



# ***SpectraComm IP***

## ***ROUTER CARD***

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### ***Installation & Operation Manual***

*076R200-000*

*Issue 1*

*April 2002*



**General DataComm**  
*Smart Solutions for Service Providers*

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## Documentation

### Revision History - SC-IP Card Installation & Operation Manual (076R200-000)

Issue Number	Date	Description of Change
1	April 2002	Initial Feature Set Documentation

### Related Publications

Description	Part Number
SpectraComm Shelf and Enclosure Installation and Operation Manual	010R302-REV
SpectraComm 2000 Shelf Installation and Operation Manual	010R358-REV
RA 1000 Enclosure Installation and Operation Manual	010R111-REV
SpectraComm Ethernet Switch Card Installation & Operation Manual	076R204-REV
Operation Manuals for individual SCM-compatible elements	Refer to <a href="http://www.gdc.com">www.gdc.com</a> for specific element Publications.
TEAM Operation Manuals for individual TEAM-managed elements	

**-REV** is the hardware revision (**-000**, **-001**, etc.)

**-VREF** is the most current software version (**-V400** is Version 4.0.0.)

In addition to the publications listed above, always read Release Notes supplied with your products.

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# Preface

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## Scope of this Manual

This manual describes installation and operation of the SpectraComm IP card (SC-IP). This document is intended for network operators and installers and assumes a working knowledge of data communication equipment.

The information in this manual has been carefully checked and is believed to be entirely reliable. However, as General DataComm improves the reliability, function and design of its products, it is possible that information may not be current. Check the General DataComm website at <http://www.gdc.com> for updated product information or contact your General DataComm field representative.

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## Safety Information

This manual should be read in its entirety and all procedures completely understood before installing or operating the unit. The notes that appear throughout this manual must be read prior to any installation or operating procedure. Examples of notes used in this manual are shown below.

---

**Note** *A note provides essential operating information not readily apparent which you should be particularly aware of. A note is typically used as a suggestion.*

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**Important** *Indicates an emphasized note. It is something you should be particularly aware of; something not readily apparent. Important is typically used to prevent equipment damage.*

---

## Precautions

The CAUTION, WARNING, and DANGER statements that appear throughout this manual are intended to provide critical information for the safety of both the service engineer and operator, and enhance equipment reliability. The definitions and symbols for such statements comply with ANSI Z535.2, American National Standard for Environmental and Facility Safety Signs, and ANSI Z535.4, Product Safety Signs and Labels, issued by the American National Standards Institute.



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**CAUTION** *Indicates a potentially hazardous situation which, if not avoided, may result in minor to moderate injury. It may also be used to alert against unsafe practices.*



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**WARNING** *indicates an imminently hazardous situation which, if not avoided, could result in death or serious injury.*



---

**DANGER** *indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.*

---

## Safety Guidelines

Under proper conditions, this unit will operate reliably and safely in your network. If any component is improperly handled or installed, equipment failure or personnel hazard may occur. Use caution and common sense when installing network wires. Use the following guidelines, especially when unsafe conditions exist or when potentially hazardous voltages are present:

- Repairs must be performed by qualified service personnel only.
- To reduce the risk of electrical shock, do not operate equipment with the cover removed.
- Never install network jacks in a wet location unless the jack is designed for that location.
- Never touch uninsulated network wires or terminals unless the network line is disconnected at the network interface.
- Never install network wiring during an electrical storm.

## Antistatic Precautions

Electrostatic discharge (ESD) results from the buildup of static electricity and can cause computer components to fail. ESD occurs when a person whose body contains a static buildup touches a computer component. The SC-IP card may contain static-sensitive devices that are easily damaged. Proper handling, grounding and precautionary ESD measures are essential. Keep parts and cards in antistatic packaging during transport or when not in use. When handling always use antistatic floorpads, workbenchpads and an antistatic wrist strap connected to a grounded equipment frame or chassis. *If a wrist strap is not available, periodically touch an unpainted metal surface on the equipment.* Never use a conductive tool, like a screw driver or paper clip to set switches.

## Compliance

### FCC Part 68 Compliance

Connection of data communications equipment to the public telephone network is regulated by FCC Rules and Regulations. This equipment complies with Part 68 of these regulations which require all of the following:

For single or multi-line equipment that connects to the telephone network via a plug and jack, the plug and jack must comply with the FCC Part 68 rules. This device is designed to be connected to the telephone or premises wiring, using a compatible modular jack which is Part 68 compliant.

The telephone company may discontinue your service if the unit causes harm to the telephone network. If possible, you will be notified of such an action in advance. If advance notice is not practical, you will be notified as soon as possible and will be advised of your right to file a complaint with the FCC. The telephone company may change its communication facilities, equipment, operations and procedures where reasonably required for operation. If so, the telephone company will notify you in writing. All repairs or modifications to the equipment must be performed by General DataComm. Any other repair or modification by a user voids the FCC registration and the warranty.

To connect the product to the Public Telephone Network, you are required to give the following information to the telephone company:

- FCC Registration Number: TBD
- Telephone Company jack type: RJ48C
- Facility Interface Codes: DDS - 04DU9-DN/BN/1KN/1SN
- Service Order Code: DDS- 6.0Y

### Industry Canada Notification

The Industry Canada label identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operation and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

**Caution:** Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

**Notice:** The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5.

### Avis D'industrie Canada

L'étiquette d'Industrie Canada identifie le matériel homologué. Cette étiquette certifie que le matériel est conforme aux normes de protection, d'exploitation et de sécurité des réseaux de télécommunications, comme le prescrivent les documents concernant les exigences techniques relatives au matériel terminal. Le Ministère n'assure toutefois pas que le matériel fonctionnera à la satisfaction de l'utilisateur.

Avant d'installer ce matériel, l'utilisateur doit s'assurer qu'il est permis de le raccorder aux installations de l'entreprise locale de télécommunication. Le matériel doit également être installé en suivant une méthode acceptée de raccordement. L'abonné ne doit pas oublier qu'il est possible que la conformité aux conditions énoncées ci-dessus n'empêche pas la dégradation du service dans certaines situations.

Les réparations de matériel homologué doivent être coordonnées par un représentant désigné par le fournisseur. L'entreprise de télécommunications peut demander à l'utilisateur de débrancher un appareil à la suite de réparations ou de modifications effectuées par l'utilisateur ou à cause de mauvais fonctionnement.

Pour sa propre protection, l'utilisateur doit s'assurer que tous les fils de mise à la terre de la source d'énergie électrique, des lignes téléphoniques et des canalisations d'eau métalliques, s'il y en a, sont raccordés ensemble. Cette précaution est particulièrement importante dans les régions rurales.

**Avertissement:** L'utilisateur ne doit pas tenter de faire ces raccordements lui-même; il doit avoir recours à un service d'inspection des installations électriques, ou à un électricien, selon le cas.

**Avis:** L'indice d'équivalence de la sonnerie (IES) assigné à chaque dispositif terminal indique le nombre maximal de terminaux qui peuvent être raccordés à une interface. La terminaison d'une interface téléphonique peut consister en une combinaison de quelques dispositifs, à la seule condition que la somme d'indices d'équivalence de la sonnerie de tous les dispositifs n'excède pas 5.

## Electromagnetic Compatibility

This Class A digital apparatus complies with FCC Part 15 and Canadian ICES-003.

### La Compatibilité d'Électro-magnétique

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

## NEBS Compliance

Certified by independent labs for NEBS compliance to standards:

GR63 - Physical Protection

GR1089 - EMC and Safety



## Service Support and Training

VITAL Network Services is a leading single-source, data communications organization that provides network service and support for General DataComm customers throughout the world. VITAL Network Services can support and train in the installation, management and maintenance of your GDC equipment. Training courses are offered at centers in the US, UK, France, Singapore and Mexico, as well as at customer sites.

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# Chapter 1: Introduction and Specifications

## About this Document

This document describes in detail the initial feature set for the SpectraComm IP Router Card. Briefly mentioned are several additional features (DDS support and modem facilities) which are planned for a future release. For more information on the availability and operation of these additional features, refer to later issues of this document or contact your GDC Sales Representative.

## SpectraComm IP Overview

The SpectraComm IP (SC-IP) router card extends the carrier's internal network to remote locations where separate IP networks are required. SC-IP also functions as a LAN-extension device which extends the carrier's internal network to remote locations where a single 'flat' IP network is required.

### SpectraComm IP as Static IP Router

As a static IP router, SC-IP forwards IP data between serial WAN ports and an Ethernet (LAN) switch. SC-IP's eight-port terminal server can connect to craft ports of co-located devices to provide out-of-band access.

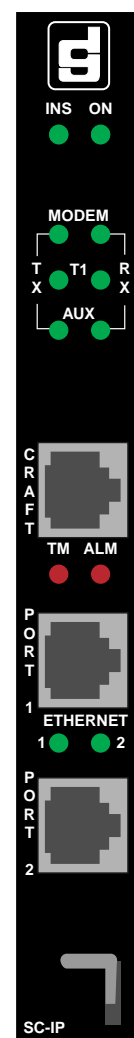
Typically, the SC-IP provides connectivity via a T1 port. The link layer WAN protocols supported are Frame Relay and the Point-to-Point Protocol (PPP). [Figure 1-1](#) shows SC-IP deployed in a Frame Relay, T1 network.

### SC-IP as LAN-extension Device

When placed in LAN-extension mode, the SpectraComm IP extends the Carrier's local area network(s). Deployed in pairs, the SC-IPs are connected to their separate LANs via the ethernet interface, and are connected to each other via the WAN. GDC's proprietary LAN-extension (LAN-X) is comprised of a link layer WAN protocol (LAN-X) which requires a SC-IP configured for LAN-X at each end of the WAN. [Figure 1-2](#) shows SC-IP in multiple extensions to local and remote LANs.

### Typical Installations

The SC-IP is a rack-mount card that installs in a SC 5000 shelf (16 slots) or in a SC 2000 shelf (2 slots). For stand-alone, non-NEBS applications, the SC-IP card is shipped from the factory pre-installed in the RA 1000 enclosure.



## Features and Benefits

- A low-cost, highly reliable and secure static router or LAN-extension device, in NEBS-compliant packaging
- Uses ‘run from ram’ architecture for increased performance and configuration integrity.
- Front Panel LEDs indicate traffic, power and test status.  
Front Panel LAN and Control (craft) ports provide connectivity.
- Shelf rear panel provides WAN connectivity for the SC-IP as router or LAN-X device.
- Provides access to T1 and Fractional T1 network services using an integral T1 CSU/DSU, including long-haul (DS1) and short-haul (DSX-1) capability.
- Provides enhanced security with multi-level password protection.
- Provides scalable, high performance LAN via 10/100B-T ethernet switch support.
- Supports software upgrades via TFTP firmware download.
- Easily configured via the interactive “smart” command line interface or the intuitive, easy-to-use web interface (HTTP).
- Can be monitored, configured and managed using standards-based protocols, including Telnet, SNMP and HTTP (web).
- Streamlined configuration of multiple SC-IPs via ASCII batch file upload/download.
- Provides quick access using Telnet “cut-thru” operation to terminal server ports.
- Provides integrated terminal server ports at the shelf rear panel connector for remote access of up to eight devices.
- Allows standards-based IP application access (Telnet, SNMP or HTTP to remote equipment. Supports ping on all interfaces.
- Uses Frame Relay or Point-to-Point Protocol (PPP) to provide link layer (Layer 2) encapsulation of IP traffic.
- When pairs of SC-IPs are configured for LAN-extension mode, they provide link layer encapsulation of ethernet frames for LAN extension between Carrier sites.
- Allows remote LAN-X configuration of a SC-IP via Remote Default Route configuration.
- Responds to HPOV polling and Auto Discovery.

## Future SC-IP Upgrades

The following features are planned for a future release of the SC-IP. For more information on the availability and operation of these additional features, refer to later issues of this document or contact your GDC Sales Representative.

- When equipped with an integral modem or an attached modem, allows initial configuration of the SC-IP over a dial-up connection, eliminating “truck roll” costs.
- When equipped with the integral V.90 modem, provides remote dial-up user access.
- When equipped with the integral V.90 modem and with RADIUS enabled, provides additional security for authentication of dial-up users.
- Supports major alarm reporting.
- Provides access to the DDS network using an integral synchronous DTE interface to an external 56/64Kbps DSU.

## CSU/DSU Functionality

The SC-IP contains an integrated CSU/DSU. Users can access digital services at T1/FT1 rates through the network interface. The Network interface provides all N x 56/64 Kbps rates from 56kbps to 1.536 Mbps (where N=1 to 24) and supports both DS1 and DSX-1.

## Smart CLI

The SC-IP employs an interactive command line interface that will feel familiar to most field personnel. Added features include auto-prompting for command arguments, recognition of abbreviated commands, online help, command line recall and an advanced utility for generating downloadable ASCII configuration files.

## Web Management

The SC-IP provides internet-ready network management (HTML and JAVA 1.1 support). An embedded web server agent allows Read or Read-Write access to SC-IP using popular browsers.

## SC-IP Interfaces/Connectivity

The typical installation environment for the SC-IP card is a SpectraComm 5000 or 2000 shelf. SC-IP has multiple physical interfaces, described below. The unit is shipped from the factory with all ports set to **Disabled** except for the Modem port and the AUX port.

### Craft (Console) Port

The Craft port is used for local configuration and monitoring. This EIA-232 interface is fixed as serial async 9600 baud, 8 data, 1 start/stop, no parity.

### Ethernet (10/100BASE-T) LAN Ports

The two Ethernet (LAN) ports allows the SC-IP to connect directly to a computer's LAN port, or to a hub device or external ethernet switch for connection to many LAN devices. With the SC-ES card co-located in the shelf, the SC-IP can access more equipment on LANs using 10BASE-T or 100BASE-T (twisted pair) wiring while maintaining NEBS compliance.

### T1/FT1 (Network) Port

The SC-IP provides an integral, fully managed Full T1 or Fractional T1 CSU/DSU with Frame Relay UNI-U and PPP support.

### Terminal Server Ports

Eight, 3-wire RS-232 ports connect up to eight devices (one port active at a time).

### Future Upgrades

#### *Asynchronous AUX/Synchronous DTE Port*

This port is designed to accommodate two types of interfaces. The synchronous DTE (EIA-232) interface can operate up to 64 kbps (max) and is used to connect directly to a SC 521A device for DDS network connections (external timing is not supported.) The asynchronous AUX (EIA 232) interface is used for connection to an external modem.

#### *V.90/V.34 Modem Port*

The modem port is designed to accept dial-up connections for direct VT-100 access (Hyperterm) or PPP session.

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**Note** For configuration of SC-IP interfaces, refer to Chapter 2: Installation and Set-Up.

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## SC-IP Router Applications

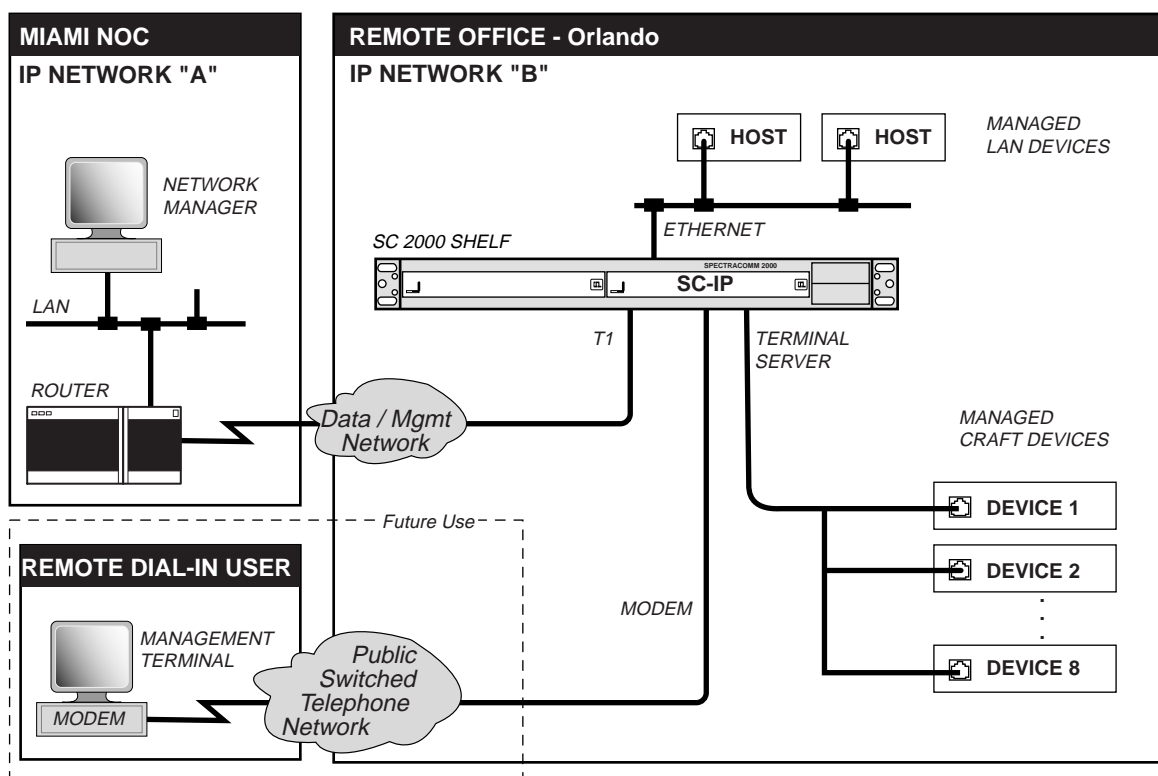
The primary application of the SC-IP is in router mode, providing low-cost, NEBS-compliant IP connectivity to the carrier's internal network and between managed sites. NEBS-compliant SC-IP can be located anywhere within a carrier's network; for example SC-IP can be located within the Central Office environment as part of the inside plant, or can be deployed in a remote office or CEV-Hut environment as part of the outside plant.

[Figure 1-1](#) shows a typical Network Operations Center managing its remote equipment via a SC-IP at a remote site. With a SC-IP deployed in all remote offices, virtually all remote devices can be connected back to the NOC through remote device ethernet (LAN) ports or their craft ports.

The SC-IP can be accessed from the NOC over the Carrier's data network using multiple WAN interfaces, such as its integral T1 CSU/DSU. In a future release, a synchronous DTE interface to an external 56/64K DSU (SC521A) is supported.

The SC-IP in router mode exclusively uses static routes to ensure a greater degree of security and reduce IP traffic in the carrier's network. This requires the addition of static routes at the NOC and the SC-IP.

**Note** *The SC-IP's LAN-X and IP forwarding functions are mutually exclusive; that is, when the SC-IP is used in router applications, it cannot employ its LAN-X mode of operation.*



**Figure 1-1** Typical Deployment of SC-IP Router

## SC-IP LAN-X Applications

A Network Operations Center (NOC) can extend its LANs via one or more pairs of SC-IPs. The SC-IPs would be configured for LAN-X mode and connected back-to-back over the WAN. This configuration provides a NEBS-compliant extension of a Carrier's LAN so that any remote device may be accessed from the NOC via the SC-IP.

For example, back-to-back SC-IPs can extend the LAN within a building (i.e., between floors) or, more typically, across a WAN connection. [Figure 1-2](#) shows a typical deployment of one pair of SC-IP units in a carrier's network. Multiple pairs of SC-IP units can be deployed to fan out the NOC's reach to additional remote sites.

SC-IP in LAN-X mode disables the unit's IP routing function; thus, management of SC-IP is conducted in one direction from a specified SC-IP port. While in LAN-X mode, a SC-IP port must be specified for management.

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**Note** *The SC-IP's LAN-X and IP forwarding functions are mutually exclusive; that is, when the SC-IP is placed in LAN-extension mode, the IP routing functions are not available.*

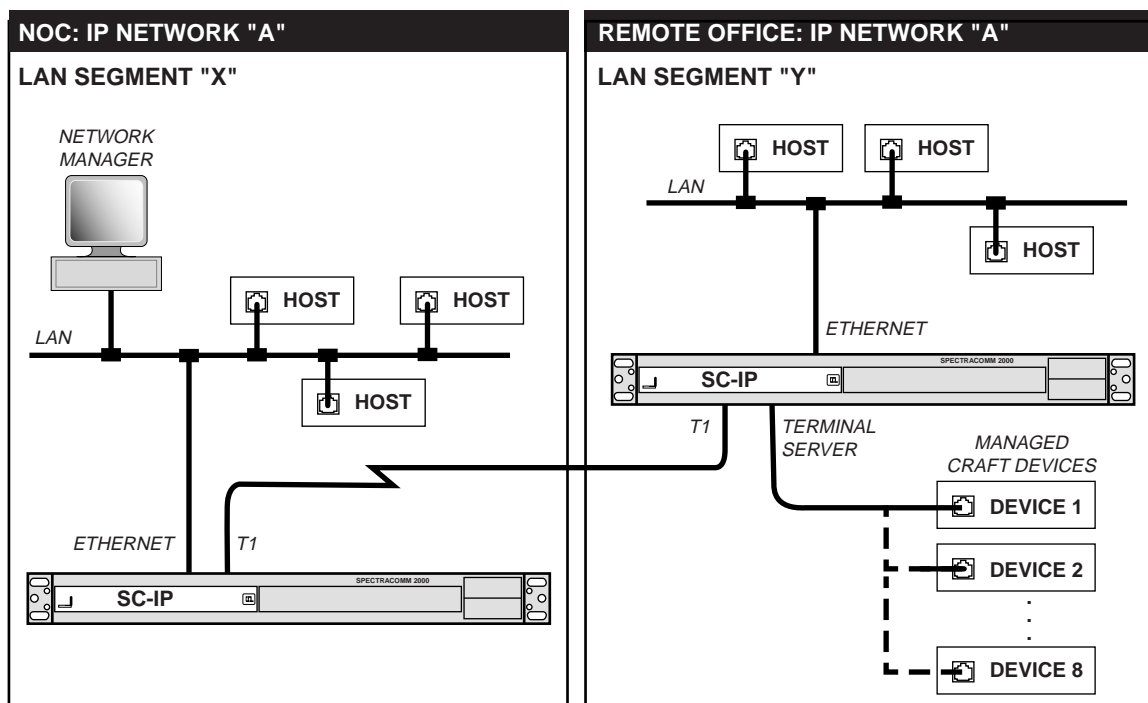
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**Note** *IMPORTANT: It is the responsibility of the network planner to ensure that when SC-IP is in LAN-X mode, a loop condition must not be in effect.*

---



**Figure 1-2** Typical Deployment of SC-IP in LAN-extension Mode

## The SC-IP Front Panel

[Table 1-1](#) describes the front panel connectors and indicators on the SC-IP Router card.  
[Figure 2-1](#) describes the SC-IP rear panel as deployed in a SpectraComm shelf or enclosure system.  
 Physical features that support DDS and Modem facilities are implemented in a future release.

**Table 1-1** SC-IP Card Front Panel

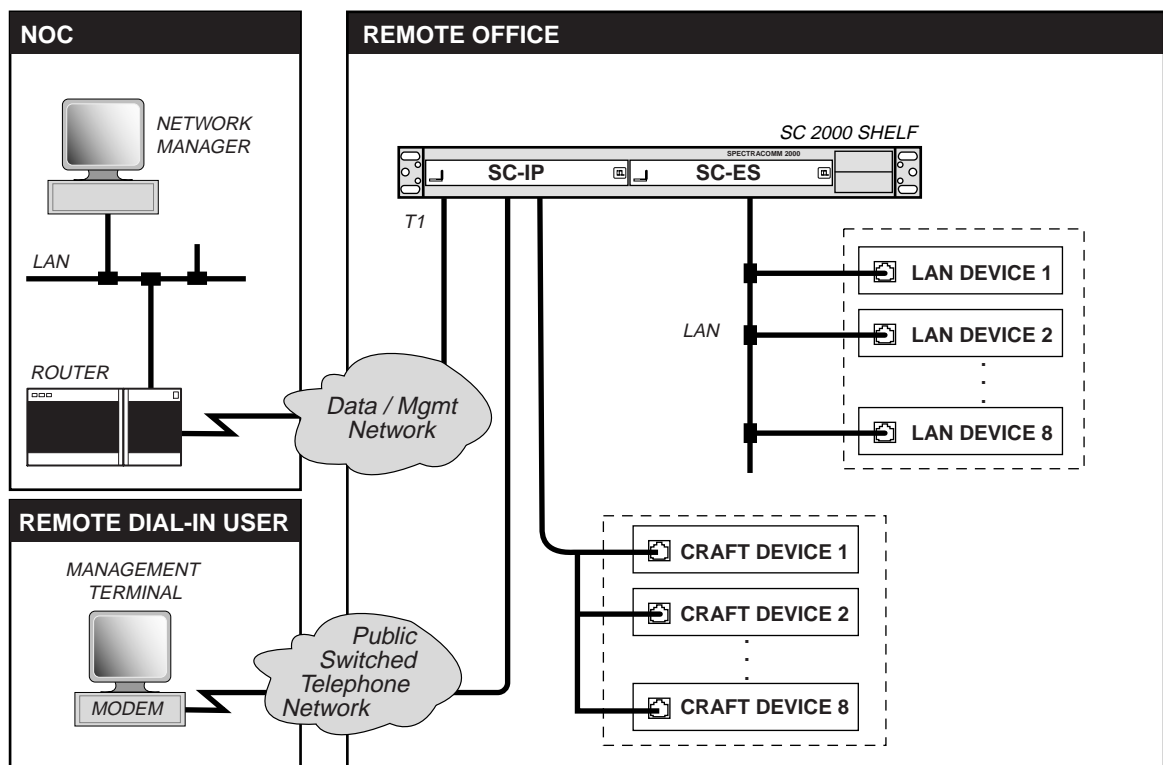
SC-IP Front Panel	LEDs / Ports	Description	Action	
	ON	On (GREEN) indicates SC-IP is receiving power.		
	INS	On (GREEN) indicates SC-IP is ready for operation.		
	MODEM TX -Future Use-	Off	No send data present at the Modem port.	
		On (GREEN)	Indicates Send Data frames are present at the Modem port.	
	MODEM RX -Future Use-	Off	No Receive Data present at the Modem port.	
		On (GREEN)	Indicates the presence of data frames at the Modem port, received from the remote modem.	
	T1 TX	Off	No data is being sent out at T1 Network port.	
		On (GREEN)	Indicates Send Data frames are present at the T1 Network port.	
	T1 RX	Off	No Receive Data present at the T1 Network port.	
		On (GREEN)	Indicates data present at the T1 port, originating from the Network.	
	AUX TX -Future Use-	Off	No send data present at the AUX port.	
		On (GREEN)	Indicates Send Data frames are present at the AUX port.	
	AUX RX -Future Use-	Off	No Receive Data present at the AUX port.	
		On (GREEN)	Indicates Receive Data frames present at the AUX port.	
	ALM -Future Use-	Off	Normal conditions.	
		On (RED)	Indicates T1 Network alarm (AIS, RAI, or LAD).	
	TM -Future Use-	Off	Indicates normal operating conditions.	
		On (RED)	Indicates SC-IP is in Test Mode, performing a diagnostic test.	
	Craft Port	RS-561-compatible jack for direct connection of the unit to a local VT100-compatible ASCII terminal.		
	Ethernet Port 1	Each Ethernet port supports 10/100Base-T connectivity.		
Ethernet Port 2				
Ethernet LEDs (1 and 2)	Off	Ethernet port 1 or 2 is not connected		
	On (STEADY)	Steady On (GREEN) indicates the Ethernet port (1 or 2) is connected and not passing data.		
	ON (BLINKING)	Blinking On (GREEN) indicates the Ethernet port (1 or 2) is connected and actively passing data.		



## Future Applications

A future release of the SpectraComm Ethernet Switch card will extend NEBS-compliant, switched Ethernet connectivity to the Carrier's remote sites. The SC-ES is designed for use in the Carrier's internal management network and complements the SC-IP's router and LAN-X operations as it:

- Eases network congestion on existing shared-hub network traffic by breaking up the collision domain, thereby dramatically increasing network performance.
- Eliminates unnecessary network traffic by delivering dedicated bandwidth for each port. LAN equipment at the remote site can be connected to the SC-ES using 10/100Base-T LAN connections.
- Provides port statistics and configuration features that are usually associated only with high-end, fully managed switches.
- Can operate stand-alone or cascaded with more SC-ES cards to satisfy the port density requirements for your network applications.



**Figure 1-3** Future Application: Deployment of SC-IP and SC-ES

## Technical Specifications

The following table describes the physical, operational, and environmental specifications for the SpectraComm IP. Conforming to these specifications ensures maximum system performance and reduces the chances of mechanical breakdown and personnel hazard.

**Table 1-2** SC-IP Specifications (Initial Feature Set)

Item	Specification	Description
Physical Characteristics	Dimensions	W: 178 mm (7.0 in.); H: 21 mm (0.81 in.); D: 241 mm (9.5 in.)
	Weight	Weight: 0.28 kg (10 oz.); Shipping weight: 0.74 kg (1 lb 10 oz)
Electrical Characteristics	Power Requirements	AC or DC power, according to your SpectraComm shelf configuration.
	Voltage/Frequency	Refer to the appropriate SpectraComm Shelf Manual.
	Fusing	Refer to the appropriate SpectraComm Shelf Manual.
	Power Dissipation	6 Watts maximum, each
Environment	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)  For altitudes above 1800 m (5906 ft), derate by one degree C per 300 m (1 degree C per 1000 ft).
Integral CSU/DSU	Communication Line	T1 digital carrier (non-loaded, staggered-twist ABAM, PIC or pulp-insulated exchange-type cable (19-26 gauge))
	Line Impedance	100 Ohm
	Network (T1)	DS1 or DSX-1, RJ48C modular jack
	Frequency	1,544,000 bps +/-75 bps
	Line Buildout	0.0, 7.5, or 15 dB (selectable or automatic) at 772 kHz
	Timing Source	Internal clock, slave (receive timing loopback)
	Pulse Density	8 (n+1)
	Data Rate	N x 56/64 Kbps, where N = 1 - 24 DS0s
	Data Encoding	AMI (at 56 x N Kbps) or B8ZS (at 56/64 x N Kbps)
Frame Format/Mode	D4, AT&T TR-54016 ESF, ANSI T1.403 ESF	
Management	Command Line Interface	Terminal and Telnet command line interface (CLI)
	HTTP Interface	Web pages and web-based CLI via embedded web-server agent via PC browser (HTML and JAVA 1.1 supported)
	SNMP Management	SNMP support for standard statistics.
	Inband Management	In one direction from NOC SC-IP towards remote site (LAN-X mode only)
Terminal Server Interface	DTE Speeds	Asynchronous 2400, 9600, 19200, 38400, 57600 (RS232)

**Table 1-2** SC-IP Specifications (Initial Feature Set)

Item	Specification	Description
Supported Protocols	Frame Relay LMI (UNI-U)	ITU-T Q.933 Annex A ANSI T1.617 Annex D Consortium LMI.
	Frame Relay IP Encapsulation	RFC 1490 IETF, Cisco (raw), SNAP
	Frame Relay PVCs	Maximum number: 16
	Point-to-Point Protocol (PPP)	RFC 1661 (1994); STD 51
	LAN-X	GDC Proprietary LAN extension
	Ethernet	ANSI/IEEE 802.3; Rates: 10 Mbps, 100 Mbps
Compliance & Compatibility	SC-IP Card	Designed for NEBS Level III Compliance
		FCC Part 68 approved; FCC Part 15 approved.
		UL Listed; CUL listed.
		Compliance with Bell Pub. 62310 and ANSI T1.410 standards



# Chapter 2: Installation & Connections

---

## Overview

The SC-IP card is designed for rack-mounting in a GDC SpectraComm 5000 or SpectraComm 2000 shelf. The card can also be deployed in the RA-1000 standalone enclosure. This chapter describes installing the SC-IP card, making power connections, performing pre-operational checks, and making system connections. If this is your first installation of the SC-IP, be sure to read the previous sections of this manual to understand the optimal functioning of the SC-IP product as it applies to your network.

This chapter also provides a brief introduction to the SC-IP's command line interface (CLI), and example configuration scripts for quickly setting up the SC-IP for either the IP forwarding function or the LAN-extension function. To configure the SC-IP using its built-in web (HTTP) interface, refer to *Chapter 3, SC-IP Configuration*.

---

**Note** *The SC-IP's LAN-X mode and IP forwarding functions are mutually exclusive; that is, when the SC-IP is configured for LAN-extension mode, the IP routing functions are not available, and visa-versa.*

---

## Shelf / Enclosure Installation Guidelines

- Locate the SpectraComm shelf in a ventilated area where the ambient temperature does not exceed 122 degrees F (50 degrees C).
- Do not install the shelf directly above equipment such as power supplies, which generate large amounts of heat.

## SpectraComm IP Router Card Installation Guidelines

- The SC-IP card may be installed in any slot in a SpectraComm 5000 Shelf.
- Determine whether the SC-IP is to function as an IP forwarding device (router) or as a LAN extension device in your network.
- Perform the setups, connections, and pre-operation checks for IP forwarding or for LAN-X mode, in their entirety, as described in this chapter.
- The SC-IP comes from the factory with only the Modem and the AUX ports **Enabled**.

---

**Note** *IMPORTANT SECURITY PRECAUTION:*  
*Make sure to change the default password at the Craft port before connecting the Modem port or the AUX port to the network.*

---

## Unpacking Instructions

The SC-IP card and components are shipped in shock-absorbent packing within a corrugated box. [Table 2-1](#) lists the standard SC-IP equipment. Some components will not be required/supplied for your network installation. Remove each component from the box and perform a thorough inspection. If any component appears damaged, contact the shipper immediately. All damaged components must be retained until an inspection by the shipper has been completed. If necessary to re-package and return the unit, use the original box and packing material.

**Note** For cable part numbers, the -XXX designation refers to cable length, in feet.

## SC-IP Equipment

**Table 2-1** SC-IP Equipment

Description	Connectivity	Part Number
SpectraComm IP Router Card (rack-mounts in SC2000 or SC5000 shelf)	LAN, T1/FT1 (PPP, Ethernet)	076P032-001
SpectraComm IP Router Card (for RA-1000 Enclosure)		076A032-015
Factory-installed Default Configuration Profile (01-99)	Router or LAN-X modes	076U032-D##
Cable, 8-pin modular to 8-pin modular straight-thru	T1 (Network Port)	022H024-XXX
Cable, 8-pin modular to 8-pin modular, crossover	T1 (Network Port)	027H266-XXX
Cable, CAT5 UTP straight-thru	LAN (Ethernet Ports 1 & 2)	S-078H010-XXX
Cable, CAT5 UTP crossover		S-078H011-XXX
Cable, Interface, RJ-45 to RJ-45	RS-561 (Craft Port)	830-128-8XX
Cable, switched network	T1/Modem Port	-Future Use-
Adapter, RS232-RS561 DB25M to RJ45	RS-561 (Craft Port)	029H210-001
Adapter, IBMPC-RS561 DB9 M to RJ45	RS-561 (Craft Port)	029H211-001
Adapter Cable, Interface	AUX Port (S1)	-Future Use-
Splitter Adapter, interface, RJ-45 plug to two RJ-45 plugs	(T1/Modem Line Port)	-Future Use-
Cable, Interface, switched network, RJ-11 to RJ-45	From Internal Modem (T1/Modem Line Port)	-Future Use-
Cable, Interface, shielded DB25M to Telco 50-pin F (2 ft)	From Term Serv Port	
Harmonica Block, Interface, Telco, 50-pin to 8-pos RJ-45	To Terminal Device (RS-561 Term Serv Port)	209-036-034

## Shelf System Options

[Table 2-2](#) lists the shelf systems and additional products that can be used with the SC-IP. Unless otherwise stated in the table, each shelf system includes the following components:

- base shelf and two mounting brackets (19/23-inch standard) with mounting hardware
- one power supply and one power supply blank front panel
- one Zone 1 connector panels
- one 16-slot DB25 Zone 3 connector panel.

**Note** For more information on the SpectraComm 5000 shelf systems, refer to the *SC/UAS Shelf Operating and Installation Manual GDC P/N 010R302-000*; for the SpectraComm 2000 shelf, refer to *GDC P/N 010R358-000*; for the RA 1000 Enclosure, refer to *GDC P/N 010R111-000*.

**Table 2-2** Shelf Systems and Optional Equipment

Item	Description	Part Number
RA 1000	Remote Access Enclosure, 115 VAC, one card slot	010B236-005
SC 2000 Shelves	SpectraComm 2000 Shelf, two slots, non-redundant power supply	010B226-001
	SpectraComm 2000 Shelf, two slots, redundant power supply	010B226-002
SC 5000 Shelves	MS-2 Mod. 1, Dual Modular 100/120 Vac MS-2 Shelf 100/120 Vac GPS-11 Power Supply Z1-S-16DRJ45, 8-Slot Dual RJ45 (2) Z3-S-16DB25, 16-Slot DB25 Blank Panel, Power Supply	010M054-001 010B150-001 035P034-001 010C342-001 010C339-001 010D727-001
	MS-2 Mod. 2, Dual Modular -48, 60 Vdc MS-2/DC Shelf -48, 60 Vdc DPS-11 Power Supply Z1-S-16DRJ45, 8-Slot Dual RJ45 (2) Z3-S-16DB25, 16-Slot DB25 Blank Panel, Power Supply	010M055-001 010B152-001 041P050-001 010C342-001 010C339-001 010D727-001
	MS-2 Mod. 3, Dual Modular 220/240 Vac MS-2E AC Export Shelf 220/240 Vac GPS-11E Power Supply Z1-S-16DRJ45, 8-Slot Dual RJ45 (2) Z3-S-16DB25, 16-Slot DB25 Blank Panel, Power Supply	010M056-001 010B151-001 035P034-002 010C342-001 010C339-001 010D727-001
	MS-2 Mod. 7, (Mass Term) 100/120 Vac MS-2 Shelf 100/120 Vac GPS-11 Power Supply UNIV Z1-50-Pin, 16-Slot 50-Pos Z3-S-16DB25, 16-Slot DB25 Blank Panel, Power Supply	010M073-001 010B150-001 035P034-001 010C377-001 010C339-001 010D727-001
	MS-2 Mod. 8, (Mass Term) 220/240 Vac MS-2E AC Export Shelf 220/240 Vac GPS-11E Power Supply UNIV Z1-50-Pin, 16-Slot 50-Pos Z3-S-16DB25, 16-Slot DB25 Blank Panel, Power Supply	010M074-001 010B150-001 035P034-002 010C377-001 010C339-001 010D727-001
	MS-2 Mod. 9, (Mass Term) -48, 60 Vdc MS-2/DC Shelf -48, 60 Vdc DPS-11 Power Supply UNIV Z1-50-Pin, 16-Slot 50-Pos Z3-S-16DB25, 16-Slot DB25 Blank Panel, Power Supply	010M075-001 010B152-001 041P050-001 010C377-001 010C339-001 010D727-001
	MS-2 Mod. 10, Dual Modular -48, 60 Vdc (redundant P.S.) MS-2/DC Shelf -48 - 60 Vdc DPS-11 Power Supply Z1-S-16DRJ45, 8-Slot Dual RJ45 (2) Z3-S-16DB25, 16-Slot DB25	010M070-001 010B152-001 041P050-001 010C342-001 010C339-001
	MS-2 Mod. 12, (Mass Term) -48, -60 Vdc (redundant P.S.) MS-2/DC Export Shelf -48, - 60 Vdc DPS-11 Power Supply (2) Z3-S-16DB25, 16-Slot DB25 (2) UNIV Z1-50 Pin, 16-Slot 50 Pos	010M076-001 010B152-001 041P050-001 010C339-001 010C377-001

## Shelf and Card Connections

The following paragraphs describe cables, connectors, and pinouts for each Front Panel port or shelf connector when the SC-IP is installed in GDC shelves and enclosures. Shelf/card connections are the same for the SC-IP as an IP router or as a LAN-X device.

- Always adhere to the installation guidelines, cited in the beginning of this chapter, and the connection guidelines listed below:
- Observe all ESD precautions during installation procedures. Be sure to wear a properly grounded antistatic wrist strap.
- Make all electrical connections through the back panel and front panel connectors provided.

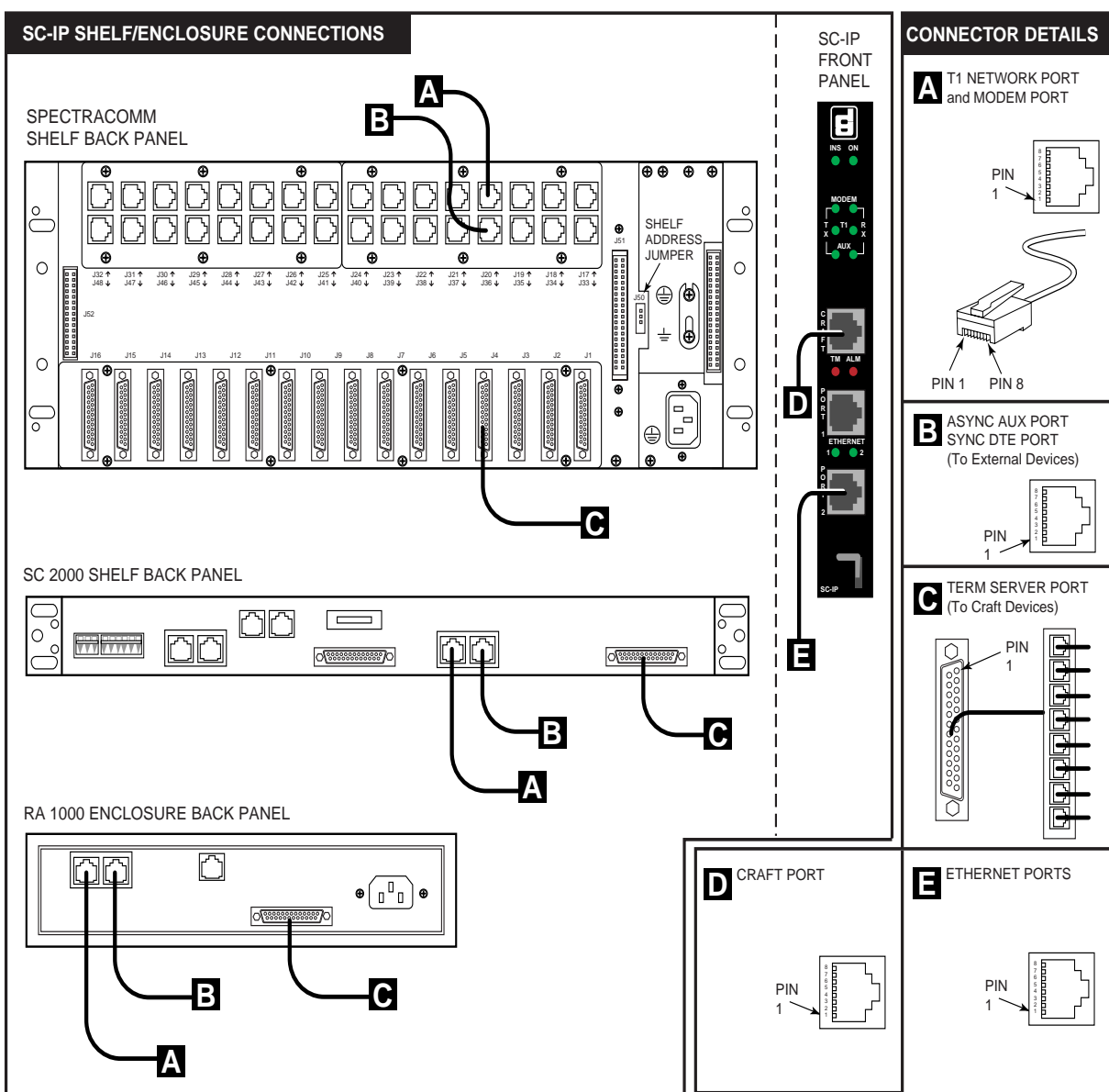


Figure 2-1 SpectraComm Card and Shelf Connections



## Interface Port Descriptions

### Network / Modem Port

(Interface “A” in [Figure 2-1](#))

The Network/Modem port interface is an RJ48C connector located on the shelf rear panel at the SC-IP slot (J17-J32). The table below describes the port pinouts.

- For T1 connectivity, use a RJ48C-RJ48C 4-wire straight-thru or crossover cable (GDC P/N 022H024-XXX or 027H266-XXX).
- For modem connectivity with or without the T1 interface, use a network/modem line adapter and a modular cable.

**Table 2-3** NTWK Port Pinouts

Pin	Signal	Direction	Description	Connectivity
1	Rx Ring	To SC-IP	Receive Data (Ring)	T1
2	Rx Tip	To SC-IP	Receive Data (Tip)	T1
4	Tx Ring	From SC-IP	Transmit Data (Ring)	T1
5	Tx Tip	From SC-IP	Transmit Data (Tip)	T1
7	Modem-Tip	two-wire (full duplex)	Tx-Rx Tip	Modem
8	Modem-Ring		Tx-Rx Ring	Modem

### AUX/Sync DTE Port

(Interface “B” in [Figure 2-1](#))

This shared port is a RJ48 connector located on the shelf rear panel at the SC-IP slot (J33-J48).

When enabled as the AUX interface this port supports an asynchronous connection to an external modem. When enabled as the serial1 interface this port supports a synchronous connection to a SC 521A device for DDS network connections (a RJ45-to-DB25M adapter cable is required).

The table below describes the AUX/Sync DTE port pinouts.

**Table 2-4** AUX/Sync DTE Port Pinouts

RJ45 Pin	Signal	DB25M Pin
1	Tx Clk	15
2	DCD	8
3	Rx Clk	17
4	GND	7
5	RxD	3
6	TxD	2
7	CTS	5
8	RTS	4

## Terminal Server Ports

(Interface “C” in [Figure 2-1](#))

The Terminal Server port is a DB-25 connector located on the shelf rear panel at the SC-IP slot (J1-J16). It supports 2400, 4800, 9600, 19200, 38400 and 57500 bps asynchronous data for terminal interface control of up to eight attached devices. An interface cable, harmonica adapter and cable/adapter suited to the intended terminal devices will be required. The table below describes the Terminal Server port pinouts.

**Table 2-5** Terminal Server Port Pinouts

P2 Connector	Signal	Direction	P2 Connector	Signal	Direction
Port 1 Pin 1	RXD-1	To SC-IP	Port 5 Pin 14	RXD-5	To SC-IP
Port 1 Pin 2	TXD-1	From SC-IP	Port 5 Pin 15	TXD-5	From SC-IP
Port 1 Pin 3	GND-1	-	Port 5 Pin 16	GND-5	-
Port 2 Pin 4	RXD-2	To SC-IP	Port 6 Pin 17	RXD-6	To SC-IP
Port 2 Pin 5	TXD-2	From SC-IP	Port 6 Pin 18	TXD-6	From SC-IP
Port 2 Pin 6	GND-2	-	Port 6 Pin 19	GND-6	-
Port 3 Pin 7	RXD-3	To SC-IP	Port 7 Pin 20	RXD-7	To SC-IP
Port 3 Pin 8	TXD-3	From SC-IP	Port 7 Pin 21	TXD-7	From SC-IP
Port 3 Pin 9	GND-3	-	Port 7 Pin 22	GND-7	-
Port 4 Pin 10	RXD-4	To SC-IP	Port 8 Pin 23	RXD-8	To SC-IP
Port 4 Pin 11	TXD-4	From SC-IP	Port 8 Pin 24	TXD-8	From SC-IP
Port 4 Pin 12	GND-4	-	Port 8 Pin 25	GND-8	-
Port 4 Pin 13	Not Used				

**Note** In order to establish a Craft session via the SC-IP's Terminal Server port, some devices will require control leads tied to the appropriate state. For example, a device with a 25-pin terminal connection may need one or more pins driven to the EIA high state.

## Craft Port

(Interface “D” in [Figure 2-1](#))

The SC-IP Front Panel Craft (or console) port is an RS-561-compatible RJ45 jack that supports 9600bps asynchronous data. It provides terminal interface control of the unit by direct connection to a local VT100-compatible ASCII terminal. Connection to the Craft port requires an RJ45-to-RJ45 cable (GDC P/N 830-128-007 and GDC P/N 029H210-001 or 029H211-001). The table below describes the Craft port pinouts

**Table 2-6** Craft Port Pinouts

Pin	Signal	Direction	Description
1	No Connection	-	-
2	DCD	From SC-IP	Data Carrier Detect - Always on
3	DTR	To SC-IP	Data Terminal Ready - Not used
4	Signal Ground	-	Signal Ground
5	RXD	From SC-IP	Receive Data - Supervisory data to the terminal
6	TXD	To SC-IP	Transmit Data - Supervisory data from the terminal
7	CTS	From SC-IP	Clear To Send - Always on
8	RTS	To SC-IP	Request To Send From the terminal

## Ethernet (LAN) Ports

(Interface “E” in [Figure 2-1](#))

The SC-IP Front Panel LAN ports support 10/100BASE-T Ethernet connectivity. This port requires an RJ45-to-RJ45 straight-thru or crossover cable (GDC S-078H010-XXX or S-078H011-XXX). The table below describes Ethernet port pinouts.

**Table 2-7** Ethernet LAN Port 1 & Port 2 Pinouts

Pin	Signal	Direction	Description
1	Rx+	To SC-IP	Receive Data
2	Rx-	To SC-IP	Receive Data
3	Tx+	From SC-IP	Transmit Data
6	Tx-	From SC-IP	Transmit Data

## Interface Cables & Adapters

### Terminal Server Cable Assembly Pinouts

The SC-IP's Terminal Server port uses an interface cable at the SC-IP Terminal Server port (DB25M to Telco 50-pin F), a harmonica block adapter (8 ports) and a customer-supplied cable/adapter suited to the intended terminal devices. [Figure 2-2](#) and [Figure 2-3](#) describe the pinouts for these Terminal Server cable assemblies.

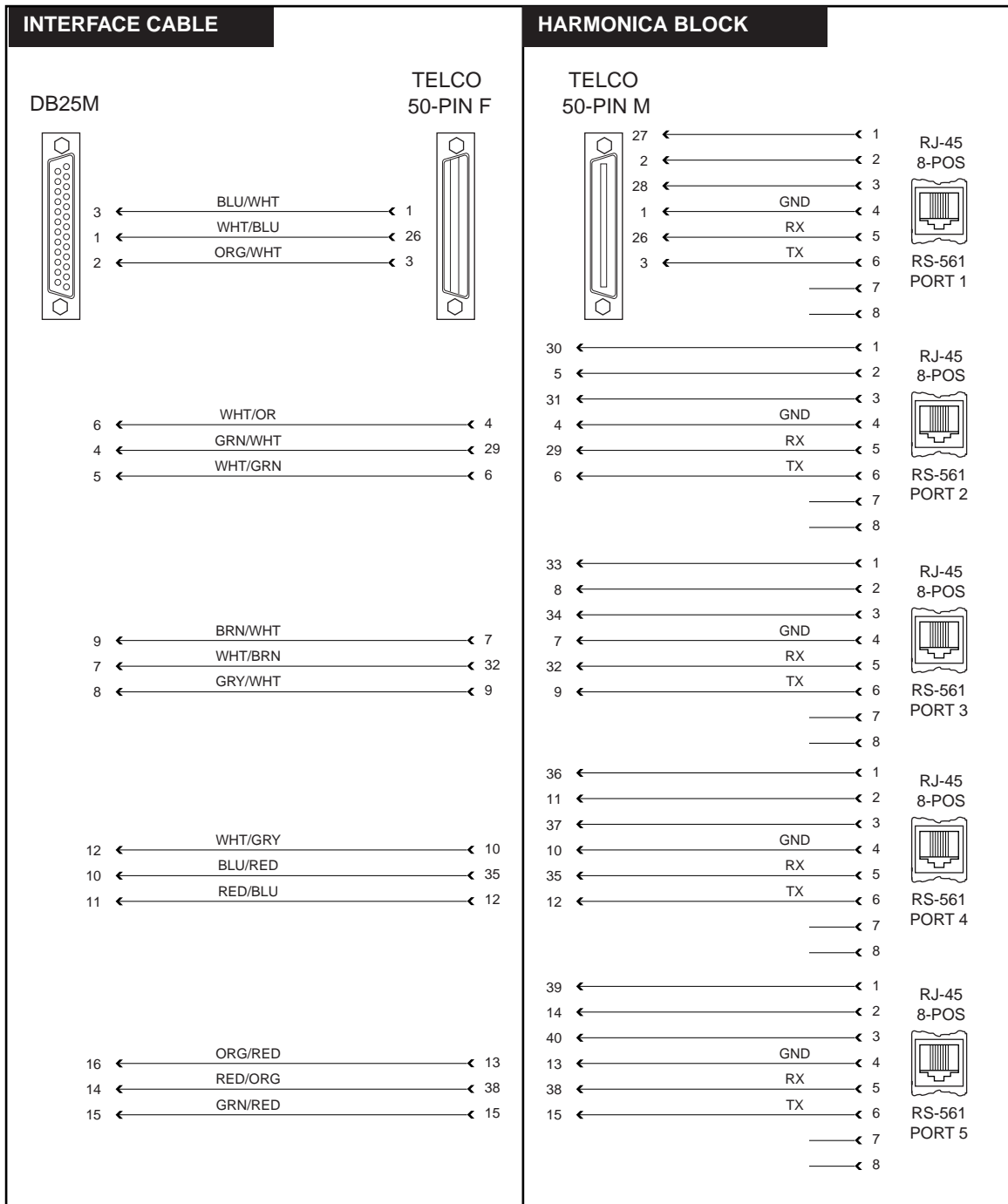


Figure 2-2 Terminal Server Cable Assembly Pinouts (Sheet 1 of 2)

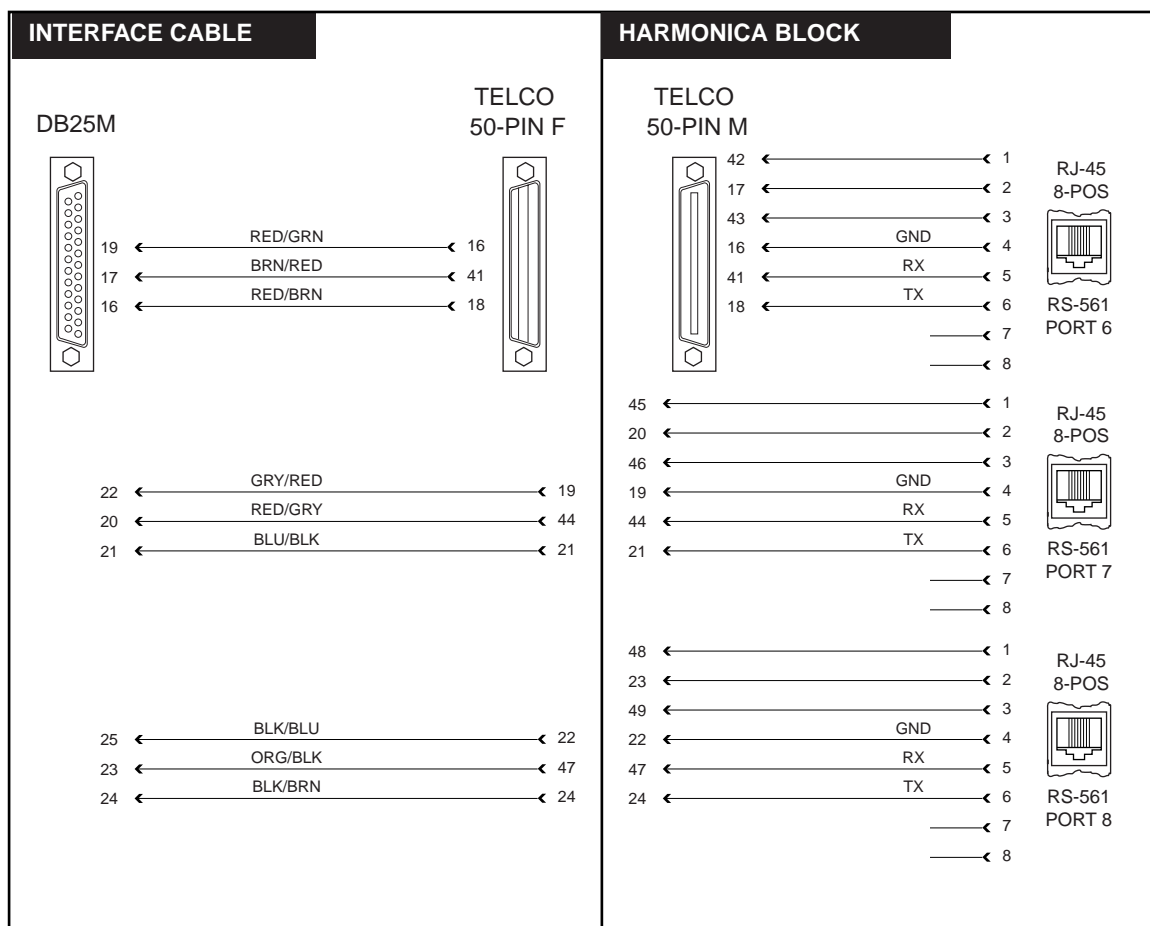


Figure 2-3 Terminal Server Cable Assembly Pinouts (Sheet 2 of 2)

### Network (T1) and Modem Line Adapter Cable Pinouts

The SC-IP's T1 port and Modem Lines port share the RJ48 connector located on the shelf rear panel at the SC-IP slot (J17-J32). It supports T1 (or modem) connectivity using a RJ48-to-T1 (or modem) Y-adapter cable. The table below describes the Y-adapter cable pinouts.

Table 2-8 Y-Adapter Cable Pinouts

Signal	Direction	Shelf Connector (RJ48)	Switched Network (RJ11)	T1 Line (RJ48)
T1-Rx-Ring	From line	1	-	1
T1-Rx-Tip	From line	2	-	2
-	-	3	-	-
T1-Tx-Ring	To Line	4	-	4
T1-Tx-Tip	To Line	5	-	5
Modem-Tip	two-wire	7	3	-
Modem-Ring	bi-directional	8	4	-

## SC-IP Power-Up

Before making connections, determine whether the SC-IP can be powered from the same AC circuit as the equipment connected to its terminal server ports. Having the SC-IP and the connecting equipment on the same AC circuit prevents large circulating currents caused by differences in ground potential.

---

**Note** *If you cannot determine whether both devices are on the same circuit, verify that the potential difference between the grounding circuits of the respective power outlets is no more than 0.25V rms.*

---

**Note** *The AC outlet that powers the SC-IP units should not be under switch control.*

---

To connect the unit to power and perform a pre-operation Self-Test, do the following:

1. Make sure there are no site or network cables connected to the unit's rear panel.
2. Attach the power cord (P/N 830-024-003) to the rear panel IEC connector and to a wall receptacle that supplies the required AC power.
3. Verify that the Front Panel INS LED flashes on and off.  
After a few seconds, the LED will illuminate steady.
4. The SC-IP is now ready for configuration to suit your network requirements.

---

**Note** *IMPORTANT: The SC-IP comes from the factory with the Modem and the AUX ports **Enabled** for ease of initial configuration. As a security precaution, do not connect the Modem and AUX ports to the network until the default password has been changed via the Craft port. (See Chapter 3: [SC-IP Configuration Overview](#) .*

---

# Chapter 3: SC-IP Configuration

## SC-IP Configuration Overview

SC-IP configuration is performed through the web interface or through the command line interface (CLI). You can execute CLI commands at a hyperterminal connection, through a Telnet connection or at the web interface. A brief overview of CLI is provided below. For a detailed guide to Smart CLI, including command tables, context-sensitive help, and practice exercises for configuring typical networks, refer to Appendix B: [CLI Reference](#).

---

*Note* For an introduction to the web interface, refer to Chapter 4: [The Web Interface](#).

---

## Command Line Interface (CLI) Basics

The SCIP command line interface is an interactive means of configuring the SC-IP through a Telnet session over the LAN/WAN, PSTN, or by typing commands at a VT100-compatible ACSII terminal connected to the SC-IP **CRAFT** port. The CLI is a smart, controlled-access interface that provides general and context-sensitive help, automatically expands abbreviated command or subcommands and also anticipates any required command arguments. The CLI will prompt for any required argument that is missing from a command line.

## Smart CLI Quick Reference

- Get context-sensitive command help by using the **?** character in the CLI command string or by referring to the commands, parameters and arguments in *Appendix B, CLI Reference*.
- Type **?** at the command prompt to view a description of IP and Utility commands (shown below). If you are in User mode, several of the commands shown below will not display.

SpectraComm IP Commands	
clear	Reset functions
configure	Configure system parameters
connect	Connect to terminal interface or modem
default	Default configuration to factory values.
disable	Turn off supervisor/admin commands
enable	Turn on supervisor/admin commands
help	Description of the command line interface and help system
ping	Send ping to remote device
show	Show system parameters

Utility Commands	
batch	Store and/or run commands in batch mode
exit	Exit SpectraComm IP Command Line Interface
flash	Copy flash files/select flash boot file
reboot	Halt and perform a reboot
tftp	Enable/Disable TFTP Server (supports flash upgrade)
tutorial	Display tutorials for SCIP

- Execute each command string by pressing the **Enter** key (or **<cr>**).

- Commands entered with the proper syntax and all required parameters and arguments will take affect immediately. If required parameters or arguments are missing from the command string, you will be prompted for them individually.
- Abbreviated commands are accepted at the command prompt.
- For information on configuring IP and subnet mask addresses, refer to *Appendix A, Application Guidelines* .

## Initializing the SC-IP for Configuration

1. Ensure your workstation is equipped with communication software (i.e., Hyperterminal) for making a VT-100 connection. Consult your PC's operating system documentation for details.
2. For initial configuration of a SC-IP, you must configure a VT100-compatible terminal for the following settings: **9600,8,N,1**
3. Connect the terminal to the SC-IP **CRAFT** (console) port using the provided cable: (GDC P/N 029H211-001).
4. Make a Hyperterminal connection to the **CRAFT** port.
5. Hit **<CR>** a few times or press **CTRL-R**. The following login screen will appear, followed by a command line prompt:

```
*****
*****
**
**      W E L C O M E   T O   S P E C T R A C O M M   I P      **
**
**      Copyright General DataComm 2001                    **
**
**      Running version is T0.0.18                          **
**
**      Use "?" at any time on the command line to get help. **
*****
*****
SC-IP>
```

---

**Note** For online help screens describing all CLI options, press **?** Note that the CLI options for configuring the SC-IP are only available when you have enabled supervisor privileges or the higher admin privileges.

---

6. Enable supervisor privileges by typing **enable <cr>**.  
When prompted for the password, type:  
**supervisor <cr> [default supervisor password]**
7. The SC-IP is now operating in supervisor mode as shown by the **#** symbol in the new CLI prompt, with all CLI options available.
8. You can now configure the SC-IP to suit your network by typing the required configurations commands at the CLI prompt. You do not need to set parameters that coincide with system defaults. Any configuration changes will take affect immediately.

---

**Note** FOR ADVANCED USERS: The SC-IP provides a utility for generating the configuration settings of a SC-IP into an ASCII file, simplifying the configuration of multiple SC-IPs. This function can also be used to archive configuration data for specific unit or as a baseline for modified configurations. Refer to Appendix A, Application Guidelines : [Batch Up/Download Overview](#).

---



## Configuring SC-IP with Smart CLI

The following paragraphs describe the basic procedures for accessing and configuring SC-IP using the command line interface (CLI). After setting up user accounts, select the configuration procedure best suited to your network environment:

- SC-IP as a IP router for a Frame Relay network  
(For static Frame Relay network applications)
- SC-IP as an IP router for Leased Line (PPP) T1 network  
(For static PPP multi-point network applications)
- SC-IP as a LAN-extension device  
(For “flat” IP network applications - no routing)

### Access to SC-IP Command Line Interface (CLI)

SC-IP controls access to the CLI through its three access modes: USER, SUPERVISOR and ADMIN. The password-protected **enable** command sets the access from user mode to supervisor or admin mode, depending on the password entered. The command prompt suffix character identifies the mode you are currently in:

- For USER mode, the prompt string ends in **>**  
Commands in USER mode allow viewing but not changing configuration data.
- For SUPERVISOR mode, the prompt string ends in **#**  
Commands in SUPERVISOR mode allow USER access plus the ability to change configuration data, reboot the unit, manipulate flash files and enable the TFTP server for file downloads.
- For ADMIN mode, the prompt string ends in **%**  
Commands in ADMIN mode allow SUPERVISOR access plus the ability to set up and modify user accounts for usernames and passwords. ADMIN mode also allows authentication for the **CRAFT** port to be turned on or off.

---

**Note** Up to 20 usernames/passwords may be specified. The Default Username is **gdc**; In User mode, the Default Password is **gdc**; Supervisor mode password is **supervisor**; Admin mode password is **admin**.

---

### Setting Up User Accounts

1. Type **disable** to turn off the supervisor access.
2. Turn Admin mode on by typing **enable** and entering the **admin** password. The command prompt will now contain the **%** character.
3. Modify default admin and supervisor accounts by typing:

```
configure accounts add admin [new admin password]
configure accounts add supervisor [new suprv password]
```

4. Add a user account and password by typing:

```
configure accounts add [name] [password]
```

## Static Routing in a Frame Relay T1 Network

In this procedure, the SC-IP's default value for each T1 parameter is shown in the command string as: *[default]*. If the default value applies to your network, you do not need to re-enter it. Otherwise, use the CLI to set the T1 configuration value as required. Type **?** following any command, sub-command or parameter for context-sensitive online help.

---

**Note** Some ADMIN mode configuration commands (i.e., enabling the craft port or setting up user accounts) cannot be accessed or executed via the web interface.

---

1. After initializing the SC-IP for configuration, perform the following steps to configure the unit as an IP router in a Frame Relay network ([Figure 3-1](#)).

1. Set the system prompt by typing:

```
configure prompt [your_site]
```

2. Configure the T1 values for your network.

```
configure t1 clock-source [line]
configure t1 fd1 [ANSI-T1.403]
configure t1 framing [ESF]
configure t1 lbo ds1 [0.0dB]
configure t1 linecode [B8ZS]
configure t1 loopback [INHIBIT]
configure t1 timeslots [1-24 64]
```

---

**Note** When configuring the Line Buildout for DSX1, SC-IP uses five ranges of lengths: 0 - 133 ft, 133-266 ft, 266-399 ft, 399 - 533 ft, 533-655 ft. Be aware that if you select a value at the beginning of a range, such as 133 ft, SC-IP will use the lower range that includes that value.

---

**Note** Type **show T1** to check your T1 value entries. Modify, if needed.

---

3. Configure the Ethernet IP address and mask by typing:

```
configure interfaces ip-address ethernet0 [###.###.###.###] [###.###.###.###]
```

4. Enter a description of the Ethernet interface by typing:

```
configure interfaces description ethernet0 [your_description]
```

5. Enable the Ethernet interface by typing:

```
configure interfaces enable ethernet0
```

6. Configure the serial0 interface (at the T1 port) for Frame Relay DTE by typing:

```
configure interface link-encap serial0 frame-relay-dte
```

7. Configure the Frame Relay LMI by typing:

```
configure frame-relay lmi type s0 [cisco]
configure frame-relay lmi n391 s0 [6]
configure frame-relay lmi n392 s0 [3]
configure frame-relay lmi n393 s0 [4]
configure frame-relay lmi t391 s0 [10]
```

8. Enable the serial0 interfaces by typing:

```
configure interfaces enable serial0
```

9. Configure the serial0 sub-interface to support Frame Relay DLCIs by typing:

```
configure interfaces add-sub serial0.[##]  
configure interfaces description serial0.[##] [your_description]
```

10. Enable the s0 sub-interface by typing:

```
configure interfaces enable serial0.[###]
```

---

**Note** Type **show interfaces** to check your interface entries. Modify, if needed.

---

11. Map Frame Relay DLCIs, IP Encapsulation to sub-interfaces by typing:

```
configure frame-relay interface-dlci serial0.[##] [##] [ietf]
```

12. Configure Traffic Shaping per sub-interface by typing the CIR, Bc and Be values. The values you enter must be consistent with how your Frame Relay network has been configured. Type:

```
configure frame-relay traffic-shape serial0.[##] [#####] [#####] [#####]  
configure frame-relay ena-traffic serial0.[##]
```

13. Enable Traffic Shaping by typing:

```
configure frame-relay ena-traffic serial0.[##]
```

14. Configure Terminal Server Ports 1 through 8 as needed by typing:

```
configure term-serv ip-address term[#] [###.###.###.###]  
configure term-serv description term[#] [your_description]
```

15. Enable each configured Terminal Server Ports by typing:

```
configure term-serv enable term[#]
```

16. Set up static routes for the Frame Relay network by typing:

```
configure ip-route add serial0.17 [destination IP] [destination mask]  
[next hop/gateway] [metric]
```

---

**Note** When setting up static routes, type the short-cut **conf ip a ?** to get a list of all required arguments.

---

17. You have completed the configuration of the SC-IP for a Frame Relay DTE network environment. You can check your settings with the following two techniques:

- Type **show config** to display the current configuration of the SC-IP.
- Test your example network by pinging from your PC/workstation at the NOC to equipment at the remote office, and vice-versa.

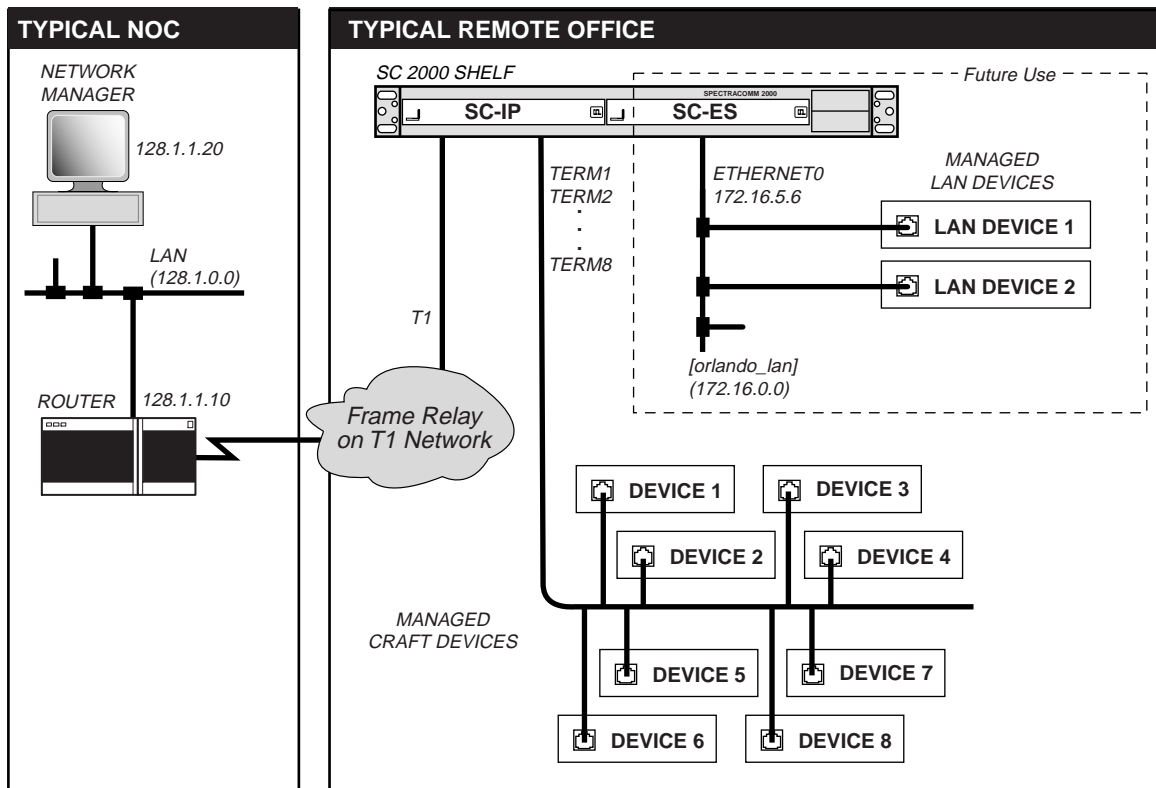


Figure 3-1 SC-IP Router in a Typical Frame Relay T1 Network

## Static Routing in a Leased Line (PPP) T1 Network

In this procedure, the SC-IP's default value for each PPP network parameter is shown in the command string as: *[default]*. If the default value applies to your network, you do not need to re-enter it. Otherwise, use the CLI to set the configuration value as required. Type **?** following any command, sub-command or parameter for context-sensitive online help.

---

**Note** Some ADMIN mode configuration commands (i.e., enabling the craft port or setting up user accounts) cannot be accessed or executed via the web interface.

---

1. After initializing the SC-IP for configuration, perform the following steps to configure the unit as an IP router in a PPP (leased line) network ([Figure 3-2](#)).

2. Set the system prompt by typing:

```
configure prompt [your_site]
```

3. Configure the T1 values for your network.

```
configure t1 clock-source [line]
configure t1 fd1 [ANSI-T1.403]
configure t1 framing [ESF]
configure t1 lbo ds1 [0.0dB]
configure t1 linecode [B8ZS]
configure t1 loopback [INHIBIT]
configure t1 timeslots [1-24 64]
```

---

**Note** When configuring the Line Buildout for DSX1, SC-IP uses five ranges of lengths: 0 - 133 ft, 133-266 ft, 266-399 ft, 399 - 533 ft, 533-655 ft. Be aware that if you select a value at the beginning of a range, such as 133 ft, SC-IP will use the lower range that includes that value.

---

**Note** Type **show T1** to check your T1 value entries. Modify, if needed.

---

4. Configure the Ethernet IP address and mask by typing:

```
configure interfaces ip-address ethernet0 [###.###.###.### 255.255.0.0]
```

5. Enter a description of the Ethernet interface by typing:

```
configure interfaces description ethernet0 [your_description]
```

6. Enable the Ethernet interface by typing:

```
configure interfaces enable ethernet0
```

7. Configure the serial0 interface for PPP by typing:

```
configure interface link-encap serial0 ppp
```

8. When the Warning message appears, type **Y**.

9. Describe and enable the interface by typing:

```
configure interface description [your_description]
configure interface enable serial0
```

---

**Note** Type **show interfaces** to check your interface entries. Modify, if needed.

---

10. Configure Terminal Server Ports 1 through 8 as needed by typing:

```
configure term-serv ip-address term[#] [###.###.###.###]
configure term-serv description term[#] [your_description]
```

11. Enable each configured Terminal Server Ports by typing:

```
configure term-serv enable term[#]
```

12. Set up static routes for the PPP (leased line) network by typing:

```
configure ip-route add serial0 [destination IP] [destination mask]
[next hop/gateway] [metric]
```

---

**Note** When setting up static routes, type the short-cut **conf ip a ?** to get a list of all required arguments.

---

13. You have completed the configuration of the SC-IP for a Frame Relay DTE network environment. You can check your settings with the following two techniques:

- Type **show config** to display the current configuration of the SC-IP.
- Test your example network by pinging from your PC/workstation at the NOC to equipment at the remote office, and vice-versa.

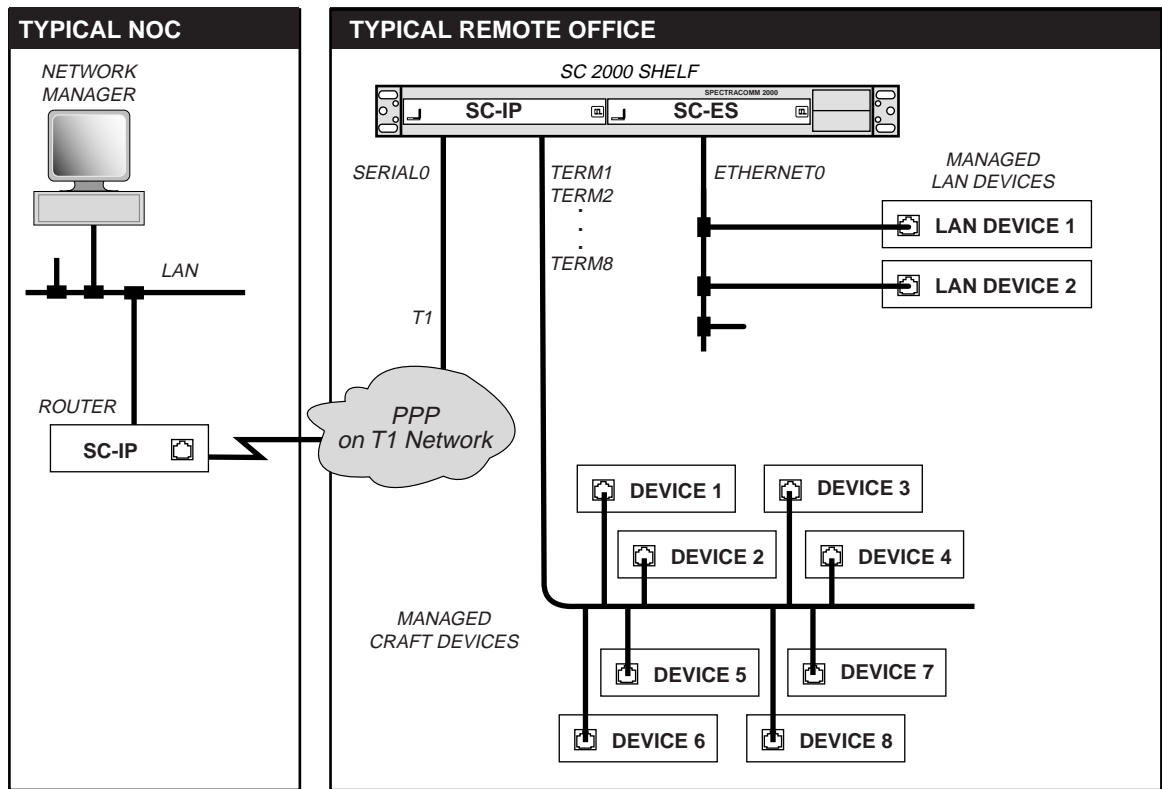


Figure 3-2 SC-IP Router in a Typical PPP T1 Network

## LAN-Extension for T1 Flat Networks

In this procedure, you must configure two SC-IP units to operate in LAN-X mode on either side of the WAN: the NOC SC-IP and the remote SC-IP. The Default value for each network parameter is shown in the command string as: *[default]*. If the default value applies to your network, you do not need to re-enter it. Otherwise, use the CLI to set the configuration value as required. Type `?` following any command, sub-command or parameter for context-sensitive online help.

---

**Note** *Some ADMIN mode configuration commands (i.e., enabling the craft port or setting up user accounts) cannot be accessed or executed via the web interface.*

---

### Configure the NOC SC-IP

1. After initializing the NOC SC-IP for configuration, perform the following steps to configure the unit for LAN-extension on a T1 network.
2. Set the system prompt for the NOC unit by typing:

```
configure prompt [your_NOC_site]
```

3. Configure the T1 values for your network.

```
configure t1 clock-source [line]
configure t1 fd1 [ANSI-T1.403]
configure t1 framing [ESF]
configure t1 lbo ds1 [0.0dB]
configure t1 linecode [B8ZS]
configure t1 loopback [INHIBIT]
configure t1 timeslots [1-24 64]
```

---

**Note** *When configuring the Line Buildout for DSX1, SC-IP uses five ranges of lengths: 0 - 133 ft, 133-266 ft, 266-399 ft, 399 - 533 ft, 533-655 ft. Be aware that if you select a value at the beginning of a range, such as 133 ft, SC-IP will use the lower range that includes that value.*

---

**Note** *Type `show T1` to check your T1 value entries. Modify, if needed.*

---

4. Configure the Ethernet IP address and mask by typing:

```
configure interfaces ip-address ethernet0 [###.###.###.###]
[###.###.###.###]
```

5. Enter a description of the Ethernet interface by typing:

```
configure interfaces description ethernet0 [your_description]
```

6. Enable the Ethernet interface by typing:

```
configure interfaces enable ethernet0
```

7. Configure the ethernet0 interface for LAN-X management by typing:

```
configure lanx-router mgt ethernet0
```



8. Configure and enable the serial0 interface for LAN-extension mode by typing:

```
configure interfaces link-encap serial0 lanx
configure interfaces enable serial0
```

9. Configure Terminal Server Ports 1 through 8 as needed by typing:

```
configure term-serv ip-address term[#] [###.###.###.###]
configure term-serv description term[#] [your_description]
```

10. Enable each configured Terminal Server Ports by typing:

```
configure term-serv enable term[#]
```

11. You have completed the configuration of the NOC SC-IP in LAN-extension mode, for a flat (no routing) network environment. You can check your settings with the following two techniques:

- Type **show config** to display the current configuration of the SC-IP.
- Test your example network by pinging from your PC/workstation at the NOC to equipment at the remote office, and vice-versa.

### Configure the Remote SC-IP

12. Attach the hyperterminal to the craft port of the remote SC-IP unit.

13. After the initializing sequence, set the system prompt for the remote unit by typing

```
configure prompt [your_REM_site]
```

14. Configure the T1 values for your network.

```
configure t1 clock-source [line]
configure t1 fd1 [ANSI-T1.403]
configure t1 framing [ESF]
configure t1 lbo ds1 [0.0dB]
configure t1 linecode [B8ZS]
configure t1 loopback [INHIBIT]
configure t1 timeslots [1-24 64]
```

---

**Note** When configuring the Line Buildout for DSX1, SC-IP uses five ranges of lengths: 0 - 133 ft, 133-266 ft, 266-399 ft, 399 - 533 ft, 533-655 ft. Be aware that if you select a value at the beginning of a range, such as 133 ft, SC-IP will use the lower range that includes that value.

---

**Note** Type **show T1** to check your T1 value entries. Modify, if needed.

---

15. Enable the Ethernet interface by typing:

```
configure interfaces enable ethernet0
```

16. Configure and enable the serial0 interface for LAN-extension mode by typing:

```
configure interfaces link-encap serial0 lanx
configure interfaces enable serial0
```

17. Configure and enable serial0 for LAN-X management by one of two methods.

The first method configures and enables serial0 directly at the remote SC-IP by typing:

```
configure interfaces ip-address serial0 [###.###.###.###] [###.###.###.###]
configure interfaces ip-address default-route serial0 [default router IP]
configure lanx-router mgt serial0
```

The second method uses the local SC-IP to configure the IP and default route of the remote SC-IP. Once the LAN-X link is up, type from the local SC-IP:

```
configure lanx-router remote ip-address serial0 [###.###.###.###]
[###.###.###.###]
configure lanx-router remote default-route serial0 [default router IP]
```

18. Configure Terminal Server Ports 1 through 8 as needed by typing:

```
configure term-serv ip-address term[#] [###.###.###.###]
configure term-serv description term[#] [your_description]
```

19. Enable each configured Terminal Server Ports by typing:

```
configure term-serv enable term[#]
```

20. You have completed the configuration of the remote SC-IP in LAN-extension mode, for a flat (no routing) network environment. You can check your settings with the following two techniques:

- Type **show config** to display the current configuration of the SC-IP.
- Test your example network by pinging from your PC/workstation at the NOC to equipment at the remote office, and vice-versa.

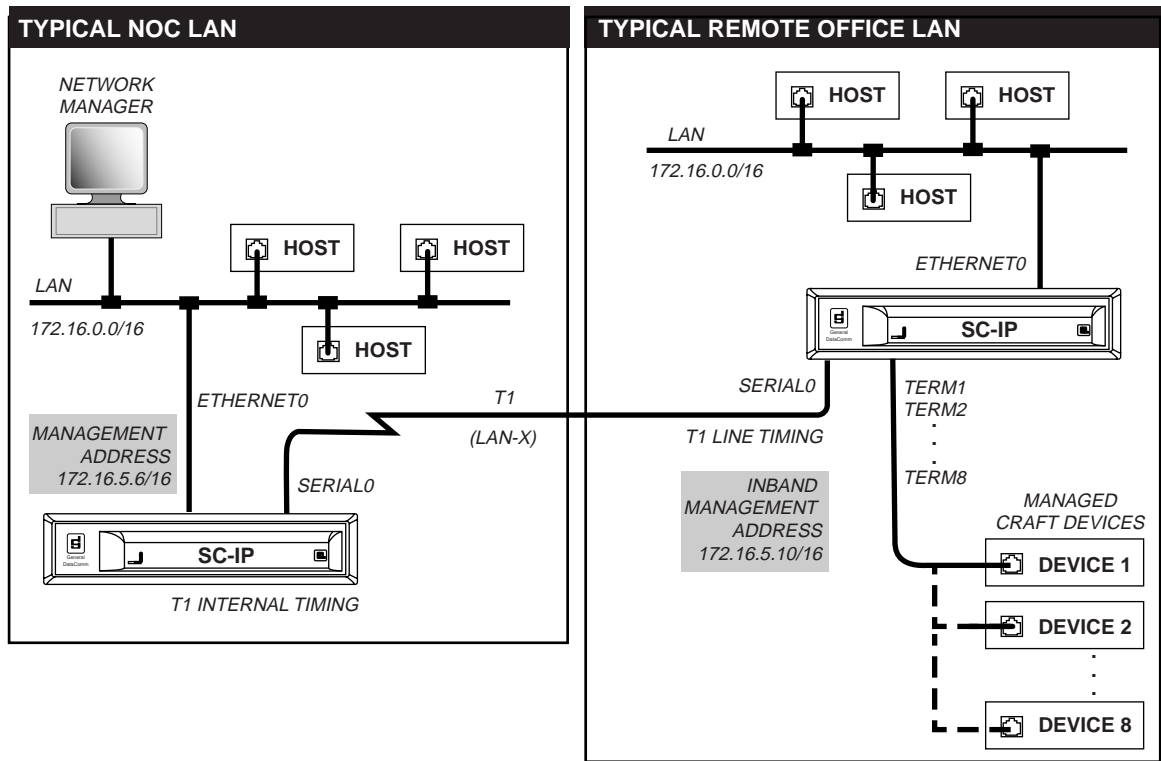


Figure 3-3 SC-IP LAN-Extension in a Flat T1 Network (No Routing)



# Chapter 4: The Web Interface

---

## Introduction to SC-IP Web Management

In addition to the command line interface at the Craft and Telnet interfaces, SC-IP provides access to a web interface through its integral HTTP server. This server allows authorized users to view or change SC-IP configuration and operation parameters in a streamlined logical format via their popular web browsers.

### Web Management Requirements

1. Minimum browser requirements are as follows:
  - Netscape Communicator Versions 4.5 through 5.x are supported.
  - Internet Explorer 5.0 or higher.
  - Java 1.1 must be enabled.
  - Cookies must be enabled

---

**Note** *At the terminal or craft interface, you can toggle `http disable/enable` to clear all cookies.*

---

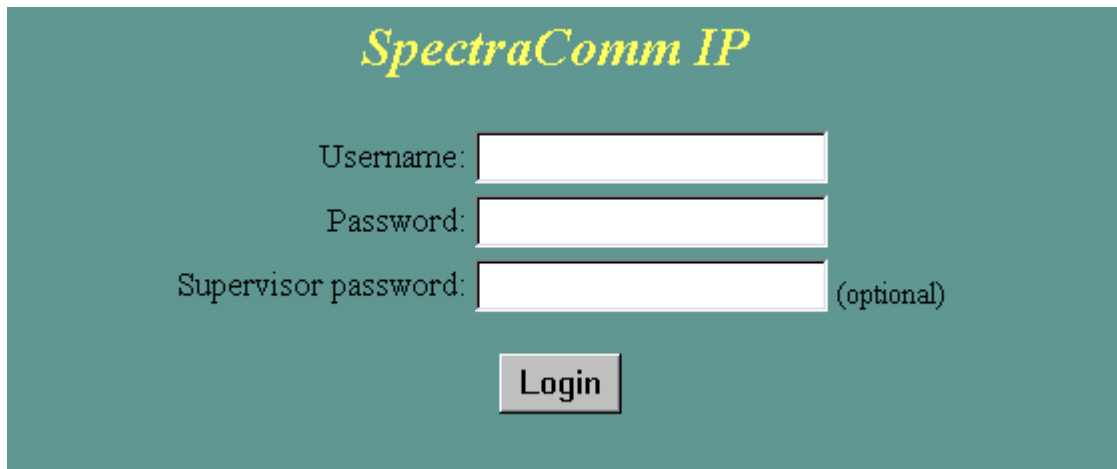
**Note** *SC-IP uses Java 1.1. If your Browser is Netscape 6.0, Java will not be supported. You will need to acquire a Java plug-in in order to make a web connection with SC-IP.*

---

2. Via the Telnet or the Craft interface, SC-IP must be configured for web management using the ADMIN commands that:
  - enable the http interface.
  - configure user accounts by entering names, passwords and read/write permissions for any authorized users.
3. Via the Craft or Telnet interface, SC-IP must be configured with an IP address and mask in order to satisfy the IP link and SNMP control. This allows a connection to the SC-IP web interface via the Ethernet LAN or T1 (WAN) connection.
4. SC-IP permits up to eight authorized users and supervisors in simultaneous web management sessions. If eight sessions are in progress, any additional users will be denied access.

## Starting A Web Session

To start a web management session, type the IP address of a SC-IP unit or type the host name at any browser. The following authorization screen appears:



*SpectraComm IP*

Username:

Password:

Supervisor password:  (optional)

### User Name and Password

SC-IP web pages are protected by pre-configured user names, passwords and the associated access privileges as assigned by an Administrator. A valid password can be up to 20 alphanumeric characters. If three consecutive invalid passwords are entered, a temporary lock-out will occur.

### Access Modes

Access modes configured by the Administrator determines whether a user name has Read-only or Read-Write privileges to the SC-IP web screens.

- User Mode  
(Read Only access)
- Supervisor Mode  
(Read/Write access permits data entry and configuration changes.)
- Admin Mode - Access Denied  
(Admin commands must be entered via Telnet or Craft interface.)

---


**Note** *Access will be denied to any user or supervisor if there are already eight web sessions in progress.*

---

## SC-IP Web Screens

The SC-IP web screens are organized by function and network type. All web screens provide the same vertical menu for accessing other screens. [Table 4-1](#) describes the web menu. Each web screen is described in this chapter.

**Table 4-1** Navigating the SC-IP Web Screens

Navigation Bar	Menu Items	Web Screen	Description
 <p>The navigation bar is a vertical green sidebar on the left side of the web interface. It contains the following items from top to bottom: 'SC-IP' in large white font, 'Administration' in small green font, 'Statistics' in small green font, 'Command Line' in small green font, 'Setup' in large white font, 'Interface' in small green font, 'IP Route' in small green font, 'T1' in small green font, 'Terminal' in small green font, 'Frame Relay' in large white font, 'DLCI' in small green font, 'LMI' in small green font, 'Traffic Shape' in small green font, and 'Logout' in blue underlined text.</p>	SC-IP	Administration	Read only and entry fields identifying the unit's physical and operational parameters.
		Statistics	Displays transmit, receive and error statistics on the selected SC-IP interface.
		Command Line	Opens a web-based CLI interface.
	Set Up	Interface Configuration	Displays configuration and status of all interfaces except Craft and Terminal Server.
		IP Route Configuration	Displays routing attributes for networks and devices.
		T1 Configuration	Provides drop-down lists for selecting parameters for T1 configuration.
		Terminal Server Configuration	Provides entry fields for configuring the eight terminal server ports.
	Frame Relay	DLCI Configuration	Displays the configured DLCIs for the sub-interfaces.
		LMI Configuration	Sets up Local Management Interface parameters.
		Traffic Shaping Configuration	Provides entry fields for configuring traffic shaping for the sub-interfaces.
	Logout	Logout	Logout command terminates a web management session. If a management session times out, any unsaved edits will be canceled. You must then logout and login to start a new web session.

**Note** Whenever you use your browser's Reload button, the system will always reload the Administration screen.

## Administration Web Screen

The first screen to appear is the Administration screen which provides entry fields for system data and also displays administration read-only information about the unit, such as serial number, software version numbers, system up time, etc. This information assists in quickly identifying and monitoring a particular SC-IP in the network. The screen and fields are described below.

**Table 4-2** Administration Web Screen

Selection	Fields	Description
System	Name Location Contact	Fields in which the system administrator can enter descriptions at any time (up to 32 characters for each field).
	Operating Mode	Router Mode or LAN-X Mode
	System Up Time	Display of the time interval in days, hours, minutes and seconds since the last powerup or reset.
Hardware	Electronic Serial Number	Read-only display of the unit's product code and MAC address, as set at the factory.
	Hardware data	Read-only display of the hardware version data as set at the factory.
Software	Primary, Standby Boot, Running	Read-only description of the software version levels of the firmware available to the unit.
Commands	Save Button	Click to save the administration data to the unit.
	Reset Button	Click to discard unsaved edits and reset options to previous settings.



## Statistics Web Screen

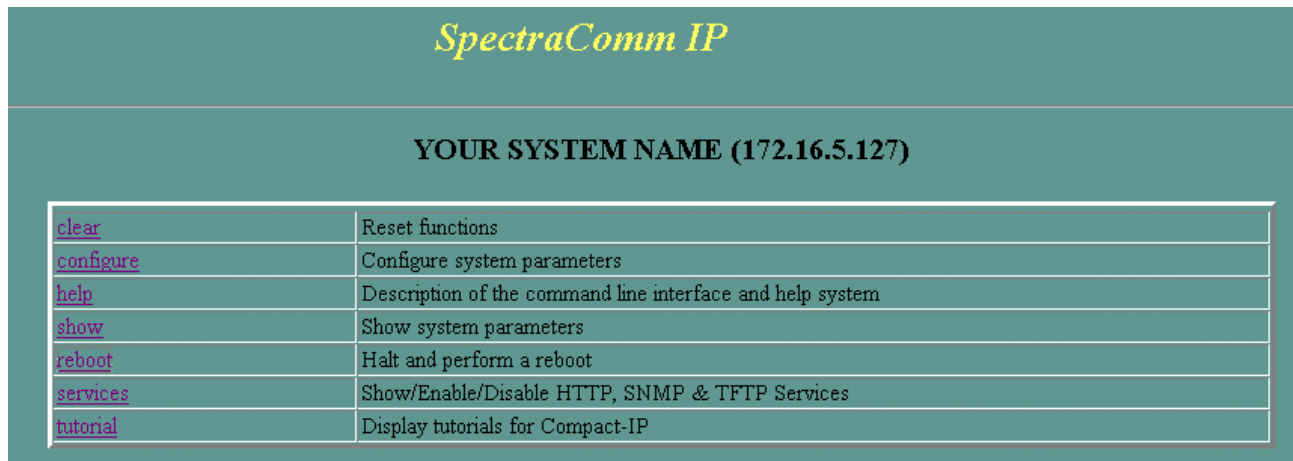
The Interface Statistics screen is used to select an active interface on the SC-IP and retrieve statistical data for receive and transmit data at that interface. This information allows the user to monitor conditions and error rates on the management network interfaces. The screen and fields are described below.

**Table 4-3** Interface Statistics Web Screen

Field	Selection	Description
Select Interface	ethernet0 (ether)	Selects the ethernet port interface.
	modem0 (PPP)	Selects the modem port (PPP) interface.
	serial0	Selects the serial interface (T1/FT1 port).
	serial0 (LMI)	Selects the serial interface (LMI).
	aux (PPP)	Select the aux port (PPP) interface.
Retrieve Button	Retrieves the read-only statistics reported at the selected interface.	
Receive Traffic	Read-only display of receive traffic conditions detected at the selected interface.	
Transmit Traffic	Read-only display of transmit traffic conditions detected at the selected interface.	
Errors	Read-only display of errors detected at the selected interface.	

## Command Line Web Screen

The SC-IP commands entered at the Command Line web screen operate exactly the same as at the telnet/terminal CLI interface. The Command line web page displays a series of tables that allow users and supervisors to execute commands and associated arguments by clicking on the links in the table. The top level command menu is shown below. When you click a command from the menu, any required arguments for that command appear. To return to the command line top menu from any argument screen, use the browser Back button, the SC-IP Command Line selection, or click the Top Menu link at the bottom of an argument table. For a detailed guide to CLI, including command tables, context-sensitive help, and practice exercises for configuring typical networks, refer to Appendix B: [CLI Reference](#).



SpectraComm IP	
YOUR SYSTEM NAME (172.16.5.127)	
<a href="#">clear</a>	Reset functions
<a href="#">configure</a>	Configure system parameters
<a href="#">help</a>	Description of the command line interface and help system
<a href="#">show</a>	Show system parameters
<a href="#">reboot</a>	Halt and perform a reboot
<a href="#">services</a>	Show/Enable/Disable HTTP, SNMP & TFTP Services
<a href="#">tutorial</a>	Display tutorials for Compact-IP

**Table 4-4** Command Line Web Screen

Field	Description
clear	Displays a selectable list of sub-commands that will clear arp-cache entries, counters on one or more interface or counters on one or more PVC.
configure (Supervisor Access Only)	Displays a selectable list of sub-commands that are used to configure parameters for SC-IP's Frame Relay, Interfaces, Static IP Routing mode, LAN-extension mode, Modem, SNMP, T1 and Terminal Server.
help	Displays a read-only display describing online help, the command access modes, some common sub-commands and arguments, and information on downloading configuration batch files.
show	Displays a selectable list of sub-commands that show SC-IP status and several operating, configuration and network parameters.
reboot (Supervisor Access Only)	Halts SC-IP operation and performs a reboot using existing configuration.
services	Displays the status of HTTP, SNMP and TFTP services as Enabled or <b>Disabled</b>
tutorial	Displays a list of tutorials on SC-IP, CLI, Frame Relay and the IP protocol.

**Note** *Supervisor Access is required for **configure** and **reboot** commands; thus, with User Access these commands will not be displayed.*

*Configuration commands that are restricted to ADMIN mode will not be displayed. You must logout of the web interface and make a Telnet or terminal connection in ADMIN mode to access/execute those commands.*

## Interface Web Screen

The Interface screen displays a read-only list of all the available information for each interface, destination or network. Information displayed on this is compiled from data entered at the command line interface. For more information, refer to Chapter 3: [Configuring SC-IP with Smart CLI](#), or use the CLI online help provided at the Command Line web screen.

<i>SpectraComm IP</i>							
<b>Interface</b>							
<b>Interface</b>	<b>IP Address/Prefix</b>	<b>Admin State</b>	<b>Line Protocol</b>	<b>Attributes</b>	<b>Link Encapsulation</b>	<b>DLCI</b>	<b>Description</b>
ethernet0	172.16.5.127/16	on	up	arp			
modem0	192.168.11.220/24	on	down				
serial0		off	down		Frame Relay DTE	0	
serial1		off	down		Frame Relay DTE	1023	
aux	192.168.11.230/24	on	down				

**Table 4-5** Interface Screen

<b>Field</b>	<b>Description</b>
Interface	Displays the available interfaces.
IP Address/Prefix	Displays the configured IP address of the interface or sub-interface.
Admin State	Displays the current state of the associated interface: ON or OFF.
Line Protocol	Displays the Layer 2 protocol for the interface (UP or DOWN).
Attributes	Displays the protocols that are in effect at the associated interface.
Link Encapsulation	Displays the configured link encapsulation for the related interface.
DLCI	Displays the DLCI number configured for the interface.
Description	Displays the user-defined description of the destination device or network.

**Note** At the web-based command line screen, up to 72 alphanumeric and other printable characters can be entered to describe an interface. Illegal characters include any non-printing characters, such as CTRL and ALT.

## IP Static Route Web Screen

The IP Static Route Configuration screen displays a read-only list all entered destination devices or networks and their static routing attributes. Information displayed on this is compiled from data entered at the command line interface or derived from the IP address and mask. For more information, refer to Chapter 3: [Configuring SC-IP with Smart CLI](#), or use the CLI online help provided at the Command Line web screen.

SpectraComm IP					
Static IP Route Table					
IP Address/Prefix	Next Hop/GW	Metric	Interface	Line Protocol	Type
172.16.0.0/16	172.16.5.127	10	ethernet0	UP	LOCAL NETWORK
172.16.5.127/32	172.16.5.127	8	ethernet0	UP	DIRECTLY CONNECTED
172.16.255.255/32	255.255.255.255	10	ethernet0	UP	BROADCAST
255.255.255.255/32	255.255.255.255	10			BROADCAST

**Table 4-6** IP Route Configuration Screen

Field	Description
IP Address/Prefix	Displays the IP address configured for destination devices, networks or interfaces.
Next Hop/GW	Displays the configured IP address of the next hop or gateway address that must be used to forward the packet out the corresponding 'interface.'
Metric	Displays the value (0-255) used by the router to determine the 'cost' of using the route. If a destination can be reached by two or more routes, the one with the lowest cost is used.
Interface	Specifies which logical port will be used to forward the received IP packet: ethernet0 (LAN port), serial0 (T1 port) or serial0.nnn (DLCI nnn on T1 port) serial1 (synchronous DTE port) or serial1.nnn (DLCI nnn on T1 port) modem0 (modem port)
Line Protocol	Displays the Layer 2 protocol for the interface (UP or DOWN).
Type	Displays the type of route.

## T1 Parameters Web Screen

The T1 Configuration screen displays all of the T1 configuration parameters. To change a particular configuration parameter, click on the adjacent down arrow to open a drop-down list of selectable configuration options for that parameter. Continue to change other parameters in the same manner. When all desired changes have been made, click on the **Save** button.

*SpectraComm IP*

**T1 Parameters**

Clock Source:

Framing:

Line Coding:

Line Buildout/Pre-equalization:

FDL:

Remote Loopback:

Timeslot Format:

Starting DS0:

Number of DS0s:

**Table 4-7** T1 Configuration Screen

Field	Description
Clock Source	Select: Line or Internal
Framing	Select: ESF, D4 or Auto
Line Coding	Select: B8ZS or AMI
Line Buildout/Pre-equalization	Select: DS1 Auto Line Buildout                      DSX1 0 - 133 ft Pre-equalization DS1 0.0dB Line Buildout                      DSX1 133 - 266 ft Pre-equalization DS1 -7.5dB Line Buildout                      DSX1 266 - 399 ft Pre-equalization DS1 -15.0dB Line Buildout                      DSX1 399 - 533 ft Pre-equalization DS1 -22.5dB Line Buildout                      DSX1 533 - 655 ft Pre-equalization
FDL	Select: ANSI-T1.403 or TR-54016
Remote Loopback	Select: Inhibit, Payload Loop, or Line Loop
Timeslot Format	Select N x 56 or N x 64 Kbps
Starting DS0	Select Timeslot: 1 - 24
Number of DS0's	Select Timeslot: 1 - 24
Save Button	Click to save the T1 configuration parameters to the unit.
Reset Button	Click to discard unsaved edits and reset options to previous settings.

## Terminal Server Web Screen

SC-IP initially displays the default configuration values for all eight terminal server ports. At the Terminal Server screen, each terminal port can be configured with an optional 'virtual IP address' to allow direct connection to that port using a Telnet or craft connection. Each terminal port can be independently turned on/off and configured. The procedure below describes how to configure a selected port.

*SpectraComm IP*

**Terminal Server**

Terminal	IP Address	Admin State	Attributes	Comms	Description
<a href="#">term1</a>		OFF		9600 8N1	
<a href="#">term2</a>		OFF		9600 8N1	
<a href="#">term3</a>		ON	Connected	9600 8N1	
<a href="#">term4</a>		OFF		9600 8N1	
<a href="#">term5</a>		OFF		9600 8N1	
<a href="#">term6</a>		OFF		9600 8N1	
<a href="#">term7</a>		OFF		9600 8N1	
<a href="#">term8</a>		OFF		9600 8N1	

---

Terminal:  IP Address:  Admin State:  Description:

Baud Rate:  Data Bits:  Parity:  Stop Bits:

**Figure 4-1** Terminal Server Port Configuration Screen

### Terminal Port Configuration Procedure

1. Activate the entry fields for the desired terminal port by clicking a port from the list or by selecting a port from the pulldown list. The current settings are displayed in the entry fields.
2. Make selections and type data in the entry fields for the selected port. Up to 72 alphanumeric characters may be entered in the Description field.
3. If needed, use the **Cancel** button to reset the fields, then enter the desired settings.
4. When the entry fields are correct, use the **Apply** button to update the list with the new settings. The ^ symbol appears in the list, designating any port that has been changed but not saved. Repeat steps 1-3 for all desired terminal ports.
5. When all desired changes have been made, click the **Save** button to save the port configuration data to the unit.

**Note** At the web-based command line screen, up to 72 alphanumeric and other printable characters can be entered to describe a port. Illegal characters include any non-printing characters, such as CTRL and ALT.

## DLCI Web Screen

The DLCI screen displays a read-only list of the DLCIs configured for the sub-interfaces. Information displayed on this is compiled from data entered at the command line interface. For more information, refer to Chapter 3: [Configuring SC-IP with Smart CLI](#) or use the CLI online help provided at the Command Line web screen.

SpectraComm IP		
DLCI		
Sub-interface	DLCI	IP Encapsulation
serial0	0	
serial1	1023	

**Table 4-8** DLCI Screen

Field	Description
Sub-interface	Displays the available sub-interfaces: serial0 or serial1.
DLCI	Displays the configured DLCI numbers for the associated sub-interface.
IP Encapsulation	Displays the IP encapsulation protocol for the associated sub-interface.

## LMI Web Screen

The LMI screen displays a read-only list of LMI information for the associated interfaces and entry fields for editing the LMI data. Use the entry fields at the bottom of the screen to configure the interfaces for LMI as required. For more information, refer to Chapter 3: [Configuring SC-IP with Smart CLI](#) or use the CLI online help provided at the Command Line web screen.

*SpectraComm IP*

**LMI**

Interface	LMI Type	n391	n392	n393	t391
<a href="#">serial0</a>	ansi	6	3	4	10
<a href="#">serial1</a>	cisco	6	3	4	10

Interface:  LMI Type:   
 n391:  n392:  n393:  t391:

### LMI Configuration Procedure

1. Activate the entry fields for the desired interface by clicking on the list or by selecting it from the pulldown list. The current settings are displayed in the entry fields.
2. Configure LMI for the selected interface by using the remaining pulldown lists. If needed, use the **Cancel** button to reset the fields, then enter the desired settings.
3. When the entry fields are correct, use the **Apply** button to update the list with the new settings. The ^ symbol appears in the list, designating any interface that has been changed but not saved. Repeat steps 1-3 for the remaining interface.
4. When all desired changes have been made, click the **Save** button to save the LMI configuration data to the unit.



## Traffic Shaping

The Traffic Shaping screen displays a read-only list of Traffic Shaping information for the associated interfaces. Use the entry fields at the bottom of the screen to configure the interfaces for Traffic Shaping as required. For more information, refer to Chapter 3: [Configuring SC-IP with Smart CLI](#) or use the CLI online help provided at the Command Line web screen.

**SpectraComm IP**

**Traffic Shape**

Interface	DLCI	Traffic Shape State	CIR Target (bps)	Byte Limit (bytes)	Bc Sustain (bits/int)	Be Excess (bits/int)	Interval (ms)	Increment (bytes)
<div style="text-align: center; margin-bottom: 10px;"><b>Save</b></div> <div style="display: flex; justify-content: space-between; align-items: flex-end;"> <div style="text-align: left;">           Interface: <input type="text"/> </div> <div style="text-align: left;">           Traffic Shape State: <input type="text" value="OFF"/> </div> </div> <div style="display: flex; justify-content: space-between; align-items: flex-end; margin-top: 10px;"> <div style="text-align: left;">           CIR: <input type="text" value="undefined"/>  <small>(0-1536000)</small> </div> <div style="text-align: left;">           Bc Sustain: <input type="text" value="undefined"/>  <small>(0-1536000)</small> </div> <div style="text-align: left;">           Be Excess: <input type="text" value="undefined"/>  <small>(0-1536000)</small> </div> </div> <div style="text-align: center; margin-top: 10px;"> <span style="margin-right: 20px;"><b>Apply</b></span> <span><b>Cancel</b></span> </div>								

### Traffic Shaping Configuration Procedure

1. Activate the entry fields for the desired interface by clicking on the list or by selecting it from the pulldown list. The current settings are displayed in the entry fields.
2. Configure Traffic Shaping for the selected interface by using the remaining pulldown lists. If needed, use the **Cancel** button to reset the fields, then enter the desired settings.
3. When the entry fields are correct, use the **Apply** button to update the list with the new settings. The ^ symbol appears in the list, designating any interface that has been changed but not saved. Repeat steps 1-3 for the remaining interface.
4. When all desired changes have been made, click the **Save** button to save the Traffic Shaping configuration data to the unit.



# Appendix A: Application Guidelines

## General Application Information

This chapter provides additional information on standard factory default settings, configuring IP Addresses, and any special network or product considerations.

## Command Access Modes

Access to Supervisor Mode or Admin Mode is password protected. The **show supervisor** command displays the current state of Supervisor Mode (enabled or disabled) and Admin Mode (on or off).

- The **enable** command prompts for entry of the Supervisor or Admin password. Once Supervisor or Admin mode is enabled, the help screens will display the additional commands made available by those modes.
- The **disable** command returns the console to normal USER mode.

Factory defaults for user accounts are:

User Name	Password
<b>admin</b>	<b>admin</b>
<b>supervisor</b>	<b>supervisor</b>
<b>gdc</b>	<b>gdc</b>

The first two usernames are **admin** and **supervisor**. These cannot be deleted, but their passwords should be changed before placing the unit into operation. Note that **admin** and **supervisor** cannot be used as username logins. They are only used to enable the supervisor/admin mode. The only default username login is defined as **gdc** with the password **gdc**. This username may be deleted or its password should be changed.

Up to twenty usernames/passwords may be configured after **supervisor**. Use the **configure accounts add** command string to add new usernames and passwords, or modify existing passwords.

When the **enable** command is used, the password entered is first compared to the Admin password and then to the supervisor password. This allows users with knowledge of the Supervisor password to enter Supervisor Mode and configure all parameters except for user accounts. Only users with knowledge of the Admin password can enter Admin mode and add/modify user accounts.

With factory default configuration, console authorization is turned off. That is, username/password login is not required to enter user mode from the console port. Console authorization may be turned on in Admin mode by the **configure accounts console enable** command string. For Telnet connections, username/password login will always be required.

## SC-IP Default Configurations

SC-IP is shipped from the factory with the ordered Default Profile that most suits the customer application. The Profile establishes default values for most configurable settings required by SC-IP in router mode or LAN-X modes. [Table A-1](#) describes Default Configuration Profile #1. Your factory defaults may vary, depending on which profile was ordered with your unit.

Users can change values from the default setting via Supv or Admin access to the CLI or the web interface. The Default Profile can be reloaded back into a SC-IP whenever a “clean baseline” is desirable prior to downloading a batch file configuration. To accomplish this, type **default all** at the command prompt, or add the **# default all** command uncommented at the start of your configuration batch file. You may need to reboot the unit.

**Table A-1** Default Configuration Profile #1 (GDC P/N 076U032-D01)

Setting	Default	Setting	Default
System Prompt	SC-IP	Serial0 Interface	Link-encapsulation serial0 Frame Relay DTE
Inactivity Timer	900 seconds		LMI type cisco
HTTP Service	Disabled		LMI n391 6
SNMP Service	Disabled		LMI n392 3
T1 Configuration			LMI n393 4
Clock-source	line		LMI t391 10
FDL	ANSI-T1.403		Disabled serial 0
Framing	ESF	Serial1 Interface	Link-encapsulation serial1 Frame Relay DTE
LBO	DS1 0.0db		LMI type cisco
Line Code	B8ZS		LMI n391 6
Loopback	Inhibit		LMI n392 3
Timeslots	1 - 24 64		LMI n393 4
Ethernet0 Interface	Disabled		LMI t391 10
Modem0 Interface	192.168.11.220 255.255.255.0 Modem Enabled		Disable serial 1
AUX interface	192.168.11.230 255.255.255.0 AUX Enabled	Terminal Server	term1 9600 8 N 1, Disabled
LAN-Extension	LANX-router mgt-None		term2 9600 8 N 1, Disabled
SNMP Configuration	Community add public ro en		term3 9600 8 N 1, Disabled
Name	“YOUR SYSTEM NAME”		term4 9600 8 N 1, Disabled
Contact	“YOUR SYSTEM CONTACT”		term5 9600 8 N 1, Disabled
Location	“YOUR SYSTEM LOCATION”		term6 9600 8 N 1, Disabled
User Accounts Configuration	Add admin		term7 9600 8 N 1, Disabled
	Add supervisor		term8 9600 8 N 1, Disabled
	Add gdc	Escape sequence ^^	
	Console (craft port) Authentication Disabled		
		Auto Reboot	Disabled To enable, uncomment the batch file line: <b># reboot</b>

## Using Sub-interfaces for Frame Relay PVCs

To support Frame Relay PVCs, you must add sub-interfaces on the `serial0` or `serial1` interface using the `configure interfaces add-sub` command. Sub-interface names take the form `serialn.nnn` where  $n = 0$  or  $1$  and  $nnn = 1-999$ . Each sub-interface must have a DLCI mapped to it before IP data can be forwarded on the sub-interface. Use the `configure frame-relay interface-dlci` command to assign a DLCI to a sub-interface and then configure its IP encapsulation. Once added, sub-interfaces can be assigned an IP address, etc.

## IP Addresses

The SC-IP is a routing network device that provides IP connectivity to other devices at a remote site. Each network interface on the SC-IP requires a unique numeric IP address which provides the network prefix and the host number. Addresses are expressed in dotted decimal notation which defines the 32-bit IP address in four 8-bit fields (or 'four octets'), e.g., `195.88.11.4`. Each octet has a value from 000 to 255.

Using the traditional Class A, B, and C network architectures, one or more octets would be allocated to the network prefix and host number. The more octets allocated to a network prefix, the larger the number of networks anticipated; likewise, the more octets allocated to a host number, the larger the number of hosts anticipated. [Table A-2](#) describes the traditional uses of these general purpose network architectures.

**Table A-2** Class-Based IP Routing

Network Class	1st Octet	2nd Octet	3rd Octet	4th Octet
Class A	NETWORK Prefix Up to 126 networks	HOST Number ~17,000,000 hosts each		
Class B	NETWORK Prefix ~65,000 Networks		HOST Number ~17,000 hosts each	
Class C	NETWORK Prefix ~ 2,000,000 Networks			HOST Number 254 hosts each

## IP Addressing Examples

An example is shown below of both classical and shortened IP address representations:

*Example: Classical IP notation:*

**IP-address ::= <Network-prefix> <Host-number>**

**192.168.11.1** with a subnet mask of **255.255.255.0**

*Example: Shortened IP notation:*

**192.168.11.1/24**

where the **/24** indicates that the first 3 octets comprise the network prefix.

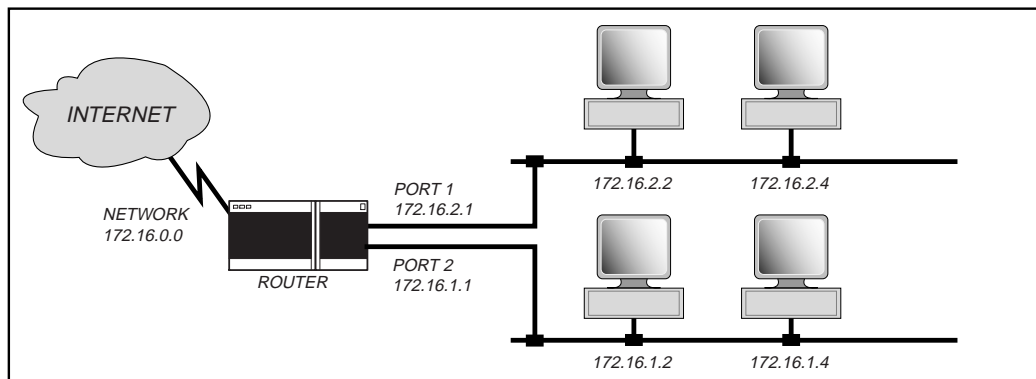
**Network Classifications**

IP addressing uses a set of fixed structure addresses known as classes (A,B, C, D, and E). An internet address can be acquired by sending a request to the Internet Network Information Center or from an Internet Service Provider. [Table A-3](#) describes network classes. Note that a message sent to a Class D address is received by all the devices sharing that address.

RFC 1918 has reserved some addresses for private Internet Addressing. In order to use these private IP addresses, you must use a firewall, Network Address Translator, or proxy server to connect to the Internet. These devices convert the private address into a legitimate Internet address. [Table A-4](#) and the associated figure illustrate private addressing for a full Class A network, 16 contiguous Class B networks and 256 contiguous Class C networks.

**Table A-3** Network Classification

NTWK Class	First Octet	Range of Networks	Default Mask	Example	Description
A	1 - 126	1.0.0.0 - 127.0.0.0	255.0.0.0	18.0.172.16	Class A, B and C addresses are used to address: hosts, hubs, switches, routers and other IP devices.
B	128 - 191	128.0.0.0 - 191.255.0.0	255.255.0.0	140.250.16.1	
C	192 - 223	192.0.0.0 - 223.255.255.0	255.255.255.0	200.10.20.10	
D	224 - 239	224.0.0.0 - 239.255.255.255	255.255.255.255	224.0.0.9	Class D addresses are used for multi-cast IP or group addresses.
E	Class E: Reserved				



*Note* Class D addresses are used in video teleconferencing, Network Time Protocol, some routing protocols (i.e., RIPv2 and OSPF), and some mass push installation programs. Class D traffic can be routed through an IP network if configured with DVMRP, PIM or MOSPF

**Table A-4** Private IP Addressing

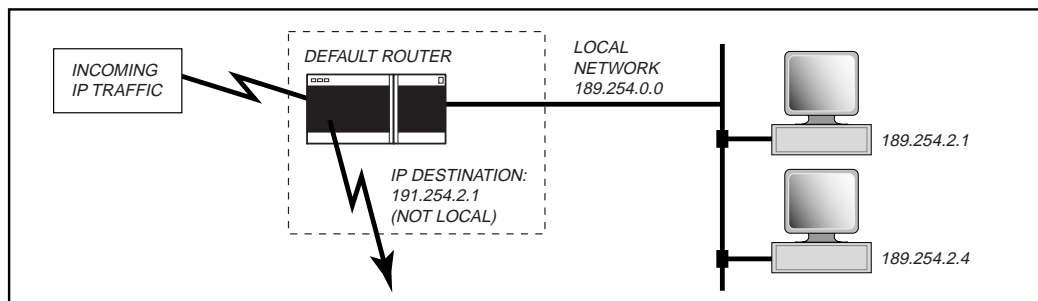
Network Class	Private RFC 1918 Addresses
A	10.0.0.0 - 10.255.255.255
B	172.16.0.0 - 172.31.255.255
C	192.168.0.0 - 192.168.255.255

## Establishing an IP Address

IP addresses and subnet masks are established by the user locally at the terminal interface. IP addresses are stored in SC-IP nonvolatile memory and retained when there is no power to the card.

In setting up the SC-IP, individual IP addresses are required for the T1/DDS interface, the modem interface, and the Ethernet (LAN) interface. Each IP address is associated with a subnet mask which further subdivides a standard class address for routing within an organization. A station submask indicates the bits used for network identification. A sending station checks the bits to see if the receiving station is on its LAN or a remote. For a remote, the sending station selects a default router from an internal table.

From the factory, the SC-IP's modem interface is pre-configured with a default address of 192.168.11.220 with a subnet mask of 255.255.255.000 for initial remote dial-in. For the other interfaces, the factory default is no IP addresses or masks.



**Figure A-1** Using Subnet Masks

## Ones Density Enforcement

Connection to the T1 Network requires the connecting device (SC-IP) to meet pulse density constraints. The method for adhering to the pulse density constraints is termed Ones Density Enforcement.

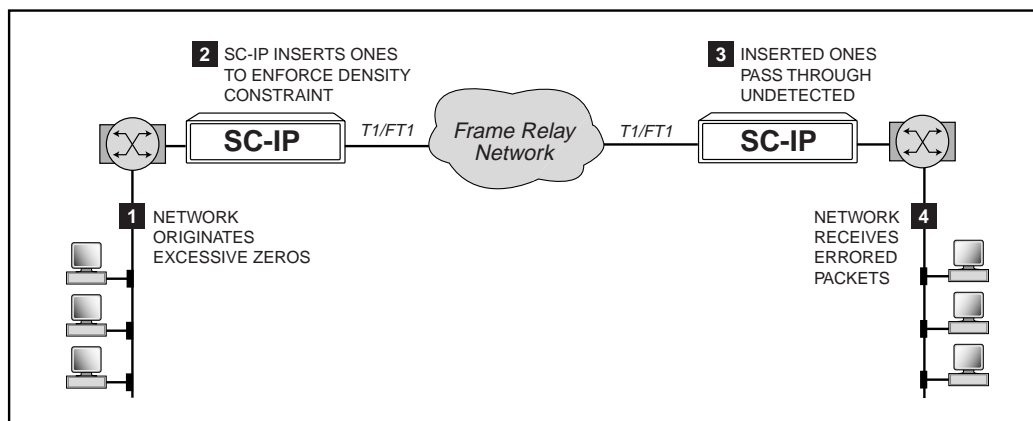
The SC-IP's Line Code option supports:

- Alternate Mark Inversion (AMI) with no bipolar violations
- Bipolar with 8 Zero Substitution (B8ZS) with bipolar violations

The Line Code option you choose depends primarily on the design of the T1 Network, keeping in mind that all equipment must be compatible with AMI coding and some equipment may not be compatible with B8ZS coding.

When optioned for B8ZS, the SC-IP replaces eight consecutive "zeros" with a sequence, including bipolar violations, which can be detected to allow any combination of zeros and ones to be transmitted throughout the T1 Network.

When optioned for AMI, the SC-IP automatically inserts "ones" in accordance to the configuration as shown below. This insertion of "ones" will cause the frame relay packets to be corrupted (FCS errors) as illustrated in and . The user should be aware of this and attempt to eliminate excessive zeros in the transmit direction (towards the T1 Network).



**Table A-5** Application with 8(N+1) Enforcement

Line Code	Format	Consecutive	Enforcement
B8ZS	xx	xx	B8ZS
AMI	Nx56K	Consecutive	None
AMI	Nx64K	Consecutive	8(N+1)

**Note** The AMI line option code is not recommended for a 64kbps network rate.



## Batch Up/Download Overview

For advanced users with SUPERVISOR mode enabled, there is a **batch** feature available to simplify configuring (or re-configuring) multiple SC-IPs. This feature allows the user to upload an ASCII text batch script from a pre-configured SC-IP via the TFTP **get** operation. Use the **show config** command to view the batch script that would be generated from the SC-IP for a subsequent TFTP upload. This text file may be modified and/or downloaded to the same SC-IP or another SC-IP via TFTP.

A batch script file may also be created by a text editor (Notepad) and then downloaded from terminal emulation program (i.e., MS HyperTerminal) at the CTRL interface. Users can initially setup the SC-IP from a predefined configuration file, rather than entering one command at a time.

### Special Considerations for Batch Files

- You must be in SUPERVISOR mode to execute a batch file, since batch script files use the **configure** command.
- You must be in ADMIN mode if the batch script file contains user accounts configuration.
- The downloaded batch script file will reside in the batch queue. The following commands can then be used on the file:
  - Use the **batch show** command to view the batch script file in the batch queue.
  - Use the **batch run** command to execute the batch script file in the batch queue.
- An execution of the **batch run** command will terminate at any invalid command string. All commands executed up to that point will be in affect.

### Batch Download Procedure

1. To use batch download, make a plain text file (using Notepad) with the first and last lines as shown:

```
batch begin
batch end
```

2. Between the **begin** and **end** lines, type valid SCIP commands along with all arguments. Typically, these commands would include IP interface configuration, terminal line baud rate configurations and static routes, as shown in the example below:

*An example download file:*

```
batch begin
configure interfaces ip-address e0 172.16.4.145 255.255.0.0 255.255.255.255
configure ip-route add e0 128.1.0.0 255.255.0.0 128.1.1.10 1
configure ip-route add e0 135.1.0.0 255.255.0.0 135.1.1.5 1
configure term-serv comms term1 9600 8 N 1
batch end
```

3. To use the batch download feature, set the file transfer settings of the terminal emulation program to wait for remote character echo. Set Line Termination to **CR** and Line Terminating Timing to **1 mSec**.
4. Enter SUPERVISOR mode or ADMIN mode and activate the file transfer.
5. When the **SC-IP#** prompt returns to the screen, type **batch show** to view the downloaded commands. If desired, type **batch run** to execute the file.

## Troubleshooting Communications Problems

### Ethernet (LAN) Communication Problems

- IP Address not set correctly in SC-IP.
  - Cables not installed.
  - Default Route not set when router exists.
1. Connect a VT100-compatible terminal to the CTRL port to check the IP Address and mask in the SC-IP and ensure the values is correct.
  2. Perform ping to determine whether the SC-IP is communicating on the network.

### WAN Communication Problems

- IP Address not set correctly in SC-IP (if using IP Addressing on a sub-interface).
  - IP Address for the SC-IP in the network manager not correct.
  - Cables not installed.
1. At the command prompt, type **show f lmi** to check that the **serial0** interface is **UP**.
  2. At the command prompt, type **show int** to check that the Line Protocol is **UP** on all interfaces you intend to use.
  3. At the command prompt, type **show ip-route** to check that you have a path for the destination IP to route to the interface.
  4. Perform ping to determine whether the SC-IP is communicating on the network.
  5. If ping was not successful, make sure that the link connection is established.

### WEB Communication Problems

- Browser not configured for accessing SC-IP.
  - Eight web management sessions already in progress.
  - Java 1.1 not supported or enabled on your browser.
1. At your browser, ensure that cookies are enabled, and that Java code is supported and enabled.
  2. Ensure that your user name and password have been entered correctly.
  3. Check that SC-IP has been configured with HTTP enabled.

---

**Note** *SC-IP uses Java 1.1. If your Browser is Netscape 6.0 or later, Java will not be supported. You will need to acquire a Java plug-in in order to make a web connection with SC-IP.*

---

# Appendix B: CLI Reference

## Using Smart CLI

The Smart CLI commands can be executed from a hyperterminal connection, a password-protected Telnet connection or at the web interface. When using CLI at the web interface, be aware that you will not be able to execute those commands that are restricted to the ADMIN mode.

The SC-IP command line interface is composed of commands, zero or more subcommands and zero or more arguments. The general syntax of a command entered at the command prompt is:

```
command <subcommand(s)> if any <required argument(s)> if any
```

## Finding Commands and Subcommands

Use the ? character to get a description of commands available, or at any time in the command line to get context help. The syntax of a help description is:

```
command      Brief description of command or subcommand
parameter(s) description, if any, for the command or subcommand
```

For example:

- When you type the ? character at the beginning of a command line, the screen displays all the commands available along with a one line description of each command:

```
Demo_unit%> ?
_____ SpectraComm IP Commands _____
clear      Reset functions
configure  Configure system parameters
connect    Connect to terminal interface or modem
default    Default configuration to factory values.
disable    Turn off supervisor/admin commands
enable     Turn on supervisor/admin commands
help       Description of the command line interface and help system
ping       Send ping to remote device
show       Show system parameters
_____ Utility Commands _____
batch      Store and/or run commands in batch mode
exit       Exit SpectraComm IP Command Line Interface
flash     Copy flash files/select flash boot file
reboot     Halt and perform a reboot
tftp      Enable/Disable TFTP Server (supports flash upgrade)
tutorial   Display tutorials for SCIP
_____ Notes _____
Commands may be abbreviated. Command text expands when space is entered.
Use "?" at any time on the command line to get help. Use CTRL-C to abort
command line. Use Up/Down arrow keys to recall previous command lines.
```

- When you type **show** the screen displays help for only the **show** command:

```
Demo_unit%> show?
show      Show system parameters
```

- When you type **show ?** the screen displays Help for all of the **show** sub commands:

```
Demo_unit% show ?
_____
Help for "show "_____
arp-cache      Show ARP cache entries
config         Show configuration as batch script text commands
directory      Show flash directory file info
frame-relay    Show frame relay parameters
history        Show command history (last 20 commands)
interfaces     Show status and statistics for one or more interfaces
ip-route       Show ip static route table
modem          Show modem parameters
snmp           Show SNMP Server parameters
supervisor     Show supervisor/admin mode
t1             Show T1 parameters
term-serv      Show terminal server parameters
version        Show system H/W and S/W status
```

- When you type **configure ?** in SUPERVISOR/ADMIN mode, the screen displays all the subcommands for the **configure** command.

```
Demo_unit% configure ?
_____
Help for "configure "_____
frame-relay    Configure frame relay parameters
interfaces     Configure interface parameters
ip-route       Configure ip static route table
modem          Configure modem parameters
prompt         Configure custom prompt; requires 1 parameter(s)
snmp           Configure SNMP Server parameters
t1             Configure T1 parameters
term-serv      Configure terminal server parameters
```

- When you type **configure interfaces ?** the screen displays help for that specific subcommand:

```
_____
Help for "configure interfaces "_____
add-sub        Add new sub-interface; requires 1 parameter(s)
remove-sub     Remove existing sub-interface; requires 1 parameter(s)
ip-address     Configure interface IP address; requires 3 parameter(s)
delete-ip      Delete interface IP address; requires 2 parameter(s)
description    Change interface description; requires 2 parameter(s)
enable         Set admin state ON (allow xmit & rcv); requires 1 parameter(s)
disable        Set admin state OFF (stop xmit & rcv); requires 1 parameter(s)
link-encap     Set link encapsulation; requires 2 parameter(s)
```

- Parameters separated by spaces may be entered after the last subcommand on the command line. If you do not enter all required arguments on the command line, you will be prompted for the missing ones after pressing **Enter** or the carriage return.

## Arguments

If a command or subcommand requires arguments, you can type the **?** character after the last subcommand to display a description of the required parameters to complete the command line.

*For example:*

When you type **configure interfaces ip-address ?** the screen will show the three required parameters and one optional parameter used to configure an IP address for an interface:

```
Demo_unit%> configure interfaces ip-address ?
```

```

_____ Help for "configure interfaces ip-address " _____
ip-address      Configure interface IP address; requires 3 parameter(s)

interface name (ethernet0, modem0, serialn, serialn.nnn)
IP address (a.b.c.d)
IP mask (a.b.c.d)
IP broadcast address (a.b.c.d) (optional; default 255.255.255.255)

```

## Entering a Command String

Each command string is executed by pressing the **Enter** key (or <cr>). The general syntax is:

```
command <subcommand(s)> if any <required argument(s)> if any
```

## Aborting a Command

Use the **CTRL-C** character to abort a command at any time and return to the main prompt.

## Command Short Cuts

You only have to type the minimum number of characters needed to identify a command or subcommand to the CLI. When space or return is entered, the CLI will expand the abbreviation to the full command name.

*For example:*

The full command name **configure** may be selected by any of the following:

```

Demo_unit%> conf
Demo_unit%> confi
Demo_unit%> config

```

When a space is entered, all of the above strings will expand to **configure**. Extra spaces between command, subcommands or arguments are ignored.

Arguments composed of strings such as **interface name** may be abbreviated to minimum uniqueness. Interface names are **ethernet0**, **modem0**, **serialn.nnn** where *n* is serial interface **0** or **1**, and *nnn* is a sub-interface value of **1 - 999**.

The **e** character is sufficient to select **ethernet0**. The **m** character is sufficient to select **modem0**. Typing **ser0.nnn** or **s0.nnn** is sufficient to select a sub-interface.

## Command Recall

There are two ways to recall previously entered commands:

- **Arrow UP Recall**  
Use the **Arrow Up** key to recall previously entered commands in reverse order.  
Use the **backspace** key to edit the command string, if needed.  
Press **Enter** to execute the command string.
- **Command History Recall**  
Type **show history** to display a numbered history of the previous 20 commands.  
At the command prompt, type **![##]** where **##** is the history screen line number of the desired command.

## CLI Command Tables

This section lists a sampling of the commands, subcommands and arguments used in the SC-IP command line interface. Commands are shown in their long syntax, but may be abbreviated at the command line to their minimal unique number of characters. For each command group, observe any access or operation requirements and exceptions.

**Note** *These command tables are subject to change as new features are added to the SC-IP. For complete and up-to-date commands use the SC-IP's context-sensitive help by entering the ? character anywhere in a command string.*

### Command Overview

The following basic commands are available in all access modes: User mode, Supervisor mode and Admin mode. Some commands are password-protected, as noted.

<b>Command Type</b>	<b>Command Syntax</b>	<b>Details</b>
SC-IP Commands	<b>connect</b>	Connect to terminal interface or modem
	<b>disable</b>	Turn on supervisor/admin commands. (Password-protected)
	<b>enable</b>	Turn on supervisor/admin commands. (Password-protected)
	<b>help</b>	Detailed tutorial of the command line interface, the three access modes, and the batch utility.
	<b>ping</b>	Send ping to remote device
	<b>show</b>	Show system parameters.
Utility Commands	<b>batch</b>	Store and or run commands in batch mode.
	<b>exit</b>	Exit the SC-IP command line interface.

### Clear Commands

Some **clear** commands require you to be in Admin or Supervisor mode.

<b>Command Syntax</b>	<b>Description</b>
<b>clear arp-cache</b>	Clears ARP cache entries.
<b>clear intf-counters</b>	Clears counters on one or more interfaces.
<b>clear login-stats</b>	Clears login account statistics. (Must be in Suprv or Admin mode to execute this command.)
<b>clear pvc-counters</b>	Clears pvc counters.
<b>clear reboot-counter</b>	Clears the reboot counters.

## Configure Accounts Commands

To access `configure accounts` sub-commands you must be in Admin mode.

<i>Command Syntax</i>	<i>Description</i>
<code>configure accounts add [username] [password]</code>	Adds/Changes username and password to accounts; Username and password are each 20 a/n chars max.
<code>configure accounts delete [username] [password]</code>	Deletes username and password from accounts; Username and password are each 20 a/n chars max.
<code>configure accounts console disable</code>	Disables console user authentication.
<code>configure accounts console enable</code>	Enables console user authentication.

## Configure Frame Relay Commands

To access **configure frame-relay** commands, you must be in Admin or Supervisor mode. Sub-interfaces must have been added previously. When entering interface names in a command string, type: **ethernet0.[nnn]** **modem0.[nnn]**, or **serial[n].[nnn]** where *n* is serial interface = 0 or 1 and where *nnn* is a sub-interface value = 1 - 999.

<b>Command Syntax</b>	<b>Details</b>
<b>frame-relay interface-dlci</b> <i>s[n].[nnn]</i> [ <i>x</i> ] [ <i>t</i> ]	Configures DLCI for sub-interface. Sub-interface name: <i>serialn.nnn</i> DLCI value <i>x</i> = 16 - 991 IP encapsulation type <i>t</i> = ietf, cisco or snap.
<b>frame-relay lmi n391</b> <i>s[n]</i> [ <i>x</i> ]	Configures LMI full status polling counter. Sub-interface name: 1 or 0 N391 counter <i>x</i> : 1-255 (default 6)
<b>frame-relay lmi n392</b> <i>s[n]</i> [ <i>x</i> ]	Configures LMI status response error threshold Sub-interface name: 1 or 0 N392 counter <i>x</i> : 1 - 10 (default 3)
<b>frame-relay lmi n393</b> <i>s[n]</i> [ <i>x</i> ]	Configures LMI event-monitored window Sub-interface name: 1 or 0 N393 counter <i>x</i> : 1 - 10 (default 4)
<b>frame-relay lmi t391</b> <i>s[n]</i> [ <i>x</i> ]	Configures LMI status inquiry intervals. Sub-interface name: 1 or 0 T391 timer <i>x</i> : 5 - 30 (default 10)
<b>frame-relay lmi typ</b> <i>s[n]</i> [ <i>x</i> ]	Configures LMI type. Sub-interface name: 1 or 0 Type <i>x</i> : cisco, ansi or q933a
<b>configure frame-relay traffic-shape</b> <i>s[n].[nnn]</i> [ <i>x</i> ] [ <i>y</i> ] [ <i>z</i> ]	Configure traffic shaping. Sub-interface name: 1 or 0 CIR target bit rate <i>x</i> : 0 - 1536000 Optional parameter for Bc bits per interval, sustained (0-1536000) Optional parameter for Be bits per interval, excess (0-1536000)
<b>configure frame-relay ena-traffic</b> <i>s[n].[nnn]</i>	Enable traffic shaping Sub-interface name: <i>serialn.nnn</i>
<b>configure frame-relay dis-traffic</b> <i>s[n].[nnn]</i>	Disable traffic shaping Sub-interface name: <i>serialn.nnn</i>



## Configure Interfaces Commands

To access **configure interfaces** commands, you must be in Admin or Supervisor mode.

- When entering interface names in a command string, type: **ethernet0.[nnn]**, **modem0.[nnn]**, or **serial[n].[nnn]** where *n* is serial interface **0** or **1** and where *nnn* is a sub-interface value **1 - 999**.
- When entering IP addresses or masks, use Classical IP notation where IP address *[a.b.c.d]* uses values from **0 - 255** to designate the network prefix and the host number.

<b>Command Syntax</b>	<b>Details</b>
<b>configure interfaces add-sub</b> <b>s[n]. [nnn]</b>	Add sub-interface name: serial <i>n.nnn</i>
<b>configure interfaces remove-sub</b> <b>s[n]. [nnn]</b>	Remove sub-interface name: serial <i>n.nnn</i>
<b>configure interfaces ip-address</b> <b>x[n]. [nnn] [a.b.c.d] [a.b.c.d]</b>	Configure interface IP address. Interface name <i>x</i> : (ethernet0, modem0, serial <i>n</i> , or serial <i>n.nnn</i> ) IP address <i>[a.b.c.d]</i> IP mask <i>[a.b.c.d]</i>  Optional IP broadcast address <i>[a.b.c.d]</i> (default 255.255.255.255)
<b>configure interfaces delete ip</b> <b>s[n].</b> <b>[nnn]</b>	Delete IP address associated with an interface.
<b>configure interfaces description</b> <b>s[n]. [nnn] [xxx]</b>	Change interface description.
<b>configure interfaces enable</b> <i>[interface</i> <i>name]</i> or <b>all</b>	Set admin state ON (allow xmit & rcv). Requires 1 parameter for specified interface.
<b>configure interfaces disable</b> <i>[interface</i> <i>name]</i> or <b>all</b>	Set admin state OFF (stop xmit & rcv). Requires 1 parameter for specified interface.
<b>configure interfaces link-encap</b> <b>s[n] frame-relay-dte</b>	Set link encapsulation for Frame Relay-DTE for specified interface.
<b>configure interfaces link-encap</b> <b>s[n] ppp</b>	Set link encapsulation for PPP for specified interface.
<b>configure interfaces link-encap</b> <b>s[n] lanx</b>	Set link encapsulation for LAN-X for specified interface.

## Configuration Tutorials

To better understand the flexibility and scalability of SC-IP, you can practice configuring the unit for deployment in three types of “example” networks. To help familiarize you with CLI, the procedures for these examples include all of the CLI commands and addresses needed for a complete operating configurations.

The configuration tutorials will describe through the basic procedures for configuring SC-IP using the CLI to suit your network environment:

- SC-IP as a static IP router using Frame Relay protocol over a T1 line ([Figure B-1](#))
- SC-IP as a static IP router in a “back-to-back” configuration using PPP protocol over a T1 line ([Figure B-2](#)). (In place of the NOC SC-IP, you can use any router in PPP mode.)
- SC-IP as a LAN-extension device across the WAN using a T1 line ([Figure B-3](#))

---

**Note** *FOR ADVANCED USERS:*  
 You can simplify the configuration of one or more SC-IPs by generate configuration settings from a source SC-IP into an ASCII file. This file can then be archived with the configuration data for specific unit or as a baseline for modified configurations. You can also download this source file into multiple destination SC-IP units. Refer to Appendix A, Application Guidelines : [Batch Up/Download Overview](#).

---

### Example 1: Configuring SC-IP for IP Routing (Frame Relay)

After initializing the SC-IP for configuration, perform the steps in this example to better understand how to configure the SC-IP to operate as an IP router in an “example” Frame Relay network ([Figure B-1](#)).

---

**Note** *This example assumes a local SC-IP or local router at the NOC. The configuration procedure applies to the remote SC-IP, unless otherwise noted.*

---

1. Set the system prompt by typing:

```
configure prompt orlando_unit
```

2. Configure the T1 values for your network. If the SC-IP’s T1 default values (shown below) apply to your network, you do not need to re-enter them. Otherwise, use the CLI to set any T1 configuration value as required. Type `?` following any command, sub-command or parameter for context-sensitive online help.

```
configure t1 clock-source line
configure t1 fd1 ANSI-T1.403
configure t1 framing ESF
configure t1 lbo ds1 0.0dB
configure t1 linecode B8ZS
configure t1 loopback INHIBIT
configure t1 timeslots 1-24
```

---

**Note** *If desired, type `show T1` to check your current T1 entries. Modify, if needed.*

---

3. Configure the Ethernet IP address and mask by typing:

```
configure interfaces ip-address ethernet0 172.16.5.6 255.255.0.0
```

4. Enter a description of the Ethernet interface by typing:

```
configure interfaces description ethernet0 "orlando_lan"
```

5. Enable the Ethernet interface by typing:

```
configure interfaces enable ethernet0
```

6. Configure the serial0 interface (at the T1 port) for Frame Relay DTE, followed by Frame Relay LMI. If the SC-IP's default values apply to your network you do not need to re-enter them. Otherwise use the CLI to set any configuration value as required. Type ? following any command, sub-command or parameter for context-sensitive online help.

```
configure interface link-encap serial0 frame-relay-dte
configure frame-relay lmi type s0 cisco
configure frame-relay lmi n391 s0 6
configure frame-relay lmi n392 s0 3
configure frame-relay lmi n393 s0 4
configure frame-relay lmi t391 s0 10
configure interfaces enable serial0
```

7. Create, configure and enable sub-interfaces to support Frame Relay DLCIs by typing:

```
configure interfaces add-sub serial0.17
configure interfaces description serial0.17 "NOC_miami"
configure interfaces enable serial0.17
```

---

**Note** *If desired, type **show interfaces** to check your current interface entries. Modify, if needed.*

---

8. Map Frame Relay DLCIs, IP Encapsulation to sub-interfaces by typing:

```
configure frame-relay interface-dlci serial0.17 17 ietf
```

9. Configure and enable Traffic Shaping per sub-interface by typing the CIR, Bc and Be values consistent with how your Frame Relay network has been configured, for example:

```
configure frame-relay traffic-shape serial0.17 768000 768000 384000
configure frame-relay ena-traffic serial0.17
```

10. Configure and enable Terminal Server Port by typing:

```
configure term-serv ip-address term1 192.160.1.12
configure term-serv description term1 "terminal_device"
configure term-serv enable term1
```

11. The following steps 11 through 15 describe setting up static routes for the Frame Relay network.

---

**Note** *If a local router is used at the NOC instead of a SC-IP, consult your router documentation for static route configuration guidelines.*

---

12. Set up a static route at a remote site towards the NOC by typing:

```
configure ip-route add serial0.17 128.1.0.0 255.255.0.0 128.1.1.10 1
```

13. On the NOC SC-IP, create, configure and enable the subinterface by typing:  

```
configure interfaces add-sub serial0.117
configure interfaces enable serial0.117
```
14. On the NOC SC-IP, map Frame Relay DLCIs, IP Encapsulation to sub-interfaces by typing:  

```
configure frame-relay interface-dlci serial0.117 17 ietf
```
15. Set up a static route at a NOC SC-IP towards a remote “orlando\_lan” 172.16.0.0 by typing:  

```
configure ip-route add serial0.117 172.16.0.0 255.255.0.0 172.16.5.6 1
```

As an alternative, to set up a static route only to a particular host instead of to the whole network, set up the static route with mask 255.255.255.255. For example, to set up LAN Device #1 on 172.16.0.0 network with an IP address of 172.16.5.10, type:

```
configure ip-route add serial0.117 172.16.5.10 255.255.255.255
172.16.5.6 1
```
16. Set up a static route at the NOC towards a LAN Device #1 connected at the Terminal Server port by typing:  

```
configure ip-route add serial0.117 192.160.1.12 255.255.255.255
172.16.5.6 1
```

---

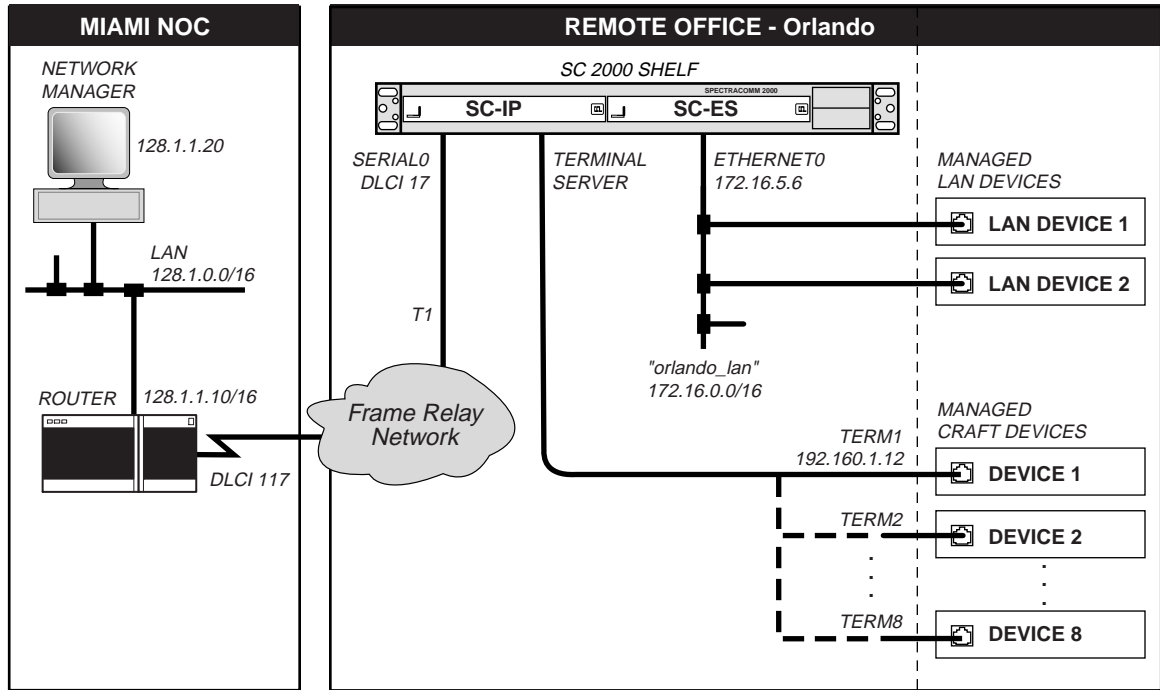
*Note* When setting up static routes, type the short-cut **conf ip a ?** to get a list of all required arguments.

---

17. Type **disable** to turn off the supervisor access.
18. Turn Admin mode on by typing **enable** and entering the **admin** password. The command prompt will now contain the % character.
19. Add admin and supervisor accounts by typing:  

```
configure accounts add admin mickey
configure accounts add supervisor minnie
```
20. Add a user account and password by typing:  

```
configure accounts add daffy duck
```
21. You have completed the configuration of the SC-IP in the selected example network. You can check your settings with the following two techniques:
  - Type **show config** to display the current configuration of the SC-IP.
  - Test your example network by pinging from your PC/workstation at the NOC to equipment at the remote office, and vice-versa.



**Figure B-1** Example: SC-IP Routing in a Frame Relay T1 Network

## Example 2: Configuring SC-IP for IP Routing (PPP)

After initializing the SC-IP for configuration, perform the steps in this example to better understand how to configure the SC-IP to operate as an IP router in an “example” PPP network ([Figure B-2](#)).

---

**Note** This example assumes a local SC-IP or local router at the NOC. The configuration procedure applies to the remote SC-IP, unless otherwise noted.

---

1. Set the system prompt by typing:  
`configure prompt orlando_unit`
2. Configure the T1 values for your network. If the SC-IP's T1 default values (shown below) apply to your network, you do not need to re-enter them. Otherwise, use the CLI to set any T1 configuration value as required. Type `?` following any command, sub-command or parameter for context-sensitive online help.

```
configure t1 clock-source line
configure t1 fd1 ANSI-T1.403
configure t1 framing ESF
configure t1 lbo ds1 0.0dB
configure t1 linecode B8ZS
configure t1 loopback INHIBIT
configure t1 timeslots 1-24
```

---

**Note** If desired, type `show T1` to check your current T1 entries. Modify, if needed.

---

3. Configure the Ethernet IP address and mask by typing:  
`configure interfaces ip-address ethernet0 172.16.5.6 255.255.0.0`
4. Enter a description of the Ethernet interface by typing:  
`configure interfaces description ethernet0 "orlando_lan"`
5. Enable the Ethernet interface by typing:  
`configure interfaces enable ethernet0`
6. Configure the serial0 interface (at the PPP port). Type `?` following any command, subcommand or parameter for context-sensitive online help.  
`configure interface link-encap serial0 ppp`
7. When the Warning message appears, type `Y`.
8. Describe and enable the interface by typing:  
`configure interface description "NOC_miami"`  
`configure interface enable serial0`
9. Type `show interfaces` to check the interface entries. Modify, if needed.
10. Configure and enable Terminal Server Port by typing:  
`configure term-serv ip-address term1 192.160.1.12`  
`configure term-serv description term1 "terminal_device"`  
`configure term-serv enable term1`

- Steps 11 through 14 describe setting up static routes for the PPP network.

---

**Note** *If a local router is used at the NOC instead of a SC-IP, consult your router documentation for static route configuration guidelines.*

---

- Set up a static route at a remote site towards the NOC by typing:

```
configure ip-route add serial0 128.1.0.0 255.255.0.0 128.1.1.10 1
```

- Set up a static route at a NOC SC-IP towards a remote “orlando\_lan” 172.16.0.0 by typing:

```
configure ip-route add serial0 172.16.0.0 255.255.0.0 172.16.5.6 1
```

As an alternative, to set up a static route only to a particular host instead of to the whole network, set up the static route with mask 255.255.255.255. For example, to set up LAN Device #1 on 172.16.0.0 network with an IP address of 172.16.5.10, type:

```
configure ip-route add serial0 172.16.5.10 255.255.255.255
172.16.5.6 1
```

- Set up a static route at the NOC towards a LAN Device #1 connected at the Terminal Server port by typing:

```
configure ip-route add serial0 192.160.1.12 255.255.255.255
172.16.5.6 1
```

---

**Note** *When setting up static routes, type the short-cut **conf ip a ?** to get a list of all required arguments.*

---

- Type **disable** to turn off the supervisor access.

- Turn Admin mode on by typing **enable** and entering the **admin** password. The command prompt will now contain the % character.

- Add admin and supervisor accounts by typing:

```
configure accounts add admin mickey
configure accounts add supervisor minnie
```

- Add a user account and password by typing:

```
configure accounts add daffy duck
```

- You have completed the configuration of the SC-IP in the selected example network. You can check your settings with the following two techniques:

- Type **show config** to display the current configuration of the SC-IP.
- Test your example network by pinging from your PC/workstation at the NOC to equipment at the remote office, and vice-versa.

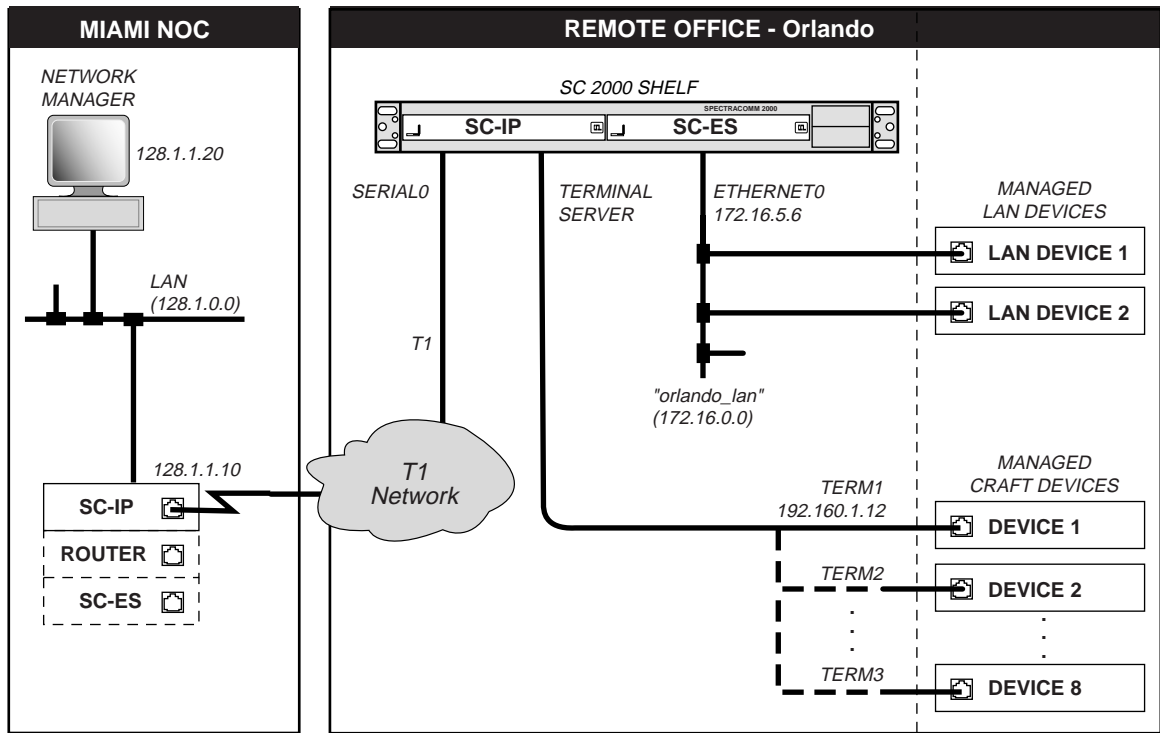


Figure B-2 Example: SC-IP in Back-to-Back Mode (using PPP Protocol)



### Example 3: Configuring SC-IP for LAN-X Mode

After initializing the SC-IP for configuration, perform the steps in this example to practice configuring two SC-IPs to operate in LAN-X mode using a T1 network ([Figure B-3](#)).

---

**Note** This exercise is intended to demonstrate LAN-X operation and does not include some general configuration commands (i.e., **modem**, **accounts**, **serial1**, **term-serv**, **snmp**). These command strings are exemplified in the previous exercises.

---

#### Configure the “NOC” SC-IP

1. Attach the hyperterminal to the craft port of the SC-IP that represents the NOC unit.
2. After the initializing sequence, set the system prompt for the NOC unit by typing:

```
configure prompt "NOC_SC-IP"
```

3. Configure the T1 values for the SC-IP for your network. If the SC-IP's T1 default values (shown below) apply to your network, you do not need to re-enter them. Otherwise, use the CLI to set any T1 configuration value as required. Type **?** following any command, sub-command or parameter for context-sensitive online help.

```
configure t1 clock-source internal
configure t1 fd1 ANSI-T1.403
configure t1 framing ESF
configure t1 lbo ds1 0.0dB
configure t1 linecode B8ZS
configure t1 loopback INHIBIT
configure t1 timeslots 1-24
```

4. Type **show T1** to check the T1 current values. Modify, if needed.
5. Configure and enable the Ethernet0 interface, IP address and IP mask by typing:

```
configure interfaces enable ethernet0
configure interfaces ip-address ethernet0 172.16.5.6 255.255.0.0
```

6. Configure and enable the serial0 interface for LAN-X mode by typing:

```
configure interfaces link-encap serial0 lanx
configure interfaces enable serial0
```

7. Configure ethernet0 interface for LAN-X Management by typing:

```
configure lanx-router mgt ethernet0
```

8. You have completed the configuration of the NOC SC-IP in LAN-X mode in the example network. You can check your settings with the following two techniques:

- Type **show config** to display the current configuration of the SC-IP.
- Test your example network by pinging from your PC/workstation at the NOC to equipment at the remote office, and vice-versa.

### Configure the “Remote” SC-IP

1. Attach the hyperterminal to the craft port of the SC-IP that represents the remote site unit.
2. After the initializing sequence, set the system prompt for the remote unit by typing:

```
configure prompt "REM_SC-IP"
```

3. Configure the T1 values for the SC-IP for your network. If the SC-IP's T1 default values (shown below) apply to your network, you do not need to re-enter them. Otherwise, use the CLI to set any T1 configuration value as required. Type `?` following any command, sub-command or parameter for context-sensitive online help.

```
configure t1 clock-source line
configure t1 fd1 ANSI-T1.403
configure t1 framing ESF
configure t1 lbo ds1 0.0dB
configure t1 linecode B8ZS
configure t1 loopback INHIBIT
configure t1 timeslots 1-24
```

4. Type `show T1` to check the T1 current values. Modify, if needed.
5. Configure and enable the Ethernet0 interface, IP address and IP mask by typing:

```
configure interfaces enable ethernet0
```

6. Configure and enable the serial0 interface for LAN-X mode and for inband management by typing:

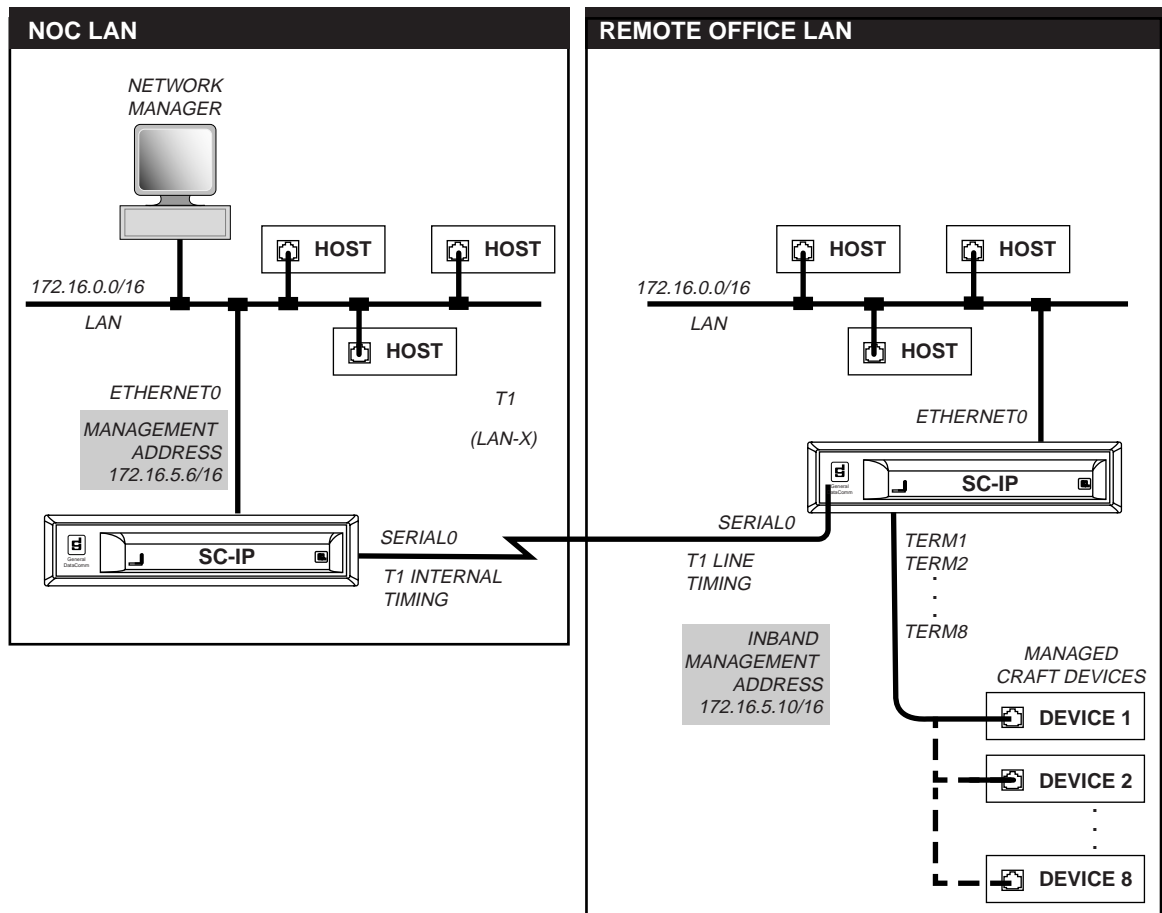
```
configure interfaces link-encap serial0 lanx
configure interfaces ip-address serial0 172.16.5.10 255.255.0.0
configure interfaces enable serial0
```

7. Configure serial0 interface for LAN-X Management by typing:

```
configure lanx-router mgt serial0
```

8. You have completed the configuration of the remote SC-IP in LAN-X mode in the example network. You can check your settings with the following two techniques:

- Type `show config` to display the current configuration of the SC-IP.
- Test your example network by pinging from your PC/workstation at the NOC to equipment at the remote office, and vice-versa.



**Figure B-3** Example: SC-IPs in LAN-X Mode ("Flat" IP Network)







---

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