

# Spirent AION

## TSN Time Sync 1588 / 802.1AS Bundle

### Overview

**Spirent AION** is a flexible delivery platform that enables users to achieve improved deployment and provisioning for all their cloud and network testing needs. It is designed to deliver ultimate flexibility in how Spirent TestCenter platforms are purchased and utilized.

The extended platform combines a wealth of industry-leading test solutions with a flexible licensing architecture to support a wide range of next-generation solution-based domain applications.

AION offers a centralized management hub to help leverage software and hardware functionalities across all lab users and locations for a simplified management and decision-making process:

- **Flexible purchasing options** available via subscription, consumption-based, and perpetual plans, with the ability to license different bandwidth, scale, and protocol bundles.
- **Flexible deployment options** offered include cloud-delivery, on-prem, and laptop-hosted licensing services.

Enhanced user serviceability delivers always-on platform services from auto-discovery and inventory management to user and workspace administration, notifications, and log aggregation.

### TSN Time Sync 1588 / 802.1AS Bundle

IEEE 1588 Precision Timing Protocol (PTP) is a protocol used to synchronize clocks throughout a computer network. IEEE 802.1AS or generalized Precision Time Protocol (gPTP) is based on IEEE 1588 (it is a profile of 1588), but it focuses on specific requirements that are critical for local area network applications like increased cost savings, improved reliability and improve interoperability. Both standards were recently updated:

- IEEE 1588-2019 also known as 1588v2.1 includes multiple improvements over the IEEE 1588-2008 version known as 1588v2. 1588v2.1 is backward compatible to 1588v2.
- IEEE 802.1AS-2020 known for many years as AS-rev is backward compatible to 802.1AS-2011 and includes several improvements, the most notable being support for multiple domains, support for Common Mean Link Delay Service and improved time accuracy when used over IEEE 802.11 links.

Due to the many benefits provided, both PTP and gPTP found wide adoption in several markets where time-critical applications play a key role, like:

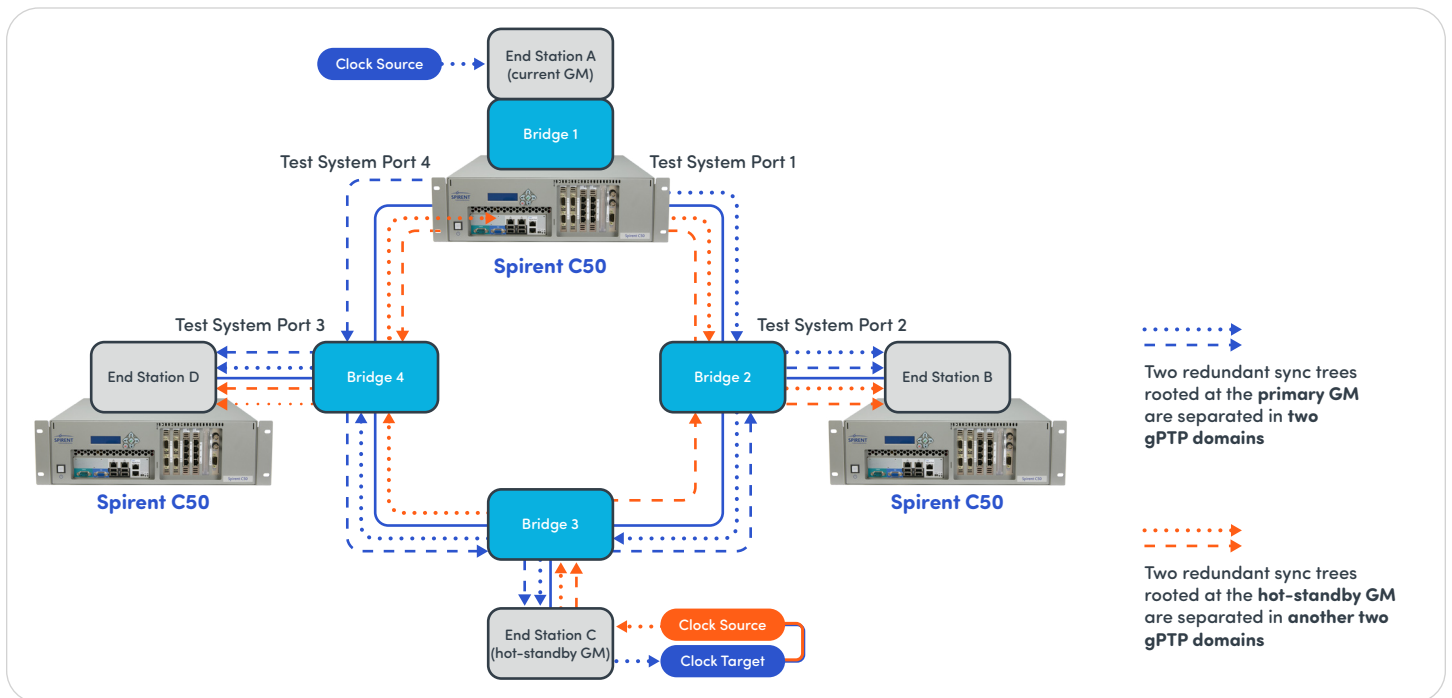
- Telecommunications
- Industrial Automation
- Automotive In-Vehicle Networks
- Professional Audio/Video
- Aerospace Networks

- Testing of main, subordinate, boundary and transparent clocks for performance, interoperability and compliance to PTP or gPTP with multiple build-in PTP profiles supported
- Offering can be used by Network Equipment Manufacturers, Service Providers, System Integrators, Automotive OEMs and their suppliers to ensure that the time-critical applications work as expected in all network conditions
- Automotive customers benefit from easy to configure and execute Avnu test specification as well as easy integration with AUTOSAR Time Sync over Ethernet or legacy buses line CAN and FlexRay
- Ideal for Industrial Automation customers who want to test timing distribution across their manufacturing floors either using TSN Ethernet or 5G System
- Combine with AION TSN Core Protocols Bundle for the most comprehensive TSN test package providing actionable analytics, strong fault isolation with easy correlation between multiple TSN protocols results
- Combine with Calnex Paragon-X to generate and measure impairments such as wander and packet delay variation for exhaustive mobile backhaul testing
- PTP remote testing using GPS synchronization

The TSN Time Sync Bundle provides support for the both PTP and gPTP, with multiple build-in PTP profiles supported. The package allows Spirent TestCenter™ ports to act as main or subordinate clocks, run the best main clock algorithm (BMCA) or statically configure port roles, negotiate unicast procedures, and exchange PTP messages with attached devices. This enables functional, performance and accuracy testing of boundary, transparent, main and subordinate DUT clocks.

The highly accurate timing inherent in Spirent TestCenter architecture ensures the accuracy required for time sensitive applications such as Ethernet mobile backhaul without the need for additional test equipment.

Impairments and other negative testing possibilities make the TSN Time Sync Bundle ideal to system wide testing, not only at device level. It can be combined with multiple TestCenter protocol bundles for end-to-end testing of service provider networks. The TSN Time Sync Bundle is a required package for the AION TSN Core Protocols Bundle.



## Features and Benefits

- Enables scale testing of boundary and transparent clocks
  - Emulates up to 500 subordinate clocks per port with full set of results and more than 25.000 with limited results
  - Supports E2E and P2P transparent clock procedures
  - Supports 1-step and 2-step clocks
- Supports Automotive In-Vehicle use cases for infotainment, ADAS or sensor fusion
  - Latest Avnu Automotive profile supported
  - Can be used with additional protocol package to test AUTOSAR Time Sync over Ethernet or legacy buses like CAN and FlexRay
  - Possibility to compare time accuracy on ports running different time protocols
- Supports Industrial Automation use cases (including TSN over 5G System)
  - Easy integration of 1588 and 802.1AS with different TSN protocols like Qbv or Qci
  - Easy testing of 5G System TSN network or device side translator
  - Possibility to compare time accuracy on ports running different time protocols
- Supports scale testing of Telecom Profile Main and Subordinate clocks
  - Supports unicast negotiation procedures per G.8265.1 Telecom profile requirements
  - Message rates up to 128 messages per second
- Optional support for external BITS and GPS time sources
  - Support for test scenarios where absolute timing accuracy is needed
  - Enables remote test scenarios where PTP accuracy needs to be validated across real network infrastructure
- Spirent TestCenter ports can operate as main or subordinate clocks over Ethernet, IPv4, or IPv6 and emulate complex routing and MPLS topologies
  - Enables users to test complex, real-world mobile backhaul scenarios with fewer DUTs
- Combine with Calnex Paragon-X for comprehensive mobile backhaul testing
  - Enables users to inject and measure physical and packet impairments and test main, subordinate, boundary and transparent clocks for compliance to G.8261 and G.8262 specifications
  - Supports Time of Day and Phase accuracy testing needed to validate LTE deployments

## Technical Specifications

| Parameter                                   | Description   |
|---|---|
| <b>Standards</b>                            |   |
| IEEE 1588-2008                              | PTP 1588v2 – IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems                                   |
| IEEE 802.1AS-2011 & 2020                    | gPTP – IEEE Standard for Local and Metropolitan Area Networks – Timing and Synchronization for Time-Sensitive Applications in Bridged Local Area Networks |
| <b>PTP Profiles</b>                         |   |
| Avnu  | Automotive Ethernet AVB Functional and Interoperability Specification Revision 1.6  |
| AES67-2018                                  | AES standard for audio applications of networks – High-performance streaming audio-over-IP interoperability   |
| SMPTE ST 2059-2:2015                        | SMPTE Profile for Use of IEEE-1588 Precision Time Protocol in Professional Broadcast Applications   |
| draft-ietf-tictoc-ptp-enterprise-profile-18 | Enterprise Profile for the Precision Time Protocol with Mixed Multicast and Unicast Messages  |
| ITU T-REC-G.8265.1                          | Precision time protocol telecom profile for frequency synchronization   |

## Ordering Information

| Product Number   | Description   |
|------------------|---|
| AON-PB-TSN-TIME  | TSN Time Sync support on STC platform (IEEE 1588 & 802.1AS) |
| AON-PB-TSN-CORE* | TSN Core Protocols Bundle                                   |

\*Related Bundle