How Can You Take Advantage of IxNetwork™?

Network Equipment Manufacturers use IxNetwork to verify the functionality and performance of the Device Under Test (DUT) by emulating surrounding IP-based routers and networks. Routers in the test bed can be replaced with IxNetwork to achieve higher scalability and greater control. Test automation can also be seamlessly integrated with IxNetwork.

Network Service Providers use IxNetwork to create complex test scenarios to qualify network designs. In this way, performance bottlenecks and interoperability issues can be identified before actual deployment.

Proof of Concept Test Labs use IxNetwork to demonstrate that the System Under Test (SUT) is capable of reaching certain performance criteria. The high scalability and flexibility of IxNetwork allow test lab engineers to easily hit target numbers without the requirement of actually staging numerous test routers.

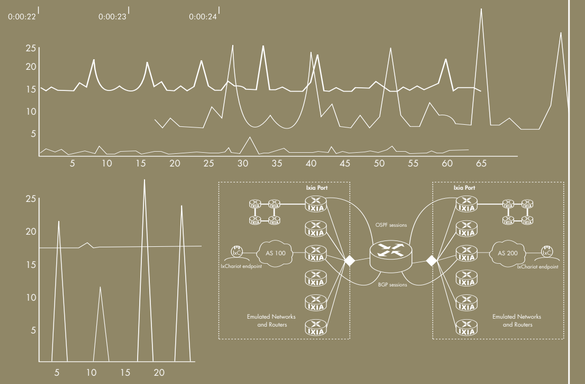
QA Engineers use IxNetwork to validate new designs and features. A repeatable test procedure can be executed and automated by IxNetwork for regression testing. Differences between releases can then be easily identified and consistently validated.

IxNetwork™

IxNetwork tests routers, switches, and Layer 2/3 forwarding devices. This is accomplished by by running large-scale routing protocol emulations and generating high traffic load to verify performance. Technologies supported include IP routing, MPLS, Multicast, and Bridging.

Supported Protocols
IGP – OSPFv2, OSPFv3, IS-ISv4, IS-ISv6, RIPv1/v2, RIPng
EGP – BGP4, BGP4+, MP-BGP
MPLS – LDP, RSVP-TE, L2 MPLS VPN, L3 MPLS VPN, VPLS
Multicast – IGMPv1/v2/v3, MLDv1/v2, PIM-SM/SSMv4/v6, Multicast VPNs
Bridging – STP, RSTP, MSTP

IXIA
Worldwide Headquarters
26601 West Agoura Road
Calabasas, California 91302
United States of America
Phone 818.871.1800
Fax 818.871.1805



Characterize the Performance and Scalability of Routers and Switches

- Emulate Internet-Scale Routing Topologies to Determine Scalability Limits
- Simulate Network Instabilities to Measure Network Convergence
- Measure Data Plane Performance across Emulated Routing Topologies
- Verify Functionality of Unicast and Multicast Networks and MPLS-based VPNs

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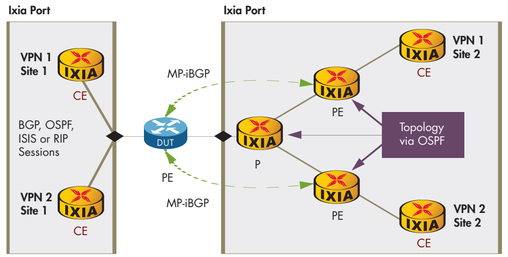
Leader in IP Performance Testing

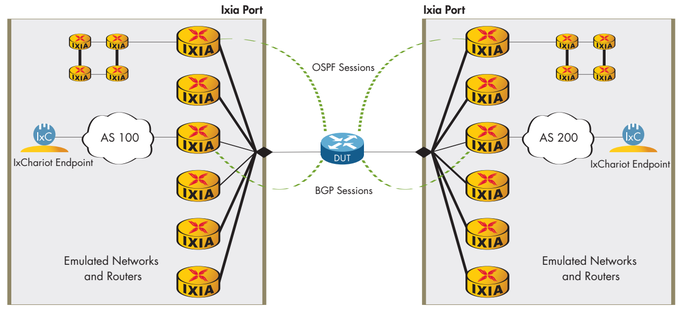
IxN

IxNetwork™

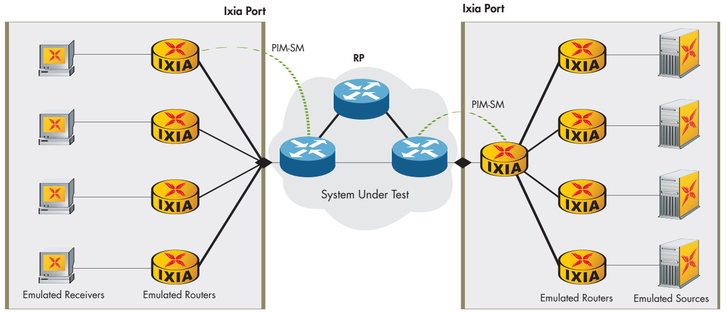
MPLS Testing



Unicast Router Testing



Multicast Router Testing



IxNetwork™ – Characterize the Performance and Scalability of Routers and Switches

Test Challenges

IP-based network devices – such as switches and routers – form the infrastructure of today's public and private networks. These devices support multiple functions, including Ethernet bridging, unicast and multicast routing, and MPLS VPN-based applications. With advances in microcode and silicon design, these networking devices provide unprecedented scalability and performance. Network Equipment Manufacturers, the designers of such networking devices, need to verify the scalability, stability, and performance of their designs. Service Providers and Enterprise network operators, who deploy these networking devices, need to characterize performance bottlenecks and verify interoperability before deployment.

As you might imagine, the challenges faced in testing such sophisticated and highly functional devices has increased significantly, just as the need to test them becomes ever more critical. However, building large-scale test networks to rigorously test real-world deployments is often not economically feasible. Instead, a purpose-built test tool with the capability of accurately simulating real-world network behavior is a much better choice for effectively assessing the performance limits of today's networking devices.

Ixia's IxNetwork Answers the Challenge

The IxNetwork test application leverages Ixia's port CPU-based Load Modules. With these modules, each network test port supports an independent PowerPC running Linux and IP routing state machines. Using the IxNetwork test application, each Ixia test port is capable of emulating thousands of routers with millions of reachable networks. Users can easily scale the size of these emulated topologies by adding additional test ports. Combined with line-rate traffic generation and the QoS measurement capabilities provided by Ixia's per-port FPGA hardware architecture, the CPU-based Load Modules verify the advertised topologies and networks for reachability and QoS performance.

Emulates Complex Network Topologies with Dynamic Flexibility

IxNetwork provides a wide variety of options to create complex configurations. For example, IGP (Interior Gateway Protocol) networks – such as OSPF and IS-IS – can be created by simply listing emulated routers, interfaces, and multiple route ranges.

Who is Ixia?
Ixia is a leading provider of performance test systems for IP-based infrastructure and services

What distinguishes Ixia Test Systems from the competition?

- Single Platform for Layer 2-7 that is forwardly and backwardly compatible
- Superior Functionality through granular control of a greater number of test parameters
- Universal Automation of every function throughout the test environment

Alternatively, an emulated router grid topology can be quickly configured by simply specifying the number of rows and columns of routers. Distant vector protocols, like BGP and RIP, are easily emulated by IxNetwork. Multiple AS paths, route ranges, and many other attributes can be defined with great control and flexibility.

Bridging protocols – like STP, RSTP and MSTP – are supported by IxNetwork with the capability to dynamically change emulated root IDs and associated costs. Users can mix and establish any combination of emulated sessions on one or many ports. Mandatory and optional protocol attributes or topologies can be changed dynamically on-the-fly without restarting the protocol state machines. Combined with real-time measurement results and learned routing information – such as labels, routes, LSAs, root bridge ID, etc. – the effect of changes can be instantly verified. IxNetwork also integrates an extremely flexible Test Scheduler to inject instability into the network, which helps users design a sequence of events to withdraw or advertise routes, enable or disable protocol sessions, start or stop traffic generator, etc.

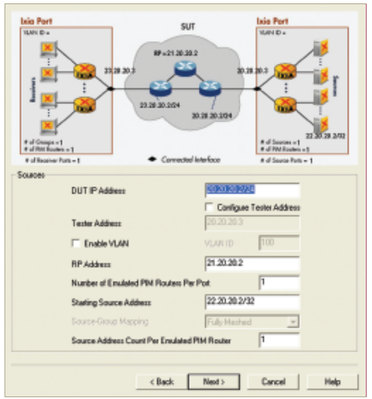
Provides Highest Degree of Scalability

With a per-port CPU design, each Ixia test port is equipped with the power to emulate thousands of routing sessions. Billions of routes can be generated, and hundreds of thousands of routes can be stored per Ixia port. Ixia's high-port density chassis allow users to easily add additional test ports to boost routing scalability so that even the world's most powerful IP-based routers can be effectively stressed to accurately assess their performance.

Easy-to-Use Interface

The IxNetwork GUI facilitates the quick and easy configuration of routing protocol emulations. Configuration wizards provide a graphical-based, step-by-step process for the initial setup of small to large-scale test topologies across multiple Ixia test ports, greatly simplifying the configuration of complex network topologies.

In addition, IxNetwork's spreadsheet GUI paradigm provides for the entry, editing, and viewing of large configurations across multiple test ports. Spreadsheet-like commands are available to quickly scale a configuration or apply operations over numerous values. Once a network topology is created, it can be copied easily onto any supported Ixia test port.



Answers the Test Challenges of Multicast Networks

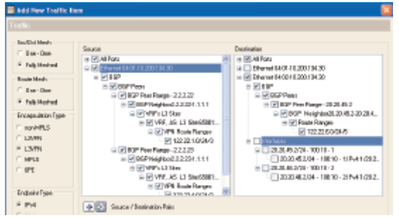
Multicast networks introduce the paradigm of point-to-multipoint communications where multicast control and data planes are distinguishably different from unicast routing. IxNetwork addresses these different testing needs with complete support for Internet Group Membership Protocol (IGMP) versions 1, 2, and 3; Multicast Listener Discovery (MLD) Protocol versions 1 and 2; and PIM-SM/SSM for testing IPv4 and IPv6 multicast networks. Thousands of multicast hosts or hundreds of PIM neighbors can be emulated by a single Ixia port to simulate joining and leaving multiple, multicast groups. IxNetwork also supports multicast over GRE tunnels. Both multicast protocol and data packets can be tunneled over GRE interfaces. GRE-based Multicast VPNs within Layer 3 MPLS VPNs can be emulated and tested by IxNetwork.

Tests MPLS VPNs with Ease of Use and Complete Control

Ixia's IxNetwork is designed to test and emulate the components that make up an MPLS-based VPN, including CE (Customer Edge), P (Provider), and PE (Provider Edge) routers. IxNetwork can emulate the MPLS signaling protocols LDP and RSVP-TE to set up Label Switching Paths (LSPs) with traffic engineering attributes across MPLS networks. Complex VPN topologies can be simulated in combination with Ixia's IGPs, such as OSPF and IS-IS, and MP-BGP (Multi-Protocol BGP) emulations. IxNetwork supports both Layer 2 and Layer 3 MPLS VPNs, including VPLS. IxNetwork's flexible Graphical User Interface (GUI) facilitates test configuration, including graphical-based wizards for quick and simple set up of complex and large VPN simulations.

Supports Dual Stack IPv6/IPv4 Networks

IxNetwork enables the performance validation of mixed IPv4/IPv6 and IPv6-only devices. Users can validate ICMPv6 as per RFC 2463, Neighbor Discovery Protocol as per RFC 2461, Address Auto-configuration as per RFC 2462, and Path MTU Discovery protocols. The IPv6 versions of all popular IP routing protocols – including BGP+, OSPFv3, IS-ISv6, and RIPng – can be emulated while line rate IPv4/IPv6 traffic is being generated and analyzed. Multicast routing emulation is also supported with PIM-SMv6, as well as IP Multicast with MLDv1/v2.



Integrates with Stateless and Stateful Data Plane Testing

Verifying the reachability of advertised routes is essential to validating the proper operation of the FIB (Forwarding Information Base) of the IP router under test. Ixia's IxNetwork simplifies testing by integrating the emulated routing topology with real-time traffic streams and analysis. The user can quickly and easily set up stateless traffic streams with the powerful Traffic Wizard to target all advertised routes or MPLS labels and perform real-time per-flow QoS measurements. In addition, Layer 4 stateful traffic generated by Ixia's IxChariot test application can be sent over emulated topologies.

Automates Test Processes with Tcl Scripting and IxScriptMate™

Automated scripts can be quickly created using the Ixia Tcl scripting environment. Alternatively, the IxExplorer™ GUI can be used to set up a test configuration, then Ixia's ScriptGen utility can be used to translate the GUI settings to Tcl code with minimal commands. Ixia also offers an extensive list of pre-built test methodologies, via IxScriptMate, to enable the creation of integrated automation environments for IP control and data plane testing.