"Your Trusted Partner in SPE Testing"

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

Ideal for testing 10Base-T1L and Ethernet-APL Devices

Model 4960-001 (8 Channels, 200m Fixed Length Each Channel)

The world's first Spur Cable Emulator for testing Ethernet-APL

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 plus shield, 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.

Simulates the Ethernet-APL Worst-Case Whole Communication Channel for a Spur with eight fixed 200m channels.

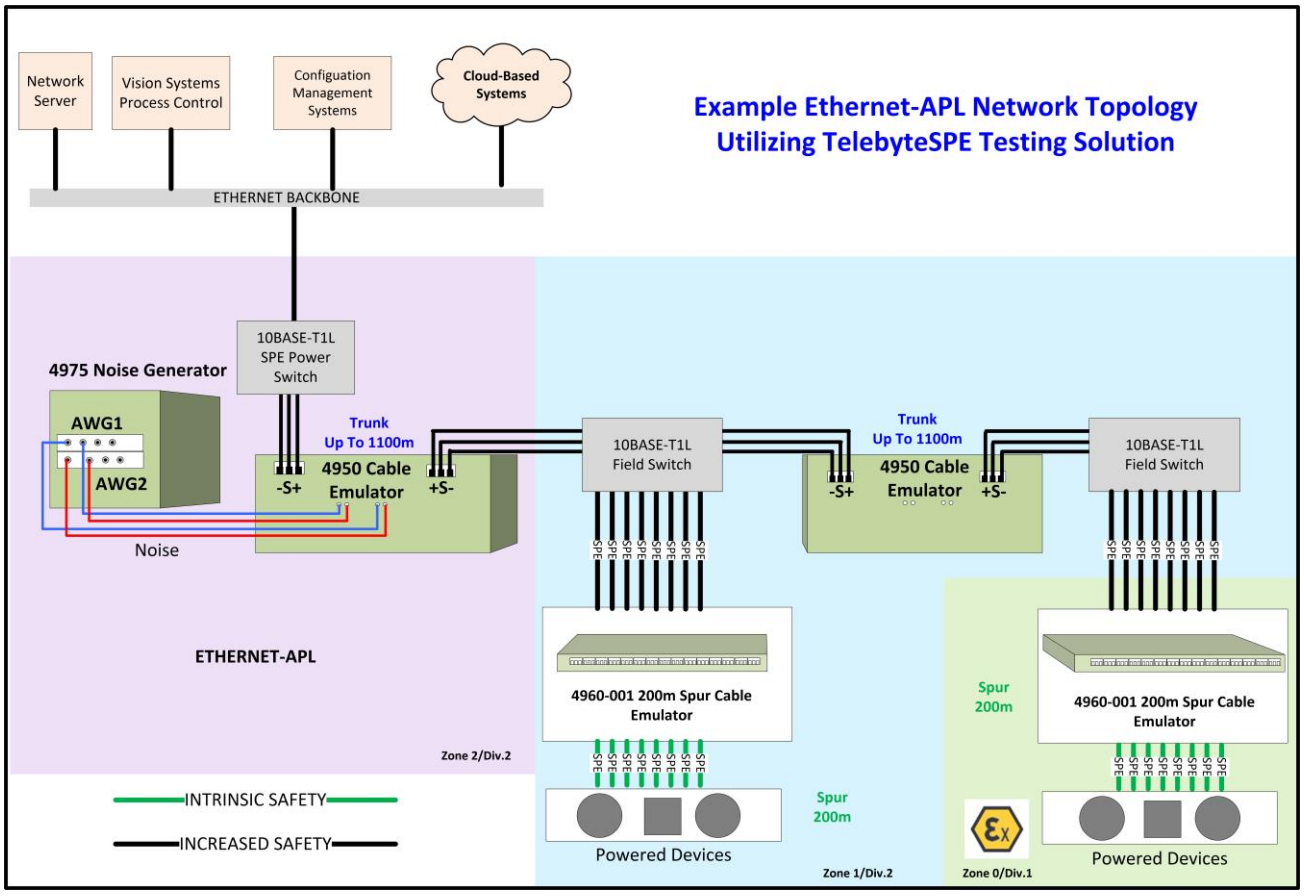
Features Include:

- Single Balanced Pair of Conductors as defined in Ethernet-APL Port Profile Specification v1.0, section 7.3 (Insertion Loss, Return Loss, Impedance, and DC Resistance)
- Bandwidth DC to 20MHz
- 8 independent channels
- Attenuation of 200m fixed length per twisted pair channel with 4 inline connectors
- 65dB isolation between channels for 8 independent cable segments
- 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 for Ethernet-APL Classes A, C & 3 IEEE 802.3cg Classes 10-14.
- 1U rack-mountable standalone chassis
- Modular design allows for expansion to build dense configurations
- Automate variable loop lengths or testbeds 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	• Single Balanced Pair of Conductors as defined in Ethernet-APL Port Profile Specification v1.0, section 7.3 • Simulates Insertion Loss, Return Loss, Impedance, delay and DC Resistance • Worst-Case Whole Communication Channel Spur Version ○ 4960-001 - 8 channels fixed 200m each channel
Bandwidth	DC to 20MHz
Average Noise Floor	< -165 dBm/Hz
Attenuation (Insertion Loss)	Mean Absolute Error (MAE) < 0.5dB (100kHz to 20MHz)
Impedance	Typically, 100 ohms +/- 20%
Return Loss	Typically, better than 19 dB from 500kHz to 20MHz
Group Delay	640nS +/- 20nS
Maximum Current	Max steady state current 1150 mA (supports APL Classes A,C & 3 and Type E Classes 10-14)
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.

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 Cable Emulator (simulating the APL Worst-Case Whole Channel Trunk) from 50m up to 1000m or beyond. The left field switch is powered by auxiliary power and supplies DC power to the cascaded field switch and the additional instrumentation to implement a 10Mbps Ethernet data link for high-speed communication between the devices and the process automation control system. The powered Spur Load (L) 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 over the Spur (Worst-Case Whole Communication Channel) using Class A, C or 3 powered device loads.

Ordering Options

Model	Description
4960-001	8-Channel two-wire Spur Cable Emulator simulating the Worst-Case Whole Communication Channel with fixed 200m cable length on each channel for testing Ethernet-APL