

Vanguard Managed Solutions

**Vanguard Applications Ware
Serial Feature Protocols**

Transparent Character-Oriented Protocol

Notice

©2002 Vanguard Managed Solutions, LLC
575 West Street
Mansfield, Massachusetts 02048
(508) 261-4000
All rights reserved
Printed in U.S.A.

Restricted Rights Notification for U.S. Government Users

The software (including firmware) addressed in this manual is provided to the U.S. Government under agreement which grants the government the minimum “restricted rights” in the software, as defined in the Federal Acquisition Regulation (FAR) or the Defense Federal Acquisition Regulation Supplement (DFARS), whichever is applicable.

If the software is procured for use by the Department of Defense, the following legend applies:

Restricted Rights Legend

Use, duplication, or disclosure by the Government
is subject to restrictions as set forth in
subparagraph (c)(1)(ii) of the
Rights in Technical Data and Computer Software
clause at DFARS 252.227-7013.

If the software is procured for use by any U.S. Government entity other than the Department of Defense, the following notice applies:

Notice

Notwithstanding any other lease or license agreement that may pertain to, or accompany the delivery of, this computer software, the rights of the Government regarding its use, reproduction, and disclosure are as set forth in FAR 52.227-19(C).

Unpublished - rights reserved under the copyright laws of the United States.

Notice (continued)

Proprietary Material

Information and software in this document are proprietary to Vanguard Managed Solutions, LLC (or its Suppliers) and without the express prior permission of an officer, may not be copied, reproduced, disclosed to others, published, or used, in whole or in part, for any purpose other than that for which it is being made available. Use of software described in this document is subject to the terms and conditions of the Software License Agreement.

This document is for information purposes only and is subject to change without notice.

Part No. T0102-06 Rev F
Publication Code DS
First Printing November 1998

Manual is current for Release 6.1 of Vanguard Applications Ware.

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

Transparent Character-Oriented Protocol

Overview

Introduction

This manual describes how to configure and use the Transparent Character-Oriented Protocol (TCOP) on Vanguard products.

Alarms and Reports

For details about the alarms and reports for the TCOP protocol, refer to the *Vanguard Applications Ware Alarms and Reports Manual* (Part Number T0005).

In This Manual

Topic	See Page
TCOP	2
Typical Applications	3
Limitations	4
Support	5
Autocalling	6
Port Configuration	7
Statistics	14

TCOP

What is TCOP?

Transparent Character Oriented Protocol (TCOP) is an enhanced version of a protocol was originally developed to support the Hitachi HSC3 protocol. TCOP allows a device to support G*NET and ADP protocols. In addition, it supports IBM BSC3270 and BSC3780/278. However, TCOP does not support spoofing with any protocol. For more information on the protocols that TCOP supports, see the most recent software release notice for vanguard Products.

TCOP supports all Vanguard products.

Features

These features are available with theTCOP protocol:

- Transmitter SYNC fill protection for the BCC (Block Check Character)
- Receiver SYNC stripping
- Normal and transparent text modes
- Full Duplex and Half Duplex line contention modes
- Full and Half Duplex modes of data transmissions
- ASCII code type
- EBCDIC code type
- Internal and External Clocking
- Up to 80 kbps sync
- CTP support for Configure, Examine, and Statistics modes
- User-configurable forwarding criteria
- Point-to-point connections over Switched Virtual Circuits (SVCs) using standard Autocall mechanism
- Port Boot, Disable, and Enable control
- Access control via Custom Software Key (CSK)

Protocol Support

TCOP supports these protocols:

- Hitachi HSC3
 - G*NET with full duplex support
 - UTS
 - ADP
 - IBM BSC3270
 - IBM BSC3780/2780
 - SLC
 - AC100
-

Typical Applications

Description This section shows typical TCOP applications.

Hitachi Terminal Equipment Figure 1 shows a generalized application where Hitachi terminal equipment is communicating with a host using the HSC3 protocol via an X.25 network.

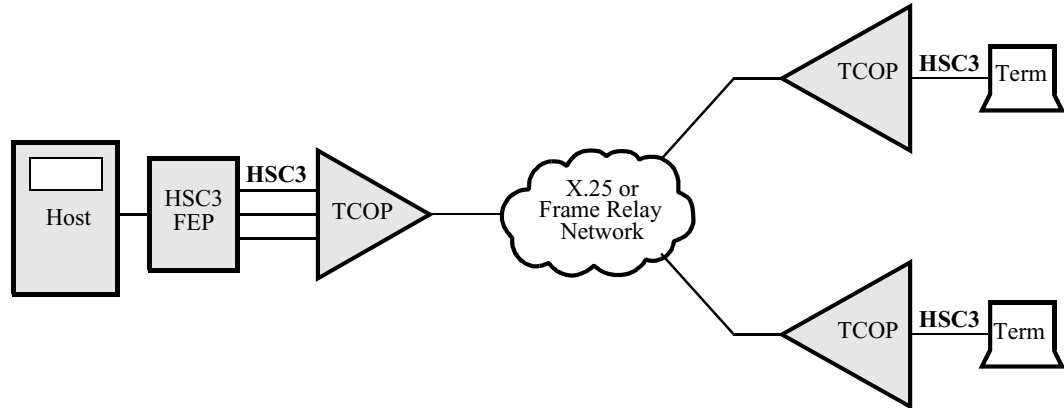


Figure 1. Hitachi Terminal Communicating with Host Running HSC3 Protocol

G*NET Devices Figure 2 shows an application where different G*NET devices communicate with each other over an X.25 network.

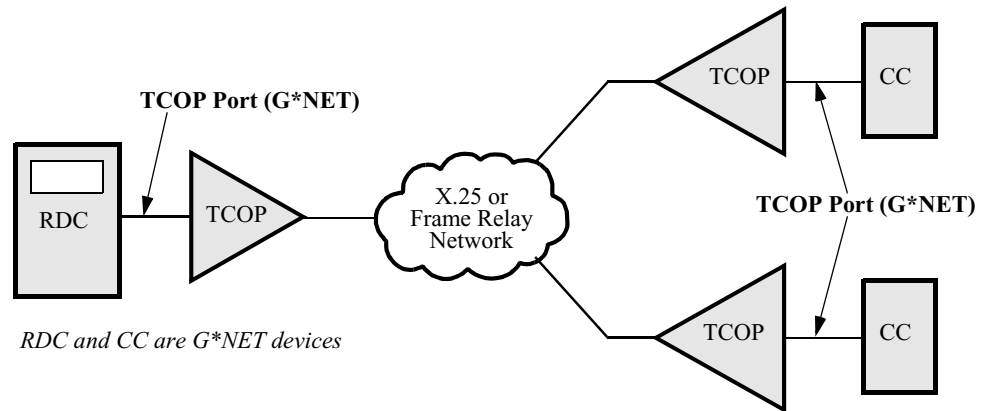


Figure 2. G*NET Devices Communicating over X.25 Network

Limitations

Description

In addition to the standard things that effect network performance such as number of nodes, link speeds, maximum packet size, response time, and transmission delays, data congestion issues limit TCOP's effectiveness.

Data Congestion

This table describes data congestion issues with TCOP:

<i>If this problem occurs...</i>	<i>Then...</i>
Network Congestion	It may cause a time-out condition for endpoint applications. To speed up the recovery of application synchronization, the TCOP port flushes (discards) messages if more than two completed messages are queued up at the local receiving side or at the remote transmitting port.
Message Overflows (at the local receiving side)	The TCOP port not only discards messages from the queue but also clears the network call in an effort to clean up other residual data in the network.
Protocol Synchronization problems	The TCOP port cannot resolve problems that might result from an unexpected network disruption.

Support

Introduction

You must configure each TCOP port with a Subtype protocol. This Subtype protocol determines which message formats it supports.

TCOP supports these Subtypes:

- HSC3
- G*NET
- UTS
- SLC
- AC100

Message Formats

This table shows the message format supported by each port subtype:

<i>Protocol (Subtype)</i>	<i>Message Format</i>
HSC3	SYNC EOT SYNC STX ENQ SYNC DLE CHAR
G*NET	SYNC SYNC SYNC SOH EOT PAD SYNC SYNC SYNC SOH...<text>...ETX LRC PAD? ■Note The transmitter fills the frame with SYNC messages if the frame is too short. When the TCOP feature is configured for GNET, the transmitter protects against sync filling within messages.
UTS	SYNC SYNC SOH...<text>...ETX BCC SYNC SYNC DLE EOT ETX BCC SYNC SYNC EOT EOT ETX BCC ■Note When the TCOP feature is configured for the Uniscope protocol, the transmitter protects against SYNC filling during the following sequences of characters: <ul style="list-style-type: none"> • Last character and PAD • DLE CHAR • ETX BCC • SOH CHAR
SLC	SYN SYN DLE BDU ETB BCC
AC100	SYNC SYNC STX...ETX LPC

Autocalling

Introduction

This section explains which parameters must be configured to enable autocall for TCOP. For more information on setting up calls, refer to the *Vanguard Configuration Basics Manual*.

Autocall Configuration Example

Figure 3 shows how to configure two Vanguard 65xx or Vanguard 100 devices for autocalling from a TCOP port on a host node to the TCOP port on a remote node. The entries are specific to this example and will differ for your application.

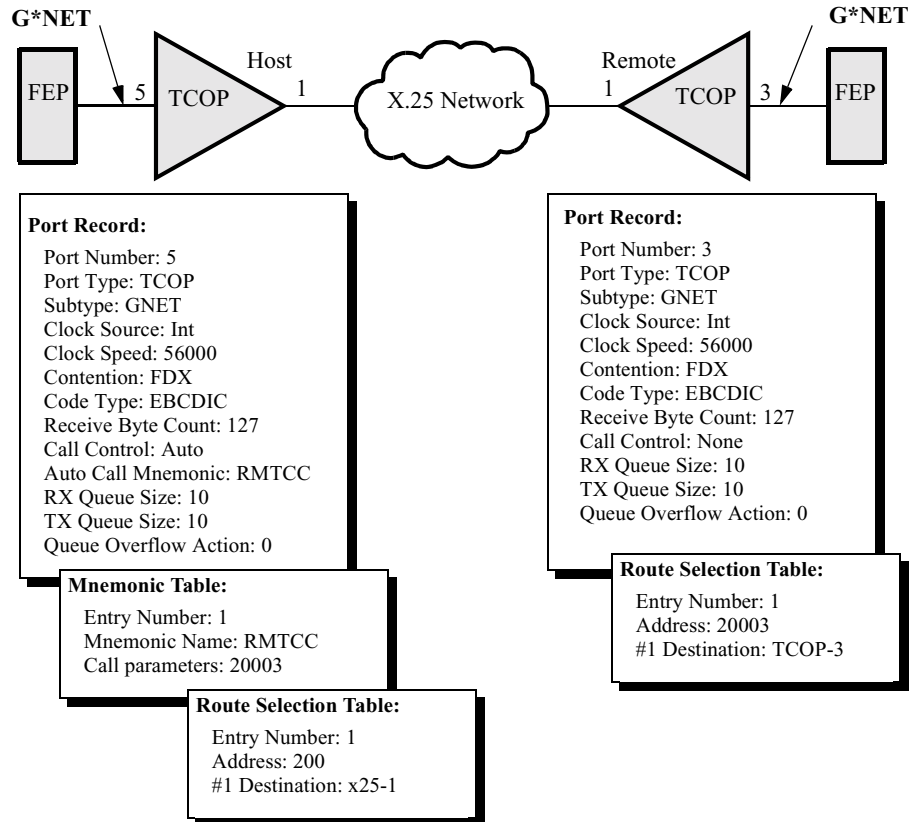


Figure 3. Autocall Configuration

Link Down

If an X.25 link goes down while a call is in place between two TCOP ports, the following events occur:

- All buffered data is discarded.
- Message reception is aborted.
- Message transmission is terminated abnormally.
- The autocall mechanism attempts to reestablish the call automatically.

Port Configuration

Introduction

This section describes the parameters that you configure to implement the TCOP protocol option.

Navigating the CTP Menu

Figure 4 shows the CTP path to the TCOP port record parameters:

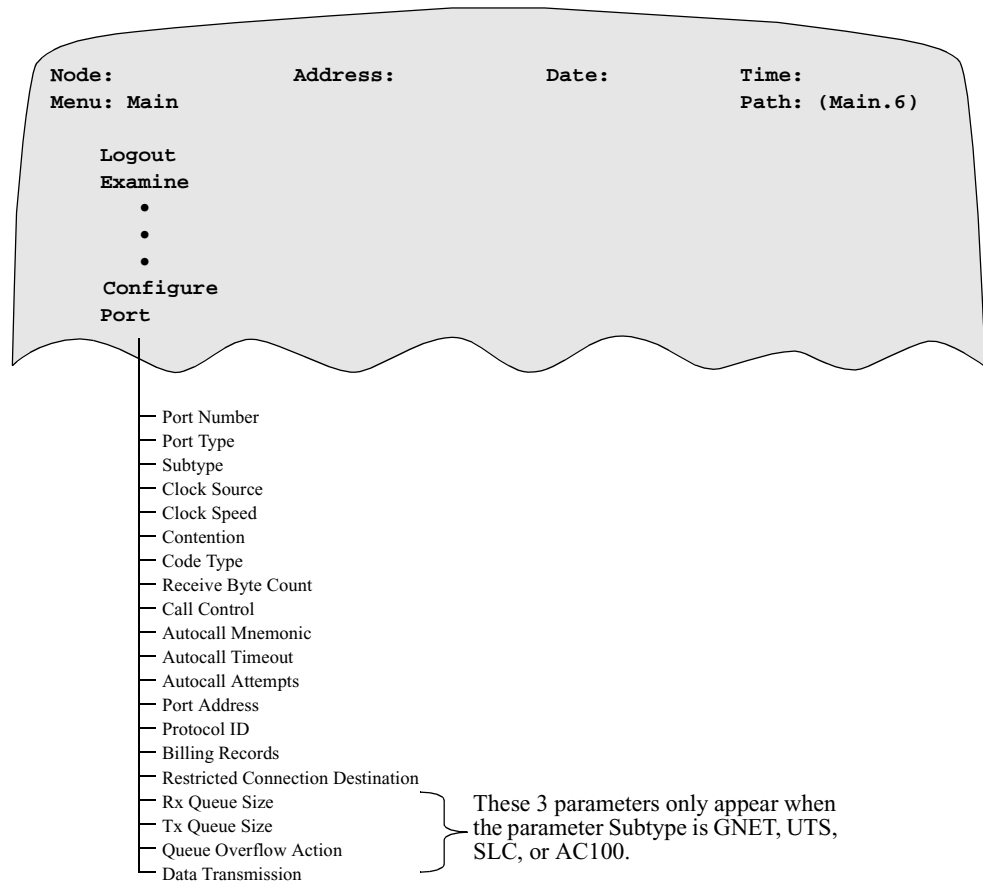


Figure 4. TCOP Parameters

Note

If you have enabled Ease of Configuration, you need to boot only the port to make changes to the parameters marked with an asterisk. For more information, refer to the Ease of Configuration section in the introductory portion of the binder (*Serial Feature Protocols Manual*, Part Number T0102).

Parameters

When you configure a TCOP port, these parameters appear:

Port Number

Range:	Contingent on platform.
Default:	n/a
Description:	Specifies the number of the port which you are configuring and serves as the entry number for the port you are about to configure.

Port Type

Range:	Contingent on software image.
Default:	n/a
Description:	Specifies the port type. For this software option, enter TCOP.

Subtype

Range:	HSC3, GNET, UTS, SLC, AC100
Default:	HSC3
Description:	Specifies the protocol subtype that determines the message format of data sent from this port. Select the type appropriate for your application: <ul style="list-style-type: none">• HSC3: Transparent Hitachi• GNET: Transparent GNET• UTS: Transparent Uniscope• SLC: Synchronous Link Control• AC100: Air Canada 100 Protocol

Clock Source

Range:	INT, EXT
Default:	EXT
Description:	Determines whether the device sets the synchronization (INT) interval or whether it takes the synchronization from another device (EXT). Select the appropriate clock source: <ul style="list-style-type: none">• INT: Internal clock. The port supplies the receive and transmit clocks.• EXT: External clock. The port receives clocks on pins 18 and 24.

Clock Speed

Range:	1200 to 80000
Default:	4800
Description:	Specifies the clock speed in bps when Clock Type = INT (Internal).

Contention

Range:	FDX, HDX
Default:	FDX
Description:	<p>Specifies whether half duplex or full duplex modem signals are generated.</p> <ul style="list-style-type: none"> • FDX: Full duplex indicates that DCD is held ON at all times. • HDX: Half duplex indicates that DCD will be turned ON only when the Vanguard device is transmitting.

Code Type

Range:	ASCII, EBCDIC
Default:	EBCDIC
Description:	<p>Specifies the code set for the control characters.</p> <ul style="list-style-type: none"> • ASCII: The data format is set to 8 bits with no parity or 7 bits with odd/even parity. Parity checking is performed on 7 bit data. • EBCDIC: The data format is set to 8 bits with no parity.

Receive Byte Count

Range:	8 to 127
Default:	64
Description:	<p>Specifies the number of bytes collected before data is forwarded to the network. Data is forwarded when the selected number is reached and when the end of the message has been received.</p> <p>This parameter let you make the best compromise between network delay and the number of packets traversing the network.</p> <ul style="list-style-type: none"> • 8 indicates the network delay is minimized, but more packets must travel through the network. • 127 indicates the network delay is increased, but fewer are needed to send a message. <p>The minimum setting for Receive Byte Count parameter is dictated by the port speeds, as follows:</p> <ul style="list-style-type: none"> • 19200 to 80000 bps: 127 • 9600 to 19200 bps: 64 • 4800 to 9600 bps: 32 • 2400 to 4800 bps: 16 • less than 2400 bps: 8

Call Control

Range:	None, Auto
Default:	None
Description:	<p>Indicates whether call control has been implemented on this port.</p> <ul style="list-style-type: none"> • None: No call control. • Auto: Autocalling enabled. <p>■ Note You must set Call Control to Auto on the port that is placing the Autocall.</p>

Autocall Mnemonic

Range:	0 to 8 alphanumeric characters, <space> blanks the field.
Default:	(blank)
Description:	Specifies the name to use when autocalling.

Autocall Timeout

Range:	5 to 255
Default:	10
Description:	Specifies the time in seconds between call attempts when Autocalling.

Autocall Attempts

Range:	0 to 255
Default:	0
Description:	Specifies the number of times the port will attempt a call. Set to zero (0) for unlimited attempts.

Port Address

Range:	1 to 15 decimal digits, <space> blanks the field.
Default:	(blank)
Description:	Specifies address that is inserted into the calling address field when the port makes a call.

Protocol ID

Range:	0 to 8 hexadecimal digits, <space> blanks the field.
Default:	C9000000
Description:	Specifies protocol identifier. It is inserted into an outgoing call packet or it is checked against the protocol identifier of an incoming call packet.

Billing Records

Range:	Off, On
Default:	Off
Description:	Indicates whether billing records are to be created for this port.

Restricted Connection Destination

Range:	0 to 32 alphanumeric characters, <space> blanks the field.
Default:	(blank)
Description:	<p>Specifies the destination of all calls routed to and from this port, regardless of the entries in the Route Selection Table.</p> <p>For example: To route a call to Port 3, enter P3; to route a call to X25 Port 2, enter X25-2; to route a call to Port 2/Station 4, enter P2S4.</p> <p>To disable this function, enter <space>.</p>

RX Queue Size

Range:	0 to 500
Default:	10
Description:	<p>The maximum number of received messages to be queued.</p> <p>Note Available only when Subtype = GNET, UTS, SLC, or AC100.</p>

TX Queue Size

Range:	0 to 500
Default:	10
Description:	<p>The maximum number of transmit messages to be queued.</p> <p>Note Available only when Subtype = GNET, UTS, SLC, or AC100.</p>

Queue Overflow Action

Range:	0 to 3
Default:	0
Description:	<p>Specifies the actions that will be taken if the queue overflows:</p> <ul style="list-style-type: none"> • 0: Reset connections • 1: Drop the message causing the overflow • 2: Flush the queue • 3: Flush queue when received message terminates with EOT <p>Note Available only when Subtype = GNET, UTS, SLC, or AC100.</p>

Data Transmission

Range:	FDX, HDX
Default:	HDX
Description:	Indicates whether the port is configured for either Half duplex or Full duplex Data Transmission: <ul style="list-style-type: none">• HDX - Half Duplex: The port can <i>either</i> receive <i>or</i> transmit data at any point of time,• FDX - Full Duplex: The port can receive <i>and</i> transmit data simultaneously

Statistics

Introduction

This section describes the TCOP information available from the Detailed Statistics windows.

What You Can View

From the CTP menu, you can view detailed port statistics for a TCOP Protocol.

How to Get Detailed Statistics

Follow these steps to display detailed port statistics for the TCOP Protocol:

Step	Action
1	Select Status/Statistics from the CTP Main menu.
2	Select the Detailed Port Stats from the Status/statistics menu.
3	At the Port Number: 1/ prompt, enter the number of the TCOP port that you want to examine.

Detailed Statistics - Page 1

Figure 5 shows a sample first page of the Detailed TCOP port statistics

```

Node:                Address:                Date:
Time:
Detailed TCOP Port Statistics: Port 3Page: 1 of 2

Port Number:        3      Port Type:    TCOP
UTS                 Port Status: Up
Port Speed:         9598   Port State:   Con-
                    nected
Port Utilization In: 0%    Port Utilization
Out: 0%

Physical Summary:
Overrun Errors:    0      Underrun Errors: 0    CRC
Errors: 0
Parity Errors:     0

Data Summary:      IN          OUT          IN
OUT
Characters:        0          0          Charac-
ters/sec:          0          0
Messages:          0          0          Messages/
sec:               0          0
Received Packets Queued: 0          Transmit
Packets Queued: 0
Maximum Rx Queue Length Reached: 0    Maximum Tx
Queue Length Reached: 0
    
```

Figure 5. Detailed TCOP Port Statistics — Page 1 of 2

**Screen Terms -
Page 1**

This table describes the screen terms shown in Figure 5:

Screen Terms	Indicates....
Port Number	physical port number.
Port Type	type and subtype of access protocol for this port.
Port Status	operational status of the port: <ul style="list-style-type: none"> • Up: A connection is established. • Down: No call is in place. • Disabled: The port is disabled.
Port Speed	measured port speed in bits per second.
Port State	current state of the port: <ul style="list-style-type: none"> • Disconnected: No call is in place. • Calling: Port has initiated Autocall. • Called: Port has received a call request. • Connected: Connection is established.
Port Utilization In/Out	amount of the port's bandwidth being utilized.
Physical Summary	number of Overrun, Underrun, CRC, and Parity errors since the last reset.
Data Summary	summary of the characters and messages sent and received over the port.
Received/Transmit Packets Queued	number of transmit and receive packets that are queued.
Maximum RX/TX Queue Length Reached	maximum size of the receive and transmit queue during data transfer.
Number of Times Queue Flushed	number of times that the receive and transmit queues have been flushed since the last reset.
Interface Summary	summary of the control signals on the port.

Detailed Statistics - Page 2 - Figure 6 shows a sample second page of the Detailed TCOP port statistics:

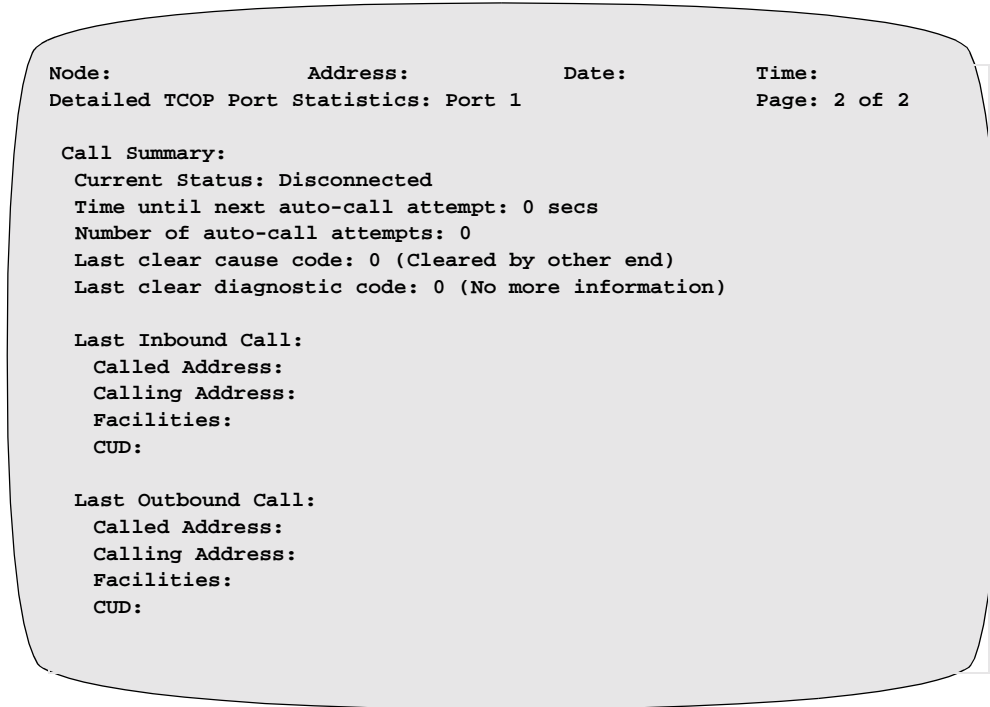


Figure 6. Detailed TCOP Port Statistics — Page 2 of 2

Screen Terms - Page 2

This table describes the screen terms shown in Figure 6:

Screen Terms	Indicates....
Call Summary	details of the calls off this port: <ul style="list-style-type: none"> • Current Status: Status of the call on the port (Disconnect, Calling, Called, Clearing, Connected, local Copy) • Time until next autocall attempt: The number of seconds until the next autocall is attempted. • Number of autocall attempts: The number of autocalls that will be attempted. • Last clear cause code: The last clear cause code received by the port. • Last clear diagnostic code: The last clear diagnostic code received by the port.

Screen Terms	Indicates.... (continued)
Last Inbound Call	details of the last inbound call: <ul style="list-style-type: none"> • Calling Address: the called address in the last call request packet received by this port • Calling Address: the calling address in the last call request packet received by this port • Facilities: the facilities in the last call request packet received by this port • CUD: the data in the Call User Data field in the last call received packet sent by this port.
Last Outbound Call	details of the last outbound call: <ul style="list-style-type: none"> • Calling Address: the called address in the last call request packet sent by this port • Calling Address: the calling address in the last call request packet sent by this port • Facilities: the facilities in the last call request packet sent by this port • CUD: the data in the Call User Data field in the last call request packet sent by this port.

A

Alarms 1
applications 3
 G*NET devices 3
 HSC3 protocol 3
Autocalling
 call control 10
 configuration 6
 devices 6
 link down 6
 parameters 6

C

calling address field 11
Configuration 7
 CTP path 7

D

data congestion
 message overflows 4
 network congestion 4
 synchronization 4
data format 9
Detailed port statistics 14
 how to get 14
 page 1 14
 page 2 16
 screen terms 15

F

Full duplex 9, 13

H

Half duplex 9, 13
HSC3 2

L

Limitations 4

M

message format
 AC100 5
 G*NET 5
 HSC3 5
 SLC 5
 UTS 5
message formats 5

N

network delay 10

P

Parameters 8
 autocall attempts 11
 autocall timeout 11
 billing records 11
 call control 10
 clock source 8
 clock speed 9
 code type 9
 contention 9
 data transmission 13
 port address 11
 port number 8
 port type 8
 protocol ID 11
 queue overflow action 12
 receive byte count 10
 restricted connection destination 12
 RX queue size 12
 subtype 8
 TX queue size 12
Port Number 8
port record parameters 7
port subtype 5, 8
 AC100 5
 G*NET 5
 HSC3 5
 SLC 5
 UTS 5
Port type 8
protocol support
 AC100 2
 ADP 2
 G*NET 2
 Hitachi HSC3 2
 IBM BSC3270 2
 IBM BSC3780/2780 2
 SLC 2
 UTS 2

Q

Queue 4, 12
 overflow 12
 received messages 12
 transmit messages 12
queue overflows 12

R

Reports 1
Route selection table 12
routing 12

S

Screen terms 15

- call summary 16
- data summary 15
- interface summary 15
- last inbound call 17
- last outbound call 17
- maximum RX/TX queue length reached 15
- number of times queue flushed 15
- physical summary 15
- port number 15
- port speed 15
- port state 15
- port status 15
- port type 15
- port utilization in/out 15
- received/transmit packets queued 15

T

TCOP

- Alarms and reports 1
 - description 2
 - features 2
 - protocol support 2
 - typical applications 3
- Transmit Packets Queued 15
- Transparent Character Oriented Protocol 2