



Time to Sync with Microsemi

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IGM Training & Features Now on YouTube!

<http://youtu.be/JymZKZVZJ74>

Featuring Microsemi Timing and Synchronization Products and Information

Esam Elashmawi

Vice President & GM

We are pleased to introduce our new quarterly newsletter, *Time to Sync*, your source for Microsemi's latest timing and synchronization news, products, key industry information, events and more! Our goal with *Time to Sync* is to keep you connected and provide high performance timing and synchronization products and solutions solving your most challenging product requirements.

Microsemi offers one of the most comprehensive and differentiated semiconductor and systems portfolios in the industry to deliver the most advanced and complete end-to-end precise time solutions available. Microsemi has a rich history of providing leading edge, unique clock and synthesis products, many of which have been industry firsts, where precision, accuracy and reliability matter. We have always worked closely with our industry to lead, drive standards and push the boundaries of technology to new levels for the world's most critical applications.

In addition, Microsemi offers a set of products in adjacent areas including Power-over-Ethernet (PoE) midspan / injectors, carrier ethernet and equipment / data link security. We look forward to sharing some of these with you when relevant, while retaining focus of this newsletter to timing and synchronization.

Time to Sync is intended to be informative and educational to help you succeed! Please send us any comments or questions including suggestions for future articles to timing@microsemi.com.

What's New in Timing and Synchronization - Watch Your Timing!

Microsemi Provides the Latest in Cyber Security and Vulnerabilities Protection and Backups

Cyber security and vulnerabilities reach across virtually all U.S. and world infrastructures - especially communications, just one of many with serious cyber security concerns related to hackers and potential terrorist infrastructure damage. Timing, and in particular GPS-based timing, is an essential cyber security component that is critical to this industry. Timing disruptions result in dropped calls, interference and service degradation. However, GPS vulnerabilities that impact timing can take many other forms including environment, manmade, accidental and malicious.

Microsemi's timing solutions leverage the Global Navigation Satellite Systems (GNSS), including GPS receivers that are excellent sources for accurate time and location services. The antennas for these receivers are often installed in locations where severe weather and lightning can cause reliability issues. In addition, the GPS signal strength received is very low and subject to interference and jamming, either intentional or unintentional.

For applications in wireless communications that have very stringent timing requirements, atomic clock oscillators have long been deployed in cellular base stations if GPS-timing receivers could not process satellite data. In new technology LTE network deployments, a cost effective Precision Time Protocol(PTP)/IEEE 1588 technology is also used. Microsemi's PTP can be used to hold and maintain time

and phase instead of atomic clock oscillators in base stations/eNodeBs where cost is a higher priority than maintaining stringent timing accuracy of the order of less than 1.5 microsecond over 24 hours. PTP, a layer 2 or 3 time stamping protocol, distributes accurate timing from a grand master clock, (GMC) and can be distributed to LTE eNodeBs as a backup to GNSS timing sources or as the primary source of timing in locations where GNSS signals are not available. GNSS receivers and PTP are complimentary, as PTP can be used to verify that GNSS receivers are providing accurate timing and the GNSS receivers can verify that PTP is delivering accurate timing as well.

If you have suggestions or concerns regarding cyber security and infrastructure protection go to: <http://www.microsemi.com/design-support/white-papers-support>.

For more information contact: sales.support@microsemi.com.

Shield Your SyncServer - Microsemi Provides Superior Protection and Response Against Vulnerabilities

Extensive Product Offering For Growing Security Threats to SyncServers

Driven by the high growth of virtual environments and cloud computing, timing and synchronization have become increasingly important inside data centers. Traditional security barriers (such as firewalls) are being penetrated at a higher rate, exposing protected infrastructures (such as SyncServers) to security threats and vulnerabilities including Bash/Shellshock and NTPd authentication weaknesses. Consequently, keeping your SyncServer software up to date is more important than ever. To provide our customers superior protection against known security vulnerabilities Microsemi has restructured its service contract maintenance options for SyncServers to offer more agile and comprehensive global services.

For more information and to learn about protecting your SyncServers from these growing security threats, please contact sales.support@microsemi.com.

View technical documentation and receive assistance with Microsemi products; become an online user for the Microsemi Time & Frequency Support Portal - register at the following link:

<http://www.microsemi.com/products/timing-synchronization-systems/support/online-support>.

End Market Update - The Small Cell Market Comes to Life

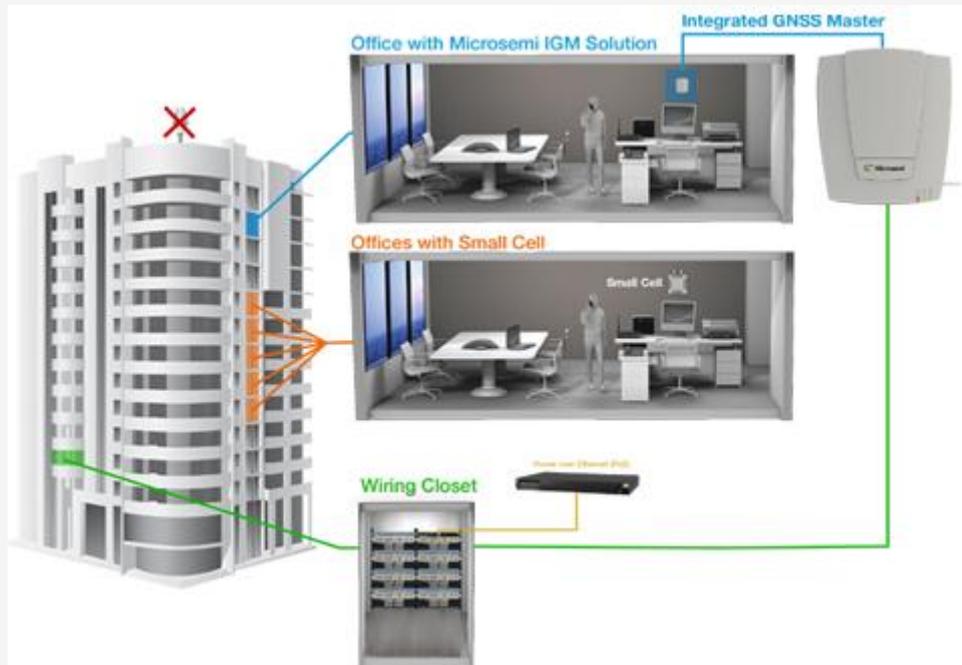
IGM Integrated GNSS Master Solution Provides Precise 1588 Phase and Frequency to Indoor Small Cells

The operator small cell market is beginning to show life. After an initial set of deployments focused on outdoor small cells (Vodafone in London for the Olympics), indoor deployments experienced great momentum in 2014. According to mobile experts, 64 operators use small cells commercially in their networks and more than 44 operators use enterprise small cells.

Growing deployments of indoor small cells and tight requirements for phase/time associated with LTE-A and TD-LTE presented an opportunity for Microsemi to innovate and create a disruptive solution to provide precise timing to indoor small cells.

IGM-1100i is the first (and only) solution that integrates a best-in-class PTP 1588 GrandMaster with a GNSS antenna and receiver in a small form factor device designed for providing precise timing/sync to indoor small cells. IGM-1100i can be deployed on a building wall or ceiling. IGM can be complemented by PTP 1588 products (that the operator has deployed in its own network including Microsemi's TP5000 and TP2700 solutions) to provide enterprise customers more reliable service. This enables our operator and OEM customers to rapidly deploy small cells at minimum cost both in CAPEX and OPEX. Microsemi is proud to lead and enable development of the industry worldwide.

See more below about the IGM-1100i solution. For more information contact sales.support@microsemi.com



New Product Update

Innovative TimeProvider 5000 System Supports Phase Synchronization Needed for LTE Advanced and TDD Deployments;
Enables Cost-effective Deployment of Next Generation Services

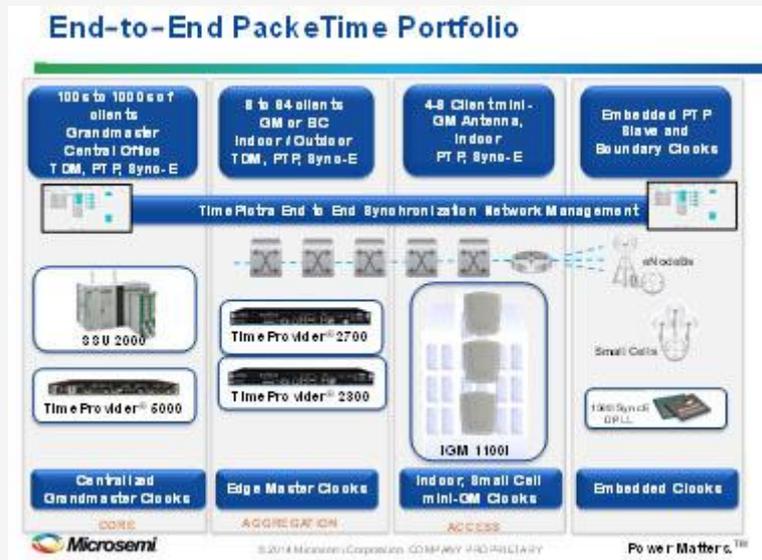
Microsemi's advanced TimeProvider[®] 5000 Software Release 2.2, adds ITU-T G.8275.1 phase synchronization profile support via a software upgrade and license key. The new software release supports Synchronous Ethernet and the IEEE 1588 Precision Time Protocol (PTP) phase profile. The PTP phase profile helps Microsemi wireless base station customers use the available spectrum more efficiently and deliver a more reliable network. Microsemi's innovative TimeProvider 5000 is deployed in over 200 networks worldwide for PTP frequency synchronization and can now support the new phase synchronization PTP profile with a singular software upgrade.

The software upgrade is for both Microsemi's extensive installed base and new network deployments and allows operators to leverage and extend their installed base of TimeProvider 5000 grandmaster(GM) clocks to support the new ITU Telecom profile for phase synchronization.

Driving this new release is recent ITU approval of a new PTP profile for phase and time in telecom networks (ITU-T G.8275.1). Microsemi's systems solution portfolio now fully supports this phase profile and the company is committed to providing our customers solutions that augment their existing network investment to meet their evolving needs.

Microsemi's full product portfolio is unlike any other in the industry. Leveraging existing frequency PTP clocks to enable PTP phase support, the TimeProvider product line features include:

- Expansion of the synchronization infrastructure to follow distributed architecture required for PTP phase support
 - Core grandmasters with TimeProvider 5000—frequency PTP and phase PTP simultaneously from a carrier class fully redundant GM
 - Edge GMs and gateway/boundary clocks with the TP2k family provide the flexibility to use as and where needed
 - The new and innovative IGM-1100i allows for in-building, convenient and cost-effective deployments at the edge
- Leading-edge embedded PTP slave clocks and boundary clocks designed into a wide range of base stations, small cells and PTP aware switching equipment
- Tying the whole clock ecosystem together is Microsemi's TimePictra which now enables end-to-end management with the recent 10.3 release, supporting the monitoring third party of PTP clocks. Synchronization monitoring is ideal for closely observing and tracking the end-to-end synchronization chain including embedded boundary clocks, end point slave clocks found in on path switching elements, and end point base stations or small cells.



With full support of the new ITU-T G.8275.1, phase profiles across its TimeProvider 5000 core and TimeProvider 2000 series edge PTP grandmaster clocks, Microsemi enables wireless operators to seamlessly migrate in networks forward to assure high quality service for LTE-A and small cell deployments. Rely on Microsemi as your total solution provider to assure your synchronization performs seamlessly

The TimeProvider 5000 is available now. For more information contact: sales.support@microsemi.com.

To learn about Microsemi's TimeProvider Series visit www.microsemi.com/timeprovider5000.

Data Sheet: http://www.microsemi.com/document-portal/doc_download/133303-timeprovider-5000.

New Integrated GNSS Master (IGM) Solution Enables Cost-effective Small Cell Deployments

Microsemi is pleased to announce its Integrated GNSS Master (IGM) solution required for small cell synchronization. The IGM is the company's innovative solution that fully integrates a 1588v2 PTP grandmaster with a GNSS receiver and antenna in a small, fully contained package, designed to mount indoors. The IGM solves the difficult technical challenge of indoor synchronization in a very cost-effective way for small cell indoor deployments.

Microsemi's indoor wall or ceiling mounted IGM combines a best-in-class 1588v2 PTP grandmaster with a GNSS receiver and antenna; IGM entirely eliminates the need for an outdoor GNSS antenna and the expensive cabling costs. An Ethernet connection is used to connect IGM to building equipment such as switches, Power-over-Ethernet (PoE) midspans and small cells. The plug-and-play operation enables quick and easy installation similar to installing a typical indoor Wi-Fi hot spot. Once installed the IGM locks to GNSS signals and provides accurate and precise PTP grandmaster synchronization needed for optimum small cell operations.

Demo units are available now by contacting : sales.support@microsemi.com

View the latest press release on the Microsemi website at <http://investor.microsemi.com/releases>. For more information visit www.microsemi.com/igm.

Download Product Brief Now:

<http://www.microsemi.com/products/timing-synchronization-systems/time-frequency-distribution/gnss>

Microsemi Continues Leadership in Timing Solutions with the Newly Enhanced Quantum Rubidium Miniature Atomic Clock *Smallest, Lightest, and Highest Performing Clock in the Industry*

Microsemi's Quantum™ Miniature Atomic Clock (MAC) family of rubidium atomic clocks is comprised of leading edge technology that offers best in class stability, size, weight and power consumption. Our SA.3Xm MAC is not only the world's first coherent population trapping atomic clock, but also cost-effective and easily adaptable to a wide variety of timing and synchronization applications.

The Quantum MAC SA.3X family specifically meets essential frequency accuracy and stability requirements in applications that include wireless base stations, wire line network infrastructure, defense systems and test and measurement instruments. These types of systems can benefit from the lowpower Quantum MAC SA.3X which provides the ability to operate across a wide range of temperatures.

Featuring excellent mechanical robustness and temperature performance, the Microsemi Quantum Rubidium MAC SA.3X family is only 25 percent in volume compared to the nearest competing clock in the same category. This small size, combined with its very low power consumption, makes the SA.3x series ideal for a broad variety of platforms that mount directly on printed circuit board assemblies (PCBAs), eliminating the need for a heat sink or fan. Here is the brief summary of the specifications:

- $\pm 5.0E-11$ accuracy at shipment
- $5.0E-11$ month aging rate
- 5 W power consumption
- 47 cc in volume

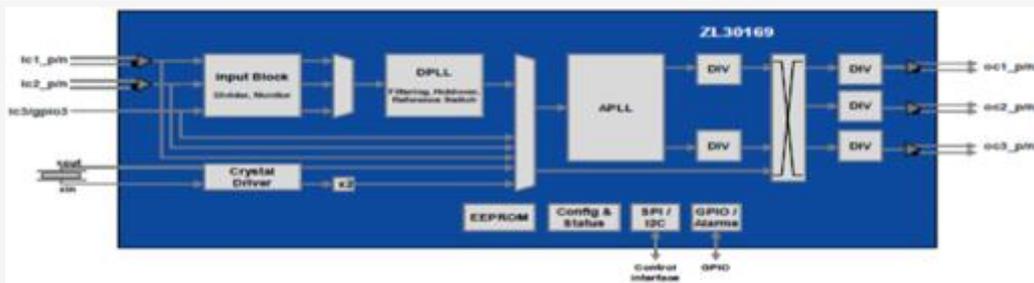


For more information visit our website or contact sales.support@microsemi.com

Microsemi Wins the 2014 EPC "Product of the Year" Award! *ZL30169 High Performance, Ultra-small Form Factor Clock Translator for Optical Transport Network Achieves the Electronic Product China Award*

Every year, the editors of Electronic Products China, a leading business publication for electronic engineers, and website 21ic.com, the most influential website among Chinese engineers, evaluate hundreds of products launches on the basis of significant advancement in technology or function, improvement for new technology and applications trend and easy for development. The ZL30169 was recognized as the best product of its category in 2014.

The ZL30169, tiny three-input, three-output any rate-to-any port clock translator for OTN provides output clocks with industry-leading jitter performance of 250fs RMS ideal for 100G coherent. The ZL30169 integrates a digital phase locked loop (DPLL), analog PLL (APLL) and EEPROM into an ultra-small 5x5mm 32-pin QFN package. The APLL generates the ultralow jitter output clocks programmable to any frequency from 1Hz to 1035MHz, the first device of its kind offering such a wide range. With programmable loop bandwidth from 14Hz to 500Hz, the DPLL accepts any input frequency from 1kHz to 1250MHz and provides hitless reference switching, holdover and jitter filtering. The EEPROM provides automatic self-configuration of the device at start-up. The ZL30169 has the critical features such as dynamic rate conversion for forward error correction used in OTN transport and switching applications. The ZL30169 meets all the jitter and wander requirements that are specified in the ITU-T G.8251 Recommendation to ensure satisfactory network performance.



The ZL30169 also offers numerically controlled oscillator (NCO) mode in which output frequencies can be controlled with very high resolution (better than 0.01ppb) by system software. This capability provides a cost-effective solution for customers designing their own mapper with FPGAs to replace large, expensive, fixed-frequency voltage-controlled oscillators (VCXOs).

For more information visit our website:

<http://www.microsemi.com/products/timing-and-synchronization/otn-timing/zl30169>.

Events Update

Microsemi frequency and time products have recently been featured in a number of events including Mobile World Congress, ITU-T, WSTS, Satellite 2015 Conference and Electronica China. Highlights are below.

Microsemi Leading Contributor to Industry Standards International Telecommunications Union (ITU-T) Meeting for Synchronization

At the interim meeting of the ITU-T Q13/SG15 synchronization expert group there were 27 attendees including operators and equipment manufacturers from North America, Europe, and Asia. Topics included: the IEEE 1588 partial on-path telecom profile for time/phase, a new enhanced primary reference time clock and an enhanced synchronous Ethernet clock. Microsemi is proud to contribute and continues to increase industry performance levels and standards to help overcome technical challenges and migrate to new technology and science levels.

Synchronization in Telecommunications Systems (WSTS)

Microsemi exhibited recently at the WSTS 2015 featuring our innovative portfolio of core, edge and end point synchronization solutions. Key technical presentations on the innovation work for these solutions were given by Joe Neil, solutions architect; Lee Cosart, R&D technologist, and George Zampetti, chief scientist of R&D.

Upcoming Events

Small Cell World Congress; June 9; London
 NIST/WSTS; June 10; San Jose, California
 JNC 2015; June 23; Orlando, Florida
 ION GNSS; Sept 8; Tampa, Florida
 LTE North America; Nov 17; Dallas, Texas

Microsemi in the News

Below is a sampling of just some of the media coverage Microsemi's Timing and Synchronization Products have received.

- **EE Web:** [Quantum Rubidium Miniature Atomic Clock | Electronics and Electrical Engineering Design News | EEWeb Community](#)
- **MPD:** [Newly Enhanced Quantum Rubidium MAC \(April Cover Feature\)](#)
- **Nature Physics:** [Quantum optics route to market](#)
- **GPS World:** [Microsemi GNSS Master Solves Small-Cell Synchronization Issue](#)
- **Electronic Products:** [Cellular timing unit provides synchronization](#)
- **Axiom:** Microsemi Universal Clock Translator
- <http://design.avnet.com/axiom/microsemi-universal-clock-translators/>

Microsemi's new product press releases can be viewed at <http://investor.microsemi.com/releases>.

Collateral Update: Datasheets, Webinars & Videos

New Datasheet:

[Miniature Rubidium Atomic Clock \(MAC\) features compact design and low power consumption](#)

Webinar Recordings:

Overcoming High Deployment Costs of Synchronizing Enterprise Small Cells [Overcoming High Deployment Costs of Enterprise Sync](#)
[How NTP Servers with Atomic Clocks Protect Against GPS Jamming/Denial to Maintain Accurate Network Time](#)

Videos:

[Microsemi Leading the World in Precise Time Solutions](#)
[QUANTUM Chip Scale Atomic Clocks](#)



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