Offering service providers operational simplicity, multi-terabit network scalability and superior PIC-enabled network efficiency

Why Choose the DTN-X Family
In a world where cloud services are growing quickly and high bandwidth connectivity is paramount, service providers must scale, simplify and increase the flexibility of their networks. Network function virtualization (NFV) provides a means to address these needs for the upper layers of the network through the migration of network functions from dedicated appliances to software services on standardized servers within cloud datacenters. This cloud services layer supports NFV plus other cloud delivered services (Layer C). In order to support Layer C, cloud datacenters and end users need to be efficiently interconnected by a highly scalable and flexible transport network (Layer T).

Scalable photonics is the foundation of Layer T and must provide more bandwidth per line card and system while simplifying the network – fewer boxes, fibers and modules, less space and power, and fewer manual processes. Photonic integrated circuits (PICs) are
INFINERA DTN-X FAMILY

integral to the evolution of the transport network, providing significant benefits when integrated into a packet-optical wavelength division multiplexing (WDM) transport system for an efficient Layer T, ultimately allowing Layer C to thrive.

The Infinera DTN-X Family leverages PIC based multi-terabit WDM transport and is designed to offer a combination of scale and efficiency while simplifying network operations. By combining plug-and-play automated turn-up, software defined network (SDN) enabled network intelligence and service automation, the DTN-X Family provides a simpler network and system architecture that leverages high density, low power enabling PICs, to deliver Intelligent Transport Networks.

DTN-X Family Overview

The Infinera DTN-X Family is a family of next-generation multi-terabit transport network platforms, comprising the DTN-X XTC Series and the DTN-X XT Series.

The XTC Series combines the benefits of PIC technology, integrated switching and the flexibility of digital and packet for subsea, long-haul and metro networks. The XTC Series includes the following platforms:

- **XTC-10**: 45 rack units (RU), 10 universal slots, 5 terabits per second (5T) (12T future) capacity
- **XTC-4**: 22 RU, 4 universal slots, 2T (4.8T future) capacity
- **XTC-2E**: 15 RU, 24 interface slots, 6 optical line system slots, 1.2T (2.4T future) capacity
- **XTC-2**: 12 RU, 24 interface slots, 1.2T (2.4T future) capacity

The XT Series uses PIC technology in a compact form-factor for point-to-point long-haul networks. The XT Series includes the XT-500 platform—2RU high with 500G line-side bandwidth and a mix of 10/40/100 gigabit Ethernet (GbE) clients.

The DTN-X Family provides network service intelligence and is positioned to meet the needs of service providers seeking to offer new and innovative services in a simple, scalable, and efficient manner.

Simple

The DTN-X Family is simple to install, operate, troubleshoot and scale. Services can be quickly and easily provisioned and transported over a common WDM layer. The key enablers of network simplicity are:

- **Bandwidth Virtualization™**: Any Service, Anywhere, On-Demand: The ability to convert the network into a pool of resources available to any service, anywhere, offering simplicity of planning, bandwidth efficiency and ultra-fast service provisioning.
- **Automatic Control Plane**: A generalized multi-protocol label switching (GMPLS) based automated control plane enables automated topology discovery, service provisioning and ≤50ms protection.
- **Transport SDN**: The Infinera Open Transport Switch (OTS) software platform with open Web 2.0 application programming interfaces (APIs) provides abstraction to offer a real-time on-demand programmable bandwidth service model. It allows providers to deliver innovative services and automate their operations while enabling efficient resource utilization within a multi-layer network.

Scalable

Infinera is the industry’s leading manufacturer of monolithic large-scale PICs. Infinera continues to prove this key technology with network deployments around the world. PICs are designed to improve network reliability and reduce power and space by integrating hundreds of optical functions onto a single chip. In fact, Infinera PICs have operated for more than 1 billion hours in live deployments.

Infinera expects PIC capacities to scale along a curve similar to Moore’s law and believes PICs are the only viable technology to scale network bandwidth in a cost-effective manner as the industry moves to higher data rates. The DTN-X Family uses PICs and a clean sheet design to offer terabit-scale performance. For example, the XTC-10 scales up to 1.2T per slot delivering a total of 12T of non-blocking packet optical transport network (P-OTN) switching per bay and 240T of non-blocking P-OTN switching in a multi-bay configuration. The non-blocking switching capacity is always available on the XTC Series without any sacrifice in switching or WDM bandwidth, whether it operates as a pure switch, as an integrated switch with WDM optics, or in pure WDM configuration. The XT Series also uses PICs to deliver high-bandwidth point-to-point interconnects that can be rapidly provisioned.

Efficient

Infinera’s PIC-based WDM line module consolidates more than 600 key optical functions using the 500G PIC and provides a foundation that enables space and power efficiencies.
• **Efficiency of space**: The DTN-X Family provides dense input/output (I/O) bandwidth per rack and a dense non-blocking switch fabric on the XTC Series.

• **Efficiency of power**: The PIC-based DTN-X Family realizes power savings for a green footprint.

**An Architecture without Compromise**

The DTN-X Family leverages the latest generation of PIC technology to deliver high performance. The universal interface slots in the XTC Series accept client and line-side modules. Client interfaces include synchronous digital hierarchy / synchronous optical networking (SONET/SDH), ITU G.709 Optical Transport Network (OTN), Ethernet, storage area network (SAN) and transparent clear-channel services, from 1G to 100G.

Terminal, junction or optical cross connect (OXC) configuration for the XTC Series: Flexible universal interface slots and integrated switching allow each digital site to be deployed in any configuration from a terminal node to multi-degree junction node with any add/drop ratio. The XTC Series can therefore be configured as a terminal node (mix of client and line modules), a junction/digital reconfigurable optical add/drop multiplexer (ROADM) (all line modules) or a multi-terabit OXC (all client modules).

High bandwidth point-to-point configuration for the XT Series: Flexible reach, easy operation and compact stackable design allow the XT Series to be configured for a variety of applications such as drop-and-continue, long-haul datacenter interconnect, and hub-and-spoke.

**Investment protection**: The XTC Series supports a common set of line and client modules that are compatible between the different platforms. This simplifies inventory management while protecting investments in networking equipment.

**Line system interoperability**: The DTN-X family interoperates seamlessly over the Infinera FlexILS™ line system to support both fixed and flexible grid for increased reach and bandwidth.

**FlexCoherent™**

Infinera’s FlexCoherent™ technology on the DTN-X Family enables service providers to easily select from one of many modulation formats to realize a more efficient reach/bandwidth trade-off with per channel granularity.

**Instant Bandwidth™**

Infinera’s Instant Bandwidth technology on the DTN-X Family enables service providers to adopt a cash-flow efficient business model, deploying additional bandwidth rapidly with a few mouse clicks when demand arises, without the need to order, install and deploy additional equipment.
FastSMP™

Infinera’s FastSMP shared mesh protection technology on the XTC Series combines mesh restoration bandwidth efficiencies with <50ms recovery. Using shared protection bandwidth reduces network bandwidth needed for protection since it is more efficient with network resources than 1+1 protection.

Infinera’s FastSMP shared mesh protection uses pre-planned and pre-signaled protection circuits. GMPLS is used as the control protocol. The pre-signaled protection circuit reserves resources only in the control plane, and does not commit any resource in the data plane.

Packet Services

Infinera’s packet services technology on the XTC Series provide advanced packet features and quality of service (QoS). It directly maps Ethernet and multi-protocol label switching (MPLS) services with QoS from the edge of the network to core transport services using OTN, creating a highly efficient packet-optical network.

GMPLS

Service providers can simplify optical network operations with the extensive automation capabilities incorporated into the Infinera IQ® Network Operating System (IQ NOS) on the DTN-X Family. IQ NOS includes a GMPLS control plane that dynamically automates network topology discovery and enables end-to-end routing and provisioning. IQ NOS also enables plug-and-play capabilities for rapid system and network turn-up and bandwidth expansions. IQ NOS improves network manageability with embedded digital maintenance, digital performance monitoring and troubleshooting capabilities for rapid fault isolation.

Carrier-Class Network Management

The DTN-X Family is managed by the Infinera Management Suite (IMS), a collection of robust carrier-class applications and toolsets, including:

- The Infinera Graphical Node Manager (GNM): Full-featured graphical element manager
- The Infinera Digital Node Administrator (DNA): GUI-based element and network management system
- The Infinera Network Planning System (NPS): Offline engineering, planning and optimization tool
- The Infinera XML Integration SDK and SNMP Fault Integration Server: Facilitates customer OSS integration

An optimal combination of scale and long term network value is critical to the success of the transport network. The Infinera DTN-X Family combines customer proven technologies such as large scale PICs to offer scalability, simplicity and efficiency. As the network infrastructure transforms to the new model of Layer C and Layer T, the Infinera DTN-X Family offers a foundation for what the network will be.