

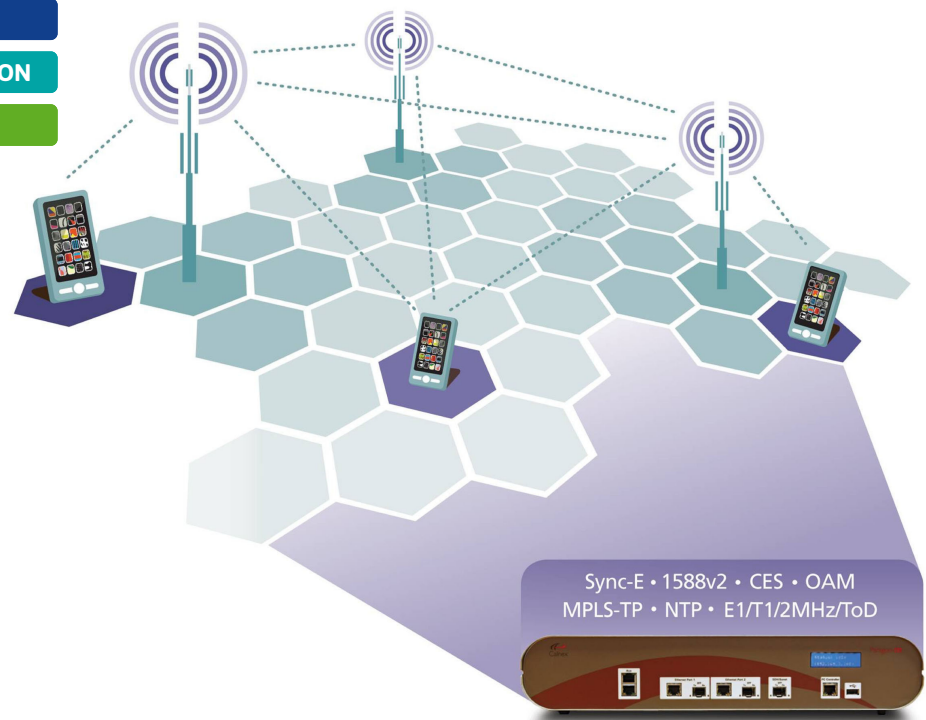
PARAGON-M

The total solution for Ethernet Mobile Backhaul

TELECOM NETWORKS

PROFESSIONAL COMMUNICATION

POWER & UTILITIES



As Ethernet sweeps in to address the huge capacity expansion requirements for mobile backhaul, this also brings completely new methods of synchronization. Network performance depends on proving overall synchronization quality and probing its underlying packet-layer and physical layer mechanisms. Oscilloquartz has teamed up with the leading test sets manufacturer Calnex to bring you the definitive testers for Sync-E, 1588v2 PTP and NTP synchronization mechanisms as well as E1/T1/ToD sync interfaces and Ethernet OAM. The Paragon-m brings together all the measurements you need for successful field deployment and troubleshooting tests on Ethernet backhaul synchronization.

Highlights

- Simultaneous measurements:
 - Sync-E MTIE/TDEV
 - 1588v2 PTP and NTP PDV
 - E1/T1 MTIE/TDEV
 - Time of-day accuracy
 - CES PDV
- Correlate sync interface quality with packet PDV
- Capture and decode Sync and OAM packet flows

Prove and diagnose Sync-E

- Measure Sync-E wander to G.8262/G.8261
- MTIE/TDEV pass/fail evaluation to standard or user mask
- 1ns accuracy
- ESMC (SSM) message testing and proving to G.8264

Prove and diagnose 1588v2 PTP & NTP

- Capture long-term 1588v2 and NTP PDV
- ITU-T Performance Metrics
- Time-of-day (ToD) accuracy measurement
- Troubleshoot 1588v2, NTP protocol and PDV issues
- Save captured PDVs for subsequent replay in the lab

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Make commissioning and maintaining Sync-E, 1588v2 PTP, NTP and CES networks fast, easy and effective.

As with all telecoms technologies, the successful deployment of Sync-E and PTP/NTP depends on rigorous standards to allow interworking and satisfactory network performance. It is therefore vital to measure in accordance with those standards at all interface points in the network, and in particular, correlating measurements from the packet and recovered timing domains. And because today's standards continually evolve to include new measurements, such as packet metrics, testing equipment must be able to track these new requirements too. With Paragon-m Solutions' unique heritage in telecom test equipment design, and our active participation in the international standards bodies, our customers can be assured that we will continue to guide them every step of the way.

Capture delay profiles from live Mobile Backhaul networks and replay the same profiles back in the lab.

Field teams using the Paragon-m can send their test files back to their labs or to the system vendors. In the lab, these same files can be replayed on the Paragon or Paragon-x platform to reproduce exact network conditions for precise troubleshooting.

General Product Specifications

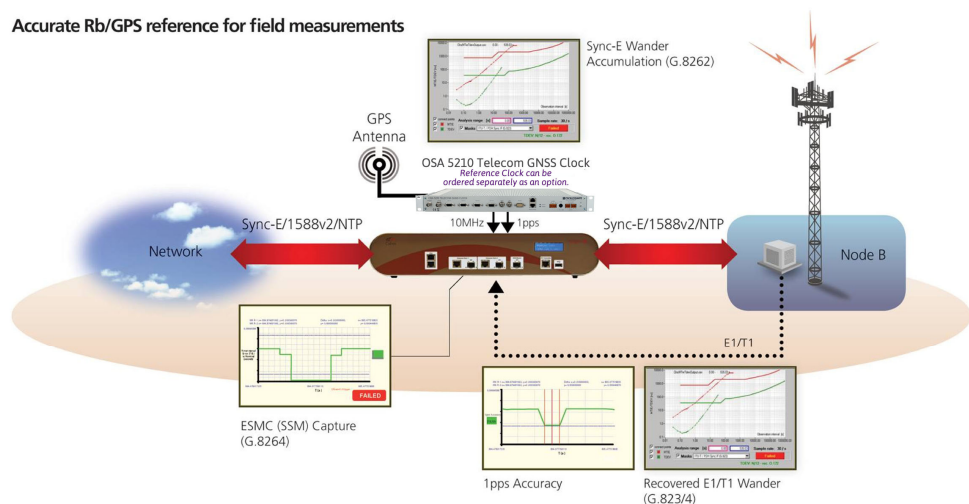
Physical interface

- Ethernet/Sync-E: 100M electrical, 100M optical (SFP)*, 1G electrical, 1G optical (SFP)
- E1 balanced/unbalanced, T1, 2MHz, 1pps single-ended/differential
- (*) 1588v2, NTP, CES, Service

Reference Clocks

- Internal: stratum 3, +/-4.6ppm
- External: 64kHz, 2.048MHz, 10MHz; T1 BITS clock; E1 MTS, 1pps single-ended/differential
- Reference Lock: soft LED indication

Accurate Rb/GPS reference for field measurements



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External Rb/GPS Reference Source (option 132)

- Accuracy $\pm 1\text{E-12}$ (typical)
- Reference Outputs: 10MHz, 1pps
- Supplied with AC power supply, GPS antenna and connecting cable

PC Control Interface

- Any standard PC or laptop (min. 4GB RAM recom.) running Windows XP, Vista or 7.
- RJ45 LAN connection to Instrument. TCP Port, IP Address and Gateway settable

Automatic flow-selection in multi-flow environment

Automatic detection of OAM (MEGs), 1588v2, NTP, CES and other flows and filter setup using **FlowWizard** Filter: (1 to 64 bytes):

- Setup messages for capture and replay
- Select OAM type within a MEG flow
- Select 1588v2/NTP Message type(s) or groups

Integrated decode using industry-standard tool, Wireshark

Packet Capture Memory

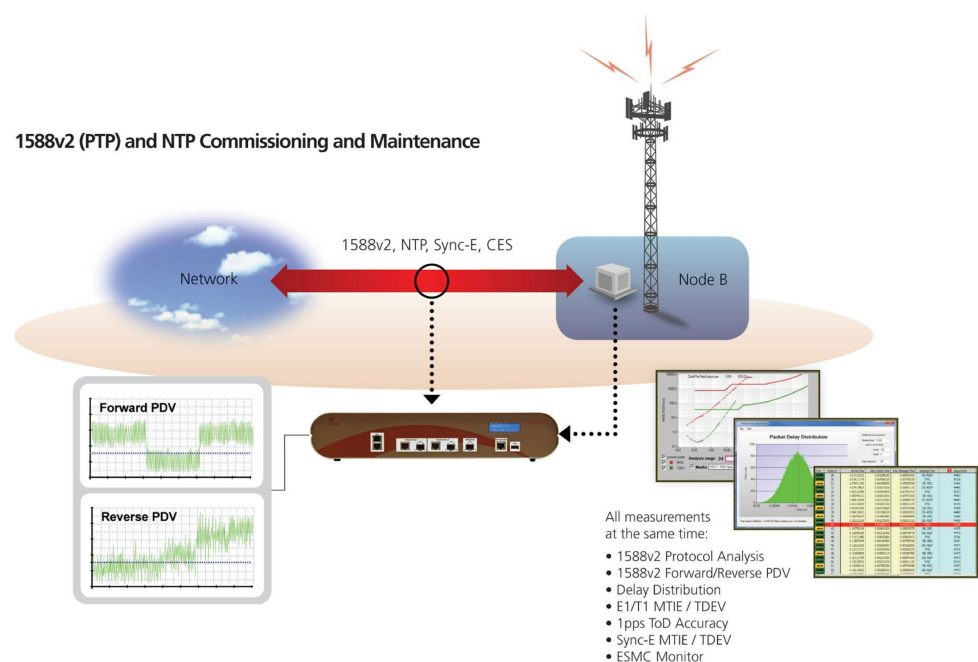
2GB internal or transfer to PC hard-drive

Graph Manipulation

Zoom in (X and Y), Zoom out (X and Y), Marker 1, Marker 2, Min/Max display in nanoseconds

Simultaneous Measurements

- 1588v2/NTP/CES PDV and IPG
- E1/T1/2.048MHz, TIE/MTIE/TDEV, 1 pps wander/accuracy



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1588v2, NTP (option 404) and CES (option 202)

	1588v2	NTP	CES
Packet Sync Rates	Any packet rate	Any packet rate	T1, E1, T3, E3 or Any
Protocols	IEEE-1588 (2008)	RFC 5905	SAToP, CESoPSN, TDMoIP
Header Capture and Alarms	Message Type, TransportSpecific, Version PTP, MessageLength, DomainNo, Flags, ControlField-SourcePortID, SequenceID, (error highlighted), ControlField, LogMessageInterval, OriginTS	LL, Ver, Mode, Stratum, Poll intl, Precision, Root Delay, Root Dispersion, Ref Id, Ref TS, Originate TS, Rx TS, Tx TS	L, R, M, FRG, Length & Sequence# (errors highlighted)
Graphs and Results Displayed	Inter-Packet delay: SYNC, DEL_REQ, DEL_RESP, pDELAY_REQ, pDELAY_RESP, FOLLOW-UP, ALL PDV: Sync (Master-to-Slave), Delay_Req (Slave-to-Master), Follow-up, Delay Resp, PDelay Req, PDelay_Resp (Included/Exclude CF in PDV, Calculation), Asymmetry Variation, RTD, Variation Slave Clock Wander (T3), Delay, Distribution Curve/Histogram	IPG Client, IPG Server, PDV Client, PDV Server, RTD, # Client messages, # Server messages (and rates), # missing Client/Server messages	TIE vs Nominal, TIE vs Measured average, Delay vs Packet #, Inter-packet time (vs Time and vs Packet#), Delay distribution curve/histogram
Measurement Accuracy	5ns		
Pass/Fail Evaluation	ITU-T metrics implemented as ratified including Pkt Filtered MTIE, MAFE, MATIE, etc.		

Sync-E, E1/T1, TIME OF DAY

Wander Measurement To ITU-T 8262, G.8261, G823, G.824, etc. MTIE/TDEV analysis with ITU-T/user-defined masks and pass/fail indication

Measurement Accuracy 1ns

ESM (SSM) Decode ESMC messages to ITU-T G.8264 and plot Quality Level (QL) changes graphically (bi-directional) to G.8264, G.781, etc. Support for ESM Decode and Sync-E in 1588 mode (for concurrent Sync-E and 1588v2 implementations)

Timing Measurements E1/T1 Wander—TIE, MTIE, TDEV analysis with ITU-T/ user-defined masks-sample rate 0.1 to 100Hz

1pps accuracy-recovered slave clock
1pps vs reference, user settable pass/fail threshold

Ethernet OAM (option 301),

MPLS-TP OAM-G.tpoam (option 302)

Capture and Decode Packet #, Arrival Time, Ethernet DA, Ethernet SA, OAM Message Type, MEP ID, RDI, Period fps TransID, TxFCf, RxFCf, xFCb. Tx Timestamp(f), Rx Time stamp(f), Tx Time stamp(b), Rx Time stamp(b), Maintenance Domain Length, Maintenance Domaine Name, Short MA Name Format, Short MA Name Length, Short MA Name, Time To Live, Origin MAC, Target MAC, Relay Action OUI, TLV Offset, TLVs

Round-trip Delay Based on DMM/DMR messages. Displayed in table and graph. MEF and ITU-T delay methods supported

View Filtering MAC addresses and OAM message types

Standards Supported ITU-T Y.1731, IEEE 802.1ag, IEEE 802.3ah, ITU-T G.8031, ITU-T G.8032

MPLS-TP OAM Flow Identification of MPLS-TP OAM flows (MPLS shims, GAL, G-Ach)

Subject to change without prior notice.