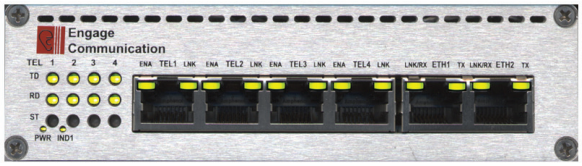
PrimaStratum

GPS Stratum 1 Timing



GPS based Stratum 1 Clock for Synchronous Telecom Networks

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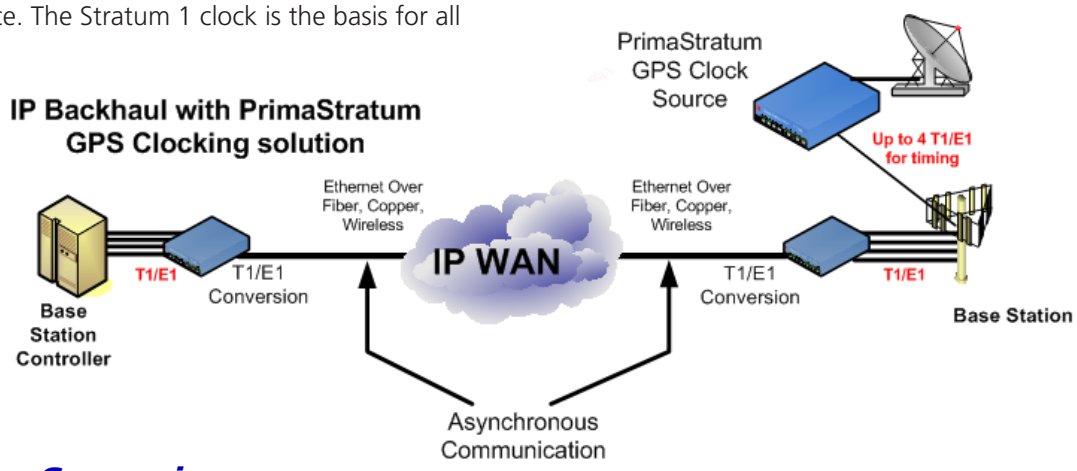
A stand-alone, GPS Disciplined Oscillator based TDM/Ethernet timing source. The Engage **PrimaStratum** provides Stratum 1 level timing signals for the interfacing of TDM and IP based circuits. The unit is designed to enable the inter-connection of circuit emulation and carrier switching infrastructures. The **PrimaStratum** guarantees TDM timing signal availability as a basis for all voice and data circuits no matter how remote or isolated the location of the interface equipment. Applications include cellular backhaul, remote data/voice extension, Last Mile data services in rural and remote areas, upgrade of existing TDM carrier circuits to combined IP and TDM backhaul interfaces.

The **PrimaStratum** receives GPS satellite timing signals to control an onboard oscillator providing from one to 4 T1 or E1 Stratum 1 reference clocks. The **PrimaStratum** utilizes a mixed-signal phase lock loop GPS driven frequency module to generate extremely accurate 1.544MHz/T1 and/or 2.048MHz/E1 references clocks that are frequency locked to the Global Stratum 1 source. The Stratum 1 clock is the basis for all telecom voice and data interfaces, required to assure proper synchronization of signals and call quality. The **PrimaStratum** incorporates this timing signal as a source for timing multiple telecom digital interfaces (T1/E1). These interfaces can be used to synchronize even remote telco equipment to a reliable, standard timing signal.

Telco Timing Extension

The Engage **PrimaStratum** provides superior timing synchronization for the most isolated and remote locations. The system is a low-cost, small footprint unit, easily rack or shelf-mountable. The unit provides up to 4 T1/E1 interfaces and communication ports for remote management, alarm monitoring and configuration. The four interfaces can be used as Stratum 1 clock references or can support up to 2 interfaces for injection mode re-timing. Injection mode timing adds Stratum 1 clocking to individual circuits as they are passed through the unit. Management of the unit can be via Ethernet (SNMP) or console interface. The **PrimaStratum** has a built-in antenna interface that permits extension of the appropriate GPS antenna.

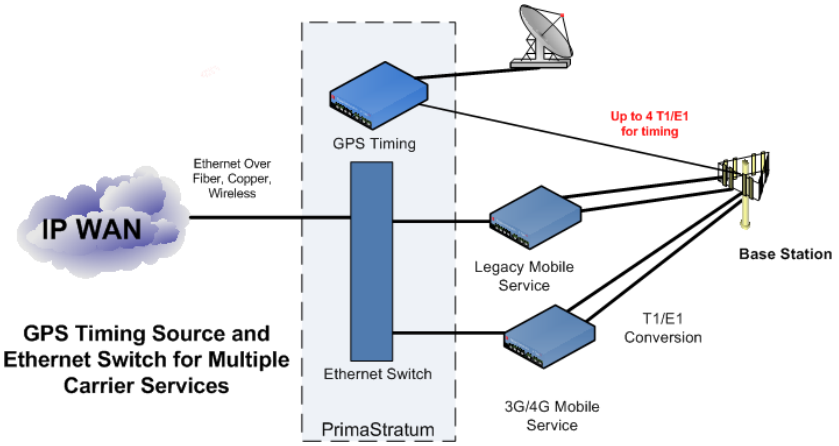


Base Station Conversion

As Base Stations are upgraded to 3G and 4G networks, the networks supporting such stations are also upgraded to IP based connections. The system incorporates both synchronous and asynchronous interfaces. The issues are seen at the remote base station, telcom timing is lost over the IP network and often a more reliable clocking source will be needed to maintain call quality and connections. The **PrimaStratum** can be added to the far-end base station to provide this clocking signal.

Built-in Ethernet Switch

A four (4) port Ethernet switch is an option available on the **PrimaStratum**. The Ethernet switch functionality is a major plus to mobile operators as they move to upgrade their existing circuits to 3G and 4G services. A rate limiting capability built into the switch means that available bandwidth can be allocated to T1 or E1 circuits for voice backhaul or can be reserved as 3G and 4G data usage increases.



Mobile Carrier Service Drop-Off

Mobile systems require extremely accurate clock sources at often very remote locations. Add to this fact that at these locations several carriers might be sharing base station equipment and separate TDM circuits need to be accessed per carrier. Without a local source of Stratum 1 timing, these circuit drop-offs can be a significant source of issues. The **PrimaStratum** provides a source of Stratum 1 timing at even these remote locations to assure that all carrier circuits are timed correctly and drop-off is with a minimum of problems.

Technical Specifications

Interface:

- 4 T1/E1, RJ-45
- Coding - B8ZS or AMI
- Comprehensive Clocking:
  Internal – the master clock source for the TDM circuit is provided by an internal GPS recovered clock oscillator

GPS Receiver:

- Receiver input: 10 MHz L1 C/A code. Coarse acquisition. Position accuracy: typical 10 m RMS tracking 4 satellites.
- Tracking: 12 parallel channels. Multi satellite ensembling with TRAIM.
- Acquisition time: Cold start <45 sec / Hot Start <2 sec Re-acquisition < 1 sec
- 1PPS output accuracy: UTC(USNO): ±30 nS RMS 100 ns peak
- Frequency output accuracy: 1 x 10-12@ 1 day
- Frequency/timing
  Modified Allan Deviation frequency stability (TCXO):
  1 x 10-9 @ 0.1 sec
  .9 x 10-9 @ 1 sec
  .5 x 10-10 @ 10 sec
  .9 x 10-10 @ 100 sec
- Meets ITU-T G.811 Wander Generation Mask
- Meets ETSI-PRC Wander Generation Mask (with OCXO reference)

Regulatory:

- CE
- Safety -IEC60950 • EMC - CFR 47 Part 15 Sub Part B:2002, EN55022:1994+A1&A2, EN55024, ICES-003 1997, CISPR 22 Level A
- Telecom Part 68

Management:

- Remote config., monitoring, & reset • Secure Socket Shell – SSH Diffie-Hellman Group1/14 key exchange and strong integrity checking via MAC SHA1/SHA1-96 with Cipher AES- 128 and 3DES and DSS and OpenSSH public key format
- Telnet support with Edit and Paste Template Files
- Console Port for Out of Band Management
- SNMP support (MIB I, MIB II, Engage proprietary) with configured traps

Environmental:

- Temperature: 0–50°C (32–122°F).
- Optional Extended Temp ranges avail.
- Humidity: Up to 90% non-condensing

Rear Panel/Power:

- 10-30 VDC, 1.0A. • Screw Locking Connector
- Power 7 Watts
- Universal Adapter 100/240 VAC 50/60 Hz
- Optional -48V 0.25 Amp
- Hot Standby

Physical:

- Dimensions: 6" (L) x 4" (W) x 1.50" (H) • Weight

Ethernet Switch Option:

- Out of band management interface with independent IP configuration
- 802.1Q VLAN support with Filtering for up to 64 VLANs
- Support both port-based membership or 802.1Q VLAN-based VLANs
- 2,048 MAC address entries with automatic learning and aging

Diagnostics:

- Telco Diagnostics: Local Loop, Remote Loop, Loop Up/Down NIU and CSU Codes. Enables isolation of connectivity faults to local, network or remote equipment
- Physical layer alarms for LOS, AIS, LOF
- Comprehensive statistics: LAN and IP layer network statistics: such as packet loss and packets arriving late, out of sequence, underruns overruns CRC, and delay variation (jitter).

Antenna:

Size: 3" Dia. x 3" H (7.62 cm x 7.62 cm)
Input: BNC female to GPS receiver. TNC on antenna
Power: +12 Vdc
Operating temperature: –55°C to +85°C (–67°F to +185°F)
Storage temperature: –55°C to +85°C (–67°F to +185°F)
Humidity: 95%, non-condensing
Certification: UL, FCC, CE, and C-UL