

Xcompass-S Series

Impairment and Network Emulation





CHALLENGE

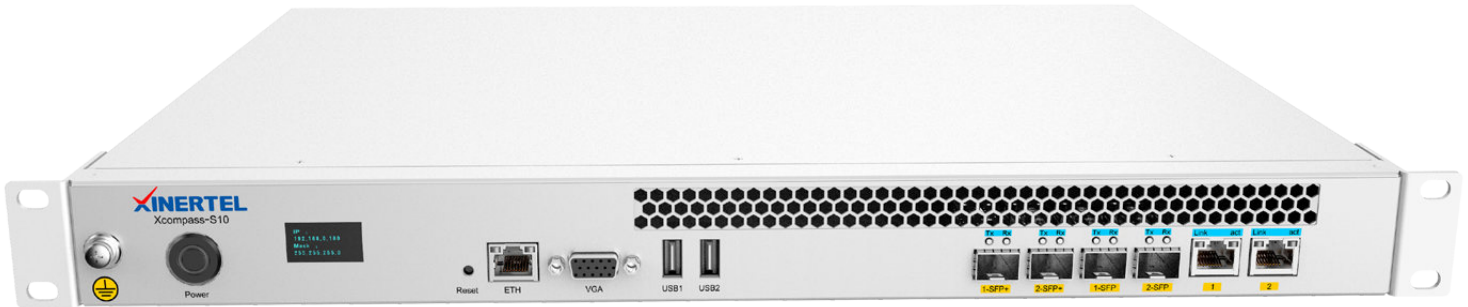
In this fast-evolving network era, new technologies and diverse applications are reshaping our lives, but they are not without their flaws. Accidents can happen during end-to-end transmission, which involves different physical environments, links, and transmission or network devices, resulting in impairments and data loss. Emulating network impairment in labs and verifying the performance of network devices and applications in the real world is a significant challenge.

SOLUTION

The Xinertel Xcompass-S Series Impairment and Network Emulation are uniquely designed to capture latency, jitter, packet loss, out-of-order packets, packet duplication, and error packets with nano-level accuracy, thanks to their FPGA architecture and 100% line-rate capacity. This enables them to validate the maximum performance of network devices and applications and provide a solid foundation for optimization.

As a result, our clients can benefit greatly from lower costs and a safer network.

Xcompass-S10 Impairment and Network Emulation



Key Features

- ▶ Support for a variety of ports including native 10GbE/1GbE, 10/100/1000M, RJ45/100M/1000M SFP, and 10GbE SFP+.
- ▶ 100% line-rate capacity based on FPGA architecture.
- ▶ Nano-level accuracy in measuring latency and jitter impairment.
- ▶ Emulation of packet loss, out-of-order packets, packet duplication, and error packets.
- ▶ Inclusion of physical link impairment.
- ▶ High-precision impairment loadings to ensure repetitive and authentic tests.
- ▶ Comprehensive statistical items for clear and detailed impairment reports.
- ▶ Web-based GUI that eliminates the need for an additional client APP.
- ▶ Support for Python API, providing added flexibility.

Xcompass-S10 Impairment and Network Emulation Specification

Hardware and Electrical Characteristics

Port rate	Optical: 1000M/10GbE; Copper: 1000M
Port density	2*1000M RJ45, 2* 1000M SFP and 2* 10G SFP+ optical
Interface standard	10M/100M/1000M copper (RJ45), 100M/1000M optical (SFP) and 10GbE optical (SFP+)
Port occupancy	Occupied by port group, i.e. 1000M RJ45, 1000M SFP and 10GSFP+ optical
Weight (kg)	6
Size (W×H×D)	438mm x 54mm x 273mm (17.2ins x 2.1ins x 10.7ins)

Xcompass-S10 Impairment and Network Emulation Specification

Operating temperature range	Work: 32°F to 95°F (0°C to 35°C) Storage: -40°F to 158°F (-40°C to 70°C)
Working relative humidity	Work: 20% to 85% Storage: 20% to 85%
Connectors	1 RJ45 10/100/1000M Base-T management port, 1 VGA port, 2 Type-A USB2.0 ports, 1 LCD display, 2 SFP+ ports, 2 SFP ports and 2 RJ45 ports
Indicators and controls	Front AC power
Chassis power	1-channel 220 V (1±10%) and 50 (1±5%) Hz
Maximum power supply (W)	100 W
Time accuracy	5ns
Internal clock	Stratum-3, +4.6ppm
Impairment	
Stream filter	Filter mode: basic filter and advanced filter (support eight 6-byte filter fields) Filter rule: filter by bytes, MAC address, IP address, frame protocol and port number Operation rule: and/or/not
Latency	Max. latency at full line rate: 800s (10M), 80s (100M), 8s (1000M) and 800ms (10GbE) Intrinsic latency with frame length: <ul style="list-style-type: none"> 1518B-12000B: 1ms (100M), 100us (1000M), 15us (10GbE) 200B-1518B: 150us (100M), 20us (1000M), 4us (10GbE) ≤ 200B: 30us (100M), 6us (1000M), 2us (10GbE)
Jitter	Model: fixed jitter value, Gaussian distribution, gamma distribution and step waveform Mode: Single and duplicate Time: Single frame and time window (range: 100-1638300ns; precision: 0.1us)
Out-of-order packets	Mode: single and cyclic Depth range: 1-32 frame
Maximum available bandwidth	<ul style="list-style-type: none"> 0-1000Mbps (10M/100M/1000M RJ45 port or 100M/1000M SFP port) 0-10Gbps (10GbE SFP+ port)
Packet loss rate	Mode: single, burst, proportion (0.00001%-99.99999%), continual, Poisson and Bernoulli Burst loss range: 0-10000 frame Loss cycle: 0-10.000s for impairment range, 0-600.000s for duplication and 0.001s for step User-defined data: 32-320000 with 32 as the unit Burst loss by proportion: proportion 1-99, 1-320 bursts and optional duplication Enhanced burst loss by proportion: proportion 1-99, 1-250 bursts and optional duplication

Xcompass-S10 Impairment and Network Emulation Specification

Frame duplication	Mode: single, burst, proportion (0.00001%-99.99999%) and continual Burst duplication range: 0-10000 frame Duplication cycle: 0-600.0s with impairment range of 0-10.0s and 0.1s step
Tampering	Tampered or replaced fields: any of the first 256 bytes in a frame
Packet corruption	Type: CRC error, IPv4 validation and error Mode: single, burst, continual, proportion (0.00001%-99.99999%) Burst impairment range: 0-10000 frame Impairment cycle: continual, by time slot (0.1-10.0s, step: 0.1s), and by cyclic time slot (time slot: 0.1s-10.0s, cycle: 0-600.0s and step: 0.1s)
Physical link impairment	Type: Lead code error Mode: Single, burst, continual, proportional (0.00001%-99.99999%) Burst impairment range: 0-10000 frame Duplication cycle: 0-600.0s with impairment range of 0-10.0s and 0.1s step
network configuration	8 impairment application scenarios, allowing independent configuration of 16 streams (8 two-way) impairment
Transmission of Data Frame	
Max frames per port	64 frames
Frame length (bytes)	64 Byte-1518 Byte (CRC excluded)
Transmission mode	Sequence, random, reverse sequence, suspension or restart
Configurable Transmission Duration	0-2 ³² times (0 indicates cyclic sending)
Minimum Inter-Packet Gap	Minimum 8 bytes
Data Statistics	
Statistical item	Total frames, total bytes, byte rate, frame rate, Pause frames, broadcasts, VLAN, QinQ, ARP, MPLS, CRC error packets, Undersize, Oversize, Jumbo, Fragment, Jabber, IPv4, IP length error packets, IPv4 header validation, IPv6, TCP, UDP, ICMP, Merge package loss, UDP header validation and TCP header validation.
Data Frame Capture	
Capture type	Filter capture by filter template 64-16383 byte capture with CRC

Xcompass-S100 Impairment and Network Emulation



Xcompass-S100 supports native QSFP28 100GbE port and 100GbE/40GbE/25GbE/10GbE rates.

Key Features

- ▶ Support for native 100GbE QSFP28 port.
- ▶ Support for multiple rates including 100GbE/40GbE/25GbE/10GbE.
- ▶ 100% line rate capacity based on FPGA structure.
- ▶ Port-based emulation of fiber flash and optical link control.
- ▶ Nano-level accuracy in measuring latency and jitter impairment.
- ▶ Emulation of packet loss, out-of-order packets, packet duplication, and error packets.
- ▶ High-precision impairment loadings to ensure repetitive and authentic tests.
- ▶ Comprehensive statistical items for clear and detailed impairment reports.
- ▶ Web-based GUI that eliminates the need for an additional client APP.
- ▶ Support for Python API for added flexibility.

Xcompass-S100 Impairment and Network Emulation Specification

Hardware and Electrical Characteristics

Port rate	Optical: 10GbE/25GbE/40GbE/100GbE
Port intensity	2
Interface standard	QSFP28
Port occupancy	Occupied by port type and group
Weight (kg)	6

Xcompass-S100 Impairment and Network Emulation Specification

Size (W×H×D)	438mm x 54mm x 400mm (17.2ins x 2.1ins x 15.7ins)
Operating temperature range	Work: 32°F to 95°F (0°C to 35°C) Storage: -40°F to 158°F (-40°C to 70°C)
Working relative humidity	Work: 20% to 85% Storage: 20% to 85%
Connectors	1 RJ45 10/100/1000M Base-T management port, 1 micro HDMI port, 2 Type-A USB2.0 ports, 1 LCD display and 2 QSFP28 ports
Indicators and controls	Front power switch
Chassis power	1-channel 220 V (1±10%) and 50 (1±5%) Hz
Maximum power supply (W)	100 W
Time accuracy	5ns
Internal clock	Stratum-3, +4.6ppm
Impairment	
Stream filter	Filter mode: basic filter and advanced filter (support eight 6-byte filter fields) Filter rule: filter by bytes, MAC address, IP address, frame protocol and port number Operation rule: and/or/not
Latency	Max. latency at full line rate: 800ms (10GbE), 320ms (25GbE), 200ms (40GbE), 80ms (100GbE)
Jitter	Model: fixed jitter value, Gaussian distribution, gamma distribution and step waveform Mode: Single and duplicate Time: Single frame and time window (range: 100-1638300ns; precision: 0.1us)
Out-of-order packets	Mode: single and cyclic Depth range: 1-32 frame
Maximum available bandwidth	0-1000Gbps
Packet loss rate	Mode: single, burst, proportion, continual, Poisson, Bernoulli Burst loss range: 0-10000 frame Proportion range: 0.00001%-99.99999% Loss cycle: 0-10.000s for impairment range, 0-600.000s for duplication and 0.001s for step User-defined data: 32-320000 with 32 as the unit Burst loss by proportion: proportion 1-99, 1-320 bursts and optional duplication Enhanced burst loss by proportion: proportion 1-99, 1-250 bursts and optional duplication

Xcompass-S100 Impairment and Network Emulation Specification

Frame duplication	Mode: single, burst, proportion and continual Burst duplication range: 0-10000 frame Proportion range: 0.00001%-99.99999% Duplication cycle: 0-600.0s with impairment range of 0-10.0s and 0.1s step
Tampering	Tampered or replaced fields: any of the first 256 bytes in a frame
Packet corruption	Type: CRC error, IPv4 validation and error Mode: single, burst, continual, proportion Burst impairment range: 0-10000 frame Proportion range: 0.00001%-99.99999% Impairment cycle: 0-600.0s with impairment range of 0-10.0s and 0.1s step
Queue depth	32K-32M
network configuration	8 impairment application scenarios, allowing independent configuration of 16 streams (8 two-way) impairment
Function area	Physical link that enables link flash, disconnection/recovery operations
Transmission of Data Frame	
Max frames per port	64 frames
Frame length (bytes)	64 Byte-1518 Byte (CRC excluded)
Transmission mode	Sequence, random or reverse sequence
Configurable Transmission Duration	0-2 ³² times (0 indicates cyclic sending)
Minimum Inter-Packet Gap	100GbE/40GbE/25GbE support for 12Byte-31Byte, and 10GbE support for 8Byte-31Byte
Data Statistics	
Statistics by port	Total frames, total bytes, byte rate, frame rate, Pause frames, broadcasts, VLAN, QinQ, ARP, MPLS, CRC error packets, Undersize, Oversize, Jumbo, Fragment, Jabber, IPv4, IP length error packets, IPv4 header validation, IPv6, TCP, UDP, ICMP, Merge package loss, UDP header validation, TCP header validation.
Statistics by template	Template frames, packet loss frames, out of order, frame duplication, replication/replacement, FCS, Checksum, input/output FPS under bandwidth limit, input/output byte rate under bandwidth limit, Shaper input/output FPS, Shaper input /output byte rate, Shaper Oversized frames
Data Frame Capture	
Capture type	Filter capture by filter template 64-16383 byte capture with CRC
PDV capture	Single or cyclic impairment capture with a capacity of 64K and support for the last four messages in cyclic capture.