

Summit X650 Series



The Summit X650 series switch is a purpose-built top-of-rack switch designed for emerging 10 Gigabit Ethernet-enabled servers deployed in enterprise data centers. Summit X650 helps optimize new server deployments while providing a seamless migration path from existing Gigabit Ethernet-based servers to 10 Gigabit Ethernet-based high-performance servers to start the transition to the new virtualized environment.

Summit X650 provides high density for 10 Gigabit Ethernet in a small 1RU form factor for up to 32 ports in one system and 192 ports in a stacked system. Summit X650 offers two advanced 10 Gigabit Ethernet technologies: 10GBASE-T and SFP+ to accommodate the needs for both copper twisted pair cable and optical fiber-based 10 Gigabit Ethernet.

With its versatile design, Summit X650 provides high density Layer 2/3 switching with low latency cut-through switching and IPv4 and IPv6 unicast and multicast routing to enable enterprise aggregation and core backbone deployment in AC-powered and DC-powered environments.

Summit X650 simplifies network operation with the ExtremeXOS modular OS, used amongst Extreme Networks Ethernet switches. The ExtremeXOS operating system provides high availability and simplicity with one OS everywhere in the network.

Target Applications

- Top-of-rack switch for servers in enterprise data centers
- High-performance 10 GbE core switch for a small network
- High-performance 10 GbE aggregation switch in a traditional three-tiered network
- An ideal choice for 10 GbE Carrier Ethernet access and PON OLT aggregation
- Interconnect switch providing low latency connections for High Performance Cluster Computing (HPCC)



Summit® X650 Series—The ultimate top-of-rack 10 Gigabit Ethernet switch.

High-Performance Switching and Routing

- 24-port 10 Gigabit Ethernet non-blocking switching in 1 Rack Unit (RU) form factor with standard option to provide 40 Gbps SummitStack™ stacking and 4-port Gigabit SFP ports
- Optional 8-port 10 Gigabit Ethernet module to provide 80 Gbps uplinks and 40 Gbps SummitStack
- Optional 256 Gbps stacking for up to 192 10 Gigabit Ethernet ports in one logically integrated unit, or optional SummitStack-V long-reach stacking via 10 GbE ports
- Optional 512 Gbps stacking for connecting two Summit X650 switches to provide 48 non-blocking 10 Gigabit Ethernet ports

Versatile Architecture

- ExtremeXOS® Operating System—a highly available, secure, open and extensible network foundation
- 10 Gigabit Ethernet over UTP cable and SFP+ for fiber and passive copper direct host attach installation
- Dual Speed support on 10 Gigabit Ethernet and Gigabit Ethernet on 10GBASE-T and SFP+ ports providing smooth migration from Gigabit Ethernet to 10 Gigabit Ethernet

High Availability

- ExtremeXOS modular OS for highly available network operation
- Extends high availability across switches with Multi-Switch Link Aggregation (M-LAG)
- Carrier-grade redundant networking protocol including Ethernet Automatic Protection Switching (EAPS)
- Internal redundant AC/DC power supply and field replaceable fan tray

Comprehensive Security

- Robust MAC and IP security framework
- Threat detection and response with CLEAR-Flow Security Rules Engine
- Common Criteria EAL3+ Certification



Make Your Network Mobile

High-Performance Switching and Routing

Summit X650 offers intelligent switching and routing with exceptional high-performance stacking technology for next generation enterprise data centers—as well as dedicated 10 Gigabit Ethernet uplink capabilities powered by the ExtremeXOS modular OS. With its low packet forwarding latency, Summit X650 helps enhance the data center and the HPCC environment.

10 Gigabit Ethernet Switching

Summit X650 offers 24-port 10 Gigabit Ethernet non-blocking switching with IEEE 802.3an standard-based 10GBASE-T interfaces or 10GBASE-X SFP+ interfaces. Summit X650 is capable of Layer 2 and Layer 3 forwarding at 363 million packets per second forwarding rate in a small 1RU form factor, enabling the next generation high-performance server deployment in data centers.

With its flexible architecture provided by the Versatile Interface Modules (VIMs), you can configure Summit X650 to best suit your network needs (see Figure 1).

SummitStack Support

Summit X650 supports compatible SummitStack solutions available in the popular Summit X250e, X450e, X450a, X460 and X480 series switches. Support for SummitStack offers a great migration path from gigabit-enabled servers to the new high-performance 10 gigabit-enabled servers. You can configure two SummitStack 40G stacking ports to provide ease of management for gigabit and 10 gigabit mixed stacking. SummitStack is provided through the standard VIM1-SummitStack module installed by default.

10 Gigabit Optimized Stacking Support

For higher density 10 Gigabit Ethernet requirements now or in the future, Summit X650 provides a 10 gigabit optimized stacking solution. Summit X650 offers an optional SummitStack256 module which provides up to 256 Gbps full duplex stacking bandwidth. With the SummitStack256 solution, Summit X650 can provide 256 Gbps stacking bandwidth optimized for high-density 10 Gigabit Ethernet switching and provides up to 192 10 Gigabit Ethernet ports with only 8RU of

height in a fully redundant configuration. Summit X650 also offers an optional 48-port 10 Gigabit Ethernet non-blocking configuration by stacking two Summit X650 switches together with an optional VIM1-SummitStack512 module.

SummitStack-V-Flexible Stacking Over 10 Gigabit Ethernet

SummitStack-V capability utilizes 10 GbE ports as stacking ports, enabling the use of standard cabling and optics technologies used for 10 GbE such as XFP, SFP+, 10GBASE-T and XENPAK. SummitStack-V provides long-distance stacking connectivity of up to 40 km while reducing the cable complexity of implementing a stacking solution. SummitStack-V enabled 10 GbE ports must be physically direct-connected. SummitStack-V is compatible with Summit X450e, X450a, X460, X480, X650 and X670/X670V switches running the same version of ExtremeXOS.

Dedicated Uplinks at 80 Gbps

Summit X650 can support an additional 8-ports of 10 Gigabit Ethernet by installing the optional VIM-10G8X module which offers 8-port 10 Gigabit Ethernet SFP+ ports as well as SummitStack 40G ports. With this option, you can maximize the number of interfaces for servers up to 24 ports while using the dedicated 8-port 10 Gigabit Ethernet for uplink connectivity. The optional VIM1-10G8X provides ideal bandwidth to the backbone by offering 80 Gbps aggregated bandwidth. With this 8-port 10 Gigabit Ethernet SFP+ module, Summit X650 can support up to 32 ports of 10 Gigabit Ethernet in a 1RU form factor. This option provides 3:1 oversubscription from front ports (total 24 ports) to uplink ports (total 8 ports) and maximizes server port density. Both in star and ring topologies, this architecture helps build a 10 Gigabit Ethernet data center or HPCC application (see Figure 2).

VIM Options	VIM1-SummitStack (default option)	VIM1-10G8X	VIM1-SummitStack256	VIM1-SummitStack512
Summit X650-24t	24 x 10GBASE-T SummitStack (shared with the last two 10GBASE-T ports) 4 x 1000BASE-X (SFP)	24 x 10GBASE-T and 8 x 10GBASE-X (SFP+) 2 x SummitStack	24 x 10GBASE-T SummitStack256	24 x 10GBASE-T SummitStack512
Summit X650-24x	24 x 10GBASE-X (SFP+) SummitStack (shared with the last two 10GBASE-X SFP+ ports) 4 x 1000BASE-X (SFP)	24 x 10GBASE-X (SFP+) and 8 x 10GBASE-X (SFP+) 2 x SummitStack	24 x 10GBASE-X (SFP+) SummitStack256	24 x 10GBASE-X (SFP+) SummitStack512

Figure 1: Summit X650 Port Configurations and Options



High-Performance Switching and Routing

High-Performance Cluster Computing (HPCC)

Ethernet-based HPCC installations have been increasing because of its highly economical architecture and lower cost of operation. With Summit X650, the cluster can be connected via 10 Gigabit Ethernet and with its low latency, Summit X650 helps increase the computing power for HPCC systems.

Supports Virtualized Data Centers

With the optional feature pack, Summit X650 switches also support Direct Attach™, which eliminates the virtual switch layer, simplifying the network and improving performance. Direct Attach enables data center simplification by reducing network tiers from 4 or 5 tiers to just 3 or 2 tiers, depending on the size of the data center.

To further enhance data center operations, Summit X650 switches support XNV™ (ExtremeXOS Network Virtualization), a set of software modules for the ExtremeXOS based switching product portfolio, and available via the Data Center Feature Pack for Extreme Networks Ridgeline™, a network and service management application. XNV brings insight, control and automation for highly virtualized data centers to the network.

Summit X650 switches also support Priority-based Flow Control (PFC, or IEEE 802.1Qbb), which allows network traffic to be controlled independently based on Class of Service. PFC allows network traffic that requires lossless traffic to be prioritized, while other traffic types that do not require or perform better without PFC can continue as normal. PFC is supported on Summit X650-24t or -24x (part number 17001B or 17002B) with the VIM1-10G8X module (part number 17012B).

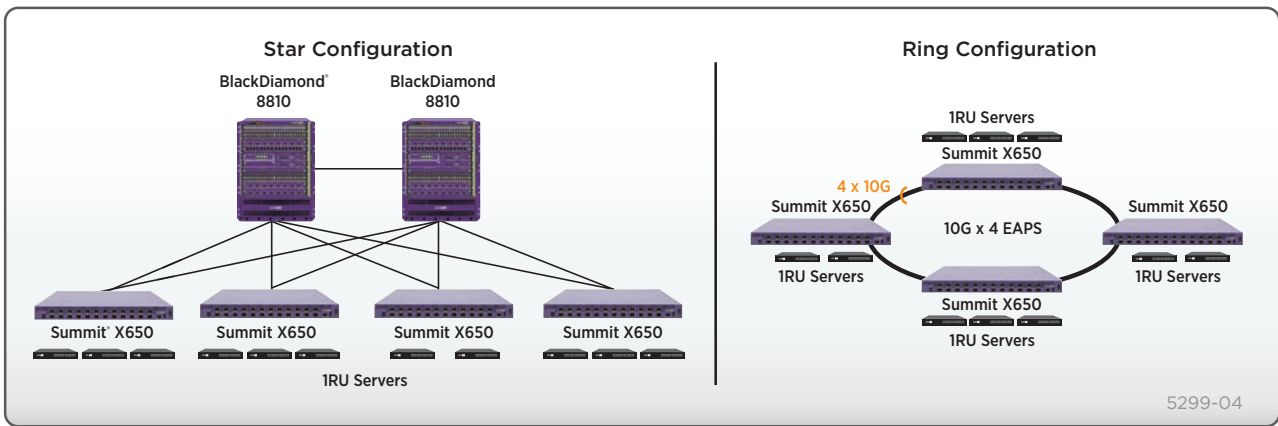


Figure 2: Summit X650 High Speed Uplink Option



Versatile Architecture

Summit X650 is designed to help deploy multiple applications that require high-performance 10 Gigabit Ethernet switching and routing. By offering enterprise core class scalability, Summit X650 can be used anywhere you need 10 Gigabit Ethernet.

Enterprise Core Class Routing and Switching Scalability

In the enterprise campus network, there is a need for cost-effective 10 Gigabit Ethernet switches, both in small-sized core backbone and in traditional three tier network architectures. Summit X650 not only offers next generation server aggregation, but also offers the 10 Gigabit Ethernet campus aggregation application with its core class routing and switching scalability. Summit X650 can support up to 12,000 IPv6 longest prefix matching routing tables, 6,000 IP ARP entries and 2,000 IP multicast group entries. Summit X650 switch's true versatility simplifies network deployment.

One Operating System

Extreme Networks provides simple network operation for the Ethernet switching products by offering one common OS throughout the entire ExtremeXOS switching portfolio. From 10/100 Mbps switching products such as Summit X150 and Summit X250e to the multi-10 gigabit core backbone BlackDiamond® modular chassis switches, all switches run exactly the same version of the OS, which helps deploy, operate and maintain your entire network.

Multiple Choices: UTP, Passive Copper or Fiber Optical Installation

With two models, Summit X650 provides a variety of configuration options from which to choose. One solution is based upon the latest IEEE standard specification called IEEE 802.3an, 10GBASE-T 10 Gigabit Ethernet over UTP.

10GBASE-T supports simpler cabling infrastructure, industry-standard and commonly used unshielded twisted pair cable, and can support up to 100 meters with Category 6a or 55 meters with Category 6 or 5e cable. 10GBASE-T is the first standard which provides a 100 meter solution over a copper cable infrastructure. The other solution is based upon the latest MSA technology called SFP+. The SFP+ model can support both passive copper cable for up to 10 meters and fiber optical cable installation with SFP+ fiber optical transceivers (see Figure 3).

Dual Speed Support

Both 10GBASE-T and SFP+ support the flexible, dual interface speed of 10 gigabit and gigabit. 10GBASE-T ports can auto-negotiate down to 1000BASE-T to provide a unified switch infrastructure for both 10GBASE-T and 1000BASE-T with UTP cable. SFP+ ports can take both 10 gigabit SFP and gigabit SFP, and depending upon the pluggable optics you choose, SFP+ can work in both modes.

Optimized Air Ventilation

Most of the servers installed in a standard 19-inch rack system flow air from front-to- back to maximize their cooling performance. Compared to side-to-side air flow, front-to-back air flow gives more effective cooling throughout the rack system in the data center. Summit X650 has a field-replaceable fan tray offering effective front-to-back air flow.



Versatile Architecture



SFP+ Optics



10GBASE-CR SFP+ Passive Copper Cable

SFP Modules	Summit X650-24x	VIM1-10G8X
	24 x SFP+ ports	8 x SFP+ ports
1000BASE-SX SFP	Yes*	Yes
1000BASE-LX SFP	Yes*	Yes
1000BASE-ZX SFP	Yes*	Yes
1000BASE-LX100 SFP	Yes*	Yes
10/100/1000BASE-T SFP	Yes*	Yes
1000BX-D/U SFP	Yes*	Yes
10GBASE-SR SFP+	Yes	Yes
10GBASE-LR SFP+	Yes	Yes
10GBASE-ER SFP+	Yes	Yes
10GBASE-CR SFP+ 1m - 10m	Yes	Yes
10GBASE-LRM SFP+	Yes	Yes

Technology	Cabling	Support Link Segments Distances
10GBASE-T	Category 6a	100 meters
	Category 6	55 meters
	Category 5e	55 meters
10GBASE-X SFP+	Multimode Fiber / 10GBASE-SR	300 meters
	Singlemode Fiber / 10GBASE-LR	10,000 meters
	Singlemode Fiber / 10GBASE-ER	40,000 meters
	Passive Copper / 10GBASE-CR	1-10 meters
	Multimode Fiber / 10GBASE-LRM	220 meters

* Excludes port number 23 and port number 24

Figure 3: Summit X650 10 Gigabit Ethernet Cable Options



High Availability

Powered by the ExtremeXOS OS, Summit X650 supports process recovery and application upgrades without the need for a system reboot. Summit X650 provides the high network availability required for mission-critical servers and applications through its advanced modular OS, highly available hardware architecture and carrier-grade network redundancy protocols.

Modular Operating System for Non-Stop Operation

Preemptive Multitasking and Protected Memory

Summit X650 series switch allows each of many applications—such as Open Shortest Path First (OSPF) and Spanning Tree Protocol (STP)—to run as separate OS processes that are protected from each other. This drives increased system integrity and inherently protects against DoS attacks.

Process Monitoring and Restart

ExtremeXOS increases network availability using process monitoring and restart. Each independent OS process is monitored in real time. If a process becomes unresponsive or stops running, it can be automatically restarted.

Loadable Software Modules

The modular design of ExtremeXOS OS allows the upgrading of individual software modules, should this be necessary, leading to higher availability in the network (see Figure 4).

High Availability Network Protocols

Ethernet Automatic Protection Switching (EAPS)

EAPS allows the IP network to provide the level of resiliency and uptime that users expect from their traditional voice network. EAPS is more adaptable than Spanning Tree or Rapid Spanning Tree protocols and offers sub-second (less than 50 milliseconds) recovery that delivers consistent failover regardless of the number of VLANs, network nodes or network topology. Since EAPS allows the network to recover almost transparently, Voice-over-IP (VoIP) calls will not drop and digital video feeds will not freeze or pixelize in most situations.

Spanning Tree/Rapid Spanning Tree Protocols

Summit X650 supports Spanning Tree (802.1D), Per VLAN Spanning Tree (PVST+), Rapid Spanning Tree (802.1w) and Multiple Instances of Spanning Tree (802.1s) protocols for Layer 2 resiliency.

Software-Enhanced Availability

Software-enhanced availability allows users to remain connected to the network even if part of the network infrastructure is down. Summit X650 continuously checks for problems in the uplink connections using advanced Layer 3 protocols such as OSPF, VRRP and Extreme Standby Router Protocol™ (ESRP, supported in Layer 2 or Layer 3), and dynamically routes traffic around the problem.

Equal Cost Multipath

Equal Cost Multipath (ECMP) routing allows uplinks to be load balanced for performance and cost savings while also supporting redundant failover. If an uplink fails, traffic is automatically routed to the remaining uplinks and connectivity is maintained.

Link Aggregation (802.3ad)

Link aggregation allows trunking of up to eight links on a single logical connection, for up to 80 Gbps of redundant bandwidth per logical connection.

Multi-Switch LAG (M-LAG)

M-LAG can address bandwidth limitations and improve network resiliency, in part by routing network traffic around bottlenecks, reducing the risks of a single point of failure, and allowing load balancing across multiple switches.

Voice-Grade Stacking with SummitStack

All SummitStack stacking architecture is designed to support mission-critical applications by its highly available, rapid failover capability with n-1 master redundancy, distributed Layer 2 and Layer 3 switching, link aggregation across the stack, and distributed uplinks. SummitStack supports up to eight units in a stack (the mixture of the units can be Summit X650, X480, X460, X450a, X450e and X250e) providing 50 milliseconds failover for path failure and hitless master/backup failover along with hitless protocol support such as OSPF graceful restart and Network Login user authentication. Summit X650 provides chassis-like management and availability with its SummitStack stacking technology (see Figure 5).

Hardware Redundancy

Summit X650 supports a dual redundant AC/DC power supply, to provide high availability. Power supply can be hot-swapped and replaced should it fail. Summit X650 supports a removable fan with field replaceability.



High Availability

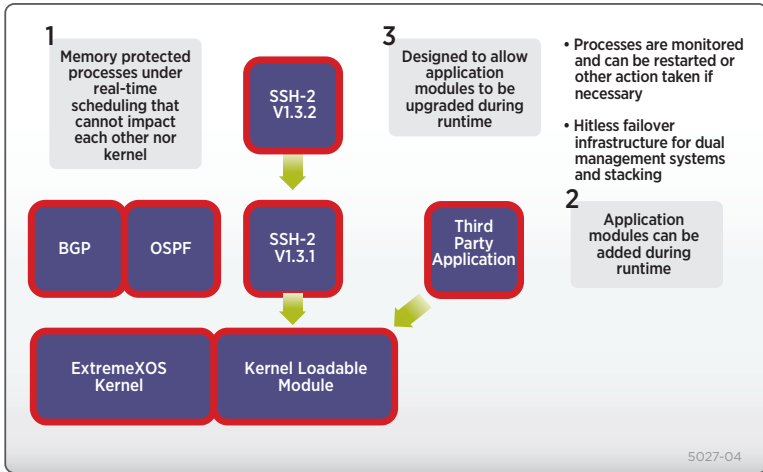


Figure 4: ExtremeXOS Modular Design

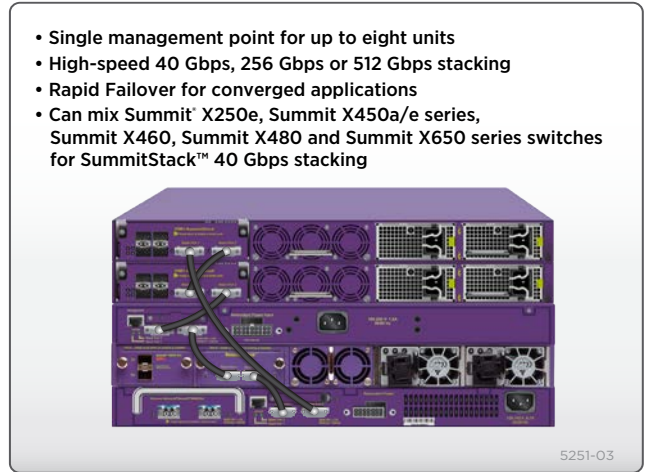


Figure 5: SummitStack Stacking Architecture



Comprehensive Security

Implementing a secure network means providing protection at the network perimeter as well as the core. Working together with Extreme Networks Sentiariant® family of products, Summit X650 uses advanced security functions to protect your network from known or potential threats.

Robust IP and MAC Security Framework

Media Access Control (MAC) Lockdown

MAC security allows the lockdown of a port to a given MAC address and to limit the number of MAC addresses on a port. This can be used to dedicate ports to specific hosts or devices such as VoIP phones or printers and avoid abuse of the port—a capability that can be especially useful in environments such as hotels. In addition, an aging timer can be configured for the MAC lockdown, protecting the network from the effects of attacks using (often rapidly) changing MAC addresses.

IP Security

ExtremeXOS IP security framework protects the network infrastructure, network services such as DHCP and DNS and host computers from spoofing and man-in-the-middle attacks. It also protects the network from statically configured and/or spoofed IP addresses and builds an external trusted database of MAC/IP/port bindings providing the traffic's source from a specific address for immediate defense.

Identity Manager

Identity Manager allows network managers to track users who access their network. User identity is captured based on NetLogin authentication, LLDP discovery and Kerberos snooping. ExtremeXOS uses the information to then report on the MAC, VLAN, computer hostname, and port location of the user. Further, Identity Manager can create both roles and policies, and then bind them together to create role-based profiles based on organizational structure or other logical groupings, and apply them across multiple users to allow appropriate access to network resources. In addition, support for Wide Key ACLs further improves security by going beyond the typical source/destination and MAC address as identification criteria access mechanism to provide filtering capabilities.

Threat Detection and Response

CLEAR-Flow Security Rules Engine

CLEAR-Flow Security Rules Engine provides first order threat detection and mitigation, and mirrors traffic to security appliances for further analysis of suspicious traffic in the network.

sFlow

sFlow® is a sampling technology that provides the ability to sample application level traffic flows on all interfaces simultaneously.

Port Mirroring

To allow threat detection and prevention, Summit X650 supports many-to-one and one-to-many port mirroring. This allows the mirroring of traffic to an external network appliance such as an intrusion detection device for trend analysis or for utilization by a network administrator for diagnostic purposes. Port mirroring can also be enabled across switches in a stack.

Line-Rate ACLs

ACLs are one of the most powerful components used in controlling network resource utilization as well as protecting the network. Summit X650 supports up to 2,048 centralized ACLs per 12-port block based on Layer 2-, 3- or 4-header information such as the MAC or IP source/destination address. ACLs are used for filtering the traffic, as well as classifying the traffic flow to control bandwidth, priority, mirroring, and policy-based routing/switching.

Denial of Service Protection

Summit X650 effectively handles Denial of Service (DoS) attacks. If the switch detects an unusually large number of packets in the CPU input queue, it assembles ACLs that automatically stop these packets from reaching the CPU. After a period of time, these ACLs are removed, and reinstalled if the attack continues. ASIC-based LPM routing eliminates the need for control plane software to learn new flows, allowing more network resilience against DoS attacks.

Secure and Comprehensive Network Management

As the network becomes a foundation of the enterprise application, network management becomes an important piece of the solution. Summit X650 supports comprehensive network management through Command Line Interface (CLI), SNMP v1, v2c, v3, and ExtremeXOS ScreenPlay™ embedded XML-based Web user interface. With a variety of management options and consistency across other Extreme Networks modular and stackable switches, Summit X650 series switches provide ease of management for demanding converged applications.



Comprehensive Security

Extreme Networks has developed tools that simplify and help in efficiently managing your network. Ridgeline™ network and service management provides fault, configuration, accounting, performance and security functions, allowing more effective management of Extreme Networks products, solutions and third-party devices, in a converged network.

For carrier networks, Ridgeline enables the shift from reactive circuit monitoring to proactive service management. The key features integrated into the Service Advisor Feature Pack unify service fulfillment, service assurance and service engineering to enable carriers to more effectively manage next-generation residential triple play, business Ethernet and Ethernet mobile backhaul services.

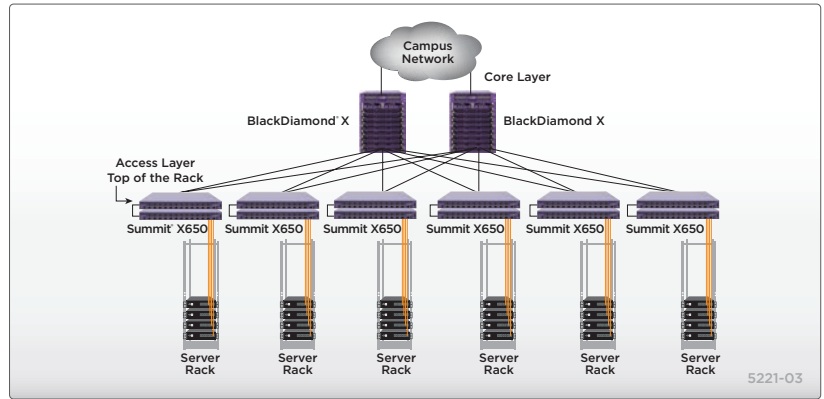


Target Applications

Summit X650 offers a variety of applications with high-performance, low latency switching along with highly-scalable Layer 2 and Layer 3 switching.

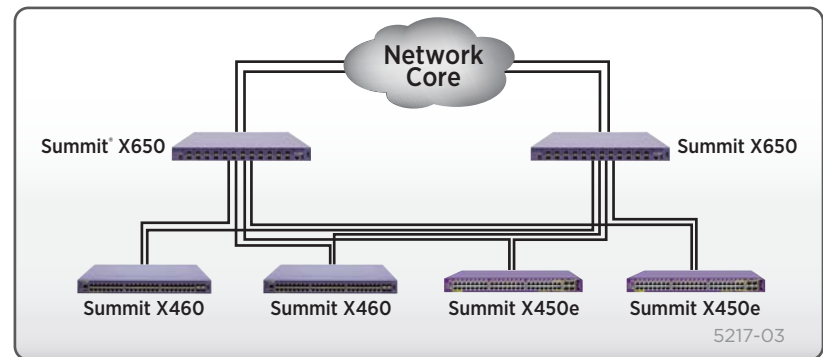
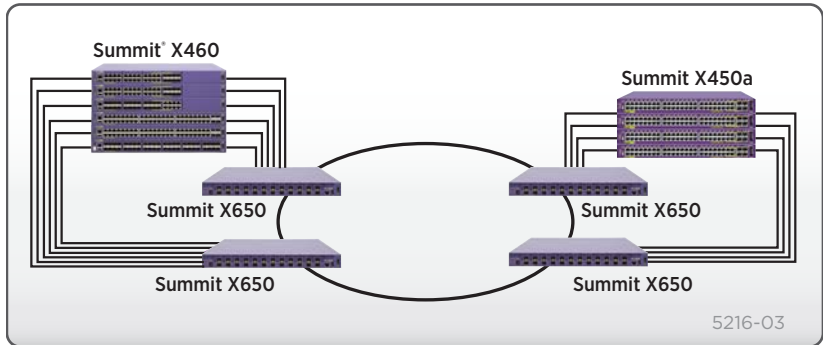
Top-of-Rack Switch for Servers in the Enterprise Data Centers

In the enterprise data center, many servers and storage systems are packed in racks, with all systems needing high-speed connectivity. A top-of-rack architecture is one way to simplify the cabling infrastructure and minimize the space requirements in the enterprise data center. Summit X650 is optimized to support 10 gigabit connectivity for servers and other network attached devices. With its 1RU design, Summit X650 allows maximizing computing power per rack without taking space away from other network-attached computing devices.



High-Performance 10 Gigabit Core Switch for a Small Network and Aggregation Switch in a Traditional Three-Tiered Network

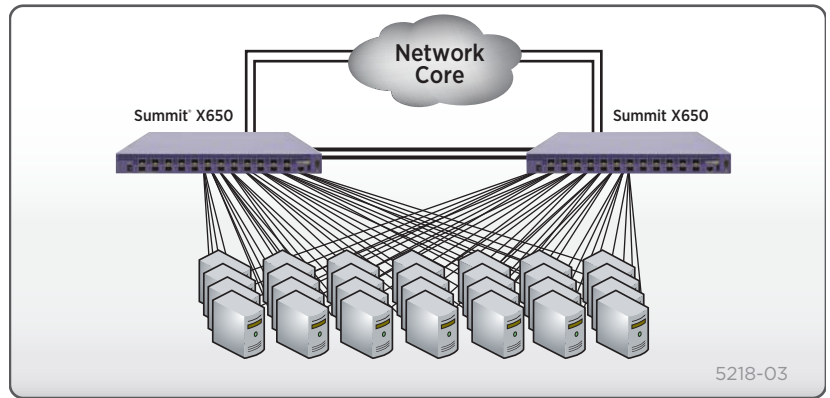
Summit X650 offers enterprise-core class scalability for both Layer 2 and Layer 3 switching. You can support up to 12,000 IPv6 longest prefix matching routes, 6,000 IP ARP entries and 2,000 multicast groups. The Summit X650 switch can also be used in the network aggregation layer in an enterprise network. With its versatile design, Summit X650 simplifies enterprise network deployment.



Target Applications

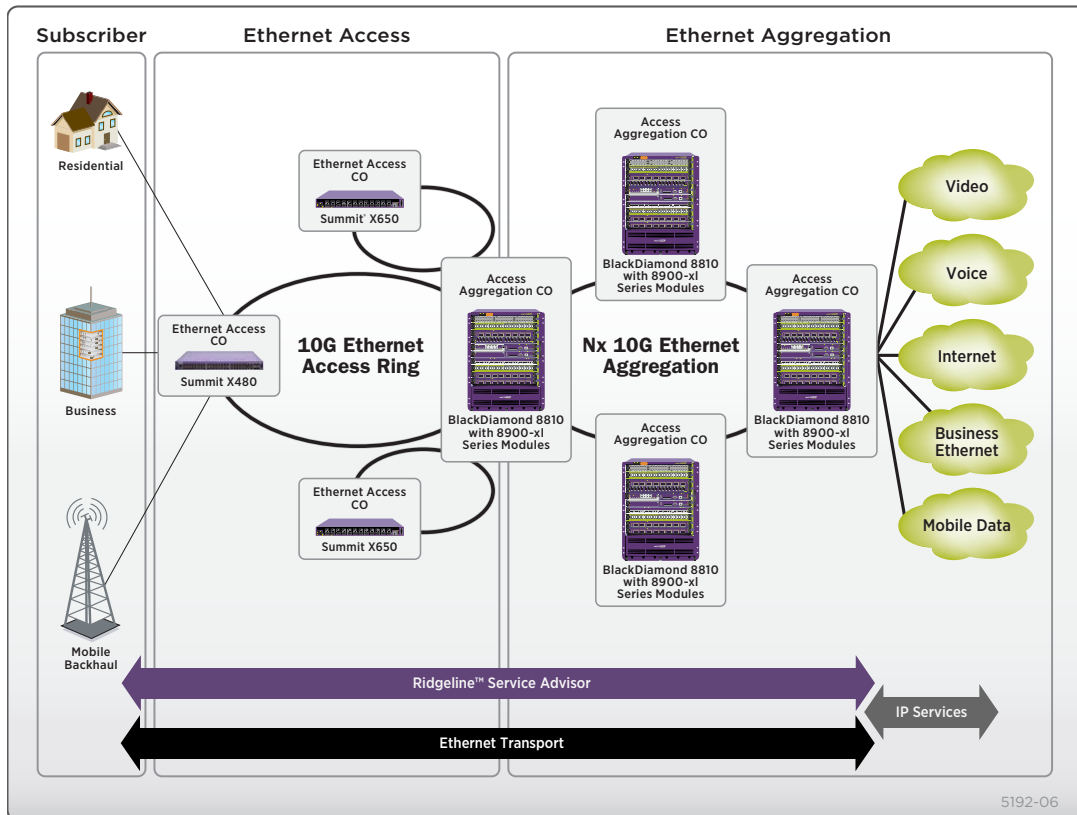
High-Performance Cluster Computing

HPCC consists of many servers working cooperatively to solve large computational problems. With the use of relatively inexpensive servers, a significant amount of processing power can be cost-effectively packed into a relatively small footprint. Summit X650 series switches address the need for high-performance and cost-effective connectivity required for HPCC using 10 Gigabit Ethernet as the interconnect technology.



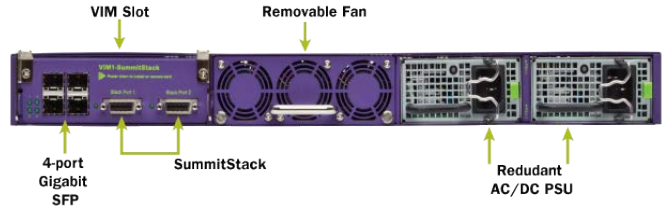
Converged Residential, Business and Mobile Backhaul Service in Metro Areas

In metro areas, regional and global carriers often deploy a stacked ring architecture that adds an Ethernet Aggregation tier to the Ethernet Access Ring Architecture. In this configuration, multiple Access Aggregation central offices are served by multiple 10 GbE aggregation rings from a Metro Core central office. The Ethernet Access central offices are equipped with Summit X650 Ethernet Transport switches, and the Ethernet Aggregation and carrier core central office are equipped with BlackDiamond 8810 Ethernet Transport switches with 8900-xl series modules.



Accessories

Summit X650 Options: Summit X650 provides highly flexible modular hardware design, and offers customized configurations for your network requirements.



Versatile Interface Modules

VIM1-SummitStack

Default option for Summit X650 switches. VIM1-SummitStack provides two SummitStack ports and four Gigabit Ethernet SFP ports. SummitStack ports are shared with the last two 10 Gigabit Ethernet ports in the front panel.



VIM1-10G8X

Option module for high-speed backbone connectivity. VIM1-10G8X provides eight ports of 10 Gigabit Ethernet SFP+ and SummitStack ports. With this option, SummitStack ports are dedicated and not shared with any other port in the switch.



VIM1-SummitStack256

Option module for high-speed stacking. VIM1-SummitStack256 provides SummitStack256 ports. SummitStack256 provides up to 256 Gbps of stacking bandwidth for up to eight Summit X650 switches in a stack.



VIM1-SummitStack512

Option module for high-speed stacking. VIM1-SummitStack512 provides SummitStack512 ports. SummitStack512 provides up to 512 Gbps of stacking bandwidth for up to two Summit X650 switches in a stack and supports 48-port 10 Gigabit Ethernet non-blocking switching.



Accessories

Power Supply and Fan Tray

Summit X650 AC and DC PSU

The Summit X650 switch does not include a power supply. Summit X650 has two unpopulated power supply slots and can take up to two power supplies in a redundant configuration.

A minimum of one power supply is required for operation.



Summit X650 Fan Tray

Summit X650 switch comes with one fan tray which is field replaceable. A fan tray can be ordered separately as a spare, and in case of fan failure, the fan tray can be replaced by the customer.



Supported Protocols and Standards

A list of supported protocols and standards is available on the Extreme Networks website at:
<http://www.extremenetworks.com/go/xos>



Technical Specifications

Summit X650

General Specifications

Performance

- 488 Gbps aggregated switch bandwidth, 363 Mpps forwarding rate (with VIM1-SummitStack)
- 680 Gbps aggregated switch bandwidth, 506 Mpps forwarding rate (with VIM1-10G8X)
- 736 Gbps aggregated switch bandwidth, 548 Mpps forwarding rate (with VIM1-SummitStack256)
- 992 Gbps aggregated switch bandwidth, 738 Mpps forwarding rate (with VIM1-SummitStack512)
- 9216 Byte maximum packet size (Jumbo Frame)
- Store-and-Forward and Cut-Through switching support
- Less than 2 micro second latency (64-byte packet)
- 128 load sharing trunks, up to 8 members per trunk
- 4,094 VLANs (Port, Protocol, IEEE 802.1Q)
- 2,048 ingress and 512 egress ACL rules per 12-port block

Forwarding Tables

- Layer 2/MAC Addresses: 32K
- IPv4 Host Addresses: 6K
- IPv4 LPM Entries: 12K
- IPv6 Host Addresses: 3K
- IPv6 LPM Entries: 6K

CPU, Memory

- 64-bit MIPS Processor Dual Core, 1 GHz clock
- 1GB ECC DRAM
- 256GB Compact Flash
- USB port for external USB flash

QoS, Rate Limiting

- 2,048 ingress bandwidth meters/12-port block
- Ingress and egress bandwidth policing/rate limiting per flow/ACL
- 8 QoS egress queues/port
- Egress bandwidth rate shaping per egress queue and per port
- Rate Limiting Granularity: 64 Kbps

LED Indicators

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

External Ports with VIM1-SummitStack

- 24-port 10GBASE-T (1G/10G dual speed¹) RJ45, 4-port 1000BASE-X SFP, 2-port SummitStack² (Summit X650-24t)
- 24 port 10GBASE-X SFP+ (1G/10G dual speed¹), 4-port 1000BASE-X SFP, 2-port SummitStack² (Summit X650-24x)
- 1-port RS-232c Serial (control port)
- 110/100/1000BASE-T out-of-band management port

External Ports with VIM1-10G8X

- 24-port 10GBASE-T (1G/10G dual speed¹) RJ45, 8-port 10GBASE-X SFP+ (1G/10G dual speed), 2-port SummitStack (Summit X650-24t)
- 32-port 10GBASE-X SFP+ (1G/10G dual speed¹), 2-port SummitStack (Summit X650-24x with VIM1-SummitStack)
- 1-port RS-232c Serial (control port)
- 110/100/1000BASE-T out-of-band management port

Option Slot

- Slot for Versatile Interface Module 1 (VIM1)

Power Supply Support

- Summit X650 AC PSU

Physical Specifications

Summit X650

- Height: 1.73 Inches/4.4 cm
- Width: 17.4 Inches/44.1 cm
- Depth: 26 Inches/65.5 cm
- Weight: Summit X650-24t: 25.6 lbs/11.6 kg
Summit X650-24x: 22.3 lbs/10.1 kg

VIM1-SummitStack

- Height: 1.7 Inches/4.3 cm
- Width: 5.2 Inches/13.2 cm
- Depth: 9.9 Inches/25.2 cm
- Weight: 1.46 lbs/0.66 kg

VIM1-10G8X

- Height: 1.7 Inches/4.3 cm
- Width: 5.2 Inches/13.2 cm
- Depth: 9.9 Inches/25.2 cm
- Weight: 2.0 lbs/0.91 kg

Summit X650 FAN module

- Height: 1.65 Inches/4.2 cm
- Width: 4.8 Inches/12.3 cm
- Depth: 6.0 Inches/15.3 cm
- Weight: 0.45 lbs/0.99 kg

Operating Specifications

- Operating Temperature Range: 0° C to 40° C (32° F to 104° F)
- Operating Humidity: 10% to 93% relative humidity, non-condensing
- Operating Altitude: 0-3,000 meters (9,850 feet)
- Operational Shock (Half Sine): 30 m/s² (3 g), 11ms, 60 Shocks
- Operational Random Vibration: 3-500 MHz @ 1.5g rms

Storage & Transportation Conditions (Packaged)

- 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)

Power: Summit X650-24t (Manufacturing part number 800246-10)

Summit X650-24t with VIM1-SummitStack Module

[AC PSU]

- Nominal Input Ratings: 100 – 240V-, 50/60Hz, 8.0A
- Input Current: 6.89A @ 100V- (lowline) 2.91A @ 240V- (highline)
- Heat Dissipation: 689W (2,351 BTU/h)
- Power Consumption: 689W (2,351 BTU/h)

[DC PSU]

- Nominal Input Ratings: 48 – 60V, 24.0A
- Input Current: 12.85A @ 48V- (lowline) 10.55A @ 60V- (highline)
- Heat Dissipation: 617W (2,105 BTH/h)
- Power Consumption: 617W (2,105 BTH/h)

Summit X650-24t with VIM1-10G8X Module

[AC PSU]

- Nominal Input Ratings: 100 – 240V-, 50/60Hz, 8.0A
- Input Current: 7.8A @ 100V- (lowline) 3.78A @ 240V- (highline)
- Heat Dissipation: 780W (2,661 BTU/h)
- Power Consumption: 780W (2,661 BTU/h)

[DC PSU]

- Nominal Input Ratings: 48 – 60V, 24.0A
- Input Current: 14.61A @ 48V- (lowline) 12.31A @ 60V- (highline)
- Heat Dissipation: 701W (2,393 BTU/h)
- Power Consumption: 701W (2,393 BTU/h)

Summit X650-24t with VIM1-SummitStack512 Module

[AC PSU]

- Nominal Input Ratings: 100 – 240V-, 50/60Hz, 8.0A
- Input Current: 7.98A @ 100V- (lowline) 3.80A @ 240V- (highline)
- Heat Dissipation: 798W (2,723 BTU/h)
- Power Consumption: 798W (2,723 BTU/h)

[DC PSU]

- Nominal Input Ratings: 48 – 60V, 24.0A
- Input Current: 14.75A @ 48V- (lowline) 12.5A @ 60V- (highline)
- Heat Dissipation: 708W (2,416 BTU/h)
- Power Consumption: 708W (2,416 BTU/h)

¹Excludes port #23 and port #24

²SummitStack ports on VIM1-SummitStack are shared with the last two 10 Gigabit Ethernet port on front panel (port #23 and port #24)

Technical Specifications

Power: Summit X650-24t (Manufacturing part number 800320-10)

Summit X650-24t with VIM1-SummitStack Module

[AC PSU]

- Nominal Input Ratings: 100 – 240V-, 50/60Hz, 8.0A
- Input Current: 4.63A @ 100V- (lowline) 1.6A @ 240V- (highline)
- Heat Dissipation: 463W (1,580 BTU/h)
- Power Consumption: 463W (1,580 BTU/h)

[DC PSU]

- Nominal Input Ratings: 48 – 60V, 24.0A
- Input Current: 8.7A @ 48V- (lowline) 7.1A @ 60V- (highline)
- Heat Dissipation: 418W (1,426 BTU/h)
- Power Consumption: 418W (1,426 BTU/h)

Summit X650-24t with VIM1-10G8X Module

[AC PSU]

- Nominal Input Ratings: 100 – 240V-, 50/60Hz, 8.0A
- Input Current: 5.52A @ 100V- (lowline) 2.5A @ 240V- (highline)
- Heat Dissipation: 552W (1,884 BTU/h)
- Power Consumption: 552W (1,884 BTU/h)

[DC PSU]

- Nominal Input Ratings: 48 – 60V, 24.0A
- Input Current: 10.42A @ 48V- (lowline) 8.8A @ 60V- (highline)
- Heat Dissipation: 500W (1,706 BTU/h)
- Power Consumption: 500W (1,706 BTU/h)

Summit X650-24t with VIM1-SummitStack512 Module

[AC PSU]

- Nominal Input Ratings: 100 – 240V-, 50/60Hz, 8.0A
- Input Current: 5.65A @ 100V- (lowline) 2.7A @ 240V- (highline)
- Heat Dissipation: 565W (1,928 BTU/h)
- Power Consumption: 565W (1,928 BTU/h)

[DC PSU]

- Nominal Input Ratings: 48 – 60V, 24.0A
- Input Current: 10.44A @ 48V- (lowline) 8.8A @ 60V- (highline)
- Heat Dissipation: 501W (1,709 BTU/h)
- Power Consumption: 501W (1,709 BTU/h)

Power: Summit X650-24x (All manufacturing part numbers)

Summit X650-24x with VIM1-SummitStack

[AC PSU]

- Nominal Input Ratings: 100 – 240V-, 50/60Hz, 4.75A
- Input Current: 2.9A @ 100V- (lowline) 1.2 A @ 240V- (highline)
- Heat Dissipation: 291 W (992 BTU/h)
- Power Consumption: 291 W (992 BTU/h)

[DC PSU]

- Nominal Input Ratings: 48 – 60V, 9.0A
- Input Current: 5.9A @ 48V- (lowline) 4.8A @ 60V- (highline)
- Heat Dissipation: 287 W (979 BTU/h)
- Power Consumption: 287 W (979 BTU/h)

Summit X650-24x with VIM1-10G8X Module

[AC PSU]

- Nominal Input Ratings: 100 – 240V-, 50/60Hz, 4.75A
- Input Current: 3.7A @ 100V- (lowline) 1.5A @ 240V- (highline)
- Heat Dissipation: 371 W (1,402 BTU/h)
- Power Consumption: 371 W (1,402 BTU/h)

[DC PSU]

- Nominal Input Ratings: 48 – 60V, 9.0A
- Input Current: 7.5 @ 48V- (lowline) 6.1 A @ 60V- (highline)
- Heat Dissipation: 364W (1,242 BTU/h)
- Power Consumption: 364W (1,242 BTU/h)

Summit X650-24x with VIM1-SummitStack512 Module

[AC PSU]

- Nominal Input Ratings: 100 – 240V-, 50/60Hz, 4.75A
- Input Current: 3.8A @ 100V- (lowline) 1.6A @ 240V- (highline)
- Heat Dissipation: 383W (1,307 BTU/h)
- Power Consumption: 383W (1,307 BTU/h)

[DC PSU]

- Nominal Input Ratings: 48 – 60V, 9.0A
- Input Current: 7.7A @ 48V- (lowline) 6.2A @ 60V- (highline)
- Heat Dissipation: 372 W (1,269 BTU/h)
- Power Consumption: 372 W (1,269 BTU/h)

All Summit X650 Series Switches

- ETSI EN 300 386 v1.3.3, 2005-04 (EMC Telecommunications)
- 2004/108/EC EMC Directive

- NEBS Level 3 compliant to portions of GR-1089 Issue 4 & GR-63 Issue 3 as defined in SR3580 with exception to filter requirement

Regulatory/Safety

North American Safety of ITE

- UL 60950-1 1st Ed., Listed Device (U.S.)
- CSA 22.2#60950-1-03 1st Ed. (Canada)
- Complies with FCC 21CFR 1040.10 (U.S. Laser Safety)
- CDRH Letter of Approval (U.S. FDA Approval)

European Safety of ITE

- EN60950-1:2006
- EN 60825-1+A2:2001 (Lasers Safety)
- TUV-R GS Mark by German Notified Body
- 2006/95/EC Low Voltage Directive

International Safety of ITE

- CB Report & Certificate per IEC 60950-1:2006 + National Differences
- AS/NZS 60950-1 (Australia/New Zealand)

EMI/EMC Standards

North America EMC for ITE

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

European EMC Standards

- EN 55022:2006 Class A
- EN 55024:A2-2003 Class A includes IEC 61000-4-2, 3, 4, 5, 6, 11
- EN 61000-3-2,8-2006 (Harmonics)
- EN 61000-3-3 1995+A2:2005 (Flicker)

International EMC Certifications

- CISPR 22: 2006 Ed 5.2, Class A (International Emissions)
- CISPR 24:A2:2003 Class A (International Immunity)
- EC/EN 61000-4-2:2001 Electrostatic Discharge, 8kV Contact, 15 kV Air, Criteria A
- EC/EN 61000-4-3:2006 Radiated Immunity 10V/m, Criteria A
- EC/EN 61000-4-4:2005 Transient Burst, 1 kV, Criteria A
- IEC/EN 61000-4-5:2005 Surge, 2 kV L-L, 2 kV L-G, Level 3, Criteria A
- IEC/EN 61000-4-6:2005 Conducted Immunity, 0.15-80 MHz, 10V/m unmod. RMS, Criteria A
- EC/EN 61000-4-11:2004 Power Dips & Interruptions, >30%, 25 periods, Criteria C

Country Specific

- VCCI Class A (Japan Emissions)
- ACMA (C-Tick) (Australia Emissions)
- CCC Mark
- KCC Mark EMC Approval (Korea)

Telecom Standards

- EN/ETSI 300 386:2001 (EMC Telecommunications)
- EN/ETSI 300 019 (Environmental for Telecommunications)
- MEF9 and MEF14 certified for EPL, EVPL and ELAN

IEEE 802.3 Media Access Standards

- IEEE 802.3ab 1000BASE-T
- IEEE 802.3z 1000BASE-X
- IEEE 802.3ae 10GBASE-X
- IEEE 802.3an 10GBASE-T

Environmental Standards

- EN/ETSI 300 019-2-1 v2.1.2 (2000-09) – Class 1.2 Storage
- EN/ETSI 300 019-2-2 v2.1.2 (1999-09) – Class 2.3 Transportation
- EN/ETSI 300 019-2-3 v2.1.2 (2003-04) – Class 3.1e Operational
- EN/ETSI 300 753 (1997-10) – Acoustic Noise
- ASTM D3580 Random Vibration Unpackaged 1.5G

Security

- Common Criteria EAL3+

Warranty

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

Technical Specifications

Power Supply Units

Summit X650 AC PSU

Dimensions and Weight

Summit X650 AC PSU

- Height: 1.57 Inches/4.0 cm
- Width: 3.2 Inches/8.1 cm
- Depth: 12.6 Inches/32.0 cm
- Weight: 3.0 lbs/1.4 kg

Power

- Voltage input range: 90 to 264 V
- Nominal input ratings: 100 to 240 V, 50/60Hz, 10 A
- Nominal input current @ full loads: 12 A @ 90 V (low-line) 5 A @ 230 V (high-line)

- Maximum in-rush current: 100 A
- Efficiency: 80% with 60% to 100% load
- Line frequency range: 47 to 63 Hz
- Power supply input socket: IEC 320 C14
- Power cord input plug: IEC 320 C13
- Output: 12 V, 70 A max, 840 Watts, 3.3 V, 6 A max, 19.8 Watts

Summit X650 DC PSU

Dimensions and Weight

Summit X650 DC PSU

- Height: 1.57 Inches/4.0 cm
- Width: 3.2 Inches/8.1 cm
- Depth: 12.6 Inches/32.0 cm
- Weight: 3.0 lbs/1.4 kg

Power

- Voltage input range: -48 to -60 VDC
- Nominal input ratings: -39 to -72 VDC
- Nominal input current @ full loads: 26 A @ 40 V, 22 A @ 48 V, 15 A @ 72 V
- Maximum in-rush current: 18A
- Efficiency: >80% typical loads
- Minimum wire size 12 AWG (3.3 mm²) copper stranded
- Output: 12 V, 70 A max, 840 Watts, 3.3 V, 6 A max, 19.8 Watts

Ordering Information

Part Number	Name	Description
17001B	Summit X650-24t	DCB, 24 10GBASE-T, VIM slot populated with 1 VIM-SummitStack (2 SummitStack stacking ports and 4 100/1000BASE-X SFP ports), ExtremeXOS Advanced Edge License, unpopulated dual PSU power slot
17002B	Summit X650-24x	DCB, 24 10GBASE-X SFP+, VIM slot populated with 1 VIM1-SummitStack (2 SummitStack stacking ports and 4 100/1000BASE-X SFP ports), ExtremeXOS Advanced Edge License, unpopulated dual PSU power slot
17010	Summit X650 Series Core License	ExtremeXOS Core License, Summit X650 series
11011	Direct Attach Feature Pack	Direct Attach Feature Pack for Summit X450a/X460/X480, Summit X650 and BlackDiamond 8800 Series with ExtremeXOS 12.5.1 or Greater
17012B	VIM1-10G8X	VIM1-10G8X, 8 10GBASE-X SFP+ ports, 2 SummitStack stacking ports
17013	VIM1-SummitStack256	VIM1-SummitStack256, 2 x 128G stacking ports for 256 Gbps stacking up to eight Summit X650 switches
17014	VIM1-SummitStack512	VIM1-SummitStack512, 4 x 128G stacking ports for 512 Gbps cross connecting two Summit X650 switches
10914	Summit X650 AC PSU	AC Power Supply module for Summit X650 series switches
10915	Summit X650 DC PSU	DC Power Supply module for Summit X650 series switches
10916	Summit X480/X650 Fan module	Fan Module for Summit X480 and Summit X650 series switches, spare
10051	SX SFP	1000BASE-SX SFP, LC Connector
10052	LX SFP	1000BASE-LX SFP, LC Connector
10053	ZX SFP	1000BASE-ZX SFP, Extra Long Distance SMF 70 km/21 dB Budget, LC Connector
10064	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
10056	1000BX SFP BX-D	1000BASE-BX-D SFP, SMF (1490 nm TX/1310 nm RX Wavelength)
10057	1000BX SFP BX-U	1000BASE-BX-U SFP, SMF (1310-nm TX/1490-nm RX Wavelength)
10301	10GBASE-SR SFP+	10GBASE-SR SFP+, 850nm, LC Connector, transmission length of up to 300m on MMF
10302	10GBASE-LR SFP+	10GBASE-LR SFP+, 1310nm, LC Connector, transmission length of up to 10km on SMF
10303	SFP+ LRM Module	10 Gigabit Ethernet SFP+ module, 1310nm, legacy MMF 220m link, LC connector
10309	10GBASE-ER SFP+	10GBASE-ER SFP+, 1550nm, LC connector, transmission length of up to 40km on SMF
10304	10GBASE-CR SFP+ 1m	10GBASE-CR SFP+ pre-terminated twin-ax copper cable with link lengths of 1m
10305	10GBASE-CR SFP+ 3m	10GBASE-CR SFP+ pre-terminated twin-ax copper cable with link lengths of 3m
10306	10GBASE-CR SFP+ 5m	10GBASE-CR SFP+ pre-terminated twin-ax copper cable with link lengths of 5m
10307	10GBASE-CR SFP+ 10m	10GBASE-CR SFP+ pre-terminated twin-ax copper cable with link lengths of 10m
16106	Stacking Cable, 20G, 0.5M	SummitStack/UniStack™ Stacking Cable, 0.5M
16107	Stacking Cable, 20G, 1.5M	SummitStack/UniStack Stacking Cable, 1.5M
16108	Stacking Cable, 20G, 3.0M	SummitStack/UniStack Stacking Cable, 3.0M
17021	Stacking Cable 128G, 0.5M	SummitStack256/512 Stacking Cable, 0.5M
17022	Stacking Cable 128G, 1.0M	SummitStack256/512 Stacking Cable, 1.0M
17023	Stacking Cable 128G, 3.0M	SummitStack256/512 Stacking Cable, 3.0M
17026	Stacking Cable 128G to 64G, 1.0M	Conversion cable for SummitStack256 and SummitStack128, 1.0M

Ordering Information

Part Number	Name	Description
17001B	Summit X650-24t	DCB. 24 10GBASE-T, VIM slot populated with 1 VIM-SummitStack (2 SummitStack stacking ports and 4 100/1000BASE-X SFP ports), ExtremeXOS Advanced Edge License, unpopulated dual PSU power slot
17002B	Summit X650-24x	DCB. 24 10GBASE-X SFP+, VIM slot populated with 1 VIM1-SummitStack (2 SummitStack stacking ports and 4 100/1000BASE-X SFP ports), ExtremeXOS Advanced Edge License, unpopulated dual PSU power slot
17010	Summit X650 Series Core License	ExtremeXOS Core License, Summit X650 series
11011	Direct Attach Feature Pack	Direct Attach Feature Pack for Summit X450a/X460/X480, Summit X650 and BlackDiamond 8800 Series with ExtremeXOS 12.5.1 or Greater
17012B	VIM1-10G8X	VIM1-10G8X, 8 10GBASE-X SFP+ ports, 2 SummitStack stacking ports
17013	VIM1-SummitStack256	VIM1-SummitStack256, 2 x 128G stacking ports for 256 Gbps stacking up to eight Summit X650 switches
17014	VIM1-SummitStack512	VIM1-SummitStack512, 4 x 128G stacking ports for 512 Gbps cross connecting two Summit X650 switches
10914	Summit X650 AC PSU	AC Power Supply module for Summit X650 series switches
10915	Summit X650 DC PSU	DC Power Supply module for Summit X650 series switches
10916	Summit X480/X650 Fan module	Fan Module for Summit X480 and Summit X650 series switches, spare
10051	SX SFP	1000BASE-SX SFP, LC Connector
10052	LX SFP	1000BASE-LX SFP, LC Connector
10053	ZX SFP	1000BASE-ZX SFP, Extra Long Distance SMF 70 km/21 dB Budget, LC Connector
10064	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
10056	1000BX SFP BX-D	1000BASE-BX-D SFP, SMF (1490 nm TX/1310 nm RX Wavelength)
10057	1000BX SFP BX-U	1000BASE-BX-U SFP, SMF (1310-nm TX/1490-nm RX Wavelength)
10301	10GBASE-SR SFP+	10GBASE-SR SFP+, 850nm, LC Connector, transmission length of up to 300m on MMF
10302	10GBASE-LR SFP+	10GBASE-LR SFP+, 1310nm, LC Connector, transmission length of up to 10km on SMF
10303	SFP+ LRM Module	10 Gigabit Ethernet SFP+ module, 1310nm, legacy MMF 220m link, LC connector
10309	10GBASE-ER SFP+	10GBASE-ER SFP+, 1550nm, LC connector, transmission length of up to 40km on SMF
10304	10GBASE-CR SFP+ 1m	10GBASE-CR SFP+ pre-terminated twin-ax copper cable with link lengths of 1m
10305	10GBASE-CR SFP+ 3m	10GBASE-CR SFP+ pre-terminated twin-ax copper cable with link lengths of 3m
10306	10GBASE-CR SFP+ 5m	10GBASE-CR SFP+ pre-terminated twin-ax copper cable with link lengths of 5m
10307	10GBASE-CR SFP+ 10m	10GBASE-CR SFP+ pre-terminated twin-ax copper cable with link lengths of 10m
16106	Stacking Cable, 20G, 0.5M	SummitStack/UniStack™ Stacking Cable, 0.5M
16107	Stacking Cable, 20G, 1.5M	SummitStack/UniStack Stacking Cable, 1.5M
16108	Stacking Cable, 20G, 3.0M	SummitStack/UniStack Stacking Cable, 3.0M
17021	Stacking Cable 128G, 0.5M	SummitStack256/512 Stacking Cable, 0.5M
17022	Stacking Cable 128G, 1.0M	SummitStack256/512 Stacking Cable, 1.0M
17023	Stacking Cable 128G, 3.0M	SummitStack256/512 Stacking Cable, 3.0M
17026	Stacking Cable 128G to 64G, 1.0M	Conversion cable for SummitStack256 and SummitStack128, 1.0M



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