

Networks in Motion



Abstract

The enterprise is in motion, both literally and figuratively. The traditional enterprise edge and lines of demarcation are disappearing, and with it, conventional views on security and access. Employees are mobile, demanding on-the-go access to data and applications across a diverse set of platforms and operating systems, while IT is expected to provide a scalable and reliable infrastructure to support this mobility spanning both private and public networks. Even data is mobile, with virtualization providing a platform upon which applications are no longer bound to a single server or confined to the IT data center. In reality, the cloud extends from the data center to the new enterprise edge. This white paper will explore how mobility is changing and what Extreme Networks® is doing to help organizations adapt, thrive and personalize.

The enterprise is in motion, both literally and figuratively. The traditional enterprise edge and lines of demarcation are disappearing, and with it conventional views on security and access. Employees are mobile, demanding on-the-go access to data and applications across a diverse set of platforms and operating systems, while IT is expected to provide a scalable and reliable infrastructure to support this mobility spanning both private and public networks. Even data is mobile, with virtualization providing a platform upon which applications are no longer bound to a single server or confined to the IT data center. In reality the cloud extends from the data center to the new enterprise edge.

At the same time, employees expect a personalized experience. No two industries, businesses, or operating environments are alike. So the better the custom fit of the IT environment to its operation, the more productive the outcome. The network, whether public or private, must have the intelligence to adapt to their requirements. It is a ‘perfect storm’ for personalization—clouds, tablets, wireless, and expectations. If IT has the capability to personalize to the user level, they can attain productivity advantages to better the operation—schools can improve learning, hospitals improve healthcare, governments improve services, and businesses improve profitability.

This perfect storm redefines mobility. It consists of users, their devices, Virtual Machines (VMs), data, and applications and is driving the next wave of IT and service provider innovation. Mobility is no longer just access to wireless LANs or even browsing the web on a smartphone.

In parallel, Ethernet is evolving, from a simple means of cost-effective connectivity to a converged technology capable of supporting requirements from the 4G and wireless LAN edge, through the campus core, and into the data center. In 1996 Extreme Networks had the moxie to state “Ethernet Everywhere.” And this has come true. Ethernet is quickly becoming the technology of choice for next-generation infrastructure investments across industries, including LTE backhaul, media including Audio Video Bridging (AVB), and industrial (SmartGrid). And, Ethernet continues to be Extreme Networks focus with over half a billion dollars

of investment in Ethernet and an Ethernet-optimized operating system—ExtremeXOS®. Ethernet Everywhere is driving the next wave of network investment for vendors and organizations.

Mobility and Ethernet are the ties that bind the future of the enterprise and the service provider. The Ethernet campus and virtualized data center, and the employee with a smartphone or tablet are all nomadic. Extreme Networks is at the crossroads of these two megatrends, bringing its expertise to bear on a shifting competitive landscape, one where new technology winners will be crowned, and incumbents seldom lead.



Figure 1: Today's enterprise comprises a growing number of mobility devices and users who require consistent, secure applications that are hosted in a virtual public or private cloud.

Extreme Networks strategic direction is to develop solutions for the service provider and the enterprise with an eye to mobility—the transformation of the enterprise workforce and data center, and the mobile networks required to support this transition. We have developed a phased approach predicated upon automation and intelligence, spanning the campus, data center, public cloud, and mobile broadband networks. It offers both economic and technical benefits. It results in an enterprise that is more agile, lean, productive, secure, and competitive.



The plan leverages Extreme Networks hardware capabilities, partnerships, and end-to-end ExtremeXOS intelligence layer. It aligns with the customers' beliefs that the network must also be inclusive, in keeping with Ethernet's openness, interoperability, and cost-effectiveness. There is no room for exclusiveness, where single vendors mandate end-to-end solutions.

Extreme Networks solution is designed to meet the imperatives of IT managers, CIOs, and employee expectations. It turns the tide on the current state of affairs

where up to 80% of IT resources are spent being reactive to network and help desk calls as opposed to focused on innovation. In fact, the Morgan Stanley October 2010 CIO Survey confirmed what many expected—IT departments are looking for products that just work as advertised, are price-effective, simple to operate, and provide choice.

Extreme Networks enables this new enterprise- mobile and distributed, agile and aware, competitive and lean, device independent and converged, virtualized and cloud-based. But how?

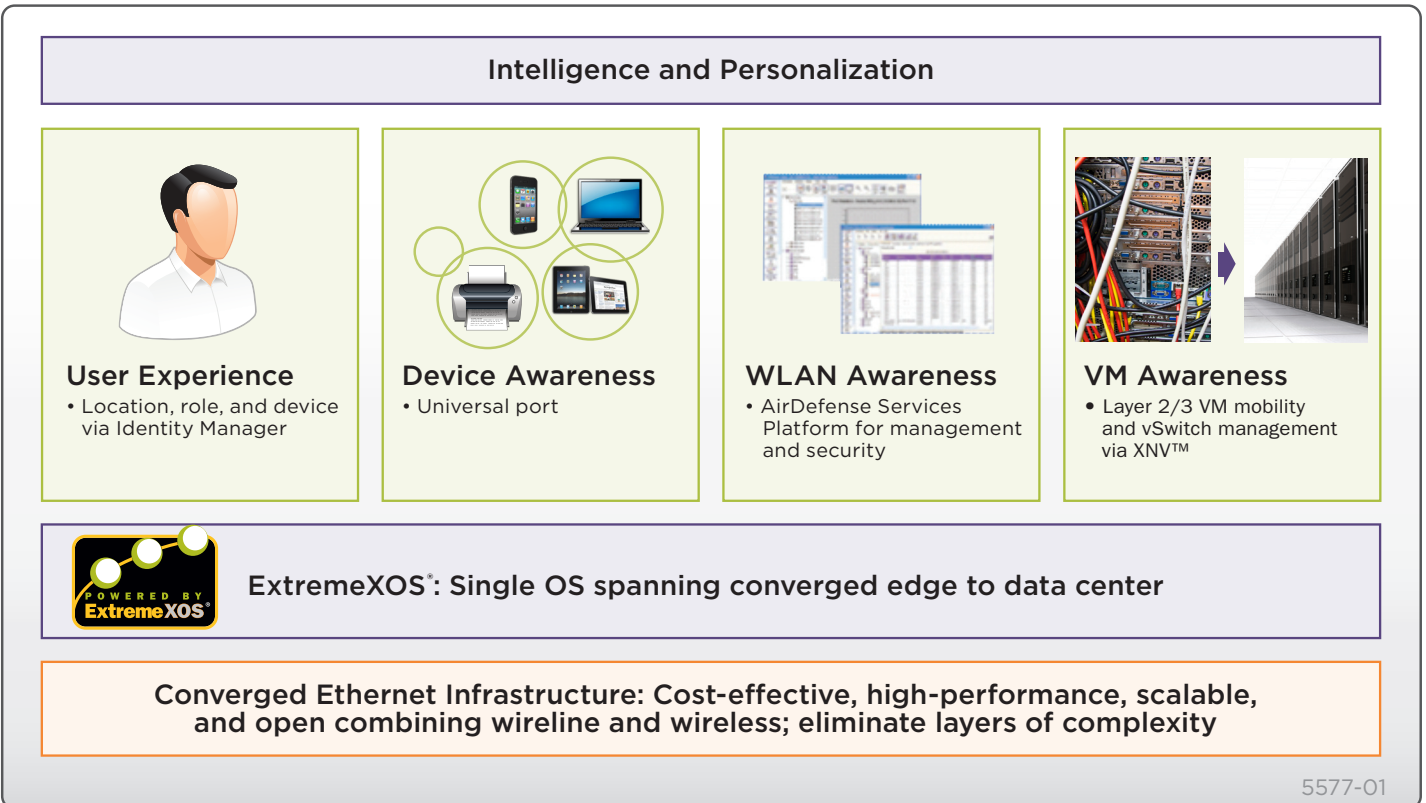


Figure 2: Extreme Networks modular and extensible operating system underlies the simple architecture, resilience, performance, scalability, flexibility and adaptability required for new mobility.



A Unique and Extensible OS Platform: ExtremeXOS

The key to Extreme Networks enterprise solution is ExtremeXOS and a single hardware family, spanning from the converged edge to the data center. ExtremeXOS provides the IT manager a single image rather than a switchyard of release trains and release cycles. It offers service predictability through consistent features, flexibility and simplicity, streamlined operations and management, and ultimately cost savings.

As an analogy, compare the network to an F-15 jet fighter and its control requirements that are so complex that a human is incapable of flying it. The plane therefore relies on a complex flight control system that adapts to constantly changing conditions. Ultimately, Extreme Networks products do the same, adapting to changing conditions to keep the network ‘in flight.’ ExtremeXOS is both modular and extensible via customization, and is based on a rich heritage of over 25 million ports installed in hardware spanning from 10/100 MbE to 40 GbE and the structure to support 100 GbE. This real-life experience in the most demanding of environments ensures stability.

Unique to ExtremeXOS is the ability for the IT administrator to create a more ‘personalized’ network, aligned to their business processes and enterprise requirements. In the same way that mobile applications stores create a personalization framework for your device, consider ExtremeXOS as a foundation for network applications built by Extreme Networks and partners. The result is a customized, optimized, and personalized network infrastructure. The ability to ‘make your network’ personal, virtual and intelligent.

Because Extreme Networks bases its product line on a single hardware architecture, our engineers can focus on solving real network problems, optimizing feature development resources across a single merchant silicon family without multi-platform, multi operating system obstacles.

Benefits: Simplified architecture, manageable costs, and consistent services across the enterprise.

In Intelligence and Personalization Layer

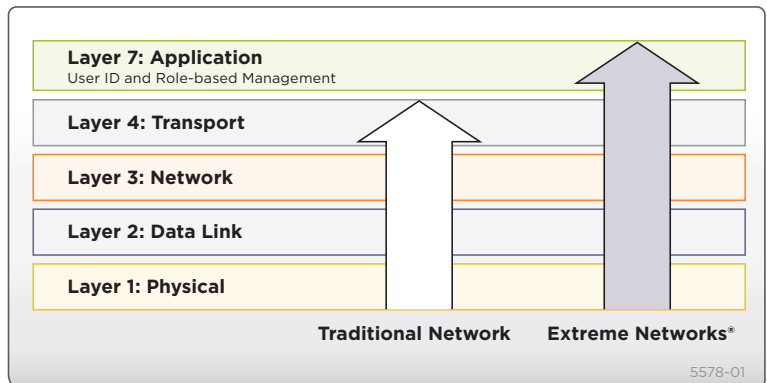


Figure 3: Mobility requires network intelligence that can provide services up to the application layer for personalization for the user, device and virtual machine.

Using ExtremeXOS as a basis and extending intelligence to the application layer (Layer 7) for user identification at the enterprise edge, Extreme Networks **Identity Manager** permits the IT manager to identify users entering the network, and then personalize the experience based on role and device. Role-based access permits the IT manager to logically segment users based on profiles (e.g., students vs. faculty vs. guests) for seamless mobility and for personalized, on-demand access to data. This is coupled with location-based access that dynamically segments users based on physical location to improve secured connectivity.

On the device side, Universal Port permits the network to identify the type of system connected to a port without manual intervention, whether it’s a laptop, phone, or even a security camera. Because devices move, Universal Port Manager’s zero-touch configuration automatically applies personalized data, voice, and video policy to any wired or wireless network. IT no longer must predefine ports, resulting in saved time and increased flexibility.

Within the data center, XNV™ (ExtremeXOS Network Virtualization) introduces VM control and automation to the network infrastructure, tracking VM inventory, location history, and provisioning across VMware, Citrix, and others. The network is now aware of VM movement, based on workload for example, and Virtual Port Profiles associated with a given VM are now automatically



moved from switch to switch. In a VM environment the IT manager now has a way to centrally control ACLs, QoS, and other network services capabilities assigned to VMs. This automation helps to optimize resource utilization, lowering TCO.

The enterprise is managed via **Ridgeline™**, a 'single plane of glass' for device and configuration management as well as control of the ExtremeXOS intelligence layer including mobile user management and XNV. Extreme Networks then secures the enterprise via **CLEAR-Flow**, dynamically changing the behavior of the switch in reaction to network events for faster containment of threats. CLEAR-Flow scrutinizes packet flow for security, network management, and network billing and enables real-time, automated response to security and traffic conditions for lossless packet flows for critical traffic such as iSCSI.

The converged edge can be managed via **Motorola's AirDefense Services Platform (ADSP)** product. ADSP is a scalable and powerful enterprise-wide WLAN management platform for configuration management, network troubleshooting, capacity planning, security, and policy enforcement that can integrate with Extreme Networks products.

Extending management to the cloud, **AlertWorks** is a hosted monitoring service where Extreme Networks highly trained technical staff keeps a close eye on the health of your network. Through the use of complex analytics the team can identify, interpret, and notify you about network anomalies before they become much larger problems. Features include a comprehensive application-centric network view, a customized dashboard, real-time reporting, baseline and comparative data, and trending.

Additional IT personalization is enabled through ExtremeXOS scripts allowing the IT manager to customize the network environment to his or her business requirements.

Benefits: Automated operations, personalized policy and user experience, corporate agility, and security that is pervasive but not disruptive.

A Single Ethernet Infrastructure from Outer Edge to Cloud

ExtremeXOS and the network intelligence and automation layers build upon a converged Ethernet infrastructure for consistent services across the enterprise. Ethernet, building upon openness and price-performance, offers the scalability and simplicity to support users, machines, and even virtual machines in motion along with their data and applications. It provides the foundation for a network that has the intelligence to dynamically adapt content and adjust access to resources. And, Extreme Networks implementation ensures sustainability with features such as power management and Energy Efficient Ethernet (EEE).

Key is an infrastructure built on a premise of cost-effective performance without compromise, leveraging both stackable and chassis-based platforms and scaling from 10/100 MbE to 40 GbE and beyond, all based on a single network operating system—ExtremeXOS. Intelligence applies from the enterprise edge, through the core, and to the data center. The capability for an integrated WLAN edge offers consistency of user experience to employees connecting via wired or wireless, while the IT manager may set common policies and is assured that the network will scale to the growing number of mobile employees. And the data center is more responsive, cost-effective, and manageable by leveraging **Data Center Bridging (DCB)** to merge the data and storage networks.

Extreme Networks wireless LAN portfolio consists of controllers and adaptive and mesh access points. Since Extreme Networks architecture is based on a single network OS—ExtremeXOS—we have the built-in capabilities to be able to extend services intelligence to both the wireless LAN converged edge and to what we call the 'outer edge,' lower-cost, simple-to-manage switches at remote locations.

The Summit® series of switches are part of Extreme Networks powerful **SummitStack™** architecture, an array of stackables that offer buy-as-you-grow flexibility with application availability and automatic failover from one switch to the next.



At the campus core are the BlackDiamond® 8900 series modules, the 5th generation of line cards scaling to 40 GbE. **Ethernet Automatic Protection Switching (EAPS)** and its standardized variant, G.8032, offer a network that is both failsafe and manageable with carrier-class network link protection for enterprise applications.

Within the data center, the BlackDiamond 8900 series of modules and Summit X650 switches all support **DCB** for data center convergence. The Summit X650 top-of-rack switch, scaling to 40G and optimized for the new generation of 10 GbE servers, is also a member of the SummitStack family and may be stacked with the other family members. The architecture provides resiliency across racks and even across rows.

Within the data center, the switches also support Direct Attach™, a technology developed by Extreme Networks that permits VMs to be 'directly attached' to the network without going through a software switch on the server. This enables a reduction in switching tiers by eliminating the virtual switch tier, while offloading the server from networking functions and providing the complete set

of network capabilities such as ACLs and security to the VM. Also within the data center, **Multi-switch Link Aggregation (M-LAG)** offers an active-active topology without the bandwidth tradeoffs created by other protocols such as STP that utilize port blocking. For more information, read the Data Center Architectures with M-LAG white paper at: www.extremenetworks.com/go/DCwithM-LAG.

ExtremeXOS also includes hardware support for both IPv4 and for future-proofing, **IPv6** across the 10/100 MbE to 40 GbE product portfolio. With the IPv4 address space all but exhausted, enterprises, mobile operators and cloud service providers have begun their migration to IPv6. ExtremeXOS includes a suite of IPv6 addressing, security, and management features.

Benefits: Converged network and services with investment protection; enables workforce efficiency

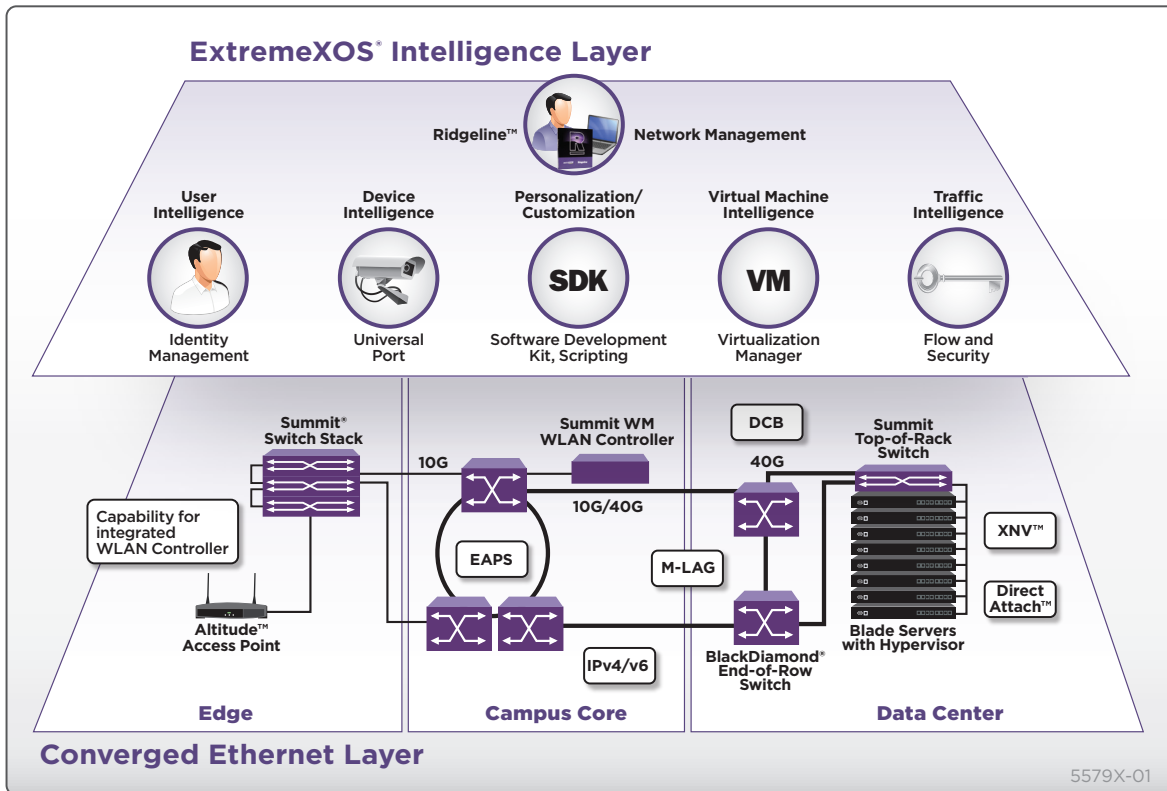


Figure 4: The Extreme Networks architecture for the mobile enterprise includes a broad product portfolio powered by a single, feature rich operating system designed to service the new mobile organization.



Conclusion

Networks truly are in motion. The challenges that IT face including building and maintaining a cost-effective network optimized for the new mobile world can be addressed with Extreme Networks Mobile Enterprise Solution. Based upon industry standards and leading price-performance, which we call 'affordable rocket science,' our products through ExtremeXOS provide the personalization and intelligence required for CIOs to succeed in their missions. We offer ease of operation for the IT department, a seamless Quality of User Experience for the employee, and allow the real productivity gains that permit the enterprise to embrace this new mobility. Coupled with sustainability, customer intimacy, and investment protection, the Extreme Networks solution is designed to help meet IT's needs from the converged edge to the cloud.



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