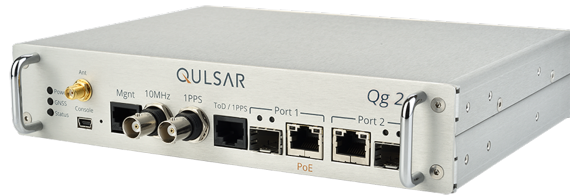


# Qg 2

## Multi-Sync Gateway

### APPLICATIONS

- Sync platform designed for small cell clusters, C-RAN and edge applications
- Edge Grand Master for smart grid transmission and distribution substations
- Gateway clock for Industrial IoT applications



### BENEFITS

- Easy to deploy and cost-effective small form-factor solution
- Scalable slave capacity
- Low power consumption
- High performance PTP clock
- Simple, easy manageability
- Configurable to operate in PTP Grand Master, APTS boundary and slave clock modes

### FEATURES

- Multiple holdover options
- Full IEEE 1588-2008 Grand Master
- Telecom BC functionality
- Supports G.8262 Synchronous Ethernet
- ITU-T G.8265.1 Frequency, ITU-T G.8275.1 & G.8275.2 Time & Phase Profiles
- ITU-T G.8272 and G.8273.2 (T-BC)
- IEEE PC37.238 Power profile
- Supports 1-step & 2-step clock
- PoE and -48V DC
- Remote provisioning & management (SNMP, XML & CLI)

Mobile operators are deploying LTE small cells in traffic hotspots and coverage holes. This occurs in a variety of locations such as in urban canyons and indoors, where GNSS signals are weak or intermittent. Qulsar's Qg 2, a Multi-Sync Gateway addresses this challenge of providing reliable and precise synchronization everywhere by using multiple sync references.

Qg 2 is designed for deployment in distributed cluster sync architectures. This involves moving timing resources close to the edge of the network in order to meet the phase and frequency precision requirements at the small cell or remote radio head (RRH). Deploying a centralized Grand Master with full on-path support to deliver high precision synchronization involves higher cost. Next generation networks need to handle rapidly growing traffic and require a more decentralized approach. The Assisted Partial Timing Support (ATPS) architecture is designed for these networks to deliver precise phase and frequency to the small cell. To support the increasing scale in such rapidly growing networks, Qg 2 is highly field-scalable to 256 PTP slaves in unicast mode at 128 packets per second.

Qg 2 is a small form factor, highly accurate Multi-Sync Gateway that provides IEEE 1588 PTP Grand Master and Boundary Clock functionality at low total cost of ownership. It leverages industry leading PTP algorithms to deliver stringent timing for LTE, including LTE-A and LTE-TDD architectures and supports ITU-T G.8265 and G.8275 frequency and phase profiles. Power-over-Ethernet (PoE) is featured to simplify installations. The product features multiple oscillator options to deliver a range of holdover performance at different cost points. LEDs on the box indicate Power, the GNSS acquisition state and Sync status. The Qg 2 has an elegant and simple management interface.

Qg 2 utilizes GNSS (GPS, Beidou & GLONASS), IEEE 1588 PTP and Synchronous Ethernet as input references and generates IEEE 1588 PTP, SyncE and timing signals (frequency, 1PPS and ToD) as outputs. The Multi-Sync Gateway features dual gigabit Ethernet ports and a small form-factor pluggable (SFP) module port for optical connections. It provides all the relevant timing interfaces such as GNSS, 1 Pulse Per Second (1PPS) and Time of Day (ToD) input/output.

The true innovation in this product lies in its simplicity, high performance, scalability and cost effectiveness. The Qg 2 has some unique features designed to make it easily manageable and provide resilient performance when reference sources are lost.

## Technical Specifications

### Synchronization Interfaces

- 1x GNSS L1 Antenna (SMA); 50  $\Omega$  impedance
- 1x 1PPS in/out (BNC)
- 1x Synchronized programmable frequency out (BNC)
  - 10MHz, 1.544 MHz, 2.048 MHz
- 1x Time of Day (ToD) + 1PPS in/out (RJ45/RS442)
  - ToD Format – configurable (ASCII (YYYY-MM-DD HH:MM:SS), NMEA, or China Mobile Binary format)
- 2x IEEE1588 PTP 100Base-TX, 1000Base-T & 1000Base-X with Synchronous Ethernet (electrical RJ45 & optical SFP)

### PTP IEEE 1588-2008 Profiles

- ITU-T G.8265.1 frequency delivery profile
- ITU-T G.8275.1 & G.8275.2 time/phase delivery profile
- Default profile
- Gateway clock mode default (includes T-BC functionality)
- PTP: L2: Ethernet; L3: UDP IPv4 / IPv6
- Supports one and two step clock

### Synchronous Ethernet

- SyncE for phase holdover during GNSS outage congruent with PTP
- Ethernet Synchronization Message Channel (ESMC)
- Support on both Ethernet interfaces (electrical and optical)

### GNSS

- GPS + Beidou or GPS + GLONASS
- Phase accuracy ( $\pm 100$ nsec from UTC) as per G.8272

### Scalability

- 16 / 32 / 64 / 128 / 256 [licensable options] slaves @ 128 packets per sec in unicast mode

### Holdover Performance

Grade	Oscillator type	1.5 us	5 us	Frequency 16 ppb
Standard	OCTCXO	30 min	40 min	15 hrs
Superior	OCXO	4 hr	10 hrs	1 week
Extended	Super OCXO	8 hrs	15+ hrs	1 month

*Note: Approximate values assuming constant temperature and assuming equipment is in normal operation mode for considerable time.*

### Software Features

- DHCP client
- TELNET server
- SSH server
- Serial terminal
- Remote firmware upgrade

### Management

- 1x Management (100Base-TX/1000Base-T RJ45)
- Web, XML, SNMP v2 / v3
- CLI local (Craft interface) & remote (telnet/SSH/Ethernet)

### LEDs

- Power status, GNSS acquisition & Sync Status

### Power Supply

- Supply: PoE, 28 - 40 VAC or 36 - 60 VDC
- Power consumption: variable (depending on holdover grade), typically – 9W to 22W

### Operating Specifications

- Operating temperature: 0°C to 50°C (-40°C to 65°C optional hardened version)
- Storage temperature: -40°C to 70°C
- 6/6 RoHS and WEEE compliant
- Size: 218 mm (W) X 159 mm (D) X 44 mm (H)

