

# APS-100/400GE Series

Modular, Hyperscale Application and Network Security Test Platform

## Problem: Quantify Unknowns in a Hyperscale World

Data center operators and service providers face exponential growth in encrypted traffic volumes and continually expanding attack surfaces driven by video streaming, cloud computing, artificial intelligence, machine learning and an explosion of IoT devices. These shifts impact organizations of all sizes and they are accompanied by industry moves to 400GE, putting further demands on network infrastructure like next generation firewalls and application delivery controllers by delivering traffic at unprecedented speed - making it more critical than ever that data center network equipment manufacturers (NEMs) and operators validate that their solutions can support these hyperscale loads without compromising security or usability.

## Solution: Modular and Flexible Hyperscale Testing

Keysight's APS Series next-generation application and security test platforms – including the APS-M8400 8x400GE QSFP-DD appliance, the APS-M1010 controller and the APS-ONE-100 appliance – leverage a modular, 'pay-as-you-grow' approach capable of generating hyperscale traffic loads while offering right-sized solutions to meet an array of testing needs and budget requirements.

The APS-ONE-100 appliance can be used individually, or multiple appliances can be stacked, scaling up to meet even the biggest application and security test demands. When stacked, the APS-ONE-100 appliances can be controlled by the APS-M1010 controller, which supports up to 10 appliances or the APS-M8400 appliance which features ultrafast 8x400GE QSFP-DD native I/O and supports up to 16 appliances. The APS Series of powerful test platforms enable NEMs to shorten their development cycles and help data center operators protect their critical infrastructure while delivering hyperscale end-user application performance.



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## Highlights

Centralized 'single pane of glass' management of up to 16 APS-ONE-100 appliances simplifies testing and software upgrades, providing one IP address for the entire system

Maximize your test budget with a flexible 'pay-as-you-grow' model: run the APS-ONE-100 appliance in standalone mode or build a stacked system with the APS-M8400 400GE QSFP-DD to aggregate up to 16 compute nodes

- Get unrivaled elephant flow performance of up to 65 Gbps per single TCP connection
- Unparalleled encrypted traffic performance capabilities, generating up to 2.4 Tbps TLS throughput, 3.4M TLS connections per second and 51M TLS concurrent connections
- Generate hyperscale performance under realistic traffic conditions with Keysight's industry-leading application and security test tools
- Future-proof your investment with an upgrade path to 8x400GE QSFP-DD and support for 400/100/50/40/25/10GE multi-speed modes



Figure 1. APS-ONE-100 appliance



Figure 2. APS-M8400 appliance

A single APS-ONE-100 appliance can actively use up to four QSFP28 100GE interfaces per single test configuration to deliver unparalleled TLS performance of up to 100K TLS connections per second, 3.2M TLS concurrent connections and 150 Gbps of encrypted throughput powered by hardware-based TLS acceleration, significantly improving the transmission of realistic application mixes over TLS connections.<sup>1</sup>

Use the APS-M1010 controller to scale up to 10 compute nodes and drive hyperscale throughput like 3.4M TLS connections per second, 45M TLS concurrent connections and 1.78 Tbps of encrypted throughput.<sup>2</sup>

Need even more test capacity? Leverage the APS-M8400 appliance and its 8x400GE QSFP-DD native I/O to aggregate up to 16 compute nodes and harness the industry's most powerful application and security test platform, capable of generating 1.6M TLS connections per second, 51M concurrent TLS connections and 2.4 Tbps of encrypted throughput.

<sup>1</sup> APS-ONE-100 with BreakingPoint

<sup>2</sup> APS-M1010 + 10x APS-ONE-100 with IxLoad

# Product Capabilities

The APS Series of next-generation application and security test platforms make up a hyperscale Layer 4–7 test solution for validating devices and systems under real-world conditions, helping users to identify performance and interoperability issues quickly and easily. The flexible, modular architecture allows linear performance scaling to multi-terabit levels by stacking up to 10 x APS-ONE-100 appliances in a single system controlled by the APS-M1010 controller or up to 16 x APS-ONE-100 appliances controlled by the APS-M8400 400GE QSFP-DD appliance.

The APS-M1010 controller and APS-M8400 appliance deliver centralized management and software updates for up to 10 compute nodes (APS-M1010) and 16 compute nodes (APS-M8400) respectively, both via dedicated management ports, enabling fast uplink connectivity and direct access to each APS-ONE-100 appliance, eliminating the need for intermediary Layer 2 switches and providing a single management IP address for the entire cluster.



**Figure 3.** Hyperscale testing with up to 5.1 Billion concurrent sessions, 56 Million CPS, and 2.4 Tbps encrypted TLS throughput.

New paradigms like a remote workplace culture and industry moves to 400GE I/O have led to unprecedented data volumes, traffic speeds and security threats. As these changes become permanent, it has never been more critical for NEMs and operators to validate that their products and services support these hyperscale loads without compromising security or usability.

Keysight’s APS Series of application and security test devices allow future-proof validation of hyperscale data center infrastructures and service provider networks with the capacity to generate up to 3.2 Tbps L47 throughput, 5.1 Billion concurrent TCP sessions, 56 Million HTTP connections per second, and 2.4 Tbps of TLS encrypted traffic from a fully populated system. And the system’s underlying management operating system has been purpose built with a cloud-native architecture for improved scalability, security, and resilience.

# Hardware

The APS-ONE-100 appliance features powerful multi-core processors with dedicated memory and crypto accelerators backing a cloud-native software implementation to generate realistic, hyperscale-volume traffic. It can be used in a standalone mode or stacked together with other appliances in a system controlled by a dedicated APS-M1010 system controller (supports up to 10 compute nodes) or a dedicated APS-M8400 appliance with 8x400GE QSFP-DD (supports up to 16 compute nodes).

This flexible, modular approach reduces CAPEX and simplifies the management of the test system while allowing for higher test port densities. The APS-ONE-100 appliance supports 100/25/10GE on the same port, while the APS-M8400 supports 400/200/100/50/40/25/10GE on the same port, further reducing CAPEX by eliminating the need to buy different hardware for each speed and increasing test platform efficiency.

## Specifications

Performance metric	APS-ONE-100 appliance
<b>Applications support</b>	
KCOS	Yes
BreakingPoint	Yes, except Bit Blaster, Routing Robot, and Recreate test components
TCL API	Yes
REST API	Yes
TLS Concurrent Connections (CC)	Yes
<b>Hardware specifications</b>	
Physical interfaces	Front I/O: 4-port 100GE QSFP28 per appliance for test traffic Rear I/O: (1) Dual 1GE management network ports for fast uplink network connectivity and BMC management over NCSI (2) Dual 10GE management network ports for future expandability (3) Dedicated BMC management port
Physical test interfaces	Up to 4 x 100GE QSFP28 interfaces per test configuration
Fanout modes <sup>1</sup>	8 x 10GE per appliance 8 x 25GE per appliance
Transceiver support	QSFP28 SR4 and CR4 (pluggable transceivers)
Hardware encryption offload	Yes
Traffic Capture	Software-based
Capture memory	Maximum between 2GB or 2 Million packets, per interface
IPv4, IPv6, UDP, TCP	Hardware checksum generation
Dimensions	30" (L) x 19" (W) x 1.7" (H) 762 mm (L) x 482 mm (W) x 43.65 mm (H)
Operating temperature	41 °F to 95 °F (5 °C to 35 °C), ambient air
Weight	36.06 lbs   15.9 kgs

1. Fan-out is only supported with BreakingPoint

Performance metric	APS-M1010 controller
<b>Applications support</b>	
KCOS	Yes
BreakingPoint	Yes, except Bit Blaster, Routing Robot, and Recreate test components
IxLoad	Yes
TCL API	Yes
REST API	Yes
<b>Hardware specifications</b>	
Physical interfaces	10-port (active), rear I/O 10GE RJ45 cluster management ports
Transceiver support	N/A
Dimensions	30" (L) x 19" (W) x 1.7" (H) 762 mm (L) x 482 mm (W) x 43.65 (H)
Operating temperature	41 °F to 95 °F (5 °C to 35 °C), ambient air
Weight	32.34 lbs   14.67 kgs
<b>System capacity</b>	
Appliances per system	Up to 10 x APS-ONE-100

Specification	Description
Input voltage	100-127VAC/200-240VAC, 50-60Hz, 15/10A (x2)
Power supply operating mode <sup>1,2</sup>	(1) Redundant PSU 1,2: 1+1 100-127VAC/200-240VAC (2) Single Supply PSU 1: 1+0 100-127VAC/200-240VAC (3) Single Supply PSU 2: 0+1 100-127VAC/200-240VAC
Power cords	15A, 250V, C13 TO C14, 6 FT (x2)—Included
Max power requirement	941-0110; 941-0114 (APS-ONE-100)—1200W 941-0113; 941-0115 (APS-M1010)—600W

1. Connect supplied power cords into the power cord sockets of the APS System chassis
2. Plug the power cords into appropriate power receptacles.

Performance metric	APS-M8400 appliance
<b>Applications support</b>	
KCOS	Yes
BreakingPoint	Yes
TCL API	Yes
REST API	Yes
<b>Hardware specifications</b>	
Physical interfaces	Front I/O: 8-port 400GE QSFP-DD per appliance for test traffic Rear I/O: (1) 16-port 400GE QSFP-DD per appliance for compute node test traffic aggregation (2) 16-port 10GE per appliance for compute node networking (3) 16-port RJ45 per appliance for compute node networking management
Physical test interfaces	8 x 400GE QSFP-DD
Fanout modes <sup>1</sup>	8 x 10GE 8 x 25GE 2 x 40GE 8 x 50GE 4 x 100GE 2 x 200GE
Transceiver support	QSFP-DD
Traffic Capture	4 x 400GE hardware based
Capture memory	Maximum between 2GB or 2 Million packets, per interface
IPv4, IPv6, UDP, TCP	Hardware checksum generation
Dimensions	31" (L) x 16.75" (W) x 3.45" (H) 788.2 mm (L) x 425.2 mm (W) x 87.6" mm (H)
Weight	56.2 lbs   25.5 kgs
Operating temperature	41 °F to 86 °F (5 °C to 30 °C), ambient air
<b>System capacity</b>	
Appliances per system	Up to 16 x APS-ONE-100

Specification	Description
Input voltage	100-127VAC/200-240VAC, 50-60Hz, 15/10A (x2)
Power supply operating mode	(1) Dual Supply PSU 1,2: 1+1 100-127VAC/200-240VAC (2) Single Supply PSU 1 or 2: 1+1 1200-240VAC <sup>1</sup>
Power cords	15A, 250V, C13 TO C14, 6 FT (x2)—Included
Max power requirement	941-0110 (APS-ONE-100)—1200W 941-0111 (APS-M8400)—1800W

1. Appliance can operate with one active power supply while (a) receiving 200-240VAC and (b) both power supplies are physically present in the system chassis

# BreakingPoint Performance

Performance numbers are provided in back-to-back scenario by using both APS-ONE-100 appliance ports.

Performance metric	M1010 controller with single APS-ONE-100 appliance	M1010 controller with 10-Unit APS-ONE-100 System
<b>Application throughput</b>	190 Gbps	1.90 Tbps
<b>HTTP Connection Rate (CPS)</b>	3.5 Million	35 Million
<b>HTTP Concurrent Connections (CC)</b>	320 Million	3200 Million
<b>TLS throughput</b> (TLS1_2_ECDHE_RSA_AES128_GCM_SHA256_2K_key, 256 P 1MB page)	150 Gbps	1.5 Tbps
<b>TLS Connection Rate (CPS)</b> (ECDHE RSA 2k key, 256 P 1B page)	100 K	1 Million
<b>TLS Concurrent Connections (CC)</b>	3.2 Million	32 Million
<b>Elephant Flow</b>	65 Gbps @ 9200B 27 Gbps @ 1500B	65 Gbps @ 9200B 27 Gbps @ 1500B
<b>IPsec Performance</b>	2M concurrent tunnels 80 Gbps 4K tunnels/sec	20M concurrent tunnels 800 Gbps 40K tunnels/sec
<b>Unidirectional HTTP Bandwidth</b> (HTTP GET with 64KB response size)	190 Gbps	1.90 Tbps

Performance metric	APS-M8400 appliance with 16-Unit APS-ONE-100 System
<b>Application throughput</b>	3.2 Tbps
<b>HTTP Connection Rate (CPS)</b>	56 Million
<b>HTTP Concurrent Connections (CC)</b>	5100 Million
<b>TLS throughput</b> (TLS1_2_ECDHE_RSA_AES128_GCM_SHA256_2K_key, 256 P 1MB page)	2.4 Tbps
<b>TLS Connection Rate (CPS)</b> (ECDHE RSA 2k key, 256 P 1B page)	1.6 Million
<b>TLS Concurrent Connections (CC)</b>	51 Million
<b>Elephant Flow</b>	65 Gbps @ 9200B 27 Gbps @ 1500B
<b>IPsec performance</b>	32M concurrent tunnels 1.2 Tbps 64K tunnels/sec
<b>Unidirectional HTTP bandwidth</b> (HTTP GET with 64KB response size)	3.2 Tbps

# IxLoad Performance

Performance numbers are provided in back-to-back scenario by using an APS-M1010 controller with APS-ONE-100 appliance(s).

IxLoad does not support operating APS-ONE-100 in stand-alone mode.

Performance metric	M1010 controller with single APS-ONE-100 appliance	M1010 controller with 10-Unit APS-ONE-100 System
Application throughput	193 Gbps	1.93 Tbps
HTTP Connection Rate (CPS)	4.8 Million	48 Million
HTTP Concurrent Connections (CC)	160 Million	1.6 Billion
TLS throughput (TLS 1.2, ECDHE ECDSA, 256 P, 1MB page)	178 Gbps	1.78 Tbps
TLS Connection Rate (CPS) (TLS 1.2, ECDHE ECDSA, 256 P, 1B page)	340 K	3.4 Million
TLS Concurrent Connections (CC) (TLS 1.2, ECDHE ECDSA, 256 P)	4.5 Million	45 Million
Elephant flow	65 Gbps @ 9200B 27 Gbps @ 1500B	65 Gbps @ 9200B 27 Gbps @ 1500B
IPsec performance	1 Million conc. tunnels 180 Gbps (UDP) 20K tunnels/sec Single tunnel 20 Gbps (UDP)	10 Million conc. tunnels 1.8 Tbps (UDP) 200K tunnels/sec

# IxLoad Application Support

IxLoad application support	APS-ONE-100 appliance
Application delivery	<ul style="list-style-type: none"> <li>• HTTP</li> <li>• HTTPS</li> <li>• HTTP/2 (beta)</li> <li>• DNS</li> <li>• Application replay</li> <li>• Stateless peer</li> <li>• FTP</li> </ul>
IPsec	<ul style="list-style-type: none"> <li>• IKEv1, IKEv2, IPsec Suites B</li> <li>• IPsec Quick Tests (beta)</li> </ul>
Stack manager	<ul style="list-style-type: none"> <li>• Static ARP</li> <li>• GratARP</li> <li>• IPv4 / IPv6</li> <li>• DNS</li> <li>• DHCPv4</li> <li>• DHCPv6</li> </ul>



## Product ordering information for BreakingPoint

Part number	Description
941-0110	Ixia, APS-ONE-100, Compute Node with 4 x 100GE front I/O ports for the APS-M1010 Management Controller (941-0113)
941-0113	Ixia, APS-M1010 Management Controller Node, 1RU. This controller can support up to 10 APS-ONE-100 Compute Nodes (941-0110). Note: APS-ONE-100 Compute Nodes are purchased separately
941-0111	IXIA, APS-M8400 Appliance, with 8 x 400GE QSFP-DD front I/O ports for test traffic. This appliance can support up to 16 APS-ONE-100 Compute Nodes (941-0110).
947-4057	Ixia, L4-7 Hardware Bundle with 10 x APS-ONE-100 Compute Nodes (941-0110) with 4 x 100GE front I/O ports each and 1 x APS-M1010 Management Controller (941-0113)
909-0856	BreakingPoint Application and Threat Intelligence (ATI) Subscription Program
QSFP28-SR4-XCVR	QSFP28 100GBASE-SR4 100GE pluggable optical transceiver, MMF (multimode), 850 nm, 100 m reach
942-0088	QSFP28 passive, copper, Direct Attach Cable (DAC), 3-meter length
942-0067	Ixia, MT-4 x LC, 10GE, and 25 fan-out cable, MMF (multimode), 3-meter length for 4 x 10GE, 4 x 25GE fan-out
942-0109	Ixia, QSFP-DD-2M-CBL 400GE 400GBASE-R passive copper, Direct Attach Cable, 2-meter length
942-0160	Ixia, QSFP-DD-to-4xQSFP28 400GBASE-R Active Electrical fan-out Cable (AEC), for 400GE to 4x100GE fan-out, 3-meter length (942-0160). ONLY COMPATIBLE WITH APS-M8400

## Product ordering information for BreakingPoint TAA-Compliant parts

Part number	Description
941-0110-T	Ixia, APS-ONE-100, Compute Node with 4 x 100GE front I/O ports for the APS- M1010 Management Controller (941-0113), (941-0110)
941-0113-T	Ixia TAA Compliant, APS-M1010 Management Controller Node (941-0113)
QSFP28-SR4-XCVR-T	Ixia, TAA compliant, QSFP28 100GBASE-SR4 100GE pluggable optical transceiver, MMF (multimode fiber), 850 nm, 100 m reach (995-8040)

## Product ordering information for IxLoad

Part number	Description
941-0115	Ixia, APS-M1010 Management Controller Node for IxLoad, 1RU. This controller can support up to 10 APS-ONE-100 Compute Nodes (941-0114) running IxLoad software. Note: APS-ONE-100 Compute Nodes (941-0114) are purchased separately.
941-0114	Ixia, APS-ONE-100, Compute Node for IxLoad with 4x100GE front I/O ports for the APS-M1010 Management Controller (941-0115). Requires 2 optional QSFP28 transceivers/cable assemblies to be ordered separately using QSFP28-SR4-XCVR (QSFP28 100GBASE-SR4 100GE pluggable optical transceiver, MMF (multimode), 850 nm, 100 m reach) or 942-0088 (QSFP28 passive, copper, Direct Attach Cable)
925-6201	Ixia, IxLoad-DATA Perpetual License Bundle for a single APS-ONE-100 appliance, floating license (per controller) (925-6201). The license enables IxLoad-DATA functionality on a single APS-ONE-100 appliance (compute node). It can be used with any single appliance managed by a management controller (APS-M1010 or APS-M8400). It includes an IxLoad Framework license and support for the DATA traffic activities (HTTP, HTTPS, DNS, AppReplay, FTP, IPSec). TAA compliance is determined by the hardware on which the license is enabled.



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