Synchronous Ethernet (SyncE) is a physical layer (PHY)-based synchronization implementation for packet networks requiring frequency synchronization. Microsemi provides standalone SyncE with an easy migration path to IEEE 1588, or combined SyncE and IEEE 1588 for both frequency and time alignment.

The market leader in SyncE timing devices, Microsemi was the first to introduce SyncE PLLs in 2006. Microsemi now offers the industry’s most comprehensive portfolio of SyncE timing devices, providing G.8262 compliance and ultra-low jitter for 10G PHYs.

Highly-integrated, feature-rich SyncE products from Microsemi allow manufacturers to create cost-effective network equipment designs that support accurate end-to-end transmission of voice, video, and data over wired and wireless networks.

**Applications**
- Core routers, edge routers, Carrier Ethernet switches—timing cards and line cards, which support up to 100 Gbps interfaces, line rate converters, and carrier-grade timing cards, SONET/SDH, Fibre Channel, XAUI, SyncE, and OTN
- Broadband equipment including PON, DSLAM, and RT-DSLAM
- Wireless backhaul—integrated basestation reference clock for air interface for GSM, WCDMA, LTE and WiMAX macro, micro or femtocells, edge router, or access aggregation nodes

**SyncE Product Chart**

| Application | ZL30151 | ZL30611 | ZL30612 | ZL30614 | ZL30616 | ZL30612 | ZL30613 | ZL30614 | ZL30621 | ZL30622 | ZL30623 | ZL30601 | ZL30602 | ZL30603 | ZL30604 | ZL30681 | ZL30682 | ZL30683 | ZL30687 |
|-------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| PLL channels | Line card | Line card | Central timing | Pizza box | Central timing | Line card | Line card | Central timing |
| Inputs      | 1, 2, 3, and 4 | 1, 2, 3, and 4 | 1 and 2 | 1, 2, 3, and 4 | 1, 2, 3, and 4 | 1, 2, 3, and 4 |
| Ref inputs  | 3 | 10 | 11 | 3 and 6 | 10 | 10 | 10 |
| Outputs     | Yes | Yes | No | Yes | Yes | Yes | Yes |
| Output jitter | 350 fs | 250 fs | 12 and 16 | 350 fs | 250 fs | <300 fs | <300 fs |

**Timing Card Product Features**
- Telcordia GR-1244 and GR-253 Stratum 3
- Low bandwidth loop filter from 0.1 mHz to 1 kHz
- Hitless reference switching, up to 11 input references
- Holdover accuracy better than <0.1 ppb
- Accept and generate any frequency from 1 Hz to 1250 MHz

**Line Card Product Line Features**
- Ultra low jitter (as low as <250 fs RMS for line cards up to 100G)
- Loop filter from 14 Hz to 896 Hz
- Hitless reference switching between up to 8 input references
- Frequency translation and jitter attenuation of any frequency between <0.5 Hz and 1045 MHz
- Numerically controlled oscillator (NCO) capability

Microsemi does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other IP rights, whether with regard to such information itself or anything described by such information. Information provided in this document is proprietary to Microsemi, and Microsemi reserves the right to make any changes to the information in this document or to any products and services at any time without notice.
Synchronous Ethernet (SyncE) Products

ZL30673 Synchronous Ethernet System Synchronizer

- Precise phase/frequency measurement and tuning lowers system latency to meet 4G LTE, 5G, and wireless infrastructure requirements
- Two programmable ultra-low jitter synthesizers generate any frequency from 0.5 Hz to 1045 MHz
- Maximum jitter less than 300 fs in 12 KHz to 20 MHz band meets jitter of 10G/40G and 100G PHYs
- One programmable general purpose synthesizer generates any clock from 0.5 Hz to 180 MHz.
- 8 differential or 16 single ended (CMOS) ultra-low jitter outputs plus two general purpose outputs
- Accepts up to 10 LVPECL/LVDS/HCSL/LVCMOS inputs
- Any input reference can be fed with clock, sync (frame pulse), clock /sync pair, or clock modulated with sync pulse (embedded pps—ePPS and embedded pp2s—ePP2S)
- Automatic hitless reference switching and digital holdover on reference fail with initial holdover accuracy better than 10 ppb
- Up to three programmable digital PLLs/NCOs with loop bandwidth from 0.1 mHz to 470 Hz synchronize to any clock rate from 0.5 Hz to 900 MHz and to clock plus sync pulse (0.5 Hz and up)

ZL30622 Synchronous Ethernet System Synchronizer

- Fully compliant to ITU-T G.813/G.8262 compliance (options 1 and 2)
- Programmable bandwidth, 0.1 Hz to 500 Hz
- Hitless reference switching
- High-resolution holdover averaging
- Digitally controlled phase adjustment
- Three inputs (two differential/CMOS, one CMOS) with frequencies from 8 kHz to 1250 MHz (8 kHz to 300 MHz for CMOS)
- Any output frequency from <1 Hz to 1035 MHz
- Output jitter as low as 0.25 ps RMS (12 kHz–20 MHz integration band)
- Automatic self-configuration at power-up from internal EEPROM; up to four configurations pin-selectable
- Telecom timing cards for SONET/SDH, SyncE, wireless base stations, and other systems

ZL30622 Block Diagram

Microsemi Corporation (Nasdaq: MSCC) offers a comprehensive portfolio of semiconductor and system solutions for aerospace & defense, communications, data center 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; enterprise storage and communication solutions, security technologies and scalable anti-tamper products; Ethernet solutions; Power-over-Ethernet ICs and midspans; as well as custom design capabilities and services. Microsemi is headquartered in Aliso Viejo, California and has approximately 4,800 employees globally. Learn more at www.microsemi.com.