VMS Software

VSI OpenVMS

VSI DECnet-Plus for OpenVMS Common Trace Facility Use

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VSI DECnet-Plus for OpenVMS Common Trace Facility Use

VMS Software

Preface

This manual describes how you use the Common Trace Facility (CTF) utility to collect and analyze protocol data from networking software.

1. Audience

This manual describes how you use the Common Trace Facility (CTF) utility to collect and analyze protocol data from networking software.

This manual is intended for the system or network manager who must carry out problem solving tasks on a DECnet-Plus for VMS network. You should be familiar with:

- The VMS operating system
- DECnet-Plus for VMS
- The networking product(s) that you are tracing. In particular, you should have a detailed understanding of the protocols used by these networking products.

2. The Structure of the Manual

This manual has four chapters and four appendixes:

- Chapter 1 is an introduction to CTF.
- Chapter 2 describes the components of CTF, and how these components collect and display data.
- Chapter 3 describes the functions provided by the CTF user interface.
- Chapter 4 describes the use of each of the CTF commands that make up the CTF user interface.
- Appendix A describes the tracepoints provided by DEC WANrouter 100/500 software.
- Appendix B describes the tracepoints provided by VAX Packetnet System Interface (P.S.I.) software.
- Appendix C describes the tracepoints provided by the VAX Wide Area Network (WAN) Device Drivers software.
- Appendix D describes the tracepoints provided by the OSI Transport software.

3. Associated Manuals

The *VSI DECnet-Plus for OpenVMS Network Management Guide* manual describes the network management model; you should be familiar with this model, particularly with the structure of entity names, since most of the tracepoint names that CTF uses are based on entity names.

You should be familiar with the problem solving documentation for the software you are tracing. This documentation contains detailed instructions about how to use CTF to diagnose problems.

4. VSI Encourages Your Comments

You may send comments or suggestions regarding this manual or any VSI document by sending electronic mail to the following Internet address: `<docinfo@vmssoftware.com>`. Users who have OpenVMS support contracts through VSI can contact `<support@vmssoftware.com>` for help with this product.

5. Conventions Used in This Manual

`Special type`	iThis typeface indicates code examples, command examples, and interactive screen displays. In text, this type also identifies website addresses, UNIX commands and pathnames, PC-based commands and folders, and certain elements of the C programming language.
UPPERCASE	Uppercase type indicates a command, the name of a routine, the name of a file, or the abbreviation for a system privilege.
lowercase italics	Italic type indicates important information, complete titles of manuals, or variables. Variables include information that varies in system output (Internal error *number*), in command lines (/PRODUCER=*name*), and in command parameters in text (where *dd* represents the predefined code for the device type).
[ ]	In command format descriptions, brackets indicate optional choices. You can choose one or more items or no items. Do not type the brackets on the command line. However, you must include the brackets in the syntax for directory specifications and for a substring specification in an assignment statement.
Ctrl/x	A sequence such as Ctrl/*x* indicates that you must hold down the key labeled Ctrl while you press another key or a pointing device button.

Chapter 1. Introduction to CTF

This chapter provides a brief introduction to the Common Trace Facility (CTF). For a more detailed description of the components and functions of CTF, see Chapter 2.

1.1. What Is CTF?

CTF is a VMS utility that assists in network problem solving. CTF allows you to collect and display information about specific protocol exchanges between systems in a network. This information is often very useful when attempting to solve such problems as:

- Suspected configuration problems
- Failures while establishing or using network links
- Network overload
- Poor network performance

1.2. How Does CTF Work?

Many of VSI's networking products include support for CTF. A networking product supports CTF by including within its code a number of **tracepoints**.

A tracepoint is a point within the networking software at which the data currently being processed (a combination of user data and protocol data) can be made available to a user for recording and analysis. Whenever a tracepoint is reached during execution of networking software, a signal is sent to CTF that this data is available for collection. The CTF user interface allows you to specify which tracepoints are to be traced; that is, you can specify those tracepoints from which data is to be collected whenever it is available.

When data becomes available at a tracepoint that you are tracing, CTF collects that data in the form of a **trace record**. The trace record consists of the data itself (user data and protocol data), together with additional information about the trace record, such as:

- Its size
- The time at which it was collected
- The name of the tracepoint from which it was collected

Depending on how you are using CTF, trace records may either be written to a **trace file** for later analysis, or they may be displayed on your terminal as they are collected.

When you display trace records (either as they are collected, or from a previously created trace file), they are **analyzed**. This analysis involves:

- Translating the binary data in the trace record into a user-readable format, which may be ASCII, hexadecimal, or octal
- Formatting the data to show the various components of protocol data, user data, and trace record information

The analysis performed on a trace record depends on the tracepoint from which it was collected. The routines that analyze trace records are supplied with the networking software that supports the tracepoints from which they are collected, and form part of that product's CTF support.

1.3. Networking Products that Support CTF

You can only use CTF on VSI's networking products. The tracepoints from which you can collect information depend on the product you are tracing. Not all VSI's networking products have tracepoints; check the Software Product Description to see if your product supports CTF.

The following networking products support CTF: DECnet-Plus for VMS

DEC WANrouter 100/500

VAX P.S.I. for DECnet-Plus for VMS

VAX WAN Device Drivers for DECnet-Plus for VMS

See the appendixes to this manual for details of the tracepoints that are provided by these products.

Chapter 2. Technical Overview

This chapter provides a brief technical overview of CTF.

Section 2.1 describes what tracepoints are, and describes the contents of trace records.

Section 2.2 describes the various ways in which CTF can collect trace records from tracepoints.

Section 2.3 describes the components of CTF that collect, store, and display trace records.

Section 2.4 lists the files that CTF uses.

Section 2.5 provides an example of the trace output provided by CTF.

2.1. Tracepoints and Trace Records

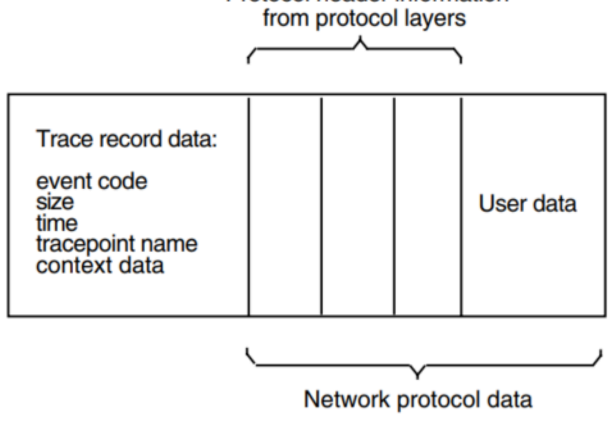
Each networking software product that supports CTF has a number of named tracepoints built into the software. A tracepoint usually records network protocol data as it passes from one protocol layer to another.

When a tracepoint is reached during execution, the networking software generates a trace record that contains:

- A trace event code, which indicates the type of event (for example, receive or transmit) that caused the trace record to be generated. Each tracepoint has a defined set of events that can cause a trace record to be generated at that tracepoint.
- The size of the trace record
- The time at which the trace record was generated
- The name of the tracepoint at which the trace record was generated
- Tracepoint-specific context information
- The network protocol data itself, consisting of the protocol-specific header and user data.

Figure 2.1 illustrates the structure of a trace record.

Figure 2.1. Trace Records



2.1.1. Local and Remote Tracepoints

There are two types of tracepoint:

- Local tracepoints are those found within host-based VMS networking products such as VAX P.S.I.
- Remote tracepoints are those found within server-based networking products such as the DEC WANrouter 100/500.

Using CTF from a VMS system, you can trace:

- All local tracepoints
- All remote tracepoints on servers for which the VMS system is a load host For security reasons, you cannot trace tracepoints on remote VMS systems.

2.2. How CTF Collects and Displays Trace Records

When networking software generates a trace record, it calls CTF to signal that a trace record is available for collection.

If you have instructed CTF to collect trace records from this tracepoint, CTF collects the trace record; otherwise, CTF ignores the trace record, which is therefore lost.

Collecting a trace record involves:

1. Copying the trace record from the network software that generated it into an internal CTF buffer.
2. Making the contents of the trace record available to the user. Since the trace record is produced in machine-readable form, it must be analyzed (that is, formatted into user-readable form) before it can be printed or displayed.

There are three ways in which CTF collects trace records and makes them available to the user: **detached tracing**, **live tracing**, and **snapshot tracing**.

2.2.1. Detached Tracing

In detached tracing, trace records are collected from one or more tracepoints into an internal CTF buffer, and are then written to a trace file. Note that the trace records in a trace file have not been analyzed; they are still in binary format, and are therefore unsuitable for display or printing. You can use CTF commands to analyze and display the contents of a trace file.

Detached tracing is so called because a separate process called the **trace server process** is created to collect the trace records from tracepoints and write them to the trace file.

You should use detached tracing:

- If you have a large quantity of trace records to collect
- If you will be tracing for long periods
- If you want to save trace records and examine them at a later date

An advantage of detached tracing is that you can exit from CTF but leave the trace server process running, thus freeing your terminal for other tasks while trace records are still being collected.

2.2.2. Live Tracing

In live tracing, trace records are collected into an internal CTF buffer and are immediately analyzed and displayed on your terminal.

You should use live tracing only when you have a small amount of trace data to collect and you do not wish to keep the trace data for later analysis. It is also helpful if you can anticipate roughly when the trace records you are interested in will be generated; this will reduce the amount of trace output that you need to collect before finding the particular trace records you are interested in.

Due to the difference in speed between the file output performed by detached tracing and the screen output performed by live tracing, it is possible that you will lose trace records when live tracing if they are generated faster than they can be collected and displayed. CTF will inform you if trace records are being lost. If this happens, you should consider using detached tracing instead.

2.2.3. Snapshot Tracing

In snapshot tracing, trace records are collected from one or more tracepoints into an internal CTF buffer, as in the case of detached and live tracing. However, unlike detached and live tracing the collected trace records are neither written to a trace file nor displayed on your terminal. The CTF buffer simply holds the trace records as they are collected. When the buffer becomes full, new trace records overwrite the oldest trace records in the buffer. The CTF buffer is therefore a circular buffer whose contents represent a ‘‘snapshot’’ of the most recent history of tracing.

At any point during snapshot tracing you can issue a CTF command that will either:

- Write the current contents of the buffer to a trace file (if you are performing detached tracing). You can then analyze the contents of the trace file as you would for a trace file that had been produced by detached tracing.
- Display the contents of the buffer on your terminal (if you are performing live tracing).

Snapshot tracing is most useful when you can accurately anticipate when the events you want to trace are going to occur; otherwise, the trace information you require may not have been generated when you collect the contents of the buffer, or it may have been overwritten by more recent trace information. Note also that snapshot tracing is less useful when tracing remote tracepoints, since the buffer in this case is on the remote server and holds less trace information than the buffer on the local VMS system.

2.2.4. Restrictions on Tracing

You can perform live, detached, or snapshot tracing on both local and remote tracepoints. However, you should note the following restrictions:

- You can perform only one type of tracing within a single invocation of CTF; that is, you cannot mix detached, live, and snapshot tracing within the same invocation of CTF.
- You cannot perform both local and remote tracing within the same invocation of CTF.
- Only one system can be traced within a single invocation of CTF. This means that if you are performing remote tracing, all the remote tracepoints traced within that invocation of CTF must be on the same server.

- Only one invocation of CTF can trace local tracepoints at any given time. This means that you cannot, for example, invoke CTF, start detached tracing on a local tracepoint, exit from CTF, then re-invoke CTF to start detached tracing on some other local tracepoint.

2.3. CTF Structure

This section describes the components of CTF that perform the functions described in Section 2.2.

CTF has two major components:

- A VMS utility that is invoked by the DCL command TRACE. This utility supports the CTF command interface, which allows you to:

Start and stop collection of trace records from specified tracepoints Analyze and display the trace records stored in a trace file

Alter the format in which trace records are displayed Assign CTF command strings to particular keys

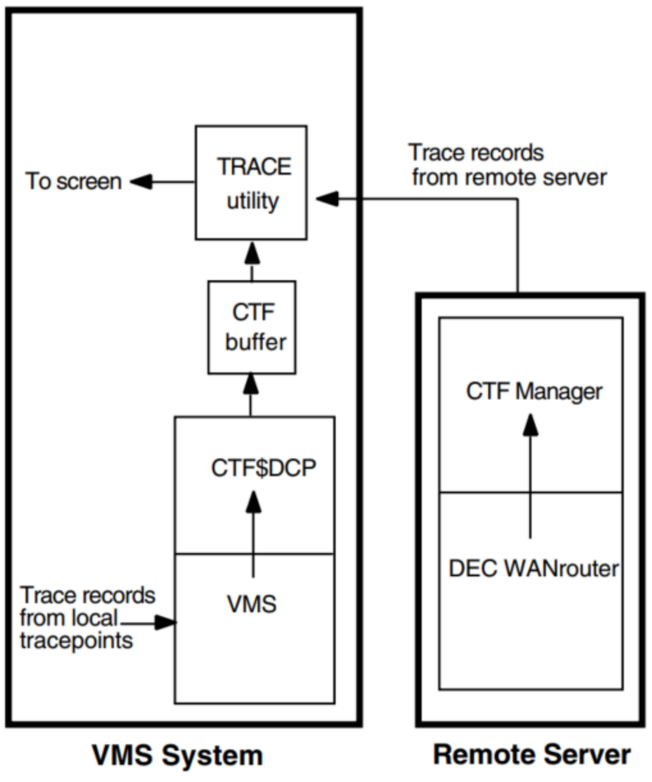
- CTF support. There is a CTF support component in each local VMS system and remote server that supports CTF. CTF support:

Starts and stops collection of trace records from selected tracepoints (in response to CTF commands)

Passes trace records from the networking software that generates them to the TRACE utility

CTF support functions are implemented differently on VMS systems and remote servers. Figure 2.2 shows how live tracing is supported on local VMS systems and remote servers. Figure 2.3 shows how detached tracing is supported on local VMS systems and remote servers.

Figure 2.2. Live Tracing on VMS Systems and Remote Servers



2.3.1. CTF Support on VMS Systems

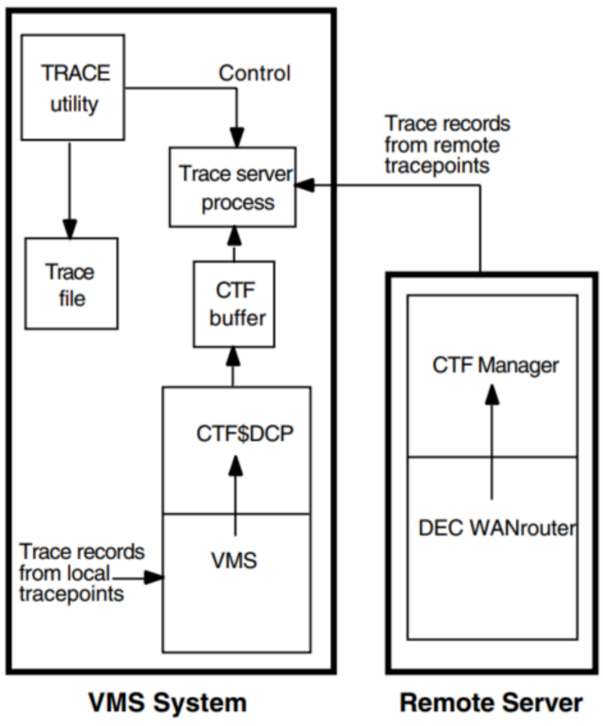
CTF support functions are provided on VMS systems partly by VMS and partly by a process called CTF$DCP. VMS collects trace records from local tracepoints, and CTF$DCP copies these trace records to a global section, which CTF uses as an internal buffer.

In the case of live tracing (see Figure 2.2), trace records are read from the CTF buffer as they arrive and are immediately formatted and displayed on your terminal.

In the case of detached tracing (see Figure 2.3), the trace server process copies trace records from the CTF buffer to a trace file. The contents of the trace file can then be formatted and displayed later.

In the case of snapshot tracing, the CTF buffer is used as a circular buffer in which trace records are collected until they are either written to a trace file or displayed on your terminal in response to a CTF command.

Figure 2.3. Detached Tracing on VMS Systems and Remote Servers



2.3.2. CTF Support on Remote Servers

CTF support functions on a remote server are provided entirely by the operating system. The operating system collects trace records and sends them to the local VMS system from which the server is being traced, using a DECnet-Plus session connection.

In the case of live tracing (see Figure 2.2), the TRACE utility establishes the session connection to the remote server, and formats and displays the received trace records on your terminal.

In the case of detached tracing (see Figure 2.3), the trace server process establishes the session connection to the remote server, and writes the received trace records to a trace file. The contents of the trace file can then be formatted and displayed later.

In the case of snapshot tracing, trace records are buffered at the remote server and are transmitted to a trace file or to the TRACE utility in response to a CTF command.

2.4. CTF Files

Table 2.1 lists the files used by CTF.

Table 2.1. CTF Files

File	Description
SYS$SYSTEM:	
CTF$UI.EXE	User interface
CTF$SERVER.EXE	Detached trace server
CTF$DCP.EXE	VMS trace record collector process CTF$SECTION.DAT Global section file used as CTF buffer when tracing the local VMS system
CTF$SECTION.DAT	Global section file used as CTF buffer when tracing the local VMS system
SYS$LIBRARY:	
CTF$NAME_TABLE.DAT	File containing names of all registered tracepoints and analysis routines. When networking products are installed, they register in this database: • The names of the tracepoints that they support. • The names of the routines that are used to format trace records from these tracepoints.
CTF$KEY.INIT	System-wide default keypad definitions
CTF$KEY.TEMPLATE	Original for CTF$KEY.INIT
CTF$*_ANALYZE.EXE	Where * generally equates to the name of a protocol that can be analyzed by CTF. These images contain the routines that format trace records.
CTF$*_TRACEPOINTS.DAT	These files contain the tracepoint names and identifiers used to create CTF$NAME_TABLE.DAT.
SYS$MESSAGE:	
CTF$MESSAGES.EXE	CTF message file
SYS$HELP:	
CTF$HELP.HLB	CTF on-line help
SYS$MANAGER:	
CTF$STARTUP.COM	Command file that installs CTF and related images.

2.5. An Example of Trace Output

This section presents an example of trace output.

Although the exact contents of trace output are protocol-specific, there are some general features common to all kinds of trace output.

One common feature is the trace output header, which shows:

- When the trace was started
- When the trace was analyzed

All trace output is divided into columns containing the following types of information for each trace record:

- The time at which the trace record was generated.
- The event code of the event that caused the trace record to be generated.
- The size of the protocol message associated with the trace record.
- The contents of the protocol message associated with the trace record.

The following example consists of trace records collected from a tracepoint at a ROUTING CIRCUIT entity. These trace records represent the PDUs that are transmitted and received on that circuit by the DNA Routing module.

```
CTF V1.0-00                                               Page 1
Trace started on 28-JUN-1991 09:28:52.98 Analyzed on 28-JUN-1991
 09:31:21.44
Trace File [USER]CTF$TRACE.DAT;1               Output File
 [USER]TRACE.LIS;1
-----------+----+-----+---------------- Routing Packet Header
 ---------------
     Time |Evnt|Data |
hh mm ss cc|    |Size |
09:28:53.00|TX  | 1492|                 Type: LAN L2 Hello
                      |      Protocol ID: 08, Length: 1B, Version: 01
                      |  Source ID: 08-00-2B-0B-04-28, Holding Time: 30
                      |  Version: V3.0.0, Segment Length: 05D4
                      | Circuit: Level 2, L1 Algorithm: N/A, L2 Algorithm:
 LS
                      | Priority: 64, LAN ID: 08-00-2B-0B 04-A6.01
                      | Options:
                      |    Type: 01 (Area Address) Length: 12
                      |       Area: 490041
                      |       Area: 490042
                      |       Area: 490001
                      |    Type: 06 (RTR Nbrs) Length: 6
                      |       Nbr: AA-00-04-00-DB-A9
                      |    Type: 08 (DNA Padding) Length: 255
                      |    Type: 08 (DNA Padding) Length: 255
                      |    Type: 08 (DNA Padding) Length: 255
                      |    Type: 08 (DNA Padding) Length: 255
                      |    Type: 08 (DNA Padding) Length: 255
                      |    Type: 08 (DNA Padding) Length: 156
                      |
09:28:53.05|RX  |   74|        Phase IV Type: L1 RV, Padding: 0, Flags:
                      |              Source Node: 1.284
                      |
09:28:53.31|RX  | 1492|        Type: LAN L1 Hello
                      |       Protocol ID: 08, Length: 1B, Version: 01
                      |    Source ID: 08-00-2B-0B-02-52, Holding Time: 9
                      |    Version: V3.0.0, Segment Length: 05D4
```

```
                                 | Circuit: Level 1, L1 Algorithm: RV, L2 Algorithm:
N/A
                                 |       Priority: 64, LAN ID: 08-00-2B-06 91-F2.01
                                 | Options:
                                 |    Type: 01 (Area Address) Length: 12
                                 |       Area: 490041
                                 |       Area: 490042
                                 |       Area: 490001
                                 |    Type: 06 (RTR Nbrs) Length: 42
                                 |       Nbr: AA-00-04-00-01-06
                                 |       Nbr: AA-00-04-00-44-06
                                 |       Nbr: AA-00-04-00-8B-05
                                 |       Nbr: AA-00-04-00-55-06
                                 |       Nbr: AA-00-04-00-48-06
                                 |       Nbr: AA-00-04-00-46-06
                                 |    Type: 08 (DNA Padding) Length: 255
                                 |    Type: 08 (DNA Padding) Length: 255
                                 |    Type: 08 (DNA Padding) Length: 255
                                 |    Type: 08 (DNA Padding) Length: 255
                                 |    Type: 08 (DNA Padding) Length: 255
                                 |    Type: 08 (DNA Padding) Length: 120
                                 |
```

Chapter 3. Using CTF

This chapter describes how to prepare your system for using the Common Trace Facility (CTF), and how to use CTF.

3.1. Introduction

Before anyone can use CTF, you must ensure that all CTF-related images have been installed and that adequate system resources are available. Section 3.2 describes the preparations that must be made before CTF can be started on a system.

You will require specific rights identifiers in order to use certain CTF commands. Also, if you intend to trace remote tracepoints, you will probably need to know certain items of access control information. Section 3.3 describes the privileges and access control information that you will require in order to use CTF.

To use the CTF command interface you must run the TRACE utility. Section 3.4 describes how you run the TRACE utility.

To generate trace output you must start collecting trace records from the tracepoints in which you are interested. Section 3.5 describes how you start detached, live, or snapshot tracing at one or more tracepoints, and describes how to stop tracing when you have collected sufficient trace output.

If you are using live tracing, trace records are displayed on your terminal as they are collected. However, if you are using detached tracing, trace records are written to a trace file. To display the contents of a trace file you must issue the appropriate CTF command. Section 3.6 describes how you display the contents of a trace file, and describes how you can alter the format of the display for both live and detached tracing.

You can associate CTF commands with function keys on your keyboard. Section 3.7 describes how you assign CTF commands to keys.

Tracing can significantly degrade system performance, both on the local VMS system on which CTF is run and, if you are remote tracing, on the remote server that is being traced. Section 3.8 describes a CTF facility that enables you to reduce the impact of tracing on system performance.

Section 3.9 describes some of the problems you might encounter using CTF, and suggests what you should do to solve these problems.

3.2. System Requirements

This section describes the system requirements for running CTF.

3.2.1. Startup Procedure

The CTF SYS$MANAGER:CTF$STARTUP.COM startup procedure is executed during the NET $STARTUP procedure. The startup procedure installs all the CTF-related images.

3.2.2. System Resources

CTF requires the following specific system resources on the local VMS system:

- For local tracing:

One process slot for CTF$DCP

One process slot for the trace server process (if detached tracing is to be used)

- For remote tracing:

One process slot for the trace server process (if detached tracing is to be used)

Tracing imposes considerable overheads on the local system and, in the case of remote tracing, on the system being traced, with consequent effects on system performance. These overheads are due to:

- Collecting and buffering trace records from tracepoints.
- Writing trace records to trace files (in the case of detached tracing).
- Displaying trace records on the screen (in the case of live tracing).

3.3. User Requirements

You use the START and STOP commands to control the collection of trace records. To use these commands you require the following privileges:

- For local tracing you require:

NET$TraceHeaders or

NET$TraceAll

- For remote tracing you require:

NET$TraceHeadersRemote or

NET$TraceAllRemote

The username and password associated with the CTF object on the remote server. These are required only if the remote CTF object on the server is protected; however, this will usually be the case.

Other CTF commands require no special privileges.

Note

You must have password protection on all remote servers for security.

All tracing operations of the CTF on DECnet-Plus end nodes or routers require that the user process hold identifiers in the rights database of the node on which the user is invoking CTF. These identifiers are:

Table 3.1. Identifiers in the Rights Database

Trace Operation	Privilege
NET$TraceHeaders	can trace message headers on the local node.
NET$TraceAll	can trace entire messages on the local node.

Trace Operation	**Privilege**
NET$TraceHeadersRemote	can trace message headers on remote nodes.
NET$TraceAllRemote	can trace entire messages on remote nodes.

These identifiers are created in the rights database during installation. They may be granted to a user account through the Authorize Utility by a system manager.

```
$ SET DEFAULT SYS$SYSTEM
```

```
$ RUN AUTHORIZE
```

```
UAF> GRANT/ID NET$TRACEHEADERS user_account
```

Note

For some tracepoints there is no distinction between tracing a header and tracing a full message.

3.3.1. Keypad Definitions

When you run the TRACE utility, it reads the default keypad definitions from the file:

```
SYS$LIBRARY:CTF$KEY.INIT
```

The system manager may edit this file to change the default keypad definitions for all CTF users.

Individual users may override the default keypad definitions by generating their own copy of CTF $KEY.INIT and equating the logical name CTF$KEY to the copy, as follows:

```
$ DEFINE CTF$KEY SYS$LOGIN:CTF_KEYPAD.INIT
```

The defaults applied to the logical name translation are: SYS$LIBRARY:.INIT

3.4. Running the TRACE Utility

To run the TRACE utility, enter the following command at the DCL prompt:

```
$ TRACE
```

The appearance of the CTF> prompt indicates that TRACE is running and that you can enter any of the CTF commands described in Chapter 4.

You can include a CTF command in the TRACE command line, as follows:

```
$ TRACE command-string
```

in which case the specified CTF command is executed as soon as TRACE is running. When this command has been executed, you are returned to VMS; the single exception to this rule is the ANALYZE command, which leaves you in the TRACE utility when it has completed (that is, the CTF> prompt will appear). For example:

```
$ TRACE START "ROUTING CIRCUIT LAN-0"
```

runs TRACE and immediately starts detached tracing at the specified tracepoint. To exit from the TRACE utility and return to DCL, enter the following command: CTF> EXIT

If you are currently performing live tracing, exitting from TRACE has the effect of stopping tracing; that is, collection and display of trace records is stopped. If, however, you are currently performing detached tracing, exitting from TRACE has no effect on collection; the collection of trace records into a trace file will continue under the control of the trace server process. To stop detached tracing you must explicitly turn off the collection of trace records (see Section 3.5.5).

3.4.1. Tracing Phase IV Products

The DECnet-Plus for VMS versions of VSI's networking products support CTF. The Phase IV versions, however, do not support CTF; instead, they support the NETTRACE utility. If you are tracing the Phase IV version of a networking product, such as a previous, Phase IV version of VAX P.S.I., rather than the DECnet-Plus for VMS version, use the NETTRACE utility rather than CTF.

To start NETTRACE, use the TRACE command with an appropriate qualifier. The qualifiers that you can specify in a TRACE command are:

- TRACE/PSI
- TRACE/ROUTER
- TRACE/SNA

See the Problem Solving Guide for the appropriate product for information about using NETTRACE.

3.5. Starting and Stopping Collection of Trace Records

This section describes how you start and stop the collection of trace records from tracepoints.

The CTF commands that start and stop the collection of trace records from tracepoints refer to these tracepoints by name. Section 3.5.1 describes how local and remote tracepoints are named and how you refer to them in CTF commands.

There are three ways to collect trace records from tracepoints:

- Detached tracing, in which trace records are written to a trace file. Section 3.5.2 describes how you start detached tracing.
- Live tracing, in which trace records are displayed on your terminal as they are collected. Section 3.5.3 describes how you start live tracing.
- Snapshot tracing, in which trace records are collected in a buffer until you issue a command that either writes the buffer to a trace file or displays the contents of the buffer on your terminal. Section 3.5.4 describes how you start snapshot tracing.

Section 3.5.5 describes how you stop trace collection.

3.5.1. Tracepoint Names

A tracepoint is usually associated with a particular network management entity, and has a name that is either identical or similar to the entity name. See the *VSI DECnet-Plus for OpenVMS Network Management Guide* for a description of the structure of entity names.

For example, the Routing module contains tracepoints for each ROUTING CIRCUIT entity that is created; such a tracepoint would have a name like:

```
ROUTING CIRCUIT SYN-0"
```

where SYN-0 is the name of a particular ROUTING CIRCUIT entity. Another example of a tracepoint name, this time in the CSMA-CD module, would be:

```
"CSMACD STATION THIS-STATION"
```

where THIS-STATION is the name of a particular CSMACD STATION entity.

Tracepoint names must always be enclosed in double quotes when they appear in CTF commands.

Note that not all tracepoints correspond to network management entities, and therefore not all tracepoints have names that correspond to entity names (see Appendix B for examples of VAX P.S.I. tracepoints whose names do not correspond to X.25 network management entities). Also, not all network management entities have tracepoints associated with them. See the appendixes to this manual for a list of the tracepoints provided by the networking products that support CTF.

The tracepoint names given above are all local tracepoint names. Remote tracepoint names are similar, but must begin with a node name. Also, since the CTF object on remote servers is usually protected by a user name and a password, remote tracepoint names must usually include this access control information as well.

For example:

```
NODEA"FRANK CHICKENS"::"CSMACD STATION THIS-STATION"
```

specifies a tracepoint on the remote server with the node name NODEA, specifying user name FRANK and the password CHICKENS. The portion of the name after the :: is the same as for a local tracepoint name. Note that the

node name and :: in a remote tracepoint name are not enclosed in double quotes. Some more examples of remote tracepoint names follow:

```
ROUTER3"SYSUSER UNGUESSABLE_PW"::"ROUTING CIRCUIT SYN-2" REMNODE"REMUSER
 FRED"::"DDCMP LINK SYN-3"
```

3.5.1.1. Using Wildcards in Tracepoint Names

You can refer to several tracepoints in a single CTF command by specifying several tracepoint names, separated by commas. For example:

```
CTF> START "ROUTING CIRCUIT SYN-0","ROUTING CIRCUIT SYN-1"
```

Alternatively, you can use the wildcard characters, * (asterisk) and ?, in a tracepoint name to make it refer to several tracepoints. The ? wildcard can stand for any single character, and the * wildcard can stand for any string of characters.

You can use the wildcard characters in two ways:

- You can use a wildcard with a partial tracepoint name to specify a number of tracepoints with similar names. For example:

```
"ROUTING CIRCUIT SYN-*"
```

refers to all ROUTING CIRCUIT tracepoints whose name begins with "SYN-".

```
"DDCMP LINK L*K"
```

refers to all DDCMP LINK tracepoints whose name begins with L and ends with K.

```
"CSMACD STATION STAT-?"
```

refers to all CSMACD STATION tracepoints with names of the form STAT-*x*, where *x* is a single character.

- You can use the * wildcard on its own to specify all the tracepoints of a given entity class. For example:

```
"ROUTING CIRCUIT *"
```

refers to all ROUTING CIRCUIT tracepoints.

Note that you can use wildcards only in the last part of a tracepoint name, the instance identifier that identifies a particular instance of an entity class. For example, you could not use:

```
CSMACD * *"
```

to refer to all CSMACD PORT and CSMACD STATION tracepoints; to do that you would have to specify two tracepoint names:

```
"CSMACD PORT *" "CSMACD STATION *"
```

3.5.2. Starting Detached Tracing

To start detached tracing, enter the following CTF command:

```
CTF> START "tracepoint-name"[,...]
```

You can enter several tracepoint names in the same START command, separated by commas; alternatively, you can issue several START commands.

Each of the following examples has the effect of starting collection of trace records from the specified tracepoints. For example, to start detached tracing of the tracepoints on two ROUTING CIRCUIT entities named SYN-0 and SYN-1, you could enter the command:

```
CTF> START "ROUTING CIRCUIT SYN-0","ROUTING CIRCUIT SYN-1"
```

or, using two separate START commands:

```
CTF> START "ROUTING CIRCUIT SYN-0" CTF> START "ROUTING CIRCUIT SYN-1"
```

or, using wildcards:

```
CTF> START "ROUTING CIRCUIT SYN-*"
```

Note that this last example would start detached tracing on all ROUTING CIRCUIT tracepoints whose name begins with SYN-, not just SYN-0 and SYN-1.

Since this is detached processing, a trace server process is created to write the collected trace records to a trace file. By default, the name of this trace server process is *username*$CTF, where *username* is your user name. You can specify a different name for the trace server process by using the /PROCESS_NAME qualifier of the START command. By default, the trace server process writes trace records to the file CTF$TRACE.DAT in your default directory. You can specify a different trace file by using the /OUTPUT qualifier of the START command. For example:

```
CTF> START/OUTPUT=DDCMPTRACE.DAT "DDCMP LINK SYN-2"
```

collects trace records from the specified tracepoint and writes them to the file DDCMPTRACE.DAT in your current directory.

See the description of the START command in Chapter 4 for a description of all the qualifiers that you can use for detached tracing.

3.5.3. Starting Live Tracing

As with detached tracing (see Section 3.5.2), live tracing is controlled by the START command. You start live tracing by including the /LIVE qualifier in the START command. For example:

```
CTF> START/LIVE "ROUTING CIRCUIT SYN-0"
```

starts collecting trace records from the specified tracepoint and displays them on your terminal.

You can interrupt the display of trace records to enter CTF commands at any time; for example, you may wish to enter CTF commands to change the format of the display. To interrupt the display, simply press any key; the CTF> prompt appears, and you can enter a CTF command. When the command has been executed, the display of trace records is resumed. Any trace records generated while you were entering a CTF command will have been buffered, and will be displayed when the display of trace records is resumed. However, since buffer space is limited, you may lose trace records if you leave the CTF> prompt displayed for too long.

See the description of the START command in Chapter 4 for a description of the qualifiers that you can use for live tracing.

3.5.4. Starting Snapshot Tracing

To start snapshot tracing, use the /NOCOLLECT qualifier in the START command. For example:

```
CTF> START/NOCOLLECT "ROUTING CIRCUIT SYN-1"
```

starts reading trace records from the specified tracepoint into the CTF buffer, but does not write them to a trace file or display them on your terminal. When you want to collect the contents of the CTF buffer, enter the following command:

```
CTF> COLLECT
```

If you are performing detached tracing, the current contents of the CTF buffer are written to the default trace file, CTF$TRACE.DAT. You can then analyze the contents of the trace file, as described in Section 3.6.2. If you are performing live tracing, the current contents of the CTF buffer are displayed on your terminal.

3.5.5. Stopping Tracing

To stop the collection of trace records from particular tracepoints, enter the following command:

```
CTF> STOP [tracepoint-name[,...]]
```

For example:

```
CTF> STOP "ROUTING CIRCUIT UNA-0"
```

stops the collection of trace records from the specified tracepoint. If you specify no tracepoint names, all current tracing is stopped.

If you specified a trace server process name other than the default, *username*$CTF, when you started detached tracing (see Section 3.5.2), you must specify this process name in the /PROCESS_NAME qualifier in the STOP command. For example, if you started detached tracing with the command:

```
CTF> START/PROCESS_NAME=DDCMPTRACE "DDCMP LINK LNK-02"
```

you would stop this trace with the command:

```
CTF> STOP/PROCESS_NAME=DDCMPTRACE "DDCMP LINK LNK-02"
```

If you stop all detached tracing, the trace server process will exit. If you stop all local tracing, the process CTF$DCP will also exit.

3.6. Displaying Trace Records

This section describes the facilities provided by CTF for displaying trace output.

3.6.1. Controlling Output During Live Tracing

When you start live tracing, trace records are formatted and displayed on your terminal as they are collected. You can interrupt the display at any time by pressing any key on the keyboard; you can then use the ANALYZE command to alter the format and contents of the display.

You can use the /DISPLAY qualifier to specify what parts of the trace record (other than the protocol data itself) are to be included in the display. For example:

```
CTF> ANALYZE/DISPLAY=(CONTEXT,EVENT,NAME)
```

displays the context-specific information, event code, and tracepoint name for each trace record.

You can use the /DATA qualifier to specify whether or not the user data part of the protocol data is displayed, and in what format. For example:

```
CTF> ANALYZE/DATA=ASCII
```

causes user data to be displayed in ASCII (the default is to display user data in hexadecimal). Note that not all trace records include user data; in such cases the

/DATA qualifier has no effect.

Normally, all trace records collected from the tracepoints you are tracing will be displayed. There are a number of ways in which you can restrict what trace records are displayed:

- You can use the /FILTER qualifier to specify that only trace records with specified event codes are displayed; for example:

```
CTF> ANALYZE/FILTER=(RX)
```

specifies that only trace records with event code RX (receive) are to be displayed. See Section 3.8 for more information about the /FILTER qualifier.

- You can use the /NAME qualifier to specify that only trace records from certain tracepoints are to be displayed; for example:

```
CTF> ANALYZE/NAME="SYN-0"
```

specifies that only trace records from tracepoints with the instance name SYN-0 are to be displayed.

- You can use the /BEFORE and /SINCE qualifiers to specify that only trace records collected before or after a specified time are to be displayed.

If your process holds identifier NET$TraceAll for tracing local data or NET$TraceAllRemote for tracing remote data, the information in a trace record will consist of a protocol header and user data. For any particular tracepoint, the user data in the trace record will include the protocol headers from higher protocol levels. For example, the user data in a trace record collected from

a DDCMP LINK tracepoint will include the protocol information from the appropriate ROUTING CIRCUIT tracepoint.

If your process does not hold NET$TraceAll or NET$TraceAllRemote, the user data portion is neither collected nor displayed.

By default, the analysis of a trace record will not include protocol information within the user data part of the trace record. For example, the default analysis of a trace record from a ROUTING CIRCUIT tracepoint would analyze only the routing packet header, and the protocol information for the higher levels would be displayed as user data.

You can use the /PROTOCOL qualifier to specify that protocol information in the user data part of the trace record is also to be analyzed. For example:

```
CTF> ANALYZE/PROTOCOL=(DDCMP,ROUTING)
```

would analyze both the routing and DDCMP protocol information in each trace record. Note that you must take care to specify the protocols in the correct order, from the lowest protocol level upwards. If, for example, you were to specify:

```
CTF> ANALYZE/PROTOCOL=(ROUTING,DDCMP)
```

the effect would be to analyze the routing packet header as though it were a DDCMP packet header and the DDCMP packet header as though it were a routing packet header. The analysis would be performed as specified, but the results would, of course, be nonsense.

The /SELECT qualifier is usually used only in connection with the /PROTOCOL qualifier. If you use the /PROTOCOL qualifier to select multiple protocol analysis of a trace record, you can use the / SELECT qualifier to specify that only some of these protocols should be displayed. For example, if you use:

```
CTF> ANALYZE/PROTOCOL=(MODEM_CONNECT,DDCMP,ROUTING)
```

to display the analyses of these three protocols, you could subsequently use:

```
CTF> ANALYZE/SELECT=(DDCMP)
```

to display only the DDCMP protocol analysis, or:

```
CTF> ANALYZE/SELECT=(MODEM_CONNECT,ROUTING)
```

to display only the analyses of the modem connect and routing protocols.

By default, trace output is displayed continuously as it arrives. You can use the

/NOSCROLL qualifier with ANALYZE to cause output to be displayed a screen at a time; you can then use the BACK and NEXT commands to move backwards and forwards through the output one screen at a time.

See the description of the ANALYZE command in Chapter 4 for more information about the qualifiers that you can use while performing live tracing.

3.6.2. Displaying the Contents of Trace Files

When you start detached tracing, unformatted trace records are collected into a trace file. To format and display the contents of a trace file, enter the following command:

```
CTF> ANALYZE [trace-file]
```

The ANALYZE command formats the trace records in a trace file into user- readable form and either displays them on your terminal or writes them to a file. By default the trace records are displayed on your terminal; you can use the

/OUTPUT qualifier to write them to a file instead. If you do not specify the name of a trace file, the default trace file CTF$TRACE.DAT (in your default directory) is assumed.

For example:

```
CTF> ANALYZE/OUTPUT=ANALYSIS.LIS MYTRACE.DAT
```

formats the trace records in MYTRACE.DAT and writes the results to ANALYSIS.LIS.

If you stop and restart detached tracing at a tracepoint, specifying the same trace file name each time, a new version of the trace file is created each time. The ANALYZE command starts with the lowest existing version of the trace file and continues up to and including the highest version. If you want to start the display with a specific version of a trace file, include the version number in the file specification. You can use the /VERSION_LIMIT qualifier of the START command to specify how many versions of the same trace file will be kept.

If trace records have been collected for more than one protocol, the default action when the trace file is analyzed is that only the protocol implied by the first tracepoint encountered in the trace file is analyzed. You can use the /TRACE_ LEVEL qualifier to alter this action; for example:

```
CTF> ANALYZE/TRACE_LEVEL=(DDCMP)
```

analyzes all DDCMP protocol trace records in the trace file.

You can use the qualifiers of the ANALYZE command described in Section 3.6.1 to alter the format and contents of the display of a trace file.

3.7. Defining Key Sequences for CTF Commands

When you run the TRACE utility, certain keys on your keyboard are defined to implement frequently used CTF commands. Table 3.2 lists the default assignments of CTF commands to keys.

You can use the DEFINE/KEY command to alter these definitions or to add further definitions. For example:

```
CTF> DEFINE/KEY KP2 "START/LIVE/DISPLAY=OCTAL"
```

redefines KP2.

You can have multiple definitions for one key by defining key states in the DEFINE/KEY command. For a description of how to use key states and the relevant qualifiers of the DCL DEFINE/KEY command, see the description of the DEFINE/KEY command in your VMS documentation.

You can use the DELETE/KEY command to delete key definitions made with the DEFINE/KEY command.

You can use the SHOW/KEY command to display the current key definitions.

Table 3.2. Default CTF Keys

Key	CTF Function
HELP	HELP
PF2	HELP KEYPAD DEFAULT
PF3	SHOW KEY/ALL
KP0	NEXT
KP2	START
KP3	STOP
KP4	ANALYZE/DATA=ASCII/NOSELECT / NODISPLAY/NOTRUNCATE
KP6	ANALYZE/DISP=ALL/WIDTH=132
KP7	ANALYZE/DATA=ASCII
KP8	ANALYZE/DATA=HEXADECIMAL
KP9	ANALYZE/DATA=OCTAL
MINUS	ANALYZE/DATA=DECIMAL
COMMA	ANALYZE/TRUNCATE
PERIOD	BACK
NEXT_SCREEN	NEXT
PREV_SCREEN	BACK
CTRL/L	CLEAR
CTRL/W	REFRESH
GOLD COMMA	ANALYZE/NOTRUNCATE
GOLD KP0	ANALYZE/SCROLL
GOLD KP2	START/LIVE
GOLD KP6	ANALYZE/NODISPLAY
GOLD NEXT_SCREEN	ANALYZE/SCROLL

3.8. Filtering

Filtering reduces the impact of tracing on system performance by reducing the number of trace records collected. This, in turn, reduces, the number of trace records that have to be written to trace files or displayed on a terminal.

Each trace record includes an event code that indicates the type of event that caused the trace record to be generated. You can use the /FILTER qualifier in the START command to specify that only trace records with specified event codes should be collected. For example, most tracepoints generate trace records for the Receive and Transmit events; you can use /FILTER to specify that only trace records generated for Transmit events are to be collected.

For example:

```
CTF> START/FILTER=TX "ROUTING CIRCUIT UNA-0"
```

starts tracing at the specified tracepoint, but indicates that only trace records with event code TX (transmit) are to be collected.

To change the filter associated with a tracepoint, issue another START command with a different filter. For example, if you follow the previous START command with:

```
CTF> START/FILTER=RX "ROUTING CIRCUIT UNA-0"
```

only trace records with event code RX (receive) will be collected.

The default value is /NOFILTER, meaning that all trace records generated at the tracepoint are collected. So, to resume collection of all trace records generated at the ROUTING CIRCUIT entity, you would issue the following command:

```
CTF> START "ROUTING CIRCUIT UNA-0"
```

You can also use the /FILTER qualifier in the ANALYZE command to select trace records with a specific event code. Note that the /FILTER qualifier in the ANALYZE command merely restricts the amount of information that is displayed; it has no effect on the amount of trace information collected from tracepoints.

3.9. Problems Running CTF

There are two major potential problem areas when running CTF:

- Loss of trace records
- Failure to connect to remote systems when remote tracing

3.9.1. Loss of Trace Records

Trace records can be lost when they are generated more quickly than they can be collected and written to the terminal or to a trace file. CTF will inform you if you have lost any trace records. If you experience this problem, try the following corrective actions:

- If you are live tracing, try detached tracing instead. The problem is less likely to occur with detached tracing.
- Reduce the amount of trace data being generated and/or collected. There are a number of ways to do this:

Use filtering to reduce the number of trace records collected.

Use the /CAPTURE_SIZE qualifier in the START command to reduce the size of each trace record.

Do not collect trace records from more than one tracepoint at a time.

- Increase the priority of the trace server process using the /PRIORITY parameter of the START command.
- If the other actions do not solve the problem, use the /BUFFER_SIZE and

/MAXIMUM_BUFFERS qualifiers in the START command to increase the size and number of CTF internal buffers.

3.9.2. Failure to Connect to Remote Servers

You may see one of two system messages indicating a failure to connect to a remote server when remote tracing:

- The message:

%SYSTEM-F-INVLOGIN, LOGIN information invalid at remote node

means that the CTF object at the remote server is protected by a user name and password. Either you have failed to supply the user name and password with the START command, or you have specified them incorrectly.

- The message:

%SYSTEM-F-REJECT, Connect to network object rejected

usually means that you have tried to trace a remote server that has been configured as a Phase IV router; CTF is supported only on servers that have been configured as DECnet-Plus for VMS routers. Use the NETTRACE facility to trace remote Phase IV servers. See the Problem Solving Guide for the product you are tracing for information on how to use NETTRACE.

Chapter 4. CTF Commands

This chapter provides a detailed description of each of the CTF commands and its qualifiers.

Table 4.1 lists the available CTF commands.

Table 4.1. Summary of CTF Commands

Command	Description
ANALYZE	Displays the trace records in a trace file, and specifies the format of this display (for both live and detached tracing).
ATTACH	Transfers control to another process.
BACK	Displays the previous screen of trace data.
CLEAR	Clears the screen of trace data.
COLLECT	Collects trace records generated during a /NOCOLLECT session into a trace file.
DEFINE/KEY	Associates a command with a key on the keyboard.
DELETE/KEY	Deletes the key definitions you have defined.
EXIT	Stops the TRACE utility.
HELP	Displays on-line help about CTF commands.
REFRESH	Redraws the screen.
SHOW KEY	Displays the key definitions for your keyboard.
SPAWN	Creates a subprocess of the current process.
START	Starts live or detached tracing at specified tracepoints.
STOP	Stops tracing at specified tracepoints.

4.1. Using the CTF Keypad

A number of keys on your keyboard are set up to provide a quick way to enter certain frequently used CTF commands. You can either use the default keypad definitions set up when CTF is installed, or you can use the DEFINE/KEY command to set up your own definitions. See Table 3.2 for a description of the default keypad definitions.

ANALYZE

ANALYZE — The ANALYZE command formats and displays the contents of a trace file. The command is also used to specify the format in which trace data is displayed, either during live tracing or when the contents of a trace file are displayed.

Format

ANALYZE [file-spec] [/qualifiers]

Parameters

file-spec

Specifies the name of the trace file to be displayed. The default is the file CTF$TRACE.DAT in your default directory. You cannot specify this parameter if you are performing live tracing.

Note

If you do not specify a file version number, the ANALYZE command starts at the lowest version of the trace file and processes each version of the file in turn.

Qualifiers

/BEFORE=time

Specifies that only trace records collected before the specified time are to be displayed. Specify the time in standard VMS format.

/BRIEF

Specifies that a single-line analysis of the protocol data in each trace record is displayed. /BRIEF is the default display. This qualifier is effective only if the relevant protocol analysis routines support abbreviated analysis of protocol data.

/DISPLAY=(field,...)
/NODISPLAY

Specifies which fields of a trace record (other than the protocol data itself) are displayed. The fields that can be displayed are:

[NO]ALL	All the fields shown below are displayed.
[NO]CONTEXT	Tracepoint-specific information
[NO]EVENT	The event code
[NO]FUNCTION_CODE	The tracepoint-specific function code of the operation being traced.
[NO]NAME	The name of the tracepoint from which the trace record was collected. Names longer than 16 characters will be truncated on the right.
[NO]SIZE	The original size of the trace data, in bytes
[NO]STATUS	If the value in this field is non-zero, it is the current status of the operation being traced.
[NO]TIME	The time at which the trace record was collected.

The default display is:

TIME
EVENT
SIZE

/FILTER=(event-code,...)
/NOFILTER

Specifies a filter for trace records. A trace record is displayed only if its event code is one of those specified in the filter. See the appendixes to this manual for a list of the event codes supported by each tracepoint. This value overrides the current filter, if any. You cannot specify this qualifier with /SELECT or /TRACE_ LEVEL. The default is /NOFILTER.

/FULL

Specifies that a multi-line analysis of each trace record is produced. If you do not specify /FULL, the default is /BRIEF. This qualifier is effective only if the relevant protocol analysis routines support full analysis of protocol data.

/NAME=instance-name

Specifies the instance part of a tracepoint name. A trace record is displayed only if it came from the specified tracepoint. If you specify only the first part of an instance name, trace records are displayed from all tracepoints whose name begins with this string. The default is to display trace records from all active tracepoints.

/OUTPUT[=output-filename]

Specifies the name of a file to which the formatted trace records are to be written. If you specify / OUTPUT without a filename, the default is to display the output on your terminal. You cannot use this qualifier if you are performing live tracing.

/PAGE=lines-per-page

Specifies the number of lines per page when writing output to a file. This qualifier has no effect if trace records are being displayed on your terminal. The default is defined by the logical name SYS$LP_LINES, which usually has the value 66.

/PROTOCOL=(protocol-identifier,...)
/NOPROTOCOL

Specifies the type of analysis performed on each trace record. The protocol data in each trace record is analyzed for each of the protocols listed in the /PROTOCOL qualifier, in the order in which they are specified. If you do not specify this qualifier, only the protocol data supplied at the protocol level of the originating tracepoint is analyzed; protocol data from higher levels is displayed, unanalyzed, as user data. If you specify /NOPROTOCOL, no analysis is performed on the protocol data in the trace record; it is all presented as user data.

/REVERSE
/NOREVERSE

Specifies that received data will be displayed in reverse video, and titles will be displayed in bold. The default is /REVERSE.

/SAVE_BUFFER_SIZE=n

Specifies how many screens of saved lines of data will be kept. These screens can be examined by using the NEXT and BACK commands. The default is 30. The minimum is one screen. The maximum is 1000 screens.

/SCROLL
/NOSCROLL

Specifies whether data is displayed continuously or a page at a time. If you specify /NOSCROLL, you have to issue the NEXT or BACK command to display the next screen or previous screen. The default is /SCROLL, which causes data to be displayed continuously.

/SELECT=(protocol-identifier,...)

> Specifies which protocol analyses are to be displayed. This qualifier is only useful if you have used the /PROTOCOL qualifier to request multiple protocol analysis of a trace record. The default is to display all the protocol analyses requested by the /PROTOCOL qualifier.

/SINCE=time

> Specifies that only trace records collected since the specified time are to be displayed. Specify the time in standard VMS format.

/TRACE_LEVEL=(protocol-identifier,...)

> Normally, CTF will display the analysis for a single protocol, even if the trace file contains trace records from more than one protocol. By default, CTF will analyze only those trace records with the same protocol as the first trace record in the trace file. However, if you use this qualifier, all the specified protocols will be analyzed. You cannot use this qualifier with either /FILTER or /SELECT.

/TRUNCATE
/NOTRUNCATE

> Specifies whether data that will not fit on one line is truncated or continued on the next line. The default is /TRUNCATE for live tracing and /NOTRUNCATE for analysis of a file.

/WIDTH=n

> Specifies the width of the output page, in columns. If the data is written to a file, the default is 132. If the data is displayed on your terminal, the default is the width of your screen.

Description

The ANALYZE command allows you to:

- Display the contents of a trace file, and specify the format of the display.
- Change the format of the display during live tracing.

If you issue the ANALYZE command while displaying a trace file, and you do not specify a filename, the qualifiers you use will be applied to the trace file being displayed.

You may not ANALYZE a trace file during live tracing, but you may use the ANALYZE command to alter the format of the display for live tracing. Simply press any key to interrupt the display, enter the ANALYZE command, and the resumed display will reflect the new format.

If you include the ANALYZE command in a TRACE command line, you will be left in the TRACE utility on completion of the command.

Examples

```
CTF> ANALYZE/OUTPUT=TRACE_ASC.LIS
```

This command formats the contents of the default trace file, CTF$TRACE.DAT, and places the formatted data in a file called TRACE_ASC.LIS.

```
CTF> ANALYZE/FILTER=(RX,TX)
```

This command displays the contents of the default trace file, CTF$TRACE.DAT, on your terminal. Only trace records with event code RX (receive) or TX (transmit) will be displayed.

ATTACH

ATTACH — The ATTACH command transfers control to the specified process.

Format

ATTACH [process-name] [/qualifiers]

Parameters

process-name

Specifies the name of a parent process or spawned sub-process to which control passes. The process must already exist, must be part of your current job, and must share the same input stream as your current process. However, the process cannot be your current process or a sub-process created with the SPAWN command using the /NOWAIT qualifier.

Process names can contain from 1 to 15 alphanumeric characters. If a connection to the specified process cannot be made, an error message is displayed.

You may not specify a process name if you specify either the /IDENTIFICATION or /PARENT qualifier.

Qualifiers

/IDENTIFICATION=PID

> Specifies the process identification of the process to which control is to be transferred. If you use this qualifier, you cannot specify /PARENT or a process name.

/PARENT

> This is only valid if used from a sub-process. It specifies that control is to be returned to the parent process. If you use this qualifier, you cannot specify /IDENTIFICATION or a process name.

Examples

```
CTF> ATTACH SMITH_1
```

transfers control to the process called SMITH_1.

```
CTF> ATTACH /IDENT=39400067
```

also transfers control to the process SMITH_1, using its PID rather than its name.

```
CTF> ATTACH /PARENT
```

transfers control back to the parent process.

BACK

BACK — The BACK command displays the previous screen of trace data.

Format

BACK

Parameters

None.

Description

If you are displaying the contents of a trace file, the BACK command puts the screen into scroll mode, in which you can display trace data one screen at a time using the NEXT and BACK commands. Each subsequent BACK command displays the previous screen of trace data.

During live tracing, the first use of the BACK command suspends the collection of trace records and puts the screen into scroll mode. Each Subsequent BACK command displays the previous screen of trace data. To scroll forward to the next screen of trace data, issue a NEXT command.

To resume scrolling of trace data, issue an ANALYZE/SCROLL command. All saved records are scrolled through before tracing starts again.

CLEAR

CLEAR — The CLEAR command clears the screen of trace data.

Format

CLEAR

Parameters

None.

Description

See also the REFRESH command.

COLLECT

COLLECT — The COLLECT command takes a snapshot of current tracing activity.

Format

COLLECT[/qualifier]

Parameters

None.

Qualifiers

/PROCESS_NAME

Specifies the name of the trace server process that is to collect the data. This must be the same process that you specify in the /PROCESS_NAME qualifier in the START/NOCOLLECT command that you issued to start snapshot tracing. If you do not specify a process name, then CTF will use the process named *username*$CTF.

You cannot specify a process name if you issue the COLLECT command while performing live tracing.

Description

If you start tracing with a START/NOCOLLECT command, the collected trace records are copied to an internal CTF buffer, but are neither written to a trace file (if you are performing detached tracing) nor displayed on your terminal (if you are performing live tracing). When the buffer is full, new trace records overwrite the oldest trace records in the buffer. The buffer is therefore a circular buffer whose contents provide a snapshot of the most recent history of tracing.

When you issue a COLLECT command, the current contents of the buffer are:

- Written to the default trace file, CTF$TRACE.DAT, if you are performing detached tracing. You can then issue an ANALYZE command to display these trace records.
- Displayed on your terminal, if you are performing live tracing.

Examples

```
CTF> COLLECT
```

if you are performing detached tracing, writes trace records collected by the default trace server process *username*$CTF and writes them to CTF$TRACE.DAT. If you are performing live tracing, the trace records are displayed on your terminal.

```
CTF> COLLECT /PROC=SMITH$CTF_Z
```

writes trace records collected by the process SMITH$CTF_Z to the file CTF$TRACE.DAT. You must have previously issued a START/NOCOLLECT command naming SMITH$CTF_Z in the / PROCESS_NAME qualifier.

DEFINE/KEY

DEFINE/KEY — The DEFINE/KEY command associates a string with a particular key on your keyboard.

Format

DEFINE/KEY key-name string [/qualifiers]

Parameters

key-name

Specifies the name of the key that you are defining. See Table 3.2 for a list of the keys that CTF defines

string

Specifies the character string to be processed when you press the specified key. Enclose the string in double quotes to preserve spaces and lower case characters.

Qualifiers

/ECHO
/NOECHO

Specifies whether the command line is echoed to the screen when you press the defined key. The default is /ECHO.

/IF_STATE=(state,...)
/NOIF_STATE

Specifies a list of states, at least one of which must be set for the specified key definition to work.

/LOCK_STATE
/NOLOCK_STATE

Specifies that the state set by the /SET_STATE qualifier remains in effect until a DEFINE/KEY/NOSET_STATE command is issued to unset the state. The default is /NOLOCK_STATE, meaning that the effect of /SET_STATE lasts only until the next definable key that you press or the next read-terminating character that you type.

/SET_STATE=state
/NOSET_STATE

Specifies that the named state is set when the specified key is pressed. The state name can be any alphanumeric string. The default is /NOSET_STATE, meaning that the current locked state is unset when the key is pressed.

See the description of the DCL command DEFINE/KEY in your VMS documentation for more information about key states.

/TERMINATE
/NOTERMINATE

Specifies whether the string executes when you press the specified key. The default is /NOTERMINATE, which means that you can press other keys before the command string is processed.

Description

See Table 3.2 for a list of the default key definitions. See also SHOW KEY andDELETE/KEY.

Examples

```
CTF> DEFINE/KEY KP2 "START/LIVE/NOCOLLECT"/TERMINATE
```

causes KP2 to start live snapshot tracing.

```
CTF> DEFINE/KEY KP2/IF_STATE="GOLD" "START/NOCOLLECT"/TERMINATE
```

causes GOLD KP2 to start detached snapshot tracing.

DELETE/KEY

DELETE/KEY — The DELETE/KEY command deletes key definitions that have been defined by the DEFINE/KEY command.

Format

DELETE/KEY key-name [/qualifier]

Parameters

key-name

Specifies the name of the key whose definition is to be deleted. See Table 3.2 in the description of the DEFINE/KEY command for a list of the key names that CTF supports.

Qualifiers

/STATE=(state,...)

Specifies the name of the state(s) for which the key definition is to be deleted. The default is the current state.

Description

If you delete the definition of a key, the use of that key within CTF becomes undefined.

Examples

```
CTF> DELETE/KEY KP2
```

deletes the current definition of KP2, leaving this key undefined within CTF.

EXIT

EXIT — The EXIT command stops the TRACE utility and returns you to VMS.

Format

EXIT

Parameters

None.

Description

If you are performing live tracing, all trace record collection will stop. If you are performing detached tracing, however, collection will continue unless you explicitly stop it using the STOP command.

Ctrl/Z has the same effect as the EXIT command.

HELP

HELP — The HELP command displays information about CTF commands.

Format

HELP [command-name]

Parameters

command-name

Specifies the command for which help is required.

Description

The HELP command displays information about the specified CTF command. You can request additional information on command parameters and qualifiers by specifying the name of a topic in response to the **Topic?** prompt.

If you do not specify a command name, HELP lists the commands and topics for which you can request help.

Examples

```
CTF> HELP ANALYZE
```

displays information about the ANALYZE command.

REFRESH

REFRESH — The REFRESH command redraws the screen.

Format

REFRESH

Parameters

None.

Description

Ctrl/W has the same effect as the REFRESH command.

SHOW KEY,

SHOW KEY, The SHOW KEY command displays the current key definitions for your keyboard.

Format

SHOW KEY [key-name] [/qualifiers]

Parameters

key-name

Specifies the name of the key whose definition is to be displayed. See Table 3.2 in the description of the DEFINE/KEY command for a list of the key names supported by CTF.

If you do not specify a key-name, you must specify the /ALL qualifier.

Qualifiers

/ALL

Displays all the key definitions for your keyboard. You must not specify /ALL if you specify a key-name.

/BRIEF

Shows a brief display of the key definitions for your keyboard. The default is/BRIEF.

/FULL

Specifies that all key definitions and qualifiers associated with a definition are displayed.

/STATE=(state,...)

Displays the key definitions for the specified state(s). The default is to show the key definitions for all states.

Examples

CTF> SHOW KEY KP2

shows the current definition of KP2 in all states.

CTF> SHOW KEY /ALL

shows the current definition of all keys in all states.

SPAWN,

SPAWN, — The SPAWN command creates a sub-process of the current process.

Format

SPAWN [/qualifiers] [command-string]

Parameters

command-string

Specifies a command string of up to 131 characters that is to be executed in the context of the created sub-process. When the command completes, the sub-process terminates and control returns to the parent process.

If you do not specify a command string, a sub-process is created and remains until you log out.

Qualifiers

/INPUT=file-spec

Specifies an input file that contains one or more DCL commands to be executed by the spawned sub-process. Once processing of the input file is complete, the sub-process is terminated. If both a command string and the /INPUT qualifier are specified, the specified command string is executed before the DCL commands in the file specified by the /INPUT qualifier.

/LOGICAL_NAMES
/NOLOGICAL_NAMES

Specifies whether process logical names and logical name tables are to be copied to the spawned sub-process. The default is LOGICAL_NAMES.

/OUTPUT=file-spec

Specifies the name of the output file to which the spawned sub-process writes its output. The default is SYS$OUTPUT.

/PROCESS_NAME=subprocess-name

Specifies the name of the sub-process to be created. By default, a unique process name is assigned with the same base name as the parent process and a unique number.

/PROMPT=string

Specifies the prompt for DCL to use within the sub-process. By default, SPAWN copies the current prompt from the parent process.

/SYMBOLS
/NOSYMBOLS

Specifies whether the system passes DCL global and local symbols to the sub- process. The default is /SYMBOLS.

/WAIT
/NOWAIT

Specifies whether the system waits until the current sub-process is completed before allowing more commands to be issued by the parent process. The default is /WAIT.

Examples

```
CTF> SPAWN "SHOW SYSTEM"
```

spawns a sub-process in which a SHOW SYSTEM command is executed, after which control returns to the parent process.

```
CTF> SPAWN /INPUT=CMDS.COM
```

spawns a sub-process and executes the DCL commands in CMDS.COM, after which control returns to the parent process.

```
CTF> SPAWN /INPUT=CMDS.COM/OUTPUT=CMDS_OUT.LIS/NOWAIT
```

also executes the DCL commands in CMDS.COM, but returns control immediately to the parent process without waiting for the spawned sub-process to complete. Any output produced by the sub-process is written to CMDS_OUT.LIS.

START

START — The START command starts tracing on one or more specified tracepoints.

Format

START [node-name["user-name password"]::] "tracepoint-name",... [/qualifiers]

Parameters

node-name

Specifies the node name of a remote server. You must specify a node name when starting a remote tracepoint.

user-name

Specifies the user name associated with the remote CTF object. You must specify this user name if the remote CTF object is protected.

password

Specifies the password associated with the remote CTF object. You must specify this password if the remote CTF object is protected.

tracepoint-name

Specifies the name of a tracepoint that you want to trace. If you are specifying more than one tracepoint, separate each tracepoint name with a comma.

Qualifiers

The qualifiers for this command are presented in three groups:

1. Qualifiers that are relevant only for detached tracing (that is, tracing that is started by a START/NOLIVE command).
2. Qualifiers that are relevant only for live tracing (that is, tracing that is started by a START/LIVE command).
3. Qualifiers that are relevant for both detached and live tracing.

Detached Tracing

/BLOCKS=n

Specifies the size, in blocks, of the trace file to which trace records from the specified tracepoints are written. If a trace file reaches its maximum size, a new version of the trace file is created. The default file size is 200 blocks. The minimum file size is 20 blocks.

/OUTPUT=filename

Specifies the name of the trace file to which trace records are written. The default trace file is the file CTF$TRACE.DAT in your default directory.

/PRIORITY=priority

Specifies the base priority for the trace server process that writes trace records to the trace file. The default is 9. The lowest is 0 and the highest is 15.

/PROCESS_NAME=process-name

Specifies the name to be given to the trace server process that is created to write trace records to the trace file. The default process name is *username*$CTF.

/VERSION_LIMIT=n

Specifies the number of versions of the trace file to keep. When this many versions have been created, each new version of the trace file causes the oldest current version to be deleted. The default is 10.

Live Tracing

/BRIEF

Specifies that a single-line analysis of the protocol data in each trace record is displayed. The default is /BRIEF. This qualifier is effective only if the relevant protocol analysis routines support abbreviated analysis of protocol data.

/DISPLAY=(field,...)
/NODISPLAY

Specifies which fields (apart from the protocol data itself) in a trace record are displayed. The fields that can be displayed are:

[NO]ALL	All the fields shown below are displayed.
[NO]CONTEXT	Tracepoint-specific information
[NO]EVENT	The event code
[NO]FUNCTION_CODE	The tracepoint-specific function code of the operation being traced.
[NO]NAME	The name of the tracepoint from which the trace record was collected. Names longer than 16 characters will be truncated on the right.
[NO]SIZE	The original size of the trace data, in bytes
[NO]STATUS	If the value in this field is non-zero, it is the current status of the operation being traced.
[NO]TIME	The time at which the trace record was collected.

The default display is:

- TIME

- EVENT
- SIZE

/FULL

Specifies that a multi-line analysis of the protocol data in each trace record is produced. If you do not specify /FULL, the default is /BRIEF. This qualifier is effective only if the relevant protocol analysis routines support full analysis of protocol data.

/NAME=instance-name

Specifies the instance part of a tracepoint name. A trace record is displayed only if it came from the specified tracepoint. If you specify only the first part of an instance name, trace records are displayed from all tracepoints whose name begins with this string. The default is to display trace records from all active tracepoints.

/PAGE=lines-per-page

Specifies the number of lines per page when writing output to a file. This qualifier has no effect if trace records are being displayed on your terminal. The default is defined by the logical name SYS$LP_LINES, which usually has the value 66.

/PROTOCOL=(protocol-identifier,...)
/NOPROTOCOL

Specifies the type of analysis performed on each trace record. The protocol data in each trace record is analyzed for each of the protocols listed in the /PROTOCOL qualifier, in the order in which they are specified. If you do not specify this qualifier, only the protocol data supplied at the protocol level of the originating tracepoint is analyzed; protocol data from lower levels is displayed, unanalyzed, as user data. If you specify /NOPROTOCOL, no analysis is performed on the protocol data in the trace record; it is all presented as user data.

/REVERSE
/NOREVERSE

Specifies that received data will be displayed in reverse video, and titles will be displayed in bold. The default is /REVERSE.

/SAVE_BUFFER_SIZE=n

Specifies how many screens of saved lines of data will be kept. These lines can be examined by using the NEXT and BACK commands. The default is 30 screens. The minimum is 1 screen. The maximum is 1000 screens.

/SELECT=(protocol-identifier,...)

Specifies which protocol analyses are to be displayed. This qualifier is only useful if you have used the /PROTOCOL qualifier to request multiple protocol analysis of a trace record. The default is to display all the protocol analyses requested by the /PROTOCOL qualifier.

/TRUNCATE
/NOTRUNCATE

Specifies whether data that will not fit on one line is truncated or continued on the next line. The default is /NOTRUNCATE.

/WIDTH=n

Specifies the width of the output. The default is the width of your terminal screen.

Detached or Live Tracing

/BUFFER_SIZE=n

Specifies the size, in bytes, of each CTF internal trace buffer (used for remote tracing only). The default buffer size is 512 bytes. The minimum buffer size is 68 bytes. You can set this value larger to enable CTF to include more trace records in a single buffer.

/CAPTURE_SIZE=n

Specifies the amount of data, in bytes, captured in each trace record. The default data size is 188 bytes. The minimum data size is 0. The maximum data size is 5000 bytes.

/COLLECT
/NOCOLLECT

NOCOLLECT prevents collected trace records being written to a trace file or displayed on your terminal until you issue a COLLECT command. The buffer into which trace records are collected is used as a circular buffer; when the buffer is full, new trace records overwrite the oldest trace records. The default is

/FILTER=(event-code,...)
/NOFILTER

Specifies a filter for trace records. A trace record is collected only if its event code is one of those specified in the filter. See the appendixes to this manual for a list of the event codes supported by each tracepoint. This value overrides the current filter, if any. You cannot specify this qualifier with /SELECT. The default is /NOFILTER, meaning that all trace records are collected.

/LIVE
/NOLIVE

Specifies whether live or detached tracing is performed on the specified tracepoints. The default is /NOLIVE, indicating that detached tracing is performed.

/LIVE
/NOLIVE

Specifies whether live or detached tracing is performed on the specified tracepoints. The default is /NOLIVE, indicating that detached tracing is performed.

/LIVE
/NOLIVE

Specifies whether live or detached tracing is performed on the specified tracepoints. The default is /NOLIVE, indicating that detached tracing is performed.

/MAXIMUM_BUFFERS=n

Specifies the maximum number of CTF internal trace buffers. The default is 5.

/TIME_OUT=n

Specifies the interval, in seconds, for which CTF support waits before flushing partially filled buffers to the the trace server process. The default for detached tracing is 0 (which means no time out is used); the default for live tracing is 5 seconds.

Description

You cannot perform live and detached tracing at the same time from the same user process. If you are currently performing live tracing and you wish to perform detached tracing from the same user process, you must first stop all live tracing, and vice versa.

You cannot perform local and remote tracing at the same time from the same user process. This means that you cannot specify local and remote tracepoints in the same START command. If you are currently tracing local tracepoints and you wish to trace remote tracepoints from the same user process, you must first stop all local tracing, and vice versa.

A single user process can collect trace records from only one system at a time. If you are remote tracing, all the remote tracepoints from which the trace session is collecting must be on the same server.

You can have only one local trace session at any given time.

Examples

```
CTF> START "ROUTING CIRCUIT UNA-0"
```

starts detached tracing at the specified local tracepoint. Trace records are written to CTF $TRACE.DAT in your default directory. The trace server process that collects trace records is *username*$CTF.

```
CTF> START NODEB"netman netmanpw"::"ROUTING CIRCUIT UNA-2"
```

starts detached tracing at the specified remote tracepoint.

```
CTF> START "ROUTING CIRCUIT UNA-1" /OUT=UNA-1/PROC=UNA1PROC
```

starts detached tracing at the specified local tracepoint. Trace records are written to the file UNA-1.DAT, and the name of the trace server process that is created to collect trace records is UNA1PROC.

```
CTF> START "ROUTING CIRCUIT UNA-3" /LIVE/FULL
```

starts live tracing at the specified local tracepoint. A full analysis of each trace record is displayed on your screen.

STOP

STOP — The STOP command stops collection at one or more specified tracepoints.

Format

STOP ["tracepoint-name",...] [/qualifier]

Parameters

tracepoint-name

Specifies the tracepoint(s) at which collection is to be stopped.

Qualifiers

/PROCESS_NAME=process-name

Specifies the process name of the trace server process associated with the specified tracepoints. This must be the process name specified in the /PROCESS_NAME qualifier of the START command that started the tracing. This qualifier is only relevant for detached tracing. The default process name is *username*$CTF.

Description

If you do not specify a tracepoint, all tracing will be stopped.

If you stop all detached tracing, the trace server process will exit. If you stop all tracing on the local VMS system, the process CTF$DCP will also exit.

Examples

```
CTF> STOP
```

stops all current tracing associated with *username*$CTF.

```
CTF> STOP "ROUTING CIRCUIT *"
```

stops tracing on all local ROUTING CIRCUIT entities.

```
CTF> STOP "ROUTING CIRCUIT UNA-1" /PROC=UNA1PROC
```

stops tracing at the specified tracepoint, which is being traced by the UNA1PROC detached process. The START command that started tracing at ROUTING CIRCUIT UNA-1 must have specified /PROC=UNA1PROC.

Appendix A. DEC WANrouter 100/500 Tracepoints

This appendix describes the tracepoints provided by DEC WANrouter 100/500. These tracepoints are (starting from the lowest protocol level):

MODEM_CONNECT LINE

DDCMP LINK

HDLC LINK

LAPB LINK

CSMA-CD STATION

CSMA-CD PORT

X25L3 DTE

X25L3 CIRCUIT

ROUTING CIRCUIT

NSP PORT

Note that tracepoints within DEC WANrouter 100/500 can only be traced remotely from a VMS load host; consequently, you must always specify the node name, user name, and password components of tracepoint names.

MODEM_CONNECT LINE

MODEM_CONNECT LINE

Format

node-name"user-name password"::"**MODEM_CONNECT LINE** line-name"

node-name

Specifies the name of the router node.

user-name

Specifies the user name associated with the remote CTF object.

Password

Specifies the password associated with the remote CTF object.

line-name

Specifies the name of the MODEM CONNECT LINE entity to be traced.

Description

This traces DEC STD52 state changes and data PDU’s transmitted on the specified Modem Connect line. Table A.1 lists the events that are recognized at this tracepoint.

Table A.1. MODEM_CONNECT LINE Trace Events for DEC WANrouter

Trace Event	Description
RX	Receive
TX	Transmit
0020	DEC STD52 state change

Example

See the MODEM_CONNECT LINE example in Appendix C.

DDCMP LINK

DDCMP LINK

Format

node-name"user-name password"::"**DDCMP LINK** link-name"

node-name

Specifies the name of the router node.

user-name

Specifies the user name associated with the remote CTF object.

Password

Specifies the password associated with the remote CTF object.

line-name

Specifies the name of the MODEM CONNECT LINE entity to be traced.

Description

This traces all data link PDUs transmitted and received by the DDCMP module on the specified link. Table A.2 lists the events recognized at this tracepoint.

Table A.2. DDCMP LINK Trace Events for DEC WANrouter

Trace Events	Description
RX	Receive
TX	Transmit
0020	Flush sent to physical layer/device driver
0021	Flush DONE back by physical layer/device driver

Example

See the example for DDCMP LINK in Appendix C.

HDLC LINK

HDLC LINK

Format

node-name"user-name password"::**HDLC LINK** link-name"

node-name

Specifies the name of the router node.

user-name

Specifies the user name associated with the remote CTF object.

Password

Specifies the password associated with the remote CTF object.

line-name

Specifies the name of the HDCL LINK entity to be traced.

Description

This traces HDLC frames on the specified link. The default analysis of this tracepoint will analyze the HDLC frame header. Table A.3 lists the events recognized at this tracepoint.

Table A.3. HDLC LINK Trace Events for DEC WANrouter

Trace Events	Description
RX	Receive
TX	Transmit

Note that if you specify the /FULL qualifier in the START or ANALYZE command, a full analysis of XID frames will be produced.

Example

See the HDLC LINK example in Appendix C.

LAPB LINK

LAPB LINK

Format

node-name"user-name password"::"**LAPB LINK** link-name"

node-name

Specifies the name of the router node.

user-name

Specifies the user name associated with the remote CTF object.

Password

Specifies the password associated with the remote CTF object.

line-name

Specifies the name of the LAPB LINK entity to be traced.

Description

This traces all data link PDUs transmitted and received by the specified LABP LINK entity. Table A.4 lists the events that are recognized at this tracepoint.

Table A.4. LAPB LINK Trace Events for DEC WANrouter

Trace Events	Description
RX	Receive
TX	Transmit
0020	Acknowledge Timer expired
0023	Retry Maximum reached
0024	Flush issued to line
0026	Line has come up
0027	Line has come down
0028	Line reset sent to device driver

Example

See the example for LAPB LINK in Appendix B.

CSMA-CD STATION

CSMA-CD STATION

Format

node-name"user-name password"::"**CSMA-CD STATION** station-name"

node-name

Specifies the name of the router node.

user-name

Specifies the user name associated with the remote CTF object.

Password

Specifies the password associated with the remote CTF object.

station-name

Specifies the name of the CSMACD STATION entity to be traced.

Description

This traces the complete 802.3 frames or the ETHERNET frame, decoding the 802.3 and 802.2 headers where applicable. Table A.5 lists the events recognized at this tracepoint.

Table A.5. CSMA-CD STATION Trace Events for DECnet–VAX

Trace Events	Description
RX	Receive
TX	Transmit

Note that you cannot specify the /FULL qualifier in the START or ANALYZE command for this tracepoint.

Example

```
$ TRACE START mynode"myname mypw"::"CSMA-CD STATION csmacd-0"/LIVE
```

produces the following output:

```
-----------+----+-----+<------802.3 Frame Header----->+<-----802.2 Frame
 Header------->+
    Time    |Evnt|Data | Destination|   Source    | Len-|Dst  Src  C  P  Type
    N     N |
hh mm ss cc|    |Size |   Address  |  Address    | gth |SAP  SAP  R  F
   R/S   R/S|
-----------+----+-----+<-------------------------->
+<---------------------------------+
13:16:18.95|TX  |   40|09002B000004|AA0004005606|   26| FE   FE  C      UI
13:16:18.95|TX  |   40|09002B000004|AA0004005606|   26| FE   FE  C      UI
13:16:18.96|RX  | 1518|AA0004005606|AA0004001C05|60-03|  Ethernet
 (length =    29)|
13:16:18.98|RX  | 1518|AA0004005606|AA0004001C05|60-03|  Ethernet
 (length =    39)|
13:16:19.06|RX  | 1518|AB0000030000|AA0004005506|60-03|  Ethernet
 (length =    34)|
13:16:19.08|RX  | 1518|AA0004005606|AA0004001C05|60-03|  Ethernet
 (length =    29)|
13:16:19.12|RX  | 1518|AB0000030000|AA000400DB05|60-03|  Ethernet
 (length =    34)|
13:16:19.12|RX  | 1518|09002B020000|AA000400DB05|60-03|  Ethernet
 (length =    34)|
13:16:19.14|RX  | 1518|AA0004005606|AA0004001C05|60-03|  Ethernet
 (length =    29)|
13:16:19.15|RX  | 1518|AA0004005606|AA0004001C05|60-03|  Ethernet
 (length =    29)|
13:16:19.17|RX  | 1518|09002B000005|AA0004004806| 1500|  SNAP    (PID =
 08-00-2B-60-03)|
13:16:19.18|RX  | 1518|AB0000030000|AA0004004306|60-03|  Ethernet
 (length =    34)|
13:16:19.19|RX  | 1518|09002B020000|AA0004004306|60-03|  Ethernet
 (length =    34)|
13:16:19.19|RX  | 1518|09002B000005|AA0004000106| 1500|  SNAP    (PID =
 08-00-2B-60-03)|
13:16:19.21|RX  | 1518|AA0004005606|AA0004001C05|60-03|  Ethernet
 (length =    29)|
13:16:19.23|RX  | 1518|AA0004005606|AA0004001C05|60-03|  Ethernet
 (length =    29)|
13:16:19.23|RX  | 1518|AA0004005606|AA0004001C05|60-03|  Ethernet
 (length =    29)|
13:16:19.24|RX  | 1518|AA0004005606|AA0004001C05|60-03|  Ethernet
 (length =    29)|
13:16:19.24|RX  | 1518|AA0004005606|AA0004001C05|60-03|  Ethernet
 (length =    29)|
13:16:19.27|RX  | 1518|AA0004005606|AA0004001C05|60-03|  Ethernet
 (length =    29)|
13:16:19.27|RX  | 1518|09002B000005|AA000400DB05| 1500|  SNAP    (PID =
 08-00-2B-60-03)|
13:16:19.28|RX  | 1518|AA0004005606|AA0004001C05|60-03|  Ethernet
 (length =    29)|
13:16:19.37|RX  | 1518|AA0004005606|AA0004001C05|60-03|  Ethernet
 (length =    29)|
13:16:19.38|RX  | 1518|AA0004005606|AA0004001C05|60-03|  Ethernet
 (length =    29)|
13:16:19.40|RX  | 1518|AA0004005606|AA0004001C05|60-03|  Ethernet
 (length =    29)|
13:16:19.41|RX  | 1518|AA0004005606|AA0004001C05|60-03|  Ethernet
 (length =    29)|
13:16:19.42|RX  | 1518|09002B000005|AA0004008B05| 1500|  SNAP    (PID =
 08-00-2B-60-03)|
13:16:19.44|RX  | 1518|AA0004005606|AA0004001C05|60-03|  Ethernet
 (length =    29)|
13:16:19.49|RX  | 1518|AA0004005606|AA0004001C05|60-03|  Ethernet
 (length =    29)|
13:16:19.67|RX  | 1518|09002B000005|AA0004004406| 1500|  SNAP    (PID =
 08-00-2B-60-03)|
13:16:19.75|RX  | 1518|09002B020000|AA000400DB05| 1500|  SNAP    (PID =
 08-00-2B-60-03)|
13:16:19.94|RX  | 1518|AB0000030000|AA000400DB05|60-03|  Ethernet
 (length =    50)|
```

CSMA-CD PORT

CSMA-CD PORT

Format

node-name"user-name password"::"**CSMA-CD PORT** port-name"

node-name

Specifies the name of the router node.

user-name

Specifies the user name associated with the remote CTF object.

Password

Specifies the password associated with the remote CTF object.

port-name

Specifies the name of the CSMACD PORT entity to be traced.

Description

This traces the complete 802.3 frames or the ETHERNET frame, decoding the 802.3 and 802.2 headers where applicable. Table A.6 lists the events recognized at this tracepoint.

Table A.6. CSMA-CD PORT Trace Events for DECnet–VAX

Trace Events	Description
RX	Receive
TX	Transmit

Note that you cannot specify the /FULL qualifier in the START or ANALYZE command for this tracepoint.

Example

```
  $ TRACE START mynode"myname mypw"::"CSMA-CD PORT CSMACD-0"/LIVE
```

produces the following output:

```
-----------+----+-----+<------802.2 Frame Header------>+
    Time   |Evnt|Data |Dst  Src  C  P  Type    N     N |
hh mm ss cc|    |Size |SAP  SAP  R  F         R/S   R/S|
-----------+----+-----+<------------------------------+
13:16:44.04|RX  |   31|  Ethernet      (length =    29)|
13:16:44.07|RX  |   31|  Ethernet      (length =    29)|
13:16:44.29|RX  | 1500|  SNAP    (PID = 08-00-2B-60-03)|
13:16:44.40|RX  |   35| FE   FE  C      UI             |
13:16:44.46|RX  |   31|  Ethernet      (length =    29)|
13:16:44.73|RX  | 1500|  SNAP    (PID = 08-00-2B-60-03)|
13:16:44.76|TX  |   26| FE   FE  C      UI             |
13:16:44.79|TX  |   26| FE   FE  C      UI             |
13:16:44.82|TX  |   26| FE   FE  C      UI             |
13:16:44.88|RX  | 1500|  SNAP    (PID = 08-00-2B-60-03)|
13:16:44.90|RX  |   76|  Ethernet      (length =    74)|
13:16:44.93|RX  |   36|  Ethernet      (length =    34)|
13:16:44.96|RX  | 1500|  SNAP    (PID = 08-00-2B-60-03)|
```

X25L3 DTE

X25L3 DTE

Format

node-name"user-name password"::"**X25L3 DTE** DTE-name"

node-name

Specifies the name of the router node.

user-name

Specifies the user name associated with the remote CTF object.

Password

Specifies the password associated with the remote CTF object.

DTE-name

Specifies the name of the X25 PROTOCOL DTE entity to be traced.

Description

This traces all X25 packet-level PDUs transmitted and received by the X25 PROTOCOL Module on the specified DTE. Table A.7 lists the events that are recognized at this tracepoint.

Table A.7. X.25 DTE Trace Events for VAX P.S.I.

Trace Events	Description
RX	Receive
TX	Transmit
0020	Call Timer expired
0021	Clear Timer Timer expired
0022	Reset Timer expired
0023	Restart Timer expired
0024	Link has come up
0025	Link has gone down
0026	Interrupt Timer expired
0027	Link has been reset

Example

See the example for X25L3 DTE in Appendix B

X25L3 CIRCUIT

X25L3 CIRCUIT

Format

node-name"user-name password"::"**X25L3 CIRCUIT** *"

node-name

Specifies the name of the router node.

user-name

Specifies the user name associated with the remote CTF object.

Password

Specifies the password associated with the remote CTF object.

Description

This tracepoint traces all X25 packet level PDUs transmitted and received by the X25 Protocol Module. Tracing can be enabled for all circuits only. Table A.8 lists the events that are recognized at this tracepoint.

Table A.8. X.25L3 CIRCUIT Trace Events for VAX P.S.I.

Trace Events	Description
RX	Receive
TX	Transmit

Example

See the example for X25L3 CIRCUIT in Appendix B.

ROUTING CIRCUIT

ROUTING CIRCUIT

Format

node-name"user-name password"::"**ROUTING CIRCUIT** circuit-name"

node-name

Specifies the name of the router node.

user-name

Specifies the user name associated with the remote CTF object.

Password

Specifies the password associated with the remote CTF object.

circuit-name

Specifies the name of the ROUTING CIRCUIT entity to be traced.

Description

This traces all network-layer PDUs transmitted and received by the specified circuit.

Note that it is not possible to trace circuits whose instance identifier is a Binary or Quoted Simplename. Table A.9 lists the events that are recognized at this tracepoint.

Table A.9. ROUTING CIRCUIT Trace Events for DEC WANrouter

Trace Event	Description
ARRX	ARP Receive

Trace Event	Description
ARTX	ARP Transmit
IPRX	IP Receive
IPTX	IP Transmit
RX	Receive
TX	Transmit

Example

```
$ TRACE START/LIVE MYNODE"MYNAME NODEPW"::"ROUTING CIRCUIT CSMA-CD-0"
```

produces the following output:

```
-----------+----+-----+<----------------Routing Packet
 Header------------------
   Time    |Evnt|Data |
hh mm ss cc|    |Size |
-----------+----+-----
+<---------------------------------------------------------
09:28:53.00|TX  | 1492|        Type: LAN L2 Hello **1**|
                      |     Protocol ID: 08, Length: 1B, Version: 01
                      | Source ID: 08-00-2B-0B-04-28, Holding Time: 30
                      | Version: V3.0.0, Segment Length: 05D4
                      | Circuit: Level 2, L1 Algorithm: N/A, L2 Algorithm:
 LS
                      | Priority: 64, LAN ID: 08-00-2B-0B-04-A6.01
                      |  Options:
                      |    Type: 01 (Area Address) Length: 12
                      |       Area: 490041
                      |       Area: 490042
                      |       Area: 490001
                      |    Type: 06 (RTR Nbrs) Length: 6
                      |       Nbr: AA-00-04-00-DB-A9
                      |    Type: 08 (DNA Padding) Length: 255
                      |    Type: 08 (DNA Padding) Length: 255
                      |    Type: 08 (DNA Padding) Length: 255
                      |    Type: 08 (DNA Padding) Length: 255
                      |    Type: 08 (DNA Padding) Length: 255
                      |    Type: 08 (DNA Padding) Length: 156
09:28:53.05|RX  |   74|     Phase IV Type: L1 RV, Padding: 0, Flags: **2**
                      |               Source Node: 1.284
09:28:53.31|RX  | 1492|      Type: LAN L1 Hello
                      |     Protocol ID: 08, Length: 1B, Version: 01
                      |   Source ID: 08-00-2B-0B-02-52, Holding Time: 9
                      |   Version: V3.0.0, Segment Length: 05D4
                      | Circuit: Level 1, L1 Algorithm: RV, L2 Algorithm:
 N/A
                      |   Priority: 64, LAN ID: 08-00-2B-06-91-F2.01
                      |   Options:
                      |    Type: 01 (Area Address) Length: 12
                      |       Area: 490041
                      |       Area: 490042
                      |       Area: 490001
                      |    Type: 06 (RTR Nbrs) Length: 42
                      |       Nbr: AA-00-04-00-01-06
                      |       Nbr: AA-00-04-00-44-06
                      |       Nbr: AA-00-04-00-8B-05
                      |       Nbr: AA-00-04-00-55-06
                      |       Nbr: AA-00-04-00-48-06
                      |       Nbr: AA-00-04-00-46-06
                      |    Type: 08 (DNA Padding) Length: 255
                      |    Type: 08 (DNA Padding) Length: 255
                      |    Type: 08 (DNA Padding) Length: 255
                      |    Type: 08 (DNA Padding) Length: 255
                      |    Type: 08 (DNA Padding) Length: 255
                      |    Type: 08 (DNA Padding) Length: 120
09:29:10.93|RX  |  257|          Type: L1 CSNP
                      |     Protocol ID: 08, Length: 21, Version: 01
                      |       Src: 08-00-2B-0B-04-A6.00, V3.0.0
                      |Range: 00-00-00-00-00-00.00.00:FF-FF-FF-FF-FF-
FF.FF.FF
                      |08-00-2B-0B-04-A6.00.00, Seq #:          656, Life:
 37
                      |08-00-2B-0B-04-A6.00.00, Seq #:          869, Life:
 52
                      |08-00-2B-0B-04-A6.00.00, Seq #:          636,
 Life:116
                      |08-00-2B-0B-04-A6.00.00, Seq #:          636,
 Life:116
                      |08-00-2B-0B-04-A6.00.00, Seq #:          636,
 Life:116
                      |08-00-2B-0B-04-A6.00.00, Seq #:          636,
 Life:116
                      |08-00-2B-0B-04-A6.00.00, Seq #:          636,
 Life:116
                      |08-00-2B-0B-04-A6.00.00, Seq #:          635,
 Life:116
                      |08-00-2B-0B-04-A6.00.00, Seq #:          635,
 Life:116
                      |08-00-2B-0B-04-A6.00.00, Seq #:          636,
 Life:116
                      |08-00-2B-0B-04-A6.00.00, Seq #:          636,
 Life:116
                      |08-00-2B-0B-04-A6.00.00, Seq #:          636,
 Life:116
                      |08-00-2B-0B-04-A6.00.00, Seq #:          635,
 Life:116
                      |08-00-2B-0B-04-A6.00.00, Seq #:          635,
 Life:116
09:29:15.52|RX  |  107|                  Type: DT
 **3**
                      |     Protocol ID: 81, Length: 28, Version: 01
                      |Lifetime: 1E, Checksum: 0000, Flags: SP ER
 **4**
                      |         Destination Address
                      |         49004108002B0964E701
                      |             Source Address
                      |         49004108002B107A9701
                      |    Segment Length: 006B, Data Unit Id: 0536
                      |    Segment Offset: 0000, Total Length: 006B
                      |  Options:
                      |    Type: C3 (QOS) Length: 1 Value: C4
```

```
09:29:15.52|TX  |   31|                   Type: RD
                      |     Protocol ID: 82, Length: 1F, Version: 01
                      |   Holding Time: 0258, Checksum: 0000
                      |      Destination Address
                      |         49004108002B0964E701
                      |             Subnet Address
                      |           AA-00-04-00-DC-06
                      |  Options:
                      |    Type: C3 (QOS) Length: 1 Value: C4
09:29:15.69|TX  |   70|                  Type: L1 LSP
                      |     Protocol ID: 08, Length: 1B, Version: 01
                      |Src: 08-00-2B-0B-04-28.00.00, V3.0.0, Seq #: 86
                      |Good Type: L1+L2, Life: 1199, Phase: V, Overload: N
 **4**
                      |       Area 490041
                      |       Area 490042
                      |       Area 490001
                      |     Router 08-00-2B-06-91-F2.01, Cost: 20
                      |   Endnode 08-00-2B-0B-04-28, Cost: 0
                      |   Endnode AA-00-04-00-59-06, Cost: 0
```

NSP PORT

NSP PORT

Format

node-name"user-name password"::"**NSP PORT** port-reference"

node-name

Specifies the name of the router node.

user-name

Specifies the user name associated with the remote CTF object.

Password

Specifies the password associated with the remote CTF object.

port-reference

Specifies the 4-digit local reference number of the NSP PORT entity to be traced.

Description

This traces all PDUs transmitted and received by the specified port. Note, however, that NSP ports used by CTF to transfer trace records to the collecting VMS host are not traced.

Table A.10 lists the events that are recognized at this tracepoint.

Table A.10. NSP PORT Trace Events for DEC WANrouter

Trace Event	Description
RX	Receive

Trace Event	Description
TX	Transmit

Example

```
$ TRACE START/LIVE MYNODE"MYNAME NODEPW"::"NSP PORT *"/LIVE
```

produces the following output:

```
-----------+----+-----+<------------------NSP
 Frame--------------------------------->+
    Time    |Evnt|Data |Msg                        Data    Other    Segnum
 Drc     Flow|
hh mm ss cc|    |Size |Type   Dest   Source   C    Numb    Numb     D  Numb
 Irc  Cntl|
-----------+----+-----
+<------------------------------------------------------------+
16:15:30.68|RX  |    7|Dack   9731   8199          8
16:15:31.66|TX  |  292|Data   8199   9731          2                     9
16:15:31.68|RX  |    7|Dack   9731   8199          2                     9
16:15:32.66|TX  |  292|Data   8199   9731          2                     9
16:15:32.68|RX  |    7|Dack   9731   8199         10
16:15:32.79|RX  |   13|DisI   9729   8214         Reason = Abort
16:15:32.84|TX  |    7|DisC   8214   9729         Reason = Disc Complete
16:15:32.90|RX  |   13|DisI   9729   8214         Reason = Abort
16:15:32.95|TX  |    7|DisC   8214   9729         Reason = Disc Complete
16:15:32.95|TX  |  448|Data   8199   9731          2                    11
16:15:32.97|RX  |    7|Dack   9731   8199         11
16:15:32.98|RX  |    7|Dack   9731   8199         11
16:15:32.98|TX  |  448|Data   8199   9731          2                    12
16:15:33.01|RX  |    7|Dack   9731   8199         12
16:15:33.01|RX  |    7|Dack   9731   8199         12
16:15:33.66|TX  |  442|Data   8199   9731          2                    13
16:15:33.68|RX  |    7|Dack   9731   8199         13
13:16:34.66|TX  |  292|Data   8199   9731          2                    14
13:16:34.68|RX  |    7|Dack   9731   8199         14
13:16:34.69|RX  |    7|Dack   9731   8199         14
13:16:35.66|TX  |  367|Data   8199   9731          2                    15
13:16:35.68|RX  |    7|Dack   9731   8199         15
13:16:36.66|TX  |  292|Data   8199   9731          2                    16
13:16:36.68|RX  |    7|Dack   9731   8199         16
13:16:37.66|TX  |  292|Data   8199   9731          2                    17
13:16:37.68|RX  |    7|Dack   9731   8199         17
13:16:38.66|TX  |  292|Data   8199   9731          2                    18
13:16:38.68|RX  |    7|Dack   9731   8199         18
13:16:39.66|TX  |  292|Data   8199   9731          2                    19
13:16:39.69|RX  |    7|Dack   9731   8199         19
13:16:39.70|RX  |    7|Dack   9731   8199         19
16:15:40.66|TX  |  367|Data   8199   9731          2                    20
16:15:40.68|RX  |    7|Dack   9731   8199         20
16:15:40.69|RX  |    7|Data   9731   8199         20
16:15:41.66|TX  |  367|Data   8199   9731          2                    21
16:15:41.68|RX  |    7|Dack   9731   8199         21
16:15:42.66|TX  |  292|Data   8199   9731          2                    22
16:15:42.67|RX  |    7|Dack   9731   8199         21
16:15:43.66|TX  |  292|Data   8199   9731          2                    23
```

```
16:15:43.68|RX  |    7|Dack   9731   8199         23
16:15:43.69|RX  |    7|Dack   9731   8199         23
16:15:44.66|TX  |  367|Data   8199   9731          2                    24
16:15:44.68|RX  |    7|Dack   9731   8199         24
16:15:44.69|RX  |    7|Dack   9731   8199         24
16:15:45.66|TX  |  367|Data   8199   9731          2                    25
16:15:45.67|RX  |    7|Data   9731   8199         25
16:15:46.66|TX  |  292|Data   8199   9731          2                    26
16:15:46.68|RX  |    7|Dack   9731   8199         26
```

Appendix B. VAX P.S.I. Tracepoints

This appendix describes the tracepoints provided by VAX P.S.I. for DECnet-Plus for VMS. These tracepoints are (starting from the lowest protocol level):

LAPB LINK

LLC2 SAP LINK

X25L3 DTE

X25L3 CIRCUIT

X25GAP CIRCUIT

LAPB LINK

LAPB LINK

Format

"LAPB LINK link-name"

node-name

Specifies the name of the LAPB LINK entity to be traced.

Description

This traces all data link PDUs transmitted and received by the specified LABP LINK entity. Table B.1 lists the events that are recognized at this tracepoint.

Table B.1. Table B–1 LAPB LINK Trace Events for VAX P.S.I.

Trace Events	Description
RX	Receive
TX	Transmit
0020	Acknowledge Timer expired
0023	Retry Maximum reached
0024	Flush issued to line
0026	Line has come up
0027	Line has come down
0028	Line reset sent to device driver

Example

```
$ TRACE START/LIVE "LAPB LINK dsv-0"/PROTOCOL=LAPB
```

produces the following output:

```
----------+----+-----+<--------------Frame---------->+
    Time    |Evnt|Data |Ad   P   Type    N      N  |
hh mm ss cc|    |Size |SAP  F          R/S   R/S |
-----------+----+-----+<------------------------------+
14:54:22.24|TX  |   15| C        I     1/1        |
14:54:22.30|RX  |    2| R        RR          2/  |
14:54:23.25|RX  |    5| C        I           2/1 |
14:54:23.25|TX  |    2| R        RR    2/         |
14:54:23.27|RX  |   16| C        I          2/2  |
14:54:23.27|TX  |    2| R        RR    3/         |
14:54:23.28|RX  |    6| C        I          2/3  |
14:54:23.28|TX  |    2| R        RR    4/         |
14:54:23.38|TX  |    5| C        I     4/2        |
14:54:23.39|RX  |    2| R        RR          3/  |
14:54:23.67|TX  |    5| C        I     4/3        |
14:54:23.68|RX  |    2| R        RR          4/  |
14:54:23.80|TX  |   16| C        I     4/4        |
14:54:23.83|RX  |    2| R        RR          5/  |
14:54:23.85|RX  |    2| C        I          5/4  |
14:54:23.85|TX  |    2| R        RR    5/         |
14:54:24.14|RX  |    2| C        I          5/5  |
14:54:24.14|TX  |    2| R        RR    6/         |
```

LLC2 SAP LINK

LLC2 SAP LINK

Format

"LLC2 SAP sap-name **LINK** link-name"

sap-name

Specifies the name of the SAP whose link is to be traced.

link-name

Specifies the name of the SAP LINK entity to be traced.

Description

This traces all data-link PDUs transmitted and received by the LLC2 Module on the specified link. Table B.2 lists the events that are recognized at this tracepoint.

Table B.2. LLC2 SAP LINK Trace Events for VAX P.S.I.

Trace Events	Description
RX	Receive
TX	Transmit
0020	Acknowledge Timer expired
0021	Poll Timer expired
0022	Reject Timer expired
0023	Busy Timer expired
0025	Retry Maximum reached

Example

```
$ TRACE START/LIVE "LLC2 SAP LINK lan-0"/PROTOCOL=LLC2"
```

produces the following output:

```
-----------+----+-----+<-------802. Frame Header------->+
    Time   |Evnt|Data |Dst  Src  C  P  Type    N     N  |
hh mm ss cc|    |Size |SAP  Sap  R  F         R/S   R/S |
-----------+----+-----+<------------------------------+
14:58:12.60|TX  |   22| 7E   7E  R       I    1/1       |
14:58:13.12|RX  |    4| 7E   7E  R       RR         2/  |
14:58:13.50|RX  |   15| 7E   7E  R       I          2/1 |
14:58:13.51|RX  |   18| 7E   7E  R       I          2/2 |
14:58:13.52|RX  |    8| 7E   7E  R       I          2/3 |
14:58:13.68|TX  |    7| 7E   7E  R       I    4/2       |
14:58:14.02|TX  |    7| 7E   7E  R       I    4/3       |
14:58:14.13|RX  |   10| 7E   7E  R       I          4/4 |
14:58:14.15|RX  |   55| 7E   7E  R       I          4/5 |
14:58:14.23|TX  |    7| 7E   7E  R       I    6/4       |
14:58:14.25|TX  |    7| 7E   7E  R       I    6/5       |
14:58:14.26|RX  |    9| 7E   7E  R       I          5/6 |
14:58:14.28|TX  |   18| 7E   7E  R       I    7/6       |
14:58:14.30|TX  |    7| 7E   7E  R       I    7/7       |
14:58:14.31|RX  |    7| 7E   7E  R       I          7/8 |
14:58:14.39|RX  |   19| 7E   7E  R       I          8/8 |
14:58:14.42|TX  |    7| 7E   7E  R       I    9/8       |
14:58:14.92|RX  |    4| 7E   7E  R       RR         9/  |
```

X25L3 DTE

X25L3 DTE

Format

node-name"user-name password"::"**X25L3 DTE** DTE-name"

DTE-name

Specifies the name of the X25 PROTOCOL DTE entity to be traced.

Description

This traces all X25 packet-level PDUs transmitted and received by the X25 PROTOCOL Module on the specified DTE. Table B.3 lists the events that are recognized at this tracepoint.

Table B.3. X.25 DTE Trace Events for VAX P.S.I.

Trace Events	Description
RX	Receive
TX	Transmit
0020	Call Timer expired
0021	Clear Timer Timer expired

Trace Events	Description
0022	Reset Timer expired
0023	Restart Timer expired
0024	Link has come up
0025	Link has gone down
0026	Interrupt Timer expired
0027	Link has been reset

Example

```
$ TRACE START/LIVE "X25L3 DTE dte1"/PROTOCOL=L3
```

produces the following output:

```
-----------+----+-----+<--------Packet---------->+
    Time   |Evnt|Data |Chn  Q   Type    P     P  |
hh mm ss cc|    |Size |     M          R/S   R/S |
-----------+----+-----+<------------------------>+
14:56:07.30|TX  |   13|001      CALL              |Called DTE 10210
           |    |     |                          |Calling DTE 102
           |    |     |                          |Data 01 00 00 00
           |    |     |                          |
           |    |     |                          |
14:56:08.25|RX  |    3|001      CALLC             |
14:54:08.27|RX  |   14|001Q     DATA   0/0        |
14:54:08.28|RX  |    4|001      DATA   0/1        |
14:54:08.36|TX  |    3|001      RR           1/   |
14:54:08.67|TX  |    3|001      RR           2/   |
14:54:08.80|TX  |   14|001Q     DATA         2/0  |
14:54:08.85|RX  |    3|001      RR     1/         |
14:54:09.14|RX  |    6|001      DATA   1/2        |
14:54:09.20|RX  |   51|001      DATA   1/3        |
14:54:09.23|TX  |    3|001      RR           3/   |
14:54:09.24|TX  |    3|001      RR           4/   |
14:54:09.25|RX  |    5|001      DATA   1/4        |
14:56:09.32|TX  |    3|001      RR           5/   |
14:56:09.34|RX  |   15|001      DATA   1/5        |
14:56:09.42|TX  |    3|001      RR           6/   |
```

X25L3 CIRCUIT

X25L3 CIRCUIT

Format

"X25L3 CIRCUIT *"

Description

This tracepoint traces all X25 packet level PDUs transmitted and received by the X25 Protocol Module. Tracing can be enabled for all circuits only. Table B–4 lists the events that are recognized at this tracepoint.

Table B.4. X.25L3 CIRCUIT Trace Events for VAX P.S.I.

Trace Events	Description
RX	Receive
TX	Transmit

Example

```
$ TRACE START/LIVE "X25L3 CIRCUIT */PROTOCOL=L3
```

produces the following output:

```
-----------+----+-----+<--------Packet---------->+
    Time    |Evnt|Data |Chn  Q   Type    P     P  |
hh mm ss cc|    |Size |     M           R/S   R/S |
-----------+----+-----+<------------------------>+
15:05:04.35|RX  |    3|001      CALLC              |
15:05:04.37|RX  |   14|001Q     DATA   0/0         |
15:05:04.38|RX  |    4|001      DATA   0/1         |
15:05:04.48|TX  |    3|001      RR           1/   |
15:05:04.76|TX  |    3|001      RR           2/   |
15:05:04.90|TX  |   14|001Q     DATA         2/0  |
15:05:04.94|RX  |    3|001      RR     1/          |
15:05:05.19|RX  |    6|001      DATA   1/2         |
15:05:05.22|TX  |    3|001      RR           3/   |
15:05:05.24|RX  |   51|001      DATA   1/3         |
15:05:05.25|RX  |    5|001      DATA   1/4         |
15:05:05.33|TX  |    3|001      RR           4/   |
15:05:05.34|TX  |    3|001      RR           5/   |
15:05:05.39|RX  |   15|001      DATA   1/5         |
15:05:05.42|TX  |    3|001      RR           6/   |
```

X25GAP CIRCUIT

X25GAP CIRCUIT

Format

"X25GAP CIRCUIT *"

Description

This tracepoint traces all X25 GAP PDUs transmitted and received by the X25 Server and X25 Client Modules. Tracing can be enabled for all circuits only. Table B–5 lists the events that are recognized at this tracepoint.

Table B.5. X25GAP CIRCUIT Trace Events for VAX P.S.I.

Trace Event	Description
RX	Receive
TX	Transmit

Example

```
$ TRACE START/LIVE "X25GAP CIRCUIT */PROTOCOL=GAP
```

produces the following output:

Appendix C. VAX WAN Device Driver Tracepoints

This appendix describes the tracepoints provided by VAX WAN device drivers for DECnet-Plus for VMS. These tracepoints are (starting with the lowest protocol level):

MODEM_CONNECT LINE

DDCMP LINK

HDLC LINK

LAPB LINK

MODEM_CONNECT LINE

MODEM_CONNECT LINE

Format

"MODEM_CONNECT LINE line-name"

line-name

Specifies the name of the MODEM CONNECT LINE entity to be traced.

Description

This traces DEC STD52 state changes and data PDU's transmitted on the specified Modem Connect line. Table C.1 lists the events that are recognized at this tracepoint.

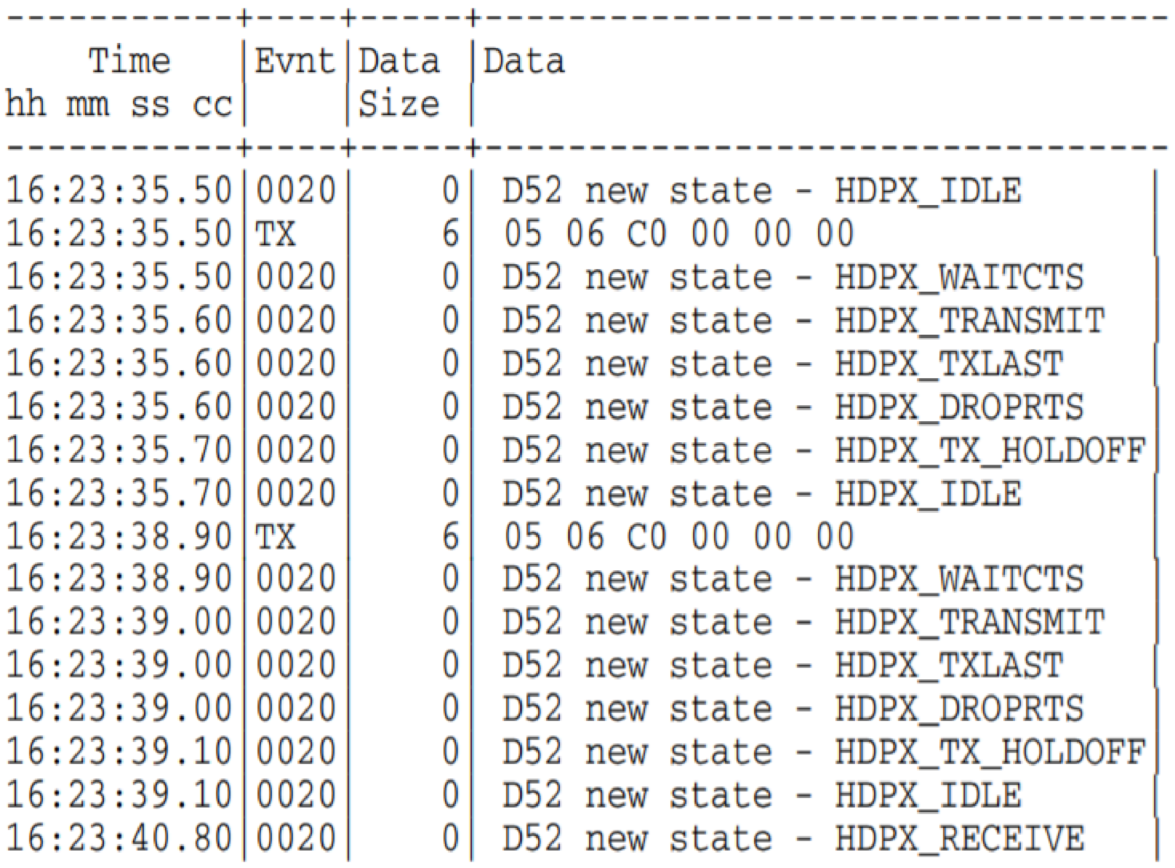
Table C.1. MODEM_CONNECT LINE Trace Events for VAX WAN Device Drivers

Trace Events	Description
RX	Receive
TX	Transmit
0020	DEC STD52 state change

Example

```
$ TRACE START "MODEM_CONNECT LINE $QLIN-DSV-0-0"/LIVE
```

produces the following output:



```
-----------+----+-----+--------------------------------
     Time   |Evnt|Data |Data
 hh mm ss cc|    |Size |
-----------+----+-----+--------------------------------
16:23:35.50|0020|    0| D52 new state - HDPX_IDLE      |
16:23:35.50|TX  |    6| 05 06 C0 00 00 00              |
16:23:35.50|0020|    0| D52 new state - HDPX_WAITCTS   |
16:23:35.60|0020|    0| D52 new state - HDPX_TRANSMIT  |
16:23:35.60|0020|    0| D52 new state - HDPX_TXLAST    |
16:23:35.60|0020|    0| D52 new state - HDPX_DROPRTS   |
16:23:35.70|0020|    0| D52 new state - HDPX_TX_HOLDOFF|
16:23:35.70|0020|    0| D52 new state - HDPX_IDLE      |
16:23:38.90|TX  |    6| 05 06 C0 00 00 00              |
16:23:38.90|0020|    0| D52 new state - HDPX_WAITCTS   |
16:23:39.00|0020|    0| D52 new state - HDPX_TRANSMIT  |
16:23:39.00|0020|    0| D52 new state - HDPX_TXLAST    |
16:23:39.00|0020|    0| D52 new state - HDPX_DROPRTS   |
16:23:39.10|0020|    0| D52 new state - HDPX_TX_HOLDOFF|
16:23:39.10|0020|    0| D52 new state - HDPX_IDLE      |
16:23:40.80|0020|    0| D52 new state - HDPX_RECEIVE   |
```

DDCMP LINK

DDCMP LINK

Format

"DDCMP LINK link-name"

link-name

Specifies the name of the DDCMP LINK entity to be traced.

Description

This traces all data link PDUs transmitted and received by the DDCMP module on the specified link. Table C.2 lists the events recognized at this tracepoint.

Table C.2. Table C–2 DDCMP LINK Trace Events for VAX WAN Device Drivers

Trace Events	Description
RX	Receive
TX	Transmit
0020	Flush sent to physical layer/device driver
0021	Flush DONE back by physical layer/device driver

Example

```
$ TRACE START "DDCMP LINK $qlnk-dsv-0-0"/LIVE
```

produces the following output:

```
-----------+----+-----+<--------DDCMP Frame-------->+
    Time   |Evnt|Data | Typ QS Res Num Ctl Adr Count|
hh mm ss cc|    |Size |                             |
-----------+----+-----+<--------------------------->+
09:28:30.81|RX  |   16| DAT  S 241 242       1     8|
09:28:30.82|TX  |   16| DAT  S 242 243       1     8|
09:28:30.82|TX  |   16| DAT  S 242 244       1     8|
09:28:30.84|TX  |   16| DAT  S 242 245       1     8|
09:28:30.85|RX  |   16| DAT  S 242 243       1     8|
09:28:30.87|TX  |   16| DAT  S 243 246       1     8|
09:28:30.88|RX  |   16| DAT  S 242 244       1     8|
09:28:30.90|RX  |   16| DAT  S 242 245       1     8|
09:28:30.93|RX  |   16| DAT  S 243 246       1     8|
09:28:30.93|TX  |   16| DAT  S 246 247       1     8|
09:28:30.96|RX  |   16| DAT  S 246 247       1     8|
09:28:30.99|TX  |   16| DAT  S 247 248       1     8|
09:28:31.00|TX  |   16| DAT  S 247 249       1     8|
09:28:31.02|TX  |   16| DAT  S 247 250       1     8|
09:28:31.02|RX  |   16| DAT  S 247 248       1     8|
09:28:31.04|TX  |   16| DAT  S 248 251       1     8|
09:28:31.05|RX  |   16| DAT  S 247 249       1     8|
09:28:31.08|RX  |   16| DAT  S 247 250       1     8|
09:28:31.10|RX  |   16| DAT  S 248 251       1     8|
09:28:31.10|TX  |   16| DAT  S 251 252       1     8|
09:28:31.13|RX  |   16| DAT  S 251 252       1     8|
09:28:31.13|TX  |   16| DAT  S 252 253       1     8|
09:28:31.14|TX  |   16| DAT  S 252 254       1     8|
09:28:31.16|TX  |   16| DAT  S 252 255       1     8|
09:28:31.17|RX  |   16| DAT  S 252 253       1     8|
09:28:31.19|TX  |   16| DAT  S 253   0       1     8|
09:28:31.19|RX  |   16| DAT  S 252 254       1     8|
09:28:31.22|RX  |   16| DAT  S 252 255       1     8|
09:28:31.24|RX  |   16| DAT  S 253   0       1     8|
09:28:31.24|TX  |   16| DAT  S   0   1       1     8|
09:28:31.28|RX  |   16| DAT  S   0   1       1     8|
09:28:31.28|TX  |   16| DAT  S   1   2       1     8|
09:28:31.30|TX  |   16| DAT  S   1   3       1     8|
09:28:31.31|TX  |   16| DAT  S   1   4       1     8|
```

HDLC LINK

HDLC LINK

Format

"HDLC LINK link-name"

link-name

Specifies the name of the HDLC LINK entity to be traced.

Description

This traces HDLC frames on the specified link. The default analysis of this tracepoint will analyze the HDLC frame header. Table C.3 lists the events recognized at this tracepoint.

Table C.3. HDLC LINK Trace Events for VAX WAN Device Drivers

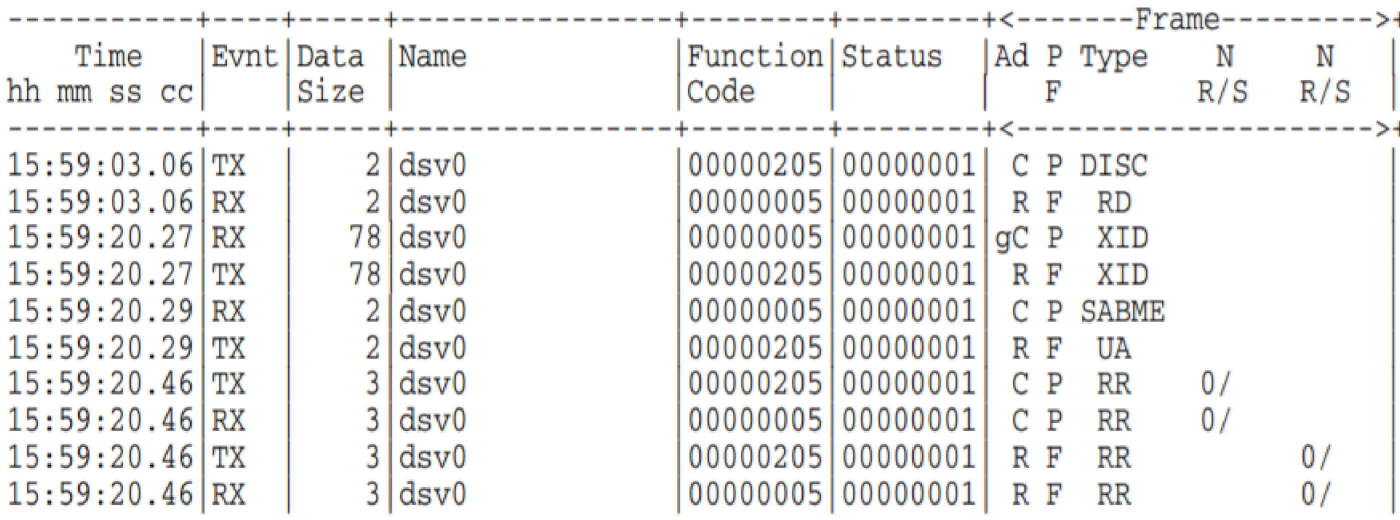
Trace Events	Description
RX	Receive
TX	Transmit

Note that if you specify the /FULL qualifier in the START or ANALYZE command, a full analysis of XID frames will be produced.

Example

```
$ TRACE START "HDLC LINK Link1"/LIVE
```

produces the following output:



```
-----------+----+-----+----------------+--------+--------+<-------Frame--------->+
    Time   |Evnt|Data |Name            |Function|Status  |Ad P Type     N     N  |
hh mm ss cc|    |Size |                |Code    |        |   F        R/S   R/S  |
-----------+----+-----+----------------+--------+--------+<--------------------->+
15:59:03.06|TX  |    2|dsv0            |00000205|00000001| C P DISC               |
15:59:03.06|RX  |    2|dsv0            |00000005|00000001| R F  RD                |
15:59:20.27|RX  |   78|dsv0            |00000005|00000001|gC P  XID               |
15:59:20.27|TX  |   78|dsv0            |00000205|00000001| R F  XID               |
15:59:20.29|RX  |    2|dsv0            |00000005|00000001| C P SABME              |
15:59:20.29|TX  |    2|dsv0            |00000205|00000001| R F  UA                |
15:59:20.46|TX  |    3|dsv0            |00000205|00000001| C P  RR     0/         |
15:59:20.46|RX  |    3|dsv0            |00000005|00000001| C P  RR     0/         |
15:59:20.46|TX  |    3|dsv0            |00000205|00000001| R F  RR           0/   |
15:59:20.46|RX  |    3|dsv0            |00000005|00000001| R F  RR           0/   |
```

LAPB LINK

LAPB LINK

Format

"LAPB LINK link-name"

link-name

Specifies the name of the LAPB LINK entity to be traced.

Description

This traces all data link PDUs transmitted and received by the specified LAPB LINK entity. Table C.4 lists the events that are recognized at this tracepoint.

Table C.4. LAPB LINK Trace Events for VAX WAN Device Drivers

Trace Events	Description
RX	Receive
TX	Transmit
0020	Acknowledge Timer expired
0023	Retry Maximum reached
0024	Flush issued to line
0026	Link has come up
0027	Link has gone down
0028	Line reset sent to device driver

Example

See the example for LAPB LINK in Appendix B.

Appendix D. DECnet-Plus for VMS Tracepoints

This appendix describes the tracepoints provided by DECnet-Plus for VMS. These tracepoints are (starting from the lowest protocol level):

MOP CIRCUIT

NSP PORT

NSP GLOBAL

OSI_TRANSPORT PORT

ROUTING CIRCUIT

SESSION PORT

MOP

MOP

Format

"MOP CIRCUIT circuit-name"

circuit-name

Specifies the name of the MOP CIRCUIT entity to be traced.

Description

This traces all the PDUs passed between MOP and the datalink drivers over the specified circuit. Table D.1 lists the events that are recognized at this tracepoint.

Table D.1. MOP Trace Events for DECnet–VAX

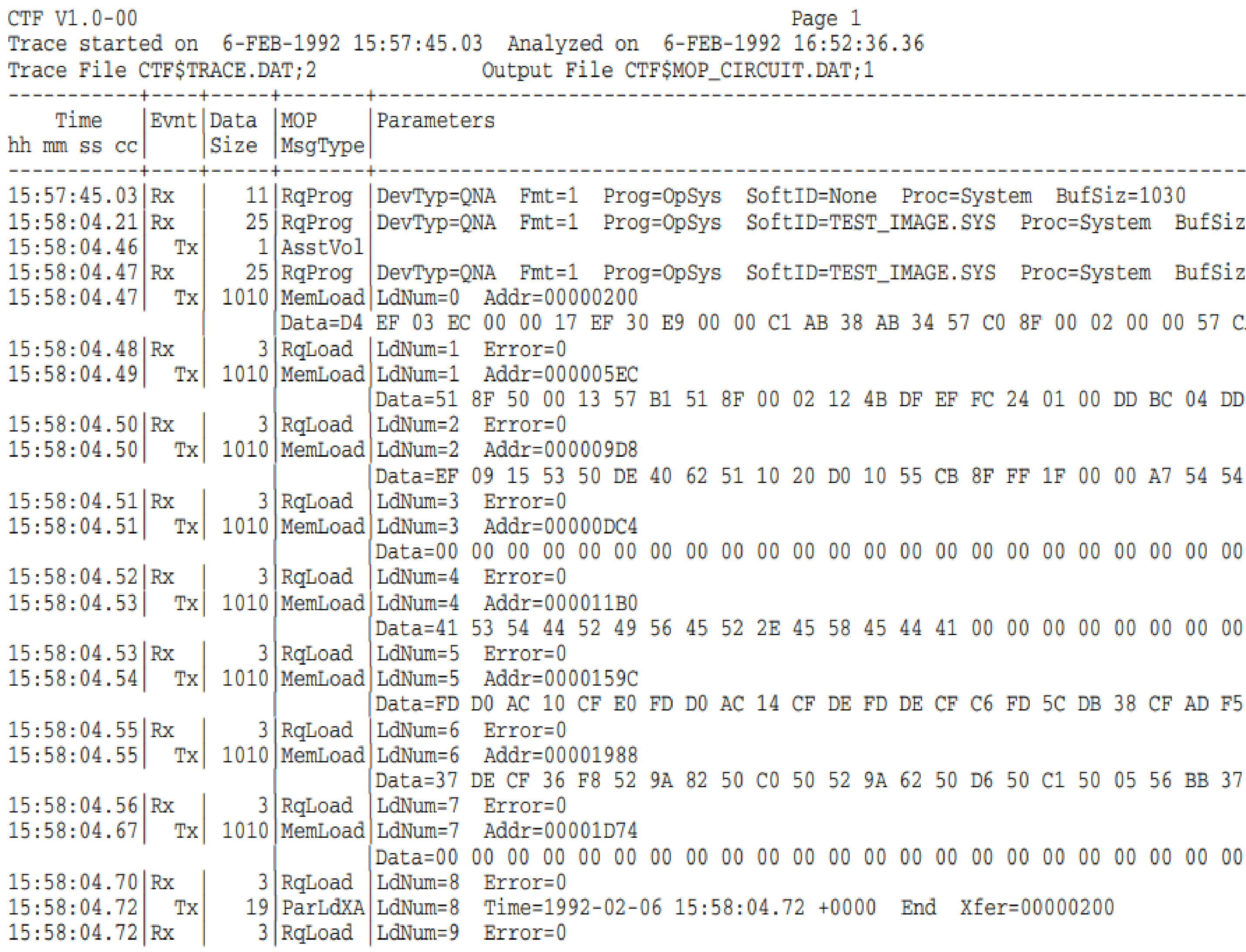
Trace Events	Description
RX	Receive
TX	Transmit

Note that ANALYZE/FULL will interpret the message type and all parameters. The /BRIEF qualifier will interpret the message type but display the remainder of the messages as uninterpreted data.

Example

```
$ TRACE/ANALYZE/PROTOCOL=MOP/FULL CTF$TRACE.DAT
```

produces the following output:



```
CTF V1.0-00                                                          Page 1
Trace started on  6-FEB-1992 15:57:45.03  Analyzed on  6-FEB-1992 16:52:36.36
Trace File CTF$TRACE.DAT;2            Output File CTF$MOP_CIRCUIT.DAT;1
-----------+----+-----+-------+---------------------------------------------------------------
    Time   |Evnt|Data |MOP    |Parameters
hh mm ss cc|    |Size |MsgType|
-----------+----+-----+-------+---------------------------------------------------------------
15:57:45.03|Rx  |   11|RqProg |DevTyp=QNA  Fmt=1  Prog=OpSys  SoftID=None  Proc=System  BufSiz=1030
15:58:04.21|Rx  |   25|RqProg |DevTyp=QNA  Fmt=1  Prog=OpSys  SoftID=TEST_IMAGE.SYS  Proc=System  BufSiz
15:58:04.46|  Tx|    1|AsstVol|
15:58:04.47|Rx  |   25|RqProg |DevTyp=QNA  Fmt=1  Prog=OpSys  SoftID=TEST_IMAGE.SYS  Proc=System  BufSiz
15:58:04.47|  Tx| 1010|MemLoad|LdNum=0  Addr=00000200
           |    |     |Data=D4 EF 03 EC 00 00 17 EF 30 E9 00 00 C1 AB 38 AB 34 57 C0 8F 00 02 00 00 57 C
15:58:04.48|Rx  |    3|RqLoad |LdNum=1  Error=0
15:58:04.49|  Tx| 1010|MemLoad|LdNum=1  Addr=000005EC
           |    |     |       |Data=51 8F 50 00 13 57 B1 51 8F 00 02 12 4B DF EF FC 24 01 00 DD BC 04 DD
15:58:04.50|Rx  |    3|RqLoad |LdNum=2  Error=0
15:58:04.50|  Tx| 1010|MemLoad|LdNum=2  Addr=000009D8
           |    |     |       |Data=EF 09 15 53 50 DE 40 62 51 10 20 D0 10 55 CB 8F FF 1F 00 00 A7 54 54
15:58:04.51|Rx  |    3|RqLoad |LdNum=3  Error=0
15:58:04.51|  Tx| 1010|MemLoad|LdNum=3  Addr=00000DC4
           |    |     |       |Data=00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
15:58:04.52|Rx  |    3|RqLoad |LdNum=4  Error=0
15:58:04.53|  Tx| 1010|MemLoad|LdNum=4  Addr=000011B0
           |    |     |       |Data=41 53 54 44 52 49 56 45 52 2E 45 58 45 44 41 00 00 00 00 00 00 00 00
15:58:04.53|Rx  |    3|RqLoad |LdNum=5  Error=0
15:58:04.54|  Tx| 1010|MemLoad|LdNum=5  Addr=0000159C
           |    |     |       |Data=FD D0 AC 10 CF E0 FD D0 AC 14 CF DE FD DE CF C6 FD 5C DB 38 CF AD F5
15:58:04.55|Rx  |    3|RqLoad |LdNum=6  Error=0
15:58:04.55|  Tx| 1010|MemLoad|LdNum=6  Addr=00001988
           |    |     |       |Data=37 DE CF 36 F8 52 9A 82 50 C0 50 52 9A 62 50 D6 50 C1 50 05 56 BB 37
15:58:04.56|Rx  |    3|RqLoad |LdNum=7  Error=0
15:58:04.67|  Tx| 1010|MemLoad|LdNum=7  Addr=00001D74
           |    |     |       |Data=00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
15:58:04.70|Rx  |    3|RqLoad |LdNum=8  Error=0
15:58:04.72|  Tx|   19|ParLdXA|LdNum=8  Time=1992-02-06 15:58:04.72 +0000  End  Xfer=00000200
15:58:04.72|Rx  |    3|RqLoad |LdNum=9  Error=0
```

NSP Transport

NSP Transport

Format

"NSP PORT port-name"

port-name

Specifies the name of the NSP port entity to be traced.

Description

This tracepoint captures receive data after the PDU from Routing has been analyzed to determine what port it belongs to. Transmit data is captured just before it is passed to Routing.

Format

"NSP GLOBAL globe-name"

globe-name

Specifies the wildcard "*".

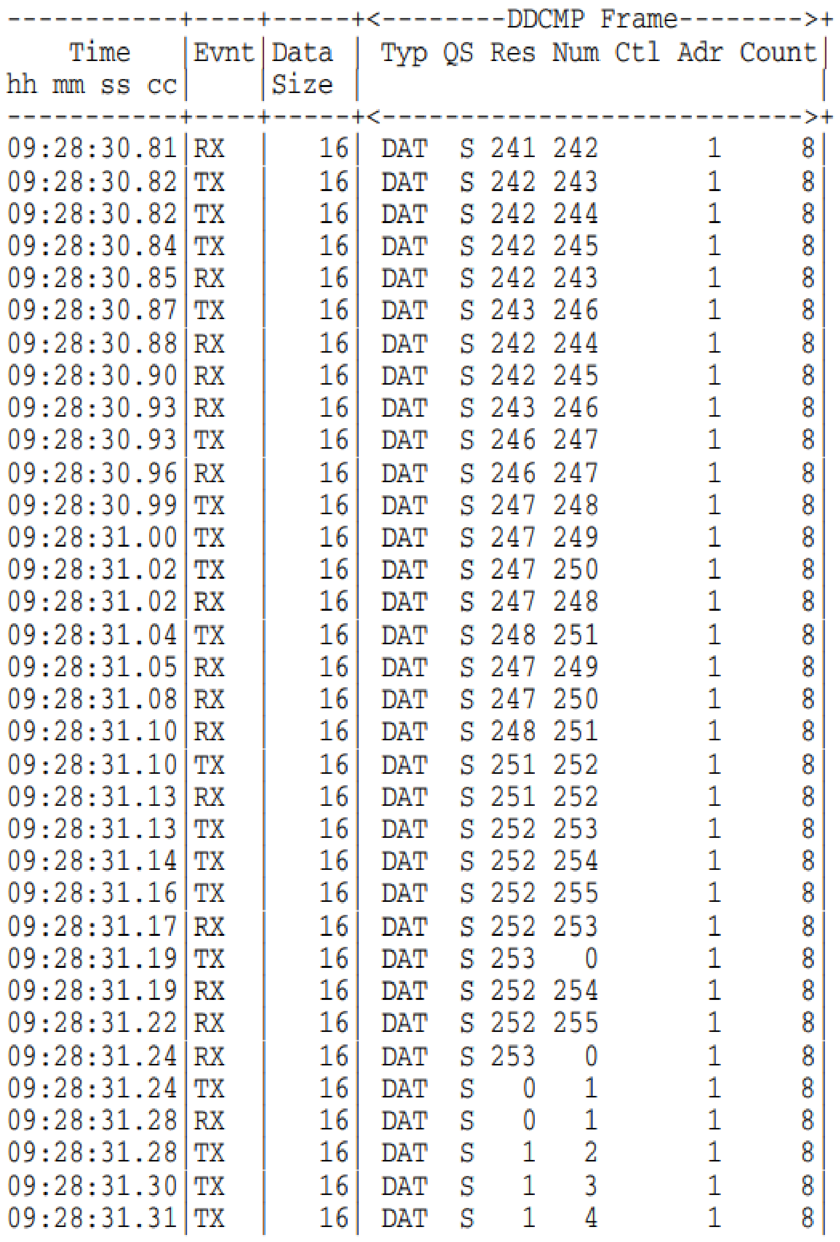
Description

This tracepoint captures receive data immediately after it is passed from Routing, before it is determined what port the PDU is associated with, and before any validation is performed. The data traced is not specific to any one port. Transmit data is captured just before it is passed to Routing. It to is specific to data at one port.

Example

```
$ TRACE/ANALYZE/PROTOCOL=NSPTP/FULL CTF$TRACE.DAT
```

produces the following output:



```
-----------+----+-----+<--------DDCMP Frame-------->+
    Time    |Evnt|Data |  Typ QS Res Num Ctl Adr Count|
hh mm ss cc|    |Size |                              |
-----------+----+-----+<---------------------------->+
09:28:30.81|RX  |   16|  DAT  S 241 242       1     8|
09:28:30.82|TX  |   16|  DAT  S 242 243       1     8|
09:28:30.82|TX  |   16|  DAT  S 242 244       1     8|
09:28:30.84|TX  |   16|  DAT  S 242 245       1     8|
09:28:30.85|RX  |   16|  DAT  S 242 243       1     8|
09:28:30.87|TX  |   16|  DAT  S 243 246       1     8|
09:28:30.88|RX  |   16|  DAT  S 242 244       1     8|
09:28:30.90|RX  |   16|  DAT  S 242 245       1     8|
09:28:30.93|RX  |   16|  DAT  S 243 246       1     8|
09:28:30.93|TX  |   16|  DAT  S 246 247       1     8|
09:28:30.96|RX  |   16|  DAT  S 246 247       1     8|
09:28:30.99|TX  |   16|  DAT  S 247 248       1     8|
09:28:31.00|TX  |   16|  DAT  S 247 249       1     8|
09:28:31.02|TX  |   16|  DAT  S 247 250       1     8|
09:28:31.02|RX  |   16|  DAT  S 247 248       1     8|
09:28:31.04|TX  |   16|  DAT  S 248 251       1     8|
09:28:31.05|RX  |   16|  DAT  S 247 249       1     8|
09:28:31.08|RX  |   16|  DAT  S 247 250       1     8|
09:28:31.10|RX  |   16|  DAT  S 248 251       1     8|
09:28:31.10|TX  |   16|  DAT  S 251 252       1     8|
09:28:31.13|RX  |   16|  DAT  S 251 252       1     8|
09:28:31.13|TX  |   16|  DAT  S 252 253       1     8|
09:28:31.14|TX  |   16|  DAT  S 252 254       1     8|
09:28:31.16|TX  |   16|  DAT  S 252 255       1     8|
09:28:31.17|RX  |   16|  DAT  S 252 253       1     8|
09:28:31.19|TX  |   16|  DAT  S 253   0       1     8|
09:28:31.19|RX  |   16|  DAT  S 252 254       1     8|
09:28:31.22|RX  |   16|  DAT  S 252 255       1     8|
09:28:31.24|RX  |   16|  DAT  S 253   0       1     8|
09:28:31.24|TX  |   16|  DAT  S   0   1       1     8|
09:28:31.28|RX  |   16|  DAT  S   0   1       1     8|
09:28:31.28|TX  |   16|  DAT  S   1   2       1     8|
09:28:31.30|TX  |   16|  DAT  S   1   3       1     8|
09:28:31.31|TX  |   16|  DAT  S   1   4       1     8|
```

OSI_TRANSPORT PORT

OSI_TRANSPORT PORT

Format

"OSI_TRANSPORT PORT name"

name

Specifies the name of the OSI TRANSPORT PORT entity to be traced.

Description

This traces all PDUs transmitted and received by the OSI module at the specified port. Table D.2 lists the events that are recognized at this tracepoint.

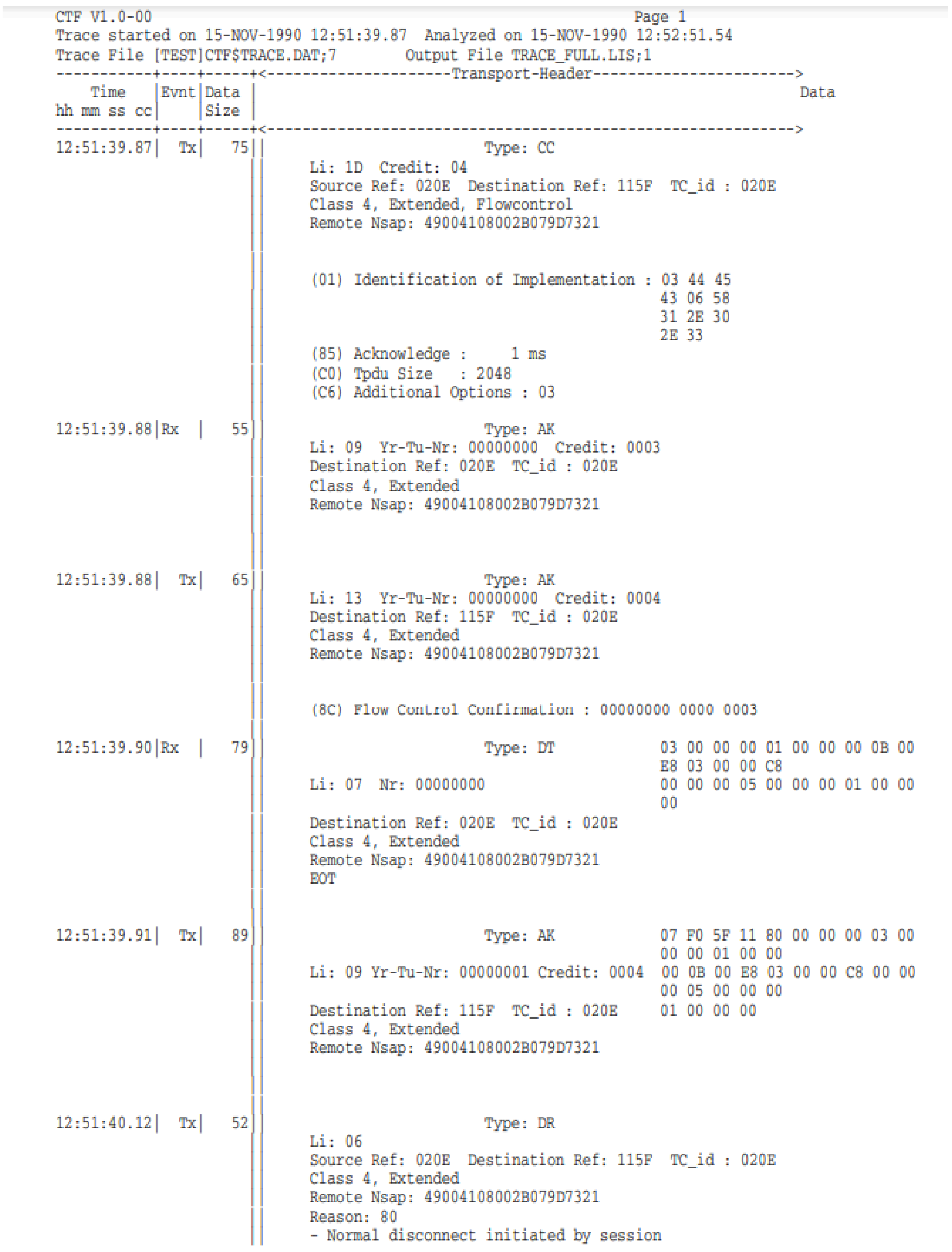
Table D.2. OSI_TRANSPORT PORT Trace Events for OSI Transport Software

Trace Events	Description
RX	Receive
TX	Transmit

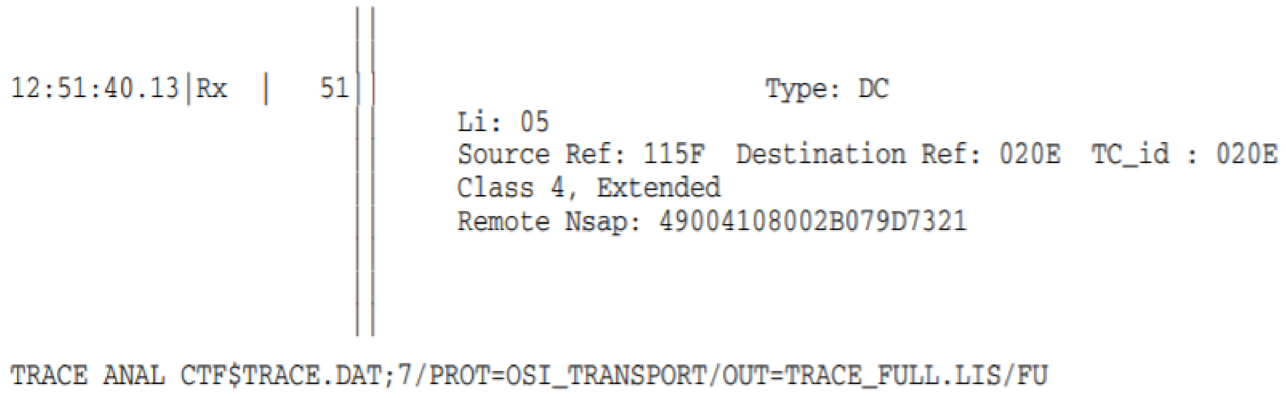
Example

```
$ TRACE ANAL CTF$TRACE.DAT;7/PROT=OSI_TRANSPORT/OUT=TRACE_FULL.LIS/FU
```

produces the following output:



```
CTF V1.0-00                                                         Page 1
Trace started on 15-NOV-1990 12:51:39.87  Analyzed on 15-NOV-1990 12:52:51.54
Trace File [TEST]CTF$TRACE.DAT;7        Output File TRACE_FULL.LIS;1
-----------+----+-----+<---------------------Transport-Header----------------------->
    Time    |Evnt|Data |                                                          Data
hh mm ss cc|    |Size |
-----------+----+-----+<------------------------------------------------------------>
12:51:39.87|  Tx|   75||                   Type: CC
                       ||    Li: 1D  Credit: 04
                       ||    Source Ref: 020E  Destination Ref: 115F  TC_id : 020E
                       ||    Class 4, Extended, Flowcontrol
                       ||    Remote Nsap: 49004108002B079D7321
                       ||
                       ||
                       ||    (01) Identification of Implementation : 03 44 45
                       ||                                            43 06 58
                       ||                                            31 2E 30
                       ||                                            2E 33
                       ||
                       ||    (85) Acknowledge :     1 ms
                       ||    (C0) Tpdu Size    : 2048
                       ||    (C6) Additional Options : 03
                       ||
12:51:39.88|Rx  |   55||                   Type: AK
                       ||    Li: 09  Yr-Tu-Nr: 00000000  Credit: 0003
                       ||    Destination Ref: 020E  TC_id : 020E
                       ||    Class 4, Extended
                       ||    Remote Nsap: 49004108002B079D7321
                       ||
                       ||
                       ||
12:51:39.88|  Tx|   65||                   Type: AK
                       ||    Li: 13  Yr-Tu-Nr: 00000000  Credit: 0004
                       ||    Destination Ref: 115F  TC_id : 020E
                       ||    Class 4, Extended
                       ||    Remote Nsap: 49004108002B079D7321
                       ||
                       ||
                       ||    (8C) Flow Control Confirmation : 00000000 0000 0003
                       ||
12:51:39.90|Rx  |   79||                   Type: DT            03 00 00 00 01 00 00 00 0B 00
                       ||                                        E8 03 00 00 C8
                       ||    Li: 07  Nr: 00000000                00 00 00 05 00 00 00 01 00 00
                       ||                                        00
                       ||    Destination Ref: 020E  TC_id : 020E
                       ||    Class 4, Extended
                       ||    Remote Nsap: 49004108002B079D7321
                       ||    EOT
                       ||
                       ||
12:51:39.91|  Tx|   89||                   Type: AK            07 F0 5F 11 80 00 00 00 03 00
                       ||                                        00 00 01 00 00
                       ||    Li: 09 Yr-Tu-Nr: 00000001 Credit: 0004  00 0B 00 E8 03 00 00 C8 00 00
                       ||                                        00 05 00 00 00
                       ||    Destination Ref: 115F  TC_id : 020E     01 00 00 00
                       ||    Class 4, Extended
                       ||    Remote Nsap: 49004108002B079D7321
                       ||
                       ||
                       ||
12:51:40.12|  Tx|   52||                   Type: DR
                       ||    Li: 06
                       ||    Source Ref: 020E  Destination Ref: 115F  TC_id : 020E
                       ||    Class 4, Extended
                       ||    Remote Nsap: 49004108002B079D7321
                       ||    Reason: 80
                       ||    - Normal disconnect initiated by session
```



```
                       ||
   12:51:40.13|Rx  |   51||                 Type: DC
                       ||    Li: 05
                       ||    Source Ref: 115F  Destination Ref: 020E  TC_id : 020E
                       ||    Class 4, Extended
                       ||    Remote Nsap: 49004108002B079D7321
                       ||
                       ||

   TRACE ANAL CTF$TRACE.DAT;7/PROT=OSI_TRANSPORT/OUT=TRACE_FULL.LIS/FU
```

ROUTING CIRCUIT

ROUTING CIRCUIT

Format

"ROUTING CIRCUIT circuit-name"

circuit-name

Specifies the name of the ROUTING CIRCUIT entity to be traced.

Description

This traces all network-layer PDUs transmitted and received on the specified circuit. Note that it is not possible to trace circuits whose instance identifier is a Binary or Quoted Simplename. Table D.3 lists the events that are recognized at this tracepoint.

Table D.3. ROUTING CIRCUIT Trace Events for DECnet–VAX

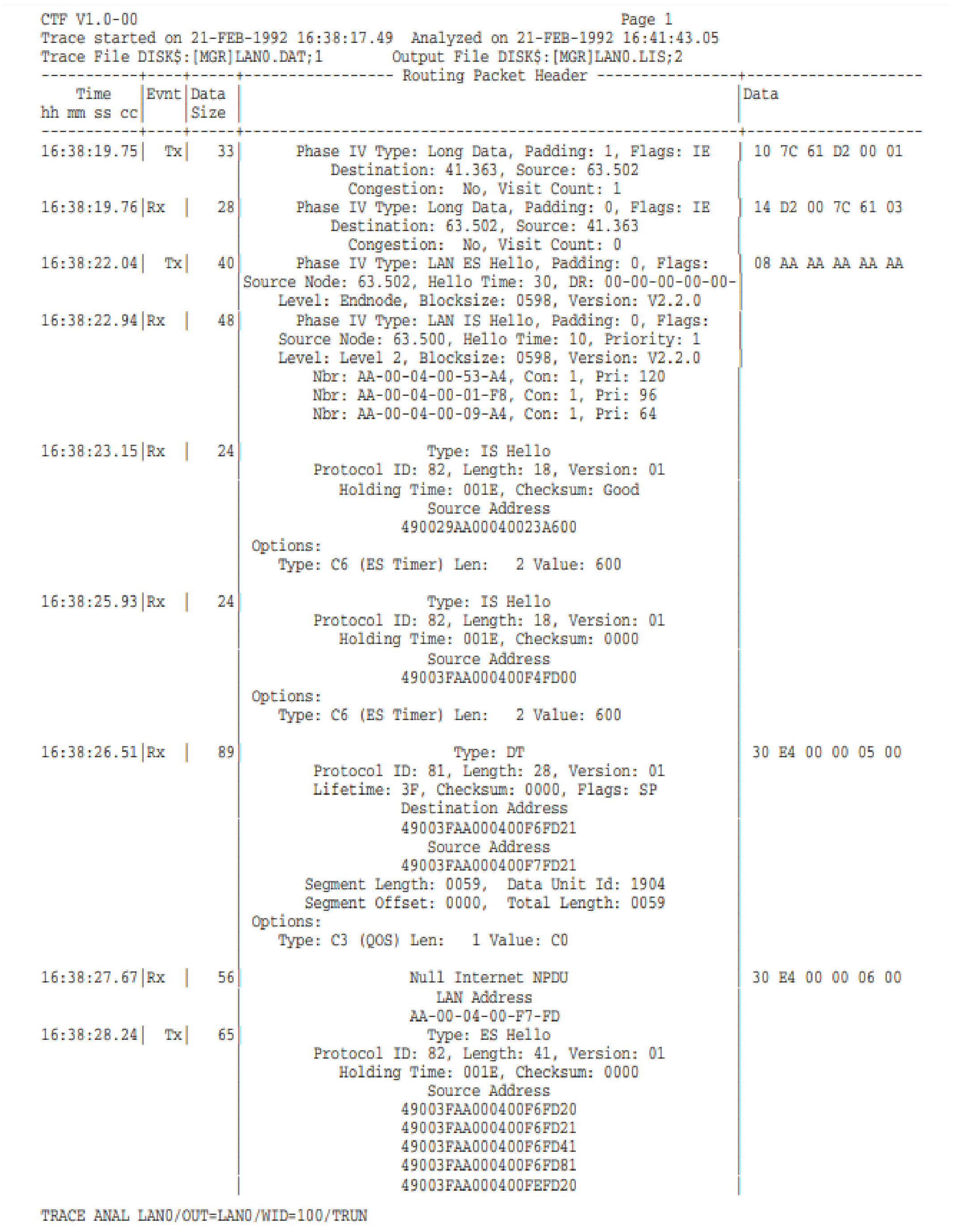
Trace Events	Description
RX	Receive
TX	Transmit

Note that a full listing is always produced for this tracepoint, even if you specify the /BRIEF qualifier in the START or ANALYZE command.

Example

```
$ TRACE/START/PROTOCOL=ROUTING
```

produces the following output:



```
CTF V1.0-00                                                     Page 1
Trace started on 21-FEB-1992 16:38:17.49  Analyzed on 21-FEB-1992 16:41:43.05
Trace File DISK$:[MGR]LAN0.DAT;1        Output File DISK$:[MGR]LAN0.LIS;2
-----------+----+-----+---------------- Routing Packet Header ----------------+--------------------
    Time   |Evnt|Data |                                                        |Data
hh mm ss cc|    |Size |                                                        |
-----------+----+-----+--------------------------------------------------------+--------------------
16:38:19.75|  Tx|   33|      Phase IV Type: Long Data, Padding: 1, Flags: IE   | 10 7C 61 D2 00 01
           |    |     |          Destination: 41.363, Source: 63.502           |
           |    |     |            Congestion:  No, Visit Count: 1             |
16:38:19.76|Rx  |   28|      Phase IV Type: Long Data, Padding: 0, Flags: IE   | 14 D2 00 7C 61 03
           |    |     |          Destination: 63.502, Source: 41.363           |
           |    |     |            Congestion:  No, Visit Count: 0             |
16:38:22.04|  Tx|   40|      Phase IV Type: LAN ES Hello, Padding: 0, Flags:   | 08 AA AA AA AA AA
           |    |     |Source Node: 63.502, Hello Time: 30, DR: 00-00-00-00-00-|
           |    |     |    Level: Endnode, Blocksize: 0598, Version: V2.2.0    |
16:38:22.94|Rx  |   48|      Phase IV Type: LAN IS Hello, Padding: 0, Flags:   |
           |    |     |    Source Node: 63.500, Hello Time: 10, Priority: 1    |
           |    |     |    Level: Level 2, Blocksize: 0598, Version: V2.2.0    |
           |    |     |        Nbr: AA-00-04-00-53-A4, Con: 1, Pri: 120        |
           |    |     |        Nbr: AA-00-04-00-01-F8, Con: 1, Pri: 96         |
           |    |     |        Nbr: AA-00-04-00-09-A4, Con: 1, Pri: 64         |

16:38:23.15|Rx  |   24|                   Type: IS Hello                       |
           |    |     |        Protocol ID: 82, Length: 18, Version: 01        |
           |    |     |           Holding Time: 001E, Checksum: Good           |
           |    |     |                   Source Address                       |
           |    |     |                490029AA00040023A600                    |
           |    |     | Options:                                               |
           |    |     |    Type: C6 (ES Timer) Len:   2 Value: 600             |
16:38:25.93|Rx  |   24|                   Type: IS Hello                       |
           |    |     |        Protocol ID: 82, Length: 18, Version: 01        |
           |    |     |           Holding Time: 001E, Checksum: 0000           |
           |    |     |                   Source Address                       |
           |    |     |                49003FAA000400F4FD00                    |
           |    |     | Options:                                               |
           |    |     |    Type: C6 (ES Timer) Len:   2 Value: 600             |
16:38:26.51|Rx  |   89|                      Type: DT                          | 30 E4 00 00 05 00
           |    |     |        Protocol ID: 81, Length: 28, Version: 01        |
           |    |     |        Lifetime: 3F, Checksum: 0000, Flags: SP         |
           |    |     |                 Destination Address                    |
           |    |     |                49003FAA000400F6FD21                    |
           |    |     |                   Source Address                       |
           |    |     |                49003FAA000400F7FD21                    |
           |    |     |       Segment Length: 0059,  Data Unit Id: 1904        |
           |    |     |       Segment Offset: 0000,  Total Length: 0059        |
           |    |     | Options:                                               |
           |    |     |    Type: C3 (QOS) Len:   1 Value: C0                   |
16:38:27.67|Rx  |   56|                 Null Internet NPDU                     | 30 E4 00 00 06 00
           |    |     |                    LAN Address                         |
           |    |     |                 AA-00-04-00-F7-FD                      |
16:38:28.24|  Tx|   65|                   Type: ES Hello                       |
           |    |     |        Protocol ID: 82, Length: 41, Version: 01        |
           |    |     |           Holding Time: 001E, Checksum: 0000           |
           |    |     |                   Source Address                       |
           |    |     |                49003FAA000400F6FD20                    |
           |    |     |                49003FAA000400F6FD21                    |
           |    |     |                49003FAA000400F6FD41                    |
           |    |     |                49003FAA000400F6FD81                    |
           |    |     |                49003FAA000400FEFD20                    |
TRACE ANAL LAN0/OUT=LAN0/WID=100/TRUN
```

Session Control

Session Control

Format

"SESSION PORT port-name"

port-name

Specifies the name of the SESSION PORT entity to be traced.

Description

This tracepoint shows the address towers used when establishing session connections, as well as the state transitions that the specified port undergoes. Table D.4 lists the event that is recognized by this tracepoint:

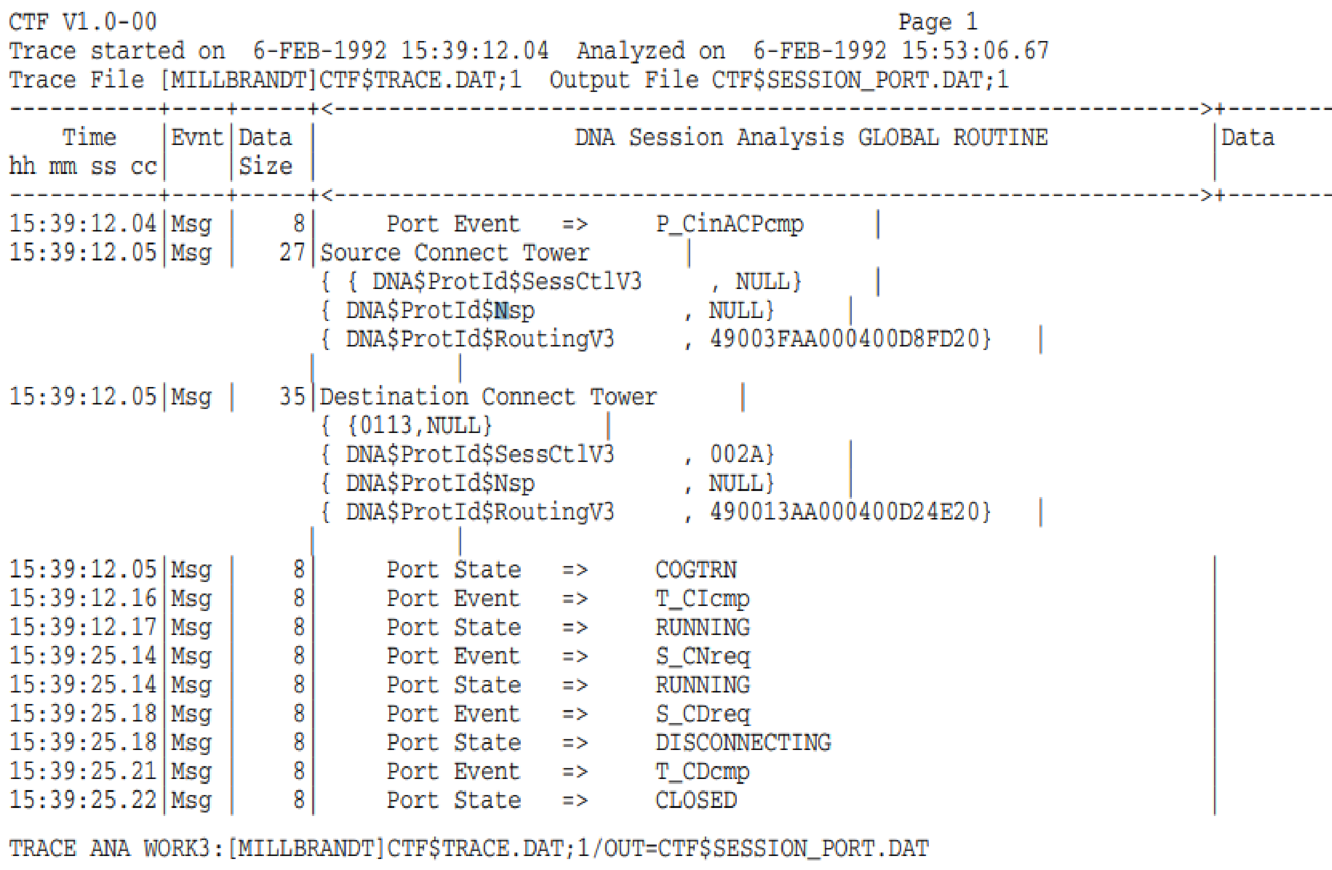
Table D.4. SESSION PORT Trace Events for DECnet–VAX

Trace Events	Description
MSG	Informational Mmessage

Example

```
$ TRACE/ANALYZE/PROTOCOL=SCL/FULL CTF$TRACE.DAT
```

produces the following output:



```
CTF V1.0-00                                                       Page 1
Trace started on  6-FEB-1992 15:39:12.04  Analyzed on  6-FEB-1992 15:53:06.67
Trace File [MILLBRANDT]CTF$TRACE.DAT;1  Output File CTF$SESSION_PORT.DAT;1
-----------+----+-----+<------------------------------------------------------------------>+--------
    Time   |Evnt|Data |                DNA Session Analysis GLOBAL ROUTINE                 |Data
hh mm ss cc|    |Size |                                                                    |
-----------+----+-----+<------------------------------------------------------------------>+--------
15:39:12.04|Msg |    8|     Port Event    =>     P_CinACPcmp     |
15:39:12.05|Msg |   27|Source Connect Tower             |
                       { { DNA$ProtId$SessCtlV3     , NULL}      |
                       { DNA$ProtId$Nsp             , NULL}    |
                       { DNA$ProtId$RoutingV3       , 49003FAA000400D8FD20}   |
                      |          |
15:39:12.05|Msg |   35|Destination Connect Tower        |
                       { {0113,NULL}        |
                       { DNA$ProtId$SessCtlV3       , 002A}    |
                       { DNA$ProtId$Nsp             , NULL}    |
                       { DNA$ProtId$RoutingV3       , 490013AA000400D24E20}   |
                      |          |
15:39:12.05|Msg |    8|     Port State    =>     COGTRN                                      |
15:39:12.16|Msg |    8|     Port Event    =>     T_CIcmp                                     |
15:39:12.17|Msg |    8|     Port State    =>     RUNNING                                     |
15:39:25.14|Msg |    8|     Port Event    =>     S_CNreq                                     |
15:39:25.14|Msg |    8|     Port State    =>     RUNNING                                     |
15:39:25.18|Msg |    8|     Port Event    =>     S_CDreq                                     |
15:39:25.18|Msg |    8|     Port State    =>     DISCONNECTING                               |
15:39:25.21|Msg |    8|     Port Event    =>     T_CDcmp                                     |
15:39:25.22|Msg |    8|     Port State    =>     CLOSED                                      |

TRACE ANA WORK3:[MILLBRANDT]CTF$TRACE.DAT;1/OUT=CTF$SESSION_PORT.DAT
```