General DataComm
Best Connections in the Business

SpectraComm ES

Fast, Switched, Scalable Ethernet Connectivity to Remote LANs

SC Ethernet Switch Highlights

- NEBS-compliant ethernet switching for applications where high-quality, high-reliability, security and low-cost are needed.
- Scalable 10/100Mbps connectivity in 9- or 18-port increments, using the existing infrastructure.
- Ideal for remote LAN access applications when used with its companion product, the SpectraComm IP static router, or any other bridge/router device.
- Flexible and secure management options.

Introduction

The SpectraComm Ethernet Switch provides fast ethernet connectivity for internal networks, allowing efficient and secure access to LAN-attached equipment.

As part of the GDC SpectraComm family of products, SpectraComm Ethernet Switches offer the high reliability and NEBS safety required in carrier or mission-critical enterprise environments. SC-ES can be deployed as a replacement to legacy hubs or in new installations where fast ethernet switching is desired.

Network Performance

SpectraComm ethernet switches (SC-ES) are a cost-effective means of dramatically increasing network performance. SC-ES reduces collisions and eases congestion problems on existing shared-hub networks. Unnecessary network traffic is eliminated as SC-ES delivers dedicated bandwidth for each of the ports.

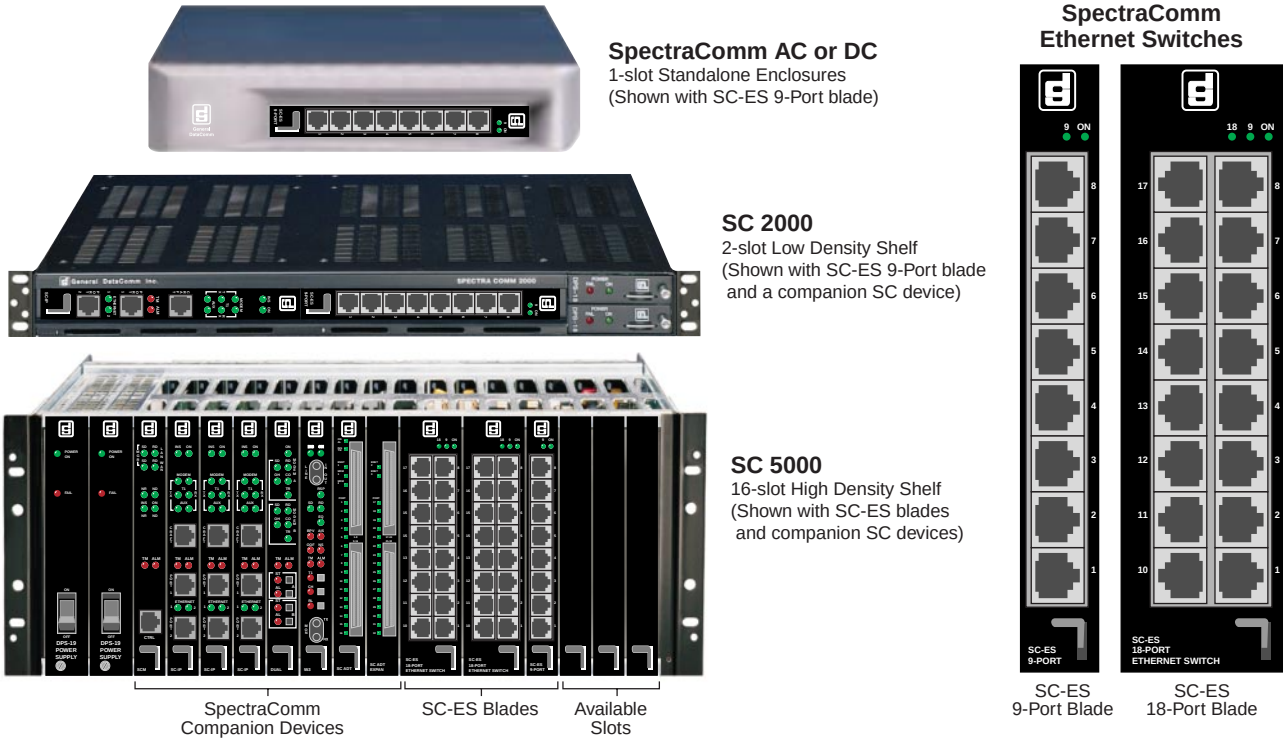
9-Port and 18-Port Models

SC-ES 9-Port is a single-width, 7-inch by 9.5-inch SpectraComm card with nine RJ45 ports. SC-ES -18 Port is a double-width, 7-inch by 9.5-inch SpectraComm card with 18 ports. SC-ES can operate as a standalone switch or, for greater port density, can employ one or two ports as a logical uplink to another switch/hub device.

Secure and Managed

SC-ES switches can be monitored and managed using standard protocols: Telnet, SNMP, and HTTP (web), and local management via a craft interface. Management access is multi-level password-protected with inactivity timers. For additional security during periods of heightened alert, SNMP and web access may be disabled.

Figure 1: ETHERNET SWITCHING in a SPECTRACOMM SYSTEM



SC-ES APPLICATIONS

The primary SC-ES application is to provide low-cost, fast ethernet switch connectivity to the carrier or enterprise internal LAN network. The NEBS-compliant SC-ES can be deployed anywhere within the network: in the central office, in the remote office or in CEV / Hut environments.

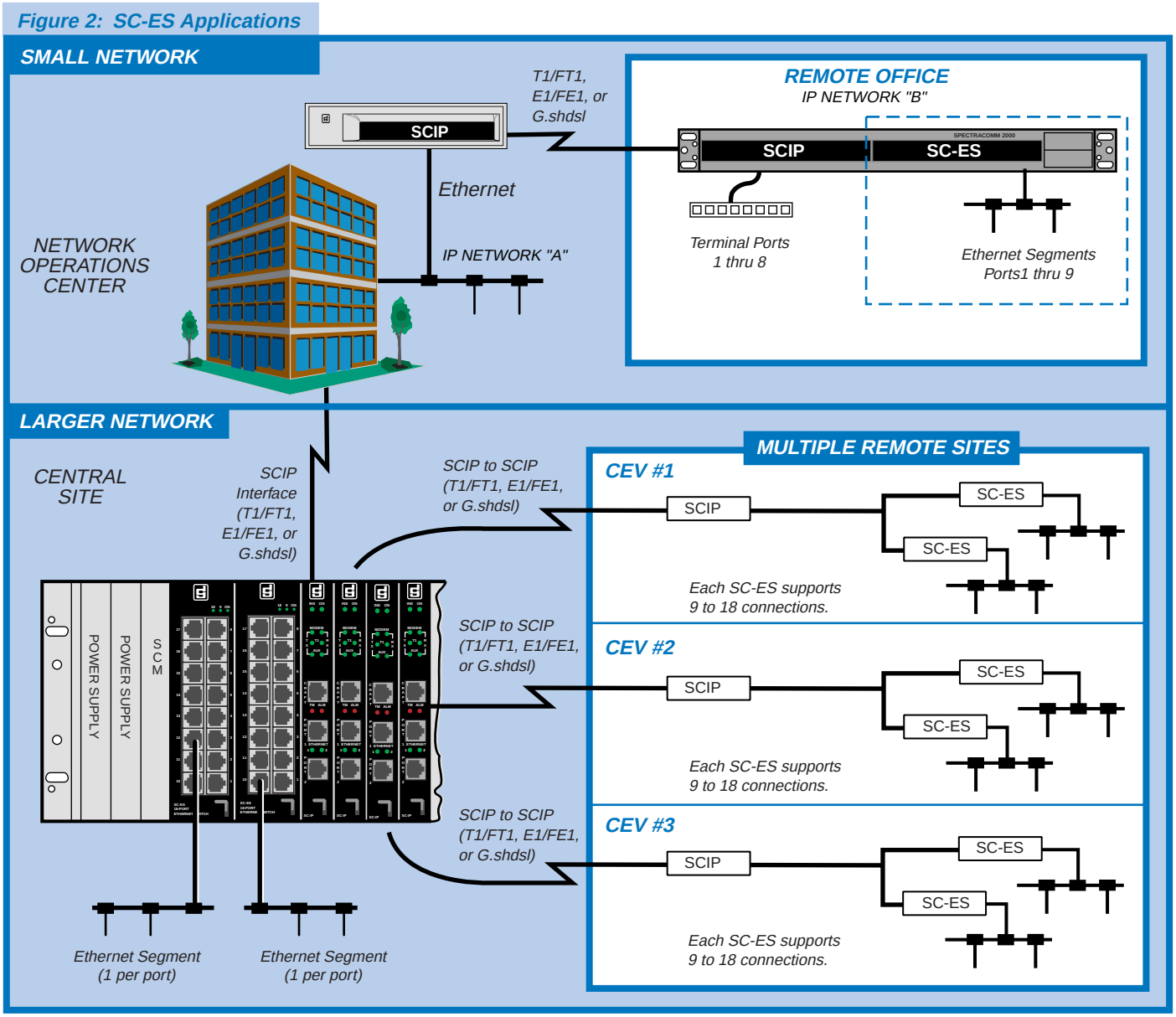
SC-ES allows the segmenting of attached LAN devices to improve network performance and provides a 100Mbps full- or half-duplex channel for servers. It allows a network to be mixed (10 and 100Mbps) for optimal price / performance ratio, and is ideal for relieving bandwidth bottlenecks and providing faster response times. Using ethernet switch technology, SC-ES supports cabling distances of up to 100 meters by eliminating the propagation delays normally found with hubs / repeaters.

Extending Small and Large Networks

The SC-ES may be deployed to extend connectivity and management in a small or large network. In a small network application, the SC-ES is installed at the remote site with one of the Ethernet ports connected to any router or bridge at that site. The remaining SC-ES ports may be used to connect as many as 17 LAN devices at that site.

In larger network applications, equipment can be accessed using SC-ES at a Central Office location which has multiple remote sites (CEVs). Similarly, multiple COs can also deploy the SC-ES. In such large networks, SC-ES provides LAN connectivity from the Network Operations Center (NOC) to a Central site and all the way out to multiple remote sites. Router / bridge functions can be provided by customer equipment or by SpectraComm IP devices (T1 / FT1, E1 / FE1, or DSL) companion products to the SC-ES.

Figure 2: SC-ES Applications



ADDITIONAL FEATURES

- Employs GDC's 'Smart CLI', an interactive command line interface, and the web-based CLI interface.
- Allows direct switch-to-switch connection via the Auto-Sense feature which detects and corrects for crossover cables.
- Auto-Negotiates for 10 or 100 Mbps port speed, full- or half-duplex modes and enabled / disabled flow control.
- Auto-Learns network addresses for up to two thousand Unicast MAC addresses and builds connections between network elements.
- Port-based and MAC-based security prevents illegal access and cable connections.
- Supports TACACS+ authentication protocol (optional) which centralizes security at a network access server.
- Efficient configuration of multiple SC-ES devices via ASCII batch file upload / download.
- Responds to HPOV polling and Auto Discovery
- High performance 'run from ram' architecture includes Running, Primary and Standby versions of software.
- Software can be upgraded via standard TFTP or FTP.
- Port-based 802.1Q tag-based VLAN functionality with GVRP support
- Port-based 802.1P DiffServ-based packet classification
- Supports 802.1D / 1w Spanning Tree Protocol
- With a future upgrade, SCES will support configuration via an intuitive web (HTTP) interface.

NEBS-Compliant - Telco Tough

The rigorous Network Equipment Building System standards (NEBS) is a requirement for Central Office equipment located in U.S. public switched network centers, and a universal measure of network product excellence for carriers. GDC's family of NEBS-compliant products meet the stringent safety, environmental, shock and vibration standards that meet or exceed the "Telco Tough" criteria.

When the SC-ES 9-Port device is installed in the 2-slot SpectraComm 2000 shelf, it also meets certain requirements of the NEBS GR-2834-CORE document: Severe Climatic Conditions (R5-2) and Temperature Cycling Normal Conditions (R5-3). Note that the Temperature Cycling Normal Conditions Test (R5-3) was modified to run above the normal -40 to +60 deg. C. range. Actual temperature tested is from -40 to +75 deg. C.

For high density applications, both models of the SC-ES device are designed for NEBS Level III compliance and can be installed in GDC's 16-slot SpectraComm / UAS shelves.

In standalone, non-NEBS standalone applications, a single SC-ES 9-port card installs easily in a variety of SpectraComm AC or DC enclosures.

Flexible and Scalable Connectivity

Any SpectraComm device, from SC202 to SC800 T3, can be co-located in the shelf with SC-ES cards, providing a unified, flexible, managed shelf environment that is scalable to the carrier or enterprise network requirements. Typical shelf configurations can combine the SpectraComm Ethernet Switch cards with the SpectraComm IP cards, DSUs, modems, LTUs, and multiplexers.

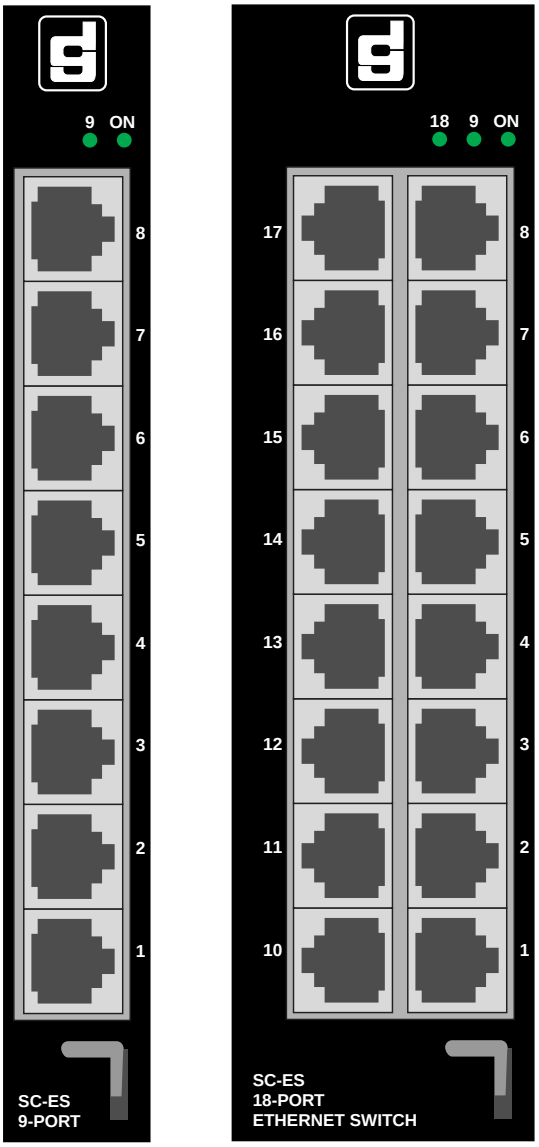


Figure 3: SC-ES Front Panel Views

SC-ES MANAGEMENT INTERFACES

SC-ES configuration is managed through SMART CLI, an interactive command line interface. Using CLI an authorized user can monitor or configure any SC-ES in the network from a terminal or Telnet connection or through any popular web browser. Using the SC-ES embedded SNMP agent, authorized users have access to the unit via any standard SNMP controller.

Secure Access and Protection

Management access is protected by several robust security features:

- User- and Supervisor-level password protection authorizes every access attempt.
- Inactivity logoff prevents hacks through 'left on' equipment
- Enable / Disable of SNMP, HTTP, Telnet, FTP and TFTP services deters hacking through these protocols.
- Provides MAC-based or port-based security against illegal MAC addresses or illegal cable connections.
- Supports TACACS+ authentication protocol (optional) which centralizes security at a network access server.

SMART CLI Features

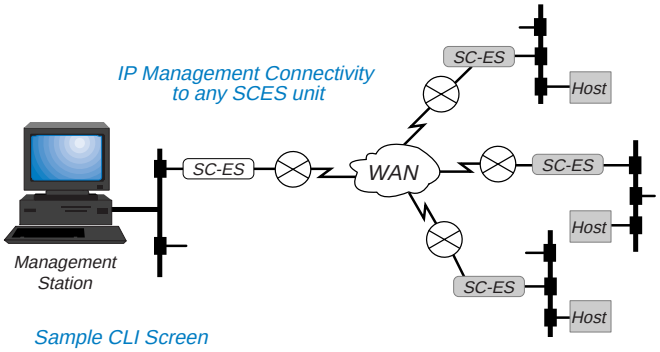
General DataComm's SMART CLI has a look and feel that will be familiar to most field personnel, with the benefit of several enhancements over most standard CLIs, such as:

- Recognition and auto-expansion of abbreviated commands and sub-commands.
- Auto-prompts for required command arguments.
- General help at the command prompt.
- Context-sensitive help at the command string.
- Command line recall for easy re-entry or review of previous commands.
- Advanced utility for generating downloadable ASCII configuration files.
- SC-ES upgrades via TFTP or FTP downloads of software versions and configuration data.
- Command entry from a Telnet or terminal connection.
- Command entry at the web-based CLI webscreen.

Centralized and Versatile Options

Figure 4 demonstrates centralized management of a system of SC-ES units in a carrier or enterprise network. From this central site, the user can access SC-ES units via the desired interface: Terminal or Telnet CLI, Web-based CLI, or SNMP (not shown.) The number of concurrent management sessions is determined your workstation resources.

Figure 4: SC-ES Management Interface Options



Sample CLI Screen

```
SCES-9% configure ?
___________Help for "configure"_____________________________________________
accounts    Configure usernames and passwords; clear login statistics
banner      Configure login banner
inactivity  Configure inactivity timer; requires 1 parameter(s)
mgt         Configure management parameters
mirroring   Configure port mirroring parameters
ports       Configure port parameters
prompt      Configure custom prompt; requires 1 parameter(s)
security    Configure port security parameters
services    Configure HTTP, SNMP, TELNET, TFTP & FTP Services
snmp        Configure SNMP Server parameters
switch      Configure ethernet switch parameters
tacacs+     Configure TACACS+ query parameters
time        Configure time service parameters
```

Sample Web Screens

SpectraComm ES

YOUR SYSTEM NAME (172.16.5.127)

clear	Reset functions
configure	Configure system parameters
help	Description of the command line interface and help system
show	Show system parameters
reboot	Halt and perform a reboot
netstat	Show TCP socket connections
services	Show/Enable/Disable HTTP, SNMP, TELNET, TFTP & FTP Services
logout	End this web session.

SpectraComm ES

Statistics for Port 1

RX Octets:	3936583	TX Octets:	147368
RX Undersize Packets:	0	TX Dropped Packets:	0
RX Pause Packets:	0	TX Broadcast Packets:	44
RX 64 Octet Packets:	49518	TX Multicast Packets:	0
RX 65-127 Octet Packets:	5997	TX Unicast Packets:	1844
RX 128-255 Octet Packets:	647	TX Collisions:	0
RX 256-511 Octet Packets:	459	TX Single Collisions:	0
RX 512-1023 Octet Packets:	0	TX Multiple Collisions:	0
RX 1024-1522 Octet Packets:	1	TX Deferred Transmit:	0
RX Oversize Packets:	0	TX Late Collisions:	0
RX Jabbers:	0	TX Excessive Collisions:	0
RX Alignment Errors:	0	TX Frame In Disc:	0
RX FCS Errors:	0	TX Pause Packets:	0
RX Good Octets:	3936583		
RX Dropped Packets:	0	Admin State:	On
RX Unicast Packets:	2387	Link Status:	Up
RX Multicast Packets:	5521	Auto Negotiate:	Enabled
RX Broadcast Packets:	48714	Flow Control:	Disabled
RX SA Changes:	51438	Port Speed:	100
RX Fragments:	0	Duplex Status:	Full
RX Excess Size Disc:	0	MDIX Status:	MDIX
RX Symbol Error:	0	Channel Polarity:	Normal

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SC-ES Physical Specifications

SC-ES 9-Port Dimensions (1-slot blade)

Width: 178 mm (7.0 in.)
Height: 21 mm (0.81 in.)
Depth: 241 mm (9.5 in.)
Weight: 0.28 kg (10 oz.); Shipping weight: 0.74 kg (1 lb 10 oz)

SC-ES 18-Port Dimensions (2-slot blade)

Width: 178 mm (7.0 in.)
Height: 42 mm (1.62 in.)
Depth: 241 mm (9.5 in.)
Weight: 0.33 kg (12 oz.); Shipping weight: 0.78 kg (1 lb 12 oz)

Environmental Specifications

Non-Operating

Temperature: -40 to 70 degrees C (-40 to 158 degrees F)
Relative Humidity: 5% to 95%
Altitude: up to 12,191 m (40,000 ft)

*Operating**

Temperature: 0 to 50 degrees C (32 to 122 degrees F)
Relative Humidity: 5% - 90% non-condensing
Altitude: -60 to 4,000 m (-197 to 13,123 ft)

*The SC-ES 9-port device in the SC2000 shelf meets certain requirements of the NEBS GR-2834-CORE document: Severe Climatic Conditions (R5-2) and Temperature Cycling Normal Conditions (R5-3).

Electrical Specifications

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

Power Dissipation (9-Port): 6 Watts maximum
Power Dissipation (18-Port): 9 Watts maximum

Compliance & Compatibility

Safety: UL Approved
NEBS Level III Certified
EMI: FCC Part 15 Class A Approved
Telco: FCC Part 68 Approved
Quality Assurance: ISO 9001: 2000 Certified

Security and Authentication

Username and Password access

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

Individual disabling of HTTP, SNMP, Telnet, FTP and TFTP

HTTP, Telnet, FTP and TFTP timeouts

TACACS+ Authentication Protocol (optional)

Port-based and MAC-based Ethernet Security

Management Options

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

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

SNMP support for standard statistics: RFC 1213 (MIB)

Operational Specifications

Modes of Operation

Used as standalone switch providing 9 or 18 port-connectivity.

For greater port density requirements, one or two ports can be used as logical uplinks to another switch/hub device.

Physical Interfaces

Rear Panel Craft Port: TIA/EIA-232

Front Panel Ethernet Ports (8 or 16 ports):
RFC1213 MIB-2; RFC1643 Ethernet-like MIB; RFC 1493 Bridge MIB
IEEE 802.3, 802.3U, 802.3x providing compatibility with all industry standard Ethernet and fast Ethernet devices.

Rear Shelf Slot Ethernet Ports (1 or 2 ports): Can be used as logical uplinks. Same specifications as for Front Panel ports.

Statistics

RX and TX Octets
RX and TX Pause Packets
RX and TX Dropped Packets
RX and TX Unicast Packets
RX and TX Multicast Packets
RX and TX Broadcast Packets
RX Undersize/Oversize Packets
RX Jabbers
RX Alignment Errors
RX FCS Errors
RX SA Changes
RX Fragments
RX Excess Size Disc
RX Symbol Error
TX Collisions
TX Deferred Transmit
TX Frame In Disc

SNMP Traps

Cold Start trap
Disconnect Port trap
Illegal MAC Address trap
Authentication Failure trap

USDA
RUS
Accepted

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