WHITE PAPER

The Converged Interconnect Network

Enabling 10G and DAA, and extending fiber deep

At the start of 2019, the cable industry announced its vision for delivering 10 gigabit networks, or 10G; ramping-up from 1 gigabit service offerings today to symmetrical speeds of 10 Gb/s and beyond while enhancing the customer experience and achieving operational efficiencies. Cable MSOs will achieve 10G with a collection of architectures and technologies including Distributed Access Architectures (DAA), Converged Interconnect Networks (CIN), full duplex DOCSIS, digital fiber in the HFC (extending fiber deep), and coherent optics. Ciena builds the Adaptive Network™ for cable MSOs, supporting their DAA strategies and CIN deployments.

DAA is based on distributing functions traditionally done in the headend and paves the way for virtualization. The CIN is a packet-based network within DAA that connects service cores such as the Converged Cable Access Platform (CCAP) in the headend to remote PHY and MACPHY devices in the access network that are used to distribute physical (PHY) layer functions and Medium Access Control (MAC) functions. Remote PHY (R-PHY) nodes and Remote MACPHY (R-MACPHY) nodes used in Flexible MAC Architectures (FMA) will be generally referred to as Distributed CCAP Architecture (DCA) nodes throughout this document.

What is a Converged Interconnect Network? Read blog

This paper provides an overview of the CIN and introduces the Ciena Fiber Deep Solution for the Converged Interconnect Network.

Converged – This originally referred to just CCAP services, which included CMTS and video functions. However, cable MSOs are now looking to use the CIN to achieve greater operational efficiencies. For example, the CIN can (and should) support multiple services –residential, enterprise, Mobile Backhaul (MBH), and Passive Optical Network (PON) for fiber to the premises.

From an architecture perspective, the CIN can be built to support a mix of DCA nodes, PON endpoints, mobile fronthaul and backhaul (macro and small cell), and point-to-point Ethernet. In the services realm, the CIN will likely need to support video (multicast and unicast), residential broadband, LTE/5G, enterprise services, and future services.

Interconnect – The transition to DAA is dramatic, not only because each outside plant endpoint changes, but also the extensive coaxial-RF interconnect network in hubs or headends transforms to digital-fiber networked endpoints as well. Pair this with the need for the CIN to support not only legacy packet core boxes, but also cloud-based packet cores and their data center fabrics, and the connectivity aspects can become complex very quickly. This creates a need for automation in provisioning and ongoing lifecycle management. Automation is key to manage the scale and complexity of the CIN.

Network – The transmission tools useful for the CIN are collective and can include Ethernet, IP, OTN, WDM, Common Public Radio Interface (CPRI), eCPRI, or other packet-centric protocols. Ultimately, the architectures and services mentioned above could coincide at different networking layers in the CIN to support service convergence: Layer 0 with wavelength multiplexing, Layer 1 with OTN framing, Layer 2 with Ethernet,