

OSA 5401 SyncPlug™

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

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.



OSA 5401 SYNCPLUG™

High-level technical specifications

OSA 5401 SyncPlug™

- 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

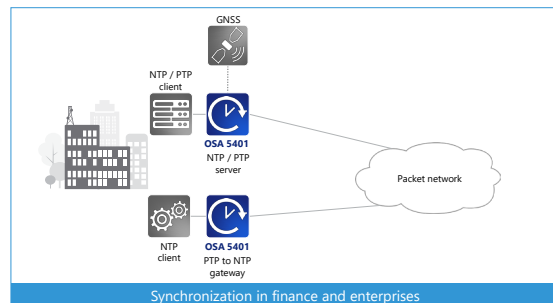
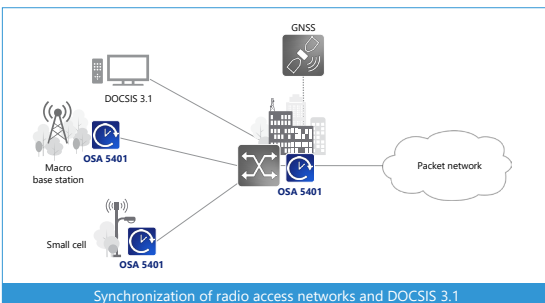
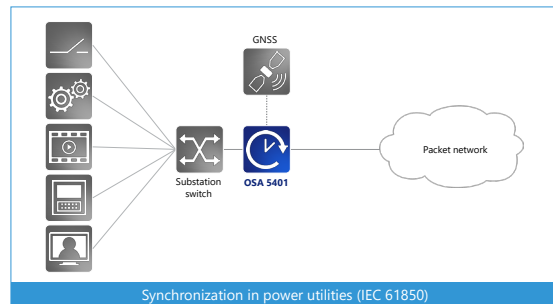
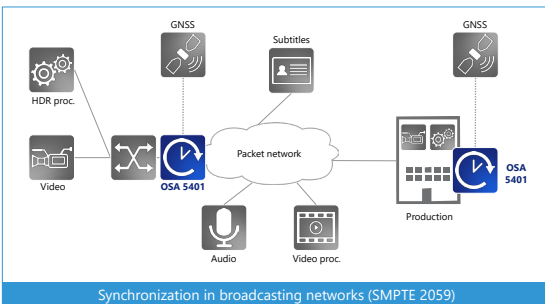
Built-in GNSS receiver

- 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



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)

IPPS/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 L1OF, 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 $\Delta F/\Delta T$: +/-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 (± 100 nsec 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

