

Operate a high capacity virtualized network fabric at the lowest TCO

Ensure the network is as agile and efficient as the virtualized server and storage components

Build long term ROI and investment protection with ExaScale's 40 GbE* and 100 GbE* ready technology today

Leverage Force10's FTOS modular operating system software to deliver inherent stability, serviceability and manageability

ExaScale: The Next Step in Ethernet Technology

The Force10 Networks ExaScale platforms are virtualized chassis-based switches that enable a new way of designing switching and routing infrastructures. ExaScale's architecture, and patented backplane and ASIC technology are designed to increase network availability, agility and efficiency while reducing power and cooling costs. ExaScale supports mission critical applications across converged fabrics in data center, telecommunication provider, service provider, enterprise and HPC networks.

Force10's ExaScale platform coupled with FTOS make a cost-effective and flexible deployment option complete with comprehensive management, automation and resource provisioning capabilities.

Force10's Virtualized Network Fabric Framework

- VirtualView™, a suite of monitoring and provisioning features, optimizes the performance of virtualized and distributed networks
- VirtualScale™ reduces TCO by consolidating the physical network and virtualizing boundaries
- VirtualControl™ manages, controls and secures multiple switching and routing domains on one physical platform

Key Applications

- Virtualized data center and cloud computing networks with multiple switching or routing domains in local or geographically disparate environments
- High capacity 10 GbE and 1 GbE switching/routing in high performance Layer 2, IP and MPLS core or aggregation networks
- HPC networks with non-blocking and deterministic N:N and N:1 management and storage I/O requirements



Specifications: ExaScale E-Series

Ordering Information

ORDER NUMBER	DESCRIPTION
CH-E600I	E600i 7-slot chassis with backplane
CH-E1200I-DC	E1200i-DC 14-slot DC power chassis with backplane
CH-E1200I-AC	E1200i-AC 14-slot AC power chassis with backplane
CC-E600-FAN	E600/E600i fan subsystem
CC-E1200I-FAN	E1200i-AC fan subsystem
LC-EH-RPM	E600i/E1200i Route Processor Module (RPM) (series EH)
CC-E-SFM3	E-Series Switch Fabric Module 3 (SFM3)
CC-E600-PWR-DC	E600i DC Power Entry Module (PEM)
CC-E600-2500W-AC	E600i 2500 W/1500 W AC Power Supply Module (PSM)
CC-E1200-PWR-DC	E1200i DC PEM
CC-E1200I-2800W-AC	E1200i-AC 2800 W AC PSM
LC-EH-10GE-10S	10-port 10 GbE line card - SFP+ modules required (series EH)
LC-EJ-10GE-10S	10-port 10 GbE line card - SFP+ modules required (series EJ)
LC-EH-10GE-10P	10-port 10 GbE line card - XFP modules required (series EH)
LC-EJ-10GE-10P	10-port 10 GbE line card - XFP modules required (series EJ)
LC-EH-GE-50P	50-port GbE line - SFP modules required (series EH)
LC-EJ-GE-50P	50-port GbE line - SFP modules required (series EJ)
LC-EH-GE-90M	90-port 10/100/1000Base-T line card with MRJ21 interfaces (series EH)
LC-EJ-GE-90M	90-port 10/100/1000Base-T line card with MRJ21 interfaces (series EJ)
GP-10GSFP-1S	Qualified SR/SW 10 GbE SFP+ optics module, LC connector
GP-10GSFP-1L	Qualified LR/LW 10 GbE SFP+ optics module, LC connector
GP-XFP-1S	Qualified SR 10GbE XFP optics module
GP-XFP-1L	Qualified LR 10GbE XFP optics module
GP-XFP-1E	Qualified ER 10GbE XFP optics module
GP-XFP-1Z	Qualified ZR 10GbE XFP optics module
GP-XFP-1CX4	Qualified CX4 10GbE XFP optics module
GP-XFP-Wxx	Qualified DWDM 10GbE XFP optics module
SW-EH-LATEST	FTOS software
SW-EH-LATEST-MPLS	FTOS Software With MPLS License
GP-SFP2-1S	Qualified SX GbE SFP optics module, LC connector



E600i/E1200i Route Processor Module



E-Series Switch Fabric Module 3



10-port 10 GbE XFP Line Card



10-port 10 GbE SFP+ Line Card



90-port 10/100/1000Base-T Line Card



50-port GbE SFP Line Card

E600 Chassis

E600i

7 line card slots

Size: 16 RU, 28 h x 17.4 w x 21.45" d
(71.1 h x 44.2 w x 54.4 cm d)

Weight (factory-installed components): 81 lbs (36.7 kg)

Weight fully loaded: 242 lbs (109.8 kg)

AC Power

Nominal input voltage: 120-240 VAC 50/60 Hz

Maximum thermal output:

12,734 BTU/h (3,732 W) at 100/120 VAC

11,677 BTU/h (3,423 W) at 200/240 VAC

Maximum input current per module:

11.5 A at 100 VAC 9.6 A at 120 VAC

8.0 A at 200 VAC 6.7 A at 240 VAC

Maximum system power input:

4.0 KVA at 100/120 VAC

3.7 KVA at 200/240 VAC

Maximum power consumption:

3,982 W at 100/120 VAC

3,673 W at 200/240 VAC

DC Power

Nominal input voltage:

-44 to -60 VDC

Maximum thermal output:

10,424 BTU/h (3,055 W)

Maximum current draw per DC PEM:

75 A

Maximum power consumption:

3,305 W



E1200 Chassis

E1200i-DC

14 line card slots

Size: 21 RU, 36.75 h x 17.4 w x 21" d
(93.3 h x 44.2 w x 53.3 cm d)

Weight (factory-installed components): 97 lbs (44 kg)

Weight fully loaded: 319 lbs (144.7 kg)

DC Power

Nominal input voltage:

-44 to -60 VDC

Maximum thermal output:

20,438 BTU/h (5,990 W)

Maximum current draw per DC PEM:

150 A

Maximum power consumption:

6,240 W



E1200i-AC

14 line card slots

Size: 24 RU, 42 h x 17.4 w x 22.25" d
(106.68 h x 44.2 w x 56.51 cm d)

Weight (factory-installed components): 139 lbs (63.05 kg)

Weight fully loaded: 422 lbs (191.2 kg)

AC Power

Nominal input voltage:

200-240 VAC 50/60 Hz

Maximum thermal output:

22,804 BTU/h (6,684 W)

Maximum input current per module:

14.6 A at 200 VAC 12.2 A at 240 VAC

Maximum system power input:

7.0 KVA at 200/240 VAC

Maximum power consumption:

6,934 W at 200/240 VAC



Specifications

Common

19" front, 19" middle (optional) and 23" middle (E600/E1200 only) rack mountable
Maximum Operating Specifications:
Temperature: 32° to 104°F (0° to 40°C)
Altitude: no degradation to 10,000 feet (3,048 m)
Relative humidity: 5 to 85 percent, noncondensing
Maximum Non-operating Specifications:
Temperature: -40° to 158°F (-40° to 70°C)
Maximum altitude: 15,000 feet (4,572 meters)
Relative humidity: 5 to 95 percent, noncondensing

Redundancy/Availability

E1200i-DC

1+1 redundant Route Processor Modules (RPMs)
9+1 redundant Switch Fabric Modules (SFMs)
1+1 redundant DC Power Entry Modules (PEMs)

E1200i-AC

1+1 redundant RPMs
9+1 redundant SFMs
3+3 redundant AC Power Supply Modules (PSMs) - 200/240 VAC

E600i

1+1 redundant RPMs
4:1 redundant SFMs
1+1 redundant DC PEMs
2+2 redundant AC PSMs - 200/240 VAC
3+1 redundant AC PSMs - 100/120 VAC and 200/240 VAC

IEEE Compliance

802.1AB LLDP
802.1D Bridging, STP
802.1p L2 Prioritization
802.1Q VLAN Tagging, Double VLAN Tagging, GVRP
802.1s MSTP
802.1w RSTP
802.1X Network Access Control
802.3ab Gigabit Ethernet (1000BASE-T)
802.3ac Frame Extensions for VLAN Tagging
802.3ad Link Aggregation with LACP
802.3ae 10 Gigabit Ethernet (10GBASE-W, 10GBASE-X)
802.3i Ethernet (10BASE-T)
802.3u Fast Ethernet (100BASE-TX)
802.3x Flow Control
ANSI/TIA-1057
LLDP-MED
Force10 FRRP (Force10 Redundant Ring Protocol)
Force10 PVST+
MTU 9,252 bytes

RFC and I-D Compliance

General Internet Protocols

768 UDP
793 TCP
854 Telnet
959 FTP
1321 MD5
1350 TFTP
2474 Differentiated Services
2698 Two Rate Three Color Marker
3164 Syslog

General IPv4 Protocols

791 IPv4
792 ICMP
826 ARP
1027 Proxy ARP
1035 DNS (client)
1042 Ethernet Transmission
1191 Path MTU Discovery
1305 NTPv3
1519 CIDR
1542 BOOTP (relay)
1812 Routers
1858 IP Fragment Filtering
2131 DHCP (relay)
2338 VRRP
3021 31-bit Prefixes
3128 Tiny Fragment Attack Protection
3046 DHCP Relay Agent Information Option

General IPv6 Protocols

1981 Path MTU Discovery (partial)
2460 IPv6
2461 Neighbor Discovery (partial)
2462 Stateless Address Autoconfiguration (partial)
2463 ICMPv6
2464 Ethernet Transmission
2675 Jumbograms
3587 Global Unicast Address Format
4291 Addressing

RIP

1058 RIPv1
2453 RIPv2

OSPF

1587 NSSA
2154 MD5
2328 OSPFv2
2370 Opaque LSA
2740 OSPFv3
3623 Graceful Restart
4222 Prioritization and Congestion Avoidance

IS-IS

1142 IS-IS
1195 IPv4 Routing
2763 Dynamic Hostname
2966 Domain-Wide Prefixes
3373 Three-way Handshake
3567 MD5
3784 Wide Metrics
5306 Restart Signaling for IS-IS
draft-ietf-isis-igp-p2p-over-lan-06 Point-to-Point Operation
draft-ietf-isis-ipv6-06 IPv6 Routing
draft-kaplan-isis-ext-eth-02 Extended Frame Size

BGP

1997 Communities
2385 MD5
2439 Route Flap Damping
2545 Multiprotocol Extensions for IPv6
2796 Route Reflection
2842 Capabilities
2858 Multiprotocol Extensions
2918 Route Refresh
3065 Confederations
4360 Extended Communities
4893 4-byte ASN
5396 4-byte ASN Representation
draft-ietf-idr-bgp4-20 BGPv4
draft-ietf-idr-restart-06 Graceful Restart

MPLS

2702 Requirements for TE Over MPLS
3031 MPLS Architecture
3032 MPLS Label Stack Encoding
3209 RSVP-TE: Extensions to RSVP for LSP Tunnels
3630 TE Extensions to OSPF Version 2
3784 IS-IS Extensions for TE
3812 MPLS-TE MIB
3813 MPLS LSR MIB
4090 Fast Reroute Extensions to RSVP-TE for LSP Tunnels
4379 Detecting MPLS Data Plane Failures (TE/LDP) Ping & Traceroute
5036 LDP Specification
5063 Extensions to GMPLS RSVP Graceful Restart

Multicast

1112 IGMPv1
2236 IGMPv2
2710 MLDv1
3376 IGMPv3
3569 SSM for IPv4/IPv6
3618 MSDP
3810 MLDv2
4541 IGMPv1/v2/v3, MLDv1 Snooping, MLDv2 Snooping
draft-ietf-pim-sm-v2-new-05 PIM-SM for IPv4/IPv6

Network Management

1155 SMIv1
1156 Internet MIB
1157 SNMPv1
1212 Concise MIB Definitions

1215 SNMP Traps
1493 Bridges MIB
1724 RIPv2 MIB
1850 OSPFv2 MIB
1901 Community-based SNMPv2
2011 IP MIB
2012 TCP MIB
2013 UDP MIB
2024 DLSw MIB
2096 IP Forwarding Table MIB
2570 SNMPv3
2571 Management Frameworks
2572 Message Processing and Dispatching
2574 SNMPv3 USM
2575 SNMPv3 VACM
2576 Coexistence Between SNMPv1/v2/v3
2578 SMIv2
2579 Textual Conventions for SMIv2
2580 Conformance Statements for SMIv2
2618 RADIUS Authentication MIB
2665 Ethernet-like Interfaces MIB
2674 Extended Bridge MIB
2787 VRRP MIB
2819 RMON MIB (groups 1, 2, 3, 9)
2863 Interfaces MIB
2865 RADIUS
3273 RMON High Capacity MIB
3416 SNMPv2
3418 SNMP MIB
3434 RMON High Capacity Alarm MIB
3580 802.1X with RADIUS
3815 LDP MIB
5060 PIM MIB
ANSI/TIA-1057 LLDP-MED MIB
draft-grant-tacacs-02 TACACS+
draft-ietf-idr-bgp4-mib-06 BGP MIBv1
draft-ietf-isis-wg-mib-16 IS-IS MIB
IEEE 802.1AB LLDP MIB
IEEE 802.1AB LLDP DOT1 MIB
IEEE 802.1AB LLDP DOT3 MIB
rugin-mstp-mib-02 MSTP MIB (traps)
sFlow.org sFlowv5
sFlow.org sFlowv5 MIB (version 1.3)
FORCE10-BGP4-V2-MIB
FORCE10-FIB-MIB
FORCE10-IF-EXTENSION-MIB
FORCE10-LINKAGG-MIB
FORCE10-CHASSIS-MIB
FORCE10-COPY-CONFIG-MIB
FORCE10-MON-MIB
FORCE10-PRODUCTS-MIB
FORCE10-SMI
FORCE10-SYSTEM-COMPONENT-MIB
FORCE10-TC-MIB
FORCE10-TRAP-ALARM-MIB

Regulatory Compliance

Safety

UL/CSA 60950-1, 1st Edition
EN 60950-1, 1st Edition
IEC 60950-1, 1st Edition Including all National Deviations and Group Differences
EN 60825-1 Safety of Laser Products Part 1: Equipment Classification Requirements and User's Guide
EN 60825-2 Safety of Laser Products Part 2: Safety of Optical Fibre Communication Systems
FDA Regulation 21 CFR 1040.10 and 1040.11

Emissions

Australia/New Zealand: AS/NZS CISPR 22: 2006, Class A
Canada: ICES-003, Issue-4, Class A
Europe: EN 55022: 2006 (CISPR 22: 2006), Class A
Japan: VCCI V3/2007.04 Class A
USA: FCC CFR 47 Part 15, Subpart B, Class A

Immunity

EN 300 386 V1.3.3: 2005 EMC for Network Equipment
EN 55024: 1998 + A1: 2001 + A2: 2003
EN 61000-3-2: Harmonic Current Emissions
EN 61000-3-3: Voltage Fluctuations and Flicker
EN 61000-4-2: ESD
EN 61000-4-3: Radiated Immunity
EN 61000-4-4: EFT
EN 61000-4-5: Surge
EN 61000-4-6: Low Frequency Conducted Immunity

RoHS

All E-Series components are EU RoHS compliant.

Unique ExaScale Technology Features

Total Cost of Ownership (TCO)

- Lower TCO through true non-blocking, line-rate throughput that removes performance bottlenecks from the network – all packet sizes, all the time
- Industry-leading density enables simpler network topologies that reduce both network capital and operational costs
 - ExaScale is the only switch/router technology on the market with 100 Gbps of data capacity per slot today (125 Gbps/slot raw capacity)
 - Up to 140 line-rate 10 GbE ports in one half rack chassis with pluggable SFP+ and XFP modules
 - Switching fabric capacity of up to 3.5 Tbps, and packet forwarding capacity of more than 2 Bpps using hardware-based distributed forwarding engines
 - Industry's lowest power per line-rate port consumption with an eco-efficient power and cooling design that saves energy
- Scalability and features for tomorrow's network with converged fabric readiness
 - Layer 2 switching for aggregation and core networks
 - IPv4 unicast and multicast routing for advanced services networks
 - IPv6 unicast and multicast routing for native and dual stack next-generation IP networks
 - MPLS switching with P router and VPN* functionality

Line Card Capabilities & Applications	ExaScale Series EH		ExaScale Series EJ	
	Layer 2 Switching	✓		✓
IPv4 Routing	Aggregation, Data Center, LAN Core		Backbone, Peering, Transit	
IPv6 Routing	Aggregation, Data Center, LAN Core		Backbone, Peering, Transit	
MPLS	—		✓	

Flexibility

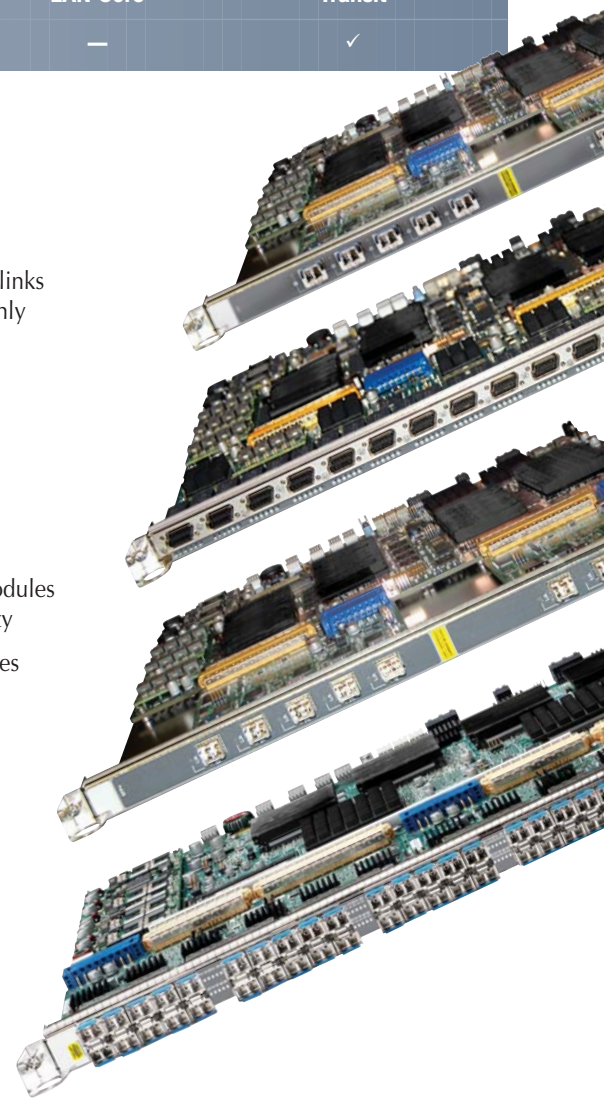
- Tunable, scalable high-capacity LAG with 64 links per group and 32 LAGs per system, or 8 links per group and 255 LAGs per system use advanced hashing algorithms to balance traffic evenly across links in backbone or aggregation applications
- Industry-leading buffering and virtual output queues eliminate head-of-line blocking and minimize queuing delay to guarantee packet delivery
- Configurable CAM profiles enable custom space allocation in hardware forwarding and classification tables to support flexibility and scalability as network requirements change

High Availability, Serviceability, and Manageability

- FTOS software, built on NetBSD and a Unix-like kernel, running on the Route Processor Modules (RPM) and line cards enables new advances in control plane scalability and system reliability
- High performance RPM uses distributed control plane processing on three CPUs and provides 1+1 control plane redundancy with hitless forwarding
- Redundant Switch Fabric Modules (SFM) with graceful and deterministic failure recovery
- High availability hardware and software architecture with OIR (hot swap) of all components
- Patented passive copper backplane
- Power and cooling redundancy

* denotes a roadmap feature or specification.

Roadmap features and specifications are subject to change, including the possibility that they may be cancelled, and should not be relied upon for purchase decisions.



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