SSU 2000

Intelligent NEBS-Compliant Sync Supply Unit

Key Features

- High capacity system: up to 640 1:1 protected or 1280 unprotected outputs
- Fully integrated, carrier-class NTP and IEEE 1588 PTP server blades
- Ready for SyncE network elements
- Performance monitoring on all inputs
- Management: SNMP, Interactive ASCII, TL1
- Dynamic control algorithms for superior performance

Key Benefits

- Single platform for traditional TDM, NTP, PTP and SyncE
- Carrier-class redundancy: module protection for all critical functions (inputs, holdover clock, outputs)
- Carrier-class capacity: TDM ports, NTP transactions, PTP clients
- Carrier-class design and features: precision time accuracy, end-to-end management, standards compliance and certifications
- Seamless interoperation with embedded sync and timing solutions in other network elements

The Symmetricom® SSU 2000 is an intelligent, fully manageable Synchronization Supply Unit or Timing Signal Generator. It is used by communications network operators to generate and distribute superior synchronization signals for their networks. In addition to traditional TDM network timing capabilities, the SSU 2000 supports packet networks with signals including IEEE 1588 Precision Time Protocol (PTP) and carrier-class NTP for advanced network services. The SSU 2000 platform is also ready to support the seamless introduction of SyncE-capable elements into your network. Designed in a NEBS-compliant package, it utilizes the latest hardware and software integration technologies.

Industry Standards Compliance

The SSU 2000 is designed to meet the latest and evolving industry standards, including ANSI, Telcordia, ITU-T, ETSI, IEEE 1588 and CE/AS.

Architecture

The SSU 2000 architecture is designed to integrate intelligent, functional modules into a flexible, fully redundant system to seamlessly satisfy current and future requirements.

The system provides total output capacity of up to 1280 unprotected ports or 640 protected ports. Up to 160 outputs are available in the main unit, and up to 1120 additional outputs are available through four expansion shelves with a capacity of

280 outputs per shelf. Output modules may be configured in redundant pairs providing twenty 1:1 fully protected outputs per pair. Expansion shelves are designed with redundant connections for reliable uptime.

Auto-Reconfiguration: If a module is removed and a like module installed in the same slot, the new module will be automatically configured to the same settings as the previous module.

Input signals are passed through in case of multiple internal failures, including clock failures.

Intelligent Modules

Each SSU module has an integrated CPU with software for superior reliability, flexibility and functionality. Modules can be removed or inserted while the unit is operating without any degradation of the output signals. Each intelligent module supports the management of critical, major and minor alarms. Powerful management can be performed to and within each module through the communication module.

Major Applications

- Synchronization Supply Unit (SSU)
- Primary Reference Source (PRS)
- Building Integrated Timing Supply (BITS)
- Subtending Timing Signal Generator
- IEEE 1588 Grandmaster
- PRS traceable reference for Synchronous Ethernet

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Input Section

The SSU 2000 accepts up to nine input modules, available in a one-port or three-port version, thus providing up to twenty-seven inputs. Each module is fully user configurable through software to support the following signals:

- DS1/E1
- SSM quality
- Japan JSW and JCC
- 1 MHz (sine or square)
- 1.544 MHz (sine or square)
- 2.048 MHz (sine or square)
- 5 MHz (sine or square)
- 10 MHz (sine or square)

Various input impedance panels are available to support the following balanced or unbalanced signal impedances:

- 50 ohms (sine)
- 75 ohms (DS1/E1)
- 100 ohms (DS1)
- 120 ohms (E1)
- 133 ohms (CC)
- High impedance for timing extraction only (bridging mode)
- Specific panel/adapter connection interfaces:
  - Wire wrap
  - COAX
  - BNC
  - Siemens
  - DE-9

GPS Module

The SSU accepts single or dual GPS primary receiver modules to meet primary reference clock requirements, which provides the following key benefits:

- Flattens the number of levels in the sync distribution hierarchy
- Improves the overall performance of the network
- Lowers the overall OAM&P costs (Operation, Administration, Maintenance, and Provisioning).
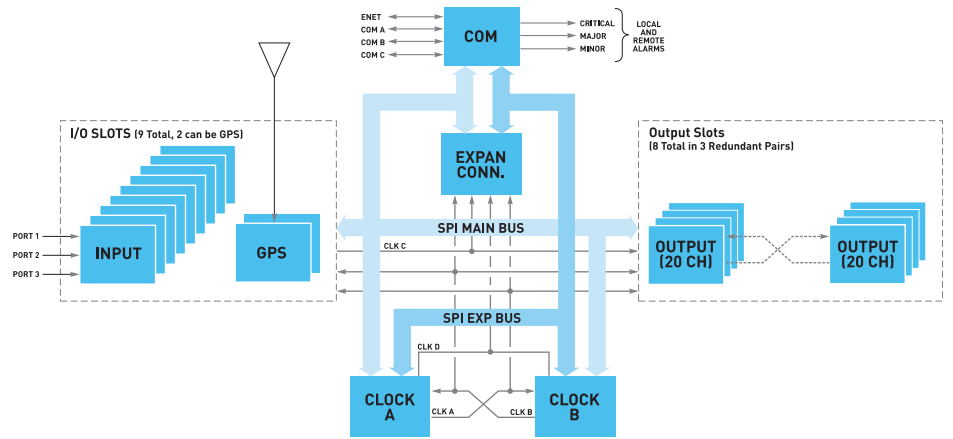
- Single unit Primary Reference Source (PRS)
- Time Of Day (TOD) through the Network Time Protocol (NTP)

Intelligent Clock Module

The SSU accepts single or dual clocks. A selection of mixed SynClock technologies is available to meet specific holdover requirements.

- Enhanced Rubidium-Stratum 2E
- Enhanced Quartz-Stratum 3E and Type I

Superior Holdover Performance

In case of loss of GPS and input references, the SSU 2000 uses intelligent software to provide enhanced output performance beyond the required holdover stability. Its superior holdover capability retains stratum G.812 performance for for three weeks during holdover conditions with a rubidium clock.

Communication Module

The SSU 2000 utilizes a single communication module, available in two different models. Coupled with Symmetricom's advanced management software solutions, the communication module provides powerful fault, configuration, accounting/inventory, performance, security, and other optional management functions.

Both models support the following management interfaces:

- Interactive ASCII
- TL1
- SNMP (optional)

The RADIUS Capable Comm Card includes security features: support for RADIUS authentication, Secure Shell (SSH) and Secure File Transfer Protocol (SFTP). The RADIUS card also supports dual images and allows network administrators to schedule automatic firmware upgrades.

Output Section

The SSU 2000's main unit accepts up to eight output modules, providing 160 outputs. Up to four expansion shelves can be added, providing up to 1120 additional outputs. The output modules may also be configured for redundant operation that supplies 20 protected outputs per pair. Various output modules are available to meet specific signal and interconnection requirements including T1, E1, CC, JSW, JCC, RS-422, carrier-class NTP, and IEEE 1588 PTP. The activation of the outputs ports are fully user controllable.

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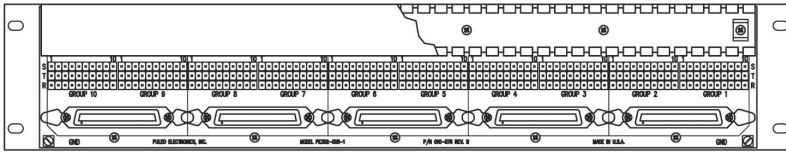
23" High Density Wire Wrap Panel (100 Outputs)
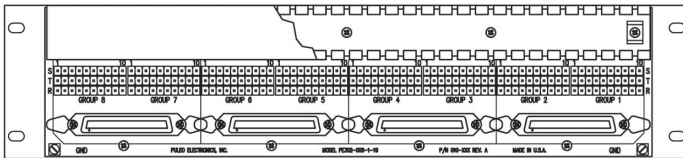
19" High Density Wire Wrap Panel (80 Outputs)

Select Rate Output Module

The RS-422/TTL Output module generates 10 balanced square-wave outputs (TTIP and TRING signal pairs on ports 1-10) and 10 single-ended (RING) squarewave outputs on ports 11-20. Each output can be turned off independently of other ports: relays on each output disconnect the driver output from the output pins. A squelch feature turns off selected ports when the input signal falls below predetermined quality levels.

DS1 Line Retiming Unit (LRU)

The LRU is comprised of a Line Re-timing Module (LRM) and a Cut-Through Assembly (CTA). The LRU is a four-port (Quad) module. The DS1 LRU inserts DS1 signals on both sides of a DSX-1 panel in a Central Office. Side 1 of the DS1 re-timer provides "3R" (Re-shape, Re-amplify, and Re-time) for the DS1 signal to a client Network Element. When the LRU receives a DS1 data stream, it re-times the data with the transmit clock signal. The clock signal is inserted into the DS1 line route between two DS1 path-terminating elements. Side one is the direction in which timing is applied. Side 1 contains the DS1 line performance reporting and AIS generator. Side 2 provides "2R", which Re-shapes and Re-amplifies (regenerates) the DS1 signal from the client Network Element.

Connectivity

There are a variety of input and output panels available with several types of connectors. These include DE9, BNC, and Siemens connectors. Also available are High density Wire Wrap Panels in both 80 and 100 output versions.

Synchronization Status Messages (SSM)

The Input Module reads and processes Sync Status Messages (SSM) in accordance with ITU-T and ANSI Standard T1.403 to determine the traceability of inputs. This traceability information is then used by the clock modules in selecting a reference signal, and is embedded into the system's outputs. An embedded editable table allows upgrades as standards evolve.

Expansion Shelf (SDU)

The SDU 2000 Synchronization Distribution Unit, is an expansion shelf that is connected to an SSU 2000 Synchronization Supply Unit and is used to provide additional output signals. The expansion shelf uses the framing and synchronization features of the main shelf to drive an array of output modules. Each expansion shelf in the system can accept 14 output modules, and two buffer modules. Any combination of DS1, E1, Composite Clock, Select Rate, or

2048 kHz output modules may be installed, including NTP and PTP server blades. Each pair of output modules produces 20 outputs, thus providing up to 280 output signals. Up to four expansion shelves can be connected together to produce an additional 1120 output signals. These output modules may also be configured as redundant pairs to provide 1:1 fully protected outputs. The last expansion shelf in the chain can be located up to 200 feet away from the main shelf.

Subtending Mode Of Operation

The SSU 2000 configured as a Subtending SSU broadens the Symmetricom SSU 2000 family of products by providing subtending clock functionality when referenced to a master TSG/BITS equipped with a Stratum 3E or better clock. The Subtending SSU is used when there is a need for more timing outputs or longer distribution paths than can be supplied by a single TSG. The subtending SSU receives redundant composite clock reference signals directly from the master BITS clock. These CC signals are used for primary and secondary inputs, and the SSU phase locks to the selected reference to ensure proper DS0 phase alignment throughout the office. If both CC reference inputs fail, the shelf provides Stratum 3E holdover stability. If both 3E clock modules fail, the Subtending SSU uses the CC reference input for clock bypass operation to maintain uninterrupted outputs.

NEBS Level 3 Certification

The SSU 2000 is fully Network Equipment Building System (NEBS) certified. This ensures the SSU 2000 meets established safety and reliability standards.

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Specifications

ARCHITECTURE

- Main unit modules: 2 clock, 1 comm, 9 mixed input/output

- Each output expansion shelf will accept up to 14 output modules of various types, thus providing an additional 280 outputs per shelf. The SSU 2000 will accomodate up to four expansion shelves, for a total of 1120 additional outputs. The last expansion shelf in the chain can be located up to two hundred feet away from the main shelf.

- The SSU 2000 is a fully automated and software manageable system. Firmware upgrades can be remotely installed, thus negating the necessity of site visits for update purposes.

GPS PERFORMANCE

- Compliant with Stratum 1 PRS (Primary Reference Source) per ANSI T1.101-1999, ITU-T G.811, Telcordia GR-2830/1244-CORE, and ETS 300 462-6.

CLOCK PERFORMANCE

- Compliant with clock levels per ANSI T1.101-1994 & 1997 draft, ITU-T G.812, Telcordia GR-2380/1244-CORE and ETS 300 462-4.

SYNC STATUS MESSAGING (SSM)

- Compliant with SSM specification per T1X1.3 TR33, ANSI T1.101-1997 draft, ITU-T G.704, and Telcordia GR-253-CORE

NETWORK TIME PROTOCOL (NTP)

- Compliant with RFC 5905 (V4); Stratum 1 server with GPS module(s)

- Supports client and server modes in unicast and broadcast

COMMUNICATIONS & MANAGEMENT

- 3x EIA-232 and 1x Ethernet ports, supporting interactive ASCII, TL1, and SNMP

REDUNDANCY

- For any pair of output modules, it is possible to connect all of the outputs from module "A" to the outputs of module "B", thus providing 1:1 output protection (1:1 redundancy). This feature is user configurable.

EVENT LOG

- Stores up to 500 events from any system faults, user interventions, and system actions. Events are time & date stamped to less than 1 msec.

INPUT

SLOT

- 9

- Slots 3 through 11 are Input/Output slots. Additionally, slots 3 and 5 will also accept GPS modules

PORT

- 1 or 3 ports/module, reference or monitoring capability

- Up to 27 inputs for monitoring or references

- Embedded Sync Status Messaging (SSM)

- Integrated performance measurements (TIE, MTIE, TDEV, ERROR RATES) on all inputs

TYPE

- DS1, E1, 1 MHz, 1.544 MHz, 2.048 MHz -G.703/13, 5 MHz, 10 MHz, Japan JSW/JCC (user selectable)

GPS

- Integrated single or dual GPS modules. Slots 3 and 5. If slot 5 is not occupied by a secondary GPS module, any other input or output module may be installed there.

SELECTION MODE

- Priority, SSM, Performance Mask

REALTIME CPU

- Intelligent software for real-time MTIE, TDEV and TIE performance monitoring.

PERFORMANCE MEASUREMENT

RESOLUTION

- Measurements are provided for each input versus each clock at a resolution of 1ns.

SAMPLING RATE

- 40 Hz

CALCULATIONS

MTIE

- Exceeds the latest ITU-T, ANSI and Telcordia standards with measurement intervals of 0.5 to 100,000 seconds.

TDEV

- Exceeds the latest ITU-T, ANSI and Telecordia standards with measurement intervals of 0.1 to 10,000 seconds.

PHASE

- 1, 100, 1,000, and 10,000 second phase averages and history are available.

FREQUENCY

- Frequency measurements can be viewed via user selectable calculation periods from 10 to 10,000 seconds.

CLOCK

HOLDOVER TYPE

- Enhanced Rubidium (Type II)

- Enhanced Quartz (Type I for ITU-T Standards)

- Enhanced Quartz (Type III)

CONTROL

- DDS (Direct Digital Synthesis) technology for cost-effective calibration-free operation and precise frequency control

OUTPUT

SLOT

- Main unit: 9 single or redundant

- Expansion shelf: 14 output modules and 2 buffer modules

PORTS PER MODULE

- All SSU 2000 Output Modules have 20 output ports

TYPE

- DS1, E1, and composite clock, plus a port selectable 2.048 MHz/2.048 Mbps

- RS-422/TTL provides output frequencies from 8 kHz to 4096 kHz in 8 k steps.

- Carrier-class NTP (refer to NTP Blades for SSU 2000 data sheet)

- IEEE 1588-2008 (PTP) (refer to IEEE 1588 Blades for SSU 2000 data sheet)

SYNC STATUS MESSAGING (SSM)

- Fully supported per above-listed standards

MAX. CAPACITY

- Main shelf: up to 160 outputs

- Up to 1120 outputs: 4 expansion shelves, 280 ports per shelf

COMMUNICATION & MANAGEMENT

COMMUNICATION PORT

- EIA-232

- Ethernet, 10 Base-T, TCP/IP

MANAGEMENT INTERFACE

- Simple fault, visual & contact closures

- Embedded Interactive ASCII

- Embedded TL1

- Embedded SNMP (optional)

LOCAL MANAGEMENT

- Windows GUI-based Local Management Terminal

ENVIRONMENTAL

POWER (VDC)

- Dual -38 to -74.9

- Less than 120 watts power consumption per shelf

SIZE (HXWXD)

- 10.47" x 18.9" x 9" (266mm x 480mm x 229mm)

WEIGHT (MAX.)

- 26.7 lbs (12.1kg) main unit, 22.3 lbs (10.1kg) for each expansion unit

OPERATING TEMPERATURE

- 0°C to 50°C

- EMC: Radiated emissions are 6dB below the Class B requirement.

Symmetricom®