Oscilloquartz accessSync™

OSA 5405-P SyncGrid™

Compact substation PTP grandmaster, NTP server, multi-interfaces

Smart grid

Benefits

- **Satellite-delivered timing**
  Built-in GNSS receiver enabling cost effective NTP and IEEE 1588v2 time server

- **Mitigating GNSS vulnerabilities**
  Advanced jamming and spoofing detection on device and management levels

- **Ease of operation**
  Managed by Ensemble Controller and Ensemble Sync Director

- **Simple installation and maintenance**
  Powered over Ethernet, SyncJack™ monitoring and assurance

- **Optimized for power utilities**
  Perfectly matching smart-grid requirements with PTP power profile, NTP, IRIG, and PPS

- **Compact and carbon-friendly design**
  Distribution of accurate timing with the smallest size and power footprint on the market

Overview

As energy distribution networks are transformed into smart grids, standardized networking and digital operations becomes mandatory. IEC 61850-compliant automated substations are essential for intelligent energy distribution. Precise synchronization is a key requirement, and IEEE 1588 PTP is the protocol of choice, for delivering timing with sub-µs accuracy and high availability. Solutions should combine network- and satellite-delivered timing with a range of legacy and packet interfaces for a seamless transformation of the substation.

Our OSA 5405-P, an integrated GNSS receiver and PTP grandmaster as well as NTP server, can be deployed in operation rooms or shelters in a smart grid site such as a substation or distributed power generator. A wide range of synchronization interfaces such as IRIG-B and PPS make it the perfect choice for replacing legacy synchronization devices while complementing the timing network with accurate PTP. With the support of several PTP profiles including power profiles, this solution can also be applied as synchronization gateway between service providers and power utility networks.

aPNT+™

Rear view

Front view

Oscilloquartz multisource aPNT+™ platform

OSA 5405-P SYNCGRID™

High-level technical specifications

OSA 5405 series highlights

- Cost-effective sync delivery
- Small form-factor PRTC-A PTP grandmaster, GNSS receiver and NTP server
- Robust design
- Combo fiber/copper Ethernet interface

Power utility variant

- Indoor cost-efficient installation
- Excellent receiver performance for indoor applications
- Small footprint for wall-, DIN- or rack-mounting
- IRIG-B DCLS/AM option

Universal applicability

- Legacy timing such as IRIG and PPS
- Network-delivered timing with PTP and NTP
- Widest range of PTP profiles
- Satellite delivered timing

GNSS receivers

- Up to three concurrent GNSS constellations
- Supporting GPS, GLONASS, BeiDou and GALILEO
- Hardware-supported jamming and spoofing detection

PTP profiles & operation modes

- GM-supported profiles: IEEE 1588 2008 L3/L2 and ITU-T
- 8265.1 / 8275.1 / 8275.2 / Power / Broadcast / Enterprise
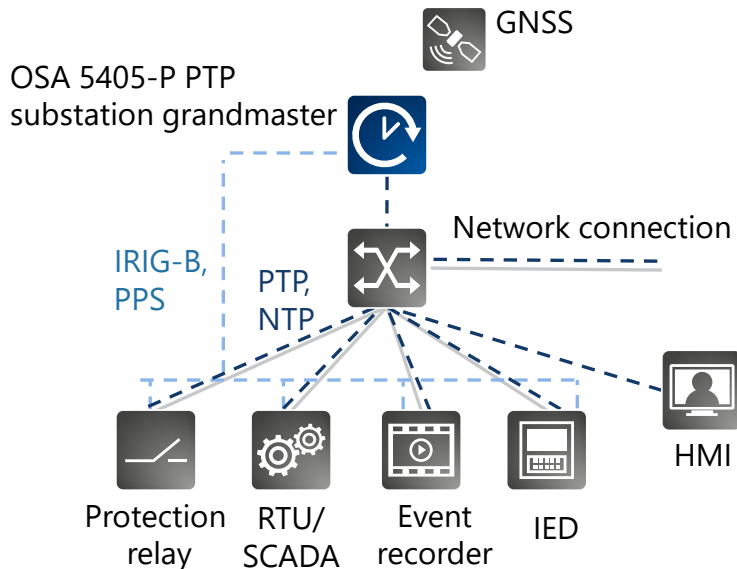- PTP over IPv4 and IPv6
- PTP and Sync-E fallback options

Management

- In-band IPv4/v6 management
- Remote and secure CLI-Telnet and SSH
- Separate management and PTP IP address
- Ensemble NMS suite

Applications in your network

Migrating timing at substation from IRIG to PTP

- Local timing solution with satellite-delivered UTC-traceable time
- Combining satellite-delivered timing with network-delivered timing
- Network-delivered time as master and satellite-delivered time for assurance and backup

Product specifications

Substation grandmaster

	OSA 5405-P SyncGrid™	Compact, cost optimized PTP grandmaster and NTP server for Indoor deployment in power utilities	Featuring integrated L1 GNSS receiver with external antenna, PPS, alarm relay and IRIG interface

PTP features

- Full featured IEEE 1588-2008 PTP grandmaster, boundary and slave clocks
- Assisted partial timing support (APTS) – PTP input to backup GNSS outage over network with partial/no timing support
- 1-step and 2-step clock
- Dedicated or common IP PTP interface
- VLAN (IEEE 802.1Q) or untagged
- Sync-E input to PTP output (frequency) conversion
- Conversion between PTP profiles
- Maintain PTP slaves list
- Fixed and dynamic asymmetry compensation
- Hardware base DoS protection

PTP master modes of operation

- PTP power and utilities profiles
  - IEC/IEEE 61850-9-3
  - IEEE C37.238-2011
  - IEEE C37.238-2017
- PTP telecom profiles:
  - ITU-T G.8265.1 & Telecom2008 frequency delivery profiles
  - ITU-T G.8275.2 time/phase delivery profile (APTS & partial timing support)
  - ITU-T G.8275.1 time/phase delivery profile (full timing support)
- PTP enterprise profile (Mixed IP multicast and unicast)
- PTP Broadcast profiles:
  - SMPTE ST 2059-2
  - AES67 media profile
- PTP AVB/TSN profile: IEEE 802.1AS
- IEEE1588v2 default PTP profiles over L3 (Annex D and E) and L2 (Annex F)
- Up to 64 unicast slaves @ 128 pps

PTP slave modes of operation

- PTP power and utilities profiles
  - IEC/IEEE 61850-9-3
  - IEEE C37.238-2011
  - IEEE C37.238-2017
- PTP telecom profiles:
  - ITU-T G.8265.1 & Telecom2008 frequency delivery profiles
  - ITU-T G.8275.2 time/phase delivery profile (APTS & partial timing support with BMCA and automatic asymmetry compensation to two remote masters)
  - ITU-T G.8275.1 time/phase delivery profile (full timing support)
- IEEE1588v2 default PTP profiles over L3 (Annex D) and L2 (Annex F)
- PTP enterprise profile (Mixed IP multicast and unicast)

Ethernet interfaces

- Hardware-based timestamping
- One combo 100/1000BaseT (copper) or 1000BaseX (SFP-fiber) port
- Fiber port support SM/MM colored/non-colored SFP and single fiber SFP

Synchronous Ethernet (Sync-E)

- Compliant to the relevant sections of ITU-T G.8261/G.8262/G.8264
- Supported on ingress and egress
- Ethernet synchronization message channel (ESMC)
- Sync-E input for time holdover during GNSS outage

OSA 5405-P SYNCGRID™

Syncjack™ monitoring and assurance tools

- Clock accuracy for up to two clock probes – computing TE and TIE of physical clocks
  - Calculation TE/TIE between physical source and reference signals
  - Programmable source and reference signals including SyncE, GNSS, PTP recovered clock.
  - TE/TIE raw data collection and export to server
- Clock analysis for up to two PTP clock probes – packet TE/TIE
  - Calculation of packet TE/TIE between physical reference signal and timestamps within the PTP packets
  - Programmable reference signals including SyncE and GNSS
  - TE/TIE raw data collection and export to server
  - Integrated with Ensemble Sync Director

GNSS receiver

- Provide high accuracy for PRTC-A applications
- Accuracy within +/-100nsec from UTC
- Independent 72-channel multi-constellation
- Supports single satellite timing modes
- Survey fixed location
- Configurable fixed location
- Navigation mode
- Configurable satellites SNR and elevation masks
- Advanced spoofing and jamming detection on device level
- AI based spoofing and jamming detection based on Ensemble Controller featuring NMS GNSS assurance
- GPS/QZSS L1 C/A and GLONASS L10F, BeiDou B1 , Galileo E1, SBAS (QZSS ,WAAS, EGNOS, MSAS)
- Up to three concurrent GNSS constellations
- User-configurable antenna cable delay compensation
- Voltage to antenna:+5 VDC
- Antenna connector SMA-F (50 ohms)

NTP Server

- Smallest NTP server formfactor
- Security-hardened NTP server with hardware-based responder
- Stratum 1 NTP server when locked to GNSS
- NTP v1, v2, v3, v4 and SNTP over IPv4 /IPv6
- Time and daytime protocols
- Hardware-based timestamping
- Within +/-100nsec from UTC
- Hardware base DoS protection using NTP responder
- Up to 500,000 transactions per second
- Support PTP and NTP on same port
- PTP to NTP translation
- PTP backup in case of GNSS outage

Programmable I/O

- CH1: SMA-F IRIG-B DCLS/AM 5V output , CLK/PPS/2M I/O
- CH2: SMA-F IRIG-B AM 5V output
- Optical ST connector – fiber 62/125µm , 820nm multimode IRIG-B-DCLS output
- Serial RS422 over RJ-45 – PPS/IRIG-B-DCLS
- Alarm/pulse relay
- Timecodes DCLS (B000 - B007); AM (B120 - B127)
- Support for IEEE1344 and IEEE C37.118

Internal oscillator

- OCXO Stratum 3E

Management and security

- In-band management (over PTP/Sync-E port)
- IPv4 and IPv6 supported
- Remote CLI - Telnet & SSH (Secure Shell)
- Separate MGMT IP & PTP address
- VLAN and untagged
- IGMP
- System software download via TFTP & SCP (secure copy)
- Enable to disable each of the protocol via CLI
- Alarm log
- Syslog

- Remote authentication via RADIUS
- Remote, secured backup and restore
- Remote, secured SW upgrade
- Low touch provisioning using configuration file
- Multi-Level user Access
- Access control list (ACL)
- Full management using SNMP v2/v3 including authentication and encryption
- LLDP
- Alarms, inventory and traps reporting to NMS
- Managed by Adtran Ensemble Controller and Ensemble Sync Director, including GNSS assurance toolkit

Regulatory and standards compliance

- Safety
  - IEC/UL 62368-1
- EMC, environmental
  - EN 55032, EN 55035
  - ETSI EN 300 386
  - FCC CFR 47 Part 15 Subpart B
  - ANSI C63.4:2014
  - CISPR 32, CISPR 35
  - IEEE 1613
  - IEC 61850-3
- Sync and time
  - ITU-T G.8261, G.8262, G.8264
  - ITU-T G.8272, G.811
  - ITU-T G.8265.1, G.8275.1, G.8275.2
  - IEC/IEEE 61850-9-3, IEEE C37.238-2011/2017
  - SMPTE ST 2059-2, AES67
  - IEEE 1588 2008 (PTPv2)
  - RFC 1059 (NTPv1), RFC 1119 (NTPv2), RFC 1305 (NTPv3), RFC 5905 (NTPv4), RFC 4330 (SNTPv4)
  - RFC868 (Time), RFC867(Daytime)
- Others
  - RoHS compliance
  - CE
  - UL
  - FCC
  - WEEE

Power consumption

- Max. power consumption: 3W (without SFP)
- IEEE 802.3at type 1 powered device
- PoE class 0

Mechanical

- Size: 103.4mm (W) x 22.1mm (H) x 100.1mm (D)
- Weight: 400g

Environmental

- Operating temperature: -25 to +65ºC
- Storage temperature : -40 to +70ºC (GR-63-CORE, ETS 300 019-1-1)
- Humidity: 5 to 95% (non-condensing)

Installation

- DIN, table ,wall , rack-mount options

Operational accessories

- PoE injector AC/DC and wide range DC
  - AC: 90 to 264VAC / 47 to 63Hz
  - DC: 47 to 57 VDC
  - Wide range DC: 80 to 320VDC
- SM or MM SFPs
- GNSS (GPS/GLONASS/BeiDou/Galileo) antenna kits 10/20/60/120/150m (32.8ft/65.6ft/ 196.85ft/393.7ft/492.1ft), including indoor and outdoor cables, roof antenna, lighting protector and mounting kit
- Lightning protector

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