

PerfectStorm ONE 10GE/40GE Appliance

Enterprise-scale application and security testing —
anywhere, anytime

Building upon the terabit-scale PerfectStorm platform, PerfectStorm ONE appliances offers enterprises, service providers, and technology vendors a revolutionary solution for generating stateful applications and malicious traffic, simulating millions of real-world end-user environments to test and validate infrastructure, a single device, or an entire system.

PerfectStorm ONE's unique combination of portability, performance, and cost-effectiveness allows any organization to perform enterprise-scale performance and security testing anywhere, at any time, using the exact application, attack, and load behavior needed to optimize and harden any IT infrastructure.

PerfectStorm ONE facilitates network and security proof-of-concepts (POCs) and assessments, all in a compact device. This POC-in-a-box enables enterprises and service providers to select optimal devices and right-size data centers, as well as providing device vendors with a platform to fully showcase their product's performance, resiliency, and throughput under real-world traffic loads.

The proliferation of dynamic and evolving applications, along with an increase in advanced malicious attacks, has created a dangerous lack of control and visibility into both the performance and security of IT infrastructures.

By seamlessly unifying the IxLoad and BreakingPoint software applications into a single enterprise-ready system, the PerfectStorm ONE solution now enables enterprises to take advantage of the performance and functionality service providers and equipment manufacturers use to test large network infrastructures.



Figure 1. PerfectStorm ONE 40GE (PS40GE2) and PerfectStorm ONE Fusion 40GE (PS40GE2NG) appliance

The Keysight PerfectStorm ONE is the essential solution to:

- Evaluate network equipment to choose the right device for your unique network
- Right-size data centers and virtualized infrastructures for peak performance and capacity use
- Perform on-the-go cyber security research and simulations to keep ahead of the latest threats
- Deploy global compact cyber ranges to harden critical communication infrastructures
- Train and certify cyber warriors to predict and prevent attack
- Reduce time-to-test to minimize costs and accelerate development of network and data center devices

Highlights

- Enterprise-scale applications and security testing, anywhere, anytime
- Enterprise's maximize investments in security devices and data center consolidation with POC testing
- Equipment vendors establish a scalable and transportable POC lab for customer evaluations using custom traffic scenarios
- Unified architecture supports BreakingPoint and IxLoad applications
- Native 40GE QSFP+ interfaces with 4 x 10GE fan-out option
- Compact form factor and reduced power requirements for customers that have a need for high performance, yet are constrained by lab space and power availability
- High-performance with hardware-based acceleration for SSL and IPsec

Key Features

Large capacity and performance — small footprint and power needs

The world is becoming an always-connected, mobile environment, with massive volumes of traffic flowing through WANs, LANs, and data centers. The increase in network traffic scale, complexity, and types is causing a huge upswing in data center port counts and technology diversity.

Equipped with powerful multi-core, multi-threaded network processors, PerfectStorm ONE uses Keysight's next-generation architecture designed to satisfy high-throughput testing needs. Due to its compact form factor and reduced power requirements, the PerfectStorm ONE is a great option for customers that have a need for high performance, yet are constrained by the space and power availability in their lab.

A single appliance allows control of up to 80Gbps of blended application traffic, 60 million concurrent connections, and new TCP connection rates of up to 2 million/sec. The hardware-based acceleration supports massive encryption levels with up to 40Gbps encrypted throughput per system. The system uses inline field programmable gate arrays (FPGAs) for enhanced accuracy pertaining to latency measurements with a resolution of 10ns and to deliver line-rate performance, including small 64-byte packets. Both IxLoad and BreakingPoint software solutions allow customers to increase the scalability by combining multiple appliances to the same test to drive operations, reporting, and results analysis from a single, unified user interface.

Flexible operation modes

The advanced aggregation capabilities of the PerfectStorm ONE 40GE appliances allow them to operate in two different modes, providing extra flexibility and performance:

Non-Aggregated, Mode: In this mode, each 40GE port uses of $\frac{1}{2}$ of the network processor and memory resources available on the load module, allowing delivery of application traffic at wire-speeds for each port, with up to 80 Gbps per module.

40GE Aggregated, Mode: This mode provides extra flexibility to allocate all network processor and memory resources available on a load module to a single 40GE port, doubling the performance the performance achieved per 40GE port. Keysight test applications transparently configure the allocation of NP resources to achieve the maximum performance.

40GE QSFP+ to 4x10GE SFP+, Mode: This mode provides additional flexibility in connecting to 10GE devices using 40GE to 4 x 10GE fan-out cables. In fan-out mode, the appliance provides access to 8 x 10GE SFP+ interfaces.

Hardware variants

The PerfectStorm ONE 40GE appliance consists of 2-port 40GE QSFP+ interfaces, and is available in two variants:

- PerfectStorm ONE, 2-port 40GE QSFP+ appliance
- PerfectStorm ONE Fusion, 2-port 40GE QSFP+ appliance

Both variants provide support for 8 x 10GE SFP+ through fan-out cable (MT-to-4x10GE LC fan-out, MMF, 3-meter or 5-meter cables) and QSFP+ 40GE optical transceiver, MMF, 850nm (948-0031).

Specifications

PerfectStorm ONE 10GE/40GE appliance specifications

Specification	PerfectStorm ONE Fusion PS40GE2NG	PerfectStorm ONE Standard PS40GE2
IxOS	Yes	Yes
IxExplorer	No	No
IxLoad	Yes	Yes
IxNetwork	No	No
BreakingPoint	Yes	No
TCL API	Yes	Yes
Hardware, Load Module specifications		
Physical interfaces	2-port, 40GE QSFP+ (native)	
	8-port, 10GE SFP+ through fan-out cable	
Transceiver support	QSFP+, 40GBASE-SR4 (pluggable transceivers)	
Memory	64 GB	64 GB
Hardware-based traffic capture (available in BreakingPoint)	1 GB per 40GE interface	N/A
Software-based traffic capture buffer (available in IxLoad)	Maximum between 2GB or 2 Million packets, per interface	Maximum between 2GB or 2 Million packets, per interface
FPGA offload	Yes	Yes
IPv4, IPv6, UDP, TCP	Hardware checksum generation	
Appliance dimensions	Length (depth) – 17.1 inches (43.43 cm) Width – 13.23 inches (33.60 cm) Height – 3.12 inches (7.93 cm)	
Appliance weight	21 lbs. (9.52 Kg)	
Operating temperature range	41 °F to 95 °F (5 °C to 35 °C), ambient air	
Power	Input voltage: 90 V to 264 V, 50/60 Hz Total max power: 750 W (6.8 A at 110 V, or 3.4 A at 220 V)	

Integrated system controller	
CPU	Quad-Core, Intel Processor
HDD	1 TB, Enterprise Class, High MTBF
Operating system	Native IxOS
Rack mount (included with appliance)	
Rack mount dimensions:	2U rackmount, 19.0 x 17.15 x 3.46 inches
Rack mount weight:	4.1 lbs.

PerfectStorm ONE 40GE Fusion appliance, BreakingPoint performance

Performance metric	PerfectStorm ONE Fusion PS40GE2NG
Applications throughput	80 Gbps
TCP connections per second	2M
Applications concurrent flows	60 Million
SSL bandwidth	20 Gbps
SSL connection rates	200,000
SSL concurrent flows	1 Million
Applications throughput over SCTP	10 Gbps
Applications throughput over IPsec	25 Gbps
IPsec, concurrent tunnels	500,000
IPsec, tunnel setup rates	2,000
Applications throughput over GTP (IPv4)	40 Gbps
GTP, UE attachment rate (per second)	450K
GTP, tunnels	6M

PerfectStorm ONE 40GE Fusion appliance, BreakingPoint mobility

BreakingPoint	PerfectStorm ONE Fusion (PS40GE2NG)
Mobility (3G/4G)	<p>Interfaces supported</p> <ul style="list-style-type: none"> • S1-U (eNodeB and SGW sides) • S1-MME (eNodeB side) • SGi (PDN side) • S5/8 (SGW and PGW sides) • S11 (MME and SGW sides) • Gn (SSGN and GGSN sides) <p>Wireless protocols supported</p> <ul style="list-style-type: none"> • S1AP • GTP-C v1, GTP-C v2, GTP-U v1 • SCTP (over UDP or IP) <p>3G/4G operational modes</p> <ul style="list-style-type: none"> • eNodeBs + UEs + MME, SGW + PGW + PDN • SGSN + UEs • GGSN + PDN • UE/eNB/MME/SGW • PGW/PDN • UE/eNB vs. MME/SGW/PGW/PDN

PerfectStorm ONE 40GE Fusion appliance, BreakingPoint test components

BreakingPoint	PerfectStorm ONE Fusion (PS40GE2NG)
Test components	<ul style="list-style-type: none"> • Bit Blaster • Routing Robot • Application Simulator • Session Sender • Security • Security NP • Recreate • Stack Scrambler • Hardware-Based Packet Capture (1GE per 40GE Interface)
Labs	<ul style="list-style-type: none"> • RFC 2544 • Resiliency Score • Session Sender • Lawful Intercept • Multicast • LTE

PerfectStorm ONE 40GE appliance, IxLoad performance

Performance numbers provided back-to-back using a single appliance. Published SSL metrics were measured with 2K key-size in ideal test configurations to maximize performance.

Performance metric	PerfectStorm ONE Fusion PS10GE8NG	PerfectStorm ONE PS10GE8
Applications throughput	64 Gbps	64 Gbps
HTTP throughput (Uni-directional/Bi-directional)	40 Gbps / 76 Gbps	40 Gbps / 76 Gbps
HTTP connections per second	1.5M	1.5M
HTTP concurrent connections	30M	30M
SSL throughput	20 Gbps	20 Gbps
SSL connection rates	200,000	200,000
SSL concurrent flows	1 Million	1 Million
IPsec, concurrent tunnels	500,000	500,000
IPsec, tunnel setup rates	10,000	10,000

PerfectStorm ONE 40GE appliance, IxLoad, application support

IxLoad application support	PerfectStorm ONE (PS40GE2 and PS40GE2NG)
Application delivery	<ul style="list-style-type: none">• AppLibrary• TCP Plugin• Application Replay• HTTP• HTTPS• FTP• SMTP• POP3• DNS• TFTP• IMAP• Stateless Peer
Video delivery	<ul style="list-style-type: none">• VoD (RTSP, QoE)• RTSP (RTP/TCP)• IPTV Multicast IPv4• Silverlight• Adobe HDS• Apple HLS• Flash Player• MPEG DASH• Video Quality

IxLoad application support**PerfectStorm ONE (PS40GE2 and PS40GE2NG)**

VoIP	<ul style="list-style-type: none">• Advanced SIP• SIP Cloud/SIP Proxy• RTP/RTCP• SRTP & TLS• Audio, Voice, Video• Video Telepresence• MSRP• Voice Quality / Video Quality
IPsec	<ul style="list-style-type: none">• IKEv1, IKEv2, IPsec Suites B• IPsec Quick Tests
Storage	<ul style="list-style-type: none">• CIFSv1• SMB 2.1• SMB 3.0• iSCSI• NFS v3, NFS v4, NFS v4.1
Stack manager	<ul style="list-style-type: none">• Static ARP• GratARP• IPv4 / IPv6• PPP• L2TP• DNS• DHCPv4• DHCPv6• IPv6 SLAAC• 6rd• DSLite• 802.1x• WebAuth• EAPoUDP

Hardware Ordering Information

PerfectStorm ONE 40GE appliance Fusion

Part number	Description
941-0028	<p>PerfectStorm ONE 40GE Fusion 2-port appliance (PS40GE2NG), 40GE 2-port QSFP+. Requires BreakingPoint Application & Threat Intelligence (ATI) (909-0856), sold separately, at time of purchase. Requires: One or more QSFP+ 40GBASE-SR4 optical transceivers (948-0031) and MT 12-fiber MMF cable, 3-meter length (942-0041).</p> <p>Supports up to 4-ports of 10GE per 40GE port through fan-out cables, sold separately - requires MT-to-4x10GE LC fan-out, MMF, 3-meter (942-0067) or MT-to-4x10GE LC fan-out, MMF, 5-meter (942-0068) cables to support the fan-out option.</p>

PerfectStorm ONE 10GE appliance (standard)

Part number	Description
941-0036	<p>PerfectStorm ONE 40GE 2-port standard appliance (PS40GE2), 40GE 2-port QSFP+. Requires: One or more QSFP+ 40GBASE-SR4 optical transceivers (948-0031) and MT 12-fiber MMF cable, 3-meter length (942-0041).</p> <p>Supports up to 4-ports of 10GE per 40GE port through fan-out cables, sold separately - requires MT-to-4x10GE LC fan-out, MMF, 3-meter (942-0067) or MT-to-4x10GE LC fan-out, MMF, 5-meter (942-0068) cables to support the fan-out option.</p>

Transceivers and cables

Part number	Description
948-0028	QSFP+ 40GBASE-SR4 optical transceivers (incompatible with fan-out)
948-0031	QSFP+ 40GBASE-SR4 optical transceivers (required for fan-out)
942-0041	MT 12-fiber MMF cable, 3-meter length
942-0067	MT-to-4x10GE LC fan-out, MMF, 3-meter
942-0068	MT-to-4x10GE LC fan-out, MMF, 5-meter

XGS2 and XGS12 Chassis — Regulatory Compliance Specifications

Country/region	Standards	Details
US/Canada	Safety:	UL 62368-1:2014 Ed 2 CSA C22.2 No. 62368-1:2014 Ed 2
	EMC:	USA: FCC CFR 47 Part 15B, Class A Canada: ICES-003/NMB-003:2016, Class A
Australia/New Zealand	Safety:	AS/NZS CISPR 32 Class A
Europe and UK	Low Voltage Directive:	2014/35/EU
	EMC Directive:	2014/30/EU
	RoHS Directive:	2011/65/EU & EU 2015/863
	WEEE:	2002/96/EC
	Safety:	EN 62368-1:2014 +A11:2017 Ed 2
	EMC:	<ul style="list-style-type: none"> • EN 55032:2015 • EN 55035:2017 • EN 61000-3-2:2014, Class A • EN 61000-3-3:2013 • EN 61000-4-2:2009 • EN 61000-4-3:2006 +A1:2008 +A2:2010 • EN 61000-4-4:2012 • EN 61000-4-6:2009 • EN 61000-4-8:2010 • EN 61000-4-11:2004
	RoHS:	EN 63000:2018
Korea	Korean Standards:	KCC
	EMI:	KN32:2015-12+RRA2017-14
	EMS:	KN35:2015-12+RRA2017-14
International	Safety	IEC 62368-1:2014 Ed 2

BreakingPoint Ordering Information

Part number	Description
909-0856	BreakingPoint - Application & Threat Intelligence Program

IxLoad Ordering Information

Part number	Description
925-6321	IxLoad, PerfectStorm ONE Multiplay , Software Bundle, Layer 4-7 Performance Test Application; Data, Storage, Voice, Video and Access & VPN bundle for PerfectStorm ONE appliances; includes: <ul style="list-style-type: none">• 925-6121 IxLoad PerfectStorm ONE DATA• 925-6112 IxLoad PerfectStorm ONE VIDEO• 925-6113 IxLoad PerfectStorm ONE VOICE• 925-6117 IxLoad PerfectStorm ONE Access & VPN
925-6104	IxLoad PerfectStorm ONE Basic , Optional Software, Layer 4-7 Performance Test Application. Includes: HTTP, HTTPS, DNS, ADVNET-DHCP, WAP, Stateless Peer
925-6121	IxLoad PerfectStorm ONE Data , Software, Layer 4-7 Performance Test Application; includes: <ul style="list-style-type: none">• 925-6104 IxLoad PerfectStorm ONE BASIC (HTTP, HTTPS, DNS, ADVNET-DHCP, Stateless Peer)• FTP, DHCP, IMAP, POP3, SMTP, TFTP, App-Replay, TCPsession HTTP Quick Test, RFC 3511 Quick Test• Storage: NFSv3, NFSv4, NFSv4.1, SMBv3, CIFS, CIFSv2 iSCSI, iSCSI• Quick Test
925-6112	IxLoad PerfectStorm ONE VIDEO , Software Bundle, Layer 4-7 Performance Test Application; includes: <ul style="list-style-type: none">• RTSP, IPTV, Video-ADVANCED• FLASH, APPLE HLS, Silverlight, Adobe HDS, MPEG-DASH• Video Quality VQMON engine for up to 10Gbps• TCP VQ – Video quality for TCP video traffic for up to 10 Gbps
925-6113	IxLoad PerfectStorm ONE VOICE , Software Bundle, Layer 4-7 Performance Test Application; includes: <ul style="list-style-type: none">• Advanced SIP, SIP endpoint, Proxy and Cloud emulation• TLS, SRTP• Audio, Video Conference, Telepresence, MSRP• Voice Quality engine for up to 10Gbps• Video Quality engine for up to 10Gbps video conversation traffic
925-6117	IxLoad PerfectStorm ONE ACCESS + VPN , Software, Layer 4-7 Performance Test Application. Includes: <ul style="list-style-type: none">• 925-6104 IxLoad PerfectStorm ONE BASIC (HTTP, HTTPS, DNS, ADVNET-DHCP, Stateless Peer)• IPsec, IPsec SUITES B, IPsec Quick Tests, PPP, L2TP, L2TP/IPsec• IPv6 Transitioning: SLAAC, 6rd, DSLite• ADVNET: DHCP, DHCPv6 (client & server), RADIUS; ADVNET-802.1X, ADVNET-NAC, ADVNET-WEBAUTH

Part number	Description
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.

For more information, visit:

<https://www.keysight.com/in/en/products/network-test/network-test-hardware/perfectstorm.html>

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