EXTENDED REACH EXPLAINED

Fiber cabling systems that operate outside of industry standards

By Sean McCloud, RCDD, Principal Applications Engineer, Leviton Network Solutions

When addressing growing network demands, IT managers will try to maximize the life of their existing fiber cabling systems by extending the network reach of their infrastructure. This can lead to distances that exceed industry standards, mating signals through multiple connection points, or a combination of both. This approach can bring big benefits but may also lead to concerns about the passive channel's bandwidth capabilities and attenuation loss in relation to the transceiver transmit power and receiver sensitivity. Let's take a closer look at extended reach considerations.

WHAT IS EXTENDED REACH?

Extended reach refers to a cabling infrastructure that exceeds the maximum length as defined by industry standards. It can also refer to a topology with many connections, which may contribute to exceeding the maximum channel loss allowed by the target Ethernet or Fibre Channel application, affecting performance.

IN THIS **ISSUE**

LEVITON **POLL**

In your data center transceiver deployments, what connector format are you likely to use?

LC 54%

MPO/MTP® 34%

Unsure 10%

SN or MDC 2%

CS 0%
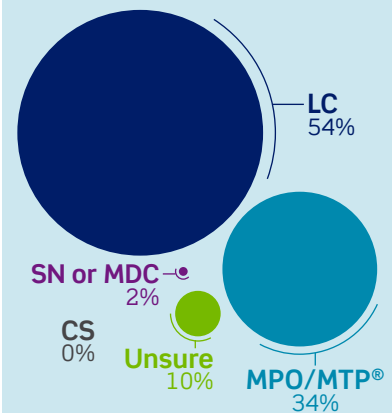
From an Oct. 2021 poll of 279 network professionals.

UPCOMING **EVENT**

**BICSI Winter
Conference & Exhibition**
Hybrid Event
Orlando, Florida
January 30 - February 3, 2022

Happy Holidays
FROM LEVITON

Here's to a wonderful holiday season filled with **laughter** and **joy**!
And from everyone at Leviton, we wish you health and success throughout the coming year.
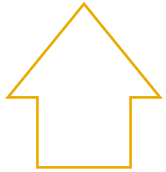
Extended Reach Explained ────────

WHY IS EXTENDED REACH NECESSARY?
Requirements for extended reach can be due to several reasons:

Legacy Cabling Infrastructure
Network managers may choose to reuse an existing cabling infrastructure as a simple cost saving measure, or due to an inability to replace or upgrade because of downtime or pathway issues.

Technology Upgrades
Tech refreshes may occur where the new application has a shorter functional operational distance than the currently deployed application, per industry standards. Some technology updates introduce additional fiber optic components, such as cassettes, harnesses, or adapter plates. These increase the number of physical matings within the channel, resulting in additional loss.

Competitive Product Response
Consultants and bidding contractors are often required to validate that their proposed design and product offering will meet performance requirements to a user specified distance, topology, or data rate.

WHAT FACTORS CAN LIMIT EXTENDED REACH CAPABILITIES?
There are a range of factors that can limit extended reach. These include the maximum performance loss of components, the number of components or matings in the channel, fiber grades (OM3, OM4, OS2), transceiver choices, and the quality of the installation.

HOW IS EXTENDED REACH ANALYSIS PERFORMED?
Leviton has the capability to calculate extended reach performance, which is the estimated maximum length a desired signal can travel and remain operational. Our calculations are generated based on the IEEE engineered link models that were originally developed to assist Ethernet and Fibre Channel committees to develop specifications and evaluate the impact of various link penalties.

Leviton's **Optical Link Verification Tool** can reinforce design work by adding a high level of confidence in the channel performance and application support. In addition, Leviton Opt-X® Unity and Opt-X Enterprise DC end-to-end fiber solutions exceed industry standard requirements, offering superior channel performance. Our Optical Link Verification Tool calculations provide a snapshot of how any given topology using Unity and Enterprise DC connectivity will outperform the standard.

Balancing budgetary considerations, operational costs, migration strategy and system performance can be a complex process. When considering extending the reach of your network, it's important to have a full understanding of current and future data applications, target application transceiver specifications, and a careful analysis of the performance capabilities of the passive cabling infrastructure. Leviton data center designers and applications engineers can offer a detailed evaluation of your current and future infrastructure to help clarify your options and create the ideal network moving forward.

> **LEARN MORE about extended reach fiber applications and Leviton's Optical Link Verification Tool in the white paper "Extended Reach Fiber Applications".**

NEWS YOU CAN USE

INDUSTRY ──────

WHILE MORE THAN 80% of data centers closely watch power consumption and usage effectiveness, only a third or less gather metrics on data center carbon emissions or disposal of end-of-life equipment, according to the latest Uptime Institute Global Data Center Survey published in September 2021. The Uptime Institute notes that this "underscores the data center sector's overall immaturity in adopting comprehensive sustainability practices."

WI-FI 6 ACCESS POINT (802.11ax) adoption is seeing strong growth globally. It made up more than 37% of enterprise AP shipments in the first half of 2021, according to the IDC Worldwide Quarterly Wireless LAN Tracker. The enterprise WLAN market saw growth across all major regions of the world.

COMPANY ──────

LEVITON INTRODUCED a new B2B Partner Portal, allowing authorized Leviton distributors quick access to important information such as order tracking, purchase lists, stock checks, order entry, and more. Learn more at Leviton.com/B2B.

YESTERDAY'S NEWS ──────
1996 — Router and switching equipment companies Netgear, Juniper Networks, and Extreme Networks were all founded 25 years ago.

Understanding MICE
FOR INDUSTRIAL NETWORKS

In industrial Ethernet applications, components must be more durable and resistant to environmental effects than standard commercial components. **The MICE environmental classifications** are a set of parameters defined in various standards documents (ISO/IEC 11801 2017 6.2.2, TIA TSB 185, TIA 1005A, etc.) that define the conditions of various locations to ensure that components installed in those locations will function properly.

The letters in MICE each represent one type of environmental impact:

M	Mechanical	Bending, flexing, vibration, tensile strength, crush and impact
I	Ingress	Particles, liquids
C	Climatic/Chemical	Humidity, sun exposure, temperature, and chemical compatibility
E	Electromagnetic	Electrostatic discharge/surges, electric fast transient/burst, magnetic fields etc.

For each of these environmental impacts, there are three levels – 1, 2, and 3 – that represent levels of severity. Level 1 represents low impact, such as observed in a commercial installation. Levels 2 and 3 represent increasing severity locations. The higher severity levels attempt to describe the areas around the industrial floor and the automation island.

LEVEL 1	LEVEL 2	LEVEL 3
Light Duty	Industrial Floor	Automation Island

To accurately describe an environment, each of the impacts can be applied at a different level. For example, an assembly plant might have high amounts of Mechanical stress (M3) but have low Ingress, Climatic/Chemical and Electromagnetic stress (I1, C1, and E1).

MICE CLASSIFICATION TABLE		
LEVEL 1	**LEVEL 2**	**LEVEL 3**
M^1	M^2	M^3
I^1	I^2	I^3
C^1	C^2	C^3
E^1	E^2	E^3

(M, I, C, E row labels on left)

Although the levels might describe the kinds of stressors that could occur, not every stressor will be in each environment. For example, an M3 environment at an automation island could have high flexing stress but very little crushing stress.

The wide diversity that exists among industrial environments has necessitated the development of products that are customized to ensure performance in very specific conditions. Rather than being designed for all possible stressors, the products are designed to perform very well against those expected to be present.

For more detailed recommendations with MICE characterization for Berk-Tek Industrial Ethernet cables, read our white paper "MICE Environmental Classification."

Standards SNAPSHOT

To the right are some highlights of projects from recent committee meetings. For a comprehensive list of the latest updates from IEEE, TIA, and ISO committees, read the **Q3 2021 Leviton Standards Report** (pdf).

IEEE
IEEE 802.3 — **Greater than 10 Mb/s Long-Reach Single Pair Ethernet Study Group Study Group** — This newly formed Study Group will investigate the addition of 100 Mb/s (and possibly 1000 Mb/s) data rates for Single Pair Ethernet. The study group is working to develop the Objectives that would outline the work of the eventual task group.

TIA
TR 42 — **Recently Published**: ANSI/TIA-606-D Administration Standard for Telecommunications Infrastructure

TR 42.7 **Telecommunications Copper Cabling Systems** — A project was approved to start for TIA TSB-184-A-2, an addendum that will work on addressing SPE cable heating.

ISO/IEC
ISO/IEC TR 11801-9911: SPE Cable Sharing - A new project has been approved to develop a Technical Report on the use of cable sharing. The document title will be ISO/ IEC TR 11801-9911 Part 11: Guidelines for the use of balanced single pair applications within a balanced 4-pair cabling system

IEC 63171-7 ED: SPE 1-pair copper M12-style connector targeted for use in industrial applications. A 1st Committee Draft (CD) is circulating with comments to be reviewed at the March 2022 meeting. Target publication is September 2023. This is the 7th connector defined to be used for Single Pair Ethernet support.

Have a question about industry standards? Email speceng@leviton.com

Explore Enterprise
— AND —
Smart Building Solutions

Smart technologies, increasing bandwidth demands, and pandemic disruptions are rapidly reshaping every area of the enterprise, from workstations to remote corners of a facility. Leviton can help you navigate through this changing landscape. We provide a wealth of resources for enterprise networks on our website. We're continually adding articles, videos, and cabling recommendations for specific enterprise applications.

Take a closer look at:

Technologies driving enterprise networks. These include ways to manage higher bandwidth requirements, Wi-Fi 6 access point upgrades, and Power over Ethernet.

Cabling architectures for smart buildings, with design recommendations for horizontal cabling and the telecom room organization.

Product recommendations for specific enterprise applications, including workstations, healthy building systems, smart lighting, security, and audiovisual systems.

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ASK THE **EXPERTS**

Q: Will multimode fiber be able to support speeds beyond 400 Gb/s?

A: It is very likely multimode will be an option for data rates beyond 400 Gb/s. As active equipment companies develop transceiver and switch technology for 800 Gb/s and higher, they will look for ways to sell to a waiting audience and provide options for a variety of media, including multimode. As data rates increase, the reach will likely decrease, but multimode will continue to be an option in data center rows in the future.

Questions? Comments? Ideas?

We want to hear from you! Email: crosstalk@leviton.com