

Driven by the continuing evolution of radio access networks to support higher data rates, increased coverage and better spectrum utilization, cost-effective delivery of assured phase, frequency and time-of-day synchronization at the edge of mobile backhaul networks has become a challenge.

Are you facing challenges with high packet delay variation and delay asymmetries across your mobile backhaul network? Do you have difficulties in meeting frequency and phase synchronization accuracies required by LTE-TDD and LTE-Advanced technology? We hear it a lot and can help. With our OSA 5420 Series, a family of IEEE 1588v2 Precision Time Protocol (PTP) grandmaster devices optimized for deployment at the network edge, cost-effective and accurate synchronization is no longer a challenge. What's more, with its NTP server and GNSS receiver capability including multiple synchronization fan-out options, our OSA 5420 Series is also ideal for deployment in legacy synchronization architectures.

► OSA 5420 Series

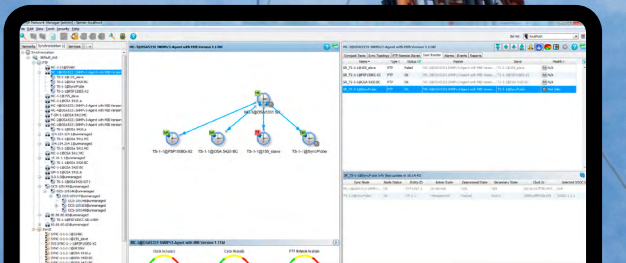
OSA 5410 Series

OSA 5401

OSA 5335

OSA 3230B

OSA Sync Survey



Your Benefits

✓ Leading Edge GNSS Receiver

Enables PRTC/PRC and grandmaster clock functionality for frequency, phase and time-of-day delivery using multiple constellations

✓ Unique Flexibility

Configurable to operate in PTP grandmaster clock, assisted partial timing support (APTS), boundary clock and slave clock mode as well as NTP Server and SSU/TSG

✓ High-Availability Design

Automatic clock selection, self-calibrating delay asymmetry compensation and power supply redundancy.

✓ Extended Holdover Performance

High-end quartz and rubidium oscillator options

✓ ADVA Syncjack™ Technology

Built-in synchronization accuracy monitoring, testing and assurance functionality

✓ Operational Simplicity

FSP Network and Sync Manager platform for superior management and sync monitoring capabilities

High-Level Specifications

OSA 5420 Series

- High-quality OCXO, DOCXO and Rubidium
- Up to two expansion line cards
- Up to 1024 unicast slaves
- Hot-swappable redundant PSU

Operation Modes

- PTP GM, BC, slave, probe
- NTP Server
- SSU – up to 32 x E1/T1 outputs
- GNSS receiver fan-out – up to 32 x clock/PPS/PPS+ToD

Built-in GNSS Receiver

- GPS/GLONASS/BEIDOU
- GPS+GLONASS
- GPS+BEIDOU
- GALILEO (hardware ready)

IEEE 1588 2008 PTP Profiles

- Default profile Ethernet multi-cast
- Telecom profiles G.8265.1 and G.8275.1
- G.8275.2 HW ready
- Enterprise hybrid profile

NTP Server

- High capacity server
- HW timestamping
- NTP/PTP/Sync-E/SSU supported simultaneously
- PTP to NTP conversion

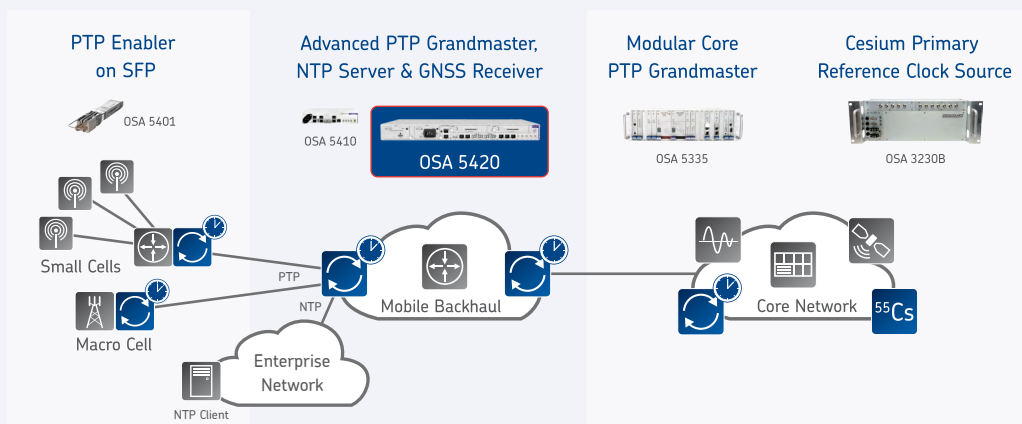
Output Cards

- 16x E1/T1/2.048MHz (120/100/75ohm)
- 16 x PPS (50ohm)
16 x clock (10MHz 50ohm)
- 16 x PPS+ToD (RJ-45)
- 4 x 1GbE (Fiber)

Applications in Your Network

Radio Access Network Synchronization

- Timing distribution at the edge of mobile backhaul networks for frequency and phase synchronization with the highest availability
- Synchronization delivery within buildings for in-door small cell radio base stations
- Precise synchronization of legacy network architectures such as NTP for timestamping



Tools and Functions





- Integrated GNSS receiver, boundary and slave clock applications for maximum flexibility
- APTS for highest synchronization signal availability and minimum delay variations/asymmetries
- NTP server with multiple, configurable fan-out options for timing signal output



For more information please visit us at www.oscilloquartz.com
Data Sheet, version 10/2016

OSCILLOQUARTZ
An ADVA Optical Networking Company

Product Variants

	OSA 5420 Quartz HQ	OSA 5420 Quartz HQ+	OSA 5421 Quartz HQ++	OSA 5421 Rubidium
				
Clock	High-quality OCXO	DOCXO	DOCXO	Rubidium
Expansion Line Cards	2	2	1	1
PSU	Hot-swappable redundant 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 1024 PTP clients)
- 1588v2 PTP Boundary Clock (up to 1024 PTP clients)
- 1588v2 APTS Clock (Assisted Partial Timing Support Clock)
- 1588v2 PTP Slave Clock
- GNSS receiver and PRC/PRTC including fan-out of multiple physical synchronization output interfaces
- NTP Server
- Synchronization protocol and physical signal conversion
- Sync Probe – Syncjack™ monitoring and assurance

PTP Networking Features

- PTP profiles support:
 - ITU-T G.8265.1 frequency delivery profile
 - ITU-T G.8275.1 time/phase delivery profile (Full Timing Support)
 - Designed to support ITU-T G.8275.2 time/phase delivery profile (Assisted Partial Timing Support)
 - PTP Enterprise profile (Mixed Multicast and Unicast)
 - IEEE 1588 2008 PTP default profile over Ethernet multicast (Annex F)
- Up to 16 Master/BC IP addresses
- Up to 16 VLANs (IEEE 802.1Q customer-tagged) and stacked VLANs
- Support for multiple profiles simultaneously
- Support master and slave on any port simultaneously
- Up to three stacked VLANs per flow (Q-in-Q service provider tagged)
- ICMP/DSCP/TOS
- Enhanced PTP GM/BC/Slave statistics, performance monitoring (15min and 24h), threshold crossing alarm (TCA) and SNMP traps
- In-house best-in-class clock recovery algorithms

NTP Features

- Stratum 1 NTP Server when locked to GNSS
- NTP v2,v3,v4
- Hardware timestamping
- Within +/-100nsec from UTC
- Up to 16 NTP Server IP addresses
- Support PTP and NTP on same Ethernet port
- PTP to NTP translation
- Up to three stacked VLANs per flow (Q-in-Q service provider tagged)
- Enhanced NTP statistics
- 7000 transaction per second (per system)
- PTP backup in case of GNSS outage

Synchronization Interfaces (Onboard)

- Synchronous Ethernet over FE/GbE interfaces
- 1 x BITS-in and 1 x BITS-out (2.048MHz, E1 or T1 (DS1) including SSM)
- 1 x 1PPS in/out and 1 x 1PPS in
- 1 x Time-of-Day (ToD) + 1PPS
- 1 x CLK 10MHz in/out and 1 x CLK 10MHz in
- Antenna input for embedded GNSS receiver

4 x Ethernet Ports

- Hardware based timestamping (PTP & NTP)
- Two combo 100/1000BaseT or 100/1000BaseX (SFP) ports
- Two additional 100/1000BaseX (SFP) ports
- All ports support SM/MM colored/non-colored SFP and copper SFP
- Per flow hardware-based policing and scheduling
- Configurable link asymmetry delay compensation

Synchronous Ethernet (SyncE)

- Supported by 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)
- Sync-E for time holdover during GNSS outage and in accordance with PTP

BITS

- 1 x BITS input over shielded RJ-48
- 1 x BITS output over shielded RJ-48
- User-configurable: E1, T1 (DS1), 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

1PPS in/out, 1PPS in

- 1 x 1PPS input
- 1 x 1PPS input/output (user configurable)
- User configurable input and output delay compensation
- SMA-F connector (50ohm)
- 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





- 1 x CLK 10MHz input
- 1 x CLK 10MHz input/output (user configurable)
- SMA-F connector (50ohm)
- Output squelch option

GNSS Receiver

- Multi-constellation GNSS (GPS/GLONASS/BEIDOU) L1 32 channels receiver
- Hardware-ready for Galileo, SBAS, QZSS
- User-configurable antenna cable delay compensation
- Support fix positioning – single satellite mode
- Software configurable mode of operation
 - GPS (1575.42MHz)
 - GLONASS (1601.5MHz)
 - BEIDOU (1561MHz)
 - Combined GPS + GLONASS
 - Combined GPS + BEIDOU
- Voltage to antenna +5VDC
- Antenna connector SMA-F (50ohm)

Output Expansion Line Cards

- OSA 5420 – Up to two expansion cards
- OSA 5421 – One expansion card

	16 x BITS	16 x CLK/PPS	16 x PPS+ToD	4 x 1G
				
Capabilities	16x BITS outputs over high density connector (VHDCI) – supporting 2.048MHz, E1 or T1 (DS1), SW configurable of output signals type & line impedance per group of 8 (E1, 2.048MHz)	16xclock 10MHz outputs over unbalanced 50ohm interface or 16xPPS outputs over unbalanced 50ohm interface	16xPPS+ToD outputs over balanced interface	4x100/1000 Ethernet ports (PTP/NTP/Sync-E)

- Hot insertion/extraction support
- Overvoltage/current protection
- Two expansion cards share a single mountable patch panel with 16xRJ-48/RJ-45 and 16xBNC connector options

Holdover Performance

	Clock	Aging/Day (after 30 days)	Temperature Stability
OSA 5420 Quartz	High-quality OCXO	± 5e-10	± 50e-10
OSA 5420 Quartz HQ+	DOCXO	± 3e-10/± 1e-10*	± 2e-10
OSA 5421 Quartz HQ++	DOCXO	± 5e-11	± 1e-11
OSA 5421 Rubidium	Rubidium	± 5e-12	± 2e-10

* Note: Effective daily aging after device was powered for one month and locked to GPS for 3 days, for the following 3 days.

	400nsec	1.1usec	1.5usec	5usec	10usec	16ppb
OSA 5420 Quartz	2 hours	4 hours	5 hours	8 hours	14 hours	1 month
OSA 5420 Quartz HQ+	8 hours	13 hours	15 hours	1.2 days	1.7 days	0.5 years
OSA 5421 Quartz HQ++	15 hours	1.3 days	2 days	4 days	6 days	>1.5 years
OSA 5421 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 542X was powered for one month and locked to GPS for 24 hours.

Sync Signal Conversion

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

GM/PRTC Frequency and Time Accuracy

While locked to GNSS:

- Phase and Time – PRTC/G.8272 phase accuracy (±100nsec from UTC)
- Frequency – PRC/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
 - TE/TIE raw data collection and export to server
- 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
 - TE/TIE raw data collection and export to server
 - PTP Network Analysis including PTP Network Probe
 - Packet Delay and Packet Delay Variation performance statistic
 - 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), including data export, threshold crossing alarm (TCA) and SNMP traps

Low-Touch Provisioning

- Text-based configuration files
- TFTP for configuration file copy
- Remote software upgrade

Management and Security

Local management

- Serial port (RS232 over RJ45) for CLI

Remote management

- Local LAN port (10/100BaseT over RJ45) using CLI, SNMP and Web GUI interfaces
- USB interface
- Maintains in-band VLAN and MAC-based management tunnels
- Static routes & configuration of default gateways
- Fully interoperable with ADVA FSP 150EG-X and ADVA FSP 150CC products
- Supported by FSP Sync Network Manager

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
- ARP cache access control
- RIPv2 and static routes

System logging

- Syslog, alarm log, audit log and security log
- Configurable system timing source – Local/NTP/PTP/PRTC (GNSS)

Standards Compliance

- ITU-T G.8261, G.8262, G.8264, G.703, G.781
- ITU-T G.8272
- ITU-T G.8265.1, G.8275.1
- IEEE 1588v2 (PTP), 802.1Q (VLAN), 802.1ad, 802.1p (Priority)
- RFC 2863 (IF-MIB), RFC 2865 (RADIUS), RFC 2819 (RMON)
- RFC 1119 (NTPv2), RFC 1305 (NTPv3), RFC 5905 (NTPv4)

Regulatory Compliance

- CE compliance
- ROHS 6 compliance
- 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

Power Supply

- Hot swappable, modular AC-PSU: 110 to 240VAC (47 to 63Hz) with over-voltage and over-current protection
- Hot swappable, modular DC-PSU: -48 to -60VDC (tolerate -36 to -72VDC) with over-voltage and over-current protection
- Power consumption (without LC or SFP; Vin=48V):
 - OSA 5420 Quartz: 20W (typical), 22W (max)
 - OSA 5421 Quartz HQ+: 25W (typical), 35W (max)
 - OSA 5421 Quartz HQ++: 25W (typical), 35W (max)
 - OSA 5421 Rubidium: 28W (typical), 41W (max)

Environmental

- Dimensions: 443mm x 44mm x 219mm /17.44" x 1.73" x 8.62" (W x H x D), ETSI-complaint
- Weight: 3.2Kg
- Operating temperature (ambient):
 - Quartz, Quartz HQ+, Quartz HQ++: AC: -40 to +50°C / DC: -40 to +65°C (hardened environment)
 - Rubidium: -40 to +45°C
- Storage temperature: -40 to +70°C (GR-63-CORE)
- Humidity: 5 to 95% (non-condensing)

Optional Accessories

- GNSS (GPS/GLONASS) 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
- 1:2/1:4/1:8 GNSS (GPS/GLONASS) splitters
- GNSS window antenna
- Cables and adapters Accessory kit
- Patch panels for BITS/CLK/PPS/PPS+ToD