General DataComm
Best Connections in the Business

SpectraComm IP-T1

Reliable Connectivity for Remote Network Management

Highlights

- Low-cost, reliable routing or Ethernet extension

- Supports scalable high performance LAN via 10/100BASE-T Ethernet

- Flexible Telco-tough NEBS Level III-compliant packaging for the central office or remote sites.

Introduction

As carriers and enterprises introduce IP equipment in their networks, GDC's SpectraComm IP-T1 (SCIP-T1) device provides two access modes for LAN-attached IP devices and legacy (craft) devices. Either mode of operation can be conducted over the T1/FT1 or DDS network, or over a dial-up PSTN.

- In router mode, the SCIP-T1 provides management access by extending the internal network to remote locations where separate IP networks are required.

- In LAN-X mode, the SCIP-T1 can be deployed as an Ethernet extension device for those remote locations where a single 'flat' IP network is required.

Connectivity via IP Routing

Figure 1 demonstrates the SpectraComm IP-T1 as a static router, forwarding IP data between serial WAN ports and an Ethernet (LAN) switch. SCIP-T1 also connects to craft ports of up to eight co-located devices. Dial-in users can be authorized for read or read-write access to remote devices over the private switched telephone network.
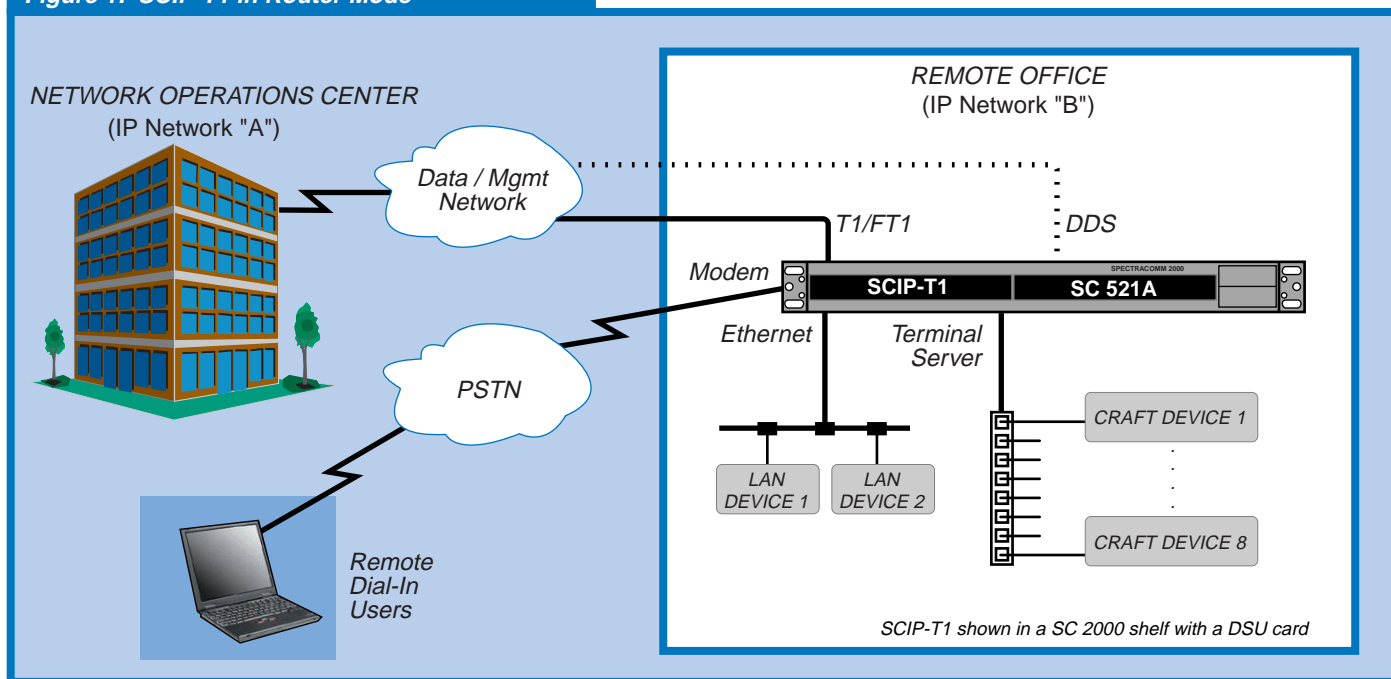
Connectivity via LAN-Extension

Figure 2: When placed in LAN-extension mode, SCIP-T1 extends carrier or enterprise local area networks. Deployed in pairs, SCIP-T1 cards are connected to their separate LANs via the Ethernet interface and are connected to each other 'back-to-back' via the T1 or WAN. GDC's LAN-extension (LAN-X) is used as the link layer WAN protocol.

Switched Ethernet Applications

When additional NEBS-compliant Ethernet connectivity is required, SCIP-T1 can integrate with SpectraComm Ethernet Switch (SC-ES) cards, which provide scalable IP connectivity in 9 or 18 port increments.

Figure 1: SCIP-T1 in Router Mode

NETWORK OPERATIONS CENTER
(IP Network "A")

REMOTE OFFICE
(IP Network "B")

Data / Mgmt Network

T1/FT1   DDS

Modem   SPECTRACOMM 2000   SCIP-T1   SC 521A

Ethernet   Terminal Server

PSTN

Remote Dial-In Users

LAN DEVICE 1   LAN DEVICE 2

CRAFT DEVICE 1
.
.
.
CRAFT DEVICE 8

SCIP-T1 shown in a SC 2000 shelf with a DSU card

SCIP ROUTER APPLICATIONS

Figure 1 shows the primary application of the SCIP-T1 in static router mode, providing NEBS-compliant IP connectivity to the carrier or enterprise internal network and between managed sites.

SCIP-T1 can be located anywhere in the network; for example SCIP-T1 can be located within the Central Office's environment as part of the inside plant, or located in a remote office or CEV-Hut environment as part of the outside plant.

With SCIP-T1 routers deployed in all remote offices, virtually all remote devices can be connected back to the NOC through their ethernet LAN ports or their craft ports. In addition, the SCIP's exclusive use of static routes provides reduced IP traffic in the carrier or enterprise network.

SCIP LAN-X APPLICATIONS

Figure 2 shows SCIP-T1 in LAN-X mode of operation where a NOC can extend its Ethernet network via one or more pairs of SCIPs connected 'back-to-back' over the T1 line. This configuration provides NEBS-compliance and extends carrier or enterprise networks; any remote device can be accessed from the NOC via the SCIP. The Ethernet can be extended within a building (i.e., between floors) or, more typically, across a WAN connection.

SCIP can be located anywhere in the carrier or enterprise network; for example SCIP can be located in the Central Office environment as part of the inside plant, or located in a remote office or CEV-Hut environment as part of the outside plant.

SCIP in LAN-X mode emulates a "flat" IP network; thus inband management is conducted in one direction from a specified SCIP port at the NOC towards the remotes site(s).

Figure 2: SCIP-T1 in LAN-X Mode

Certified NEBS Compliant
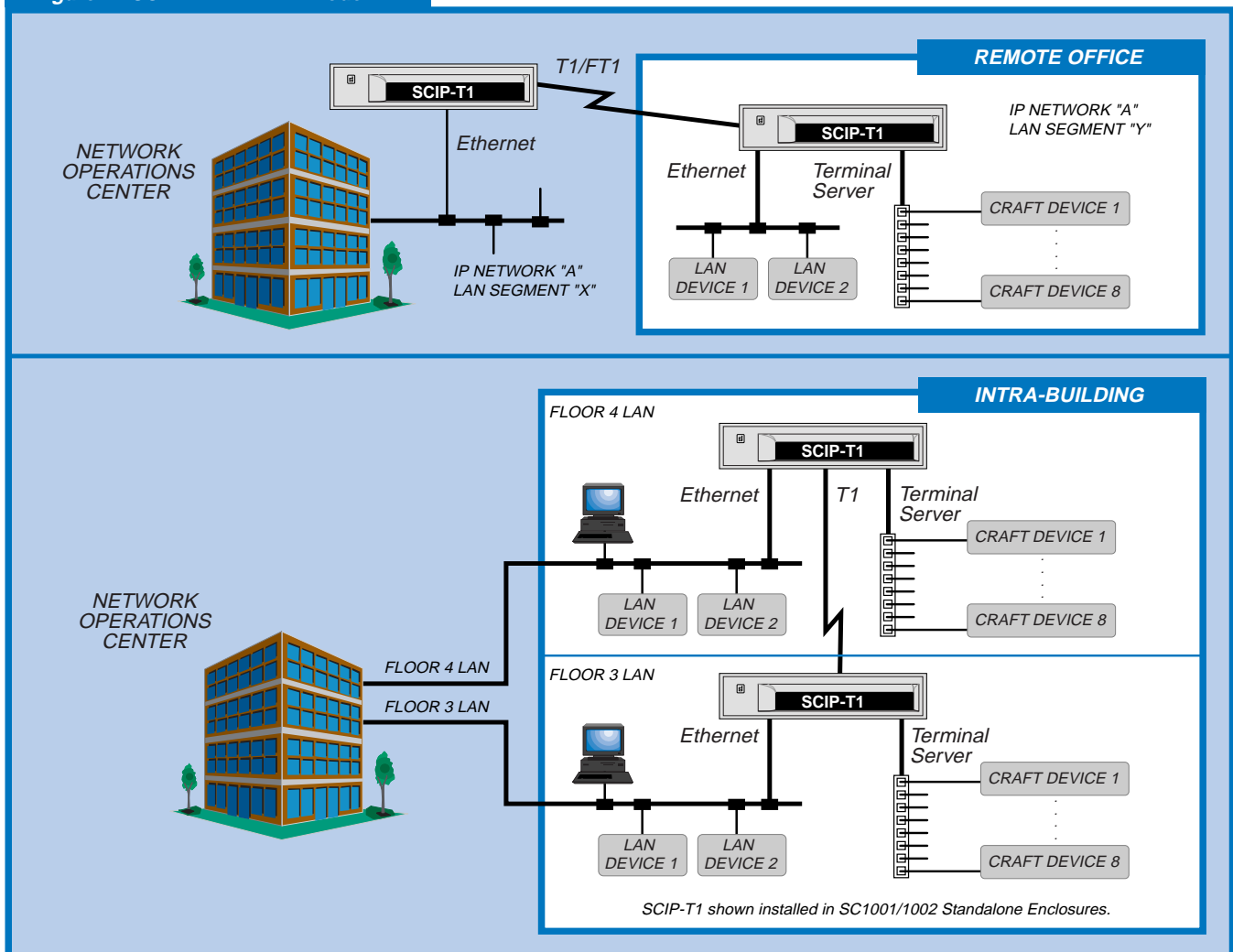
ADDITIONAL FEATURES

- Employs GDC's 'Smart CLI', an interactive command line interface, and the intuitive web (HTTP) interface.
- Remote access to eight craft devices and two LAN switching devices.
- Provides Telnet 'cut-thru' to terminal server ports.
- Access to T1/FT1 network via an integral T1 CSU/DSU with long-haul and short-haul capability.
- Frame Relay or PPP for link layer encapsulation of IP traffic
- Efficient configuration of multiple SCIPs via ASCII batch file upload/download
- High performance 'run from ram' architecture includes Running, Primary and Standby versions of software.
- Software can be upgraded via TFTP or FTP.
- Supports an internal or external V.34 modem.
- Supports DDS network access via synchronous DTE interface to an external DSU (SC521A/S)
- Secure SCIP configuration via dial-up connectivity.
- Supports Spanning Tree Protocol (STP) which eliminates loops and provides fault tolerance
- Supports MACL (Media Access Control List) Security which identifies invalid users by their MAC address.
- Supports Ethernet broadcast limiting, Ethernet jumbo packets, and priority queueing of IP traffic marked for expedited forwarding.

NEBS-Compliant - Telco Tough

The SCIP-T1 is NEBS Level III compliant and can be deployed in the 16-slot SC 5000 shelf or 2-slot SC 2000 shelf. For greater density applications, use a dual SC 5000 shelf configuration (32 slots). Non-NEBS standalone applications can use a single SCIP-T1 card in SpectraComm AC or DC standalone enclosures.

Flexible and Scalable Connectivity

Any SpectraComm device, from SC 202 to SC 800 T3, can be co-located in the shelf with SCIP cards, providing a unified, flexible, managed shelf environment that is scalable to carrier or enterprise network requirements.

Typical shelf configurations can include SCIP with SpectraComm Ethernet Switch cards (SC-ES 9-Port or SC-ES 18-Port), the SpectraComm 521A DSU, and GDC modems, LTUs and multiplexers.

SCIP-T1 and SCES Applications

The SC-ES cards can connect several 10/100B-T Ethernet devices on the same network segment at maximum speed and improved LAN performance. In a SC 5000 shelf at a remote site, the SC-ES 9-port or SC-ES 18-port card connects to one of SCIP's two ethernet ports. This configuration extends carrier or enterprise management networks to reach remote devices attached to a scalable ethernet LAN.

Your Connectivity Requirements:	*SCIP-T1 Solutions*
Local legacy devices and two local LANs	The terminal server connects to up to eight legacy device craft port; the Ethernet interface connects to two hosts, hubs or switches, reaching devices attached to associated LANs.
Remote legacy devices via T1/FT1	The T1/FT1 interface connects to SCIP-T1 at the remote site, reaching up to eight remote legacy devices.
Remote legacy devices via DDS network	The synchronous DTE interface to a SC 521A DSU connects to SCIP at the remote site, reaching up to eight remote legacy devices.
LAN-attached devices at remote sites on the same IP network (i.e., a flat IP network)	SCIP LAN-extension reaches any LAN or craft-attached device at remote sites.
LAN-attached devices at remote sites on separate IP networks	SCIP static routing reaches LAN or craft devices at remote sites; static routes required.
Local or remote switched Ethernet devices	SCIP and SC-ES cards provides switched connectivity to remote sites (SC-ES 9-Port switch or SC-ES 18-port switch)
Secure and authenticated access for remote users	Password-protected access to SCIP via integral or external modem. Password-protected access to SCIP via its asynchronous AUX interface to an external modem (*Future Use*). Integrates with optional TACACS+ Authentication via LA, the integral modem, or an external modem, and a customer-supplied TACACS+ server. Supports SNMP traps for all interfaces from illegal MAC addresses or from link up/down.

SCIP MANAGEMENT INTERFACES

SCIP 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 in the network from a terminal or Telnet connection or through any popular web browser.

Secure Access and Protection

Management access at CLI and web interfaces is protected by several SCIP security features:

- User- and Supervisor-level password protection authorizes every access attempt.

- Inactivity logoff prevents hacks through 'left on' equipment

- Enable/Disable SNMP, HTTP, Telnet, FTP and TFTP services deters hacking through these protocols.

- Enable/Disable management traffic by interface, for provider and customer management access schemes.

- Supports TACACS+ authentication protocol (optional) which centralizes security at a network access server.

- Supports SNMP traps for a variety of events.

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.

- SCIP upgrades via FTP or TFTP downloads of software versions and configuration data.

- Command entry from a Telnet or terminal connection.

- Command entry at the web-based CLI webscreen.

Figure 3: SCIP Management Interface Options

Terminal CLI Interface Option

```
SC-IP% configure
Type "configure ?" for a list of subcommands
SC-IP% configure ?
_____Help for "configure"_____
accounts       Configure usernames and passwords; clear login statistics
banner         Configure login banner
contact        Configure contact sense parameters
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
macl           Configure media access control list
modem          Configure modem parameters
prompt         Configure custom prommpt: requires 1 parameter(s)
services       Configure HTTP, SNMP, TELNET, TFTP, FTP Services
snmp           Configure SNMP Server parameters
span-tree      Configure Spanning Tree Protocol
t1             Configure T1 parameters
tacacs+        Configure TACACS+ parameters
term-serv      Configure termial server parameters
time           Configure Time Service parameters
traffic        Configure traffic parameters
```

Web-CLI Interface Option

SpectraComm IP	
YOUR SYSTEM NAME (172.16.5.127)	
clear	Reset functions
configure	Configure system parameters
help	Description of the command line interface and help system
show	Show system parameters
reboot	Halt and perform a reboot
netstat	Show TCP socket connections
services	Show/Enable/Disable HTTP, SNMP, TELNET, FTP & TFTP Services
logout	Exit this web session

Centralized and Versatile Options

Figure 3 illustrates centralized management of a system of SCIPs in the carrier or enterprise network. From this central site, the user can access SCIPs via the preferred interface: Terminal or Telnet CLI, or the Web-based CLI. The number of concurrent management sessions is determined by your workstation resources.

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SCIP-T1 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 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% - 90% non-condensing
Altitude: -60 to 4,0000 m (-197 to 13,123 ft)

Electrical Specifications

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

Power Dissipation: 6 Watts, maximum

Compliance and Compatibility

SCIP-T1 Card
Safety: UL Approved
NEBS Level III Certified
Telco: FCC Part 68 Approved
EMI:FCC Part 15 Class A Approved
Bell Pub. 62310 and ANSI T1.410 standards compliant

Integral V.34 Modem
FCC Part 15B and Part 68 compliant
CE Mark/CTR21 compliant
UL/CUL recognized component

Quality Assurance
ISO 9001: 2000 certified

Security and Authentication

Username and Password verification

Multi-level permissions: User (Read-only), Supervisor (Read-Write), or Administrator (Read-Write and special functions)

Individual disable/enable of HTTP, SNMP, Telnet, FTP and TFTP
HTTP, Telnet, and FTP and TFTP timeouts
MACL (Media Access Control List) Security
TACACS+ Authentication Protocol (optional)

Management Interfaces

Command line interface via Telnet, VT-100 compatible terminal, and web (HTTP) interface.

Embedded web-server agent uses PC browser (HTML supported)

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

LAN-X Mode: Ethernet extension via SCIP-to-SCIP over WAN (T1 or DDS) interface. (Proprietary WAN protocol)

Physical Interfaces
Front Panel Craft Port: TIA/EIA-232

Front Panel Ethernet Ports (2): RFC 1213; MIB for Network Management of TCP/IP-based Internets; RFC 1398; Ethernet MIB; ANSI/IEEE 802.3; ANSI/IEEE 802.1d; Full duplex Ethernet

WAN Ports (2)

Terminal Server Ports:
TIA/EIA-232 for connection to up to eight devices.

AUX Port:
TIA/EIA-232 for asynchronous operation up to 115.2 kbps *(Future);* TIA/EIA-232 for synchronous operation up to 64 kbps

T1 Interface: DS1 and DSX-1; Frame Relay DTE interface (UNI-U); PPP interface (RFC 1661)

Integral Modem port: PPP or UART mode

Integral CSU/DSU Operation
T1 Data Rate:
N x 56/64 Kbps, where N = 1 - 24 DS0s

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

Optional Integral Modem Operation
ITU-T V.34
V.42 LAPM and MNP 2-4 error correction
V.42 bis and MNP 5 data compression

Diagnostics, Alarms and SNMP Traps
T1 Network Line Loopback Test,
T1 Self Test, T1 Self Test with Loopback
T1 Payload Loopback Test

Out Of Frame (OOF) Alarm
Loss of Signal (LOS) Alarm
Alarm Indication Signal (AIS)
Bipolar Violation (BPV) Alarm
Cyclic Redundancy Check (CRC) Error Alarm
Received Yellow (RYEL) Alarm Event
Low Average Density (LAD) Alarm

Cold Start trap
Up/Down traps for etherswitch ports 1 and 2
Contact Sense trap for Start/Stop
Contact Sense trap for Active/Clear
MACL Violation trap
Authentication Failure trap
LinkUp/Down traps for ethernet0, serial0, serial1
LinkUp/Down trap for modem0 (if so equipped)

INS ON
MODEM
T X   T1   R X
AUX
CRAFT
TM ALM
PORT 1
ETHERNET 1 2
PORT 2
SC-IP

USDA
RUS Accepted