Reliable Connectivity for Remote Network Management

Highlights

- Low-cost, reliable routing or LAN-extension
- Supports scalable high performance LAN via 10/100BASE-T Ethernet
- Telco-tough NEBS Level III-compliant packaging

Introduction

As Carriers introduce IP equipment to their networks, GDC offers two access solutions for LAN-attached IP devices and legacy (Craft Port) devices. Either mode of operation can be conducted over the Carrier's T1/FT1 or DDS network, as well as over a dial-up PSTN.

- In router mode, the SpectraComm IP (SC-IP) provides management access by extending the Carrier's internal network to remote locations where separate IP networks are required.
- In LAN-X mode, the SC-IP can be deployed as a LAN-extension device for those remote locations where a single 'flat' IP network is required.

Connectivity via IP Routing

Figure 1 demonstrates how the SpectraComm IP uses static routing to forward IP data between serial WAN ports and an Ethernet (LAN) switch and connects to the craft ports of up to eight co-located devices. Dial-in users may be authorized for read or read-write access to remote devices over the private switched telephone network.

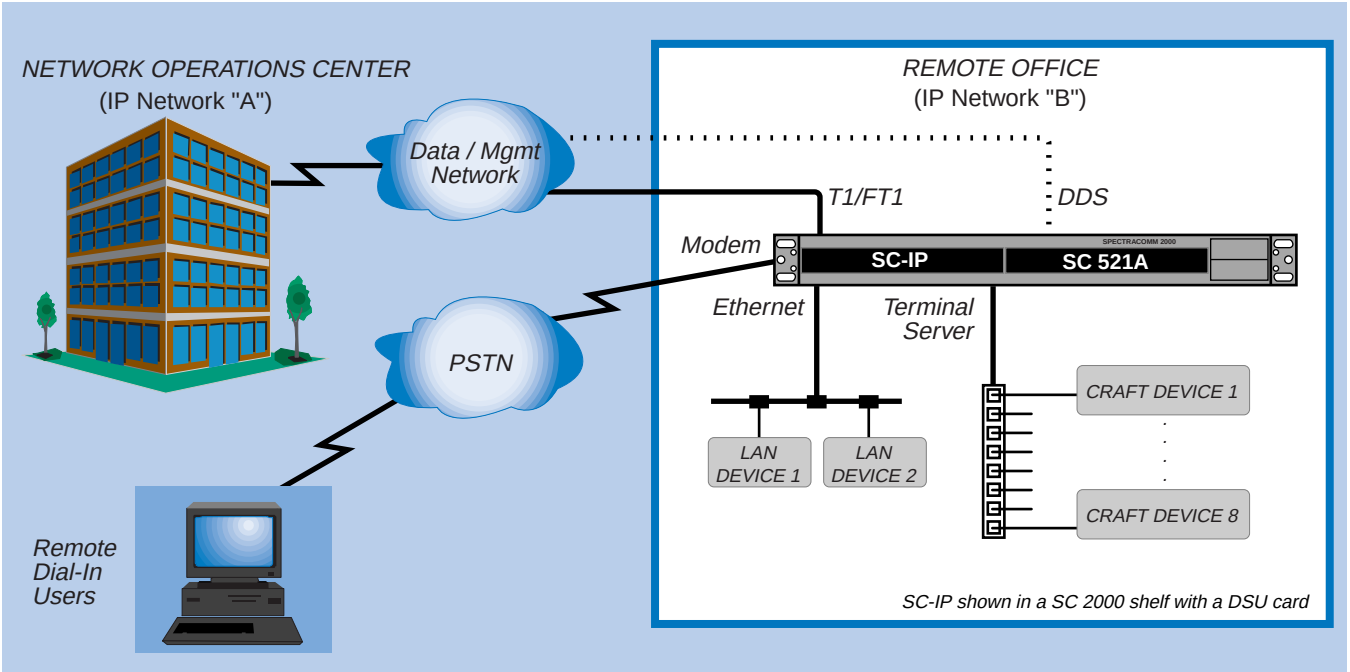
Connectivity via LAN-Extension

Figure 2: When placed in LAN-extension mode, the SC-IP extends the Carrier's local area networks. Deployed in pairs, SC-IP 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, SC-IP can integrate with SpectraComm Ethernet Switch (SC-ES) cards, offering scalable IP connectivity in 9 or 18 port increments.

Figure 1: Typical Deployment of SC-IP Router



SC-IP ROUTER APPLICATIONS

Figure 1 shows the primary application of the SC-IP in static router mode, providing NEBS-compliant IP connectivity to the Carrier's internal network and between managed sites.

SC-IP can be located anywhere within the Carrier's network; for example SC-IP 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 SC-IP 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 SC-IP's exclusive use of static routes provides reduced IP traffic in the Carrier's network.

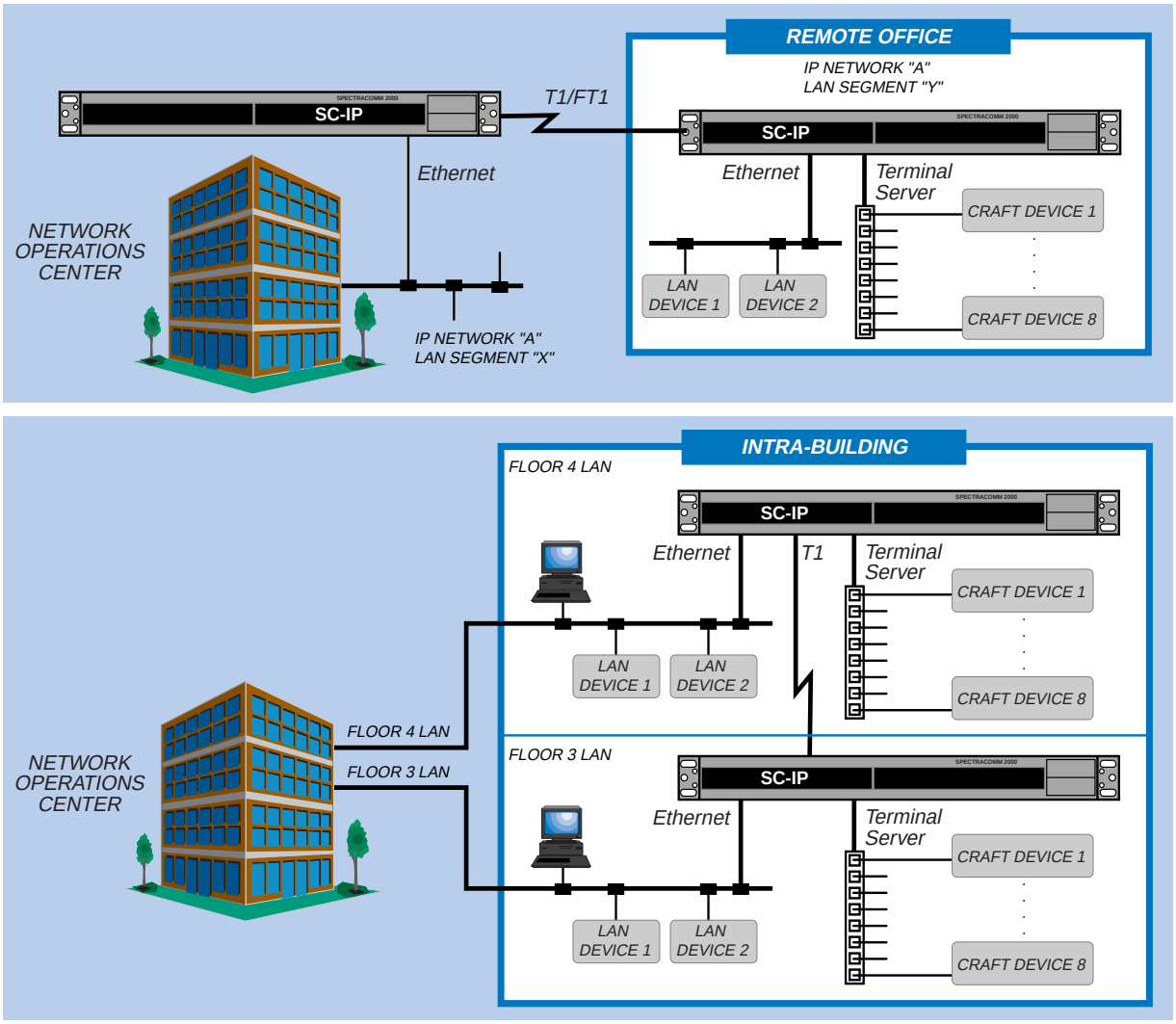
SC-IP LAN-X APPLICATIONS

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

SC-IP can be located anywhere within the Carrier's network; for example SC-IP 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.

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

Figure 2: SC-IP in LAN-extension Mode



SpectraComm IP

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 SC-IPs 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.
- With a future upgrade, SCIP supports:
  - an internal or external V.34 modem.
  - DDS network access via synchronous DTE interface to an external DSU.
  - secure SC-IP configuration via dial-up connectivity.

NEBS-Compliant - Telco Tough

The SC-IP 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 stand-alone applications can use a single SC-IP in the RA 1000 enclosure.

Flexible and Scalable Connectivity

Any SpectraComm device, from SC 202 to SC 800 T3, can be co-located in the shelf with SC-IP cards, providing a unified, flexible, managed shelf environment that is scalable to the Carrier's network requirements. Typical shelf configurations can include SC-IP with SpectraComm Ethernet Switch cards (SC-ES 9-Port or SC-ES 18-Port), the SpectraComm 521A DSU, as well as GDC modems and LTUs.

SpectraComm Ethernet Switch Cards

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 SC-IP's two ethernet ports. This configuration extends the Carrier's management network to reach remote devices attached to a scalable ethernet LAN.

Remote Authentication for Dial-In Users

With a future upgrade, RADIUS can be enabled in the SC-IP integral modem or an external modem in order to open a client service session for RADIUS security. With this capability, only authorized dial-in users will be granted access to remote devices connected to the SC-IP in the Carrier's network.

Security

SC-IP access is protected by several security measures: provides multi-level password authentication; can disable TFTP, HTTP or SNMP services when desirable; can enable RADIUS security (optional software) for dial-in users.

Connectivity Requirements:	*SC-IP Solutions Extend the Reach*
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 SC-IP 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 SC-IP 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)	SC-IP LAN-extension reaches any LAN or craft-attached device at remote sites.
LAN-attached devices at remote sites on separate IP networks	SC-IP static routing reaches LAN or craft devices at remote sites; static routes required.
Local or remote switched Ethernet devices	SC-IP and SC-ES cards provides switched connectivity to remote sites: SC-ES 900 (9 ports) or SC-ES 1800 (18 ports).
Secure access for dial-up users	Password-protected access to SC-IP via its V.90 modem. Password-protected access to SC-IP via its asynchronous AUX interface to an external modem. Integrates with optional RADIUS Security via the SC-IP's integral modem or via the SCM and a SC V.34 modem.

SC-IP MANAGEMENT INTERFACES

SC-IP 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 SC-IP 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 SC-IP 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.

Centralized and Versatile Options

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

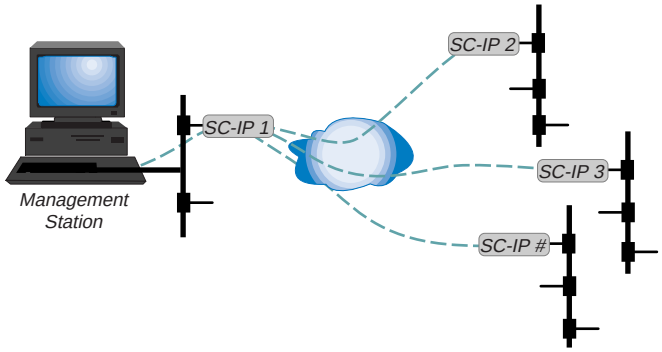
SMART CLI Features

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.
- SC-IP upgrades via TFTP downloads of software versions and configuration data.
- Command entry from a Telnet or terminal connection; Command entry at the web-based CLI webscreen.

Web-Based GUI Management

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



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
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
t1             Configure T1 parameters
term-serv      Configure termial server parameters
SC-IP% configure _
```

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
services	Show/Enable/Disable HTTP, SNMP, & TFTP Services
tutorial	Display tutorials for SC-IP

Web GUI Interface Option

SpectraComm IP

SC-IP

Administration
Statisitcs
Command Line

Setup

Interface
IP Route
T1
Terminal

Frame Relay

DLCI
LMI
Traffic Shape

Logout

Administration

Name:
Contact
Location

Hardware Description:
Electronic Serial # : 01.19-00c064012001
Processor type : MPC860EN50
Flash type : 2 MB
SDRAM Size : 16 MB
PCB Assy Num : 058A169-001
PCB Assy Rev : A-
Manufacturing Date : 01/01/02

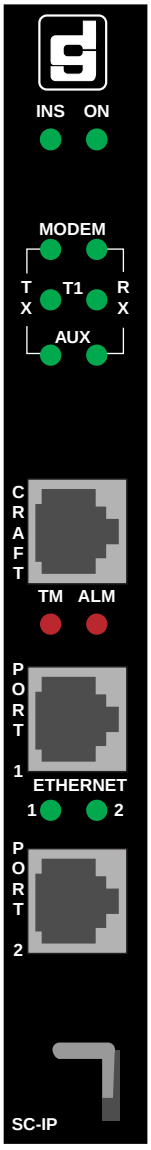
Operating Mode: Router
System Up Time: 5 days 02:17;35

	Version	Size (bytes)
Primary:		403063
Standby:	1.0.0	396882
Boot	1.0.0	51524
Running:	1.0.0	

SAVE RESET

Figure 3: SC-IP Management Interface Options

SpectraComm IP



Physical & Electrical Specifications

Dimensions

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

Electrical Characteristics:

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

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

Fusing: Determined by your SpectraComm shelf.

Power Dissipation: 6 Watts maximum, each

Compliance & Compatibility

Safety:

UL Listed

CUL Listed

SC-IP Card:

Designed for NEBS Level III Compliance

Bell Pub. 62310 and ANSI T1.410 standards-compliant

FCC Part 68 Approved

FCC Part 15 Class A approved

Integral V.34 Modem:

FCC Part 15B & Part 68 compliant

CE Mark/CTR21 compliant

UL/CUL recognized component

Operational Specifications

Modes of Operation

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

LAN-X Mode: SC-IP to SC-IP 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

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
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

SC-IP CSU/DSU Operation

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

Integral Modem Operation

ITU-T V.34

V.42 LAPM and MNP 2-4 error correction

V.42 bis and MNP 5 data compression

SC-IP Management Interface Options

Command line interface via VT-100 compatible terminal

Command line interface via Telnet and web-interface

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

SNMP support for standard statistics.

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