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A division of Adtran
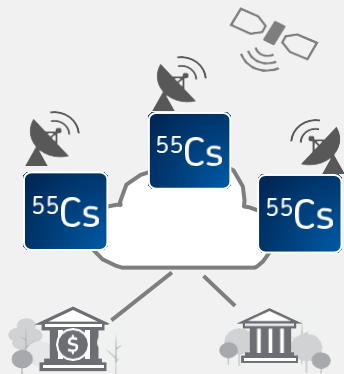
75 YEARS
TIMING EXCELLENCE

From Atomic Clocks, GNSS Receivers, Through GM, BC and Clients: Managing the Entire Sync Network

WSTS 2025 | Igal Pinhasov | Oscilloquartz

# Timing is everywhere (..and it is getting challenging to manage it all)

Metrology, timekeeping institutes, science labs, providing ultra-precise TaaS/GBaaS offerings

- TaaS – Time as a Service
- GBaaS -- GNSS Backup as a Service
- PTP – Precision Time Protocol
- NTP – Network Time Protocol

Space navigation augmentation systems and defense applications

- BITS – Building Integrated Timing Supply
- PPS – Pulse Per Second
- Sync-E – Synchronous Ethernet.

BITS, PPS, Sync-E, PTP, NTP
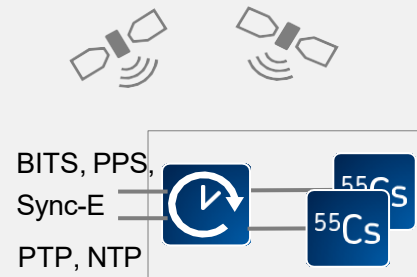
PRC/ePRC and ePRTC for communication and cloud service providers

- PRC – Primary Reference Clock
- ePRC – Enhanced Primary Reference Clock
- ePRTC – Enhanced Primary Reference Time Clock

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Managing Time is getting complicated

Increasing number of timing devices and diverse vendors

Complexity arises from multi-vendor environments and varying performance requirements

Essential to maintain high accuracy and resilience in timing networks

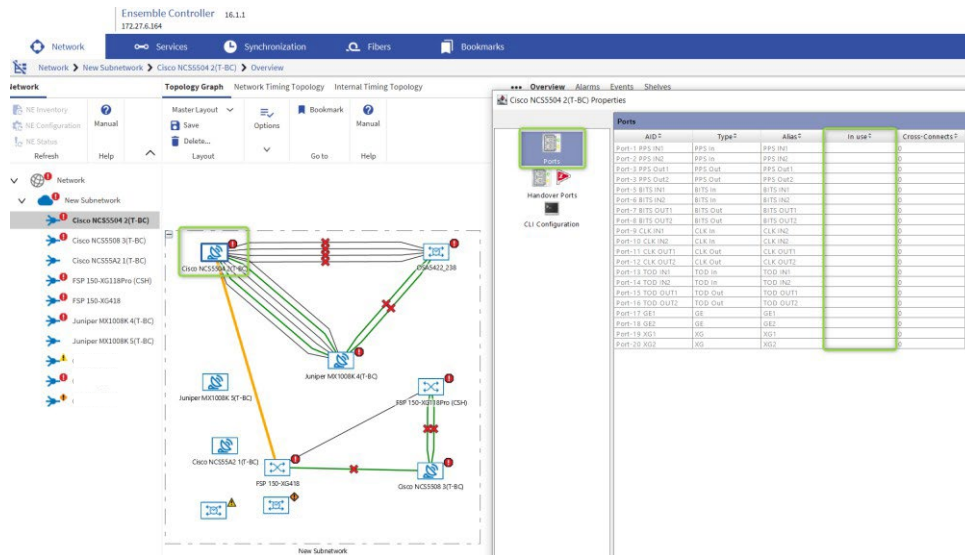# We need comprehensive synchronization framework

An End-to-End Approach

Visualizing timing flow within and between devices

Integrating and managing multi-vendor GNSS receivers and boundary clocks

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Managing Timing Flows Within and Between Devices

Inside the device: Sources, holdover time, GNSS disruptions.

Between devices: Grandmaster to Client through BC/TC.

Managing third-party devices effectively

- TC – Transparent Clock

Visualization Timing Distribution Within and Between Devices

Key Requirements

- Synchronization routes (network wide and within devices)
- Alignment between of physical network of devices and their Sync distribution function
- Sync network health indication and Sync performance reports

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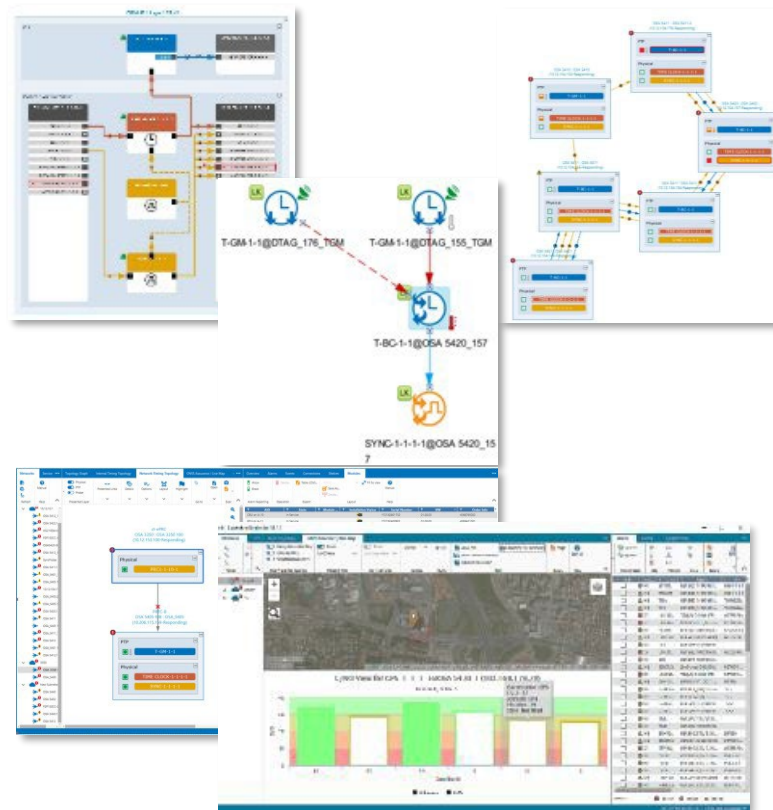
GNSS Receiver Installation Health Report

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Remote continuous health test for GNSS Receivers

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Automatic Jamming/Spoofing Detection - Machine Learning Prediction

GNSS firewall - automated solution for issues prevention and correction

Key requirements

- Providing key solution to fight against GNSS cyber attacks
- Utilizing ML/AI together for automated optimization and security protection of GNSS
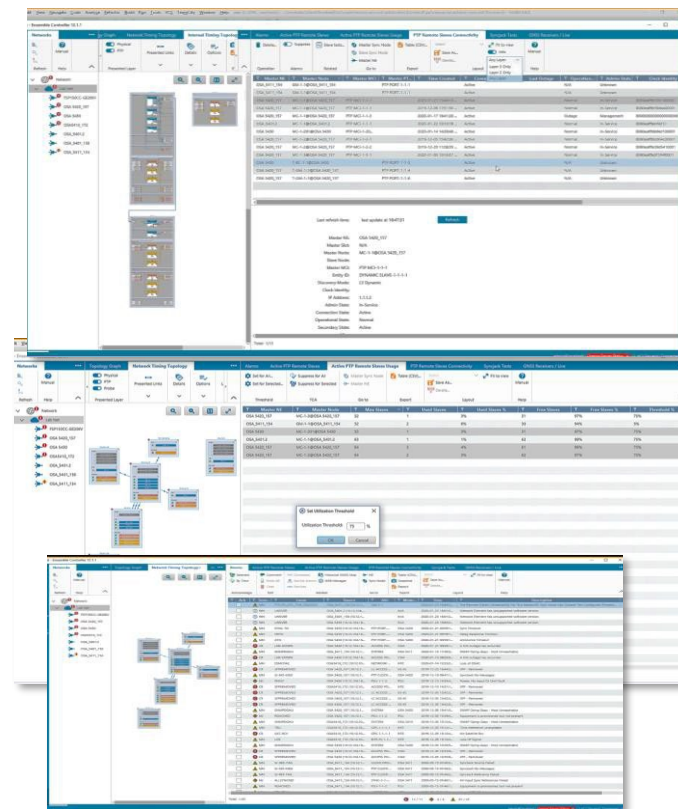

- ML – Machine Learning
- AI – Artificial Intelligence

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Centralized monitoring of PTP Clients connectivity

Key Requirements

- Centralized monitoring and reporting about the remote client status in PTP networks
- Identification of timing delivery problems and bottlenecks with respect to the linkage to the Grandmaster
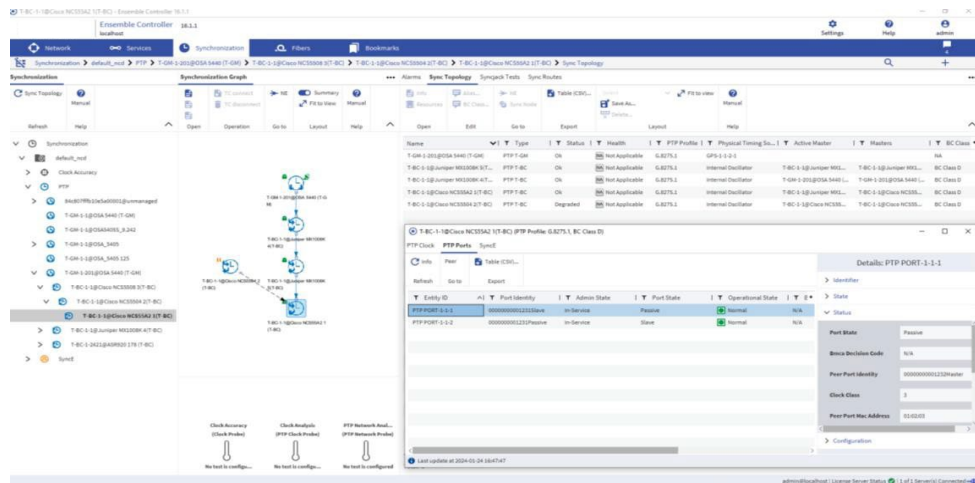
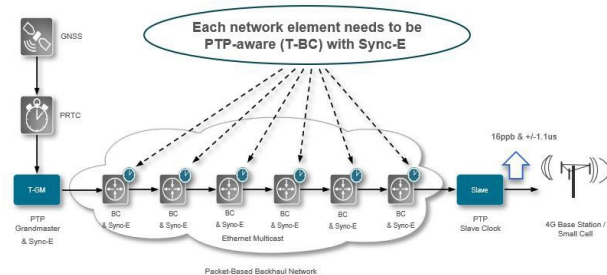# Monitoring 3rd party (G.8275.1) T-BC in the timing network

Key Requirements

Automatic discovery of T-BC Clocks and Sync Routes

Display PTP related Clock delivery Status

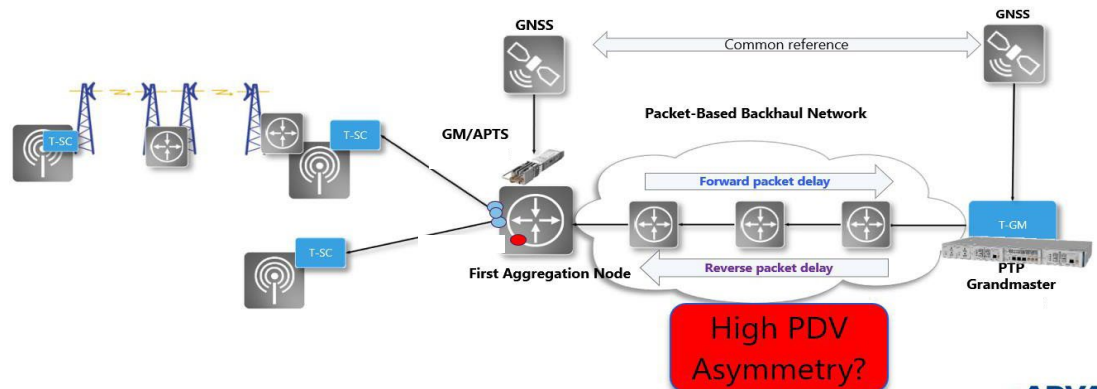**Ability to recognize Timing loops and misconfigurations**

Phase Synchronization – G.8275.1 Full On-Path Support

- G.8275.1 – ITU-T Telecom Profile for Phase Synchronization with Full Timing Support

IEEE1588 PTP time & phase quality monitoring and analysis

Key Requirements

- Allows to monitor BC and Slave clock recovery quality for entire network
- Identifying problems, analyzing bottlenecks and network limits
- SLA conformance reporting to the end customers
- Enable customers to offer Timing-As-A-Service

- PDV – Packet Delay Variation

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