The growth of personalized, media-rich applications, mobile devices, and new networking technologies is putting an enormous strain on service providers' networks and the control plane software running on the networking devices. Server interfaces are transitioning to higher Ethernet speeds, and as virtualization continues to increase link utilization, data center networks are demanding switches with dense 10GbE and 40GbE connectivity at the access and aggregation layers. IP Infusion ZebOS-XP is true modern network software that spans the access, core, aggregation, transport and data center networks, bringing with it the consistency, flexibility, and reliability that organizations need to operate the high performance, hyper scale networks of today and tomorrow.

IP Infusion's lab testing results for the ZebOS-XP 1.0.1 and ZebOS 7.10.3 control plane running on Broadcom ToR Reference platform data path hardware verifies, that the performance capabilities of ZebOS-XP control plane platform offers superior scaling and performance to support current and future multiprocessor hardware platforms, helping ensure scalability well into the future.

Test Report Objective

This test report summary highlights the performance and scalability aspects of the new and improved ZebOS-XP (extended performance) control plane platform in comparison with the legacy ZebOS control plane platform. This report covers testing results for most commonly used Layer 3 routing protocols (OSPF, BGP, ISIS, RIP) and Layer 2 switching (VLAN, xSTP and LACP) protocols.

Key Takeaway

The ZebOS-XP (extended performance) software platform provides superior scaling and performance to support current and future multiprocessor hardware platforms, helping ensure scalability well into the future.

Compared to current shipping versions of ZebOS, the ZebOS-XP has the following attributes:

- 2–4+ times route scaling advantage when subjected to rapid increases in IP sessions and total bandwidth requirements for large network topologies.
- Up to 8x ECMP route scaling for Layer 3 unicast routing protocols offering substantial increases in bandwidth by load-balancing traffic over multiple paths
- Significantly improved convergence time for Layer 2 Switching and Layer 3 unicast routing designed to provide stability and to perform well in environments with a huge number of routes with low cpu utilization.

How We Did It

With support for up to 100+ 10GbE ports and full flexibility in configuring 10GbE/40GbE ports, the StrataXGS® Trident switch series can be used to build highly scalable, feature-rich, blade switch, top-of-rack (ToR) switches, and aggregation equipment to enable cloud-scale networking. This performance test report uses, Broadcom ToR reference design with Trident + switching chipset for the data plane forwarding, to do the performance comparison study between ZebOS 7.10.3 and ZebOS XP 1.0.1

Test Environment and associated Device Under Test Configurations

DUT: Broadcom Trident+
      CPU: FreeScale 1 GHz (Single Core) configuration
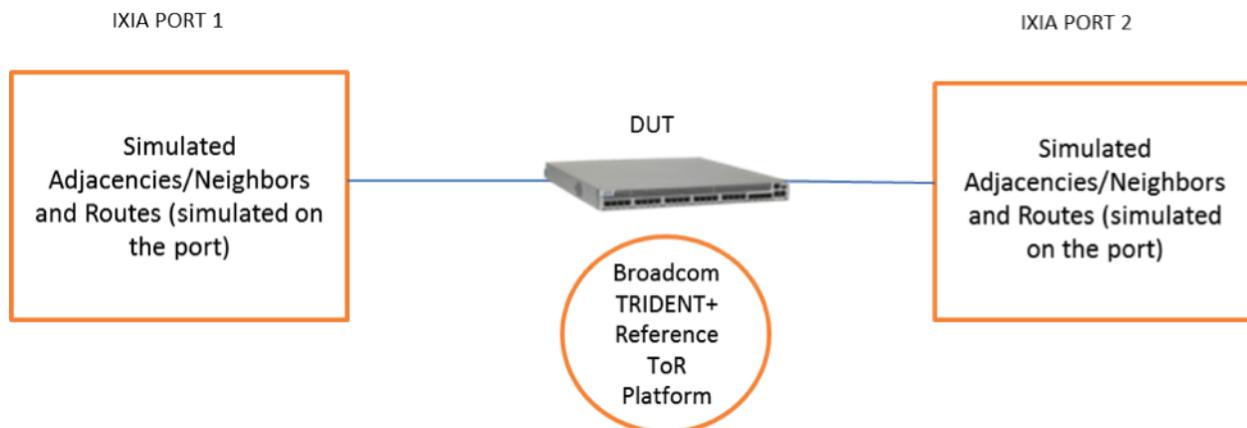   Memory: 512 MB

OS and Kernel Information: Linux tplus3 2.6.27.39-WR3.0.2ax_standard
                            ppc GNU/Linux, AMP KERNEL.

**Supporting Test Device:** IXIA

Test Topology Used:

Figure 1 Layer-3 Test Bed Topology

Topology Considerations (Layer 3):

- For testing OSPF, the DUT and the OSPF Adjacencies (on IXIA) are all configured as part of Backbone Area.
- For testing BGP, the DUT and the BGP Neighbors (on IXIA) are all configured in different Autonomous Systems (EBGP Neighbors).
- For testing ISIS, the DUT and the ISIS Adjacencies (on IXIA) are all configured as L1-L2 Routers.

Figure 2 Layer 2 Test Bed Topology
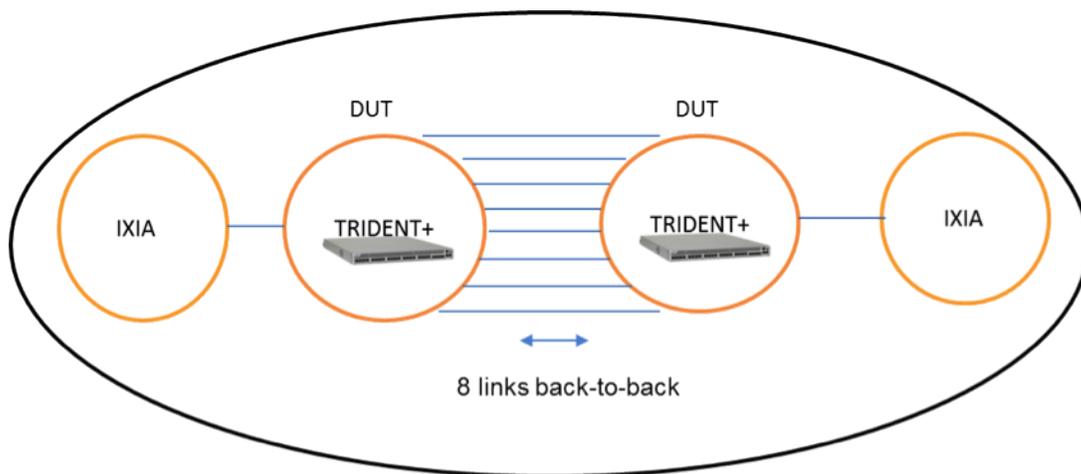
Topology Considerations (Layer 2):

- For testing VLAN, stand-alone DUT has been used. VLANs were created using the CLI on DUT.
- For testing xSTP, DUTs are connected with four back to back links.
- For testing LACP, DUTs are connected with eight back to back links (on IXIA)

Layer 3 Routing Performance

Protocols (Non-ECMP)	XP 1.0.1- Convergence Time for 100 Neighbors and 16000 Routes	7.10.3 - Convergence Time for 100 Neighbors and 16000 Routes
OSPFv2	7.16 secs	34.53 secs
BGP	87.2 secs	121.6 secs
ISIS-IPv4	84.3 secs	98.4 secs
RIP	4.6 secs	7.8 secs
Protocols	XP 1.0.1- Convergence Time	7.10.3 - Convergence Time
xSTP	< 1 sec	2 secs
LACP	0.39 secs	Not available (Testing Underway)
Protocols	XP 1.0.1- Time to create 3999 VLANs through CLI	7.10.3 - Time to create 3999 VLANs through CLI
VLAN	5 secs	36 secs

Layer 2 Switching Performance[1]

Protocols	XP 1.0.1- Time to delete 3999 VLANs through CLI	7.10.3 - Time to delete 3999 VLANs through CLI
VLAN	15 secs	257 secs

[1]The significant improvements in the Convergence Time for the above layer 3 routing protocols and layer 2 (xSTP) and Time for VLAN creation/deletion in Zebos-XP over ZebOS 7.10.3 is due to the new and improved architecture which features message Bulking, Async messages and HSL multi-threading support.

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About IP Infusion

IP Infusion is a leading provider of intelligent network software for enhanced Ethernet and IP services. Tier one and two OEMs rely on IP Infusion's ZebOS software and global professional services to bring products to market faster, and to differentiate them from competitors with less cost. Products built on IP Infusion technology are deployed in networks with five-9s reliability across five continents—as well as a growing number of enterprises—to improve network performance, decrease network infrastructure costs, and grow revenue. IP Infusion is headquartered in Sunnyvale, Calif., and is a wholly owned and independently operated subsidiary of ACCESS CO., LTD., of Tokyo, Japan.

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