

High Density M13 Multiplexing for Carrier Applications

SC M13 Multiplexer Highlights

- NEBS Level III Certified for applications where high-quality and high-reliability are required.
- Low Power: 13 watts maximum
- Hot-swappable cards
- High density packaging - Four redundant M13's in a single 4RU shelf
- Full connectorization for easy installation
- 1+1 Redundancy with "hitless" protection
- Redundant Power
- TFTP downloadable firmware
- Compatible with existing SpectraComm infrastructure

Reliable Performance Uninterrupted Service

The SC-M13 supports 1+1 hardware redundancy with "hitless" protection. Because DSX-1 drop and DS3 line circuits are on the same card, any hardware failure on the primary card will result in automatic switching to the redundant card with no loss of frame synchronization to the non-affected line or drops.

The SC-M13 offers DS3 line protection (by using dual DS3 line connectors), with automatic switching from a faulted primary line to a redundant line in less than 50 milliseconds. In the event of a board level failure, SC-M13 multiplexer cards are hot-swappable so there is no loss of service. The SC-M13 supports both AC and DC load sharing redundant power supplies.

Overview

The SpectraComm M13 multiplexer is a NEBS Level III certified solution for bandwidth consolidation in GDC's "Telco-Tough" SpectraComm 5000 high density platform. With the addition of channelized T3, the SpectraComm platform provides the most diverse set of application support modules in the industry. GDC's SpectraComm M13 supports M13 or C-bit parity.

The SpectraComm M13 device occupies four adjacent slots of any SpectraComm 5000 shelf and provides interfaces for up to 28 DSX-1 signals. Four SC-M13 devices (112 DSX-1 signals) can be accommodated in a single shelf.

Figure 1: SC M13 in SC5000 Shelf

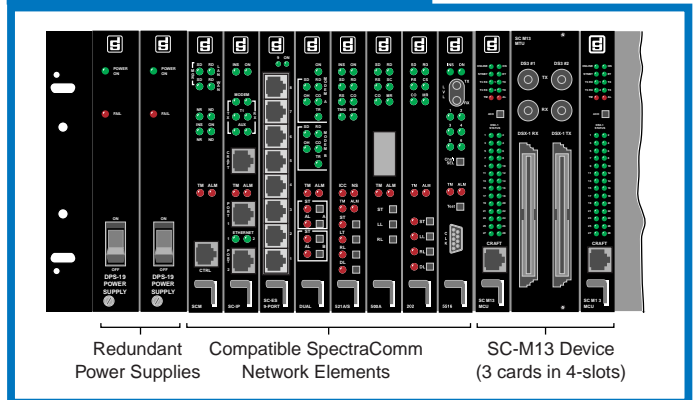
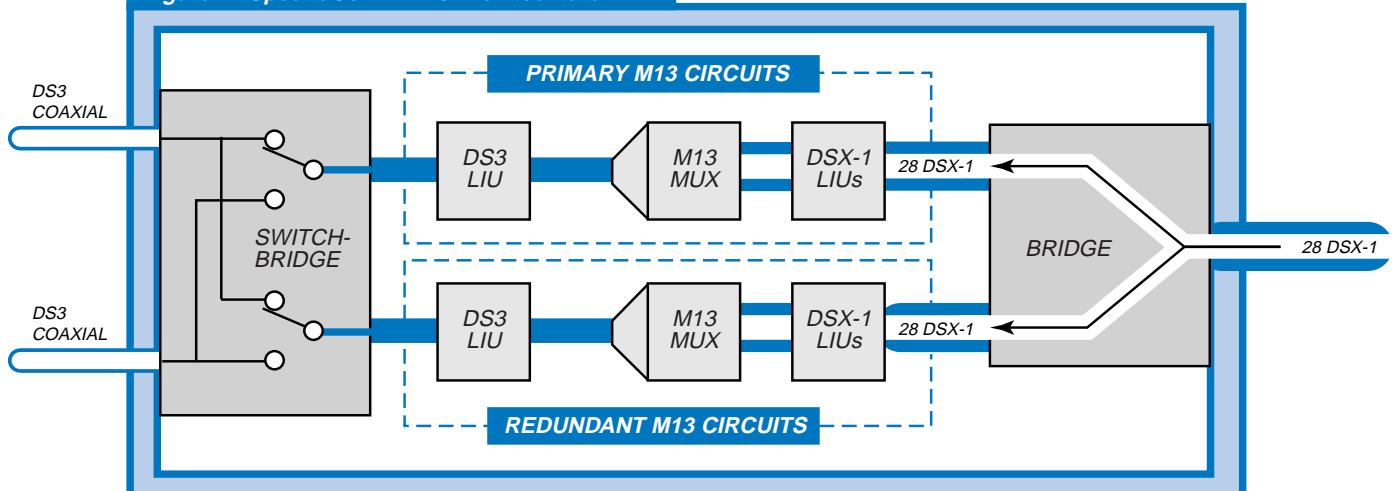


Figure 2: SpectraComm M13 Architecture





SC-M13 APPLICATIONS

The SpectraComm M13 and SpectraComm 5000 high density platform offers the flexibility, scalability and reliability to support a diverse set of carrier and service provider applications:

- Service providers wanting T1/T3 bandwidth consolidation in their co-locations.
- Service provider backhaul for IXC, LECs, CLECs, ISPs, etc.
- T1 Enterprise access from fiber/ SONET DS3 drops.

Figure 3, Figure 4 and the accompanying paragraphs describe these SC-M13 applications.

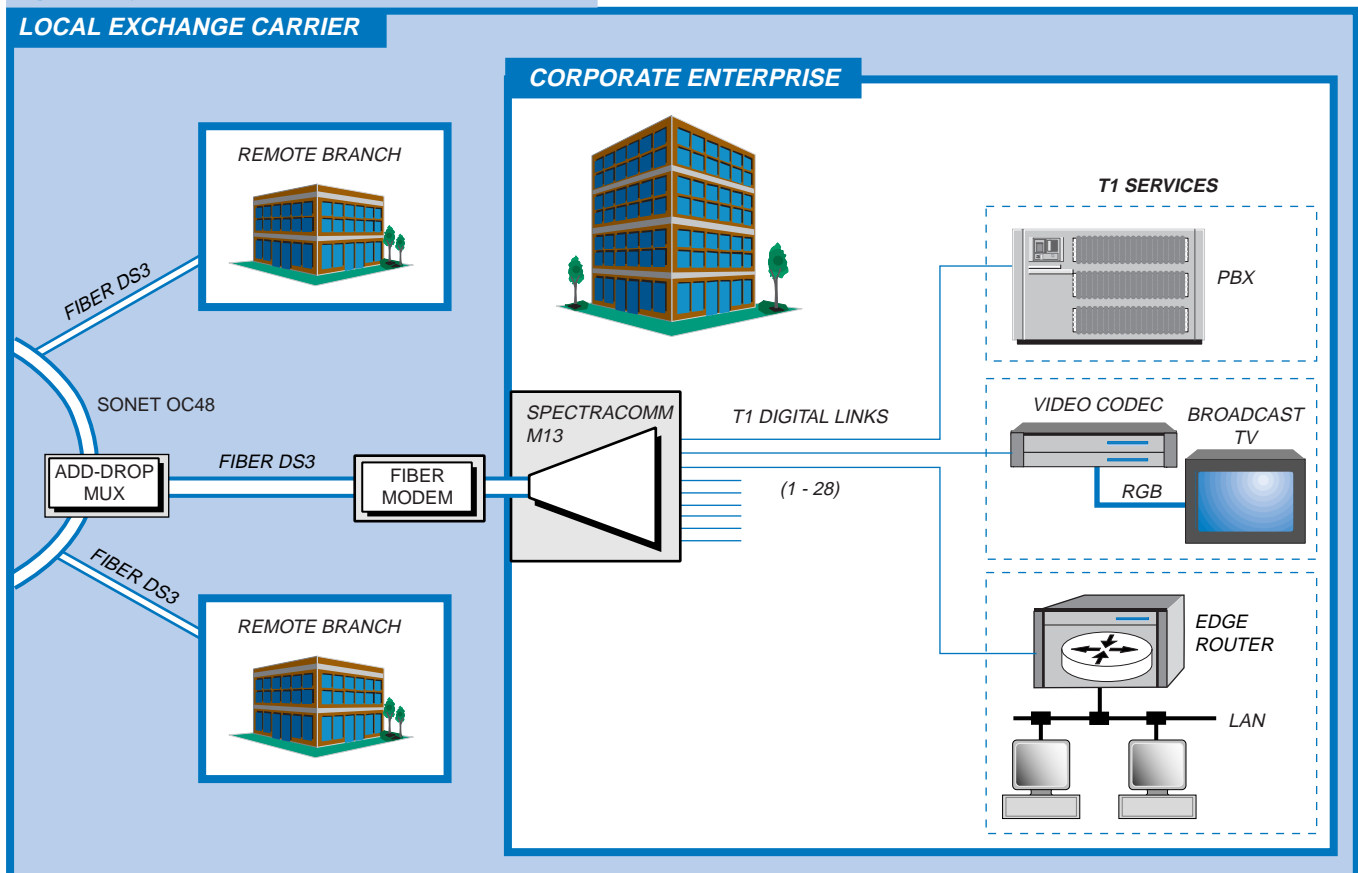
SpectraComm M13 Applications for T1 Enterprise Access

The Enterprise user must be capable of consolidating data, voice and video traffic, and communicating with multiple remote branch locations. GDC's SpectraComm M13 multiplexer delivers the flexibility and scalability required in large enterprise applications.

As shown in Figure 3, a SONET DS3 fiber drop is provided by the Carrier to the Enterprise location. Terminating the fiber with the SpectraComm M13 allows the user to derive as many as 28 DSX-1 channels. Through this deployment of the SC-M13, voice services from a PBX, video broadcasts or video-conferencing, and data traffic via an edge router can be delivered to remote locations.

Up to 28 DSX-1 ports are available so that you can grow your bandwidth as needed.

Figure 3: Typical T1 Enterprise Access Application





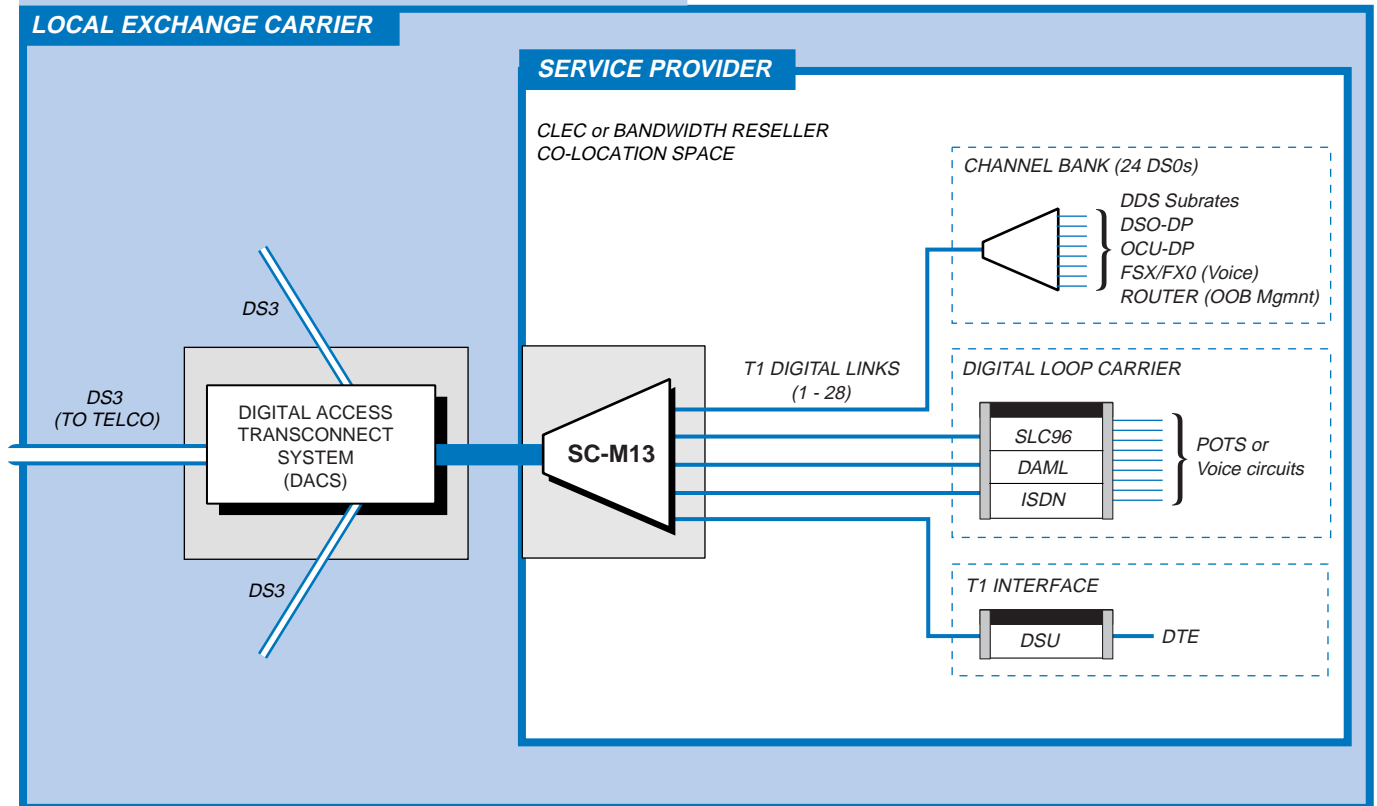
SpectraComm M13 Applications for Service Provider Backhaul

Co-location space is at a premium. GDC's line of SpectraComm products give to CLECs a full suite of NEBS-certified connectivity options. The SpectraComm M13 Multiplexer allows CLECs to install up to four SC-M13 devices in a single 4-RU SpectraComm shelf.

The SpectraComm M13 is compatible with GDC's full line of modems, CSU/DSUs, IP routers and ethernet switches. This consolidation of network products, from 202 to DS3 and IP, represents the most robust and diverse NEBS Level 3-certified set of products available.

In *Figure 4*, a CLEC derives DSX-1 ports from a Local Exchange Carrier (LEC) using the SpectraComm M13 Multiplexer. The availability of up to 28 DSX-1 ports allows the CLEC to provision and manage services using GDC's line of SpectraComm CSU/DSUs, modems and IP products. The CLEC can also deploy channel banks and Digital Loop Carrier equipment.

Figure 4: Typical Service Provider Backhaul Application

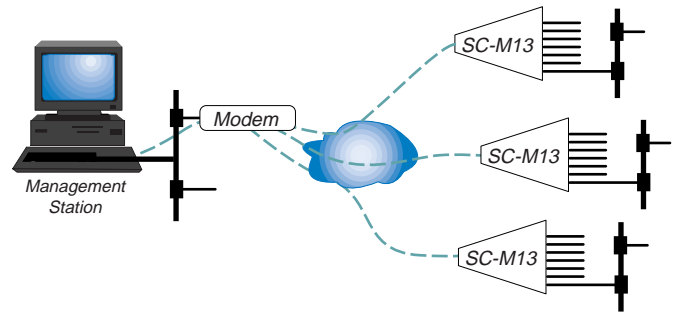




MANAGEMENT INTERFACES

The SpectraComm M13 multiplexer provides comprehensive management options: Through these interfaces, an authorized user can monitor or configure any SC-M13 device in the network from a craft or Telnet connection

- A craft interface for local VT100-compatible terminal or dial-up using GDC's V.34 4-port modem
- An embedded SNMP agent, Telnet server, and an integral Ethernet 10/100 BaseT interface for SNMP/Telnet management



Diagnostics and Performance Monitoring

Installation and maintenance is further simplified through the use of diagnostics and tests. The SC-M13 supports remote C-bit loopback, local loopback and diagnostic data test patterns.

Performance monitoring in cumulative errored seconds is supported for both DSX-1 and DS3 circuits. In addition, external major and minor alarm contacts are provided for external alarm systems.

Secure Connectivity

Management access at craft and terminal interfaces is protected by several SC-M13 security features:

- User- and Supervisor-level password protection authorizes every access attempt.
- Inactivity logoff prevents hacks through 'left on' equipment
- Enable/Disable of SNMP and TFTP services deters hacking through these protocols.

Cost Effective Maintainability

Authorized users can monitor or change SC-M13 configuration and operation parameters from any management location in the network. In addition, SC-M13 firmware can be maintained and upgraded via TFTP downloads whenever a new feature set becomes available from GDC.

Centralized and Versatile Options

Figure 5 illustrates the SC-M13 device and its capability for centralized management in the Carrier's network. From a central site or a local craft connection, SC-M13 can be accessed via craft or Telnet or SNMP controller. The number of concurrent management sessions is determined by your workstation resources.

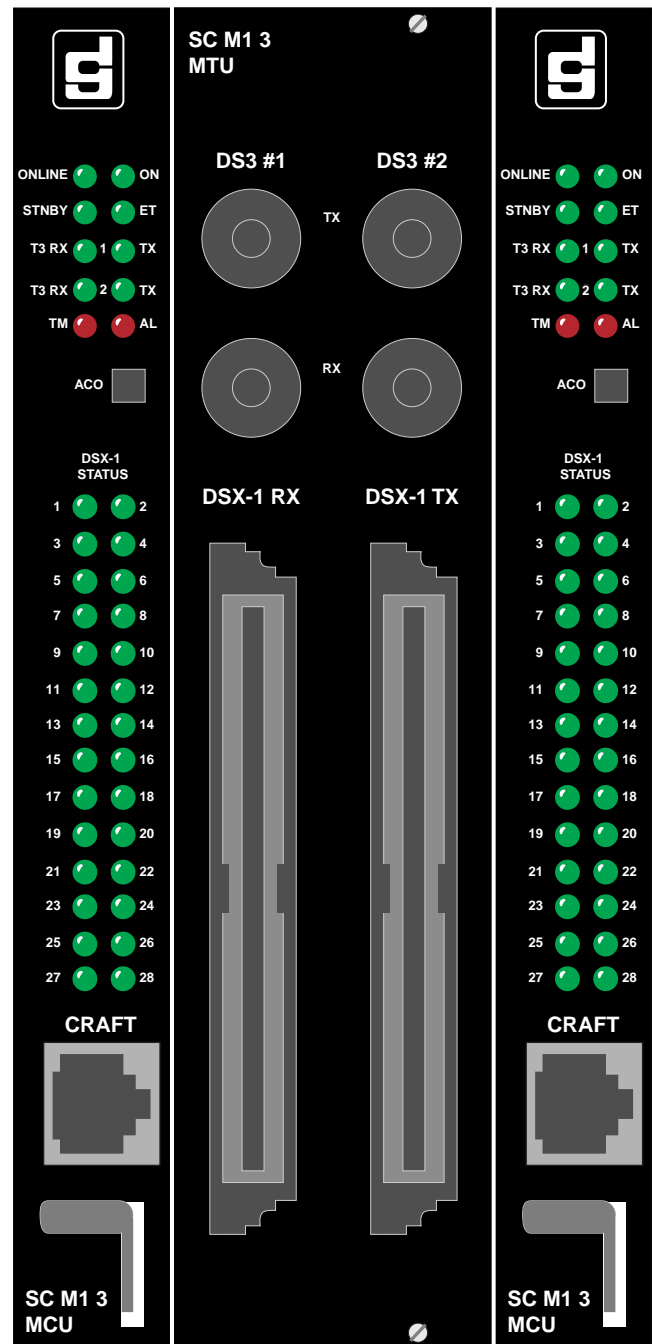


Figure 5: SC-M13 Device

SC M13 Physical Specifications

Mounts into 4 slots of a high density SpectraComm 5000 shelf
Width: 91 mm (3.6 in)
Height: 178 mm (7 in)
Depth: 241 mm (9.5 in)
Weight: 2 lbs; Shipping weight: 4 lbs

Environmental Specifications

Non-Operating

Temperature: -40 to 70 degrees C (-40 to 158 degrees F)
Relative Humidity: 5% to 95%
Altitude: up to 12,191 m (40,000 ft)

Operating

Temperature: 0 to 50 degrees C (32 to 122 degrees F)
Relative Humidity: 5% - 95% non-condensing
Altitude: -60 to 3,660 m (-197 to 12,000 ft)

Electrical Specifications

Power (AC or DC), voltage, frequency, and fusing attributes determined by SpectraComm shelf/enclosure
Power Dissipation: 13 Watts maximum for 4-card set

Compliance & Compatibility

Safety: UL Approved
NEBS Level III Certified
EMI: FCC Part 15 Class A Approved
Telco: FCC Part 68 Approved
Quality Assurance: ISO 9001: 2000 Certified

Part Numbers

076M041-001: SpectraComm M13 Redundant (4-card set)
076M041-002: SpectraComm M13 Non-Redundant (3-card set)
076P041-001: SpectraComm M13 Controller (single card)

Operational Specifications

DS3 Interface Specifications

Framing Format: M13 or C-bit parity
Line Rate: 44.736 Mb/s +/- 20 ppm
Line Code: B3ZS
Line Build-Out: Short (0 to 225 ft.) or Long (225 to 450 ft.)
Line Impedance: 75 ohms, unbalanced

DSX-1 Interface Specifications

Line Rate: 1.544 Mb/s (TX: +/- 50 ppm; RX: +/- 130 ppm)
Line Code: AMI or B8ZS
Line Build-Out: 0 to 655 ft.
Line Impedance: 100 ohms, balanced
Supports independent DSX-1 timing and is transparent to DSX-1 framing.

Redundancy

1+1 hardware redundancy with "hitless" protection:
Any hardware failure on the primary card will result in automatic switching to the redundant card with no loss of frame synchronization to the non-affected line or drops.

DS3 line protection with automatic switching with dual DS3 line connectors. Automatically switches from a faulted primary line to an alternate redundant line in less than 50 msec.

Front Panel Physical Interfaces

Craft Port: RJ-45, TIA/EIA-232/561
DS3 BNC coaxial connectors (4)
DSX-1 64-pin amphenol connectors (2)
RJ-45 Ethernet 10/110BaseT
External alarm contacts

Alarm Reporting

DS3 Alarms: LOS, OOF, AIS
DSX-1 Alarms: LOS, AIS-C, AIS-D
Front Panel audible alarm cutoff switch
External alarm contacts for major and minor alarm:
Normally Open (closes when alarm condition detected)
and Normally Closed (opens on alarm) pinout.

Timing Sources

Internal Timing Source: Stratum 4E (Local Oscillator)
Line Timing Source : Recovered from DS3 RX Signal

Diagnostics & Monitoring

DS3 Line Loopback and Diagnostic Test Pattern Generation and Checking
DSX-1 Line Loopbacks and Local Loopback
DS3 Monitoring for Cumulative Errored Seconds, Severely Errored Seconds and Unavailable Seconds
DSX-1 Monitoring for Cumulative Severely Errored Seconds and Unavailable Seconds

Management Options

Menu-driven user interface via VT-100 compatible terminal
Menu-driven user interface via Telnet
Embedded SNMP agent
Supports MIB II (RFC 1213)

