OSCILLOQUARTZ
A division of Adtran

Oscilloquartz accessSync™

Data Sheet

OSA 5401 SyncPlug™

SFP-based PTP grandmaster, NTP server, boundary/slave clock, GNSS receiver

5G Mobile | Telecom | Defense | Data center | Smart grid | Transportation | Financial | Broadcast

Benefits

- **Syncjack™ technology**
  Highly accurate timing delivery and assurance with smallest footprint on the market
- **Fully-featured freq. and phase enabler**
  Built-in GNSS receiver enabling PRTC and IEEE 1588v2 grandmaster (GM), boundary (BC), slave clock (SC) and NTP server functionality
- **Compatible**
  Compliant with SFP multi-source agreement (MSA) – no need for additional space and power
- **Advanced jamming and spoofing detection**
  Advanced jamming and spoofing detection on device and NMS levels
- **Extended holdover performance**
  Multiple fallback options - high-stability OCXO, SyncE and PTP can be used in the event of GNSS outage
- **Customizable**
  OEM product customization option for vendor branding

Overview

From 4G and 5G mobile networks, through power utilities to modern broadcast services, mission-critical applications demand ultra-compact and cost-effective synchronization solutions for deployment deep in the network with minimal footprint and power consumption. Our OSA 5401 SyncPlug™ enables precise synchronization in the most space-restrictive environments. Now there's a simple way to upgrade legacy systems with IEEE 1588v2 Precision Time Protocol (PTP).

The OSA 5401 SyncPlug™ small-form factor pluggable (SFP) is a powerful and versatile time server with a built-in GNSS receiver and the smallest footprint and most compact design on the market. It enables accurate phase and frequency synchronization using PTP, Sync-E and NTP at the network edge with zero-adding footprint. Its small form factor and rich feature set enable a versatile range of deployment options for enhanced synchronization network performance.

Oscilloquartz multisource aPNT+™ platform

OSA 5401 SYNCPLUG™

High-level technical specifications

OSA 5401 SyncPlugTM

- Small form-factor pluggable SFP with GNSS receiver
- Integrated GM, BC, SC
- Integrated NTP server
- Robust design
- Add-on plugs into hosting device

SFP form factor

- Power consumption < 1.5W
- Extended operating temperature range
- MSA compliant
- Zero footprint

PTP functionalities

- Configurable as GM, BC, slave clock and APTS
- GM supported profiles:
  - IEEE 1588 2008 L3/L2,
  - ITU-T 8265.1 / 8275.1 / 8275.2
  - Power, broadcast
- PTP over L2 and over IPv4/IPv6 supported simultaneously

Timing accuracy

- +/-100nsec from UTC
- G.8272 / G.8273.1 compliant PRTC
- G.811 compliant PRC
- G.8262 / G.8264 Sync-E

Management

- In-band management over IPv4 and IPv6
- Remote and secured CLI-Telnet and SSH
- Separate management and PTP IP address
- Ensemble mgmt. and control

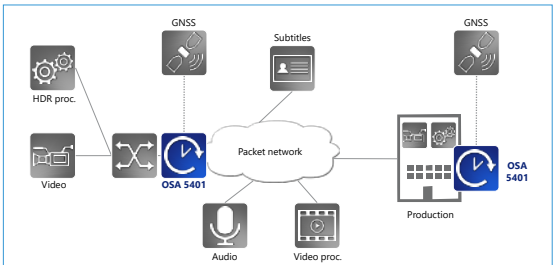
Built-in GNSS receiver

- 72-channel multi-GNSS
- Enhanced timing features
- Advanced jamming and spoofing detection
- Dual-frequency GNSS
- GPS, GLONASS, BeiDou

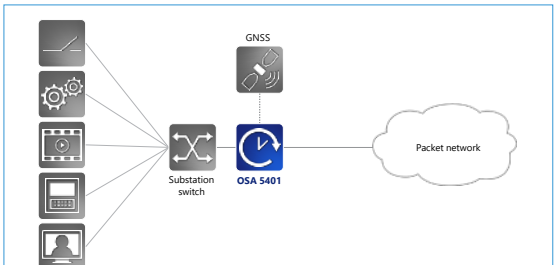
Applications in your network

Ultra-compact and cost-effective synchronization

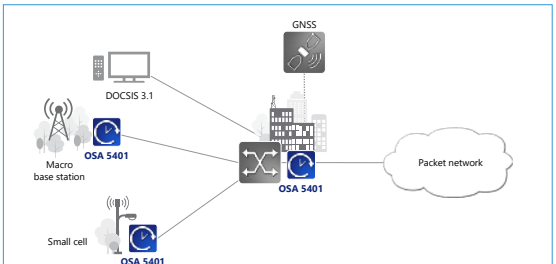
- Radio access network synchronization including 3G, 4G, 5G (femtocells and small cells as well as macro cells)
- GNSS receiver upgrade for small cells
- Cable networks (DOCSIS 3.1) and PON synchronization
- Modernized power utility and media broadcast networks
- Time-sensitive network and audio video bridging
- Time-as-a-service into data center, financial, health and media networks
- Upgrade of aggregation switches for delivering precise frequency and phase sync via PTP and SyncE
- PTP boundary and slave clock enabler to existing network elements such as switches and microwaves



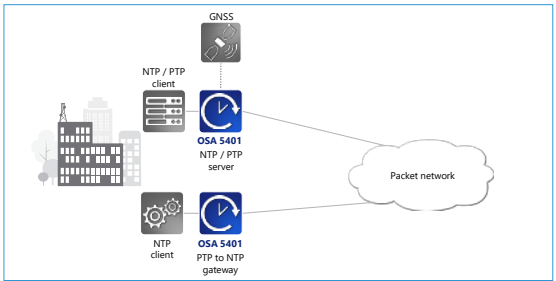
Synchronization in broadcasting networks (SMPTE 2059)



Synchronization in power utilities (IEC 61850)



Synchronization of radio access networks and DOCSIS 3.1



Synchronization in finance and enterprises

OSA 5401 SYNCPLUG™

Product specifications

Main applications

- 1588v2 PTP grandmaster, boundary and slave clocks
- PTP to Sync-E and Sync-E to PTP conversion
- GNSS receiver operating as PRTC and PRC
- NTP server

PTP master modes of operation

- PTP Telecom profiles:
  - ITU-T G.8265.1 & Telecom2008 frequency delivery profiles
  - ITU-T G.8275.2 time/phase delivery profile
  - ITU-T G.8275.1 time/phase delivery profile (full timing support) also used for DOCSIS 3.1
- PTP enterprise profile (mixed IP multicast and unicast)
- PTP power and utility profiles:
  - IEC/IEEE 61850-9-3
  - IEEE C37.238-2011
  - IEEE C37.238-2017
- 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)
- Grandmaster simultaneous support for multiple profiles

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)

PTP features

- Up to 64 unicast slaves at 128pps
- 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 asymmetry compensation
- Hardware base DoS protection

Ethernet interface

- SFP or combo SFP/SFP+ 1000Base-X (MSA compliant)

1PPS/CLK out

- User configurable output: 1PPS/10MHz/2.048MHz
- RP-MMCX connector (50ohms)

Synchronous Ethernet (Sync-E)

- Compliant to the relevant sections of ITU-T G.8261/ G.8262/G.8264
- Supported on ingress and egress
- G.811 compliant Sync-E primary reference clock (PRC) when locked to GNSS
- Ethernet synchronization message channel (ESMC)
- Sync-E input for time holdover during GNSS outage

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 & 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
- Stationary or moving platforms

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:+3.3 VDC
- Antenna connector SMA-F (50 ohms)

Internal oscillator

- Frequency stability over temperature: +/-10ppb
- Frequency slope ΔF/ΔT: +/-0.5 ppb/°C
- Long term stability (aging):
  - +/-1ppb/day
  - +/-2.5ppm/20 years

Frequency accuracy

- G.811 compliant PRC while locked to GNSS

Time and phase accuracy

- G.8272 / G.8273.1 compliant PRTC (±100nsec from UTC, MTIE<100nsec) while locked to GNSS
- During GNSS outage: time holdover using a G.811 PRC / G.8272 PRTC Sync-E input
  - Traceable to G.811 PRC: TimeError < UTC +/-1µsec for 24 hrs
  - Traceable to G.8272 PRTC: TimeError < UTC +/- 1µsec for 72 hrs

Indications

- GNSS operation and general fault indication status LED

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 Controller Sync Director

Management and security

- In-band management (over PTP / Sync-E port)
- Remote CLI – Telnet & SSH (Secure Shell)
- Separate MGMT IP & PTP address
- VLAN and untagged
- 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

OSA 5401 SYNCPLUG™

Regulatory and standards compliance

- 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
- IEEE 1588v2 (PTP)
- RFC 1059 (NTPv1), RFC 1119 (NTPv2), RFC 1305 (NTPv3), RFC 5905 (NTPv4), RFC 4330 (SNTPv4)
- RFC868 (Time), RFC867(Daytime)
- ETSI EN 300 386 V1.6.1
- EN 55024
- EN 55022 Class-B
- AS/NZS CISPR 22
- FCC CFR 47 Part 15 Subpart B
- ANSI C63.4 Class-B
- IEC/EN 61000-3-2
- IEC/EN 61000-3-3
- IEC/EN 61000-4-2 (ESD): ±15 kV / ±8 kV (air/contact)
- IEC/EN 61000-4-3 (RI)
- IEC/EN 61000-4-4 (EFT): 1 kV / 50 A (5/50 ns)
- IEC/EN 61000-4-5 (Surge): 4KV (10/700 µs)
- IEC/EN 61000-4-6 (CI)
- EN 60950-1:+A11, +A12, +2 (SAFETY)
- RoHS compliance

Environmental

- Operating temperature: -40 to +80°C / -104 to 176°F
- Storage temperature: -40°C to +85°C / -104 to 185°F
- Humidity: 5 to 95% (non-condensing)

Power consumption

- Max power consumption <1.5W (T >20°C)

Optional accessories

- GNSS (GPS/GLONASS/BeiDou) antenna kits 10/20/60/120/150m (32.8ft/65.6ft/ 196.85ft/ 393.7ft/492.1ft), including indoor and outdoor cables, roof antenna, lightning protector and mounting kit
- Patch window antenna
- 1:2/1:4/1:8 GNSS splitters
- RP-MMCX to BNC adapter cable