

## mTera<sup>®</sup> Universal Transport Platform

*Multi-terabit Packet Optical Transport Solution*

### DOMINATING THE ERA OF EXPONENTIAL GROWTH

Telecommunications services are undergoing a profound transformation. Customers are demonstrating an insatiable appetite for increased bandwidth by demanding more flexible, more dynamic, and more customized solutions. Additionally, the rapid growth of data center services is fundamentally changing connectivity patterns. Service providers are facing unprecedented challenges to cost effectively address this network evolution. To overcome these challenges, the Coriant<sup>®</sup> mTera<sup>®</sup> Universal Transport Platform (UTP), including both the 14-slot chassis and the 8-slot chassis, provides a uniquely efficient and adaptable solution.

As a key component of the Coriant Dynamic Optical Cloud™ networking solution, the mTera<sup>®</sup> UTP can transform transport networks from static and fixed resources to dynamic, software-defined, service providing engines. The mTera<sup>®</sup> UTP is an extremely flexible multi-service optical transport platform offering two shelf types that seamlessly support OTN, packet, and SONET/SDH switching, as well as an advanced ROADM-based optical layer on a single 14-slot or 8-slot shelf. The system supports numerous applications including metro core traffic management, long haul traffic grooming, flexible and scalable data center interconnection, Layer 1 and Layer 0 restoration, and an efficient gateway between aggregation networks and dynamic, multi-service, all-coherent high speed core networks.

### LEVERAGING INNOVATIVE ARCHITECTURE FOR UNPARALLELED FLEXIBILITY

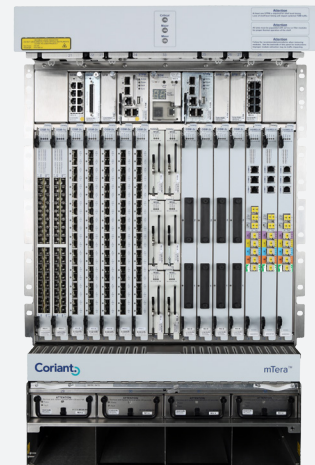
The mTera<sup>®</sup> UTP is designed to handle virtually any application with a minimal set of universal interface cards that use every port to its full potential. The system lifts all switching boundaries and restrictions by allowing native switching and interworking on every universal module port, including multiple protocols on a single port simultaneously. The mTera<sup>®</sup> UTP provides this new level of flexibility in two chassis options: a scalable 14-slot chassis and a compact 8-slot chassis. Both systems support an extremely dense switching capacity of 500G per slot. The 14-slot chassis supports up to 7T of switching capacity for the single shelf configuration and 12T of switching capacity for the dual shelf configuration. The 8-slot chassis supports up to 3.2T OTN and 4T packet switching capacity. Both chassis backplanes are ready to support 1T switching capacity per slot.

### PROMOTING A NEW PARADIGM OF UNIVERSAL ADAPTABILITY

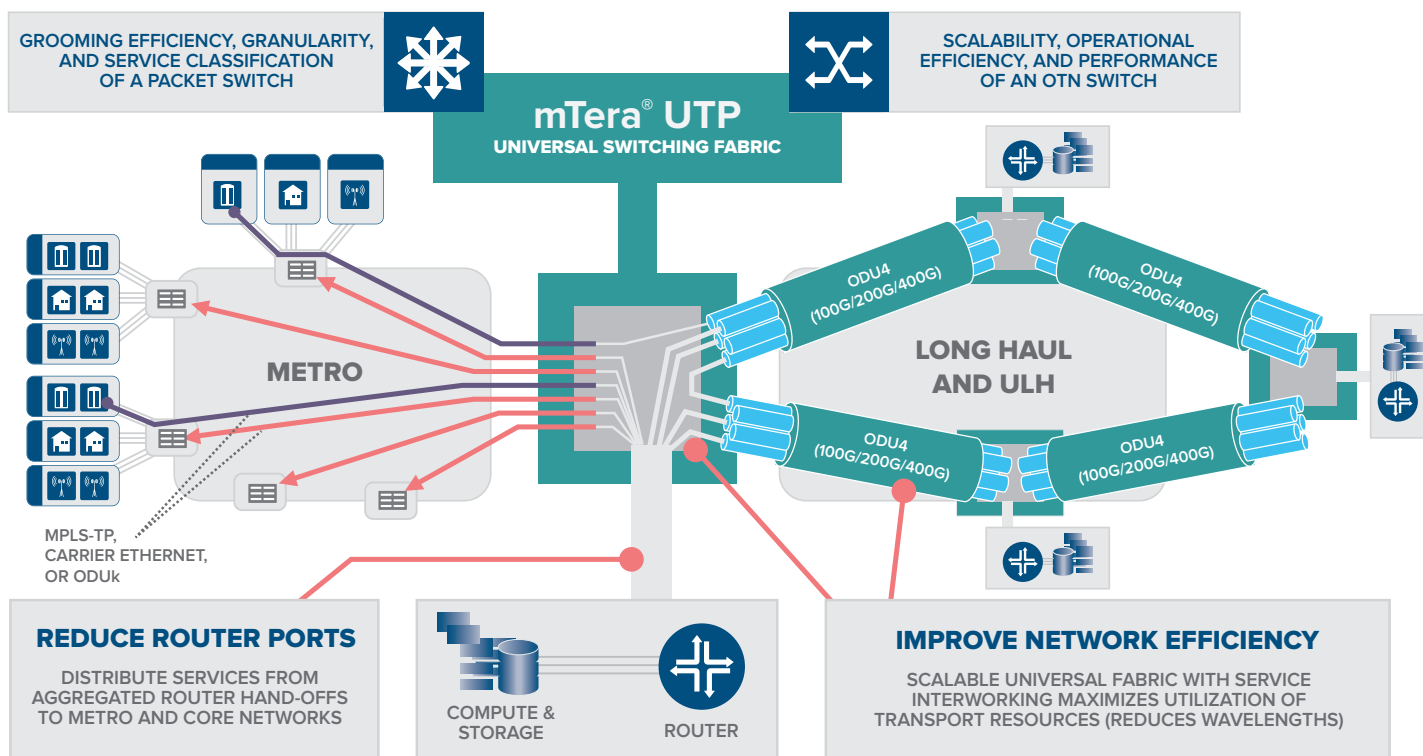
Unlike traditional switching platforms that restrict service grooming to a single protocol per module or a single protocol per port, the mTera<sup>®</sup> UTP removes these restrictive limitations with an innovative universal switching concept. With a suite of universal switching modules supporting interfaces from 155M to 200G, the mTera<sup>®</sup> UTP provides the ability to groom traffic at any layer irrespective of the physical interface. This enables grooming of multiple protocols on a single port, interworking between multiple protocols, and migrating from one grooming strategy to another on the same physical port. Coriant's universal grooming concept enables network operators to adapt to changing network conditions as traffic is managed seamlessly on the same physical module and the same physical port.

### BENEFITS OF THE CORIANT<sup>®</sup> mTera<sup>®</sup> UTP

- **Improve** overall network efficiency by providing aggregated handoffs to routers and maximizing utilization of both metro and core wavelengths
- **Simplify** network operations with a minimal set of highly flexible multi-service cards that support all applications
- **Maximize** fiber utilization with high speed transmission and tunable spectral widths for high spectral efficiency super-channels
- **Reduce** node and network complexity to simplify installation and service activation and limit the chances for manual errors
- **Enable** an optically and electrically flexible infrastructure that can be leveraged by the Coriant Transcend™ SDN Transport Controller to provide a truly programmable and dynamic network
- **Deliver** ultra-high density 10G and 100G interfaces with seamless support for 400G and 1T super-channels



In addition to the universal switching modules, the mTera® UTP supports a SONET/SDH switching interface module that accepts SONET/SDH physical interfaces, VC-4 switched SDH, or STS-1 switched SONET level grooming and interworking to facilitate the integration and modernization of legacy transport networks. Both mTera® UTP chassis support a variety of highly compact integrated ROADMs solutions including colorless, directionless, and contentionless configurations that can be deployed on the same shelf as the interface modules for truly flexible and customizable configurations.



## KEY FEATURES AND BENEFITS

### Offering One Solution for Numerous Applications

With ultra-high density 10G and 100G interfaces and seamless support for 400G and 1T super-channels, the mTera® UTP is an ideal solution for metro core, long haul grooming, data center interconnect, and transport gateway applications, to act as the bridge between traditional 10G networks and next generation all-coherent networks.

### Simplifying Network Operations

As with all Coriant transport solutions, the mTera® UTP is designed with an extremely simplified architecture that requires only a small number of interface cards to support a variety of applications, reduce sparing, and simplify installation and service activation. The optical layer has also been simplified via highly integrated ROADMs modules that provide complete ROADM degrees (including amplifiers, WSS, and optical monitoring) on a single slot card.

### Improving Network Resiliency

The mTera® UTP offers both Layer 1 (ODU and SONET/SDH) and Layer 0 (OCH) GMPLS enabled protection and restoration capabilities. End-to-end services can be provisioned with the resiliency level required, from unprotected to restorable to always-on with multi-fault tolerant protection and restoration. The mTera® UTP L0 GMPLS and L1 solutions integrate seamlessly with Coriant® 7100 Packet Optical Transport Solutions in access and aggregation networks, while the mTera® UTP L0 GMPLS solutions integrate seamlessly with the Coriant® hiT 7300 Multi-Haul Transport Platform in DWDM networks. Additionally, the mTera® UTP offers a flexible set of Layer 2/2.5 resiliency functions for both point-to-point and E-LAN based services, all with 50ms switching performance.

## Providing the Foundation for the Coriant Dynamic Optical Cloud™

One of the foundations of the Coriant Dynamic Optical Cloud™ Solution is an adaptable end-to-end transport infrastructure. The mTera® UTP enables an optically and electrically adaptable infrastructure that can be leveraged by the Coriant Transcend™ SDN Transport Controller to provide a truly programmable and dynamic network. The mTera® UTP offers several deployment options for seamless end-to-end network integration, including:

- SONET/SDH, OTN, and packet interworking with all Coriant products
- DWDM interworking with wavelengths launched from the 7100 Series or the hiT 7300
- Deployment as an integrated switching component with the 7100 Series and hiT 7300
- All deployment scenarios are managed as a single network element in the Coriant® Transport Network Management System (TNMS)
- ROADM to ROADM interworking with the 7100 Series and hiT 7300

This flexibility enables network operators to deploy new mTera® UTP networks and expand existing 7100 Series and hiT 7300 networks with all the capabilities enabled by the mTera® UTP.

## Integrating Coriant CloudWave™ Optics Flexible Interfaces

The mTera® UTP incorporates a software-switchable 2x100G/150G/200G blade that addresses high performance and high capacity requirements in core networks with unregenerated reaches of up to 5,000km terrestrial and capacities up to 25.6Tb/s in terrestrial applications. The flexi-rate line side module provides two fully programmable physical DWDM line side interfaces that can be configured between QPSK, 8QAM, and 16QAM modulation schemes. In addition, the line side interfaces support fixed grid and flexi-grid channel arrangements with various super-channels (200G, 300G, 400G, 1T) in meshed networks. Coriant CloudWave™ Optics with the mTera® UTP are line side interoperable with the hiT 7300, Coriant Groove™ G30 DCI Platform, and 7100 Series for a seamless network evolution to a cost-optimized mix of OTN switching and muxponding solutions. The flexi-rate interface module in the mTera® UTP provides the same OTN and packet switching capabilities as all of the mTera® UTP universal interface modules assuring seamless evolution of mTera® UTP networks.

## SOLUTION HIGHLIGHTS

- 1.6T – 7T of switching capacity, future expandable to 14T – 108T
- Rack footprint (19-in and 23-in NEBS, ETSI)
- Optical and switching cards supported in a single shelf
- Optical layer configurations
  - 9 and 20 port route and select ROADM on-a-blade with an 0-32dB switchable pre-/input amplifier gain
  - Fixed, colorless, colorless/directionless (CD), and colorless, directionless, and contentionless (CDC) add/drop
- 10G, 100G, 150G, and 200G wavelengths including support for Coriant CloudWave™ Optics Technology
- Flexible multi-service grooming
  - STS-1/VC-4 grooming
  - ODU0 to ODU4 grooming including ODUflex
  - MPLS-TP, including VPWS and H-VPLS
  - Carrier Ethernet, point-to-point and bridged
- Pluggable interfaces (SFP, SFP+, CFP, CFP2)
- Network management support with TNMS and the Coriant® 8000 Intelligent Network Manager (INM)
- Optical network planning with Coriant® TransNet and Coriant® 7196 Optical Planning Tool (OPT)
- Capacity planning with the 7196 OPT and Coriant® NetWorks for ultimate multi-layer optimization
- GMPLS, ASON, SDN support

## TECHNICAL SPECIFICATIONS

### System Configurations

- Stand-alone universal switch
- Integrated hybrid switch and multi-degree ROADM
- Switching port shelf for the Coriant® 7100 Optical Transport System and the Coriant® 7100 Nano™ Packet Optical Transport Platform
- Switching port shelf for the hiT 7300

### Interface Cards

- All services supported by a minimal set of modules
- OSM-1S: 32x Sub 10G any-rate SFP interfaces
- OSM-2S: 20x 10G SFP+ interfaces
- OSM-2C: 2x 100G CFP interfaces
- OSM-4F: Coriant CloudWave™ Optics flexi-rate interface card with two programmable interfaces
  - 100G QPSK
  - 150G 8QAM
  - 200G 16QAM
- OSM-4C: 4 x 100G CFP2-ACO
- OSM-4S: 40 x 10G SFP+
- OSM-5C: 5 x 100G CFP2
- SSM-2S:
  - 6 x SFP+: OC-192/STM-64
  - 24 x SFP: OC-48/STM-16, OC-12/STM-4, OC-3/STM-1

### Interfaces

- All interfaces up to 100G are pluggable
- SFP for 100M – 4.25G
- SFP+ for 8G and 10G
- CFP for 100G and 40G
- CFP2 for 100G
- Grey light and DWDM options
- Up to 128 channels with flexi-grid ROADM
- Multiple modulation formats

### Optical Layer

- Industry-leading ROADM density
- R&S option

- Flexi-grid support
- Fixed, colorless, colorless/directionless (CD), and colorless/directionless/contentionless (CDC) add/drop configurations

### WDM Transmission Speeds

- 10G, 100G, 150G, 200G, 400G super-channel
- 1T super-channel (future)

### Switching Capacity

- Up to 7T (14T ready) per ½ rack on 14-slot chassis
- 1.6T to 12T dual shelf configuration
- Up to 3.2T OTN/4T packet per ⅓ rack on mTera 8-slot chassis
- 500G per slot on mTera 14-slot chassis and mTera 8-slot chassis, backplanes are 1T per slot ready

### Native Switching Formats

- OTN – ODU0/1/2/2e/3/4/flex
- Packet – MPLS-TP and Carrier Ethernet
- SONET/SDH (STS1, VC-3/VC-4)

### Physical Shelf Dimensions (14-slot)

- Supports 19-in and 23-in NEBS and ETSI racks
- Height: 19RU (33.25 in or 845 mm)
- Width: 19.585 in or 497.5 mm
- Depth: 15 in or 381 mm

### Physical Shelf Dimensions (8-slot)

- Supports 19-in and 23-in NEBS and ETSI racks
- Height: 10RU (17.33 in or 446.2 mm)
- Width: 21.37 in or 542.8 mm
- Depth: 14.95 in or 379.7 mm

### Resiliency

- Redundant control
- 1:N Redundant switch fabric
- 1:1, 1+1 service protection
- SNC/I, SNC/N, SNC/S
  - ASON/GMPLS (ODU, OCH, and SONET/SDH)

- Always-on protection (multiple-fault tolerant protection with restoration)
- Packet protection features:
  - G.8031 Ethernet 1:1 VLAN protection
  - G.8032 Ethernet ring protection
  - Link Aggregation (Active/Active and Active/Standby)
  - Multi-chassis Link Aggregation (future)
  - RFC 6378 1:1 LSP protection
  - Pseudowire redundancy (future)

### Service Assurance

- PM: OTUk section, ODUkP path, ODUkT tandem connection
- Delay measurement
- Integrated test signal generation
- GCC0, GCC1, GCC2
- 10G FEC – Standard and Enhanced
- 100G FEC – Soft Decision
- Ethernet performance measurements according to ITU-T Y.1731
- Statistics based on Frame Delay, Frame Delay Variation, and Frame Loss Ratio

### Services

- STM-1/4/16/64, OC-3/12/48/192
- OTU1/2/2e/3/4
- 1G, 10GbE, 40GbE, 100GbE
- FC-1G/2G/4G/8G/10G/16G/32G
- MPLS-TP and Carrier Ethernet

### Environmental

- ETSI EN 300 019-1-3 V2.3.2, Class 3.1
- NEBS (GR-63)
- UL and CE compliant
- VCCI certified
- FCC Class A
- mTera 14-slot chassis and 8-slot chassis are ANSI and ETSI environments ready with 48VDC and 60VDC
- mTera 8-slot chassis supports AC power supply

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