# Practical Applications for CAT 8

Category 8 cabling solutions have arrived with the ability to support new 25/40GBASE-T networks. It's impressive that the same tried-and-true twisted pair cabling and RJ-45 interface that delivered 10 megabits per second 15 years ago still play an important role in next generation networks.

But what are the practical applications for Cat 8? Where will it be deployed? First of all, these cabling systems make sense for applications requiring speeds greater than 10 Gb/s. This goes beyond the capabilities of Cat 6A, which has the performance specifications and flexibility to handle 10 Gb/s or slower speeds.

For data center managers, Cat 8 offers some huge benefits.

Also, for now, Cat 8 cabling systems will be limited to the access layer in data center networks. Due to its distance limitations of 30 meters or less in a two-connector channel — per IEEE, ISO, and TIA standards — Cat 8 cabling really isn't applicable for enterprise or premise networks. However, for data center managers, Cat 8 offers some huge benefits. When planning for networks greater than 10 Gb/s in the access layer, the decision of which cable type to use largely depends on the network topology you prefer: **Top-of-Rack (ToR)**, **End-of-Row (EoR)**, or **Middle-of-Row (MoR)**. Cat 8 will be able to support all of these topologies.
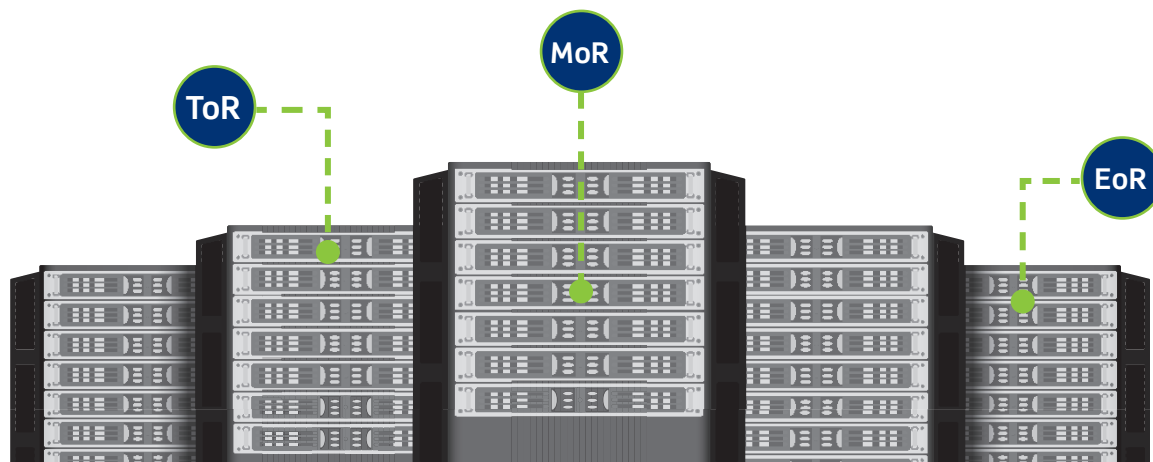
Cabling for **Top-of-Rack**

If you prefer a ToR topology, you now have a choice between twinax Direct Attach Copper (DAC) assemblies or Cat 8 for copper infrastructure. The ToR model uses a simplified cabling scheme — short intra-rack cable runs with a small number of uplinks to the aggregate switches.

Quad small form-factor pluggable (QSFP+) DAC passive assemblies were standardized in 2010 through IEEE 802.3ba. They are low-power solutions and have a similar form-factor to SFP+ 10 Gb/s (and future 25 Gb/s) assemblies. However, they have a limited distance of up to seven meters. With such limited reach, they are a better fit for ToR topologies instead of longer distances used in other topologies.

Also, unlike some twinax solutions, Cat 8 cabling leverages the benefits of autonegotiation. Autonegotiation allows for two Ethernet devices to connect to each other and select a common transmission speed that both devices support. Autonegotiation requirements are laid out in IEEE 802.3 BASE-T standards. For example, 25 Gb/s ToR switches can communicate with 10Gb/s servers, whether over Cat 8 or Cat 6A connectivity. In addition, the different category ratings use the same RJ-45 connector form factor, whereas twinax requires different assembly modules depending on the data rate.

This also allows for network migration to 25/40GBASE-T to be done in phases, allowing for more flexibility in terms of timing, disruption, and cost. With staggered active gear upgrades, BASE-T solutions can allow for mixed server speeds in each rack or cabinet supporting any combination of 1, 2.5, 5, or 10, 25, or 40 Gb/s servers, creating better port utilization of the switches.

Topology

ToR

MoR

EoR

Fiber Links
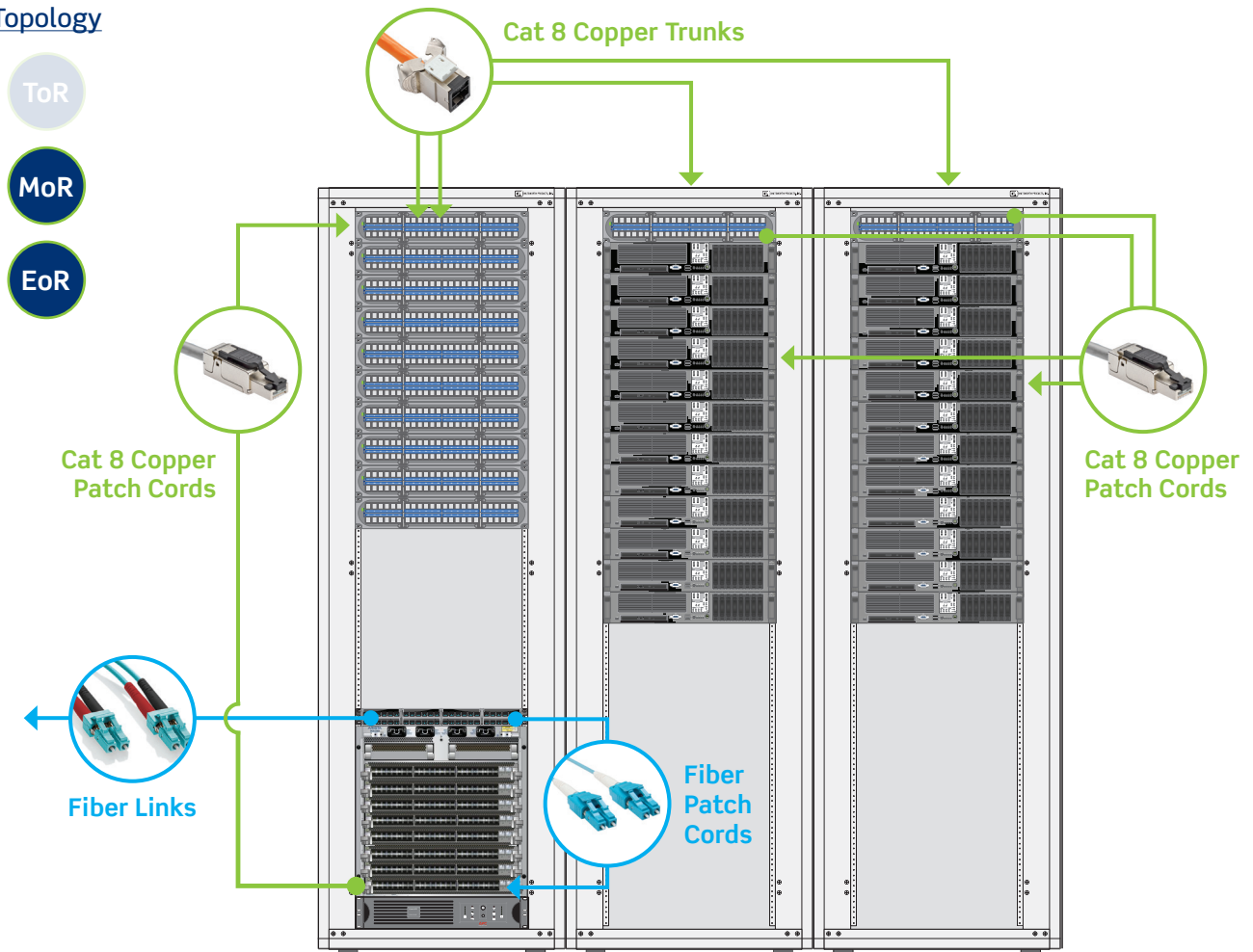
Cat 8 Copper Patch Cords
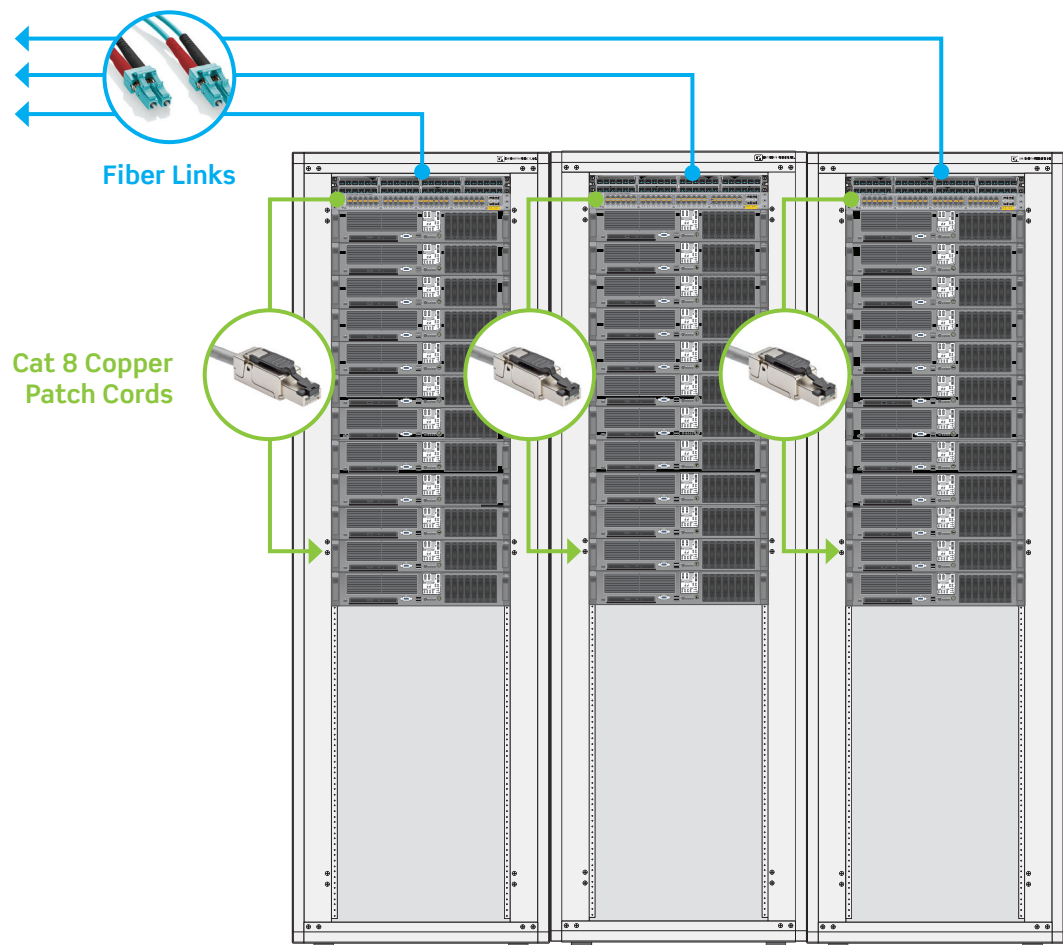
Cabling for End-of-Row and Middle-of-Row

EoR and MoR designs have every server cabled back to a single switch dedicated to a row of server racks. The upside of this structured cabling approach is a simplified management environment with just one switch to manage per row.

These topologies require longer links than those for ToR designs, and for 25 and 40 Gb/s networks in EoR and MoR topologies, your two options are to use Cat 8 or multimode fiber. The longer cabling requirements eliminate short-length DAC assemblies as an option.

Topology

ToR

MoR

EoR

Cat 8 Copper Trunks

Cat 8 Copper Patch Cords

Cat 8 Copper Patch Cords

Fiber Links

Fiber Patch Cords

Multimode fiber offers the benefit of working over longer distances and low power, and it can provide a smaller cable profile. However, the high costs of fiber active equipment makes it an option that not all end users can justify.

Category 8 can support the longer distances required in EoR and MoR designs, but it is limited to 30 meters or less. However, according to IEEE, links of 30 meters or less make up 80 percent of data center connections in the industry. If you require longer distances, fiber is the only option. Cat 8 also offers the benefit of operating over low power: it will not likely require any greater power or cooling requirements than a typical 10GBASE-T system used today.

Even if Cat 8 is not part of your immediate data center strategy, you may want to anticipiate future tech refreshes in your current network infrastructure design. This means considering cable distances, connection counts, shielding, and more. Preparing for Cat 8 now will create a simple and cost effective migration in the future.

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Leviton Leads with Atlas-X1™

Altas-X1 Cat 8 connectivity uses the same form factor and termination methods as other Atlas-X1 connectors. In fact, Atlas-X1 is the industry's first system to support shielded applications from Cat 8 to 5e and UTP applications from Cat 6A to 5e, all from one unified connectivity platform.

This comprehensive system is made in the United States, and delivers the highest level of verified performance across all categories to seamlessly support network migration up to 40GBASE-T. It has been third-party tested to comply with the ISO/IEC 11801 Class I channel standard, and components support Power over Ethernet (PoE) applications up to 100 Watts.
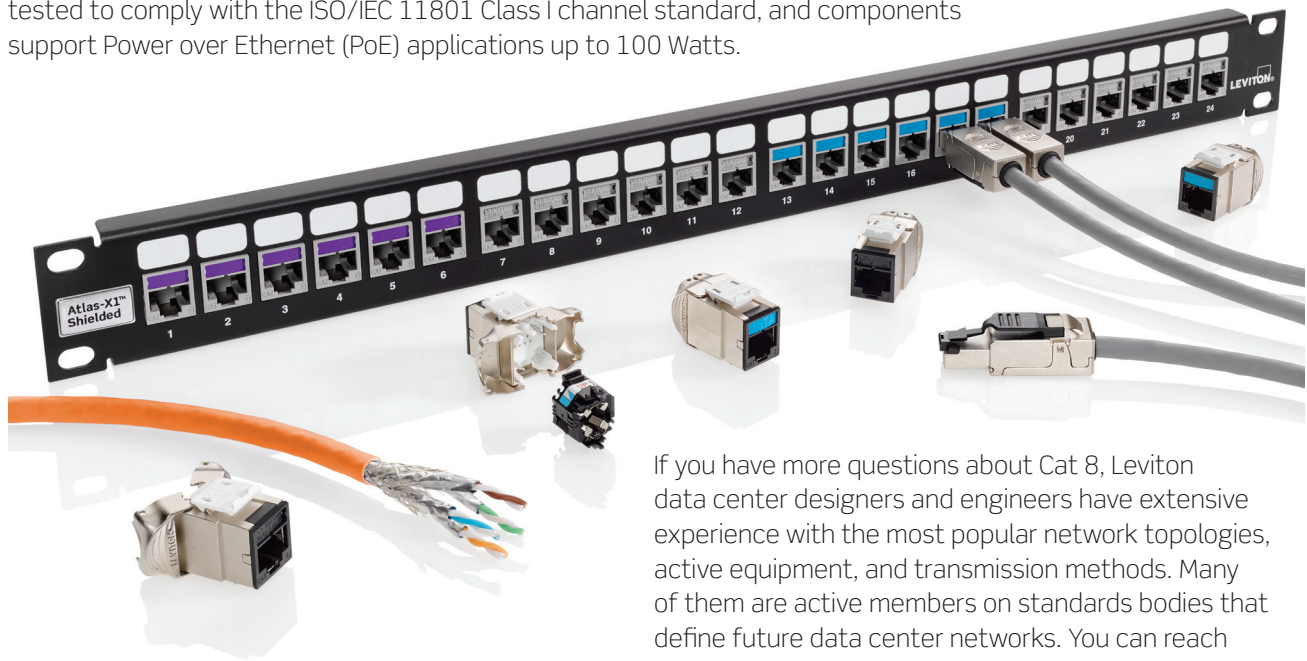
If you have more questions about Cat 8, Leviton data center designers and engineers have extensive experience with the most popular network topologies, active equipment, and transmission methods. Many of them are active members on standards bodies that define future data center networks. You can reach them at 1-800-824-3005 or 1-425-486-2222.

LEARN MORE ABOUT CAT 8 AND LEVITON'S ATLAS-X1 SYSTEM AT LEVITON.COM/CAT8.

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