

# External Antenna Integrated GNSS Master (IGM and IGM Plus) 1100x Release 3.0

Small Form Factor 1588 PTP Grandmaster

## New Features

### Hardware - IGM Plus Model

- SC-cut oscillator for enhanced time keeping holdover
- GNSS receiver for additional Galileo and QZSS support

### Software

- Increased capacity to 60 PTP clients
- Increased scalability to 32 clients when using PTP input and APTS
- IPv6 support for OAM/Management
- Group configuration with Zero Touch Provisioning through DHCP
- Individual device configuration and management through full CLI support

## Features

- Small form factor with single 1 GbE RJ45 port
- PTP profiles: ITU-T G.8265.1, ITU-T G.8275.1 (L2 multicast), ITU-T G.8275.2 (L3 unicast), Telecom 2008, and Ethernet default
- One-step and two-step clock
- SyncE input, output
- PTP input, GNSS backup
- APTS, asymmetry compensation
- PRTC-compliant
- IPv4 and IPv6 for PTP traffic and OAM
- Cable compensation
- 802.1Q VLANs
- GNSS receiver
- GPS, Glonass (Global Orbiting Navigation Satellite System; Russia), Beidou-ready, SBAS; IGM Plus model : Galileo and QZSS
- Time to First Fix (TTFF) of 10 minutes to less than one hour until system lock

## Benefits

- Leverages existing GNSS antennas when available (see Specifications and user guide)
- Small form factor 1588 PTP grandmaster

- Enables most cost-effective mini GM deployments at the very edge of mobile networks
- Best-in-class sync solution
- Serves precise time and phase to locations such as racks, small buildings, huts, and cabinets
- Deployment flexibility (small size, wall- or ceiling-mount, and indoor)



IGM-1100x Unit

The synchronization needed for the latest mobile deployments requires a high accuracy 1588 Precision Timing Protocol (PTP) to be installed at the very edge of the network with a limited number of hops to the eNodeBs or small cells.

Such high-precision PTP grandmasters exist in the market today. As a matter of fact, Microchip has deployed more than 450 mobile networks worldwide for 2G, 3G, and LTE using products such as the TimeProvider 5000 and TimeProvider 4100. However, such solutions are often too costly and are a challenge to deploy at the very edge of mobile networks due to power, space, form factor, and other considerations.

For deployments where the distance between the PTP 1588 grandmaster, the eNodeBs and small cells is long, and when the focus is serving indoor cells, then Integrated GNSS Master IGM-1100x is the perfect solution.

But when a GNSS antenna is already deployed in the environment or when the length of the GNSS cable would be short and thus the cost of the GNSS deployment limited, then IGM-1100x is a perfect low-cost, small form factor, mini grandmaster solution for installation in cabinets, huts, or racks serving a limited number of nodes.

The Microchip IGM-1100x does not integrate a GNSS antenna, but does provide an additional port to the Ethernet RJ45 output, allowing an external antenna such as a L1 GNSS antenna to connect to the unit for precision time.

## Problem to Solve

LTE-TDD, LTE-A, and LTE-FDD require-tight coordination (eICIC, CoMP) and very tight UTC-aligned phase synchronization. The only cost effective solution to provide this level of phase synchronization is to use GNSS PTP grandmaster timing systems. GNSS timing systems require an antenna to pick up the satellite signals. Due to the very low power of these signals, an external GNSS antenna—often mounted on the roof for indoor small cells—has been the primary technique for signal acquisition.

In scenarios where the needed GNSS antenna already exists at the desired location, or where the GNSS cabling would be short enough for cheap and easy installation, then a cost effective solution is to deliver precise time and phase with a low-cost 1588 PTP grandmaster connected to an external GNSS antenna.

## Solution: 1588 PTP Mini Grandmaster with External Antenna

The Microchip small form factor IEEE 1588 IGM grandmaster with integrated GNSS receiver and external antenna delivers precise time in scenarios where a GNSS antenna is already deployed on premise, or where it would be cost-effective deployment in a small onestory building, rack, hut, or cabinet. A single Ethernet connection is used for auto configuration management and Power over Ethernet (PoE) is used for the IGM and PTP grandmaster operations to precisely synchronize the eNodeBs. The plug and play operation, leveraging DHCP, is meant for quick and easy installation, similar to installing a typical indoor Wi-Fi antenna hot spot.

IGM can also be managed with static IP and CLI over SSHv2. IGM-1100x provides a cost-effective alternative to existing 1588 grandmasters that typically present space, power, and cost consideration hurdles.

### Deployment Automation

Customers need to deploy multiple units in an automated fashion to avoid individual configurations (which can be accomplished through CLI). Zero Touch Provisioning can be accomplished with a configuration file that can be leveraged on a large number of devices through a DHCP server with Option 43 (IPv4) or Option 17 (IPv6).

### Antenna Specifications

IGM 1100x works with Active L1 GNSS antennas (1575 MHz to 1606 MHz) with 5 VDC feed and a SMA cable connector.

### Specifications

#### Management and Interfaces

- In-band using Ethernet port
- SMA connector to external antenna (L1 or patch GNSS)
- IPv4 and IPv6 (both PTP and OAM) with up to 20 VLANs
- TimePictra support through SNMP, fault only
- Zero Touch Provisioning through DHCP Option 43 (IPv4) or Option 17 (IPv6)
- Full CLI over SSHv2; support for individual device management
- SNMP v2/v3
- Internal log

#### Outputs

- PTP 1588v2 GM output
- SyncE output with ESMC support
- 1PPS test point

#### Inputs

- PTP client with APTS capability
- SyncE input
- GNSS input

#### Diagnostics

- Alarms: SNMP traps
- LEDs: Sync, Network, Alarm

#### Plug and Play

- Auto-configuration through DHCP Option 43 (IPv4) or Option 17 (IPv6)
- Communicate with external servers (DHCP or static IP)

#### Redundancy

- Achieved by deploying two or more IGM units at a site with client failover capabilities

#### Power

- PoE Class 3 input
- Power: <12.95 W

#### Capacity

- Base model four unicast slaves at 128 pkt/sec. Upgrades by license to 8, 16, 32, and 60 1588 PTP slaves.

#### Mechanical

- Size: Height: 7.766 in; Width: 6.638 in; Depth: 1.456 in
- Weight: 1.65 lbs

#### Installation

- Indoor mounting: Vertical wall-mount or ceiling-mount with same unit

#### Regulatory and Environmental Compliance

Specification	
Operating	0 °C to 65 °C (operating), 5% to 90% non-condensing
Storage	-40 °C to 70 °C
EMC Certifications	FCC part 15 Class B, ICES-003 Class B, VCCI, AS/NZS CISPR 32/24 Class B, and EN 55032/EN55024, BSMI Class B, EMC Directive 2014/35/EU, CB scheme IEC 60950-1 2 <sup>nd</sup> edition w/BSMI (Pending)
Safety Certifications	NRTL UL 60950-1 2 <sup>nd</sup> edition, NRTL CSA C22.2 No. 60950-1 2 <sup>nd</sup> edition, CE Mark EN 60950-1:2006 2 <sup>nd</sup> edition w/Am1
Environmental Certifications	ETSI EN 300 019-2-1—Storage Tests, Class T1.2, ETSI EN 300 019-2-2—Transportation Tests, Class T2.3, ETS 300 019-2-3—Operational Tests, Class T3.1, Weather-Protected (Temperature-Controlled Locations), RoHS (6/6)

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