Using the DTXA Adapter

PTF U458585 provides software that allows DirectTalk Version 2.1 to use the ARTIC960RxD Quad Digital Trunk PCI Adapter. This adapter is known to DirectTalk as the DTXA adapter (DirectTalk feature code 6310).

The DTXA adapter provides an alternative way of connecting your RS/6000 (using a full PCI slot) to the telephone network: it does not require an external digital trunk processor (or pack). A single DTXA adapter performs all the functions for which you previously required a digital trunk quad adapter (DTQA), four SPACKs in a 9295 digital trunk processor, and an external power supply. This makes your DirectTalk system simpler: it occupies less space and uses less power. Figure 1 on page 2 shows how a DTXA adapter connects to the telephone switch and shows how this is simpler than with earlier adapters.

Each DTXA adapter manages the digital signals coming from the telephony switch to the RS/6000 on up to four telephony trunks. So with a single DTXA adapter you can process up to:

- 4 E1 trunks (120 telephony channels), or
- 4 T1 trunks (72 telephony channels)

You can install up to three DTXA adapters in a PCI RS/6000, provided there are sufficient slots available.

You can install both DTXAs and DTQAs in the same PCI RS/6000 (provided that model supports both adapters), but you can have no more than three adapters altogether.

To use a DTXA adapter with DirectTalk, you must do the following ***before you start DirectTalk***:

- Install the DTXA adapter in your RS/6000 (see page 3).
- Connect the DTXA adapter to any other SCbus or H.100 adapters that are already installed in the RS/6000 (see page 7).
- Connect the DTXA adapter to the telephone network (see page 7).
- Test the DTXA adapter using the supplied hardware diagnostic procedures (see page 8).
- Register DirectTalk as the owner of the DTXA adapter (see page 9).

This file also describes:

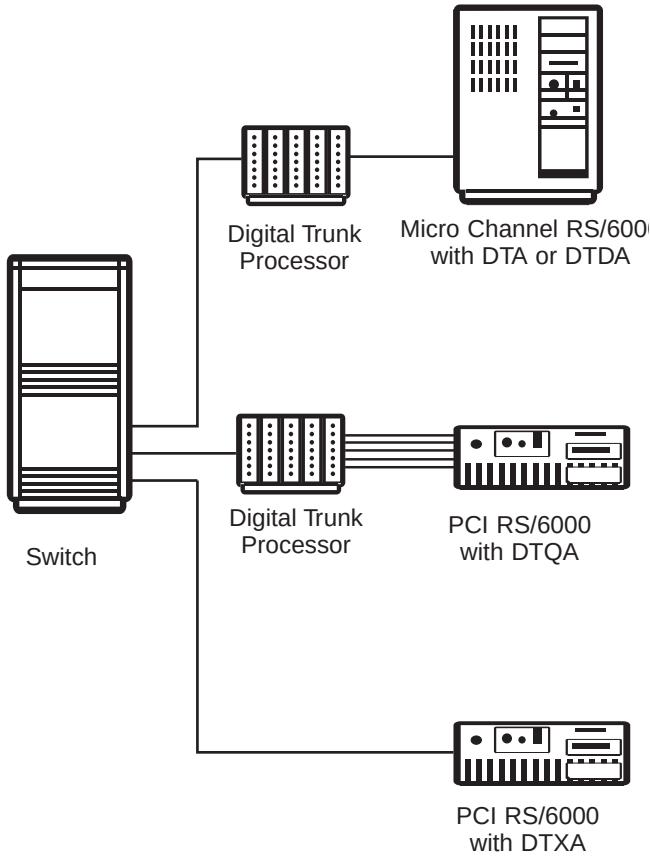

Figure 1. Connecting Your Switch to Your RS/6000

Required Hardware and Software

You can install a DTXA adapter in the following models of RS/6000:

- 7043-140
- 7025-F50
- 7026-H50

This list was correct at the time that this file was written. For a current list of supported models, see your IBM representative.

You also need the following cables:

- One or more telecommunications cables to connect each DTXA adapter to the telephone network (see “SCbus and H.100 Connections” on page 4)
- One or more cables to connect together the DTXA and other SCbus or H.100 adapters in your RS/6000 (see “SCbus and H.100 Connections” on page 4)

To use the DTXA adapter, you must install version 1.3.1 of the ARTIC driver (`devices.artic960.1.3.1`). The developer’s kit that matches this is version 1.3.0 (`devices.artic960dev.1.3.0`). You can obtain both of these drivers from the World Wide Web at http://www.hursley.ibm.com/callpath.

Installing the DTXA Adapter

You must install a DTXA adapter in a PCI, or shared PCI/ISA, slot in your RS/6000 system unit. For information on how to do this, see the *IBM ARTIC960RxD Quad Digital Trunk PCI Adapter: Guide to Operations,* part number 09J8823.

SCbus and H.100 Connections

All DTQA, DTXA, Antares, and any other SCbus or H.100 adapters in an RS/6000 must be connected together using an SCbus or H.100 top-connector cable. This is to synchronize the adapters and to support functions such as voice recognition and channel-to-channel connection (tromboning). H.100 is the new industry standard for PCI systems.

To make connection easier, install H.100 and SCbus adapters in adjacent slots in the RS/6000 system unit.

Three cables are available as DirectTalk feature codes (see Table 1). You must order the cables you require.

Table 1. H.100 Cables for DTXA Adapters

Feature Code	Cable
2877	4-way, H.100
2878	5-way, SCbus
2879	4-way, H.100, with additional SCbus connector. Use with cable 2878.

For H.100-only systems (for example, DTXA), use only cable 2877. This allows you to connect together upto four H.100 adapters.

For mixed H.100 and SCbus systems, use cables 2878 and 2879 together. This allows you to connect upto four H.100 adapters to upto four SCbus adapters.

Synchronization of Trunk Clocks

DirectTalk trunk interfaces are designed to operate in a clock-slave mode where DirectTalk attempts to recover the clock from the received signal and synchronizes its transmit clock to this recovered received clock. If the network or PBX is not configured as a clock master, incorrect operation and clock instability may result.

For DTQA and DTXA systems, unsynchronized trunk clocks can be handled by DirectTalk, but it adjusts the internal clock in order to normalize all clocks to the internal SCbus. This will probably not be noticeable on voice, but may result in excessive data errors if trunks are being used for other types of data, such as fax. For this reason, it is strongly recommended that all trunk clocks be synchronized (this will probably be the case automatically with direct network connections, but channel banks may require some special attention).

Telecommunications Cables

DirectTalk needs telecommunications cables to connect each DTXA adapter to the telephone network. You need a 4-way cable for each DTXA: the cable plugs into the rear connector of the DTXA. You can connect the cable to upto four telephone trunks, using the four separate connectors at the other end of the cable.

The cables you use depend on the type of your telephone switch, as well as the length and type of connector you require. Table 2 on page 6 shows the cables that are available. The table also shows which extension cable you need to use if the 4-way cable is not long enough.

Note: No cables are supplied with the DTXA adapter. You must order the cables you require (specifying the feature codes in Table 2) when you order your DTXA adapter.

Table 2. Telecommunications Cables for DTXA Adapters

	4-way Cable				Extension Cable			
System Type	**Length**	**Impedance**	**Connectors**	**Feature Code**	**Length**	**Impedance**	**Connectors**	**Feature code**
T1	1.8 m	100 Ω	RJ48	2710	Use a standard telephony cable.			
T1	3 m	100 Ω	DB15 (female)	2871	15 m	100 Ω	DB15 (male) to solid-core bare wires	2872[a]
E1[b]	1.8 m	120 Ω	RJ48	2709	Use a standard telephony cable.			
E1[b]	3 m	120 Ω	DB15 (female)	2873	7.5 m	120 Ω	DB15 (male) to stranded bare wires	2874[c]
E1[d]	1.8 m	75 Ω	Four BNC (female coax)	2875[e]	Use standard coaxial cables and adapters.			
E1[d]	1.8 m	75 Ω	Four BNC (female coax)	2876[f]	Use standard coaxial cables and adapters.			

a. This is the same as the cable that is supplied with the T1 SPACK.

b. For channel-associated signalling (CAS) wherever you require a balanced connection, and for ISDN everywhere.

c. This is the same as the cable that is supplied with the E1 SPACK for 120 Ω connections.

d. For channel-associated signalling (CAS) wherever you can use an unbalanced connection.

e. XMT and RCV coax shields are both grounded. Use this cable only when your telephony network or the switch does not ground XMT.

f. XMT coax shield grounded, RCV coax shield ungrounded.

Connecting Together Your SCbus and H.100 Adapters

Prerequisites

Before you connect your SCbus or H.100 adapters together, note the following:

- H.100 and SCbus adapters should be in adjacent slots.
- For H.100 adapters, the termination jumper must be set for the adapter at each end of the chain. For details see the *ARTIC960RxD Quad Digital Trunk PCI Adapter: Guide to Operations.*

Installing the Cables

The DTXA adapter has two H.100 connectors: one on the base card (nearest to the front of the RS/6000) and the other on the shorter line card. Always use the connector on the base card when you connect adapters together; DirectTalk does not use the connector on the line card.

When you install the cables on your adapters, leave any unused connectors tucked neatly inside the machine.

Connecting a DTXA Adapter to the Telephone Network

Prerequisites

You need one 4-way telecommunications cable for each DTXA adapter. You may also need one extension cable for each trunk, if the 4-way cable is not long enough to reach from the RS/6000 to the switch or telephony network.

Procedure

1. Connect the extension cable connectors to the telephony network at one end, and to the 4-way cable connectors at the other. Make sure that the transmit-to-network pins are connected to receive-from-network pins, and vice versa.

   Note: The 4-way cable connectors are numbered 0, 1, 2, and 3. These will correspond to DirectTalk trunks numbered:

   - On the first adapter: 1, 2, 3, and 4
   - On the second adapter: 5, 6, 7, and 8
   - On the third adapter: 9, 10, 11, and 12

2. Plug the 4-way cable into the rear connector socket of the DTXA, ensuring that the plug is firmly latched in place.

Running Hardware Diagnostic Procedures

Use the following procedure to run the maintenance and analysis procedures (MAPs) to test for any faults on the DTXA adapter.

Note: You must stop DirectTalk before running the stand-alone diagnostics.

1. Log in as **root**.
2. Test that the adapters are registered as `Available` on your system. To do this:
   a. At the system prompt type:
      ```
      lsdev -c | grep riciop
      ```
   b. In the output from the **lsdev** command (for an example, see Figure 2 on page 11), find the lines that describe the DTXAs. They contain the string:
      ```
      IBM ARTIC960RxD Quad Digital Trunk PCI Adapter
      ```
   c. Check that each of your DTXAs is marked as being `Available`.
3. At the system prompt type:
   ```
   cd /usr/lpp/devices.artic960/bin
   ```
4. At the system prompt type:
   ```
   ricdiag
   ```
5. Follow the instructions displayed on the screen.

Notes:

1. You should choose the menu option to test all the ARTIC960 adapters.
2. There are options to test the adapters either with or without wrap connectors fitted. A wrap connector is supplied with each adapter: for a more thorough test of the adapter, fit the wrap connector before you run the diagnostic test. You can fit the wrap connector either to the DTXA itself, or to the ends of the 4-way cable. If you want to test the cable as well, fit the wrap connector on the four ends of the cable.

Registering Ownership of Each DTXA

After you have installed one or more DTXA adapters, you must register DirectTalk as the owner of each one. To do this, use the **dt_setowner** command.

dt_setowner Command

Syntax

dt_setowner [**-q** *adapter_number*] [**-s** *adapter_number*] [**-u** *adapter_number*]

Description

Use the **dt_setowner** command to register DirectTalk as the owner of a DTXA adapter. Other applications can use a DTXA, so if you do not register DirectTalk as the owner, DirectTalk cannot use that DTXA.

Notes:

- Before you use the **dt_setowner** command, you must determine the identification number of every DTXA you want to use. To do this, see "Determining the Identification Number of a DTXA Adapter" on page 10.
- Before you can run the **dt_setowner** command, you must log in as **root**.
- You must run the **dt_setowner** command before you start DirectTalk.
- You must run the **dt_setowner** command for every DTXA you want to use.

Flags

q Displays the name of the application that has registered ownership of the DTXA.

s Registers DirectTalk as the owner of the DTXA.

u Unregisters DirectTalk as the owner of the DTXA.

adapter_number
The identification number of the DTXA. See "Determining the Identification Number of a DTXA Adapter" on page 10.

Exit Status

0 Successful completion.

>0 An error occurred. Messages show the reason for the error.

Determining the Identification Number of a DTXA Adapter

To determine the identification numbers of the DTXA adapters in your system unit:

1. Log in as **root**.
2. Type the following command and press ENTER:

   ```
   . /usr/lpp/dirTalk/tools/vae.setenv
   ```

   Leave a space between the period and the slash before `usr`.
3. Type the following command to list all the ARTIC devices installed in the system unit:

   ```
   lsdev -C | grep riciop
   ```
4. In the output from the **lsdev** command (for an example, see Figure 2 on page 11), find the lines that describe the DTXAs. They contain the string:

   ```
   IBM ARTIC960RxD Quad Digital Trunk PCI Adapter
   ```
5. At the start of each of these lines is the identifier for the adapter. For example:

   ```
   riciop4
   ```
6. Use the digits at the end of this identifier as the *adapter_number* parameter of the **dt_setowner** command.

   For example, to register DirectTalk as the owner of the DTXAs whose identifiers are `riciop1` and `riciop4`, type the commands:

   ```
   dt_setowner -s1
   dt_setowner -s4
   ```

You may need to distinguish between the DTXAs installed in your system unit if you are using some of the DTXAs for applications other than DirectTalk. If you need do this:

1. Log in as **root**.
2. Type the following command and press ENTER:

   ```
   . /usr/lpp/dirTalk/tools/vae.setenv
   ```

   Leave a space between the period and the slash before `usr`.
3. Find the location code of the adapter slot in which the DTXA you want to identify is installed.

   The location codes are described in the publications that came with your RS/6000. An example of a location code is `30-61`.
4. Type the following command to list all the ARTIC devices installed in the system unit:

   ```
   lsdev -C | grep riciop
   ```
5. In the output from the **lsdev** command (for an example, see Figure 2 on page 11), find the line that contains the location code for your adapter. For example:

   ```
   30-61
   ```

6. At the start of that line, find the identifier for the adapter. For example:

   ```
   riciop4
   ```

7. Use the digits at the end of this identifier as the *adapter_number* parameter of the **dt_setowner** command.

   For example, to display the name of the application that has registered ownership of the DTXA whose identifier is `riciop4`, type the command:

   ```
   dt_setowner -q4
   ```

Examples

Figure 2 shows an example of the output from the **lsdev** command.

```
riciop1    Available   1O-79         IBM ARTIC96ORxD Quad Digital Trunk PCI Adapter
riciop4    Available   3O-61         IBM ARTIC96ORxD Quad Digital Trunk PCI Adapter
riciop2    Available   3O-70         IBM ARTIC96O PCI Adapter
ddriciop0  Available   1O-79-OO      IBM ARTIC96ORxD PCI Device Driver
ddriciop1  Available   3O-61-OO      IBM ARTIC96ORxD PCI Device Driver
ddriciop2  Available   3O-70-OO      IBM ARTIC96O PCI Device Driver
```

Figure 2. Example of the Output from the **lsdev** Command

The following example registers DirectTalk as the owner of the first two DTXAs listed in Figure 2:

```
dt_setowner -s1
dt_setowner -s4
```

Licensing

In addition to the licenses for the DirectTalk channels you use, you also require a license for each DTXA trunk you use.

Table 3. Licence and Adapter Requirements

Channels		Trunk Licenses Required	DTXAs Required
T1	**E1**		
24	30	1	1
48	60	2	
72	90	3	
96	120	4	
120	150	5	2
144	180	6	
168	210	7	
192	240	8	
216	270	9	3
240	300	10	
264	330	11	
288	360	12	

Restrictions

The DTXA adapter does not support the Signalling System 7 (SS7) protocol.

If you want to use the alarm relay, you must make a special cable. For information on how to do this, contact your IBM representative.

Migrating from Using a DTQA

If you currently use a digital trunk quad adapter (DTQA) with DirectTalk, you will notice the following when you change to using a DTXA adapter:

- In the windows of the System Monitor and the Configurator, your DTXA adapters are listed as XPACKs.
- The trunk operation and alarm LEDs that are on the front of the SPACK are replaced by 8 LEDs on the rear of the DTXA adapter. For more information on these LEDs, see “Diagnosing Telephony Line Errors” on page 13.

Diagnosing Telephony Line Errors

Telephony line errors can be caused by:

Loss of Signal (LOS, SL)

This is most likely to be caused by a break in the wiring between a DTXA adapter and the telephony network or the switch. Check all connections and cables, replacing cables where necessary. If the problem persists, contact your network service provider.

BPV (Bipolar Violation), ER (Error Rate)

High error rates can be caused by a noisy line. Check all connections and cables, replacing cables where necessary. If the problem persists, contact your network service provider.

Other Errors

If there are communication problems between DirectTalk and the network, check your configuration because the most likely cause is a mismatch in configuration, for example, a line protocol.

For DTXA systems, the trunk alarms are indicated by LEDs on the rear of the adapter, as shown in Figure 3.

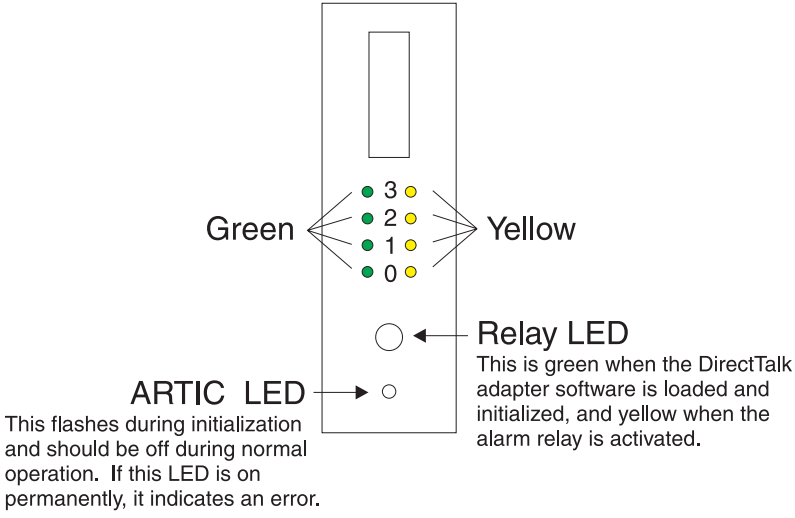

Figure 3. DTXA Backplate showing LEDs

There are two LEDs for each trunk, which indicate the following:

Green LED	Yellow LED	Meaning
On (not flashing)	On (not flashing)	Trunk not enabled
On (not flashing)	Off	Trunk enabled, no alarms
On (not flashing)	Flashing	Trunk enabled, alarm present

When trunk enabled, alarm present, is indicated, the rate of flashing of the yellow LED indicates the type of error:

Long, three short
LOS or SL (Red)

Long, two short
AIS (Blue)

Long, one short
RAI (Yellow)

Long (no short flashes)
Other errors

To display the hardware alarms, you can use the **DTXA_alarms** utility in the `$VAE/tools` directory. To use this utility, from the command line on an AIXwindow type:

```
$VAE/tools/DTXA_alarms
```

The utility displays a continuous stream of hardware alarms. These alarms are also shown in the DirectTalk System Monitor, after a short delay.