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.
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).
### 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.

<table>
<thead>
<tr>
<th>Your Connectivity Requirements:</th>
<th>SCIP-T1 Solutions</th>
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<tbody>
<tr>
<td>Local legacy devices and two local LANs</td>
<td>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.</td>
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<tr>
<td>Remote legacy devices via T1/FT1</td>
<td>The T1/FT1 interface connects to SCIP-T1 at the remote site, reaching up to eight remote legacy devices.</td>
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<tr>
<td>Remote legacy devices via DDS network</td>
<td>The synchronous DTE interface to a SC 521A DSU connects to SCIP at the remote site, reaching up to eight remote legacy devices.</td>
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<tr>
<td>LAN-attached devices at remote sites on the same IP network (i.e., a flat IP network)</td>
<td>SCIP LAN-extension reaches any LAN or craft-attached device at remote sites.</td>
</tr>
<tr>
<td>LAN-attached devices at remote sites on separate IP networks</td>
<td>SCIP static routing reaches LAN or craft devices at remote sites; static routes required.</td>
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<tr>
<td>Local or remote switched Ethernet devices</td>
<td>SCIP and SC-ES cards provides switched connectivity to remote sites (SC-ES 9-Port switch or SC-ES 18-port switch)</td>
</tr>
<tr>
<td>Secure and authenticated access for remote users</td>
<td>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.</td>
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</table>
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.

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.
**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 4,000 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

**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)