

OSA 5430

Compact, redundant, high-capacity PTP grandmaster, SB/MB-GNSS receiver



5G Mobile



Telecom



Defense



Data center



Smart grid



Transportation



Financial



Broadcast

Benefits

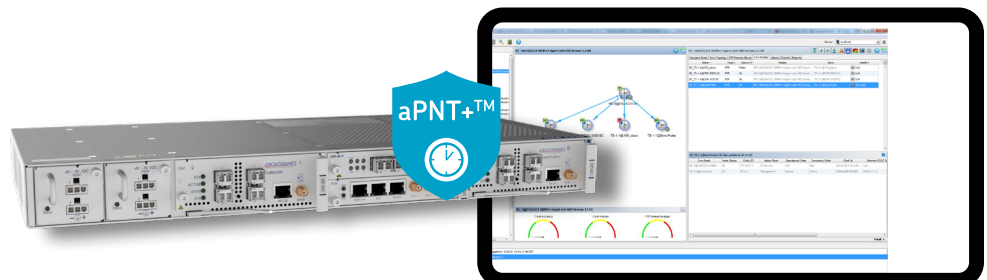
- **Fully redundant hardware**
All key modules are protected ensuring no loss of performance and high service availability
- **High-accuracy White Rabbit PTP**
Unlock sub-nanosecond synchronization with a firmware upgrade only; no extra hardware needed
- **G.8271.1 HA-TT**
System is compliant with G.8271.1 High Accuracy Time Transfer
- **ePRTC holdover re-learning continuity**
Retains previously learned holdover parameters during reference interruptions, ensuring continuous holdover performance
- **Ultra-long Holdover**
Enhanced ePRTC algorithms provide up to 150 days of holdover within 100ns
- **Multi-source ePRTC combiner**
Improves ePRTC resilience by combining up to five phase and frequency sources
- **G.8272.2 cnPRTC Annex A**
Supports UTC(k) insertion for cnPRTC clock combiner deployments
- **IEEE 1588 2019 v2.1 Annex P Reference Validator (Prong C)**
Provides cross-reference validation using complementary timing systems for enhanced timing redundancy
- **IEEE 1588 2019 v2.1 Annex P (Prong D)**
Enhanced security through PTP monitoring and management capabilities
- **NTS (Network Time Security) for NTP**
Uses RFC 8915 cryptographic authentication to protect timing services against spoofing and man-in-the-middle attacks
- **Operational simplicity**
Simplifies synchronization management and monitoring with Mosaic Network Controller, Sync Director, GNSS assurance and PTP assurance

Overview

Reliable and accurate delivery of synchronization from the core to the network edge is essential to meet the stringent requirements of new mobile, fixed and cable networks. However, the challenges go beyond accuracy. In addition to strict precision, network operators need a robust, scalable and cost-effective solution that can operate over packet-based networks and legacy infrastructure.

The OSA 5430 is a carrier-grade ePRTC, PRTC A/B, SSU and IEEE 1588v2 grandmaster clock supporting both 10G and 1G interfaces with hardware timestamping. With a modular design and technology-focused cards, it enables seamless capacity expansion as well as smooth technology migrations. Its built-in NTP server, multiple BITS/composite clock (CC) outputs and GNSS receiver capabilities make it ideal for the gradual evolution of legacy synchronization architectures. Leveraging a next-generation ePRTC engine, the OSA 5430 delivers exceptional holdover performance,

providing up to 150 days within 100ns and ensuring sustained timing accuracy even during prolonged GNSS outages. To further enhance resilience, the platform incorporates multi-layer jamming and spoofing protection mechanisms, safeguarding synchronization integrity in increasingly challenging RF environments. In addition to standard IEEE 1588v2 support, the OSA 5430 integrates White Rabbit technology, enabling sub-nanosecond synchronization accuracy for applications requiring the highest level of precision. With its ability to deliver precise timing to DOCSIS 3.1 remote PHY devices, the OSA 5430 is also a powerful tool for cable operators addressing growing bandwidth demand. A modular, scalable and fully redundant architecture provides maximum configuration flexibility and high availability. Furthermore, integrated Syncjack™ technology enables in-service synchronization monitoring and assurance without the need for external test equipment. With the OSA 5430, cost-effective and highly accurate synchronization distribution for next-generation technologies such as LTE-A and 5G becomes straightforward and reliable.



Oscilloquartz zero-trust multisource & redundant aPNT+™ platform

OSA 5430

High-level technical specifications

System overview

- High-quality OCXO, DOCXO and rubidium
- Up to 8x 1/10G (CSM) plus 4x 1/10G (line card)
- Up to 1536 unicast slaves per CSM
- Hot-swappable redundant CSM, GNSS receiver and oscillator
- Hot-swappable PSU

Operation modes

- ePRTC, PRTC A and PRTC B
- White Rabbit PTP grandmaster, White Rabbit boundary clock, White Rabbit slave
- IEEE 1588v2 PTP grandmaster, boundary clock class D, slave and probe
- NTP server
- PRC/SSU (Sync-E and BITS/CC)

GNSS receiver

- Embedded single-band or multiband L1/L5 receiver
- Multi-constellation (GPS, Galileo, BeiDou, GLONASS, SBAS, NavIC and QZSS)
- Jamming and spoofing detection

IEEE1588v2 PTP profiles

- Default profiles over Ethernet and IP multicast
- Telecom profiles G.8265.1, G.8275.1 and G.8275.2
- Enterprise hybrid profile
- Power and utility profiles
- Broadcast profiles

NTP server

- High-capacity Stratum 1 server
- Hardened NTP responder
- Hardware timestamping
- NTP/PTP/Sync-E/SSU supported simultaneously
- NTP authentication
- PTP to NTP conversion
- Network Time Security (NTS) server

Expansion cards (optional)

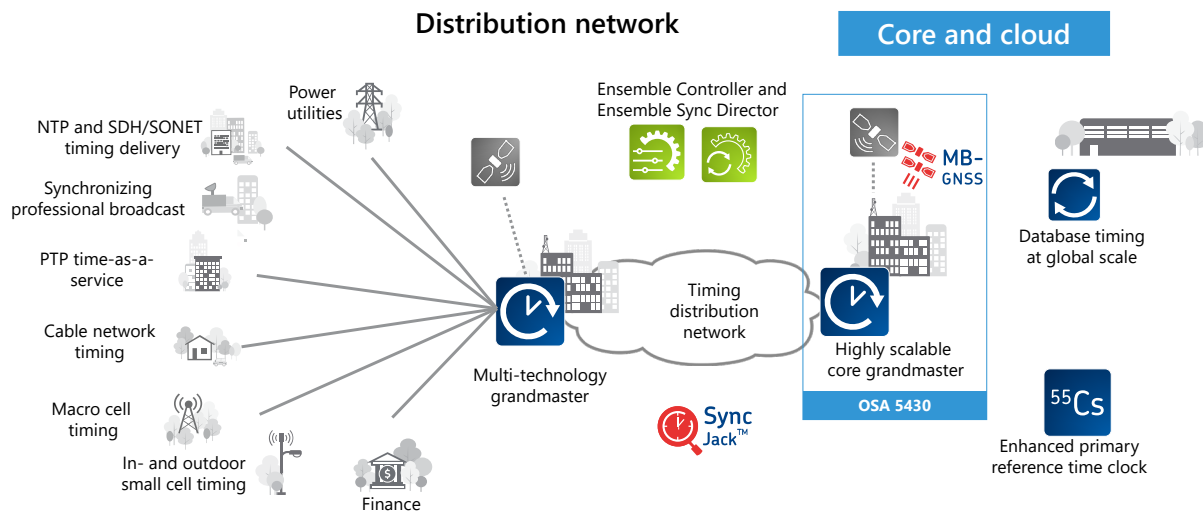
- One hot-swappable expansion card per OSA 5430
- Line cards:
 - 16x E1/T1/2.048MHz (120/100/75ohm)
 - 4x 1/10GbE (PTP/Sync-E)
 - Multiband GNSS
 - 10x composite clock

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Applications in your network

Timing distribution from the network core

- High-accuracy White Rabbit PTP grandmaster and boundary clock
- High Accuracy Time Transfer (HA-TT) support
- Radio access network synchronization, including 4G, 4.5G LTE/LTE-A, 5G NR, femtocells and small cells
- Precise synchronization of legacy network architectures based on NTP and PRC/SSU/CC
- Cable network (DOCSIS 3.1) and PON synchronization
- Data center and enterprise network synchronization
- Modernized and legacy power utility networks
- Modernized digital broadcasting studios
- Compatible with Optical Timing Channel



OSA 5430

Product specifications

Product overview

	OSA 5430
	
Size (WxHxD)	1RU 443mm x 44.1mm x 216mm / 17.44" x 1.73" x 8.50"
Clock	Quartz (OCXO) Quartz HQ+ (high-quality OCXO) Quartz HQ++ (enhanced high-quality OCXO) Rubidium
Expansion line Cards	Up to 1
PTP/NTP/Sync-E ports	Up to 12
Composite clock ports	Up to 10
BITS output ports	Up to 17
PSU	Hot-swappable redundant DC PSU (up to 2)

Main applications

- Enhanced primary time clock (ePRTC)
- Primary time clock (PRTC A and PRTC B)
- IEEE 1588v2 PTP grandmaster clock (up to 1536 PTP clients at 128pps per CSM)
- 1588v2 PTP boundary clock (up to 1536 PTP clients at 128pps per CSM)
- ITU-T G.8273.2 boundary clock class D
- ITU-T G.8273.4 APTS
- IEEE 1588v2 PTP slave clock
- GNSS receiver and PRC/PRTC including fan-out of multiple physical synchronization output interfaces
- Synchronization supply unit (SSU) and composite clock generator
- NTP server
- Sync probe – Syncjack™ monitoring and assurance

NTP features

- Stratum 1 NTP server when locked to GNSS
- NTP v1, v2, v3 and v4 over IPv4 and IPv6
- NTP unicast/multicast/broadcast
- Symmetric key and autokey authentication
- TIME and DAYTIME protocols
- NTP peering
- NTP selectable timescale (UTC/GNSS/Local)
- Nanosecond-accurate hardware timestamping
- NTP server accuracy within +/-100nsec from UTC when locked to GNSS
- Network Time Security (NTS) – RFC 8195

- Up to 16 NTP server IP addresses
- Supports PTP and NTP on same Ethernet port
- PTP to NTP translation
- Up to 3 stacked VLANs per flow (Q-in-Q service provider tagged)
- Enhanced NTP statistics and client lists
- Up to 8,000 transactions per second, per CSM
- Up to 500,000 transactions per second without authentication, per CSM
- PTP backup in case of GNSS outage

PTP networking features

- PTP high accuracy:
 - White Rabbit PTP profile
 - White Rabbit to IEEE PTP translation
- PTP profiles support:
 - ITU-T G.8265.1 frequency delivery profile (IP unicast over IPv4/IPv6)
 - 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 – IPv4/IPv6)
 - PTP enterprise profile (mixed multicast and unicast)
 - IEEE 1588 2008 PTP default profile over IP multicast
 - IEEE 1588 2008 PTP default profile over Ethernet multicast (Annex F)
 - PTP power and utility profiles: IEC/IEEE 61850-9-3, IEEE C37.238-2011, IEEE C37.238-2017
 - PTP Broadcast and media profiles: SMPTE ST 2059-2, AES67

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- Up to 300,000 delay requests/delay responses in multicast and hybrid PTP profiles
- 1-step and 2-step clock
- No performance degradation as slave capacity grows
- Up to 16 master/BC IP addresses (IPv4 and IPv6 supported simultaneously on same port)
- Multi VLAN flow point supporting a range of 4095 VLANs
- Support for multiple profiles simultaneously
- Supports PTP (TAI) and arbitrary (ARB) timescales
- Supports master and slave on any port simultaneously
- Up to three stacked VLANs per flow (Q-in-Q service provider tagged)
- Enhanced PTP GM/BC/slave statistics, performance monitoring (15min and 24h), threshold crossing alarm (TCA) and SNMP traps
- Nanosecond-accurate hardware timestamping
- In-house best-in-class clock recovery algorithms
- DoS protection using hardware access control list (ACL) and traffic rate limiting
- Operates as single or double attached clock in PRP IEC 62439-3 network

Hardware modules

- Modules
 - CSM: Clock synchronization module
 - AUX: Auxiliary I/O module
 - PSU: Dual Feed DC power supply unit
- Expansion line cards (optional):
 - XGE-4S-P: 4x 1/10G Ethernet card
 - BTOH-P-16: 16x BITS outputs card
 - MB-GNSS: multi band GNSS input card
 - CCO: 10x composite clock outputs
- Number of module cards supported

	OSA 5430
CSM	2
AUX	1
PSU	2
Line Cards	1

Clock Synchronization Module (CSM)

- Dual CSM design allows full protection of all critical components including GNSS, PTP/NTP ports, oscillator and management

CSM oscillator options

- Quartz (OCXO)
- Quartz HQ+ (high quality OCXO)
- Quartz HQ++ (enhanced high quality OCXO)
- Rubidium

4xEthernet ports

- Hardware-based timestamping (PTP and NTP)
- 4x 1G/100MbFE(SFP) or 10G(SFP+), user configurable per port
- All fiber ports support SM/MM colored/non-colored/dual/single fiber SFP / SFP+ and copper SFP
- Per-flow hardware-based policing and scheduling
- Configurable link asymmetry delay compensation

Synchronous ethernet (SyncE)

- Compliant to ITU-T G.8261/G.8262/G.8262.1/G.8264
- Ethernet synchronization message channel (ESMC) and enhanced ESMC with enhanced SSM codes
- Sync-E for time holdover during GNSS outage

CSM multi-band GNSS receiver

- Redundant GNSS receivers and antenna inputs (one on each CSM)
- Provides enhanced accuracy for ePRTC and PRTC-B
- Concurrent reception of multiple L1/L5 frequency GNSS constellations:
 - GPS / QZSS (L1C/A L5), Galileo (E1B/C, E5a), GLONASS (L1OF), BeiDou (B1C, B2a), NavIC (SPS-L5), QZSS (L1C/A L2C), SBAS (EGNOS, GAGAN, MSAS, WAAS)
- Skyview and GNSS satellites status
- Configurable SNR, elevation and PDOP masks
- User-configurable antenna cable delay compensation
- Jamming and spoofing detection
- Advanced spoofing detection and mitigation
- Supports fix positioning – single satellite mode
- Voltage to antenna +5VDC
- Antenna connector SMA-F (50ohm)

CSM single-band GNSS receiver

- Redundant GNSS receivers and antenna inputs (one on each CSM)
- Multi-constellation GNSS (GPS / GLONASS / BeiDou / Galileo) L1 32-channel receiver
- Skyview and GNSS satellites status
- Configurable SNR, elevation and PDOP masks
- User-configurable antenna cable delay compensation
- Support fix positioning – single satellite mode
- Software configurable mode of operation
 - GPS L1 (1575.42MHz)
 - GLONASS (1601.5MHz)
 - BeiDou (1561MHz)
 - Galileo (1575.42 MHz)
 - Combined GPS + GLONASS
 - Combined GPS + BeiDou
 - Combined GPS + Galileo
- Voltage to antenna +5VDC
- Antenna connector SMA-F (50ohm)

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Multi-band GNSS receiver line card

- Hot swappable
- Provide enhanced accuracy for ePRTC and PRTC-B
- Multi-band, multi-constellation 184-channel GNSS receiver
- GPS (L1C/A L2C), Galileo (E1B/C E5b), GLONASS (L1OF, L2OF), BeiDou (B1I, B2I), QZSS (L1C/A L2C), SBAS (L1C/A: WAAS, EGNOS, MSAS, GAGAN)
- 4 concurrent GNSS constellations
- Skyview and GNSS satellites status
- Configurable SNR, elevation and PDOP masks
- User-configurable antenna cable delay compensation
- Supports fixed positioning – single satellite mode
- Jamming and spoofing detection
- Advanced spoofing detection and mitigation
- Voltage to antenna +5VDC
- Antenna connector SMA-F (50ohm)

Auxiliary card (AUX)

Synchronization interfaces

- 1x BITS in/out
- 1x PPS in/out
- 1x Time-of-day (ToD) + PPS in/out
- 2x CLK in(2.048/10MHz)/out(10MHz)

BITS in/out

- BITS input/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 time holdover during GNSS outage
- Output squelch option
- SSU filtering option

PPS in/out

- PPS input/output (user configurable)
- User configurable input and output delay compensation
- SMA-F connector (50ohm)
- Output squelch option
- PPS configurable width

ToD + PPS in/out

- G.8271 compliant
- ToD formats – NMEA 0183 (\$GPZDA sentence), ITU-T G.8271 and CCSA
- RS422 over shielded RJ-45
- PPS configurable width
- Output squelch option

CLK in/out

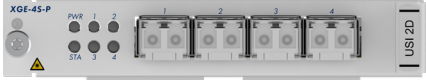
- 2x CLK in(2.048/10MHz)/out(10MHz) user configurable
- SMA-F connector (50ohm)
- Output squelch option

Output expansion line cards

- Line cards:
 - XGE-4S-P: 4x 1/10G Ethernet card
 - BTOH-16: 16x BITS card
 - CCO : 10x composite clock outputs
- One line card per OSA 5430
- Field upgradable
- Hot insertion / extraction support
- Overvoltage / current protection
- Hot swappable

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Product overview

	BTOH-P-16 (16x BITS)	XGE-4S-P (4x 1/10Gbit/s)
		
Capabilities	16x BITS outputs over high-density connector (VHDCI) – supporting 2.048MHz, E1 or T1 (DS1), Per output configurable signals type (E1, 2.048MHz)	4x1/10Gbit/s fiber Ethernet ports (PTP / Sync-E)
	MB-GNSS	CCO (10x CC)
		
Capabilities	Multi-band, multi-constellation GNSS input card	10x composite clock outputs over high-density connector – supporting 10 composite clock output pairs. SW configurable shutdown of output signals. One composite clock input 1:1 output card redundancy

Holdover performance

	Clock	Aging / day (after 30 days)	Temperature stability
Quartz CSM	High-quality OCXO Stratum 3 / G.812 Type III	$\pm 5 \times 10^{-10}$	$\pm 50 \times 10^{-10}$
Quartz HQ+ CSM	High-quality OCXO G.812 Type I	$\pm 2 \times 10^{-10} / \pm 1 \times 10^{-10} *$	$\pm 2 \times 10^{-10}$
Quartz HQ++ CSM	DOCXO Stratum 2 / G.812 Type II	$\pm 5 \times 10^{-11} / \pm 1 \times 10^{-11} *$	$\pm 1 \times 10^{-11}$
Rubidium CSM	Rubidium Stratum 2 / G.812 Type II	$\pm 5 \times 10^{-12}$	$\pm 2 \times 10^{-10} / \pm 2 \times 10^{-11} **$

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

**Note: Effective temperature stability after compensation.

	200nsec	400nsec	1.1usec	1.5usec	5usec	10usec	16ppb	After 24 hours
Quartz	1 hour	2 hours	4 hours	5 hours	8 hours	14 hours	1 month	22us
Quartz HQ+	4 hours	8 hours	14.5 hours	16.5 hours	1.5 days	2 days	0.5 years	2.3us
Quartz HQ++	10 hours	17 hours	1.5 days	2.2 days	4.4 days	6.6 days	>1.5 years	600ns
Rubidium	1 day	1.8 days	3.5 days	4 days	8 days	12 days	>5 years	200ns

Note: The above are typical values (1-sigma confidence) assuming a controlled-temperature environment, after the device has been powered for 1 month and locked to GPS for 72 hours. Due to the excellent temperature stability of the HQ++, the HQ++ holdover will outperform the rubidium holdover when significant temperature variations are present.

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Sync signal conversion

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

PRTC frequency and time accuracy

- While locked to GNSS
 - Phase and time – PRTC / G.8272 phase accuracy
 - <15nsec RMS from UTC
 - Single-band GNSS, PRTC-A: ±100nsec from UTC
 - Multi-band GNSS, PRTC-B: ±40nsec from UTC
- Frequency – PRC / G.811 frequency accuracy

ePRTC frequency and time accuracy

- While locked to GNSS and connected to ePRC
- Phase and time – ePRTC / G.8272.1 phase accuracy: ±30nsec from UTC
- Max holdover performance
 - 100nsec over min 40/60 days (guaranteed / typical) with ePRC+
 - 100nsec over min 55/90 days (guaranteed / typical) with SePRC
 - 100nsec over 100/150 days (guaranteed / typical) with SePRC+

Note: The tracking period for maximum holdover may vary

- GNSS-independent ePRTC operation – the ePRTC algorithm can discipline phase and time using alternative references e.g. PPS+ToD, PTP, and White Rabbit, not only GNSS
- Meets timing characteristics of G.8272.2 cnPRTC
- Up to five phase/frequency references to ePRTC
- Multisource combiner
- Advanced Reference Weighting (Automatic or Manual) for both frequency and phase references:
 - Automatic mode – system assigns optimal weights,
 - Manual mode – user defines the weight per reference.
 - Includes support for a “golden reference” intended for direct UTC(k) insertion as per cnPRTC G.8272.2 Annex A;
- Holdover re-learning continuity. After a reference loss and restore (e.g., GNSS jamming/spoofing), the system retains previously learned holdover parameters—no “start from zero.” This keeps the platform holdover ready even under flapping phase references.

- Cross-reference validator capable of invalidating faulty source when three or more references connected, as per IEEE1588 2019 v2.1 Annex P Prong C
- Phase output steering in holdover
- Live holdover readiness and time-to-threshold. The UI exposes learning status while locked and, during holdover, shows time remaining to the 100 ns error threshold
- Graceful return from holdover protecting timing networks from phase jumps

Assured PNT (aPNT) solution

- Multiple backups to GNSS including PTP, SyncE, CLK, BITS and local oscillator
- PRTC can automatically select between three available input references
- Frequency automatically selected between three available input frequency references
- Improved holdover with HQ+/HQ++/Rubidium oscillator
- Automatic switchover in case of jamming, spoofing or interference detection
- ePRTC combines GNSS, PTP and PPS+ToD with cesium clock from improved accuracy in locked mode and extended holdover in case of GNSS outages
- Interoperable with OSA 5405 smart antenna
- PTP and GNSS assurance using Mosaic Sync Director

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
- Clock analysis for up to eight PTP clock probes per CSM–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
 - Supports measurements on PTP port in slave and passive state

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- 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
- All probes include enhanced sync assurance statistics, performance monitoring (15min and 24h), including
- Programmable source and reference signals including SyncE, BITS, PPS, GNSS, PTP, IRIG and CLK
- MTIE mask and time error threshold alarms based on SNMP traps
- TE/TIE raw data collection and export to server
- User-configurable MTIE masks
- Meaconing firewall – record/replay spoofing attack detection and prevention
- Daily MTIE and TE performance monitoring reports

Low-touch provisioning

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

Management and security

Local management

- Serial port (RS232 over RJ45) for CLI (on CSM)

Remote management

- Local LAN port (100/1000BaseT over RJ45) using CLI, SNMP and Web GUI interfaces (on AUX)
- Support for IPv4 and IPv6 (dual stack)
- Maintains in-band management tunnels
- Configurable static routes and default gateways
- Fully interoperable with Adtran FSP 150 and Adtran FSP 3000 products
- Supported by Adtran Mosaic Controller, including Mosaic Sync Director and GNSS assurance

Management protocols

- Telnet, SSH (v1/v2)
- HTTP/HTTPS (TLS 1.3)
- SNMP (v1/v2c/v3)

Certificates

- CA-signed X.509 certificates
- Automatic certificate enrollment with full integration into PKI (Public Key Infrastructure)
- Self-signed certificates

Secure administration

- Configuration database backup and restore
- System software download via FTP, HTTPS, SFTP or SCP (dual flash banks)
- Remote authentication via RADIUS/TACACS+/LDAPv3
- SNMPv3 with authentication and encryption
- Access control list (ACL)
- ICMP filtering and rate limiting
- Automatic certificate enrollment with full integration into PKI

IP networking

- DHCP v4/v6
- ARP cache access control
- IPv4 RIPv2 and static routes
- IPv6 NDP address resolution and static routes
- RIPng for IPv6
- ICMP

SMTP Client

- System sends the email to defined recipient in case of alarm

System logging

- Syslog, alarm log, audit log and security log
- Configurable system timing source – local/NTP/PTP/PRTC (GNSS)
- User-configurable time zone and daylight saving time (DST)

Standards compliance

- ITU-T G.8261, G.8262, G.8262.1, G.8264, G.703, G.704, G.781, G.812, G.811
- ITU-T G.8272.1, G.8272, G.8273.2, G.8273.4
- ITU-T G.8265.1, G.8275.1, G.8275.2
- IEEE 1588v2 (PTP), 802.1Q (VLAN), 802.1ad, 802.1p (priority), 802.3ae (10G)
- RFC 2863 (IF-MIB), RFC 2865 (RADIUS), RFC 2819 (RMON), RFC 2460 (IPv6)
- RFC 1059 (NTPv1), RFC 1119 (NTPv2), RFC 1305 (NTPv3), RFC 5905 (SNTPv4), RFC868 (TIME), RFC867(DAYTIME), RFC 1321 (autokey)

Regulatory compliance

- CE compliance, directive 2014/30/EU (EMC)
- EMI
 - EN 55024 :2010 Class A,
 - EN 55032: 2012/AC:2013 Class A,
 - EN 61000-3-2-2014,
 - EN 61000-3-3 2013,
 - EN 300 386 V2.1.1:2016
 - FCC 47FR Part 15 2014 Class A
 - ICES-003 Issue 6 :2019 Class A
 - ANSI C63.4:2014

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- Safety
 - EN/IEC 62368-1:2014 2nd Ed. +A11:2017
 - UL/TUV 62368-1
 - 21CFR1040.10 compliance by using ADTRAN SFPs [CFR for LASER products]
 - EN 60825 compliance by using ADTRAN SFPs [LASER Safety]
- NEBS Level-3:
 - GR-1089-CORE, Issue 7
 - GR-63-CORE, Issue 5
- RoHS compliance , directive 2011/65/EU (ROHS)

Power Supply

- Hot-swappable, modular DC-PSU: -48 /-60VDC (tolerate -36 to -72VDC) with over-voltage and over-current protection
- Each PSU supports dual power feeds
- Optional external 85-264VAC to 48VDC converter

Environmental

- Dimensions (W x H x D): 443mm x 44mm x 216mm / 17.44" x 1.73" x 8.50"
- Weight (depending on the configuration): 3.6Kg to 5.5Kg
- Operating temperature (ambient): -5 to +45°C
- Storage temperature: -40 to +70°C (GR-63-CORE)
- Humidity: 5 to 95% (non-condensing)
- Operational altitude: -450m to 5000m

Optional accessories

- GNSS(GPS/GLONASS/BeiDou/Galileo/SBAS/QZSS) single and multiband 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
- Anti-jamming/anti-spoofing single band GNSS (GPS/GLONASS/BeiDou/Galileo/SBAS/QZSS) antenna
- 1:2/1:4/1:8 GNSS (GPS / GLONASS/BeiDou/Galileo) splitters
- GNSS window antenna
- Cables and adapters accessory kit
- Patch panels for BITS line cards

Updated August 3, 2026

