Vanguard Managed Solutions

Vanguard Applications Ware
Multi-Service Feature Protocols

SMDS Option

Notice

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Overview

Introduction

Switched Multimegabit Data Service (SMDS) is a connectionless packet switching service which extends LAN-like performance beyond a subscriber's location. This option manual describes SMDS support for Vanguard Products running Release 4.90 (and later) software.

Note

The alarms and reports generated by SMDS are described in the *Vanguard Applications Ware Alarms and Reports Manual* (Part Number T0005).

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What is SMDS?

Introduction

Available in many countries around the world, Switched Multimegabit Data Service (SMDS) is a connectionless packet switching service which extends LAN-like performance beyond a subscriber's location. SMDS provides for the exchange of variable length SMDS data units which can contain up to 9188 octets of user information per data unit.

SMDS addresses are 64 bits long. The highest nibble is used to indicate an Individual address or a Multicast address. The remaining 60 bits are BCD encoded according to the E.164 address format. In North America, only 10 BCD digits are used for addresses. The remaining address field is padded with ones.

SMDS datagrams contain a source and destination address. Address screening is done by the SMDS network at ingress and egress. SMDS also supports group addressing for applications which require multicasting capabilities.

Access to the SMDS network is provided by running the SMDS Interface Protocol (SIP) Level 3 over DXI or Frame Relay.

- SIP Level 3 provides SMDS addressing and contains a 36-byte header and 4-byte trailer information.
- DXI provides framing and bit error detection using a 2-byte CRC. It uses HDLC UI frames to transport a complete SIP Level 3 Protocol Data Unit.

Link integrity between units is verified by the use of a Heart Beat Poll by the DXI. When Heart Beat Poll is Enabled (on the DXI Port), a TEST command is sent out of the DXI port every 5 seconds. A unit receiving this TEST command responds with a TEST response. If the number of responses received lags the number of commands sent by 3, then the link is declared down. The unit continues to send TEST commands even if the link is in the down state. When a link is in the down state, the first response received results in the link being declared up. Even if the Heart Beat Poll is Disabled, a TEST response is always generated for every TEST command received.

Speeds

SMDS can be used at any speed provided by the DXI interface. These speeds include:

- T1
- Fractional T1
- E1
- 2 Mbps

The SMDS network interface is accessed via a DSU/CSU connected to the DXI port.

Supported Protocols

These are the protocols supported by SMDS on Vanguard Products:

- SMDS Data Exchange Interface (DXI) Protocol (for DXI port):
  - Heart Beat Poll procedure.
  - Maximum frame size support for SMDS/DXI is 4590 bytes.
  - Clock speeds to E1. The configuration speed value and range prompt depends on the interface type and is consistent with other port types.
- IP Routing:
  - RFC 1209 encapsulation with multiple logical IP subnets.
  - RIP and OSPF.
  - Interoperability with Cisco routers.
  - IP to SMDS address mapping by ARP or manual configuration.
  - IP Broadcast/Multicast addresses are mapped into SMDS multicast addresses.
- IPX Routing:
  - RFC 1209 encapsulation.
  - Interoperability with Cisco routers.
  - IPX to SMDS address mapping by ARP or manual configuration.
  - IPX Broadcast addresses are mapped into SMDS multicast addresses.
- X.25 over SMDS:
  - The protocol uses the HLPI field in the SIP Level 3 header set to 2.
- Bridging:
  - The SNAP header is used with proprietary codepoint.
- Remote access of the CTP using the X.25 Virtual link over SMDS or by Telnet.
- SNMP support for SMDS objects are supported via a private MIB. RFC 1694 (MIB for SMDS Interface Protocols) is not supported.
- Forwarding of reports/events to remote locations can be done over the X.25 Virtual link over SMDS or by SNMP Traps using IP.
- SIP Level 3 frames can also be carried over a Frame Relay DLCI.

Routing within SMDS

Each routed packet must contain information identifying the protocol. For SMDS and LAN interfaces, this protocol identification is carried in the SNAP. The SNAP used for some protocols is listed in this table.

Protocol	Organization ID	Protocol ID
IP	00-00-00	08-00
ARP	00-00-00	08-06
IPX	00-00-00	81-37

These packets are encapsulated within an LLC Type 1 UI frame. Both IP and IPX use ARP for Address resolution. For IPX, the 6-byte node MAC Address is resolved to an SMDS Address.

Routing protocols require Multicast Stations for RIP/SAP updates. The HLPI field in the SIP Level 3 header is set to 1 for Routed and Bridged protocols when using Multicast Stations. Using Unicast Stations for routing protocols causes the router to miss RIP/SAP updates.

Bridging with SMDS

Only half bridges are supported over SMDS. SMDS has a frame loss of $1x10^{-4}$ and a frame misordering ratio of $1x10^{-9}$.

Bridged protocols usually recover from frame loss, but may not recover from frame misordering:

- When the effect of frame misordering is negligible, the Multicast Station used for routing can be reused for Bridging. Bridged Ethernet (802.3), Bridged Token Ring (802.5), and Spanning Tree Protocol (STP) packets are carried in a proprietary encapsulation which has the OID field in the SNAP header set to 00-00-FF. The HLPI field in the SIP Level 3 header is 1.
- When the effect of frame misordering/duplication is not tolerable, a virtual X.25 link can be defined across the SMDS network and Bridging done over it.

Bridge links are mapped to LAN Connections (LCONs). LCONs must have their encapsulation set to CODEX.

X.25 over SMDS

Providing X.25 over SMDS allows serial protocols to be transmitted over an SMDS network. Virtual X.25 links are established over the SMDS network free of frame loss, frame misordering, and frame duplication. These links are defined by unique source and destination SMDS address tuple. An X.25 call (SVC) is routed to a virtual X.25 station using the Route Selection Table. Implementation of this connection-oriented service uses the HLPI field set to 2 in the SIP Level 3 header.

Multicast Stations

Multicast Stations should be used when routing IP and/or IPX traffic. Mapped to a router interface, a Multicast Station has a source SIP address and IP/IPX Bridging Multicast Addresses. The source SIP address identifies a multicast station and must be unique from all stations on the SNI. Packets forwarded to the SMDS Multicast Station must be CODEX encapsulated, an intra-node encapsulation. The RFC 1209 encapsulation goes out to the SMDS network. The HLPI field in the SIP Level 3 header is set to 1.

LAN Connections (LCONs) attached to SMDS Stations must have their encapsulation set to CODEX. The Multicast Stations interface only to the WAN adapter. This is only PVC connections. The Channel Identifier used for SMDS Multicast Station is SMDS-i (where i is the Entry Number of the station).

Unicast Stations

Unicast Stations are identified by a Source and Destination SIP Address and provide for point-to-point service across the SMDS network. This service does not protect data from frame loss, misordering, or duplication. Higher layer protocols are used to recover from these conditions.

- If the Unicast Station is connected to the WAN adapter, SLIP, or PPP, the internode encapsulation used is RFC1209 with the HLPI field in the SIP Level 3 header set to 1.
- If the Unicast Station is connected intranode to an X.25 Virtual Station, the frames sent out over the SMDS network have the HLPI field in the SIP Level 3 header set to 2.
- LAN Connections (LCONs) attached to SMDS Unicast Stations must have their encapsulation set to CODEX.
- SLIP/PPP, when attached to SMDS Unicast Stations, must have their encapsulation set to RFC1294. Note that these are intranode encapsulations.

The Channel Identifier used for SMDS Unicast Station is SMDS-i (where i is the Entry Number of the specific Unicast Station).

Unicast Stations should not be used when routing IP and/or IPX traffic. Otherwise, the router misses RIP/SAP updates.

Virtual X.25 Station

When used in conjunction with an SMDS Unicast Station, the Virtual X.25 Station provides an X.25 Virtual link across the SMDS network. It uses LAPB to address frame loss and implements a protocol to eliminate frame misordering by implementing sequence numbers. (By not addressing frame misordering, FRMR generation takes place which restarts the virtual X.25 link every time frame misordering occurs).

The Channel Identifier VX-i (where i is the Entry Number of the Virtual Station) connects the Virtual X.25 Station to the SMDS Unicast Station. The Channel Identifier VX25-i is used by the Route Selection Table to connect to serial applications.

The Virtual X.25 Station can be associated with an X.25 Profile. The profile contains all X.25 parameters such as Level 2 Link address, Level 2 and 3 window sizes, etc. The Profiles DTE and DCE are predefined, but they can be redefined and other profiles can be added.

Application Examples

Introduction

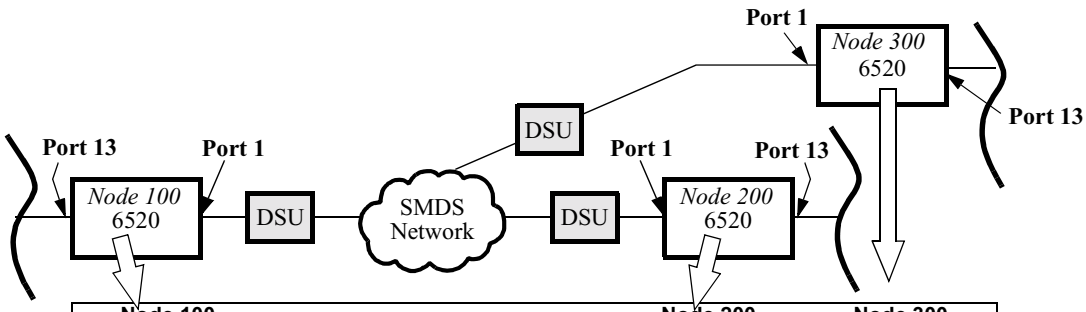
This section illustrates how to configure SMDS for several applications:

- IP Routing across an SMDS Network
- Bridging across an SMDS Network
- X.25 over SMDS

IP Routing Across an SMDS Network

Configuration Illustration

Figure 1 shows how to configure 6520s for IP Routing within an SMDS Network:



Node 100		Node 200	Node 300
	Node Record		
100	Node Name	200	300
100	Node Address	200	300
	Port Records		
1	Port Number	1	1
DXI	Port Type	DXI	DXI
SIMP	Connection Type	SIMP	SIMP
EXT	Clock Source	EXT	EXT
64000	Clock Speed	64000	64000
Enabled	Heart Beat Poll	Enabled	Enabled
13	Port Number	13	13
Eth	Port Type	Eth	Eth
	SMDS Station Table		
9	Entry Number	9	9
Multicast	Station Type	Multicast	Multicast
9055071111	Source	9055072222	9055073333
9055079999	IP Multicast	9055079999	9055079999
1	SNI	1	1
	PVC Tables		
1	Entry Number	1	1
SNI-1	Source	SNI-1	SNI-1
DXI-1	Destination	DXI-1	DXI-1
2	Entry Number	2	2
LCON-9	Source	LCON-9	LCON-9
SMDS-9	Destination	SMDS-9	SMDS-9
	LAN Connection Table		
9	Entry Number	9	9
9	Router Interface Number	9	9
CODEX	Encapsulation Type	CODEX	CODEX
	Autocall Mnemonic		
	Router Interface States		
Enabled	Interface #1 State	Enabled	Enabled
Enabled	Interface #9 State	Enabled	Enabled
	IP Interfaces		
1	Entry Number	1	1
1	Interface Number	1	1
1.0.0.1	IP Address	2.0.0.1	3.0.0.1
9	Entry Number	9	9
9	Interface Number	9	9
9.0.0.1	IP Address	9.0.0.2	9.0.0.3

Figure 1. IP Routing in an SMDS Network

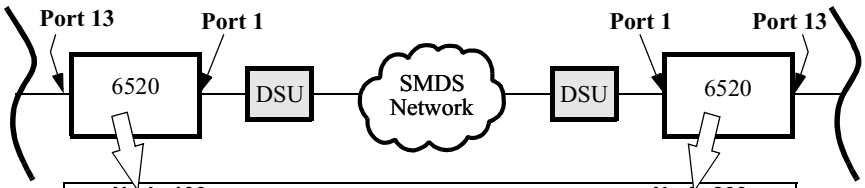
Bridging Across an SMDS Network

Configuration Illustration

Figure 2 shows how to configure Vanguard 6520s for Bridging within an SMDS Network.

This configuration assumes that the SMDS network does not have excessive frame misordering. Therefore, Multicast Station can be used for Bridging and Routing.

If frame misordering is a significant factor, an X.25 Virtual link must set up and a Bridge link mapped to a virtual circuit using an LCON.



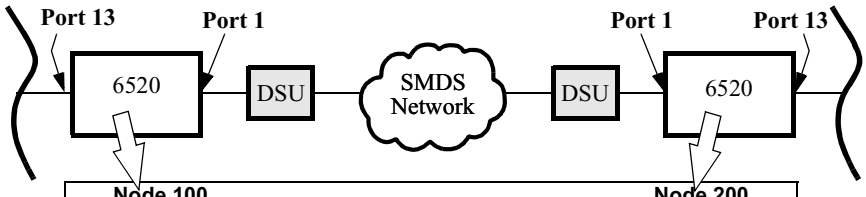
Node 100		Node 200
	Node Record	
6520	Node Name	6520
100	Node Address	200
	Port Records	
1	Port Number	1
DXI	Port Type	DXI
SIMP	Connection Type	SIMP
EXT	Clock Source	EXT
64000	Clock Speed	64000
Enabled	Heart Beat Poll	Enabled
13	Port Number	13
Eth	Port Type	Eth
	SMDS Station Table	
9	Entry Number	9
Multicast	Connection Type	Multicast
9055071111	Source	9055072222
9055072222	TB Unicast SIP Address	9055071111
1	SMDS SNI	1
	PVC Tables	
1	Entry Number	1
SNI-1	Source	SNI-1
DXI-1	Destination	DXI-1
2	Entry Number	2
LCON-9	Source	LCON-9
SMDS-9	Destination	SMDS-9
	Bridge Parameters	
Auto	STPE Control	Auto
	Bridge Link Parameters	
9	Entry Number	9
9	Bridge Link Number	9
TB	Bridge Type	TB

Figure 2. Bridging in an SMDS Network

X.25 Across an SMDS Network

Configuration Illustration

Figure 3 shows how to configure Vanguard 6520s for running serial protocols across an SMDS Network.



Node 100		Node 200
	Node Record	
6520	Node Name	6520
100	Node Address	200
	Port Records	
1	Port Number	1
DXI	Port Type	DXI
SIMP	Connection Type	SIMP
EXT	Clock Source	EXT
64000	Clock Speed	64000
Enabled	Heart Beat Poll	Enabled
	SMDS Station Table	
1	Entry Number	1
Unicast	Connection Type	Unicast
9055071111	Source	9055072222
9055072222	Destination	9055071111
1	SMDS SNI	1
	VX Station Table	
1	Entry Number	1
DTE	Profile Name	DCE
	PVC Tables	
1	Entry Number	1
SNI-1	Source	SNI-1
DXI-1	Destination	DXI-1
2	Entry Number	2
VX-1	Source	VX-1
SMDS-1	Destination	SMDS-1
	Route Selection Table	
1	Entry Number	1
200	Address	100
VX25-1	Destination	VX25-1

Figure 3. X.25 Across an SMDS Network

Configuration

Introduction

This section describes the parameters that must be configured to use SMDS.

SMDS Records

The parameters that should be configured for SMDS are organized in several records:

- SMDS Multicast Stations
- SMDS Unicast Stations
- ARP
- DXI port
- Virtual X.25 Station
- X.25 Profile

The following sections describe each record and parameter in detail.

Multicast Configuration

Introduction

This section describes the configurable parameters for Multicast.

SMDS Record with Multicast

To configure an SMDS Multicast Station, you need to access the SMDS Record. Figure 4 shows the SMDS Record when Connection Type = Multicast. (The tree looks different when Connection Type = Unicast as shown in Figure 5.)

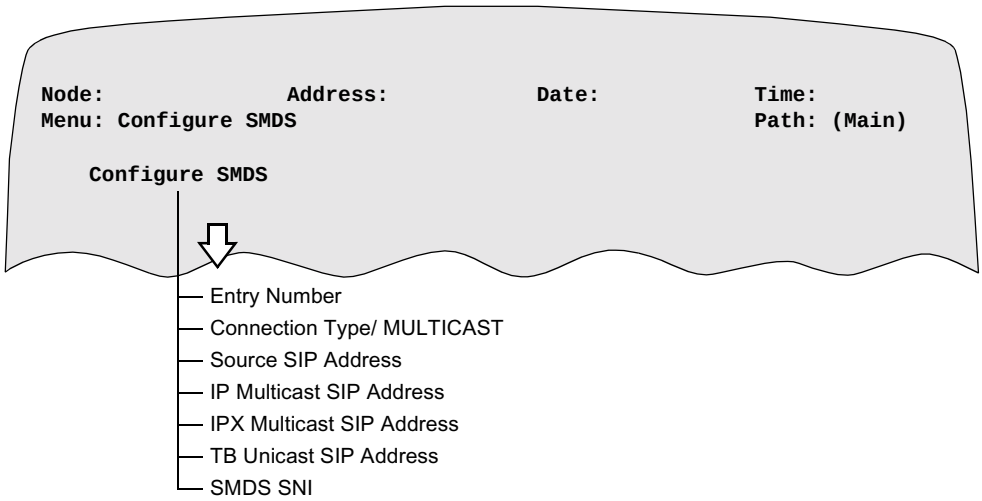


Figure 4. SMDS Multicast Parameters

Multicast Parameters

This section describes the parameters that appear when the Connection Type is set to Multicast:

Connection Type

Range	Unicast, Multicast
Default	Multicast
Description	Specifies the connection attribute of the SMDS Station. The parameters that follow assume that this has been set to Multicast.

Source IP Address

Range	E.164 Address
Default	N/A
Description	Specifies the SIP Individual Address for a Station. Each Multicast Station has a Unique SMDS Individual Address.

IP Multicast SIP Address

Range	E.164 Address
Default	N/A
Description	Specifies the SIP IP Group Address for a Station. Each Multicast Station has a Unique SMDS Multicast Address. This address is used for ARP resolution of IP addresses.

IPX Multicast SIP Address

Range	E.164 Address
Default	N/A
Description	Specifies the SIP IPX Group Address for a Station. Each Multicast Station has a Unique SMDS Multicast Address amongst IPX Multicast Addresses. This address is used for ARP resolution of IPX node addresses.

TB Unicast SIP Address

Range	E.164 Address
Default	N/A
Description	Specifies the Unicast Address to be used for Transparent Bridging. Only point-to-point view is supported.

SMDS SNI

Range	1 to 10
Default	1
Description	Specifies an SNI to associate this Station with a Level 1 Interface. The actual association is done through the PVC Table. Multiple Stations could have the same SNI indicating that they are all associated with the same Level 1 Interface.

Unicast Parameters

Introduction

This section describes the configurable parameters for Unicast.

SMDS Record with Unicast

To configure an SMDS Unicast Station, you need to access the SMDS Record. Figure 5 shows the SMDS Record when Connection Type = Unicast. (The tree looks different when Connection Type = Multicast as shown in Figure 4.)

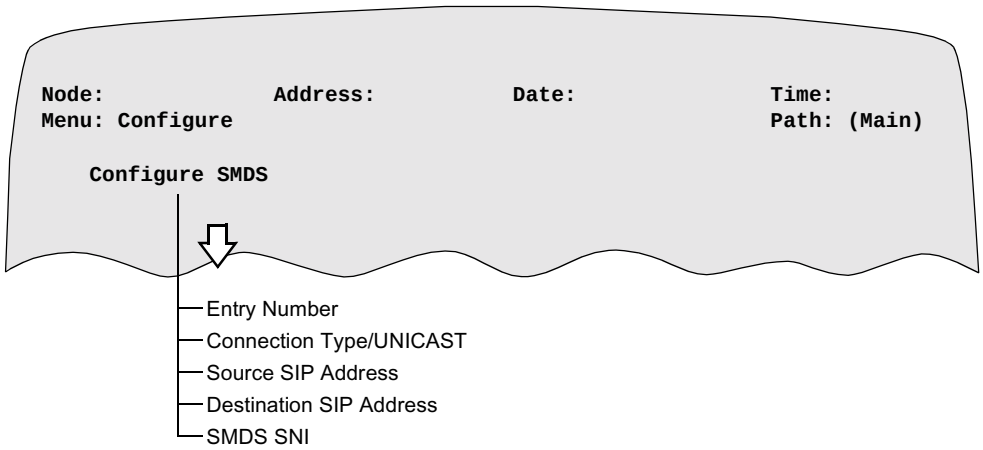


Figure 5. SMDS/Unicast Parameters

Unicast Parameters

This section describes the parameters that appear when Connection Type = Unicast:

Connection Type

Range	Unicast, Multicast
Default	Multicast
Description	Specifies the connection attribute of the SMDS Station. The parameters that follow assume that this has been set to Unicast.

Source IP Address

Range	E.164 Address
Default	N/A
Description	Specifies the SIP Individual Address for a Station. Each Multicast Station has a Unique SMDS Individual Address.

Destination SIP Address

Range	E.164 Address
Default	N/A
Description	Specifies the SIP Individual Address for a Destination SMDS Interface. The Source and Destination SIP Address defines a point-to-point connection and is unique amongst all Unicast Stations.

SMDS SNI

Range	1 to 10
Default	1
Description	Specifies an SNI to associate this Station with a Level 1 Interface. The actual association is done through the PVC Table. Multiple Stations could have the same SNI indicating that they are all associated with the same Level 1 Interface.

ARP

Introduction

This section describes the configurable parameters for configuring the ARP Cache Table.

ARP Cache Table

To configure the ARP Cache Table, you need to access the record as shown in Figure 6.

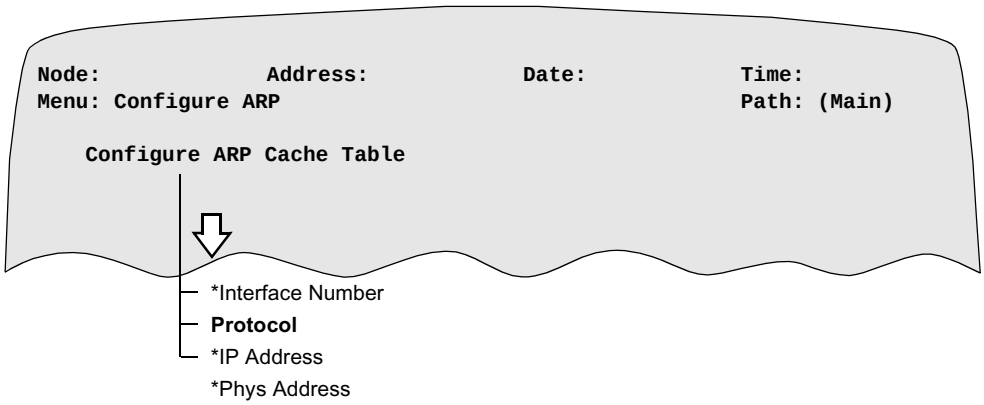


Figure 6. ARP Cache Table Parameters

ARP Cache Parameters

This section describes the ARP Cache parameter.

Protocol

Range	IP, IPX
Default	IP
Description	Specifies the protocol for which the ARP entry is being defined. For IPX protocol, the ARP cache maps a MAC address to an SMDS Address. This appears only for WAN interfaces (with interface numbers greater than 5).

DXI Port Configuration

Introduction

This section describes the configurable parameters for configuring a DXI Port.

DXI Port Record

To configure the DXI Port Record, you need to access the record as shown in Figure 7.

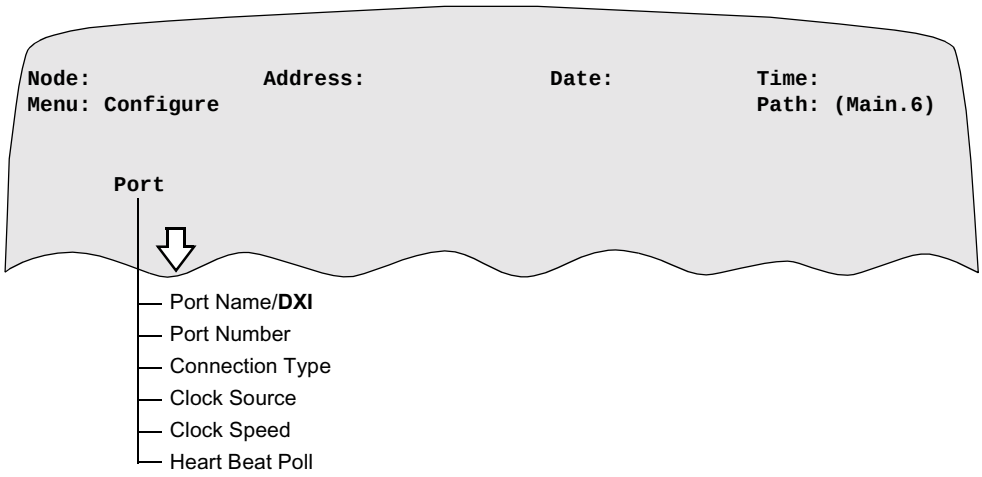


Figure 7. DXI Port Record Parameters

DXI Port Parameters

This section describes the DXI Port parameters.

Connection Type

Range	SIMP
Default	SIMP
Description	Specifies the type of control signal handshaking that is required before logical connections can be made to this port. Select SIMP when the terminals are wired to the port with a cable that has few conductors so that most control signals are missing. Such cabling should provide only ground, transmit and receive data, and transmit and receive clock. Control signals from the port are maintained high.

Clock Source

Range	EXT, INT
Default	EXT
Description	Specifies the clocking source: • INT: the port provides clocking • EXT: external device provides clocking

Clock Speed

Range	1200 to 383000
Default	64000
Description	The speed of the port in bits per second. The highest speed depends on the type of card and the port interface: • 6500*PLUS* Processor Cards, Ports 1 and 2: 1200 to 384000 (V.25, V.36, and X.21) • 6500*PLUS* Processor Cards, Ports 1 and 2: 1200 to 80000 (EIA 232) • 6500*PLUS* Processor Cards, Ports 3 to 6: 1200 to 80000 • Universal I/O Card, Ports 1 to 6: 1200 to 80000 **Note** This parameter is enabled when Clock Source = INT.

Heart Beat Poll

Range	Enable, Disable
Default	Disable
Description	Specifies whether the Heart Beat Poll process is active. Fixed values are used for the Heart Beat Poll timer and the Ack interval required by the process.

X.25 Virtual Station Configuration

Introduction

This section describes the parameters for configuring an X.25 Virtual Station (VX Station).

VX Station Record

To configure the VX Station, select VX Station under the Configuration menu. Figure 8 shows how to access the record.

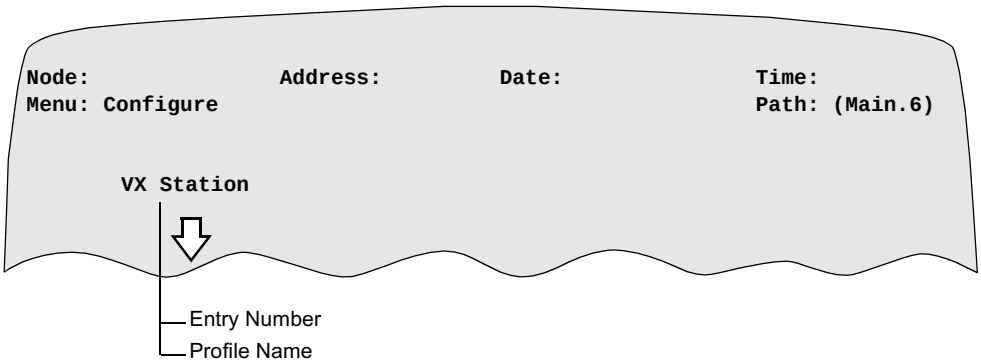


Figure 8. VX Station Parameters

VX Station Parameter

This section describes the VX Station parameters.

Profile Name

Range	0 to 8 alphanumeric characters
Default	DTE
Description	References name for this X.25 Profile. DTE and DCE are predefined profile names.

X.25 Profile Configuration

Introduction

This section describes the parameters for configuring an X.25 Profile.

At present, this profile is used only by SMDS Stations.

X.25 Profile Record

To configure the X.25 Profile, select X.25 Profile under the Configuration menu. Figure 9 shows the parameters that make up the record.

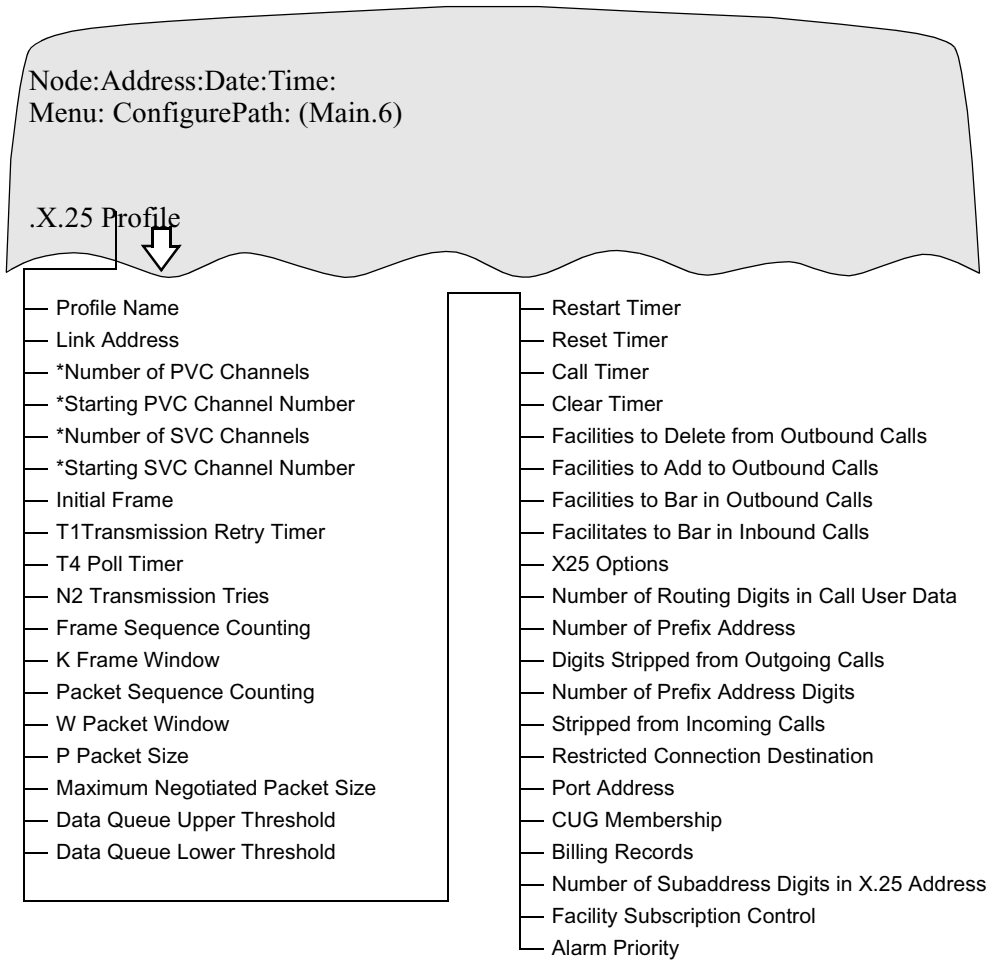


Figure 9. X.25 Profile Parameters

X.25 Profile Parameter

This table describes the X.25 Profile parameter Profile Name.

Note

For information about the rest of the X.25 Profile parameters, refer to the *Multipoint X.25 Option* (Part No. T0008-07).

Profile Name

Range	0 to 8 alphanumeric characters
Default	DTE
Description	Name for this X.25 Profile. DTE and DCE are predefined profile names.

Unicast Stations without SMDS Addresses

Partial Configuration

On an SNI, you can have a Unicast Station configured without a Source and Destination SMDS Address. When connected to the network, the station's address is set by the first compatible packet from the network which is not directed to an SMDS Station whose Source and Destination Addresses are defined. For example, you can set up a Virtual X.25 link between two nodes across an SMDS network by configuring only one node with the SMDS addresses.

This capability is useful when a node is shipped to a remote site with only a generic configuration. The central site, which has knowledge of the remote node's SMDS Address, can contact the node and do the site-specific configuration. An example of the generic configuration on the remote node is shown here:

Record	*Parameter*	*Entry*
PVC Table	Entry	1
	Source	SNI-1
	Destination	DXI-1
	Entry	2
	Source	SNI-2
	Destination	DXI-2
SMDS Station Table	Entry	1
	Station Type	Unicast
	Source	--
	SNI	1
VX Station	Entry	1
	Profile name	DTE

Statistics

Introduction

This section describes the Statistical information available with SMDS.

Available Statistics

These are the Statistics screens available with SMDS:

- Detailed SMDS Station Statistics
- ARP Cache Statistics
- Detailed DXI Port Statistics
- VX Statistics

These screens and their contents are described later in this section.

SMDS Statistics

Screen

Detailed SMDS Station statistics are available by selecting the SMDS Statistics entry under the Status/Statistics menu and then answering the prompts for Station Number. Figure 10 is an example of a Detailed SMDS Station Statistics screen.

```
Station Number: 1/1

Node:             Address:          Date:             Time:

 Detailed SMDS Station statistics. SNI 1, Station 9  Page:1 of 1

 Station Type: Multicast
 Station SIP Address:    C905.5071.111F.FFFF
 IP Multicast Addr:      E905.5079.999F.FFFF
 IPX Multicast Addr:     E905.5079.999F.FFFF
 TB Unicast Address:     0000000000000000000


 Connection Type: PVC
 Encapsulation Type: CODEX
 Connection State: CONNECTED
In Packets: 100                          In Dropped Packets: 0
Out Packets: 100                         Out Dropped Packets: 0


Press any key to continue (ESC to exit)...
```

Figure 10. Detailed SMDS Station Statistics Screen

Screen Terms

This table describes the SMDS terms in the Detailed SDMS Station Statistics screen:

Term	Description
Station SIP Addr	As configured from the CTP.
IP Multicast Addr	For Multicast Station only. As configured from the CTP.
IPX Multicast Addr	For Multicast Station only. As configured from the CTP.
TB Unicast Addr	For Multicast Station only. As configured from the CTP.
Connection Type	SVC or PVC. Connect to SMDS Station via the PVC Table or Route Table.
Encapsulation Type	IntraNode Data Encapsulation. Values are: • CODEX: when connecting to a WAN adapter • X25: when connecting to a VX25 station • RFC1290: when connecting to a SLIP/PPP
Connection State	State of the station. Values are: • Waiting for call • Connected, Handshaking • Clearing • Disabled • Connected (this is data passing state)
In Packets	Packets received at the station.
Out Packets	Packets transmitted from the station.
In Dropped Packets	Anything above 0 indicates that the data queues are full and packets from network are being dropped.
Out Dropped Packets	Anything above 0 indicates that data packets are being transmitted to DXI faster than it can send them to the network.

ARP Statistics

Screen

To obtain ARP Cache statistics information, follow this path starting from the Main menu:

Statistics->Router Statistics->ARP Stats->ARP Cache

Note

These statistics are only available for WAN router interfaces.

Figure 11 is a sample of the ARP Statistics for IPX on Interface 9.

```
Interface #: 9
Protocol: IP/IPX
MAN Address          IPX Address         Mins Until     Timeout
                                         Refresh        Usage
c9-05-50-72--22-2f-ff      00000c31df61   4              3
c9-05-50-73--33-3f-ff      08003E0040D9   3              1
```

Figure 11. ARP Cache Statistics

Screen Terms

This table describes the SMDS terms in the ARP Cache Statistics screen:

Term	*Description*
MAN Address	Identifies the SMDS Address associated with this address.
IPX Address	Identifies the IPX Address that is mapped to the SMDS address.
Mins Until Timeout	• Refresh — The number of minutes until an entry in the ARP cache is removed from the table, if it is not refreshed. • Usage — The number of minutes until an entry in the ARP cache is removed, if no packet is forwarded to it.

DXI Statistics

Screen

The Detailed DXI Port Statistics screen (Figure 12) shows the EIA and Error Summary and the parameter values being used for the Heart Beat process.

```
Node:               Address:            Date:              Time:
Detailed DXI Port Statistics: Port 1                       Page: 1 of 1


Port Number:1                    Port Type: DXI Port          Status: Up
Port Speed: 64000                Port State: Connected
Port Utilization In: 10%         Port Utilization Out: 10%
HeartBeat: Enabled               PVC State: Connected

Data Summary:
                   IN   OUT                              IN   OUT
  Characters:    4726  8050           Characters/sec:   100   170
  Frames:         546   513           Frames/sec:        11    10


Physical summary:
  Overrun: 0  Underrun: 0    CRC: 0 NON-Octet Aligned: 0

Interface Summary:  EIA-232-D DCE      INPUT           OUTPUT
                                  DTR  RTS  MB  P14    DSR  DCD  RI  CTS
  State: Connected (SIMPLE)        H    H   L   H      H    H   L   H

Press any key to continue (ESC to exit)...
```

Figure 12. Detailed DXI Port Statistics Screen

Screen Terms

This table describes the DXI Port Statistics fields specific to the DXI:

Term	*Description*
Status	• Up: port has been enabled from the CTP. • Disabled: port has been disabled from the CTP.
Port State	State of the connection between DXI and BOP: Disconnected or Connected.
HeartBeat	As configured for DXI Port: Enabled or Disabled.
PVC State	State of the connection between DXI and SNI. • Disabled: port has been disabled from the CTP. • Handshaking: HeartBeat function indicates the link is down. • Connected: HeartBeat function indicates the link is up.

X.25 Virtual Station Statistics

Screen

The statistics for the X.25 Virtual Station are identical to X.25 Port Statistics except for Page 1, which is shown in Figure 13.

```
Node:               Address:            Date:           Time:
Detailed VX Station Statistics: Station 1               Page: 1 of 4

Stn Number: 1      Station Status: Up          L2 State: Normal

Call Summary;

                    SVC             PVC
Maximum:            0               0
Current:            1               0

Data Summary:       Last Statistics Reset:
                    IN              OUT
Characters:         10              10
Packets:            10              10
Frames:             397             400
Number of Packets Queued: 0


Press any key to continue (ESC to exit)...
```

Figure 13. X.25 Virtual Station Statistics

Screen Terms

The terms in the X.25 Virtual Station Statistics page 1 are the same as for the X.25 Port statistics (in the *Vanguard Configuration Basics Manual*) except for the term described here:

Term	*Description*
L2 State	Indicates the state of Link Level 2. Values can be: • Disc. • Phase • Link Disc • Link Setup • Frame Reject • Normal • Remote Busy • Reset • Send Reject Generally, the important states are Link Setup and Normal. Only after Level 2 (LAPB) reaches the Normal State is Link Restart at Level 3 attempted.