

parallel testing for

# Frequency, Phase, Time of Day Synchronization

1588 • SyncE • E1/T1, 2/10 MHz • 1 pps • ToD



Calnex Paragon-*t*



# Save on time and equipment with the **Paragon-t**

Put simply, the Calnex Paragon-t combines power with versatility. That's because it has four independent transmit and measurement ports enabling you to comprehensively test four separate network devices simultaneously — including SECs, EECs, and Boundary and Slave Clocks.

For both legacy synchronization and next-generation Ethernet devices and systems, the Paragon-t proves wander tolerance at key rates so you can benchmark and validate against the latest ITU standards. It's invaluable for developers and labs testing a range of interfaces and outputs, and because it can also make lengthy simultaneous measurements, it's perfect for long term Software Regression/System Verification testing or during Acceptance and Installation testing.

The Paragon-t's built-in Calnex Analyzer Tool (CAT) ensures that all your measurement results are on hand for fast, easy analysis. The CAT's multi-graph window lets you correlate a variety of measurements and channels simultaneously to quickly characterize and validate system and device behaviour. Plus, it provides pass/fail evaluation to ITU-T standards or user masks.

If you're looking to rigorously test SECs, EECs, boundary and slave clocks, the Calnex Paragon-t provides all the frequency, phase, ToD and wander test functions you'll need. Furthermore, because you can generate wander on up to four interfaces, and make up to 12 precise measurements simultaneously, you'll save days of test time, greatly increase test coverage, and save on test equipment. That's real savings, not promises.

## Test multiple NEs and clocks simultaneously

### Paragon-t performance at a glance

- 4 ports SyncE clock generation plus frequency offset and wander – 1 GbE, 100BT
- 4 ports clock generation plus frequency offset and wander – E1 (bal/unbal), T1 (bal), 10 M (unbal), 2 M (unbal)
- 4 ports SyncE clock measurement – 1 GbE, 100BT
- 4 ports clock measurement – E1 (bal/unbal), T1 (bal), 10 M (unbal), 2 M (unbal)
- 4 ports phase measurement – 1 pps (bal/unbal)
- 4 ports Time of Day (ToD) measurement
- Clock Reference input – GPS Antenna, 64 k, 2 M, 6.3 M, 10 M, T1 BITS, E1 MTS

### Simultaneously test multiple BCs/SCs

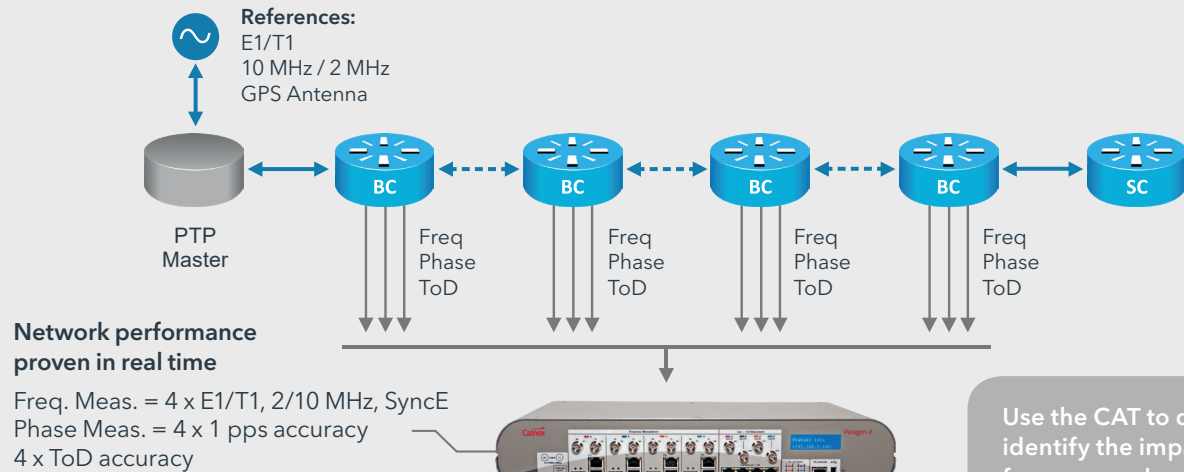
- 4 ports simultaneous BC and SC frequency measurements
- 4 ports simultaneous phase measurements – 1 pps
- 4 ports ToD measurement
- 4 ports MTIE, TDEV, clock MAPE and FFO pass/fail evaluation to standard or user masks

### Simultaneous SyncE measurement

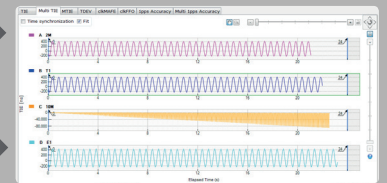
- 4 ports simultaneous SyncE wander measurement to G.8262/G.8261
- 4 ports SyncE ESMC monitoring with G.8264 decodes
- 4 ports MTIE, TDEV, clock MAPE and FFO pass/fail evaluation to G.8262/G.8261 standard or user masks
- Simultaneous wander measurements:
  - 4 ports SyncE wander generation to G.8262/O.174
  - 4 ports E1/T1/10 M/2 M to G.813/O.172



## Testing network chains

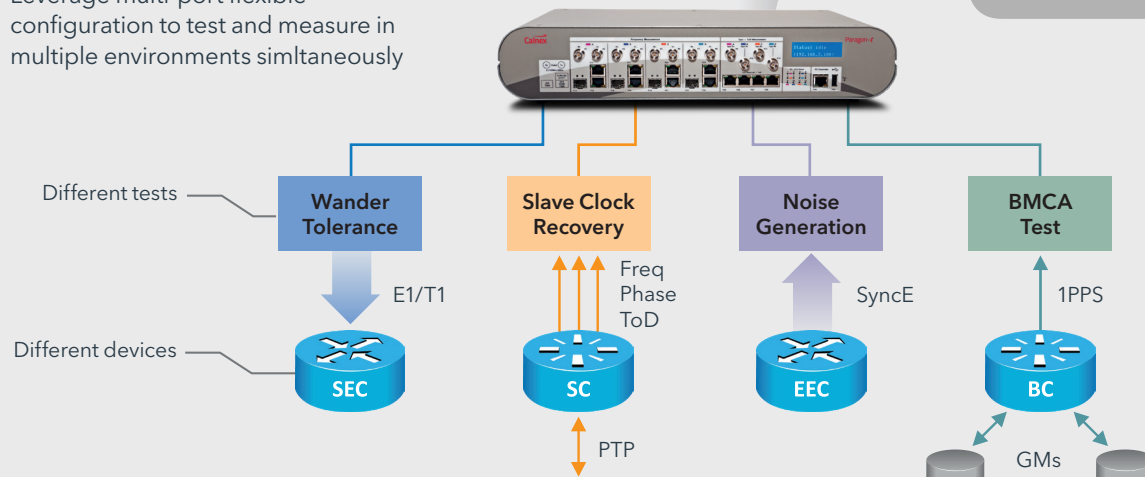


Use the CAT to quickly identify the impact of wander, frequency, phase and ToD



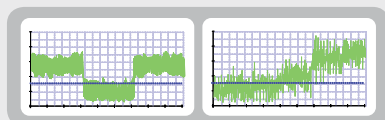
## Multiple tests at the same time

Leverage multi-port flexible configuration to test and measure in multiple environments simultaneously



## 1588 multi-port BC or SC testing

Calnex Paragon-X Master Emulation (running multiframe PDV)



Calnex Paragon-X generates PDV impairments

4 x individual DUTs

Freq  
Phase  
ToD

**Reduce test time by up to 75%**

Freq. Meas. = 4 x E1/T1, 2/10 MHz, SyncE  
Phase Meas. = 4 x 1 pps accuracy  
4 x ToD accuracy



## Product Specifications

|                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Physical Interfaces</b>                           | Ethernet: 4 x 1 G, 100BT Electrical – RJ45, 4 x 1 G Optical (SFP required)<br>4 ports E1, 10 MHz, 2.048 MHz – BNC (unbalanced)<br>4 ports E1, T1 – RJ48 (balanced)<br>4 ports 1 pps – BNC (unbalanced)<br>4 ports 1 pps – RJ45 (balanced)<br>4 ports ToD – RJ45                                                                                                                                                                                                       |
| <b>Wander Generation/<br/>Measurement</b>            | TIE to ITU-T G.8262 and ITU-T O.174/O.172<br>Measurement accuracy 1 ns.                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>MTIE/TDEV Analysis</b>                            | Built-in wander analysis software with ITU-T Masks (G.813, G.823, G.824, G.8261, G.8262, G.8263, G.8261.1, GR.1244) and Pass/Fail indication (also clock MAFE and clock FFO).                                                                                                                                                                                                                                                                                         |
| <b>ESMC (SSM) Features</b>                           | Decode ESMC messages to ITU-T G.8264 and plot Quality Level (QL) changes graphically (bi-directional) to G.8264, G.781 etc.<br>QLs: PRS, PRC, INV3, SSU-A/TNC, INV5, INV6, ST2, SSU-B, INV9, EEC2/ST3, EEC1/SEC, SMC, ST3E, PROV, STU/UKN, DNU/DUS.                                                                                                                                                                                                                   |
| <b>Reference Clocks</b>                              | Lock internal timing reference to external reference. Reference Lock soft LED indication.<br>External reference inputs: 64 kHz, 2.048 MHz, 6.312 MHz, 10 MHz, T1 BITS clock (1.544 Mb/s), E1 MTS (2.048 Mb/s), 1 pps single ended/differential, SyncE, GPS Antenna.<br>Internal Ref. Clock: Frequency Stability over Temp: $\pm 1.5 \times 10^{-7}$ (no GPS), $< 5 \times 10^{-12}$ over 24 hrs (with GPS).<br>Companion GPS/Rb timing source available (Option 132). |
| <b>PC Control Interface</b>                          | Any standard PC or laptop (min. 4GB RAM recommended) running Windows Vista, 7 or 8.<br>RJ45 LAN connection to instrument.                                                                                                                                                                                                                                                                                                                                             |
| <b>Timing Measurements</b><br>(Option 001, 002, 003) | E1, T1, 10 MHz, 2.048 MHz, SyncE Wander – TIE, MTIE, TDEV analysis with ITU-T masks, sample rate 0.1 Hz to 100 Hz.<br>1 pps accuracy – recovered slave clock 1 pps vs 1 pps reference.                                                                                                                                                                                                                                                                                |
| <b>Simultaneous<br/>Measurements</b>                 | 4 x Clock Wander (E1/T1/10 MHz/2.048 MHz) – Option 001<br>4 x Clock Wander (SyncE) – Option 002<br>4 x 1pps Wander/Accuracy – Option 003<br>4 x ToD Accuracy – Option 003                                                                                                                                                                                                                                                                                             |
| <b>Wander Generator</b><br>(Option 004, 005, 223)    | E1, T1, 10 MHz, 2.048 MHz, SyncE Wander – Frequency Offset, Sine Wave, MTIE/TDEV, 0.01 to 10 $\mu$ s, 100 $\mu$ Hz to 10 Hz.                                                                                                                                                                                                                                                                                                                                          |
| <b>Remote Control</b>                                | Scripting via TCL.                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Operation and<br/>Regulatory</b>                  | CE and EMC (incl. EN-61010, EN-61326, etc.) certified.<br>Voltage 85 – 246 VAC, 100 – 240 VAC (nominal) @ 50/60 Hz.                                                                                                                                                                                                                                                                                                                                                   |
| <b>GPS/Rb Reference</b><br>(Option 132)              | PRS-/Stratum 1 (GPS locked): typical $1 \times 10^{-12}$<br>Outputs: 10 MHz, 1 pps                                                                                                                                                                                                                                                                                                                                                                                    |

Specification is subject to change without notice.

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 the Calnex Paragon platform, and to take advantage of Calnex's extensive experience in Packet Sync and OAM testing technologies, contact Calnex Solutions today:

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