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INFOBRIEF

Three Steps to the New Packet Edge

Metro networks are growing and changing

Driven by the increased adoption of cloud technology and applications, traffic volume is growing at an average rate of 40 to 50 percent CAGR, 2016-2021, annually in metro networks, even more in some cases.[1] At the same time, service providers are finding that they cannot charge the same amount for transported bits, so they are expected to invest in increased network capacity without an equivalent rise in revenue.

The silver lining to this growth is that one protocol, Ethernet, is replacing legacy protocols and becoming the dominant traffic type in the metro network. In 2012, Ethernet bandwidth eclipsed legacy bandwidth services for the first time; it is estimated that over 75 percent of all global bandwidth will be Ethernet by 2017.[2]

Breaking down Ethernet traffic further, a different trend appears in the rates of connections and services being used. In recent years, 1GbE traffic has declined rapidly, with 10GbE is now the dominant choice due to higher-bandwidth services coupled with more end-users, both man and machine. 100GbE is just starting to be deployed, primarily to aggregate lower-rate connections onto an optical wavelength and transport it across the metro more efficiently. 100GbE is also used as a demarcation service directly to end-users, such as large enterprise campuses or office buildings, where it is broken down into lower-rate services to different customers.

Traditional networking approaches are lacking

While traffic and technology are evolving in the metro network, the industry's handling of bandwidth growth has not largely changed. Network operators still commonly employ the traditional method of deploying more and more routers throughout the metro network. These complex and expensive pieces of hardware are often tasked with performing the relatively simple function of aggregating lower-rate traffic into higher-rate traffic. The traditional all-routed approach to networks can lead to over-design, costly networks, and inefficient bandwidth utilization.

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Deploying routers in this manner produces an overly complex operational model, as these complicated platforms must be provisioned and maintained by highly trained IT professionals. Additional complexities come from management, inventory, sparing, and training, all of which add to CAPEX and OPEX. This task could be performed far more simply by employing a purpose-built solution to aggregate and switch Ethernet traffic.

1 Cisco VNI: Global Mobile Data Traffic Forecast Update, 2016-2021
2 Vertical Systems Group - ENS, Global Business Bandwidth Trends Ethernet vs. Legacy Services 20 Year Perspective

New approach, new thinking

Step 1 – Take the best of the data center

Data center networks are primarily packet-based, and because they have been based on Ethernet for decades, the industry has developed design practices yielding very dense 10GbE and 100GbE products. These solutions also maximize power and space utilization to allow more bandwidth in a very compact footprint. Trends toward Software-Defined Networking (SDN) and associated applications allow for very agile packet-based networks.

Data center networks, however, are designed under the assumption that equipment is collocated within the same building, or at least nearby. Troubleshooting the network is less complicated because all of the equipment and cabling is within easy reach. Once packet-based traffic is sent it outside the building, it becomes part of a metro network, running over optical fiber on telephone poles, under the streets, and buried in underground channels. When something goes wrong with a metro network, troubleshooting becomes far more complex, requiring additional management tools.

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Packet Networking solution

Step 2 – Leverage the best of the metro network

Metro networks use high-capacity coherent optics and photonics that allow traffic to be transferred across the network at great speed. They also embody design philosophies that allow for very high resilience to ensure connectivity is always available, as expected by end-users. This availability requires a rich set of optical and packet Operations, Administration, and Maintenance (OAM) tools that allow operators to proactively and reactively troubleshoot their network. This way, when an inevitable failure such as a fiber cut occurs, it can be isolated and repaired quickly, keeping the network operational and maintaining set Service Level Agreements (SLAs).

Step 3 – Adopt a converged approach

A converged approach means combining the optical and packet layers into a single network platform and putting IP routers only where needed, such as within the data center. The converged approach is more cost-effective for aggregating and switching lower-speed traffic in the metro network, and far simpler.

Massive scale can be achieved with this approach while maintaining the benefits of Ethernet, from both a simplicity and cost perspective. Ethernet is ubiquitous because it is relatively inexpensive compared to legacy protocols, and relatively inexpensive because it is ubiquitous (forming a virtuous circle).

Because Ethernet is fast becoming the dominant technology both inside data centers and in the metro networks that interconnect them, it makes sense to deploy networks that are raw and powerful, able to switch and aggregate Ethernet, and reduce the cost and complexity of deploying high-touch functions that are not needed in many parts of the metro network.

8700 Packetwave® Platform: A programmable, multi-terabit Ethernet-over-DWDM platform that will transform how metro Ethernet networks are designed, deployed, and operated.

Benefits: This new platform helps operators scale their networks to support bandwidth-hungry 'on-demand' applications like cloud services, streaming video, and content distribution that continue to drive demand for 10GbE/100GbE services.

Solving the challenge of the metro: The 8700 is a new class of networking product that combines packet switching and coherent optical technologies to help metro Ethernet network operators get ahead—and stay ahead—of unpredictable cloud traffic. With the ability to deliver high-capacity services rapidly, aggregate and switch users efficiently, and provide high-speed connections to and from data centers, the 8700 combines the best of the data center and the metro. The result is a system with up to twice the density, using half the power and space of alternative approaches.

Ciena: More than 150+ service providers rely on Ciena's Packet Networking products to deliver the programmable and responsive bandwidth their users demand. With more than 845,000+ packet platforms deployed worldwide, Ciena knows packet networking.

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