

ExtremeSwitching[™] ExtremeWireless[™] WiNG





Extreme Services

Extreme Networks Product Guide

Table of Contents

Workflow Composer



(i) Description

DevOps-inspired solution, powered by StackStorm open source project, that provides event-driven, cross-domain automation for enabling IT agility and digital transformation



Product Positioning

- Improves business agility by integrating network automation with tool chains, workflows, and processes from other IT domains
- Organizations can implement cross-domain automation quickly with nearly 2000 pre-built, customizable workflow automation integration packs
- Leverages the power of DevOps methodologies, popular open source technologies that embrace industry best practices, and a thriving technical community for collaboration and innovation



Key Differentiators

- Collection of Sensors, Actions, and Rules provides a simple but powerful architecture for event-driven network lifecycle and cross-domain automation
- Sensors and Actions use APIs to integrate with virtually any cross-domain platform and application
- Sensors listen for specific events while Actions execute commands
- User-defined Rules determine what workflows to execute and actions to perform based on inputs from Sensors
- This highly flexible, scalable approach enables easy integration within any DC process, tool chain, and existing workflow

Workflow Composer Automation Suites



(i)

Description

The ideal solution to jumpstart an organization's automation journey and accelerate use of network automation



Product Positioning

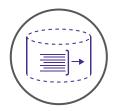
- Turnkey so organizations can deploy with confidence using minimal programming skills or resources and still be able to roll into production and derive value very quickly
- Provide complete network lifecycle automation including provisioning, validation, troubleshooting, and remediation
- Open and customizable to ensure long term value as skills mature and requirements change



Key Differentiators

- Network Essentials deliver automation building blocks for common networking tasks
- Data Center Fabrics provide out-of-box automation for provisioning, validating, troubleshooting, and remediation of data center fabric networks

Flow Optimizer





Description

Policy-Based, intelligent flow management



Product Positioning

- Improves business agility by streamlining automation and existing network operations via policy-driven visibility and automated control of network flows
- Extracts network-wide visibility of Layer 2 through Layer 4 traffic flows collected from network devices through sFlow
- Provides automated threat management by sensing and clipping volumetric DDoS attacks
- Identifies and mitigates application level threats by integrating with Firewall and Intrusion Detection Systems
- Delivers real-time control of flows (drop, meter, remark, mirror, normal forward) for deterministic, policy-driven forwarding
- Automates policy applied via an embedded GUI or through an open API



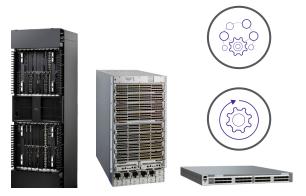
Key Differentiators

Detect and mitigate threats in the network quickly and efficiently with:

- Real-time programmability
- Support for BGP Remote Triggered Black Hole (RTBH) and solutions with BGP Flowspec to manage threats with as much granularity as possible
- Integration with third-party security and analytics platforms, such as Palo Alto Networks firewall
- Monitor, tune, and map network flows for intelligent SLA management with profile granularity and enhanced flow reporting:
 - · OpenFlow statistics
 - · Logical Port/MPLS LSP and IPsec tunnel selection
 - Ease of manageability and visualization via GUI
 - · Ease of upgradability across Flow Optimizer versions



Network Packet Broker













Description

Carrier-grade network visibility



Product Positioning

- Provides scalable network visibility for high-capacity network monitoring
- Delivers dynamic flow programming, enabling real-time, on-demand traffic visibility • Enables wirespeed traffic aggregation, regeneration, optimization, and load balancing
- Provides 10/40/100 GbE port density and backplane capacity, optimizing scale and space
- Offers flexible 4, 8, 16, and 32-slot chassis form factors



Key Differentiators

- Flow Aggregation and Regeneration 10/40/100 GbE flow filtering and forwarding
- · Configurable flow selection and filtering
- · Load Balancing across multiple egress ports
- Layer 2-4 packet modification features for optimized flow delivery
- Mobile (Layer 7) stateful optimization of mobile bearer and control flows
- · API access for real-time flow programming



Description

TOR leaf 1 RU switches



Product Positioning

- Transforms networks to deliver cloud scale, agility, and operational efficiency with data center fabrics
- Supports 1, 10, and 40 GbE options for optimal flexibility and scale
- Meets today's application demands with high performance and low latency
- Delivers line-rate throughput for all ports and packet sizes



Key Differentiators

- Fits into any data center design by leveraging 10/40/100 GbE uplinks, with Ports and Capacity on Demand
- · Supports storage environments with advanced flexibility
- Integrated with Workflow Composer and Workflow Composer Automation Suites delivering cross-domain workflow automation



Description

TOR leaf and spine 1 RU and 2 RU switches



Product Positioning

- Supports 1/10/40 GbE options for flexibility and scale
- Max I/O 2.88 Tbps

VDX 6940

- Transforms networks to deliver cloud scale, agility, and operational efficiency with data center fabrics
- Meets today's application demands with high performance and low latency
 - Delivers line-rate throughput for all ports and packet sizes



- Fits into any data center design by leveraging 10/40/100 GbE uplinks, with Ports and Capacity on Demand
- 800 ns any-port-to-any-port latency and 24 MB buffer
- Integrated with Workflow Composer and Workflow Composer Automation Suites delivering cross-domain workflow automation
- Supports storage environments with advanced flexibility









Modular Chassis - Spine, Super Spine



Product Positioning

- Delivers 1/10/40/100 GbE options for flexibility and scale
- 4 Tbps per slot line-rate design for substantial capacity and headroom
- Meets today's demanding network and application demands with high performance and low latency
- Delivers line-rate throughput for all ports and packet sizes



Key Differentiators

- Enables connectivity for more than 1,000 server ports with scale-out fabrics, 10,000 ports with multifabrics, and 100,000 ports using multifabrics with overlays
- 4-microsecond latency to assure rapid response for latency-sensitive applications
- Packet forwarding performance of up to 11.42 billion packets per second



SLX 9140

Description

Fixed Form Factor - TOR leaf 1 RU switch



Product Positioning

- Supports 1/10/25/40/100 GbE
- Max I/O Capacity 3.6 Tbps
- Buffers 24 MB tunable
- With high-density, scale-out architecture and low-power design, it delivers a cost effective solution that optimizes power, cooling, and data center space
- · ASIC Cavium Xpliant



Key Differentiators

- Native 25 GbE connectivity with flexible 25/40/100 GbE uplink options in 1RU
- Programmable ASIC to accelerate adoption of new protocols and technologies
- SLX Insight Architecture delivers flexible, real-time monitoring of virtualized dynamic workloads
- Integrated with Workflow Composer and Workflow Composer Automation Suites delivering cross-domain workflow automation



Description

Fixed Form Factor – TOR leaf and spine 1 RU switch



Product Positioning

- Supports 10/40/100 GbE
- Max I/O Capacity 6.4 Tbps
- Buffers 24 MB tunable
- With high-density, scale-out architecture and low-power design, it delivers a cost effective solution that optimizes power, cooling, and data center space
- · ASIC Cavium Xpliant



- Programmable ASIC to accelerate adoption of new protocols and technologies
- SLX Insight Architecture delivers flexible, real-time monitoring of virtualized dynamic workloads
- Integrated with Workflow Composer and Workflow Composer Automation Suites delivering cross-domain workflow automation







Fixed Form Factor - TOR WAN Edge 1 RU switch



Product Positioning

- Provides carrier-class forwarding in a compact edge switch supporting 1.500.000 IPv4. 140.000 IPv4 routes. MPLS, VPLS, VLL, BGP-EVPN VXLAN overlay and Carrier Ethernet 2.0
- Delivers I/O up to 1.6 Tbps with up to 800 Gbps switch fabric capacity and up to 720 mpps forwarding performance
- Supports 1/10/40/100 GbE interfaces for flexible deployment
- Ultra-deep 6 GB tunable buffers help optimize bursty traffic
- ASIC Broadcom Qumran (Dune)



Kev Differentiators

- SLX Insight Architecture enables flexible, real-time monitoring of workloads
- Integrated with Workflow Composer and Workflow Composer Automation Suites delivering cross-domain full network lifecycle workflow automation
- Extreme OptiScale™ optimizes the programmable hardware and software capabilities of the adaptive SLX 9540 to deliver Internet Routing with investment protection







Description

Modular Chassis - Data Center Spine, Super Spine, and WAN Edge Router



Product Positioning

- · Cost-efficient solution purpose-built for demanding service provider and enterprise data center deployments
- Up to 230 Tbps non-blocking system switching capacity
- Supports dense 100/40/10/1 GbE
- Up to 36 GB tunable buffers per interface module
- ASIC Broadcom Jericho (Dune)



Key Differentiators

- · SLX Insight Architecture delivers flexible, real-time monitoring of workloads
- Innovative 1.5 RU interface module design maximizes port density and scale across multiple generations of forwarding silicon for best in class investment protection
- · Industry leading backplane and midplane free chassis enables seamless upgrade to new capabilities, including 400 GbE, maximizing investment protection
- Extreme OptiScale[™] optimizes the programmable hardware and software capabilities of the adaptive SLX 9850 to deliver Internet Routing with investment protection





Description

Modular Chassis (4, 8, 16, 32 slot) with a wide range of 1/10/40 GbE interface modules -Spine, Super Spine, WAN Edge Router



Product Positioning

- · Scalable multiservice IP/MPLS, SDN enabled routers in 4. 8. 16. and 32-slot chassis options
- Fully distributed, non-blocking, and programmable architecture with up to 9.5 billion packets per second routing performance with non-blocking 15.36 Tbps data capacity
- Up to 64 100 GbE, 128 40 GbE, 768 10 GbE, and 1,536 1 GbE ports in a single router
- · Wire-speed forwarding performance for all software features, including Ethernet, VLAN, IPv4, IPv6, MPLS, VPLS, IPsec, MACsec, and OpenFlow forwarding



- Robust route scale: Optimized peering scale, MCT and L3VPN features supporting up to 2.4 million IPv4 routes or 1.8 million IPv6 routes proven in thousands of mission critical deployments around the globe
- · Data security: Supports inline 256-bit Suite B IPsec encryption and 128-bit MACsec encryption without compromising performance or complicating deployment models
- Integrated SDN solutions: Simultaneous support for traditional forwarding and OpenFlow 1.3 on the same MLXe port. Coupled with Open Daylight SDN Controllers provides a toolkit to build custom SDN solutions or deploy a fully integrated turnkey solution with Extreme Flow Optimizer





Description

Edge (access) and deep buffer TOR leaf 1 RU switches



Product Positioning

- Compact 1U IP/MPLS/VRF-enabled, NEBS Level 3-certified switch that is purpose-built for advanced Carrier Ethernet and large data center applications
- Available in 24-port 1 GbE plus 4-port 10 GbE versions for fiber and copper with non-blocking wirespeed performance
- Powered by the field-proven Extreme Neltron OS that runs on the MLXe Series of high performance routers
- Advanced and highly scalable IPv4/ IPv6 routing and Carrier Ethernet services, including E-LINE, E-LAN, and E-TREE
- MEF 9-, MEF 14-, and MEF 21-certified, with comprehensive service OAM capabilities



Key Differentiators

- Ideal to extend advanced forwarding services to the edge (access) network with full support for Carrier Ethernet 2.0, MPLS, and dual stack IPv4/IPv6 forwarding
- Deep buffers support top of rack applications in bursty traffic environments





Description

Fixed Form Factor - WAN Edge 1 RU router



Product Positioning

- Compact 1U, IP/MPLS, NEBS Level 3-certified router, built for high-performance edge routing applications
- Max I/O 192 Gbps
- Buffers 128 MB
- Scalable edge router designed to support a full Internet routing table along with MPLS forwarding for advanced business and residential services, service provider data center interconnect, and Internet peering
- Available in 24-port 1 GbE plus 4-port 10 GbE versions for both copper and fiber with non-blocking wire speed performance and a complete suite of IPv4/IPv6 unicast and multicast routing supporting fast convergence times



Key Differentiators

 Ideal for Internet peering applications or as a data center or enterprise border router with concurrent support for up to 1,500,000 IPv4 routes and up to 256,000 IPv6 routes in hardware



Aggregation / Core Switching

VSP 8600

X870 **VSP 8400**









Description

High-density 100 GbE modular core/aggregation switch



Product Positioning

- · High-density, reduced footprint modular chassis solution
- Fabric Connect-capable platform ideal for campus core
- Multi-rate 10 / 25 / 40 / 100 GbE support



Key Differentiators

- · Innovative 7RU high chassis design
- Over 21 Terabits raw switching capacity
- Up to 192 x 10 GbE, 128 x 40 GbE or 48 x 100 GbE interfaces
- Extreme Fabric Connect
- MACsec and IPv6 support

Description

High-density 100 GbE leaf spine switch



Product Positioning

- Purpose-built 100 GbE switch for high-performance enterprise and cloud data centers
- · Ideal for leaf-spine, as well as TOR deployments
- Supports 10GE, 25 GbE, 40 GbE, 50 GbE, and 100 GbE interface rates



Key Differentiators

- · Role-based policy support
- 32 x 100 GbE ports
- Option for up to 128 x 10 GbE or 128 x 25 GbE ports enables high-density leaf aggregation
- · Optional DC power
- · Unified modular XOS operating system



Description

Flexible, compact modular 10/40/100 GbE aggregation switch



Product Positioning

- High-performance, modular 10/40/100 GbE switch
- · Fabric Connect-capable switch Ideal for high-speed aggregation
- Modular form factor with up to 4 Ethernet switch modules



- · Efficient compact form factor reduces power and footprint
- Up to 96 x 10 GbE, 32 x 40 GbE, or 8 x 100 GbE interfaces
- · Extreme Fabric Connect
- MACsec and IPv6
- VXLAN Gateway



Aggregation / Core Switching

S-Series

X770

X690









Description

Terabit-class modular switches for edge-to-core



Product Positioning

- High-performance custom CoreFlow2 ASICs for deep visibility and control
- Classifies users, devices and applications; enforces access control and categorization policies for granular QoS functionality and predictable application performance
- Flexible architecture allows deployment from the network edge to core, reducing deployment and maintenance costs and simplifying management



Key Differentiators

- · Multi-user authentication and policy at scale
- Programmable dataplane for future protocol support
- · Application policy support
- Network Address Translation and server load balancing at scale (NAT and LSNAT)
- GRE tunneling
- Unsampled NetFlow data on every port for complete visibility
- MACSEC link encryption
- VXLAN Gateway



Description

High-density TOR switch



Product Positioning

- High-density, low latency TOR switch with 32 x 40 GbE interfaces
- Can support up to 104 ports of 10 GbE



Key Differentiators

- · Role-based policy support
- Low latency (less than 600ns)
- 1588 PTP timing support
- · Optional DC power
- · Unified, modular XOS operating system including heterogeneous stacking



Description

High-performance 10/100 GbE leaf switch



Product Positioning

- · High-density, advanced 10 GbE switch for aggregation
- Ideal as 10 GbE leaf switch with X870
- Supports 10 GbE, 25 GbE, 40 GbE, 50 GbE, and 10 GbE interface rates



- · Role-based policy support
- 48 x 10 GbE / fiber SFP+ and copper 10GBASE-T models
- 6 high-speed uplinks with 10/25/40/50/100 GbE rate options
- · Optional DC power
- · Unified, modular XOS operating system



Aggregation / Core Switching









Description

Versatile TOR aggregation switch



Product Positioning

- · High-performance TOR switch with up to 72 x 10 GbE fiber interfaces
- Ideal for 10 GbE/40 GbE leaf and spine architectures



Key Differentiators

- · Role-based policy support
- · 40 GbE uplinks
- · Industry-leading density
- · Low latency (less than 600ns)
- IEEE 1588 Precision Timing Protocol (PTP) support
- · Optional DC power
- · Unified, modular XOS operating system including heterogeneous stacking



Description

High-performance, compact, fixed-format 10/40 GbE core/aggregation switch



Product Positioning

- High-performance, fixed-format 10/40 GbE switch
- · Fabric connect-capable switch ideal for small core or mass 10 GbE aggregation scenarios



Key Differentiators

- · Efficient compact form-factor reduces power and footprint
- 80 x GbE and 4 x 40 GbE uplink interfaces
- Extreme Fabric Connect and Fabric Attach
- · MACsec and IPv6 support
- · Distributed virtual routing, PIM and VXLAN gateway capabilities



Description

High-performance 10 GbE/40 GbE **TOR** switches



Product Positioning

- · Fixed high-density, TOR switches for server connectivity
- Compact form factor with 48 x 10 GbE plus 6 x 40 GbE interfaces
- · Fabric connect as well as conventional ip routing support



- · Non-blocking wire-speed architecture
- · Copper and Fiber 10 GbE interface options
- · 40 GbE for uplink or distributed TOR connectivity
- Extreme Fabric Connect
- MACsec

Aggregation / Core Switching

K-Series 7100K





Cost-effective modular switch with premium features for enterprise campus edge-to-small core



- · Engineered with Coreflow2 ASICs for deep visibility and control without impacting performance
- · High performance/capacity in a small form factor for cost optimization



- · Multi-user authentication and policy at scale
- Application policy support
- GRE tunneling
- Unsampled NetFlow data on every port for complete visibility



Description

High-density 10 GbE aggregation switch



Product Positioning

- · TOR switch with 24 or 481 GbE and 10 GbE interfaces
- Supports advanced features such as Data Center Bridging (DCB) and Virtual Switch Bonding (VSB)
- Identical software features as the S-Series and K-Series modular switches (without CoreFlow2 support)

Key Differentiators

- · High-density, cost-effective 10Gbase-T support
- · 40 GbE uplinks
- · Role Based policy support
- · Modular fans with reversible airflow
- · VSB stacking with 7100G-Series





Description

High-capacity, stackable intelligent edge switch



- · High-capacity intelligent edge switch with increased capacity and stacking options
- Up to 512K routing table sizes for Layer 3 routing
- · High-scalability to meet service provider requirements



- 10 and 40 GbE uplinks
- · Designed to meet NEBS requirements
- · Optional DC power
- EAPS/ERPS support (~50ms failover)
- Unified, modular XOS operating system including heterogeneous stacking



Edge Switching

X460-G2







(i) Description

Family of 10 GbE edge switches



Product Positioning

- Complete family of 10GBASE-T and SFP+ fiber models
- 10 GbE 10 port and 16 port versions
- Ideal for small storage and campus core applications



Key Differentiators

- Compact 10 port versions for both 10GBASE-T and SFP+ fiber
- Support for 2.5 GbE and 5 GbE multi-rate as well as 60W PoE++
- Hot swappable modular 16 port versions with configurable air flow and AC / DC power options
- Flexible management options with integrated web management, Extreme Control Center, and advanced command line interface
- Unified, modular XOS operating system including stacking

(i) Description

Scalable, versatile intelligent edge switch with POE+ support



Product Positioning

 Powerful and scalable, versatile intelligent edge switch with enhanced PoE+ support



Key Differentiators

- · Role-based policy support
- Up to 1668w of PoE+ power for up to 30w per port
- · Optional DC power
- 1 GbE / 2.5 GbE multi-rate interface option (up to 16 ports)
- · Modular fans with reversible airflow
- IEEE 1588 Precision Timing Protocol (PTP) support
- Unified, modular XOS operating system including heterogeneous stacking

(i) Description

Versatile 1 GbE and campus edge switch



7100G

Product Positioning

- Data Center TOR (ToR) or advanced campus edge switch with 1 GE interfaces
- Versatile chassis supports 48-port copper, 48-port fiber or 24-ports of each
- Identical software features as the S-Series and K-Series modular switches (without CoreFlow2 support)



- 40 GbE uplinks
- Role-based policy support
- Extremely cost-effective model supporting 24 copper and 24 fiber on one chassis
- · VSB stacking with 7100K-Series

Edge Switching









Premium wiring closet stackable switches



Product Positioning

- · High-end, Fabric-enabled stackable switches for the wiring closet or campus
- · Delivers Fabric Connect to the wiring closet
- 24, 48 and 96 port GbE models



Key Differentiators

- Non-blocking, wire-speed switches with 4 x 10 GbE SFP+ uplinks
- · Optional 2.5 GbE multi-rate models
- Optional PoE, PoE+ and PoE++ (60w) support
- · Extreme Fabric Connect and Fabric Attach
- Up to 8 units in a stack
- IPv4 and IPv6 routing
- · Front-to-Back and Back-to-Front airflow options

Description

Versatile, cost-effective edge switch with role-based policy



Product Positioning

- Cost-effective 10/100/1000 switch with 24 or 48 interfaces
- Available PoE power with up to 30 watts per port



Key Differentiators

- · Role-based policy support
- · Modular, hot-swappable fans and available PoE power supplies
- · Unified, modular XOS operating system including heterogeneous stacking
- Supports 4 front-mounted 1 GbE or 10 GbE uplinks



Description

Fabric-enabled multi-service edge switches



Product Positioning

- · Cost-effective Fabric Connect-enabled edge switch
- · Extends Fabric services to the Campus, MAN or WAN edge
- · Ideal for multi-service, multi-tenant edge deployments



- 1 RU small form factor switch optimal for smaller locations
- Supports 48 x 1 GbE interfaces plus 2 SFP+ 10 GbE uplinks
- Extreme Fabric Connect
- Power over Ethernet (PoE+) support





Premium wiring closet stackable switches



- High-end, Fabric-enabled stackable switches for the wiring closet or campus
- · Delivers Fabric Connect to the wiring closet
- 24, 48 and 96 port GbE models



- Non-blocking, wire-speed switches with 4 x 10 GbE SFP+ uplinks
- Optional 2.5 GbE multi-rate models
- Optional PoE, PoE+ and PoE++ (60w) support
- · Extreme Fabric Connect and Fabric Attach
- Up to 8 units in a stack
- IPv4 and IPv6 routing
- Front-to-Back and Back-to-Front airflow options



(i) Description

X440-G2

Versatile, cost-effective edge switch with rolebased policy



Product Positioning

- Cost-effective 10/100/1000 switch with 12, 24 or 48 interfaces
- Available PoE power with up to 30 watts per port



Key Differentiators

- · Role-based policy support
- Modular, hot-swappable fans and available PoE power supplies
- Unified, modular XOS operating system including heterogeneous stacking
- Supports 4 front-mounted 1 GbE or 10 GbE uplinks



(i) Description

Cost-effective stackable edge switches



Product Positioning

- Non-blocking wire-speed switches for wiring closet or campus
- 24 and 48-port GbE models with optional PoE/PoE+
- · Economical edge switching solution for enterprises



- Fabric Attach for seamless connection to Extreme Fabric Connect environments
- 720W PoE power budget
- 4 x 10GbE SFP+ ports available for stacking/uplinks

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S-Series Standalone (SSA)

X430



200 Series





Highly intelligent switch for campus edge applications



Product Positioning

- Highly intelligent switch for 1 GbE aggregation
- · Entry-level CoreFlow2 switch



Key Differentiators

- · Modular switch capabilities in a fixed platform
- Network Address Translation and server load balancing at scale (NAT and LSNAT)
- · GRE tunneling
- Unsampled NetFlow data on every port for complete visibility



Description

Entry level access edge switch



Product Positioning

- Entry-level standalone switch with 10/100/1000 interfaces
- · Layer 2 switching only
- Supports 24 or 48 ports without PoE
- Supports 8 or 24 ports with PoE+



Key Differentiators

- · Fixed power supply
- · PoE support for 8 and 24 port models only
- · Unified, modular XOS operating system



Managed GbE switches for enterprise and SMB



Product Positioning

- Economical 1 GbE Layer 2/3 access switches
- Available in 12, 24 and 48-port models with and without PoE+
- Ideal for small to medium business and distributed enterprises



- Flexible management including ExtremeCloud, Web GUI, and industry-standard CLI
- 1 and 10 GbE uplink options
- · Up to 4-high stacking
- Comprehensive Layer 2 features with static and dynamic RIP routing

ISW Series Industrial Ethernet Switches





Hardened switches for industrial deployments



Product Positioning

- Designed for industrial environments, including intelligent transportation systems, utilities, and smart cities
- · Hardened small form factor design
- High-power PoE+ ideal for video surveillance applications



- Flexible management including ExtremeCloud, Web GUI, and industry-standard CLI
- 1 and 10 GbE uplink options
- Up to 4-high stacking
- Comprehensive Layer 2 features with static and dynamic RIP routing

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IoT-Ready AP3912i - Wallplate AP



(i) Description

Simplifies installation by reusing existing ethernet cabling



Product Positioning

- Purpose built 802.11ac wave 2 dual radio wall plate access point with integrated Bluetooth and 4 Ethernet ports
- Ideal for service areas such as residence halls, patient rooms, or conference rooms
- Fast deployments leveraging existing wall plate cabling
- PoE Pass-thru port to power additional device



Key Differentiators

- Perfect workgroup AP with policy controlled Wi-Fi, BTLE or 802.15.4 and 3 LAN ports in a single easy to install package
- 802.11ac W2 and a 3rd radio for IoT devices
- PoE out to power devices such as IP Phone, IPTV, etc.
- Also a 4th LAN port provides pass through connectivity from the switch to a connected device

Indoor AP3915i/e



i Description

High-performance at mid-market price



Product Positioning

- · Ideal for state and local, K12, community colleges.
- Flow based architecture for greater performance and provides application visibility when combined with ExtremeAnalytics
- High performance access points with MU-MIMO technology to serve multiple clients simultaneously in dense user environments
- Two variants with internal and external antennas for different applications
- AP3915e external has extended temperature range for more demanding environments



Key Differentiators

- 802.11ac 2x2:2 Wave 2 MU-MIMO
- · Future support with ExtremeCloud
- Integrated BLE

IoT-Ready AP3916i - Camera AP



(i) Description

The first HD camera integrated into a flowbased, 802.11ac W2 AP: perfect for classrooms and smart buildings



Product Positioning

- · Perfect for classrooms and smart buildings
- Save time and money by eliminating the need to run separate cable and/or power for camera
- Install one product to get both secured Wi-Fi service and video surveillance for physical security



- Combines the access point with an integrated surveillance camera into a single package
- Create a layer 7 policy to prioritize video traffic, at the AP
- This can also be installed in a mesh to extend camera AP out to hard to reach areas where you may not want to run a cable



Indoor AP3935i/e



Description

Ultra-performance industrial grade access points designed to operate in high-density and harsh environments



Product Positioning

- Flow based architecture for greater performance and provides application visibility when combined with ExtremeAnalytics
- Support for demanding voice/video/data applications to enhance mobile worker productivity and convenience
- · Role-based grouping of users, devices, and applications to deliver priority, QoS, and security in accordance with business needs
- · Supports high-density of users and applications with 802.11ac Wave 2 technology providing 25%+ highereffective throughput than 802.11ac Wave 1 offerings



Kev Differentiators

- · Optimized for high-density deployments with four dedicated single-band antenna ports per band (8 total) and quad and eight-feed antennas
- No traffic bottlenecks...and transparent PoE failover for mission critical deployments
- · Cloud-ready for zero-touch provisioning to private or public cloud

Outdoor AP3965i/e



Description

Ultra-performance industrial grade access points designed to operate in high-density and harsh environments



Product Positioning

- Extends Wi-Fi beyond the building extending Wi-Fi access outdoors. uses the same policy and single pane of glass management as the indoor APs
- Perfect for stadiums and other outdoor venues, such as warehouses, mines, and manufacturing plants
- · Add AP3965X is designed to support a high-density of users and applications with 802.11ac Wave 2 technology providing 25%+ higher-effective throughput than 802.11ac Wave 1 offerings



Key Differentiators

- IP67/NEMA 6 certified for use in harsh manufacturing environments and severe weather conditions
- · Optimized for high-density deployments with four dedicated single-band antenna ports per band (8 total) and quad and eight-feed antennas
- · The AP3965i has an integrated 8-antenna array for easeof-deployment and lower installation costs
- Full range of high-performance MIMO antenna offerings for service, meshing and backhaul services

Outdoor AP3917i/e





Description

Designed for harsh environments: sub-zero temperature



Product Positioning

- Extends Wi-Fi access outdoors for campus applications
- Uses the same policy and single pane of glass management as the indoor APs
- Perfect for venues, such as K12 and higher ed campuses, hospitals, warehouses and manufacturing plants



- AP3917 Wave 2 802.11ac IP67 outdoor rated access point
- Cellular Coexistence Filter (ACF) Minimizes interference from 3G/4G, cellular networks, distributed antenna systems and commercial small cell/femtocell equipment
- External antenna variation features an outdoor rated IP67 enclosure and internal circuity to extend the operating temperature from -40C to 70C; ideal for maximum range and performance in demanding industrial applications
- Embedded GPS

Indoor AP3801i, AP3805i/e, and AP3825i/e



(i) Description

Full range of indoor APs priced to provide Wi-Fi connectivity for any environment



- Adapts to customer's business needs by simultaneously supporting bridge@AP, bridge@controller, and route@controller data paths within the same SSID
- Supports high-density of users, APs, and applications with optimized data paths and role-based QoS and access control
- WIDS, WIPS, Spectrum analysis, QoS, and role-based access control are built into the network and not boltedon providing visibility, security, and control

Key Differentiators

- Optimized for high-density deployments as validated in stadiums
- No traffic bottlenecks Ethernet ports designed to process Wi-Fi traffic as fast as it comes in
- Independent, intelligent APs do not require controller access to provide security, RF management and spectrum analysis. Combines the scalability of a centralized design with the flexibility and performance of a distributed data plane

Outdoor AP3865e



i Description

Industrial grade access points designed to operate in harsh environments

Product Positioning

- Extends Wi-Fi beyond the building extending Wi-Fi access outdoors. uses the same policy and single pane of glass management as the indoor APs
- Perfect for stadiums and other outdoor venues, such as warehouses, mines, and manufacturing plants



- IP67 / NEMA 6 certified for use in harsh manufacturing environments and severe weather conditions
- Optimized for high-density deployments with 3 dedicated antenna ports per band supporting triple feed and 6 feed antennas
- Full range of high-performance MIMO antenna offerings for service, meshing and backhaul services

Physical and Virtual Appliances: V2110, C35, C5210, C5215



i Description

Virtual or physical appliances provide role-based controls for Wi-Fi users, devices, and apps

Product Positioning

- Flexibility allows appliances to simultaneously control all APs, some APs or allow APs to run independent of appliance
- Can be deployed as a managed service where appliances are centralized and APs. geographically distributed
- Built in high availability is included with sub-one second failover to maintain voice connectivity

- Scales from small branch to large enterprise to data center
- Full management through the appliance or centralize management with ExtremeControl.
- · Optimized for data convergence (voice, video, and data)
- Hardware-based encryption acceleration for up to 18Gbps of data capacity



E

Radar





Wi-Fi security and spectrum analysis, simultaneous Wi-Fi access and assessment mode or full time assessment with guardian mode



Product Positioning

- Built into the Wi-Fi solution provides greater RF visibility and control than using a 3rd party solution
- Integrated with ExtremeControl for single pane of glass Wi-Fi/ wired management



- Flexibility allows the customer to use solution option best suited to their needs:
 - In-service mode scans in service channel while simultaneously providing Wi-Fi access
 - Guardian mode puts the AP in full time sensor mode to continuously scan all channels
 - AP can be switched between Guardian and in-service mode at anytime Radar comes with ExtremeManagement

Indoor AP 8533

Description

802.11ac Wave 2 with MU-MIMO and tri-radios for high-density and security



Product Positioning

- · Specifically designed for high density applications, RF security and guest engagement
- · Tri-radios, triple sensor technology
- · Integrated Bluetooth and BLE for guest engagement



Key Differentiators

- 4x4:4 wave 2 technology supporting the highest capacity
- Dedicated 3rd dual band RF radio for full time WIDS/ WIPS and RF spectrum analysis
- Integrated Bluetooth radio for security and location
- Scales from 1 AP, to controller-less networks of 64 APs, to networks up to 25,000 AP with NOC controllers and cloud
- Internal and external antennas

Indoor AP 8432



Description

802.11ac Wave 2 with MU-MIMO for high-density, security, and Internet of Things (IoT)



Product Positioning

- · Specifically designed for high density applications, RF security, guest engagement and IoT
- · Integrated Bluetooth and BLE for guest engagement
- Enables Internet of Things with PoE pass-through



Key Differentiators

- 4x4:4 wave 2 technology supporting the highest capacity
- Dedicated 3rd dual band RF radio for full time WIDS/ WIPS and RF spectrum analysis
- Built in PoE out to connect with third party IoT devices
- Integrated Bluetooth radio for security and location
- Scales from 1 AP, to controller-less networks of 64 APs, to networks up to 25,000 AP with NOC controllers and cloud

Indoor AP 7632i/e





Description

High-performance at mid-market price



Product Positioning

- · Ideal for mid-market applications in retail, hospitality, manufacturing
- High performance access points with MU-MIMO technology to serve multiple clients simultaneously in dense user environments
- Two variants with internal and external antennas for different applications
- · AP 7632e external also has extended temperature range for more demanding environments



Key Differentiators

- 802.11ac 2x2:2 Wave 2 MU-MIMO
- Fully integrated WiNG controller to build controller-less networks up to 25 APs or with NOC or cloud solutions
- · Operates with premise or cloud based NOC controllers
- · Future support with ExtremeCloud
- · Integrated BLE



ExtremeWireless WiNG

Indoor AP 7532, AP 7522



(i) Description

High-performance, cost-effective 802.11ac Wave 1 technology



Product Positioning

- Mid-tier, high performance Wave 1 access points for cost sensitive applications
- Dual radio, supporting 2.4 GHz and 5 GHz and 802.11 a/b/g/n/ac devices



Key Differentiators

- AP 7532 is 3x3:3
- AP 7522 is 2x2:2
- Scales from standalone Hotspot AP to controller-less networks of 64 APs with virtual controller technology with no AP licensing or hardware appliance
- · Supported by WiNG NOC controllers and cloud
- · Internal and external antennas

Indoor AP 7622



Description

Purpose-built for massive distributed branch solutions



Product Positioning

- Price/performance to meet the needs of massive deployments of distributed branch offices.
- Configurable RF and performance flexibility to tune to specific needs
- Simple deployments, choice of standalone, simple autonomous networks or NOC/cloud solutions



Key Differentiators

- 802.11ac wave 1
- Configurable radios as single 2x2:2 or dual 1x1:1
- Fully integrated WiNG controller to build controller-less networks up to 25 APs or with NOC or cloud solutions for branch solution applications
- Integrated BLE for guest engagement

Wall Plate AP 7602



(i) Description

Specifically designed for in-room hospitality applications



Product Positioning

- Purpose built wall plate access point with integrated BLE and Ethernet ports
- Slim and trim, the AP hides in plain sight for clean room aesthetics
- Quick install, less than 2 minutes with secured mounting



- 802.11ac Wave 1
- Configurable radios as single 2x2:2 or dual 1x1:1
- Fully integrated WiNG controller to build controller-less networks up to 25 APs or with NOC or cloud solutions
- Integrated managed Ethernet ports
- · Integrated BLE for guest engagement



ExtremeWireless WiNG

Wall Plate AP 7612



(i)

Description

Specifically designed for in-room hospitality applications



Product Positioning

- · Ideal for hotel rooms and dormitories
- Purpose built 802.11ac wave 2 wall plate access point with integrated BLE and Ethernet ports
- Slim and trim, the AP hides in plain sight for clean room aesthetics
- Quick install, less than 2 minutes with secured mounting



Key Differentiators

- 802.11ac 2x2:2 Wave 2 MU-MIMO
- Fully integrated WiNG controller to build highly cost effective controller-less networks up to 25 APs
- Operates with premise or cloud based NOC controllers
- · Future support with ExtremeCloud
- Integrated managed EthernetPorts
- Integrated BLE for guest engagement

Wall Plate AP TW 522



(i)

i) Description

Solution wireless over VDSL



Product Positioning

- · Industry unique solution
- · Purpose built for hospitality in-room Wi-Fi
- Allows hotels to deliver Wi-Fi over existing telephone twisted pair into the guest room
- Hide in plain sight design with simple and fast deployments, less than 2 minutes per room



Key Differentiators

- Patented line power over phone wire
- Uses existing telephone (CAT3) twisted pair which is installed in all rooms already. Saving cost of pulling new CAT 5/6 cables and disrupting guest
- No disruption to guest, install can be done during normal room service

Outdoor Access Point AP 7562





Description

Rugged, Industrial-Grade for the most demanding applications



Product Positioning

- Not just a repackage of an indoor AP. The AP 7562 has been purpose built inside and out for outdoor applications
- Specially designed outdoor IP67-RATED diecast aluminum enclosure
- Built to meet industrial applications with M12 version certified for subway and railroads
- · Vehicle Mounted Modem option



- 802.11ac 3x3:3 for high performance outdoor applications
- Extreme's patented MESHConnex[™] Creating a Mesh network on both radios allows automatic failover for superior uptime and survivability
- Self-forms and self-heals into a mesh router eliminating any disruption in wireless connectivity
- · EN 50155 Railway Certification

Outdoor AP 7662i/e

WiNG Controllers: NX5500, NX7500, NX9600, VX9000





i Description

Designed for harsh environments; sub-zero temperature



Product Positioning

- Offered in two variants with internal and external antenna options
- Perfect for retail inventory, staff, and guest, hospitality, transportation and logistics and warehouses
- Operates in harsh and extreme conditions of manufacturing plants, warehouse freezers, outdoor parks and sports fields, shipyards



Key Differentiators

- AP 7662 Wave 2 802.11ac IP67 outdoor rated access point
- Cellular Coexistence Filter (ACF) Minimizes interference from 3G/4G, cellular networks, distributed antenna systems and commercial small cell/femtocell equipment
- External antenna variation features an outdoor rated IP67 enclosure and internal circuity to extend the operating temperature from -40C to 70C; ideal for maximum range and performance in demanding industrial applications
- Embedded GPS

(i)

) **Description**

Unrivaled scalability in distributed branch solutions



Product Positioning

- WiNG enjoys unprecedented scalability and offers controllers to meet the specific needs of branch solutions
- Hierarchical software allows uses of various size controllers, as well as controller-less branches to be managed



Key Differentiators

- The same WiNG OS operates across all controllers, as well as on the access points themselves
- AP support:
 - RFS4000: 144
 - NX5500: 512
 - NX7500: 2048
 - NX9600: 10,240
 - VX9000: 25.000
- Wireless client support scales from 16K to over 200,000

Extreme NSight



(i)

Description

Provides rich analytics for easy network visualization, monitoring, and troubleshooting



Product Positioning

- Flexible and graphical WLAN management solution that makes it easy to access the wealth of powerful information
- Keeps you on top of all the key characteristics of your network:
 - · Network analytics for trend analysis
 - · Role-Based Dashboards for various users
 - · Interactive Maps for quick problem resolution
 - · Customized reports



- Network analytics is displayed in easy-to-read highlygraphical screens, in real time or over a time period of your choosing, for easy trend analysis
- Create custom role-based dashboards from help desk staff to the CIO
- Interactive maps drill down into a site or a specific access point within a site — as well as its connected client devices — all with just a few clicks
- Comprehensive library of pre-defined and customizable reports



ExtremeWireless WiNG

Extreme AirDefense



(i) Description

Industry Leading Wireless Intrusion Prevention System protects your WiFi network and assists with enforcing regulatory compliance requirements

Product Positioning

- Wireless IPS system protects your network against over the air attacks including detecting and terminating rogue access points
- It combines the information collected from the network of sensors or access points with the analytical power of an intelligent central console
- Provides 24/7 network monitoring, automate security, and enable regulatory compliance

Key Differentiators

- Detects 199 wireless threats, reducing the chances of damage to your network
- Advanced Forensics module captures 325 data points every minute for every identified wireless device
- Administrators have the ability to rewind and analyze detailed records of wireless activity in support of forensics investigations or network performance troubleshooting
- Wireless Vulnerability Assessment module uses an industry-first, patented technology to remotely test wireless security

ExtremeGuest



(i) Description

ExtremeGuest is a robust and comprehensive guest engagement solution which gives unique opportunity for the retailer to personalize engagement by understanding the customer behavior and interest, and then tailor services based on the insights

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Product Positioning

- Provision and manage access across multiple networks
- · Deeper visibility into guest application analytics'
- · Single Login with:
 - Social ID/SMS
 - · Social media usage
 - · Device analytics
 - · Comprehensive reporting

Key Differentiators

- Scalability: support for up to
 - 10 million users
- · Wired captive portal
- · Operations distributed and centralized
- · Licensing model
- Site specific splash pages
- · Unlimited # of dashboards

ExtremeLocation



(i) Description

ExtremeLocation is a resilient and scalable cloud-based location and analytics solution offered by Extreme Networks as a subscription service, to align with your new business imperatives

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Product Positioning

- Provides a choice of location resolution from presence which detects a device is present, to a zone which locates a device in an area, to position, which provides a location of the device
- · Micro-locationing to a meter with BLE beacons
- Delivers powerful analytics and trends which can be viewed by administrators or extracted by campaign and policy engines via the RESTful APIs
- Provides extensive real-time and historical location analytics which can be chosen for a duration, including site, zone and associate analytics
- Administrators can view real-time dashboards and monitor trends of sites, zones and associates



- ExtremeLocation has the most extensive real-time and historical analytics for site, zone and associates
- ExtremeLocation is the ONLY solution to offer associate tracking and analytics
- Map View is unique to ExtremeLocation, providing a real-time map of activities taking place on a map, being able to visually see traffic flow, heat maps, and detecting when congestion is occurring to send staff to help alleviate
- Supporting what could be thousands of sites and up to 100,000 APs, ExtremeLocation is a highly scalable and high performance solution

ExtremeManagement



(i) Description

Integrated management of your wired and wireless infrastructure from a single pane of glass

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Product Positioning

- Standards based and easily supports snmp based third party devices in addition to the extreme networks family of devices
- Cuts down troubleshooting time and manages any network
- Easy policy enforcement network-wide for qos, bandwidth, etc.

Mey Differentiators

- · Open and published interface (or API)
- Future proof easily scales from the smallest to the largest network
- · Eliminates manual tasks with built in automation

ExtremeCloud



(i) Description

Simple, flexible, and business aligned cloud-managed wired and wireless networks



Product Positioning

- Targeted at organizations with limited it or highly distributed environment
- Designed for MSPs with multi-tenancy and white labeling
- Highly scalable, from 1 to 10,000 APs and unlimited number of switches per customer
- Reduces CAPEX and scales OPEX to fluctuating business needs



- Application Adaptive Infrastructure Visibility and control. The flow-based architecture identifies and prioritizes business applications over unwanted applications for an excellent quality of user experience
- Investment Protection Allows for the growth of an organization, since our on-premises solution leverages the same hardware and firmware. No ripping out of expensive equipment
- Simplicity, From Provisioning to Day-to-Day
 Operations With zero-touch provisioning of APs and
 switches, the network is operational within minutes
- Business Aligned Subscription based model aligns spend with business growth
- World Class Support Backed by industry's only 100% insourced services and support



ExtremeControl



Description

Automate your network infrastructure with customized integration using an open northbound API into major enterprise IT platforms

Product Positioning

- Unifies the security of your wired and wireless networks with in-depth visibility and context-based control over users and endpoint devices for BYOD and IoT
- Automated and secure guest access control with sponsor approval, sms or e-mail verification, pre-registration, front desk and social media login
- Granular policy controls enable you to comply to company policies and regulatory compliance obligations
- Let's you locate, authenticate and authorize targeted access policies to users and devices as they connect to the network for secure BYOD, guest access and IoT
- Integration with it infrastructure such as active directory. LDAP and firewall
- Enhanced capabilities in convergence with identity engines portfolio



Key Differentiators

- · Single pane of glass to configure and monitor end systems, profilers, security posture, guest access
- Secure and automate the network attachment of IoT devices and provide full visibility into what's connected to vour network
- · Orchestrate the threat mitigation and containment workflow based on alerts received from next generation security solutions
- · Out-of-the-box integration with third party security platform including MDM, posture, next generation firewall, SIEM, IDS/IPS and security gateway
- Automate your network infrastructure with customized integration using an open northbound API into major enterprise IT platforms

Identity Engines



Description

A complete and integrated solution to ensure secure BYOD, guest and network access for employees, guests and business partners



Product Positioning

Identity Engines provides Enterprises with several benefits:

- · Control Enables IT managers to quickly and easily add, remove and control the level of network access for every user and device
- Security Support for 802.1x Network Access Control, Captive Portal and centralized user and device authentication and authorization
- Centralized Visibility Grants system administrators full visibility of who has accessed and who is on the network and on what device
- Manageability Centralized policy engine allows administrators to instantly view and alter user account details and access privileges

Key Differentiators

- · Simplicity and Ease of Use
- · Guest provisioning in under 10 seconds
- Simplified licensing (no per user or network size fees required)
- Pricing (no recurring subscriptions required)
- Innovative policy engine that simplifies IT administration
- · Complete BYOD solution (iOS, Mac, Android, Windows, etc.)
- Full end-user support (employees, guests, business partners, etc.)
- · Network agnostic (wired, wireless, VPN, across any vendor)
- Federated Identity (LDAP, AD, etc.)

Information Governance Engine



Description

A network solution that automatically analyses and assesses network configurations for HIPAA, PCI and GDPR compliance

Product Positioning

- · Reduces risks and maintenance cost of your network
- · Enables you to establish and maintain your clinical network operations baseline by automatically analyzing and assessing network configurations across the entire wired and wireless network
- · Assesses your entire wired and wireless network and provides you with a detailed remediation map to achieve 100% compliance of your network configurations for HIPAA, PCI and GDPR

Key Differentiators

- · Manage complex compliance regulations, pass audits, and avoid penalties
- · Easily create and maintain compliance baselines and determine network configurations for ongoing HIPAA, PCI and GDPR compliance
- · Augment endpoint solutions to extend automated compliance reporting from devices to network configurations
- · Eliminate multi-day manual audits with regularly scheduled automated assessments
- · Receive alerts to changes in network configurations that are out of compliance with HIPAA, PCI and GDPR
- Schedule regular network configuration compliance assessments with records of the analysis and scoring



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ExtremeAnalytics





Description

A network powered application and optimization analytics solution for actionable business insights



Product Positioning

- Provides actionable business insights from your network and applications for network-driven decision making
- Gives you granular visibility into network and application performance, users, locations and devices to align the network to business goals
- Save operational costs, solve issues fast and deliver a superior quality of end user experience with real-time data in one easy-to-read dashboard
- Speeds up troubleshooting by separating network from application performance so you can quickly identify root-causes
- Makes your network safer as it monitors shadow IT, identifies and reports malicious or unwanted applications, and monitors security compliance



- Gain actionable context-based knowledge about applications, users, locations and devices
- Manage quality of experience by understanding network and application performance in one simple view
- Get contextual data about your applications without performance degradation
- Troubleshoot and visualize all wireless clients with our intuitive event analyzer
- Can identify more than 2,300 applications with transport layer independent application fingerprinting



Extreme Services

Professional Services



Product Positioning

- Site surveys and deployment of wireless services
- · Network design and deployment of any Extreme Networks solutions
- · On-site IT staff augmentation



Key Differentiators

- · Assessment services
- · Managed deployment
- Comprehensive installation
- · Project management
- Network and security consulting
- Network performance optimization
- · Resident engineering services



Business Value

- · Expert assistance in assessing, planning and designing the optimum solution to meet customers' unique business needs
- Focused expertise to ensure successful deployments and to manage complex multi-technology solutions
- Technical expertise and methodologies to assess the availability, operations, and vulnerability of customer networks
- · Highly technical on-site resources for staff augmentation needs

Maintenance Services



Product Positioning

- · Call anytime from anywhere to talk to an Extreme Networks expert
- · Ensure that devices are running the latest application and operating system software
- · Get parts when ans where they are needed
- · Go to the web to log and check status on cases and find additional information



Key Differentiators

- · Global presence
- 100% in-sourced technical experts
- Award winning technical assistance available 24x7x365
- 24x7x365 in-house technical assistance
- · Software updates and upgrades
- · Wide variety of hardware replacement options, including on-site where available
- Flexible go to market options
- · Web access to solutions, knowledgebase and community



Business Value

- Provides choices to match customer's budget and network demands
- Helps ensure network performance and health
- Flexible go-to-market model enables qualified partners to engage as much as they desire
- · Enables your IT staff to focus on more strategic tasks

Premier Services



Product Positioning

- · High touch, customer advocacy
- · Proactive engagement model
- Global, award-winning technical assistance available nonstop
- Expertise in networking trends and best practices



Key Differentiators

- · Single point of contact
- · Proactive communications
- · Priority case queuing



Business Value

- · Single point of contact providing comprehensive customer advocacy across the support spectrum
- · Responsive, high touch networking expertise that's needed when things go wrong
- Unparalleled personal touch; never feel like a number in a queue



Managed Services



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Product Positioning

- · Monitoring, management, and support
- Proactive resolution to minimize the impact of network issues
- Ensures maximum networks performance and uptime
- Lower cost alternative to traditional in-house network management



Key Differentiators

- Fully managed service for Extreme wired and wireless networks
- Access to Network reporting via a Managed Services Gateway
- Cloud based storage of network configurations and optional updating of configurations and software
- Designated Service Manager to manage problem resolution and support
- Semi-annual service reviews



Business Value

- Provides highly available and secure network operations
- Cloud based dashboard provides instant visibility to networks status
- Restore previous network configurations with ease
- Comprehensive support of Extreme devices, providing status of network performance, health vulnerabilities and suggested improvements

Learning





Product Positioning

- · Technical training and certifications
- · Wide variety of instructor-led and self-paced options



Key Differentiators

- Switching and Routing
- Wireless
- Network Management



Business Value

- Provides your team with in-depth knowledge to successfully deploy and manage Extreme Networks products and software
- Get and stay ahead of the faced paced evolution of technology



Extreme Services