Efficient and Reliable Interface to T1/FT1 Services

Features

- Provides the interface to T1 or Fractional T1 services.

- Supports CSU mode or concentrator modes of operation.

- Connects with up to 15 DSE cards via the shelf backplane in a single shelf.

- Network and local configuration and management via a co-located SCM; Also supports AT commands.

- Built-in T1 cascade port accepts channelized T1-rate signal; Up to three LTUs can be cascaded.

- Supports timing from network (loop) shelf, cascade, internal clock, external clock, or station timing sources.

- Automatically adapts network/cascade interfaces to ESF or D4 superframe formats.

- Provides extensive T1 and DS0 diagnostic testing.

- Supports LTU redundancy and T1 line protection via manual or authomatic switching via a redundant LTU co-located in the shelf.

- Supports AMI and B8ZS line codes, and allows options for ones density in the data stream.

Introduction

The SpectraComm 5001 LTU is an efficient means of transmitting and receiving digital data over a T1 line. Ideal for medium-sized, low-channel density networks, the LTU serves as the interface between the T1 line and up to 15 data set emulator cards (DSEs) co-located with the LTU in a SpectraComm shelf. Two modes of operation are available: in CSU mode, the LTU performs all local interface functions via its DSX-1 cascade port; in concentrator mode, the LTU provides grooming and network interface functions for a group of up to 24 data set emulators. Grooming combines data channels at the user site for transmission to a Telco switch location on a T1 link.

Theory of Operation

In a typical application, the LTU is co-located with an SCM card and DSEs in the shelf. The shelf backplane consists of four separate data highways and a management bus. Each data highway supports the transfer of data between one LTU and up to four DSEs. The DSEs provide DTE interface functions and are compatible with remote V.34 analog modems.

The SCM provides the management access, SNMP management, and the IP address for the LTU and up to 14 additional co-located devices.

Figure 1: Typical SC 5001 Application

SpectraComm 5001
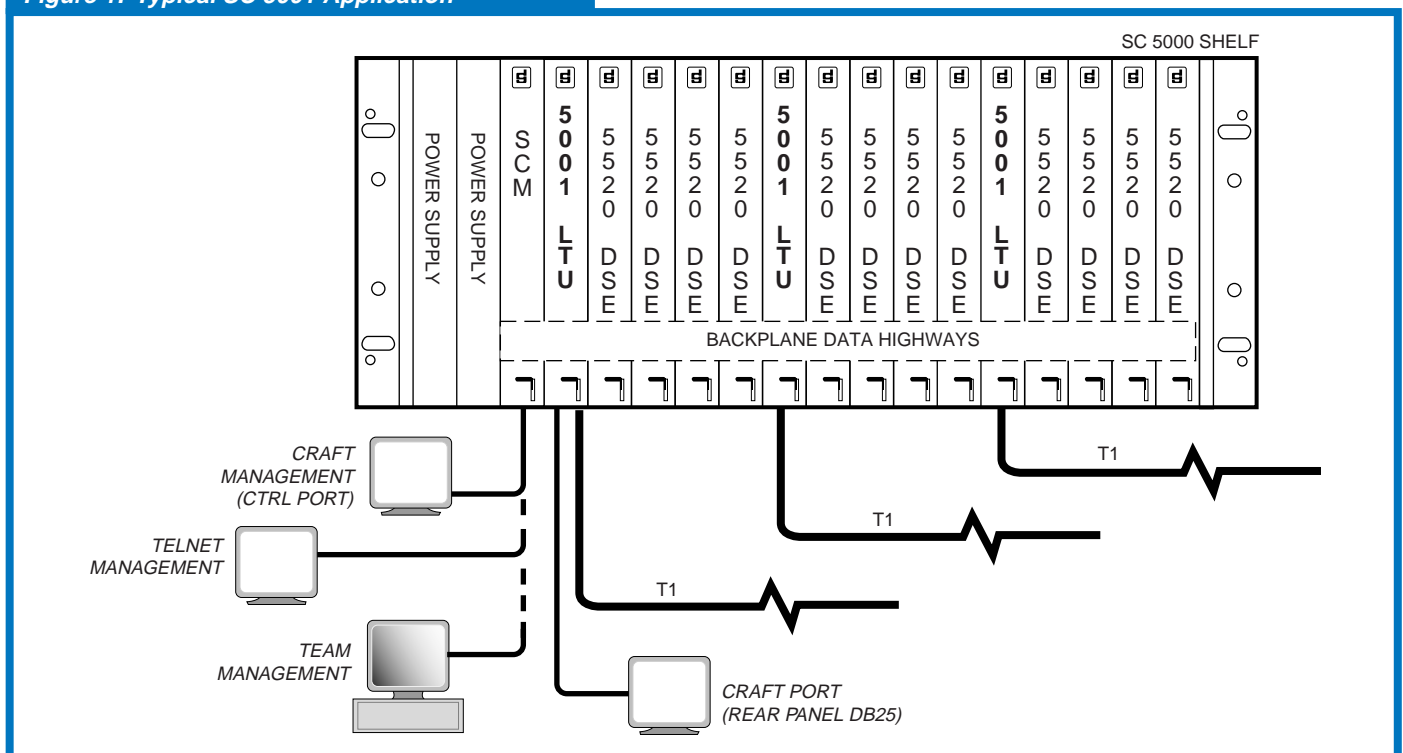
SAFE T1 (Redundancy) Applications

The SC 5001 T1 LTU can be configured with another SC 5001 to provide LTU/T1 redundancy for an entire LTU/T1 functional group. A functional group can be a series of cards or an entire shelf with a T1 data path. Option jumper X1 on the LTU cards sets each pair of LTUs for redundancy.

Besides providing an alternate LTU/T1 path in the event of SC5001 LTU failure, the LTU/T1 Redundancy reliably isolates and confirms failures occurring solely on the T1 line.

Manual Redundancy Mode

The LTU can be configured one of two modes of redunancy operation: Manual Redundancy or Auto Redundancy.

In Manual Redundancy mode, redundancy is conducted via the SNMP controller which monitors LTU and T1 status across the backplane. When an LTU or T1 line fails in a functional group, the operator uses the SNMP controller to manually disable the LTU associated with the failure, and then command the other LTU to assume communications for the group.

Auto Redundancy Mode

In Auto Redundancy mode, the two LTUs are initially configured in Active and Standby states, where the active LTU passes data and communicates status information directly with the standby LTU via the heartbeat cable. When the LTU or the T1 line in a functional group fails, the standby LTU becomes active and takes over the T1 line, commanding into an inactive state the LTU associated with the failure.

Figure 1-2 shows a typical Auto-Redundant LTU application, where two LTUs are connected via a Y-cable to one T1 line. In the event of an LTU failure, the units automatically switch over allowing continuous communication over the secondary LTU/T1 data path. As an alternative, two LTUs in the functional group can each be connected to their own dedicated T1 lines for full unit and line redundancy.

Figure 2: Safe-T1 Auto Redundancy — One or Two T1 Lines per Group
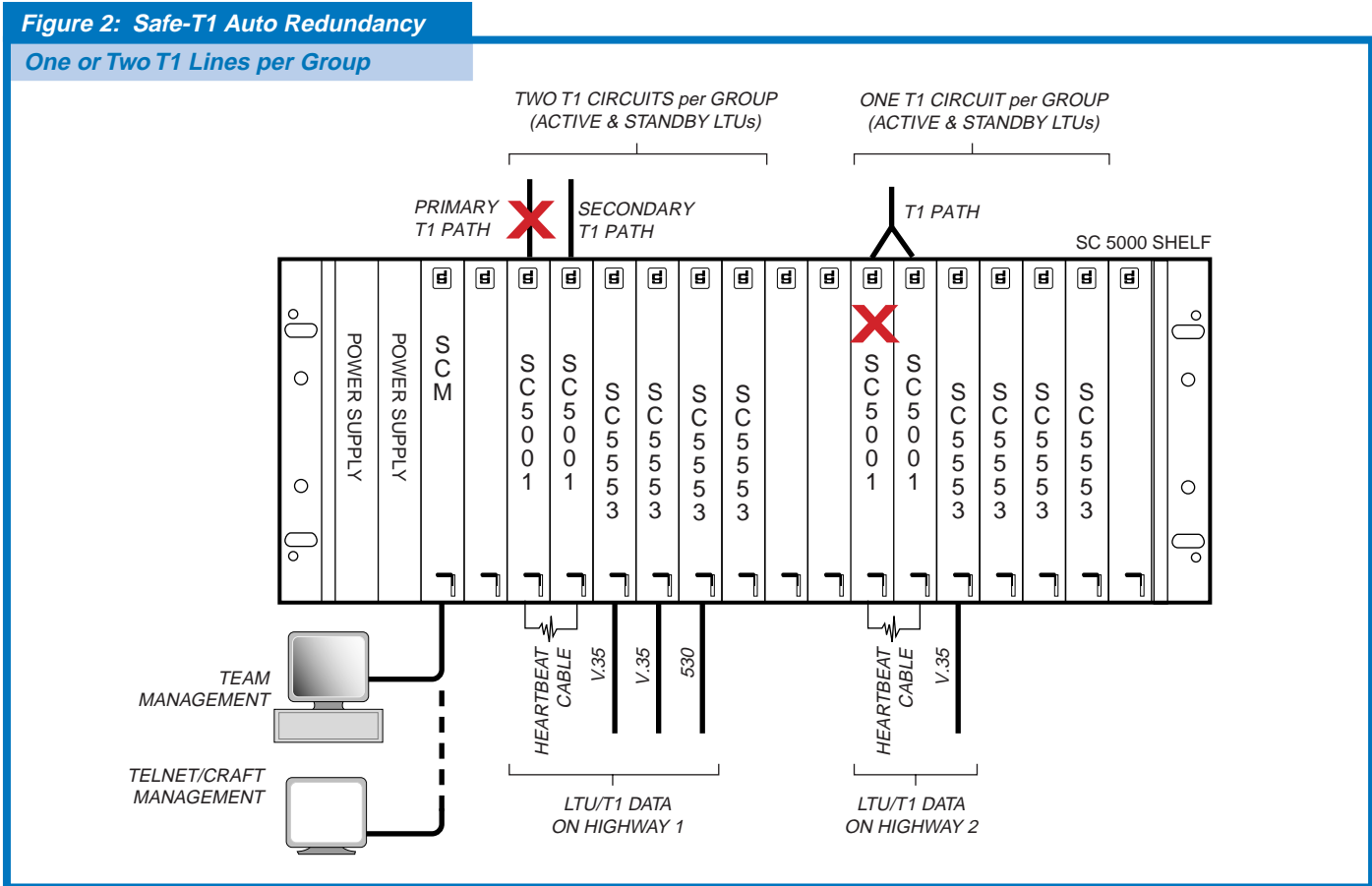
SC5001 Physical Specifications

Single-slot Blade
Width: 178 mm (7.0 in.)
Height: 21 mm (0.81 in.)
Depth: 241 mm (9.5 in.)

Weight: 0.28 kg (10 oz.)
Shipping weight: 0.74 kg (1 lb 10 oz)

Environmental Specifications

Non-Operating
Temperature: -40 to 85 degrees C (-40 to 185 degrees F)

Altitude: Up to 12,192 m (40,000 ft)

Operating
Temperature: 0 to 50 degrees C (32 to 122 degrees F)
Derate by 1 degree C/1000 ft above sea level

Relative Humidity: 5% - 95% non-condensing

Altitude: 0 to 3,048 m (0 to 10,000 ft)

Electrical Specifications

Power (AC or DC), voltage, frequency, and fusing determined by your SpectraComm shelf or enclosure.

Power Dissipation:
5 Watts maximum +5V, 1 Watt maximum +/-12V

Compliance & Compatibility

Safety: UL Approved

EMI: FCC Part 15 Approved

Telco: FCC Part 68 Approved

NEBS Level III Certified

Quality Assurance: ISO 9001: 2000 Certified

Operational Specifications

Modes of Operation
CSU Mode or Concentrator Mode

Auto Redundancy Mode or
Manual Redundancy Mode

Physical Interfaces
Network Interface: RJ48C modular jack

Line Impedance: 100 3/4

Communication Line: T1 digital carrier (non-loaded, staggered-twist ABAM, PIC or pulp-insulated exchange-type cable, 19 -26 gauge).

Network Transmitter
Frequency: 1,544,000 +/- 50 bps

Pulse Amplitude (with surge protection):
2.40 to 3.60 V at 60 deg F.
May vary over a cycle of 60 Hz current.

Unbalance in height of adjacent negative and positive pulses: 200 mV, maximum

Width of output pulse (half amplitude):
324 nsec +/- 45 nsec

Unbalance in width of positive and negative pulses: 20 nsec, max.

Time between consecutive pulses of opposite polarity: 648 nsec +/- 15 nsec (Measured at half amplitude point of leading edges.)

Maximum rise or falling time: 100 nsec

Overshoot at trailing edge of pulse:
10% to 30% of pulse amplitude

Line buildout:
0, 7.5, or 15 dB (selectable or automatic) at 772 kHz

Timing source: Internal clock, external clock, network timing, shelf timing, station clock, cascade timing

Network Receiver
Operating Range: 0 to 36 dB of cable loss at 772 kHz (relative to 3.0V launch pulse)

Input impedance: 100 3/4

Jitter tolerance: Conforms to specifications defined in AT&T PUB 62411, December 1988

Longitudinal balance: 35 dB from 50 to 1500 kHz

Transmitter
Pre-equalization: 0 to 655 ft of line length

Impedance: 100 3/4

Alarms and status conditions: Out Of Frame (OOF), Alarm indication Signal (AIS or Blue alarm), Loss of Signal (LOS)

Diagnostic Testing
DS-1 Line Loopback, DS-1 Payload Loopback, DS-1 Local Loop Test, DS-0 Loopback, DSX-1 Digital Loopback, Remote Loop, Network Interface Loopback, Self-Test, DS0 Delay Measurement Test

Front Panel Self Test, Local Test, Remote Loop switches

Front Panel Test Jacks for DS-1 access

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