Symmetricom

55400A

Smart Synchronization Supply Unit

KEY FEATURES

- Nine inputs and up to 80 protected outputs in master subrack
- Upgradeable and expandable (up to four expansion subracks)
- Fully redundant
- Hot swappable cards
- SmartClock technology
- Downloadable firmware with memory protection
- Three levels of security
- Programmable thresholds
- Rearrangement of inputs with zero phase hits
- Integrated real time performance monitoring
- Retiming capabilities
- SSM supported on inputs and outputs
- Lowest cost per port
- Multiple output types
- CE marked

THE SMART SSU

The 55400A Synchronization Supply Unit (SSU) is a modular, fully redundant, CE marked, timing distribution system for 2048k/bits primary rate networks. The unit tracks incoming timing references, qualifies the signals against network timing standards, then filters and distributes precise timing to all equipment in the node. Incoming reference signals may come from cesium standards, GPS reference sources, or E1 signals. The SmartSSU meets ETSI and ITU-T synchronization standards, and provides holdover that exceeds the requirements for stratum 2 transit and local node performance.

The SmartSSU offers unprecedented performance that leads to maximum signal availability and network uptime. It has zero phase variances on the output signal upon rearrangement of the inputs. The unit will also "ride out" or ignore errored seconds to create more stable timing.

Other features built into the SmartSSU to guarantee the highest possible network availability include intelligent quartz oscillator technology (SmartClock), real time monitoring and management, vast memory of up to 1000 events, and built-in LAN, TP4 and X.25 connectivity.

The SmartSSU's simple integrated design provides greater functionality and redundancy. A SmartSSU system consists of one management card, input track and hold cards and output cards

MASTER SUBRACK

The master subrack provides up to 80 1:1 protected outputs and holds the SmartSSU's individual input, output, and management cards. The Smart SSU accepts up to nine inputs, one primary reference clock and up to eight 2048k/bits or 2048 khz signals. All inputs go to both input track and hold cards.

EXPANSION SUBRACK

For offices that require more than 80 outputs, up to four expansion racks can be added, each with 80 1:1 protected outputs. In its fully expanded configuration, the SmartSSU offers a total of 400 1:1 protected outputs. A modified management card and modified input track and hold cards essentially 'extend' the backplane of the master subrack.

FIG.1 55400A Smart Synchronization Supply Unit

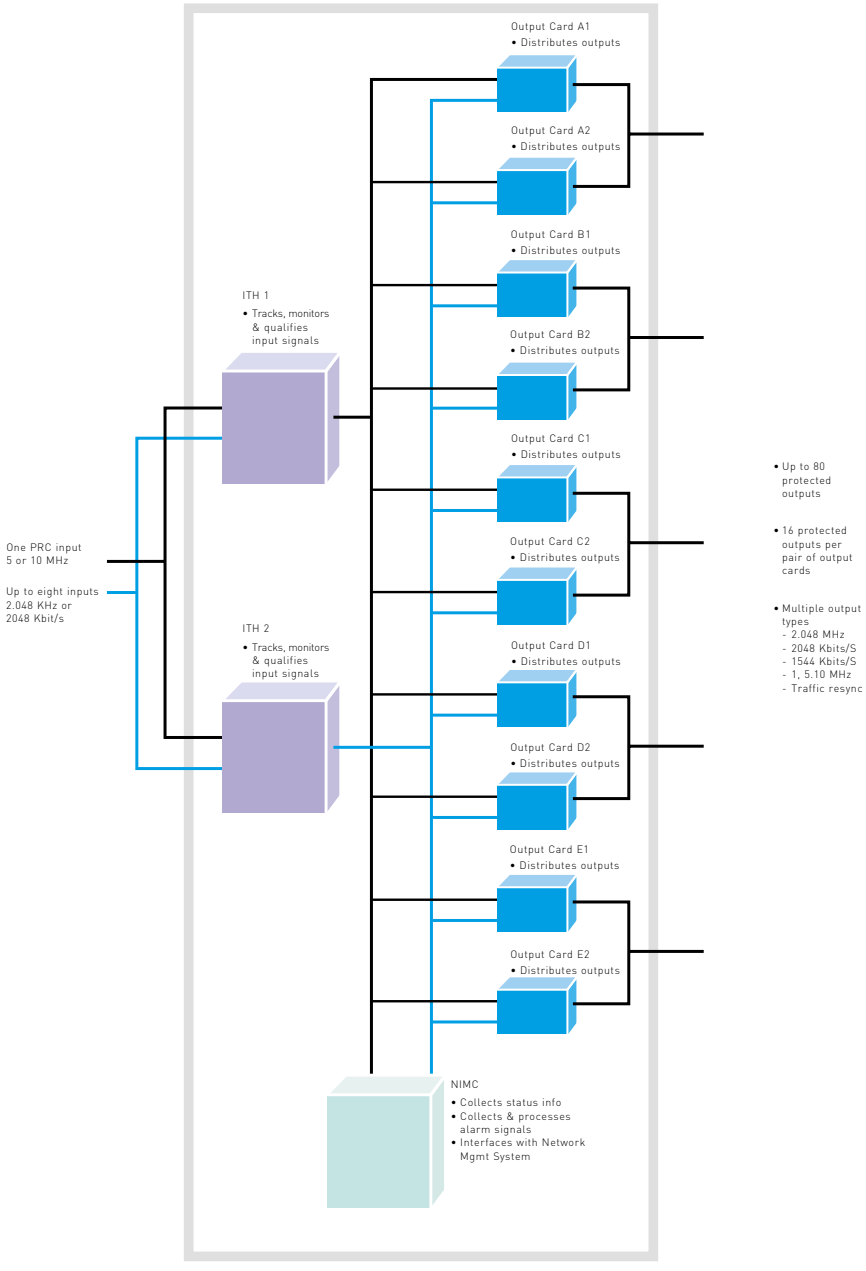

FIG.2 55400A Architecture

This design lowers the cost of expansion and simplifies network management architecture. The expansion subracks uses inputs from the master subrack. Output cards are identical to the ones used in the master subrack and full redundancy is maintained.

INPUT TRACK AND HOLD CARD

The SmartSSU uses a pair of ITH cards for redundancy. Both cards receive and monitor all nine input signals. One card is active while the other is in standby mode. The active card selects a good timing input, then filters the input and distributes a stable frequency to the output cards. The ITH card also reports the status of all inputs to the Network Information Management Card. The two cards operate in master/slave configuration and track each other in phase, allowing swapping of cards while the SSU is online. The cards' oscillators provide holdover in the event all input signals are unavailable.

SMARTCLOCK™ TECHNOLOGY

SmartClock Technology improves the performance and accuracy of oscillators. Using intelligent firmware algorithms, SmartClock 'learns' the effects of aging and temperature on the clock while it is locked to a reference signal and stores this information. When the incoming reference signals are lost or disqualified, SmartClock uses the stored data to compensate for frequency changes.

The system will continue to distribute highly stable synchronization signals while predicting and correcting the behavior of the oscillators when all references are lost. The result is an improved, stable synchronization signal during holdover, which other holdover algorithms cannot achieve.

OUTPUT CARDS

Redundant pairs of output cards (up to five pairs) provide up to 16 1:1 protected outputs per pair. If the active card in the pair fails, its standby card immediately takes over with minimal phase hit.

If the ITH card is in holdover so long that the oscillator does not meet specifications or the output voltage levels fall out of specification, the output card squelches the outputs, ensuring that substandard outputs will never be sent to the networks.

TRAFFIC RESYNCHRONIZATION CARD

A traffic resync card (TRSC) provides eight channels for E1 signals. Four of these channels will retime the four input signals and four will only buffer the input signals.

The four retimed channels of the TRSC provide precision timing for network equipment that cannot receive external clock timing. These channels accept E1 traffic bearing signals, remove jitter and wander from the signals, then supply these resynchronized signals for use by downstream network equipment. When any network element (NE) derives its timing from these signals, the NE is synchronized to the network.

The TRSC accepts four other signals that it can buffer, performing a repeater function. These input signals are recovered with the resulting output signals being restored to the correct nominal amplitude levels. These four buffered channels do not retime the input signals nor do they filter any jitter and wander.

NETWORK INFORMATION MANAGEMENT CARD

The Network Information Management Card (NIMC) is ready for full synchronization network management with built in TCP/IP, TP4, or X.25 connectivity. No new firmware, card, or SSU is required.

The NIMC collects status information from the ITH and output cards and interfaces with the synchronization network management system. It collects and processes alarm signals from all other cards in the master and expansion subracks. The NIMC stores up to 1000 events to provide unprecedented capability for remote and local management. When connected to the network management software, the NIMC provides visibility and control over the SmartSSU from a network management center. When connected to a local PC, the card gives technicians access to all of its data to help in installation and maintenance of the SSU.

SYNCHRONIZATION STATUS MESSAGING

Synchronization Status Messaging (SSM) assists network managers monitor the health of a synchronization network and maintain high quality synchronization. SSM capability is included in the basic design of the SmartSSU. No new firmware or card is required.

SYNCHRONIZATION NETWORK MANAGEMENT SOFTWARE

The SmartSSU is ready to be managed by Symmetricom's latest synchronization network management software, TimePictra™. TimePictra's Web enabled platform allows network managers to maintain, administer, monitor, and upgrade the entire synchronization network from anywhere.

TimePictra provides full FCAPS functionality (fault management, configuration management, accounting/inventory management, performance management, security management) to ensure high Quality of Service (QoS).

TimePictra's multi-tier architecture is scalable and adaptable. It has the ability to manage entire synchronization networks, including equipment from multiple vendors, while providing the scalability that would protect investments as the network grows. The architecture enables open integration to network-level systems. Modules already exist to support some of these interfaces such as SNMP and Q3.

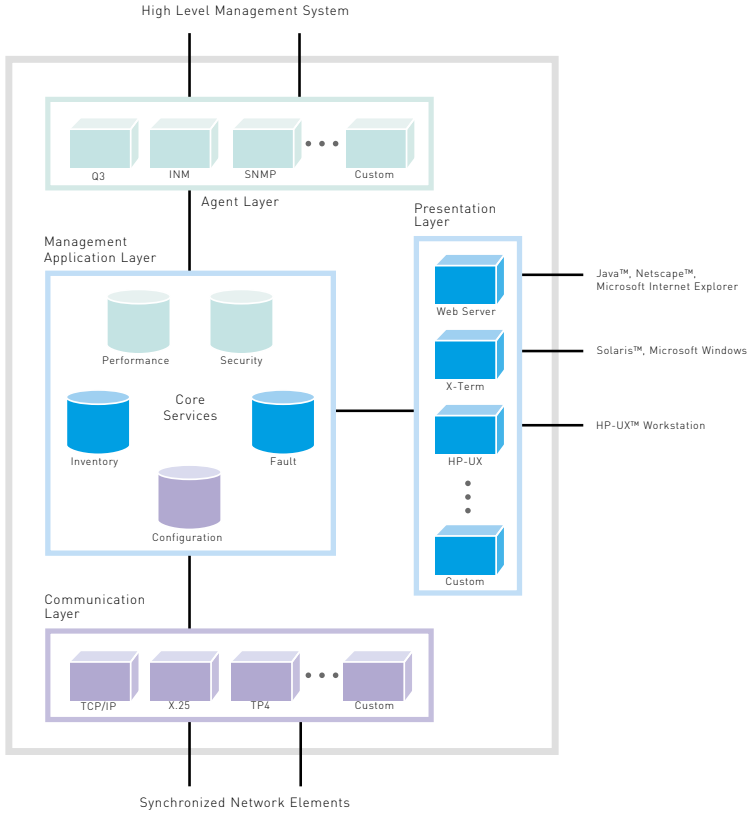

FIG.3 TimePictra Open Architecture

55400A SPECIFICATIONS

INPUTS PER SUBRACK
- Up to nine reference inputs, 1:1 protected

REFERENCE AND MONITORING INPUTS
- One 5 or 10 MHz PRC
- Up to eight, any combination, 2048 kHz or 2048 kbit/s

JITTER/WANDER INPUT TOLERANCE
- Complies with ITU-T G.823

MONITORING PARAMETERS
- TDEV Time deviation
- MRTIE Maximum relative time interval error
- LMRTIE Latest maximum relative time interval error
- FFOFF Fractional frequency offset
- SPREAD Frequency spread

INTERNAL REFERENCE
- Quartz crystal oscillator or rubidium

HOLDOVER STABILITY
- At 25°C after 10 days of continuous operation
  - Enhanced stratum 2 (rubidium) ± 2.0 x 10^{-11}/day
  - Enhanced transit node (quartz) ± 1.0 x 10^{-10}/day for 3 days
  - Transit node (quartz) ± 5.0 x 10^{-10}/day
  - Local node (quartz) ± 1.0 x 10^{-9}/day

NUMBER OF OUTPUTS
- Up to 80 outputs, 1:1 protected

TYPES OF OUTPUTS (16 PER CARD)
- 2048 kHz CCS or CAS, with or without CRC4
- 2048 kbit/s
- 64/8 kbit/s

TYPES OF OUTPUTS (8 PER CARD)
- 1.544 kbit/s
- 1, 5, 10 MHz
- Traffic resync

OUTPUT PHASE VARIATION
- Reference switchover <1ns
- ITH card switchover <15ns
- Output card switchover <15ns
- ITH card failure <15ns

EXPANSION RACK CAPABILITY
- Four additional subracks, up to 80 1:1 protected outputs each

ALARMS
- Audible and visible
- Critical, major, and minor
- Normally open and normally closed contacts

MANAGEMENT PORTS
- Local RS-232D, DCE
- Remote RS-232C, DTE

SYSTEM SUPPLY VOLTAGE
- Dual redundant inputs
- -36 Vdc to -57Vdc

POWER REQUIREMENTS (FULLY LOADED)
- Cold start 3.0A
- After warm up 7.0A (maximum)

OPERATING TEMPERATURE
- -5 to 45 °C

DIMENSIONS (H x W x D)
- 533mm x 435mm x 275 mm

WEIGHT
- 18 kg fully loaded

MOUNTING
- ETSI or EIA racks

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