

INFINERA DTN-X PACKET

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Enhance revenues with packet services + packet aggregation efficiency

Infinera's mission is to build the world's most innovative network solutions to help our customers win, and we do that by delivering on our founding vision of "An Infinite Pool of Intelligent Bandwidth." Today Infinera is well known in the technology segments of optical WDM transport and digital OTN switching for its award-winning DTN-X platform. Infinera is enhancing the platform with the introduction of the PXM, a packet-switching module that provides advanced packet features and Quality of Service (QoS) capabilities. It enables service providers to directly map Ethernet and MPLS services with QoS from the edge of their networks to core transport services creating highly efficient packet-optical network architecture. Service providers can now benefit from the efficiencies of statistical multiplexing

with packet aggregation and transport port consolidation. They can also improve their revenues with an augmented portfolio of highly reliable Metro Ethernet Forum (MEF)-compliant Carrier Ethernet (CE) services. The Infinera DTN-X is now the most comprehensive software-controlled core transport platform with converged packet, digital and optical functionality.

The new core for a software-driven world

IT and network architectures are being dramatically transformed. The old model of a hierarchical, functionally heavy, ring-fenced network comprising several layers of devices is being replaced by virtualiza-

Packet Switching Module for the DTN-X

- Ethernet VLAN, MPLS LSP
- Ethernet/MPLS-TP (PWE) over ODU-flex
- MEF 2.0 Services, UNI, NNI
- Point-to-point E-LINE (EPL, EVPL)
- Multi-point E-LAN, E-TREE; E-ACCESS
- Ethernet OAM, OTN OAM, SNMP/RMON
- Carrier-Grade QoS (Port, VLAN, CoS; Queuing)
- CLI, Infinera DNA NMS, API-driven SDN control



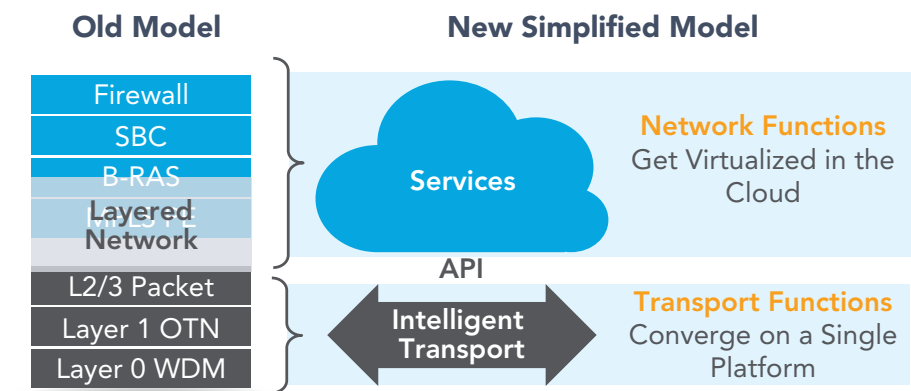


Figure 1: Enhancing the Core for a Software-driven World

tion of many functions onto a common x86 infrastructure, and for those functions that require dedicated hardware the rise of massively scalable, converged and open platforms. These are characteristics of a software-driven world with virtualized instances of applications and services hosted in the cloud. Network Function Virtualization (NFV) is enabling operators to migrate Layer 4-7 services like Security, Voice, CPE, and BRAS from a standalone device to a cloud service. Layer 3 services like L3 VPN at the provider edge are being also considered for cloud migration.

Meanwhile, transport functions at the lower layers are converging as operators encourage vendors to drive to the most cost effective network elements. These include combining packet services of MPLS and Ethernet, digital functionality of OTN switching and optical

transmission and switching with WDM and ROADM functionality. Software Defined Network (SDN) technology abstracts these services and functions and present standardized application programming interfaces to the upper layers for control of the converged forwarding infrastructure. All this is conceptualized as the Intelligent Transport Network architecture, which is the judicious mix of packet, digital and optical functions on a single, scalable platform exposed to virtualized control and network applications via APIs using SDN.

Intelligent Transport Network with the DTN-X

Infinera pioneered a new approach for networks with photonic integration. This provides massive WDM capacity using industry-first super-channels in a small power and space footprint to handle growing bandwidth needs. It also allows the transport system to scale in other dimensions – adding digital OTN switching and packet functionality while injecting software intelligence. This clean-slate design differs from competitive tactical solutions as they use 10G/40G platforms that may need to be retrofitted for scale or performance or completely refreshed within a couple of years. The award-winning Infinera DTN-X is the most comprehensive software-controlled core platform with converged packet, digital and optical functionality for operators to build the Intelligent Transport Network.

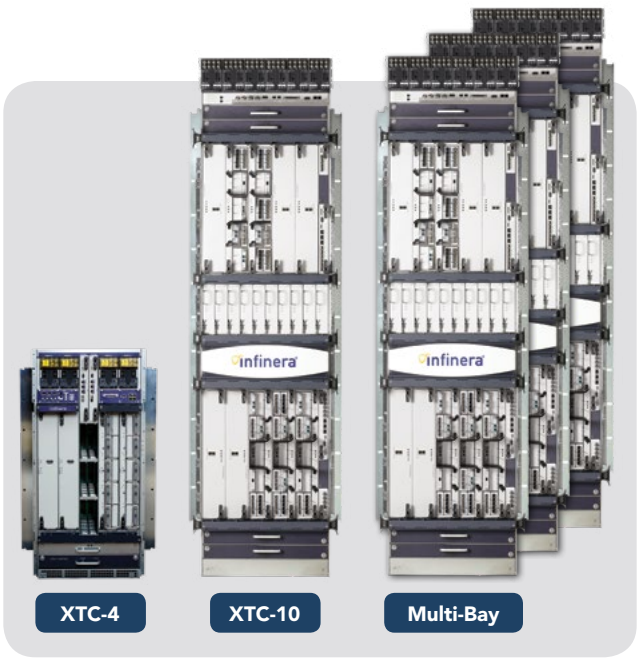


Figure 2: DTN-X Family

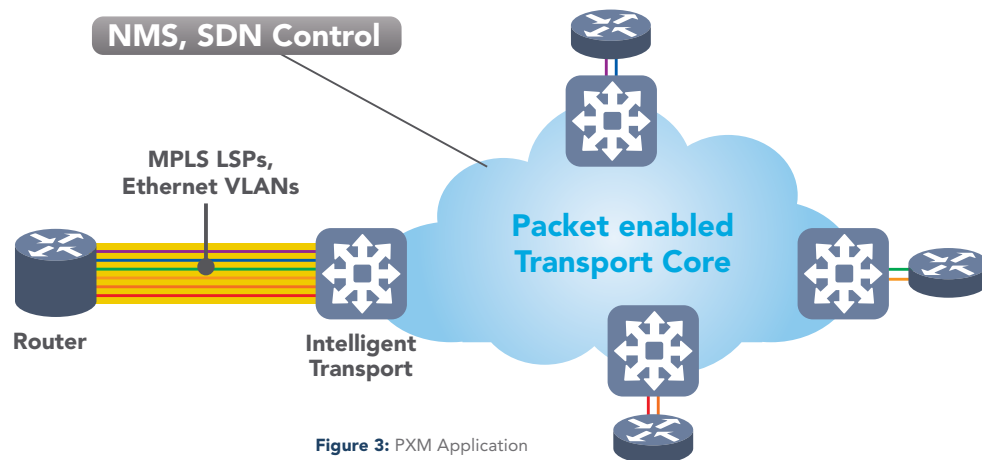


Figure 3: PXM Application

A recent survey across global operators confirms widespread deployment and continued growth in the use of digital OTN switching and Shared Mesh Protection (SMP) in the core for the next four years. The Infinera DTN-X provides OTN and DWDM switching along with hardware-accelerated SMP in the backbone to handle complex, mesh based traffic flows. The introduction of the Packet Switching Module (PXM) for the DTN-X allows network operators to peer inside a transport connection and process packet flows. The DTN-X now handles Ethernet VLANs or MPLS Label Switched Paths (LSPs) at the edge of the core network with Carrier-Grade QoS at port, VLAN and Service level with Queuing to gain statistical multiplexing benefits. It transmits these flows over granular ODUflex circuits across the core, raising overall network efficiency. The PXM module as well as the overall DTN-X platform can be managed using CLI, Infinera DNA NMS or API-driven SDN control.

High capacity packet services and aggregation

Network operators can improve their revenues by providing high capacity MEF-compliant Ethernet services directly from the DTN-X. These services vary by application, ranging from private-line connectivity to multi-point links for video distribution. The MEF has standardized these services in a Carrier Ethernet 2.0 portfolio, and end-user adoption is growing rapidly. It is forecast that high-capacity MEF services will grow at a CAGR of 32% through 2018.

The traditional approach to designing a network for this opportunity is to use multiple layers of switch/routing devices which aggregated end-user services and then connected them to the WDM transport layer. The hub location requires multiple ports between the central router and the transport node. The DTN-X packet now can provide

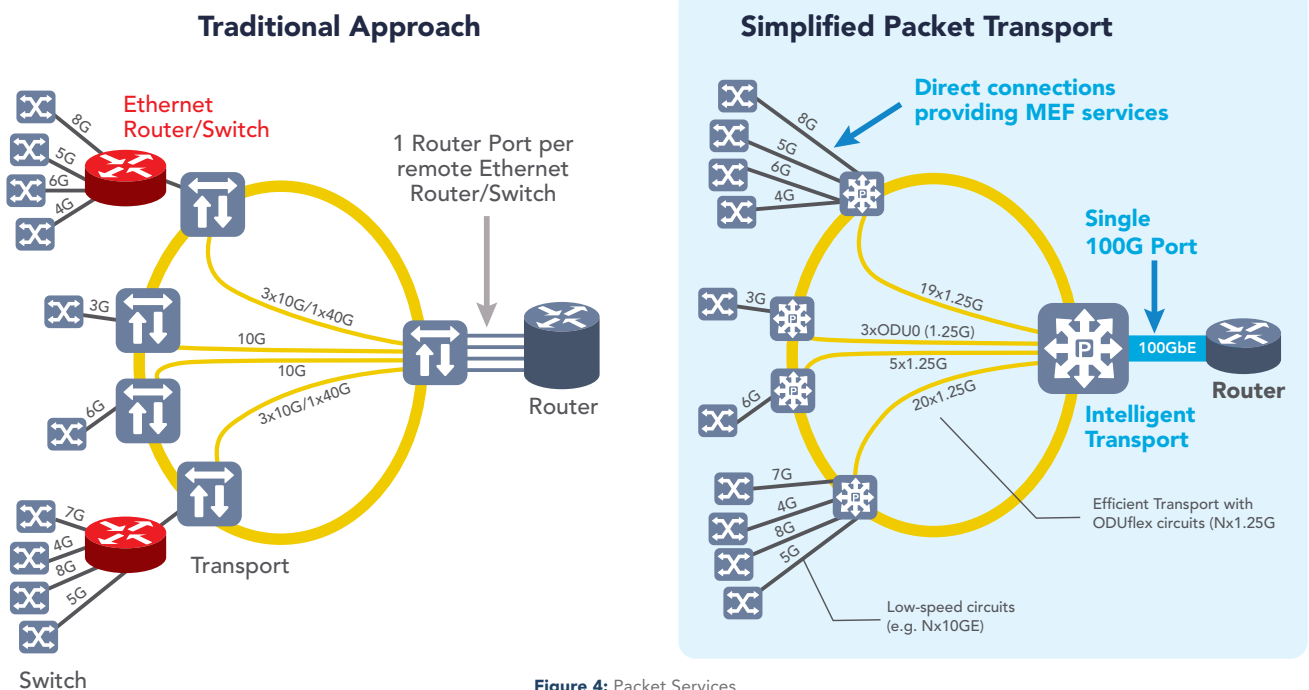


Figure 4: Packet Services

direct connection to high-capacity end-user MEF services as well as consolidate transport ports to the central router. In the above graphic of the use-case, the DTN-X packet solution provides 26.5% improvement in network capacity. Furthermore, the solution provides a rich set of high-capacity MEF 2.0 compliant Carrier Ethernet 2.0 services directly from the P-OTS:

- Point-to-point E-LINE (EPL, EVPL)
- Multi-point E-LAN, E-TREE
- E-ACCESS

The old model of a hierarchical, functionally heavy, silo-driven packet, and optical transport core is now being replaced by the new Intelligent Transport Network, which is built on three key principles,

- Scalability: DWDM super-channels, digital OTN and packet Ethernet/MPLS granularity
- Optimized Convergence: Multi-layer packet-optical switching
- Automation: Open software-defined APIs, hardware-accelerated resiliency

These features allow network and cloud operators to build a highly flexible packet-optical transport infrastructure that is optimized and allows significant agility in today's software-driven world.