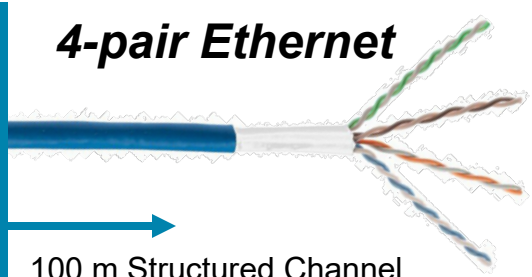
Single Pair Ethernet for Smart Buildings and Industry

May 19, 2022

PANDUIT™

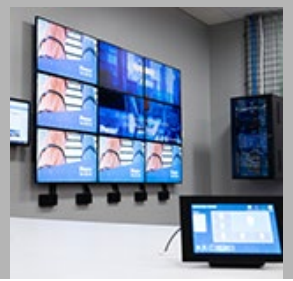
Single Pair Ethernet
the Future of Serial and Analog Fieldbus

4-pair Ethernet



100 m Structured Channel

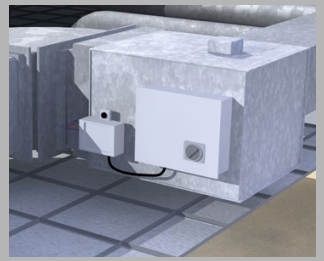
Example Applications:



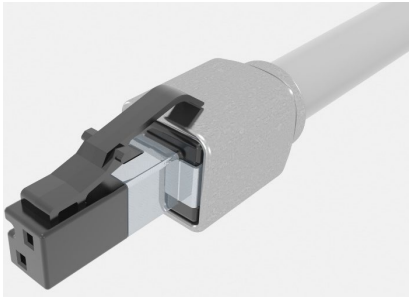
Single Pair Ethernet

1 km Structured Channel

Example Applications:



Single Pair Ethernet
the Future of Serial and Analog Fieldbus



	Typical Fieldbus	Single Pair Ethernet	
Construction	2 wires; 100 Ω	2 wires; 100 Ω	✓
Connectivity	Screw Terminals	evolving to plug-and-play	✓
Bandwidth	Varies, 31.25 kbps	10 Mbps	✓
Distance	Varies, 1 km	Up to 1km	✓
Power	Limited	Up to 52W	✓

Evolving Needs in Smart Buildings

HR

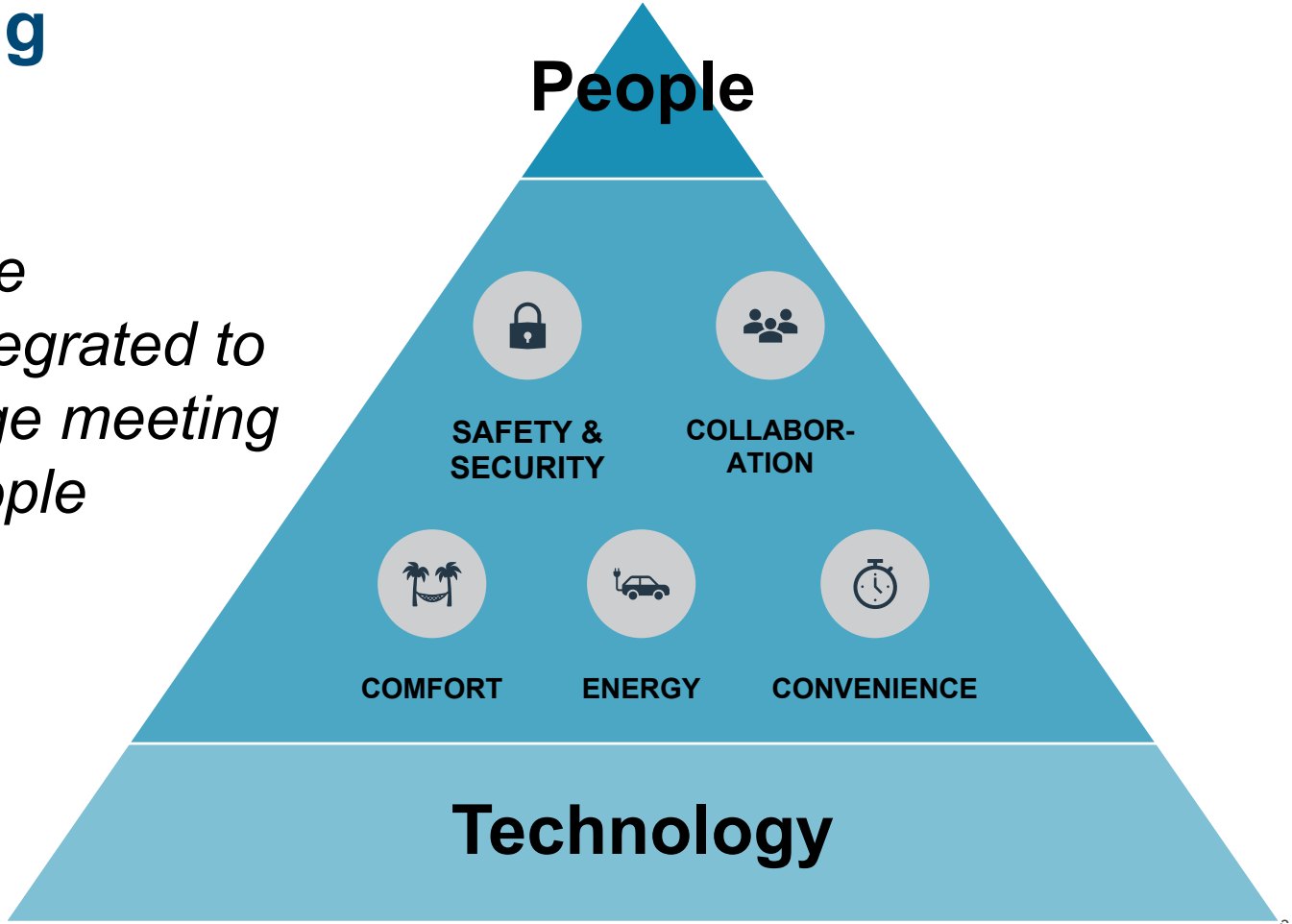
We are moving to

HYBRID WORK

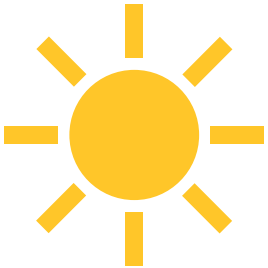
Choose when you come into the office and when you work from home*

Smart Building

A structure where technology is integrated to efficiently manage meeting the needs of people



Objectives of Intelligence



TUNE to better meet physiological needs

Personalization

Light tuning/daylight

Collaboration

IMPROVE efficiency

Reduce Energy Use

Increase Utilization

Reduce friction for Collaboration

Smart Building Applications

Twisted Pair Copper and Fiber Ethernet

Communications to the Desk

Conferencing & Scheduling

Cameras

Wireless & DAS

Serial and Analog

Security & Access

Lighting

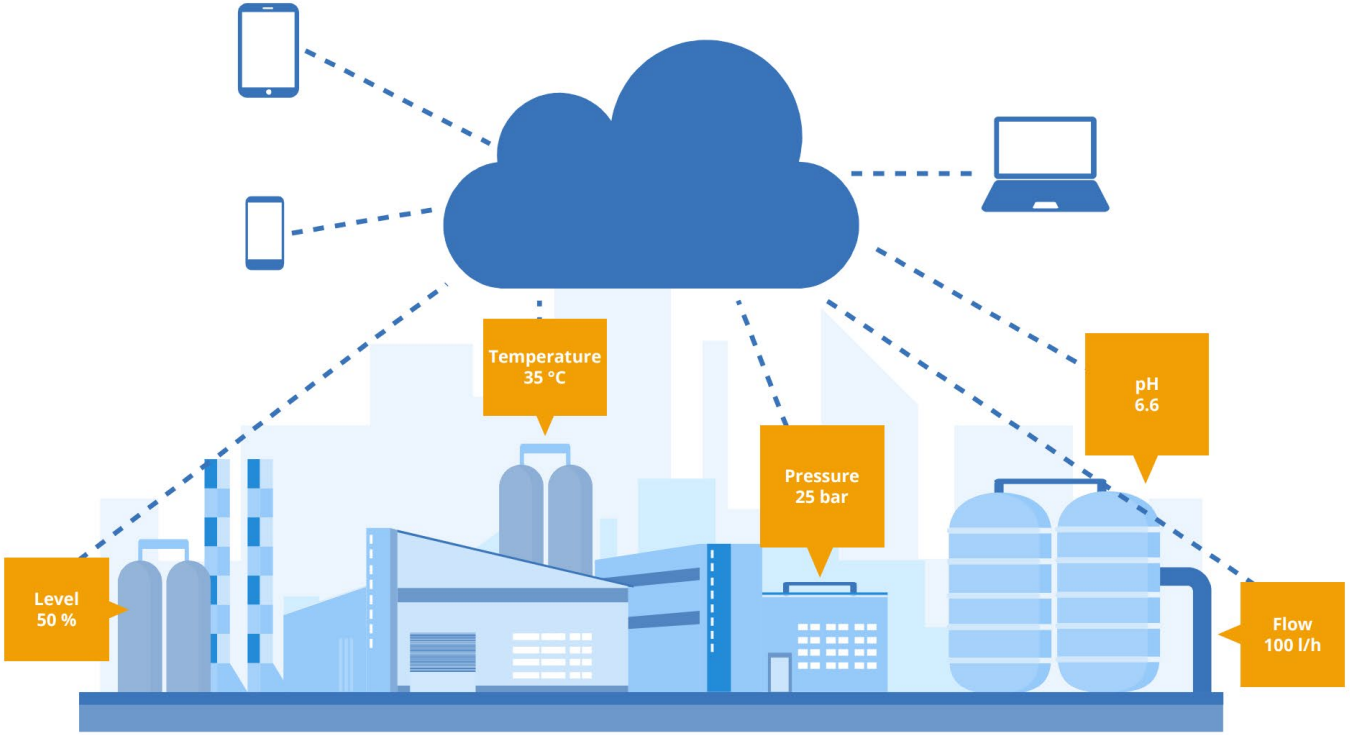
HVAC

Life/Safety

Evolving Needs in Industry

Digital Transformation of Process Plants

The Current Trend



Networking of all components

Central data consolidation and analysis

Unlock the potential of the field

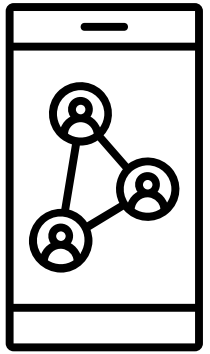
Technologies to the Field Today

Reality in the Field within Process Plants

	Pneumatic	Analog	Low-speed Digital	High-Speed Digital	Ethernet
Technology	Pneumatic	4-20 mA	4-20 mA + HART	Fieldbus	Ethernet
Communication Type	Air	Analog	Analog + serial	Serial digital	Digital network
Measurement	1 value	1 value	1+N values	N values	N values
Local access to data	-	-	Gateway required	Integrated	Integrated
Remote access to data	-	-	Gateway required	Gateway required	Integrated

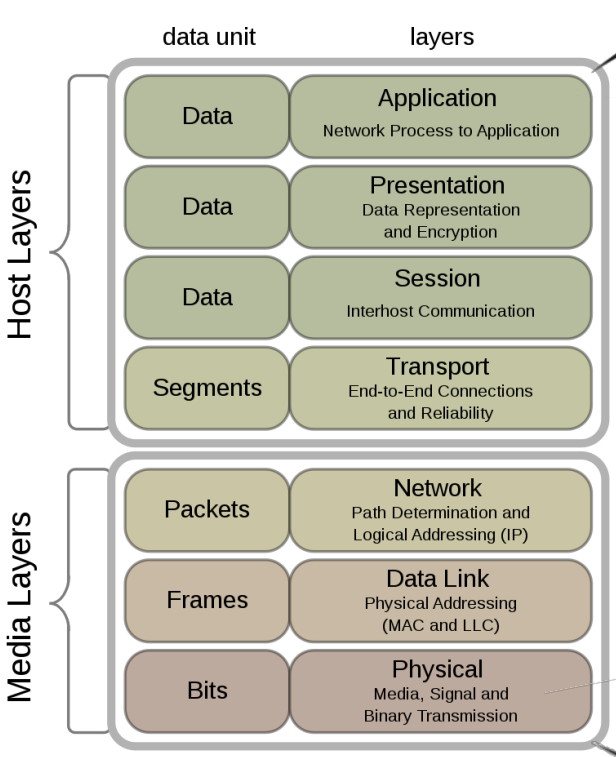
Case for Change toward Ethernet

- Improved network security
- Increased flexibility and visibility
- Standardize expertise and tools



…So how do we get there?

Application Layer Ethernet Integration



Serial Fieldbus		Ethernet Fieldbus
PROFIBUS	→	PROFINET
Foundation Fieldbus H1	→	Foundation Fieldbus HSE
HART	→	HART IP
ControlNet	→	EtherNet/IP
BACnet MS/TP	→	BACnet/IP
KNX	→	KNXnet/IP

Ethernet Integration is complete for most popular OT protocols

…Where do we go from here?

Validating the Physical Layer

Setting the standard to reduce startup complexity and simplify upgrades

Testing and Validation

Question: With fieldbus, at what point are you sure your cable and connectivity infrastructure will work?

a. When you specify all certified components and check that they are installed correctly
b. When you run a continuity and signal quality test
c. When you plug in your devices and everything is recognized
d. When you operate at full communication load

speaking of Profibus…

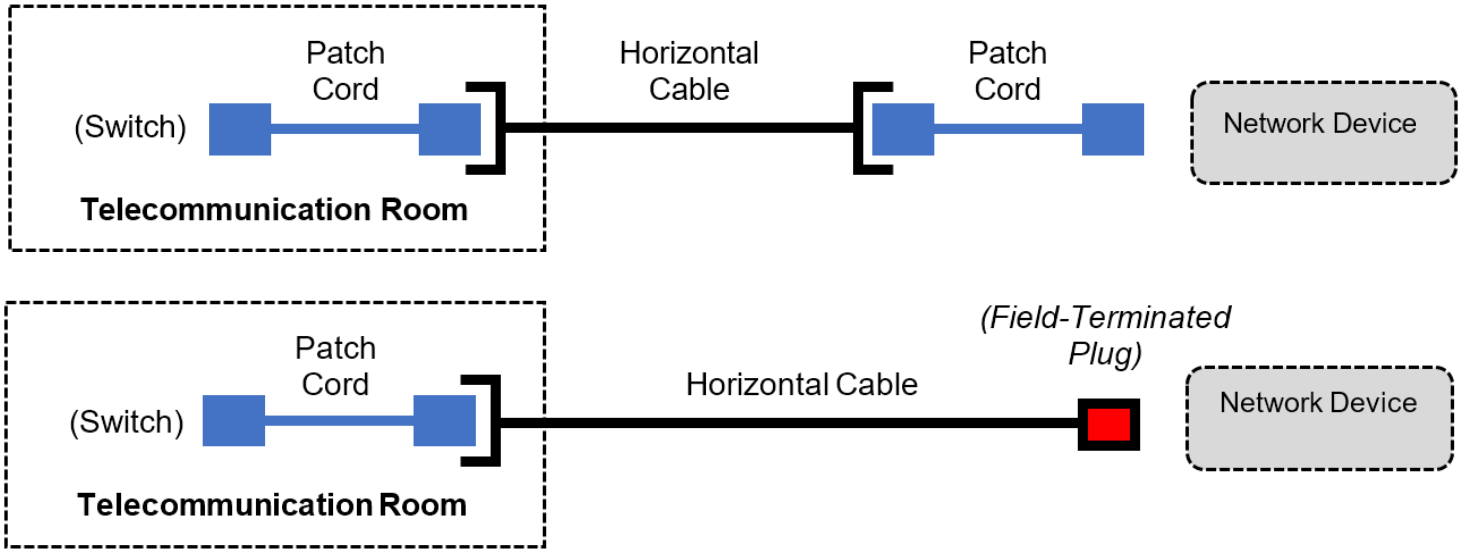
“…most network problems are physical installation issues…

“It is hard to tell a bad device from a device that is simply having trouble communicating on a bad network.”

- James Powell, P.Eng. Siemens

Structured cabling
to create a permanent, testable link

Protocol-independent physical layer that can be validated (and warrantied) before network devices are installed



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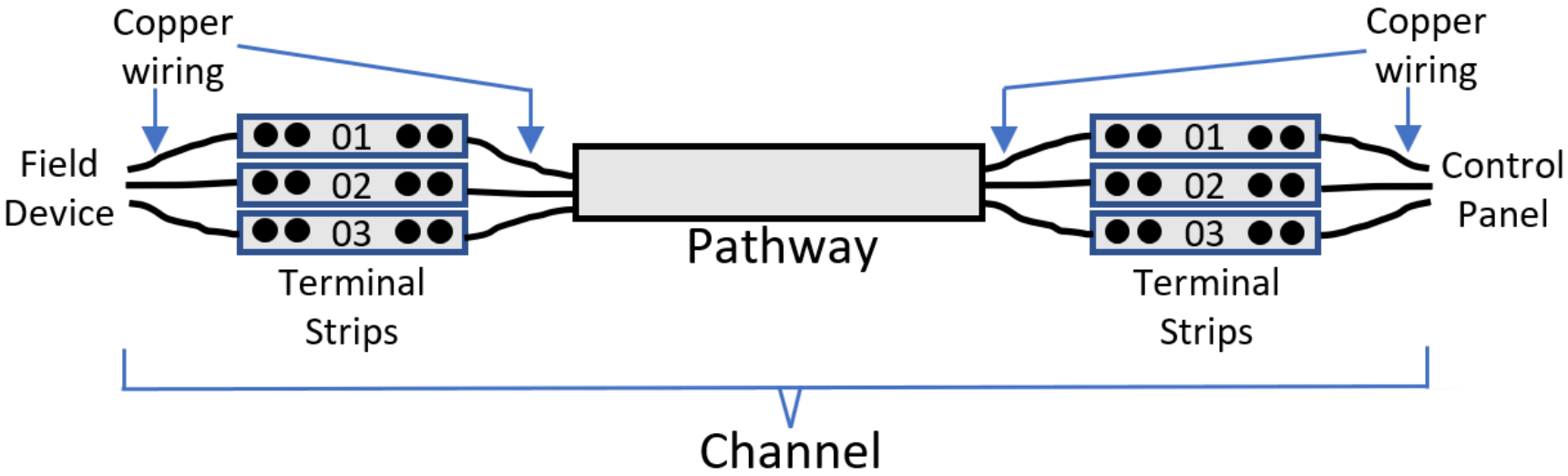


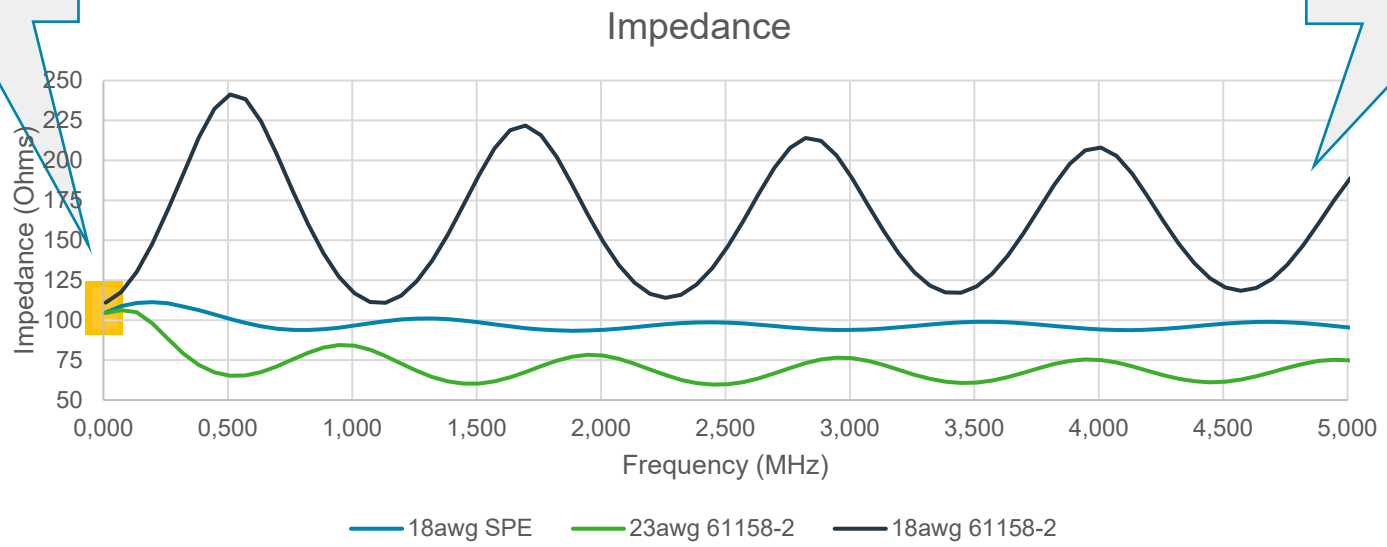
Fieldbus systems do not have standards for physical layer performance validation

Why Validate?

Here is the impedance of two typical 100-Ohm fieldbus cables:

Matches 100Ω at <50Khz

Significant unbalance at high frequencies

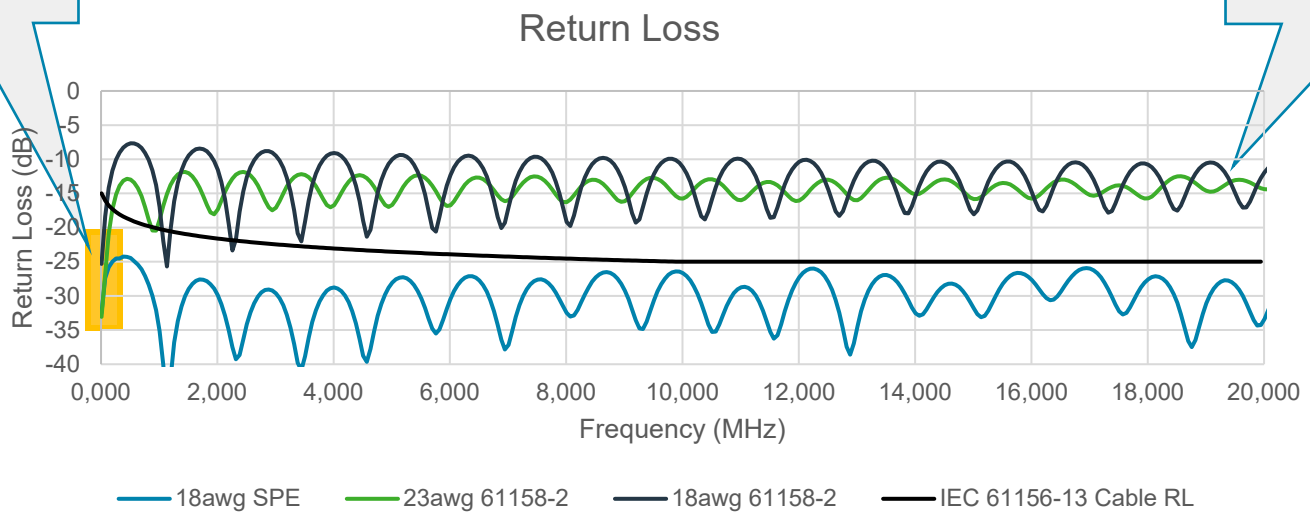


Why Validate?

Here is the return loss of two typical fieldbus cables:

Meets requirements <50Khz

Significant loss at high frequencies



Legacy fieldbus cables have degraded performance at high frequencies

Panduit Certification Plus℠ System Warranty

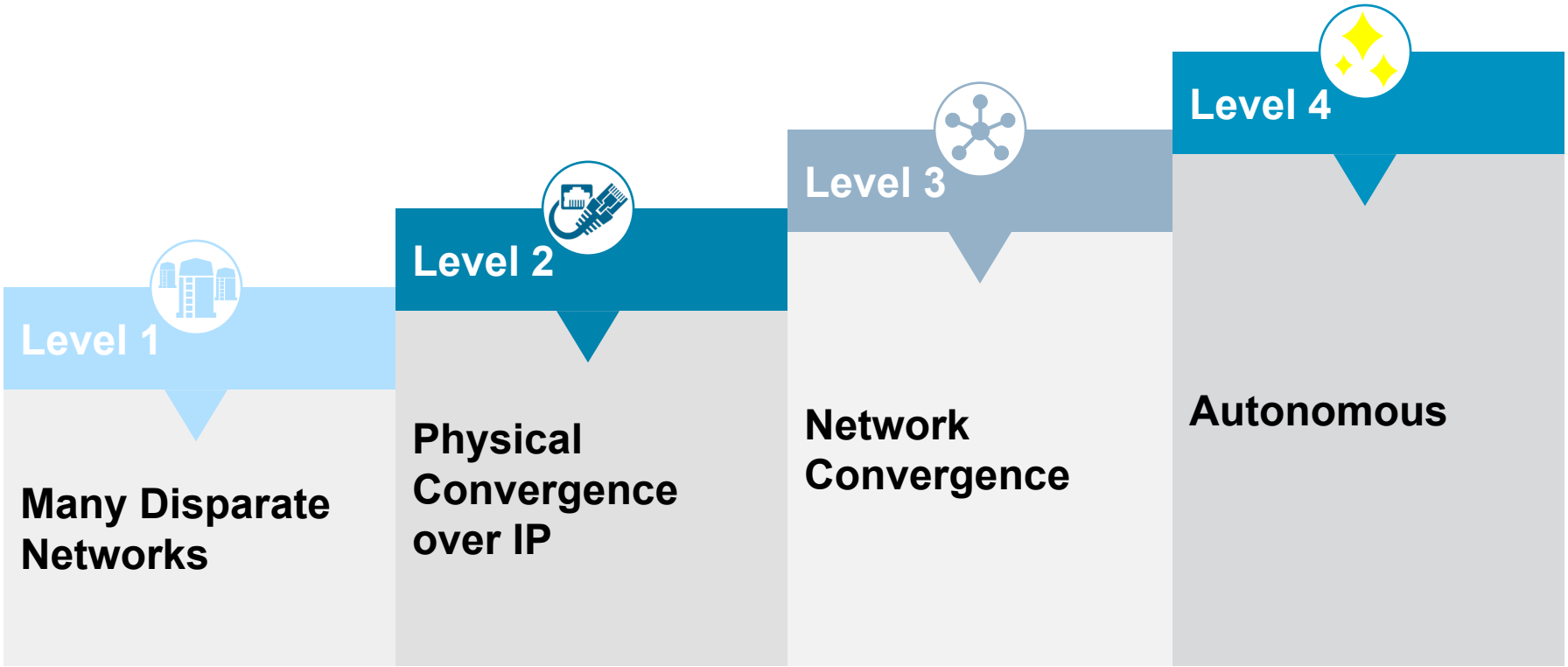
- 25-year performance warranty applies to registered fiber optic and copper communication channels
- Guarantees they will meet/exceed performance requirements
- Increases confidence in Serial and Analog performance
- Available through Panduit ONE℠ partners

IEC® International Electrotechnical Commission

TIA® ADVANCING GLOBAL COMMUNICATIONS

A Maturity Model for Smart Buildings & Industry

A Network Maturity Model for Smart Buildings & Industry



Recommendations for Future-proofing

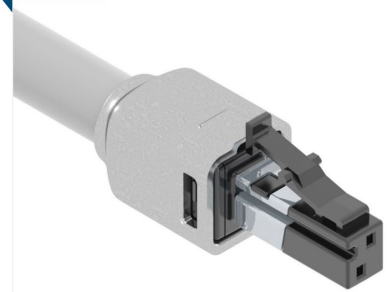
Design	Design fieldbus systems with **structured cabling** methods
Install	Install cabling that supports **higher frequency** transmission for all fieldbus and I/O
Test	Test existing cabling early in a project using **IEC and TIA test methods**

Panduit offering for Single Pair Ethernet

Part Number	Application	Construction	Flame Rating	Regions
SP-SFCS1IG-CEG	• Ethernet-APL Process Instrumentation • Industrial sensors and I/O • Building RS-485 Serial bus	S/FTP	CM, CMX, CMR, EuroClass Eca	NA, LATAM, EMEA, AP
SP-SFPS2IG-CEG	• Light industrial Fieldbus • Building RS-485 Serial Bus • Sensors and I/O	S/FTP	CMP (Plenum)	NA
SP-SFLS2IG-CEG			CM, LSZH, EuroClass Dca	LATAM, EMEA, AP
SP-SFYS2IG-CEG			LSZH, EuroClass Cca	Europe

SPE Connectivity IEC 63171-1 Type 1

FEATURED



SP1 Single Pair Ethernet Shielded Plug Connector

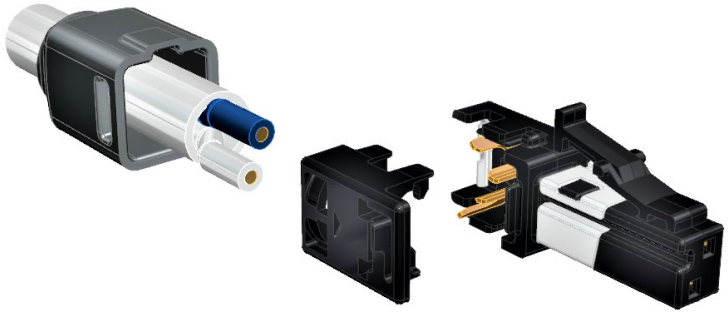
SP-1LSA22BL

Share Print

The Single Pair Ethernet Shielded Connector provides simple field-termination to 18 AWG 1-pair shielded copper cable that is compliant with ANSI/TIA-568.5 (draft) SP1 and IEC 61156-13 and -14 (draft) standards. The plug complies with IEC 63171-1 "Type 1" standard and provides IP20 performance according to IEC SC48B standard.

Find A Distributor

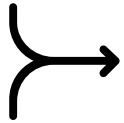
Qty | Add to Part List



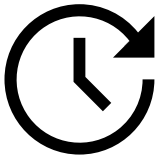
Specifications

Product Type	Modular Plug
Performance Level	NA
Connector Type	Field Terminable Plug
Body Material	Die Cast
Contact Material	Phosphor Bronze
Number of Plugs	1
Wiring Scheme	NA
Overall Length (In.)	1.14
Overall Length (mm)	29.1
Shield Type	Shielded (STP)
Overall Width (In.)	0.4
Overall Width (mm)	10.3
Overall Height (In.)	0.48
Overall Height (mm)	12.1
Maximum Operating Temperature (°C)	60
Maximum Operating Temperature (°F)	140
Minimum Operating Temperature (°C)	-10
Minimum Operating Temperature (°F)	14
Compatible Wire Gauge (AWG)	18

Conclusion



Efficiency is driving Smart Buildings and Industry towards a **Converged Ethernet Network** - from the server to the sensor.



With the release of SPE standards, customers can **future-proof** their serial networks to work for fieldbus today and Ethernet in the future.

Customers can evaluate their readiness for the future using a **maturity model** that assesses their communication networks.

Thank you!

Any Questions?