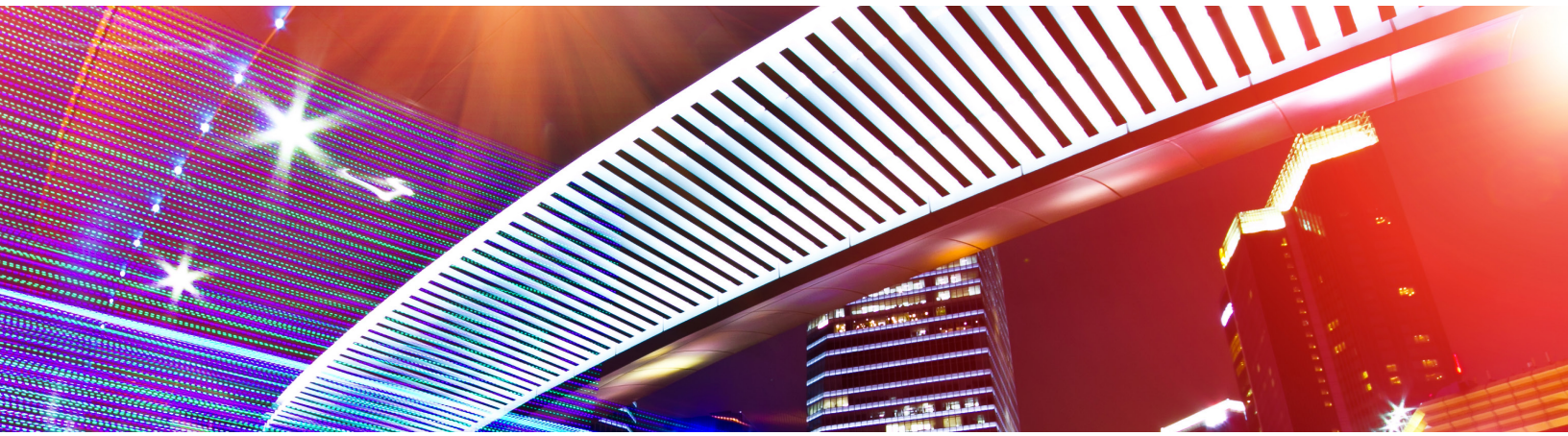
Small Cells Solutions



End-to-End Synchronization

Reduced Power Consumption

Secure Your Small Cells

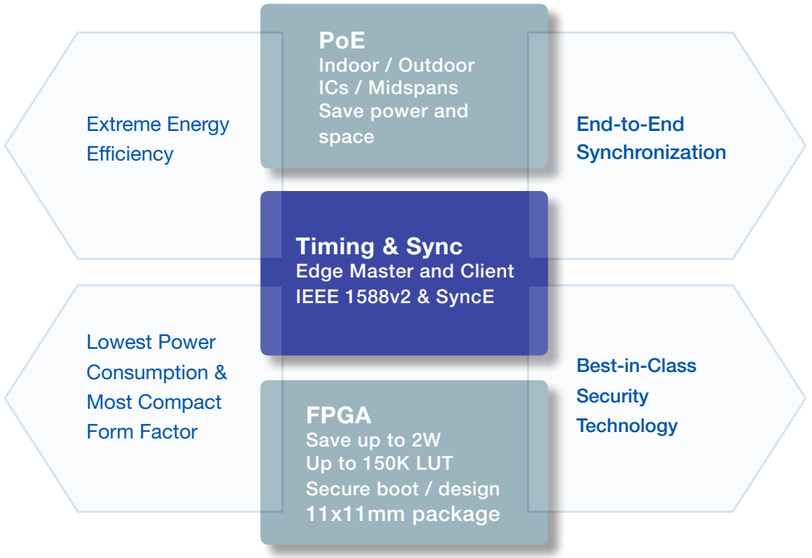
Leading-Edge System Solutions

Microsemi

Leading Supplier of Small Cells Solutions

Microsemi® brings leading-edge technologies enabling deployment of small cells and addressing the major challenges faced by both carriers and OEMs. Highlighted here are some of the key benefits of Microsemi's portfolio of semiconductor technologies and systems for Small Cell design and deployment.

Solutions for Small Cell Architecture

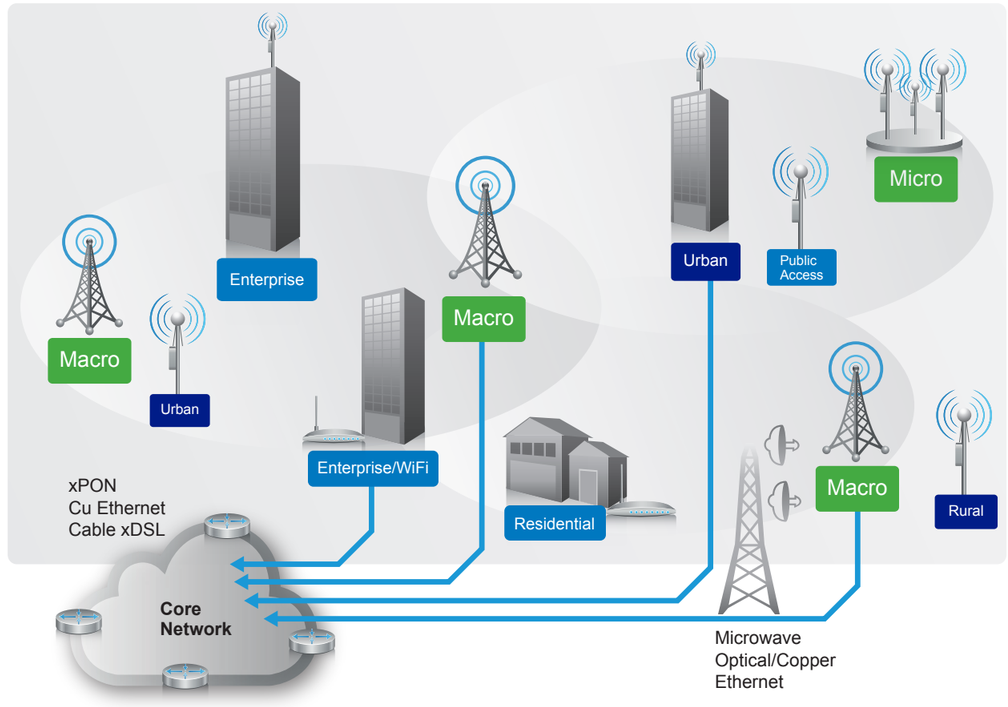


- **End-to-End Synchronization**: Microsemi products enable end-to-end coordination and synchronization of timing for heterogeneous networks with IEEE1588, Synchronous Ethernet and GPS systems.
- **Extreme Energy Efficiency**: Microsemi products are designed to minimize power consumption of small cells which help reduce heat dissipation. Also, Microsemi offers a portfolio of Power over Ethernet solutions to efficiently supply power to small cells – for indoor as well as outdoor applications.
- **Fortress of Security**: Microsemi FPGAs are uniquely positioned to enable security of small cell design and deployment at multiple levels.
- **Compact Form Factor**: Low power consumption of Microsemi products with specially designed small form factor packaging enables the most compact form factor of small cells.

Solutions for Heterogeneous Network

For carriers, Microsemi offers a unique end-to-end synchronization of networks, as well as powering small cells using Power over Ethernet (PoE) midspans. For OEMs, Microsemi offers a variety of components including PLLs, PoE ICs, low power FPGAs, WiFi FEM and DC-DC converters.

Deploying Small Cells in Heterogeneous Network



Microsemi offers unique and innovative solutions to address some of the key challenges faced by carriers deploying small cells, specially in a heterogeneous network.

1. Microsemi portfolio of network synchronization products include industry leading Grandmaster and Edge Master systems already proven and in deployment in many carrier networks around the world.
2. Microsemi offers the largest portfolio of standard compliant PoE midspans that can power small cells and small cell backhaul equipment in variety of deployment scenarios – for indoor as well as outdoor applications.

End-to-End Synchronization

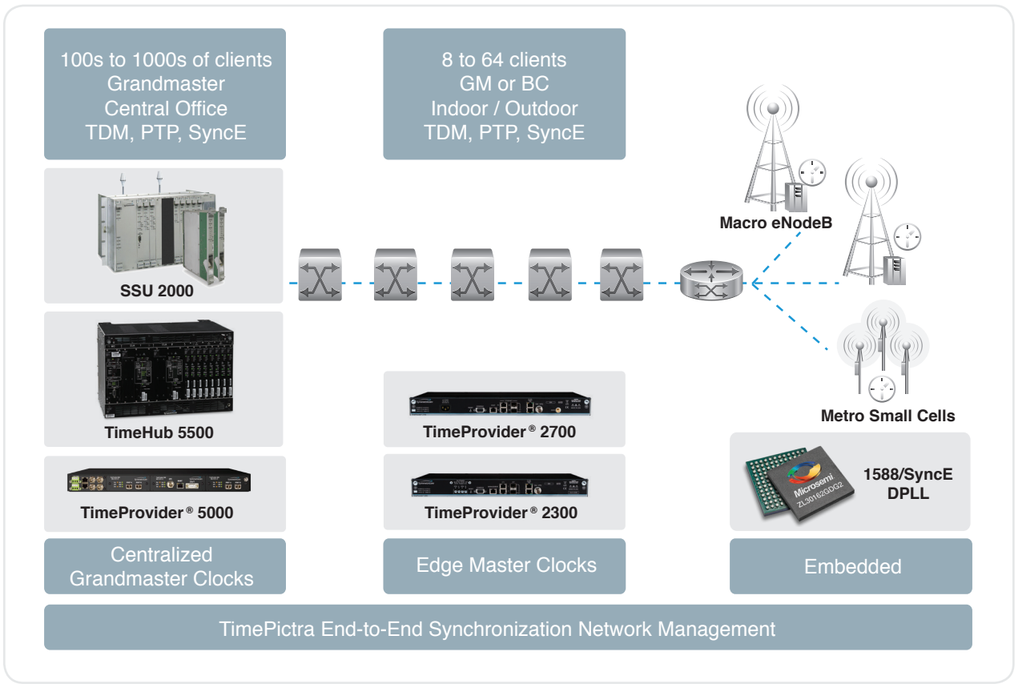
Small cells timing synchronization is a multi-faceted challenge and requires an innovative approach. Precise timing and synchronization ensures delivery of increased network capacity and coverage, and is critical to the successful deployment of small cells. New network nodes need accurate network timing support to ensure that the call hand-off and the service level agreement for latency critical application.

Network synchronization can be achieved in one of two ways, first by locating the timing synchronization solution at or near the edge and by taking into consideration time error budget and network asymmetry. Secondly, Carriers may place boundary clocks throughout their network, thus providing very accurate Phase & Time performance. Both methods will enable carrier networks to support LTE-TDD and LTE-A stringent requirements for frequency and phase synchronization within new and existing networks.

Microsemi offers several unique and industry leading solutions to address the mobile networks requirements including primary reference time clocks (PRTC).

Microsemi Grandmaster clocks provide service reliability, deployment flexibility, unified manageability along with multi-sync capability to ensure service continuity in the event of loss of one or more of the primary sync signals or when the GPS signal is compromised.

Microsemi offers industry's most comprehensive range of components for IEEE1588, Synchronous Ethernet (SyncE) and GPS based synchronization; all are tailor made for small cells and for use within boundary clock network equipment. Microsemi offers software as well as silicon based (PLLs) solutions which have been used extensively in the wireless infrastructure around the globe.



Powering Small Cells

One of the key challenges is to power the small cell for indoor as well as outdoor deployment. For indoor deployment on a wall or ceiling as well as outdoor deployment at street level, PoE offers most practical solution to deliver power to small cells.

Microsemi's PoE portfolio offers a range of options to cover variety of different deployment scenarios as well as power consumption.

Microsemi offers a portfolio PoE Midspan products with or for low cost indoor applications as well as ruggedized outdoor applications supporting different levels of power consumption by different capacity of small cells. The company also offers unique solutions to power unique deployment scenarios. Including multi-port midspans that can power multiple small cells using a single midspans. Another example is to power a small cell and a backhaul radio using single midspans product.

Microsemi also offers the industry's most power-efficient, standards-compliant PoE ICs supporting different levels of power consumption and management features.

Single-port Indoor Unit

Single-port Outdoor Unit with Lightening Protection

Dual-port Outdoor Unit

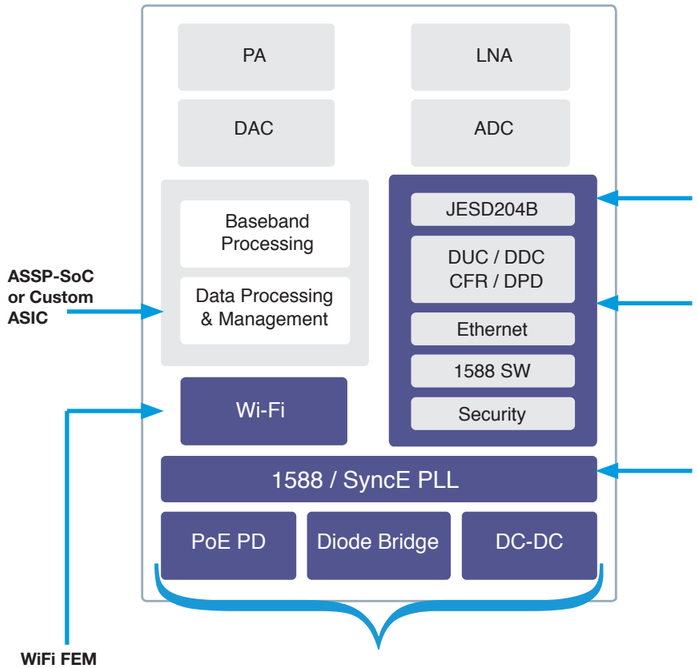
- Passive hub
- With lightening and surge protection
- AC Power (optional)

Power over Ethernet Midspan Products

- PoE standard compliant
- Up to 95W power delivered
- Indoor, outdoor (UL certified)
- Single port or multi-port options
- Direct powered, power forwarding, hub configuration options

Microsemi IC Portfolio for Small Cells

For architects and designers tackling the challenges of small cell designs, Microsemi offers a variety of components including PLLs, PoE ICs, low power FPGAs, WiFi FEM and DC-DC converters.



Low power, FPGA fabric
- Low power: Save ~1W compared to SRAM
- Integration: ARM®Cortex™-M3 - Ideal for 1588 SW
- Space saver: Up to 90K LEs in 11x13.5mm
- Security: Tamper resistant, clone resistant FPGA, secure boot enabled
- IP: JESD204B, Ethernet MAC

IEEE 1588 SW
- Clock recovery algorithm and PTP stack
- Comprehensive network-proven proven solution

1588 / SyncE PLL
- Up to 4 independent clock synthesis (Packet, electrical or 1 PPS input)
- 40 bit PLL accuracy - better than 0.001 ppb
- Wander filtering (ITU-T G.813 / G.8262 Op'1&2)
- Low 0.65 ps output jitter
- Input monitoring and hitless reference switching, precision holdover
- Aligned clock and 1 PPS output

WiFi FEM
- 2.4GHz / 5GHz RF Front End module
- PA: Upto 28dBM Power output
- LNA : Upto 28dB gain
- Compact QFN-16 package

PoE PD / Diode Bridge / Power supply
- Most efficient devices (least power dissipation)
- PoE standards compliant
- 15W, 30W, 60W and 95W options

Microsemi IC Portfolio - Value Propositions

Lowest Power Consumption

- Reduce ~1000mW with Flash-based FPGAs
  - Low leakage compared to SRAM-based FPGAs
  - Power saving of 0.5W to 2.5W depending on Microsemi's FPGA design and operating conditions
- Reduce ~400mW with Ideal Diode Bridge
  - Unique, highly efficient diode bridge
  - Save >400mW power dissipation compared to Schottky or Standard bridge
- Wide portfolio of highly-efficient PoE products
  - ICs, Diode Bridge, Midspan

Best-in-Class Security Technology

- Secure your Design on an FPGA
  - Encrypted design with secure key storage
  - DPA hardened – resistant to key stealing
  - Tamper detection and response
- Secure your supply chain
  - Avoid copying / shrinkage / pilferage in manufacturing chain
  - Control number of units being manufactured
  - Authenticate each unit being assembled
- Securely boot Processor/s on board
- Enable strong security of processor software based on secure root-of-trust boot

Microsemi Portfolio for Small Cells

Network Timing Reference: TimeHub and TimeProvider timing source

Network Synchronization: PLL and software for SyncE and IEEE1588v2, clock buffers and synthesizers, distribution

SoC FPGAs: SmartFusion®2 - Low power, compact form factor, tamper resistant, highly-secure FPGAs

FPGAs: IGLOO2 - Lowest-power, highly-secure, 5Gbps SERDES, PCIe, XAUI, etc.

PoE IC: Power Source (PSE) and power supply ICs

PoE Midspans: Comprehensive portfolio of midspans for indoor and outdoor deployment

RF: WiFi FEM (PA+LNA) in compact QFN16 package

For further information, please visit http://www.microsemi.com/applications/communications

Microsemi

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Microsemi Corporation (Nasdaq: MSCC) offers a comprehensive portfolio of semiconductor and system solutions for communications, defense & security, aerospace and industrial markets. Products include high-performance and radiation-hardened analog mixed-signal integrated circuits, FPGAs, SoCs and ASICs; power management products; timing and synchronization devices and precise time solutions, setting the world's standard for time; voice processing devices; RF solutions; discrete components; security technologies and scalable anti-tamper products; Power-over-Ethernet ICs and midspans; as well as custom design capabilities and services. Microsemi is headquartered in Aliso Viejo, Calif., and has approximately 3,400 employees globally. Learn more at www.microsemi.com.

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