Lucent Technologies
Bell Labs Innovations

PassageWay® Telephony Services for Windows NT Release 2.22 Beta

DEFINITY® Enterprise Communications Server Network Manager's Guide

Issue 1.1

Lucent Technologies – formerly the systems and technology unit of AT&T

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The following abbreviations, terms, and conventions are used in this document: "DEFINITY Generic 3" or "Generic 3" for DEFINITY Communications System Generic 3, and "G3PD" for the DEFINITY Generic 3 PBX Driver. The terms "PBX" and "switch" are used interchangeably to mean "private branch exchange." The phrase "SECURITY ALERT" warns you of possible security and toll fraud issues.

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Introduction

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Purpose of This Guide

This document describes configuration, maintenance, and troubleshooting of the DEFINITY® G3 PBX Driver (G3PD) for Telephony Services, Release 2.22, for Microsoft Windows™ NT. Information in this document is provided for telephony services administrators and the Services organization that assists administrators when they experience problems with the G3PD.

This document contains the following sections:

- Introduction — Provides an overview of the DEFINITY G3 PBX Driver.
- Configuration — Describes how to reconfigure the G3PD. Most driver administration is handled during installation.
- Maintenance — Describes the tools that can be used to observe and test the G3PD. An Operations, Admini-stration, and Maintenance (OA&M) utility can be used from a Microsoft Windows NT or Windows 95 machine to perform G3PD OA&M tasks.
- Troubleshooting — Describes actions to take when the G3PD does not appear to be working properly.

Overview of DEFINITY G3 PBX Driver

The DEFINITY G3 PBX Driver (G3PD) is a Dynamic Link Library (DLL) that allows Telephony Services for Windows NT to communicate with a DEFINITY G3 PBX. The primary function of the G3PD is to interpret Computer Supported Telephony Application (CSTA) requests made by Telephony Services applications and forward them to the PBX. To do this, the G3PD converts these requests into CallVisor® Adjunct Switch Application Interface (ASAI) messages. ASAI messages are sent and received across an ASAI link that connects your Tserver to the DEFINITY Generic 3 system; see Figure 1-1.

Adjunct (ADJLK) links are provided over Ethernet. A network interface card is installed in the Tserver to provide a link to a DEFINITY LAN Gateway.

NOTE:
ASAI functionality may be provided through ADJLK link authorization.

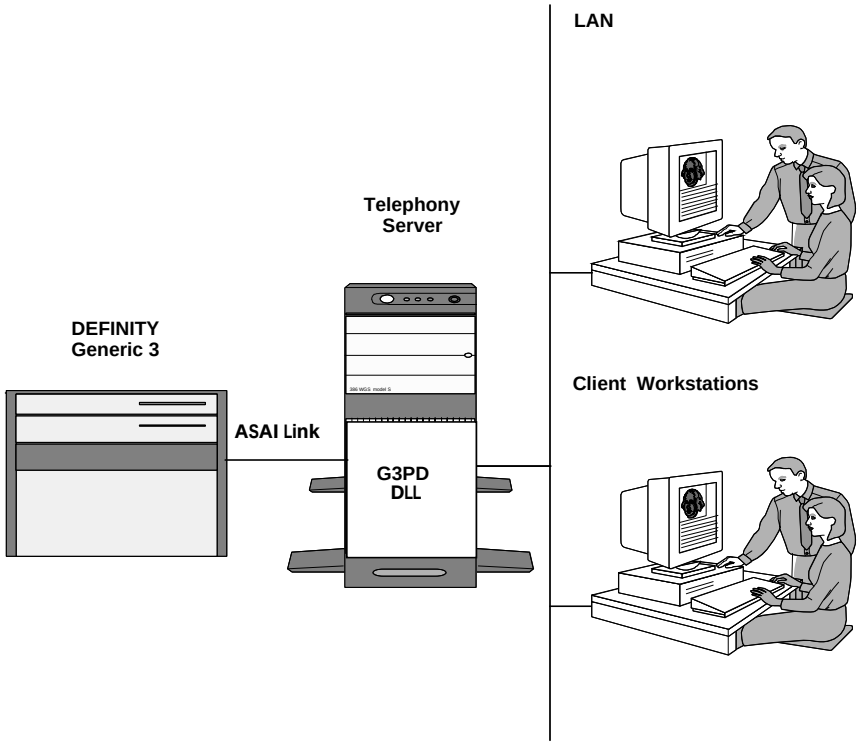

Figure 1-1. DEFINITY Telephony Services Network

Administration Permissions

To ensure your environment's security, Lucent recommends that you use multiple-level administration permission to control which users are allowed to pass on administration permissions. For details, see "Controlling SDB Administration Access" in the *PassageWay Telephony Services for Windows NT Network Manager's Guide*.

Terms Used in This Guide

ADJLK	AT&T Adjunct Link(s); label for the driver authorization disk or switch station type which is required to enable the appropriate link connection and is provided with the G3PD.
ASAI	Adjunct Switch Application Interface. Also called CallVisor ASAI. An option on the DEFINITY switch that enables the Adjunct Services Messaging Interface between the switch and an Adjunct Processor (such as a Tserver). This messaging interface allows the Adjunct Processor to perform call monitoring and control functions. Also a station type for the switch–Tserver link
CSTA	Computer Supported Telecommunications Applications. A CTI standard established by the European Computer Manufacturers Association (ECMA).
CTI	Computer Telephony Integration
DEFINITY LAN Gateway (DLG)	This gateway provides a virtual point-to-point connection between a particular Telephony Server and an associated port on the DEFINITY switch. It translates Adjunct/Switch Application Interface (ASAI) messages from Q.921 synchronous data frames to TCP/IP Ethernet packets. DLG functionality is provided by the software running on the Multi-function Board (MFB) in the DEFINITY switch.
G3 PBX Driver	The G3 PBX Driver, abbreviated G3PD, is a Dynamic Link Library (DLL) on a Windows NT machine. The G3PD software communicates with both the DEFINITY G3 PBX and the Tserver to provide switch services to Telephony Services applications.

G3 Private Data Support Library	Private data is a mechanism that allows a switch to provide value-added services that go beyond those defined in CSTA. The G3PD provides a number of private data services (for example, switch-collected call prompter digits in events, or sending DTMF tones that make up the support library.
LAN	local area network.
MFB	Multi-function Board (TN2208). The MFB resides in a DEFINITY carrier and is part of the DEFINITY LAN Gateway system. The MFB software serves as an ISDN brouter of ASAI messages through a TCP “tunnel” via 10Base-T Ethernet. A menu-based application allows OA&M for the LAN Gateway.
NIC	Network Interface Card. A circuit board residing in the Tserver that provides an interface to the DEFINITY LAN Gateway or to the local area network (LAN) with Tserver clients.
NT machine	A general name for any one of the following Windows NT 3.51 machines: NT Workstation, NT Server, NT Backup Domain Controller, and NT Primary Domain Controller.
PBX Driver	A PBX-specific Dynamic Link Library (DLL) that receives TSAPI messages from a Telephony Server, reformats them into a set of messages understood by the PBX, and sends the reformatted messages to the PBX over a CTI link. Provided by the vendor supplying the PBX and CSTA services for a switch.
Telephony Server	A server that has Telephony Services software installed. More than one Telephony Server can exist on a LAN. See Tserver below.

TSAPI	Telephony Services Application Programming Interface. The interface used by applications to make telephony requests, such as call control requests (make a call, transfer a call), monitor requests (trace a call), or routing requests.
Tserver	A program installed on a Windows NT machine that provides Telephony Services and receives TSAPI messages from client and server applications. These messages are checked for permissions and, if allowed, forwarded to the PBX driver.

Related Documents

- ∗*PassageWay Telephony Services for Windows NT Installation Guide*, 555-201-116

  This document describes how to install the Telephony Server and the G3 PBX Driver (G3PD) used by the Telephony Server.

- ∗PassageWay Telephony Services for Windows NT Network Manager's Guide, 555-201-506

  This document provides an overview of the Telephony Services product. The document also describes client and server applications, architecture, software components, and Tserver administration and maintenance operations. The troubleshooting section of this document describes the Tserver error log.

- DEFINITY Communications System Generic 3 Implementation, 555-230-655

  This document describes all G3 switch administration and maintenance procedures, including administering the ASAI (adjunct or ADJLK) link and CTI on your DEFINITY system..

- DEFINITY Communications System Generic 3 Installation, Administration, and Maintenance of CallVisor ASAI Over the DEFINITY LAN Gateway, 555-230-223

  This document covers the CallVisor ASAI DEFINITY LAN Gateway system that provides ASAI functionality using Ethernet transport. It explains the tasks involved in installing, administering, and maintaining a DEFINITY LAN Gateway system.

- *Product Security Handbook,*555-025-600

  This document provides a detailed explanation of security risks and the measures that can be taken to prevent external telecommunications fraud.

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* These documents are also available on the CD-ROM containing the Software Developer's Kits for Telephony Services for Windows NT, Release 2.22.

Configuration

2

Overview

During installation of the G3PD, administration of the G3PD is also performed. Following installation, changes to the G3PD are accomplished by rerunning the Setup program located on the CD-ROM and choosing the option to reconfigure the driver. Under most circumstances, you should not need to modify the default settings provided in the G3PD Advanced Configuration dialog box.

NOTE:
If you find that multiple links are disabled, you are probably working on a single-link system.

Configuring the NT Machine for a Secure LAN Gateway Connection

On the Tserver, for a secure gateway connection, there should be no routing between the Network Interface Card (NIC) used for the DEFINITY LAN Gateway and the NIC used for client access. (This does not mean that all tslib clients must be on the same LAN, however.) After installing the NIC on your Windows NT machine, take the following steps to configure the connection with no routing:

1. Select the "**Network**"control panel to open the **Network Settings** dialog box. Verify that the NIC to be used for the DEFINITY LAN Gateway is listed under the **Installed Adapter Cards** heading.

2. Select "**TCP/IP**" under the **Installed Network Software** heading to access the **TCP/IP Configuration** dialog box.

3. On the dropdown menu for **Adapter**, select the NIC that will be communicating with the DEFINITY LAN Gateway.

   Administer the IP address selected for your DEFINITY LAN Gateway; refer to the information on TCP/IP administration under "Installing the DEFINITY G3 PBX Driver" in Chapter 2 of the *PassageWay Telephony Services for Windows NT Installation Guide*.

   NOTE:
   If you accept the defaults during installation of the G3PD, the IP address is **192.168.25.10**

4. Select the "**Advanced...**" button to access the **Advanced Microsoft TCP/IP Configuration** dialog box. Make sure that the "**Enable IP Routing**" option is disabled.

Changing the G3PD Configuration

If you need to change the G3PD configuration, for example, to change the IP address or hostname, take the following steps:

1. Make sure that the Tserver is stopped; refer to “Loading and Unloading PBX Drivers” in Chapter 8 of the *PassageWay Telephony Services for Windows NT Network Manager’s Guide.*

2. Run the Setup program from the CD-ROM: \SERVER\G3PD|SETUP.EXE.

   After the Welcome screen appears, the DEFINITY G3 PBX Driver for Windows NT Reinstall/Reconfigure dialog box will open (see Figure 2-1).

3. From this screen you can choose:

   a. to reinstall the G3PD software;

   b. to reconfigure G3PD (this is the default);

   c. to both reinstall the software and reconfigure the driver.

   NOTE:
   You can cancel these operations at any time, if necessary, by clicking on the **Cancel** button.

4. Make sure that “**Reconfigure DEFINITY G3 PBX Driver**” is selected and then click on **“Next”**.

5. When the **DEFINITY G3 PBX Driver Configuration** screen appears, you may change the IP addresses or the hostname for Link 1; see Table 2-1, below.

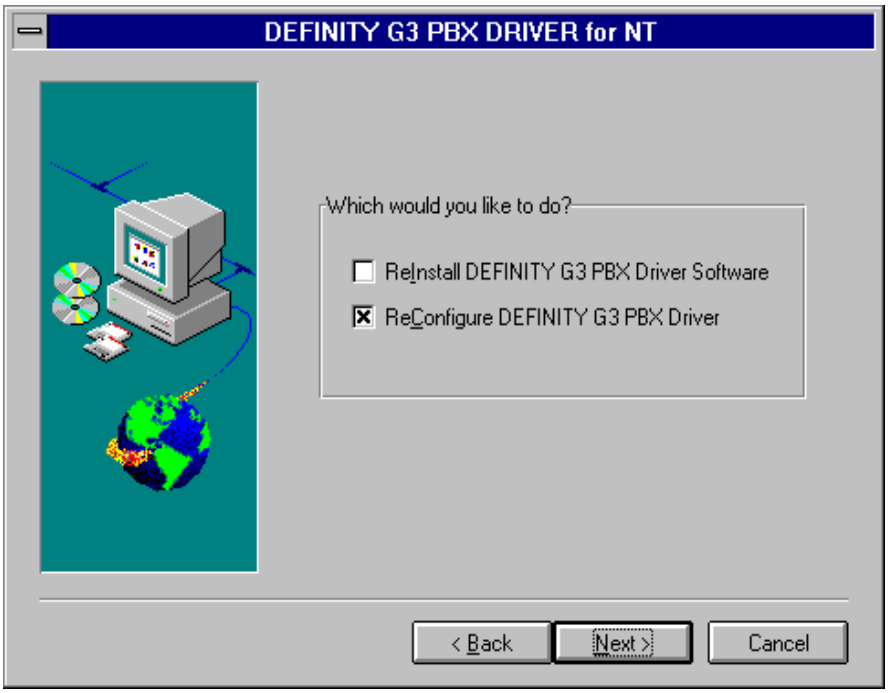

Figure 2-1. G3PD Reinstall/Reconfigure Dialog Box

6. To change any of the advanced configuration parameters, click on the **"Advanced"** button. Enter your changes and click on **"OK"**. Refer to Table 2-2, below, for details on these options.

   In the Advanced screen, you can restore the defaults at any time by clicking on **"Restore"**.

7. When you are satisfied with your changes, click on the **"Next"** button to confirm them. Your changes will be written to the configuration Registry and will take effect the next time the G3PD is loaded.

Tunable Parameters

Tables 2-1 and 2-2 describe the administrable G3PD parameters in the Windows NT Registry.

Table 2-1. G3PD Configuration Parameters

FIELD NAME	REGISTRY KEY	DEFAULT	COMMENTS
LOCAL_IP	IP ADDRESS	192.168.25.20	IP address of your DEFINITY G3PD driver
LINK1_DEST	IP ADDRESS	192.168.25.10	IP address or hostname for Link 1

Some parameters for the Advanced G3PD Configuration are flagged in the following table (Table 2-2), as follows:

- Default values for parameters flagged with an asterisk (*) are reserved for the Lucent Technical Services Organization (and you should not change them). These parameters could affect overall system performance.

- Default values for parameters flagged with a double asterisk (**) are guidelines. They should be properly sized for optimal performance, but are not subject to strict limitations (for example, if they are sized too large, memory may be wasted; if they are sized too small, performance decreases slightly).

Table 2-2 Advanced G3PD Configuration Parameters

VARIABLE	TYPE	DEFAULT	COMMENTS
MAX_ASSOCIATIONS	DECIMAL	2048	Maximum per-link associations (same number is used for all links). The minimum number of associations is 64, and the maximum is 8192. *See* Table 3-3 for effects on DLL size. This parameter should not be changed.
MAX_TDI_MEMORY	DECIMAL	524288 (0.5 MB)	The number of bytes used for message buffers in the interface between the G3PD and the Tserver (per PBX). The minimum number of bytes is 65536 (64 KB) and the maximum number of bytes is 2097152 (2 MB). The default value is enough for normal operations. If the application experiences TDI buffer congestion, then this number needs to be increased.
KLOG_RECORDS*	DECIMAL	2000	Number of in-core trace records. The minimum is 500 and the maximum is 500,000. This parameter is for G3TRACE internal use and should not be changed.
NUM_SESSIONS**	DECIMAL	50	Guideline for number of simultaneous sessions (active acsOpenStream requests). The minimum is 5 and the maximum is 5000.

Table 2-1. Advanced G3PD Configuration Parameters (Continued)

VARIABLE	TYPE	DEFAULT	COMMENTS
NUM_CALL_MONITORS**	DECIMAL	200	Guideline for number of simultaneous cstaMonitorCall requests. The minimum is 5 and the maximum is 5000.
NUM_DEVICE_MONITORS**	DECIMAL	200	Guideline for number of simultaneous cstaMonitorDevice requests. The minimum is 5 and the maximum is 5000.
NUM_SESSION_REQUESTS**	DECIMAL	20	Guideline for number of simultaneous (not confirmed) CSTA requests for a single session (open stream). The minimum is 5 and the maximum is 5000.
NUM_SESSION_MONITORS**	DECIMAL	40	Guideline for number of active device or call monitors for a single session (open stream). The minimum is 5 and the maximum is 5000
NUM_TRACE_FILES*	DECIMAL	2	The number of files that will be created to contain trace entries. Each file contains 10,000 trace records and is about 250 Kbytes in size. The minimum is 0 and the maximum is 20. *See* description of G3TRACE.EXE. This parameter is for debugging purposes and the user should not change it.

Table 2-1. Advanced G3PD Configuration Parameters (Continued)

VARIABLE	TYPE	DEFAULT	COMMENTS
HWM_TDI_MEM_PERCENT*	DECIMAL	80	The percentage of the MAX_TDI_MEMORY value used as a High-Water Mark. When TDI memory usage reaches the High Water Mark amount, TDI memory requests from the Telephony Server (for incoming client messages) will be rejected as a simple means of flow control. TDI memory requests from the G3PD (for reply messages back to clients) will be honored until the memory used for message buffers reaches the MAX_TDI_MEMORY value. The minimum is 0 and the maximum is 100. The user should *not* change this parameter.
MAX_REQS_QUEUED_PER_DEV*	DECIMAL	4	The maximum number of CSTA requests queued on any single device (by all clients). The minimum is 1, and the maximum is 20. If the application occasionally experiences Universal Failure with the error code REQUESTS_ON_DEVICE_EXCEEDED_REJECTION, this parameter should be increased to a higher number, such as 10.

Table 2-1. Advanced G3PD Configuration Parameters (Continued)

VARIABLE	TYPE	DEFAULT	COMMENTS
MAX_REQS_QUEUED_PER_ PBX*	DECIMAL	10	The maximum number of CSTA requests queued in the TDI for each PBX. This includes messages going from the Tserver to the G3PD and messages going from the G3PD to the Tserver. Once this limit is reached, the Tserver will reject certain CSTA requests from clients (as a simple means of flow control). The minimum is 3, and the maximum is 100.
OAM_INACT_TIMEOUT	DECIMAL	30	The number of minutes of inactivity before the G3PD disconnects WG3OAM. Can be set from 10 to 720 minutes (12 hours).
CTI_LINK_PACING_FACTOR	DECIMAL	300	This parameter forces the G3PD to pace consecutive API calls to the switch for each station by introducing a delay when necessary. This delay (the pacing factor) is specified in milliseconds. The minimum is 0 and the maximum is 500.
MAX_MSGS_HELD	DECIMAL	5	The minimum is 1 and the maximum is 200.

Table 2-1. Advanced G3PD Configuration Parameters (Continued)

VARIABLE	TYPE	DEFAULT	COMMENTS
VENDOR_NAME		LUCENT	Can be LUCENT or ATT. If this is a new installation, chose “LUCENT”. If you are migrating from Telephony Services for NetWare, you may wish to choose “ATT” so that existing user applications will not have to be reconfigured with the new service name.

Memory Use

This section describes how much memory is required for optimal performance by the G3PD. Table 2-3 lists the memory required for a minimally configured G3PD.

Table 2-□. Memory Required for a Minimal G3PD Configuration

MEMORY TYPE	SIZE
Total G3PD disk space requirements	2.0 Mbytes
G3PD static data and text	600 Kbytes
G3PD stacks	1 Mbytes (reserved)
G3PD Non-load-dependent (static) allocated memory (MAX_ASSOCIATIONS=1024, KLOG_RECORDS=2000, plus additional, non-configurable memory)	297 Kbytes
G3PD Load-dependent (dynamic) allocated memory (Sample 1024-association load: 50 sessions, 200 device monitors, 820 other active CSTA requests (for example, MakeCalls))	860 Kbytes
G3PD Maximum messages held (MAX_MSGS_HELD)	264 Kbytes per message
G3PD total memory usage (1024 associations)	1,812 Kbytes

The boot-time parameters (MAX_ASSOCIATIONS and KLOG_RECORDS, allocate static memory that is not released back to the system until the driver is unloaded.

Further (dynamic) memory is allocated for the lifetime of active associations and CSTA requests (for example, device monitors or MakeCalls).

Table 2-2. Memory Required for a G3PD Configuration of More Than Minimal Capacity

VARIABLE	STATIC/DYNAMIC	COST PER UNIT
MAX_ASSOCIATIONS (beyond the 1024 above)	STATIC	148 bytes each
KLOG_RECORDS (beyond the 2000 above)	STATIC	22 bytes each
NUMBER OF LINKS (beyond 1)	STATIC	MAX ASSOCIATIONS × 148 bytes each
NUM_SESSION (Number of active sessions)	DYNAMIC	250 bytes avg. each.
Number of active device monitors	DYNAMIC	450 bytes avg. each.
Number of other active CSTA requests (for example, MakeCalls)	DYNAMIC	950 bytes avg. each.

The examples that follow show how additional memory can be computed.

Example:

A G3PD configured with the MAX_ASSOCIATIONS set to 2048 and 1 link would use an additional 152 Kbytes of static memory. If the load on the G3PD is 50 active sessions, 200 active device monitors, and 1,844 active MakeCalls (that is, 1,024 additional CSTA requests), then an additional 075 Kbytes of dynamic memory would be used.

Computation of additional DYNAMIC memory required:

50 active sessions	x 250 bytes/session	=	12,500 bytes
200 active device monitors	x 450 bytes/monitor	=	90,000 bytes
1024 additional CSTA sessions	x 950 bytes/session	=	972,800 bytes
			+
			1,075,300 bytes
			(1,075 Kbytes)

Computation of additional STATIC memory required:

1024 additional associations	x 148 bytes/assoc.	=	151,552 bytes
			(152 Kbytes)
Total additional memory:	1075 Kbytes + 152 Kbytes	=	1227 Kbytes

Maintenance

3

Overview

This chapter describes the G3PD Windows OA&M utility.

The G3PD Windows OA&M utility (WG3OAM) provides maintenance commands that are particularly useful if there are communications problems between the server and the DEFINITY LAN Gateway. This utility can be run from an MS Windows and a Windows NT client.

For startup instructions, refer to the section below on “Starting the G3PD Windows OA&M Utility”, which describes how to start a session using the G3PD WG3OAM.EXE program. If the administration components of WG3OAM.EXE have not yet been installed, refer to the *PassageWay Telephony Services for Windows NT Installation Guide.*

The sections on Menu Options in this chapter explain how to perform each task.

NOTE:
If using this tool to access the G3PD for NetWare Telephony Services, consult the NetWare version of this document.

Before you can log in to the G3PD Windows OA&M utility, you must have OA&M privileges administered on the Tserver. For further information, see the *PassageWay Telephony Services Solution Network Manager's Guide.*

The execution of many of the commands described in this section is recorded in the Tserver error log as AUDIT_TRAIL events.

Starting the G3PD Windows OA&M Utility

You can start the WG3OAM utility by double-clicking on the DEFINITY G3 Driver Administration icon in the TS Win16 Client program group. When you first start WG3OAM, the OA&M services selection screen is displayed; see Figure 3-1.

When specifying the name of the G3PD service you wish to access, the server name will have the following format:

LUCENTG3#G3_OAM#**OAM#***server_name*

The first field of the server name is set by default to **LUCENTG3.**

The fourth field is the name assigned to the Windows NT machine where the driver is loaded (you can only load *one* G3PD per server).

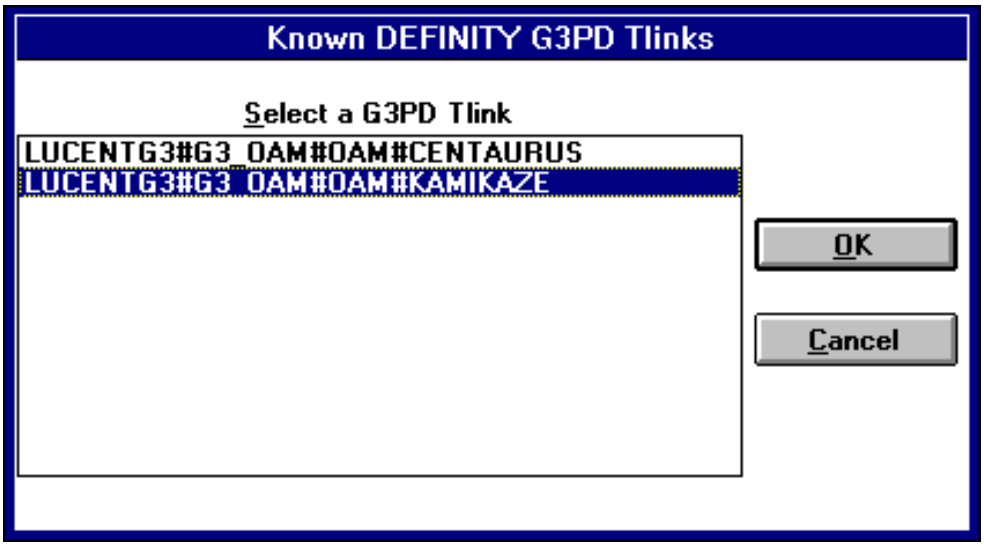

Figure 3-1. G3PD Services Selection Dialog Box

To select the service to which you want to attach, highlight the service name and then double-click on it or select "**OK**".

NOTE:
If no G3PD Tlinks services are displayed, make sure that the G3PD is installed and loaded. Use TSA or TSM32 to display the **Driver DLL Information** dialog box, which will report the status of the g3pd.dll as "Loaded"or "Unloaded".

Once you have selected a service, the Login screen is displayed. Complete the login to the G3PD OA&M service by entering a valid user name and password, and selecting "**OK**".

NOTE:
The user must have login permission in the administration database. The default user is “administrator”.

Once the login is processed, the WG3OAM main window is displayed. There are three available menus: the File menu, the Maint menu, and the Help menu.

File Menu Options

Use the File menu to log out or exit from the G3PD Windows OA&M utility. Logging out ends your current current G3PD OA&M session and allows you to select a different OA&M service to log into.

If you select “**Logout**”, you will end your current session and be presented with the OA&M server selection screen.

If you select “**Exit**”, the G3PD Windows OA&M application automatically logs out from the G3PD OA&M server.

NOTE:
OA&M sessions are dropped if no activity is detected for a specified interval of time. For more information, see the OAM_INACT_TIMEOUT entry in Table 2-1, Chapter 2.

Maint Menu Options

Use the Maint menu to view status and to perform various maintenance operations.

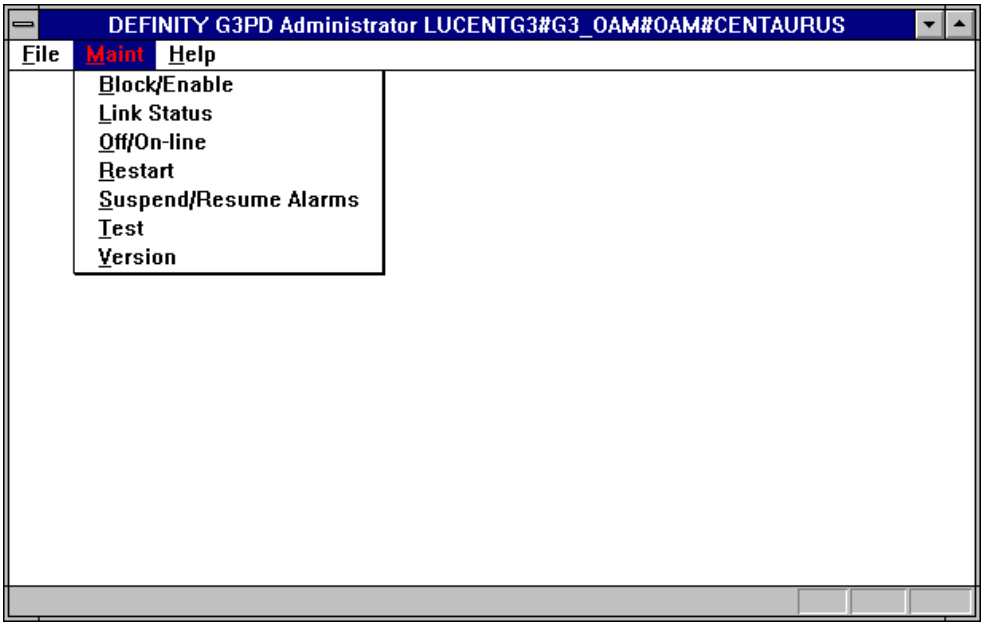

Figure 3-2. Maint Menu

Block/Enable Command

The **`Block/Enable`** command is used to block or to enable a given switch link. Blocking a link means that only previously established connections or sessions (device and call monitors) will remain active on the link. Additionally, new Telephony Services requests using a call ID or monitor previously established over the link will be serviced. No other new Telephony Services requests will be allowed over the link.

For example, if a device was already being monitored using Link1 before it was blocked, the monitor will remain active. If a Make Call request was issued over Link1 and the call ID is still active, any Hold Call and retrieve call requests using that call ID will succeed. If the call ID (from a previous Make Call request) is still active, it is possible to issue a device monitor on the *calling* deviceID. However a Make Call request or a monitor of a completely different device will not be serviced using a blocked link.

The following figure shows the Block/Enable screen. To change the state of a link, click on the appropriate state, **Enabled** or **Blocked**, and select "**OK**".

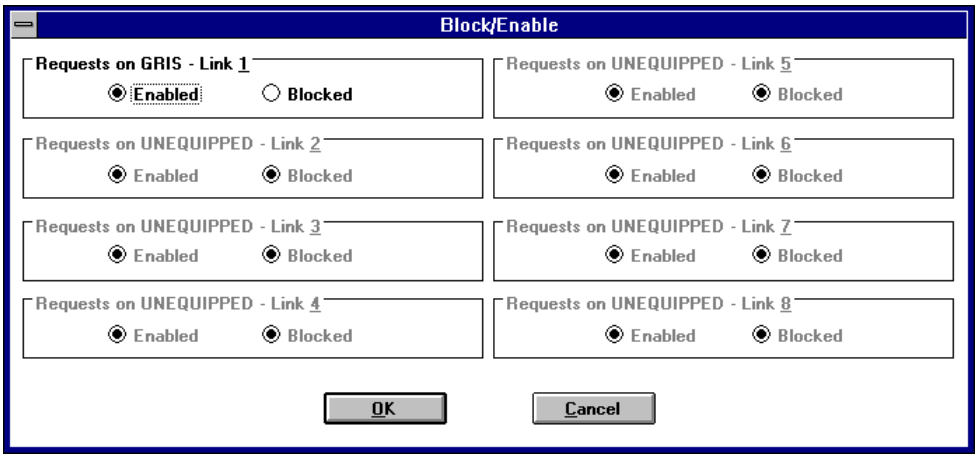

Figure 3-3. Block/Enable Dialog Box

After you select "**OK**", the Results screen is displayed. Select "**Close**" to complete the operation.

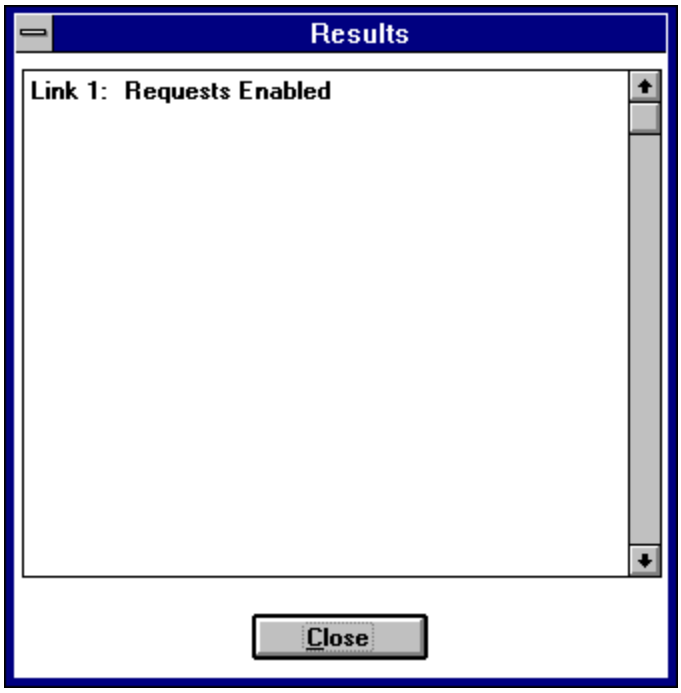

Figure 3-4. Block/Enable Results Screen

Link Status Command

The **`Link Status`** command displays the current status of each equipped G3PD switch link. The **Refresh** button updates the screen and the **Close** button exits the screen. The screens are automatically refreshed every 30 seconds, but you can refresh a screen immediately by clicking on the **Refresh** button.

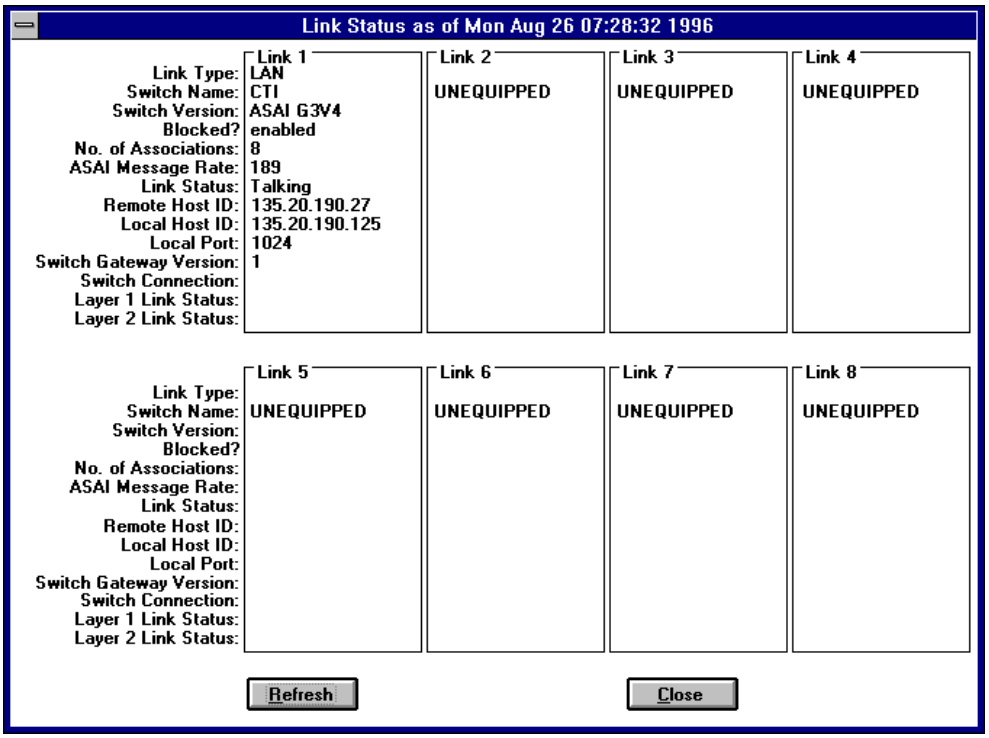

Figure 3-5. Link Status Screen

The Link Status fields are described in the following table.

Table 3-1. Link Status Screen Fields

Field Name	Field Description
Link Type	The link type is LAN.
Switch Name	The advertised switch name is listed or unequipped.
Switch Version	This is the DEFINITY Generic 3 version number (G3V2, G3V3, G3V4, or G3V5).
Blocked?	Indicates whether new Telephony Service requests are being accepted. This is controlled by the "Block/Enable" command.
No. of Associations	The number of single association objects (SAO) currently in use. The upper limit of SAO is controlled by MAX_ASSOCIATIONS (see "Memory Use" in Chapter 2.
ASAI Message Rate	The number of ASAI messages sent and received by the switch per minute. Note that the G3PD "speaks" ASAI to the G3 switch and CSTA to the Tserver.

Table 3-1. Link Status Screen Fields (Continued)

Field Name	Field Description
Link Status	This field provides the status of a link with respect to the TCP/IP connection and the DEFINITY LAN Gateway tunnel protocol. If the TCP/IP connection and the DEFINITY LAN GATEWAY connection are established, this field has a value of "**Talking**"; otherwise, see Chapter 4. If there is no TCP/IP connection and no DEFINITY LAN Gateway connection, the link status field will indicate the reason why. If the TCP/IP and DEFINITY LAN GATEWAY connections are established but the DEFINITY LAN GATEWAY link to the DEFINITY is down, the link status field indicates the reason why. For more details, see Chapter 4. "Troubleshooting".
Remote Host ID	The host name or IP address of the DEFINITY LAN Gateway application to which the G3PD has the link
Local Host ID	The IP address associated with the Windows NT machine hosting G3PD software.
Local Port	The TCP port that is associated with the TCP/IP connection established for this link.

Table 3-1. Link Status Screen Fields (Continued)

Field Name	Field Description
Switch Gateway Version	The version of the DEFINITY LAN Gateway Tunnel Protocol that is running on the DEFINITY LAN Gateway application.
Switch Connection	N/A
Layer 1 Link Status	N/A
Layer 2 Link Status	N/A

Offline/Online Command

The **Offline/Online** command is used to take a link off line or to put it on line.

The **Online** command opens a TCP/IP connection and establishes the DEFINITY LAN Gateway connection on the specified link.

The **Offline** command closes both the TCP/IP connection and the DEFINITY LAN Gateway connection on the specified link(s); for these reasons, this command is disruptive.

The **Offline** command is destructive.

While a link is offline, no CSTA requests for that link can be processed. Furthermore, all existing device and call monitors are dropped (aborted). A confirmation screen must be acknowledged to complete an **Offline** request.

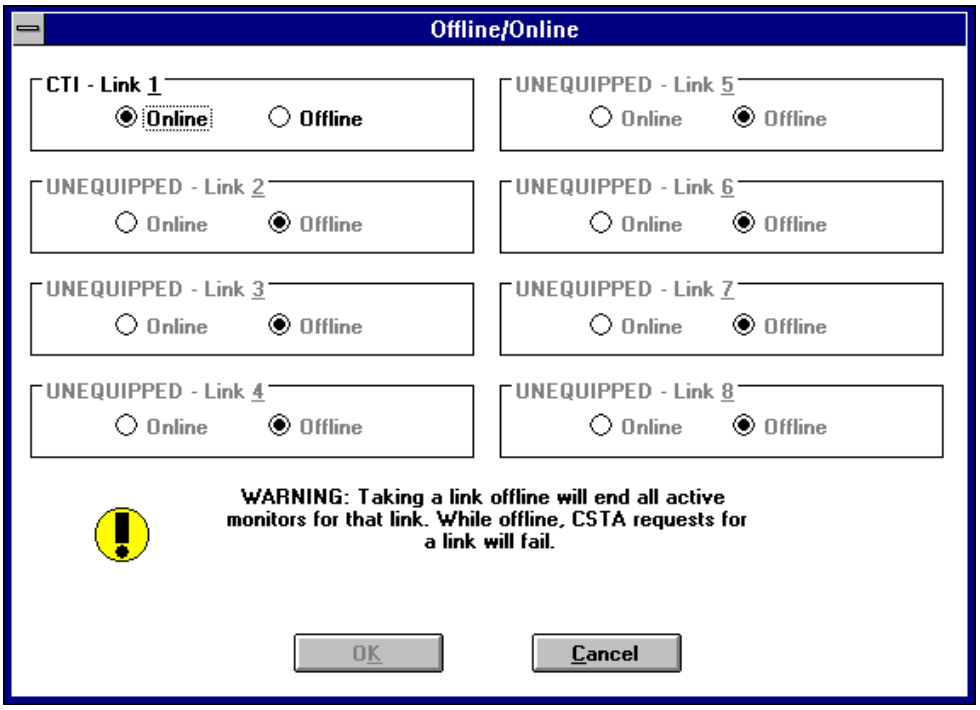

Figure 3-6. Offline/Online Dialog Box

Restart Command

When a link is restarted with the **Restart** command, the TCP/IP connection is closed and a new connection is opened. Closing the TCP/IP connection also causes the DEFINITY LAN Gateway connection to be closed. When the new TCP/IP connection is opened, a new DEFINITY LAN Gateway connection is established. After you select a link to restart and click on **OK**, a confirmation dialog box will open, and you must click on **Yes** to confirm the restart. A **Results** screen will be displayed when the operation is completed.

This command is disruptive, and will cause all existing device and call monitors to fail. If a link is equipped, the corresponding link type and the appropriate command choices will be displayed.

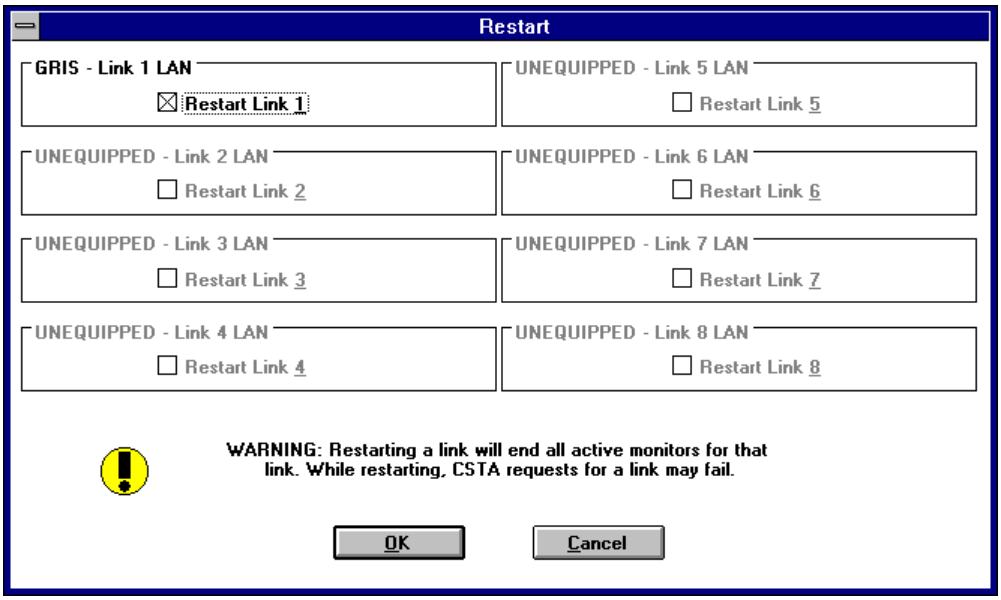

Figure 3-7. Restart Dialog Box

Suspend/Resume Alarms Command

The **Suspend/Resume** command is used to suspend or resume switch alarms for a given link. Suspend the switch alarms if you are working on the switch link (or associated G3PD/server) and do not want an adjunct switch alarm to appear on the switch.

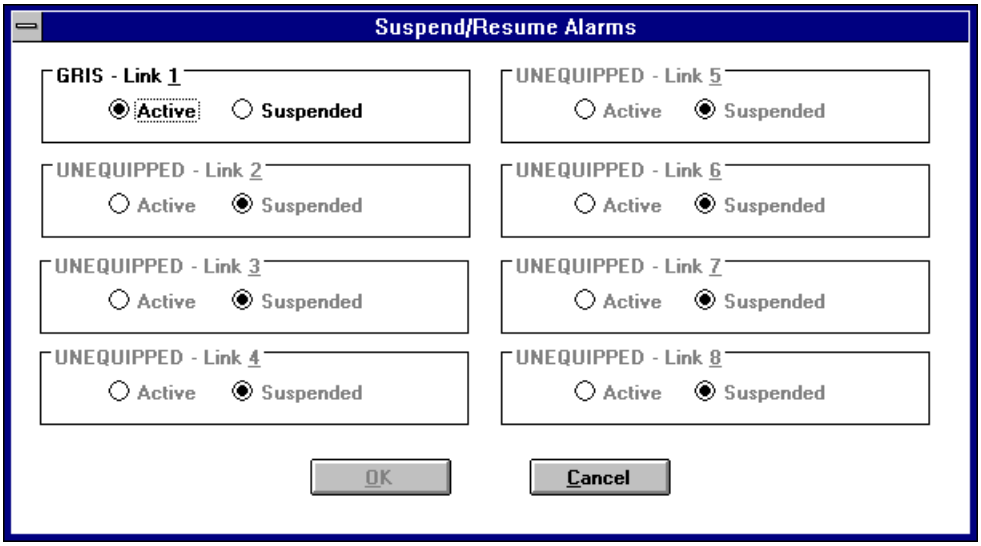

Figure 3-8. Suspend/Resume Alarms Dialog Box

NOTE:
The G3PD will automatically activate alarms 4 minutes after being loaded.

If you were to suspend the alarms on switch Link 1 and select "**OK**", the **Results** screen, shown below, would be displayed on the client.

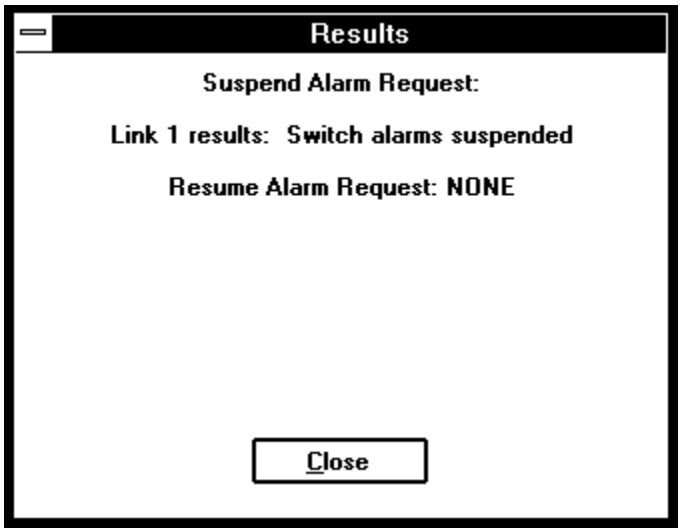

Figure 3-9. Suspend/Resume Alarms Results Screen

Test Command

To test a CTI link from the Windows OA&M utility, first select the link number on the **Test** dialog box and then click on the "**Test**" button.

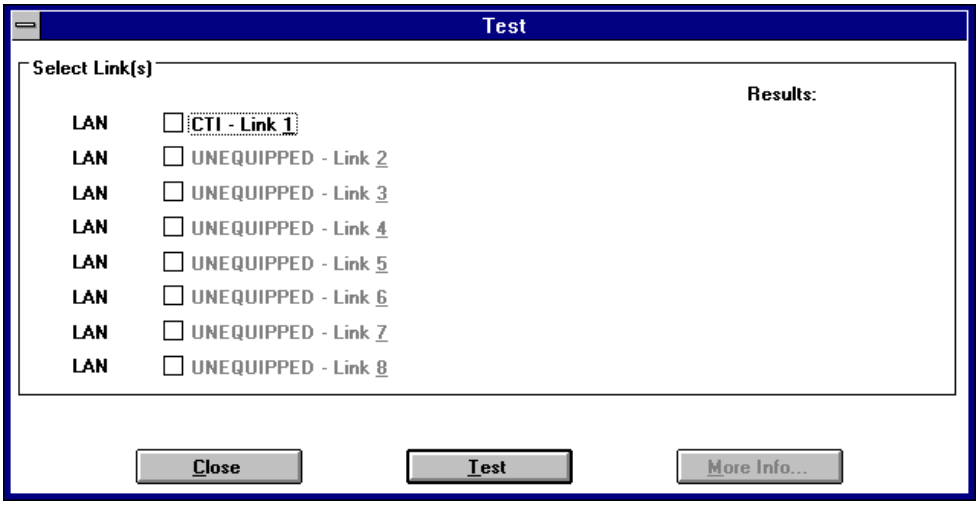

Figure 3-10. Test Dialog Box

If the switch connection is active, a heartbeat request is sent to the switch. If a test fails, other useful information is written to the Tserver error log. The Test Results screen is displayed for the selected link.

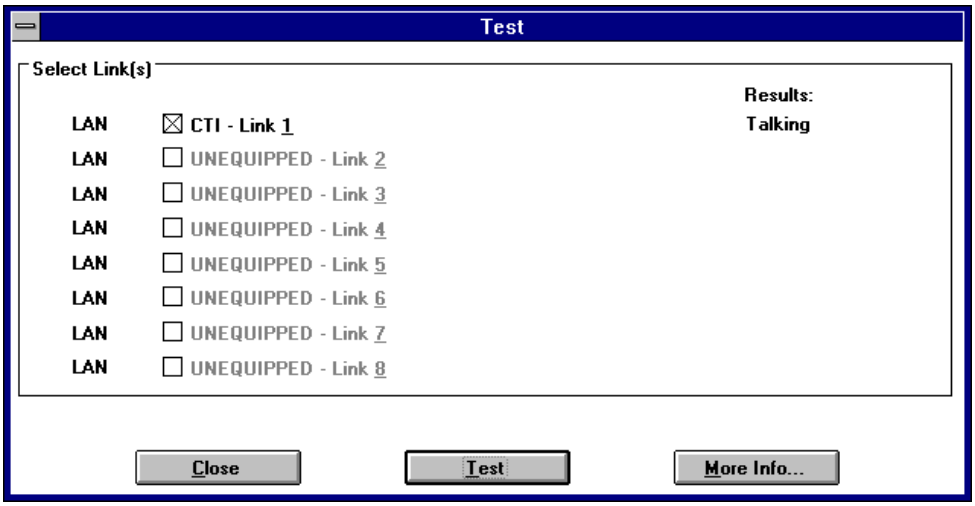

Figure 3-11. Test Results Dialog Box

If you select "**More Info**", a Test Results screen providing more detailed information is displayed.

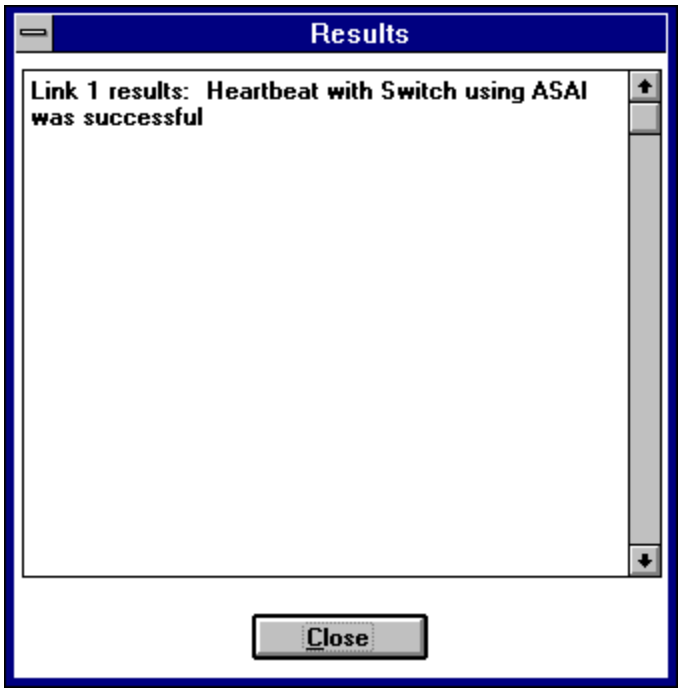

Figure 3-12. "More Info" Test Results Screen

This example shows a successful test of the heartbeat request.

Version Command

The **Version** command displays the version strings for the G3PD driver, the PC/ASAI library, PC/ESAI library, the DEFINITY LAN Gateway tunnel protocol on the G3PD, and the no IPCI card. The screen also contains the OA&M version of the OA&M application you are currently using.

NOTE:
IPCI pumpware is not applicable to the DEFINITY LAN Gateway.

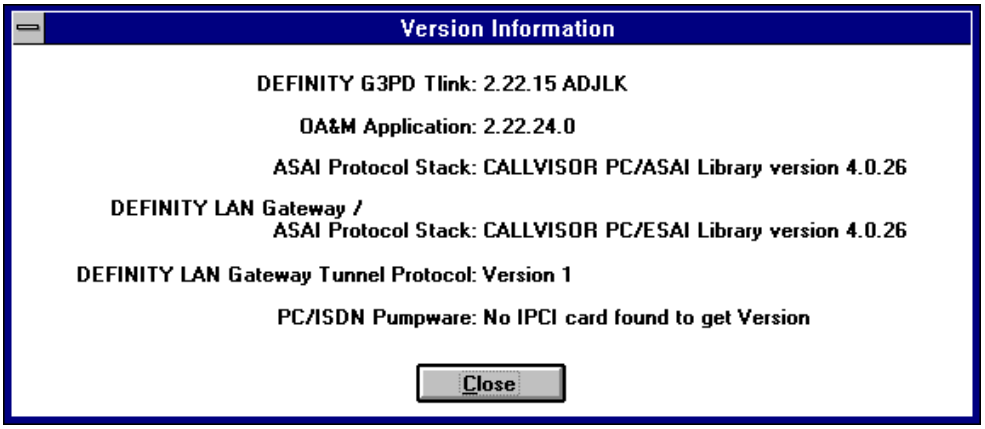

Figure 3-13. Version Command Screen

NOTE:
The first line of the screen indicates whether the sytem is using ADJLK authorization for the link.

Help Menu Options

The G3PD Windows OA&M utility provides **Help** screens. Use them when you need clarification or additional information on a specific command.

You can select "**Help**" from the Main bar of the WG3OAM utility's Main window.

To display information on the current version of DEFINITY G3PD Administrator, click "**About**" on the main Help menu.

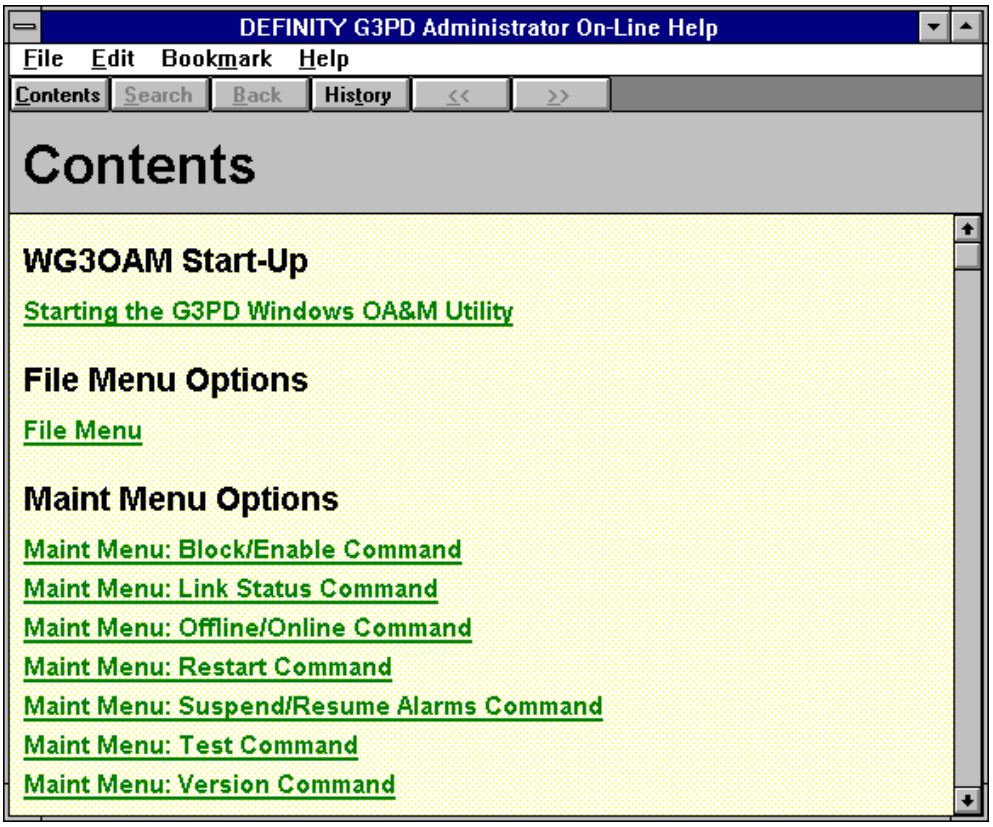

Figure 3-14. Administrator On-Line Help Menu

Troubleshooting

4

Overview

This chapter describes problems that can occur with the DEFINITY G3 PBX Driver for Windows NT, the switches, and the switch links, and suggests possible solutions to these problems.

The “Tserver Error Log” section at the end of this chapter briefly describes errors related to the G3PD and gives general recommendations for corrective actions. Other problems related to the Tserver, the services it provides, and the applications running on it are discussed in the “Troubleshooting” chapter of the *PassageWay Telephony Services for Windows NT Network Manager’s Guide.*

CAUTION:
Use caution before executing any tasks that may disrupt existing service. It is safe to view the current status of the G3PD driver and associated switch link(s), the error log, and the trace files, and to run nondisruptive tests while the G3PD is providing Telephony Services. *All other activities, such as taking the link off-line, restarting the link, and uninstalling the G3PD) should be run out-of-hours after providing a suitable warning to all affected users.*

Problem Descriptions

The following list details possible G3PD problems and their solutions.

1. **The G3PD driver won't start.**

   If you are experiencing problems when loading the G3 PBX Driver software from the TSA or TSM32 **Driver DLL Information** dialog box, look for one of the error messages listed below and take the suggested corrective action. If the driver status remains at "loading" or goes back to "unloaded," view the Tserver error log.

   If the driver is being loaded automatically when Telephony Services is started, look in the error log for messages related to the errors below.

   Load of driver library failed

   The Tserver cannot find the driver software or one of its supporting DLLs.

   Verify that the G3PD software is installed by looking in your system directory (for example, \WINNT\system32) for G3PD.DLL and ATTPRV.DLL. If these libraries are not in the directory, you will need to install the G3PD. Follow the installation procedures in Chapter 2 of the *PassageWay Telephony Services for Windows NT Installation Guide* and then attempt to load the G3PD.DLL.

   If the driver software is installed and you receive this message, call Services.

   No memory

   The NT machine does not have enough memory.

   Verify memory requirements for both the Tserver and the driver software. You must reduce the number of applications loaded on your machine, reduce the load on the Telephony Server machine, reconfigure G3PD memory usage (see "Memory Use" in Chapter 2 of this guide), or add more memory.

   If the problem is not evident from the TSA or TSM32, inspect the error log

(maintained by the Tserver) for Tserver and G3PD-tagged errors related to G3PD load problems.

2. **The switch connection is not up.**

   This may be the problem if users are receiving ACS Universal Failure messages with the error **LINK UNAVAILABLE** (1007) or CSTA Universal Failure messages with the error **RESOURCE_OUT_OF_SERVICE** (34).

   a. Use the WG3OAM.EXE **`Link Status`** command to verify that the link status is "Talking". If the link status is "Not initialized" refer to the "LAN Link Problem Descriptions" section below.

   b. Compare the TCP/IP and brouter administration of the DEFINITY LAN Gateway with the configuration of the G3PD CTI link. Make sure the IP addresses and link numbers match.

   c. Check the configuration of the link on the DEFINITY G3. Compare the parameter values from the **`display station`** command with the required values specified in Appendix D of the *PassageWay Telephony Services for Windows NT Installation Guide*.

   d. Check the physical wiring between the Network Interface Card (NIC) for the G3PD and the DEFINITY LAN Gateway.

   e. Check the link integrity setting of the Ethernet cards and hubs.

3. **Clients fail to connect (acsOpenStream) to a visible G3PD.**

   If an acsOpenStream request fails, look up the error in the "Troubleshooting" chapter of the *PassageWay Telephony for Windows NT Network Manager's Guide* and follow the recommended action.

   a. Use the WG3OAM utility's **`Link Status`** command to make sure the link is not blocked. If the link is blocked, select "**Block/Enable**" from the Maint menu to re-enable the link.

b. Use the WG3OAM utility's **`Link Status`** to make sure the link is not off line. If the link status is "offline", select "**Off/Online**" from the Maint menu to bring the link back on line.

4. **The switch link is "Talking" but not in service (authentication failed for ADJLK connection).**

   The "Talking" state of the link connection does not necessarily mean that the link is in service and can accept requests.

   To verify that the link is in service, on the WG3OAM **Link Status** screen the "Switch Version" field should have the correct version of the switch.

   You can also use the WG3OAM **`Test`** command; the "More Info" field should indicate if the heartbeat with the switch was successful.

   If the problem persists, contact Services.

5. **Clients cannot see an advertised PBX driver (the G3PD is not visible to WG3OAM.EXE).**

   a. From the TSA or TSM32, choose the "**Driver DLL Information**" option to verify that the driver is loaded. If it is not in the list or not loaded, try to load it. If this fails, refer to problem description 1, above.

   b. Verify that TCP/IP is running on the client.

      To verify network connectivity and ensure that you can communicate with the Tserver, use the **`ping`** command to ping the Tserver from the client.

   c. If you are migrating to Telephony Services for Windows NT from Telephony Services for NetWare, check that you have the correct version of software for the client libraries. Only the client libraries provided on the Telephony Services for Windows NT CD-ROM will be able to connect to a Windows NT Tserver.

   d. Check that the TSLIB.INI includes the IP address of the Tserver; refer to the *PassageWay Telephony Services for Windows NT Installation Guide*.

If your TSLIB.INI file contains host names rather than IP addresses, verify that host name resolution is operational from the client. (Use the command **`ping <hostname>`** to verify.)

e. If the driver is loaded, run the TSA or TSM32 and choose the "**Tlink Information**" option to verify that the driver is registered with the Tserver. If the tlink name is not in the list or it is not registered, view the Tserver error log for more information.

If the problem still exists, check a different client to see if the problem is with the G3PD or Tserver, or with the client itself.

6. **Not all events are received by the application.**

For example, a user receives a call, but the application does not notify the user.

a. First, start the tracing utility program for the client (TSspy) to see if the event is being sent to the application. If it is, then there is a problem with the application.

b. Verify that the DEFINITY G3 administration settings are correct for the DEFINITY LAN Gateway connections; refer to the section on "DEFINITY Administration" in the *PassageWay Telephony for Windows NT Installation Guide*.

NOTE:
Event Minimization should be set to "**n**" on the switch for the Basic Rate Interface (BRI) link connected to the G3PD.

c. If not, check the error log on the Tserver for possible problem explanations. If the problem persists, report to Services.

7. **Slow performance.**

Check the Tasking options on your Windows NT machine: from the **Main** program group, select "**Control Panel**" and then "**System**". In the System

dialog box, select "**Tasking**", and then select "**Foreground and Background Applications Equally Responsive**."

Slow performance is usually caused by insufficient memory. You must reduce the number of applications running on your server, reduce the load on the server, reconfigure G3PD memory usage by running SETUP.EXE (refer to "Tunable Parameters" in Chapter 2 of this guide), add more memory, or consider moving to a faster processor.

8. **The G3PD stops responding.**

   Open the WG3OAM utility's Maint menu and look at the **Link Status** dialog box to verify the current state of the G3PD. If the link status is "Talking", use the **Test** command to test the ASAI heartbeat with the switch.

   Also, check the Tserver error log and the Windows NT Event Log for possible errors. (When viewing the Windows NT Event Log, be sure that "**Application**" is selected from the "Log" menu.). If the G3PD is not responding, you may have to unload and reload the G3PD; see the section "Loading and Unloading PBX Drivers" in Chapter 8 of the *PassageWay Telephony Services for Windows NT Network Manager's Guide.*

9. Users receive **CSTA Universal Failure** messages with error **RESOURCE_OUT_OF_SERVICE** (34), or are notified that device monitoring has ended.

   Either or both of these problems may occur if the CTI link between the Telephony Server and the DEFINITY G3PD goes down or is reset.

   If the link is resetting, the **RESOURCE_OUT_OF_SERVICE** errors should clear up when the link comes up, but if link failure persists, you should go to the switch and check the port on the switch and on the DEFINITY LAN Gateway.

   If either of these problems occurs frequently for unexplained reasons, there is most likely a problem with the CTI link and you should report to Services.

10 **If you have questions about switch feature operations...**

The *Telephony Services Application Programming Interface (TSAPI),Version 2,* document indicates the primitives to use to control calls. For actual feature behavior, you will need to refer to a switch feature description document.

LAN Link Problem Descriptions

This section describes problems that can occur with the LAN link between the DEFINITY G3PD and the DEFINITY LAN Gateway, and suggests possible solutions to these problems.

NOTE:
In general, the **`ping`** and **`netstat`** commands are useful for troubleshooting problems with a LAN link.

1. **The LAN link will not initialize.**

   Use the WG3OAM **`Link Status`** command to check the status of the link. A link status of “Not Initialized” indicates that link initialization has failed.

   This means that the G3PD cannot complete its internal setup or cannot initially complete the TCP/IP connection with the DEFINITY LAN Gateway.

   Check the IP addresses on the G3PD Configuration screen and on the DEFINITY LAN Gateway.

   To verify that TCP/IP connectivity can be established between the Tserver and the DEFINITY LAN Gateway, use the **`ping`** command and utility provided for Windows NT and with the DEFINITY LAN Gateway. The **`ping`** command will indicate whether it is possible to reach the DEFINITY LAN Gateway application from the Tserver. If not, proceed with the following steps:

   a. Check the configuration of the link on the DEFINITY G3. Compare the parameter values from the **`display station`** command with the

required values specified in Appendix E of the *PassageWay Telephony Services for Windows NT Installation Guide*.

b. Check the physical wiring between the Network Interface Card (NIC) for the G3PD and the DEFINITY LAN Gateway.

c. Check the link integrity setting of the Ethernet cards and hubs.

Also, the Windows NT **`netstat`** command reports can be used to provide NT active connections and their connection state. The Local Port and Local Host Identifier provided in the WG3OAM **Link Status** report can be used to locate the corresponding table entry in the NT **`netstat`** results report.

After resolving any networking problems, you will have to unload and reload the G3PD.DLL to initialize the link.

2. **The WG3OAM.EXE reports that the LAN Link status is not "Talking".**

   a. **The LAN link to the DEFINITY switch is down.**

   When the link to the DEFINITY is down, the TCP/IP connection is not closed. However, the G3PD cannot communicate over the link until it receives a link status message that the link is up. To establish or re-establish the link to the DEFINITY switch, you must first determine what is wrong on the DEFINITY switch or on the DEFINITY LAN Gateway and correct it. The G3PD should then receive a status update and the link to the DEFINITY LAN Gateway should work properly. □

   - Use the DEFINITY **`status bri-port`** command to verify that the status of the ASAI port is "l3-established".

   - Choose "**Port Status/Control**" from the DEFINITY LAN Gateway main menu. This command should indicate that the DEFINITY Port State is "CONNECTED", the TCP/IP Connection State is "Established", and the Brouter Service State is "in service".

   The following are the values of the LAN link status that may be reported:

- **DEFINITY Down** — The DEFINITY switch is being rebooted or the interface between the DEFINITY LAN Gateway and the switch is down.

  The latter may occur if the carrier or cabinet in which the DEFINITY LAN Gateway is located is not functioning properly.

- **L2 Down** — ISDN layer 2 on the DEFINITY switch is not established. This may occur if the BRI port has been busied out on the DEFINITY LAN Gateway.

  L2 Down can also occur if the DEFINITY LAN Gateway cannot establish the link with the switch. This may also be a transient status when the G3PD establishes a connection to the DEFINITY LAN Gateway or the switch performs a maintenance activity. The transient cases should not last longer than a few seconds; if they persist, contact Service.

- **MFB Busy** — Services has busied out the BRI port on the DEFINITY LAN Gateway.

  The BRI port may or may not be administered on the switch. If it is administered on the switch and busied out at the LAN Gateway, this prevents layer 2 from being established. (In this case, Services is actively working on a problem; if not, the network manager should contact Services to release the BRI port on the Gateway.)

- **Invalid Reason —** The message received from the DEFINITY LAN Gateway indicating that the link is down has an unknown reason. This is an error. If it persists, report to Services.

NOTE:

If one of the following DEFINITY LAN Gateway error conditions are present, the G3PD automatically tries to establish the link every ten seconds.

b. **TCP Connection Problems**

- **No Response —** The G3PD expects, but did not receive, a response to a connection request or a DEFINITY LAN Gateway heartbeat message that it sent to the DEFINITY LAN Gateway application. Check the physical connections.

- **Client Too Slow** — The DEFINITY LAN Gateway application closed the TCP link because it did not receive the connection request from the G3PD quickly enough.

- **No Reply to HB** — The DEFINITY LAN Gateway application did not get a response to a heartbeat message.

- **TCP Connect Fail** — A remote failure (not a failure on the Windows NT server) was detected.

- **TCP Internal** — An internal software problem was encountered when setting up the TCP connection with the Windows sockets.

- **TCP connection errors** — Check the G3PD configuration to make sure that the LOCAL_IP address is in dotted-decimal notation format. Also check that the remote hostname is correct. See the section on "Changing the G3PD Configuration" in Chapter 2; these instructions allow you to inspect the configuration for errors without changing any configuration details unless necessary.

The following steps and problem descriptions may help solve other TCP/IP problems; if any problem can not be resolved, contact Services.

1. Check the Windows NT TCP/IP administration for the G3PD Network Interface Card (NIC). Verify that the IP address and subnet mask are correct.

2. Check that the IP address and remote host destination are correct on the DEFINITY G3 PBX Driver Configuration dialog box screen by running the Setup program (located on the CD-ROM in SERVER\G3PD\SETUP.EXE).

3. Check the TCP/IP administration and brouter administration for the DEFINITY LAN Gateway.

4. Use the **`ping`** command provided with the DEFINITY LAN Gateway and the **`netstat`** command on Windows NT to verify that TCP/IP connectivity can be established between the Tserver and the DEFINITY LAN Gateway.

   The **`ping`** report can be used to see if it is possible to reach the Tserver from the DEFINITY LAN Gateway.

c. **Mismatched Version or Potential Software Problems**

- **Unexpected Msg —** The G3PD received a message that it did not expect or a message with an invalid size.
- **Invalid Version —** The G3PD and the DEFINITY LAN Gateway application have different DEFINITY LAN Gateway tunnel protocol versions. Check the version via the Maint menu of the WG3OAM utility.
- **Invalid Context —** The DEFINITY LAN Gateway received a valid message type, but it was out of context and unexpected. Report to Services.
- **Invalid Type —** A message with an invalid type was received by the DEFINITY LAN Gateway application.
- **Invalid Cause —** A message with an invalid cause value was received by the DEFINITY LAN Gateway application.
- **Too Much Data —** The DEFINITY LAN Gateway application received a message from the G3PD that was bigger in size than expected.

A potential cause for these types of errors is that the G3PD and the DEFINITY LAN Gateway application are using different DEFINITY LAN Gateway tunnel protocol versions.

To determine the DEFINITY LAN Gateway tunnel protocol version with which the G3PD is compliant, select “**Version**” on the WG3OAM utility’s Maint Menu. Check the “DEFINITY LAN Gateway Tunnel Protocol”. If

there is a version mismatch, the G3PD and DEFINITY LAN Gateway application must be upgraded so that they are both using the same version of the tunnel protocol. If the versions match, contact Services for help with the problem.

d. **Other Problems:**

- **Invalid Link** — The link number sent to the DEFINITY LAN Gateway is unknown by the DEFINITY LAN Gateway. This is a configuration problem. Compare the link number from the brouter administration screen of the DEFINITY LAN Gateway with the link number configured for the G3PD. They must be the same.
- **Out of Service** — A connected LAN link was taken out of service by the DEFINITY LAN Gateway software. Contact Services.
- **Server Error** — The DEFINITY LAN Gateway application experienced a serious error. If the problem persists, contact Services.
- **New Connection** — The G3PD has a connection on this link and another G3PD running on another server tries to connect with the same host or IP address and link number. The original G3PD connection will be taken down by the DEFINITY LAN Gateway application. This error condition can happen if TCP/IP is not configured properly for multiple G3PDs on multiple Tservers. If this occurs, use the G3PD Setup program to view the “parameters” on each G3PD, and reconfigure the G3PD to correct any errors (refer to “Changing the G3PD Configuration” in Chapter 2).

  This may also occur if the G3PD disconnects its connection to the DEFINITY LAN Gateway and attempts to connect again before the gateway has processed the first disconnect. This is not an error condition. Wait a few seconds for the link to be established. If it is not, contact Services.

  On the other hand, if there are multiple G3PDs on multiple Tservers and this occurs, then two clients are using the same link. This *is* an

error condition. Change the configuration so that both clients are not using the same link.

- **Invalid Client** — The G3PD is not known to the DEFINITY LAN Gateway application. Check the brouter administration on the DEFINITY LAN Gateway. Verify that the brouter administration and G3PD configuration are consistent.

- **Offline** — A user has run an OA&M command to take the link off line. Use the WG3OAM utility's **online** command to bring the link back on line.

  If you need help with DEFINITY switch or DEFINITY LAN Gateway problems, contact the Technical Services Organization (TSO) number for Telephony Services at **1-800-334-1096.**

How a Dropped Link Affects Telephony Services Requests

If a particular link goes down, all existing requests associated with that link (monitors, etc.) will be aborted by the switch. The client receives:

- a CSTA Universal Failure Confirmation event for each outstanding request (***cstaMakeCall()*,** etc.). An outstanding CSTA request is one that has not yet received a confirmation event. The error code in the CSTA Universal Failure event is set to **RESOURCE_OUT_OF_SERVICE** (34).

  The user should reissue the request. If other links are available, the new request will succeed. If no other links are available, the client will continue to receive **RESOURCE_OUT_OF_SERVICE** (34) and should assume service is unavailable.

- a Monitor Ended event for any previously established monitors. The cause is **EC_NETWORK_NOT_OBTAINABLE** (21). The client should re-establish the monitor request. This may require restarting the application. If other links are available, the monitor request is honored. If no other links are available, the client receives a CSTA Universal Failure Confirmation

with the error code returned **RESOURCE_OUT_OF_SERVICE** (34) and should assume service to the switch is unavailable.

- a Route Register Abort event is sent to the application when all of the CTI links that support the ***routeRequestEvents*** for the registered routing device are down. The application could make use of System and Link Status Notification to determine when the link comes back up. If the application wants to continue the routing service after the CTI link is up, it must issue a ***cstaRouteRegisterReq()*** to re-establish a routing registration session for the routing device.

- a Route End event for any active Route Select dialogue. The client does not need to do anything.

If all links to a switch go down or are blocked, service to the switch becomes unavailable and the G3PD sends a CSTA Universal Failure event for any new CSTA requests. The error code is set to **RESOURCE_OUT_OF_SERVICE** (34). In this situation, the client application could make use of System and Link Status Notification to determine when service is restored.

If these problems persist, contact Services.

How a Dropped Link Affects Open Streams

When a PBX has multiple links configured and one link goes out of service, service to the affected switch can still be available if another link is available to provide service. Service remains available to any previously opened streams, and to any new ***acsOpenStream()*** requests.

If all links to a PBX become unavailable, any previously opened streams remain open until either they are closed or the G3PD unloads. The client does not receive a specific message stating that service is unavailable unless system status event reporting has been requested via the API call, ***cstaSysStatStart().***

If service becomes unavailable (because all links are down), any subsequent Telephony Services requests over any open streams receive a CSTA Universal Failure event (**RESOURCE_OUT_OF_SERVICE**).

Any attempts to open a stream to a PBX that has no links available results in an ACS Universal Failure message with the error code set to **DRIVER_LINK_UNAVAILABLE** (1007).

Tserver Error Log

The Tserver Error Log provides a common log for viewing the errors generated by the Tserver, the G3PD, and any other PBX driver that chooses to log to this file. Following are the kinds of errors you may find during installation of the G3PD. Lucent Services maintains a complete list of specific errors and troubleshooting messages.

NOTE:
When viewing error files on the Tserver, do *not* use MS Word for Windows. This editor can prevent the Tserver from accessing the file (this is the only editor known to affect the Tserver).

You can use the Setup program to view the current configuration and to reconfigure any items that are causing errors; refer to “Tunable Parameters” in Chapter 3 of this guide.

- **Configuration errors —** Check the G3PD configuration to make sure there is an IP address or hostname assigned to LINK(1-8)_DEST and then rerun the Setup program (*setup.exe*). See the section on “Changing the G3PD Configuration” in Chapter 2; these instructions allow you to inspect the configuration for errors without changing any configuration details unless necessary.

- **Connection errors —** The G3PD tried to connect with the DEFINITY LAN Gateway and did not receive a response. There may be a problem on the DEFINITY LAN Gateway or with the G3PD configuration. Check that LINK(1-8)_DEST is the hostname or IP address of the DEFINITY LAN Gateway. After correcting any errors using G3install, use the **`ping`** command to verify the connections in both directions.

- **TCP/IP bind errors** — Check for an IP address mismatch between the LOCAL_IP address and the Bind error messages in the Tserver log.

- **TCP/IP software function call errors** — These should be reported with any data recorded in the error log to the Services organization, if they persist.

- **Can't find** or **Missing destination/hostname error** — Check that the hostname is correct and that the IP address is in the correct dotted-decimal notation form in the host file or on the domain name server. See the section on "Changing the G3PD Configuration" in Chapter 2; these instructions allow you to inspect the configuration for errors without changing any configuration details unless necessary.

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