Vanguard Managed Solutions

Vanguard Applications Ware
Basic Protocols

Serial Line IP (SLIP)

Notice

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To comment on this manual, please send e-mail to LGEN031@vanguardms.com

Overview

Introduction

This manual describes Serial Line IP (SLIP) packet framing protocol available in the Vanguard Applications Ware, for use with Vanguard products. This manual supplements the *Vanguard Configuration Basics Manual* by describing additional features for SLIP support.

About the Serial Line IP

The Serial Line IP (SLIP) packet framing protocol defines a method of encapsulating IP packets for point-to-point serial connections running TCP/IP. The SLIP software feature connects X.25 and Frame Relay service to TCP/IP hosts, gateways, and routers that do not natively support any of these services yet can use serial lines.

SLIP is one of two standard mechanisms (the other is PPP) for transmitting TCP/IP packets over serial lines versus LAN lines. SLIP is a standard part of all TCP/IP packages and is quickly becoming a standard feature of various computer operating systems: SLIP has been a standard utility in UNIX, is a component of Windows 95/NT 4.0.

SLIP, defined by RFC 1055, allows small remote LANs and PCs access to router networks across an X.25 or Frame Relay (supported via RFC 1490 encapsulation) public or private network.

Related Documentation

You should also familiarize yourself with the *Vanguard Configuration Basics Manual* (Part Number T0113).

In This Manual

Features

Introduction

SLIP support on the 65xx and Vanguard platforms includes the following features:

- Support for RFC 1490 encapsulation of IP datagrams
- 115 kbps asynchronous ports
- Support for RFC 1055
- Password-protected access to SLIP ports

Support for RFC 1490

A device connected to a SLIP port and a FRAD appears to a router as an RFC 1490 host.

A SLIP port can be configured to insert an RFC 1490 NLPID header into all packets forwarded to the adjacent channel (through the PVC connection) and strip the header from all packets arriving from the adjacent channel.

115 kbps Async Ports

A SLIP port supports 8 bit/no parity/1, 1.5, or 2 stop bits settings. Maximum port speed depends on the hardware platform:

- 38.4 kbps on the 6500***PLUS***
- 115 kbps on the 6520
- 38.4 kbps on the Vanguard

Support for RFC 1055

SLIP on the Vanguard platforms adhere to RFC 1055, which defines two special characters:

- END (octal 300)
- ESC (octal 333)

To send a packet, a SLIP host starts sending data in the packet. If a data byte is the same code as an END character, a two-byte sequence of ESC and octal 334 is sent instead.

If a data byte is the same as an ESC character, a two-byte sequence of ESC and octal 335 is sent instead. When the last byte in the packet has been sent, an END character is transmitted.

This SLIP implementation always throws away the zero-length IP packet. If noise exists on the line, data received due to the noise is discarded without effecting the following packet.

Password Protection

The SLIP port can optionally be configured for password protection using the standard Network User Identification database to configure and authenticate user accounts. After three unsuccessful attempts to log in, the SLIP port initiates EIA-level disconnection. For more detailed information, refer to the *Vanguard Basics Manual*.

How You Use SLIP

You implement SLIP as another type of port on a Vanguard device. The SLIP port supports PVC-type connections to other protocol stacks, including X.25, Annex G, and Frame Relay Bypass.

The SLIP port also supports SVCs over X.25 and Annex G.

SLIP Advantages

SLIP offers the following advantages:

- It offers SLIP to TCP/IP using RFC 1490 Frame Relay encapsulation, as shown in Figure 1, which illustrates a network with remote PCs accessing an IP host off a router.
- Using SLIP port on a Vanguard product is an economical solution compared to buying an Ethernet Network Interface Card, an IP router, and an external DSU—then cabling it all together.
- There is no need to contend for Ethernet resources as found when dialing into a central site router supporting dial up access.

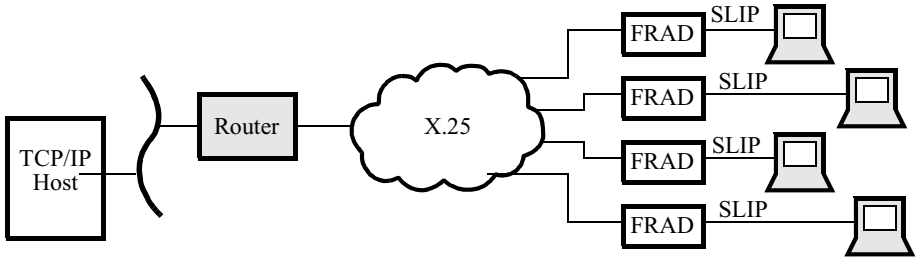


Figure 1. SLIP with RFC 1490

Limitations

Because SLIP is merely a packet framing protocol, it only defines a sequence of characters that frame IP packets on a serial line. No addressing, packet type identification, or error detection/correction are provided.

Typical SLIP Applications

Introduction

Using a Frame Relay Access Device (FRAD) with SLIP support lets users running remote TCP/IP applications connect over Frame Relay to headquarters LANs and/or WANs.

The FRAD links remote PCs, workstations, communications servers, and networks to a standard router that supports TCP/IP over Frame Relay (per RFC 1490).

The frame relay network concentrates all remote traffic into a single access line to the router, cutting carrier services and internetworking equipment costs.

SLIP Support

Typical applications with SLIP support include:

- Single remote PC to a headquarters router
- Small remote LAN to a headquarters router
- Communication server to a headquarters router

Figure 2 illustrates typical applications for FRADs.

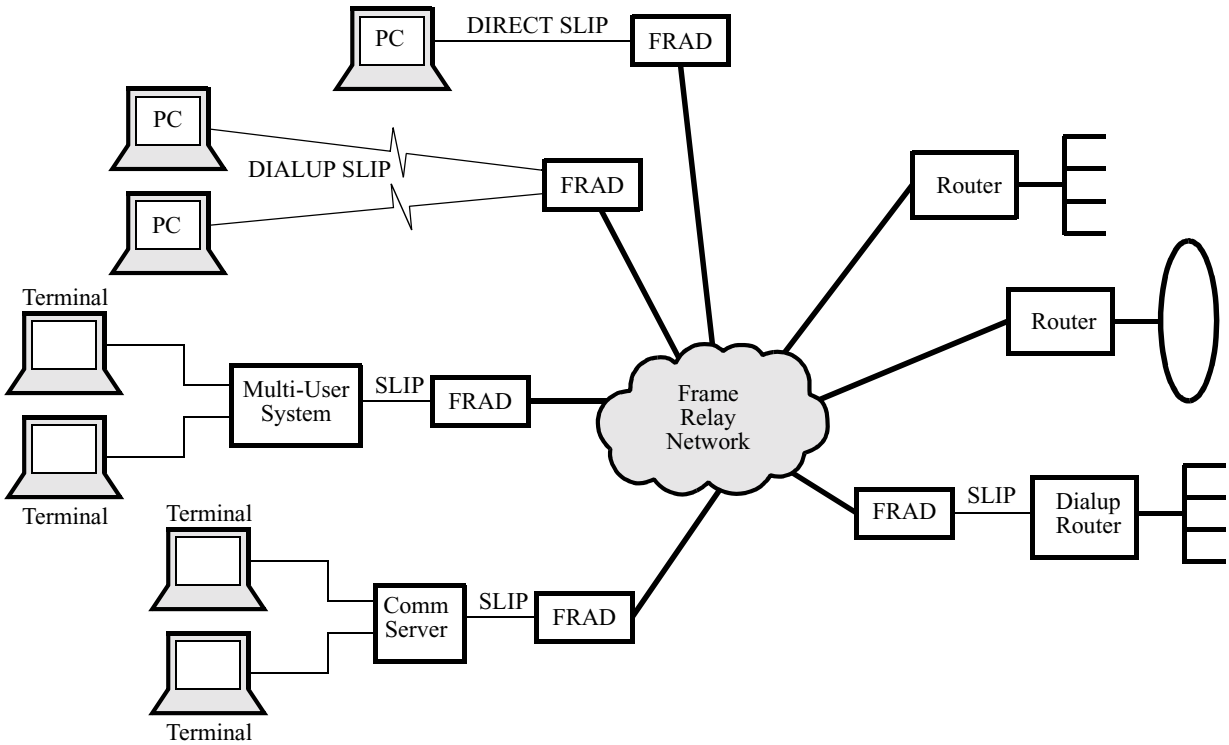


Figure 2. Typical SLIP Applications

Single Remote PC to a Headquarters Router

The link between the FRAD and the PC can be direct (NULL modem) or dialup. The FRAD supports a number of SLIP ports acting as a SLIP server. A multi-user system (for example, UNIX host) with dumb terminals is a variation of this.

Small Remote LAN to a Headquarters Router

An inexpensive dialup router or a general purpose computer (equipped with a Network Interface Card and a serial port) can act as an IP gateway.

Most low-end dialup routers and general purpose computers do not support frame relay interfaces; therefore, a FRAD could be a cost-effective alternative to upgrading to a more expensive router.

Communication Server to a Headquarters Router

Some communication servers support IP routing, integrating functionality of the terminal server and the router.

SLIP Configuration Sequence

Introduction

This section describes procedures used to configure SLIP.

SLIP Configuration

You can configure a SLIP port to support:

- PVC connections to X.25, Frame Relay Bypass, and Annex G protocol stacks. The SLIP port acts as a protocol converter, converting SLIP framing to RFC 1490 encapsulation.
- PVC connections to the IP router via a LAN connection table entry, which represents the IP router interface. The SLIP port is used as another interface on the router.
- SVC connections over X.25 and Annex G; the SLIP port can accept X.25 calls, but cannot originate calls.

Configuring the SLIP Port Record

Introduction

This section describes how to navigate through the Control Terminal Port (CTP) Main menu and access the SLIP port record. Refer to the *Vanguard Basics Manual* for more detail about CTP procedures.

Configuring A SLIP Port

The following procedure describes how to configure a SLIP port.

Step	Action	Result
1	From the CTP Main menu, select Configure.	The Configure menu appears.
2	Select Port from the Configure menu.	The Port Configuration menu appears along with a prompt.
3	Enter the number of the port you want to configure.	Press Return. You are prompted to enter information for the port type.
4	Select SLIP as the port type.	After you select SLIP as the port type, the SLIP parameters appear on the screen.

Configure SLIP Port Menu

Figure 3 illustrates the SLIP port menu.

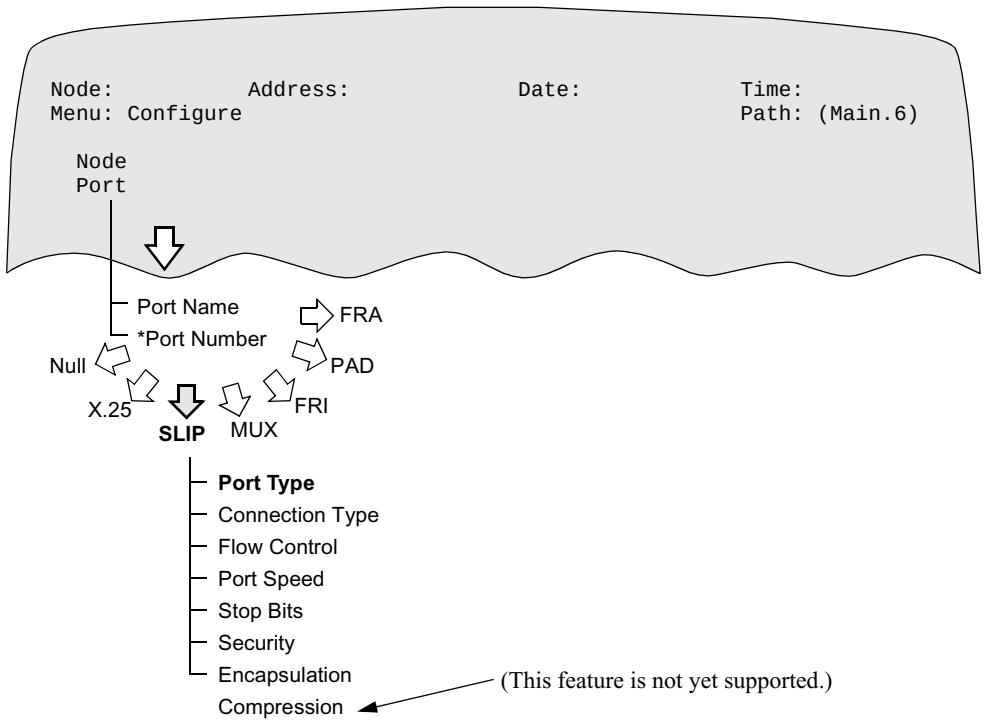


Figure 3. SLIP Port Record

Configuration Parameters

The following parameters make up the SLIP port record.

Note

Unless otherwise indicated, you must perform a port boot to implement a change to SLIP parameters.

Port Number:

Range:	1
Default:	1
Description:	The number of the port to configure, which corresponds to the physical port position at the rear of the unit and constitutes the Port Record reference number.

Port Type:

Range:	NULL, PAD, X25, FRI, FRA, SLIP
Default:	SLIP
Description:	Determines types of ports that can be selected and subsequent prompts that appear. **Note** A change to this parameter requires a node boot to take effect.

Connection Type:

Range:	SIMP, DTR, DIMO
Default:	SIMP
Description:	Defines how EIA signalling should be handled by specifying the control signal handshake and clocking required for a connection to be made on this port. • **SIMP:** simple; no control signals required. • **DTR:** dedicated; requires the data terminal ready (DTR) signal. • **DIMO:** port handshakes with attached dial modem. **Note** For a direct connect to a PC, DTR is recommended.

Flow Control:

Range:	NONE, HARDWARE
Default:	NONE
Description:	Specifies the type of flow control: **NONE:** no flow control. **HARDWARE:** flow control using EIA signals. **Note** SLIP is not able to support XON/XOFF.

Port Speed:

Range:	50-38.4k
Default:	9600
Description:	Specifies port speed in bits per second when using internal clocking. **Note** Speed of 38.4 kbps can only be used on CPU+ cards.

Stop Bits:

Range:	1, 1.5, 2
Default:	1
Description:	Specifies the number of stop bits: • **1:** 1 stop bit • **1.5:** 1.5 stop bits • **2**: 2 stop bits

Security:

Range:	NONE, PASS
Default:	NONE
Description:	Determines level of security by specifying access control to the port. • **NONE:** no access control. • **PASS:** port is protected by the password (account name and password configured in the NUI table).

Encapsulation Type:

Range:	NONE, RFC 1490
Default:	NONE
Description:	Determines whether an RFC 1490 header should be added by specifying the data encapsulation type.

Configuring a PVC to FRI Bypass Station

Overview

If you connect a SLIP port to FR Bypass, a PVC is required because FR Bypass only supports PVCs. No standard exists for supporting FR SVCs.

Configuration

Perform the following steps to configure a PVC to FRI Bypass Station.

Step	Action
1	Configure the SLIP Port; refer to "Configuring the SLIP Port Record" earlier in this document.
2	Configure the Node Record.
3	Configure the FRI port.
4	Configure the FRI station. **Note** There are two types of stations: Annex G and Bypass. You can define a number of PVCs only for Annex G.
5	Configure the PVC Setup Table Source parameter as SLIP, port # (SLIP-#) and the Destination parameter as Frame Relay Bypass port #, station # (FRI-#S#). Refer to the *X.25 Configuration Basics Manual* for X.25 or the *Frame Relay Option Manual* for Frame Relay Bypass or Annex G concerning step-by-step details.

Configuring a PVC to a Router Interface

Introduction

Perform the following steps to configure a SLIP port to the IP router via a LAN connection table entry, which represents the IP router interface.

Configuration

To configure a PVC to a router interface:

Step	*Action*
1	Configure the SLIP Port; refer to “Configuring the SLIP Port Record.”
2	Configure the Node Record.
3	Connect a SLIP Port and a LAN Connection Table entry.
4	Configure the LAN Connection Table.
5	Configure the PVC Setup Table; refer to the *Vanguard Basics Manual* for step-by-step details.

Configuring SLIP over X.25 Using PVCs

Overview

You can connect a SLIP Port to either X.25 or an Annex G channel using a PVC. When connecting a SLIP port to Annex G stations, X.25 SVCs can be established over an Annex G type of station, because essentially you have an X.25 stack over the FR stack.

Configuration

Perform the following steps to configure SLIP over X.25 using PVCs.

Step	*Action*
1	Configure the SLIP Port; refer to "Configuring the SLIP Port Record" earlier in this document.
2	Configure the Node Record.
3	Configure the FRI port and the FRI station. ■ **Note** The number of PVC channels parameter must be configured to reflect a value other than the default of 0 Or: Configure an X.25 port.
4	Configure the PVC Setup Table. Refer to the *X.25 Configuration Basics Manual* for X.25 or the *Frame Relay Option Manual* for Frame Relay Bypass or Annex G concerning generic configuration procedures.

Configuring SLIP Using SVC

Overview

Perform the following procedures to connect a remote router to a SLIP port using SVC.

Guidelines

Ensure that the remote node on the other side of the WAN is capable of an autocall. A SLIP port only accepts incoming calls; it does not initiate calls.

Refer to the *Vanguard Basics Manual* for generic configuration procedures.

Configuration

Perform the following steps to configure SLIP using SVC.

Step	Action
1	Configure the SLIP Port; refer to “Configuring the SLIP Port Record” earlier in this document.
2	Configure the Node Record.
3	Configure a LAN Connection table entry for autocalling.
4	Create a mnemonic that defines the address of a SLIP Port.
5	Configure the routing table on a remote node (router) to forward the call onto the proper channel (X.25 or Annex G).

Statistics

Introduction

This section describes the statistics used with SLIP. Other statistics are described in the *Vanguard Basics Manual*.

Accessing Detailed SLIP Port Statistics

Detailed SLIP port statistics provide status reports concerning various SLIP port operations. The following procedure describes how to view Detailed SLIP port statistics.

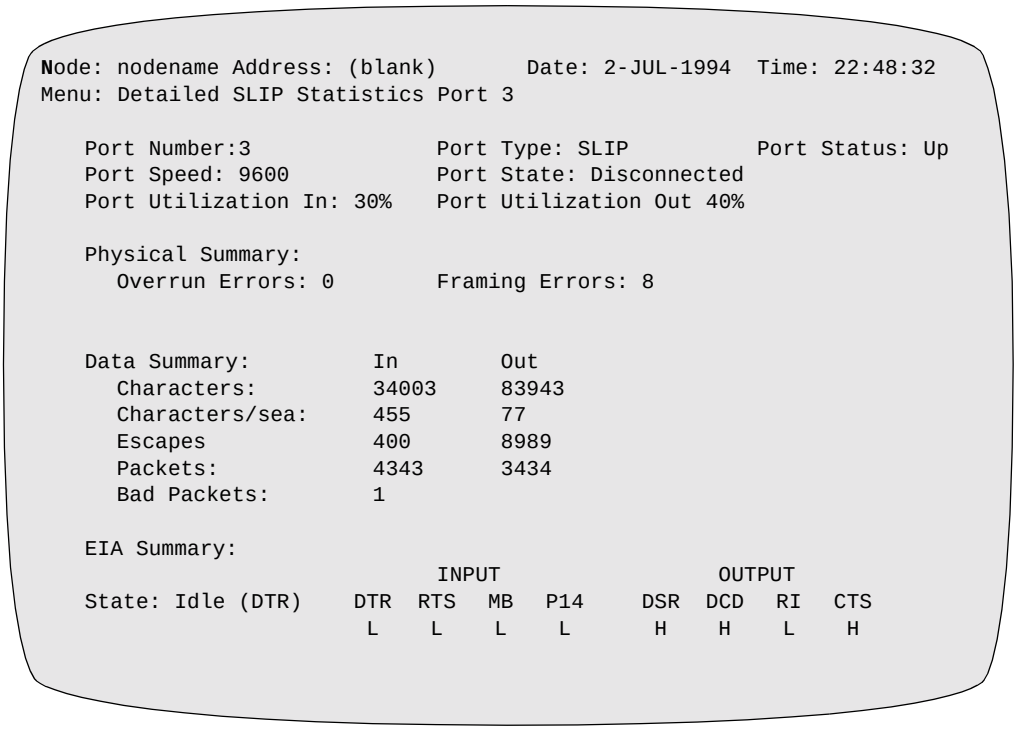
Step	Action	Result
1	From the CTP Main menu, select Status/Statistics.	Status/Statistics menu appears.
2	Select Detailed Port Statistics from the Status/Statistics menu.	A prompt appears.
3	Enter the number of the selected port you want statistics on.	Press Return. The Detailed Port Statistics screen for that port appears.

Typical SLIP Statistics Screens

The following figures present sample statistics screens that you may see for a SLIP port. Fields that appear on screen are similar to those in Figures 4 and 5, which reflect SLIP port status.

Detailed S LIP Statistics Screen: Example 1

Fields in the following screen provide detailed statistics on the SLIP port, such as Port Speed, Port Utilization, and Port State.



```
Node: nodename Address: (blank)       Date: 2-JUL-1994  Time: 22:48:32
Menu: Detailed SLIP Statistics Port 3

   Port Number:3              Port Type: SLIP          Port Status: Up
   Port Speed: 9600           Port State: Disconnected
   Port Utilization In: 30%   Port Utilization Out 40%

   Physical Summary:
     Overrun Errors: 0        Framing Errors: 8


   Data Summary:          In        Out
     Characters:          34003     83943
     Characters/sea:      455       77
     Escapes              400       8989
     Packets:             4343      3434
     Bad Packets:         1

   EIA Summary:
                                INPUT                 OUTPUT
   State: Idle (DTR)     DTR  RTS   MB   P14     DSR  DCD   RI   CTS
                          L    L    L    L       H    H    L    H
```

Figure 4. Detailed SLIP Statistics Screen, Page 1

Detailed SLIP Statistics Screen: Example 2

Fields in the following screen provide detailed statistics on the SLIP port, such as Call Summary information.

```
Node: nodename Address: (blank)       Date: 2-JUL-1994   Time: 22:50:32
Menu: Detailed SLIP Statistics Port 3

    Call Summary:

       Connection Type:       SVC
       Encapsulation Type:    RFC 1490
       Connection State:      Connected


       Last Inbound Call:
          Calling Address:    10003
          Calling Address:    20094
          Facilities:
          CUD:                C0010100
```

Figure 5. Detailed SLIP Statistics Screen, Page 2

Detailed SLIP Port Statistics Terms

The following terms appear in the Detailed SLIP port statistics screens.

Term	Description
Port Number:	Indicates a specific port (physical port number) in the node.
Port Type:	Indicates the type of access protocol for this port. This field displays SLIP, indicating that this port is accessed by the SLIP protocol.
Utilization In:	Inbound utilization of the port.
Utilization Out:	Outbound utilization of the port.
Port Status:	Specifies current port status: • Up • Disabled • Busy Out
Port State:	Specifies the current port state: • Disconnected • Login • Connected
Port Speed:	Message transmission in bits per second.
Physical Summary:	Specifies the number of overrun and framing errors since the last node reset.
Data Summary In:	Specifies the number of bytes, SLIP escape characters, packets, and bad packets received on the port. A bad packet is one that contains SLIP protocol errors, which constitute incorrect escape sequences, or one that is shorter than 20 bytes, which is the legal limit for valid IP packets.
Data Summary Out:	Specifies the number of bytes, SLIP escape characters, and packets sent over the port.
EIA Summary:	Indicates the state of EIA control signals.

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