

## Extend Your Ethernet Networks with SCIP in LAN-X Mode

### Application Highlights

General DataComm offers its SpectraComm IP technology to carriers and enterprises that want to expand their internal IP networks, increase revenues, and provide a high margin IP service offering while reducing cost. Any SpectraComm IP device (SCIP-T1, SCIP-E1, or SCIP-DSL.bis) can be configured for LAN-X mode to extend Ethernet connectivity, with several value-added features and benefits:

- Increases revenues and service offerings.
- Reduces hardware and network maintenance costs, simplifying installation and network management.
- Low-cost and highly reliable transparent Ethernet LAN over standard T1/FT1, E1/FE1, DDS or G.s circuits
- Supports Ethernet broadcast limiting, Ethernet jumbo packets, and priority queueing of IP traffic marked for expedited forwarding.
- Provides full redundancy and loop elimination with standards-based Spanning Tree Protocol (STP)
- Supports MACL (Media Access Control List) Security which identifies invalid users by their MAC address.
- Supports scalable high performance LAN via standard 10/100BASE-T Ethernet.
- Telco-tough NEBS Level III-compliant packaging for Central Office sites
- Reduced power consumption and flexible packaging for remote sites

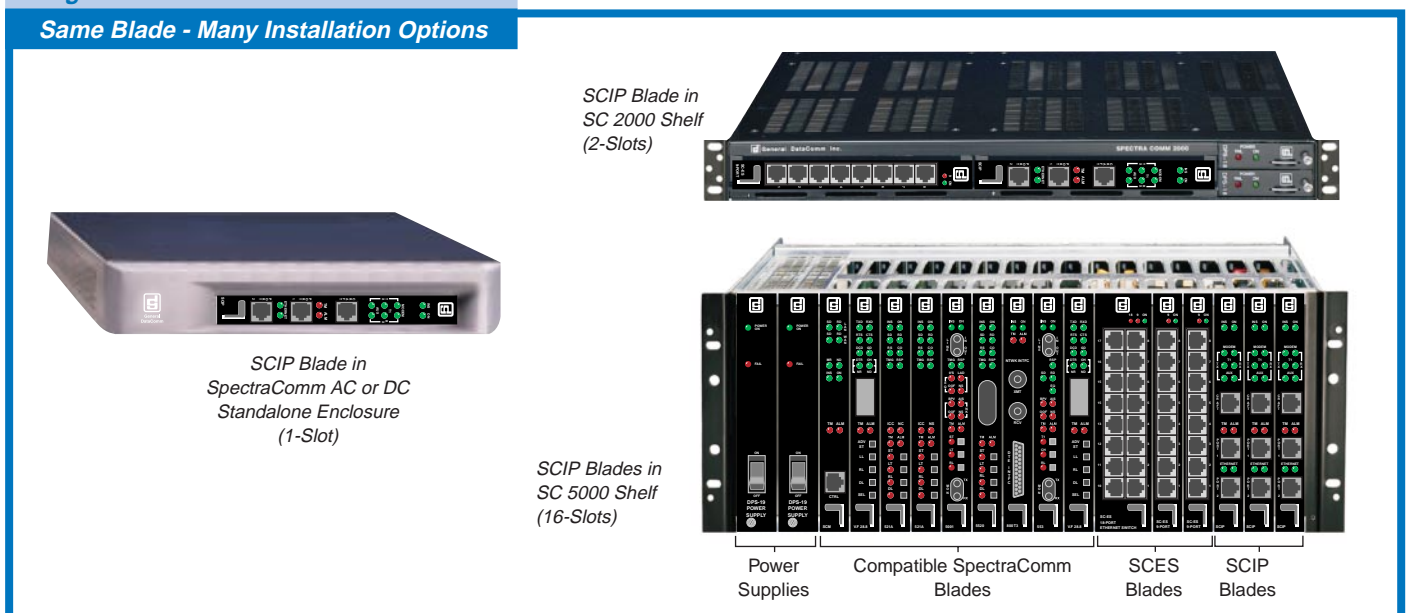
### Application Overview

As carriers, PTTs, and enterprises expand and provision the use of network equipment, the 100-meter distance limitation of standard Ethernet can become an issue. By extending the LAN over longer distances, network architecture is simplified and expensive routers eliminated. GDC's SCIP devices in LAN-X mode provide out-of-band management solutions for Ethernet-attached IP devices over standard FT1/T1, E1/FE1, DDS or G.shdsl circuits. By extending Ethernet between floors or between buildings, SCIP employs 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 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 blade installs just as easily in the single-slot SpectraComm AC or DC standalone enclosures. Any SpectraComm blade can be co-located in the shelf with SCIP, comprising a unified, flexible, managed shelf environment that is scalable to carrier or enterprise network requirements. This "Spectra-Commonality" means reduced sparing requirements and more flexible inventories (*Fig 1*).

**Figure 1: SPECTRACOMMONALITY:  
Same Blade - Many Installation Options**



## OUT-OF-BAND MANAGEMENT Between Floors

SpectraComm IP in LAN-X mode allows carriers and enterprises to manage equipment when extended network distances are required between floors. SCIP devices "bridge" the Ethernet 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 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 in LAN-X mode offers several more 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 3.968 Mbps over 4 wires up to 12000 ft (3658 m) without repeaters
- Utilizes G.shdsl at 1.984 Mbps over 2 wires up to 12000 ft (3658 m) without repeaters
- Utilizes G.shdsl at 768 Kbps over 4 wires up to 18000 ft (5486 m) without repeaters

## IP Addressing Requirements

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

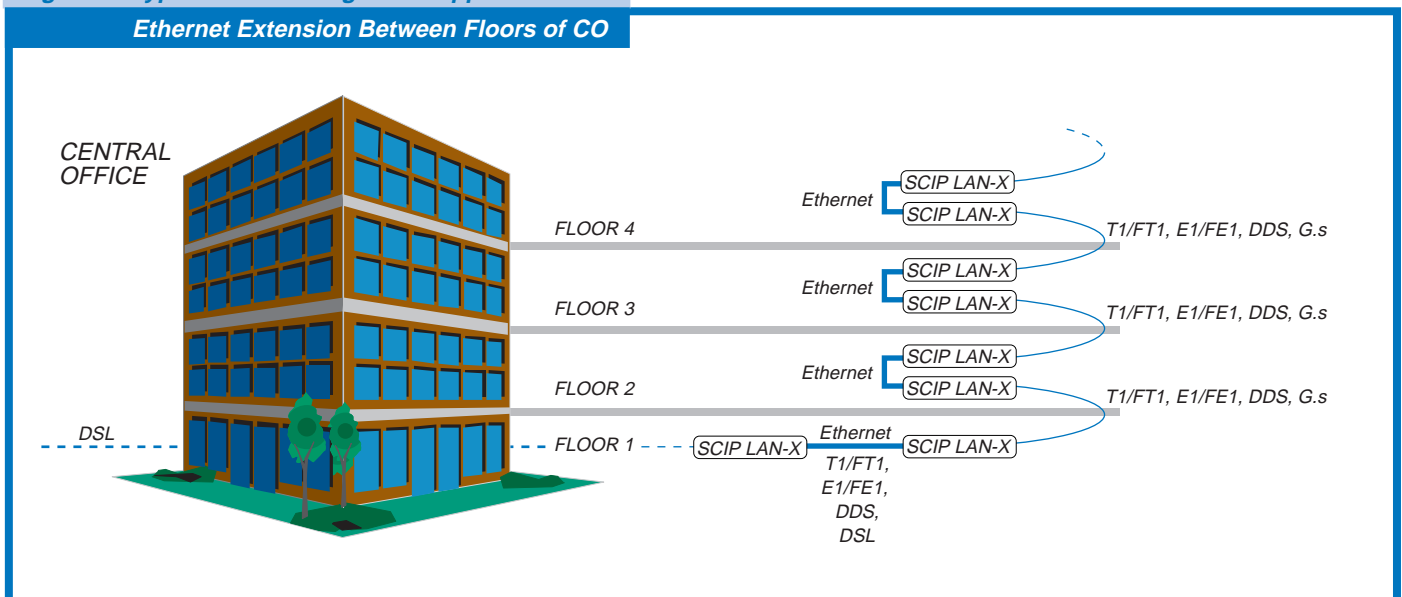
- In non-managed applications, SCIP can be installed without IP addressing.
- In applications that require management of the SCIP via Telnet or HTTP (web browser), SCIP can be installed with IP addressing.
- For installations within a building that require OOB management of multiple IP networks, one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

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



Figure 2: Typical OOB Management Application:

### Ethernet Extension Between Floors of CO



## OUT-OF-BAND MANAGEMENT to Remote Sites

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

Besides two Ethernet connection ports, SCIP devices have eight terminal server ports for remote access to legacy (craft) equipment. When equipped with the optional V.34 integral modem, SCIP can provide a backup management path to remote sites in carrier or enterprise networks.

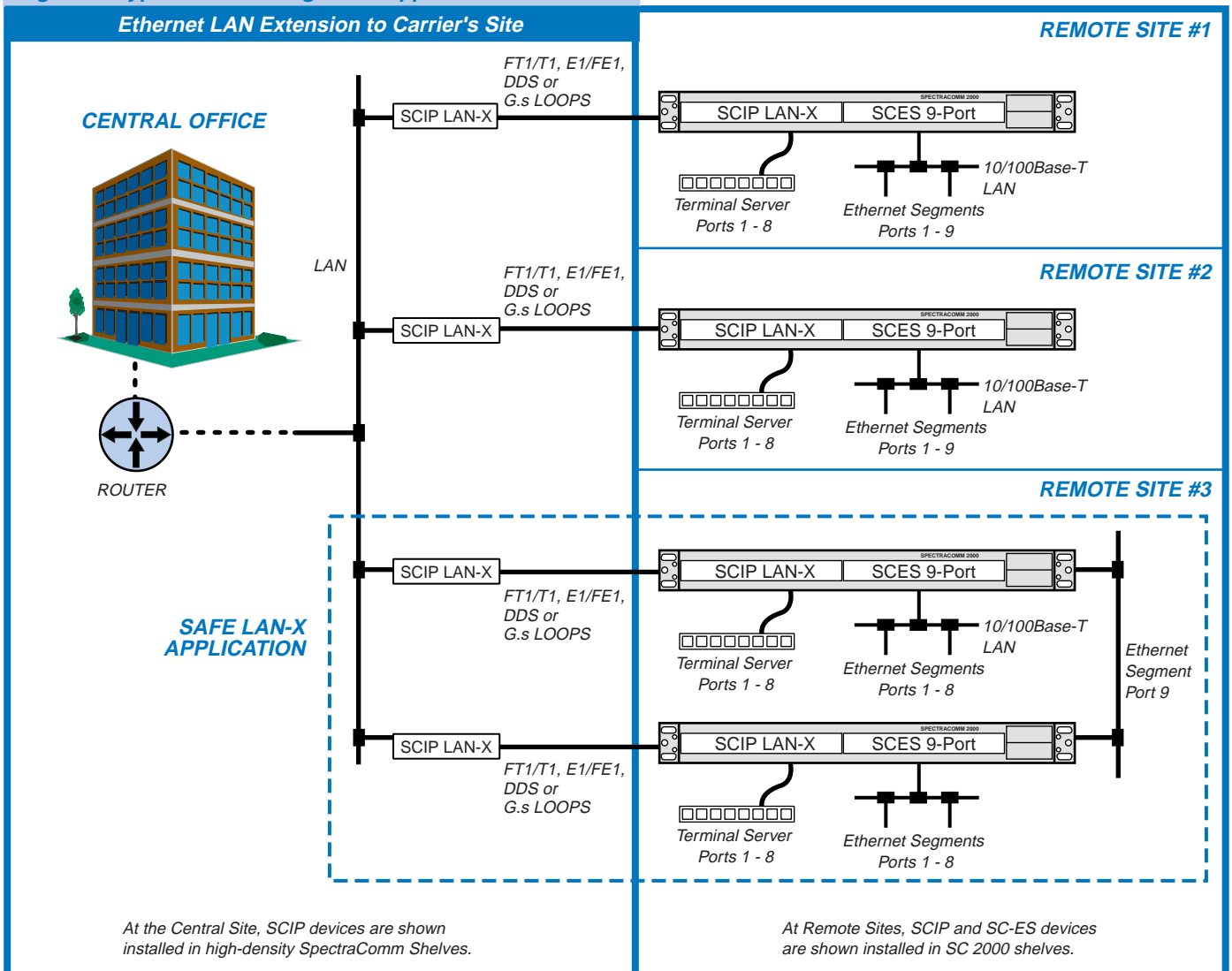
Figure 3 shows SCIP devices in LAN-X mode extending out-of-band management to Ethernet-connected devices at Remote Sites #1 and #2.

## SAFE LAN-X: Ethernet Extension to Remote Sites

If a location requires redundancy, two pairs of SCIP devices can be configured for "SAFE LAN-X" operation. Standards-based Spanning Tree Protocol (STP) will automatically redirect 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 devices in LAN-X mode extending the Ethernet LAN to Remote Site #3. This out-of-band management link is protected by "SAFE LAN-X" redundancy.

Figure 3: Typical OOB Management Application:



## BROADBAND SERVICE OFFERINGS

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

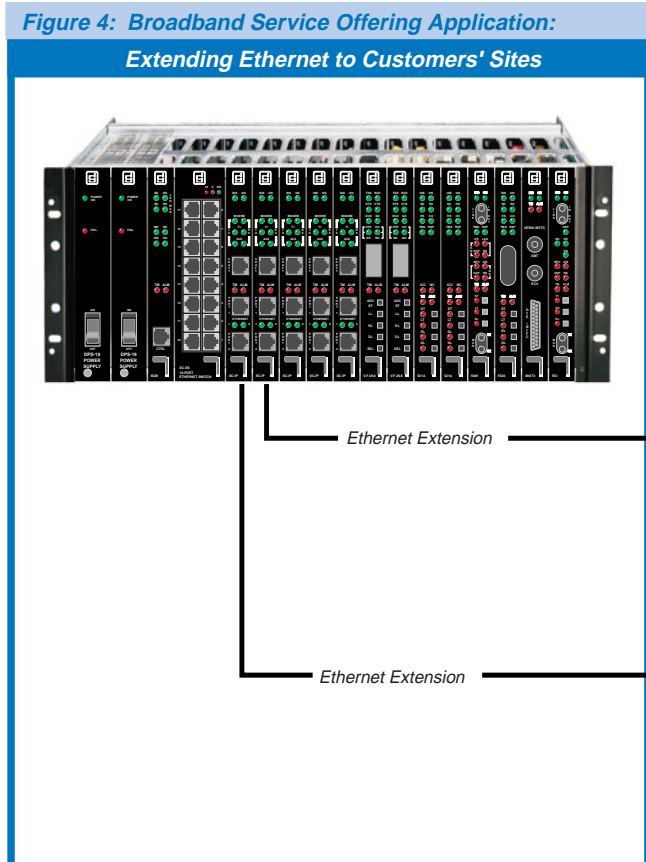
Each customer can be served at scalable speeds using T1, FT1, E1, FE1 or DDS up to 5000 ft without repeaters. Using G.shdsl, customers can be served at scalable speeds to 3.968 Mbps up to 12000 ft (3658 m) without repeaters. LAN connections at the customer sites use standard 10/100B-T, based on IEEE 802.3 Ethernet.

Figure 4 shows SCIP devices in LAN-X mode launching new Broadband services to carrier customers.

## Increased Revenues

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

- Customer premise SCIP 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 allows emergency management access over a dial-in connection.
- Diagnostics are available for quick trouble-shooting and resolution of customer problems.



Multiple SCIP devices shown installed in SpectraComm high density shelf at Service Provider site.

Individual SCIP devices shown installed in SpectraComm standalone enclosures at Customer sites.

## ETHERNET Connectivity

When scalable Ethernet connectivity is required, the SpectraComm Ethernet Switch (SCES), a companion product to SCIP devices, can be deployed in 9- or 18-port increments. NEBS-compliant SCES can be installed anywhere in a carrier or enterprise network.

SCES 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. SCES supports cabling distances of up to 100 meters by eliminating the propagation delays normally found with hubs/repeaters.

## Extending Small and Large Networks

The SCES and SCIP devices may be deployed together to further extend management in small and large network applications requiring more than two LAN ports at each site. In small networks, SCES installs at a remote site with one Ethernet port connected to the SCIP device. The remaining SCES ports may be used to connect as many as 17 additional LAN devices at that site.

In larger applications where a central office location has multiple remote sites (CEVs), SCIP devices provide the connectivity from a network operations center (NOC) to a central site and out to multiple remote sites. The carrier or enterprise can then extend its reach to devices attached to SCES at the remote sites. *Figure 5* shows SCIP and SCES extending connectivity in both small and large networks.

