IS2000

IEEE1588v2 PTP Grandmaster Clock

Key Features

- IEEE1588v2-2008 Precision Time Protocol(PTP) Grandmaster clock
- Lock to GNSS(GPS or GLONASS) input signal, PRTC
- Economic deployment in the mobile small cells network
- Edge Grandmaster deployment to avoid backhaul noisy, and packet network asymmetry
- Alternate master based on IEEE1588's BMCA
- Hybrid operation with IEEE1588 and SyncE protocols
- Unicast, Multicast, and Mixed-mode for PTP
- Designed to support the future ITU-T G.8275.2 profile for small cell synchronization
- Support the various number of clients: up to 512/256/128/64 clients
- Hardware-based PTP packet processing, No performance degradation and accuracy
- Synchronous Ethernet interface as master.
- 100/1000Mbps combo style interface(copper & fiber)
- 10MHz, 1PPS and ToD output
- DC or AC power by factory option
- WEB UI, and CLI management
- SNMP

Application

- 4G/LTE-FDD/TDD, LTE-Advanced networks
- Ethernet backhaul networks
- WiMAX backhaul networks
- Passive Optical Network(PON)
- Electric Power network: substation

Compliance and Certifications

IEEE
- IEEE1588v2-2008
- IEEE802Q VLAN
- IEEE802p LAN Layer2 QoS/CoS Protocol

ITU-T
- ITU-T G.812
- ITU-T G.8261, G.8262, G.8265.1
- ITU-T G.8275.1, G.8275.2(ready)
- ITU-T G.8264
- ITU-T G.781

IETF
- RFC 792
- RFC 2474
- RFC 2616

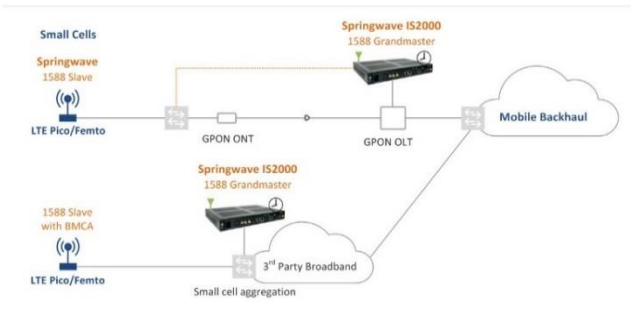
Overview

The Springwave's IS2000 series is a grandmaster clock to build the precision time and frequency synchronization based on the IEEE 1588v2-2008 standard. Especially, it is designed for the economic deployment and precision synchronization in the 4G/LTE small cell networks which mobile data service traffic is growing at the present day. Also it supports Synchronous Ethernet clock master synchronized with the GNSS reference in the carrier ethernet networks.

Edge Master in the Small Cell Network

Currently the base stations in the 4G/LTE small cell networks are increasing caused by the tremendous mobile data traffic growth, like smartphone. Furthermore, these base stations are demanded on the precision time/frequency synchronization, and the equipment is increasing coming from their narrow RF coverage.

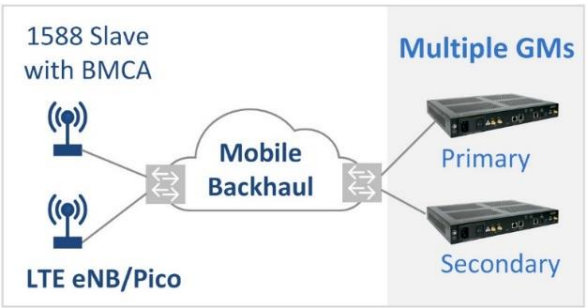
The IS2000 series is designed to solve these two issues in the small cell networks. The one is deployment price, and other is synchronization accuracy.



Feature Highlights

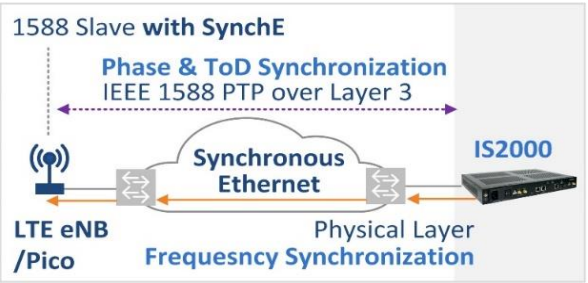
Alternate Master for Protection

The carrier-grade networks may be needed protection clock for reliable network operation. The alternate Master based on BMCA (Best Master Clock Algorithm) specified in IEEE1588v2-2008 supports the master equipment protection and the network protection. The slaves selects the grandmaster on the basis of QL value first, then priority. IS2000 series following G.8275.1 and G.8265.1 profiles is completely designed for these protection.



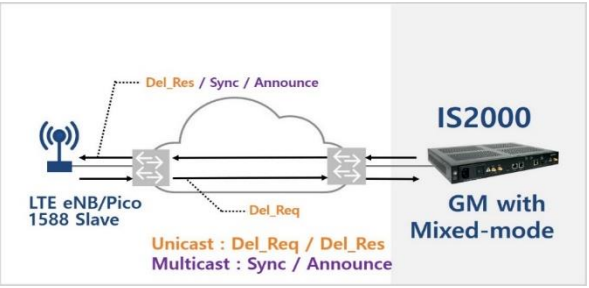
Hybrid operation

Synchronous Ethernet is a physical layer–based technology, supports hop-by-hop frequency transfer, where all interfaces on the trail must support Synchronous Ethernet. In the hybrid mode, the frequency syntonization derives from physical layer of synchronous ethernet, and phase and time of day derives from PTP. These technic may resolve a large number of network hops and provide clock synchronization accuracy. IS2000 series supports this hybrid-mode operation by configuration.



Mixed-mode PTP communication

Basically ITU-T G.8265.1 recommends unicast PTP communication for telecom networks. Optionally, it can be operated mixed-mode PTP communication to reduce the network traffic load. This mixed-mode is multicast downstream(Sync,Announce), and unicast(Del_Req, Del_Res) traffic mixed. IS2000 series supports below operation modes.



Specification

> GNSS input
- Factory option: GPS/SBAS or GLONASS IF
- Connector: 50Ω SMA[female]
- Voltage feed to GNSS antenna: 5Vdc±5%

> Mechanical
- Case size: 340 x 259 x 43.6 mm(W x D x H)
- 1U rack mountable (rack: 19 or 23 inch)

> Environmental
- Operating temperature: 0~50ºC
- Operating humidity: 0~90 %
- RH non-condensing
- Storage temperature: -40 ~ +70ºC

> Power Supply
- Factory option : AC or DC input
- AC input : 90~264Vac, 50Hz/60Hz
- DC input : -38.4 ~ -72Vdc
- Power consumption : max 30[W]

> Time and Frequency Accuracy
- Accuracy under locked to GNSS at operating temp.
- Time : < 150ns/day
- Frequency : 1 x 10-11(ITU-T G.811)
- Holdover Accuracy (over constant temperature)
- Time : < 8us/day(G.812)
- Frequency : < 1 x 10-11/day(G.812)

> I/O Port in Front Panel
- AC option : IEC60320 C14 socket
- DC option : 1776692(MSTB 2,5/2-GF), Phoenix
- Monitoring
  - 1PPS output : 50Ω SMA[female]
  - 10MHz clock output : 50Ω SMA[female]
- CLI : RS232, RJ45
- Management : 10/100Mbps Ethernet, RJ45
- PTP interface : 100M/1000Mbps Ethernet combo
  - Combo style : copper RJ45 and Fiber SFP
- GNSS input : 50Ω SMA[female]
- LEDs : 2 x 3 row, 1 x 2 row

> Monitoring Output
- 10MHz clock: sinusoidal, disable by configuration
- 1PPS : +3.3V LVTTL, disable by configuration
- MON : Test port for production testing

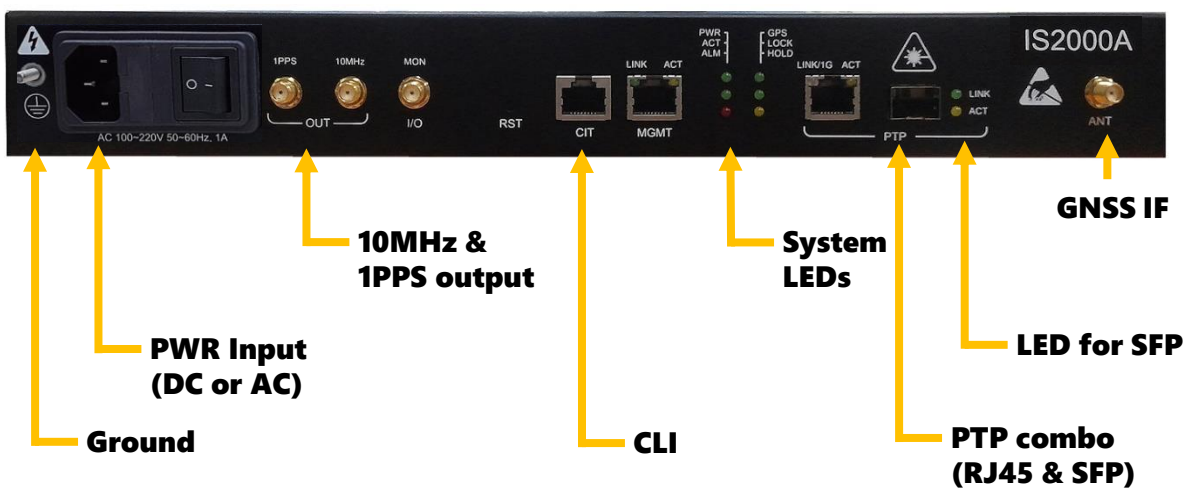
> Network Support
- VLAN (802.1Q, 802.1p), Q-in-Q
- IPv4 DSCP
- ICMP (RFC792)
- Hybrid operation :
  - Frequency synchronization : SyncE
  - Phase and ToD synchronization : IEEE1588v2
- SNMP v2c, v3 for NMS

> IEEE1588v2 PTP Interface
- Client capacity : 64 clients, basic
- Client expanding : 128, 256, 512 by soft license
- Up to 128 PTP messages per second per client
- PTP over IPv4
- 1 or 2 step PTP mode
- Best Master Clock Algorithm(BMCA), with default profile. Supporting Alternate Master
- Unicast, Multicast, and Mixed-mode for PTP
- IEEE1588v2 PTP End-to-End, and Peer-to-Peer
- Hardware-based PTP packet processing. No performance degradation as clients capacity growing
- Fully comply with IEEE1588v2-2008 standard
- Support ITU-T G.8275.1 Telecom Profiles

> Synchronous Ethernet
- Transmit Frequency through SyncE PHY of PTP port as a master to the next hop
- Conforms to ITU-T G.8261, G.8262, and G.8264 Ethernet Synchronization Message Channel (ESMC)

> Management
- CLI
- WEB base management, Web UI
- Telnet for remote system control
- Remote software upgrade

IS2000 - front view



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