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Hyperscale Carrier Architecture

Applying Data Center Principles to Speed Up Innovation and Drive Down Costs

In addition to today's challenges of strong traffic growth driven by internet video, cloud, and data center interconnect, tomorrow's networks will also have to cope with significant growth of latency-sensitive applications, including augmented reality, the tactile internet, and autonomous driving, and with huge increases in IoT scale, driven primarily by the adoption of 5G. To address these challenges, Coriant Hyperscale Carrier Architecture (HCA), leveraging an open hardware and software ecosystem, helps network operators evolve their points of presence, including central offices and head-ends, regional hubs, and core sites, based on data center principles.

EVOLVING NETWORKS BASED ON DATA CENTER PRINCIPLES

To optimally meet today's challenges and to be ready for the challenges of tomorrow, network operators need to evolve their networks based on data center principles, virtualizing and distributing network functions while migrating to an IT-like operational environment. Regional hubs become regional data centers hosting virtualized functions such as Evolved Packet Core (EPC) for mobile and Broadband Network Gateway (BNG) for fixed network access, while core sites become core data centers for less latency-sensitive cloud applications such as email and storage and for backup and other administrative tasks. Edge sites, including central offices and Cable MSO head-ends, evolve to micro data centers, becoming a key competitive asset. Consistent with Central Office Re-Architected as a Data Center (CORD), Head End Re-Architected as a Data Center (HERD), and 5G Mobile Edge Computing (MEC), these micro data centers bring the cloud closer to end users in order to deliver a better customer experience for latency-sensitive applications, such as autonomous driving, gaming, and augmented reality, and to better scale IoT applications with very large numbers of connected devices.
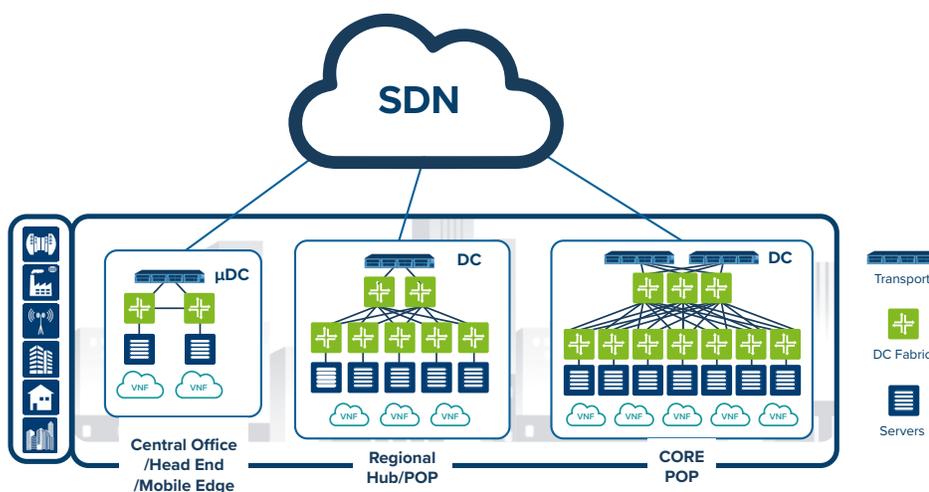
BENEFITS OF CORIANT HYPERSCALE CARRIER ARCHITECTURE

- **Minimize** CapEx with programmable packet and photonic innovation technologies and by reducing vendor lock-in

- **Reduce** OpEx with seamless automation, lower power consumption, and reduced footprint

- **Deliver** an enhanced customer experience with faster service delivery, new services, and lower latency

- **Accelerate** innovation with the disaggregation of both hardware and software into best-in-class functional blocks

- **Increase** network capacity quickly and cost effectively with horizontal scaling – disaggregating fabrics to spine switches and line cards to leaf switches

Figure 1 – Points of Presence Become Data Centers

UTILIZING SDN/NFV, DISAGGREGATION, PROGRAMMABLE PACKET, AND PHOTONIC INNOVATION

Coriant HCA leverages a number of key technology enablers, including:

- **SDN/NFV**: SDN is a key enabler for disaggregation and programmable packet and greatly reduces the time and cost of integrating new innovations into the network. Together with big data analytics and machine learning, it also enables seamless automation. NFV enables network functions to be virtualized and disaggregated from costly custom hardware.

- **Disaggregation**: This HCA enabler involves the separation of hardware and software into best-in-class functional blocks with open APIs and with the ability to replace each functional block independently. This enabler reduces vendor lock-in and enables faster innovation resulting in lower CapEx and OpEx.

- **Programmable Packet**: This HCA enabler involves SDN control of the packet function, which is evolving from SDN control of traditional packet switching platforms to hardened white box platforms based on commodity chipsets with disaggregated network operating systems and network protocol software. In the future, the evolution will include protocol-independent forwarding that supports emerging programming languages such as Programming Protocol-independent Packet Processors (P4) and Protocol Oblivious Forwarding (POF).

- **Photonic Innovation**: Leveraging silicon photonics, miniaturization, and electronic-photonic integration, this HCA enabler decreases cost, lowers power consumption, and reduces footprint. Use cases include coherent line interface pluggables, short reach optical interconnects between disaggregated functional blocks (a key enabler for horizontal scaling), and cost-effective wavelength aggregation.
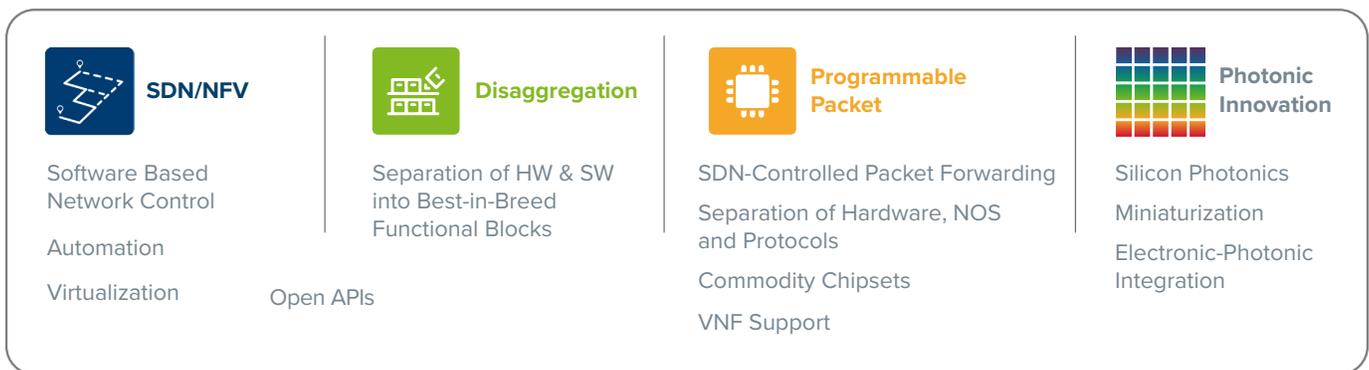

Figure 2 – Key HCA Enablers

LEVERAGING AN OPEN ECOSYSTEM WITH BEST-IN-BREED PARTNERS

While these technology enablers provide the key building blocks for HCA, the Coriant Multi-Sided Platform (MSP) Partner Program, leveraging an open ecosystem, integrates and validates complementary products and technologies from best-in-breed partner companies that aid the evolution of networks based on data center principles.

FASTER INNOVATION, LOWER COSTS, AND A BETTER CUSTOMER EXPERIENCE

The reduced vendor lock-in of disaggregation enables network operators to leverage the innovation capabilities of the entire ecosystem rather than be tied to the innovation capabilities of a single vendor, and to align the upgrade of each functional block based on its own technology renewal cycle. Furthermore, SDN speeds innovation by greatly simplifying the integration of new technologies into the IT/OSS environment.

Reduced vendor lock-in, faster innovation, photonic innovation, programmable packet, and horizontal scaling can enable CapEx savings of more than 50%, while seamless automation enabled by SDN together with big data analytics and machine learning along with lower power consumption and reduced footprint can also lower OpEx by more than 50%. Finally, faster service delivery, the ability to quickly add capacity with horizontal scaling, new SDN/NFV-enabled services, and lower latency all contribute to a better customer experience.

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