Vanguard Managed Solutions

Vanguard Applications Ware
Multi-Service Feature Protocols

Remote Datascope

Notice

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Overview

Introduction

This manual describes the Remote Datascope feature for Vanguard products. It supplements information found in the *Vanguard Configuration Basics Manual* (Part Number T0113).

Related Documentation

You should familiarize yourself with the *Vanguard Configuration Basics Manual.*

In This Manual

Introduction

What is Remote Datascope?

Remote Datascope is a utility that allows up to five users to concurrently monitor data on ports and connected devices in a Vanguard products node. Remote Datascope allows you to configure monitoring using an interactive session or single command line. Output format can be viewed in either hex or binary format.

Why You Use Remote Datascope

You use Remote Datascope to monitor data traffic on a node, instead of using a more costly Protocol Analyzer. When a problem occurs at a remote node, you can remotely monitor protocol traces, to initiate preliminary testing without going to the site.

Hardware and Software Requirements

Remote Datascope operates on all Vanguard and 650D products. This feature a Customer Software Key (CSK) for operation. Contact your Customer Service representative for additional information.

The PC-based Padscope utility from Symbiotic Services LLC is also required for display of trace data output. The URL is:
http://www.symservices.com/products/

Padscope Win32 version is available for downloading.

What Remote Datascope Monitors

You can access Remote Datascope from a PAD port to monitor ports, devices, and signals, as described in this table:

Type	*Description*	*Protocols Supported*
Port	Monitors data on ports running one of the specified protocols.	• IBM2260 • BSC3270 • SDLC • APAD • BSC2780 • TCOP • X.25 • Frame Relay
Device	Monitors data by device number to or from any devices on a port with the specified protocol.	• SDLC • IBM2260 • BSC3270

Type	Description	Protocols Supported
EIA Signals	Monitors the EIA signals while monitoring the ports running the specified protocols (except for BSC2780 and BSC3270) and displays captured receive and transmit EIA signal levels with time-stamping.	• IBM2260 • SDLC • APAD • TCOP • BSC3270 • BSC2780 • X.25 • Frame Relay

Supported Protocols, Stations, and Devices

This table shows the protocols and traffic handled by Remote Datascope.

For this protocol...	Remote Datascope monitors...
SDLC	Traffic for a station or physical unit (PU).
IBM2260	Single stations and group stations. Remote Datascope monitors a specific station or if the station type is configured as a group, then a set of stations under that group.
BSC3270	Devices and controllers. A controller handles a number of devices. Remote Datascope monitors traffic for either a particular device under a controller or for all devices under the same controller.
X.25	Port (BOP driver), frame, or packet data If the X.25 port is mapped to a ISDN D-channel then frame monitoring can be specified for SAPI 0, 16, or 63.
Frame Relay	Port (BOP driver), frame, station, or Local Management Interface (LMI) channel data.

How Remote Datascope Works for a Single User Session

Figure 1 shows a single user session with Remote Datascope on 6500^{PLUS} nodes.

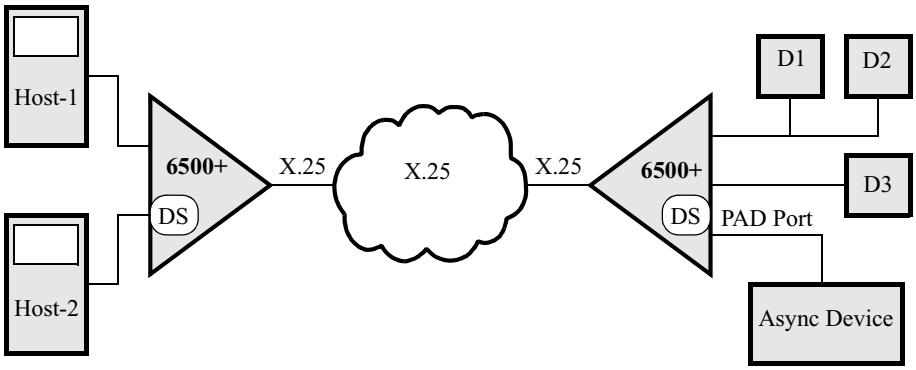

Figure 1. 6500 ^{PLUS} Nodes Using Remote Datascope in a Single User Session

Guidelines for Single-User Sessions

These guidelines apply to a single-user Remote Datascope configuration.

Access

You can access Remote Datascope locally through an asynchronous device connected to a node's PAD port or you can access a remote node's Remote Datascope by making an SVC call to the remote node and specifying the Remote Datascope subaddress.

To format and display the output forwarded by Remote Datascope as a result of a monitoring session, you connect a PC emulating a VT 100 terminal with the Padscope utility provided with Remote Datascope.

Note

You cannot monitor the port through which you connect to the Remote Datascope whether connecting locally or via an access SVC call.

Monitoring Ports

Once connected, you specify the port number on which to monitor transmit and receive data. Along with port data, you can also see any exceptions that occur.

Monitoring Devices

You can also use Remote Datascope to monitor receive data and exceptions of a particular device on a port rather than monitoring total port traffic.

Monitoring EIA Signals

You can, optionally, monitor EIA signals on a port and timestamp the data-segment traces. EIA signals are monitored only on a port. You cannot monitor EIA signals on a device.

Timestamping

When the trace starts, the node's real-time clock timestamps it. Timestamps for subsequent traces are relative to the previous trace, that is, all traces subsequent to the first have a timestamp indicating the amount of time elapsed since the last trace. The timestamp is displayed in units of 10 milliseconds (ms). For example, **T; [365]** means 365 10ms units have elapsed since the last trace was received.

This table describes timestamping.

Type of Monitoring	*Transmit Data*	*Receive Data*
Port	Timestamped following transmission of a data segment to the attached device.	Timestamped after a data segment is received from the attached device.
Device	Timestamped after a data segment is submitted to the port driver of the attached device.	Timestamped after a data segment is received from the driver of the attached device.

Output Format

The data octets captured from the port's Receive or Transmit data stream are converted to a hex format, for example, two hex digits using ASCII characters 0-9 and A-F. Remote Datascope passes a sequence of trace segments tagged as Receive or Transmit data and forwards them through the PAD. You can also view trace data in Binary transfer mode without formatting, but containing the minimum necessary information to format the data at the user end.

Note

In the case of device monitoring, you see data at the frame level.

How Remote Datascope Works with Multiple, Concurrent Users

Figure 2 shows a session with multiple users monitoring data concurrently via Remote Datascope on three 6500*PLUS* nodes. In this example, three nodes are connected across a network. The Remote Datascope resource resides in Node 1. Three users have established connection to Remote Datascope (one local and two from remote nodes: Node 2 and Node 3). The call from Node 2 monitors device 41 and 42, which are connected to port P1 of Node 1. The local call from Node 1 does port monitoring of P1. The user from Node 3 is monitoring the BSC3270 controller 43, connected to P2.

These users could monitor any supported port or device in Node 1.

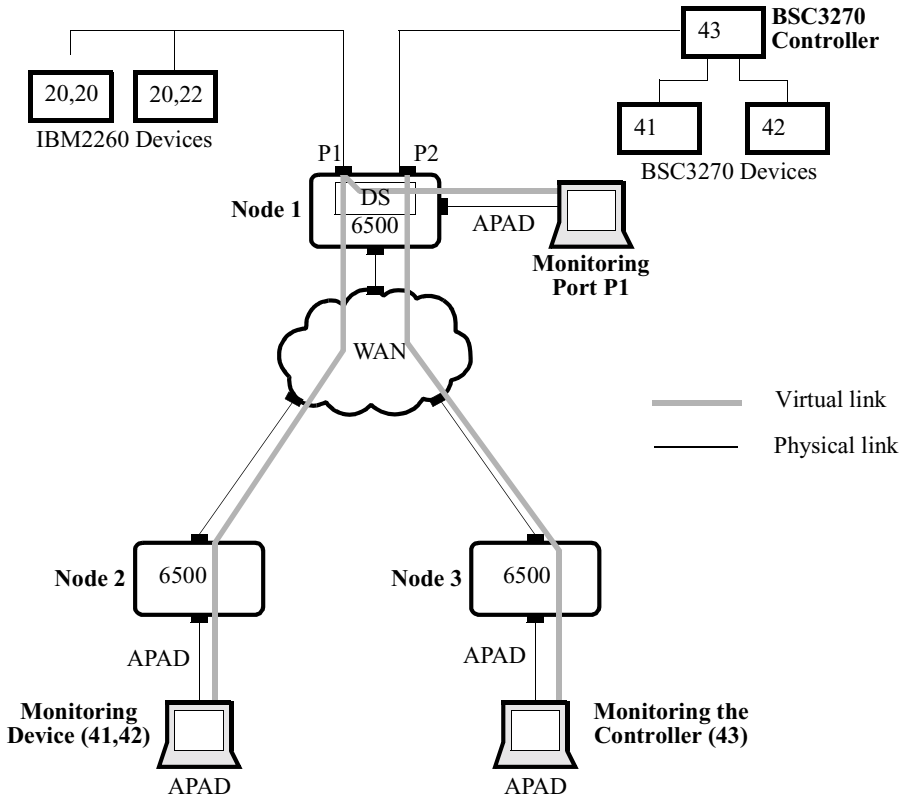

Figure 2. 6500^{PLUS} Nodes Using Remote Datascope in a Multiple-User Session

Guidelines for Multiple, Concurrent Users

These considerations apply to concurrent, multiple-user configurations. You can monitor only one port or device at a time. Other users can monitor the same port (or device) or a different one. These situations can exist:

- All five users can monitor the same port or device.
- All users can monitor different ports or devices.
- Combinations where some users monitor the same port or device and some others monitor different ports or devices can also exist.
- A user can monitor any supported port or device, configure monitoring parameters, and start and stop the monitoring, independent of other users who are simultaneously monitoring. This is true even if the other users are monitoring the same port or device.

When you establish a connection to Remote Datascope and arrive at the **MAIN>** prompt, you can monitor any supported port or device irrespective of the port or device other users monitor.

Limitations

If a sixth user tries to connect to the Remote Datascope, configuration fails, even if the other users are not monitoring. Users connected via an SVC must quit from the Remote Datascope connection, using the **q** command before a sixth user can connect. If you see the **MAIN>** prompt, you are still connected to Remote Datascope.

Configuration

Introduction

You can configure the Remote Datascope by defining configuration parameters interactively in tabular form, or non-interactively using a single-line configuration command. You can configure interactively with or without using the Padscope utility you received with Remote Datascope. With Padscope, parameters are presented on a single menu. Without Padscope, parameter prompts appear in a series as you configure them. Refer to the Padscope help text for instructions on loading and configuration.

Configuration examples and their resulting output appear in the "Output" section on page 17.

Note

Refer to the *Vanguard Configuration Basics Manual* (Part Number T0113) for instruction on entering CSKs for features such as Remote Datascope.

Using ATPAD to Connect to Datascope

To connect to the Datascope module via ATPAD:

Step	*Action*
1	Configure the Protocol ID for the ATPAD port to 01000000.
2	Boot the node or port.
3	Enter **ATD node_address+Datascope_subaddress,** at the **OK** prompt, and press Return. For example: 700700187 **Note** User input is not echoed once connected to Datascope because the ATPAD port does not support echoing.

How to Configure the Subaddress of the Remote Datascope

Remote Datascope is loaded into the node at the default address of "87" (hex). You can change the subaddress of the Remote Datascope, if necessary, using the CTP as described below.

Step	*Action*	*Result*
1	Select **Configure** from the CTP Main menu.	The Configure menu appears.
2	Select **Node**.	The Node record appears.
3	At the **Remote Datascope Subaddress: 87/** prompt, enter the new address.	
4	Select **Node** from the Boot menu.	The node reboots with the Remote Datascope subaddress as specified.

How to Configure a Monitoring Session Interactively

This table describes how to connect an asynchronous device to a PAD port of the node and configure the port.

Step	Action	Description/Result
1	Type the node address followed by the port subaddress, for example, 87, and press **Return** at the * prompt.	This headline appears: **Connected to the Datascope on Node "NODE1" at 4-AUG-1994 11:10:48.** Then, the **MAIN>** prompt appears.
2	Type**?** At the **MAIN>** prompt for a list of commands that you can enter.	These options appear: • p <CR> — Configure parameters • r <CR> — Start the Remote Datascope • q <CR> — Disconnect call • ESC — Stop the Remote Datascope trace
3	Enter **p** and press the Return key at the **MAIN>** prompt. Then enter the parameters in the following tables.	You are connected to Remote Datascope. For details on Remote Datascope parameters, refer to the "Remote Datascope Parameters" section.

Remote Datascope Parameters

Once connected to the Remote Datascope, enter the parameters in these tables to configure a Remote Datascope monitoring session. Guidelines for device address configuration follow this section.

The order in which parameters appear in interactive mode depends on your configuration. Only certain parameters apply to certain protocols. These tables reflect the most commonly used parameters first. The X.25 and Frame Relay-specific protocols require configuration of fewer parameters and are shown at the end of this tables list. Single-line configuration can be done in any order.

Note

For convenience, each of the prompts below begins with the single-line configuration command letter in parentheses. The actual prompts for interactive configuration do not contain the command letter. Single-line configuration is discussed later in this manual.

(p) Port number to monitor (1-54 <CR>)?:

Range:	1 to 54
Default:	1
Description:	Specifies the port number to monitor.

(a) Enter SDLC station address to monitor:<Station ADDR><CR>: [NONE]/

Range:	01 to FF (Hex)
Default:	None
Description:	Specifies the Station address to monitor. This prompt appears only if you are monitoring SDLC devices.

(a) Enter IBM2260 station address to monitor: <ADDR1, ADDR2><CR>: [NONE]/

Range:	01 to FF (Hex)
Default:	None
Description:	Specifies the Station address to monitor. This prompt appears only if you are monitoring IBM2260 devices.

(a) Enter BSC3270 address to monitor: <CUA, DVA?<CR>: [NONE]/

Range:	01 to FF (Hex)
Default:	None
Description:	Specifies the Device address to monitor. This prompt appears only if you are monitoring BSC3270 devices. • CUA and DVA must be valid BSC3270 poll addresses in the configured character set of the port. • For device monitoring, both BSC3270 Controller Address (CUA) and Device Terminal Address (DVA) are required. For cluster controller monitoring, you need only the CUA address.

(a) Enter FR DLCI address to monitor: <DLCIADDR>?<CR>: [NONE]/

Range:	0 to 1023
Default:	16
Description:	Specifies the Frame Relay Station address to monitor. This prompt appears only if you are monitoring a Frame Relay station (DLCI). This parameter is prompted for only if level 3 is specified for the prompt: **FR type of monitoring**.

(a) Enter SAPI to monitor

Range:	0, 16, 63
Default:	16
Description:	Specifies the Service Access Point Identifier (SAPI) to monitor. • 0 indicates Q931 SAPI • 16 indicates X25 SAPI • 63 indicates Management SAPI This parameter is prompted only if level 2 is selected for "X.25 level to be monitored" for an X.25 port attached to an ISDN D-Channel. If level 1 or 3 is selected this prompt does not appear. SAPI is the point at which the Data Link Layer provides services to Layer 3 in the OSI reference model.

(e) Enable EIA control signals monitoring: (Y/N)?:

Range:	Y (yes) or N (no)
Default:	N
Description:	Enables EIA control signals monitoring. This parameter appears only if port monitoring is enabled.

(t) Enable time stamping (Y/N <CR>)

Range:	Y (yes) or N (no)
Default:	N
Description:	Assigns the timestamp escape sequence to the trace element.

(f) Mode of transfer: (H/B<CR>)

Range:	H, B
Default:	H
Description:	Specifies the output format mode of the protocol trace transfer. • H: ASCII-Hexadecimal • B: Binary.

(s) ESCape key: (1b/")

Range:	ASCII value
Default:	0x1b
Description:	Specifies the ASCII value of the ESC key. • Any valid ASCII value, provided it does not belong to the Escape sequence character set (M, T, S, X, R, F, E, ';'). • 0x4d, 0x54, 0x53, 0x58, 0x52, 0x46, 0x45 and 0x3b are not allowed as ESC key. • ESC value must be a hexadecimal string. • Uppercase or lowercase letters are allowed. • Leading zero is unnecessary. That is, if you want to configure 0x0b as ESC, you can specify the strings "b" or "0b". • Leading spaces are ignored. • The maximum number of valid characters excluding the leading spaces is two. That is, "023" is invalid input. It is not the same as "23". • If you input more than one value separated by the space character, then the first value is considered and the rest is ignored. That is, "2 b" means 0x02 is the value of ESC. • If the input does not equal a valid ASCII byte, then the prompt is displayed again and you must retype the value. • If you press **Return**, the default value is assumed. The default value is 0x1b. If you press the ESC key, the **MAIN>** prompt appears.

(k) X.25 level to be monitored

Range:	1, 2, 3
Default:	1
Description:	Specifies the level of X.25 stack to be monitored. • 1: BOP driver level • 2: Frame level • 3: Packet level This parameter is only valid when monitoring an X.25 port. A value of 2 or 3 disables EIA signal monitoring.

(n) Number of user data bytes from X.25 packet to be displayed

Range:	0 to 1024
Default:	12
Description:	Specifies the number of user data bytes from X.25 packet to be displayed. This parameter is only valid when monitoring an X.25 port and if the k parameter is set to level 3.

(j) FR type of monitoring? (1/2/3/4): [2]/

Range:	1, 2, 3, 4
Default:	2
Description:	Specifies the type of monitoring. • 1: Frame Relay port monitoring. • 2: Frame Relay frame monitoring. • 3: Frame Relay station monitoring. • 4: Frame Relay Local Management Interface (LMI) channel monitoring. A value of 3 causes this prompt to appear: **Enter FR DLCI Address to monitor:<DLCIADDR><CR>:[NONE]/**

Guidelines for Device Address Configuration

Use these guidelines when configuring a device address in the preceding parameters:

- A comma is an address separator. You can also use the space character as an address separator.
- A carriage return indicates end of the line. If you press **Return** without a parameter, it means that you want to monitor a port. If you specify a station or a device address on the command line, then the appropriate device or station is monitored. Once you enter the address and press **Return**, Remote Datascope checks only the length of the entered address and whether it has valid hex characters. In case of failure, it displays an error message and prompts you to re-enter the device address.

How to Configure a Monitoring Session Non-interactively

Perform these steps to configure a monitoring session using a single-line configuration command rather than parameter prompts:

Step	*Action*	*Description/Result*
1	Type the node address followed by the port subaddress, for example, 87, and press **Return** at the * prompt.	This message appears: **Connected to the Datascope on Node "NODE1" at 4-AUG-1994 11:10:48.** Then, the **MAIN>** prompt appears.
2	Enter a configuration string of the format: **@<parameter1=[value1[,value2]]>;[<parameter2=[value1[,value2]]>;]...[r;]<CR>** where the guidelines in the following section describe the command line.	Monitoring is initiated as configured.

Single-Line Configuration Syntax

Follow these guidelines when defining the single-line configuration command, shown above, to establish a non-interactive Remote Datascope session.

Single-line syntax is defined as follows:

Command	*Description*
@	Causes Remote Datascope to recognize the single-line configuration command.
;	Used as the only valid parameter delimiter.
r	Refers to the run command. When used, this must be the last parameter on the command line. **r** is optional and can be issued at any time to run the configuration.
,	Used to separate multiple values of a parameter.
parameter #=value	Represents a pair consisting of parameter name and its value. Parameters are described earlier in this manual.
Return key	Terminates the single-line configuration command and causes Remote Datascope to execute the command.

Single-Line Configuration Considerations

Consider these when configuring the single-line command:

- You can specify parameters in any order.
- If you specify the same parameter twice, the value specified at the second reference is configured.
- If you try to configure monitoring of a port that also supports device monitoring, the configuration string for the device address can be specified as:

a = ;	Port monitoring is requested. This is the default.
a = 41;	Controller monitoring (in BSC3270 terminology) is requested.
a = 41,42;	Device monitoring is requested.

- Space characters are permitted around the semicolon (**;**) and equals sign (=), after the at sign (**@**), and before a carriage return.
- If semicolon (**;**) follows an equals sign (=) without specifying any value to that parameter, then the default value of that parameter is configured. If a default value does not exist for the parameter, then configuration fails and a configuration failed message appears. The input is validated strictly. Except for the space character, any extra character other than required is considered an error.
- If you supply invalid data for the value of any parameter, the configuration fails and the configuration failed message is followed by the **ERR in input** message.
- If you specify any parameter name not described in this manual, configuration fails and the **ERR in input** message appears.
- If command syntax is correct, but you supply insufficient parameters, the default value of the absent parameters is taken. If no default value exists for an absent parameter, the configuration fails and the **ERR in input** message appears.
- In some cases, all parameters are not needed to configure a session. If you specify more parameters than necessary for configuration, a configuration failed message appears.

Illegal Configuration Examples

These are examples of configurations that fail:

- If you specify device monitoring for parameter **a**, and specify **e=y;** to enable EIA monitoring, an error results and configuration fails. EIA monitoring applies only to ports, not devices. However, **e=n;** and **e=;** configurations are ignored since these specify the EIA default value of no. If, however, **a=;** then no device address is specified and port monitoring is assumed, in which case the **e** specification is accepted.
- If you specify **f=h;** (Formatted mode on), the parameter **s** is not allowed. You cannot specify use of the Escape key in combination with Formatted mode. If you specify parameter **s** in the command string with **f=h** enabled, then the configuration fails.

Operation

Introduction

To monitor using Remote Datascope, configure the monitoring session as discussed in the previous section and press **r** to start monitoring. The trace header (first frame information) followed by data traces is displayed. If the monitoring fails, the **MAIN>** prompt appears after displaying the trace header and corresponding error message.

If you try to start Remote Datascope and five calls are already connected to the Remote Datascope on that node, this message appears: **CLR NP 71**

This means that the call is cleared. NP means “no path” or that the destination is not available. 71 is the reason code, meaning no logical channel is available.

Error messages are described in the *Vanguard Alarms & Reports Manual*.

Exceptions

This is the exceptions generated by the Remote Datascope at runtime

Data Loss Due to Buffer Overflow in the Remote Datascope: Exception Number (hex) 17.

Output

Introduction

Two data output formats are available for Remote Datascope protocol trace transfers:

- ASCII-HEX format
- Binary transfer format

EIA monitoring returns output in its own format.

Note

The Padscope utility, used in conjunction with Remote Datascope, allows viewing of trace output in either ASCII or EBCDIC.

ASCII-Hex Format

Remote Datascope displays all data present on the line, whether it is valid or not. With the exception of X.25 and Frame Relay ports, Remote Datascope monitors only the frame level. Transmit and receive data are represented such that you can view the time relationship. Remote Datascope does not store traces or support scrolling.

Data is displayed in octet format using hex characters (ASCII set 0-9 and A-F). This table lists the format of output data:

Data Type	*Output Format*
Transmit data	XDATAZ
Frame Relay Transmit data	X[Frame in Hex Format]Z
X.25 Transmit data	X[Frame in LAPB format]Z
Receive data	RDATAZ
Frame Relay Receive data	R[Frame in Hex Format]Z
X.25 Receive data	R[Frame in LAPB (Link Access Protocol Balanced) format]Z
Timestamp data	T;[xxxx]Z;
EIA signals	SXXXXZ
Exception messages	M;[Message Number]Z;
X.25 and Frame Relay Exception messages	M;[Exception Number in Hex Format]Z;
First frame information: format for port monitoring (conveyed in 2 trace elements)	F;HH:MM:SS.S[Port Number][Port Type]Z; E;[xx]messageZ;
First frame information: format for device monitoring (conveyed in 2 trace elements)	F;HH:MM:SS.S[Port Number(Device Address)][Port Type]Z; E;[xx]messageZ;
X.25 and Frame Relay First frame information: format for port monitoring	F;HH:MM:SS.SSS[Port Number][Port Type][Protocol Info]Z;

ASCII-Hex Output Example

The configuration/output example shown below, is for a monitoring session that displays results in ASCII-Hex mode. When you specify these values to the prompts listed under "Configuration," the data such as the sample shown under "Output" is displayed.

Configuration:

```
MAIN>p
Port number to monitor (1-54 <CR>)? 2
Enable EIA control signals monitoring? (Y/N): [N]/
Enable time stamping (Y/N <CR>)? y
Mode of Transfer (H/B): [H]/
MAIN>r
```

Output:

```
F;18:39:39.0[02][4]Z;E;[01]monitoringinitiatedZ;T;[653]Z;X0A64666768646867646664686
46667686467686466676864666761666768666768666768666666646464666666666464646
4646464647272727 20DZT;[1033]Z;X0A7272720DZT;[1306]Z;X0A616161610DZT;[1177]
Z;X0A616161610DZT;
```

Binary Transfer Format

Remote Datascope can transfer protocol traces in Binary mode. In this mode, data is sent to the user end without formatting. It contains the minimum information necessary to format the data. Transfers appear as follows:

- Binary mode uses a two-byte ASCII escape sequence as a delimiter between traces.
- The first character in the escape sequence is an ESC character, whose value is configurable. You can configure ESC to use any ASCII value provided it does not belong to the Escape sequence character set described in the table below.
- The second character describes the type of trace data that follows.
- Aside from the delimiters between traces, trace header structure in Binary mode reflects the structure depicted in Hex mode.

Escape Sequence Types

Three possible escape sequence types are:

Type	*Description*
• **ESC M** - Exception number • ESC T - Timestamp • ESC S - EIA signal image • ESC X - Transmitted data segment • ESC R - Received data segment • ESC F - Trace header • ESC E - Messages generated by Remote Datascope during a trace session	Denotes the start of a trace and lists the type of trace that follows. The start of trace sequence is immediately followed by the trace element sequence. The start of trace also acts as the end of the preceding trace element, if that trace element was not terminated by **ESC;**. For example, the sequence **ESC M... ESC T... ESC R... ESC;** denotes that three trace elements arrived and are of the type exception, timestamp, and received data. The last one is terminated with **ESC;**. A trace element can also come individually, with its own **ESC;** as terminator.

Type	Description (continued)
ESC;	Denotes the end of the preceding trace element. Every trace element is delimited by any of the escape sequences listed above, combined with **ESC;**.
ESC ESC	Provides data transparency to the ESC character. If any character in the trace data carries the same value as the ESC character, Remote Datascope replaces the trace data character with ESC ESC and continues the transfer. Any time ESC ESC occurs in the trace data at the user-end, you consider it as a single data character of value ESC. For example, • The arrival of the sequence ESC ESC M means that two data characters ESC and M have arrived. The second ESC is associated with the first ESC, and not with the M. • The arrival of the sequence ESC ESC ESC; means that the trace element contains a data character ESC, and the trace element is ending here. The second ESC is associated with the first ESC and the third ESC is associated with the semicolon, which is the last byte in the trace.

Trace Element Type Structure

In Binary mode, the content of trace elements is not formatted. The structure of each type is as follows.

Trace Element Type	Description
Time stamp	[ESC T Byte1 Byte2 Byte3 Byte4 ESC ;] Timestamp is a 32-bit integer. Byte1 is the most significant byte, Byte2 the next most significant byte, and Byte4 is the least significant. The number of timestamp bytes can be less than four, if the value of the timestamp can be expressed in fewer bytes. This reduces the size of the timestamp trace element sent. The unit of timestamp in either output mode is 10 milliseconds. The maximum value of timestamp is 85899345 units (when 4 bytes are used). This is approximately 49 days, after which overflow occurs.

Trace Element Type	***Description*** *(continued)*
Transmitted data segment	[ESC X Byte1... ByteN ESC ;] Byte1 to ByteN are the traced data without any formatting except the potential use of data transparency explained earlier in this section.
Received data segment	[ESC R Byte1 ... ByteN ESC ;] Same as Transmitted data segment.
EIA signal image	[ESC S Byte1 Byte2 ESC ;] Byte1 is the image of incoming signals and Byte2 is the image of outgoing signals.
Exception number	[ESC M Byte ESC ;] Byte is a single byte and contains the exception number.
Trace header	[ESC F String ESC ;] The 'String' is a transparent ASCII string. Its content is the same as in formatted mode.
Message trace	[ESC E Byte message ESC ;] The message is a transparent ASCII string.

Example

The configuration/output example shown below, is for a monitoring session that displays results in Binary mode. When you specify these values to the prompts listed under "Configuration," the data such as the sample shown under "Output" is displayed.

Configuration:

```
MAIN>p
Port number to monitor (1-54 <CR>)? 2
Enable EIA control signals monitoring? (Y/N): [N]/
Enable time stamping (Y/N <CR>)? y
Mode of Transfer (H/B): [H]/ b
ESCape key : [1b]/ 41
MAIN>r
```

Output:

```
AF18:42:52.0[02][4]AEmonitoring
initiatedA;ATxAXA;ATUARrA;ATAXrA;AT9ARrA;ATAXrA;ATARrA;ATAXrA;ATARrA;ATA
XrA;ATGARrA;ATAXrA;ATARrA;ATAXrA;ATARrA;ATAXrA;AT*ARrA;ATAXrA;RrA;ATAXr
A;ATARrA;ATAXrA;ATARrA;ATAXrA;AT:ARrA;ATAXrA;AT(ARrA;ATAXrA;AT/
ARrA;ATAXrA;AT

ARrA;ATAXrA;AT*ARrA;ATAXrA;ATARrA;ATAXrA;ATARrA;ATAXrA;AT/
ARrA;ATAXrA;ATKARrA;ATAXrA;ATARrA;ATAXrA;ATARrA;ATAXrA;ATARrA;ATAXrA;AT
ARrA;ATAXrA;
```

EIA Signal Monitoring Format

On trace start, the initial state of the EIA signals is forwarded. EIA signals are represented in the form of four hex digits. The first two digits represent the Receive EIA signals and the last two represent the Transmit EIA signals. Each of the 16 bits in these four digits represents one EIA signal, with bit-breakup as shown below. If the signal is HIGH, the bit is set to 1. If the signal is LOW, the bit is set to 0.

Rx EIA Signals: (NU) => Bit Not used, always shown as zero (0)

Bit Number	7	6	5	4	3	2	1	0
Signal	(NU)	(NU)	SI	TM	P14	MB	RTS	DTR
Pin Numbers			Pin 16	Pin 22 or 25		25	Pin 4	Pin 20

Tx EIA Signals:

Bit Number	7	6	5	4	3	2	1	0
Signal	(NU)	(NU)	LP3	LP2	CTS	RI	DCD	DSR
Pin Numbers			Pin 15 or 18	Pin 21	Pin 5	Pin 22	Pin 8	Pin 6

Disconnecting Remote Datascope

To disconnect Remote Datascope, type **q** and press **RETURN** at the **MAIN>** or **STOPPED** prompts. The **CLR DTE 0** message appears.

Stopping a Trace

To stop a trace on Remote Datascope:

Step	*Action*	*Result*
1	Press the **ESC** key.	The VT100 terminal or PC screen displays a **STOPPED>** prompt.
2	Type **c** at the **STOPPED>** prompt.	The trace continues.
3	Type **m** at the **STOPPED>** prompt.	The **MAIN>** prompt appears.
4	Type **q** at the **STOPPED>** prompt.	The call is disconnected.

Performance Impact

Considerations

Consider these performance impacts when you monitor using Remote Datascope:

- CPU utilization during a Remote Datascope trace for a particular port or device can be as high as 1.0 to 1.5 times the CPU utilization due the same port without monitoring.
- Performance degradation can be up to 5% for every port in a node where Remote Datascope resides.
- Performance degradation can be up to 20% for every port on the master CPU if Remote Datascope is monitoring any port in the node.
- Performance degradation can be up to 50% for any port that is being monitored by Remote Datascope.
- Performance degradation can be up to 150% for a port with up to five devices being monitored by Remote Datascope.

Optimal Performance

Optimal high speed frame relay performance on 6400, 6560, and 7300 is achieved when the datascope module is not present in the image.

Monitoring Ports, Devices, and Signals

Introduction

This section describes Remote Datascope monitoring support for protocols as outlined in this table. Remote Datascope monitors only one port or one device or a group of devices on one port at any one time.

For this protocol...	*Remote Datascope monitors...*
SDLC	Traffic for a station or physical unit (PU).
IBM2260	Single stations and group stations. Remote Datascope monitors a specific station or if the station type is configured as a group, then a set of stations under that group.
BSC3270	Devices and controllers. A controller handles a number of devices. Remote Datascope monitors traffic for either a particular device under a controller or for all devices under the same controller.
X.25	Port (BOP driver), frame, or packet data. If the X.25 port is mapped to an ISDN D-channel then frame monitoring can be specified for SAPI 0, 16, or 63.
Frame Relay	Port (BOP driver), frame, station, or Local Management Interface (LMI) channel data.

Monitoring SDLC Ports

Introduction

SDLC port data segments consist of frames. The length of each frame depends on the frame being transmitted or received. The current maximum length for Vanguard products is 1024 or 4096 bytes depending on SDLC port configuration, except for UIO ports where it is always 1024.

Exceptions

This table shows the exceptions generated during SDLC port monitoring for Vanguard products.

Exception	*Exception Number (Hex)*	*Description*
Receive Overrun error *	03	Occurs when the port is unable to receive data at the rate at which the connected device communicates with it, because the node CPU is heavily loaded.
Receive Large Frame indication	0D	Occurs when the frame length received is greater than the maximum defined.
Receive Frame abort sequence indication	0E	Occurs when a minimum of seven consecutive ones is received during frame receipt.
Receive Frame Non-Octet alignment indication	0F	Occurs when the frame that contained a number of bits is not divisible by eight.
Transmit Frame underrun *	10	Occurs when the port is unable to send data to the connected device at the rate at which it receives data from higher protocol layers. This can happen when the node CPU is heavily loaded.
Transmit Frame Abort *	11	Occurs when the Abort frame is transmitted.
Receive Frame CRC error indication *	12	Occurs when a frame received contains a CRC Error.

For SDLC port monitoring on the UIO card, only the exception messages marked with an asterisk (*) are displayed.

Limitations

These limitations apply for SDLC port monitoring:

- The Frame Check Sequence (FCS) is not forwarded for either transmit or receive frames.
- The SDLC port I/O driver normally forwards complete frames to the Remote Datascope regardless of the frame size.
- You can only observe these changes using EIA signal monitoring:
  - Modem CTS (DRO pin 14) loss during frame transmission
  - Modem DCD (RTS pin 4) loss during frame reception
- Only the error condition and the first portion of a frame that contains the frame control header is forwarded if one of these exception conditions occurs:
  - Transmit Frame underrun
  - Transmit Frame abort (induced by protocol)
  - Receive Large frame indication
- A frame is discarded and the error indication is forwarded if one of these exception conditions occurs:
  - Receive Overrun
  - Receive Frame abort sequence
  - Receive non-octet alignment
  - Receive CRC error
- Maximum frame size is 1024 bytes.

Monitoring SDLC Devices

Monitoring an SDLC device is similar to monitoring SDLC ports. However, the data is seen at the frame level (level 2). These types of SDLC frames are displayed in a Remote Datascope trace:

- Unnumbered Frames — These frames are commands and responses such as Set Normal Response Mode (SNRM), Unnumbered Acknowledgment (UA), Disconnect (Disc), Request Disconnect (RD), Request Initialization Mode (RIM), Set Initialization Mode (SIM), Disconnected Mode (DM), Test, and Exchange Station Identification (XID).
- Supervisory Frames — These frames acknowledge receipt of Information Frames and control information interchange. These are Receive Ready (RR), Receive Not Ready (RNR), and Reject (REJ).
- Information Frames — These are the data frames.

Exceptions

This table shows the exceptions generated during SDLC device monitoring:

Exception	Exception Number (Hex)	Description
Bad Frame Length	13	Received frame has incorrect length. Set the attached device to send smaller frames. When this exception occurs, the full packet is not displayed. Only a few bytes up to the control field are sent with the exception code. The data portion of the packet is not sent.
Bad Frame Type	18	Unrecognizable Control Byte Received.
Bad N(R)	19	Received N(R) is not as expected.
Master Polled Early	1A	Master polled slave prior to it going offline. Poll timer needs to be set to larger value.
Frame Reject (FRMR)	1B	Current frame is rejected. No frame is forwarded.
Station Requested Disconnect	1C	SDLC controller has sent a Request to Disconnect to the TPAD.
Station Up	1E	SDLC station that was disconnected is now in the Data Transfer state.
Station Down	1F	SDLC station is deactivated due to the number of connection attempts being exceeded.
Response Time out	20	Time out to polls.

Limitations

Device monitoring limitations are similar to port monitoring. However, unlike IBM2260 and BSC3270 device monitoring, SDLC device monitoring enables monitoring of data to or from a particular station or physical unit (PU). If a station is connected to several logical unit devices (LUs), and you enter that station's address, you see all receive and transmit data pertaining to all the LUs under it.

Monitoring IBM2260 Ports

Introduction

These limitations apply to monitoring IBM2260 ports:

- Autospeed mode — Prior to having autospeed, no trace of RX/TX data is generated.
- Data bits and Parity bit — An octet is sent to the Remote Datascope for each data character. The setting of the 8th bit depends on the port configuration. The 8th bit (as seen by the protocol layer) is not altered for the purpose of the Remote Datascope.
- Internal Data Generation — Internally generated data segments for transmission to the attached device can be up to 64 kbytes (for example, broadcast data, Fox message, and so on).

Exceptions

This table shows the exceptions generated during port monitoring:

Exception	*Exception Number (Hex)*
Parity Error Detected	01
Data Overrun Detected	03
Bad Character Frame Received	07

Monitoring IBM2260 Devices

An IBM2260 data segment is a complete message up to 1024 bytes long. These message formats are supported in IBM2260:

- Polls/Selects
- ACK/NAK/EOT
- DATA and BCC

The Remote Datascope forwards only poll or select messages, responses, and data traffic of the specified station address. The Poll or Select response is displayed in this format: **AD1-AD2-POLL/SELECT**

Note

Polls and data traffic for other stations are suppressed.

If you specify the address of a single station, the data packets pertaining to that particular station are sent to the Remote Datascope. If you specify the address of a group station, all data pertaining to that group is sent to the Remote Datascope.

Note

Addr2 of a Station configured as a GROUP station (Data Troll devices) defaults to (Hex): 40, 41, 42, and 43. You must specify at least one of the valid Addr2 of the group, to enable the port to recognize the Station group.

Device Monitoring TPAD

This table shows an example of device monitoring. A single station address (Addr1 = 20, Addr2 = 20) is configured on the IBM2260 PAD and is selected on the Remote Datascope by the address (20, 20) for monitoring.

Poll type sent by TPAD to Stations	*Result*
POLL(20,20)	Sent to Remote Datascope.
POLL(20,32)	Not sent to Remote Datascope.
POLL(30,20)	Not sent to Remote Datascope.
SELECT(30,20)	Not sent to Remote Datascope.
SELECT(20,20)	Sent to Remote Datascope.
SELECT(20,32)	Not sent to Remote Datascope.

This table shows another example of device monitoring. Vanguard products require at least one valid Addr2 of a configured group to recognize the Station Group, if a GROUP Station Address (Addr1 = 20, Addr2 = assumed to be 40, 41, 42, and 43) is configured on the IBM2260 PAD and is selected on the Remote Datascope for monitoring by either the address:

- (20,40) or (20,41)

or

- (20,42) or (20,43)

Poll type sent by TPAD to Stations	*Result*
POLL(20,x)	Sent to Remote Datascope.
SELECT(20,x)	Sent to Remote Datascope.

Note

x takes value 40h,41h,42h,43h for TPAD and HPAD.

For IBM2260-BSC3270 interoperation, only specific polling is allowed. Since Group poll is not supported, Remote Datascope can do only specific device monitoring.

Exceptions

This table shows the exceptions generated during monitoring:

Exception	Exception Number (Hex)	Description
Response Timeout	20	Indicates response timeouts in the receive or transmit direction.
Device Up	1E	Indicates that the polled or selected device is operational.
Device Down	1F	Indicates that the polled or selected device is not operational.
Disconnected	21	Indicates that disconnection occurred during device monitoring.
Inbound Error	23	Generated under these conditions: • Bad CRC received • Buffer Overflow • Format error • Host terminated poll/select
Outbound Error	24	Generated under these conditions: • NAKs received • Host terminated poll/select

Limitations

These limitations apply to IBM2260 device monitoring:

- When you use a group address, all data related to the group is forwarded by the Remote Datascope.
- The device trace does not include any EIA signal changes of the port.
- Prior to having autospeed, no trace of receive and transmit data is generated.
- An octet is sent to the Remote Datascope for each data character. The setting of the 8th bit depends on the port configuration. The 8th bit (as seen by the protocol layer) is not altered for the purpose of the Remote Datascope.
- The 8th bit (parity) is set to zero on the IBM2260.
- Parity is not shown on the Remote Datascope on the APAD port.
- Internally generated data segments for transmission to the attached device can be up to 64 kbytes (for example, broadcast data, Fox message, and so on).

Monitoring the BSC3270 and BSC2780 Ports

Introduction

BSC3270/2780 port monitoring gives the traces of all packets exchanged through the port being monitored. In the case of device monitoring, Remote Datascope traps only the packets pertaining to the device (cluster controller) being monitored. Port monitoring is done at the driver level, whereas device monitoring is done at the protocol level (level 2).

Note

- BSC3270 supports both port and device monitoring.
- BSC2780 supports port monitoring only.
- BSC3780 is not supported as of Release 4.97 of Remote Datascope.

Port Limitations

Limitations to BSC3270/2780 port monitoring are:

- The line idle conditions (FF) are not forwarded unless they are received as transparent text data.
- The data parity bit is not displayed on the Remote Datascope. An octet is sent to the Remote Datascope for each data character. The most significant bit (bit 7) is set to zero.
- The Transmit BCC character for BSC3270 (ASCII and EBCDIC) and BSC2780 is generated (hidden) by the hardware and is not forwarded to the Remote Datascope.
- DLE Stripping — DLEs on the line get stripped and are not forwarded to the next level. The DLEs are forwarded to the Datascope.
- Receive Exception Conditions
  - SYNC Stripping — SYNs on the line are stripped on the data stream if embedded in the text message and cannot be recovered for the Datascope. DLE SYNs are also stripped in Transparent mode.
  - Aborting Long Message (Buffer Overflow 7 Kilobytes) — The receiver is disabled and further data on the line cannot be displayed on the Remote Datascope. The abort message condition is indicated to the Remote Datascope.

Device Limitations

Limitations to the BSC3270 device monitoring are as follows:

- The device trace does not include any EIA signal changes of the port.
- The 6500 TPAD always precedes its polls and selects with an End of Text (EOT) message. This message is treated as part of the poll or select and is forwarded to the Remote Datascope as a single data segment.

  The EOT message from the responding end is the normal frame delimiter and is, therefore, displayed.
- Some hosts precede their polls and selects with an EOT. The Vanguard HPAD receives the EOT and poll or select as two separate messages. The Vanguard HPAD forwards only the poll or select message to the Remote Datascope and not the preceding EOT. The preceding EOT is forwarded to the Datascope as a “frame closing EOT” of the previous frame only if the previous frame was forwarded to the Datascope and no other EOT occurs prior to the host EOT in the poll select message. This occurs, for example, when excessive NAKs to a text message are received.

- When you enter the run command for the Remote Datascope after a device or controller is selected, the Vanguard node does not forward eligible frame messages until the next message frame is opened with a poll or select message.

  A poll or select frame ends with EOT from either end.
- Receive Exception Conditions
  - Aborting Message Reception on ENQ in a text message — The receiver is disabled and further data on the line cannot be displayed on the Remote Datascope. No indication is given to the Remote Datascope because this is the normal method of aborting messages by BSC3270 devices.
  - Aborting Message Reception When Encountering Data Character = Hex FF — The receiver is disabled and further data on the line cannot be displayed on the Remote Datascope.
- Transmit Exception Conditions — Sync filling (SYN or DLE SYN for Transparent mode) occurs on transmitter underrun. This condition cannot be detected. The condition is not indicated to the Remote Datascope. Also not indicated to the Datascope is Sync filling (SYN or DLE SYN for Transparent mode) by the driver between 128-byte data segments.

Ports and Devices

Limitations to the BSC3270/2780 port and device monitoring are:

- The transmit and receive data are forwarded to the Remote Datascope as seen by the protocol emulator internal to Vanguard Products.

Exceptions

This table shows the exceptions generated during BSC3270/2780 port monitoring:

Exception	*ExceptionNumbers (Hex)*
Parity Error Detected	01
Data Overrun Detected	03
Aborting Long Message Detected	04
BCC Error Detected	0A
Aborting Long Message Reception on Mark Idle Detected	0B
Busy Error Detected	16

Monitoring the BSC3270 Devices

This section describes the monitoring of BSC3270 devices.

You enter the poll address (not a select address) of the BSC3270 controller or device that you want monitored. The poll and select frames are sent to the Remote Datascope.

You can configure a monitoring session to generate and forward a trace of all traffic and exception conditions applicable to the selected device or controller and label the trace with a prefixed timestamp.

The receive and transmit traffic of the device or controller includes all the receive and transmit activities between the protocol handler and the I/O driver of the port pertaining to the specified device or controller.

These activities include specific or general polling procedures, selection procedures, application data, and error recovery procedures.

Each exchange of text and control messages between the host and the Vanguard HPAD or TPAD and the controller has the form of the message frame described in this table.

Message Format

General poll , ...[sequence of messages]..... , EOT message
Specific poll , ...[sequence of messages]..... , EOT message
Select , ...[sequence of messages]..... , EOT message

Message Frame

The message frame is a sequence of messages exchanged on the Vanguard HPAD or TPAD controller interface. The frame begins with a general or specific poll or a select message from the host or VanguardTPAD and ends with the first End of Text (EOT) message. A series of message frames make up the device or controller trace.

The first EOT message on the trace is the delineation of the messages frame. Its source can be either end.

It is possible that more than one EOT message appears between frames. For the general or specific poll frames, the closing EOT message normally comes from the responding end. In case of an error condition, such as timeout, the originator EOT serves as the frame terminator. For the select frame, the closing EOT message normally comes from the select originator (host or Vanguard TPAD).

BSC3270 Message Types

Within the frame, you can see these BSC3270 message types:

- Text or status messages
- Positive or negative acknowledgment
- Inquiry
- Wait before transmit
- Reverse interrupt
- Temporary text delay control messages

The Vanguard HPAD or PAD forwards transmit or receive segments to the Remote Datascope when a segment is a complete message or a portion of a message up to a maximum of 1024 bytes length.

General Poll Frames

General polling applies to all devices of an addressed controller. The message sequences within the frame apply to one or more devices of the controller. Because all devices of a controller are under the scope of a general poll, the general poll frame applies to both device and controller monitoring.

If...	*Then...*
A controller is being monitored	The sequence of messages within the message frame is forwarded to the Remote Datascope.
A device is being monitored	• The message sequences within the frame are filtered so that only the sequences applicable to the selected device are forwarded to the Remote Datascope. • Other device sequences are suppressed. • Only the frame boundaries are forwarded to the Remote Datascope, provided no message sequences are selected within a frame.

If a General poll address is selected, traffic for all devices under the scope of the general poll is forwarded to the Remote Datascope. Corrupted or control messages that are not attributed to any device are not forwarded to the Remote Datascope. These messages are captured with controller monitoring.

Specific Poll Frames

Specific polling applies to a unique device of a controller, and all message sequences within the frame apply to the same device. The specific poll frame applies to both device and controller monitoring.

When you monitor a controller, all specific poll frames applicable to any device under this controller are forwarded to the Remote Datascope.

When you monitor a device, all complete specific frames applicable to the specific device are forwarded to the Remote Datascope. All other device or controller specific frames are suppressed from the Remote Datascope trace.

Select Frames

Select procedures apply uniquely to a device of a controller. All message sequences within the frame are destined for the same device. The select frame is applicable to both device and controller monitoring.

If...	*Then...*
You monitor a controller	All select frames applicable to any device under this controller are forwarded to the Remote Datascope.
You monitor a device	• All complete select frames applicable to the specific device are forwarded to the Remote Datascope. • All other device or controller select frames are suppressed from the Remote Datascope trace.

Exceptions

This table shows the exceptions generated during monitoring of BSC3270 devices.

Exception	Exception Number (Hex)	Description
Device Operational	1E	Indicates that the polled or selected device is operational. Equivalent to **Device up**.
Device Down	1F	Indicates that the polled or selected device is not operational.
Disconnected	21	Generated when the device and the remote node are disconnected.
Inbound Error	23	• Generated at the TPAD when the number of input errors exceeds the designated error threshold count for a current device. • Generated at the HPAD when EOT is received in response to a NAK sent from HPAD.
Outbound Error	24	• Generated at the TPAD when the response sequence received from a device is invalid for a value larger than the specified error threshold count. • Generated at the HPAD when the host responds with an EOT after a text message was sent to the host by HPAD.
Response Timeout	20	Generated because of timeout during polling or timeout during data transfer.

Monitoring Asynchronous PAD (APAD) Ports

Introduction

Remote Datascope gives traces of the data exchanged through the APAD port being monitored. APAD monitoring is done at the driver level.

Exceptions

This table shows the exceptions generated during APAD port monitoring:

Exception	*Exception Numbers (Hex)*
Parity Error Detected	01
Internal Buffer Overflow Detected	02
Data Overrun Detected	03
Break [Character] Transmitted	05
Break [Character] Received	06
Bad Character Frame Received	07
XON Flow Control Character Transmitted	08
XOFF Flow Control Character Transmitted	09
XON Flow Control Character Received	14
XOFF Flow Control Character Received	15
Attention Character Received	0C

Limitations

These limitations apply to monitoring the APAD ports:

- Transmit Exception conditions:
  - ***Transmit: Break Condition*** — A Break indication will be sent to the Remote Datascope when a BREAK character is transmitted. The end of break condition will not be indicated to the Remote Datascope (BREAK duration is 100 msec fixed).
- Receive Exception conditions:
  - ***Receive: Break condition*** — A Break indication will be sent to the Remote Datascope when a BREAK character is received. No indication of BREAK duration will be given to the Remote Datascope. Due to the hardware in the 68302 driver, the timestamp for the Break condition is out of sync with the data and can be inaccurate.
  - ***Receive: XON and XOFF conditions*** — Due to the hardware in the 68302 driver, the timestamp for the XON/XOFF condition is out of sync with the data and can be inaccurate.
- Autospeed mode — Prior to having autospeed, no trace of RX/TX data is generated.
- Data bits and Parity bit — An octet is sent to the Remote Datascope for each data character. The setting of the 8th bit depends on the port configuration. This bitt (as seen by the protocol layer) is not altered for Remote Datascope.
- Internal Data Generation — Internally generated data segments for transmission to the attached device can be up to 64 Kbytes (for example, broadcast data, Fox message, and so on).
- Transparent Poll Async — The Transparent Poll Async (TPA) feature is not supported by Remote Datascope.

Monitoring TCOP Ports

Introduction

Remote Datascope can monitor any port configured as TCOP and give the trace of all data exchanged through that port.

Exceptions

This table shows the reported exceptions during TCOP port monitoring:

Exception	*Exception Number (Hex)*	*Description*
Parity Error	1	Indicates that received data has a character with a parity error. This is applicable only when the code set is ASCII. Data up to the erroneous character is displayed on Datascope, followed by the exception indication. Remaining data is not displayed because the protocol discards it.
Receive Overrun error	3	Occurs when the port is unable to receive data at the rate at which the connected device communicates with it. Occurs when the node CPU is heavily loaded.
Invalid DLE Sequence in the Rxd Data	1D	Displayed when the data received has DLE characters in an unexpected sequence. Data up to the erroneous character is displayed on the Datascope, followed by the exception indication. Remaining data is not displayed because the protocol discards it.
Tx Aborted	2A	Displayed when the driver receives a **Tx abort** instruction from the TCOP protocol layer. Occurs in situations such as timeout of the Tx acknowledgment timer, disconnection from higher layer, and Tx data Queue overflow.
RX Aborting Long Message	04	Displayed when the message received exceeds the maximum message size of 8 kbytes. A message up to 8K will be shown on the Remote Datascope, followed by the Exception indication.

Limitations

The only limitation to TCOP monitoring occurs when the transmission of a message is aborted. The remainder of the message is not sent to the Remote Datascope.

Monitoring X.25 Ports

Introduction

You can monitor the following levels of the X.25 protocol stack:

- Level 1 - Port (BOP driver) level
- Level 2 - Frame level. The frame level protocol is LAPB but if the X.25 Port is using the ISDN D Channel then the frame level protocol is Q.921. In this case one could monitor a specific SAPI.
- Level 3 - Packet level

Note

Specific LCN monitoring is not supported.

Monitoring at the Driver Level

Remote Datascope forwards raw driver level data to the Padscope utility for your viewing. The packet components are displayed separately only if you are using the Padscope utility. Refer to SDLC port monitoring for a description of monitoring at the BOP driver level.

Frame-Level Receive and Transmit Data Output

X.25 LAPB monitoring at the Frame level results in display of the following components. The frame components are displayed separately only if you are using the Padscope utility

- Address
- Frame type (RR, RNR, REJ, SABM, DM, DISC, UA, FRMR, INFO)
- N(s), N(r)
- P/F bit

Refer to the CCITT X.25 specification for detailed information on the above components.

For elements of Q.92.1 refer to the CCITT Q.921 specification.

Exceptions (Frame Level) During X.25 Port Monitoring

Exceptions to monitoring at the LAPB Frame level are described in this table:

Note

No exceptions are generated when monitoring Q.921

Exception	*Exception Number (Hex)*	*Description*
Link Down	2D	Indicates the DTE-DCE link is down.
Disc Received	2E	Indicates the other party sent a disconnect frame to suspend operations.
Bad Frame Type	2F	Indicates the Frame type is none of the ennumerated X.25 level 2 types.
Address Error	30	Indicates the Address field does not contain one of the two valid addresses.
Bad Frame Length	31	Indicates the Frame Length is greater than that supported by the network.

Exception	Exception Number (Hex)	Description (continued)
Frame Reject	32	Indicates the Frame is rejected by secondary in order to report an error condition.
Link Up	33	Indicates the DTE-DCE link is up.
Link Blocked	34	Indicates the link is congested.
Bad N(r)	35	Indicates the Rejected frame control field contains invalid N(r).
Access Port Up	36	Indicates an X.25 access port link is up.
Access Port Down	37	Indicates an X.25 access port link is down.

Packet-Level Receive and Transmit Data Output

X.25 monitoring at the Packet level results in the display of these components:

- LCGN
- LCN
- Q bit
- D bit
- M bit
- P(s), P(r)
- First n bytes of user data, where n is a configurable parameter defaulting to 12
- Packet type, including
  - CALL REQUEST
  - CALL ACCEPTED
  - CLEAR REQUEST
  - CLEAR CONFIRMATION
  - DATA
  - INTERRUPT
  - INTERRUPT CONFIRMATION
  - RR
  - RNR
  - REJ
  - RESET REQUEST
  - RESET CONFIRMATION
  - RESTART REQUEST
  - RESTART CONFIRMATION
  - DIAGNOSTIC

Refer to the CCITT X.25 specification for detailed information on the above components.

Exceptions (Packet Level) During X.25 Port Monitoring

Exceptions to monitoring at the Packet level are described in this table:

Exception	Exception Number (Hex)	Description
Packet Level Restart	38	Indicates receipt of a Restart request from primary.
No Response	39	Indicates the timer expired while waiting for a Call Accept packet.
Channel Reset Received	3A	Indicates receipt of a Reset packet on a particular LCN.
Recd Packet Out Of Receive Window	3B	Indicates received packet is out of the receive window.
Bad P(R)	3C	Indicates received P(r) is not within the range of last received P(r) and P(s)+1 of the oldest entry on the retransmission queue.
Bad P(S)	3D	Indicates received P(s) is not the expected packet number.
Unassigned LCN	3F	Indicates LCN is not the one assigned.
Bad Packet Length	40	Indicates the length of the packet is less than the length of the header, or data size is greater than the maximum permitted on the network.
Bad Packet Type	41	Indicates the packet type is not one of the enumerated X.25 packet types.
Broadcast Overrun	42	Indicates the number of packets on the broadcast queue has reached the maximum limit.
Input Buffer Overrun	43	Indicates that packet size exceeds buffer length.

Limitations

You cannot monitor the X.25 port through which you connect to Datascope on a remote node.

Monitoring Frame Relay Ports

Introduction

You can monitor the following levels of the Frame Relay protocol stack:

- Level 1, Port (BOP driver) level
- Level 2, Frame level — Displays every frame passing through the port. It differs from port monitoring in the type of exceptions generated.
- Level 3, Station level — Displays frames pertaining to a particular station.
- Level 4, Local Management Interface (LMI) channel level — Displays frames pertaining to the LMI channel.

Frame/Station-Level Receive and Transmit Data Output

Frame Relay monitoring at the Frame or Station level results in display of the following components:

- Address
- Control Information (CR, FECN, BECN, DE, and EA)
- Information field

The resulting displayed components are the same for either type of monitoring; however, monitoring at the station level returns data for only the station specified. There are no exceptions for FR Station monitoring.

Exceptions (Frame Level) During Frame Relay Port Monitoring

Exceptions to monitoring at the Frame level are described in the following table:

Exception	*Exception Number (Hex)*	*Description*
Link Up	44	Indicates that the FR link is up. **Note:** This exception does not occur when monitoring FR-DTE.
Link Down	45	Indicates that the FR link is down. **Note:** This exception does not occur when monitoring FR-DTE.
Link Congested	46	Indicates that the FR link is congested.
Bad Frame Length	47	Indicates that the Frame length is greater than that supported by the network.
Frame From Disabled Station	48	Indicates that a frame was received from a disabled station.
Address Error	49	Indicates an error in the address field of the received frame.
Unknown DLCI	4A	Indicates that the frame received was not for the configured DLCI.

LMI-Level Receive and Transmit Data Output

Frame Relay monitoring at the LMI Channel level results in display of the following components:

- Unnumbered frame indicator
- Protocol discriminator
- Call reference
- Information elements

Exceptions (LMI Channel Level) During Frame Relay Port Monitoring

Exceptions to monitoring at the LMI Channel level are described in the following table. These exceptions are generated in accordance with report alarms.

Exception	*Exception Number (Hex)*	*Description*
FSR Not Received	4B	Indicates the expected full status response was not received.
Invalid Sequence Number	4C	Indicates an invalid receive sequence number was received.
Status Not Received	4D	Indicates a Status message was not received within the configured timeout period.
Status Enquiry Not Received	4E	Indicates a Status enquiry message was not received within the configured time-out period.
Protocol Error Threshold Reached	4F	Indicates the configured number of erroneous events occurred within the configured number of monitored events.

Limitations

There are no specific limitations to monitoring of a Frame Relay port.

Monitoring EIA Signals

Introduction

EIA signals do not relate to the data. The Remote Datascope scans the EIA signals of the selected port at a 50-millisecond interval and forwards EIA signal indications when a signal change occurs. You can have the indications timestamped. Remote Datascope supports all three EIA interface types: V.24, V.35, and V.36.

Refer to the “Output” section on page 17 for details on EIA monitoring output.

Exceptions

General Exceptions

This table shows the exception generated by the Remote Datascope.

Exception	Exception Number (Hex)
Data Loss Due to Buffer Overflow in the Remote Datascope	17

Generated During Port Monitoring

This table shows the exceptions generated during port monitoring of all supported port types.

Exception	ExceptionNumber (Hex)
IBM2260	
Parity Error Detected	01
Data Overrun Detected	03
Bad Character Frame Received	07
BSC3270/2780	
Parity Error Detected	01
Data Overrun Detected	03
Aborting Long Message Detected	04
BCC Error Detected	0A
Aborting Long Message Reception on Mark Idle Detected	0B
Busy Error Detected	16
APAD	
Parity Error Detected	01
Internal Buffer Overflow Detected	02
Data Overrun Detected	03
Break [Character] Transmitted	05
Break [Character] Received	06
Bad Character Frame Received	07
XON Flow Control Character Transmitted	08
XOFF Flow Control Character Transmitted	09
XON Flow Control Character Received	14
XOFF Flow Control Character Received	15
Attention Character Received	0C
Datascope	
Data Loss Due to Buffer Overflow in the Datascope	17
Generated if the port is disabled or booted.	26

Exception (continued)	ExceptionNumber (Hex)
SDLC	
Receive Overrun error *	03
Receive Large Frame indication	0D
Receive Frame abort sequence indication	0E
Receive Frame Non-Octet alignment indication	0F
Transmit Frame underrun *	10
Transmit Frame Abort *	11
Receive Frame CRC error indication *	12
TCOP	
Parity Error	1
Receive Overrun error	3
Invalid DLE Sequence in the Rxd Data	1D
Tx Aborted	2A
RX Aborting Long Message	04

Generated During Device Monitoring

This table shows the exceptions generated during device monitoring of all supported port types.

Exception	ExceptionNumber (Hex)
IBM2260	
Response Timeout	20
Device Up	1E
Device Down	1F
Disconnected	21
Inbound Error	23
Outbound Error	24
BSC3270/2780	
Device Operational	1E
Device Down	1F
Disconnected	21
Inbound Error	23
Outbound Error	24
Response Time-out	20
SDLC	
Bad Frame Length	13
Bad Frame Type	18

Exception *(continued)*	**ExceptionNumber (Hex)**
Bad N(R)	19
Master Polled Early	1A
Frame Reject (FRMR)	1B
Station Requested Disconnect	1C
Station Up	1E
Station Down	1F
Response Timeout	20

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