

## 8800 Smart Router Ethernet Line Card 2 (ELC-2)

*Ethernet Line Card with 6x10GbE Ports*

The Coriant™ 8800 Smart Router Ethernet Line Card 2 (ELC-2) provides full-duplex 10 Gigabit Ethernet (GbE) interface capability across six 10GbE Ethernet Ports, with maximum per-slot bandwidth of 40GbE. With a fully populated Coriant™ 8860 Smart Router, the ELC-2 provides up to 84 10GbE ports (14 ELC-2 cards with 6 ports per card in 8860; slots 15 and 16 do not support ELC-2). The ELC-2 target applications include metro Ethernet backbones, business Ethernet fan-out/aggregation, point of presence (POP) and data center or server farm aggregation.

### FEATURES AND BENEFITS

The ELC-2 is designed for networks which require both high switching capacity and high speed Ethernet interfaces. It is supported by both Coriant 8840 and 8860 Smart Routers. It interoperates with existing 8800 Smart Router Universal Line Cards (ULCs) and ELC-1 cards to optimize desired port configuration and density, and utilizes the same Command Line Interface (CLI) provisioning as the ULCs and ELC-1 cards.

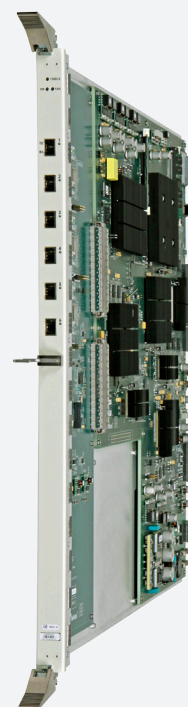
The ELC-2 occupies a single chassis slot, and offers 40 Gigabits of bidirectional switching capacity on six 10GbE interfaces. With the ELC-2, the 8860 Smart Router can serve as a high capacity traffic aggregation element. Any available line card slot of an existing or new 8840/8860 Smart Router can be equipped with the ELC-2 (with the exception of slots 15/16 which do not support the ELC-2). The total number of ELC-2 cards is dependent on the total backplane switching capability of the 8800 Smart Router, which is maximized at 560 Gigabits utilizing three SCC-2 cards (580 Gigabits if ELC-1 cards are available in slots 15/16).

The ELC-2 utilizes enhanced small form-factor pluggable (SFP+) optics that support up to 10G data rates. Available SFP+ optics provide LAN or WAN services at 10km, 40km, or 80km distances.

The ELC-2 allows the service provider to provide both Ethernet point-to-point and multi-point services (i.e., Virtual Private LAN Service (VPLS)). It supports MPLS trunks, native IP and IP VPN applications, and service interworking with legacy interfaces residing on ULCs.

### BENEFITS OF THE CORIANT™ 8800 SMART ROUTER ELC-2

- Up to 84 10GbE ports per node (8860)
- Provides 50% per port cost savings versus ELC-1
- Identical service provisioning to existing ULC/ELC-1 in CLI
- Interoperates fully with existing ULCs and ELC-1
- Line rate multicast
- Provides Synchronous Ethernet
- Enhanced diagnostics functionality



## The Smart Router Series

The Smart Router series offers versatile and scalable solutions for mobile backhaul from small aggregation sites to controller and gateway sites. In addition, Smart Routers serve fixed and mobile convergence and cloud computing networking needs. These solutions are designed to meet the ever-growing requirements of data hungry mobile and enterprise users. All of the Smart Routers are LTE-ready and provide an extensive Ethernet and IP/MPLS feature set. Simultaneous support for multiservice applications in access and aggregation networks protects earlier network investments. The Smart Router product family is supported by the Coriant™ 8000 Intelligent Network Manager (INM), which is an easy to use end-to-end network management solution. The 8000 INM minimizes operational and maintenance costs and scales up to tens of thousands of network elements.

## TECHNICAL SPECIFICATIONS

### Physical Dimensions

- Length: 55.2 cm (21.75 in)
- Width: 3.0 cm (1.2 in)
- Depth: 58.0 cm (22.82 in)
- Weight: 5.5 kg (12.1 lb)
- Installation into in any open standard sized chassis slot in the Coriant™ 8800 Smart Router

### Power

- Input voltage: minimum 40 -VDC nominal 48 -VDC maximum 60 -VDC
- Power consumption: maximum 195W

### Interfaces

- 6 x 10GbE SFP+ Ports

### LEDs

- ELC Status:
  - OK (On, green – module functions properly and in-service;
  - Off, no power, ELC admin disabled, card failed, or line module mismatch)
  - FAIL (On, red – HW Failure, Uncleared HW fail alarm, or Uncleared HW mismatch alarm;
  - Off, No power, ELC admin disabled, or no outstanding conditions)
- Port Status:
  - (On, green – Port enabled, no Uncleared port alarms, and no external loopback;
  - On, orange – ELC held in reset;
  - On, red – Uncleared port alarm, external loopback, or internal loopback with port alarm;
  - Off, No power, administratively disabled, or ELC held in reset)

### Forwarding Capacity

- Up to 40 Gbps Ethernet (requires 3 SCCs)

### Forwarding Plane

- IPv4 routing (IPv6 at FP9.3)
- MPLS switching (LSR and LER)
- Ethernet MAC switching

### Chassis Configuration

- Hot swappable
- Up to 12 ELC-2s per 8840
- Up to 14 ELC-2s per 8860
- Interoperable with ULC and ELC

### Software

- Supported in Feature Package (FP) 9.2 and higher TMOS Software

### Ordering Info

- Part number: 81.88L-ELC2-R6
- Description: 6 Port 10GE ELC 88X0 No Optics

### Network Connectors

- 10GE LAN/WAN LC/SFP+ SMF Optics (ER, EW, LR, LW, ZR, ZW):
  - 81.88T-SFPPER-R6
  - 81.88T-SFPPEW-R6
  - 81.88T-SFPPLR-R6
  - 81.88T-SFPPLW-R6
  - 81.88T-SFPPZR-R6
  - 81.88T-SFPPZW-R6

### Synchronization

- DS3 timing derived from the Network Element (NE) clock reference (Synchronous Timing)
- Synchronous Ethernet

### Functionality

- Layer 2 circuit types: Ethernet, VLAN, VLAN/QinQ, Ethernet-ietf, VLAN-ietf, IPL2-ietf
- Layer 2 bridging interface L2 types (VPLS): Ethernet, VLAN, VLAN/QinQ
- Layer 2 bridging interface LSP types: Static, LDP, RSVP, LDP over RSVP

- Hierarchical VPLS
- IP circuit types: Ethernet, VLAN, LAG/LACP, IpEnet, IpVlan
- IP LAG circuit types: IpEnet, IpVlan

### Resiliency

- Service Assured Upgrade (SAU)
- Hot-swappable
- N:1 Redundancy on forwarding plane and common system elements
- 1+1 control plane redundancy and nonstop forwarding during control plane switchover
- MPLS over LAG interfaces (incremental bw mode)
- Routing resiliency: OSPF and RSVP-TE stateful redundancy, OSPF, ISIS, BGP and LDP graceful restart
- Database redundancy: RIB and FIB routing and forwarding table, OSPF-TE and ISIS-TE traffic engineering database, CAC, statistics, VPLS MAC address, circuit states
- Data path protection: Supports redundant LSPs and LSP fast reroute in sub-10 ms, ECMP, link aggregation, VRRP, STP, RSTP, MSTP, H-VPLS, backup pseudowires and VRRP, loop detection blocking

### Security

- Operating security using protected memory and modular processes
- Management plane security using multi-level security matrix for secure EMS/NMS access, SNMPv3 security support, SFTP, RADIUS, TACACS+, forensics capability for security audit or threat diagnostics, network database backup for disaster recovery

## TECHNICAL SPECIFICATIONS CONTINUED

- Control plane security against DDoS and TCP SYN attacks and MD5 authentication for IP and MPLS
- Data plane security for flexible class-based traffic protection, E911 regulation for public safety, inspection, flexible access control list, lawful interception, resource protection, spoofing prevention

### IP Routing Protocols:

- Routing: BGP4, IS-IS, OSPF, PIM-SM, Constraint-based Shortest Path First (CSPF) in multiple areas
- Advanced Routing features: BGP Confederation and BGP graceful restart
- IS-IS: Graceful Restart, Jumbo Frames, Domain-wide Prefix Distribution, Mesh Groups, IGP Shortcuts
- OSPF: Stateful Redundancy, NSSA, IGP Shortcuts, Multiple Instances, graceful restart
- MPLS: LDP, RSVP-TE
- Advanced MPLS Features: MPLS traffic engineering, RSVP-TE, IS-IS-TE, OSPF-TE, Constraint-based Shortest Path First (CSPF)
- RSVP-TE: stateful redundancy, fast reroute (FRR) with sub 10ms failover, Diffserv encoding, backup LSPs, open-bandwidth LSPs and auto-bandwidth LSPs
- LDP: LDP QoS, graceful restart, fault tolerant, LDP over RSVP tunnels
- IP VPN: RFC2547bis/4364 MP-BGP, OSPF multi-instance, overlapping VPNs, Full mesh and hub/spoke VPN topologies
- IP Multicast: IGMPv2, PIM-SMv2, IGMP Snooping, IGMP Proxy
- Policies: Access lists, prefix lists, route maps, AS-path lists, extended community lists
- DHCP relay

### Traffic Management

- MPLS traffic engineering using OSPF-TE, ISIS-TE, RSVP-TE, LDP over RSVP tunnel
- CSPF routing
- E-LSP (EXP inferred)
- L-LSP (Label inferred)
- 2-Stage CAC at Layer 2, Layer 3 and LSP level
- Strict Priority Queuing: CBR, VBR-rt, VBR-nrt, UBR, UBR+ and UBR+max
- Weighted Fair Queuing (WFQ) based on Deficit Round Robin (DRR) scheme
- Policing at the ingress (Dual leaking bucket algorithm with 3 color marking + explicit drop)
- Shaping at the egress and ingress
- Weighted Random Early Detection (WRED) and/or Weighted Tail Drop (WTD)
- Hierarchical queuing
- Hierarchical QoS
- 32,000 Per-Flow Queues (unidirectional) per ELC-2
- 16,000 Aggregate Schedulers per ELC-2
- Virtual output queues
- SLAs are applied (both policing and shaping) on Per-Flow Queues via state-of-the-art ASICs
- Multi-class pseudowires
- Weighted QoS

### Management

- CLI with SSH2, FTP with SSH2
- SNMPv1 and SNMPv2 monitoring
- CORBA OSS north-bound interface
- Coriant™ 8000 Intelligent Network Manager

### Standards

- Safety
  - UL 60950-1
  - EN 60950-1:2001
  - CSA C22.2 No. 60950-1
  - AS/NZS 60950.1:2003
  - EN 60825-1:1994, A11, A2

- EMC/Immunity
  - FCC Part 15 Class A
  - ICES-003 Class A (Canada)
  - EN 55022 (1998) Class A (Europe)
  - VCCI (April 2000) Class A (Japan)
- NEBS
  - GR-63-CORE: Issue 2 (APR 2002) NEBS Physical Protection
  - GR-1089-CORE Issue 3 (2002): EMC and Electrical Safety
  - ETS 300 019-2-1
  - ETS 300 019-2-2
  - ETS 300 019-2-3
  - ETS 300 019-2-4
  - ETS 300 753
  - AT&T NEDS (MLID#4069, V4.01, 1/16/2004)
  - SBC-TP-96200 Issue 5A, Feb 2004

### Environmental

- Operating temperature: ETS 300 019-2-3 (0 to +40 C)
- Storage temperature: ETS 300 019-2-2 and ETS 300 019-2-3 (-40 to +70 C)
- Humidity: 95% RH
- Altitude: Up to 4000 meters (13,123 feet)
- Seismic/Earthquake: NEBS-Zone 4 compliant

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