

BlackDiamond® X8



Highlights

- High density 10GbE and 40GbE switch for data center consolidation
- 768 ports of 10GbE per switch, 2304 ports of 10GbE per rack
- 192 ports of 40GbE per switch, 576 ports of 40GbE per rack
- 2.3 μ s latency
- Midplane-less architecture with 20+ Tbps
- Powered by time-tested, modular ExtremeXOS® operating system with resilient and intelligent virtualization features and hardware switching of up to 128,000 virtual machines
- Converged open fabric for reliable IP based storage services and transit for FCoE traffic
- Low power consumption of 5.6 Watts per 10GbE or 22.5 Watts per 40GbE port for low Total Cost of Ownership

Overview

Designed for large, virtualized data centers and clouds, the Extreme Networks® BlackDiamond X8 switch provides high density 10GbE and 40GbE. Furthermore, the BlackDiamond X8 was built with green operations in mind, resulting in low per port power consumption, which when combined with high density, can result in a lower Total Cost of Ownership.

With massive scalability, the BlackDiamond X8 offers 2.56Tbps per slot capacity and more than 20Tbps total switching capacity with 768 ports of line rate 10GbE or 192 ports of line rate 40GbE in a single chassis. All of this is offered in a relatively small footprint of only 14.5 RU, or one-third of a standard rack. The BlackDiamond X8 provides a standards-based “fabric in a box” which can eliminate expensive multiple-box and multi-tier solutions—along with their inter-device connectivity, uplink bandwidth and latency challenges.

The BlackDiamond X8 has the ability to automatically track and report 128,000 virtual machines (VMs) and automatically migrates Virtual Port Profiles (VPPs) in a touch-less manner through XNV™ (ExtremeXOS® Network Virtualization). Automated configuration and provisioning further contribute to simplicity of deployment and operation.

Key Features/Benefits

“Cloud-Scale” Switching

Designed from the ground up with the density, performance and capacity requirements of “cloud scale” data centers in mind, the BlackDiamond X8 provides 20.48Tbps total switching capacity, supporting up to 2,304 10GbE ports or up to 576 40GbE ports at wire-speed in a single seven-foot rack helping increase utilization of limited and expensive rack space. The BlackDiamond X8 fabric design uses an orthogonal direct mating system between interface and switch fabric modules, eliminating the performance bottleneck of backplane or midplane design. The BlackDiamond X8 can offer up to 2.56Tbps capacity per interface slot, allowing for future expansion to even higher port densities.

Low Latency

For larger scale low-latency deployments, the non-blocking 192 ports of 40GbE with cut-through switching can provide cost-effective means for a high-speed, open, “fabric in a box” when deployed as an End-of-Row/ Middle-of-Row solution.

Server Virtualization

The BlackDiamond X8, powered by the ExtremeXOS modular operating system, helps provide the foundation for virtualized applications. The BlackDiamond X8 switch includes virtualization features and scalability, supporting 128,000 Virtual Machines (VMs) per system or 384,000 VMs per rack by connecting up to 768 physical servers per system or 2,304 servers per rack through 10GbE.

The ExtremeXOS modular operating system runs on high-performance control plane hardware and helps simplify network deployment and operation with its VM-ready capabilities, such as XNV and Direct Attach™. Extreme Networks XNV allows auto-configuration of Virtual Port Profiles (VPP) to automatically detect and provision network policies in a virtualized data center in a hypervisor agnostic manner, providing simplicity in managing mobility in data centers. If a VM is moved from one physical server to the other, associated port policies on the connecting switch port are automatically moved, making an effortless change. The BlackDiamond X8 features redundant management modules with dual core Intel i7-based high-performance processors, communicating with each module in the system at gigabit speeds.

Reliable Delivery of Converged Storage Traffic

The BlackDiamond X8 supports Data Center Bridging (DCB) for reliable storage traffic. With IEEE compliant implementation of Priority Flow Control (PFC) and Enhanced Transmission Selection (ETS), storage traffic can be prioritized, queued separately and bandwidth guaranteed. This can provide a highly reliable and yet flexible and cost-effective network to provision storage services.

High Availability

The BlackDiamond X8 prevents single points of failure in hardware components through isolated control and data planes, fully redundant 1+1 management modules, N+1 redundancy for the switching fabric, and N+1 redundancy at the fan level combined with dynamic temperature control. For the power system, BlackDiamond X8 offers N+1 redundancy for power supply failure, and simultaneously supports N+N for power source redundancy.


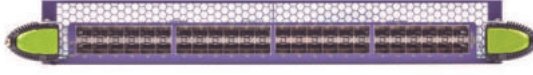


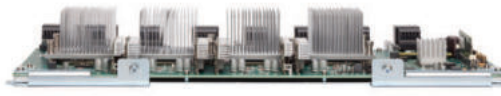
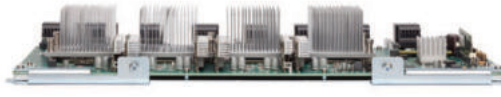


The modular architecture of ExtremeXOS also contributes to the high availability of the system. ExtremeXOS software increases network availability by monitoring independent operating system processes in real time. If any of these processes become unresponsive, or stop running, they can be automatically restarted without impacting other processes. The BlackDiamond X8 runs a set of high availability protocols, including Multi-Switch Link Aggregation (MLAG) and Ethernet Automatic Protection Switching (EAPS), allowing the network to provide uninterrupted connectivity in the event of a failover, delivering a high level of resiliency and uptime. MLAG links between BlackDiamond X8 switches provide full active-active network-level redundancy. In most failover situations, inter-data center traffic does not drop and digital video feeds do not freeze or pixelize because EAPS allows the network to recover almost transparently from link failure (in less than 50 milliseconds in most cases).

Lower Operating Costs

The BlackDiamond X8 is designed to be efficient, with power consumption as low as 5.6 Watts per 10GbE and 22.5 Watts per 40GbE port. Front-to-back cooling helps data center network operators optimize the cooling environment. Fan speed is dynamically controlled and is set no higher than required. This allows efficient use of the cool air from the cold aisle and produces lower heat in the hot aisle.



Technical Specifications

Modules and Density	
Component	Minimum Requirement and Maximum Density
	<p>Management Module</p> <ul style="list-style-type: none"> • 2 Management Modules for 1+1 control plane redundancy • Minimum 1 required
	<p>48-Port 10GbE Interface Module</p> <ul style="list-style-type: none"> • 8 Interface Modules maximum • Maximum 384 10GbE wire-speed ports • Supports 1/10GbE SFP/SFP+ optics and cables
	<p>12-Port 40GbE Interface Module</p> <ul style="list-style-type: none"> • 8 Interface Modules maximum • Maximum 96 40GbE or 384 10GbE wire-speed ports • Supports 40GbE QSFP+ optics and cables
	<p>24-Port 40GbE Interface Module</p> <ul style="list-style-type: none"> • 8 Interface Modules maximum • Maximum 192 40GbE or 768 10GbE wire-speed ports • Supports 40GbE QSFP+ optics and cables
	<p>2.56Tbps (10T) Switch Fabric Module</p> <ul style="list-style-type: none"> • 4 SFM total for 10.24Tbps capacity and N+1 redundancy • Minimum 3 required for wire-speed • Cannot be mixed with 5.12Tbps SFM or 24x40GbE module
	<p>5.12Tbps (20T) Switch Fabric Module</p> <ul style="list-style-type: none"> • 4 SFM total for 20.48Tbps capacity and N+1 redundancy • Minimum 3 required for wire-speed • Cannot be mixed with 2.56Tbps SFM
	<p>Fan Tray</p> <ul style="list-style-type: none"> • 5 Fan Trays total • All 5 required (ship with the chassis)
	<p>2500W AC Power Supply</p> <ul style="list-style-type: none"> • 8 Power Supplies total • N+1 and N+N level power redundancy



BlackDiamond X8 Series

General Specifications

Performance

- 20.48 Tbps data switching capacity, 30,476 MPPS forwarding rate
- Store-and-Forward and Cut-Through switching support
- 2.3 micro-second port-to-port latency (64-byte packet)

Density

- 10 GbE Port Density:
 - 768 wire-speed 10GBASE-X SFP+ ports using 24-port 40 GbE I/O module
 - 384 wire-speed 10GBASE-X SFP+ ports using 48-port 10 GbE or 12-port 40 GbE I/O module
- 40 GbE Port Density:
 - 192 wire-speed 40GBASE-X QSFP+ ports using 24-port 40 GbE I/O module
 - 96 wire-speed 40GBASE-X QSFP+ ports using 12-port 40 GbE I/O module

Scale

- MAC Addresses: 128K
- IPv4 Host Addresses: 16K, up to 28K per switch
- IPv4 LPM Entries: 16K

- IPv6 Host Addresses: 6K
- IPv6 LPM Entries: 8K
- 4,094 VLANs (Port, Protocol, IEEE 802.1Q)
- 9216 Byte maximum packet size (Jumbo Frame)
- 384 load sharing trunk groups, up to 16 members per trunk
- 2,048 ingress and 1,024 egress ACL rules per group of 24 10GbE or 6 40GbE ports
- 1,024 ingress ACL meters and 512 egress ACL meters per group of 24 10GbE or 6 40GbE ports
- Ingress and egress bandwidth policing/rate limiting per flow/ACL
- Egress bandwidth rate shaping per egress queue and per port
- 8 QoS egress queues per port
- Rate Limiting granularity: 8 Kbps – 1Mbps

CPU, Memory

- Intel i7 Dual Core 2GHz
- 2GB ECC DDR3 SDRAM
- 1GB Compact Flash

LED Indicators

- Per port status LED for link/packet activity
- System Status LEDs: management, fan, fabric and interface modules and power supplies

Physical Specifications

Product dimensions and weights without packaging:

	Chassis		Management Module		Switch Fabric Module		Interface Module		Fan Tray		Power Supply	
	inches	cm	inches	cm	inches	cm	inches	cm	inches	cm	inches	cm
Rack Units	14.5											
Height	25	63.5	3	7.6	20	50.8	3	7.6	24	60.9	1.5	3.8
Width	18	45.7	8	20.3	3	7.6	17	43.1	4	10.1	4.2	10.6
Depth	30	76.2	18	45.7	10	25.4	18	45.7	3	7.6	14.5	36.8
	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
Weight (loaded)	420.6	190.7										
Weight (regular)	187.4	85.0	5.5	2.5	9.2	4.1	10.9	4.9	6.2	2.8	5.3	2.4
					10T SFM		48-Port 10GbE					
					9.2	4.1	11.0	5.0				
					20T SFM		12-Port 40GbE					
							14.0	6.3				
							24-Port 40GbE					



Operating Specifications

- Operating Temperature Range: 0° C to 40° C (32° F to 104° F)
- Operating Humidity: 10% to 95% relative humidity, non-condensing
- Operational Altitude: up to 2000m (6561 feet)
- Operational Shock: 30 m/s² (3g), 11ms, 60 Shocks
- Operational Random Vibration: 3-500MHz @ 1.5g rms

Packaging and Storage Specifications

- Storage/Transportation Temperature: -40° C to 70° C (-40° F to 158° F)
- Storage and Transportation Humidity: 10% to 93% RH
- Packaged Shock (Half Sine):
 - < 50 kg 180 m/s² (10 g), 6 ms, 600 shocks, modules
 - > 50 kg 100 m/s² (6 g), 11 ms, 600 shocks, chassis
- Packaged Sine Vibration: 5-62 Hz @ Velocity 5mm/s, 62-500 Hz @ 0.2G
- Packaged Random Vibration: 5-20Hz @ ASD=1.0 & 20-200Hz @ -3dB/octave
- Packaged drop height
 - @ 39.5" <22 lb (10 kg) modules
 - @ 11.8" <110 lb (50 kg) chassis

Regulatory/Safety

North American Safety

- cULus 60950-1:2007 2nd Ed., Listed Device (U.S.)
- CSA 22.2#60950-1-03 1st Ed. 2006-07 (Canada)
- Complies with FCC 21CFR Chapter1, Subchapter J (U.S. Laser Safety)
- CDRH Letter of Approval (U.S. FDA Approval)

European Safety

- CB Scheme, IEC 60950-1:2005+National Deviations
- EN 60825-1:2007 (Lasers Safety)
- 206/95/EC Low Voltage Directive

International Safety

- GS Mark, IEC 60950-1:2006 2nd Edition
- AS/NZS 60950-1 (Australia/New Zealand)

EMI/EMC Standards

North American EMC Standards

- FCC CFR 47 part 15 Class A (U.S.)
- ICES-003 Class A (Canada)

European EMC Standards

- EN 55022:1998 Class A
- EN 55024:1998 Class A
- EN 55011:2009+A1:2010
- EN 61000-3-2:2006+A2:2009 (Harmonics)
- EN 61000-3-3:2008 (Flicker)
- EN 61000-6-4:2007 (Emissions for Industrial, Scientific & Medical)
- EN 61000-6-2:2005 (Immunity for Industrial, Scientific & Medical)
- ETSI EN 300 386 v1.5.1 (2010-4) EMC Telecommunications
- 2004/108/EC EMC Directive

International EMC Certifications

- CISPR 22:2008 Ed 5.2), Class A (International Emissions)
- CISPR 24:2010 Class A (International Immunity)
- IEC 61000-4-2:2008 Electrostatic Discharge, 8kV Contact, 15kV Air, Criteria A
- IEC 61000-4-3:2008+A2:2010 Radiated Immunity 10V/m, Criteria A
- IEC 61000-4-4:2004 aml ed.2.1 2011 Transient Burst, 1kV, Criteria A
- IEC 61000-4-5 2005 Surge, 2kV, 4kV, Criteria A
- IEC 61000-4-6:2008 Conducted Immunity, 0.15-80MHz, 10V/m unmod. RMS, Criteria A
- IEC 61000-4-11 Power Dips & Interruptions, >30%, 25 periods, Criteria C

Country Specific

- Japan Class A (VCCI)
- Australia/New Zealand, C-Tick (ACMA)
- Taiwan EMC CNS 13438(95) Class A, Safety CNS 14336-1(2010) (BSMI)
- Mexico (via NRTL Listing)
- South Korea KN22, KN24 (KCC)

Telecommunication Standards

- ETSI EN 300 386 v1.5.1 (2008-04) EMC Telecommunications
- ETSI EN 300 019 (Environmental for Telecommunications)

IEEE 802.3 Media Access Standards

- IEEE 802.3z 1000BASE-X
- IEEE 802.3ae 10GBASE-X
- IEEE 802.3ba 40GBASE-X
- IEEE 802.3ac VLAN Tag
- IEEE 802.3ad Link Aggregation

Operational and Transportation Standards

- EN/ETSI 300 019-2-1 v2.1.2 – Class 1.2 Storage
- EN/ETSI 300 019-2-2 v2.2.1 – Class 2.3 Transportation
- EN/ETSI 300 019-2-3 v2.2.2 – Class 3.1e Operational
- EN/ETSI 300 753 v1.2.1 (2009-7) – Acoustic Noise
- ASTM D3580 Random Vibration Unpackaged 1.5G

Fan and Acoustic Noise

- Sound pressure for comparison to legacy standards
 - Low Speed: 60.3 dB(A) per ISO 7779:2010
 - Medium Speed: 66.0 dB(A) per ISO 7779:2010
 - High Speed: 82.3 dB(A) per ISO 7779:2010
- Sound power in accordance with EN 300 753 v1.3.1 (2011-11)
 - Low Speed: 72.0 dB(A) per ISO 3744:2010
 - Medium Speed: 78.0 dB(A) per ISO 3744:2010
 - High Speed: 94.4 dB(A) per ISO 3744:2010
- Declared sound power in accordance with EN 300 753 v1.3.1 (2011-11)
 - Low Speed: 7.5 dB(A) in accordance with ISO 9296:2010

- Medium Speed: 8.1 dB(A) in accordance with ISO 9296:2010
- High Speed: 9.7 dB(A) in accordance with ISO 9296:2010

Warranty

- Ltd. 1-year on Hardware
- 90-days on Software
- For warranty details, visit www.extremenetworks.com/go/warranty

Power Specifications

Power Supply

- Rated Inputs:
 - Low Range: 100-120VAC, 60/50 Hz, 13 A max each power supply
 - High Range: 200-240VAC, 60/50 Hz, 13 A max each power supply
- Input Ranges:
 - Low Range: 90 -132VAC, 47 - 63 Hz
 - High Range: 185 - 264VAC, 47 - 63 Hz
- Power supply input socket IEC 320 C20
- Power cord input plug IEC 320 C19
- Power cord-sets up to 2m (6.5ft) length require minimum 16 AWG (1.0 mm²) copper stranded wire
- Power cord-sets greater than 2m (6.5ft) length require minimum 14 AWG (1.25 mm²) copper stranded wire
- (The power supply cord-set wall plug must be appropriately rated and approved for the country of installation)
- Efficiency 90% typical at full load
- DC voltage output range: 47.5 to 48.5 Vdc
- Nominal DC output:
 - Low Range: 48 Vdc, 25 A maximum each PSU
 - High Range: 48 Vdc, 50 A maximum each PSU
- DC output power:
 - 2500W @ high range for one PSU (See manual for more than one PS)
 - 1250W @ low range for one PSU (See manual for more than one PS)

Power Consumption

- Worst case power consumption and heat load (With 10Tbps SFM):
 - 4,436 W at output of power supplies
 - 4,929 W at input of power supplies
 - 16,817 BTU/Hour total heat load
- Worst case power consumption and thermal (With 20Tbps SFM):
 - 6,532 W at output of power supplies
 - 7,258 W at input of power supplies
 - 24,764 BTU/Hour total heat load
- Typical power consumption: *
 - 5.6 W per 10GbE, 22.5 W per 40GbE



*Per-port power is based on ATIS calculation per Lippis test report.

ExtremeXOS Supported Protocols

The BlackDiamond X8 switch supports ExtremeXOS version 15.1 or later.
Supported protocols and features can be reviewed in the latest
ExtremeXOS data sheet available at: <http://extremenetworks.com/go/xos>

Ordering Information

Part Number	Product Name	Description
Base Products		
48001	BDX8-AC	BlackDiamond X8 Series chassis with 8 I/O slots. Chassis includes 5 Fan Trays. Power Supplies or Blank Panels are not included
Module Options		
48021	BDX-MM1	Management Module 1 for BlackDiamond X series chassis. 2 modules required for 1+1 redundancy
48032	BDXA-FM10T	2.56Tbps Fabric Module for BlackDiamond X chassis. Minimum 3 modules required for wirespeed performance, 4 required for N+1 redundancy supporting full 10Tbps
48031	BDXA-FM20T	5.12Tbps Fabric Module for BlackDiamond X chassis. Minimum 3 modules required for wirespeed performance, 4 required for N+1 redundancy supporting full 20Tbps
48041	BDXA-10G48X	48-Port 10GBASE-X SFP+ module for BlackDiamond X series chassis. Up to 8 modules in the BlackDiamond X8 chassis support up to 384 wirespeed 10GbE ports and work with either 2.56 or 5.12Tbps Fabric Modules. Optics and cables are not included
48046	BDXA-40G12X	12-Port 40GBASE-X QSFP+ module for BlackDiamond X series chassis. Up to 8 modules in the BDX8 chassis support up to 96 wirespeed 40GbE or 384 wirespeed 10GbE ports and work with either 2.56 or 5.12Tbps Fabric Modules. Optics and cables are not included
48051	BDXA-40G24X	24-Port 40GBASE-X QSFP+ module for BlackDiamond X series chassis. Up to 8 modules in the BDX8 chassis support up to 192 wirespeed 40GbE or 768 wirespeed 10GbE ports and only work with 5.12Tbps Fabric Module. Optics and cables are not included
Accessories, Power Supplies and Fan (Spare)		
48015	BDX8-FAN	Fan Tray for BlackDiamond X8 chassis, spare. 5 fan trays required in the system
48011	BDX-PSU-AC2500	2500W AC Power Supply for BlackDiamond X series chassis. Up to 8 supported in the BDX8 chassis
48019	BDX-IO-BLANK	Blank Panel for BlackDiamond X series chassis for empty I/O module slot
48020	BDX8-MMK	Mid Mount Kit for BlackDiamond X8 chassis
Software Licenses		
48091	BDX-CORE-LIC	Core license for the BlackDiamond X8 chassis for scalable Layer 3 rich applications
48093	BDX-MPLS-LIC	MPLS Feature Pack license for the BlackDiamond X8 chassis
11011	BDX Direct Attach	Direct Attach Feature Pack for Summit X450a/X460/X480, X650, X670 and BlackDiamond 8800, X Series
Power Cables		
10080	Pwr Cord, 16A,NEMA 6-20P,C19	Power Cord, 16A, NEMA 6-20P, IEC320-C19
10081	Pwr Cord, 16A,CEE 7/7,C19	Power Cord, 16A, CEE 7/7, IEC320-C19
10084	Pwr Cord, 15A,AS/NZZS3112,C19	Power Cord, 15A, AS/NZZS3112, IEC320-C19
10087	Pwr Cord, 13A,BS1363,C19	Power Cord, 13A, BS1363, IEC320-C19
GbE Optics and Cables		
10051	SX mini-GBIC	Mini-GBIC SFP, 1000BASE-SX, MMF 220 & 550 meters, LC connector
10052	LX mini-GBIC	Mini-GBIC SFP, 1000BASE-LX, MMF 220 & 550 meters, SMF 10km, LC connector



10053	ZX mini-GBIC	Mini-GBIC SFP, 1000BASE-ZX, SMF 70km, LC connector
10064	LX100 mini-GBIC	Mini-GBIC, SFP, Extra long distance SMF 100 Km/30 dB budget, LC connector
10056	1000BASE-BX-D BiDi SFP	1000BASE-BX-D SFP, 1490-nm TX/1310-nm RX wavelength
10057	1000BASE-BX-U BiDi SFP	1000BASE-BX-U SFP, 1310-nm TX/1490-nm RX wavelength
10071	SX SFP 10 Pack	SX SFP 10 Pack
10072	LX SFP 10 Pack	LX SFP 10-Pack, Package of ten 1000BaseLX SFPs, LC connector, 10km-20km transmission with SMF and 550m transmission with MMF
10GbE Optics and Cables		
10301	SR SFP+ module	10 Gigabit Ethernet SFP+ module, 850nm, MMF 26-300m link, LC connector
10302	LR SFP+ module	10 Gigabit Ethernet SFP+ module, 1310nm, SMF 10km link, LC connector
10303	LRM SFP+ module	10 Gigabit Ethernet SFP+ module, 1310nm, MMF 220m link, LC connector
10309	ER SFP+ module	10 Gigabit Ethernet SFP+ module, 1550nm, SMF 40km link, LC connector
10304	1m SFP+ Cable	10 Gigabit Ethernet SFP+ passive cable assembly, 1m length
10305	3m SFP+ Cable	10 Gigabit Ethernet SFP+ passive cable assembly, 3m length
10306	5m SFP+ Cable	10 Gigabit Ethernet SFP+ passive cable assembly, 5m length
10307	10m SFP+ Cable	10 Gigabit Ethernet SFP+ passive cable assembly, 10m length
40GbE Optics and Cables		
10319	QSFP+ SR4 module	40 Gigabit Ethernet QSFP+ SR4 optical module, MPO connector, 100m link length
10311	0.5m QSFP+ Passive Copper Cable	40 Gigabit Ethernet QSFP+ passive copper cable assembly, 0.5m length
10312	1m QSFP+ Passive Copper Cable	40 Gigabit Ethernet QSFP+ passive copper cable assembly, 1m length
10313	3m QSFP+ Passive Copper Cable	40 Gigabit Ethernet QSFP+ passive copper cable assembly, 3m length
10315	10m QSFP+ Active Optical Cable	40 Gigabit Ethernet QSFP+ active optical cable assembly, 10m length
10316	20m QSFP+ Active Optical Cable	40 Gigabit Ethernet QSFP+ active optical cable assembly, 20m length
10318	100m QSFP+ Active Optical Cable	40 Gigabit Ethernet QSFP+ active optical cable assembly, 100m length
10321	QSFP+ - 4xSFP+ fan-out cbl, 3m	QSFP+ to 4 x SFP+ fan-out copper cable, 3m
10322	QSFP+ - 4xSFP+ fan-out cbl, 5m	QSFP+ to 4 x SFP+ fan-out copper cable, 5m



Make Your Network Mobile

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