The Extreme Networks Federal Data Center Design Series

This document series should assist federal data center planners with the design of their data centers and provide insights and considerations for deploying Extreme Networks solutions. It outlines how the Extreme Networks approach to building Data Center Fabrics will enable agencies to deliver upon the tenets of the Office of Management Budget (OMB) guidelines for creating viable long-term network solutions for the Federal Data Center that will serve their constituents well into the future.

Volume 1: Industry Trend towards a de facto standard: IP Fabric Overview – This document

This document discusses the industry adoption of IP Fabric in the Data Center, including the Layer 2 and Layer 3 services approach to provide interconnection of software applications and compute stack tiers of the data center architecture.

Volume 2: Achieving Any-to-Any Connectivity with Time-Tested Design Approaches and Proven Methodologies

This document discusses the historical background of utilizing a staged approach to gain economy in building any-to-any architectures. It discusses the nature of 3 and 5 stage Clos IP Fabric and their ancestry from cross point architectures in switching systems, their adaptation to resolve problems in the communications industry over time.

Volume 3: Evaluation of Reliability and Availability of Network Services in the Data Center Infrastructure

This document discusses the industry standard methodologies of calculating, for purposes of comparison, various underlay element types. It compares single form factor switching elements at the Leaf, Spine and Super-Spine Layers with their chassis-based counterparts, and identifies the mean-time-between-failures (MTBFs), Mean-time-between-repairs (MTTR), and their relation to element and network availability. It also provides availability measurements and the unavailability calculations based upon the elements placement in the network, and the number of port connections between compute and application services platforms.

Volume 4: The Data Center IP Fabric Control Plane

This document discusses the protocols utilized to handle the IP control plane of the data center fabric. It also discusses the ability to provide deployment, automation, and simplicity and uniformity with time-saving tools that create an automated underlay and overlay for tenant services.

The Extreme Networks Federal Data Center Design Series
Volume 1: Industry Trends Towards a De Facto Standard: IP Fabric

Extreme Networks Data Center technologies, based upon the SLX switching and routing platforms, deliver to the data center an unmatched combination of visibility, automation, agility, performance and security. These capabilities support the unique requirements of the modern warfighter, intelligence community and civilian agencies of the U.S. Federal Government. Extreme Networks solutions are certified via NIST, Common Criteria and the Joint Interoperability Command Test facilities to meet the security and interoperability requirements of the U.S. Federal Government, NATO and other partner government agencies.

Extreme Networks delivers solutions that are standards based to ensure vendor interoperability, incorporate third party solutions, and avoid vendor lock-in, yet remain feature rich. This series will discuss how Extreme Networks delivers reliable solutions and offers ease of use capabilities that enable organizational agility, and ease of inserting new technology; while being backed by the industry's best customer service. These attributes support the Office of Management and Budget (OMB) stated priorities in the federal government's efforts to consolidate data centers.

Office of Management and Budget Priorities:

- (1st) Consolidation and Closure
- (2nd) Optimization
- (3rd) Virtualization
- (4th) Availability
- (5th) Energy
- (6th) Metering and Server Utilization

Throughout this document, we will discuss how an agile IP Fabric-based Data Center Infrastructure can enable federal agencies in meeting these priorities.

Data Center Networking Alignment with Federal Priorities

So how do agencies determine their progress in delivering against these priorities? Government agency technical leadership recognizes that it must digitize their agencies IT network environment to accelerate innovation and to provide seamless services to their stakeholders. Currently government IT organizations and programs are running the risk of being over-burdened with outdated processes that thwart the progress of making delivery of services more efficient. They realize that the fast innovation needed to drive this transformation can only happen with an agile IT foundation, and with seamless automation and network visibility connecting IT domains and functions. They need a network platform that, regardless of architecture, natively incorporates agility into the operation of their infrastructure. Extreme Networks delivers against these priorities with capabilities that enable pervasive visibility and extensive automation.

Extreme Networks Fabrics: Delivering Flexible Architecture Support

Generally, the IT enterprise, Service Provider and Cloud Service Provider (Public/Private/Hybrid) industries have come to the resounding conclusion that IP Fabric suit the requirements of data center deployments across the globe. Gone are the days of designing architectures with spanning tree, blocked ports, and multiple tiers that leave 50% of the ports or capacity waiting unused or under-utilized. The client endpoint applications that access the data center require reliability, safety, security, privacy, interoperability and autonomy. The platform and the underlying architecture should support these properties as a baseline. The requirements for the government data center also

include high-bandwidth, low-latency, and in many cases nonblocking server-to-server connectivity. In addition to these baseline properties, vendors now offer IP Fabric that support:

- Flow-based Multi-pathing load-balancing across the fabric

- Provide expandability to enable non-blocking Clos topologies

- Accommodate any-to-any interface connectivity across the leaf and spine layers

- Provide flexible deployment options that scale, regardless of designed subscription ratios (i.e. 5:1, 4:1 or even 1:1 non-blocking)*

- Ability to automate IP Fabric Day 0, Day 1, and Day 2 deployments

   *Per Gardner, 80% of the typical data centers' traffic is 80% East-West

Extreme Networks offers multiple flexible architecture fabric support options for customers requiring high availability, agility and programmability. While the industry, in its adoption of IP Fabric, seems to have settled on a de facto data center fabric architecture, RFC7938 (use of BGP routing for large scale data centers), Extreme Networks understands that not all fabrics are optimal in all places of the network. In fact, some Extreme Networks customers believe that the fabric technologies delivered by Extreme Networks provide the precise functionality required for their application in very specific points in the network. Extreme provides network fabrics that enable multiple advantages over the traditional network at layer 1, 2, 3, or a combination to deliver the benefits of fabric technology to any place in the network:

In the Federal Data Center

- Using the SLX portfolio, IP Fabric that deliver an automated BGP underlay, fast tenant provisioning, security of policy enforcement, QoS assurance, traffic policing/shaping, as well as the ability of the leaf to act as an anycast gateway to facilitating mobility with VXLAN overlays

- Using the VDX portfolio, TRILL (transparent interface with lots of links) based fabrics using auto-forming, auto-healing underlays

In the Federal Campus

- Using VOSS and EXOS portfolios to build automated Shortest Path Bridging (SPB) underlays that delivers unmatched endpoint security, and ease of provisioning capabilities across the campus

- Using campus access portfolios to deliver 802.1br based edge/access campus technologies

- For more detailed information on Fabric solutions from Extreme Networks, please check out our Fabric Networking for Dummies eBook

End-to-End: From the Federal Data Center to the Network Access in the Federal Campus Network

- Using the Extreme Universal Hardware Switching platform that supports multiple network OS boot options, Extreme Networks delivers unparalleled solution technology options for any place in the network

Continue to Volume 2: Achieving Any-to-Any Connectivity with Time-Tested Design Approaches and Proven Methodologies. This document discusses the historical background of utilizing a staged approach to gain economy in building any-to-any architectures. It discusses the nature of 3- and 5-stage Clos Fabrics and their ancestry from cross point architectures in switching systems, their adaptation to resolve problems in the communications industry over time.

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