



DataFire PRIme™ Driver

for

Windows NT

Installation and Configuration Guide

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92000247B

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Introduction

This manual provides information related to the installation and configuration of the Digi DataFire PRIme ISA Adapter and the Digi DataFire PRIme PCI Adapter. The term “DataFire PRIme adapter” used throughout this manual refers to either type of adapter.

Product Description

The DataFire PRIme adapter and driver give a Microsoft Windows NT server the power to establish connections to remote networks over ISDN lines, using multiple ISDN lines in parallel.

When used in Windows NT Server environments, the DataFire PRIme adapter uses the concepts of ISDN networks to make ISDN calls. ISDN networks are groups of settings (profiles) that determine how an ISDN connection is made; a profile includes information about the type of ISDN connection to make, the telephone number of the remote server, and so on. More than one ISDN network can exist in a given server configuration.

Features

- Up to two PRI lines per adapter, each line configurable for 23 T1 “B” channels (or WAN ports).
- For Euro ISDN, up to 30 E1 “B” channels are configurable.
- Supports up to multiple DataFire PRIme adapters in one server.

System Requirements

Successful operation of the DataFire PRIme driver requires the following:

- The Windows NT Server must have available a free expansion slot for the type of adapter being installed as well as the necessary hardware resources for each adapter.
- The Windows NT ISDN configuration must be done from the same server on the network that has the adapter installed.
- The server with DataFire PRIme adapter(s) must be running Windows NT 3.51 or later.
- The DataFire PRIme driver currently supports remote access services provided by Microsoft Windows NT.

DataFire adapters work with all currently deployed switches in the U.S., including the following:

- AT&T 5ESS Switches (now Lucent)
- Northern Telecom DMS-100 Switches (now Nortel)
- Any National ISDN-2 (NI2) Switch.

In Europe, the DataFire adapters are compatible with Euro ISDN (ETSI)

Installation and Configuration

In This Chapter

This chapter describes how to install and configure the DataFire PRIme adapter software. It discusses the following topics:

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Preparing for Installation	4
Installing the Windows NT Device Driver	5
Configuring the Adapter	6
Setting Adapter Properties	7
Setting Line Settings Properties	9
Setting CSU (Control Service Unit) Properties	9
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Preparing for Installation

Fill Out the Worksheet

Certain ISDN information is required for installation of the DataFire PRIme ISDN adapter. Obtain from your ISDN service provider information regarding the type of switch to which you will be connected. Before you begin installing the driver on your system, complete the Installation Worksheet at the back of this manual (page 27). The worksheet describes the information necessary to configure the driver for your system.

Contact Your Service Provider

Some of the information required for installation must be obtained from your ISDN service provider. You must have this information before you can configure your adapter(s) for use. Have the completed worksheet available when you call.

Install the Adapter

The hardware installation process for your DataFire PRIme adapter is described in an installation card that accompanies the adapter. You should refer to this card, Digi publication number 91000592 for the PCI adapter and number 91000573 for the ISA adapter, for detailed instruction regarding installation and setup of the adapter.

During driver installation, you will need to know the I/O port and memory address of each ISA adapter installed for use with the driver. PCI adapters will be detected automatically at installation time. Use the worksheet at the back of this manual to record the hardware settings you will need during configuration.

Installing the Windows NT Device Driver

This procedure assumes that you have installed the adapter(s) in the server per the procedures contained in the installation card.

The following procedure pertains to both versions 3.51 and 4.0 of Windows NT and each step contains the necessary notation.

1. At the Windows NT server, insert disk 1 of the DataFire PRIme adapter Device Driver software into a 3.5-inch floppy drive.
2. **NT 3.51** - Click the *Control Panel* icon in the *Program Manager* to open the Control Panel window.

NT 4.0 - Select *Start/Settings/Control Panel* to open the Control Panel window.

3. Within the Control Panel window, double-click the Network icon:

NT 3.51 - and the *Network Settings* dialog box appears.

NT 4.0 - and the *Network* dialog box appears. Make sure the Adapters tab is currently selected.

4. **NT 3.51** - Select *Add Adapter . . .* and the Add Network Adapter dialog box appears.

NT 4.0 - Select *Add. . .* and the Select Network Adapter dialog box appears.

5. **NT 3.51** - From the list of adapters, choose <Other> Requires disk from manufacturer, select *Continue*.

NT 4.0 - Select *Have Disk*.

6. Enter *A:\<platform>* in the dialog as shown below (where *A:* is your floppy drive designation and *<platform>* is x86, Alpha, or PowerPC) and select *Continue* or *OK*.

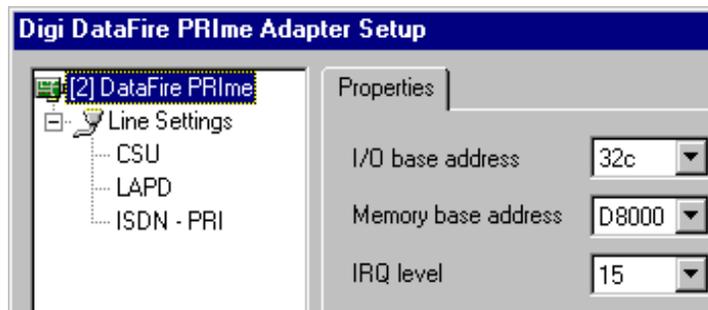
7. From the list of adapters that appears in the message box, select the adapter that matches the model you are installing and click *OK*.

Note: If the system has one or more PCI adapters installed that have not been

added, the message box will list those adapters. When any and all PCI adapters have been added, the list will then display ISA adapters. You can then select and add the appropriate ISA adapter.

8. At this point the system copies the driver files to your server's hard drive and when finished displays the *DataFire PRIme Adapter Setup* dialog box and the Properties tab for the adapter, shown in Figure 1.

Figure 1 **The DataFire PRIme Properties Tab**



Note: The *DataFire PRIme Adapter Setup* dialog box is divided into two separate panes; the contents pane and the properties pane. The contents pane displays a hierarchical view of the configurable elements of the adapter. The properties pane shows the configuration settings for each adapter element.

9. Configure the DataFire PRIme adapter as described in the following section.

Configuring the Adapter

Once the DataFire PRIme adapter software has been installed, it is necessary to configure the adapter to the environment in which it will operate. To accomplish configuration of the adapter, first access the *DataFire PRIme Properties* tab as previously described in "Installing the Windows NT Device Driver" on page 5.

This tab is the starting point for configuring the DataFire PRIme adapter. From this point you will need to configure, or at least confirm the default settings for, each adapter installed in the server and the connected ISDN lines. Each adapter supports one or two ISDN lines which are configured by means of the procedures that follow.

Note: Click the Help button in the tabs to display tab information in the Help Viewer.

Setting Adapter Properties (ISA models only)

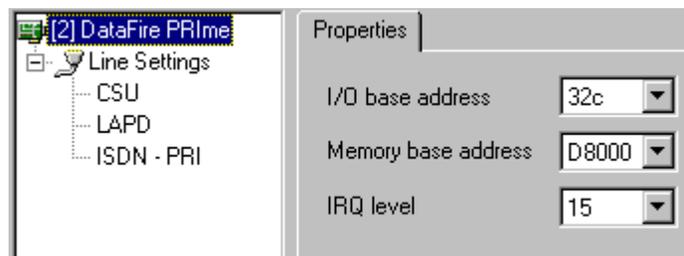
To select DataFire PRIme Properties for ISA bus adapters, access the *DataFire PRIme Properties* tab shown in Figure 2 as follows (if you are setting properties for a PCI adapter, skip this procedure and continue with “Setting Line Properties” on page 9):

1. If not already displayed on the server’s monitor, access the Network Settings window as described in steps 2 and 3 of the “Installing the Windows NT Device Driver” procedure on page 5.
2. **NT 3.51** - Highlight the DataFire PRIme adapter in Installed Adapter Cards list box.

NT 4.0 - Highlight the DataFire PRIme adapter in Network Adapter list box.
3. **NT 3.51** - Select Configure . . . and the monitor displays the *DataFire PRIme Properties* tab.

NT 4.0 - Select Properties . . . and the monitor displays the *DataFire PRIme Properties* tab.

Figure 2 The DataFire PRIme Properties Tab



4. Select the appropriate values for the memory base address, the I/O base address and the IRQ level as described in the following sections.

Selecting the I/O Base Address (ISA models only)

Click the  button to open the drop down list box for I/O Addresses. Select the I/O address which matches the hardware setting for the adapter you are installing. If you previously filled out the worksheet at the back of this manual, you should have this information available.

Selecting the Memory Base Addresses (ISA models only)

The DataFire PRIme adapter requires 32kB of unused memory address space in your computer. This is typically allocated from the area between 0C0000h and 0EFFFFh in your computer's memory map, referred to as the memory window.

When deciding on a memory start address, keep in mind that the DataFire PRIme adapter may have to coexist with a number of other devices which also require memory address space.

You can click the  button in the DataFire PRIme Adapter Setup tab, then choose Resources/Memory to determine which memory addresses are in use and to locate a free area for the memory window. Enter the memory base address in the worksheet at the back of this manual.

Selecting the Hardware IRQ Levels (ISA models only)

An IRQ is a hardware line over which the adapter can send an interrupt (request for service) to the microprocessor. There are several IRQ lines built into the computers hardware and each can be assigned a different levels of priority. These levels allows the microprocessor to determine the relative importance of incoming service requests from the different adapters installed in the server computer.

Several of the IRQ levels are reserved for system use, such as for disk drivers, com ports, and so on. In addition, several are available for assignment to optional adapter boards. It is important that each adapter be assigned a different IRQ level otherwise an interrupt conflict can result (two adapters requesting service at the same time and at the same priority level).

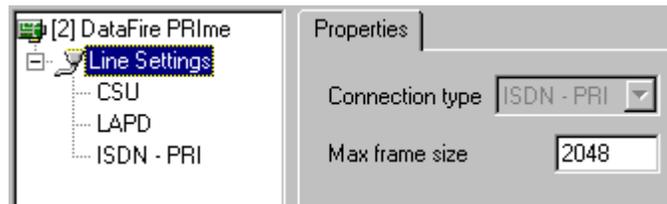
Be sure to assign a unique IRQ level to each adapter installed in the system, and one that is not already in use by an adapter or some other system component.

You can click the **Windows NT diagnostics** button in the DataFire PRIme Adapter Setup tab, then choose Resources/IRQ to determine which IRQ levels are in use. Enter the IRQ level selected for the adapter in the worksheet on page 22.

Setting Line Properties

In the contents pane on the left, select Line Settings. The *Properties* tab in the properties pane, shown in Figure 3, allows you to specify the Connection type and Maximum packet size that is handled by the ISDN line.

Figure 3 **The Line Settings Properties Tab**



Connection Type

This value may not be changed from its default value connection type of ISDN-PRI.

Maximum Frame Size

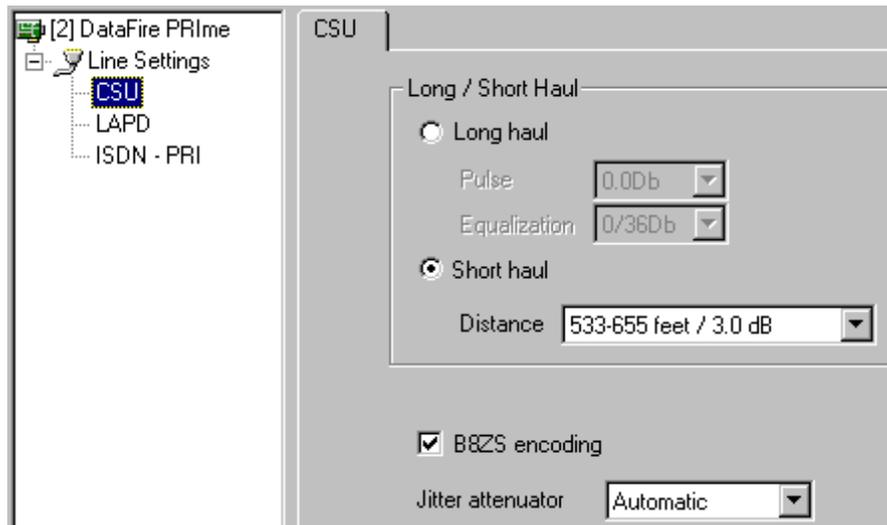
The default value for the maximum frame size is 2048. Change this setting only if specified by the ISDN service provider and then only to the value specified.

Setting CSU Properties

From the contents pane on the left, select CSU. The *CSU* tab in the properties pane, shown in Figure 4, allows you to specify long haul and short haul values as well as select UniPolar mode and B8ZS encoding.

Figure 4

The CSU Tab



Long haul

If the line is greater than 655 feet (200 meters), it is considered “long haul.” The default level for the Pulse is 0dB. The default values for the Equalization are 0 to 36dB. Other values for Pulse and Equalization may be supplied by your service provider.

Short haul

If the line is less than 655 feet (200 meters), it is considered “short haul” and the length should be specified to the CSU from the choices in the drop-down list.

B8ZS encoding

B8ZS encoding defines the encoding scheme for the binary data passed between the adapter. Clear channel data rates cannot be achieved (for example, 64kbps on a B-channel) without this encoding.

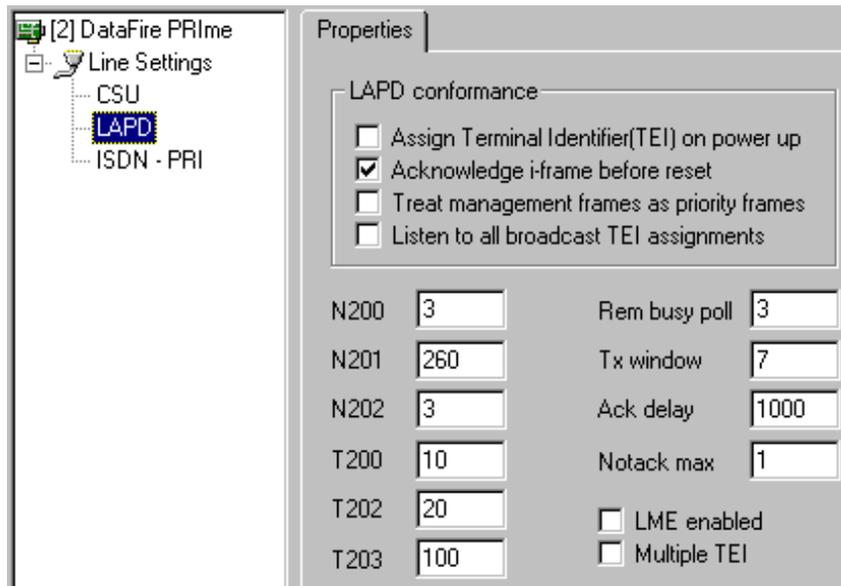
Jitter attenuator

The default value for the Jitter Attenuator is “Automatic.” This item should be selected only on direction from your service provider or Digi Technical Support.

Setting LAPD Properties

From the contents pane on the left, select LAPD. The LAPD *Properties* tab in the properties pane, shown in Figure 5, allows you to specify characteristics, limits, and timers for the LAPD channel.

Figure 5 The LAPD Properties Tab



Assign Terminal Identifier (TEI) on power up

If this is checked, a TEI should be requested from the network on detection of power at the interface. Otherwise, TEI assignment is delayed until a service is requested by layer 3, which requires a TEI.

Acknowledge i-frame before reset

If this is checked, the I frame containing the NR error will be acknowledged before the link is reset.

Treat management frames as priority frames

If this is checked, all management frames will be passed to the physical level as priority frames.

Listen to all broadcast TEI assignments

If this is checked, all TEI assignment messages will be checked for possible multiple assignment and not just when a request is outstanding.

N200, N201, N202

The **N200** value is the maximum number of retransmissions of a frame when in timer recovery condition. The default value is 3.

The **N201** value is the maximum number of octets in an information field. For an SAP (Service Access Point) supporting signaling or packet information, the default value is 260.

The **N202** value is the maximum number of transmissions of the TEI assignment identity request message. The default value is 3.

T200, T202, T203

The **T200** value is the maximum time (in tenths of seconds) allowed in which a response to a transmitted frame is expected to be received. The default value is 10.

The proper operation of the procedure requires that time T200 be greater than the maximum time between transmission of command frames and the reception of their corresponding response or acknowledgment frames.

The **T202** value is the minimum time (in tenths of seconds) between transmission of TEI assignment identity request messages. The default value is 20.

The **T203** value is the maximum time (in tenths of seconds) allowed without frames being exchanged. Expiration results in transmission of a supervisory frame with the poll bit set to one. The default value is 100.

Rem busy poll

The **Rem busy poll** value is the maximum number of times a remote station will be polled when it is in a busy condition. If no change of state is notified within this time, then the data link is re-established.

Tx window

The **Tx window** value is the maximum number of sequentially numbered transmitted I frames that may be outstanding at any given time.

Ack delay

The **Ack delay** value is the maximum delay allowed before transmitting any pending acknowledgments.

Notack max

The **Notack max** value is the maximum number of I frames allowed to be received at any given time before they must all be acknowledged. The value must not exceed 127 for extended (modulo 128) operation.

Default values:

- 1 - for an SAP supporting basic access D-channel (16 kbit/sec) signaling.
- 3 - for an SAP supporting basic access D-channel (16 kbit/sec) X.31 packet information.
- 4 - for an SAP supporting basic access D-channel (16 kbit/sec) LAPD-based packet information.

LME enabled

If **LME enabled** is checked, the local management entity is enabled providing support for the management procedures to TEI assignment, TEI checking, and TEI removal. If not checked, only a TEI of value zero is supported.

Multiple TEI

If **Multiple TEI** is checked, more than one TEI is supported per subnetwork, each one being associated with an active upper stream. If not checked, one TEI is supported per subnetwork and is associated with the lower stream.

Setting ISDN - PRI Properties

From the contents pane on the left, select ISDN - PRI. The ISDN - PRI *Properties* tab in the properties pane, shown in Figure 6, allows you to specify several link management options as well as automatic loopback.

Figure 6 The ISDN-PRI Properties Tab

The screenshot shows a dialog box with two tabs: 'Properties' and 'Timers'. The 'Properties' tab is active. It is divided into two main sections. The left section, titled 'Options', contains a list of ten checkboxes. The right section contains several dropdown menus and a group of checkboxes. The 'Switch Type' dropdown is set to 'National ISDN-2'. The 'Address Type' dropdown is set to 'National'. The 'Numbering Plan' dropdown is set to 'Unknown'. The 'Subaddress Type' dropdown is set to 'NSAP'. Below these is a group box titled 'Incoming transfer capabilities' containing seven checkboxes.

Option	Checked
Self-Identification	Yes
Multiple Subscriber Number	No
Start immediately with datalink up	Yes
Generate High Layer Compatibility	No
Check High Layer Comaptibility	No
B-channel cut through	No
Use Directory Number	Yes
Loopback	No
Fixed Channel	No
Scattered Channel	No
Sequential Channel	No

Switch Type	Value
Switch Type	National ISDN-2
Address Type	National
Numbering Plan	Unknown
Subaddress Type	NSAP

Capability	Checked
Speech	No
3.1khz audio	No
7khz audio	No
Unres digital	No
Res digital	Yes
Digital 56	No
Video	No

Switch Type

Select the appropriate switch types; National ISDN-2, AT&T 5ESS, Northern Telecom DMS-100, or if the installed adapter is a European model, Euro ISDN (ETSI). This information is supplied by your ISDN service provider. If you previously filled out the worksheet at the back of this manual, you should have this information available.

Address Type

Type of address expected on incoming calls in the calling/called party number fields incoming call request. Any of the following values are possible:

Value	Meaning
International	This number type is used to indicate international address numbering.
National	This number type is used to indicate national address numbering. This is the default.
Network	This number type is used to indicate administration/service number specific to the serving the network; such as when used to access an operator.

Numbering Plan

Numbering plan is part of the calling/called part number and can be any of the following values:

Value	Meaning
Unknown	This numbering plan selection is used when the user or the network has no knowledge of the numbering plan.
ISDN	Selects the ISDN/telephony numbering plan.
Data	Selects the data numbering plan.
Telex	Selects the telex numbering plan.
National	Selects the national standard numbering plan.
Private	Selects a private number plan.

Subaddress Type

Type of subaddress is part of the calling/called part number and can be any of the following values:

NSAP - Parsing of the address is based on NSAP X.213 addressing standard.
This is typically the default selection.

User - For user-specified subaddress, this field selected for application specific needs.

Note: It is recommended that the NSAP subaddress be used since this subaddress type allows the use of decimal, binary, and IA5 characters in a standardized manner.

Self-Identification

If this is checked, the local calling address Information Element (IE) is included in a SETUP message. Otherwise, the address is not included.

Multiple Subscriber Number

In a point-to-point NT-TE configuration it can be assumed that all incoming calls are for the TE, or the NT would not have forwarded the calls; so no check is necessary. This is the default setting.

Start immediately with datalink up

If this is checked, the LAPD data link to NT will be brought up automatically as soon as LAPD stream is found.

Generate High Layer Compatibility

If this is checked, the option to generate a high layer compatibility information element in incoming SETUP messages is enabled.

Check High Layer Compatibility

If this is checked, the option to check a high layer compatibility information element in incoming SETUP messages is enabled.

B-channel cut through

If this is checked, B-channel cut through should be used.

Use Directory Number

If set, utilizes any configured directory numbers or subaddresses. This is only appropriate for switch type National ISDN-2. This field is typically not selected.

Loopback

Used for testing call processing between two subnets. One port is set to be Network and the other is Terminal. This field is typically not selected.

Fixed Channel

If this is checked, a fixed B-channel aggregation scheme to achieve H-channel capacity is indicated. Fixed channel is the aggregation of six consecutive B channels, starting at the first channel.

Scattered Channel

If this is checked, a fixed B-channel aggregation scheme to achieve H-channel capacity is indicated. Scattered channel is the aggregation of six non-consecutive B channels. This is only appropriate for switch type National-ISDN-2.

Sequential Channel

If this is checked, a fixed B-channel aggregation scheme to achieve H-channel capacity is indicated. Sequential channel is the aggregation of six consecutive B channels, starting at any channel. This is only appropriate for switch type National-ISDN-2.

Speech

Allows incoming Speech calls to be offered to the server. This parameter is typically checked.

3.1kHz audio

Allows incoming 3.1kHz audio calls to be offered to the server. This parameter typically should not be set.

7kHz audio

Allows incoming 7kHz audio calls to be offered to the server. This parameter typically should not be set.

Unres digital

Allows incoming unrestricted digital calls to be offered to the server. This parameter is typically checked.

Res digital

Allows incoming Restricted digital calls to be offered to the server. This parameter is typically checked.

Digital 56

Allows incoming digital 56kBit calls to be offered to the server. This parameter is typically checked. This is only appropriate for switch type National ISDN-2.

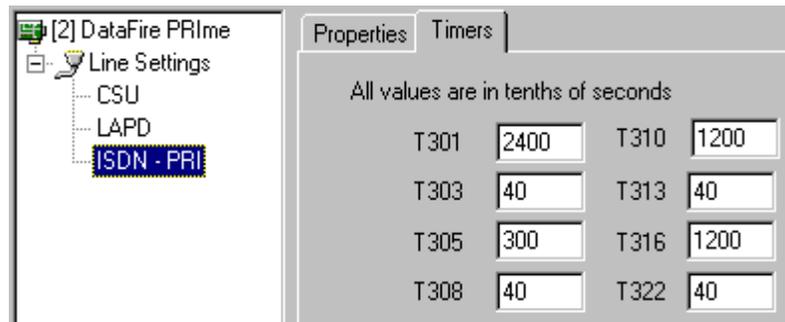
Video

Allows incoming Speech calls to be offered to the server. This parameter typically should not be set.

Setting ISDN - PRI Timers

From the contents pane on the left, select ISDN-PRI. The ISDN-PRI Properties tab in the properties pane, shown in Figure 7, allows you to specify ISDN-PRI timer values.

Figure 7 The ISDN-PRI Properties Tab



The **T301** timer has a default minimum time-out value of 4 minutes (2400 tenths of a second). T301 starts upon the receipt of an ALERT (alert ringing) condition and stops when connection is made. If T301 times out, it clears the call.

The **T303** timer has a default value of 4 seconds (40 tenths of a second). T303 starts when a SETUP (network setup) is sent and stops when an ALERT (alert ringing), CONN (connect), REL COMP (release completed) CALL PROC (call proceeding), or SETUP ACK (acknowledge setup) condition is received. On initial timeout, it re-sends and restarts; if it times out again, it sends REL COMP.

The **T305** timer has a default value of 30 seconds (300 tenths of a second). T305 starts when a request to disconnect (DISC) is sent and stops when a REL (release) or DISC condition is received. If T305 times out, it sends REL.

The **T308** timer has a default value of 4 seconds (40 tenths of a second). T308 starts when a request for release (REL) is sent and stops when a REL COMP (release completed) or REL (release) condition is received. If T308 times out, it restarts and re-sends REL; if it times out again, the B-channel is placed in the maintenance state.

The **T310** timer has a default value of 2 minutes (1200 tenths of a second) and is always greater than the value of the T303 timer. T310 starts when a CALL PROC (call proceeding) condition is received and stops when an ALERT (alert ringing), CONN

(connected), DISC (disconnected) or PROG condition is received. If T310 times out, it sends a DISC.

The **T313** timer has a default value of 4 seconds (40 tenths of a second). T313 starts when a CONN (request to connect) is sent and stops when a CONN ACK (connect acknowledgment) is received. If T313 times out, it sends a DISC (disconnected).

The **T316** timer has a default value of 2 minutes (120 tenths of a second). T316 starts when a REST (restart request) is sent and stops when a REST ACK (restart request acknowledgment) is received. If T316 times out, it restarts and re-sends the REST a nominal number of times.

The **T322** timer has a default value of 4 seconds (40 tenths of a second). T322 starts when a STAT ENQ (status inquiry) is sent and is stopped when a STAT (status), DISC (disconnected), REL (released) or REL COMP (release completed) is received. If T322 times out, it restarts and re-sends the STAT ENQ a nominal number of times.

Configuration Worksheet

Use the worksheet in this section to record the information you will need during installation and configuration of the DataFire PRIme adapter.

Adapter Setup and Line Configuration Worksheet

Depending on the Digi PRI adapter, it can accommodate one or two ISDN lines and the Digi driver for Windows NT can be used with multiple adapters in one server. Use the worksheet below to note the hardware setup for each adapter you install and the parameters for the ISDN lines connected to them. Make multiple copies of this worksheet as necessary to document all adapters.

Adapter Setup and Line Configuration Worksheet

Parameters	Adapter 1		Adapter2		Adapter 3	
*I/O Base Address						
*Memory Base Address						
*IRQ Level						
* ISA bus adapters only	Line 1	Line 2	Line 1	Line 2	Line 1	Line 2
Board Name						
Line Type						
Switch Type						
Long/Short Haul Line						
Short Haul Line						
Line Length						
Long Haul Line						
Line Build Out						
Receiver Gain						
Comment						
Circuit ID (optional)						

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