

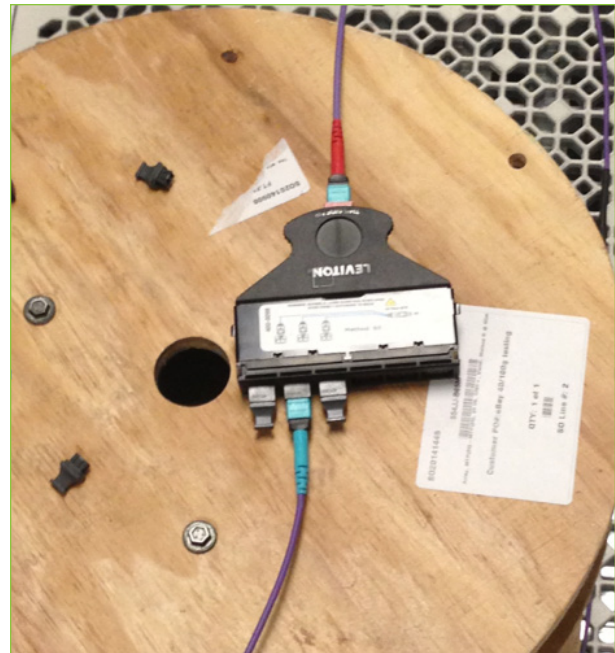
eBay Data Centers Upgrade to 40GbE with Leviton

Synopsis

As part of its data center technology roadmap, eBay planned to upgrade to 40GbE to its servers. In order to meet the requirements of the new design, eBay required a custom OM4+ cabling solution that would help solve the following challenges:

- Support long multimode fiber runs — up to 500 meters in length
- Increase fiber density to six times greater than the existing design
- Have the flexibility to support various equipment vendors
- Allow migration to future bandwidth speeds of 100GbE and 400GbE
- Offer easy network management and maintenance

Through extensive collaboration with Leviton, eBay was able to meet its requirements, and the OM4+ system is now installed in four data centers. The company now makes more efficient use of its existing facilities, can quickly respond to customer demand, and is in a stronger position to expand in the future.



Push for Higher Bandwidth and Greater Reach Drives Innovation

eBay is a recognized leader in data center advancement. From aggressively reducing power consumption to unique space-saving initiatives, the e-commerce company is at the forefront of data center efficiency and design.

In 2014, eBay developed a new Leaf-Spine network design that would deliver 40GbE to server cabinets in its existing data centers. As part of this fourth-generation “G4” upgrade, eBay data center engineers wanted to use high-density switch ports with cost-effective multimode optics, as opposed to more expensive single-mode optics. However, they weren’t sure if multimode fiber would be able to support the distances required in their large data centers — up to 500 meters in some cases.

The engineers tested a multimode system using Arista 120GbE MXP ports in the spine switch, cabled to extended reach 40GBASE-XSR4 transceivers in the Top-of-Rack (ToR) switches. In order to ensure interoperability, eBay used switches from various manufacturers in the testing, including Arista, Cisco, and Juniper. eBay also chose the Leviton OM4+ Violet



Fiber cabling system for the testing, which provides higher bandwidth and a longer reach than standard OM4 cabling.

While extended reach 40GBASE-XSR4 transceivers have a manufacturer's stated maximum distance of 400 meters, the test was successful with zero errors or dropped packets when transmitting over 750 meters. This real-world application demonstrated the longest-known channel for supporting 40GbE over multimode fiber.

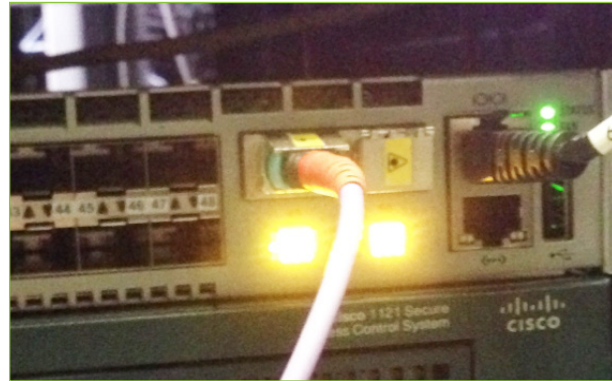
Value through density, flexibility, and scalability

eBay tested the optical channel using four mated pairs with 24-fiber MTP® connectors. The cabling system included Leviton Opt-X® Unity trunk cables, harnesses, and array cords, and e2XHD snap-in cassettes.

Each Arista 120GbE MXP switch port enables twelve 10GbE, three 40GbE, or one 100GbE. By using 24-fiber MTP connections at the distribution switch, eBay is able to convert to three 40GbE 8-fiber MTP cables. This configuration optimizes density while utilizing 100 percent of the fibers in the channel, and allows eBay to keep the same 24-fiber cabling in the system when migrating to 100GbE or greater bandwidth in the future.

The 40GbE channel design and testing demonstrated to eBay that it could meet its length requirements and minimize cost per channel. The ability to optimize density at the switch port while meeting the 750-meter reach translates into less overall hardware required. This also puts eBay in a better position to accommodate growth and handle future customer demand.

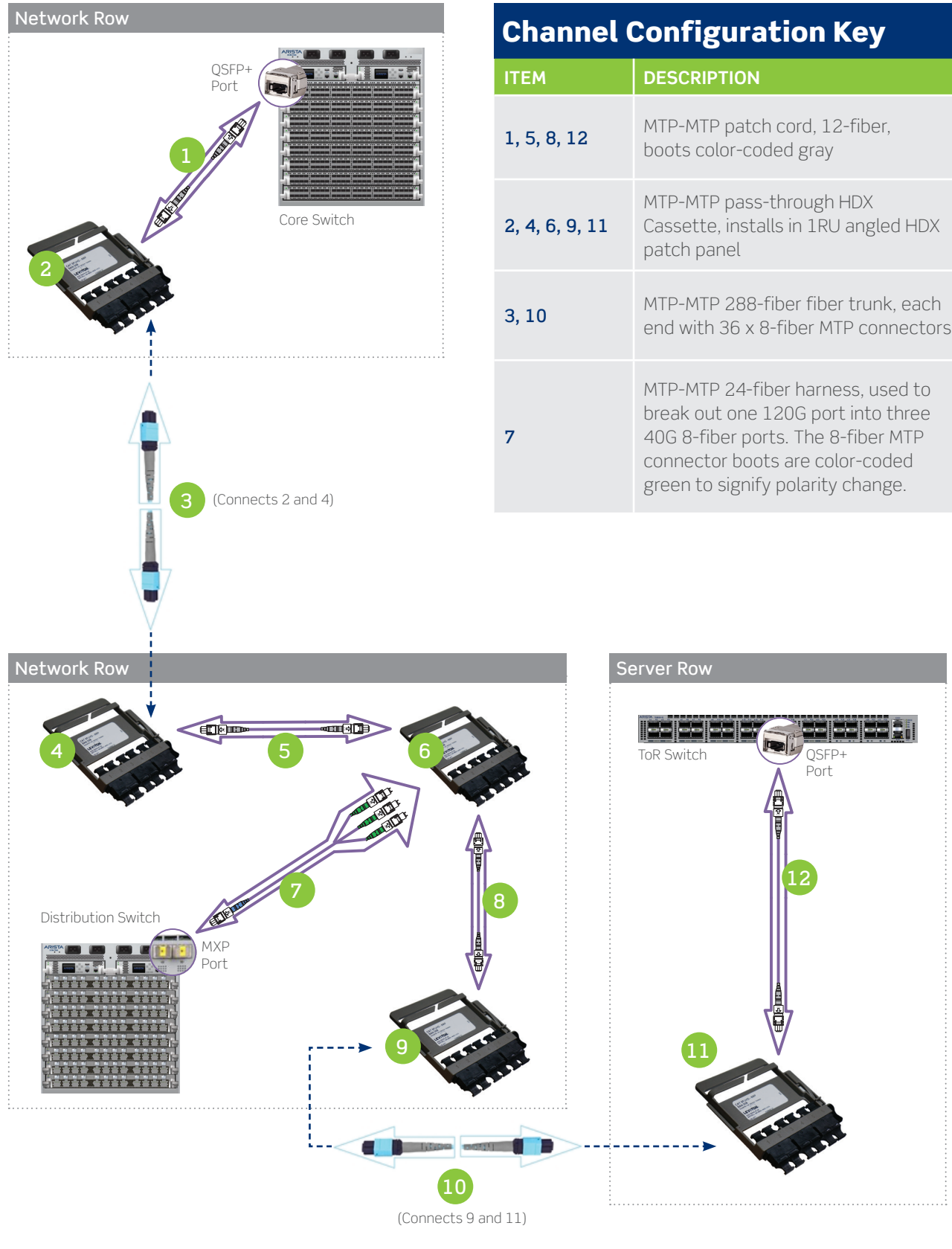
Since the initial testing, eBay has installed the OM4+ extended reach system in four of its locations in the United States. In these installations, eBay switched to compact Leviton HDX cassettes for higher-density patching, creating greater space savings and more capacity for expansion. Several products in the OM4+ system were custom designed and manufactured specifically for the G4 project:



Arista 120G MXP port

- Leviton engineers created an entirely new high-density top-of-rack patch panel for eBay. The custom angled panel accepts the HDX cassettes, and can patch up to 144 fibers using LC or 576 fibers using 8-fiber MTP connections in just one rack unit. Leviton was able to build a prototype panel within six weeks and began production on the panel shortly thereafter.
- The Opt-X Unity violet-colored OM4+ trunks deployed offer 288 fibers in one cable that then break out into 8-fiber MTP connections, a unique solution in the industry. The trunks use Berk-Tek MDP cable with GIGAlite-10XB fiber, which offers the industry's smallest form factor, allowing eBay to reduce pathway fill and improve airflow.
- eBay deployed custom color-coded MTP array cords and harnesses that help data center technicians identify polarity changes throughout the system. For example, green connector boot colors signify MTP method B polarity, while grey boots designate MTP method A. This type of clear identification supports ongoing maintenance and MACs, helping technicians save time and maintain the correct parallel groupings for switch ports. In addition, the cable assemblies are color-coded violet to identify OM4+ fiber in the network and avoid confusion and channel loss that can occur when OM3 and/or OM4 fiber cabling is used in the same data center. The Leviton OM4+ system was the first all-violet end-to-end solution on the market.

eBay 40GbE Channel Configuration



Channel Configuration Key	
ITEM	DESCRIPTION
1, 5, 8, 12	MTP-MTP patch cord, 12-fiber, boots color-coded gray
2, 4, 6, 9, 11	MTP-MTP pass-through HDX Cassette, installs in 1RU angled HDX patch panel
3, 10	MTP-MTP 288-fiber fiber trunk, each end with 36 x 8-fiber MTP connectors
7	MTP-MTP 24-fiber harness, used to break out one 120G port into three 40G 8-fiber ports. The 8-fiber MTP connector boots are color-coded green to signify polarity change.

Collaboration for the G4 Upgrade

When selecting the right products and infrastructure design for the initial testing and G4 upgrades, Shawn Tugwell, eBay's Data Center Whitespace Engineer, worked closely with Leviton to develop a full solution for the new G4 upgrade. Leviton team members collaborated extensively with eBay in developing the custom high-density products, new polarity configurations and unique color-coding schemes.

The Leviton support team included:

- **Randy Perkins**
Regional Sales Manager
- **Gary Bernstein**
Sr. Director of Product Management for Fiber and Data Center
- **Dave Mullen**
Sr. Product Manager for Fiber and Data Center
- **Dennis Manes**
Fiber and Data Center Principal Applications Engineer

Impact

The G4 tech refresh has allowed eBay to increase bandwidth to servers in its existing data centers. The extended reach OM4+ multimode design gives the company greater design flexibility while using more cost effective multimode transceivers. And the high-density design — with 120G MXP ports, 24-fiber MTP connectivity, 288-fiber trunks, and custom patch panels — makes the most efficient use of eBay's space and creates capacity for future growth.



You can learn more about Leviton's innovative OM4+ violet fiber solutions at Leviton.com/OM4plus.