OSCILLOQUARTZ
A division of Adtran

Oscilloquartz edgeSync™

Data Sheet

OSA 5410 Series

Compact PTP grandmaster, multi-interfaces

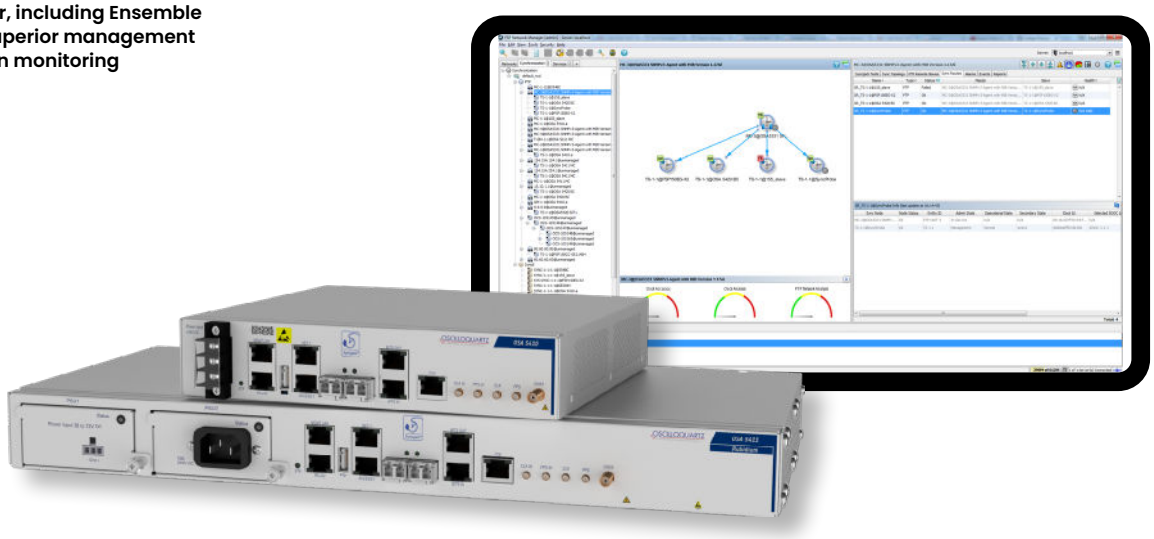
Benefits

- **Compact and cost-effective**
  Small form factor design optimized for access network deployment
- **Syncjack™ technology**
  Built-in technology for in-service synchronization accuracy monitoring, testing and assurance functionality
- **Unique flexibility**
  Configurable to operate in grandmaster clock, assisted partial timing support (APTS), boundary clock and slave clock mode
- **Real-time sync monitoring**
  In-service, network-based synchronization moni-toring
- **High-availability design**
  Automatic clock selection, self-calibrating delay asymmetry compensation and power supply redundancy
- **Operational simplicity**
  Ensemble Controller, including Ensemble Sync Director, for superior management and synchronization monitoring capabilities

Overview

Radio access network (RAN) technology is evolving. Reliable and highly precise delivery of phase, frequency and time-of-day synchronization across mobile backhaul networks has become critical. Real-time synchronization monitoring also plays a key role in detecting sync degradations before services are affected and assuring sync performance.

With our OSA 5410 Series, ensuring cost-effective and reliable synchronization of your base station clocks is no longer a challenge. This family of IEEE 1588v2 Precision Time Protocol (PTP) access grandmaster devices features a built-in GNSS receiver. What's more, it also has the unique capability of monitoring synchronization quality while operating in service; powered by our Syncjack™ technology, the OSA 5410 can perform clock frequency and phase accuracy measurements of both PTP and legacy networks.



OSA 5410 SERIES

High-level technical specifications

OSA 5410

- High-quality OCXO
- Integrated PSU (AC/DC)
- 1RU 19" half-width chassis, ETSI compliant
- Cost-effective PTP GM, BC, slave and sync probe

OSA 5411

- Quartz, high-quality quartz or rubidium
- Hot-swappable redundant PSU (AC/DC)
- 1RU 19" chassis, ETSI compliant

Main applications

- 1588v2 PTP grandmaster, boundary and slave clock, and APTS clock
- GNSS receiver and PRTC
- Synchronization signal conversion
- Sync probe – Syncjack™ monitoring and assurance

Built-in GNSS receiver

- Software configurable
- GPS/GLONASS/BEIDOU/ GALILEO
- GPS+GLONASS
- GPS+BEIDOU
- GPS+GALILEO

PTP operation modes

- ITU-T G.8265.1 frequency delivery profile
- ITU-T G.8275.1 (full timing support) and ITU-T G.8275.2 profiles (APTS)
- PTP enterprise profile
- Default profiles over Ethernet and IP multicast

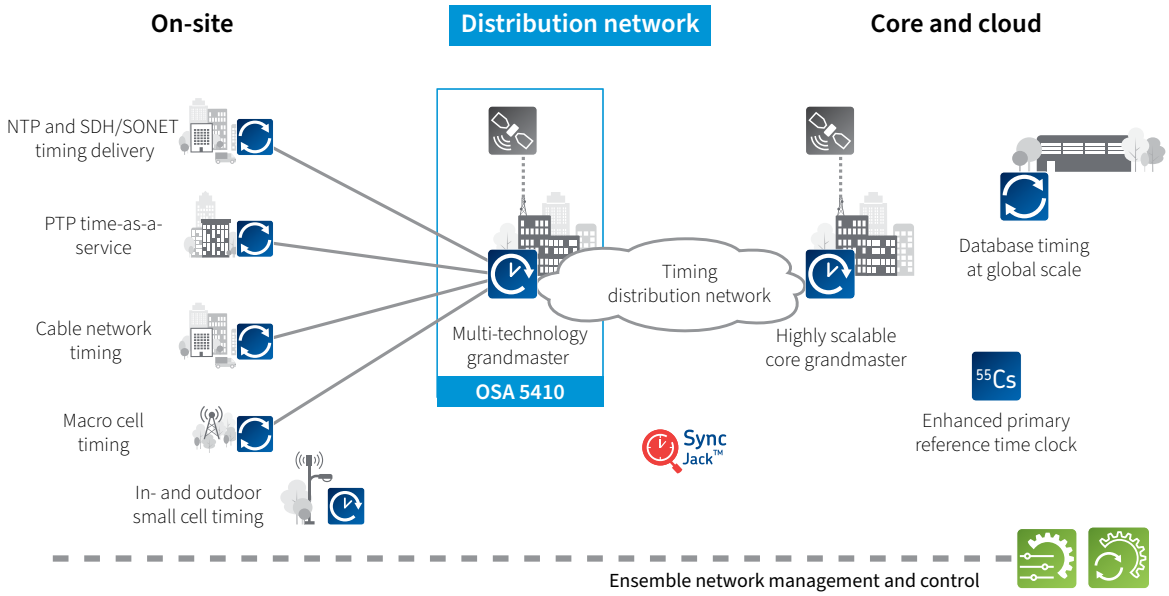
Syncjack™ technology

- Frequency and phase accuracy measurements
- TE, TIE and MTIE calculation
- PTP message transport analysis
- PTP network analysis

Applications in your network

Radio access network synchronization and in-service sync probing

- Assured synchronization of LTE-TDD, LTE-Advanced and 5G radio base stations
- PTP slave capable of translating between PTP and Sync-E/BITS/CLK/PPS outputs
- Sync probing – In-service, network-based monitoring, testing and assurance that macro and small cell radio base station clocks are precisely tracking their master
- Time as a service into data center, financial, health and media networks



OSA 5410 SERIES

Product specifications

Product variants

	OSA 5410 Quartz[1]	OSA 5411 Quartz[2]	OSA 5411 Quartz HQ++[3]	OSA 5411 Rubidium[4]
				
Clock	OCXO	OCXO	High-quality DOCXO	Rubidium
Size	1RU, half-width	1RU 19" chassis	1RU 19" chassis	1RU 19" chassis
PSU	Integrated PSU (AC/DC)	Hot-swappable redundant PSU (AC/DC)	Hot-swappable redundant PSU (AC/DC)	Hot-swappable redundant PSU (AC/DC)

Main applications

- 1588v2 PTP Grandmaster Clock (up to 64 PTP clients)
- 1588v2 PTP Boundary Clock (up to 64 PTP clients)
- 1588v2 APTS Clock (Assisted Partial Timing Support Clock)
- 1588v2 PTP Slave Clock
- GNSS Receiver and PRTC
- Synchronization signal conversion
- Sync Probe – Syncjack™ monitoring and assurance

Synchronization interfaces

- Synchronous Ethernet ITU-T G.8261/G.8262/G.8264
- 1 x BITS-in and 1 x BITS-out (2.048MHz, E1 or T1)
- 1 x 1PPS in/out and 1 x 1PPS in
- 1 x Time-of-day (ToD) + 1PPS in/out
- 1 x CLK 10MHz in/out and 1 x CLK 10MHz in
- Antenna input for embedded GNSS receiver

Ethernet interfaces

- Two combo 10/100/1000BaseT or 100/1000BaseX (SFP) ports

Synchronous Ethernet (SyncE)

- Support on all Ethernet interfaces in fiber and copper modes
- Compliant to the relevant sections of ITU-T G.8261/G.8262/G.8264
- Ethernet synchronization message channel (ESMC)
- SyncE for time holdover during GNSS outage

BITS

- 1 x BITS input over shielded RJ-48
- 1 x BITS output over shielded RJ-48
- User-configurable: E1, T1, 2.048MHz
- G.823/G.824 sync interface compliant
- Synchronization status message (SSM)
- BITS input for frequency input or output (Sync-E Tx, 10M out)
- BITS input for time holdover during GNSS outage
- Output squelch option
- SSU filtering option

1PPS in/out, 1PPS In

- 1 x 1PPS input
- 1 x 1PPS input/output (user configurable)
- User configurable input and output delay compensation
- Mini SMB-M connector (50 Ohms)
- Output squelch option

Time-of-day (ToD) output

- G.8271 compliant
- ToD format – NMEA 0183 ($GPZDA sentence) and CCSA
- RS422 over shielded RJ-45
- Output squelch option

CLK in/out, CLK In

- 1x CLK 10MHz input
- 1x CLK 10MHz input/output (user configurable)
- Mini SMB-M connector (50 Ohms)
- Output squelch option

GNSS receiver

- Multi-constellation GNSS (GPS, GLONASS, GALILEO and BEIDOU) L1 32 channels receiver
- User configurable antenna cable delay compensation
- Software configurable mode of operation
  - GPS (1575.42 MHz)
  - GLONASS (1601.5 MHz)
  - BEIDOU (1561MHz)
  - Combined GPS + GLONASS
  - Combined GPS + BEIDOU
- Voltage to antenna +5VDC
- Antenna connector SMA-F (50 Ohms)

Holdover performance

	Clock	Aging/Day (after 30 days)	Temperature stability
Quartz	High-quality OCXO Stratum 3/G.812 Type III	± 5 x 10^{-10}	± 50 x 10^{-10}
Quartz HQ++	DOCXO Stratum 2/G.812 Type II	± 5 x 10^{-11}/ ± 1 x 10^{-11}*	± 1 x 10^{-11}*
Rubidium	Rubidium Stratum 2/G.812 Type II	± 5 x 10^{-12}	± 2 x 10^{-10}

*Note: Effective daily aging for the next following three days after device has been powered for one month and locked to GPS for three days.

	400nsec	1.1usec	1.5usec	5usec	10usec	16ppb
Quartz	2 hours	4 hours	5 hours	8 hours	14 hours	1 month
Quartz HQ++	15 hours	1.3 days	2 days	4 days	6 days	>1.5 years
Rubidium	15 hours	1.3 days	2 days	4 days	6 days	>5 years

Note: The above are approximated values assuming constant temperature, no initial phase and frequency error, after OSA 541X has been powered for one month and locked to GPS for 72 hours

Sync signal conversion

	SyncE Tx	BITS OUT	CLK OUT (10MHz)	PTP	1PPS OUT	ToD
GPS/GNSS	✓	✓	✓	✓	✓	✓
SyncE Rx	✓	✓	✓	✓	freq.	n/a
BITS IN	✓	✓	✓	✓	freq.	n/a
CLK IN (10MHz)	✓	✓	✓	✓	freq.	n/a
PPS IN	✓	✓	✓	✓	✓	✓
PTP	✓	✓	✓	✓	✓	✓

OSA 5410 SERIES

GM/PRTC frequency and time accuracy

- While locked to GNSS:
  - Phase & time – G.8272 phase accuracy (±100nsec from UTC)
  - Frequency – G.811 frequency accuracy

Syncjack™ monitoring and assurance tools

- Clock accuracy for up to two clock probes – computing TE, TIE and MTIE of physical clocks
  - Calculation of maximum, constant and dynamic TE, TIE and MTIE between physical source and reference signals
  - Programmable source and reference signals including SyncE, BITS, 1PPS, GNSS and 10MHz
  - MTIE mask and Time Error threshold alarms based on SNMP traps
- Clock analysis for up to four PTP clock probes – packet TE, TIE and MTIE
  - Calculation of packet maximum, constant and dynamic TE, TIE and MTIE between physical reference signal and timestamps within the PTP packets
  - Support for active and passive probe mode
  - Programmable reference signals including SyncE, BITS, 1PPS, GNSS and 10MHz
  - MTIE mask and time error threshold alarms based on SNMP traps
  - PTP network analysis including PTP network probe
  - Packet delay and packet delay variation performance statistics
  - Delay asymmetry
  - Network usability statistics (FPP based on G.8261.1)
  - Packet loss statistics
  - Programmable reference signals including SyncE, BITS, 1PPS, GNSS and 10MHz
  - Enhanced sync assurance statistics, performance monitoring (15min & 24h), threshold crossing alarm (TCA) and SNMP traps

PTP networking features

- PTP profiles support:
  - ITU-T G.8265.1 frequency delivery profile (IP unicast)
  - ITU-T G.8275.1 time/phase delivery profile (Full Timing Support - Ethernet multicast)
  - ITU-T G.8275.2 time/phase delivery profile (Assisted Partial Timing Support - IP unicast)
  - PTP Enterprise profile (Mixed Multicast and Unicast over IP)
  - IEEE 1588 2008 PTP default profile over IP multicast
  - IEEE 1588 2008 PTP default profile over Ethernet multicast (Annex F)
- Up to 4 Master/BC IP addresses
- Up to 4 VLANs (IEEE 802.1Q customer-tagged) and stacked VLANs
- Support for multiple profiles simultaneously
- Support PTP (TAI) and arbitrary (ARB) timescales
- Support master and slave on any port simultaneously
- Up to three stacked VLANs per flow (Q-in-Q service provider tagged)
- ICMP/DSCP/TOS
- Static routes configuration of default getaways
- Enhanced PTP GM/BC/slave statistics, performance monitoring (15min & 24h), threshold crossing alarm (TCA) and SNMP traps

Low-touch provisioning

- Text-based configuration files
- FTP/SFTP/SCP for configuration file copy
- Remote software upgrade

Management and security

Local management

- Serial connector (RS232 over RJ45) using CLI

Remote management

- Local LAN port (10/100BaseT over RJ45) using CLI, SNMP and Web GUI interfaces
- Support for IPv4 and IPv6
- 3G/LTE USB interface
- Maintains in-band VLAN and MAC-based management tunnels
- Supported by Ensemble Suite Controller, including Ensemble Sync Director

Management protocols

- Telnet, SSH (v1/v2), HTTP/HTTPS, SNMP (v1/v2c/v3), ICMP

Secure administration

- Configuration database backup and restore
- System software download via FTP, HTTPS, SFTP or SCP (dual flash banks)
- Remote authentication via RADIUS/TACACS+
- SNMPv3 with authentication and encryption
- Access control list (ACL)

IP routing

- DHCP, RIPv2 and static routes, ARP cache access control
- IPv6 NDP address resolution
- RIPng for IPv6

System logging

- Syslog, alarm log, audit log and security log
- User configurable time zone & day light saving time
- Configurable system timing source – Local/NTP/PTP/PRTC (GNSS)

Regulatory and standards compliance

- ITU-T G.8261, G.8262, G.8264, G.703, G.781, G.812
- ITU-T G.8272, G.8273.2
- ITU-T G.8265.1, G.8275.1, G.8275.2
- IEEE 1588v2 (PTP), 802.1Q (VLAN), 802.1ad, 802.1p (Priority)
- RFC 2863 (IF-MIB), RFC 2865 (RADIUS), RFC 2819 (RMON)
- Power: ETSI 300 132-2, BTNR2511, ETS 300-019, ETS 300-019-2-[1,2,3], ANSI C84.1-1989
- Safety: EN 60950-1, 21CFR1040.10, EN 60825
- EMI: EN 55022 2010 Class A, EN 61000-3-2-2006, EN 61000-3-3 2008, EN 300 386 v1.6.1 2012, FCC 47FR Part 15 2014 Class A, ICES-002 2012 Class A
- RoHS compliance

Power supply

- Integrated PSU[1]: 110/240 VAC, -48 to -72VDC or +24 to +30VDC
- Hot swappable, modular AC-PSU[2,3,4]: 110 to 240VAC (47 to 63Hz) with over-voltage and over-current protection
- Hot swappable, modular DC-PSU[2,3,4]: -48 to -72VDC or +24 to +30VDC with over-voltage and over-current protection
- Power consumption:
  - 13W (typical), 19.5W (max)[1,2]
  - 22W (typical), 27W (max)[3]
  - 25W (typical), 30W (max)[4]

Environmental

- Dimensions:
  - 1U ½ 19" compact chassis, 220mm x 44mm x 212mm / 8.7" x 1.75" x 8.4" (W x H x D), ETSI-compliant[1]
  - 1U 19" compact chassis, 439mm x 44mm x 212mm / 17.3" x 1.75" x 8.4" (W x H x D), ETSI-compliant[2,3,4]
- Weight: 1.834 Kg[1],2.98Kg[2], 3.07Kg[3,4]
- Operating temperature:
  - -40 to +65°C (hardened environment)[1,2,3]
  - -40 to +45°C[4]
- Storage temperature: -40 to +70°C (GR-63-CORE)
- Humidity: 5 to 100% (with condensation)

Optional accessories

- 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, lightning protector and mounting kit
- 1:2/1:4/1:8 GNSS (GPS/GLONASS/BEIDOU/GALILEO) splitters
- GNSS window antenna
- Cables and adapters Accessory kit

Product Legend

[1] OSA 5410
[2] OSA 5411 Quartz
[3] OSA 5411 Quartz HQ++
[4] OSA 5411 Rubidium

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TL9000
TL19.1270

ADTRAN Certified Supplier
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