

Keysight AresONE-S-400GE QSFP-DD High-Density 16-Port Test System

Challenge: Testing all PAM4 and NRZ speeds

8x56Gb/s electrical interface, PAM4 encoded technology is required with 400GE adoption. Most switch ASICs now support this new PAM4 modulation along with the legacy NRZ encoding used for lower-speed technologies—easing the transition from 100GE to 400GE. Testing all 7 speeds from 10GE to 400GE on these platforms has become a new challenge. Bandwidth requirements for internet applications is driving the need of testing line rate traffic of 3.2, 6.4, 12.8, 25.6 Tbps ASICs.

Keysight has extended its industry-leading AresONE 400GE network test platforms to address these evolving market needs.

Solution: All in one test platform with 16-port density and 7 speeds

With first-to-market solutions, both AresONE and AresONE High Performance have established significant footprint as enablers for testing bleeding-edge, high scale, 400GE technology. AresONE-S is our latest addition to the AresONE family.

AresONE-S doubles the density of AresONE in the same 2RU fixed chassis form factor. A staggering 6.4Tbps traffic generation capability, stackable to build higher-throughput test beds gives you a future-proof test platform that can grow with your needs. It enables testing 7 speeds in the same platform with each port capable of the following speeds.

- PAM4 Speeds: 1x400, 2x200, 4x100, 8x50GE

Highlights

- AresONE-S 16 port model enables industry's highest-density testing in a single platform
- 6.4 Tbps of line-rate traffic, with option to synchronize multiple chassis to test 25.6 Tbps and beyond switching platforms
- 2RU fixed chassis form factor to optimize power and cooling requirements
- Complete L2/3 protocols emulation coverage and industry-leading scale and performance with Ixia's IxNetwork software application
- One platform for all 7 speeds: 400/200/100/50/40/25/10GE with PAM4 and NRZ signaling
- Flexible bundle options for port and performance upgrades, to extend your investment



AresONE-S QSFP-DD-400GE
16-port, fixed chassis system

- NRZ Speeds: 2x100, 4x50, 2x40, 8x25, 8x10GE

Pay as you Grow—Full and Reduced, Speed Variants, All Field Upgradeable

AresONE-S fixed chassis are available in full- and reduced-performance models:

16-port hardware chassis:

- AresONE, S400GD-16P-QDD, High Density, 16-port, full performance fixed chassis model with native QSFP-DD 400GE (PAM4) physical interfaces and L1-3 support (944-1186)
- AresONE, S400GDR-16P-QDD, High Density, 16-port, reduced performance fixed chassis model with native QSFP-DD 400GE (PAM4) physical interfaces and L1-3 support (944-1187)

8-ports enabled on the 16-port hardware chassis:

- AresONE S400GD-16PHW-8P-QDD, High Density, 8-port, full performance fixed chassis model with native QSFP-DD 400GE (PAM4) physical interfaces and L1-3 support (944-1300)
- AresONE S400GDR-16PHW-8P-QDD, High Density, 8-port, reduced performance fixed chassis model with native QSFP-DD 400GE (PAM4) physical interfaces and L1-3 support (944-1301)

Keeping with the trend set by earlier generation of AresONE, next generation AresONE-S offers flexibility for upgrade based on need. In addition to being field upgradable from reduced to full feature, users can field-upgrade from an 8-port configuration to a full chassis of 16 ports and add on PAM4 and NRZ speeds, as desired

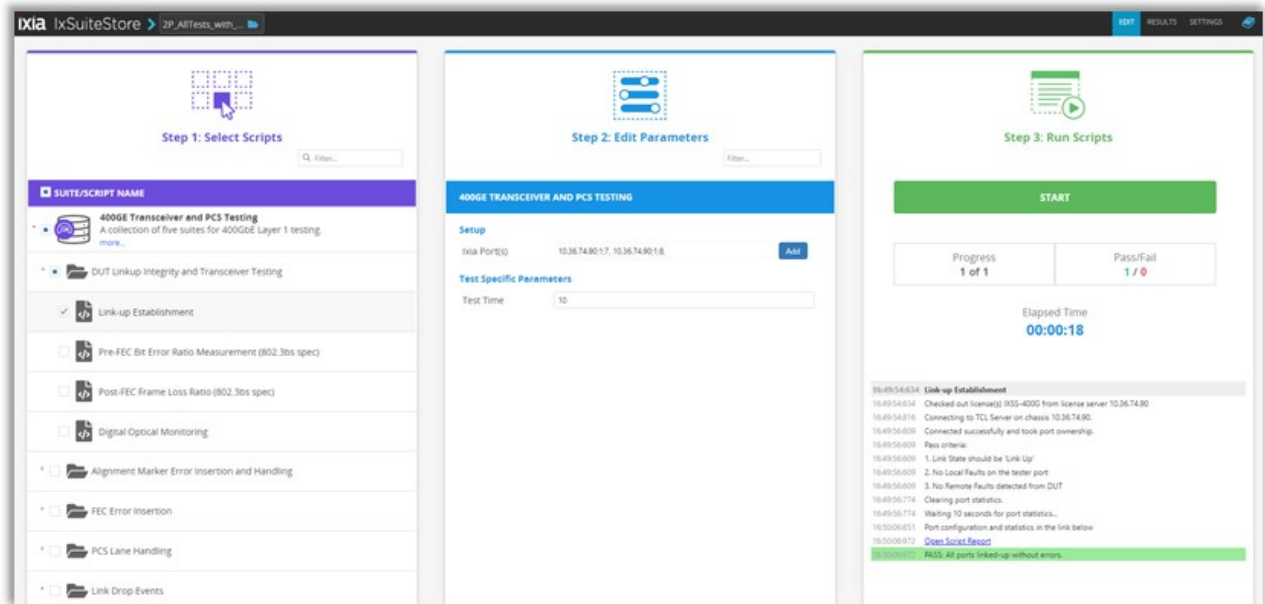
Key features

- Line-rate 400 Gbps packet generation, capture, and analysis of received traffic to detect and debug data transmission errors for multiple speeds
- Multi-rate fan-out speed options, to configure the fan-out speeds with PAM4 or NRZ signaling or both modes:
 - PAM4 speeds: 2x200, 4x100, 8x50GE (optional)
 - NRZ speeds: 2x100, 4x50, 2x40, 8x25, 8x10GE (optional)
 - 1x400GE PAM4 is the default (that is, built-in) per port speed on the hardware chassis
- IxNetwork protocol bundles that provide easy and flexible pricing designed for fixed chassis systems
- IxSuiteStore, the industry's first fully automated IEEE 802.3bs-based test suite that enables automated validation of 400GE implementations, includes testing of physical coding sublayer (PCS) lanes, bit error rate (BER), KP4 FEC bit-error distribution with error insertion and link stability
- Field upgradability from reduced to full feature, incremental port density, and add-on speed options
- Bundles for easy ordering of multiple options under a single part number
- Line-rate, at all speeds with per-port and per-flow statistics
- High-latency measurement resolution at 0.625 ns at the 400GE speed and 1.25 ns at 200GE
- RS-544 (KP4) Forward Error Correction (FEC) support for all PAM4 speeds (400/200/100/50GE)
- RS-FEC and FC-FEC as applicable for NRZ speeds

- Auto-negotiation (AN) and link training (LT) support. See the Specifications table for additional information
- 400GE and 2x200GE FEC symbol error injection and FEC symbol error density distribution; comprehensive set of FEC corrected and uncorrected counts, rates, and statistics; BER per lane and per port, and pre-FEC BER, frame loss ratio (FLR) analysis is provided to name a few
- Keysight instrumentation, including floating timestamp, sequence number, flow identification, and data integrity
- 400GE PCS lanes Transmit, error injection testing and receive measurement:
 - Per-lane controls and status, FEC and error monitoring, FEC and PCS error insertion, lane mapping and skew insertion; see details in Specification Table in this data sheet, as capabilities may vary per Ethernet speed
- Layer 1 BERT capability with per-lane and per-port BER statistics, ability to send PRBS patterns and inject bit errors per lane under user control
- +/- 100 PPM line frequency adjustment
- Inject packet errors: CRCs, runts, giants, alignments, checksum errors, and out of sequence
- Mid-range L2/3 networking protocol emulation to validate performance and scalability of L2/3 routing/switching and data center test cases using Keysight's IxNetwork protocol emulation application
- Supports RFC benchmarking of networking devices and equipment using industry-standard RFC benchmark tests at line-rate 400/200/100/50GE speeds
- Supported with the Native IxOS software
- Application support: backwards compatible with existing chassis and software with IxExplorer and IxNetwork
- IxExplorer, IxNetwork, and related Tcl and automation APIs

IxSuiteStore—Fast and Efficient Standards-Based Test Methodology for 400GE PAM4

The automated 400GE Transceiver and PCS Testing suite enables developers of 400GE equipment to accelerate testing and gain significant time to market advantage. Quality assurance teams can benefit from front-loading testing, flagging implementation issues more quickly, and reducing manual test time. Consumers of 400GE equipment like data center and service provider equipment validation teams can use the test suite to automate 400GE equipment and optical transceiver and copper cable validation during initial stages of qualification, to ensure quality of upgrades and avoid future interoperability issues.



The 400GE test suite is available using Keysight's IxSuiteStore framework. The test suite validates key aspects of a 400GBASE-R PCS and supported physical media dependents (PMDs) per IEEE 802.3bs. Following are more details on this test suite:

- A set of Keysight-provided scripts exercising most of the Layer 1 test capabilities of Keysight AresONE hardware
- Enables quick-start testing with basic steps and progressively guides to more advanced cases
- Customers can configure these tests to support regression testbeds
- Currently 25 tests are available, covering key validations required in a 400GE implementation

Specifications

Product Description	S400GD-16P-QDD Full Feature 16-Port / 8-Port	S400GDR-16P-QDD Reduced Feature 16-Port / 8-Port
Part Numbers	944-1186 / 944-1300	944-1187 / 944-1301
Hardware Fixed Chassis System Specifications		
RU / Number of Ports	2 RU 16-port and 8-port enabled, fixed chassis systems	
Physical Interfaces	Native QSFP-DD physical port	
Supported Port Speeds	Default 1x400GE/port (PAM4): 400GE-capable fiber and passive copper cable media	
	Optional fan-out speeds: <ul style="list-style-type: none"> • PAM4: 2x200, 4x100, 8x50GE • NRZ: 2x100, 4x50, 2x40, 8x25GE, 8x10GE • Requires purchase of a factory or a field upgrade speed option or a bundle options. See the Ordering Section of this datasheet. 	
CPU and Memory	Multicore processor with 2 GB of CPU memory per port	
Number of users	The 16-port enabled chassis supports 8 simultaneous users The 8-port enabled 16-port hardware chassis supports 4 simultaneous users	
IEEE Interface Protocols for 400GE	IEEE 802.3bs 200GE and 400GE, 400GBASE-R	
	IEEE 802.3cd 50 Gb/s, 100 Gb/s, and 200 Gb/s Ethernet	
Layer 1 Support	PAM4, 400GE native ports and 200/100/50GE speed option: <ul style="list-style-type: none"> • KP4 (RS-544,514) Ethernet Forward Error Correction, Clause 119 • Auto-negotiation (AN) and link training (LT) support • All speeds support AN and LT for 1x400GE, 2x200GE, 4x100GE, and 8x50GE speed modes with the exceptions shown below • 8x50GE PAM4 speed mode Half-port density mode: <ul style="list-style-type: none"> • Ports 1, 3, 6, 8 and 9, 11, 14, 16 are active for the 8x50GE speed in PAM4 mode with AN and LT enabled on each port • Only needed for copper DAC support—Copper DACs require AN and LT to be enabled 	

Product Description	S400GD-16P-QDD Full Feature 16-Port / 8-Port	S400GDR-16P-QDD Reduced Feature 16-Port / 8-Port
	<ul style="list-style-type: none"> Up to 8 users will have one port each of 8x50GE from each port resource group on the 16-port hardware chassis <p>Full-port density mode:</p> <ul style="list-style-type: none"> All ports in all port resource groups are in the 8x50GE PAM4 fan-out speed AN and LT are disabled on all active ports in all resource groups Up to 8 users will have two ports each of 8x50GE per port in each port resource group on the 16-port hardware chassis Correctable and uncorrectable FEC statistics per-port FEC symbol error injection (400GE and 200GE speeds only) FEC Codeword error distribution statistics support for all PAM4 speeds except for the Full port density mode of the 8x50GE fan-out speed PCS lanes Tx and Rx test and statistics Layer 1 BERT with PRBS-7Q, PRBS-9Q, PRBS-11Q, PRBS-13Q, PRBS-15Q, PRBS-20Q, PRBS-23Q, and PRBS-31Q pattern support <p>NRZ, 100/50/40/25/10GE speed option:</p> <ul style="list-style-type: none"> 2x100, 4x50, 2x40, 8x25GE, and 8x10GE speed support RS(528,514) Clause 91, BASE-R FEC Cause 74 Forward Error Correction, Clause 91 for applicable speeds Auto-negotiation and link training support for all 100/50/40/25GE speeds Correctable and uncorrectable FEC statistics per-port for applicable speeds Ability to independently turn ON or OFF AN with Link training, or FEC, or to allow IEEE defaults to automatically manage the interoperability Layer 1 BERT with PRBS-7, PRBS-9, PRBS-11, PRBS-13, PRBS-15, PRBS-20, PRBS-23, and PRBS-31 pattern support 	
Optical Transceiver Support	Support for QSFP-DD MSA compliant optical transceivers up to Power Class 7 with 14 watts of power consumption such as: 400GBASE-DR4, 400GBASE-FR4, 400GBASE-LR4, 400GBASE-LR8, and 400GBASE-SR8 other optical transceiver types (for example, QSFP56), and AOCs. Please consult the factory for specific transceiver support information. See Optical Transceivers under the Ordering Information section of this datasheet for current support of optical transceiver for this product.	
Passive Copper Cable Media	400GBASE-CR8, passive, copper Direct Attached Cable (DAC) up to 3	

Product Description	S400GD-16P-QDD Full Feature 16-Port / 8-Port	S400GDR-16P-QDD Reduced Feature 16-Port / 8-Port
	meters in length. Both point-to-point and fan-out cables are supported. Please consult the factory for longer lengths and information on Active Electrical Cable information. See Cables and Transceivers under the Ordering Information section of this datasheet for current support for this product.	
Fixed Chassis System Dimensions	30.3" (L) x 17.3" (W) x 3.46" (H) 770 mm (L) x 438.2 mm (W) x 88 mm (H)	
Fixed Chassis System Weights	<ul style="list-style-type: none"> • Hardware only: 65 lbs. (29.5 kg) • Shipping: 99.2 lbs. (45 kg) ¹ <p>¹ Approximate (includes rackmount slides, power cords, sync cables, and packaging).</p>	
Temperature (Ambient Air)	<ul style="list-style-type: none"> • Operating: 41 °F to 95 °F (5 °C to 35 °C) • Storage: 41 °F to 122 °F (5 °C to 50 °C) 	
Humidity (Ambient Air)	<ul style="list-style-type: none"> • Operating: 0 % to 85 %, non-condensing • Storage: 0 % to 85 %, non-condensing 	
Regulatory Compliance Specifications	IEC 60950-1, UL 60950-1, CSA C22.2 No.60950-1, CE (LVD, EMC, RoHS), EN/IEC 55032, EN/IEC 55024, CFR 47, FCC Part 15B, ICES-003, AS/NZ CISPR 32/24, KN32/35	
Chassis Synchronization Extensibility		
Maximum Number of Chassis in Single Test Topology	<ul style="list-style-type: none"> • Each chassis has built-in star topology synchronization ports to connect to 5 additional compatible chassis systems • The Metronome Timing System is used for synchronizing a total of 6 or more chassis at one time. Consult factory for port count requirements beyond 5 chassis in a single configuration 	
Transmit Feature Specifications		
Transmit Engine	Wire-speed packet generation with timestamps, sequence numbers, data integrity, and packet group signatures	
Max. Streams per Port and Speed	<ul style="list-style-type: none"> • 400GE: 64 • 200GE: 64 	<ul style="list-style-type: none"> • 400GE: 32 • 200GE: 32

Product Description	S400GD-16P-QDD Full Feature 16-Port / 8-Port	S400GDR-16P-QDD Reduced Feature 16-Port / 8-Port
(Including in Data Center Ethernet)	<ul style="list-style-type: none"> • 100GE: 32 • 50GE: 16 • 40GE: 16 • 25GE: 16 • 10GE: 16 	<ul style="list-style-type: none"> • 100GE: 16 • 50GE: 8 • 40GE: 8 • 25GE: 8 • 10GE: 8
Stream Controls	<ul style="list-style-type: none"> • Rate and frame size change on the fly • Advanced stream scheduler support • Optional sequential stream support (must be ordered as a factory installed option-no field upgrade is available). Consult the Keysight product management before the quotation of this option. 	
Minimum Frame Size	<p>400GE and 200GE:</p> <ul style="list-style-type: none"> • 64 bytes at full line rate • 60 bytes at less than full line rate <p>100GE and below:</p> <ul style="list-style-type: none"> • 64 bytes 	
Maximum Frame Size	<p>400GE and 200GE: 16,000 bytes</p> <p>100GE and below: 14,000 bytes</p>	
Maximum Frame Size in Data Center Ethernet	9,216 bytes	
Priority Flow Control	<ul style="list-style-type: none"> • 4 line-rate-capable queues, each supporting up to 2,500-byte frame lengths • 1 line-rate-capable queue, non-blocking supporting up to 9,216-byte frame length 	
Frame Length Controls	Fixed, increment by user-defined step, weighted pairs (up to 16K in 400/200/100GE and 8K in 50GE and below), uniform, repeatable random, IMIX, and Quad Gaussian	
User-Defined Fields (UDF)	Fixed, increment or decrement by user-defined step, sequence, value list, and random configurations; up to 10, 32-bit-wide UDFs are available	
Value Lists (Max.) per port	<ul style="list-style-type: none"> • 400GE: 64K /port /UDF • 200GE: 32K /port /UDF 	

Product Description	S400GD-16P-QDD Full Feature 16-Port / 8-Port	S400GDR-16P-QDD Reduced Feature 16-Port / 8-Port
	<ul style="list-style-type: none"> • 100GE: 64K /4 ports /UDF • 50GE: 32K /4 ports /UDF • 40GE: 64K /4 ports /UDF • 25GE: 16K /4 ports /UDF • 10GE: 16K /4 ports /UDF 	
Sequence (Max.)	<ul style="list-style-type: none"> • 400GE: 32K • 200GE: 16K • 100GE: 8K • 50GE: 4K • 40GE: 4K • 25GE: 4K • 10GE: 4K 	
Error Generation (FEC and Standard Keysight L2/3 Ethernet in PAM4 Mode Only)	<p>400GE and 2x200GE FEC:</p> <ul style="list-style-type: none"> • FEC symbol error-injection allows the user to inject FEC symbol errors using various weighted methods to achieve specific bit error rates (BER) for 400/200GE • No FEC error insertion and related statistics for 4x100GE and 8x50GE 	
	<p>400GE, 2x200GE, 4x100GE, 8x50GE L2/3 Ethernet:</p> <ul style="list-style-type: none"> • Generate good CRC or force bad CRC, undersize and oversize standard Ethernet frame lengths, and bad checksum 	
Physical Coding Sublayer	<ul style="list-style-type: none"> • PCS lane marker error injection • PCS lane re-mapping • PCS lane marker error injection • PCS bit error generation 	
Hardware Checksum Generation	Checksum generation for IPv4, IP over IP, ICMP/GRE/TCP/UDP, L2TP, GTP, and multilayer checksum; support for protocol verification for control plane traffic	

Product Description	S400GD-16P-QDD Full Feature 16-Port / 8-Port	S400GDR-16P-QDD Reduced Feature 16-Port / 8-Port
Link Fault Signaling	<ul style="list-style-type: none"> • Reports, no fault, remote fault, and local fault port statistics • Generate local and remote faults with controls for the number of faults and order of faults • Option to have the transmit port ignore link faults from a remote link partner and send traffic anyway 	
Latency Measurement Resolution	<ul style="list-style-type: none"> • 400GE: 0.625 ns • 200GE: 1.25 ns • 100GE: 2.5 ns • 50GE: 2.5 ns • 40GE: 2.5 ns • 25GE: 2.5 ns • 10GE: 2.5 ns 	
Intrinsic Latency Compensation	Removes inherent latency error from the port electronics for all speeds	
Transmit Line Clock Adjustment	Ability to adjust the parts-per-million (ppm) line frequency over a range of +/- 100 ppm on all the ports of a 400GE fixed chassis system	
Transmit/Receive Loopback	Internal loopback support	
Receive Feature Specifications		
Receive Engine	Wire-speed packet filtering, capturing, real-time latency, and inter-arrival time for each packet group, with data integrity, and sequence checking capability	
Trackable Receive Flows per Port without Sequence Checking and with Tx/Rx Synch	<ul style="list-style-type: none"> • 400GE: 32K full statistics • 200GE: 32K full statistics • 100GE: 4K full statistics and 32K with minimum statistics • 50GE: 4K full statistics and 16K with minimum statistic • 40GE: 4K full statistics and 16K with minimum statistic • 25GE: 4K full statistics and 16K with minimum statistic • 10GE: 4K full statistics and 16K with minimum statistic 	
Trackable Receive Flows per Port with and without	<ul style="list-style-type: none"> • 400GE: 32K full statistics • 200GE: 32K full statistics • 100GE: 8K full statistics and 32K with minimum statistics 	

Product Description	S400GD-16P-QDD Full Feature 16-Port / 8-Port	S400GDR-16P-QDD Reduced Feature 16-Port / 8-Port
Sequence Checking and no Tx/RX Synch	<ul style="list-style-type: none"> • 50GE: 8K full statistics and 16K with minimum statistic • 40GE: 8K full statistics and 16K with minimum statistic • 25GE: 8K full statistics and 16K with minimum statistic • 10GE: 8K full statistics and 16K with minimum statistic 	
Minimum Frame Size	64 Bytes	
Filters (User-Defined Statistics, UDS)	2 SA/DA pattern matchers, 2x16-byte user-definable patterns. 6 UDS counters are available with offsets for start of frame	
Hardware Capture Buffer	1 MB per front panel port	
Standard Statistics and Rates	Link state, line speed, frames sent, valid frames received, bytes sent/received, fragments, undersize, oversize, CRC errors, 6 user-defined stats, capture trigger (UDS 3), capture filter (UDS 4), data integrity frames, data integrity errors, sequence checking frames, sequence checking errors, ARP, and PING requests and replies	
FEC Statistics	<p>PAM4 400GE, 2x200GE, 4x100GE and Half-port density 8x50GE:</p> <ul style="list-style-type: none"> • FEC port statistics: Total Bit Errors, Max Symbol Errors, Corrected Codewords, Total Codewords, Uncorrectable Codewords, Frame Loss Ratio, Pre-FEC Bit Error Rate, and Codeword error distribution analysis • FEC per lane Rx statistics: FEC Symbol Error Count, Corrected Bits Count, Symbol Error Rate, Corrected Bit Rate <p>NRZ speeds: 2x100, 4x50, and 8x25GE²</p> <ul style="list-style-type: none"> • 100GE FEC statistics • Ethernet Forward Error Correction RS-FEC, Clause 91 • FEC statistics: <ul style="list-style-type: none"> ○ RS-FEC Corrected and uncorrectable codewords • 50GE FEC statistics • FC-FEC, Clause 74 for BASE-R PHYs • RS-FEC, 50GE FEC statistics: <ul style="list-style-type: none"> ○ RS-FEC Corrected and Uncorrected Codeword Count ○ FC-FEC Corrected and Uncorrected Block Count ○ FC-FEC Corrected Error Bits • 25GE FEC statistics • FC-FEC, Clause 74 for BASE-R PHYs 	

Product Description	S400GD-16P-QDD Full Feature 16-Port / 8-Port	S400GDR-16P-QDD Reduced Feature 16-Port / 8-Port
	<ul style="list-style-type: none"> • RS-FEC, Clause 108 for 25GBASE-R PHYs • FEC statistics: <ul style="list-style-type: none"> ○ RS-FEC corrected and uncorrected codeword count ○ FC-FEC corrected and uncorrected block count ○ FC-FEC corrected error bits <p>2 This is a minimum specification; consult factory for more information. Note: FEC is not supported on 40GE and 10GE speeds with NRZ signaling.</p>	
Latency / Jitter Measurements	Cut-through, store and forward, forwarding delay, latency/jitter, MEF jitter, and inter-arrival time	
Receive-side PCS Lanes Port Statistics Counters	PCS: Sync Errors, Illegal Codes, Remote Faults, Local Faults, Illegal Ordered Set, Illegal Idle, and Illegal SOF	
400GE PCS Receive-Side Statistics and Indicators	Per-lane PCS receive capabilities include: <ul style="list-style-type: none"> • Receive—per-lane PCS receive statistics, Physical Lane assignments, Lane Marker Lock, Lane Market Map, Relative Lane Skew, Lane Marker Error Count • Receive—per-lane FEC receive statistics, FEC Symbol Error Count, FEC Corrected Bits Count, FEC Symbol Error Rate, FEC Corrected Bit Rate 	
Layer 2-3 Protocol Support		
Basic	IxNetwork Base, RFC2544/2889/3918 QuickTest	
Routing, Switching, and Carrier Ethernet	BGP4/BGP4+, OSPFv2/v3, ISISv4/v6, RIP/RIPng, EIGRP, BFD, Seamless BFD, IGMP/MLD, PIM-SM/SSM, STP/RSTP/MSTP/PVST, LACP/Protocol over LACP, GRE and Protocol over GRE, LISP, CFM/Y.1731, Link-OAM, PBB-TE, ELMI, 1588v2/SyncE ESMC, Y.1564QT, TWAMP, NTP; REQUIRES: 930-2201 IxNetwork Basic package for AresONE	Complete protocol coverage as shown on the left side of this row only with reduced session scale: <ul style="list-style-type: none"> • 100 routing and switching sessions • 2,000 host/access sessions
Software Defined Network	BGP4/BGP4+, OSPFv2/v3, ISISv4/v6, RIP/RIPng, BFD; EVPN, VXLAN, GENEVE, Segment Routing	Complete protocol coverage as shown on the left side of this row only with reduced session scale:

Product Description	S400GD-16P-QDD Full Feature 16-Port / 8-Port	S400GDR-16P-QDD Reduced Feature 16-Port / 8-Port
	(MPLS and IPv6), BGP-LS, PCEP, BGP SR-TE Policy, BGP FlowSpec, OVSDB, Netconf, BIER, OpenFlow; GRE and Protocol over GRE, LACP/Protocol over LACP, eCPRI; REQUIRES: 930-2201 IxNetwork Basic package for AresONE	<ul style="list-style-type: none"> • 100 routing and switching sessions • 2,000 host/access sessions
MPLS and VPN	BGP4/BGP4+, OSPFv2/v3, ISISv4/v6, RIP/RIPng, EIGRP, BFD, RSVP-TE P2P/P2MP, LDP/LDPv6/mLDP, LDP L2VPN (PWE/VPLS), BGP VPLS/VPWS, L3VPN/6VPE, BGP RFC3107, PIM-SM/SSM, Multicast VPN, MPLS-TP, MPLS OAM, EVPN/PBB-EVPN; REQUIRES: 930-2201 IxNetwork Basic package for AresONE	<p>Complete protocol coverage as shown on the left side of this row only with reduced session scale:</p> <ul style="list-style-type: none"> • 100 routing and switching sessions • 2,000 host/access sessions
Broadband Access and Authentication	PPPoX/L2TPv2, DHCPv4/DHCPv6, ANCP, IGMP/MLD, IPv6 Autoconfiguration (SLAAC), 802.1x, Bonded GRE HG, GRE/Protocol over GRE, LACP/Protocol over LACP, Session Aware Traffic, Service over MPLS, Broadband Control Plane QT, Asymmetric Data Performance QT; REQUIRES: 930-2201 IxNetwork Basic package for AresONE	<p>Complete protocol coverage as shown on the left side of this row only with reduced session scale:</p> <ul style="list-style-type: none"> • 100 routing and switching sessions • 2,000 host/access sessions
Data Center Ethernet	BGP4/BGP4+, OSPFv2/v3, ISISv4/v6, RIP/RIPng, BFD; EVPN, VXLAN, GENEVE, OVSDB, DCBX, FCoE, Fabric Path, SPBM, VEPA, TRILL, FCoE QT, IxCloudPerf QT, RFC7747 BGP Convergence QT, LACP/Protocol over LACP; REQUIRES: 930-2201 IxNetwork Basic package for AresONE	<p>Complete protocol coverage as shown on the left side of this row only with reduced session scale:</p> <ul style="list-style-type: none"> • 100 routing and switching sessions • 2,000 host/access sessions

Application Support

QSFP-DD-400GE / QSFP-DD-R400GE
IxExplorer: Layer 1–3 wire-speed traffic generation, capture, and analysis with Forward Error Correction and error injection with statistics, PCS Lanes Tx/Rx with statistics. and reporting capability.
IxNetwork: Wire-rate traffic generation with service modeling that builds realistic, dynamically controllable data-plane traffic. IxNetwork offers the industry's best test solution for functional and performance testing by using comprehensive emulation for routing, switching, MPLS, IP multicast, broadband, authentication, Carrier Ethernet, and data center Ethernet protocols.
IxSuiteStore: Test suite for functional validation of PCS lanes BER, KP4 FEC bit-error distribution with error insertion and link stability based on IEEE 802.3bs specification (at 400GE speed only)
Tcl API: Custom user script development for Layer 1-3 testing

Ordering Information

Part Number	Description
Fixed Chassis	
944-1186	IXIA, AresONE S400GD-16PHW-16P-QDD, High Density, 16-port, full performance fixed chassis model with native QSFP-DD 400GE (PAM4) physical interfaces and L1-3 support (944-1186)
944-1187	IXIA, AresONE S400GDR-16PHW-16P-QDD, High Density, 16-port, reduced performance fixed chassis model with native QSFP-DD 400GE (PAM4) physical interfaces and L1-3 support (944-1187)
944-1300	IXIA, AresONE S400GD-16PHW-8P-QDD, High Density, 8-port, full performance fixed chassis model with native QSFP-DD 400GE (PAM4) physical interfaces and L1-3 support (944-1300)
944-1301	IXIA, AresONE S400GDR-16PHW-8P-QDD, High Density, 8-port, reduced performance fixed chassis model with native QSFP-DD 400GE (PAM4) physical interfaces and L1-3 support (944-1301)
Upgrade and Speed Options	
905-1060	Ixia, AresONE UPG-S400GDR-16PHW-16P-to-S400GD-16P FIELD UPGRADE for the reduced performance S400GDR-16PHW-16P-QDD (944-1187) to become the full performance S400GD-16PHW-16P-QDD (944-1186), (905-1060)

Part Number	Description
905-1077	Ixia, AresONE UPG-S400GD-16PHW-8P-to-S400GD-16P FIELD UPGRADE for the full performance S400GD-16PHW-8P-QDD (944-1300) to become the full performance S400GD-16PHW-16P-QDD (944-1186), (905-1077)
905-1078	Ixia, AresONE UPG-S400GDR-16PHW-8P-to-S400GDR-16P FIELD UPGRADE for the reduced performance S400GDR-16PHW-8P-QDD (944-1301) to become the reduced performance S400GDR-16PHW-16P-QDD (944-1187), (905-1078)
905-1079	Ixia, AresONE UPG-S400GDR-16PHW-8P-to-S400GD-8P FIELD UPGRADE for the reduced performance S400GDR-16PHW-8P-QDD (944-1301) to become the full performance S400GD-16PHW-8P-QDD (944-1300), (905-1079)
905-1056	<p>IXIA, AresONE S400GD-16PHW/S400GDR-16PHW PAM4 Fan-out option: FACTORY INSTALLED option for 2x200GE, 4x100GE and 8x50GE speed support. (905-1056) One option is required for each fixed chassis system for all 16x400GE or 8x400GE physical ports.</p> <p>Note: This option is REQUIRED ON NEW PURCHASES to enable the fan-out speeds per port. (905-1056)</p>
905-1057	<p>IXIA, AresONE S400GD-16PHW/S400GDR-16PHW PAM4 Fan-out option: FIELD UPGRADE option for 2x200GE, 4x100GE and 8x50GE speed support. (905-1057) One option is required for each fixed chassis system for all 16x400GE or 8x400GE physical ports.</p> <p>Note: This option is REQUIRED ON FIELD UPGRADE PURCHASES to enable the fan-out speeds per port. (905-1057)</p>
905-1058	<p>IXIA, AresONE S400GD-16PHW/S400GDR-16PHW NRZ mode and NRZ mode Fan-out option: FACTORY INSTALLED option for 2x100GE, 4x50GE, 4x40GE, 8x25GE and 8x10GE speed support (905-1058). One option is required for each fixed chassis system for all 16x400GE or 8x400GE physical ports.</p> <p>Note: This option is REQUIRED ON NEW PURCHASES to enable the NRZ mode and NRZ mode Fan-out per port. (905-1058)</p>

Part Number	Description
905-1059	<p>IXIA, AresONE S400GD-16PHW/S400GDR-16PHW NRZ mode and NRZ mode Fan-out option: FIELD UPGRADE option for 2x100GE, 4x50GE, 2x40GE, 8x25GE and 8x10GE speed support (905-1059). One option is required for each fixed chassis system for all 16x400GE or 8x400GE physical ports.</p> <p>Note: This option is REQUIRED ON FIELD UPGRADE PURCHASES to enable the NRZ mode and NRZ mode Fan-out per port. (905-1059)</p>
Fixed Chassis System Bundle Options	
947-5086	IXIA, Bundle AresONE S400GD-16PHW-16P-QDD, High Density, 16-port, full performance fixed chassis model with native QSFP-DD 400GE (PAM4 and NRZ) physical interfaces, with all speed modes and L1-3 support (947-5086)
947-5087	IXIA, Bundle AresONE S400GD-16PHW-16P-QDD, High Density, 16-port, full performance fixed chassis model with native QSFP-DD 400GE (PAM4) physical interfaces, with all speed modes and L1-3 support (947-5087)
947-5088	IXIA, Bundle AresONE S400GDR-16PHW-16P-QDD, High Density, 16-port, reduced performance fixed chassis model with native QSFP-DD 400GE (PAM4 and NRZ) physical interfaces, with all speed modes and L1-3 support (947-5088)
947-5089	IXIA, Bundle AresONE S400GDR-16PHW-16P-QDD, High Density, 16-port, reduced performance fixed chassis model with native QSFP-DD 400GE (PAM4) physical interfaces, with all speed modes and L1-3 support (947-5089)
Multiple AresONE/AresONE-S Timing and Synchronization Chassis	
942-0090	<p>IXIA, Metronome Timing System and Metronome Timing Software enabling advanced chassis timing. Includes Sync Cable 5m (942-0096). Compatible with the XGS-SD chassis, XGS-SDL chassis, XGS-HSL chassis, AresONE fixed chassis and Novus ONE PLUS fixed chassis.</p> <p>Note: The Metronome chassis is used when more than 5 AresONE-S chassis must be time synchronized</p>

Part Number	Description
IxNetwork AresONE Only—Software Bundle Options	
930-2200	<p>IxNetwork, All Inclusive package for AresONE. Supports all IxNetwork software features with exclusion; Excludes: 930-3461 IxNetwork AppLibrary Slot Bundle, Layer 4-7 Performance Test Application; 930-2207 IxNetwork Encryption test package for AresONE. Any optional script package or IxSuiteStore optional test suite is not considered as part of IxNetwork software features.³</p> <p>³ All AresONE models do not support a traditional IxNetwork a la carte license, bundle licenses, and tier licenses.</p>
930-2201	IxNetwork Basic package for AresONE; INCLUDES: IxNetwork Base, RFC2544/2889 QuickTest.
930-2202	IxNetwork Routing, Switching and Carrier Ethernet package for AresONE; Includes BGP4/BGP4+, OSPFv2/v3, ISISv4/v6, RIP/RIPng, EIGRP, BFD, IGMP/MLD/PIM-SM/SSM, LACP/Protocol over LACP, STP/RSTP/MSTP/PVST, GRE and Protocol over GRE, CFM/Y.1731, Link-OAM, PBB-TE, ELMI, 1588v2/SyncE ESMC, Y.1564QT, TWAMP, NTP, LISP; REQUIRES: 930-2201 IxNetwork Basic package for AresONE.
930-2203	IxNetwork MPLS and VPN package for AresONE; INCLUDES: BGP4/BGP4+, OSPFv2/v3, ISISv4/v6, RIP/RIPng, BFD, RSVP-TE/P2MP, LDP/mLDP/LDPv6, L3VPN/6VPE, NgmVPN, PIM-SM/SSM/mVPN, MPLS-TP, MPLS OAM, GRE and Protocol over GRE, LACP/Protocol over LACP; REQUIRES: 930-2201 IxNetwork Basic package for AresONE.
930-2204	IxNetwork SDN package for AresONE; INCLUDES: BGP4/BGP4+, OSPFv2/v3, ISISv4/v6, RIP/RIPng, BFD; EVPN, VXLAN, GENEVE, Segment Routing, BGP-LS, PCEP, BGP SR-TE Policy, BGP FlowSpec, OVSDb, Netconf, BIER, OpenFlow; GRE and Protocol over GRE, LACP/Protocol over LACP; REQUIRES: 930-2201 IxNetwork Basic package for AresONE.
930-2205	IxNetwork Data Center package for AresONE; INCLUDES: BGP4/BGP4+, OSPFv2/v3, ISISv4/v6, RIP/RIPng, BFD; EVPN, VXLAN, GENEVE, OVSDb, DCBX, FCoE, Fabric Path, SPBM, VEPA, TRILL, FCoE QT, IxCloudPerf QT, RFC7747 BGP Convergence QT, LACP/Protocol over LACP; REQUIRES: 930-2201 IxNetwork Basic package for AresONE.
930-2206	IxNetwork Broadband Access and Authentication package for AresONE; INCLUDES: PPPoX/L2TP, DHCPv4/v6, ANCP, IGMP/MLD/IPTV, 802.1x, GRE/Protocol over GRE, LACP/Protocol over LACP, Session Aware Traffic, Service over MPLS, Broadband Control Plane QT, Asymmetric Data Performance QT; REQUIRES: 930-2201 IxNetwork Basic package for AresONE.

Part Number	Description
930-2207	IxNetwork, Encryption Test package for AresONE (930-2207); INCLUDES: MACsec Emulation; REQUIRES: 930-2201 IxNetwork Basic package for AresONE; Recommend with: 930-3461 IxNetwork AppLibrary Slot Bundle, Optional Software, Layer 4-7 Performance Test Application for additional encryption/decryption capability in Static MACsec emulation.
IxSuiteStore Software Option	
930-6001	Ixia IxSuiteStore optional test suite for functional validation of PCS lanes BER, KP4 FEC Bit-error distribution with error insertion and Link stability based on IEEE 802.3bs specification (at 400GE speed only). This software is compatible with the following hardware platforms with the native QSFP-DD 400GE interfaces: K400 QSFP-DD-400GE (944-1152), K400 QSFP-DD-R400GE (944-1153); and all AresONE QSFP-DD and OSFP models: T400GD-8P-QDD (944-1170), T400GDR-8P-QDD (944-1171), T400GD-4P-QDD (944-1172), T400GDR-4P-QDD (944-1173), T400GD-8P-OSFP (944-1174), T400GDR-8P-OSFP (944-1175), T400GD-4P-OSFP (944-1176), T400GDR-4P-OSFP (944-1177).
Passive Copper Point-to-Point Cables	
QSFP-DD-1M-CBL	Ixia, QSFP-DD-to-QSFP-DD 400GE 400GBASE-R passive copper, Direct Attach Cable (DAC), point-to-point cable, 1-meter length (942-0106). This copper DAC is compatible with all K400 QSFP-DD modules: K400 QSFP-DD-400GE (944-1152), K400 QSFP-DD-R400GE (944-1153); and all AresONE QSFP-DD models: T400GD-8P-QDD (944-1170), T400GDR-8P-QDD (944-1171), T400GD-4P-QDD (944-1172), T400GDR-4P-QDD (944-1173), and T400GP-4P-QDD (944-1178).
QSFP-DD-2M-CBL	Ixia, QSFP-DD-to-QSFP-DD 400GE 400GBASE-R passive copper, Direct Attach Cable (DAC), point-to-point cable, 2-meter length (942-0109). This copper DAC is compatible with all K400 QSFP-DD modules: K400 QSFP-DD-400GE (944-1152), K400 QSFP-DD-R400GE (944-1153); and all AresONE QSFP-DD models: T400GD-8P-QDD (944-1170), T400GDR-8P-QDD (944-1171), T400GD-4P-QDD (944-1172), T400GDR-4P-QDD (944-1173), and T400GP-4P-QDD (944-1178).
QSFP-DD-2.5M-CBL	Ixia, QSFP-DD-to-QSFP-DD 400GE 400GBASE-R passive copper, Direct Attach Cable (DAC), point-to-point cable, 2.5-meter length (942-0108). This copper DAC is compatible with all K400 QSFP-DD modules: K400 QSFP-DD-400GE (944-1152), K400 QSFP-DD-R400GE (944-1153); and all AresONE QSFP-DD models: T400GD-8P-QDD (944-1170), T400GDR-8P-QDD (944-1171), T400GD-4P-QDD (944-1172), T400GDR-4P-QDD (944-1173), and T400GP-4P-QDD (944-1178).

Part Number	Description
Passive Copper Fan-Out Cables	
QSFPDD4XQ56-1-5M-CBL	Ixia, QSFP-DD-to-4xQSFP-DD 400GBASE-R Direct Attached Copper cable (DAC), for 400GE to 4x100GE PAM4 fan-out, 1.5 meter length (942-0140). This Direct Attached Copper (DAC) cable is compatible with all K400 QSFP-DD modules: K400 QSFP-DD-400GE (944-1152), K400 QSFP-DD-R400GE (944-1153); and the following AresONE QSFP-DD models: T400GD-8P-QDD (944-1170-06 and later), T400GDR-8P-QDD (944-1171-06 and later), T400GD-4P-QDD (944-1172-05 and later), T400GDR-4P-QDD (944-1173-05 and later) and T400GP-4P-QDD (944-1178). Note: This fanout cable supports PAM4 signaling only.
QSFPDD2XQ56-2-5M-CBL	Ixia, QSFP-DD-to-2xQSFP-DD 400GBASE-R Direct Attached Copper cable (DAC), for 400GE to 2x200GE PAM4 fan-out, 2.5 meter length (942-0141). This Direct Attached Copper (DAC) cable is compatible with all K400 QSFP-DD modules: K400 QSFP-DD-400GE (944-1152), K400 QSFP-DD-R400GE (944-1153); and the following AresONE QSFP-DD models: T400GD-8P-QDD (944-1170-06 and later), T400GDR-8P-QDD (944-1171-06 and later), T400GD-4P-QDD (944-1172-05 and later), T400GDR-4P-QDD (944-1173-05 and later) and T400GP-4P-QDD (944-1178). Note: This fanout cable supports PAM4 signaling only.
Optical Transceivers	
QSFP-DD-LR4-XCVR	IXIA QSFP-DD 400GE 400GBASE-LR4 pluggable optical transceiver, SMF (single mode), 1310 nm, 10 km reach (948-0054). This optical transceiver is compatible with all K400 QSFP-DD modules: K400 QSFP-DD400GE (944-1152), K400 QSFP-DD-R400GE (944-1153); and all AresONE QSFP-DD models: T400GD8P-QDD (944-1170), T400GDR-8P-QDD (944-1171), T400GD-4P-QDD (944-1172), T400GDR-4P-QDD (944-1173), T400GD-4P-QDD (944-1178).

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