Symposium OPEN IVR
CAS and ISDN Signaling Option Guide

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This is the Standard 1.0 issue of the *Symposium OPEN IVR CAS and ISDN Signaling Option Guide*.

Contents

About this guide

Conventions used in this guide

This guide uses several typographic conventions to highlight certain types of information:

- Items that appear on the Symposium OPEN IVR screens are identified in quotes. For example:

  the “Timeout” part of the parameters window

- Prompts, File and Menu names, Directories, Accounts, and Options are shown in a different typeface. For example:

  `/sci>`

  `sci/install` menu

  `/u/nortel/3270/getbalance.act` file

- Symposium OPEN IVR buffer names are shown in all uppercase characters. For example:

  the CURRENT MESSAGE buffer

- Field names are shown in italics. For example:

  the *Device* field

- Items you must type are shown in bold in a different typeface. For example:

  type **`tn5250`** at the prompt

- Variables shown in command lines appear in italics. For example:

  the `host_cfg`*n* file, where *n* is a variable representing a board number

- Key names you press are shown in angled brackets. For example:

  the <F1> key

- Keyboards usually have keys named <Return> or <Enter> that perform the same function. For convenience, this guide uses the keyname <Enter> to represent both keynames.

Symposium OPEN IVR 4.0 documentation

These are the documents in the Symposium OPEN IVR Release 4.0 documentation suite.

Document	NT number/ A0 number P0 number
Symposium OPEN IVR 4.0 Getting Started Guide	NTVE8201 A0732100 P0881271
Symposium OPEN IVR 4.0 Product Guide	NTVE8202 A0732101 P0881273
Symposium OPEN IVR 4.0 System Administration Guide	NTVE8203 A0732102 P0881274
Symposium OPEN IVR 4.0 Application Development Guide	NTVE8209 A0732108 P0881275
Symposium OPEN IVR 4.0 Cell Catalog	NTVE8208 A0732107 P0881276
Symposium OPEN IVR 4.0 Installation, Upgrade, and Maintenance Guide	NTVE8204 A0732103 P0881277
Symposium OPEN IVR Planning and Engineering Guide	NTVE8205 A0732104 P0881278
Symposium OPEN IVR 4.0 Error Messages Guide	NTVE8206 A0732105 P0881279

Document	NT number/ A0 number P0 number
Symposium OPEN IVR 4.0 Web Option Guide	NTVE8210 A0732109 P0881281
Symposium OPEN IVR 4.0 SQL Server User Guide	NTVE8216 A0732115 P0881282
Symposium OPEN IVR 4.0 Service Console Interface Reference Manual	NTVE8207 A0732106 P0881284
Symposium OPEN IVR 4.0 VT100 Host Connectivity Configuration and Development Guide	NTVE8221 A0732120 P0881286
Symposium OPEN IVR 4.0 Text-to-Speech Option Guide	NTVE8213 A0732112 P0881292
Symposium OPEN IVR 4.0 Speech Recognition Option Guide	NTVE8212 A0732111 P0881293
Symposium OPEN IVR 4.0 Fax Option Guide	NTVE8211 A0732110 P0881294
Symposium OPEN IVR 4.0 CAS and ISDN Signaling Option Guide	NTVE8214 A0732113 P0881296

Document	NT number/ A0 number P0 number
Symposium OPEN IVR 4.0 Integration Package for Meridian Link User Guide	P0881297 NTVE8215 A0732114
Symposium OPEN IVR 4.0 Prompt Import Utility Guide	NTVE8218 A0732117 P0881400
Symposium OPEN IVR 4.0 SNA Host Communications Guide	NTVE8227 A0732774 P0881750

To install the Line Side E1 option, you require the following documentation: *Meridian 1 Line-side E1 Interface: Description, installation, and maintenance.*

Chapter 1: Introduction

Overview

This manual provides feature description and installation procedures for the following:

- CAS/ISDN PRI
- T1 ISDN PRI
- Line Side E1

CAS/ISDN PRI

This option supports the ISDN PRI ETS300 signaling protocol for Euro ISDN, DPNSS, DPNSS Enhanced, and QSIG signaling protocol, and the E1 CAS signaling protocols for Belgium, Brazil, China, Malaysia, and Mexico.

T1 ISDN PRI

This option establishes connectivity to the DMS, providing a digital interface to the switch. It supports ACD/UCD treatment, DNIS, and CLID or ANI collection, but does not support DMS-based call transfer. It supports the T1 and PRI signaling protocols for the United States and Canada.

Line Side E1 (LSE1)

This option establishes connectivity to the Meridian 1 Line Side E1 cards, providing a basic quasi-analog interface to the switch, at higher port densities and lower port costs than a loopstart interface. This PBX protocol is supported in the following countries:

Argentina	Ecuador	Luxembourg	Sweden
Austria	Finland	Mexico	Switzerland
Belgium	France	Norway	Turkey
Brazil	Germany	Peru	the United Arab Emirates
Chile	Greece	Portugal	the United Kingdom
Colombia	Holland	Puerto Rico	Venezuela
Costa Rica	Ireland	Qatar	
Denmark	Italy	Saudi Arabia	
the Dominican Republic	Jamaica	Spain	

ISDN protocols and functionality

The following table shows the functionality available for each ISDN protocol.

Feature	DPNSS	QSIG	EuroISDN	LSE1
Call answer	Yes	Yes	Yes	Yes
Call origination	Yes	Yes	Yes	Yes
CLID	Yes	Yes	Yes	No
DNIS	Yes	Yes	Yes	No
Call Transfer	Yes	Yes	Yes	No
Transfer using single channel	No	No	No	Yes
Route optimization	Yes	Yes	No	N/A
Conferencing	Yes	Yes	Yes	No

Trunk optimization is not supported across a EuroISDN trunk-network interface.

Chapter 2: E1 CAS/ISDN PRI Signaling Option features

Overview

This chapter discusses E1 CAS/ISDN PRI signaling option system requirements and features.

System requirements

The base MRS software 4.0 already includes the system requirements listed here for installing and using the E1 CAS/ISDN PRI signaling option for Symposium OPEN IVR 4.0. Specifically, these requirements are as follows:

- Symposium OPEN IVR license file created specifically for your system configuration
- for unfolded MRS systems with up to 72 ports, a minimum of 32 Mbytes of memory. Systems with more than 72 ports require a minimum of 64 Mbytes of memory.
- a combination of the following cards:
  - — one Aculab 60-port E1/PRI Network Interface Module (Rev. 4) and two Dialogic D/320 SC cards
  - — one Aculab 30-port E1/PRI Network Interface Module (Rev. 4) and two Dialogic D/320 SC card
  - — one Aculab 60-port E1/PRI Network Interface Module (Rev. 5) and two Dialogic D/320 SC cards
  - — one Aculab 30-port E1/PRI Network Interface Module (Rev. 5) and one Dialogic D/320 SC card

Note: Aculab Rev. 4 cards provide PEB-only compatibility, and each system can support only one card. Aculab Rev. 5 cards provide SCbus compatibility, and each system can support up to two Rev. 5 cards.

E1 signaling systems

CAS signaling

Symposium OPEN IVR supports E1 MFC R2 CAS signaling for the following countries and protocols:

- Belgium
- Brazil
- China
- EEMA
- Malaysia (Singapore)
- Mexico

ISDN PRI

Supported network protocols

Symposium OPEN IVR supports the following E1 ISDN PRI network protocols:

- DPNSS (Digital Private Network Signaling System)
- DPNSS Enhanced
- ETS300 (Euro ISDN)
- QSIG

  Note: You cannot use the COUT cell with an ISDN signaling protocol.

Supported signaling features

Symposium OPEN IVR supports the following E1 ISDN PRI signaling features:

- incoming calls with ANI (CLI) and DNIS (DDI) information
- outgoing calls with the capability to send the calling party ID (CLID)
- BOUT or CONP cell call conferencing

Including the features listed above, DPNSS Enhanced supports the following features:

- call diversion information
- called and calling line category information
- route optimization

Chapter 3: Installing the E1 CAS/ISDN PRI Signaling Option

Overview

This chapter describes how to install the E1 CAS/ISDN PRI signaling option.

High-level procedure

Installing the E1 CAS/ISDN PRI Signaling option requires the following steps:

1 Installing the license file.

2 Installing the CAS/ISDN PRI signaling options from the CD-ROM.

3 Configuring the signaling protocols.

4 Installing the E1 CAS/ISDN PRI signaling option hardware.

E1 CAS/ISDN PRI Signaling Option package components

The E1 CAS/ISDN PRI Signaling option includes the following components:

- EISA Configuration Utility (ECU) File
- CAS Signaling
- DPNSS Signaling
- DPNSS Enhanced Signaling
- ETS-300 Euro ISDN Signaling
- QSIG Signaling

Note: Every shipment of MRS software 4.0 includes a license key file that specifies the options for that installation.

Installing the license file

Note: The license file is available only on floppy disk and is installed when you are upgrading your system.

Before you begin

Before you install the license file, make sure of the following:

- The build process has been completed successfully
- the network (between the AP and MRS) is functioning properly
- remote commands (for example, `rcp`) work properly

Installing the file

To install the license file, follow these steps.

1 Insert the license disk into the floppy drive of the main AP.

This disk is DOS formatted, and contains any of the following files.

File	Contains	For
`w1234500.kcd`	KDS (version 2.0) enveloped licensed files	AP1
`w1234501.kcd`		MRS1
`w1234502.kcd`		MRS2
`w1234503.kcd`		MRS3
`w1234504.kcd`		MRS4
`w1234588.kcd`		MRS/AP
`w1234599.kcd`		redundant AP (AP2)

The disk could also contain raw (unenveloped) versions of license files.

File	Contains	For
w1234500.kcd	raw licensed file	AP1
w1234501.kcd		MRS1
w1234502.kcd		MRS2
w1234503.kcd		MRS3
w1234504.kcd		MRS4
w1234588.kcd		MRS/AP
w1234599.kcd		redundant AP (AP2)

Note: Any files named differently from the above will not work.

2 At the UNIX prompt, type the following:

```
install_licenses
```

3 Monitor the progress of the installation.

If the installation of the licenses to an AP or an MRS was successful, the following message is displayed:

```
Successfully installed license for ....
```

Note 1: If there are any problems distributing the files to the different MRSs or APs, the following message is displayed:

```
Unable to copy license file for  ....
```

This indicates a problem with the network connection. Test your network connections with `ping` or `telnet`, and try again.

Note 2: If there is a problem unwrapping a KDS enveloped license file, the following message is displayed:

```
Unable to extract license file for ....
```

This indicates a problem with either the disk itself or the drive that you are using. Test both of these, and then try the installation again.

4 Restart the OPEN IVR system.

The license takes effect upon startup.

Installing the CAS/ISDN PRI signaling options from the CD-ROM

To install the CAS/ISDN PRI signaling options, follow these steps.

1 Access the SCI, and log in as **`service`**.

2 At the `/sci` menu, type **`install`**. When prompted, type **y** to indicate that you wish to continue.

3 At the `/sci/install` menu, type **`package`** and press <Enter>**.**

The system displays the following options:

```
Select Media Device:
1. CD-ROM
2. Hard Disk          (local installs only)
3. Floppy Disk        (local installs only)
Please enter your selection or q to quit [ ]:
```

4 Type **1** and press <Enter>.

The system displays the following options:

```
Specify which host machine installing FROM and TO:

1. FROM localhost TO localhost
2. FROM remote host TO localhost
3. FROM localhost TO remote host
Please enter your selection or q to quit [ ]:
```

5 Make your selection depending on where the CD-ROM is located. If you select **2** or **3**, you see the prompt for the host name of the remote machine.

Note: You should enter the full domain name or IP address if prompted for the remote host name.

After the host information is gathered, you see the prompt:

```
Enter “c” to continue, “r” to redo, or “q” to quit
```

6 Type **c** to continue.

The system displays the following message:

```
Insert installation CD into CD-ROM drive at host
=> localhost.
Type q to quit or hit ENTER to continue:
```

7 Insert the CD-ROM into the CD-ROM drive, and press <Enter> to continue.

Note: The localhost name shown above may be another host name, depending on the type of installation.

The system displays the following:

```
Specify which packages will be installed:
(Enter y or n to select packages, or q to quit)

AP    [n]?
MRS   [n]?
License Manager[n]?
Enter “c” to continue, “r” to redo, or “q” to quit:
```

8 Type **y** for the MRS selection, and type **c** to continue.

The system displays the following:

```
Select the MRS packages to be installed:

System packages[n]?
Speech technologies[n]?
Fax, E1/PRI, BRI[n]?
DPD, Global Call[n]?
```

9 Type **y** for the `Fax, E1/PRI, BRI` package.

The system displays the following:

```
Installing Fax [n]?
Installing Aculab E1/PRI Options [n]?
E1 CAS Signaling Option. . . . . [n]?
Euro ISDN Signaling Option. . . .[n]?
DPNSS Signaling Option[n]?
DPNSS Enhanced Signaling Option[n]?
QSIG Signaling Option[n]?
```

10 Type **n** at the `Installing Fax` prompt. Type **y** at the `Installing Aculab E1/PRI Options` prompt and at each signaling option prompt that you wish to install.

Note: You can install as many signaling protocols on your MRS as you wish, but you can configure only one protocol to run at a time.

11 Press <Enter> at all the other option install prompts.

The system displays the following:

```
Enter “c” to continue, “r” to redo, or “q” to quit:
```

12 Type **c** to continue.

If the E1 CAS/ISDN PRI Signaling option has been previously installed, you see the prompt to replace the original copy.

13 Type **y** to continue.

The system installs the PRI Signaling option and provides informational messages during the installation. When the installation is complete, the system responds with the following message:

```
Installation complete.
```

The following prompt then appears:

```
Press ENTER to continue or “q” to quit:
```

14 Type **q** to quit.

The following prompt appears:

```
No other software packages selected.
Install another software package (y/n)?
```

15 Type **n** and press <Enter>.

16 Continue with “Configuring the signaling protocols” on page 3-9.

Configuring the signaling protocols

This section provides the procedures for configuring the signaling protocols.

Note 1: You can install as many signaling protocols on your MRS as you wish, but you can configure only one protocol to run at a time.

Note 2: The procedures for configuring the parameters require some signaling-specific information for proper system configuration. Before you start, read these procedures thoroughly to determine the appropriate responses to system prompts.

E1 CAS signaling protocol

To configure your system to use one of the E1 CAS signaling protocols, follow these steps.

1 At the `/sci/install>` prompt, type **`country`** and press <Enter>.

The system displays the copyright notice.

2 Press <Enter> to continue.

The system displays the following:

```
Do you want to configure the system to use Aculab E1
network cards? [y/n]:
```

3 Type **y** and press <Enter> to continue.

The system displays the following:

```
Number of Aculab cards in the system? 1 or 2  [ ]:
```

4 Respond appropriately, and press <Enter> to continue.

a If you choose **1**, you see the following prompt:

```
Number of trunks on your Aculab card? 30 or 60  [ ]:
```

b If you choose **2**, you see the following prompt:

```
Number of trunks on your first Aculab card? 30 or 60
[ ]:
Number of trunks on your second Aculab card? 30 or
60  [ ]:
```

5 If you are using one 30-port card, type **30**. If you are using one 60-port card, type **60**. If you are using two cards, respond appropriately to the prompts.

Note: If you have two cards and you choose 30 for the first card, the system automatically chooses 30 for the second card. If you have a 60-port card and a 30-port card, enter the 60-port card first.

6 Press <Enter> to continue.

The system displays the following:

```
Do you want to configure the system to use SCbus?
[y/n]:
```

Note: To configure for SCbus, you must have an SCbus-based system.

7 Respond appropriately, and press <Enter> to continue.

The system displays the following:

```
1. ETS300 - Euro-ISDN
2. CAS - Belgium
3. CAS - Brazil
4. CAS - China
5. CAS - Malaysia
6. CAS - Mexico
7. CAS - EEMA
8. DPNSS
9. QSIG
Enter the number of the protocol/country
you want to configure the system for.
```

8 Respond appropriately, and press <Enter> to continue.

If you choose **2** for Belgium, continue from here.

If not, skip to step 10 and continue.

9 If you are using one card, the system displays the following:

```
Configure as User end or Network end [un]?
```

If you are using two cards, the system displays the following:

```
Configure first card as User end or Network end
[un]?
Configure second card as User end or Network end
[un]?
```

Respond appropriately, and press <Enter> to continue.

10 The system displays the following:

```
Enter the number of DDI digits expected: 0 to 30 [
]:
Enter the number of CLI digits expected: 0 to 30 [
]:
Do you want to strip calling line category digit?
[y/n]:
```

Note: When you install the CAS signaling option, the system prompts you to enter the number of Direct Dialed Inward (DDI) and Calling Line Identity (CLI) digits to be used. (DDI and CLI are equivalent to DNIS and ANI, respectively.) Consequently, Nortel suggests that you know the number of digits that the network provides before installing the country parameters. (If you do not know the appropriate number, specify a sufficiently high number of digits.)

11 Respond to each question appropriately, and press <Enter> to continue.

The system displays the following:

```
This system will be configured using <selected
country> parameters
Number of Aculab boards = X
Aculab board type = XX port[1]
Aculab Firmware = XXXXXX.ram
Number of DNIS (DDI) digits = XX
```

1. If there are two E1/PRI cards in your configuration, this message displays:
   `Aculab board 1 type = XX port, Aculab board 2 type = XX port.`

```
Number of ANI (CLI) digits = XX
```

where <*selected country*> is the name of the country selected in step 8

```
Do you wish to continue the installation [y/n]:
```

12 If your system configuration is satisfactory, type **y**, and press <Enter> to continue.
If your system configuration is not satisfactory, type **n**, press <Enter>, and return to step 1.

If you typed **y**, the system displays the following:

```
Installing files...
```

After installation, the system displays the following:

```
Do you wish to manually edit the space.c file? [y/n]
```

Note: Some installations require modification of the *space.c* file for use with certain types of telco switches. If you are not familiar with the *space.c* file, type **n** to disregard this question and continue the installation.

13 Respond appropriately, and press <Enter>.

The system displays the following:

```
Do you wish to continue the installation [y/n]:
```

14 Type **y**, and press <Enter>.

The system displays several information messages.

When the installation is complete, the system displays the following:

```
The Voicetek XXX Country Parameters
have now been installed.
```

15 At the /sci/install> prompt, type **restart**, and press <Enter>.

The configuration of the E1 CAS Signaling option is complete.

16 Continue with “Installing the E1 CAS/ISDN PRI signaling option hardware” on page 3-25.

ETS300-EURO-ISDN signaling protocol

To configure your system to use the ETS300-Euro-ISDN signaling protocol, follow these steps.

1 At the `/sci/install>` prompt, type **`country`**, and press <Enter>.

The system displays the copyright notice.

2 Press <Enter> to continue.

The system displays the following:

```
Do you want to configure the system to use Aculab E1
network cards? [y/n]:
```

3 Type **y**, and press <Enter> to continue.

The system displays the following:

```
Number of Aculab cards in the system? 1 or 2  [ ]:
```

4 Respond appropriately, and press <Enter> to continue.

a If you choose **1**, you see the following prompt:

```
Number of trunks on your Aculab card? 30 or 60  [ ]:
```

b If you choose **2**, you see the following prompts:

```
Number of trunks on your first Aculab card? 30 or 60
[ ]:
Number of trunks on your second Aculab card? 30 or
60  [ ]:
```

5 If you are using one 30-port card, type **`30`**. If you are using one 60-port card, type **`60`**. If you are using two cards, respond appropriately to the prompts.

Note: If you have two E1/PRI cards and you choose 30 for the first card, the system automatically chooses 30 for the second card. If you have a 60-port card and a 30-port card, enter the 60-port card first.

6 Press <Enter> to continue.

The system displays the following:

```
Do you want to configure the system to use SCbus?
[y/n]:
```

Note: To configure for SCbus, you must have an SCbus-based system.

7 Respond appropriately, and press <Enter> to continue.

The system displays the following:

```
1. ETS300 - Euro-ISDN
2. CAS - Belgium
3. CAS - Brazil
4. CAS - China
5. CAS - Malaysia
6. CAS - Mexico
7. CAS - EEMA
8. DPNSS
9. QSIG
Enter the number of the protocol/country
you want to configure the system for.
```

8 Type **1**, and press <Enter> to continue.

a If you are using one E1/PRI card, you see the following prompt:

```
Configure ETS300 as User end or Network end [un]?
```

b If you are using two E1/PRI cards, you see the following prompts:

```
Configure first card as User end or Network end
[un]?
Configure second card as User end or Network end
[un]?
```

Note: You must configure your MRS in the opposite manner to the equipment your system is connecting to. For example, if the remote equipment is configured as a user end, you must configure your MRS as a network end.

Typically, if you configure your system to communicate with the network, you specify user end. If you configure your system to communicate with an E1 switch, you specify network end.

9 Respond appropriately to the prompts, and press <Enter>.

The system displays the following:

```
Configure ETS using CRC (cyclic redundancy
checking) [yn]?
```

Note: Cyclic Redundancy Checking (CRC) is a form of error checking that may or may not be enabled on the E1 network that your system connects to. To answer this prompt appropriately, you must determine whether CRC is necessary.

10 Respond appropriately, and press <Enter>.

The system displays the following:

```
Do you want to use SS7 out of band signaling [yn]?
```

11 Respond appropriately, and press <Enter>.

After installation, the system displays the following:

```
This system will be configured using ETS300
parameters
Number of Aculab boards  = X
Aculab board type = XX port[1]
Aculab Firmware card = XXXXXX.ram[2]

Do you wish to continue the installation [y/n]:
```

1. If there are two E1/PRI cards in your configuration, this message displays:
   `Aculab board 1 type = XX (30 or 60) port, Aculab board 2 type = XX (30 or 60) port.`
2. If there are two E1/PRI cards in your configuration, this message displays:
   `Aculab Firmware card 1 = XXXXXX.ram, Aculab Firmware card 2 = XXXXXX.ram.`

12 If your system configuration is satisfactory, type **y**, and press <Enter> to continue. If your system configuration is not satisfactory, type **n,** press <Enter>, and return to Step 1.

If you typed **y**, you see the following prompt:

```
Do you wish to manually edit the space.c file? [y/n]
```

Note: Some installations require modification of the `space.c` file for use with certain types of telco switches. If you are not familiar with the `space.c` file, type **n** to disregard this question, and continue the installation.

13 Respond appropriately, and press <Enter>.

```
Do you wish to continue the installation [y/n]:
```

14 Type **y**, and press <Enter>.

The system displays several information messages.

When the installation is complete, the system displays the following:

```
The Voicetek ETS300 Country Parameters
have now been installed.
```

15 At the `/sci/install>` prompt, type **`restart`**, and press <Enter>.

The configuration of the Aculab ETS300-Euro-ISDN Signaling option is complete.

16 Continue with “Installing the E1 CAS/ISDN PRI signaling option hardware” on page 3-25.

DPNSS/DPNSS Enhanced Signaling protocol

To configure your system to use the DPNSS/DPNSS Enhanced Signaling Protocol for your system, follow these steps.

1 At the `/sci/install>` prompt, type **`country`**, and press <Enter>.

The system displays the copyright notice.

2 Press <Enter> to continue.

The system displays the following:

```
Do you want to configure the system to use Aculab E1
network cards? [y/n]:
```

3 Type **y**, and press <Enter> to continue.

The system displays the following:

```
Number of Aculab cards in the system? 1 or 2  [ ]:
```

4 Respond appropriately, and press <Enter> to continue.

a If you choose **1**, you see the following prompt:

```
Number of trunks on your Aculab card? 30 or 60  [ ]:
```

b If you choose **2**, you see the following prompts:

```
Number of trunks on your first Aculab card? 30 or 60  [ ]:
Number of trunks on your second Aculab card? 30 or 60  [ ]:
```

5 If you are using one 30-port card, type **30**. If you are using one 60-port card, type **60**. If you are using two cards, respond appropriately to the prompts.

Note: If you have two E1/PRI cards and you choose 30 for the first card, the system automatically chooses 30 for the second card. If you have a 60-port card and a 30-port card, enter the 60-port card first.

6 Press <Enter> to continue.

The system displays the following:

```
Do you want to configure the system to use SCbus?
[y/n]:
```

Note: To configure for SCbus, you must have an SCbus-based system.

7 Respond appropriately, and press <Enter> to continue.

The system displays the following:

```
1. ETS300 - Euro-ISDN
2. CAS - Belgium
3. CAS - Brazil
4. CAS - China
5. CAS - Malaysia
6. CAS - Mexico
7. CAS - EEMA
8. DPNSS
9. QSIG
Enter the number of the protocol/country
you want to configure the system for.
```

8 Type **8**, and press <Enter> to continue.

The system displays the following:

```
Do you want to use Enhanced drivers [yn]?
```

9 If you installed the DPNSS Enhanced Signaling Option, type **y**, and press <Enter>; otherwise, type **n**, and press <Enter> to continue.

a If you are using one E1/PRI card, you see the following prompt:

```
Configure DPNSS with bits A/X or B/Y [ab]?
```

b If you are using two E1/PRI cards, you see the following prompts:

```
Configure first card with bits A/X or B/Y [ab]?

Configure second card with bits A/X or B/Y [ab]?
```

Note: To properly configure the card bits, you must choose a setting opposite to that for the switch connected to the MRS. If the switch is set to A, choose B. If the switch is set to B, choose A.

10 Respond appropriately to the prompts, and press <Enter> to continue.

The system displays the following:

```
This system will be configured using DPNSS
parameters
Number of Aculab boards = X
Aculab board type = XX port[1]
Aculab Firmware card = XXXXXX.ram[2]
DPNSS card signalling = XX[3]

Do you wish to continue the installation [y/n]:
```

11 If your system configuration is satisfactory, type **y**, and press <Enter> to continue. If your system configuration is not satisfactory, type **n,** press <Enter>, and return to step 1.

After installation, you see the following prompt:

```
Do you wish to manually edit the space.c file? [y/n]
```

Note: Some installations require modification of the `space.c` file for use with certain types of telco switches. If you are not familiar with the `space.c` file, type **n** to disregard this question and continue the installation.

12 Respond appropriately, and press <Enter>.

```
Do you wish to continue the installation [y/n]:
```

13 Type **y**, and press <Enter>.

The system displays several information messages.

When the installation is complete, the system displays the following:

```
The Nortel DPNSS Country Parameters
have now been installed.
```

---

1. If there are two E1/PRI cards in your configuration, this message displays:
   `Aculab board 1 type = XX port, Aculab board 2 type = XX port.`
2. If there are two E1/PRI cards in your configuration, this message displays:
   `Aculab Firmware card 1 = XXXXXX.ram, Aculab Firmware card 2 = XXXXXX.ram.`
3. If there are two E1/PRI cards in your configuration, this message displays:
   `DPNSS card 1 signaling, DPNSS card 2 signaling.`

14 At the `/sci/install>` prompt, type **`restart`**, and press <Enter>.

The configuration of the DPNSS Signaling option is now complete.

15 Continue with “Installing the E1 CAS/ISDN PRI signaling option hardware” on page 3-25.

QSIG signaling protocol

Follow this procedure to configure your system to use the QSIG signaling protocol.

1 At the `/sci/install>` prompt, type **`country`**, and press <Enter>.

The system displays the copyright notice.

2 Press <Enter> to continue.

The system displays the following:

```
Do you want to configure the system to use Aculab E1
network cards? [y/n]:
```

3 Type **y**, and press <Enter> to continue.

The system displays the following:

```
Number of Aculab cards in the system? 1 or 2  [ ]:
```

4 Respond appropriately, and press <Enter> to continue.

a If you choose **1**, you see the following prompt:

```
Number of trunks on your Aculab card? 30 or 60  [ ]:
```

b If you choose **2**, you see the following prompts:

```
Number of trunks on your first Aculab card? 30 or 60
[ ]:
Number of trunks on your second Aculab card? 30 or
60  [ ]:
```

5 If you are using one 30-port card, type **`30`**. If you are using one 60-port card, type **`60`**. If you are using two cards, respond appropriately to the prompts.

Note: If you have two E1/PRI cards and you choose 30 for the first card, the system automatically chooses 30 for the second card. If you have a 60-port card and a 30-port card, enter the 60-port card first.

6 Press <Enter> to continue.

The system displays the following:

```
Do you want to configure the system to use SCbus?
[y/n]:
```

Note: To configure for SCbus, you must have an SCbus-based system.

7 Respond appropriately, and press <Enter> to continue.

The system displays the following:

```
1. ETS300 - Euro-ISDN
2. CAS - Belgium
3. CAS - Brazil
4. CAS - China
5. CAS - Malaysia
6. CAS - Mexico
7. CAS - EEMA
8. DPNSS
9. QSIG
Enter the number of the protocol/country
you want to configure the system for.
```

8 Type **9**, and press <Enter> to continue.

a If you are using one card, you see the following prompts:

```
Configure QSIG as Master end or Slave end [ms]?
Configure 'priority if call clash' as A or B [ab]?
```

b If you are using two cards, you see the following prompts:

```
Configure first card as Master end or Slave end
[ms]?
Configure first card 'priority if call clash' as A
or B [ab]?
Configure second card as Master end or Slave end
[ms]?
Configure second card 'priority if call clash' as A
or B [ab]?
```

Note: You must configure your MRS in the opposite manner to the equipment your system is connecting to. For example, if the remote equipment is configured as a master end, you must configure your MRS as a slave end.

Typically, if you configure your system to communicate with the network, you specify slave end. If you configure your system to communicate with an E1 switch, you specify master end.

9 Respond appropriately to the prompts, and press <Enter> to continue.

The system displays the following:

```
Configure QSIG using CRC (cyclic redundancy
checking) [yn]?
```

Note: Cyclic Redundancy Checking (CRC) is a form of error checking that may or may not be enabled on the E1 network that your system connects to. To answer this prompt appropriately, you must determine if CRC is necessary.

10 Respond appropriately, and press <Enter>.

After installation, you see the following prompt:

```
This system will be configured using QSIG
parameters
Number of Aculab boards = X
Aculab board type = XX port[1]
Aculab Firmware card = XXXXXX.ram[2]

Do you wish to continue the installation [y/n]:
```

1. If there are two cards in your configuration, this message displays:
   `Aculab board 1 type = XX (30 or 60) port, Aculab board 2 type = XX (30 or 60) port.`

11 If your system configuration is satisfactory, type **y**, and press <Enter> to continue. If your system configuration is not satisfactory, type **n,** press <Enter>, and return to step 1.

If you type **y**, you see the following prompt:

```
Do you wish to manually edit the space.c file? [y/n]
```

Note: Some installations require modification of the `space.c` file for use with certain types of telco switches. If you are not familiar with the `space.c` file, type **n** to disregard this question and continue the installation.

12 Respond appropriately, and press <Enter>.

The system displays the following:

```
Do you wish to continue the installation [y/n]:
```

13 Type **y**, and press <Enter>.

The system displays several information messages.

When the installation is complete, the system displays the following:

```
The Nortel QSIG Country Parameters
have now been installed.
```

14 At the `/sci/install>` prompt, type **`restart`**, and press <Enter>.

The configuration of the QSIG Signaling Option is complete.

15 Continue to the next section.

2. If there are two cards in your configuration, this message displays:
   `Aculab Firmware card 1 = XXXXXX.ram, Aculab Firmware card 2 = XXXXXX.ram.`

Installing the E1 CAS/ISDN PRI signaling option hardware

To install the E1 hardware, follow these steps.

Note: Wear an antistatic wrist band when handling the option cards.

1 Unpack the E1 CAS/ISDN PRI Signaling option card(s) and remove it (them) from the antistatic bag.

CAUTION

Risk of data loss

Always observe proper precautions when working with the system. Be sure to follow all applicable electrostatic discharge (ESD) guidelines during configuration and installation of the option cards.

2 Shut down the MRS.

3 Once the shutdown process is complete, turn off the power to the system.

4 Configure the E1 interface card(s) as shown in the configuration drawings in Appendix A, "Card configurations for the E1 CAS/ISDN PRI option."

If the system is configured to use PEB, the E1 interface card must be installed at the end of the PEB(s). If the system is configured to use SCbus, the E1 interface card(s) can be installed anywhere on the SCbus cable. The illustrations and tables in Appendix A illustrate cabling, proper I/O addressing, board operation, and hardware interrupt settings. Be aware of the notes that accompany the tables.

5 Open the system and find an open slot in which you can install the E1 interface option card(s). Follow the recommendations in step 4.

6 Remove the PEB or SCbus cable from the cards that will be connected to the E1 Interface card.

7 Install the E1 interface card in the system. Do not tighten the retaining screws yet.

8 Reconnect all the cards with the PEB or SCbus cable. You may need to lift some cards from their slots in order to attach the cable.

9 Ensure that the card(s) are properly seated and aligned before installing the card-retaining screws. Install and secure the screws.

10 Power up the system, and allow it to boot normally.

Note: During the boot process, the E1 driver should announce its presence and indicate the state of the E1 cards in the system.

Chapter 4: T1 ISDN PRI option features

Overview

This chapter describes the T1 ISDN PRI option in the following sections:

- System requirements
- Features
- Supported protocols
- Parameter values

System requirements

The base MRS software 4.0 system already includes the system requirements listed here for installing and using the T1 ISDN PRI option for Symposium OPEN IVR Release 4.0. Specifically, these requirements are as follows:

- a minimum of 64 Mbytes of memory
- D/240SC-T1 card
- SCO UNIX 3.2 v5.0.4e or higher
- PEB and SCbus

Features

The T1 ISDN PRI option is based on an application programming interface (API) that provides a call-control interface for developing applications for multiple network interface technologies.

The T1 ISDN PRI supports the following:

- ANI (CLI)
- DNIS (DDI)
- inbound and outbound calls
- call setup and tear-down

Supported protocols

T1 ISDN PRI supports the following T1 ISDN PRI protocols:

- DMS/250 (U.S., Canada)
- DMS/100 (U.S.)
- NTT (Japan)
- 4ESS (U.S. AT&T)
- 5ESS (U.S. AT&T)

Note: The 4ESS and 5ESS are AT&T switches. The DMS is a Nortel switch. The NTT protocol is for the NTT INS1500 switch.

Parameter values

This section provides information on the supported parameter values for the T1 ISDN PRI option in the SCI.

T1 ISDN PRI parameters

This section provides the names, descriptions, and valid values for the ISDN PRI parameters that you can configure for your particular environment.

Parameter name: Switch Type

Description: The `Switch Type` parameter sets the switch emulation.

Table 4-1 shows the valid protocols for a T1 network.

Table 4-1: Valid protocols for a T1 network

Network interface	Valid protocols
T1 ISDN PRI	DMS NTT[a] 4ESS (default) 5ESS

a. For testing purposes, there is also NT1. You can loop NT1 into 4ESS, 5ESS, and DMS only; NT1 simulates the network end for those protocols.

Parameter name: Transfer Capability

Description: The `Transfer Capability` parameter sets the type of data to be transferred. Speech and 3.1KHzAudio both describe a transfer capability using a single voice-grade channel. The reason for distinguishing between the two services is that it may be cost-effective for the network to use compression and encoding techniques that are appropriate only for human speech. Nonspeech applications in the voice band (for example, modem) may use the bandwidth in a more uniform and less predictable fashion than voice and might be rendered useless if the signal is altered using voice compression techniques.

- 7 KHzAudio provides high-quality speech.
- Video service is used for visual information transfer.
- Rdigital (Restricted Digital) is a 64 kbps bit stream where all-zero octets are not permitted.
- Udigital (Unrestricted Digital) is a 64 kbps bit stream where all-zero octets are permitted.

Valid values:

- Speech (factory-shipped)
- udigital
- rdigital
- 3.1KHzAudio
- 7KHzAudio
- video

Parameter name: Transfer Mode

Description: The `Transfer Mode` parameter sets the mode for transferring data. Circuit mode is analogous to connection over the circuit switched network and provides a dedicated end-to-end connection for delay-sensitive applications, such as voice, audio, and video. Packet mode is useful for applications not running in real time that send unrestricted or restricted digital data.

Valid values:

- circuit (factory-shipped)
- packet

Parameter name: Transfer Rate

Description: The `Transfer Rate` parameter sets the transfer rate for B channels. The throughput is specified in bits for each second for circuit-mode and packets for each second for packet-mode service.

Valid value:

- 64 kbps

Parameter name: Destination Number Type

Description: The `Destination Number Type` parameter sets the destination number type. The number type identifies how the ISDN number is sent to the called ISDN device.

- Using overlap, an ISDN terminal sends the called party's ISDN number in separate messages, one digit at a time.
- En-bloc enables an ISDN terminal to send the called party's ISDN number in the single SETUP message.

Valid values:

- national (factory-shipped)
- international
- local
- overlap
- en-bloc

Parameter name: Destination Number Plan

Description: The `Destination Number Plan` parameter sets the destination numbering plan and specifies network addressing. A telephone number is the address of a device attached to the telephone network.

Valid values:

- telephony (factory-shipped)
- isdn
- private
- unknown

Parameter name: Facility Coding Value

Description: The `Facility Coding Value` parameter sets the facility coding.

Valid values:

- megacom (factory-shipped)
- sdn
- megacom800
- wats
- tie
- accunet
- long
- int800
- catsc
- multiquest

Parameter name: Bearer Capability Value

Description: The `Bearer Capability Value` parameter sets the bearer capability. This parameter's functionality is similar to that of the transfer capability parameter, but the bearer capability value parameter can also specify the type of speech, encoding, and so on.

For example, if you select the transfer capability as 3.1KHzAudio, you can enhance this feature by specifying the service as G711ULAW or G711ALAW, which identifies the associated compounding algorithm (that is, mu-law or A-law).

Valid values:

- default (factory-shipped)
- G711ULAW
- G711ALAW
- G721ADCPM
- G722F725
- H261
- NONITTV120
- CCITTV120
- CCITTX31

Parameter name: Tracing

Description: The `Tracing` parameter is used only for troubleshooting purposes by Customer Support personnel.

When enabled, `Tracing` requires up to 24 Mbytes of disk space in the `/vrs/vsn/drivea` file system to log debug information, which reduces the available disk space on Drive A by 24 Mbytes.

Do not enable `Tracing` unless you have been specially trained to do so; `Tracing` may affect overall system performance.

Valid values:

- on
- off (factory-shipped)

Editing the Country Inbound Parameter File

You can change the number of ANI (CLI) and DNIS (DDI) digits in the Country Inbound Parameter File using the SCI.

After accessing the `/sci` menu, follow these steps.

1 Type **`config`**, and press <Return>.

The system displays the `/sci/config` menu.

2 Type **`gc`**, and press <Return>.

The system displays the `/sci/config/gcspan>` menu.

3 Type **`edit`**, and press <Return>.

4 The system prompts you to enter a switch type.

Type the name of the switch type, and press <Return>.

5 The system prompts you to enable tracing. By default, `Tracing` is disabled.

Press <Return>.

6 The system prompts you to modify the Parameter File. The default answer is **`No`**.

Press <Return>.

7 The system prompts you to modify the Country Outbound Parameter File. The default answer is **`No`**.

Press <Return>.

8 The system prompts you to modify the Country Inbound Parameter File.

9 Type **Yes**, and press <Return>.

The system opens the Country Inbound Parameter File in the `vi` editor.

Scroll down in the file until you see the following lines:

```
$7 number of DDI digits:
$8 maximum number of ANI digits:
```

10 Type the appropriate number of DDI and ANI digits.

ATTENTION

The switch type you choose has a predefined number of DDI digits. The number of DDI digits you enter at this prompt must be equal to or less than that amount. For example, if the switch type has four DDI digits, you must type **4** or less at the following prompt:

```
$7 number of DDI digits:
```

If you enter a value higher than the predefined number, your system will not report inbound calls.

11 Save your changes, and exit from the file.

The system returns you to the `/sci/config>` prompt.

12 Type **done**, and press <Return>.

Chapter 5: Installing the T1 ISDN PRI option

Overview

This chapter describes how to install the T1 ISDN PRI option.

High-level procedure

Installing the E1 CAS/ISDN PRI Signaling option requires the following steps:

- Installing the T1 Telco Interface Module
- Installing the license file
- Installing the T1 ISDN PRI option
- Restarting the system

ISDN PRI option package components

The following T1 ISDN protocols are included in the ISDN PRI option:

- ISDN DMS Protocol
- ISDN NTT Protocol
- ISDN NT1 Protocol
- ISDN 4ESS Protocol
- ISDN 5ESS Protocol

Note: The 4ESS and 5ESS are AT&T switches. The DMS is a Nortel switch. The NTT protocol is for the NTT INS1500 switch.

Installing the T1 Telco Interface Module

MRS software supports up to five D/240SC-T1cards for the T1 ISDN PRI option, allowing a system-wide maximum of 120 ports.

To install the option hardware, follow these steps.

1 Shut down the MRS.

2 Once the shutdown process is complete, turn off the power to the system.

Note: Wear an antistatic wrist band when handling the option cards.

3 Unpack the option card(s), and remove it (them) from the antistatic bag.

CAUTION

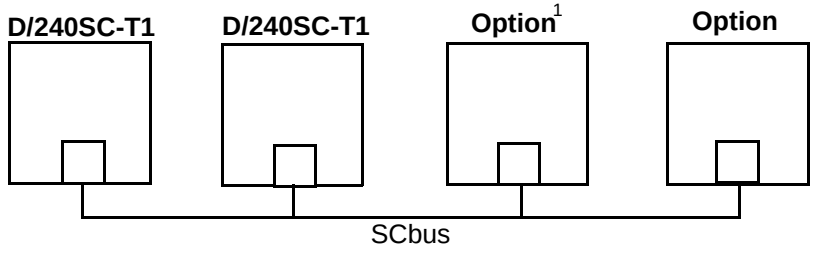
Risk of data loss

Always observe proper precautions when working with the system. Be sure to follow all applicable electrostatic discharge (ESD) guidelines during configuration and installation of the option cards.

4 Configure the option card(s). Refer to Appendix B, "Card configurations for the T1 ISDN PRI option", for information about configuring the board.

Figure 5-1 illustrates the configuration for the T1 ISDN PRI option.

Figure 5-1: Installing the T1 card on the SCbus



T1 cards and option cards can be arranged in any order on the SCbus

[1]An option could be an additional module, such as a fax, TTS, or ASR.

5 Open the system, and find open slots in which you can install the modules.

6 Install the option card(s) in the system. Do not screw them in yet.

7 Reconnect all the cards with the SCbus cable. You may need to lift some cards from their slots to attach the bus cable.

8 Properly seat and align the card(s) before you install the card-retaining screws. Install and secure the screws.

9 Power up the system, and allow it to boot normally.

When the READY light on the front panel stops flashing and the login prompt displays on the monitor, the hardware installation of the option is complete. If the READY light does not stop flashing, contact Nortel Customer Service.

Installing the license file

Note: The license file is available only on floppy disk and is installed when you are upgrading your system.

Before you begin

Before you install the license file, make sure of the following:

- the build process has been completed successfully
- the network (between the AP and MRS) is functioning properly
- remote commands (for example, `rcp`) work properly

Installing the file

To install the license file, follow these steps.

1 Insert the license disk into the floppy drive of the main AP.

This disk is DOS formatted, and contains any of the following files.

File	Contains	For
`w1234500.kcd`	KDS (version 2.0) enveloped licensed files	AP1
`w1234501.kcd`		MRS1
`w1234502.kcd`		MRS2
`w1234503.kcd`		MRS3
`w1234504.kcd`		MRS4
`w1234588.kcd`		MRS/AP
`w1234599.kcd`		redundant AP (AP2)

The disk could also contain raw (unenveloped) versions of license files.

File	Contains	For
w1234500.kcd	raw licensed file	AP1
w1234501.kcd		MRS1
w1234502.kcd		MRS2
w1234503.kcd		MRS3
w1234504.kcd		MRS4
w1234588.kcd		MRS/AP
w1234599.kcd		redundant AP (AP2)

Note: Any files named differently from the above will not work.

2 At the UNIX prompt, type the following:

```
install_licenses
```

3 Monitor the progress of the installation.

If the installation of the licenses to an AP or an MRS was successful, the following message is displayed:

```
Successfully installed license for ....
```

Note 1: If there are any problems distributing the files to the different MRSs or APs, the following message is displayed:

```
Unable to copy license file for  ....
```

This indicates a problem with the network connection. Test your network connections with `ping` or `telnet`, and try again.

Note 2: If there is a problem unwrapping a KDS enveloped license file, the following message is displayed:

```
Unable to extract license file for ....
```

This indicates a problem with either the disk itself or the drive that you are using. Test both of these, and then try the installation again.

4 Restart the OPEN IVR system.

The license takes effect upon startup.

Installing the T1 ISDN PRI option

This section provides procedures for installing this option from the CD-ROM, and also provides the procedures for installing the option protocols and activating the option.

Installing from CD-ROM

To install the option and protocols from the CD-ROM, follow these steps.

1 Access the SCI, and log in using the `service` account.

2 At the `/sci` prompt, type **`install`**, and press <Enter>.

The SCI displays a warning message:

```
****************************************
WARNING - Executing this option will cause the
system to be stopped. Once the Install Menu is
entered the only way to restart operations will be
to reboot the MRS.
****************************************

Are you sure you wish to continue?
Current continue? = no
yes     - Continue with operation.
no      - Return to previous menu.
        continue? =
```

3 Type **y**, and press <Enter> to continue.

4 From the `/sci/install>` prompt, type **`package`**, and press <Enter>.

The system displays the following:

```
Select Media Device:
1. CD-ROM
2. Hard Disk          (local installs only)
3. Floppy Disk        (local installs only)
Please enter your selection or q to quit []:
```

5 Type **1**, indicating the CD-ROM, and press <Enter>**.**

The system displays the following:

```
Specify which host machine installing FROM and TO:
-------------------------------------------
1. FROM localhost TO localhost
2. FROM remote host TO localhost
3. FROM localhost TO remote host
Please enter your selection or q to quit []:
```

6 Make your selection depending on where the CD-ROM is located. If you select **2** or **3**, you see the prompt for the hostname of the remote machine.

Note: You should enter the full domain name or IP address if prompted for the remote hostname.

The system displays the following:

```
Enter “c” to continue, “r” to redo, or “q” to quit
```

7 Type **c**, and press <Enter>.

The system displays the following:

```
Insert installation CD into CD-ROM drive at host =>
localhost
Type q to quit or hit ENTER to continue:
```

8 Press <Enter>.

The system displays the following:

```
Specify which packages will be installed:

(Enter y or n to select packages, or q to quit)

AP............[n]?

MRS............[n]?

License Manager..[n]?
```

9 Type **n** or press <Enter> at the AP and License Manager prompts. Type **y** at the MRS prompt, and press <Enter>**.**

The system displays the following:

```
Enter “c” to continue, “r” to redo, or “q” to quit:
```

10 Type **c**, and press <Enter>.

The system displays the following:

```
Select the MRS packages to be installed:
System packages...........[n]?
Speech technologies.......[n]?
Fax, E1/PRI, BRI..........[n]?
DPD, Global Call..........[n]?
```

11 For all choices except DPD, GlobalCall, type **n** or press <Enter>. For DPD, GlobalCall, type **y**, and press <Enter>.

The system displays the following:

```
Installing DPD [n]?
Installing Global Call CAS E1 [n]
Installing Global Call ISDN [n]?
```

12 Type **y** for Installing Global Call ISDN only, and press <Enter>.

The system displays several prompts.

13 Type **y** and press <Enter> for `Installing GlobalCall ISDN Option`. Type **y** for each additional protocol you wish to install. The supported protocols are `NTT`, `DMS`, `4ESS`, and `5ESS`.

```
Installing Global Call ISDN Option....[n]?
Installing Global Call ISDN Protocols [n]?
ISDN 1TR6 Protocol.............[n]?
ISDN NT1 Protocol..............[n]?
ISDN CTR4 (Euro ISDN) Protocol[n]?
ISDN DASS2 Protocol............[n]?
ISDN NTT Protocol..............[n]?
ISDN TPH Protocol..............[n]?
ISDN TPH NT Protocol...........[n]?
ISDN NE1 Protocol..............[n]?
ISDN DMS Protocol..............[n]?
ISDN 4ESS Protocol.............[n]?
ISDN 5ESS Protocol.............[n]?
ISDN VN Protocol...............[n]?
ISDN VN NT Protocol............[n]?
QSIG Network End...............[n]?
QSIG User End..................[n]?
```

The system displays the following:

```
Enter “c” to continue, “r” to redo, or “q” to quit:
```

14 Type **c**, and press <Enter> to continue.

Note: Disregard any error messages referring to `rm:` and `grep:` that you may see during this portion of the installation; they do not affect system operation.

The system displays the following:

```
Global Call ISDN Option Installation

Transferring files...

Installation complete.

The installation of the MRS GlobalCall ISDN is now
complete.

Press ENTER to continue or “q” to quit:
```

15 Press <Enter> to continue installing the option protocols.

After you install each option protocol, the system prompts you to continue or quit. Continue installation until you have installed all protocols specified in step 13.

16 Type **q** to quit at the following prompt:

```
Press ENTER to continue or "q" to quit:
```

The system displays the following:

```
No other software packages selected.

Install another software package (y/n)?
```

17 Type **n**, and press <Enter>.

The installation is completed when the system displays the `/sci/install` prompt.

18 Proceed to the next section.

Activating the option

When the T1 ISDN PRI option components (hardware and software) are installed, activate the option using the `/sci/install/setup` menu as follows. Access to this menu of utilities is restricted to only trained personnel using service account privileges.

1 Access the SCI, and log in as **`service`**.

2 From the `/sci/install/setup` menu, type **`trkbrd`**, and press <Enter>.

The SCI displays this prompt:

```
Please enter the trunk group number to edit =
```

3 Type the trunk group range (in increments of 6 for T1), and press <Enter>.

The SCI confirms whether the trunk range has already been activated:

```
Current Trunk Group Does Not Exist - Add it? =
cancel
add      - Add a new entry.
cancel    - Do not add the new entry.
        Trunk Group Does Not Exist - Add it? =
```

4 Type **add**, and press <Enter> to activate the new range of trunks.

The system displays the following:

```
Current Board Type = d160sc-ls
acl30 - Aculab 30 port E1/ISDN Network Card.
acl60 - Aculab 60 port E1/ISDN Network Card.
aclbri - Aculab BRI ISDN with D/240SC Span Card.
d160sc-ls - A D/160SC-LS 16 channel Loopstart Card.
d240sc-t1 - A D/240SC-T1 high density T1 Span Card.
d240sc-t1gc - 23 port PRI ISDN with D/240SC-T1 Span Card
d300sc-e1gc - 30 port PRI ISDN with D/300SC-E1 Span Card
dti301sc-elg - 30 port CAS with DTI/301SC and D/320SC
Span Cards
d4xe - A D4xE Interface & Springboard.
default - A D/160SC-LS 16 channel Loopstart Card.
             Board Type =
```

5 Type **`d240sc-t1gc`** for the board type, and press <Enter>.

The SCI prompts you to enter the switch (protocol) types available for the board you selected. For example, the following switch types are available for T1 installations:

```
Current Switch type = 4ESS
4ESS - 4ESS Signaling (USA)
5ESS - 5ESS Signaling (USA)
DMS - DMS/250 and DMS/100 Signaling (USA, Canada)
NTT - NTT Signaling (Japan)
NT1 - NT1 T1 Network emulation (Testing)
default - 4ESS Signaling (USA)
        Switch type =
```

6 Type the protocol to be assigned, and press <Enter>.

The system displays the following:

```
Default Board Base RAM Address in hex = 0xD0000
Board Base RAM Address in hex =
```

7 Press <Enter> to select the default address.

The system displays the following:

```
Default Board Locator address in hex = 0x0
Board Locator address in hex =
```

8 Press <Enter> to select the default address.

The system displays the following:

```
Current Type of data encoding to use? = mu-law
mu-law - Default data encoding used in the US.
a-law - Default data encoding used in Europe.
Type of data encoding to use? =
```

9 For T1 installations, type **`mu-law`**, and press <Enter>**.**

10 Repeat the steps in this procedure to activate all the available trunks.

11 At the `/sci/install/setup>` prompt, type **done**, and press <Enter>.

The installation and activation of the T1 ISDN PRI option is complete.

12 Proceed to the next section.

Restarting the system

Restart the MRS for your installation of the option to take effect.

To restart the MRS, follow these steps.

1 Ensure that you remove the last installation floppy from the disk drive (or the CD-ROM from the CD-ROM drive).

2 At the `/sci/install>` prompt, type **`restart`**, and press <Enter>.

The system verifies the integrity of the newly installed packages and informs you of any inconsistencies.

The MRS starts to come down. The system automatically reboots once it reaches the shutdown state.

3 Allow the system to boot up normally, which can take several minutes.

When the system comes up, your new installation is in effect.

Chapter 6: Reconfiguring the T1 ISDN PRI option

Overview

If necessary, you can reconfigure a variety of parameters associated with the T1 ISDN PRI option using the `/sci/config` menu. This chapter shows examples of how to reconfigure the T1 ISDN PRI option.

Configuring the T1 ISDN PRI option

Access the `list` option from the `/sci/config` menu to list the current configuration. A sample follows.

```
/sci/config> list
SYSTEM INFORMATION
    System Bus Type = SCBUS
    Sysgen File Version = 4.00
    Sample Rate = 32k
    Application Processor Link = auto
    A.P. Link Com Port Used = /dev/tty2a
    A.P. Link Failure Mode = none
    Current COM1 (/dev/tty1a) settings = 9600,7e1
    Current COM2 (/dev/tty2a) settings = 9600,7e1
    Duplicate Error Log Path = /dev/null
    SNMP Service Flag = off
    Default Tail Erase [msec] = 250
    Maximum Record Length [Minutes] = 15
    Minimum Valid Voice [msec] = 250
    Severity Level = MINOR
```

```
VOLUME INFORMATION
    VOLUME 1    Total Capacity = 24.5MB
    VOLUME 2    Total Capacity = 24.5MB
    VOLUME 3    Not Formatted or Not Present
    VOLUME 4    Not Formatted or Not Present

TRUNK INFORMATION
    TRUNK GROUP  1 Channels   0 to  3  SCBUS
ExtLineIntfc  mu-law
    TRUNK GROUP  2  Channels  4 to  7  SCBUS
ExtLineIntfc  mu-law
    TRUNK GROUP  3  Channels  8 to 11  SCBUS
ExtLineIntfc  mu-law
    TRUNK GROUP  4  Channels 12 to 15  SCBUS
ExtLineIntfc  mu-law
    TRUNK GROUP  5  Channels 16 to 19  SCBUS
ExtLineIntfc  mu-law
    TRUNK GROUP  6  Channels 20 to 23  SCBUS
ExtLineIntfc  mu-law

GC SPAN INFORMATION
GLOBAL CALL SPAN: 1
Signaling type: 4ESS
Base channel: 0
Board type: D/240SC-T1
Transfer Capability: speech
Transfer Mode: circuit
[KTransfer Rate: 64KBPS
Destination Number Type: national
Destination Number Plan: telephony
Facility Coding Value: megacom
Bearer Capability Value: G711ULAW
Tracing is off.

/sci/config>
```

Specify the gcspan option and modify the various parameters associated with the T1 ISDN PRI option. A sample follows.

```
/sci/config>  gcspan
Please Enter the Global Call span to edit =  1
edit          - Modify parameters for this PRI span.
list            - List parameters for this PRI span.
done          - Return to the previous menu.
/sci/config/gcspan>  edit
Current Switch type = 4ESS
4ESS     - 4ESS Signaling (USA)
5ESS     - 5ESS Signaling (USA)
DMS         - DMS/250 and DMS/100 Signaling (USA,
Canada)

NTT      - NTT Signaling (Japan)
NT1     - NT1 T1 Network emulation (Testing)
default    - 4ESS Signaling (USA)
        Switch type =
Current Transfer Capability = speech
speech    - Speech Bearer Capability.
udigital  - Unrestricted Digital Capability.
rdigital  - Restricted Digital Capability.
3.1KHzAudio - 3.1KHz Audio Capability.
7KHzAudio  - 7KHz Audio Capability.
video     - Video Capability.
default    - Speech Bearer Capability
        Transfer Capability =
Current Transfer Mode = circuit
circuit   - info transfer mode - circuit mode.
packet    - info transfer mode - packet mode.
default   - info transfer mode - circuit mode.
        Transfer Mode =
Current Transfer rate = 64KBPS
64KBPS    - B_CHANNEL_UNITS 1X64.
default    - B_CHANNEL_UNITS 1X64.
        Transfer rate =
Current Destination Number Type = national
national   - National number.
international- International number.
local     - Local number.
overlap    - Number is sent overlap.
en-bloc    - Number is sent en-bloc
default    - National number.
```

```
        Destination Number Type =
Current Destination Number Plan = telephony
telephony  - Telephony numb. plan E.163.
isdn     - ISDN numb. plan E.164.
private   - Private numbering plan.
unknown    - Unknown plan.
default   - Telephony numb. plan E.163.
        Destination Number Plan =
Current Facility Coding Value = megacom
megacom   - Service coding - MEGACOM.
sdn      - facility coding - SDN.
megacom800 - facility coding - MEGACOM 800.
wats     - facility coding - WATS.
tie      - facility coding - TIE.
accunet   - facility coding - ACCUNET.
long    - facility coding - Long distance.
int800   - facility coding - International 800.
catsc    - facility coding - CA TSC.
multiquest - facility coding - ATT MultiQuest.
default   - Service coding - MEGACOM.
        Facility Coding Value =
Current Bearer Capability Value = default
default   - User info layer 1 - Default Value
G711ULAW  - User info layer 1 - G.711 u-law
G711ALAW  - User info layer 1 - G.711 A-law
G721ADCPM  - User info layer 1 - G.721 ADCPM
G722F725  - User info layer 1 - G.722 and G.725
H261     - User info layer 1 - H.261
NONCCITT  - User info layer 1 - non-CCITT
CCITTV120  - User info layer 1 - CCITT V.120
CCITTX31  - User info layer 1 - CCITT X.31
default   - User info layer 1 - Default Value
        Bearer Capability Value =
```

CAUTION

Risk of system performance degradation

Do not enable `Tracing` unless you have been specially trained to do so. If you enable tracing, it may affect overall system performance.

When enabled, `Tracing` requires up to 24 Mbytes of disk space in the `/vrs/vsn/drivea` file system to log debug information. This reduces the available disk space on drive A by 24 Mbytes.

```
Current Tracing = off
on      - Enable process tracing
off     - Disable process tracing
        Tracing =
```

CAUTION

Risk of data loss

Nortel recommends that you do not modify firmware parameters unless you are trained to do so.

See Chapter 4, “T1 ISDN PRI option features”, for more information on firmware parameters.

```
Current Modify firmware parameter file = no
yes      - Modify settings.
no      - Do not modify settings.
        Modify firmware parameter file =
```

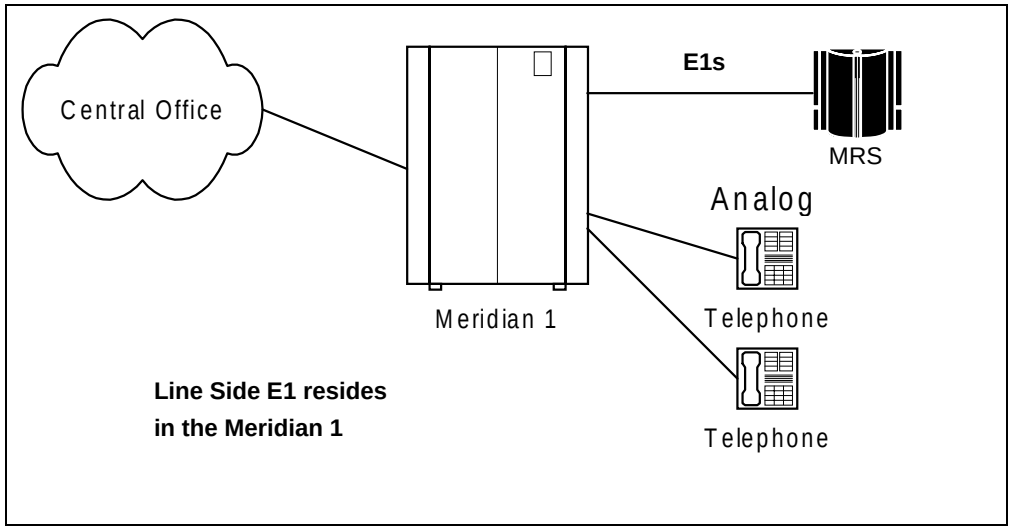
This is the end of the sample script.

Chapter 7: Line Side E1 Option features

Overview

Line Side E1 establishes connectivity to the Meridian 1 Line Side E1 cards, providing a basic quasi-analog interface to the switch, at higher port densities and lower port costs than a loopstart interface.

Figure 7-1: Line Side E1 integration with the MRS



The Line Side E1 card is an intelligent peripheral equipment (IPE) line card that provides a direct all-digital connection between E1-compatible terminal equipment (such as a voice messaging system or a voice response unit) and a Meridian 1 system (Option 11 through Option 81) with station side features. No channel bank equipment is required, resulting in a more robust and reliable connection than one that requires the conversion of the signal from digital to analog back to digital. The Line Side E1 interface is appropriate for any application where both E1 connectivity and line side functionality are required.

Availability

This option is supported in the following countries. It is not available in the United States or Canada.

Argentina	Ecuador	Luxembourg	Sweden
Austria	Finland	Mexico	Switzerland
Belgium	France	Norway	Turkey
Brazil	Germany	Peru	the United Arab Emirates
Chile	Greece	Portugal	the United Kingdom
Colombia	Holland	Puerto Rico	Venezuela
Costa Rica	Ireland	Qatar	
Denmark	Italy	Saudi Arabia	
the Dominican Republic	Jamaica	Spain	

Line Side E1 call operation

The Line Side E1 card performs call processing separately on each of its 30 channels. The signaling is performed through channel associated signaling (CAS), which is standard for E1 communication. CAS simulates standard battery and ground on an analog line by sending a meaningful combination of ones and zeros across the line that correlate to the electrical impulses that standard analog signaling sends.

Note: Loopstart mode of operation is the only mode supported by the MRS.

Call operations

Call operation can be categorized into the following main states:

- idle (on-hook)
- incoming calls
- outgoing calls
- calls disconnected by the Central Office (CO)
- calls disconnected by the telephone

Call processing

This section describes Line Side E1 call processing.

Incoming calls

Incoming calls to a terminal equipment attached to a Line Side E1 card can originate from stations that are either local (served by the Meridian 1 PBX), or remote (served through the public switched telephone network, or PSTN).

Note: PSTN information, such as CLID, ANI, and DNIS, are not supported.

To provide the ringing signal to a telephone, the Line Side E1 card simulates ringing on the ring lead to the terminal equipment by alternating the transmit B bit between 0 and 1 (0 during ring on, 1 during ring off). When an incoming call is answered by the terminal equipment going off-hook, the terminal equipment simulates tripping the ringing and shutting off ringing, causing the Line Side E1 card’s receive A bit to be changed from 0 to 1.

Outgoing calls

For outgoing calls from the terminal equipment, a channel is seized when the station goes off-hook, simulating a low-resistance loop across the tip and ring leads toward the Line Side E1 card. The Line Side E1's receive A bit is then changed from 0 to 1. This bit change prepares the Line Side E1 to receive digits. Outward address signaling is then applied from the terminal equipment in the form of loop (interrupting) dial pulses, which are signaled by the receive A bit pulsing between 1 and 0, or DTMF tones.

Call disconnect from far end (PSTN, private network, or local station)

While a call is in process, the far end may disconnect the call from the Meridian 1. If the Line Side E1 port has been configured with the Supervised Analog Line (SAL) feature, the Line Side E1 card responds to the distant end disconnect message by momentarily changing its transmit A bit to 1 and then returning it to 0. The duration of time that the transmit A bit remains at 1 before returning to 0 depends upon the setting that was configured using the SAL. If the terminal equipment is capable of detecting distant end disconnect, it responds by changing the Line Side E1 card's receive A bit to 0 (open loop). The call is now terminated, and the interface is in the idle (on-hook) state.

System requirements

Line Side E1 requires the following:

- X11 software release 21 or later
- AP software release 4.00 or later
- a 30-port or 60-port E1card and a D/320SC DSP voice processing card for each E1 span, as shown in the following chart.

Ports	Card requirements
30 ports	1 single-span E1 card (ACL-30) + 1 D/320SC card
60 ports	1 dual-span E1 card (ACL-60) or 2 single-span E1 cards (ACL-30) + 2 D/320SC cards
90 ports	1 dual-span E1 card (ACL-60) and 1 single-span E1 card (ACL-30) + 3 D/320SC cards
120 ports	2 dual-span E1 cards (ACL-60) + 4 D/320SC cards

Note 1: To support outdialing, the E1 card(s) must be equipped with the optional DSP daughter card(s).

Note 2: Line Side E1 is supported using the Aculab Rev. 5 or later family of cards in SCbus mode only. PEB mode is not supported.

Note 3: A maximum of two (2) cards of either type (30 ports or 60 ports) is supported.

- Connection from the Meridian 1 system to the MRS is accomplished through single or multiple digital E1 lines (up to four connections per server) using one of the following:
  - 75 Ohm (coaxial)
  - 120 Ohm (twisted pair)

  Note: When you order the Line Side E1 interface, it is important to know whether the installation will use a twisted pair E1 (120 ohm) or coaxial E1 (75 ohm) connection. This affects the cabling you require.

- Use the following table to determine the standard and optional equipment required to support your Line Side E1 configuration.

Description	Quantity	Standard or Optional requirement
Line Side E1 Interface card (Option 11)	based on customer requirements	Standard
Line Side E1 Interface card (Options 21 - 81)	based on customer requirements	Standard
Twisted Pair Extension Cable	1 per cable	Optional
Cable Assembly, LE1 Twisted Pair	1 per card	Standard for Twisted Pair Connections
Cable Assembly, LE1 Coaxial Interface	1 per card	Standard for Coaxial Connections
Assy, LE1 Daisy Chain Cable Adapter MMI	1 per system to support TTY connection to all Line Side E1 cards equipped	Optional
Cable Assy, AUX ALM CA, HD DB 15 to Bare Wire, 25ft	1 per cable	Optional

Chapter 8: Installing the Line Side E1 option

Overview

This chapter provides a high-level overview of the installation and configuration of the Line Side E1 option.

Installing the Line Side E1 option

For information about installing the Line Side E1 option, refer to the following documentation: *Meridian 1 Line-side E1 Interface: Description, installation, and maintenance.*

Configuring the Line Side E1 interface

You install and configure the Line Side E1 interface in the MRS using the Service Console Interface (SCI).

Selecting Line Side E1

Since the Line Side E1 loopstart protocol is an asymmetrical (non-balanced) protocol, it has a network or central office (CO) exchange side (LSN) and a user side (LSU). Using the `SCI Country Configuration Utility`, you configure the Line Side E1 card in the MRS as either end of the protocol.

Note: LSN (network end) is usually the end of the protocol that is implemented by the PBX or switch, in this case the Meridian 1, so the MRS should normally be configured for LSU (user end) to interface to it.

- To configure the system for Line Side E1 operation, select the entry labeled `Line Side E1` in the `Country Configuration Utility` of the SCI maintenance menu (`/sci/maint/country`).

Selecting driver configuration switches

The `Country Configuration Utility` in the SCI enables you to choose default driver configuration switches for either LSN or LSU. It also enables you to set any of the available driver configuration switches for E1 Line Side CAS as described in Chapter 2, "E1 CAS/ISDN PRI Signaling Option features".

- Select the appropriate driver configuration switches.

Configuring call detection

Line Side E1 provides complete call progress analysis using a voice processing engine (SPAN card) that provides the ability to detect ringing, voice energy, SIT (special information tones), busy, fax, and answering machines.

- Enable the analog call progress feature in the trunk type file of the AP.

  Note: This is required so that analog call progress detection on outbound calls is properly enabled.

- Set other analog call progress feature flags in the trunk type file as required to enable particular elements of call progress analysis.

Note: When analog call progress analysis is enabled, the application itself must ensure that a trunk is properly disconnected (released) after detecting a "ring no answer" condition on an outbound call. For example, a HANG cell should be executed after a DOUT takes the Ring No Answer branch, or a CEND or CCTRL cell should be executed after a COUT takes the Ring No Answer branch.

Configuring Call Disconnect from far end (PSTN, private network, or local station)

Set the following configuration parameters.

- Configure the Supervised Analog Line (SAL) feature for each Line Side E1 port.

  Note: By default, the SAL feature opens the tip side for 750 msec in loopstart operation. This is configurable in 10 msec increments.

- Ensure that for outgoing trunk calls, the trunk facility provides far end disconnect supervision.

- Enable the "battery reversal" feature within the SAL software.

  Note 1: This is required for the system to be able to detect distant end disconnect for calls originating and terminating on the Line Side E1 card.

  Note 2: Enabling the "battery reversal" feature does not provide battery reversal indication. Instead, it provides a momentary interruption of the tip ground by asserting the A bit to 1 for the specified duration.

- Enable the "hook flash" feature within the SAL software.

  Note: This is required for the system to be able to detect distant end disconnect for calls originating and terminating on the Line Side E1 card.

Configuring Call Disconnect from Line Side E1 terminal equipment

Alternatively, while a call is in process, the MRS may disconnect by going on-hook. The terminal equipment detects no loop current and sends signaling to the Line Side E1 card, which causes its receive A bit to change from 1 to 0. The call is now released.

The following chart sets out the Line Side E1's A and B bit settings in each state of call processing.

	Transmit		Receive	
State	**A**	**B**	**A**	**B**
Idle.	0	1	0	1
Incoming Calls				
Idle.	0	1	0	1
Ringing is applied from the Line Side E1 card.	0	1/0	0	1
The terminal equipment goes off-hook.	0	1/0	1	1
The Line Side E1 card stops ringing.	0	1	1	1
Outgoing Calls				
Idle.	0	1	0	1
The terminal equipment goes off-hook.	0	1	1	1

Call Disconnect from far end				
Steady state (call in progress)	0	1	1	1
The far end disconnects by dropping loop current. The Line Side E1 card changes the Transmit A bit to 1 momentarily.	1	1	1	1
The terminal equipment responds, causing the Receive A bit to change to 0.	1	1	0	1
Line Side E1 returns its Transmit A bit to 0. The call is terminated and set to idle state.	0	1	0	1
Call disconnect from terminal equipment				
Steady state (call in progress)	0	1	1	1
The terminal equipment goes on-hook, causing the Line Side E1's Receive A bit to change to 0. The call is terminated and set to idle state.	0	1	0	1

Configuring the Meridian 1

The Line Side E1 interface has the ability to provide call transfer (supervised or blind) and conferencing, but the Meridian 1 must be configured to take advantage of these transfer and conference features.

- Configure the Meridian 1 to enable XFA in the class of service for each enabled channel.
- Ensure that the Line Side interface in the Meridian 1 system matches the physical interface of a corresponding E1 interface on the MRS.

Configuring the trunk type file

You need to ensure that the MRS properly detects an answer on an outgoing call.

- Enable the analog call progress feature (`acallprog`) in the trunk type file of the MRS.

Configuring the Call Progress Detection feature flags

The following table shows some of the applicable call progress detection feature flags available through the trunk type file. It also provides a brief description of the function of each cell.

Feature flag	Description	Required or Optional
`Set acallprog = 1`	Enables analog call progress analysis.	Required
`Set usetones = 1`	Enables tone detection templates.	Required
`Set callperf = 1`	Enables call analysis.	Required
`Set usefax = 1`	Enables fax tone detection.	Optional
`Set usesit = 1`	Enables SIT (special information tone) detection.	Optional
`Set usepamd = 1`	Enables Positive Answering Machine Detection.	Optional

Note: Using the `usepamd=1` parameter can sometimes cause call progress analysis to become very slow. In the alternative, the following parameter can be used to quantify how much Positive Answering Machine Detection to use.

```
Set pamdspd = 1;PAMD speed (1=quick, 2=full,
3=enhanced)
```

Appendix A: Card configurations for the E1 CAS/ISDN PRI option

Appendix A shows the configurations of the 30- and 60-port E1 cards for the E1 CAS/ISDN PRI option and for the corresponding D/320SC voice card.

Figure A-1: Aculab 60-port E1/PRI Network Interface Module (75 and 120 ohm version), Rev. 4

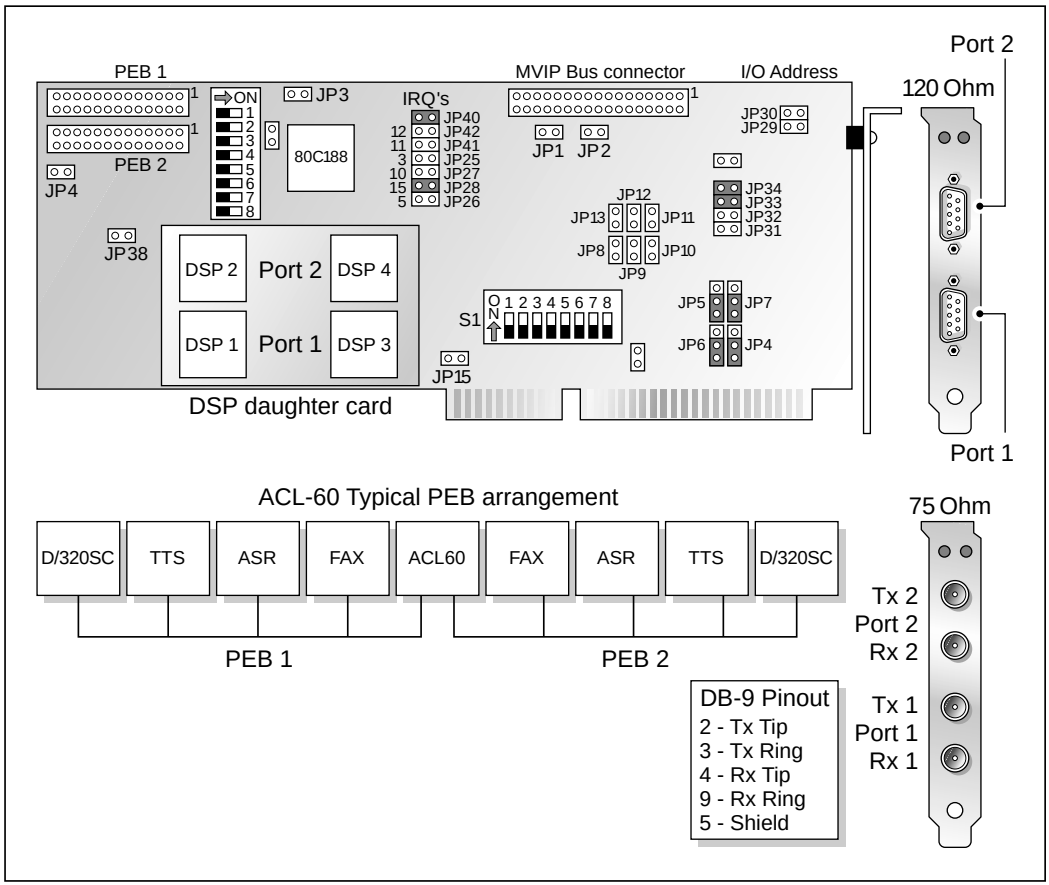


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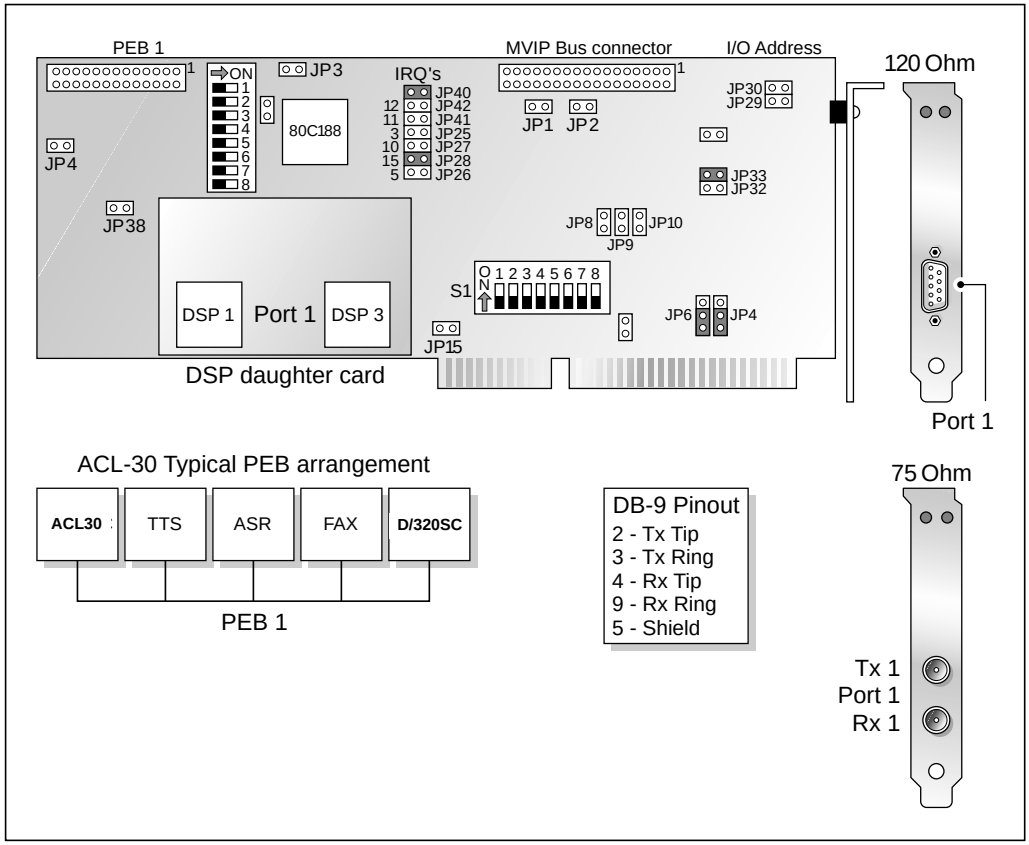
Figure A-2: Aculab 30-port E1/PRI Network Interface Module (75 and 120 ohm version), Rev. 4



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Notes for Revision 4 Aculab E1/PRI 30-port and 60-port cards

The following notes apply to Revision 4 Aculab E1/PRI 60-port and 30-port cards.

1 Aculab E1/PRI Rev. 4 cards are available in the following variations:

- 30 ports (one E1 span), or 60 ports (two E1 spans)
- 75 ohm (coax version), or 120 ohm (DB-9 version)
- with DSP daughter card (MF R2 support), or without

2 The S1 switch sets the board I/O base address and occupies four address locations per card. The default I/O address is set to 320 Hex. Only one E1/PRI Rev. 4 card is supported per system.

3 ACL30 or ACL60 Rev. 4 card may operate in PEB mode only. The E1/PRI card has built-in terminators and therefore must be installed at the end of the PEB bus. Both ends of the PEB bus must be terminated.

4 Each E1/PRI network span requires a corresponding D/320SC voice card (the ACL60 card requires two D/320 SC cards). Fractional E1 span is not supported.

5 The Aculab E1/PRI card Rev. 4 installed in the system requires 64 Kbytes of shared memory in the memory range E0000–EFFFF configurable through a driver configuration option during installation.

6 The DSP daughter card is required only for signaling protocols that require tone processing independent of capabilities of the voice cards (most CAS protocols with R2 signaling).

7 Card IRQ selection is performed via jumpers on the board and by default should be set as follows:

- for the 486/MRS (in earlier releases), to IRQ 15
- for the MRS/AP (700t) (in earlier releases), to IRQ 15

Ensure that card settings do not conflict with any other IRQs. The IRQ terminator (JP40) must be installed for proper operation.

8 The JP8 and JP11 are needed only for the 75 ohm version of the E1/PRI card.

9 During installations with the 75 ohm (coax) version of the E1/PRI card, only one end of each coax cable must be grounded. Default jumper settings are shown in Table A-2 on page A-5. Please consult the installation manual of the switching equipment to which you are connecting the Aculab E1/PRI card.

10 The 120 ohm version of the E1/PRI card requires an external line interface unit (LIU), which is typically shipped with a system for each E1/PRI span installed.

Table A-1: Typical usage of 75 ohm versus 120 ohm card

75 Ohm–Coax version	120 Ohm–DB-9 version
DPNSS BT-CAS Mercury CAS Most CAS and R2 protocols	ETS300

Table A-2: Shield grounding arrangements–Applicable to 75 ohm interfaces only

Port 1	Port 2	Default settings
JP32 Rx Shield to GND	JP31 Rx Shield to GND	off
JP33 Tx Shield to GND	JP34 Tx Shield to GND	on

Table A-3: I/O addressing–S1

	Address	8	7	6	5	4	3	2	1	Memory range
Card 1	320h	off	off	on	on	off	on	on	on	E0000–EFFFF

Table A-4: Example of I/O address selection

Switch S1	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**—**	**—**
Switch S1 setting	off	off	on	on	off	on	on	on		
Binary address	1	1	0	0	0	0	0	0	0	0
Hex address	3		2				0			

Table A-5: S2 settings—RAM/EPROM download

S2	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
RAM/EPROM download	off	off	on	on	off	off	on	on

Figure A-3: Aculab 60-port E1/PRI Network Interface Module (75 and 120 ohm version), Rev. 5

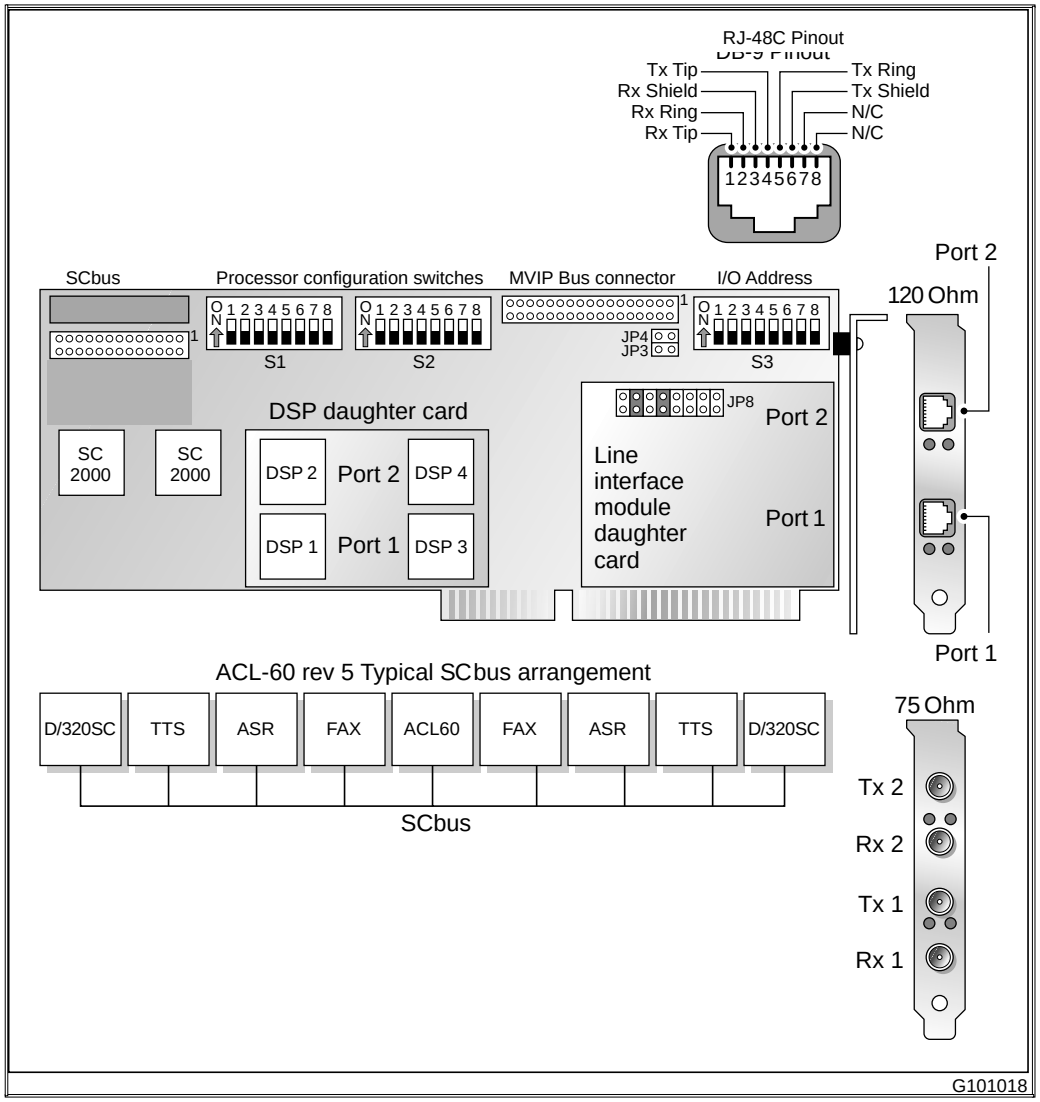
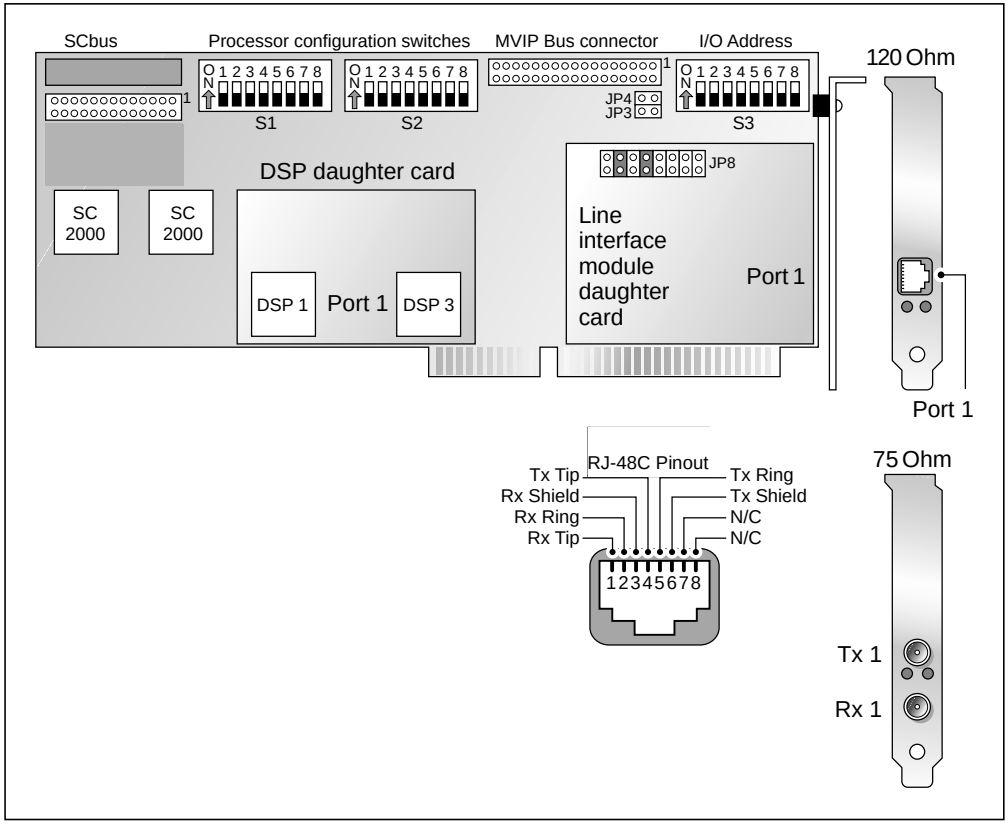


Figure A-4: Aculab 30-port E1/PRI Network Interface Module (75 and 120 ohm version), Rev. 5



Notes for Revision 5 Aculab E1/PRI 30-port and 60-port cards

The following notes apply to Revision 5 Aculab E/PRI1 60-port and 30-port cards.

1 Aculab E1/PRI Rev. 5 cards are available in the following variations:

- 30 ports (one E1 span), or 60 ports (two E1 spans)
- 75 ohm (coax version), or 120 ohm (RJ45) version)
- with DSP daughter card (MF R2 support), or without

2 S3 switch sets the board I/O base address. Each board in the system must have a unique board I/O address on the four-port boundary. The maximum number of Rev. 5 cards supported in the system is two. You can have two 30-port cards or two 60-port cards. You can also have a 60-port and a 30-port card in the same system, but the 60-port card must be configured as the first card.

3 Each E1/PRI network span requires a corresponding D/320SC voice card (the ACL60 card requires two D/320 SC cards). Fractional E1 span is not supported.

4 The Aculab E1/PRI card Rev. 5 installed in the system requires 16 Kbytes of shared memory in the memory range E0000–E3FFF configurable via a driver configuration option during installation.

5 The DSP daughter card is required only for signaling protocols that require tone processing that is independent of the capabilities of the voice cards (most CAS protocols with R2 signaling).

Card IRQ selection is performed from the software during device driver installation and should be set as follows:

- for the MRS/AP (300tp or 700tp), to IRQ 14
- for the AP (700tp or 1000rp), to IRQ 15

Make sure the card IRQ selection does not conflict with any other IRQs. Dialogic telco interface cards also use the same IRQ. Be sure to remove the Dialogic network driver and relink the kernel to free up the appropriate IRQ prior to installing the Aculab E1 cards.

6 During installations with the 75 ohm (coax) version of the E1/PRI card, only one end of each coax cable must be grounded. Default jumper settings are shown in Table A-7. Please consult the installation manual of the switching equipment to which you are connecting the Aculab E1/PRI card.

7 Switches S1 and S2 should be set as shown in Table on page A-11.

Table A-6: Typical usage of 75 Ohm versus 120 Ohm card

75 ohm—Coax version	120 Ohm—RJ45 version
DPNSS BT-CAS Mercury CAS Most CAS and R2 protocols	ETS300

Table A-7: Shield grounding arrangements—Applicable to 75 ohm interfaces only

Port 1	Port 2	Default settings
JP8 (1-2) Rx Shield to GND	JP8 (5-6) Rx Shield to GND	off
JP8 (3-4) Tx Shield to GND	JP8 (7-8) Tx Shield to GND	on

Table A-8: I/O addressing—S1

	Address	8	7	6	5	4	3	2	1	Memory range
Card 1	320h	off	off	on	on	off	on	on	on	E0000–E3FFF
Card 2	324h	off	off	on	on	off	on	on	on	E0000–E3FFF

Table A-9: Example of I/O address selection

Switch S1	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**—**	**—**
Switch S1 setting	off	off	on	on	off	on	on	on		
Binary address	1	1	0	0	0	0	0	1	0	0
Hex address	3		2				4			

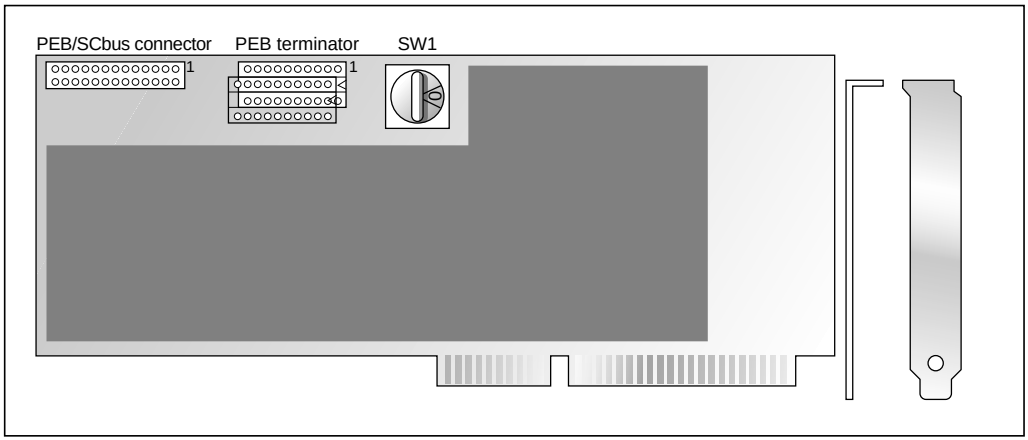
Table A-10: S2 settings—RAM/EPROM download

S2	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
RAM/EPROM download	off	off	off	off	off	off	on	on

D/320SC card

Each E1/PRI network span requires a corresponding D/320SC voice card (the ACL60 card requires two D/320 SC cards).

Figure A-5: D/320SC 32-port voice processing card



Notes for the D/320SC card

1 SW1 - Card identifier switch sets the card ID number. Each D/320SC card must have a unique card ID.

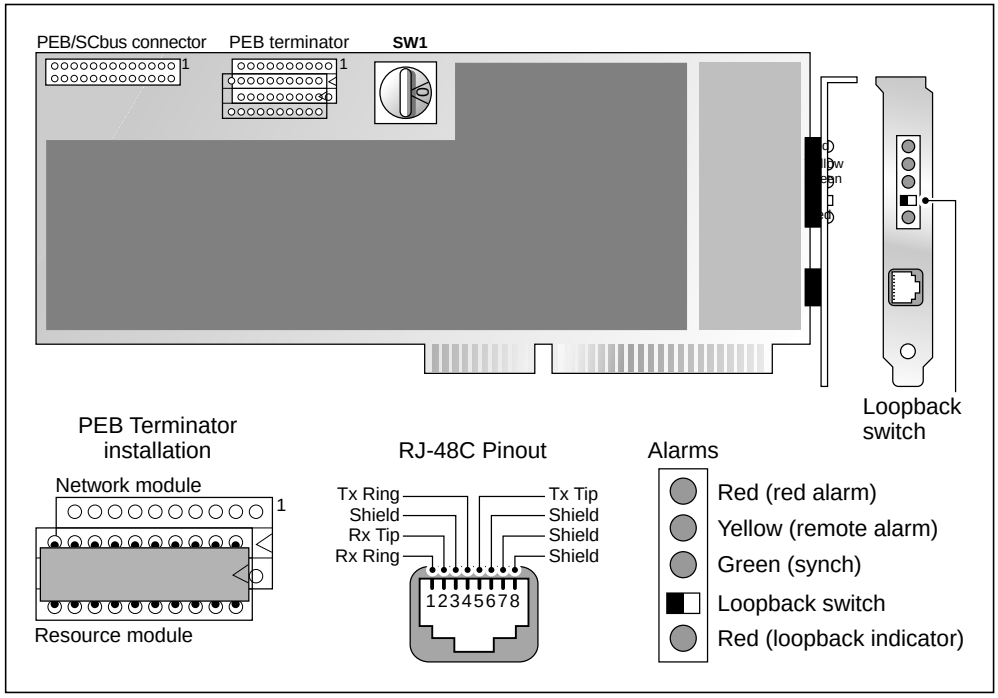
2 This card operates in PEB-mode and SCbus-mode. Do not use terminators for SCbus-mode.

3 This card uses IRQ 5 and shared memory address range D0000 - D7FFFh which is configured through the software.

Appendix B: Card configurations for the T1 ISDN PRI option

This appendix shows the configurations of the D/240SC-T1 card for the T1 ISDN PRI option.

Figure B-1: D/240SC-T1 24-port voice processing card with T1 interface (Rev. 1)



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Notes for the D/240SC-T1 24-port voice processing card with T1 interface (Rev. 1)

The following notes apply to this figure.

1 SW1 - The Board Selector Switch sets the board ID number. Each board in the system must have a unique board ID number. The maximum number of ports supported is 120 (5 cards).

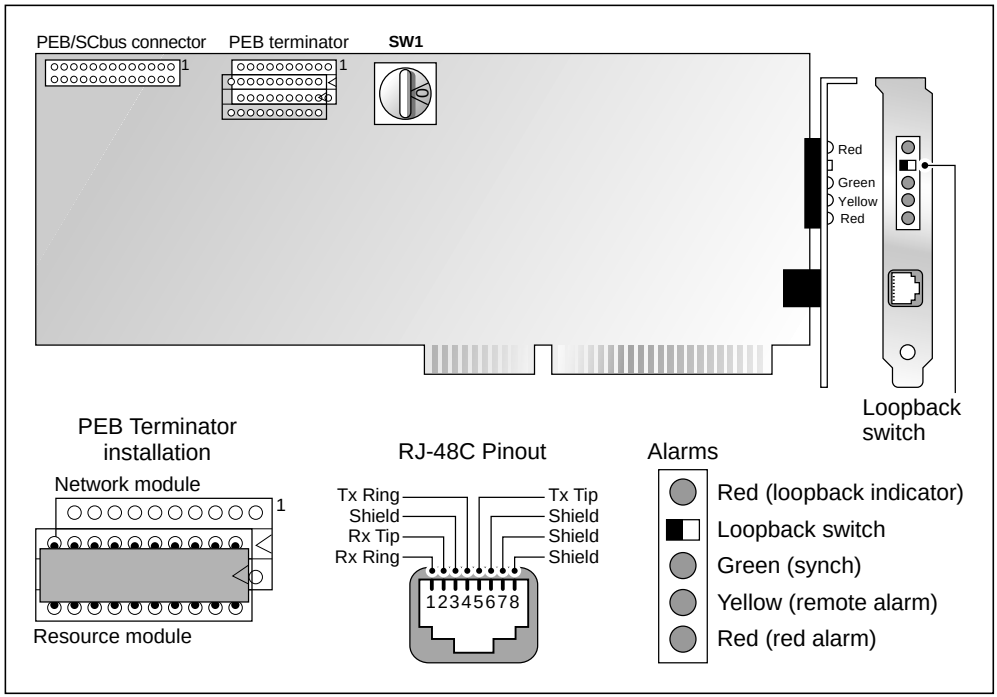
2 The D/240SC-T1 card may operate in PEB or SCbus mode, depending on the system configuration. The PEB Terminator is necessary only for the SCbus mode of operation.

3 When running in PEB mode, PEB terminators must be installed at the end of the PEB bus to ensure the proper electrical characteristics of the PEB bus. Unless specified otherwise, install PEB terminators in the lower terminator socket of the Resource Module.

4 IRQ selection (2, 3, 4, 5, 7, 10, 12, 14, or 15) is performed during voice driver installation. By default, it should be set to 10. One IRQ line is shared by multiple D/240SC-T1 cards. Avoid IRQ conflicts with other cards. In systems with the VR/160, either reinstall the VR/160 at an IRQ other than 10, or select another IRQ for the D/240SC-T1 card.

5 D/240SC-T1 cards use 32 kbytes of shared memory on 32 kbyte boundaries. The default shared memory address is set to D0000. All D/240SC-T1 cards share the same base memory address.

Figure B-2: D/240SC-T1 24-port voice processing card with T1 interface (Rev. 2—Omega)



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Notes for the D/240SC-T1 24-port voice processing card with T1 interface (Rev. 2—Omega)

The following notes apply to this figure.

1 SW1 - The Board Selector Switch sets the board ID number. Each board in the system must have a unique board ID number. The maximum number of ports supported is 120 (5 cards).

2 The D/240SC-T1 card may operate in PEB or SCbus mode, depending on the system configuration. The PEB Terminator is necessary only for the SCbus mode of operation.

3 When running in PEB mode, PEB terminators must be installed at the end of the PEB bus to ensure the proper electrical characteristics of the PEB bus. Unless specified otherwise, install PEB terminators in the lower terminator socket of the Resource Module.

4 IRQ selection (2, 3, 4, 5, 7, 10, 12, 14, or 15) is performed during voice driver installation. By default, it should be set to 10. One IRQ line is shared by multiple D/240SC-T1 cards. Avoid IRQ conflicts with other cards. In systems with the VR/160, either reinstall the VR/160 at an IRQ other than 10, or select another IRQ for the D/240SC-T1 card.

5 D/240SC-T1 cards use 32 kbytes of shared memory on 32 kbyte boundaries. The default shared memory address is set to D0000. All D/240SC-T1 cards share the same base memory address.

Appendix C: Card configurations for the Line Side E1 option

Appendix C shows the configurations of the 60-port E1 card for the Line Side E1 option.

Figure C-1: 60-port E1/PRI Network Interface Module (75 and 120 Ohm version), Rev. 5

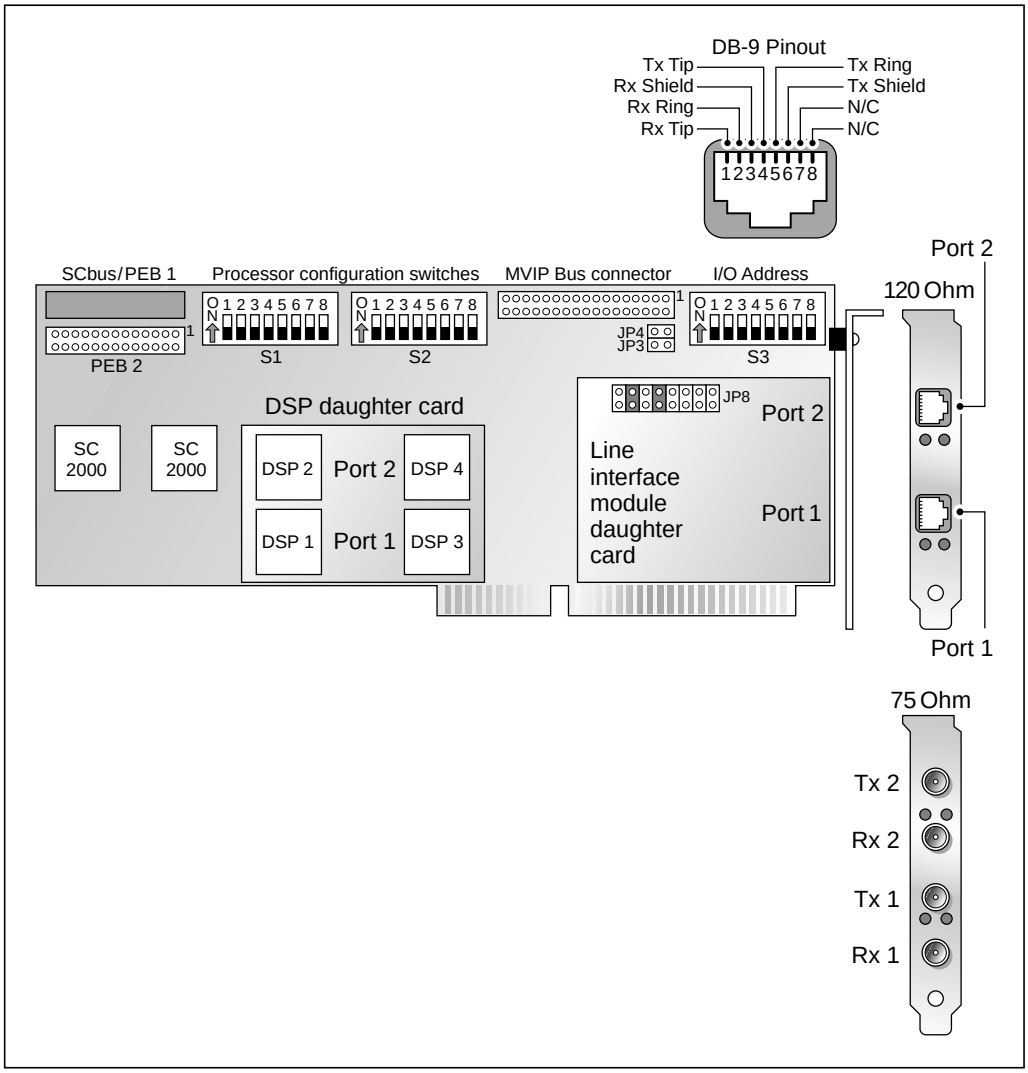

Table C-1: Typical usage of 75 Ohm versus 120 Ohm card

75 Ohm–Coax version	120 Ohm–DB-9 version
DPNSS	ETS300
DASS-2	1TR6
BT CAS	VN3
Mercury CAS	
Most CAS and R2 protocols	

Table C-2: Shield grounding arrangements JP8–Applicable to 75 Ohm interfaces only

Port 1	Port 2
JP8 (1-2) Rx Shield to GND	JP8 (5-6) Rx Shield to GND
JP8 (3-4) Tx Shield to GND	JP8 (7-8) Tx Shield to GND

Table C-3: I/O addressing–S3

	Address	8	7	6	5	4	3	2	1	Memory range
Card 1	320h	off	off	on	on	off	on	on	on	E0000–EFFFF
Card 2	324h	off	off	on	on	off	on	on	off	E0000–E3FFF

Table C-4: Example of I/O address selection

Switch S3	8	7	6	5	4	3	2	1	—	—
Switch S3 setting	off	off	on	on	off	on	on	off		
Binary address	1	1	0	0	1	0	0	1	0	0
Hex address	3		2				4			

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