

CORIANT IS NOW PART OF INFINERA

7090-LO CEM

Compact and Flexible Platform for TDM Migration

While SONET/SDH networks continue to perform valuable network functions, significant operational costs including expensive maintenance, large footprint, high power consumption, and difficulties finding replacement parts are prompting many network operators to migrate these networks to a packet-based infrastructure. The Coriant® 7090 M/CEM Packet Transport Solutions provide ideal options for migration with comprehensive MPLS-TP support and with circuit emulation enabling the continued delivery of high margin TDM services. The Coriant® 7090-LO CEM enhances the ability of the 7090 M/CEM Series to address this application by providing a compact and cost-effective 1RU platform supporting both low order and high order circuit emulation, including aggregation onto channelized interfaces and local cross-connects.

OFFERING OPTIMIZED MIGRATION FROM SONET/SDH TO PACKET

The 1RU 7090-LO CEM houses a 62 Gbps fabric and consumes a maximum of only 110 W when fully loaded with modules. It provides two fixed 10GE SFP+ interfaces and four fixed GbE SFP interfaces. The 7090-LO CEM contains four slots for interface modules. Available interface modules include: 16xE1/T1, 3xE3/DS3, 4xSTM-1, 4xSTM-1/4, 2xSTM-16, 8xGbE, and 1x10GE+1xGbE. The 7090-LO CEM supports up to 64 E1 or T1, up to 12 E3 or DS3, up to 16xSTM-1, up to 8xSTM-4, up to 4xSTM-16, up to 22xGbE, and up to 4x10GE.

MIGRATING TDM SERVICES TO PACKET WITH FLEXIBLE CIRCUIT EMULATION

The 7090-LO CEM supports the RFC 4842 SONET/SDH Circuit Emulation over Packet (CEP) standard. CEP provides a bandwidth-efficient and flexible option for both low order and high order TDM circuit emulation. It can be used to provide clear channel transport of E1, T1, E3, DS3, STM-1, STM-4, and STM-16 over the packet network. It can also be used to aggregate subrate traffic (VC-11, VC-12, VC-3, VC-4) onto channelized interfaces (E3, DS3, STM-1, STM-4, STM-16). CEP enables the 7090-LO CEM to be used as a local cross-connect, switching VC-11s, VC-12s, VC-3s, and VC-4s between interfaces on the same 7090-LO CEM.

BENEFITS OF THE CORIANT® 7090-LO CEM

- **Migrate** a wide range of TDM services to MPLS-TP, with support for both low order and high order TDM, and for both clear channel and channelized interfaces
- **Reduce** space and power by up to 70% compared to traditional SONET/SDH MSPPs
- **Assure** TDM quality with comprehensive synchronization support and hard QoS across the Coriant packet network
- **Deploy** the 7090-LO CEM either as a standalone platform or as a TDM fan out shelf for a larger 7090 M/CEM platform, for the Coriant® 7100 Series, or for the Coriant® mTera® UTP
- **Minimize** OpEx with end-to-end management, control, and orchestration provided by the Coriant Transcend™ Software Suite



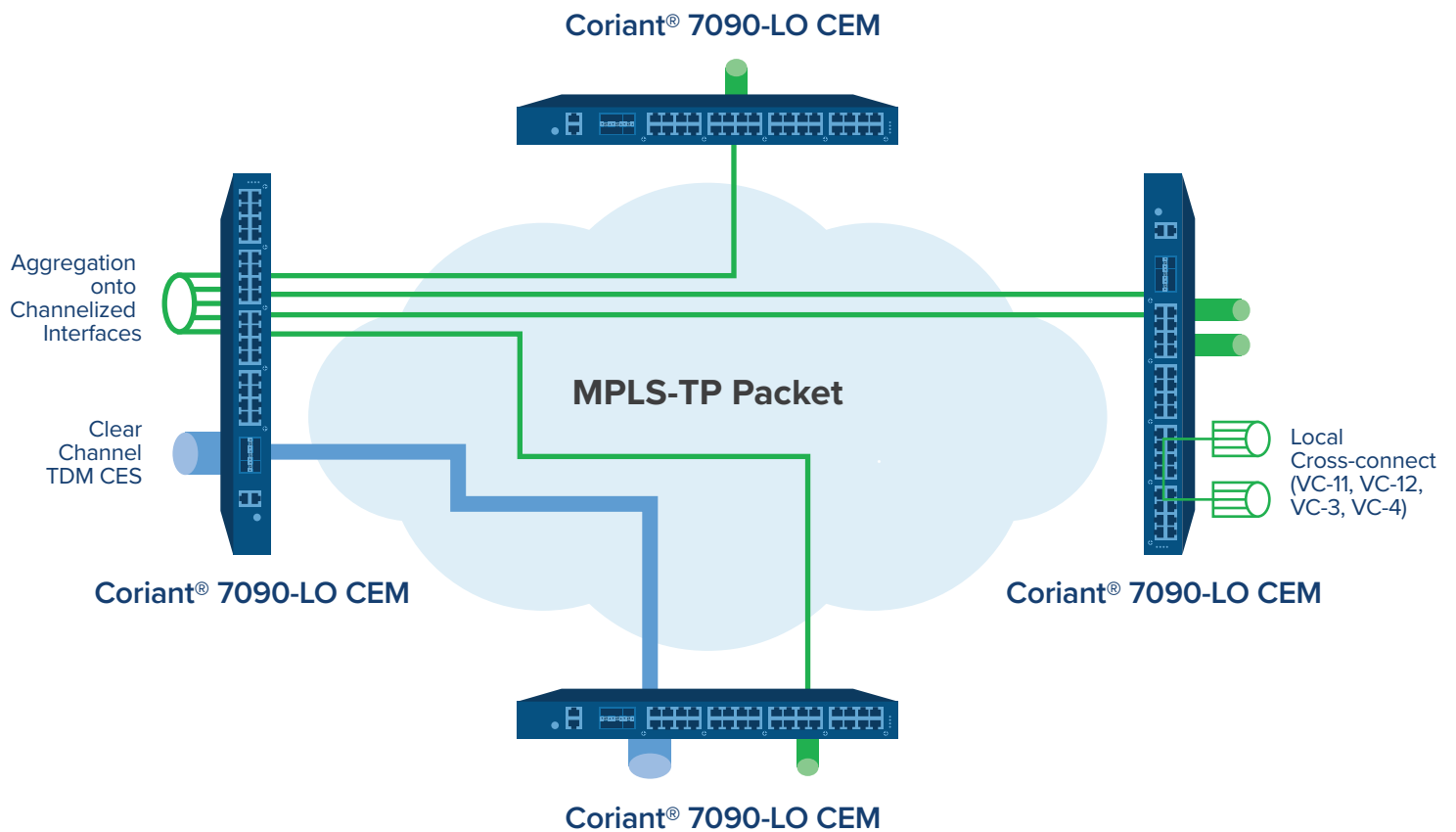


Figure 1: Flexible Circuit Emulation Support Including Aggregation onto Channelized Interfaces

The 7090-LO CEM also provides the option of the RFC 4553 Structure-Agnostic TDM over Packet (SAToP) standard for low order TDM circuit emulation (E1, T1, Channelized STM-1) enabling interoperability with other SAToP compliant platforms, including other members of the 7090 M/CEM Series.

PROVIDING A STANDALONE PLATFORM AND ENABLING TDM FAN OUT

The 7090-LO CEM can be deployed as a standalone platform with two of the 10GE interfaces used for a 10G ring or two of the GbE interfaces used for a GbE ring, aggregating a mix of E1/T1, E3/DS3, STM-1/4/16, GbE, and 10GE. The 7090-LO CEM can also be collocated with a larger 7090 M/CEM platform providing TDM fan out including clear channel and channelized interfaces. In addition, it can be collocated with the Coriant® 7100 Packet Optical Transport Platform or the Coriant® mTera® Universal Transport Platform providing TDM CES functionality as well as options for E1/T1, E3/DS3, and channelized interfaces. In these collocated cases, multiple network elements can be grouped together and managed as a single entity by the Coriant Transcend™ Software Suite.

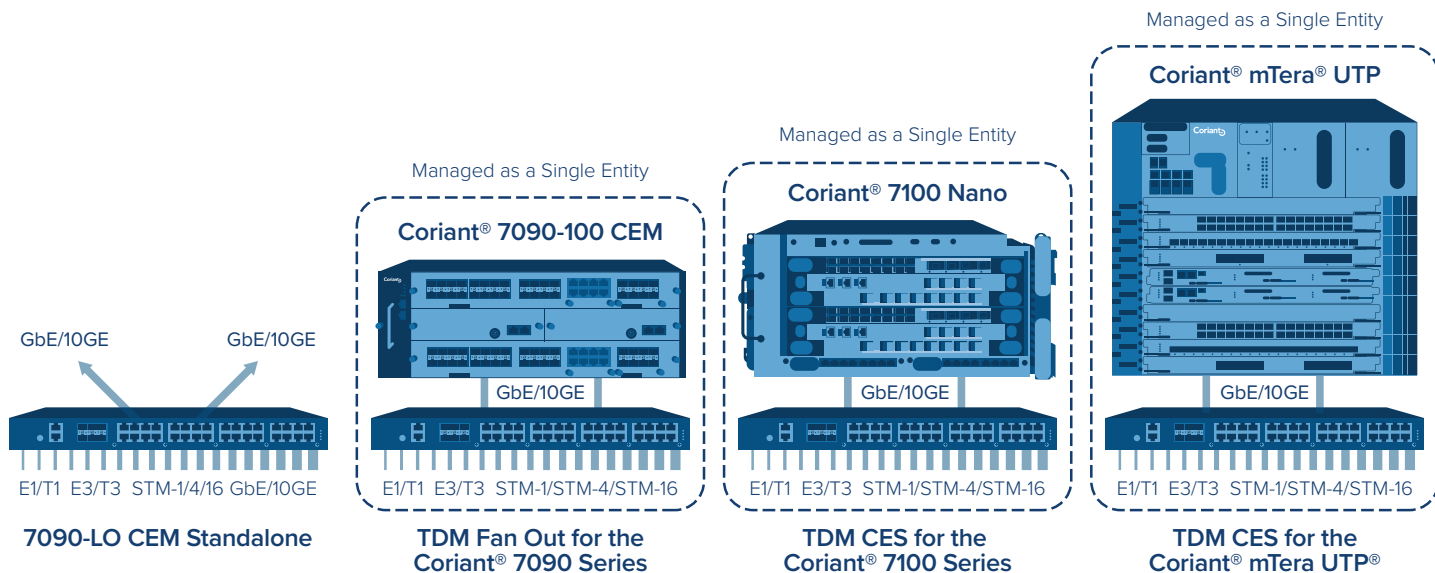


Figure 2: 7090-LO CEM Deployment Options

ASSURING TDM QUALITY WITH COMPREHENSIVE SYNCHRONIZATION SUPPORT

TDM quality is assured by frequency synchronization over packet options including Synchronous Ethernet, 1588v2 frequency profile, and a hybrid option that combines Synchronous Ethernet and 1588v2. Additional 1588v2 phase/frequency synchronization options include boundary clock, transparent clock, and ordinary clock.

EXTENDING MPLS-TP TO THE NETWORK EDGE

MPLS-TP provides a scalable, transport-oriented option for packet switching. Comprehensive MPLS-TP support includes static LSPs, single segment and multi-segment pseudowires, Virtual Private LAN Service (VPLS), and Hierarchical Virtual Private LAN Service (H-VPLS). MPLS-TP OAM support includes G.8113.1 and G.8113.2. Additional Ethernet OAM capabilities include Y.1731, 802.3 Link OAM, and 802.1 CFM OAM. MPLS-TP protection features include 1:1 LSP protection, LSP SNC, MPLS-TP ring protection, and both 1:1 single segment and 1:1 multi-segment pseudowire protection.

MAXIMIZING SERVICE REVENUES WITH HARD QoS AND A RANGE OF HIGH AVAILABILITY FEATURES

Quality of service (QoS) mechanisms include Layer 2 and Layer 3 classification, policing, and shaping. Eight service levels with strict priority and deficit weighted round robin scheduling algorithms are supported. Hierarchical QoS is supported for pseudowires and LSPs. Unintentional overbooking is prevented by connection acceptance control (CAC) in the network management system, enabling hard QoS. In addition to the MPLS-TP protection mechanisms, 802.1AX Link Aggregation on both client (UNI) and network (NNI) interfaces is supported. Furthermore, the 7090-LO CEM supports redundant DC power feeds and a field replaceable fan unit that can tolerate the failure of one of its two fans for 24 hours.

REDUCING OPEX WITH POWERFUL END-TO-END PACKET MANAGEMENT

The Coriant Transcend™ Software Suite includes the Coriant Transcend™ Chorus for network management and operations, the Coriant Transcend™ Symphony SDN controller, and the Coriant Transcend™ Maestro multi-domain orchestrator. The Transcend solution provides comprehensive end-to-end management and orchestration for the 7090-LO CEM and the other members of the Coriant product portfolio including the 7100 Series, mTera UTP, and the rest of the 7090 Series. Key features include network inventory, capacity management, advanced troubleshooting, performance monitoring, service provisioning and supervision, and service and subscriber management. Open APIs include a REST API (Presto) to support the MEF Lifecycle Service Orchestration (LSO). A local craft station option, the Coriant® 7090 LCT NE Management System, is also available.

TECHNICAL SPECIFICATIONS

Physical

- Height: 44.5 mm (1RU)
- Width: 442 mm
- Depth: 210 mm
- Dual DC Power Feeds
- AC power with external adapter
- Power Consumption (no modules): 55 Watts
- Max Power Consumption (4 modules): 110 Watts
- Temperature Range: -5°C to +65°C

Interfaces

- Fixed Interfaces:
 - 2x10GE (SFP+)
 - 4xGbE/FE (SFP)
- Available Modules for 4 Slots:
 - 16xE1/T1, RJ45 (maximum 4)
 - 3xE3/D3, CC4 connector (maximum 4)
 - 4xSTM-1 SFP (maximum 4)
 - 4xSTM-1/4 SFP (maximum 2)
 - 2xSTM-16 SFP (maximum 2)
 - 8xGbE/FE SFP (maximum 2)
 - 1x10GE SFP+ and 1xGbE SFP (maximum 2)
- Maximum Supported Interfaces:
 - E1/T1: 64
 - E3/DS3: 12
 - STM-1: 16
 - STM-4: 8
 - STM-16: 4
 - GbE: 22
 - 10GE: 4

TDM Circuit Emulation

- Clear Channel: E1, T1, E3, DS3, STM-1, STM-4, STM-16
- Channelized Interfaces: E3, STM-1, STM-4, STM-16 (VC-12, VC-3, VC-4); DS3 (VC-11)
- RFC 4842 Synchronous Optical Network/Synchronous Digital Hierarchy (SONET/SDH) Circuit Emulation over Packet (CEP)
- RFC 4553 Structure-Agnostic TDM over Packet (SAToP)

Timing and Synchronization

- Synchronous Ethernet (G.8261, G.8262)
- IEEE 1588v2:
 - Boundary Clock, Transparent Clock, Ordinary Clock (G.8275.1/2)
 - Frequency Profile (G.8265.1)

MPLS-TP

- Static LSPs
- Static Single Segment (SS) pseudowires
- Static Multi-Segment (MS) pseudowires
- VPLS/H-VPLS

OAM

- MPLS-TP OAM (G.8113.1/G.8113.2)
- ITU-T Y.1731 End-to-end Performance Monitoring and AIS
- 802.3 Link OAM
- 802.1 CFM OAM
- Hardware-based delay and loopback measurement with nanosecond resolution

Network Protection

- LSP 1:1 linear protection
- LSP SNC protection
- LSP ring protection
- Single segment (SS) pseudowire 1:1 protection
- Multi-segment (MS) pseudowire 1:1 protection
- 802.1AX Link Aggregation (UNI/NNI) with LACP
- MSP 1+1/1:1
- RSTP (IEEE 802.1Q)
- Link Pass-Through (LPT)

Quality of Service and Traffic Management

- L2 Classification: VLAN, PRI, MAC address, TPID
- L3 Classification: IP address, DSCP, port number, TOS
- Connection Admission Control (CAC)
- Policing (CIR, CBS, EIR, and EBS; Color-Blind Mode and Color-Aware Mode)
- Shaping
- Congestion Avoidance: WRED

- 8 Service Classes
- Scheduling: SP, DWRR, SP+DWRR

Ethernet Functions

- VLAN (IEEE 802.1Q)
- Q-in-Q (IEEE 802.1ad)
- 9600 bytes jumbo frame
- VLAN manipulation: stack/switch/strip
- Flow control (IEEE 802.3x)
- IGMP snooping (V1/V2/V3)

Management

- Coriant Transcend™ Software Suite
- Coriant® 7090 LCT NE Management System
- In-band Management VLAN
- Out-band Management Interface (100M Ethernet, RJ45)
- Alarm Interface
- OSPF Layer 3 DCN
- Zero Touch Provisioning (ZTP)
- SFTP
- SSHv2

Certifications

- MEF CE 2.0 Compliant: E-Line, E-LAN, E-Tree, E-Access
- ETSI 300 019
- ETSI EN 300 386 V1.6.1/EN 55022(2010)
- EN 60950-1: 2006+A11: 2009+A1:2010+A12:2011

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