4960 is the world's first commercially available Spur Cable Emulator for Ethernet-Advanced Physical Layer (APL) testing. Ethernet-APL is a two-wire, 10Mbps Ethernet data link for process automation based on IEEE 802.3cg-2019 and IEC standards. It implements a proven switched Ethernet architecture using a trunk-and-spur network topology and facilitates the convergence of Operational (OT) and Information Technology (IT) systems. The often-demanding operating conditions and hazardous areas of process plants benefit from the simplified installation, configuration, maintenance, and utilization of the high-speed communication to the field for process automation control systems.

The 4960 series emulates eight channels of two-wire spur cable segments (of under 200m) between a 10Base-T1L field Power Switch and field Powered Devices (PD) such as sensors, actuators, detectors, cameras and more, that draw power from the switch to operate and communicate. The 4960 Spur Cable Emulator implements a passive design that features a very low noise floor - providing realistic, repeatable Single Pair Ethernet (SPE) test results for field switches and powered devices.

Three versions are available, eight fixed 50m channels, eight fixed 100m channels, and eight fixed 125m channels.



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8-Channel Spur Cable Emulator
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Features Include:

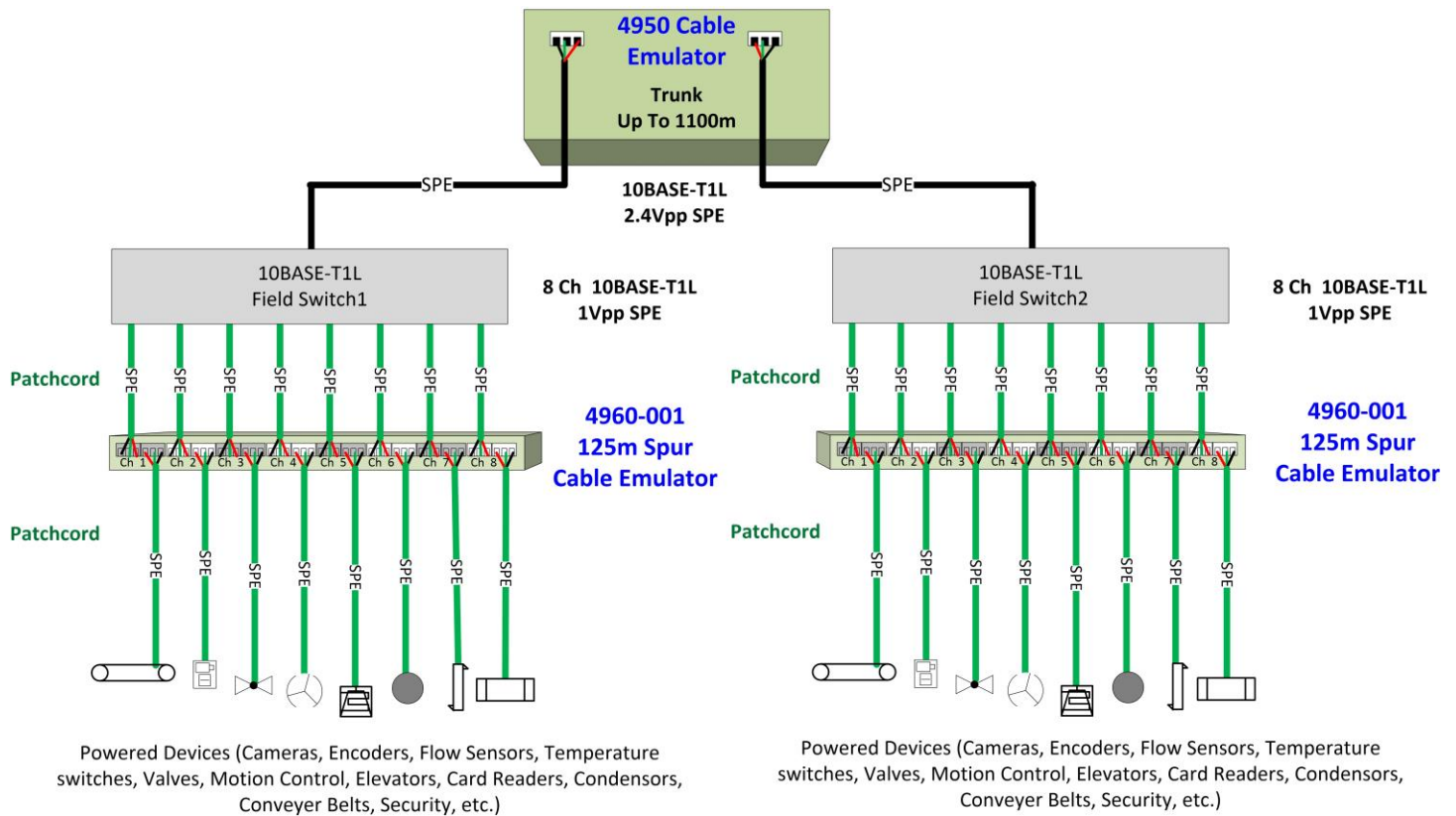
- Single Balanced Pair of Conductors (1.0 Vpp cable model) as defined in section 146.7.1 of IEEE 802.3cg-2019 (Attenuation, Impedance, Group Delay and DC Resistance)
- Bandwidth DC to 20MHz
- 8 independent channels
- Three versions in fixed lengths per channel: 50m, 100m or 125m twisted pair
- 65dB isolation between channels for 8 independent loops
- Passive design provides very low noise floor of < -165 dBm/Hz
- Reliable and repeatable test results
- Supports testing of Type E Power over Data Lines (PoDL) devices. 100m and 125m fixed length supports Class 10-14 and 50m fixed length supports Class 10-15
- 1U rack-mountable standalone chassis
- Modular design allows for expansion to build dense configurations
- Automate variable loop lengths by integrating with Telebyte's 600 Series Switch Modules
- Use with Telebyte's 4950 Cable Emulator (Trunk Line) and 4975 Noise Generator & Analyzer to simulate a real-world environment in the test laboratory

Specifications	
Simulation	<ul style="list-style-type: none"> • Single Balanced Pair of Conductors (1.0 Vpp cable model)) as defined in section 146.7.1 of IEEE 802.3cg-2019 • Simulates attenuation, impedance, group delay and DC Resistance • Three Versions <ul style="list-style-type: none"> ○ 4960-001 - 8 channels fixed 125m each channel ○ 4960-002 - 8 channels fixed 100m each channel ○ 4960-003 - 8 channels fixed 50m each channel
Bandwidth	DC to 20MHz
Average Noise Floor	< -165 dBm/Hz
Attenuation (Insertion Loss)	Mean Absolute Error (MAE) < 1dB (100kHz to 20MHz)
Impedance	Typically 100 Ohms +/- 10 Ohms
Group Delay	4,920nS per km +/- 10% between 0.1MHz to 20MHz
Maximum Current	4960-001 - Max steady state current 940 mA (supports Type E Classes 10-14) 4960-002 - Max steady state current 940 mA (supports Type E Classes 10-14) 4960-003 - Max steady state current 2A (supports Type E Classes 10-15)
Maximum voltage	60 VDC
Dimensions	[1U] W 19 in x H 1.75 in x D 24 in (W 482 mm x H 44 mm x D 609 mm)
Mounting options	Mountable in 19" rack
Connectors	16, 3-position terminal blocks on front (1 in, 1 out per channel)

Specifications are subject to change without notice. Made in USA.

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Example Use Case



In this example the two Field Switches are communicating with each other over a trunk line that is tested with the Telebyte Model 4950 Channel Emulator from 50m up to 1100m. Each field switch is powered by auxiliary power and supplies DC power to the field instrumentation to implement a 10Mbps Ethernet data link for high speed communication between the devices and the process automation control system. The powered devices connected to each field switch may be a variety of sensors, encoders, control valves, etc. to provide data over the network for optimization and real-time control of the industrial process for various industries including intrinsically safe environments. In this example, the two Model 4960-001 Spur Cable Emulators are used to connect the Field Switches to 16 powered devices.

Ordering Options

Model	Description
4960-001	8-Channel two-wire Spur Cable Emulator with fixed 125m cable length on each channel
4960-002	8-Channel two-wire Spur Cable Emulator with fixed 100m cable length on each channel
4960-003	8-Channel two-wire Spur Cable Emulator with fixed 50m cable length on each channel