Outdoor Integrated GNSS Master (IGM and IGM Plus) 1100o Release 3.0

Small 1588 PTP Grandmaster for Outdoor Scenarios

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 for GNSS backup
- PRTC-compliant
- IPv6 support for 1588 traffic and OAM
- 802.1Q VLANs
- Integrated GNSS receiver
- GPS, Glonass (Global Orbiting Navigation Satellite System; Russia), Beidou-ready, SBAS; IGM Plus model : Galileo and QZSS

Benefits

- Reduced installation costs and simplified cabling
- Ruggedized device that supports a wider temperature range
- Best-in-class sync solution
- Provides precise time for environments where temperature range is an issue, or environmental constraints require ruggedization

IGM-1100o Unit

The synchronization needed for indoor small cell operations requires a high accuracy timing receiver nearby. Until now, this proximity required an expensive and often complicated GNSS antenna installation for a few small cells. In some scenarios, it is not possible to deploy the Microchip IGM-1100i due to limited building materials, urban canyons, or other constraints. The Microchip IGM-1100o (also referred to as the Outdoor IGM) addresses this use case. The IGM-1100o brings precise timing indoors and serves indoor small cells, but is located on the roof of the building instead of on a wall or ceiling.

The Microchip IGM-1100o does not use Assisted-GNSS as it is placed outdoors, where GNSS signal reception is optimal. The IGM-1100o uses Power over Ethernet (PoE) to further simplify the installation. When mounted on the roof and connected to the network with PoE, the unit automatically selfconfigures through DHCP option 43, locks to GNSS signals, and begins PTP grandmaster operations. On-premise user configuration is not necessary.

Problem to Solve

LTE-TDD, LTE-A, and LTE-FDD, which require tight coordination (eICIC, CoMP), also need 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 satellite signals. Due to the very low power of the signals, indoor operation of an IGM-1100i may not be possible in some situations. IGM-1100o is the outdoor version in the IGM portfolio that enables service to indoor small cells from the roof. The Outdoor IGM, though not as cost effective as IGM Indoor, still leads to considerable deployment cost savings, as it integrates the PTP 1588 grandmaster and the GNSS antenna into the same device. The device is connected to the rest of the network through a simple RJ45 Ethernet port. As a result, the device produces Ethernet as an output rather than a L1 cable, providing cost savings and deployment flexibility.

Beyond serving indoor small cells, the Outdoor IGM also provides precise time and phase to eNodeBs in a cost effective way for cases where these nodes are served from challenging environments such as huts, cabinets, or other settings where temperature range and ruggedness are key requirements.

Solution: Integrated GNSS Master

The Microchip Outdoor IEEE 1588 IGM grandmaster with integrated GNSS receiver and antenna solves the problem of delivering precise time and phase to indoor small cells in challenging environments by placing the integrated unit on the roof. A single Ethernet connection is used for automatic configuration management: a PoE connection for the IGM and PTP grandmaster operations

to precisely synchronize all the small cells in a building. The integrated solution can also be used in environments such as outdoor cabinets and huts where temperature range and environmental ruggedness are key. Therefore, it can serve eNodeBs from the very edge of the mobile network with very few hops to the nodes. The plug and play operation that leverages DHCP allows for quick and easy installation similar to creating a typical indoor Wi-Fi antenna hotspot. The IGM can also be managed with static IP and CLI over SSHv2. After installation, the IGM locks to GNSS signals and provides accurate and precise PTP grandmaster synchronization for optimum small cell operations.

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).

Specifications

Management and Interfaces

- In-band through Ethernet port
- 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 (traps only)
- Internal log

Outputs

- PTP 1588v2 GM output
- SyncE output with ESMC support

Inputs

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

Diagnostics

- Alarms: SNMP traps

Plug and Play

- Auto-configuration through DHCP Option 43 (IPv4) or Option 17 (IPv6)
- Communication 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: Diameter: 6 in; Height: 4 in
- Weight: 1.5 lbs

Installation

- Pole-mount on roof or cabinet, hut, and so on

Safety Certifications

- UL60950-1/CSA C22.2
- IEC60950- 1:2005(2nded)/AM 1:2009/AM 2:2013
- EN60950-1: 2ed. 2006/A11:2009/A1:2010/A12:2011/A2:2013

EMC Compliance

- ETSI 300 386 v1.6.1; CISPR 32: 2012, Class B limits; CISPR 24: 2010; EN 55032: 2012/AC2013, Class B limits; EN 55024: 2010; FCC Title 47 Part 15, ICES-003, AS/NZS, Class B limits; VCCI V-3/2015.04/V-4/2012.04, Class B limits; KN 55032/35, Class B limits; EN 301 489-1 v2.1.1 pending; ITU-K.20*

**: Non-compliant K.20 table 4b test #4.3.1 under 160-ohm test. All seven other resistor values pass.*

EMC Certifications

- EMC Directive 2014/30/EU Class B
- RED Directive 2014/53/EU pending
- BSMI pending
- VCCI
- KCC

Environmental

- ETSI 300 019-2-1 Storage Tests Class T1.2
- ETSI 300 019-2-2 Transportation Tests Class T2.3
- ETSI 300 019-2-4 Operational Tests Class T4.1E
- 1.3 Expected Operational Temperature and Humidity Range
  - –40 °C to 46 °C solar load (optional 70 °C) –40 °C to 70 °C
  - <5% to 100% RH with condensation
- 6.1 Salt Fog Exposure
- 6.2.2 Seismic under GR-63 and ANSI T1-329
- RoHS 2 Directive 2011/65/EU
- WEEE Directive 2012/19/EU
- IEC 60529 Ed. 2.2 2013, IP66 Compliant