

## INFINERA DTN™ SWITCHED WDM SYSTEM

# IT CARRIES 6.4 TRILLION BITS PER SECOND. BETTER YET, IT'S ALL PLUG AND PLAY

The world's first switched WDM system, the Infinera DTN combines the scalability of multi-wavelength optical transport with the simplicity and efficiency of digital switching to help network operators drive long-term sustainable profitability.

### Why the Infinera DTN is Right for You

Unlike traditional optical networks, the Infinera DTN was designed from the ground up for multi-dimensional efficiency. By combining the service efficiency of multi-service platforms, network efficiency of a switching platform and operational efficiency enabled by GMPLS automation and large-scale photonic integrated circuits, the DTN delivers what no other platform can, while conserving power and space. In short, we believe it's the single most efficient transport platform on the planet today.

### The Infinera DTN

Designed for efficiency The Infinera DTN automates service delivery for services ranging from 155 Mb/s to 100 Gb/s, with the ability to optimize the network at every node using integrated 2.5 Gb/s (ODU1) granularity digital switching and grooming. In addition, the network and its services are managed with carrier-class feature set, including full digital performance monitoring, integrated digital service protection and point-and-click, end-to-end service provisioning. Infinera goes one step further to improve service efficiency using a technique we call Bandwidth Virtualization™, which ensures that any service at any node can use any available bandwidth on the network side on demand. Further, DTN operates with the Infinera Line System (ILS), which supports up to 160 C-band wavelengths on a single fiber, for up to 6.4 Tb/s fiber with 40G waves, or 400 Gb/s (40 channels, 10 Gb/s each) in a half-rack. DTN is available in both 19-inch (MTC) and 23-inch (DTC) wide chassis configurations. It can also support

multi-chassis configurations across several racks to create a multi-fiber direction, multi-Terabit transport system that's managed as a single network element.

### Photonic Integration

Enabling Intelligent Transport Networks Based on Infinera's Photonic Integrated Circuit (PIC) technology, the Infinera DTN switched WDM system provides full digital access to the optical layer, which simplifies the network dramatically while offering the ultimate in network flexibility. With PIC technology, the DTN makes it possible to rapidly



The Infinera DTN platform's use of pluggable tributary adapter modules allows high-density digital add/drop of multiple services. The DTC chassis accommodates 23-inch and ETSI racks.

scale any network backbone, deliver more services to more customers and simplify operations while reducing the cost of the network. PIC technology dramatically reduces the cost and complexity of optical-electronic-optical (O-E-O) conversion, and allows service providers to deploy highly scalable transport services much more quickly than is possible with traditional DWDM or ROADM systems. DTN also integrates seamlessly with Infinera’s ATN metro edge platform, providing a highly efficient, end-to-end optical transport solution from metro edge to water’s edge.

The Infinera DTN platform’s use of pluggable tributary adapter modules allows high-density digital add/drop of multiple services.

### Fast, Simple and Profitable

The Infinera DTN employs pluggable 100 Gb/s line cards, called Digital Line Modules (DLMs), which facilitate rapid automated turn-up of DWDM capacity, 100 Gb/s at a time. The DLM provides full retiming, reshaping, regeneration, and recoding services for each optical wavelength. It also provides integrated sub-wavelength grooming and switching capabilities for unconstrained and reconfigurable add/drop and express traffic through the node. The DLM also isolates all analog impairments from adjacent spans to eliminate wavelength blocking and simplify network planning. Together, these capabilities help provide more flexibility and manageability than other DWDM platforms or ROADM systems.

DWDM wavelengths from each DLM are multiplexed onto the line-side fiber via the Band Multiplexing Module (BMM). The BMM optically multiplexes up to 160 wavelengths from the DLMs, along with an Optical Supervisory Channel. This allows all optical multiplexing to be performed on a single card, offering significant density advantages versus conventional systems.

### Fully Reconfigurable Add/Drop

The Infinera DTN supports in-service pluggable client-side circuit packs called Tributary Adapter Modules (TAMs) that are separate from the line-side DWDM optics, enabling mix-and-match and fully flexible add/drop capabilities of client interfaces at any digital site. The native client interfaces are encapsulated in a digital wrapper before being groomed or switched by the system.

The DLM supports TAMs with client service interfaces including SONET, SDH, OTN, Ethernet, Video and SAN services with full transparency for any speed from 155 Mb/s to 100 Gb/s. Tributary Adapter Modules feature programmable optical interfaces, so one TAM can support multiple services, eliminating the need for service specific sparing.

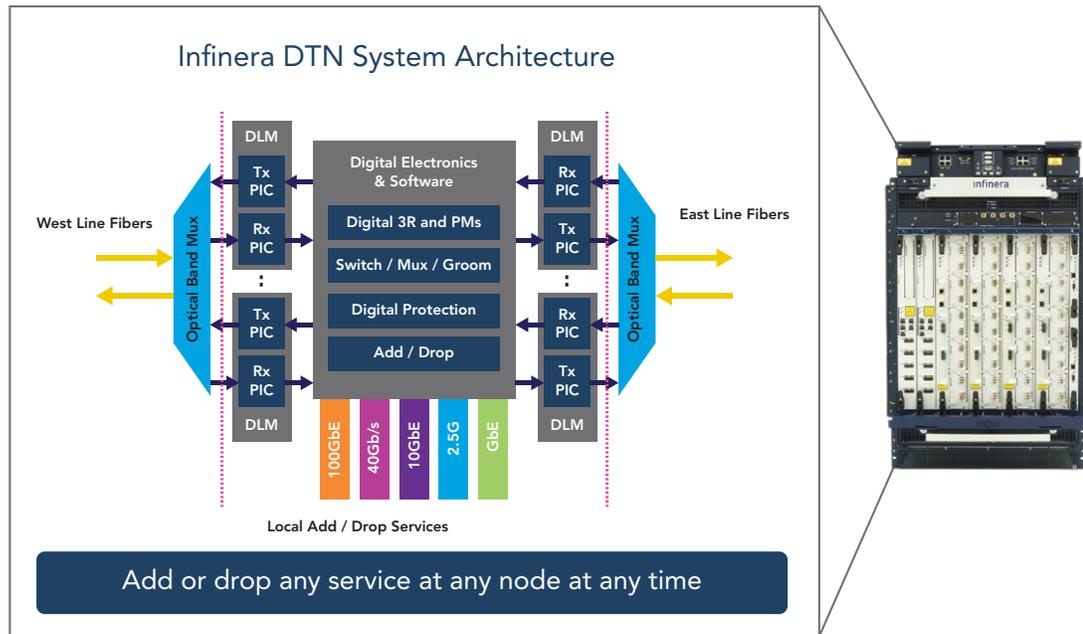
The DTN also features a built-in “Digital ROADM”—a ROADM that uses an electronic switch fabric rather than optical components for its reconfigurability. Because the DTN’s ROADM capability is digital, it can provide bit-transparent services with rich digital performance monitoring, without the complexity of expensive components and a jungle of patch cables. More importantly, as a Digital ROADM with 2.5 Gb/s bandwidth management granularity, the DTN flexibly manages sub-wavelength, wavelength, or even super-wavelength services. Unlike conventional ROADMs or WSS-based “all-optical” systems, the DTN eliminates the need for muxponders or Multiservice Provisioning Platforms (MSPPs) to manage 1 Gb/s and 2.5 Gb/s circuits. Its digital architecture also eliminates the need for back-to-back transponders for wavelength translation.

### Carrier-Class Reliability and Availability

Improving network reliability is a key motivation behind the development of the Infinera DTN. Its photonic integrated circuits eliminate

## Infinera DTN Anatomy





up to 97% of the fiber couplings in a system, a key source of failure for discrete optical components. The system architecture of the Infinera DTN also contributes to its carrier-class availability through a fully redundant control and management solution and full separation of the control plane from the data plane. It supports other system redundancy capabilities, including redundant power entry modules and cooling fans.

The Infinera DTN also supports a highly available management plane with support for redundant OSS-NE and EMS-NE communications to ensure maximum access. A high-capacity in-band Optical Supervisory Channel (OSC) facilitates in-band management and control communications from a Gateway Network Element (GNE) to Subtending Network Elements (SNEs). The DTN solution supports a multi-chassis architecture that enables scalable nodal growth while maintaining a simplified and consolidated network management view of the system as a whole.

The DTN's integrated switching enables service protection and restoration to maintain service availability in the face of fiber cuts or other network outages. Infinera offers 50-millisecond "Digital SNCP" protection as well as dynamically signaled restoration for SONET/SDH, wavelength and Ethernet-based services.

### Simplify and Automate with GMPLS

Service providers seeking to reduce cost and complexity of operations will appreciate the extensive automation capabilities incorporated into the Infinera IQ® Network Operating System (IQ NOS), including a Generalized Multi-Protocol Label Switching (GMPLS) control

plane that dynamically automates network topology discovery and enables end-to-end routing and provisioning. The IQ NOS also enables true Ethernet-like plug-and-play capabilities for rapid system and network turn-up and capacity expansions. The IQ NOS improves network manageability with embedded digital maintenance, digital performance monitoring, and troubleshooting capabilities for rapid fault isolation.

### Carrier-Class Network Management Solutions

An Infinera Intelligent Transport Network system is managed with the Infinera Management Suite, a collection of robust carrier-class applications and toolsets, including:

- The Infinera Graphical Node Manager (GNM), a full-featured graphical element manager for craft access to any Infinera network element, local or remote.
- The Infinera Digital Node Administrator (DNA), a comprehensive integrated element and network management system that provides users with a graphical interface to full fault, configuration, performance, provisioning and security management capabilities.
- The Infinera CORBA Integration SDK (CIS)\* and the Infinera SNMP Fault Integration Server (FIS) are standards-compliant interfaces and SDKs for facilitating the integration of customer Operations Support Systems (OSSs) with the Infinera Intelligent Transport Network, automating back-office operations.
- The Infinera Network Planning System (NPS)\*, an offline application for link engineering, capacity planning, what-if analysis, and optimization of greenfield and brownfield networks.

**Specifications**

Type	Parameter	Specifications
Mechanical	Height (all)	34.95 inches / 888 mm / 20 RU / 35.5 SU
	Width	DTC: 19.50 inches / 500 mm
		MTC: 17.68 inches / 449 mm
	Depth	12.00 inches / 305 mm (from faceplate)
Weight		DTC: Empty — 88.5 lbs / 40.3 kg Fully loaded — 240 lbs / 109.1 kg
		MTC: Empty — 82 lbs / 37.2 kg Fully loaded — 233.5 lbs / 105.9 kg
Electrical	Power Consumption	1500W (typical, fully loaded)
		2730W (maximum)
	Input Voltage Range	-40- to -60V DC
Environmental	Operating Temperature	+5° to +40° C (-5° to +55° C short term)
	Storage Temperature	-40° to 70° C
	Humidity	90% non-condensing

**Regulatory and Compliance**

Type	Specifications
Emissions	FCC Class A, CISPR Class A Compliant, CE
Environmental	NEBS Level 3
Laser Safety	ANSI Class 1 / IEC Class 1M, EN60825
Product Safety	UL / EN / IEC 60950

Infinera uses the latest technology to design its products for minimal energy use and ease of recycling. The Infinera DTN is in compliance with the EU WEEE, RoHS 5/6, and other global environmental regulations.

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