Layer 2-3 Network Test Products

CATALOG

Table of Contents

A New Era of Network Testing

As network infrastructures and devices evolve, your testing strategy must keep up!

Building and maintaining a reliable and secure network is a high stakes game. Whether you're a network equipment manufacturer (NEM) who must identify issues before shipping to prevent costly product recalls and warranty claims or a service provider who needs to accelerate adoption of new technology with confidence and validate performance under high traffic, the network is the lifeline of your business.

Unplanned downtime comes at a great cost that stretches far beyond lost revenue and productivity. There are also the recovery costs and other intangibles like poor customer satisfaction or a big hit to your valuable reputation. Depending on the cause and length of your downtime, recovery can take weeks, months and even years in some cases.

From NEMS to cloud providers, hyperscalers, chipset and optical transceiver manufacturers, and enterprises, your network is the heartbeat

of your organization. It provides the connectivity and communication you need to survive. Without a reliable infrastructure, all other IT components and software applications don't matter. It's common for organizations to invest heavily in validating expensive business and security applications, yet overlook testing the underlying network infrastructure that hosts the applications and enables today's emerging technologies.

Keysight's end-to-end network test and security portfolio addresses all seven network layers in the OSI model. However, this catalog focuses only on our L2-3 products plus a couple that provide layer 1.5 support.

Keysight's family of load modules deliver the industry's highest density and performance Ethernet IP test solutions. Our network emulators precisely emulate real-world network impairment conditions. Our flexible chassis platforms deliver high performance, functionality, conformance, and realistic security testing of underlying network equipment and applications.

 Peek inside – we think you'll like what you see!
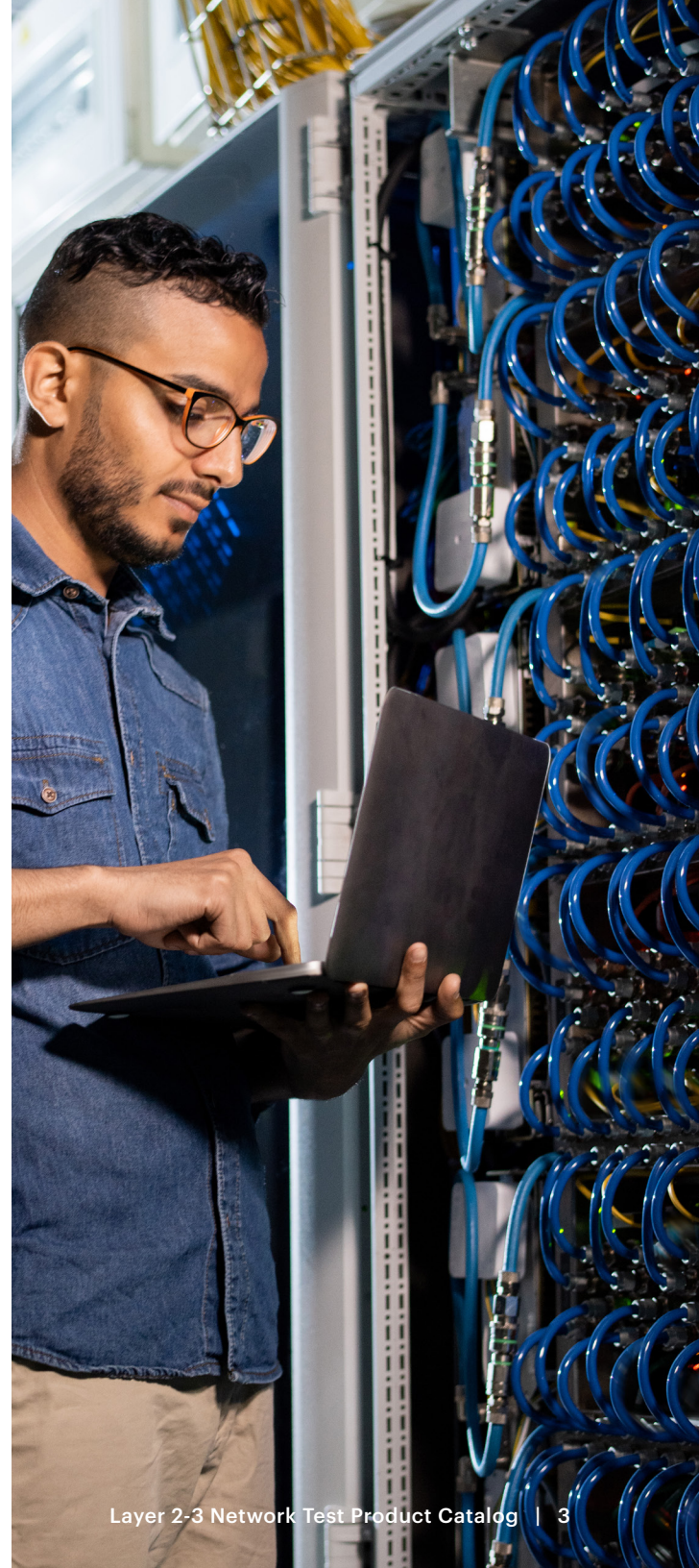
Pick Your Solution ...

L2-3 test software & cloud solutions

L2-3 test hardware solutions

Click here for L4-7 product catalog

Layer 2-3 Network Test Software

Intuitive UI and full test automation using trusted industry methodologies

Our broad selection of infrastructure test software delivers comprehensive L2-3 test applications.

Layer 2-3 Network Infrastructure Testing

Keysight's network infrastructure testing applications offer comprehensive network access / switching / routing / SDN protocol coverage, cloud and SP-scale.

They also deliver industry standard conformance, compliance and support of benchmark test suites. Our layer 2-3 test portfolio will help you build a differentiated, cost-effective network infrastructure to meet exponential growth in data center traffic across networks.
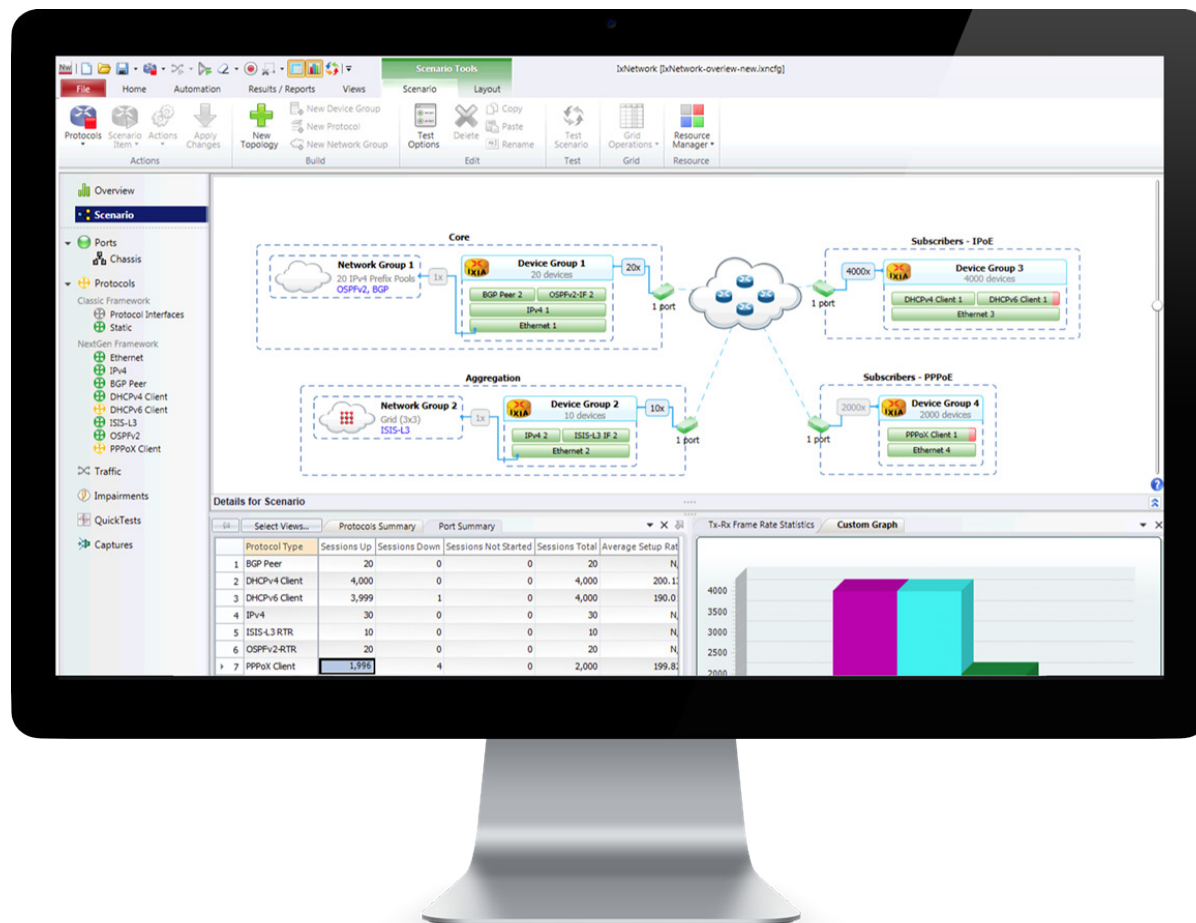
Our network infrastructure testing applications will:

- Reduce capital expenditures by emulating and testing an exceptionally large scale of hosts/switches/routers without using real devices.

- Reduce test time with easy-to-use visual topology-based protocol configuration, comprehensive analytics with drill-down, learned information, and test automation support.

- Cut network operating costs and identify problems in the lab before deployment with realistic emulation of real-world conditions, granular traffic generators, and stateful AppLibrary.

- Help you understand performance and scaling bottlenecks with unparalleled density, scale, and performance stress testing to take down the most powerful network device(s).

Software / application	OSI layer(s) support	Applicable to test hardware	Virtual edition	
IxNetwork	L2-3	AresONE family, Novus family	IxNetwork VE	Get Quote >
IxVerify	L2-3	N/A	KVM environment	Get Quote >
IxChariot	L2-7	XRPi, Vision Edge 1S (E1S)	IxChariot console and performance endpoints	Get Quote >
IxANVL	L2-4	Windows / Linux host	N/A	Get Quote >
Keysight Elastic Network Generator	L2-3	N/A	Cloud-native	Get Quote >

IxNetwork

L2-3 network infrastructure performance testing that scales to your business needs

- Supports test coverage from 1GE to 800GE

- Comprehensive protocol test coverage for routing/switching, multiprotocol label switching (MPLS), software-defined networking (SDN), data center networking, broadband access, carrier Ethernet, automotive & industrial Ethernet, 5G transport, L2 security (MACSec).

- Emulates realistic network topology from access, and data center, to core network testing.

- Generates traffic flows that mimic realistic network traffic, and user applications.

- Provides powerful ingress/egress tracking and drill-down traffic flow analysis for rapid isolation of service violations.

- Emulates real-world application traffic mix over L23 infrastructure.

- Delivers end-to-end test system automation and performance benchmarking.

- **IxNetwork VE** runs in virtualized networks from any commercially available compute environment including private and public clouds.

IxNetwork comparison chart

| License name	Subscription / perpetual	Floating / node-lock	Variants			
			Subscription tier	Throughput	Common applications	Part number
IxNetwork software bundle	Perpetual	Node-lock for XGS-2/XGS-12 chassis and fixed chassis/ appliance	SW package Tier 0 (Chassis)	Depends on HW	Routing, Basic MPLS and Multicast	928-0020
			SW package Tier 1 (Chassis)	Depends on HW	Routing/Switching, MPLS/VPN, Multicast	930-3500
			SW package Tier 2 (Chassis)	Depends on HW	Routing/Switching, MPLS/VPN, Multicast, Carrier Ethernet	930-3501
			SW package Tier 3 (Chassis)	Depends on HW	Routing/Switching, MPLS/VPN, Multicast, Carrier Ethernet, Data Center Ethernet, Broadband	930-3500
			All-inclusive	Depends on HW	All Inclusive package excludes: AppLibrary Slot Bundle, MACSec and/or Encryption test package	930-2210 (Chassis) 930-2200 (AresONE) 930-2220 (Novus ONE Plus)
	Annual Subscription	Floating	Subscription Tier 1	Depends on HW	Routing/Switching, MPLS/VPN, Multicast	930-9521
			Subscription Tier 2	Depends on HW	Routing/Switching, MPLS/VPN, Multicast, Carrier Ethernet, data Center Ethernet, Broadband	930-9522
			Subscription Tier 3	Depends on HW	All Inclusive package excludes: AppLibrary Slot Bundle, MACSec and/or Encryption test package	930-9523
IxNetwork AppLibrary slot bundle	Annual Subscription	Node-lock	Slot bundle	Depends on HW	IxNetwork Subscription AppLibrary Slot Bundle	930-3461
		Node-lock	Chassis bundle	Depends on HW	IxNetwork Subscription AppLibrary Slot Bundle	930-3463

IxNetwork Virtual Edition (VE) comparison chart

| License name	Description	Subscription / perpetual	Floating / node-lock	Variants		
				Performance tier	Throughput	Part number
IxNetwork VE annual subscription	IxNetwork VE tiered floating annual subscription license	Annual subscription	Floating	Tier 0	1 Gbps	939-9510
					100 Gbps	939-9620
				Tier 1	1 Gbps	939-9501
					100 Gbps	939-9621
				Tier 2	1 Gbps	939-9502
					100 Gbps	939-9622
				Tier 3	1 Gbps	939-9503
					10 Gbps	939-9523
					100 Gbps	939-9623
IxNetwork VE perpetual	IxNetwork VE tiered floating perpetual license	Perpetual	Floating	Tier 0	100 Gbps	939-9626
				Tier 1	100 Gbps	939-9627
				Tier 2	100 Gbps	939-9628
				Tier 3	1 Gbps	939-9509
					10 Gbps	939-9529
					100 Gbps	939-9629

IxChariot

Instant performance assessment for complex networks from pre- to post-deployment

- Tests conformance for IPv4/IPv6, routing/MPLS/VPN, segment routing, automotive Ethernet, and more.

- Test Wi-Fi clients and access points (APs) based on Wi-Fi Alliance certification tool.

- Assess network performance instantly, including wireless performance and geo-location.

- Support distributed and portable performance endpoints deployed on mobile, PC, Mac or in any hypervisor or cloud provider.

- Manage tests from an intuitive web-based user interface.

- Control device, network, and application performance based on comprehensive key performance metrics (throughput, packet loss, jitter, delay, MOS, and application latency).

- Emulate and report KPIs from complex application flows, voice and video services like Netflix and YouTube to understand your network's ability to deliver quality user experience.

- Emulate a blend of real-world application traffic used on today's networks. See AppLibrary.

IxANVL
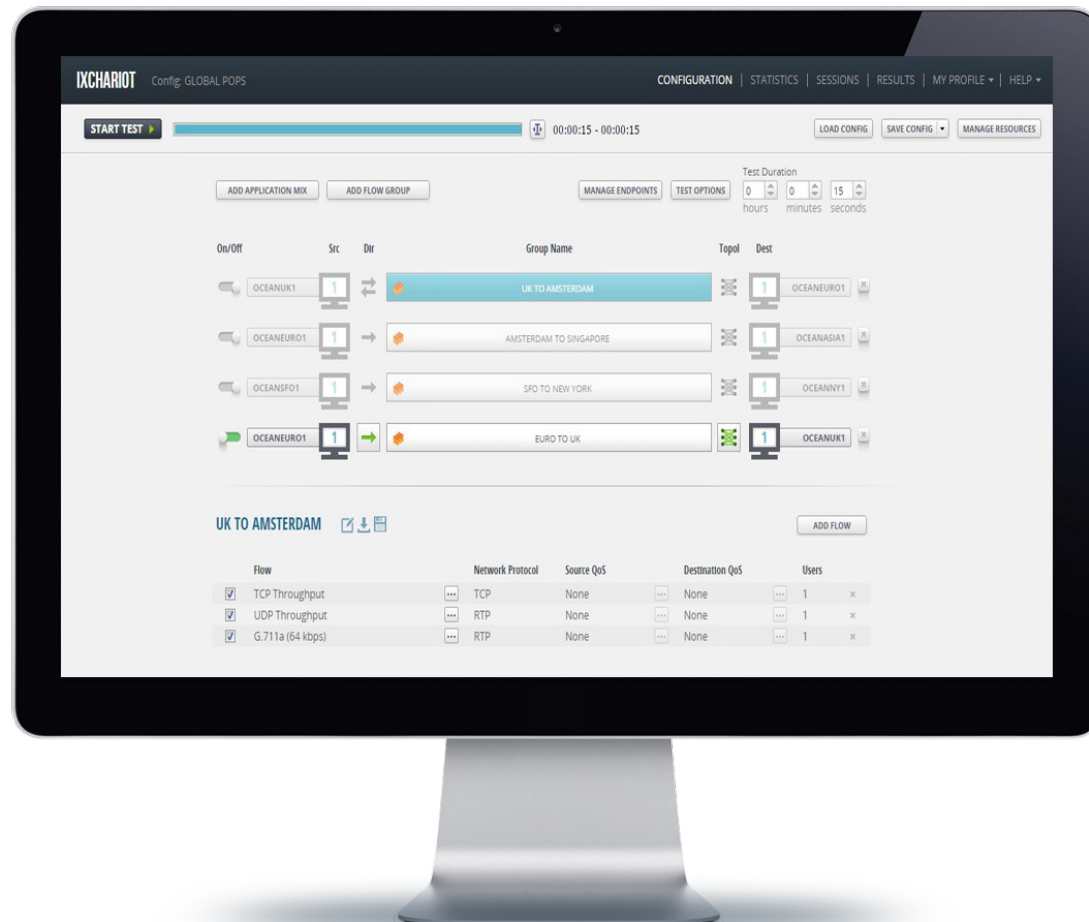
## Industry standard for automated network protocol validation

- Provides conformance test cases for wide variety of protocols.

- Emulates large, multi-node networks which reduces costs and leads to more efficient testing and faster product-release times.

- Enables verification of the protocol stack, whether it is RFC/Standard compliant or not.

- Runs on minimal hardware, such as a PC with a Linux or Windows operating system and only an Ethernet card.

- Functions with Keysight's powerful test and analysis platform through a Virtual Network Interface Card (VNIC) driver.

- Flexible support of industry standard test interfaces, including 100 Mbps/1GE/10GE/100GE/400GE Ethernet.
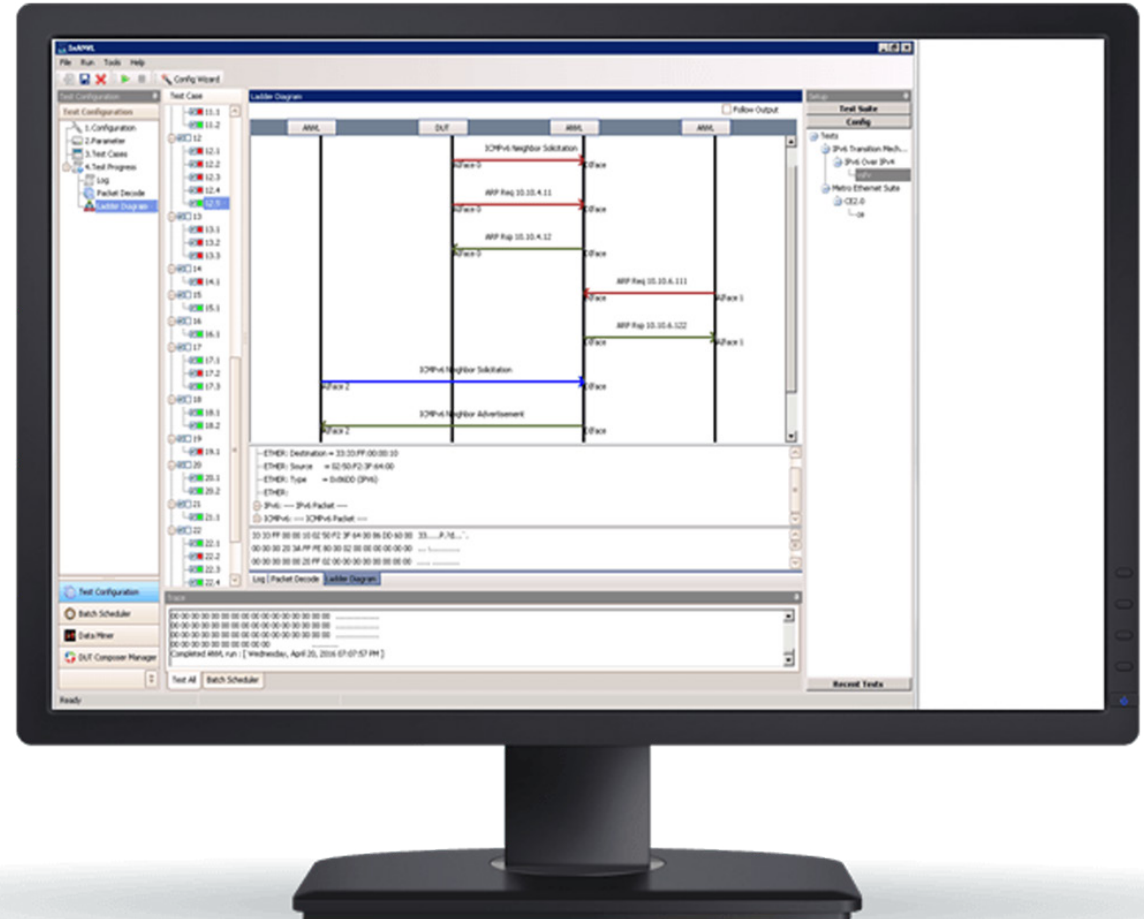
Keysight Elastic Network Generator

Containerized network infrastructure testing based on Open Traffic Generator API

- **Software solution.** Validate modern data center networks in a software world.

- **Automated testing.** Execute automated test scripts for repeatable validation.

- **Open interfaces.** Create scripts based on open-source OTG API data model.

- **Language choice.** Use preferred scripting language with snappi or gosnappi.

- **Modern architecture.** Deploy a modular tool based on containers / microservices.

- **Fast. Very fast.** Accelerate execution with fast API response time. Did we say fast?

- **Select protocols.** Emulate key data center layer 2-3 control plane protocols.

- **Traffic performance.** Send layer 2-3 data plane traffic with DPDK acceleration.
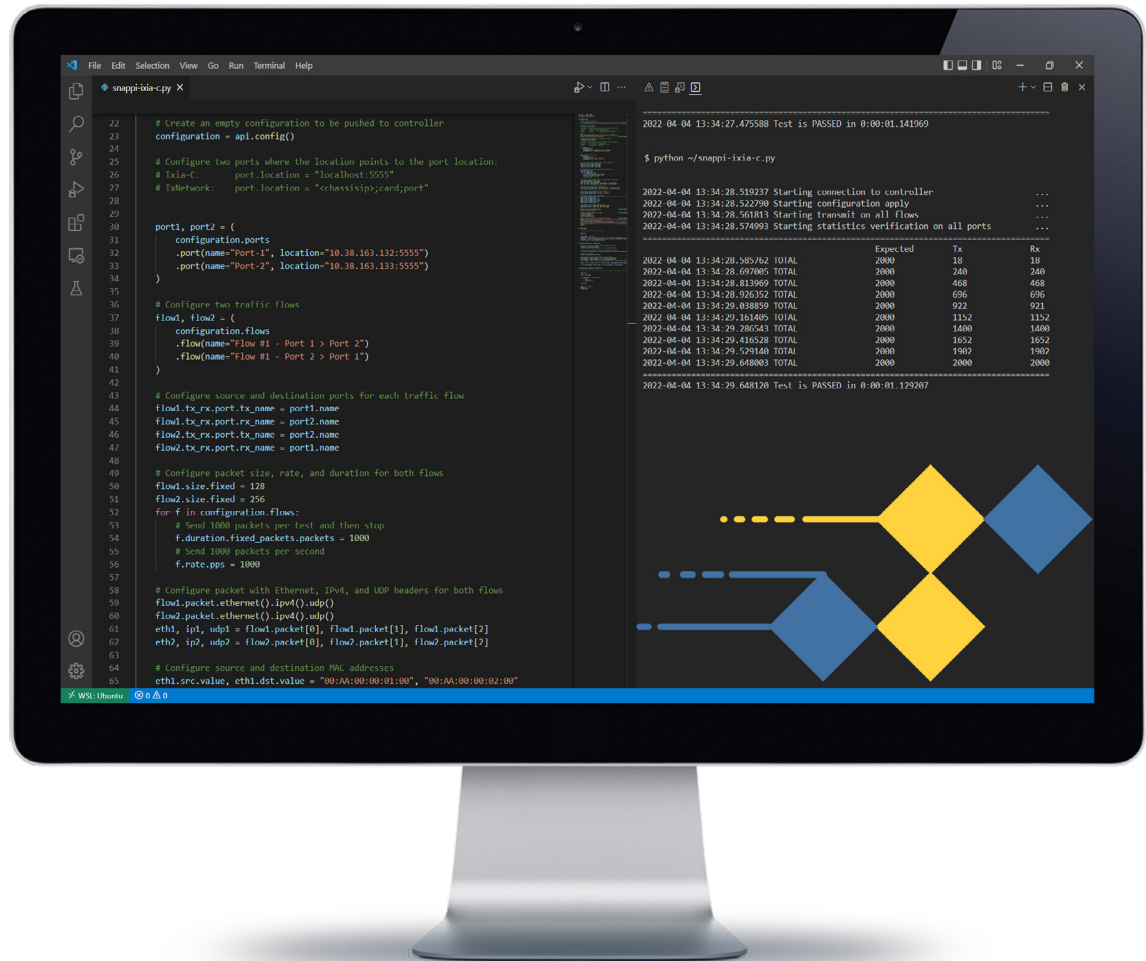
IxVerify

## A purpose-built solution for pre-silicon testing in emulation

- Test routers, switches, automotive, SmartNIC or 5G radio unit chip design in emulation.

- Use elastic fully virtual test solution to support globally distributed users.

- Access packet and signal rate measurements and statistics.

- Support automation with REST, Python, TCL, Perl, and Ruby.

- Integrate with a variety of emulators, adding necessary stimuli to validate protocols and measure performance during chip verification cycle.

- Ensure zero packet loss between virtual IxVerify environment and the emulation system.

- Share test configurations and scripts across pre-silicon and post-silicon test environments.
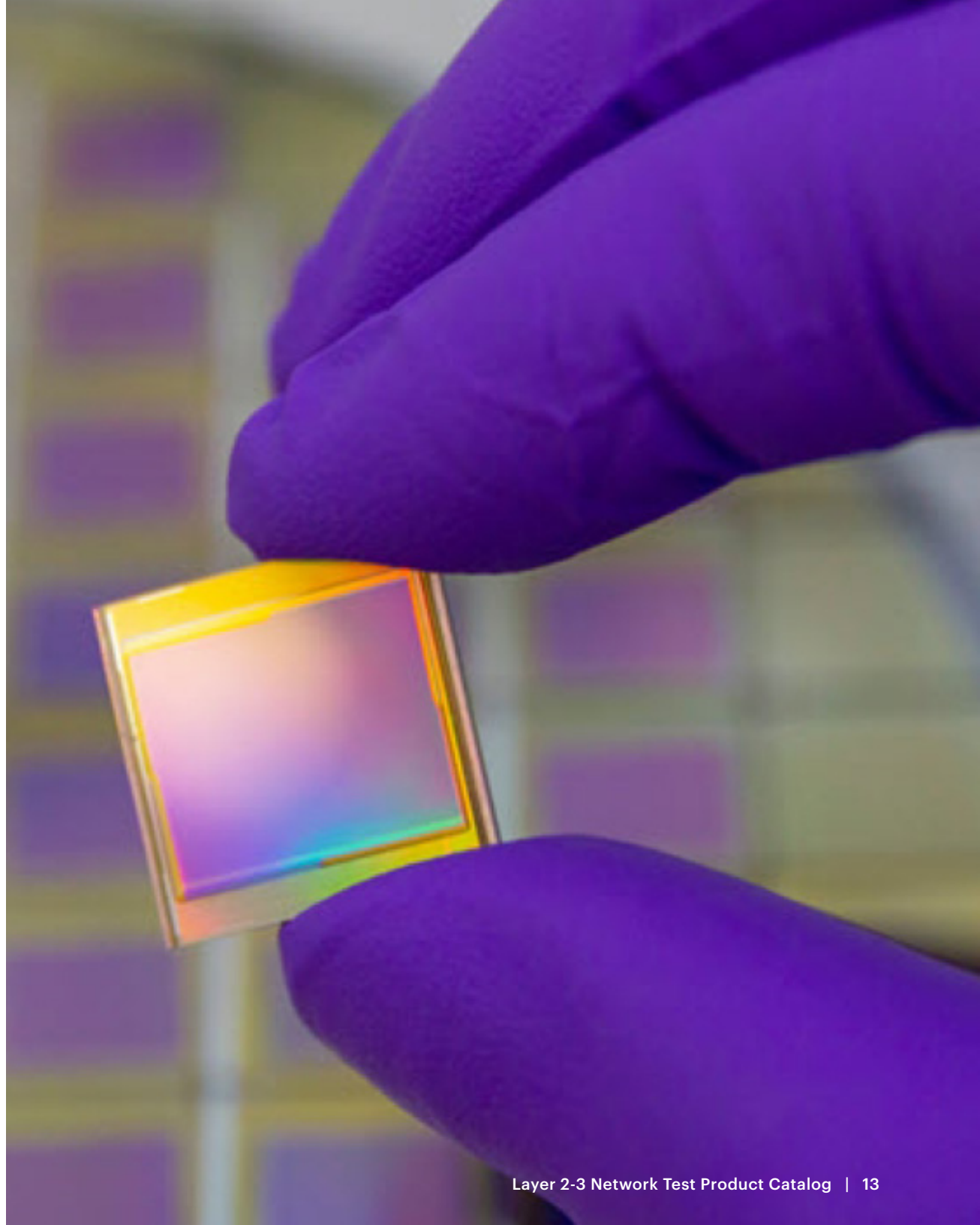
Network Test Hardware

Purpose built high performance turnkey solutions

Our fixed-chassis, appliances, and load modules offer high-density and high-performance Ethernet Internet Protocol (IP) test solutions.
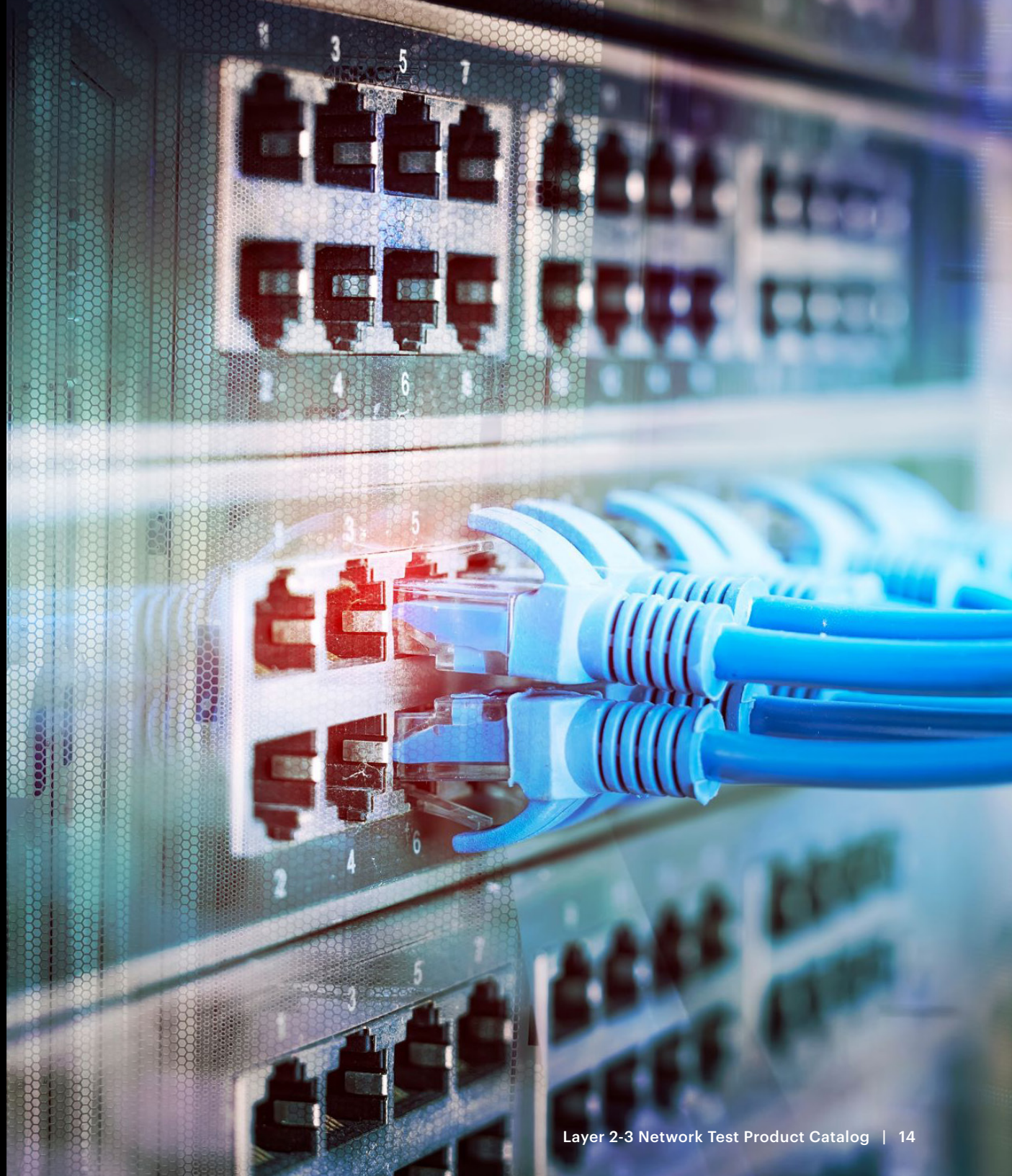
Layer 2-3 Network Infrastructure Testing

Keysight's hardware-based family of traffic generators, network impairment generators, modular chassis and award-winning IxNetwork and IxExplorer applications help you build a differentiated, cost-effective network infrastructure to meet exponential data center traffic growth across your networks. Our network infrastructure test portfolio offers high-volume traffic generators in 1GE, 1GE, 10GE, 25GE, 40GE, 50GE, 100GE, 400GE, and 800GE.

Our network infrastructure test portfolio validates the physical, data link, and network layers to:

- Provide data center and network performance, scalability, and interoperability.

- Validate network functions at internet scale.

- Ensure conformance to a broad range of industry standards and performance-benchmark specifications.

Category		Product / product family	Appliance / chassis	Software / application	Get a quote
800GE multi-rate		AresONE 800GE	Fixed chassis	IxNetwork / IxExplorer*	Get Quote >
		G800GE-02 (layer 1-2)	Fixed chassis	KiOS	Get Quote >
400GE multi-rate		AresONE 400GE	Fixed chassis	IxNetwork / IxExplorer*	Get Quote >
100GE multi-rate		UHD100T32	Appliance	UHD Web Application & Quick Test	Get Quote >
		Novus QSFP28 / SFP28	XGS2 / XGS12	IxNetwork / IxExplorer*	Get Quote >
		Network Emulator 3	Fixed chassis	Network impairment software	Get Quote >
10GE multi-rate		Novus 3 or 5-speed 10GE	XGS2 / XGS12	IxNetwork / IxExplorer* / IxLoad	Get Quote >
		Novus One Plus	Appliance	IxNetwork / IxExplorer* / IxLoad	Get Quote >
		Network Emulator II	Fixed chassis	Network impairment software	Get Quote >
2.5GE multi-rate		Novus mini	Appliance	IxNetwork Web / Keysight Network Conformance (KNC)**	Get Quote >
XGS Chassis	Compact (2-slot, 3RU)	XGS2-SD, XGS2-SDL and XGS2-HSL	Benchtop (Rack mount optional)	IxOS	Get Quote >
	Full (12-slot, 11RU)	XGS12-SD, XGS12-SDL and XGS12-HSL	Rackmount	IxOS	Get Quote >

* IxExplorer software provides complete configuration, control, and monitoring of Keysight resources in the test network.

** Keysight Network Conformance (KNC) is an automated graphical web-based network protocol and performance conformance tool with flexible scheduling, reporting and REST API. It also runs on the Novus ONE Plus and some Novus line cards

AresONE 800GE

All-in-one 800GE multi-rate system level testing solution

- QSFP-DD800, OSFP800, and dual interface chassis with 2-port, 4-port, and 8-port full and reduced performance models.

- Support multi-rate Ethernet traffic generation, reception, capture, and packet analysis per port (all 400/800GE PAM4-based speeds).

- Options for testing NRZ-encoded Ethernet speeds: 1x200GE, 2x100GE, 1x100GE, 4x50GE, 2x50GE, 8x25GE, and 4x25GE.

- Comprehensive L1 BERT pattern generation and BER analysis, RS-544 FEC statistics, pre-FEC BER, FEC symbol error density distribution, Frame Loss Ratio, and PCS/FEC symbol error injection testing, and per lane / port analysis.

- Auto-negotiation and link training for passive, and direct attached copper cables (DAC).

- Simplify interoperability testing by qualifying new silicon devices, optical transceivers, AOCs, copper cables (DACs), ACCs, AECs, and networking equipment to IEEE 802.3ck and IEEE802.3bs specifications.

- Provides broad protocol coverage for all Ethernet speeds to validate high scale layer 2-3 multi-protocol networking devices for performance and scalability.

AresONE 800GE comparison chart

Product name	Number of ports	Stream count per port	Physical interfaces	Variants		
				Physical ports	Performance	Model number
AresONE 800GE QSFP-DD800-C 8-port	8 x 800GE physical ports can fan-out to: • 16 x 400GE • 32 x 200GE • 64 x 100GE • 4 x 800GE physical ports model fan out to half the port density shown above	Full performance • 800GE: 64 • 400GE: 64 • 200GE: 64 • 100GE: 32 Reduced performance • 800GE: 32 • 400GE: 32 • 200GE: 32 • 100GE: 16	QSFP-DD800	8	Full	800GE-8P-QDD-C
				8	Reduced	800GER-8P-QDD-C
				4	Full	800GE-8PHW-4P-QDD-C
				4	Reduced	800GER-8PHW-4P-QDD-C
AresONE 800GE QSFP-DD800-C 4-port	4 x 800GE physical ports can fan-out to: • 8 x 400GE • 16 x 200GE • 32 x 100GE • 2 x 800GE physical ports model fan out to half the port density shown above	Full performance • 800GE: 64 • 400GE: 64 • 200GE: 64 • 100GE: 32 Reduced performance • 800GE: 32 • 400GE: 32 • 200GE: 32 • 100GE: 16	QSFP-DD800	4	Full	800GE-4P-QDD-C
				4	Reduced	800GER-4P-QDD-C
				2	Full	800GE-2P-QDD-C
				2	Reduced	800GER-2P-QDD-C

AresONE 800GE comparison chart, continued

Product name	Number of ports	Stream count per port	Physical interfaces	Variants		
				Physical ports	Performance	Model number
AresONE 800GE OSFP800-C 8-port	8 x 800GE physical ports can fan-out to: • 16 x 400GE • 32 x 200GE • 64 x 100GE • 4 x 800GE physical ports model fan out to half the port density shown above	Full performance • 800GE: 64 • 400GE: 64 • 200GE: 64 • 100GE: 32 Reduced performance • 800GE: 32 • 400GE: 32 • 200GE: 32 • 100GE: 16	OSFP800	8	Full	800GE-8P-OSFP-C
				8	Reduced	800GER-8P-OSFP-C
				4	Full	800GE-8PHW-4P-OSFP-C
				4	Reduced	800GER-8PHW-4P-OSFP-C
AresONE 800GE OSFP800-C 4-port	4 x 800GE physical ports can fan-out to: • 8 x 400GE • 16 x 200GE • 32 x 100GE • 2 x 800GE physical ports model fan out to half the port density shown above	Full performance • 800GE: 64 • 400GE: 64 • 200GE: 64 • 100GE: 32 Reduced performance • 800GE: 32 • 400GE: 32 • 200GE: 32 • 100GE: 16	OSFP800	4	Full	800GE-4P-OSFP-C
				4	Reduced	800GER-4P-OSFP-C
				2	Full	800GE-2P-OSFP-C
				2	Reduced	800GER-2P-OSFP-C

G800GE-02

800GE layer 1 BERT, KP4 FEC & L2 packet blast multiport testing solution
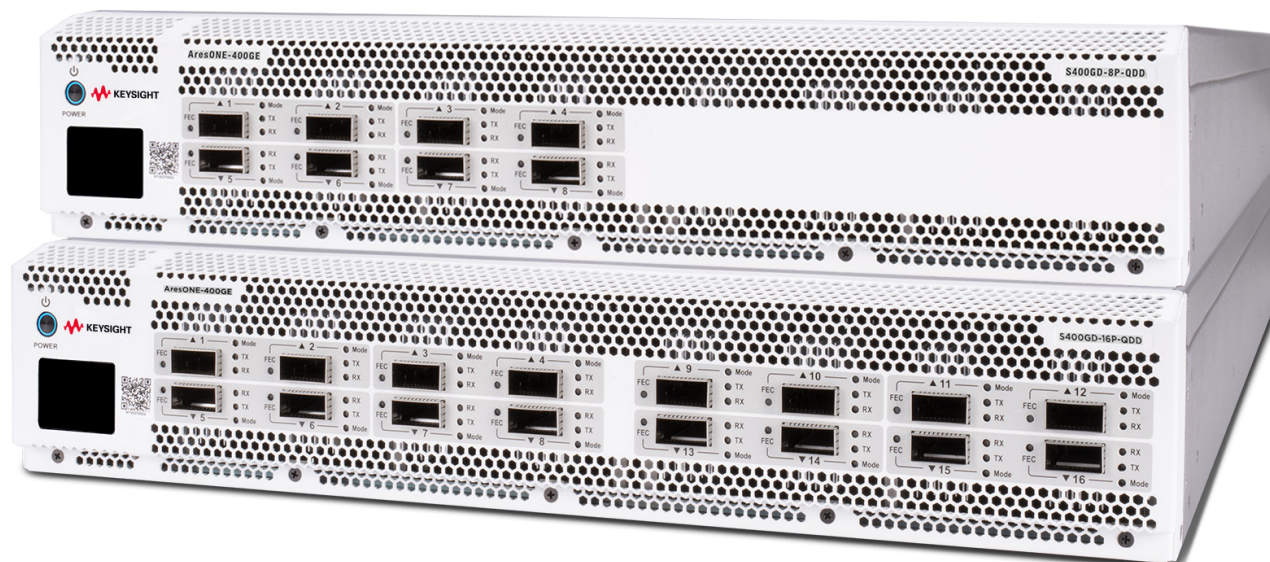
- Validate BER performance of optical transceivers, active and passive copper cables, silicon devices with the 800GE BERT, FEC and packet blast test capabilities and Keysight's KiOS browser application.

- Find problems fast with KiOS browser-based single page application (SPA), system- view of all BERT, FEC, and packet statistics. Supports all lanes or ports with 1x800GE, 2x400GE, 4x200GE, 8x100GE and 8x100GE Ethernet support.

- Measure full line rate BER, FEC, and L2 packet performance in minutes, not hours—at all Ethernet speeds simultaneously with Keysight's patented Enhanced BERT option.

- Perform long-duration (timed tests) and stress tests using Keysight's KP4 FEC symbol bit error density distribution analysis—excellent for catching bursty errors that occur over time.

- Connect G800GE-02 to Keysight's M8040A high-performance BERT analyzer or Infiniium UXR-Series oscilloscopes for advanced FEC-aware physical layer test and validation.

- Connect a module compliance board or device eval board via the electrical coaxial cable interface.

AresONE 400GE

All-in-one 400GE system level testing solution

- Grow with your needs with 16-port and 8-port models also available with reduced port options for economical low-port-count testing, plus options for reduced or high performance.

- Optimize power and cooling requirements with a 2RU fixed chassis form factor.

- Future-proof with a single platform for all seven speeds: 400/200/100/50/40/25/10GE with PAM4 and NRZ signaling mode support.

- Scale to 6.4 Tbps of line-rate traffic, with the ability to synchronize up to five chassis in a star topology to test 25.6 Tbps with option for up to six chassis for applications beyond 25.6 Tbps with the Metronome Timing System.

- Validate with complete L2/3 protocols emulation support with the IxNetwork software application.

- Improve interoperability for optics, cables, and devices using Layer 1 BERT, PCS, and FEC testing for both PAM4 and NRZ signaling modes.

AresONE 400GE comparison chart

Product name	Number of ports	Stream count per port	Physical interfaces	Variants		
				Physical ports	Performance	Model number
AresONE-S 400GE 16-port	16 x 400GE physical ports can fan-out to: PAM4 • 32 x 200GE • 64 x 100GE • 128 x 50GE NRZ • 32 x 100GE • 32 x 40GE • 64 x 50GE • 128 x 25GE • 128 x 10GE 8 x 400GE physical ports model fan out to half the port density shown above	Full performance • 400GE: 64 • 200GE: 64 • 100GE: 32 • 50GE: 16 • 40GE: 16 • 25GE: 16 • 10GE: 16 Reduced performance • 400GE: 32 • 200GE: 32 • 100GE: 16 • 50GE: 8 • 40GE: 8 • 25GE: 8 • 10GE: 8	QSFP-DD	16	Full	S400GD-16P-QDD
				16	Reduced	S400GDR-16P-QDD
				8	Full	S400GD-16PHW-8P-QDD
				8	Reduced	S400GDR-16PHW-8P-QDD
AresONE-S 400GE 8-port	8 x 400GE physical ports can fan-out to: PAM4 • 16 x 200GE • 32 x 100GE • 64 x 50GE NRZ • 16 x 100GE • 16 x 40GE • 32 x 50GE • 64 x 25GE • 64 x 10GE 4 x 400GE physical ports model fan out to half the port density shown above	Full performance • 400GE: 64 • 200GE: 64 • 100GE: 32 • 50GE: 16 • 40GE: 16 • 25GE: 16 • 10GE: 16 Reduced performance • 400GE: 32 • 200GE: 32 • 100GE: 16 • 50GE: 8 • 40GE: 8 • 25GE: 8 • 10GE: 8	QSFP-DD	8	Full	S400GD-8PHW-8P-QDD
				8	Reduced	S400GDR-8PHW-8P-QDD
				4	Full	S400GD-8PHW-4P-QDD
				4	Reduced	S400GDR-8PHW-4P-QDD

AresONE 400GE comparison chart, continued

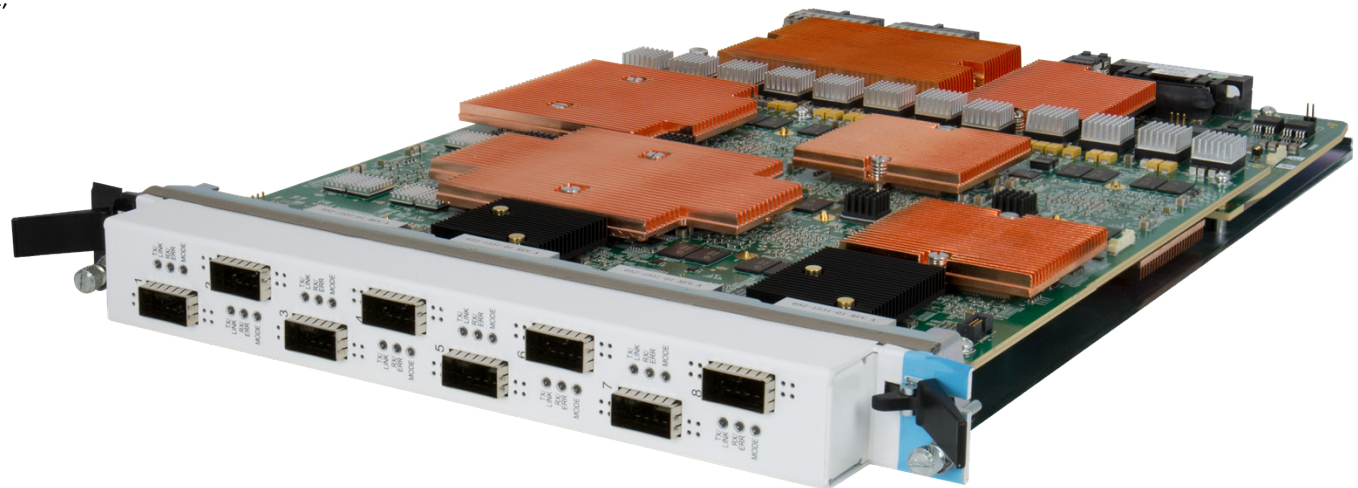| Product name	Number of ports	Stream count per port	Physical interfaces	Variants		
				Physical ports	Performance	Model number
AresONE high-density	8 x 400GE physical ports can fan-out to: • 16 x 200GE • 32 x 100GE • 64 x 50GE 4 x 400GE physical ports model fan out to half the port density shown above	Full performance • 400GE: 128 • 200GE: 128 • 100GE: 32 • 50GE: 16 Reduced performance • 400GE: 32 • 200GE: 32 • 100GE: 16 • 50GE: 8	QSFP-DD	8	Full	T400GD-8P-QDD
				8	Reduced	T400GDR-8P-QDD
				4	Full	T400GD-4P-QDD
				4	Reduced	T400GDR-4P-QDD
			OSFP	8	Full	T400GD-8P-OSFP
				8	Reduced	T400GDR-8P-OSFP
				4	Full	T400GD-4P-OSFP
				4	Reduced	T400GDR-4P-OSFP
AresONE high-performance	4 x 400GE physical ports can fan-out to: • 8 x 200GE • 16 x 100GE • 32 x 50GE		QSFP-DD	4	N/A	T400GP-4P-QDD

Novus QSFP28 / SFP28
High-density 100G multi-rate testing

Novus 5-speed QSFP28

- Enables high-density, multi-rate native QSFP28 100/50/40/25/10GE testing.

- Validates 100GE, 50GE, 40GE, 25GE, and 10GE over copper, multimode and single-mode fiber media.

- Provides excellent interoperability in a high performance platform for the new 100GBASE-SR4, 100GBASE-CR4, 50GBASE-CR2, 50GBASE-SR2, 25GBASE-CR, and 25GBASE-SR, with auto-negotiation, FEC, and link training.

- Leverages affordable lower-density 4-port full-feature configuration with field-upgradable option to 8-ports.

- Generates broad range of traffic and analysis with full L2/3 network protocol emulation and coverage.

Novus-S 4-speed SF28/QSFP28

- Validates 5G RAN xHaul transport network infrastructure on SFP28 25GE and 10GE interfaces.

- Emulates frame preemption over 25GE using SFP28 interfaces for 5G fronthaul.

- Validates TSN standards in 10GE, 25GE, 50GE, 100GE.

Novus QSFP28 / SFP28 comparison chart

Product name	Number of ports	Stream count per port	Physical interfaces	Variants		
				Physical ports	Performance	Model number
Novus QSFP28 5-speed 100GE/50GE/40GE/25GE/10GE	8 x 100GE physical ports can fan-out to: • 16 x 50GE • 8 x 40GE • 32 x 25GE • 32 x 10GE 4 x 100GE physical ports model fan out to half the port density shown above	Full performance • 100GE:128 • 50GE: 64 • 40GE: 128 • 25GE: 64 • 10GE: 64 Reduced performance • 100GE:64 • 50GE: 16 • 40GE: 64 • 25GE: 16 • 10GE: 16	QSFP28	8	Full	NOVUS100GE8Q28+FAN
				8	Midrange	NOVUS-M100GE8Q28+FAN
				8	Reduced	NOVUS-R100GE8Q28+FAN
				4	Full	NOVUS100GE4Q28+FAN
Novus SFP28/QSFP28 4-speed 100GE/50GE/25GE/10GE	Load module supports: • 8 x 100GE (QSFP, optional) • 8 x 50GE (QSFP, optional) • 8 x 25GE (SFP28) • 8 x 10GE (SFP28)	• 100GE:64 • 50GE: 64 • 25GE: 64 • 10GE: 64	SFP28	8	N/A	NOVUS-S 10/25GE8SFP28
			SFP28 + QSFP28	8	N/A	Speed upgrade from NOVUS-S 10/25GE8SFP28

UHD100T32

Ultra-high density 100GE QSFP28 test system

- Conduct data center vendor selection tests for disaggregated white-box and network operating system deployments – **SONiC-testbed-in-a-box solution** with IONOS and sonic-mgmt community test capability.

- Speed time to test with easy-to-deploy, out-of-the-box solution.

- Validate high-port-count devices for performance, scalability, and interoperability.

- Pay as you grow with alternative full-solution subscription model.

- Use less rack space and power with compact, data-center-ready footprint.

- Detect and debug data transmission errors for multiple speeds with line-rate 3.2Tbps packet generation and analysis of received traffic.

UHD100T32 comparison chart

Product name	License	Number of ports	Stream count per port	Physical interfaces	Control plane
UHD100T32	Perpetual	32 x 100GE physical ports can fan-out to: • 64 x 50GE • 32 x 40GE • 128 x 25GE • 128 x 10GE	• 100 GE: 32 • 50 GE: 16 • 40 GE: 32 • 25 GE: 8 • 10 GE: 8	QSFP28	IPv4 / IPv6, BGP4 / BGP4+, OSPFv2 /v3, ISISv4 / v6, LACP, VXLAN, EVPN, DHCPv4/v6 (32 sessions per port)
	Base subscription		• 100 GE: 1 • 50 GE: 1 • 40 GE: 1 • 25 GE: 1 • 10 GE: 1		IPv4 / IPv6 (1 session per port)
	Standard Subscription		• 100 GE: 1 • 50 GE: 8 • 40 GE: 16 • 25 GE: 4 • 10 GE: 4		IPv4 / IPv6, BGP4 / BGP4+, OSPFv2 / v3, ISISv4 / v6, LACP, DHCPv4/v6 (10 sessions per port)
	Premium Subscription		• 100 GE: 32 • 50 GE: 16 • 40 GE: 32 • 25 GE: 8 • 10 GE: 8		IPv4 / IPv6, BGP4 / BGP4+, OSPFv2 / v3, ISISv4 / v6, LACP, VXLAN, EVPN, DHCPv4/v6 (32 sessions per port)

Novus 10GE

High density 10GE multi-rate testing solution

- Delivers a high density 10/1/100M SFP+ and Dual-PHY SFP+/10GBASE-T RJ45 test solution.

- Supports 32-port full line-rate traffic generation to evaluate and validate the performance of ultra-high density networking equipment.

- Emulates L2-3 protocols for ultra-high scale performance testing of routing/switching and data center test cases using Keysight IxNetwork.

- Performs industry-standard RFC benchmark tests and protocol emulation in large test bed with hundreds of ports in a single test.

- Covers broad range of L4-7 protocols including video, voice, storage, and access protocols using Keysight's IxLoad application.

- Supports 3-Speed 10GE/1GE/100M or 5-speed 10GE/5GE/2.5GE/ 1GE/100M mode, providing low total cost of ownership and high ROI.

- Enables real-time latency with latency resolution of up to 2.5ns.

- Offers extensive port and traffic flow statistics.

- Delivers advanced sequence checking with duplicate packet detection.

- Provides portable appliance support.
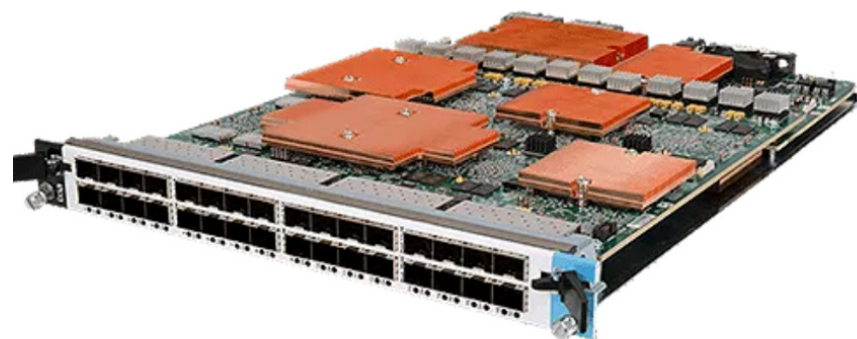
Get the Novus data sheets

Novus 10GE comparison chart

Product name	Number of ports	Form factor	Application support	Physical interfaces	Variants		
					Physical ports	Performance	Model number
Novus 32-port 10GE/1GE/100M SFP+	32 x 10GE 32 x 1GE 32 x 100M	Load module	IxNetwork (L2-3)	SFP+	32	N/A	NOVUS10/1GE32S
Novus 5-speed 10GE/5GE/2.5GE/1GE/100M	8 or 16	Load module	IxNetwork (L2-3) IxLoad (L4-7)	SFP+ and 10Base-T RJ-45	16	Full	NOVUS10/5/2.5/1/100M16DP
					8	Full	NOVUS10/5/2.5/1/100M8DP
					16	Reduced	NOVUS10/5/2.5/1/100M16DP-R
					8	Reduced	NOVUS10/5/2.5/1/100M8DP-R
Novus 3-speed 10GE/1GE/100M	8 or 16	Load module	IxNetwork (L2-3) IxLoad (L4-7)	SFP+ and 10Base-T RJ-45	16	10G/1G/100M	NOVUS10/1GE16DP
					8	10G/1G/100M	NOVUS10/1GE8DP
					16	1G/100M	NOVUS1GE16DP
Novus-NP 10GE/1GE/100M	8 or 16	Load module	IxNetwork (L2-3) IxLoad (L4-7)	SFP+ and 10Base-T RJ-45	16	N/A	NOVUS-NP10/1GE16DP
					8	N/A	NOVUS-NP10/1GE8DP
					4	N/A	NOVUS ONE PLUS 10/1GE16DP
Novus ONE PLUS 3-speed 10GE/1GE/100M	4,8 or 16	Appliance	IxNetwork (L2-3) IxLoad (L4-7)	SFP+ and 10Base-T RJ-45	16	N/A	NOVUS ONE PLUS 10/1GE8DP
					8	N/A	NOVUS ONE PLUS 10/1GE4DP
					4	N/A	NOVUS ONE PLUS 10/5/2.5/1GE16DP
Novus ONE PLUS 5-speed 10GE/5GE/2.5GE/1GE/100M	4,8 or 16	Appliance	IxNetwork (L2-3) IxLoad (L4-7)	SFP+ and 10Base-T RJ-45	16	N/A	NOVUS ONE PLUS 10/5/2.5/1GE8DP
					8	N/A	NOVUS ONE PLUS 10/5/2.5/1GE4DP
					4	N/A	NOVUS ONE PLUS 10/5/2.5/1GE4DP

Novus Mini

Compact network testing for automotive and industrial IoT

- Offers traffic generation and protocol testing in a single platform.

- Features ultra-quiet, fan-less operation and a small footprint.

- Provides a very affordable solution with outstanding cost per port.

- Validates layers 2-3, covering full performance and conformance testing.

- Tests critical industrial IoT timing standards that supports full timing testing and automated time TSN for 802.1AS 2011/2020, 802.1Qbv, 802.1Qav, 802.1CB, and 802.1Qci.

Network Impairment Emulators

Precisely emulate real-world network impairment conditions

Keysight's family of network emulators precisely emulate real-work network impairment conditions and/or worse case conditions in a controlled lab environment to help validate and test the performance of new hardware, protocols, and applications.

They identify:

- Application performance across distributed data centers and/or long-haul network

- 5G RAN E2E performance across the xHaul transport network

- The effects of delay, jitter, packet loss on application and network timing and performance

- The effects of packet modification over open fronthaul interface on O-RAN security

- The efficacy of data center backup

Network Emulator II

### 10GE multi-rate real-world network impairment testing

- Provides a single hardware platform for Ethernet 10GE, 1GE, and 100MB speeds.

- Integrates with Keysight IxNetwork™, IxLoad™, and BreakingPoint™ test systems for a complete test environment that includes real-world impairments.

- Enables validation, performance, and interoperability testing.

- Features 8 Port FPGA hardware architecture that provides 100% line-rate performance.

- Allows IT to test mixed speeds simultaneously using one device.

- Offers robust profile configuration for line-rate packet capture; produces standard PCAP output format.

- Precisely reproduces and quickly resolves issues occurring in the field.

- Delivers flexible resource management.

Network Emulator 3

100GE multi-rate real-world network impairment testing

- Provides a single hardware platform for Ethernet 100GE/50GE/40GE/25GE/10GE speeds.

- Emulates normal and worst-case conditions in the lab that can occur over live production LAN/WAN networks.

- Tests hardware, protocols, and applications to validate performance and interoperability.

- Characterizes end-user experience under real-world conditions.

- Reproduces and quickly resolves issues occurring in the field.

- Tests the effect of delay on the network and application performance.

- Determines how applications will perform when distributed across data centers.

- Causes outage and degrade scenarios to trigger and validate fail-over protection.

- Tests 5G RAN networks and the impact of delay and impairments – **ORAN open fronthaul conformance/performance/security testing solution.**
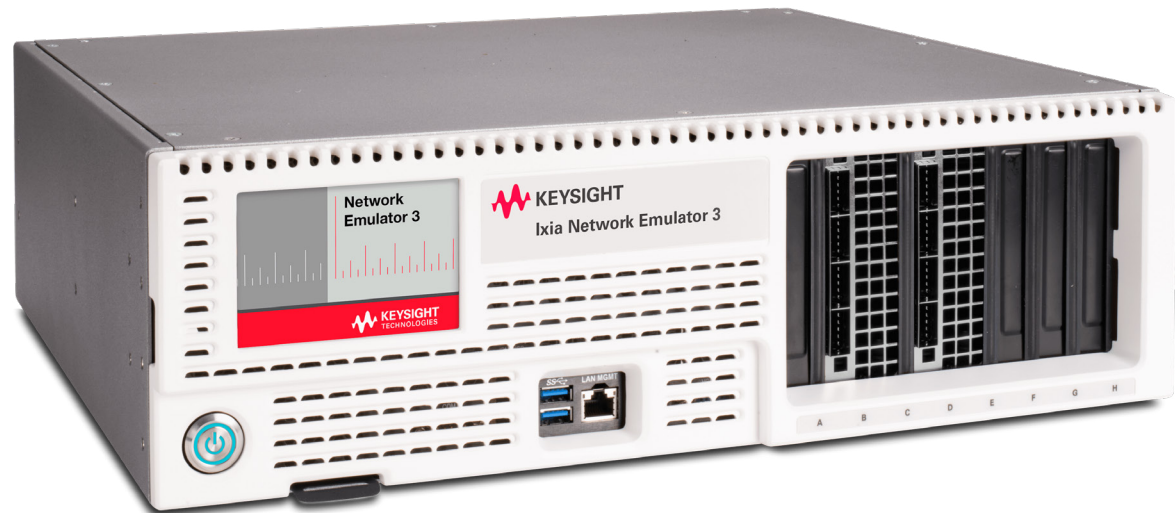
Time Sync Analyzer

Nextgen High Performance O-RAN DU Emulator and TimeSync Tester

- Integrate with Open RAN Studio to play, capture, and analyze O-RAN traffic

- Future proof CUSM-Plane fronthaul validation in a single platform.

- Expandable fronthaul data rate for massive MIMO beamforming test demand

- High-density and high-performance TimeSync Tester

- Analyze PTP, SyncE and digital clocks with built-in impairment for realistic testing.

- Measures clock quality per ITU-T and O-RAN specifications.

- Scalable multi-user architecture for parallel test execution.

- Flexible reference clock sources fit different timing topologies.

Chassis

Flexible and scalable modular test systems

Keysight's chassis family makes our modular test systems possible, providing the power and performance necessary for portable to massive-scale testing of L2-7.

Keysight's chassis family:

- Supports hot-swappable Novus, PerfectStorm and CloudStorm load modules, providing seamless integration with existing Keysight test systems.

- Reduces space requirements and simplifies management for high port densities for broad range of speeds.

- Offers ultra-high performance chassis assembly with innovative high-speed backplane, supporting resource aggregation and meeting high-bandwidth requirements.

- Provides front-to-back airflow system that ensures load modules operate efficiently.

- Simplifies management and upgrades with integrated IxOS operating system for chassis and load modules.

- Enables simple and quick field service with field-replaceable modular controller, fan, and power supply nodules.

- Supports remote chassis management via browser.

- Offers multi-user environment that leverages a per-port user ownership model for all test module ports.

Category	Product / product family	Form factor	Software / application
Compact (2-slot, 3RU)	XGS2-SD, XGS2-SDL and XGS2-HSL	Benchtop (rackmount optional)	IxOS
Full (12-slot, 11RU)	XGS12-SD, XGS12-SDL and XGS12-HSL	Rackmount	IxOS

Network Testing in the Cloud

- Agile, elastic, and scalable

- Industry standard for virtual / cloud testing

- Pre- and post-deployment testing

Cloud Test

Complete end-to-end solutions for testing cloud infrastructure

Keysight's cloud test solution suite offers complete test coverage from cloud infrastructure (compute/storage/network), and various types of virtual VNFs (vRouter, vFW, vSLB, ...), to end-to-end network, application and security.

Our cloud test solutions fit in all types of virtualized environments from VM on private clouds to container on the public clouds. It helps in both pre-deployment functional and performance tests, and post-deployment SLA monitoring with complex troubleshooting scenarios.

The floating subscription licensing model of Keysight's cloud test solutions provides a flexible and cost-effective way to address your current and future needs on a "Pay as needed and Pay as you go" basis.

This catalog focuses only on our L2-3 network test products. You can find more details on our L 4-7 product portfolio in our:
L 4-7 Application and Security Test product catalog.

Software / application	SUT/DUT	Applicable to production network	Get quote
IxNetwork VE	**Network VNF/PNF (Isolated DUT)**	**No**	Get Quote >
Cloud Peak	**NF Vi**	**No**	Get Quote >
IxChariot	**End-to-end network**	**Yes**	Get Quote >
CyPerf	Distributed and hybrid network, SD-WAN, SASE, WAF, vNGFW, CDN	Yes	See L4-7 Catalog
BreakingPoint VE	Application and security VNF/PNF (Isolated DUT)	No	See L4-7 Catalog
IxLoad VE	Application and security VNF/PNF (Isolated DUT)	No	See L4-7 Catalog

Cloud Peak

Virtual cloud infrastructure validation solution

- Complete virtual infrastructure performance benchmarking for private, hybrid, telco, edge, and public clouds.

- Workloads available as virtual machine or Docker container images with similar benchmark capabilities.

- Automated workload deployment via specific API interfaces on Amazon, OpenStack, VMware, and K8S clouds.

- Predefined test methodologies with unique parameters tuned for virtual infrastructure testing.

- Decomposes and individually validates the compute, network, storage, and VIM performance dimensions.

- Measures scheduler capability to isolate the good workloads and the bad noisy neighbors.

- Scales from small test beds with a single compute node to large environments with many compute racks.

- Subscription licensing for low startup cost and flexible pay-as-you-grow model.
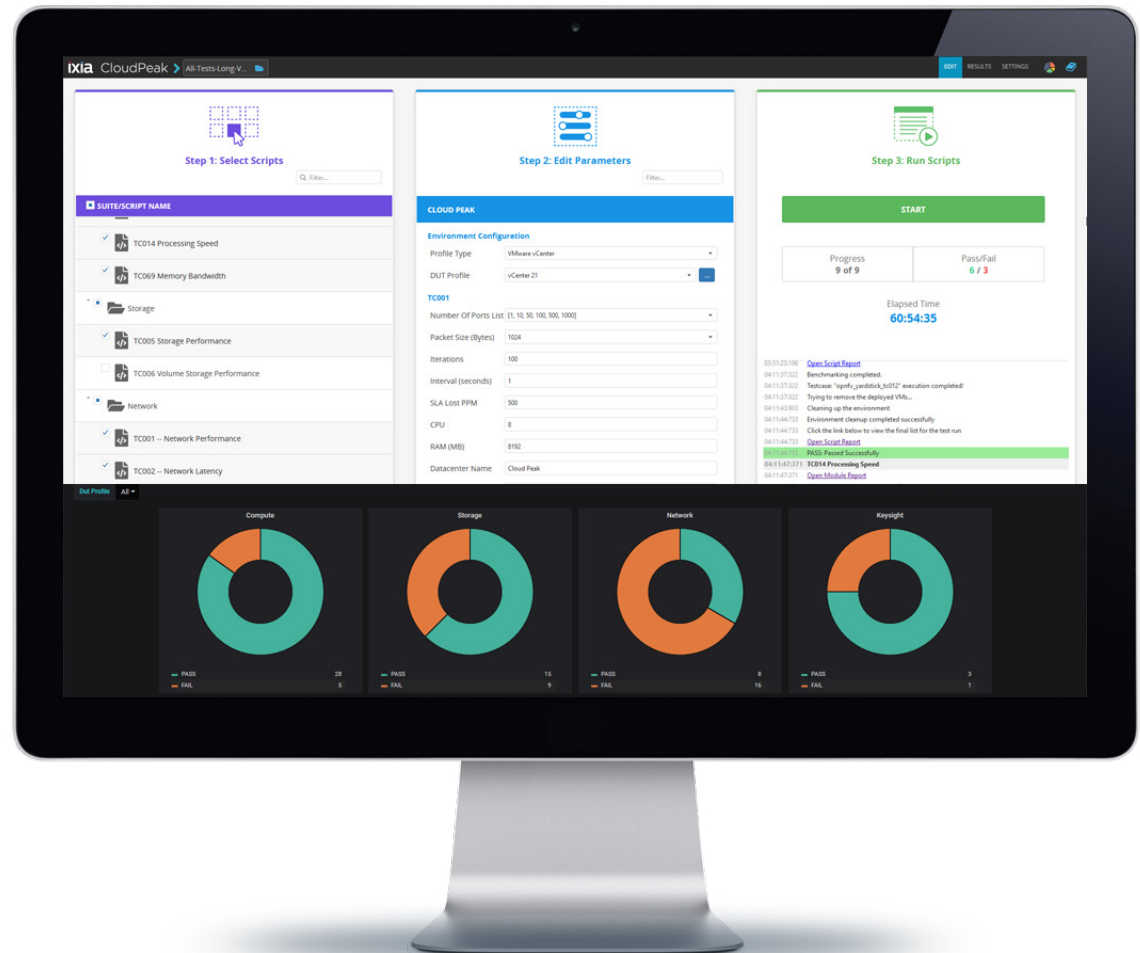
Keysight enables innovators to push the boundaries of engineering by quickly solving design, emulation, and test challenges to create the best product experiences. Start your innovation journey at www.keysight.com.