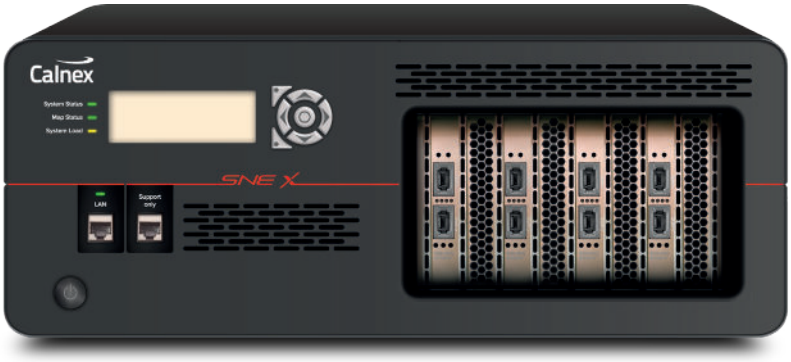
Calnex **SNE–X**

High Precision, Cost-effective Network Emulation

Test with real-world network conditions in your lab

The Calnex SNE-X is a multi-port, high-performance network emulator designed to drive product/application quality and reduce the cost of test with rigorous, scaleable test capability. The Calnex SNE-X offers:

- **Up to 28 ports** – allows network impairment of hundreds of packet streams simultaneously.
- **1 to 100GbE wire rate** – for emulating network conditions experienced by 5G services and applications.
- **Low intrinsic latency** – maximum intrinsic latency of 20µs is ideal for simulating throughput-sensitive applications.
- **High performance backplane** – allows simultaneous testing with “Any Port to Any Port”™.



The SNE–X provides industry-leading flexibility in building and modelling complex, real-life systems enabling you to simulate networks and emulate the real-world conditions under which applications and platforms need to perform.

Applications

The SNE-X is a total solution to the problem of real-world Ethernet testing. It combines comprehensive and efficient network emulation for:

5G

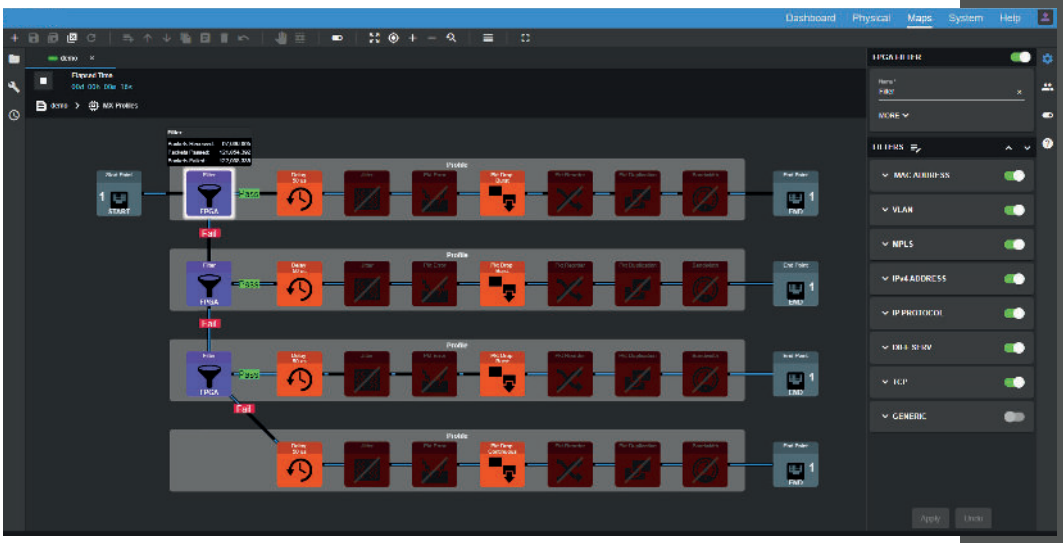
- Mobile Edge Computing
- Backhaul
- Midhaul
- Services (AR/VR, V2X etc)

Data Center

- Interconnect
- Management
- Migration

Cloud

- Infrastructure
- Application testing
- Device testing



The flexible Web UI enables you to drag and drop from the extensive list of impairments into your network “map” to create a range of impairment scenarios that can run simultaneously for fast, high-volume test.

Technical Specifications	PRODUCT RANGE 1G	10G	25G	50G	100G
Physical					
Network Interfaces	up to 28	up to 28	up to 16	up to 8	up to 8
Standard Network Interfaces	GbE Copper	SFP+	SFP28	QSFP28	QSFP28
Optional Network Interfaces	RJ45	SFP+	SFP28	QSFP28	QSFP28
Max. Packet Rate Per Port (bi-directional)	TBD	TBD	TBD	TBD	TBD
Dimensions	4u Rack	4u Rack	4u Rack	4u Rack	4u Rack
Intrinsic Latency	<20µs	<20µs	<20µs	<20µs	<20µs
Max. Frame Size — Jumbo Mode 9219 bytes; Non-jumbo Mode 1542 bytes	✓	✓	✓	✓	✓
General					
Timing Precision	10µs	10µs	10µs	10µs	10µs
Any Port to Any Port™ Packets can be sent between any port for complete flexibility	✓	✓	✓	✓	✓
Live Changes — Real-time modification of any impairment setting	✓	✓	✓	✓	✓
Traffic Capture and Replay with Looping Option					
Volatile Storage (20G RAM)	✓	✓	✓	✓	✓
Non-volatile Storage (1TB SSD)*	optional	optional	optional	optional	optional
*Max Traffic Capture Rate 1Gb/s					
Bi-directional, Independent Emulations	✓	✓	✓	✓	✓
Timeline — Schedule changes to emulation settings with no manual intervention required. Option: loop timeline for continuous playback	✓	✓	✓	✓	✓
Link Flap	✓	✓	✓	✓	✓
Delay Emulation — up to 4s at 25GbE; up to 4s at 10GbE; up to 10s at 1GbE; up to 30s (all rates at reduced bandwidth)					
1GbE Delay Emulation — up to 1.25secs	✓	✓	✓	✓	✓
10GbE Delay Emulation — up to 0.5secs	n/a	✓	✓	✓	✓
25GbE Delay Emulation — up to 0.5secs	n/a	n/a	✓	✓	✓
50GbE Delay Emulation — up to 0.339secs	n/a	n/a	n/a	✓	✓
100GbE Delay Emulation — up to 0.339secs	n/a	n/a	n/a	n/a	✓
Delay Emulation (at reduced bandwidth) — up to 30secs	✓	✓	✓	✓	✓
1GbE Extended Delay Emulation — up to 10secs	optional	optional	optional	optional	optional
10GbE Extended Delay Emulation — up to 4secs	n/a	optional	optional	optional	optional
25GbE Extended Delay Emulation — up to 4secs	n/a	n/a	optional	optional	optional
50GbE Extended Delay Emulation — up to 2.714secs	n/a	n/a	n/a	optional	optional
100GbE Extended Delay Emulation — up to 2.714secs	n/a	n/a	n/a	n/a	optional
Fixed Latency	✓	✓	✓	✓	✓
Variable Latency	✓	✓	✓	✓	✓
Ramp	✓	✓	✓	✓	✓
Normal / Gaussian	✓	✓	✓	✓	✓
Sinusoidal Wave	✓	✓	✓	✓	✓
Jitter — 0.1ms to 100ms or 0.1 to 100% of constant delay	✓	✓	✓	✓	✓
Timing Constraints (specify start and duration of impairments activity) Start / Duration 0.01ms to 360,000ms (in 0.01ms increments)	✓	✓	✓	✓	✓

✓ Provided as Standard

Technical Specifications (cont'd)	PRODUCT RANGE 1G	10G	25G	50G	100G
Bandwidth Emulation (with user configurable buffer size up to 20Mbytes for video)					
Constant Throttle	128bits/sec to 1G	128bits/sec to 10G	128bits/sec to 25G	128bits/sec to 25G	128bits/sec to 25G
Random Range (min to max with time constraints)	128bits/sec to 1G	128bits/sec to 10G	128bits/sec to 25G	128bits/sec to 25G	128bits/sec to 25G
Random Range Duration — 1000ms to 60 minutes (in 0.1ms increments)	✓	✓	✓	✓	✓
Background Traffic Generation					
Fixed Data Rate Generate broadcast packets Range (min to max with time constraints)	500byte/sec to 1G	500byte/sec to 10G	500byte/sec to 25G	500byte/sec to 50G	500byte/sec to 100G
Range Duration 1000ms to 360,000ms (in 1ms increments)	✓	✓	✓	✓	✓
Reordering					
Time Based Re-order Displace packet from 0.1ms to 500 ms	✓	✓	✓	✓	✓
Position Base Re-order Displace packet up to 10,000 places	✓	✓	✓	✓	✓
Corruption					
Bitflips Start and end position (first byte to last byte), 1 to 100%	✓	✓	✓	✓	✓
Byte Overwrites Start and end position (first byte to last byte), 1 to 100%	✓	✓	✓	✓	✓
Ethernet Fragmentation MTU: 68 to 9000	✓	✓	✓	✓	✓
Bit Error Rate (Per) Simulation x bits in y received (1 bit to IE+15)	✓	✓	✓	✓	✓
Enable/Disable FCS	✓	✓	x	x	x
Duplication					
Simple (single duplication) Packets received on link will be immediately duplicated once	✓	✓	✓	✓	✓
Timed (duplicated every x seconds) Single duplication after specified delay (1ms to 10,000ms)	✓	✓	✓	✓	✓
Complex (multiple, timed duplication) Specified multiple duplications after specified time delay (1ms to 1,000ms)	✓	✓	✓	✓	✓
Loss					
Standard — Drop x packets in y received	✓	✓	✓	✓	✓
Percentage — Drop 1% to 100% (in increments of 1%)	✓	✓	✓	✓	✓
Markov — 2-state random packet drop (as per ITU-T G.1050 Appendix II - Gilbert-Elliott model)	✓	✓	✓	✓	✓
Outage — Drop all packets received on specified link	✓	✓	✓	✓	✓
Drop Evenly — Packets will be dropped regularly throughout emulation	✓	✓	✓	✓	✓
Drops in Bursts — Packets will be dropped in continuous groups	✓	✓	✓	✓	✓
Timing Constraints — Start/Duration 0.01ms to 360,000ms (in 0.01ms increments)	✓	✓	✓	✓	✓

✓ Provided as Standard

Technical Specifications (cont'd)	PRODUCT RANGE All interfaces: 1G, 10G, 25G, 50G, 100G
Modification	
Generic Packet Modifier — Modify up to 6 bit/byte sections per packet	✓
Analysis (Extract analysis information from any part of the emulation)	
Bandwidth Graph — Show bandwidth utilization — export, clipboard, peak, averaging, etc.	✓
Packet Rates — Show packet utilization, Inter Packet Gap	✓
RTP Analyzer — Output detailed information on RTP streams	optional
Stateless load generation with multiple load distribution models	
TCP Client — Simulate clients with data streams	optional
TCP Server — Simulate servers with data streams	optional
DDOS Simulation — Simulate extremely stressful DDOS environments	optional
Audio Visual (AV) Pack	
RTP Filter	optional
MPEG H.264 and H.265 Corruptor	optional
Management	
Drag and Drop User Interface — Simple User Interface, allowing user to draw out their target network on screen, drop impairments as required and visualise the network-under-test	✓
RESTful API for Test Automation	✓
Smart Start-up — Automatically launch previous map on boot	✓
Filtering (UDP, TCP, Packet count)	
Maximum Filter — Connect multiple filters in any way to create complex filter rules	unlimited
IP Source / destination address filtering (impair specific traffic flows)	✓
TCP — Advanced: Source and destination port filtering (including range) TCP Packet length filtering	✓
UDP — Advanced: Source and destination port filtering (including range) UDP Packet length filtering	✓
MAC Address — Src / Dst single or range	✓
Ethernet Payload	✓
Packet Counting — Fail or Pass packets based on packet count or percentage	✓
Advanced Filtering	
Generic Filter — Filter on multiple bit / byte values with logic operations	✓
IP Protocol — Payload Type and Value	✓
MPLS — MPLS Label, QoS Value, TTL Value	✓
VLAN — VLAN ID, User Priority	✓
MPEG Video	optional
RTP A/V	optional
Reporting	
Live Monitoring — Bandwidth monitoring, packets per second, interpacket gap, export to CSV max/average values, etc.	✓
Wireshark Integration (on up to 200 protocols) — Allows for live traffic capture and root cause analysis; replay third-party traffic streams under impairments, record traffic and replay at a later date	✓

Calnex Solutions plc is a global leader in Test and Measurement solutions for next-generation telecom networks. Our products help to prove new technologies for applications such as SD-WAN, DataCenters, Cloud/OTT, Broadcast Video, and AV/Video conferencing. For more information contact Calnex today:

tel: +44 (0) 1506 671 416
email: info@calnexsol.com

calnexsol.com