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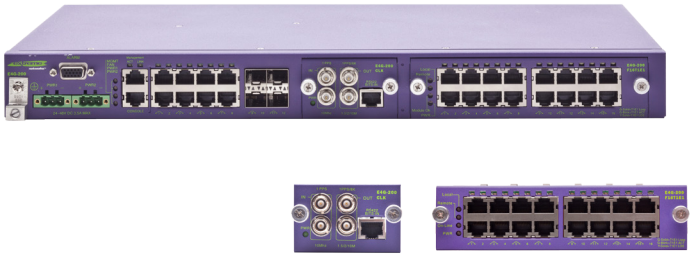
DATA SHEET

E4G-200 Cell Site Router

HIGHLIGHTS

The E4G-200 enables service providers to provide Ethernet/IP services cost-effectively at any cell site, including optional TDM pseudowires and deployments of 4G base stations. Thisflexibility gives service providers the ability to deploy revenue-generating services at 2G/3G cell sites and allows for 4G deployments and new Ethernet/IP services.

- Increased Gigabit Ethernet ports – twelve active GbE ports
- Optional industry-standard pseudowires – supports up to 16 E1/T1 ports with up to 256 pseudowires
- Extended temperature range – from -40°C to +65°C
- Certified and optional synchronization – both IEEE 1588v2 and SyncE
- Carrier-grade resiliency – through EAPS (Ethernet Automatic Protection Switching, RFC 3619) or ITU-T G.8032 Ethernet Ring Protection standard
- Integrated Ethernet OAM – support for IEEE 802.3ah, IEEE 802.1ag, and ITU Y.1731 in hardware for extremely accurate delay, jitter, and frame loss measurements
- Low latency for LTE
- Line rate performance
- Compact size – 1 RU and only 10 inches/25.4cm in depth
- All front access - every connection (data, power, & management) is from the front of the unit



Overview

For service providers, revenue growth is increasingly driven by 3G and eventually 4G mobile services that provide access to compelling smartphone, and tablet-based, and other mobile applications. The challenge in designing true 4G mobile backhaul is to build a foundation that protects existing investments in 2G and 3G services, provides a superior subscriber experience, prepares for future 4G service requirements, and minimizes costs. This challenge can be met by deploying a true 4G mobile backhaul network with three key ingredients: resiliency, synchronization and performance.

Extreme Networks E4G-200 router is a carrier-grade Ethernet platform that provides a seamless migration path from TDM circuits to Ethernet services for mobile operators and creates a fundamental Ethernet infrastructure capable of scaling to the needs of 2G, 3G and 4G mobile networks.

Product Description

The Extreme Networks E4G-200 Cell Site Router delivers Ethernet, IP/MPLS and pseudowire capabilities in a compact 1RU form factor. The E4G-200 provides mobile operators the ability to manage and aggregate TDM and Ethernet services and their associated protocols onto an economical and efficient Ethernet mobile backhaul infrastructure.

The Extreme Networks E4G-200 Cell Site Router (CSR) is where 4G backhaul begins and where the T1/E1 pseudowire circuit for 2G/3G is also initiated. Installation is in or very near to the base station tower. 2G and 3G base stations use T1/E1 for backhaul connectivity and 4G base stations connect directly to the cell site router via Ethernet. The E4G-200 provides the necessary interfaces for 2G, 3G, and 4G base stations while still meeting the demands of its installation environment, in a design that is very compact (less than 10 inches/24 cm deep), and features an extended temperature range.

The Extreme Networks E4G-200 router is designed for services running over an Ethernet and IP/MPLS infrastructure. The E4G-200 is designed to backhaul 2G, 3G and 4G mobile traffic, using a single backhaul network instead of a multiple backhaul networks which translates into an economical deployment model. Service providers, energy utilities, transportation and government agencies can deploy

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Extreme Networks E4G-200 router for mobile backhaul with the knowledge that their deployments will have advanced services.

- With advanced routing and switching features such as MPLS, IPv6, Ethernet OAM, and others, the E4G-200 is future proof to protect the service provider's investment
- ExtremeXOS® software at the cell site affords new revenue opportunities to service providers through advanced, Ethernet-based service offerings - http://www.extremenetworks.com/product/extremexos-network-operating-system/
- Using hardware-based Ethernet OAM standards allows detailed service assurance guarantees offerings to be offered over the packet-based backhaul network
- E4G-200 routers allow for a cost-effective transformation path to an Ethernet backhaul by providing E1/T1 interfaces.
- Powerful Carrier Ethernet platform in only a 1RU system, but accommodates up to 12 Gigabit Ethernet ports and 16 E1/T1 ports becoming the basis of the TDM-to-Ethernet backhaul transformation and easing the transition for the service provider
- Resilient Ethernet rings, using G.8032 or EAPS
- CSRs provide lower capital costs (CapEx) than traditional SONET/SDH rings while still maintaining a 50ms failover time

Key Features and Benefits

The 1RU size of the E4G-200 allows economical installation in cell site locations where space is limited. All Extreme Networks advanced routing and switching features, including IPv6, are available on this compact and powerful platform.

E4G-200 optionally supports up to 16 ports for circuit emulations via industry-standard pseudowires, allowing the transformation of TDM cell sites to Ethernet/IP/MPLS cell sites.

With an extended temperature range of -40°C to +65°C, service providers can deploy the E4G-200 router at sites without climate control, enabling more sites to convert to packet-based backhaul, reducing CapEx and OpEx, and allowing Ethernet/IP services to be delivered to a larger target market.

Twelve active GbE ports allow service providers to connect more 4G base stations for growth and to support other Ethernet/IP equipment local to the cell site.

Mobile backhaul networks require accurate timing. The E4G-200 provides today's existing TDM timing on it T1/E1 ports as well as the Ethernet-based timing—both IEEE 1588v2 and SyncE—on its Ethernet ports.

Extreme Networks supports EAPS as well as the G.8032 Ethernet Ring Protection standard.

Support for IEEE 802.3ah, IEEE 802.1ag, and ITU Y.1731 gives management and reporting control over the Ethernet backhaul, including pseudowires to provide integrated Ethernet OAM.

Functions in the hardware allow for mere microseconds of latency to improve performance of latency-sensitive applications that are a part of LTE rollouts.

Ports, services and OAM functions run at line rate with no degradation in service when the different feature sets are enabled.

Extreme Networks Ethernet mobile backhaul solutions are geared towards the unique demands of mobile operators. Our solutions offer support for multiple generations of services. Mobile operators can lower their capital expenses (CapEx) and operational expenses (OpEx) by reducing the number of network elements and simplifying operations. Our solutions can enable mobile operators to deliver a network that is geared towards the new mobile world, providing access, awareness and control, from the cloud to the converged edge.

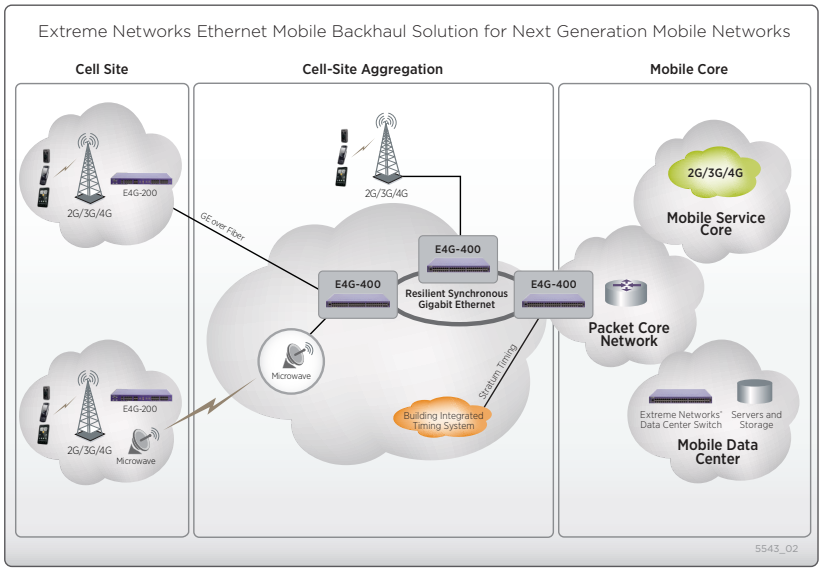

Figure 1: Typical Network Architecture for Wireless Backhaul

Technical Specifications

SYNCHRONIZATION

- Internal Stratum-3 Clock (Telcordia GR-1244-CORE)
- Common Clock Distribution across All Ports
- External Reference Timing Input (BITS)
- Synchronous Ethernet (ITU-T G.8262)
- IEEE 1588v2 Precision Time Protocol
- Adaptive Clock Recovery (ACR) for TDM Pseudowires
- Differential Clock Recovery (DCR) for TDM Pseudowires

SERVICES

Pseudowires

- CESoPSN – Structure-Aware Time Division Multiplexed (TDM) Circuit Emulation Service over Packet Switched Network
- SAToP – Structure-Agnostic Time Division Multiplexing (TDM) over Packet
- MEF 8 Implementation Agreement for the Emulation of PDH Circuits over Metro Ethernet Networks
- PWE3 Control Word for Use over an MPLS PSN
- Pseudowire Setup and Maintenance using the Label Distribution Protocol (LDP) or RSVP
- Encapsulation Methods for Transport of Ethernet over MPLS Networks

VLANs

- VLAN Tagging
- Port-based VLANs
- Protocol-based VLANs
- MAC-based VLANs
- Multiple STP domains per VLAN
- Private VLANs
- Virtual MANs (vMANs)

MPLS and VPN Services

- Multiprotocol Label Switching Architecture
- MPLS Label Stack Encoding
- RSVP Refresh Reduction
- Label Distribution Protocol (LDP)
- RSVP-TE: Extensions to RSVP for LSP Tunnels
- Traffic Engineering Extensions to OSPFv2
- Fast Re-route Extensions to RSVP-TE for LSP (Detour Paths)
- Detecting MPLS Data Plane Failures (LSP Ping)
- Bidirectional Forwarding Detection

Layer 2 VPNs

- Pseudowire Setup and Maintenance using the Label Distribution Protocol (LDP)
- Encapsulation Methods for Transport of Ethernet over MPLS Networks
- Virtual Private LAN Services (VPLS) using Label Distribution Protocol (LDP) Signaling
- Pseudowire Virtual Circuit Connectivity Verification (VCCV)

RESILIENCY

Software

- Ethernet Automatic Protection Switching (EAPS)
- ITU G.8032v2 Ethernet Ring Protection
- Spanning Tree/Rapid Spanning Tree Protocols
- Software-Enhanced Availability
- Equal Cost Multipath
- Link Aggregation
- Multi-Switch LAG (M-LAG)
- 1:1 RSVP-TE LSP protection
- Bidirectional Forwarding Detection (BFD) based LSP protection

Hardware

- 2 Power Feeds
- Internal Fan Array with 2 Redundant Fans – 1 active and 1 standby

PERFORMANCE

- Aggregated Switch Bandwidth: 24.1 Gbps
- Frame Forwarding Rate: 17.8 Mpps
- Latency: <4 microseconds (64-byte)
- Max Packet Size: 9,216 Byte (Jumbo Frame)
- Total Trunks: 12 load sharing, Members per trunk: 8
- VLANs: 4,094
- Ingress ACLs: 2,048
- Egress ACLs: 512

Forwarding Tables

- Layer 2/MAC Addresses: 32K
- Layer 2/Multicast Groups: 1K
- IPv4 LPM Entries: 12K
- IPv6 LPM Entries: 6K
- IPv4 Host Addresses: 8K
- IPv6 Host Addresses: 4K

- Layer 3 Interfaces: 4K
- IP Multicast Groups: 4K

CPU, Memory

- Single Core CPU, 800 Mhz clock
- 1 GB ECC DRAM
- 1 GB Compact Flash

QoS, Rate Limiting

- Ingress bandwidth meters: 2,048
- Ingress metering granularity: 8 Kbps
- Ingress bandwidth policing/rate limiting per flow/ACL
- Egress QoS queues/port: 8
- Egress bandwidth rate shaping per egress queue and per port
- Egress rate granularity: 8 Kbps

LED Indicators

- Per port status LED including power status
- System Status LEDs: management, fan and power feeds

EXTERNAL PORTS

E4G-200-DC Router

- 8 x 10/100/1000BASE-T (RJ-45)
- 4 x 100/1000BASE-X (SFP) unpopulated ports
- 1 x Serial (console port)
- 1 x 10/100BASE-T out-of-band management port
- 1 x 15 pin D-sub – for Alarm Input / Output

E4G-200-12x-DC Router

- 12 x 100/1000BASE-X (SFP) unpopulated ports
- 1 x Serial (console port)
- 1x 10/100BASE-T out-of-band management port
- 1 x 15 pin D-sub - for Alarm Input / Output

E4G-F16T1E1 Module

- 16 x TDM E1/T1 Ports

E4G-CLK Module

- 4 x mini-BNC Ports – 1 PPS Input, 1 10MHz Input, 1PPS/8k Output, 1 1.5/2.0/10 MHz Output
- 1 x RJ45 – RS422 BITS/TOD Input

WEIGHT AND PHYSICAL DIMENSIONS

E4G-200-DC Router

- Weight: 7.14 lb (5.46 kg)
- Height: 1.75 inches (4.4 cm)
- Width: 17.25 inches (43.8 cm)
- Depth: 10.75 inches (27.3 cm)

E4G-200-12x-DC Router

- Weight 7.14 lb (5.46 kg)
- Height 1.75 inches (4.4 cm)
- Width 17.25 inches (43.8 cm)
- Depth 10.75 inches (27.3 cm)

E4G-F16T1E1 Module

- Weight: 2.0 lb (0.9 kg)
- Height: 1.75 inches (4.4 cm)
- Width: 6.25 inches (15.9 cm)
- Depth: 9.5 inches (24.1 cm)

E4G-CLK Module

- Weight: 0.75 lb (0.34 kg)
- Height: 1.75 inches (4.4 cm)
- Width: 2.5 inches (6.4 cm)
- Depth: 8 inches (20.32 cm)

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature

- -40° C to 65° C (-40° F to 149° F)
- Humidity: 10% to 95% relative humidity, non-condensing
- Altitude: 0 to 3,000 meters (9,850 feet)
- Shock (half sine): 30 m/s2 (3 G), 11 ms, 60 shocks
- Random vibration: 3 to 500 Hz at 1.5 G rms

Fan Speed

- Minimum: 0 RPM
- Maximum: 10,500 RPM

Airflow

- Side to side

Storage and Transportation

- Transportation Temperature: -40° C to 70° C (-40° F to 158° F)
- Storage and Transportation Humidity: 10% to 95% RH, non-condensing
- Packaged Shock (Half Sine): 180 m/s2 (18 G), 6ms, 600 shocks
- Packaged Sine Vibration: 5-62 Hz @ Velocity 5mm/s, 62-500 Hz @ 0.2G
- Packaged Random Vibration: 5-20 Hz @ 1.0 ASD w/-3dB/oct.from 20-200 Hz 14 drops min on sides & corners @ 42" (<15 kg box)

Acoustic Noise

- Fan off : 0 dB
- Fan on : 54.1dB

Power Specification

POWER SPECIFICATION	E4G-200-DC/ROUTER	E4G-200-12X-DC/ROUTER
Nominal Input Ratings	-22 to 60V DC auto-detecting -48 V, 1.25A or +24V, 2.5A	-22 to 60V DC auto-detecting -48 V, 1.25A or +24V, 2.5A
E4G-200 BASE UNIT		
Input Current at Full Load	0.68 A @ +24 V 0.52 A @ -48 V	1.41 A @ +24 V 0.73 A @ -48 V
Input Power at Full Load	33 W	35 W
Heat Dissipation	33 W 113 BTU/hr	35 W 120 BTU/hr
Maximum Inrush Current	35 A at 72 V peak	35 A at 72 V peak
E4G-200 BASE UNIT W/ E4G-F16 T1E1 MODULE		
Input Current at Full Load	0.89 A @ +24 V 0.69 A @ -48 V	1.81 A @ +24 V 0.93 A @ -48 V
Input Power at Full Load	43 W	44.5 W
Heat Dissipation	43 W 147 BTU/hr	44.5 W 152 BTU/hr
Maximum Inrush Current	35 A at 72 V peak	35 A at 72 V peak
E4G-200 BASE UNIT W/ E4G-CLK MODULE		
Input Current at Full Load	0.83 A @ +24 V 0.64 A @ -48 V	1.81 A @ +24 V 0.93 A @ -48 V
Input Power at Full Load	40 W	44.5 W
Heat Dissipation	40 W 137 BTU/hr	44.5 W 152 BTU/hr
Maximum Inrush Current	35 A at 72 V peak	35 A at 72 V peak
E4G-200 BASE UNIT W/ E4G-F16 T1E1 MODULE AND E4G-CLK MODULE		
Input Current at Full Load	1.02 A @ +24 V 0.78 A @ -48 V	2.02 A @ +24 V 1.03 A @ -48 V
Input Power at Full Load	49 W	49.5 W
Heat Dissipation	49 W 167 BTU/hr	49.5 W 169 BTU/hr
Maximum Inrush Current	35 A at 72 V peak	35 A at 72 V peak

Power Connections

- 3-pin terminal block input sockets for A-feed and B-feed connections)
- Power cord input plug/socket: 3-pin terminal block connector
- Power Supply Cord Gauge: #14 AWG

Ordering Information

PART #	NAME	DESCRIPTION
16440	E4G-200-12x-DC/router	12 x 100/1000BASE-X unpopulated SFP, one front I/O slot, one front Sync slot, one internal DC PSU with two inputs
16441	E4G-200-DC/router	8 x 10/100/1000BASE-T, 4 x 100/1000BASE-X unpopulated SFP, one front I/O slot, one front Sync slot, one internal DC PSU with two inputs
16442	E4G-F16T1E1/module	16 x RJ45 port front plug-in module supporting pseudowire emulation of 16 T1/E1
16444	E4G-CLK/module	2 x SMA port front plug-in module supporting BITS, 1588v2, SyncE, and TDM Line timing
16490	E4G200 Ntwrk Timing 1588 PTP	ExtremeXOS Network Timing Feature Pack for E4G-200 that enables 1588v2 PTP (Precision Time Protocol)
16491	E4G200 Adv Edge Lic & MPLS	Extreme XOS Advanced Edge License Upgrade from Edge for E4G-200 products and includes the MPLS feature pack
16492	E4G200 Core Lic from Adv Edge	Extreme XOS Core License Upgrade from Advanced Edge for E4G-200 products
16493	E4G200 Core Lic fr Edge & MPLS	Extreme XOS Core License Upgrade from Edge for E4G-200 products and includes the MPLS feature pack
10051	1000BASE-SX SFP	1000BASE-SX SFP, LC Connector
10052	1000BASE-LX SFP	1000BASE-LX SFP, LC Connector
10053	1000BASE-ZX SFP	1000BASE-ZX SFP, Extra Long Distance SMF 70 km/21 dB Budget, LC Connector
10056	1000BASE-BX-D SFP	1000BASE-BX-D SFP, SMF (1490nm TX/1310nm RX Wavelength)
10057	1000BASE-BX-U SFP	1000BASE-BX-U SFP, SMF (1310nm TX/1490nm RX Wavelength)
10060	100FX/1000LX SFP	100FX/1000LX SFP, SMF, LC Connector (Requires MCP and 6dB Attenuator for 100FX-MMF Operation)
10063	100FX SFP	100FX SFP, MMF, LC Connector
10064	1000BASE-LX100 SFP	1000BASE-LX100 SFP, Extra Long Distance SMF 100 km/30dB Budget, LC Connector
10065	10/100/1000Base-T SFP	10/100/1000BASE-T SFP module, Category 5 cable 100m link, RJ45-Connector
10067	100BASE-FX SFP	100M SFP, 100FX MMF, (1310nm, 2km multimode transmission) LC connector
10066	100BASE-LX10 SFP	100M SFP, 100LX10 SMF, (1310nm 10km single mode transmission) LC connector
10058	100BASE-BX-D SFP	100M SFP, 100BASE-BX-D, SMF (1550nm TX/1310nm RX wavelength), 100 Mbps bidirectional
10059	100BASE-BX-U SFP	100M SFP, 100BASE-BX-U, SMF (1310nm TX/1550nm RX wavelength), 100 Mbps bidirectional
10071	SX SFP 10 Pack	SX-SFP 10 Pack
10072	LX SFP 10 Pack	LX-SFP 10 Pack
10051H	1000BASE-SX SFP, Hi	1000BASE-SX SFP, MMF 220 & 550 meters, LC connector, Industrial Temp
10053H	1000BASE-ZX SFP, Hi	1000BASE-ZX SFP, SMF 70km, LC connector, Industrial Temp
10071H	1000BASE-SX SFP 10 Pack, Hi	1000BASE-SX SFP 10 Pack, Industrial Temp
10072H	1000BASE-LX SFP 10 Pack, Hi	1000BASE-LX SFP 10 Pack, Industrial Temp

Extreme networks

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