Calnex
Insight and Innovation

Prove Ethernet Sync to 10GbE

1588 (PTP) • SyncE • NTP • CES • E-OAM

Calnex Paragon - x

All the measurements you need in one box

The timing performance of today's Ethernet networks depends on proving overall synchronization quality, and probing the underlying packet-layer and physical-layer timing mechanisms.

For technologies up to 10 Gb/s, the Calnex Paragon-X offers direct insight to actual device and service behaviour, and the ability to generate a broad range of real-world disruption scenarios to validate the operation of your network devices and systems to industry standards.

The Paragon-X is the definitive one-box solution to rigorously test SyncE, PTP and NTP synchronization mechanisms, as well as E1/T1 sync interfaces and Ethernet OAM. It brings together all the measurements you need — from jitter and wander through to measuring the accuracy of the recovered Time of Day (ToD), Phase (1pps) and Frequency (MTIE/TDEV) — to ensure your products will work reliably in the complex world of Ethernet switches, routers and gateways.

The Paragon-X also offers Network Emulation so you can fully stress-test the transport of real-time services like video and VoIP over next-gen IP platforms and networks. While powerful, fully-integrated traffic filtering targets the effect of impairments on particular packets or particular types of traffic.

For design through to evaluation, it's for good reason that the Paragon-X is the tester of choice for proving Ethernet sync up to 10 Gb/s.

Control

Generate industry standard and custom physical and packet timing signals.

- Drop-down Master Slave emulation setting for fast and easy profile conformance test
- Generate ESMC messages
- Automatic test configurations for Boundary Clocks (BCs), Transparent Clocks (TCs), Bridge Time Error, G.8262

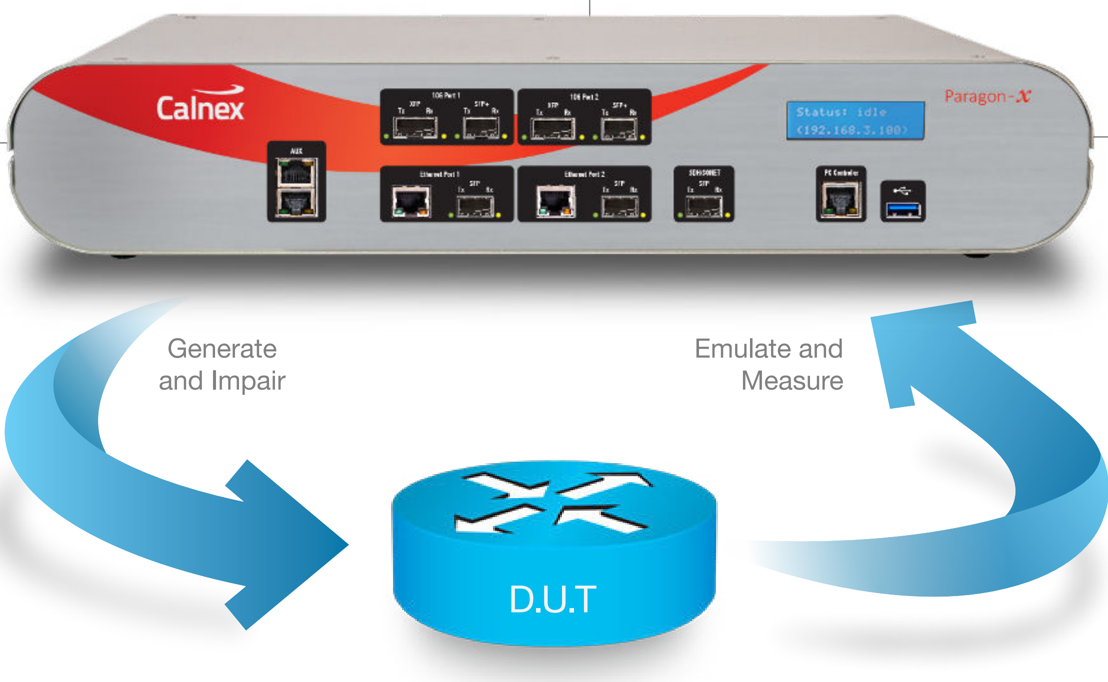
Precision

Fully integrated test bed aligns test stimulus and measurement for increased accuracy and repeatability.

- No additional equipment necessary
- Fully scriptable
- Simultaneous measurement and visualisation of all signals

Flexibility

- Time Error and PDV Profiles, with custom editing
- Hybrid testing – combine input/output types: PTP, SyncE, 1pps, Time of Day
- User-defined wander/jitter
- Total control of generated PTP fields
- Signalling impairments
- Message suppression



1588 and CES

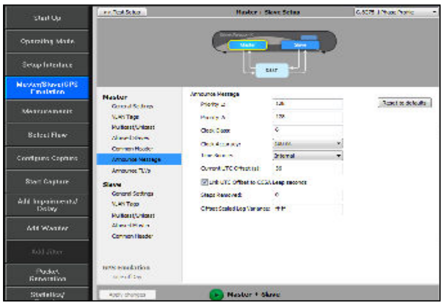
- One-box PTP testing for Master Clock, Slave Clock, Boundary Clock and Transparent Clock devices
- Emulate two PTP masters for BMCA and G.8265 conformance test
- Capture and replay PDV stress profiles
- Run ITU-T and MEF-18 test cases

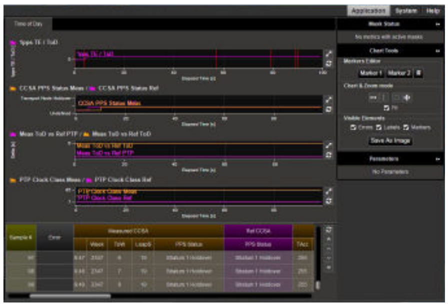
SyncE

- Prove SyncE Jitter and Wander to G.8262
- MTIE/TDEV Pass/Fail evaluation
- 1 nanosecond accuracy
- ESMC (SSM) message testing and validation to G.8264
- Full hybrid SyncE/PTP test suite

Ethernet OAM

- Prove Connectivity Fault Management and Performance Monitoring for Y.1731, 802.1ag and 802.3ah
- Add latency, jitter, errors, dropped packets to prove OAM implementation
- Prove G.8031/2 protection
- Support for 1000s of MEGs





Master and Slave Emulation

PTP Master and Slave emulation (with optional SyncE support) allows fully controllable protocol and timing test – no additional network equipment required and no Command Line Interface.

- Generate PTP to defined/custom profiles with easy drop-down menus and total control of fields
- Manipulate PTP messages in controlled ways – ideal for Negative testing and troubleshooting
- Generate high-accuracy timing: no external equipment, no uncertainty
- Impair timing signals including Time Error/Packet Delay Variation and SyncE Jitter/Wander

PTP Field Verifier

Analyze PTP protocol for conformance to standards or user-defined profiles with the PTP Field Verifier (PFV).

- Automatic Pass/Fail indication – check captured PTP messages against a pre-defined set of rules, with clear Pass/Fail alerts
- Check transmitted PTP messages for compliance with ITU-T, IEEE and user-defined standards and rules – areas of non-conformance immediately visible
- Flexible XML rules allow full customisation of pass criteria
- Full report generation capability

Advanced Time of Day (ToD)

Generate industry-standard ToD event and information messages with full control of message format and alarms.

Full decode of significant fields in ToD messages lets you rapidly identify and pin down timing errors.

- Generate ToD signals simultaneously to PTP and SyncE
- Check device response to controlled manipulation of all timing inputs
- Combine with CAT visualization to easily see the effects of status transitions
- Align ToD results with other simultaneous measurements for complete performance analysis

The Calnex Analysis Tool (CAT) provides powerful insight into network and device performance. All your measurement results are now in one place, and you can view multiple graphs simultaneously for easier correlation of your results.

- Enhanced graphics makes it easy to evaluate ITU-T metrics such as Time Error (cTE, dTE), MTIE and TDEV against ITU-T masks
- Import live and archived measurement data
- Customisable multi-graph window lets you rapidly select measurements and channels for detailed analysis
- One button generation of reports in PDF format: Pass/Fail statistics and details of failures

Meeting Industry Standards

Verify your products and devices meet relevant standards including:

- ITU-T G.8262x/7x
- IEEE 802.1AS/AS-REV
- IEC/IEEE 61850-9-3
- IEEE C 37 238
- SMPTE 2059-2

Elevate your testing with greater accuracy, deeper measurement insight, and with repeatability you can rely on. The Paragon-X gives you all the tools you need to ensure your network devices and network topologies are not only thoroughly tested but truly meet industry standards.

Ethernet Network Emulation

Calnex Paragon-X lets you emulate 'the Cloud' for real-world testing of your Ethernet devices or topology. It offers both comprehensive and ultra-high precision network emulation, enabling you to test:

- Video/voice applications (IPTV, VoIP, etc.)
- Mobile subscriber networks (VoLTE, eMBMS, etc.)
- Content delivery networks
- Cloud computing/migration
- CoS/QoS levels
- WAN acceleration/network optimization
- LAN/WAN enterprise networks
- ADSL/FTTH
- SLA verification
- ITU-T Y.1731/IEEE 802.1ag operations and maintenance
- Satellite links
- Storage networks
- Telecom/Federal network applications
- Carrier WiFi
- Cable/boadband networks

Don't emulate just any network, re-create your actual network

With Real Capture + Replay you're neither limited to capturing pings, nor restricted with capacity. Now you can capture IPG and PDV traffic from live networks for long periods of time and replay these back in the lab to test your devices for absolute proof of performance.

Impair eight CoS/QoS levels up to 10GbE

Class of Service (CoS)/Quality of Service (QoS) levels have to be independently impaired during testing. Paragon-X allows eight CoS/QoS levels to be uniquely impaired at the same time, even at 10GbE.

Related Products

Calnex Paragon-neo

- Delivers high accuracy sub-nanosecond timing measurements at rates up to 100GbE
- Capture and decode PTP packets for analysis and Time Error testing
- Prove SyncE jitter and wander performance to ITU-T G.8262.1/G.8262
- Evaluate MTIE/TDEV pass/fail results to ITU-T G.8262.1/G.8262 masks
- Control ESMC (SSM) message generation for testing to ITU-T G.8264

Calnex Analysis Tool (CAT)

- Analyzes the Time Error and Frequency performance of devices and networks
- Evaluates metrics such as MTIE and TDEV against O-RAN and ITU-T masks
- Displays multiple graphs simultaneously for easy correlation of results

Calnex Sentinel

- Tests PTP, NTP, SyncE and TDM in one portable box
- Measure ALL parameters at the SAME time
- Over-the-Air Time Error analysis
- For LTE-A, TDD LTE and small cell deployment – test network phase accuracy and validate network performance to ITU-T limits
- Measure and analyze metrics: PDV, FPP, TE/max|TE|/dTE, MTIE/TDEV
- Best-in-class internal Rubidium and measurement accuracy

Pre-deployment **Deep Analysis** **Network Deployment**

Calnex Solutions is a global leader in Test and Measurement solutions for next-generation telecom networks. Our products help to prove new technologies for Mobile Backhaul and Carrier Ethernet networks.

For more information on Calnex's Paragon and Sentinel products, and to take advantage of our extensive experience in Packet Sync, OAM and Ethernet testing technologies, contact Calnex Solutions today:
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