

EXFO Verifier

A CRITICAL COMPONENT FOR END-TO-END VISIBILITY



KEY FEATURES AND BENEFITS

Integrated QoS and QoE test capabilities: Test and validate performance from L2 transport to L7 applications through a single EXFO Verifier deployment to deliver superior quality of experience (QoE) visibility. EXFO Active's extensive test catalog includes more than 100 network quality of service (QoS) and user QoE tests, with more than 30% directly measuring QoE.

Scalability: EXFO's EXFO Verifier active test probes are deployed in some of the world's largest communications networks. Capable of supporting the most demanding accuracy needs of today's low-latency networks they lead the world in sheer scalability, supporting upwards of 24 million test sessions per hour distributed across 500,000 endpoints tested and only 32 EXFO Verifiers.

Flexible deployment options: Mix and match physical (PNF), virtual (VNF), container (CNF) and embedded software EXFO Verifiers to provide complete orchestrated or standalone coverage from physical to cloud, user edge to core.

Orchestrate and automate: Automate the delivery, instantiation and operation of virtual and container-based EXFO Verifiers through a rich set of APIs for zero-touch operation. Facilitating direct orchestration in Kubernetes environments, the EXFO μ -Verifier can be deployed using a Yang configuration model, ideal for assuring dynamic services and network slices.

Centralized management: The EXFO Worx platform is a scalable solution to manage the lifecycle of thousands of EXFO Verifiers remotely including software updates, configuration and functional state.

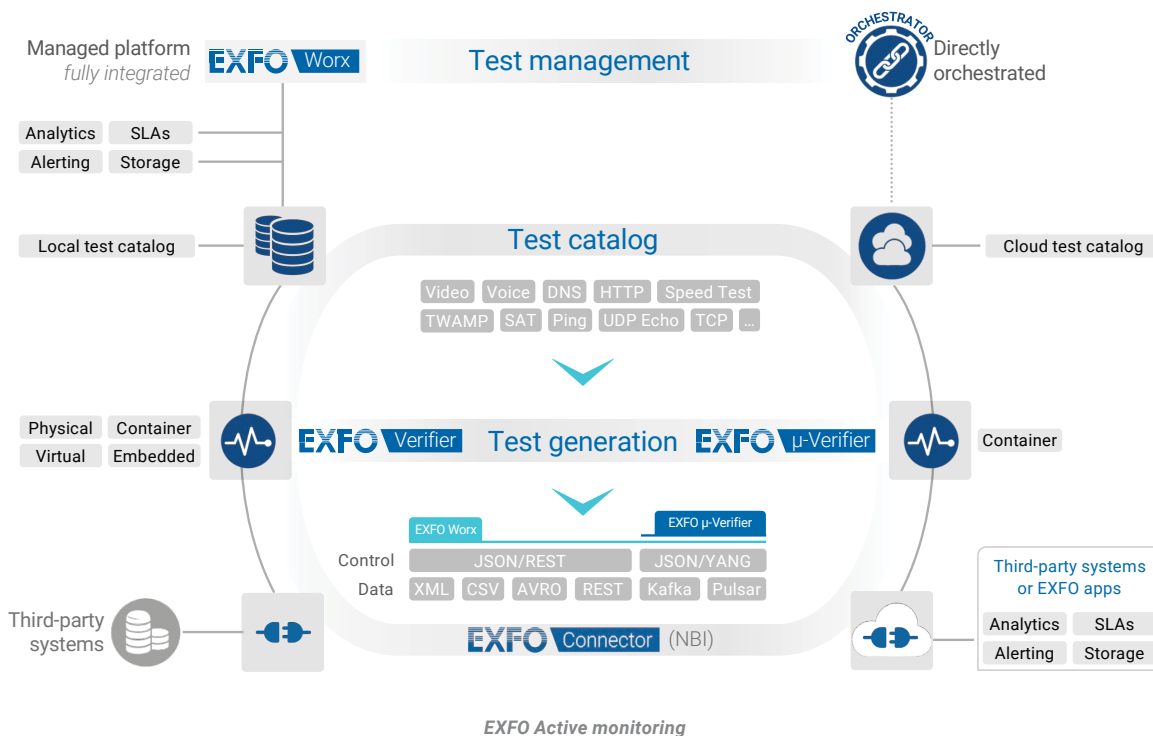
Full line-rate performance: Perform service activation and throughput testing with physical EXFO Verifiers leveraging powerful FPGA acceleration or software EXFO Verifiers leveraging SR-IOV and DPDK to achieve full line rate traffic generation.

Streaming analytics: Use Kafka or Pulsar to live-stream monitoring results to real-time and big data analytics platforms. EXFO Verifier monitoring results can also be analyzed by EXFO ASA Platform to instantly detect abnormal events in live monitoring data streams, speeding up the task of identifying faults. This combination can detect the silent faults often related to 'no fault found' conditions, while eliminating the sea of alarms typical in today's operations centers.

EXFO ACTIVE MONITORING

EXFO Active assurance delivers the most scalable, integrated QoS and QoE monitoring available—critical to delivering a flawless customer experience over dynamic, virtualized networks and services. It allows operators to instantly detect, diagnose and resolve issues impacting data, voice, streaming video and IoT services.

The EXFO Verifier family of test probes execute active test sequences that measure end-to-end and segmented performance across all layers of the service, and provide an accurate view of the delivered quality of service and experience. EXFO Verifiers can combine multiple tests to accurately pinpoint degradation and faults within the infrastructure, transport, service and application layers—accelerating the troubleshooting of faults and isolating potential issues.

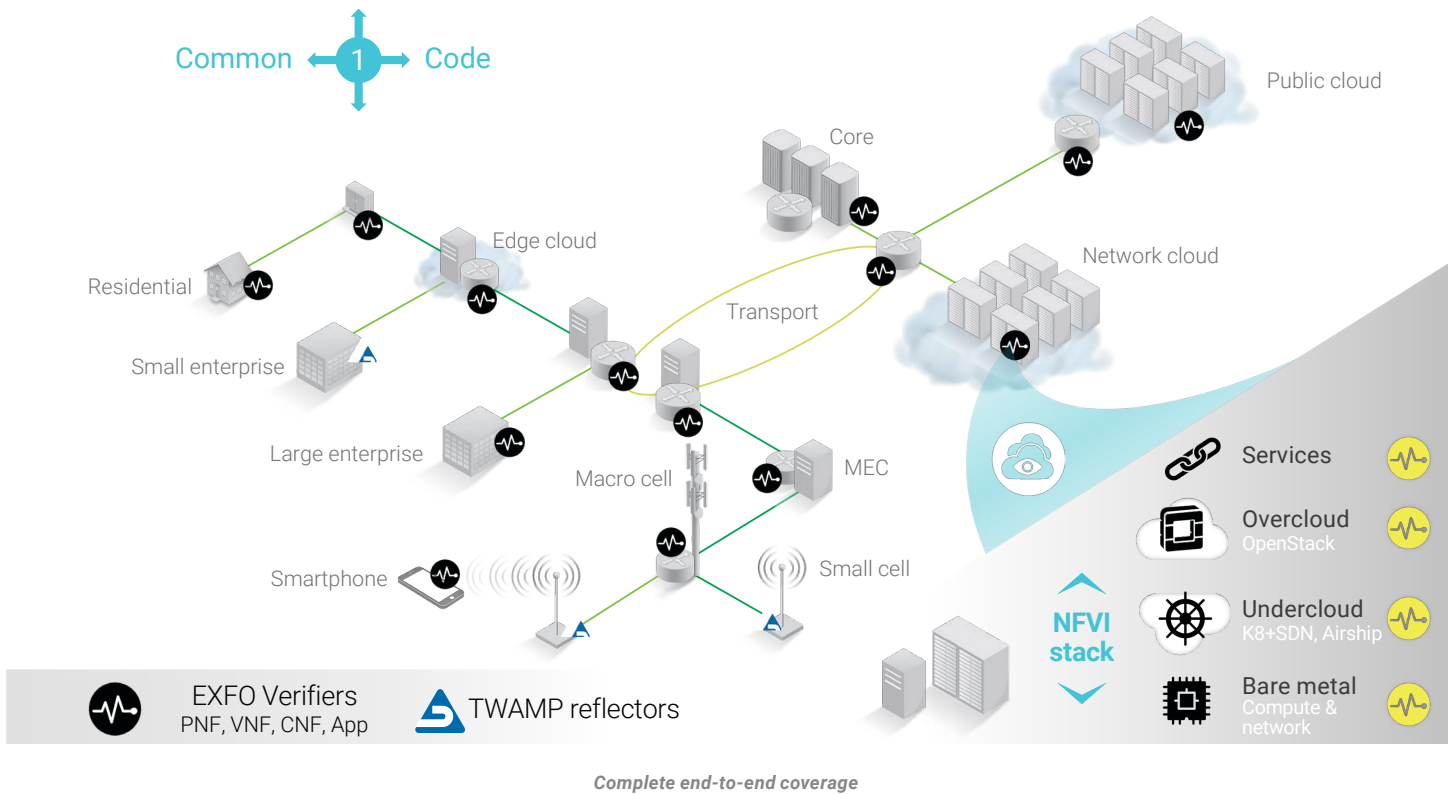


EXFO VERIFIERS

Built on a unified software platform, EXFO Verifiers are available in physical, virtual, container and embedded versions, covering not just the traditional network infrastructure, but also orchestrated network slices and edge compute locations, and devices themselves. Sharing a common code base means tests can be executed consistently end-to-end across hybrid infrastructure. Real-time streaming connectors provide native integration into existing big-data environments.

The EXFO Verifier engine executes all the tests from a common catalog of over 100 different performance tests covering layers L2-L7. EXFO Verifiers can execute multiple tests concurrently, combining different tests to provide visibility of performance at multiple layers simultaneously.

The physical, virtual, container and embedded software-based EXFO Verifiers are managed by EXFO's element management system, EXFO Worx. EXFO Verifiers maintain a secure and encrypted communication channel which guarantees the integrity and security of the test process and collected metrics.



SOFTWARE PROBES

EXFO Verifier containerized network function (CNF)

The EXFO Verifier containerized network function (CNF) is a lightweight software agent, designed for deployment in non-hypervisor environments. EXFO Verifier CNF is available as a simple software package which can be downloaded and installed on a host of environments. Once deployed, it provides the ability to run L2 to L7 performance testing and help gain visibility from the installed platform.

SPECIFICATIONS	
Minimum resource requirements	<ul style="list-style-type: none"> • 64 MB RAM • 50 MB storage
Architecture	x86, x86-64
Compatibility	32 bit and 64 bit x86 architecture
Supported OS	<ul style="list-style-type: none"> • Ubuntu • CentOS/RHEL
Available packages	<ul style="list-style-type: none"> • OpenWRT (.opk, x86) • Ubuntu (.deb, x86-64) • CentOS/RHEL (.rpm, x86-64) • Docker (x86-64)
Public cloud	<ul style="list-style-type: none"> • Amazon AWS • Google GCP • Microsoft Azure

EXFO Verifier virtual network function (VNF)

The EXFO Verifier virtual network function (VNF) is built as an VNF package. It is built as an extensible VNF package which can be deployed in hypervisor environments to provide L2 to L7 visibility. Available as an ETSI VNF, EXFO Verifier VNF can be integrated into a NFVI VNF catalog to be deployed via an orchestrator.

SPECIFICATIONS		
Minimum resource requirements	<ul style="list-style-type: none"> • 1x vCPU • 512 MB RAM • 2 GB storage • Openstack small flavor 	
Virtualization support	NFV/SDN/NFVI: <ul style="list-style-type: none"> • Openstack • VMware ESXi 	Hypervisors: <ul style="list-style-type: none"> • KVM • QEMU • VirtualBox • VMware ESXi
Available formats	<ul style="list-style-type: none"> • VMDK Image • QCOW2 	
Processor supported	x86-64	
Accelerated technologies	<ul style="list-style-type: none"> • SR-IOV • DPDK for Y.1564 	

PHYSICAL PROBES

EXFO Verifier physical network function (PNF) probes are dedicated physical appliances, designed for guaranteed performance. They combine a powerful computer platform with FPGA-based acceleration to deliver line rate traffic generation capability and active tests scalability.

Available in a range of sizes, interface rates and compute resources, EXFO Verifier PNFs are designed to adapt to any scenario. Physical Verifiers can be used to deliver end-to-end service activation testing, performance measurements and segmentation from high speed cores to subscriber edge locations through a wide variety of physical interface rates.

SPECIFICATIONS			Test interfaces	10/100/1000 Mbit/s	1GbE (SFP)	10GbE (SFP28)	Dedicated management	1588v2 PTP	FPGA
BV-110	Edge scale verifier	Complete L2-L7 performance visibility and assurance from a compact format.	2	•	•			•	•
NV-40B	Core-scale verifier	Powerful FPGA with scalable hardware platform, guaranteed throughput.	2	•	•	•	•	•	•

COTS HARDWARE PROBES

EXFO Verifier physical COTS probes combine a certified hardware base with EXFO Verifier CNF or EXFO Verifier VNF probes for the best all-around cost to performance value. Built using proven and reliable hardware components, the COTS hardware platform offers user upgradeability for all platforms. Standard SO-DIMM RAM modules or ECC RDIMM/LRDIMM are used on EXFO's COTS hardware probes to offer great upgrade path for all models.

SPECIFICATIONS						
	10/100/1000 Mbit/s	1GE/ 10GE	100GE	PCI passthrough support	SR-IOV support	RAM module
NV-10B	4			•		DDR3L SODIMM (2 GB max)
NV-20A	4	2 (SFP+)	2 (SFP+)	•		DDR4 SODIMM (8 GB max)
NV-40A	4	4 (SFP+)		•	•	DDR4 SODIMM (32 GB max)
NV-50A	4	2 (SFP+)	2 (QSFP28)	•	•	DDR4 SODIMM (64 GB max)
NV-60A	4	2 (SFP+)	2 (QSFP28)	•	•	DDR4 SODIMM (128 GB max)

TEST AND MONITORING SPECIFICATIONS					
		Software probes ^a		Physical probes (EXFO Verifier PNF)	
		EXFO Verifier CNF	EXFO Verifier VNF	BV-110	NV-40B
Reflectors	Smart loopback			•	•
	TWAMP responder (light/full)	•	• ^b	•	•
	Ethernet reflector test	•	•	•	•
	NTP passive test		•	•	•
	TCP echo	•	•	•	•
	UDP echo	•	•	•	•
	POLQA		•		•
	PESQ			•	•
Throughput tests	Y.1564 service activation (L2-L4)	•	•	•	•
	RFC-2544 (L2-L4) service activation			•	•
	RFC-6349 (TCP performance)		•		•
	iPERF	•	•	•	•
L2/L3 QoS tests	L2 Y.1731 SOAM-PM	•	•	•	•
	L3 RFC-5357 TWAMP	•	•	•	•
	UDP, TCP echo	•	•	•	•
IP services	ICMP ping/traceroute	•	•	•	•
	FTP	•	•	•	•
	NTP	•	•	•	•
	Email performance	•	•	•	•
	HTTP/HTTPS	•	•	•	•
	DNS	•	•	•	•
	DHCP	•	•	•	•
VoIP and video infrastructure and media	SIP VoIP (signalling, media)	•	•	•	•
	VoIP gateways	•	•	•	•
	IPTV video	•	•	•	•
Mobile services and infrastructure	VoLTE	•	•	•	•
	Diameter	•	•	•	•

a. NV-10B supports EXFO Verifier CNF features. NV-20A, NV-40A, NV-50A and NV60A supports EXFO Verifier VNF features.

b. Available when DPDK is enabled.

PHYSICAL PROBE SPECIFICATIONS

EXFO Verifier BV-110



GENERAL SPECIFICATIONS

Size (H x W x D) 35 mm x 205 mm x 192 mm (1 3/8 in x 8 1/16 in x 7 9/16 in)

Weight AC version: 1.4 kg (3 lb)
DC version: 1.4 kg (3.1 lb)

Temperature Operating 0 °C to 50 °C (32 °F to 122 °F)
Storage -40 °C to 70 °C (-40 °F to 158 °F)

Relative humidity 90 % non-condensing

Operating altitude 4 000 m (13 000 ft)

Optional 19-inch rack mount kit Supports 1 or 2 BV-110 side-by-side in a 1RU space

AC power adapter

Temperature Operating -20 °C to 70 °C (-4 °F to 158 °F)
Storage -20 °C to 80 °C (-4 °F to 176 °F)

Relative humidity Operating 20 % to 80 % non-condensing
Storage 10 % to 95 % non-condensing

Operating altitude 2 000 m (6 562 ft)

POWER

AC power adapter 100 - 240 V ~; 50-60 Hz; 2.5 A

DC power -48 - -60 V ---; 0.75 A

INDICATORS AND INTERFACES

Two Ethernet test ports Each combo port includes:
• 1 Gbit/s fiber SFP interface
• 10/100/1000 bit/s RJ45 interface
• Link and activity LEDs
• In-band management

Console port Yes

AC or dual feed DC power Yes

Power status LED Yes

REGULATORY

EMC EN 61326-1, FCC 47 CFR Part 15 Subpart B, ICES-001

Safety IEC/EN CSA/UL 61010-1

Certification marks CE, cNus

NV-40B



GENERAL SPECIFICATIONS

Size (H x W x D)	43 mm x 435 mm x 707 mm (1 11/16 in x 17 1/8 in x 27 13/16 in)
Weight	16.3 kg (35.9 lb)
Temperature	Operating: 5 °C to 45 °C (41 °F to 113 °F) Storage: -30 °C to 60 °C (-22 °F to 140 °F)
Relative humidity	Operating: 5 % to 93 % non-condensing Storage: 5 % to 93 % non-condensing
Operating altitude	61 m (200 ft) to 3960 m (13000 ft)
Rackmount	1U (for 19-inch rackmount)

POWER

AC power	100 - 240 V ~; 50/60 Hz; 2.4 A
DC power	-48 V ---; 5 A

INDICATORS AND INTERFACES

Network	<p>Controllers:</p> <ul style="list-style-type: none"> • 1x Intel® 1350-T4 • 1 x fb2CGhh@KU15P 100G Dual FPGA <p>Connectors:</p> <ul style="list-style-type: none"> • 4x 10/100/1000BASE-T RJ45 ports • 2x 100G QSFP28 (2x QSFP28 to SFP28 (10GbE) adapter embedded for turn-up testing)
Processor	Intel® Xeon Silver 4210 (2.2 GHz / 10-core / 85 W)
RAM	32 GB (2x 16 GB DDR4)
Disk	1x 480 GB SATA 6G mixed use SFF SC multi-vendor SSD
Console port (DB9)	Yes
ILO port	Yes
AC or dual feed DC power	Yes
System status LED (green/amber)	Yes

REGULATORY

EMC	EN 55032, EN 55035 and EN 300 386, FCC 47 CFR Part 15 Subpart b, ICES-003
Safety	IEC/EN CSA/UL 62368-1
Certification marks	CE, cULus, UKCA
NEBS	Level 3 certified

COTS PROBE SPECIFICATIONS

NV-10B



GENERAL SPECIFICATIONS

Size (H x W x D)	21 mm x 152 mm x 125 mm ($1^{3/16}$ in x 6 in x $4^{15/16}$ in)
Weight	0.7 kg (1.5 lb)
Temperature	Operating: 0 °C to 40 °C (32 °F to 104 °F) with 0.7 m/s air flow Storage: -40 °C to 85 °C (-40 °F to 185 °F)
Relative humidity	95 % non-condensing

POWER

AC power adapter	<ul style="list-style-type: none"> • Input: 100 - 240 V \sim ; 50/60 Hz • Output: 12 V --- ; 3 A
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INDICATORS AND INTERFACES

Network	<ul style="list-style-type: none"> • 4x Intel® i211-AT controller • 4x 10/100/1000BASE-T RJ45 port
Console port	Yes
LED indicator	Power, HDD, software-defined status

REGULATORY

EMC	EN 55032 and EN 55035, FCC 47 CFR Part 15 Subpart B, ICES-003, GB/T 9254
Safety	IEC/EN CSA/UL 62368-1, IEC 60950-1, GB 4943.1
Certification marks	CE, cULus, FCC, CCC

NV-20A



GENERAL SPECIFICATIONS

Size (H x W x D)	44 mm x 220 mm x 160 mm (1 ³ / ₁₆ in x 8 ¹¹ / ₁₆ in x 6 ⁵ / ₁₆ in)
Weight	2.3 kg (5 lb)
Temperature	Operating Storage
	-20 °C to 60 °C (-4 °F to 140 °F) with 0.7 m/s air flow -40 °C to 85 °C (-40 °F to 185 °F)
Relative humidity	95 % non-condensing

POWER

AC power adapter	<ul style="list-style-type: none"> • Input: 100 - 240 V ~ ; 50/60 Hz • Output: 12 V --- ; 3 A
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INDICATORS AND INTERFACES

Network	<p>Controllers:</p> <ul style="list-style-type: none"> • Intel® SoC MAC • 1x Marvell 88E1543 PHY • 2x Intel® i211 <p>Connectors:</p> <ul style="list-style-type: none"> • 4x 10/100/1000BASE-T RJ45 ports • 2x 10G/1G SFP+
Console port	Yes
LED indicator	<ul style="list-style-type: none"> • 2x fixed LED: power, HDD • 2x software-defined status • 2x SFP LED: SFP1, SFP2

REGULATORY

EMC	EN 55032 and EN 55035, FCC 47 CFR Part 15 Subpart B, ICES-003, GB/T 9254
Safety	IEC/EN CSA/UL 62368-1, IEC 60950-1, GB 4943.1
Certification marks	CE, cULus, FCC, CCC

NV-40A



GENERAL SPECIFICATIONS

Size (H x W x D)	43 mm x 435 mm x 707 mm (1 11/16 in x 17 1/8 in x 27 13/16 in)
Weight	16.3 kg (35.9 lb)
Temperature	Operating: 5 °C to 40 °C (41 °F to 104 °F) Storage: -40 °C to 70 °C (-104 °F to 158 °F)
Relative humidity	Operating: 5 % to 93 % non-condensing Storage: 5 % to 93 % non-condensing
Operating altitude	61 m (200 ft) to 3960 m (13000 ft)
Rackmount	1U (for 19-inch rackmount)

POWER

AC power	100 - 240 V ~; 50/60 Hz; 2.4 A
DC power	-48 V ---; 5 A

INDICATORS AND INTERFACES

Network	<p>Controllers:</p> <ul style="list-style-type: none"> • 1x Intel® 1350-T4 • 2x Intel® x710-DA2 <p>Connectors:</p> <ul style="list-style-type: none"> • 4x 10/100/1000BASE-T RJ45 ports • 4x 10G SFP+
Processor	Intel® Xeon Silver 4210 (2.2 GHz / 10-core / 85 W)
RAM	32 GB (2x 16 GB DDR4)
Disk	1x 480 GB SATA 6G mixed use SFF SC multi-vendor SSD
Console port (DB9)	Yes
AC or dual feed DC power	Yes
System status LED (green/amber)	Yes
ILO port	Yes

REGULATORY

EMC	EN 55032, EN 55035 and EN 300 386, FCC 47 CFR Part 15 Subpart b, ICES-003
Safety	IEC/EN CSA/UL 62368-1
Certification marks	CE, cULus, UKCA
NEBS	Level 3 certified

NV-50A



GENERAL SPECIFICATIONS

Size (H x W x D)	43 mm x 435 mm x 707 mm (1 11/16 in x 17 1/8 in x 27 13/16 in)
Weight	16.3 kg (35.9 lb)
Temperature	Operating: 5 °C to 40 °C (41 °F to 104 °F) Storage: -40 °C to 70 °C (-104 °F to 158 °F)
Relative humidity	Operating: 5 % to 93 % non-condensing Storage: 5 % to 93 % non-condensing
Operating altitude	61 m (200 ft) to 3960 m (13000 ft)
Rackmount	1U (for 19-inch rackmount)

POWER

AC power	100 - 240 V ~ ; 50/60 Hz; 2.4 A
DC power	-48 V --- ; 5 A

INDICATORS AND INTERFACES

Network	<p>Controllers:</p> <ul style="list-style-type: none"> • 1x Intel® 1350-T4 • 2x Intel® x710-DA2 • 1x Mellonex 841QSFP28 <p>Connectors:</p> <ul style="list-style-type: none"> • 4x 10/100/1000BASE-T RJ45 ports • 4x 10G SFP+ • 2x 100G QSFP28
Processor	Intel® Xeon Gold 6230 (2.1 GHz / 20-core / 125 W)
RAM	64 GB (4x 16 GB DDR4)
HDD	1.2 TB (2x 600GB SAS 12G)
ILO port	Yes
AC or dual feed DC	Yes
System status LED (green/amber)	Yes

REGULATORY

EMC	EN 55032, EN 55035 and EN 300 386, FCC 47 CFR Part 15 Subpart b, ICES-003
Safety	IEC/EN CSA/UL 62368-1
Certification marks	CE, cULus, UKCA
NEBS	Level 3 certified

NV-60A



GENERAL SPECIFICATIONS

Size (H x W x D)	43 mm x 435 mm x 707 mm (1 11/16 in x 17 1/8 in x 27 13/16 in)
Weight	16.3 kg (35.9 lb)
Temperature	Operating: 5 °C to 40 °C (41 °F to 104 °F) Storage: -40 °C to 70 °C (-104 °F to 158 °F)
Relative humidity	Operating: 5 % to 93 % non-condensing Storage: 5 % to 93 % non-condensing
Operating altitude	61 m (200 ft) to 3960 m (13000 ft)
Rackmount	1U (for 19-inch rackmount)

POWER

AC power	100 - 240 V ~ ; 50/60 Hz; 2.4 A
DC power	-48 V --- ; 5 A

INDICATORS AND INTERFACES

Network	<p>Controllers:</p> <ul style="list-style-type: none"> • 1x Intel® 1350-T4 • 2x Intel® x710-DA2 • 1x Mellonex 841QSFP28 <p>Connectors:</p> <ul style="list-style-type: none"> • 4x 10/100/1000BASE-T RJ45 ports • 4x 10G SFP+ • 2x 100G QSFP28
Processor	Intel® Xeon Gold 6212U (2.4 GHz / 24-core / 165 W)
RAM	128 GB (8x 16 GB DDR4)
HDD	2.4 TB (4x 600 GB SAS 12G)
ILO port	Yes
AC or dual feed DC power	Yes
System status LED (green/amber)	Yes

REGULATORY

EMC	EN 55032, EN 55035 and EN 300 386, FCC 47 CFR Part 15 Subpart b, ICES-003
Safety	IEC/EN CSA/UL 62368-1
Certification marks	CE, cULus, UKCA
NEBS	Level 3 certified

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