General DataComm
The Best Connections in the Business

SpectraComm SDT

IP Transport for Legacy Synchronous Data

SpectraComm SDT Highlights

- Provides secure, high performance, low-cost transport of packetized, HDLC-based synchronous data between sites utilizing IP networks.
- Two modes of transport to enhance traffic delivery in delay- or loss-sensitive applications.
- Individually configurable ports in 3-port increments.
- From 2400 bps (for low rate legacy applications) to a maximum full-duplex data rate of 2.048 Mbps per port.
- Provides alarm reporting via contact sensing, alarm traps and contact outputs between network locations.
- Supports LAN connection to 10/100Base-T Ethernet.
- Supports automated configuration of multiple SC-SDT devices via ASCII batch file upload/download.
- Low power consumption (6 watts maximum per slot)
- Designed for NEBS Level III Certification
- Supports password-protected access.

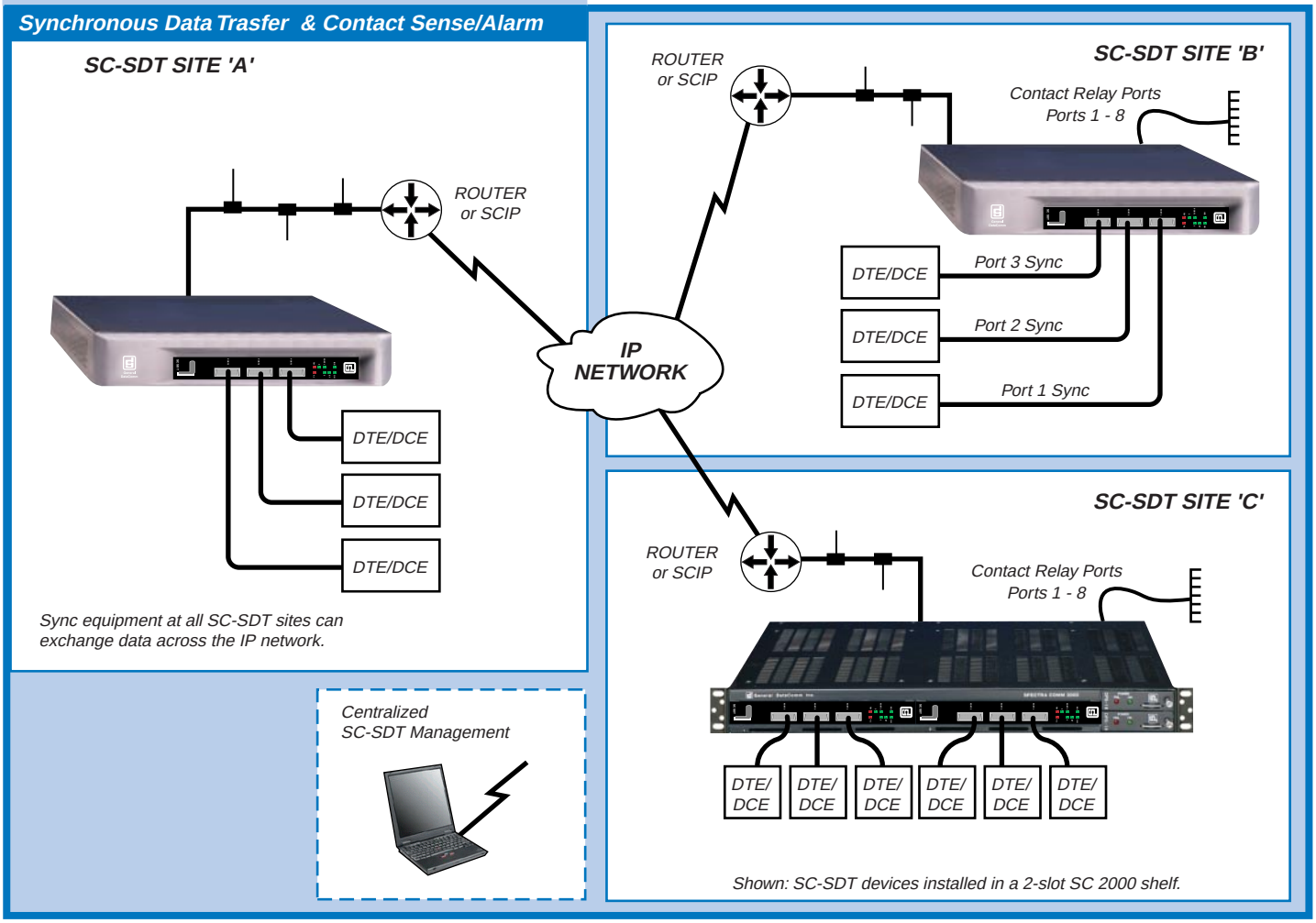
Introduction

GDC's SpectraComm SDT (Synchronous Transport Device) is designed for sync data transport of HDLC-based traffic over today's IP networks. The HDLC-based traffic is the common Layer 2 for many encapsulated and transported legacy protocols *(Table 1)*. Traffic can be transported over your IP network in TCP/IP mode for ultimate reliablity, or UDP/IP mode which reduces delay and stale packets.

The NEBS-certified SC-SDT can be deployed anywhere in the IP network where synchronous devices or contact relays are located. *Figure 1* shows SC-SDT supporting multiple applications simultaneously:

- DTE/DCE devices at any SC-SDT site can exchange sync data with devices at other SC-SDT sites.
- The SC-SDT rear panel DB-25 connector provides contact ports for alarm transfer and traps.
- SC-SDT units are managed via Telnet, SNMP, HTTP.

Figure 1: END-TO-END APPLICATIONS



Flexible, Scalable Packaging

The SpectraComm SDT device is NEBS Level III compliant and is intended for installation in GDC's SpectraComm shelves and enclosures. The SC-SDT is a 7- by 9.5-inch card that occupies one slot in GDC's 2-slot SpectraComm 2000 shelf or the 16-slot SpectraComm 5000 shelf. Other SpectraComm devices can be co-located in the shelf with SC-SDT cards, providing a unified, flexible, managed shelf environment that is scalable to your network requirements.

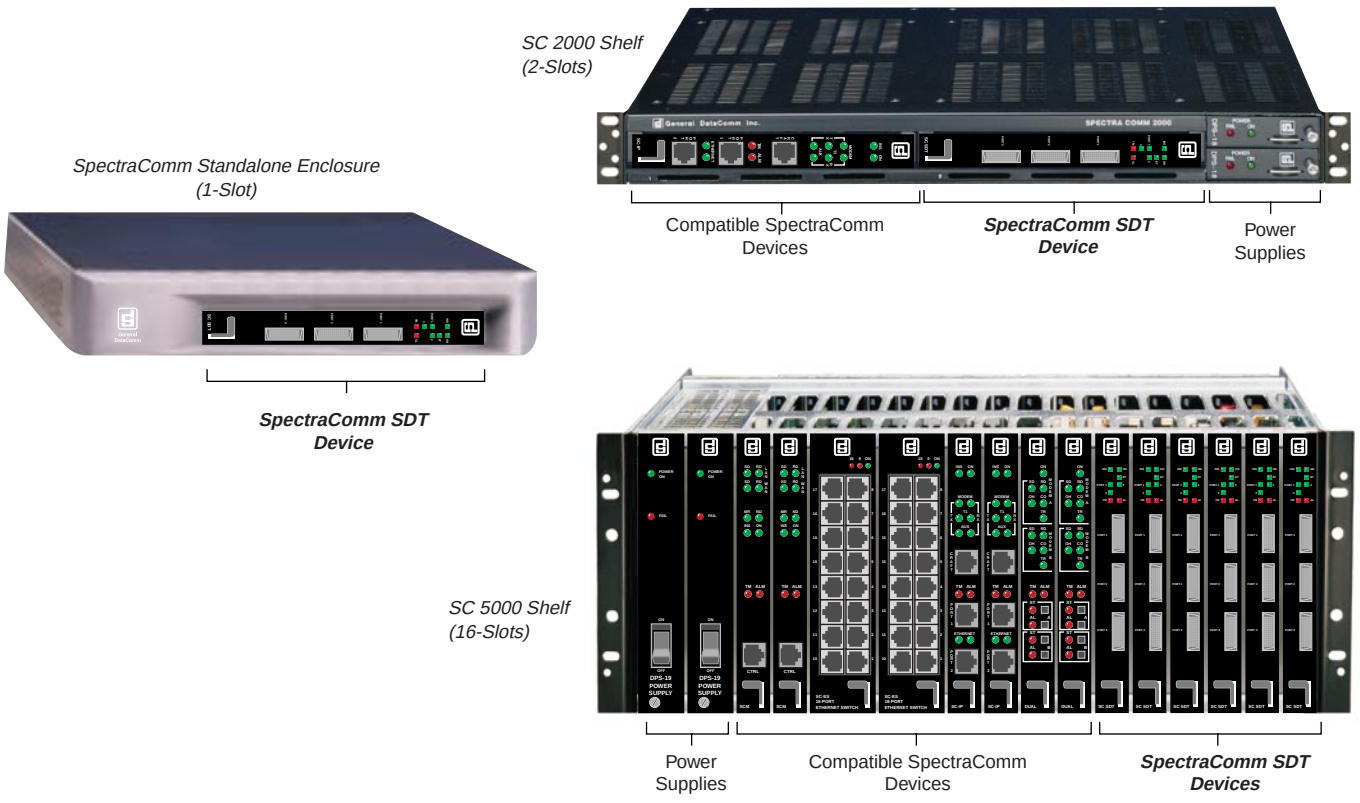
For remote site or non-NEBS, stand-alone applications, the SC-SDT also installs in the single-slot SpectraComm AC or DC standalone enclosures.

Figure 2 shows SC-SDT devices installed in GDC's flexible and scalable SpectraComm shelf and enclosure platforms, along with other compatible product cards.

TABLE 1:
Common HDLC-based (Legacy Protocols) Applications

Protocol	Description
X.25	Uses LAP-B for Layer 2, which is HDLC frame format.
SS7 Signaling	Uses MTP-2, which is HDLC frame format.
IBM System Network Architecture (SNA)	Uses SDLC, which is a subset of HDLC frame format.
Frame Relay	Based on HDLC frame format.
Point-to-Point (PPP)	Based on HDLC frame format.

Figure 2: SPECTRA-COMMONALITY:
Application Cards & Shelf Systems



ADDITIONAL FEATURES

- Diagnostics: loopbacks, ping and statistics.
- Employs GDC's 'Smart CLI', an interactive command line interface, and the web-based CLI interface.
- Ethernet auto-negotiates for 10 or 100 Mbps port speed, full- or half-duplex modes and enabled / disabled flow control.
- Ethernet auto-sense (HP MID / X) for straight-thru or crossover cable connections.
- Efficient configuration of multiple SC-SDT devices via ASCII batch file upload / download.
- Responds to SNMP polling and discovery.
- High performance 'run from ram' architecture includes Running, Primary and Standby versions of software.
- Provides a console port for local management.
- Supports remote management using standards-based IP protocols including Telnet, TFTP, and HTTP (Web)
- Supports discovery, statistics, and alarm traps using standards-based SNMP.
- Supports multi-level password protection for added security.
- Supports TACACS+ authentication for secure, centralized username and password administration.
- Software upgradable via TFTP, allowing quick bug fixes and feature enhancements over time.

Highest Design Standards

The SC SDT device is NEBS Level III compliant and is intended for installation in GDC's 'telco-tough' SpectraComm shelves and enclosures.

General DataComm's family of NEBS-certified products meet the stringent safety, environmental, shock and vibration standards that meet or exceed the Network Equipment Building System standards (NEBS).

Typical shelf configurations can include GDC's NEBS compliant SpectraComm SDT, SpectraComm IP cards (SCIP, SCIP-E1, SCIP-G.S), SpectraComm Ethernet Switches (SC-ES 9-Port or SC-ES 18-Port) and SC-ADT devices, as well as GDC SpectraComm modems, DSUs, LTUs and multiplexers *(Figure 2)*.

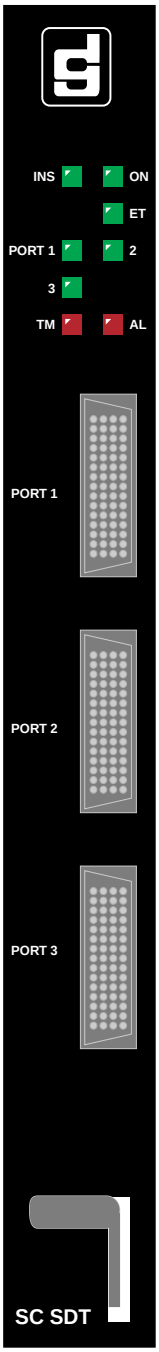


Figure 3: SpectraComm SDT Front Panel

SDT APPLICATIONS

The primary application of the SC-SDT is to utilize ethernet LAN facilities for end-to-end synchronous data traffic between sites in the customer's IP network. In such applications, sync data is received from customer equipment, encapsulated and transferred between sites.

Each SC-SDT front panel connector can be configured to interface one local synchronous customer equipment port. For higher density requirements, simply adding more SC-SDT devices will attach additional devices to the ethernet segment at each site in 3-port increments.

When the user connects the serial cable, SC-SDT will auto-configure the interface settings (V.35 or RS232) and the device type (DTE or DCE). A DTE-type port will receive clocking from the local equipment. A DCE-type port will provide clocking to the local equipment.

Theory of Operation

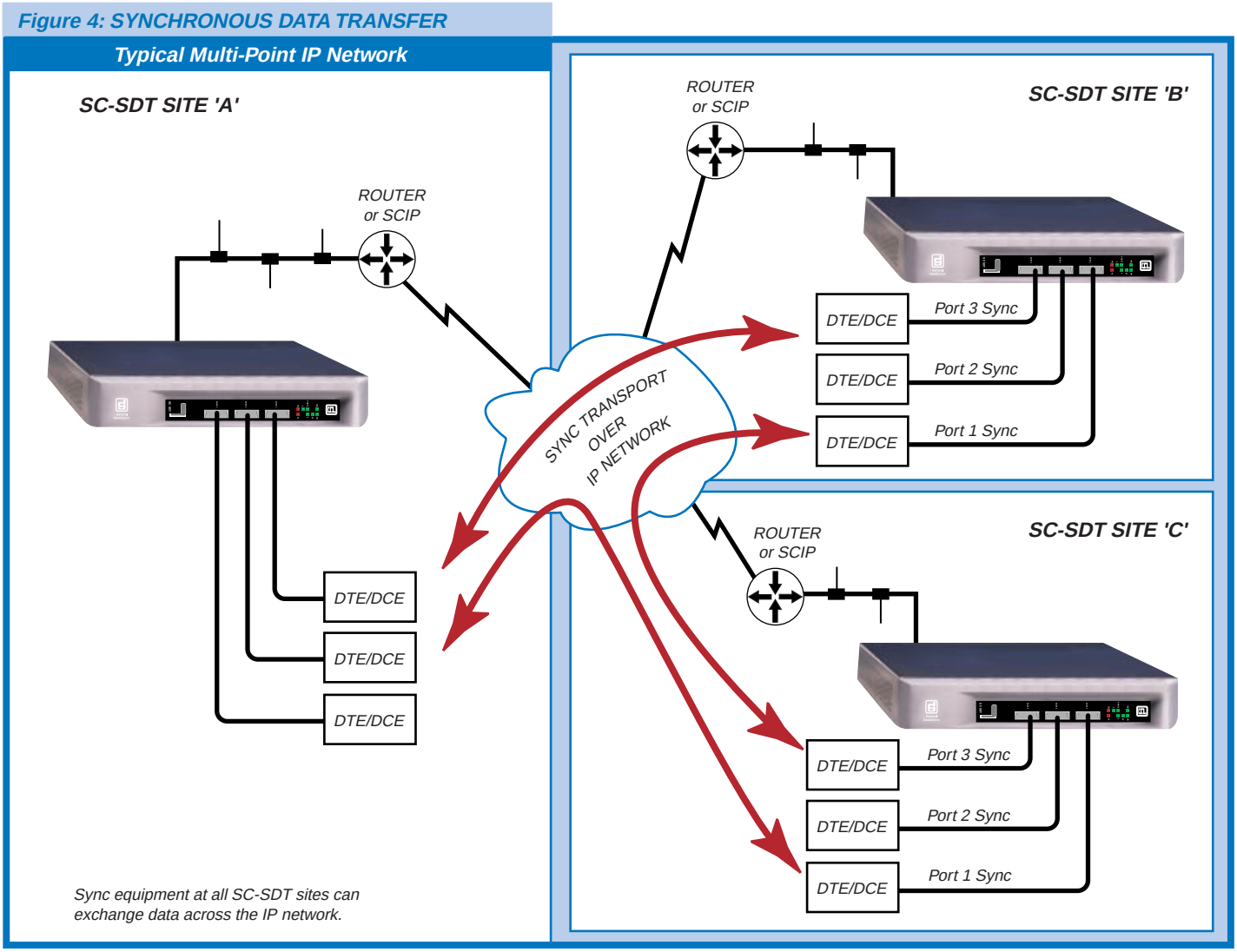
The SC-SDT encapsulates the synchronous HDLC-based traffic into IP Packets and forwards the data over Ethernet to the local router/bridge, or to a SpectraComm IP (SCIP) for transport over the IP network.

The synchronous data at any local SC-SDT port can be forwarded to any sync port at any remote SC-SDT location using a set of lookup tables maintained in each SC-SDT.

A SC-SDT device is required at both ends of a link to support the proprietary encapsulation scheme.

Figure 4 shows multiple sites with sync equipment linked together over the customer's IP network via SC-SDT. Any DTE/DCE at any SC-SDT site can exchange sync traffic with any other DTE/DCE.

Figure 4: SYNCHRONOUS DATA TRANSFER



CONTACT SENSE APPLICATIONS

The SpectraComm SDT rear panel DB-25 connector can perform contact sensing and can be configured for alarm notification whenever a change in contact relays occur at customer network sites.

Each SC-SDT rear panel connector provides up to eight contact input ports for sensing activation of an open or closed contact; and up to two contact output ports to open or close a local contact relay. To support requirements for more contact ports, simply add more SC-SDT devices to accommodate each site requirements.

Theory of Operation

SC-SDT detects when a contact changes from its normal state and, depending on its configuration, will send an alarm trap, transport the contact state, or perform both trap and transport actions. A 'clear' trap is sent when the contact returns to the normal state. SC-SDT devices are required at both sites to transport contacts, whereas a SC-SDT device is not required to receive traps. Any Management Station in the network can be a trap destination.

Configuration Options

Typical contact (alarm) applications may include sensing temperature and entry to a remote location. The alarm notification is user-configured to one of three options:

SNMP Trap

After sensing a relay state change from the normal state (open or closed), an alarm trap is sent to a management station using an SNMP alarm trap.

Contact State Transport

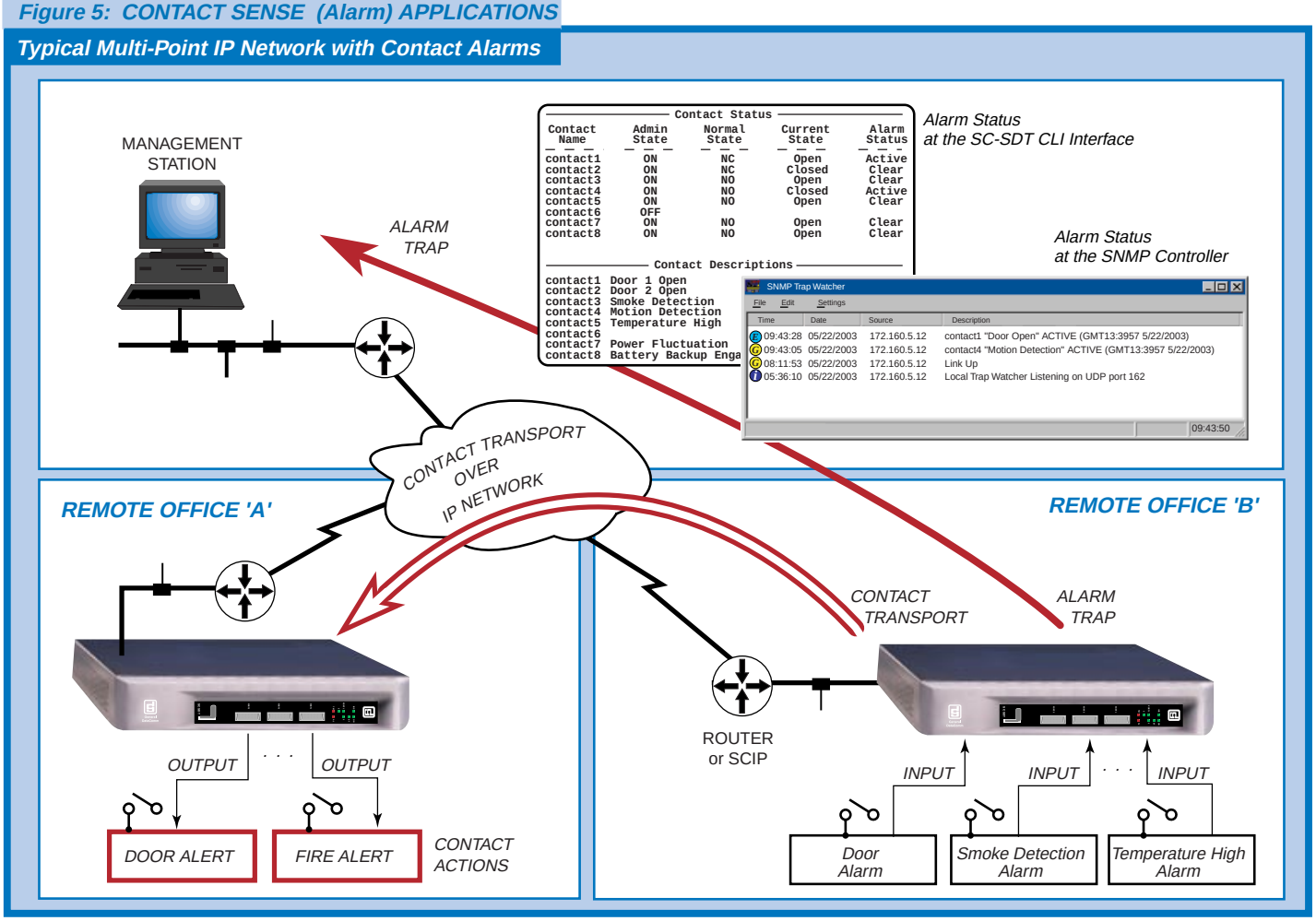
After sensing a relay state change, a message is sent to a remote SC-SDT device to open or close a relay at that site.

Trap and Transport

The alarm will be transported between sites and a trap will be sent to a management station. The destinations for alarm transport and traps are independent.

Figure 5 shows the SC-SDT in a typical contact sense application, with SNMP traps sent to a Management Station and a Contact Transport message sent to another SC-SDT site.

Figure 5: CONTACT SENSE (Alarm) APPLICATIONS



SC-SDT MANAGEMENT

SC-SDT 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-SDT device in the network via a terminal or Telnet connection or through any popular web browser.

Secure Access and Protection

Management access to SC-SDT through 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.
- Access control: 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.
- TACACS+ protocol to offload user authentication to a central server, providing 'centralized' security.

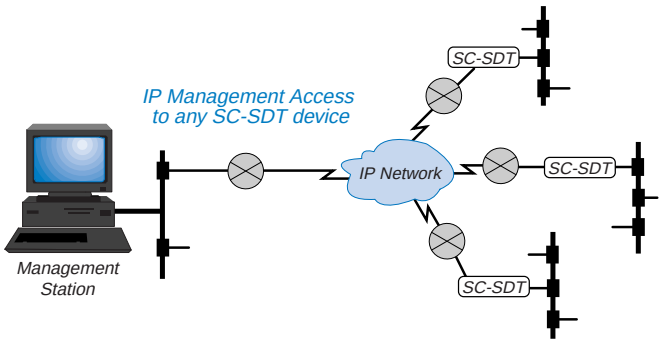
SMART CLI Features

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 SC-SDT software versions and configuration data.
- Command entry from a Telnet or terminal connection, or using a standard browser.

Figure 6: MANAGEMENT INTERFACE OPTIONS

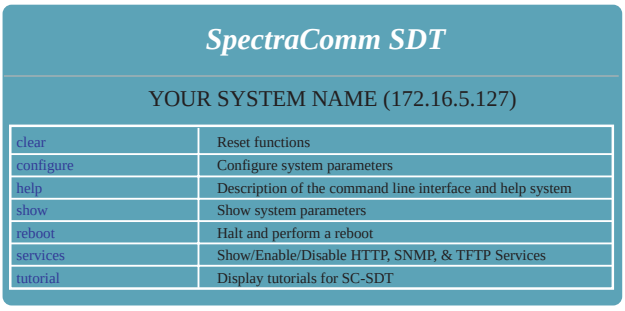
Flexible, Secure and SMART



Terminal or Telnet CLI Interface Option

```
SC-SDT% configure
Type "configure ?" for a list of subcommands
SC-SDT% configure ?
___________Help for "configure"_____________________________________________
accounts        Configure usernames and passwords; clear login statistics
banner          Configure login banner
contact         Configure contact sense parameters
inactivity      Configure inactivity time; requires 1 parameter(s)
mgt             Configure management parameters
ports           Configure port parameters
prompt          Configure custom prommpt; requires 1 parameter(s)
snmp            Configure SNMP Server parameters
tacacs+         Configure tacacs+ query parameters
time            Configure time service parameters
SC-SDT% configure _
```

Web-based Interface Option



All SC-SDT devices are simultaneously configurable for Synchronous Data Transfer or Contact Sense (alarm) applications.

Web-Based Management

An integral HTTP server provides password-protected access to a web-based CLI interface. Authorized users can monitor or change SC-SDT configuration and operation parameters in a streamlined logical graphical user interface using any popular web browser.

Centralized and Versatile Options

Figure 6 shows management throughout the network from the central site. SC-SDT units can also be accessed via a craft connection from a VT100-compatible terminal, a Telnet connection, or a web browser.

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SpectraComm SDT

SC-SDT 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 Characteristics

Power (AC or DC) determined by your SpectraComm shelf/enclosure.
Voltage/ frequency determined by your SpectraComm shelf/enclosure.
Fusing determined by your SpectraComm shelf.
Power Dissipation: 6 Watts per slot maximum

Compliance & Compatibility

Safety: UL Approved

EMI: FCC Part 15 Class A Approved

Quality Control: ISO 9001:2001 Certified

NEBS Level III Certified

Vibration: Compliant with GR-63-Core, Section 4.4.4 and Section 4.4.3

Shock: Compliant with GR-63-Core, Section 4.3 for Category A and Category B Containers.

Compliant with GR-1089-Core, GR-63-Core, GR-78-Core.

EMI FCC Part 15 Class A, ICES 003 Class A

Quality Assurance: The MTBF reliability shall be greater than 150,000 hours per BELLCORE TR-232.

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 FTTP, SNMP, and or TFTP access

HTTP, Telnet, and TFTP timeouts

TACACS+ Authentication Protocol (optional)

Management Options

Command line interface via VT100-compatible terminal

Command line interface via Telnet.

HTTP interface via embedded webserver agent using PC browser (Supports HTML)

SNMP support for discovery, statistics and alarm traps:
MIB for Network Management of TCP/IP-based Internets MIB2 (RFC 1213); Ethernet MIB (RFC 1398).

Operational Specifications

Physical Interfaces

Craft Port: Standard asynchronous EIA-232 DCE (3-wire) interface at 9600,8,N, 1 for connection to standard VT100-compatible terminal, using rear panel DB-25 connector.

LAN Port (10/100B-T Ethernet) using rear panel RJ-connector.

Three sync ports using three front-panel 26-pin (D-type) connectors.

Eight Contact Relay Input (2-wire) Interfaces and two Output (3-wire) Interfaces on rear DB-25 connector

Operation Modes

TCP/IP transport mode for optimum reliability;
UDP/IP transport mode for reduced delay and stale packets.

Data Rates

From 2400 bps (for low rate legacy applications) to a maximum full-duplex data rate of 2.048 Mbps on each sync port.

Diagnostics & Statistics

Generates/answers pings

Tests Contact States

Sync Ports Loopback

Transmit and Receive packet counts on Ethernet interface.

Transmit and Receive byte counts on Ethernet interface.

Transmit and Receive character counts on Sync ports.

Transmit and Receive byte counts on Management IP address (optional).

Simulates TCP or UDP transport traffic for observing packet loss and delay.

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