EXTREME NETWORKS SOLUTION BRIEF: SDN

Exceed the Limits

BENEFITS

• ExtremeXOS – A single operating system for SDN, OpenFlow and classic Ethernet across all Extreme Networks Slalom, Summit and BlackDiamond platforms.
• Open Flow hybrid mode for natural SDN migration
• High Bandwidth support from 1GbE to 40GE in any increment with Link Bundling
• Flow-based quality of service in hardware
• Automated Flow Management to scale flow tables

Extreme Networks SDN Solutions

ExtremeXOS-based switches offer a programming interface through OpenFlow to enable high degrees of automation in provisioning network services for upper layer business critical applications that run on the OpenFlow-based SDN controller. Extreme Networks broad and deep Ethernet switch portfolio supports industry standard OpenFlow 1.0 and the OpenStack Folsom Quantum network virtualization model.

ExtremeXOS-based switches also allow for integration with the OpenStack open source cloud computing platform for public and private clouds through its Quantum plugin. The plugin provides a scalable, automated, rich API-driven system that enables networking-as-a-service models for managing data center interconnect solutions and large multi-tenant networks.

Extreme Networks released OpenFlow and OpenStack with ExtremeXOS version 15.3.1. Mapping the Extreme Networks SDN portfolio into the Open Fabric architecture highlights Extreme Networks broad product set, features and innovations within ExtremeXOS, and strategic partnerships at both the Centralized Management and Application Layers.

The OpenFlow and OpenStack features are available (as of April 2013) on Extreme Networks Summit X440, X460, X480, and X670 products, covering 1GbE - 40GbE across a diversity of Access and Top of Rack switches. Additionally, support on Extreme Networks BlackDiamond X8 and Extreme Networks BlackDiamond 8800 chassis platforms for high density Aggregation is scheduled for 2H 2013.

Extreme Networks Slalom™ is a thin SDN switching platform based on the open source Indigo project with Project Floodlight (www.projectfloodlight.org). Slalom provides an open source and hardware-based switching platform for easy entrance into production-quality SDN.

Extreme Networks OpenFlow support, along with XML-based APIs native to ExtremeXOS, allows organizations to deploy SDN and OpenFlow throughout their networks and ensure the right product can be applied in the right place at the right time.

Extreme Networks Value Add

HYBRID MODE SUPPORT FOR BOTH OPENFLOW AND CLASSIC ETHERNET NETWORKS

ExtremeXOS supports OpenFlow Hybrid switch functionality. The default behavior for packets arriving on a switch port is to process the packet using standard Ethernet...
switching techniques (FDB learning and forwarding, ACL and QoS processing, VLAN isolation, and L3 routing). ExtremeXOS CLI commands are used to enable OpenFlow, and to assign physical ports and Link Aggregation Groups belonging to specific VLANs to the OpenFlow domain for external control by an OpenFlow Controller.

Extreme Networks switches support hybrid mode on a per VLAN basis. A single port can support both OpenFlow controlled VLANs and traditional networking services.

**LINK AGGREGATION GROUP FOR RESILIENCY AND REDUNDANCY**

ExtremeXOS OpenFlow supports Link Aggregation Groups for system redundancy and bandwidth scaling. ExtremeXOS represents an entire LAG group as a single high capacity link to an SDN controller, enabling existing SDN applications to utilize the bandwidth scaling, load balancing, and resiliency characteristics of a LAG group without being required to manage the individual member of the LAG directly.

A LAG group is used to incrementally increase bandwidth between switches as needed. For example, as a 1GE port becomes oversubscribed, a second 1GE port can be added into the LAG to increase the bandwidth between switches, without having to make the jump directly from 1 GE to 10 GE.

**HARDWARE QUEUING WITH EXTREMEXOS**

Extreme Networks OpenFlow feature set includes a rich set of OpenFlow controlled QOS/Slicing capabilities based on an extensive set of existing QOS capabilities. ExtremeXOS enables the definition of QOS profiles for OpenFlow packet egress queuing control. ExtremeXOS QOS profiles support rate limiting and rate shaping with single and dual rate QOS policies in addition to configurable drop policies.

Using the ExtremeXOS CLI, interface queues are configured based on operator-defined service policies and then assigned to physical ports. When those same physical ports are also configured as OpenFlow ports, the Extreme Networks switch will report configured profile queues to the OpenFlow controller with the Queue_Get_Config_Reply message. This enables the controller to dynamically program the flows that are mapped to those configured queues, providing a rich set of traffic-differentiated services.

**AUTOMATED FLOW MANAGEMENT FOR INCREASED FLOW TABLE SIZE**

ExtremeXOS OpenFlow fully supports platform-based hardware capabilities. ExtremeXOS intelligently classifies and maps controller flow-mods to the appropriate platform hardware resources to insure maximum flow scaling. Complex flows requiring combinations of L2 and L3 match conditions are instantiated in platform TCAM ACL hardware. Simple L2-only flows are mapped to the more scalable platform L2 forwarding table. ExtremeXOS OpenFlow also fully supports OpenFlow idle_timeout and hard_timeout flow mods to evict flows from the hardware resources efficiently and effectively, allowing new flow entries as required.