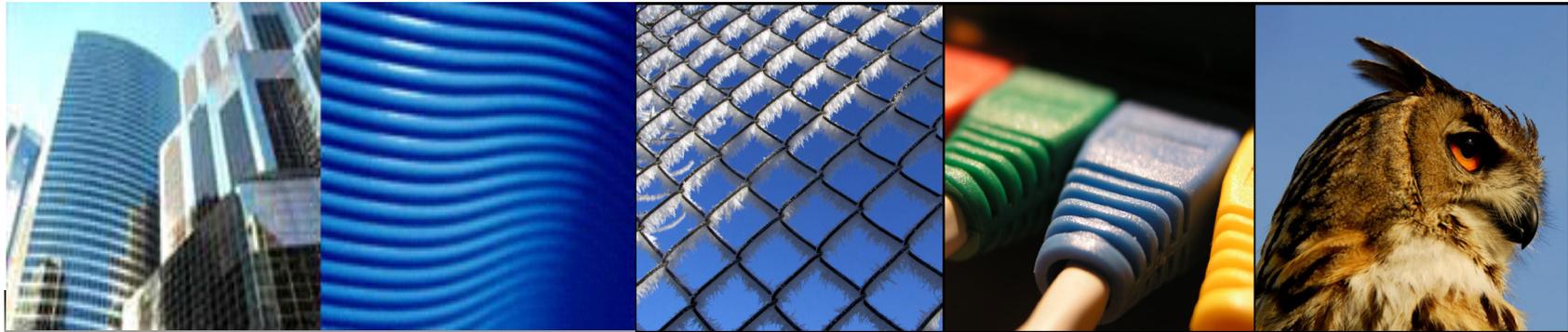


Laboratory

Ethernet / IP / Synchronization



Synchronization and Transmission Lab



ALBEDO Telecom offers a full range of telecommunication products and services to the international market.

- **Hand-held Filtering Taps:** battery operated, 1kg. double port
- **Stream-to-disk appliance:** SSD disk, wirespeed capture, wirespeed storage, 2Gb/s
- **Impairment Generator:** Carrier Ethernet and IP
- **Hand-held testers:** E1, SDH, GbE, SyncE, IP, IPTV, VoIP, Datacom, Jitter, Wander
- **Acceptance Labs:** IPTV, VoIP, ISDN, POTS
- **Consultancy / Integration:** IPTV, VoIP

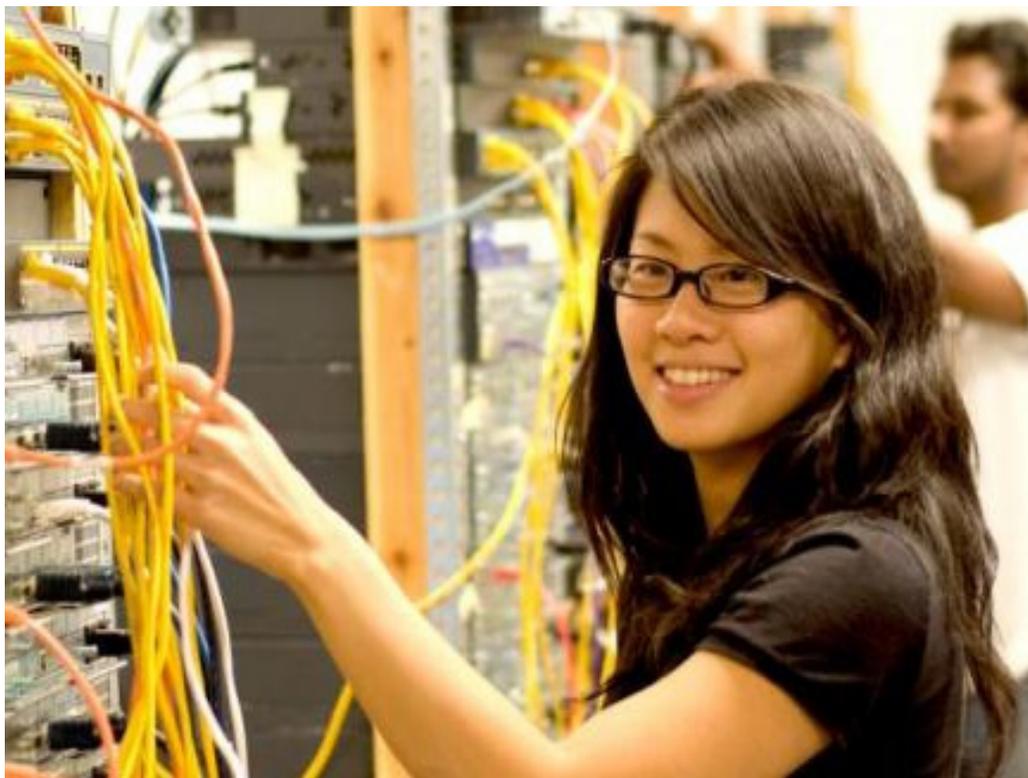




Companies such as Telecom Operators, Power Utilities, Railways have experts in synchronization that have to conduct approval and acceptance test on selected components. The objective is:

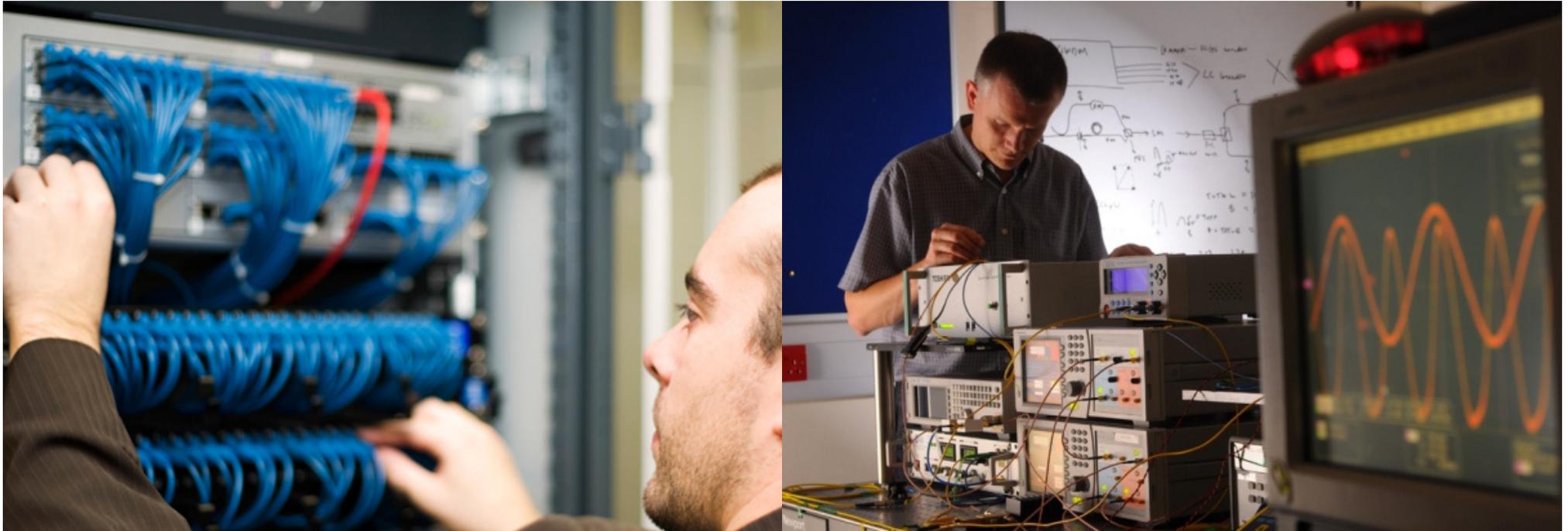
- to verify not only compliance to the international standards
- to test specific quality requirements
- demonstrate interoperability with the installed base
- differentiate the different manufactures
- select the most suitable network resources

This solution can also be an good platform to train the staff that have to install and maintain the synch network while maintaining its KPIs.



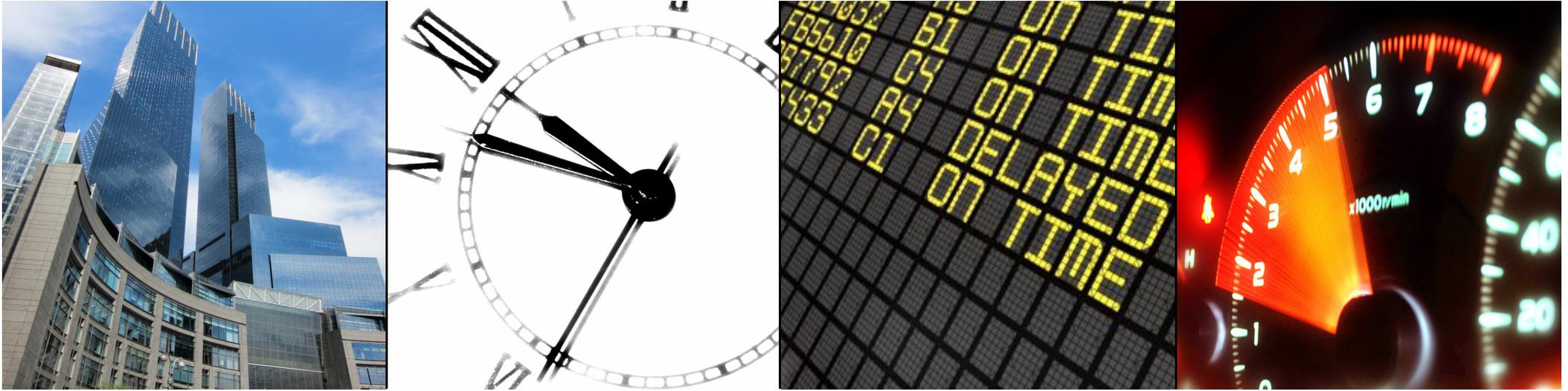
The solution is built as a lab capable to configure, simulate & test synchronization signals:

- High speed Ethernet network supporting the new synchronization architectures
- Asynchronous while Synchronous Ethernet (SyncE) PHY layers
- Configurable PTP master and slave clocks



Experts on new telecom standards all based at the university, that is, Teachers, R+D engineers, Graduate students, and PhD students that had the necessity to experiment and investigate on new telecom topologies and protocols. In order to satisfy that necessity it was necessary:

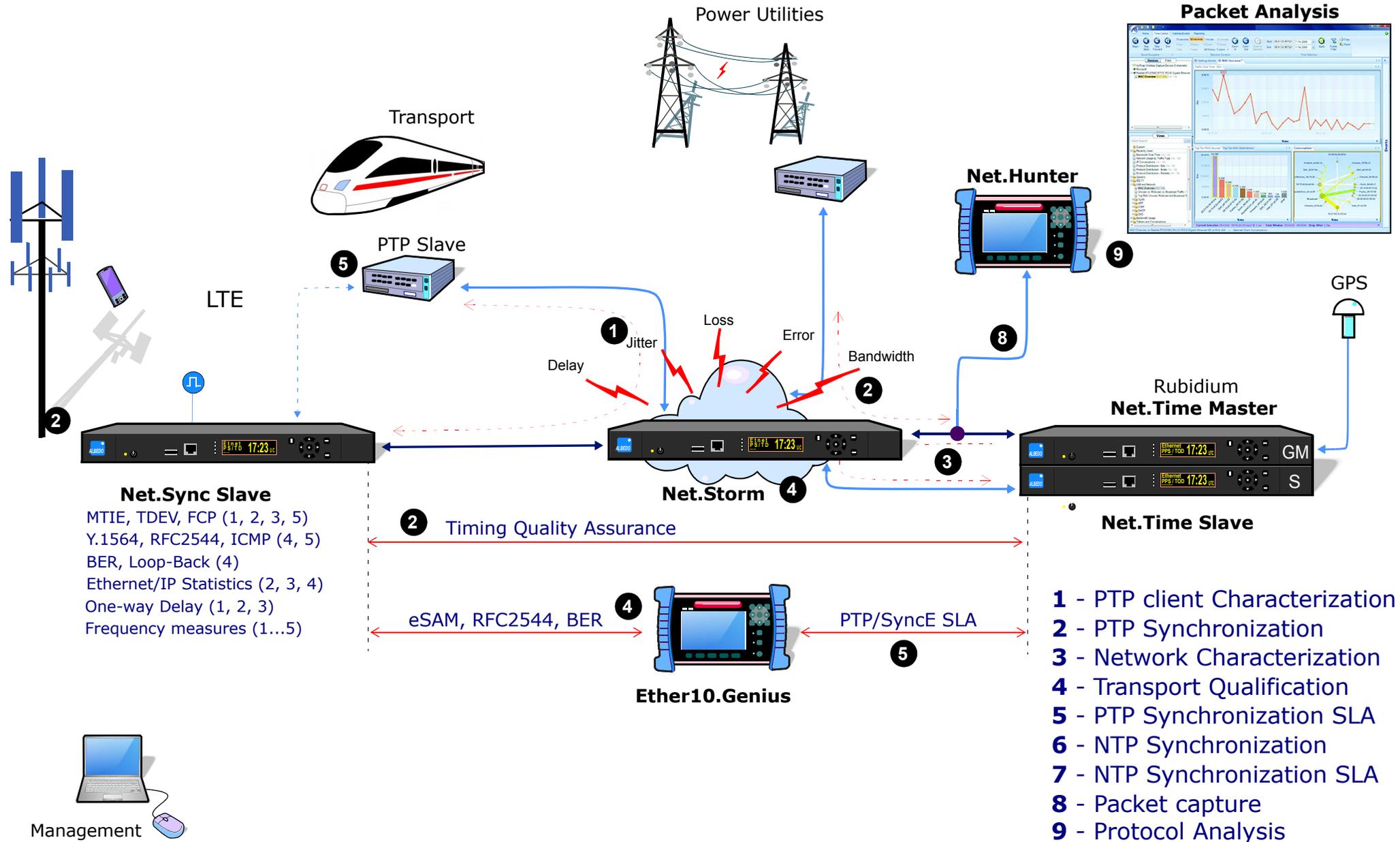
- A Next Generation telecom network capable to support the new telecom standard of the ITU-T
- The Lab should be equipped with all network elements but should also be able to simulate real traffic conditions, otherwise experiments and investigation could not be considered valids.
- A number of tools to configure, test, analyze and evaluate the new protocols.



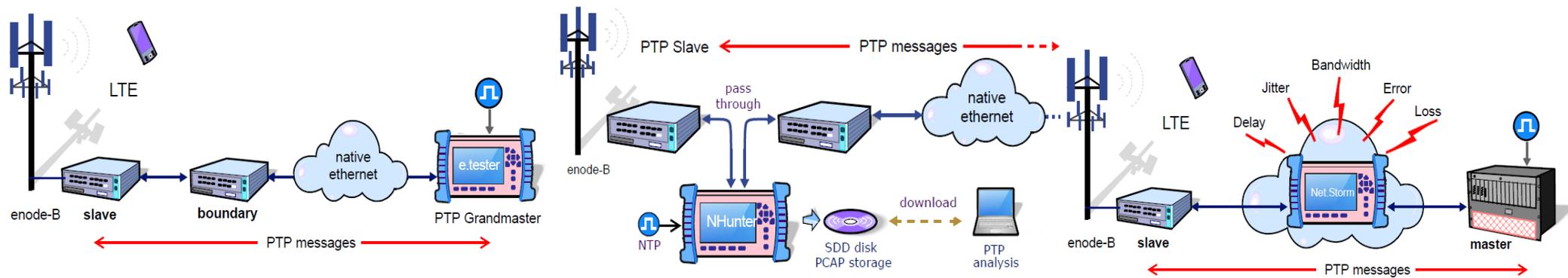
ALBEDO is a supplier of benchmarking laboratories built exclusively to satisfy the mentioned needs. The solution includes:

- **Master PTP 1588v2 / SyncE clock** feeding a slave PTP/SyncE clock.
- **WAN emulator** to stress PTP flows with delays, jitter, loss, errors, etc.
- **Packet tap** that filters and captures PTP flows to be analyzed
- **PTP/SyncE tester** to measure Frequency, Wander, One-way Delay, ESMC/SSM, emulating Master/Slave clocks, text eSAM, measure quality of the Ethernet network, etc.

The Benchmarking Solution



Test suite sample



- 1. Network and PTP client.** Characterization of network delay and delay variation
- 2. PTP Synchronization Modelization.** Multiple time refs. for packet stream generation
- 3. PTP Network Characterization** by means of timing accuracy measurements and statistics
- 4. Transport layer Qualification** and troubleshooting (performance and quality test suites)
- 5. Synchronization SLA** how to monitor the frequency and phase impairments
- 6. Test under real traffic conditions:** generation in controlled way, packet impairments to verify how boundary clocks manage with packet lost and packet delay variation (PDV or Jitter)
- 7. Boundary or slave clocks tolerance** compensate delay asymmetries properly
- 8. PTP Wander measurement:** calculation of the performance of the timing
- 9. Capture PTP packets** compliant with specific filters for troubleshooting and protocol analysis

Why ALBEDO?

Net.Time GM



Net.Sync



Net.Storm



Net.Hunter



Ether.Genius



- Because ALBEDO' partner, was able to match demands and products
- ALBEDO has a portfolio that covers:
 - Synchronization nodes (PTP clocks)
 - WAN emulators
 - Packet capture tap
 - Telecom testers for Ethernet, SyncE, and PTP
- Good value balance

That's all



ALBEDO
Telecom
the Path to Excellence