Extending IP Connectivity with SCIP LAN-X

SCIP LAN-X Highlights

A powerful technology is now available from General DataComm to help Carriers reduce costs while expanding their internal IP networks, increasing revenues and providing a high margin IP service offering. SCIP LAN-X extends the reach of IP connectivity with value-added features and benefits:

- Increases revenues and service offerings
- Reduces hardware and network maintenance costs
- Simplifies installations and network management
- Low-cost and highly reliable transparent Ethernet LAN over standard T1/FT1, E1/FE1, DDS or xDSL circuits.
- Supports scalable high performance LAN via standard 10/100BASE-T Ethernet
- Provides full redundancy and loop elimination with standards-based Spanning Tree Protocol (STP)
- Telco-tough NEBS Level III-compliant packaging for Central Office sites
- Reduced power consumption
- Flexible packaging for remote sites

Introduction

As Carriers and PTTs expand and provision the use of equipment in their networks, the 100-meter distance limitation of standard Ethernet can become an issue. By extending the LAN over longer distances, the network architecture can be simplified and the need for expensive routers is eliminated. GDC's SCIP LAN-X offers out-of-band management solutions for LAN-attached IP devices over standard FT1/T1, E1/FE1, DDS or xDSL circuits. LAN extension between floors or between buildings uses the available digital technology for timely installation and management of services over existing facilities. This same technology can be used to offer transparent LAN services (TLS) to customers as a new TLS service offering.

Scalable and Flexible Connectivity

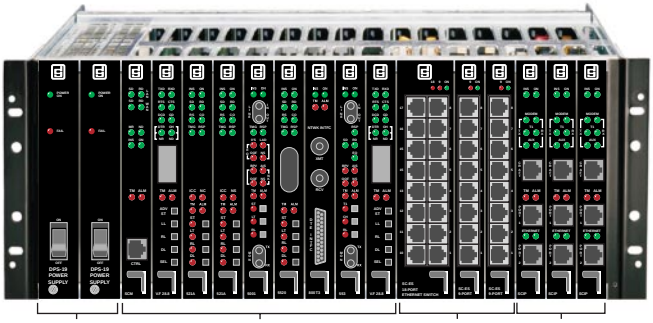
As part of the SpectraComm family of products, NEBS Level III compliant SCIP LAN-X is designed for installation in any GDC shelf or enclosure: the 2-slot SC2000 shelf or, for higher density applications, the 16-slot SC5000 shelf. For standalone, non-NEBS CPE applications, a SCIP LAN-X installs just as easily in single-slot SC1001/1002 standalone enclosures. Any SpectraComm device can be co-located in the shelf with SCIP LAN-X, comprising a unified, flexible, managed shelf environment that is scalable to the Carrier's network requirements. This "SpectraCommonality" means reduced sparing requirements and more flexible inventories (*Fig 1*).

Figure 1: SPECTRACOMMONALITY:
One Card - Many Installation Options

SC 1001/1002 Standalone Enclosure (1-Slot)

SC 2000 Shelf (2-Slots)

SC 5000 Shelf (16-Slots)



OUT-OF-BAND MANAGEMENT Between Floors

The SpectraComm IP LAN-X allows Carriers to manage equipment when extended network distances are required between floors. The SCIP LAN-X units "bridge" the LANs together on each floor, effectively creating a single IP network. LAN equipment is connected at 10 or 100Mbps using standard 10/100Base-T IEEE 802.3 Ethernet.

The distance between SCIP LAN-X devices can be as much as 18000 ft. without the need for repeaters. This far exceeds the 300 ft (100m) limitation of standard Ethernet.

Connectivity Options

When connectivity is required between or within buildings, SCIP LAN-X offers several additional options described below *(distances based on 26 AWG twisted pairs)*.

- Utilizes standard DS1 at 1.544 Mbps, Fractional T1 or DDS up to 5000 ft (1525 m) without repeaters
- Utilizes standard E1/FE1 at 2.048 Mbps over 4 wires up to 4000 ft (1219 m) without repeaters.
- Utilizes G.shdsl at 4.6 Mbps over 4 wires up to 12000 ft (3658 m) without repeaters
- Utilizes G.shdsl at 2.3 Mbps over 2 wires up to 12000 ft (3658 m) without repeaters
- Utilizes G.shdsl at 768 Kbps over 2 wires up to 18000 ft (5486 m) without repeaters

IP Addressing Requirements

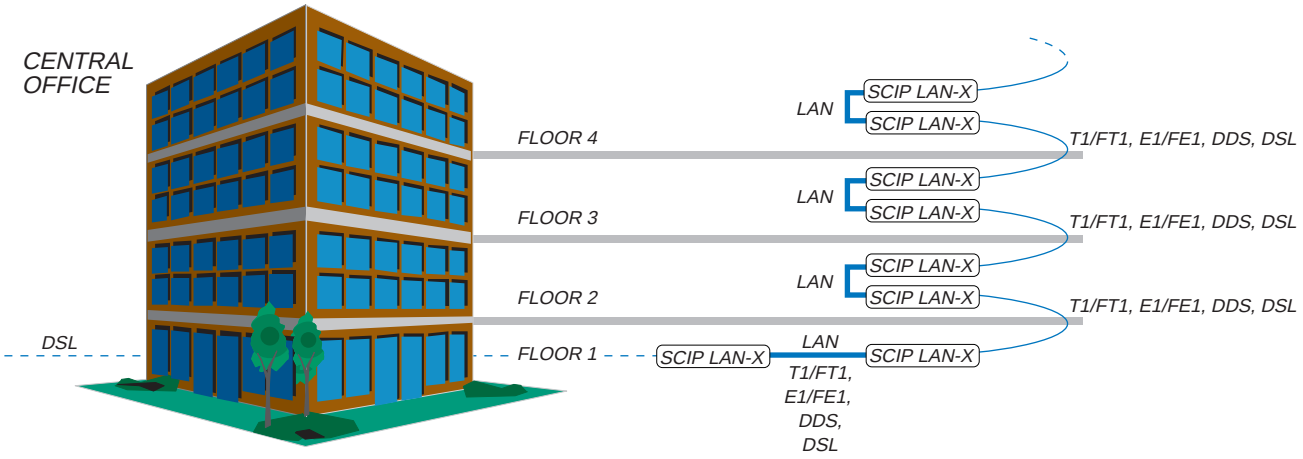
Out-of-Band management can be conducted with or without SCIP LAN-X requiring an IP address:

- In non-managed applications, SCIP LAN-X can be installed without IP addressing.
- In applications that require management of the SCIP via Telnet or HTTP (web browser), SCIP LAN-X can be installed with IP addressing.
- For installations within a building that require OOB management of multiple IP networks, one or more SCIP LAN-X devices can be configured to router mode of operation.

Figure 2 shows SCIP LAN-X extending out-of-band management in a typical 'between floors' Carrier network application.

Figure 2: Typical OOB Management Application:

LAN Extension Between Floors of CO



OUT-OF-BAND MANAGEMENT to Carrier Remote Sites

The SCIP LAN-X extends LANs at the central and remote sites creating a single IP network where one end is local and the other is a remote tail circuit. Connections at remote sites are made using standard IEEE 802.3 Ethernet equipment at 10/100Base-T.

In addition to two Ethernet connection ports, the SCIP LAN-X is equipped with eight terminal server ports for remote access to legacy (craft) equipment. When equipped with the optional V.34 integral modem, SCIP LAN-X is capable of providing a backup management path to Carrier remote sites.

Figure 3 shows SCIP LAN-X extending out-of-band management to Ethernet-connected devices at remote sites.

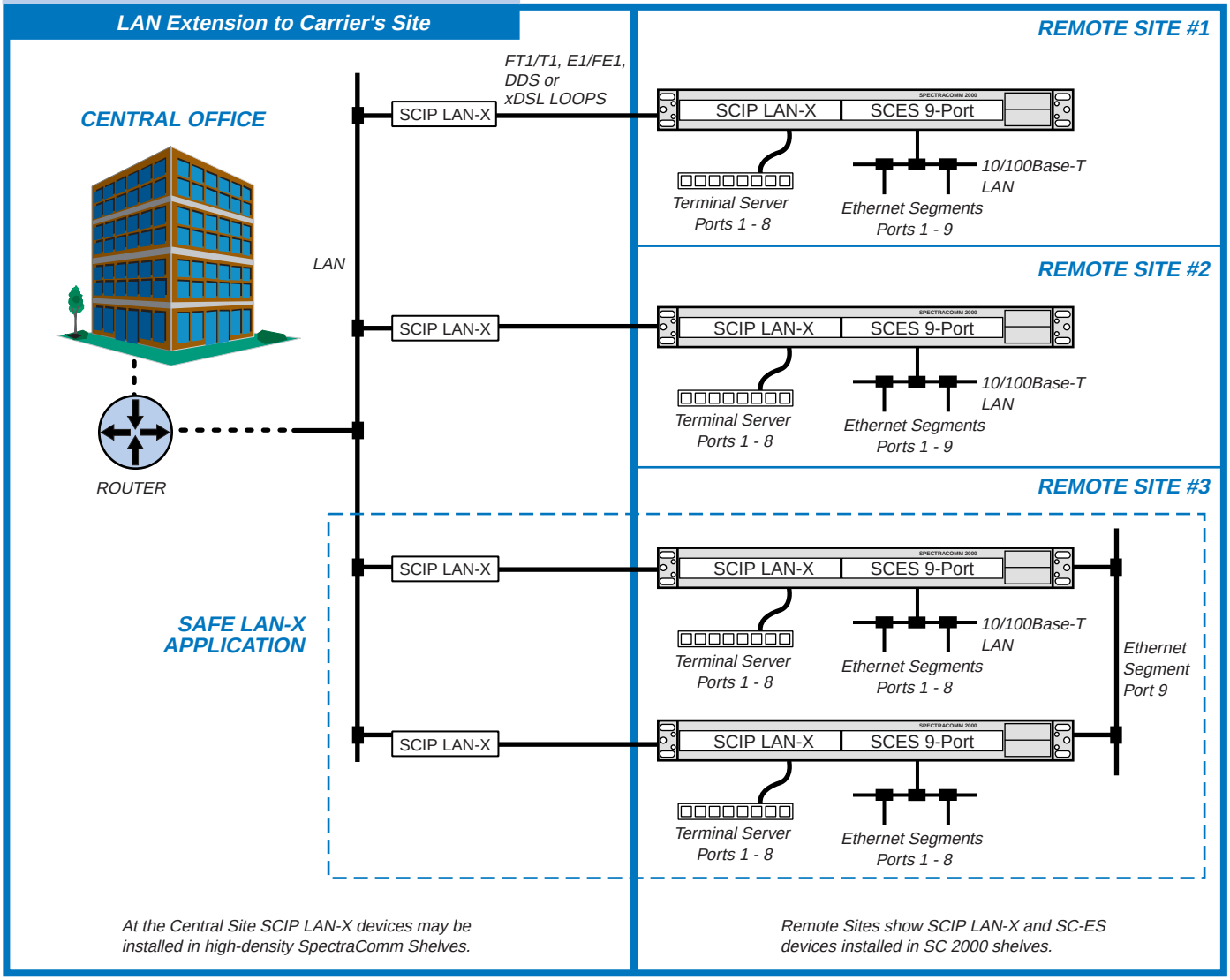
SAFE LAN-X to Carrier Remote Sites

If a location requires redundancy, two pairs of SCIP LAN-X devices can be installed with GDC's Safe LAN-X option.

When SCIP LAN-X is configured for Safe LAN-X operation, the standards-based Spanning Tree Protocol (STP) is engaged to automatically re-direct LAN traffic between two circuit paths whenever network or link failures occur. Spanning Tree Protocol also eliminates network loops which can cause outages.

Figure 3 shows SCIP LAN devices extending the LAN to Remote Site #3. This out-of-band management link is protected with SAFE LAN-X redundancy.

Figure 3: Typical OOB Management Application:



BROADBAND SERVICE OFFERINGS

SCIP LAN-X can be used to launch new Broadband service offerings to Carrier customers, increasing revenues with minimal Carrier expense. The symmetrical bandwidth of SCIP LAN-X over FT1/T1, E1/FE1, DDS or xDSL makes this the right choice for small-to-medium enterprise customers. SCIP-LAN-X provides a full suite of flexible WAN connectivity options via its integral FT1/T1 or E1/FE1 CSU/DSU, xDSL interface, or its synchronous DTE interface to an external 56/64 DSU.

Each customer can be served at scalable speeds using T1, FT1, E1, FE1 or DDS up to 5000 ft without repeaters. Using G.shdsl, cutomers can be served at scalable speeds to 4.6 Mbps up to 12000 ft (3658 m) without repeaters. LAN connections at the customer sites uses standard 10/100B-T, based on IEEE 802.3 Ethernet.

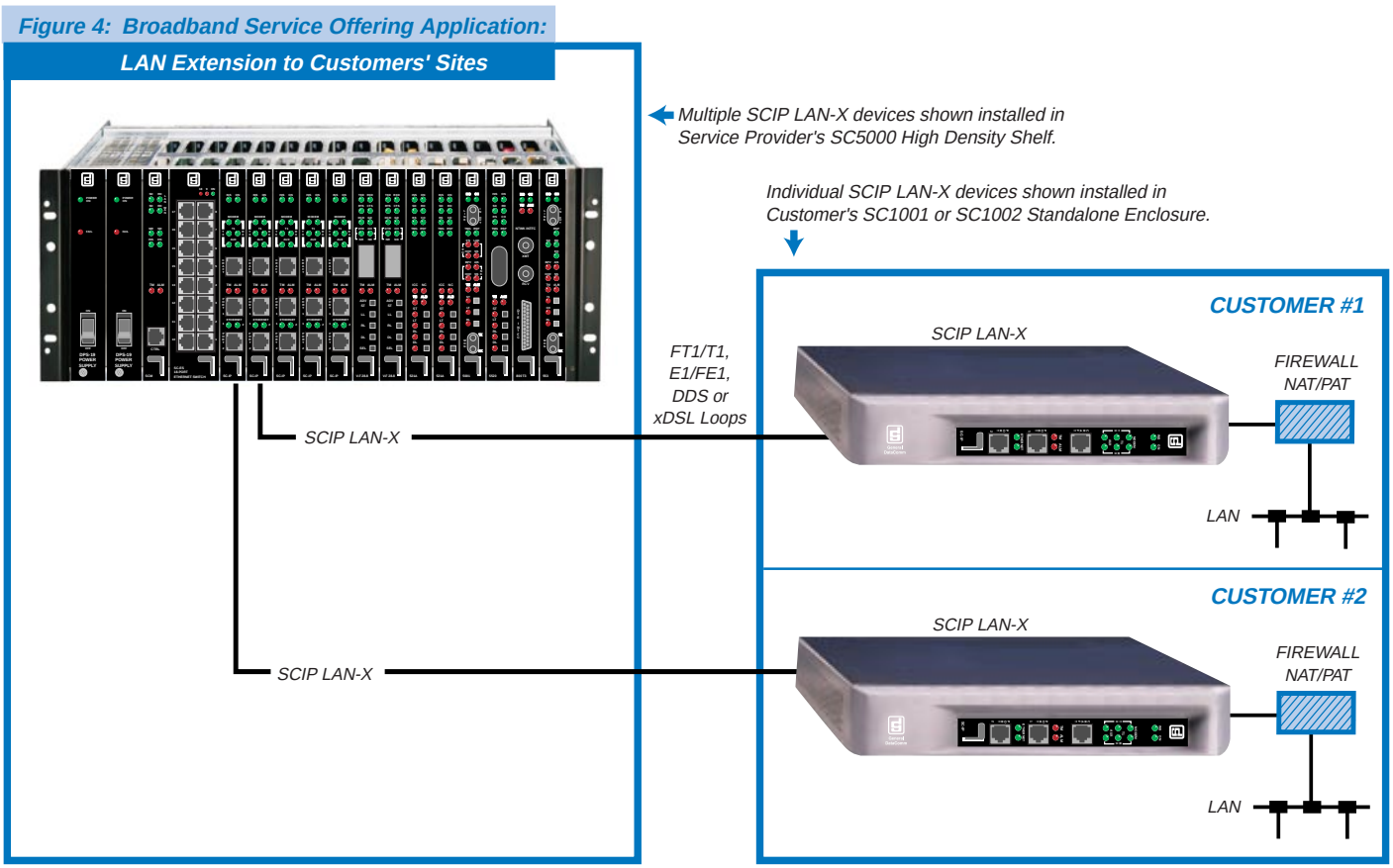
Figure 4 shows SCIP LAN-X launching new Broadband services to Carrier customers.

Increased Revenues

At Carrier provisioning locations, the SCIP LAN-X would be installed in high-density Telco-tough SC5000 shelves. At customer locations, CPE equipment would be installed in the SC1001 or SC1002 standalone enclosure, up and passing data right out of the box with little or no configuration required (*Figure 4*).

- Customer premise SCIP LAN-X devices can be remotely managed by the service provider. This can generate incremental monthly revenue through software upgrades, feature enhancements, and re-configuration for new service offerings (such as fractional line rates), all performed from the central site.
- When equipped with the optional V.34 modem, SCIP LAN-X allows emergency management access over a dial-in connection.
- Diagnostics are available for quick trouble-shooting and resolution of customer problems.

Figure 4: Broadband Service Offering Application:
LAN Extension to Customers' Sites



SCALABLE ETHERNET CONNECTIVITY

For applications requiring scalable Ethernet connectivity, the SpectraComm Ethernet Switch (SCES), a companion product to the SCIP LAN-X, can be deployed in 9- or 18-port increments. NEBS-compliant SC-ES can be installed anywhere within a Carrier's network: in the NOC, in central offices, remote offices or in CEV / Hut environments.

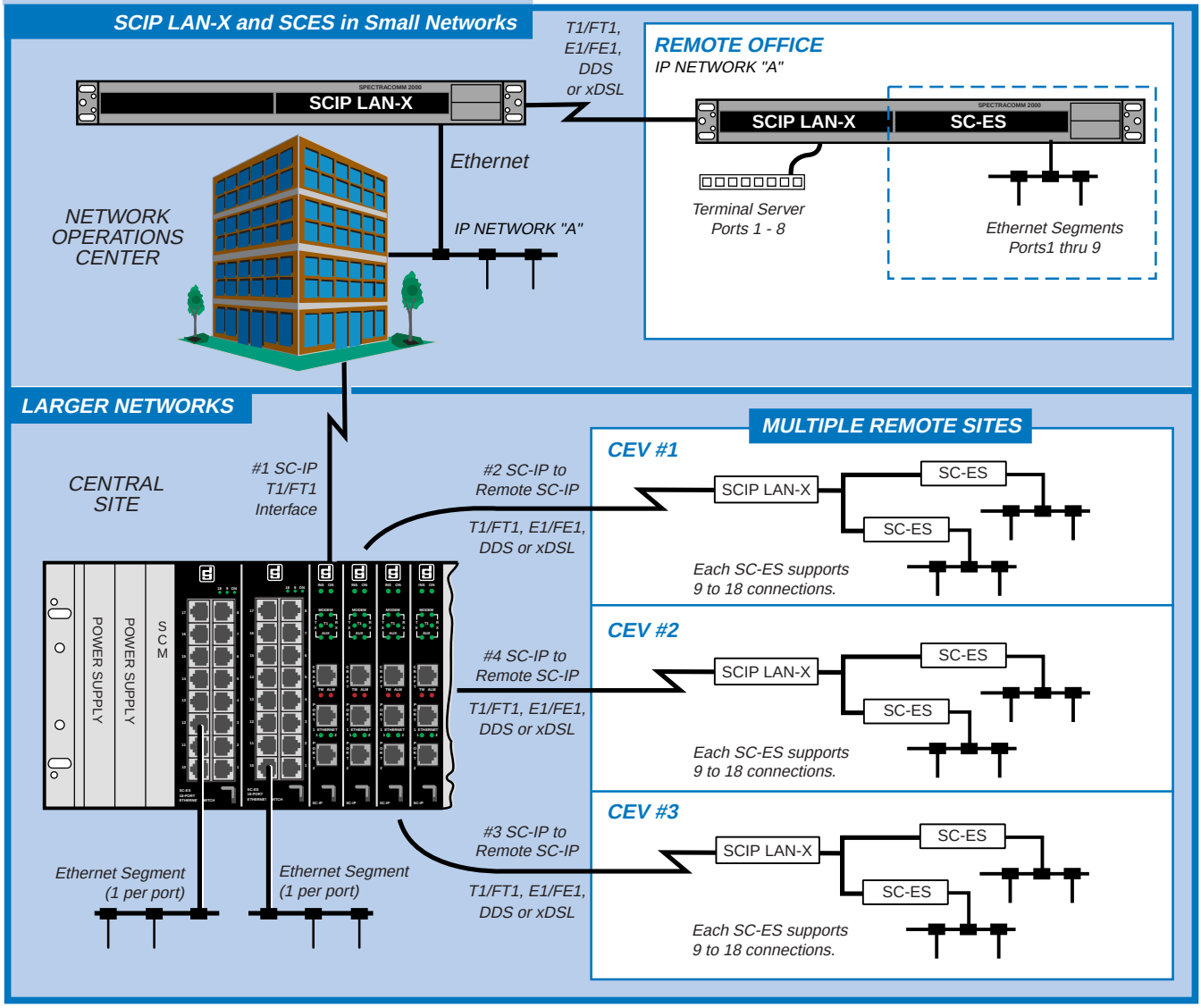
SC-ES allows the segmenting of attached LAN devices to improve network performance and provides a 100Mbps full- or half-duplex channel for servers. It allows a network to be mixed (10 and 100Mbps) and is ideal for faster response times and for relieving bandwidth bottlenecks. SCES can be 'plug-and-play' or fully managed for ethernet security and network monitoring. SC-ES supports cabling distances of up to 100 meters by eliminating the propagation delays normally found with hubs / repeaters.

Extending Small and Large Networks

The SCIP LAN-X and SC-ES may be deployed together to further extend the Carrier's management in small and large network applications requiring more than two LAN ports at each site. In small networks, SCES would be installed at a remote site with one of its Ethernet ports connected to SCIP LAN-X. The remaining SC-ES ports may be used to connect as many as 17 additional LAN devices at that site.

In larger network applications where a Central Office location has multiple remote sites (CEVs), SCIP LAN-X provides the connectivity from the Network Operations Center (NOC) to a Central site and out to multiple remote sites. The Carrier can then reach devices attached to SCES at the remote sites. *Figure 5* shows SCIP LAN-X and SCES extending the Carrier's management in both small and large networks.

Figure 5: SCALABLE ETHERNET CONNECTIVITY



SCIP LAN-X MANAGEMENT

SCIP LAN-X configuration is managed through SMART CLI, an interactive command line interface, or through graphical user interface (GUI) web screens. Through these interfaces, an authorized user can monitor or configure any SCIP LAN-X in the network from a terminal or Telnet connection or through any popular web browser.

Secure Access and Protection

Management access to SCIP LAN-X at CLI and web interfaces is protected by several security features:

- User- and Supervisor-level password protection authorizes every access attempt.
- Inactivity logoff prevents hacks through 'left on' equipment.
- Enable / Disable of SNMP, HTTP, and TFTP services deters hacking through these protocols.
- Enable / Disable management traffic by interface, for provider and customer management access schemes.
- Can be upgraded for TACACS+ protocol which allows a network access server to offload user administation to a central server, providing 'centralized' security.

SMART CLI Features

General DataComm's SMART CLI has a look and feel that will be familiar to most field personnel, with the benefit of several enhancements over most standard CLIs, such as:

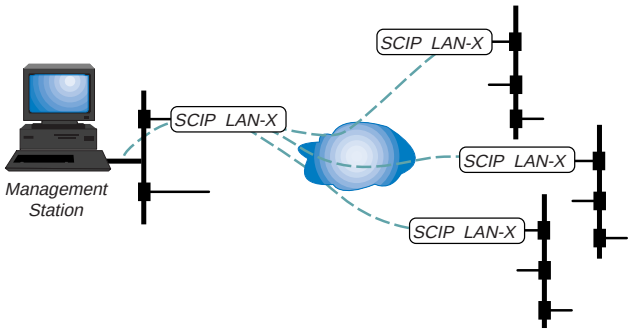
- Recognition and auto-expansion of abbreviated commands and sub-commands.
- Auto-prompts for required command arguments.
- General help at the command prompt.
- Context-sensitive help at the command string.
- Command line recall for easy re-entry or review of previous commands.
- Advanced utility for generating downloadable ASCII configuration files as batch scripts.
- Upgradable via TFTP downloads of SCIP LAN-X software versions and configuration data.
- Command entry from a Telnet or terminal connection, or using a standard browser.

Web-Based Management

The SCIP LAN-X integral HTTP server provides password-protected access to easy-to-use webscreens. Authorized users can monitor or change SCIP LAN-X configuration and operation parameters in a streamlined logical graphical user interface using any popular web browser.

Figure 6: MANAGEMENT INTERFACE OPTIONS

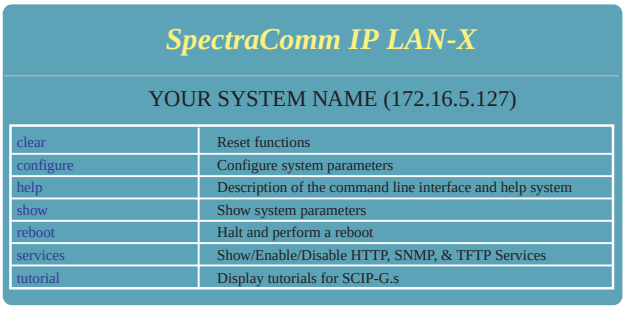
Flexible, Secure and SMART



Terminal or Telnet CLI Interface Option

```
SCIP-LANX% configure
Type "configure ?" for a list of subcommands
SCIP-LANX% configure ?
_________Help for "configure"_____________________________________________
accounts      Configure usernames and passwords; clear login statistics
frame-relay   Configure frame relay parameters
inactivity    Configure inactivity time; requires 1 parameter(s)
interfaces    Configure interface parameters
ip-route      Configure ip static route table
lanx-router   Configure LAN extension or routing mode
modem         Configure modem parameters
prompt        Configure custom prommpt: requires 1 parameter(s)
snmp          Configure SNMP Server parameters
wan           Configure WAN circuit parameters
term-serv     Configure termial server parameters
SCIP-LANX% configure _
```

Web-based Interface Option



Centralized and Versatile Options

Figure 6 illustrates how SCIP LAN-X conducts centralized management in the Carrier network. From the central site, SCIP LAN-X can be accessed via a craft connection from a VT100-compatible terminal, a Telnet connection, or a web browser. Maximum number of concurrent management sessions is determined by your workstation's capabilities.

SpectraComm IP LAN-X

Physical & Electrical Specifications

SpectraComm LAN-X Dimensions

Dimensions (HxWxD):
178 mm x 21 mm x 241 mm
(7.0 in x 0.81 in x 9.5 in)

Weight: 0.28 kg (10 oz)

Shipping Weight: 0.74 kg (1 lb 10 oz)

Environmental Specifications

Operating Ambient Temperature:
0 to 50 degrees C (32 to 122 degrees F)

Non-Operating Ambient Temperature:
-40 to 70 degrees C (40 to 158 degrees F)

Relative Humidity: 5% - 90% non-condensing

Altitude: -60 to 4,000 m (-197 to 13,123 ft)

Electrical Characteristics:

Power Requirements: AC or DC powered, according to your SpectraComm shelf.

Fusing: Determined by the SpectraComm shelf.

Voltage/Frequency: 100 to 240 VAC or 24/48 VDC, according to your SpectraComm shelf.

Power Dissipation: 6 Watts maximum

Shown:

SCIP T1 LAN-X Card Front Panel

Compliance & Compatibility

Safety: UL Listed, CUL Listed

EN 60950, EN 55022 Class A

Designed for NEBS Level III Compliance

Bell Pub. 62310 and ANSI T1.40

FCC Part 68 Approval

FCC Part 15 Class A Approval

Management Options

Command line interface via VT100-compatible terminal

Command line interface via Telnet and web browser

HTTP interface via embedded web-server agent using PC browser (Supports HTML and JAVA 1.1)

SNMP support for standard statistics: RFC 1213;
MIB for Network Management of TCP/IP-based Internets MIB2;
RFC 1398; Ethernet MIB

Operational Specifications

Modes of Operation

LAN-X mode:
SCIP LAN-X to SCIP LAN-X over WAN-T1/FT1, E1/FE1, DDS, xDSL

Router mode:
Static routing between any two SCIP interfaces (IP version 4)

Physical Interfaces

Front Panel Craft Port: ASYNC V.24/V.28, TIA/EIA-232 for connection to standard VT100-compatible terminal

Front Panel Ethernet Ports (2): Full duplex 10/100BaseT Ethernet, ANSI/IEEE 802.3)

Terminal Server Ports: ASYNC V.24/V.28, TIA/EIA-232 for connecting up to eight devices

WAN Ports (Two)

Integral CSU/DSU Operation

Data Encoding: AMI (56 x N Kbps) or B8ZS (56/64 x N Kbps)

Frame Format/Mode: D4, AT&T 54016 ESF, ANSI T1.403 ESF

LMI: Q.933 Annex A, T1.67 Annex D, Consortium LMI

T1/FT1 Data Rates: up to 1.544 Mbps

E1/FE1 Data Rates: up to 2.048 Kbps

G.shdsl Data Rates: up to 4.6 Mbps

Operation with External DSU

IDSL 2B1Q Data Rates: up to 128 Kbps
(using external UAS611 DSU)

DDS Data Rates: N x 56/64 Kbps where N = 1 - 24 DS0s
(using external SC521A DSU)

Optional Integral Modem Operation

ITU-T V.34

V.42 LAPM and MNP 2-3 error correction

V.42 bis and MNP 5 data compression

SCIPLX-DS03-063-EO