IxLoad Overview — Converged Multiplay Service Validation

Ensure Performance and QoE with Highly Scalable, Easy-To-Use Testing

Problem: Endangered Quality of Experience

In today's highly competitive landscape, organizations must meet stringent network quality requirements to deliver the best customer experience. However, a widening array of multimedia applications, and an increasing number of users, is making it harder—and more expensive—than ever to validate converged multiplay services and application delivery platforms. Without a way to properly test these services, customer quality of experience (QoE) is at risk.

Solution: A Highly Scalable Solution for Faster QOE Insight

IxLoad delivers comprehensive performance testing for validating user QoE. IxLoad works by emulating web, video, voice, storage, VPN, wireless, infrastructure, and encapsulation/security protocols to create realistic scenarios. A modular system design allows IxLoad to scale with your infrastructure while real-time QoE metrics let you drill down to quickly identify network degradations and isolate breaking points. Since IxLoad is as easy to use as it is effective, you don't have to be a protocol expert to achieve complete end-to-end service validation.

Highlights

- Measure key performance and QoE indicators for each application with scalable, stateful application emulations

- Make rapid decisions about competing products and technologies with data-driven PoCs

- Right-size your investment with scale and capacity testing

- Optimize SLAs by analyzing the impact of new rollouts and subscriber growth on existing services

- Reduce your test time and learning curve with predefined templates addressing typical use cases and comprehensive analytics for faster real-time insight into errors and QoE

KEYSIGHT TECHNOLOGIES

Key Features

- Offers the industry's highest HTTP, SSL, and IPsec performance and scale
- Delivers end-to-end testing of converged wireless and wired application delivery infrastructure and services
- Provides real-time insight into QoE
- Emulates fully integrated broadband network infrastructures with application traffic testing
- Serves as the only test solution in the market that can model the dynamic nature of user behavior
- Achieves seamless application performance validation across physical and virtual networks

Specifications

Application Layer Protocols

IxLoad delivers a wide variety of fully stateful protocols to emulate a complete multiplay user environment. It delivers a sophisticated subscriber modeling capability that enables users to model the dynamic nature of subscriber behavior. Ixia's purpose-built chassis and load modules empower IxLoad to generate city-scale traffic. This, along with comprehensive network support, advanced test timelines and automatic goal-seek fine-tuning to meet test objective, enables users to comprehensively assess the performance of their service delivery networks and determine application-level performance with a single integrated solution.

Technology	Protocols
Web	HTTP (1.0/1.1), SSLv3, TLS v1.0, TLS v1.1, TLS v1.2, TLS v1.3 Client and Server emulations HTTP2, TLS v1.2 Client and Server emulations
File Transfer	FTP, and TFTP Client and Server emulations
Email	SMTP, POP3, and IMAP Client and Server emulations
Database	Oracle, MySQL, and MSQL Client emulations
Storage	RoCEv2 requesters and responders emulation, SMB1, SMB2, and SMB3 Client and Server emulations; NFSv3, NFSv4, and NFS 4.1 Client emulations; iSCSI, SCSI over FoCE and Initiator and Target emulations; Cloud Storage – OpenStack Swift Client emulation
IPTV / VOD	IGMPv2/3, MLDv1/2, RTSP, RTP/UDP
Over the Top (OTT)	Adobe Flash Player, Microsoft Silverlight Player, Apple HLS Player, Adobe HDS, and MPEG DASH Client emulations
Voice	SIP, WebRTC, MGCP, H.248 (Megaco), Cisco SCCP (Skinny), RTP & SRTP, Audio, Conversational Video, File Transfer (MSRP) – (only with SIP) and Fax over IP (T.38) (only with SIP)
Infrastructure Services	DNS Client/Server, DHCP Client, LDAP Client, RADIUS Client, SSH Client. & Telnet Client/Server

Technology	Protocols
Network Access	DHCPv4/v6, PPPoE, L2TP, PCP, IPSec, DSLite, 6RD, GTP/eGTP, RADIUS, Diameter, DNS, 802.1x, EAP, and NAC
Security	Published Vulnerabilities and Malware, Distributed Denial of Service (DDoSv2), and IPsec VPN
TCP/UDP and Replay Traffic	TCP Client/Server emulation, AppReplay-Replays stateful and stateless captures to simulate emerging and propriety Internet traffic, Stateless Peer and StreamBlaster-Generates stateless IP/UDP traffic
Application Mixes	AppLibrary – A continually expanding and updated library of pre-defined application flows and application mixes of the most current internet applications

Sophisticated Subscriber Modeling

To closely model real-world device and network load, IxLoad uses a unique approach called subscriber modeling that enables users to:

- Emulate multiple application services per subscriber or user, including service sequencing
- Model traffic usage over time for each application, with advanced timelines
- Simulate the temporal nature of subscribers connecting and disconnecting from the network in a dynamic manner
- Completely control usage profile — particular websites visited, e-mail servers used, transfer sizes, channel changing behavior, streaming content, protocol options, etc.
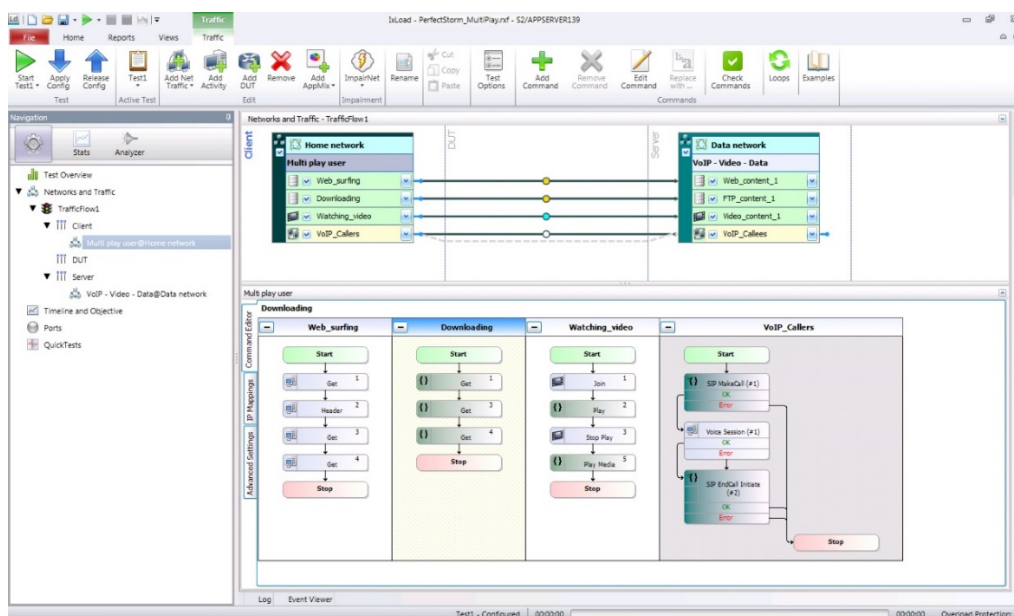
Emulates a complete multiplay user environment with realistic subscriber modeling

AppLibrary

In addition to the fully stateful protocols emulations, IxLoad includes AppLibrary, and extensive library of pre-defined application flows that simulate end-user interactions and devices. It speeds and simplifies testing application performance with blended application mixes. AppLibrary uses Ixia Application and Threat Intelligence (ATI) program to ensure the flows are current and are updated on a monthly basis.
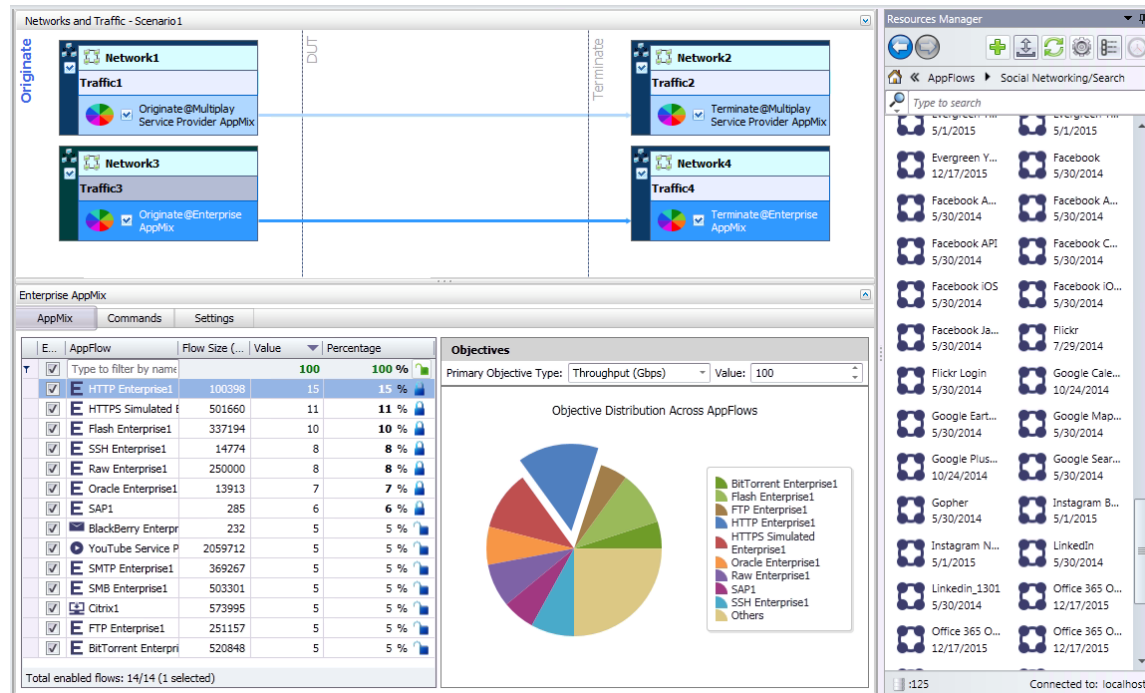

IxLoad AppLibrary Traffic Wizard

Quality of Experience Metrics

IxLoad delivers an extensive real-time statistics viewer with pre-defined, customizable views.

- Protocol-level statistics for in-depth functional testing, as well as real-time test-level statistics ideally suited to scale testing
- Aggregate statistics are displayed hierarchically, with the ability to drill-down to network groups, application/activity-level and port-level statistics
- Analyze the QoE impact of services on per-user, per-IP, or per-VLAN basis
- Set filters on statistics by specifying conditions to isolate errors and failures
- Use CSV files to capture a single-results view or at the global level to capture all results in real-time; an integrated CSV viewer enables viewing of large-result files
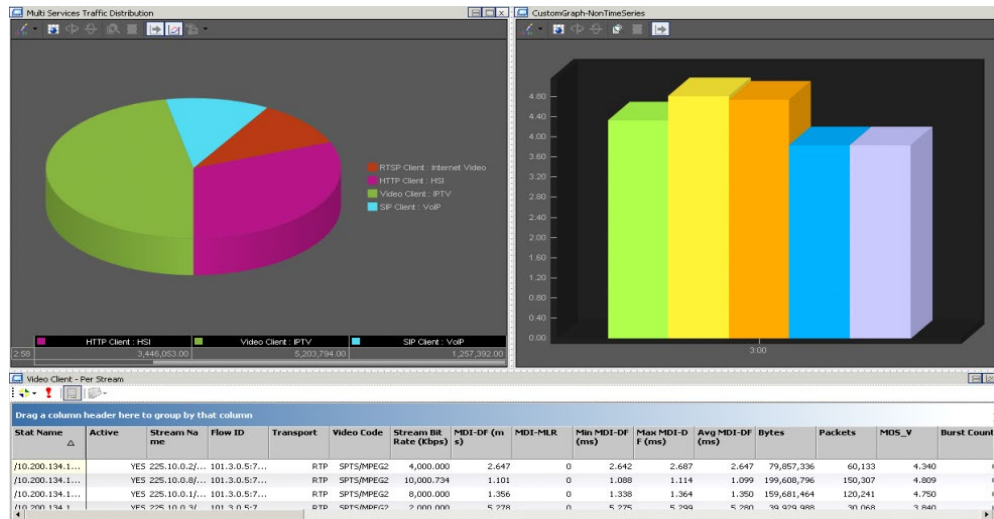
Highly visual statistic viewer

Resource Manager

A common pain-point for users was the lack of a collaboration tool to aid in incrementally building configurations and sharing the expertise of different team members. IxLoad Resource Manager is a central repository used to save, store, and reuse the various components of an IxLoad test. This allows multiple users and teams to share the different components of a test like network, traffic, activity, and protocol settings, full configuration files, external files, and more.

Sharing of resources between teams increases productivity and saves precious time. You can even use Resource Manager as a light-weight version control system, storing external files like DUT configurations and topology diagrams so others know where to access the latest (or even an earlier) revision.
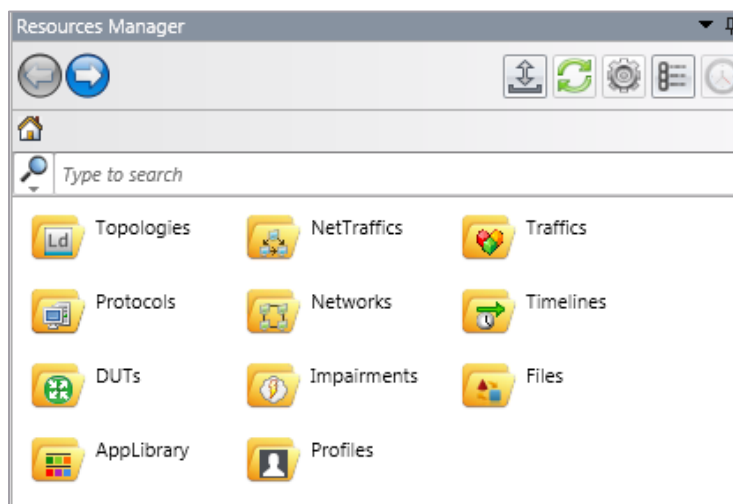
Resource Manager

Reports

IxLoad provides built-in reports that are visually rich and contain concise performance metrics at test, protocol, and port level. Any report template can be customized or create your own templates that can be shared. If also includes IxReporter Designer Studio to create new charting and analytics using all the raw metrics from IxLoad rest results as well external sources.
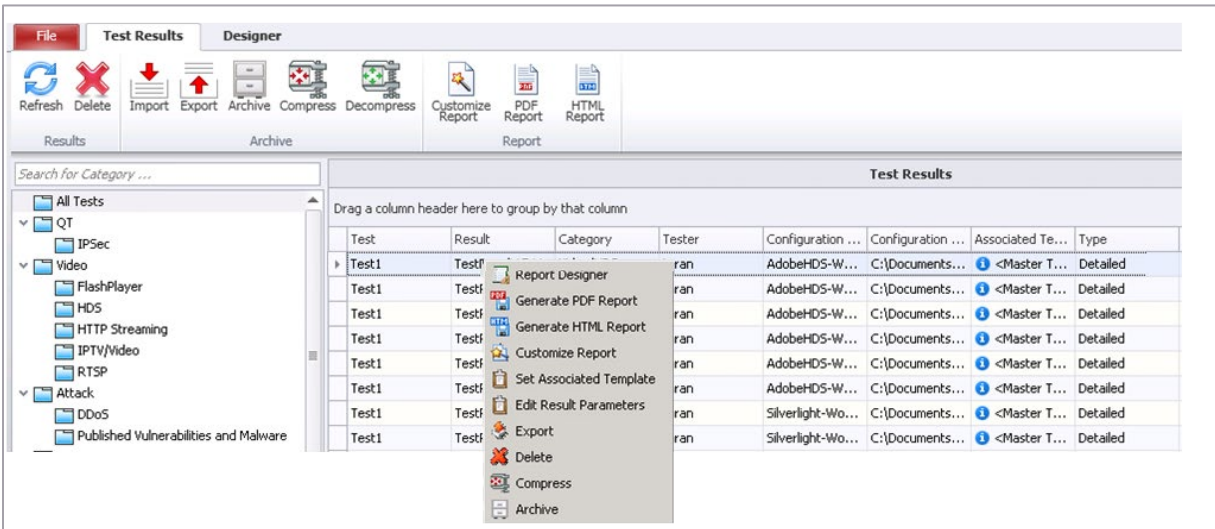

1-click report generation in PDF and HTML

Built-In Data Capture and Analysis

Internet protocols are complex—multi-protocol emulations even more so. IxLoad includes a built-in capture analysis tool, called Analyzer. The Analyzer module is a sophisticated network analyzer, with the ability to display protocol ladder diagrams. IxLoad allows you to trigger and filter control- and data-plane packet captures based on user-defined packet field. It also supports a circular buffer that enable users to see the most recent packets even if the test is configured to run for a very long duration.

Automation

IxLoad provides powerful GUI-based automation with the Test Composer and QuickTests components. It also has a robust feature set for GUI-to-script and API-based automation. Test scenarios are set up using IxLoad's step-by-step GUI, and then a single button-press generates TCL, Python, or Perl test scripts. Scripts may be modified and combined in any fashion. When the script is run, the IxLoad GUI watches the execution—providing real-time statistics and state information.

| Feature	Description
QuickTest	• Easy-to-use, configurable, pre-packaged tests • Generate detailed reports of results • HTTP, SSL, and IPsec performance test only
Test Composer	• GUI-based solution to automate test actions • Detailed control over test execution without Tcl expertise • Complete access to the Tcl API with easy UI
ScriptGen	• Provides an easy, one-click GUI-to-script generation
APIs	• One-click GUI to Tcl script conversion available (Scriptgen) • Complete access to and control over test configuration • Tcl, Python, Perl, RESTful APIs, ROBOT API
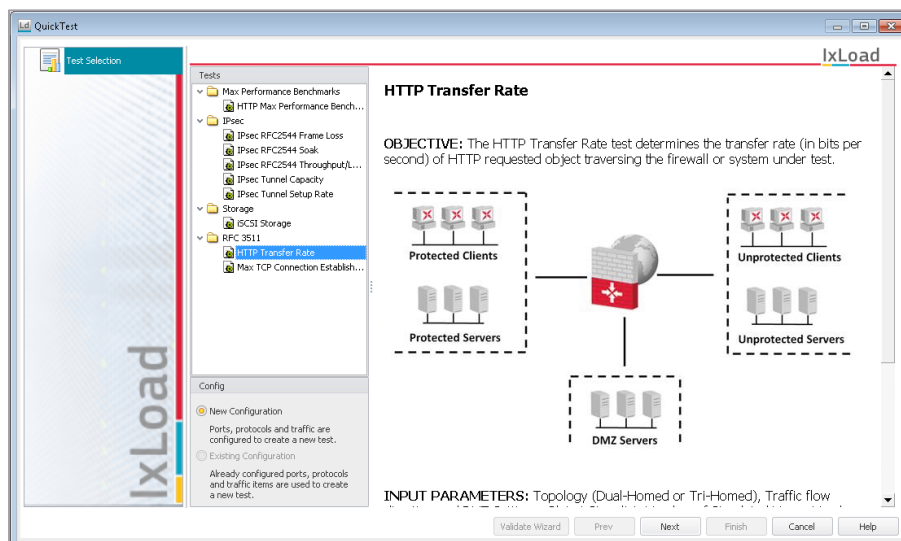
QuickTest end-to-end wizards

Web UI and REST API Browser

IxLoad offers web interfaces for controlling the execution of IxLoad tests, changing the execution parameters, and checking the statistics. Complemented by IxLoad REST API Browser (see below), IxLoad Web UI allows users to conduct the entire testing process directly from a web browser in a client-free, Windows-free environment.

Through REST API Browser, users can change IxLoad configuration parameters and add/modify/delete components to build or adjust a test configuration just from a web browser. Also, authoring automation scripts are more efficient by using IxLoad REST API Browser; it allows the developers to easily identify IxLoad's embedded methods and internal parameters names by navigating, in a simple and intuitive way, the object structure of the IxLoad test configurations.
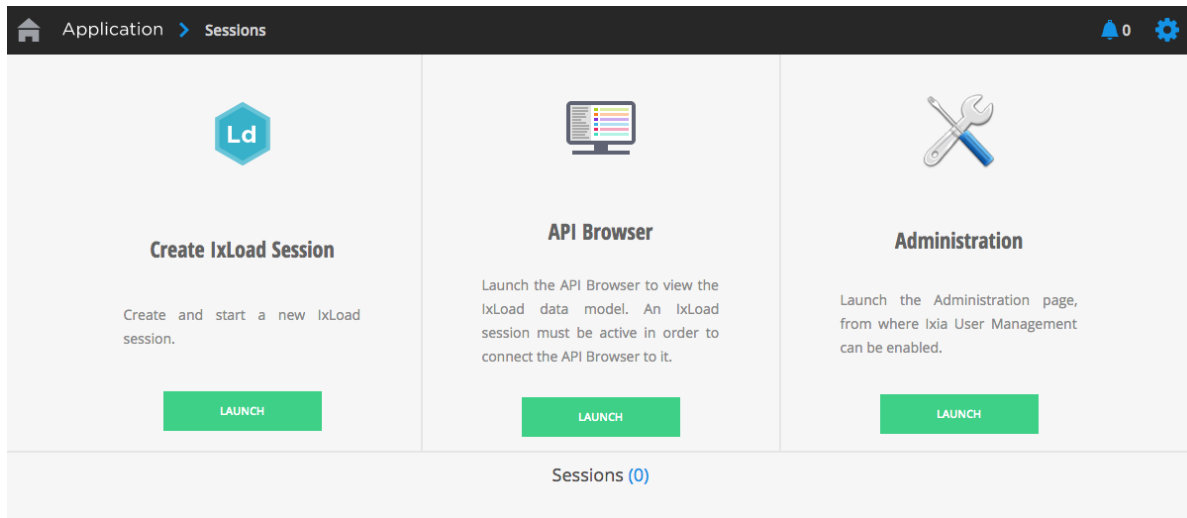
Any-time, any-where access to IxLoad through Web UI

Platform Options

Visit Keysight.com for more information on IxLoad platform options	
Virtual Platform	• IxLoad Virtual Edition (VE)
Public Cloud	• IxLoad on AWS • IxLoad on Azure
Chassis	• XGS-12 HSL/SD/SDL Chassis • XGS-2 HSL/SD/SDL Chassis

Visit Keysight.com for more information on IxLoad platform options	
Load Modules	• CloudStorm Fusion 10GE, 40GE, 25GE, & 100GE • CloudStorm 10GE, 40GE, 25GE, & 100GE • PerfectStorm Fusion 10/1GE, 40GE, & 100GE • PerfectStorm 10/1GE, 40GE, & 100GE • Novus-NP 10G/1G/100M • Novus 10G/1G/100M • Novus 10G/5G/2.5G/1G/100M • Data Center Storage 10G/25G/40G/100G (RoCEv2 & HTTP only)
Appliances	• PerfectStorm ONE Fusion 10/1GE, 40GE, & 100GE • PerfectStorm ONE 10/1GE, 40GE, & 100GE • Novus ONE Appliance • Novus ONE Plus Appliance
Load Modules: Limited Functionality and Performance	• Xcellon-Multis QSFP28 100/50/25GE • Xcellon-Multis CFP4 100GE • Xcellon-Multis CXP 100/40/10GE • Xcellon-Multis QSFP 40/10GE • Xcellon-Lava CFP 100/40GE • Xcellon-Flex QSFP/SFP+ 40/10GE

IxLoad Technology Solutions

Visit Keysight.com for more information on IxLoad Technology Solutions
• IxLoad Overview—Converged Multiplay Service Validation • IxLoad Virtual Edition (VE) L4-7 Application Performance Testing • IxLoad Data Test Solution • IxLoad Video Test Solution • IxLoad Voice Test Solution • IxLoad IPsec and Network Access Test Solution • IxLoad on AWS – Cloud Application Performance Testing • IxLoad on Azure – Cloud Application Performance Testing

Ordering Information

Chassis Licenses

Part number	Description
925-3379	**IxLoad Multiplay,** Software Bundle, Layer 4-7 Performance Test Application Data-Video-Voice package. Includes: • **Data**: Enables support for HTTP, HTTPS, TCP Session, FTP, DNS, Mail (SMTP, POP3 and IMAP), Database, SSH, RADIUS, TFTP, Application-Replay, DHCP, LDAP, Telnet, Stateless-Peer and StreamBlaster emulations. • **Video**: Enables support for basic RTSP, IPTV (Multicast), Video-ADVANCED (VoD), Adobe Flash Client, Apple HLS Client, Microsoft Silverlight Client, Adobe HDS Client and DASH Client emulations. Includes Video Quality VQMON engine for up to 10Gbps and TCP VQ Video quality for TCP video traffic for up to 10 Gbps. • **Voice**: Advanced VoIP SIP & RTP, Audio Codecs, VoLTE extensions, and Bulk SIP & MGCP. Includes: Voice Quality engine for up to 10Gbps, Video Quality engine for up to 10Gbps conversational video traffic. • **ADVNET**: Enables support for Advanced Access networking protocols such as DHCP for IP address acquisition, DHCP Server, PPP, L2TP and IPsec. • **Storage**: iSCSI, CIFSv1, CIFSv2 (SMB2), SMB3, NFSv3 Client, NFSv4 Client, NFS4.1 Client, Cloud Storage Client, DCBX, FCoE and FC; Note the FCoE and FC emulation is only supported on selected load modules. • **Access**: DHCP, PPP, L2TP, L2TP, IPsec, IPsec Performance Benchmarking QuickTest & SuiteB Cryptographic, 6RD, DSLITE and IPv6 SLAAC, 8021X, NAC and WEBAUTH. • Note: some of the features are available only on specific load modules
925-3461	**IxLoad AppLibrary Slot Bundle**, Software Bundle, Layer 4-7 Performance Test Application; Enables support for AppLibrary on a single load module. It includes **AppLibrary Slot Feature** (925-3462) and **Slot Subscription** service (925-3460) to access new application flows for one year; Requires previous purchase of 925-3040 (IXLOAD Base) or higher bundle.
IxLoad bundles per technology (Data, Video, Voice, Access and VPN, Storage, Security) are also available.	

Appliance Licenses

Part number	Description
925-6321	**IxLoad Appliance Multiplay,** Software Bundle, Layer 4-7 Performance Test Application. Enables IxLoad **Data, Storage, Voice, Video** and **Access & VPN** on PerfectStorm ONE and Novus ONE appliances**.** Includes: • 925-6121 IxLoad PerfectStorm ONE **DATA & Storage** • 925-6112 IxLoad PerfectStorm ONE **VIDEO** • 925-6113 IxLoad PerfectStorm ONE **VOICE** • 925-6117 IxLoad PerfectStorm ONE **Access & VPN**
925-6104	**IxLoad Appliance Basic**, Optional Software, Layer 4-7 Performance Test Application. Enables IxLoad Basic functionality on PerfectStorm ONE and Novus ONE appliances. Includes: HTTP, HTTPS, DNS, ADVNET-DHCP, WAP, Stateless Peer. Requires IxLoad Framework, 925-0001, which is free with adjoining software purchase.
925-3461	**IxLoad AppLibrary Slot Bundle**, Software Bundle, Layer 4-7 Performance Test Application; Enables support for AppLibrary on a single load module. It includes **AppLibrary Slot Feature** (925-3462) and **Slot Subscription** service (925-3460) to access new application flows for one year; Requires previous purchase of 925-3040 (IXLOAD Base) or higher bundle.
IxLoad bundles for appliances per technology (Data, Video, Voice, Access and VPN, Storage, Security) are also available.	

Virtual Edition Licenses

Part number	Description
939-9511	**IxLoad VE Tier-1 1G Floating SUBSCRIPTION** License. Includes the following IxLoad protocols supported on IxLoad VE for a duration of 1-Year: Data (HTTP, HTTPS, FTP, TFTP, DNS, DHCP, LDAP, Radius), Mail (IMAP, POP3, SMTP). Enables 1 Gig throughput per unit.
939-9512	**IxLoad VE Tier-2 1G Floating SUBSCRIPTION** License. Includes the following IxLoad protocols supported on IxLoad VE for a duration of 1-Year: Data (HTTP, HTTPS, FTP, TFTP, DNS, DHCP, LDAP, Radius), Mail (IMAP, POP3, SMTP), Storage (SMB, NFS, iSCSI, Storage I/O). Enables 1 Gig throughput per unit.

Part number	Description
939-9513	**IxLoad VE Tier-3 1G Floating SUBSCRIPTION** License. Includes the following IxLoad protocols supported on IxLoad VE for a duration of 1-Year: Data (HTTP, HTTPS, FTP, TFTP, DNS, DHCP, LDAP, Radius), Mail (IMAP, POP3, SMTP), Storage (SMB, NFS, iSCSI, Storage I/O), Voice (VoIP SIP, VoLTE), Video (DASH, Flash,HDS, HLS, IPTV VoD, MS IPTV, Silverlight), IPsec, IxLoad- Attack and IxLoad-AppLibrary. Enables 1 Gig throughput per unit.
939-9533	**IxLoad VE Tier-3 10G Floating SUBSCRIPTION** License. Includes the following IxLoad protocols supported on IxLoad VE for a duration of 1-Year: Data (HTTP, HTTPS, FTP, TFTP, DNS, DHCP, LDAP, Radius), Mail (IMAP, POP3, SMTP), Storage (SMB, NFS, iSCSI, Storage I/O), Voice (VoIP SIP, VoLTE), Video (DASH, Flash,HDS, HLS, IPTV VoD, MS IPTV, Silverlight), Ipsec, IxLoad- Attack and IxLoad-AppLibrary. Enables 10 Gig throughput per unit.
939-9514	**IxLoad VE Tier-4 1G Floating SUBSCRIPTION** License. Includes the following IxLoad protocols supported on IxLoad VE for a duration of 1-Year: Data (HTTP, HTTPS, FTP, TFTP, DNS, DHCP, LDAP, Radius), Mail (IMAP, POP3, SMTP), Storage (SMB, NFS, iSCSI, Storage I/O), Voice (VoIP SIP, VoLTE), Video (DASH, Flash,HDS, HLS, IPTV VoD, MS IPTV, Silverlight), IPsec, IxLoad- Attack and IxLoad-AppLibrary. Includes EPC and WiFi Offload protocols. Enables 1 Gig throughput per unit.
939-9534	**IxLoad VE Tier-4 10G Floating SUBSCRIPTION** License. Includes the following IxLoad protocols supported on IxLoad VE for a duration of 1-Year: Data (HTTP, HTTPS, FTP, TFTP, DNS, DHCP, LDAP, Radius), Mail (IMAP, POP3, SMTP), Storage (SMB, NFS, iSCSI, Storage I/O), Voice (VoIP SIP, VoLTE), Video (DASH, Flash,HDS, HLS, IPTV VoD, MS IPTV, Silverlight), IPsec, IxLoad- Attack and IxLoad-AppLibrary. Includes EPC and WiFi Offload protocols. Enables 10 Gig throughput per unit.

Learn more at: www.keysight.com

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