

Infinera mTera Universal Transport Platform

Universal Switching of OTN, Packet, and SONET/SDH

Network operators are facing challenges like bandwidth growth driven by video, cloud, and data center interconnect as well as unpredictable traffic patterns. These trends are only likely to accelerate as mobile networks migrate to 5G and Internet of Things adoption accelerates. At the same time, network operators need to reduce operational costs including space and power consumption, migrate from legacy technologies such as SONET/SDH, and grow revenues by offering next-generation Ethernet services and new SDN-enabled services. They also need to maximize network and service availability cost-effectively.

ADAPT TO CHANGE WITH THE UNIVERSAL SWITCHING OF OTN, PACKET, AND SONET/SDH

The Infinera mTera Universal Transport Platform (UTP) helps network operators to address these challenges. It is available as both a 10RU/12RU, 4 Tb/s eight-slot shelf and a 19RU, 7 Tb/s 14-slot shelf, with paired 14-slot shelves able to deliver 12 Tb/s of switching. Its agnostic cell-based fabrics enable the universal switching of OTN, packet, and SONET/SDH. A wide range of OSM modules provide the ability to select OTN, MPLS-TP (including VPLS/H-VPLS), and Carrier Ethernet (including VLAN cross-connects and Ethernet bridging) for each interface or virtual interface. The SSM2S module enables SONET/SDH switching and interworking to packet and OTN on the OSM modules.

REDUCE 100G+ INTERFACE COSTS WITH FULL-FEATURED OTN SWITCHING

The OSM modules support ODU_k (where k = 0, 1, 2, 2e, 3, 4, flex) switching with one (i.e., ODU₂ → ODU₄) or two (i.e., ODU₀ → ODU₂ → ODU₄) levels of ODU multiplexing. Performance monitoring features include OTU_k section monitoring, ODU_kP path monitoring, and delay measurement. SNC protection and Y-cable protection for Ethernet and SONET/SDH clients are also supported. Additional features include PRBS test and loopback, GCC in-band management, and in-service ODUflex resizing.

BENEFITS OF THE INFINERA mTera UTP

- **Define** any interface for OTN, MPLS-TP, or Carrier Ethernet switching, and scale up to 7 Tb/s in a single shelf or 12 Tb/s in a paired-shelf configuration
- **Minimize** 100G+ interface costs with efficient native grooming of OTN, packet, and SONET/SDH onto the same high-speed wavelength
- **Deliver** MEF CE 2.0-certified services leveraging mTera UTP's scalable, feature-rich packet switching
- **Migrate** SONET/SDH to next-generation packet optical technologies, including MPLS-TP, Carrier Ethernet, OTN, and up to 1.68 Tb/s of STS-1/VC-4 switching
- **Offer** secure leased line services or address internal security requirements with wire-speed ODU payload encryption
- **Maximize** network and service availability with a wide range of mechanisms, including Y-cable, SNC protection, Carrier Ethernet, and MPLS-TP protection mechanisms, as well as SDN or ASON/GMPLS restoration

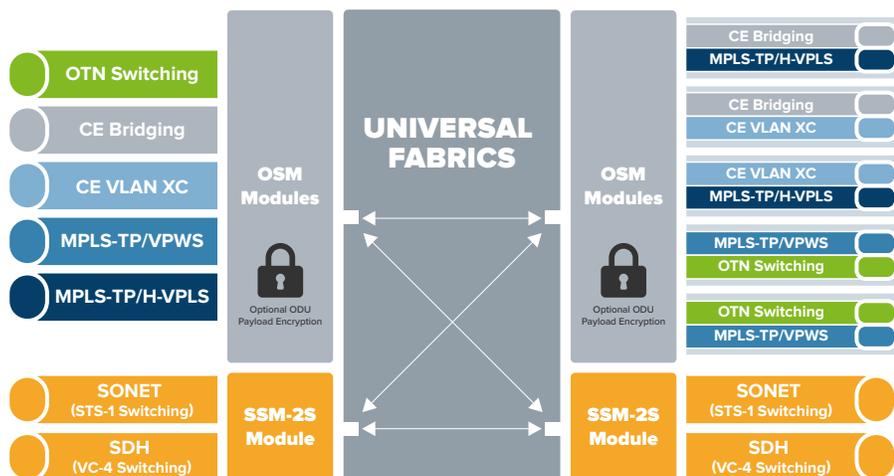


Figure 1: Universal switching of OTN, packet, and SONET/SDH

Module	Interfaces	Per-slot Capacity	Switching
OSM-1S	32 x SFP	40 Gb/s	OTN, MPLS-TP (including VPLS/H-VPLS), VLAN XC, bridging
OSM-2S	20 x SFP+	200 Gb/s	OTN, MPLS-TP (including VPLS/H-VPLS), VLAN XC, bridging
OSM-2C	2 x CFP	200 Gb/s	OTN, MPLS-TP (including VPLS/H-VPLS), VLAN XC, bridging
OSM-4S	40 x SFP+	400 Gb/s	OTN, MPLS-TP (including VPLS/H-VPLS), VLAN XC, bridging
OSM-4F	2 x 100G/150G/200G	400 Gb/s	OTN, MPLS-TP (including VPLS/H-VPLS), VLAN XC, bridging
OSM-5C	5 x 100G/200G CFP2/CFP2-DCO	500 Gb/s	OTN, MPLS-TP (including VPLS/H-VPLS), VLAN XC, bridging
OSM-5Q	5 x 100G QSFP28	500 Gb/s	OTN, MPLS-TP (including VPLS/H-VPLS), VLAN XC, bridging
SSM-2S	6 x SFP+, 24 x SFP	120 Gb/s	SONET/SDH (with OTN/packet interworking)

Table 1: Infinera mTera switching modules

DELIVER MEF ETHERNET SERVICES WITH COMPREHENSIVE PACKET SWITCHING

The OSM modules support a wide range of packet switching protocols, including MPLS-TP (including VPLS/H-VPLS) and Carrier Ethernet (including VLAN cross-connect and Ethernet bridging), with a comprehensive packet feature set. Quality of service (QoS) is ensured with classification based on port, MAC, or Layer 2/2.5/3 header information; multiple queues per port and per VLAN/LSP; multi-level hierarchical scheduling and policing; and NMS-enabled CAC. Packet protection mechanisms include G.8032v2 Ethernet Ring Protection, G.8031 1:1 VLAN protection, G.8131 1:1 LSP protection, and 802.1AX Link Aggregation. Supported OAM features are Y.1731 and 802.1 CFM OAM, 802.3 Link OAM, IETF-based MPLS-TP LSP fault management, LLDP peering, and RFC 2544/Y.1564 service activation testing. The OSM modules also offer Synchronous Ethernet support and in-band management VLANs. The mTera UTP is MEF CE 2.0-certified for 100G and services including E-Line (EPL and EVPL), E-LAN (EPLAN and EVPLAN), and E-Access.

MIGRATE WITH SONET/SDH SWITCHING AND INTERWORKING

The mTera UTP SSM-2S module supports native SONET/SDH switching of 1.68 Tb/s in the 14-slot mTera and 960 Gb/s in the eight-slot mTera. It also supports SONET/SDH to OTN interworking and Ethernet over SONET/SDH (EoS) to packet interworking. Protection options include UPSR and 1+1 APS for SONET and SNC and 1+1 MSP for SDH. Synchronization is provided by the Stratum 3 clock in the shelf timing and processor modules (STPMs), with timing references coming from either the interface modules or T1/E1 interfaces in the shelf timing interface module (STIM) for the 14-slot mTera UTP and the shelf input/output module (SIOM) for the eight-slot mTera.

LEVERAGE COHERENT DWDM OPTICS

The mTera UTP supports multiple options for coherent DWDM interfaces. The OSM-4F module provides two flexible-rate interfaces with support for 100G (QPSK), 150G (8QAM), and 200G (16QAM), enabling over 25 Tb/s per fiber pair and 100G terrestrial reach of up to 5,000 km. The OSM-5C provides the option of CFP2-DCO pluggables, enabling options for 100G (QPSK), 200G (8QAM), and 200G (16QAM). Additionally, the OSM-5Q leverages cost-effective QSFP28-based 100G interfaces for interconnections to compact modular platforms, such as the Infinera Groove (GX) Series, for transport over 600G+ wavelengths.

MAXIMIZE SECURITY WITH WIRE-SPEED AES-256-GCM ENCRYPTION

Encryption-capable variants of the OSM modules enable network operators to combine the flexibility of the mTera UTP's universal switching with ODU payload encryption. AES-256-GCM encryption, secure key distribution over TLS, X.509 certificates, and configurable key rotation enable a secure solution with FIPS 140-2 Level 2 and NAIIP Common Criteria Network Device Collaborative Protection Profile certifications. This provides network operators with a flexible solution ideal for offering encrypted client services between secure colocation facilities or for protecting internal traffic with bulk encryption on the mTera UTP's line interfaces.

MINIMIZE DOWNTIME WITH COMPREHENSIVE PROTECTION AND RESTORATION

Designed to offer protection against single points of failure of its common equipment modules, each module in the mTera UTP receives power from two independent external sources. The platform supports N:1 fabric redundancy, which provides cost-effective protection against a fabric failure. Equipment protection also includes the fans and processor modules. At the network level, in addition to a comprehensive set of OTN, packet, and SONET/SDH protection mechanisms, the mTera UTP supports restoration with both traditional ASON/GMPLS and SDN-enabled vASON.