Meridian 1
Succession 1000
Succession 1000M
Succession 3.0 Software

DASS2

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Revision history

October 2003

Standard 1.00. This document is a new NTP for Succession 3.0. It was created to support a restructuring of the Documentation Library, which resulted in the merging of multiple legacy NTPs. This new document consolidates information previously contained in the following legacy documents, now retired:

- *DASS2 Product Overview Guide (553-3911-100)*
- *DASS2 Installation Guide (553-3911-200)*
- *DASS2 Features and Services Guide (553-3911-300)*
- *DASS2 Maintenance Guide (553-3911-500)*

Contents

About this document

This document is specific to the UK market. Contact your system supplier or your Nortel Networks representative to verify that the hardware and software described is supported in your area.

Subject

The DASS2 document provides:

- information on DASS2 components and functionality, including features, application protocols, hardware components and schematics, hardware and software requirements
- procedures to install and administer features through overlay programs, and to maintain DASS2 links
- lists of applicable system error messages

Note on legacy products and releases

This NTP contains information about systems, components, and features that are compatible with Succession 3.0 Software. For more information on legacy products and releases, click the **Technical Documentation** link under **Support** on the Nortel Networks home page:

http://www.nortelnetworks.com/

Applicable systems

This document applies to the following systems:

- Meridian 1 Option 11C Chassis
- Meridian 1 Option 11C Cabinet

- Meridian 1 Option 51C
- Meridian 1 Option 61
- Meridian 1 Option 61C
- Meridian 1 Option 61C CP PII
- Meridian 1 Option 81
- Meridian 1 Option 81C
- Meridian 1 Option 81C CP PII
- Succession 1000
- Succession 1000M Chassis
- Succession 1000M Cabinet
- Succession 1000M Half Group
- Succession 1000M Single Group
- Succession 1000M Multi Group

Note that memory upgrades may be required to run Succession 3.0 Software on CP3 or CP4 systems (Options 51C, 61, 61C, 81, 81C).

System migration

When particular Meridian 1 systems are upgraded to run Succession 3.0 Software and configured to include a Succession Signaling Server, they become Succession 1000M systems. Table 1 lists each Meridian 1 system that supports an upgrade path to a Succession 1000M system.

Table 1
Meridian 1 systems to Succession 1000M systems (Part 1 of 2)

This Meridian 1 system...	Maps to this Succession 1000M system
Meridian 1 Option 11C Chassis	Succession 1000M Chassis
Meridian 1 Option 11C Cabinet	Succession 1000M Cabinet
Meridian 1 Option 51C	Succession 1000M Half Group

Table 1
Meridian 1 systems to Succession 1000M systems (Part 2 of 2)

This Meridian 1 system...	Maps to this Succession 1000M system
Meridian 1 Option 61	Succession 1000M Single Group
Meridian 1 Option 61C	Succession 1000M Single Group
Meridian 1 Option 61C CP PII	Succession 1000M Single Group
Meridian 1 Option 81	Succession 1000M Multi Group
Meridian 1 Option 81C	Succession 1000M Multi Group
Meridian 1 Option 81C CP PII	Succession 1000M Multi Group

Note the following:

- When an Option 11C Mini system is upgraded to run Succession 3.0 Software, that system becomes a Meridian 1 Option 11C Chassis.
- When an Option 11C system is upgraded to run Succession 3.0 Software, that system becomes a Meridian 1 Option 11C Cabinet.

For more information, see one or more of the following NTPs:

- *Small System: Upgrade Procedures* (553-3011-258)
- *Large System: Upgrade Procedures* (553-3021-258)
- *Succession 1000 System: Upgrade Procedures* (553-3031-258)

Intended audience

The intended audience of this document is as follows.

- network data managers, design personnel, marketing personnel, and anyone requiring information about DASS2
- network data administrators and technicians responsible for DASS2 connections

- individuals responsible to install DASS2 networks
- technical staff responsible to maintain DASS2 networks

Conventions

Terminology

In this document, the following systems are referred to generically as "system":

- Meridian 1
- Succession 1000
- Succession 1000M

The following systems are referred to generically as "Small System":

- Succession 1000M Chassis
- Succession 1000M Cabinet
- Meridian 1 Option 11C Chassis
- Meridian 1 Option 11C Cabinet

The following systems are referred to generically as "Large System":

- Meridian 1 Option 51C
- Meridian 1 Option 61
- Meridian 1 Option 61C
- Meridian 1 Option 61C CP PII
- Meridian 1 Option 81
- Meridian 1 Option 81C
- Meridian 1 Option 81C CP PII
- Succession 1000M Half Group
- Succession 1000M Single Group
- Succession 1000M Multi Group

The call processor in Succession 1000 and Succession 1000M systems is referred to as the “Succession Call Server”.

Related information

NTPs

The following NTPs are referenced in this document:

- *Spares Planning* (553-3001-153)
- *ISDN Primary Rate Interface: Installation and Configuration* (553-3001-201)
- *Features and Services* (553-3001-306)
- *Software Input/Output: Administration* (553-3001-311)
- *ISDN Primary Rate Interface: Features* (553-3001-369) or *ISDN Basic Rate Interface: Features* (553-3001-380)
- *DPNSS1* (553-3001-372)
- *Software Input/Output: Maintenance* (553-3001-511)
- *ISDN Primary Rate Interface: Maintenance* (553-3001-517)

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Overview

Contents

This section contains information on the following topics:

Introduction

British Telecom's Digital Access Signaling System No.2 (DASS2) is the signaling protocol defined for PBX access to the Integrated Services Digital Network (ISDN). In the United Kingdom, DASS2 provides:

- digital access to (U.K.) ISDN for voice and data calls
- supplementary facilities, such as Call Charge Indication and Calling Line Identity
- TIE line user-to-user signaling facility, allowing semi-permanent private networking connections to be established between PBXs, via ISDN

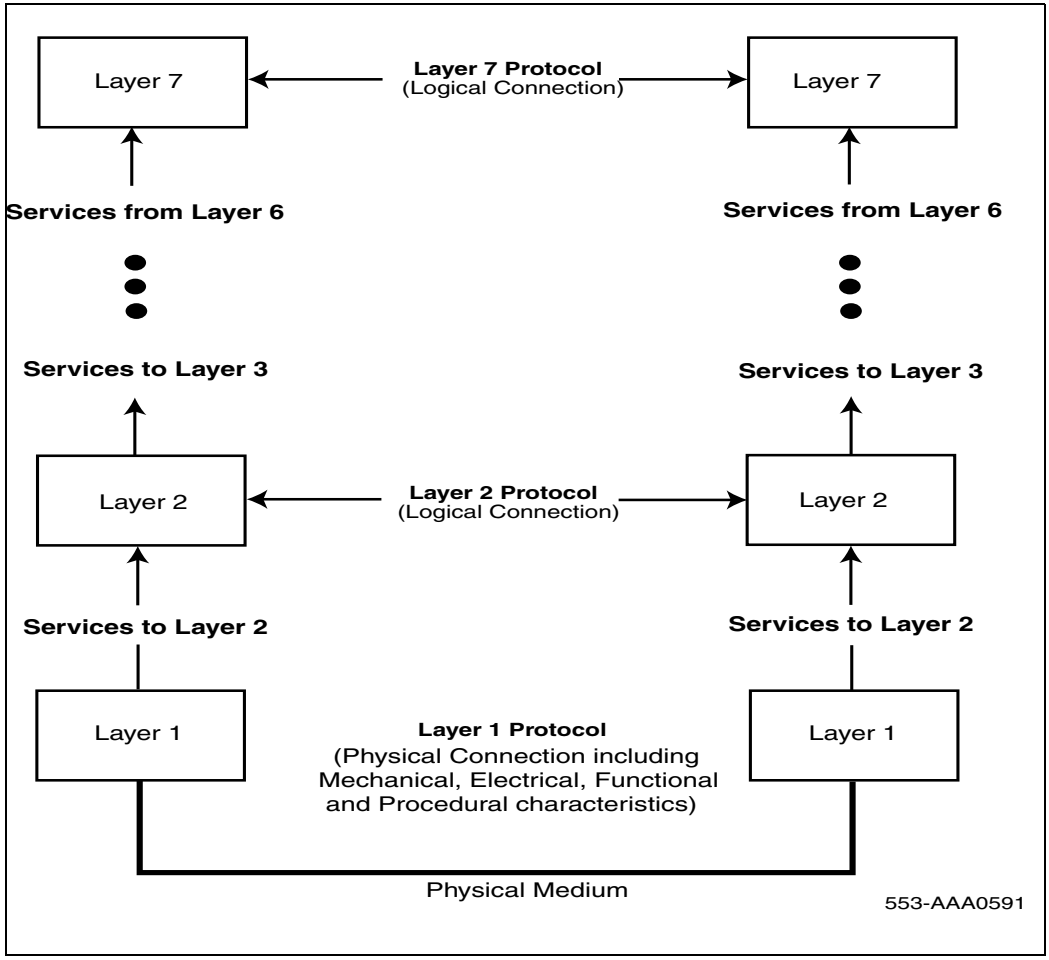
Note: DASS2 is supported only in the Succession Media Gateway and the Option 11C Chassis. It is not supported in the Media Gateway Expansion or Option 11C Chassis Expander.

DASS2 is the standard UK protocol for 2Mbit/s connections between PBXs and British Telecom's ISDN. In keeping with the product development philosophy of Nortel Networks, full interworking is provided between DASS2 and the following signaling interfaces:

- Q.931 MCDN interface
- Q.931 public ISDN access interface
- DPNSS1 private networking interface

DASS2 is specified in terms of the International Standards Organization (ISO) reference model for Open Systems Interconnection (OSI). Level 1 (Physical) of the model is a 2.048 Mbit/s digital interface and level 2 (Data Link) is the Link Access Protocol (LAP) defined for DASS2. Level 3 (Network) is the message layer unique to DASS2. Figure 1 illustrates the OSI model.

Figure 1
How the OSI Model works



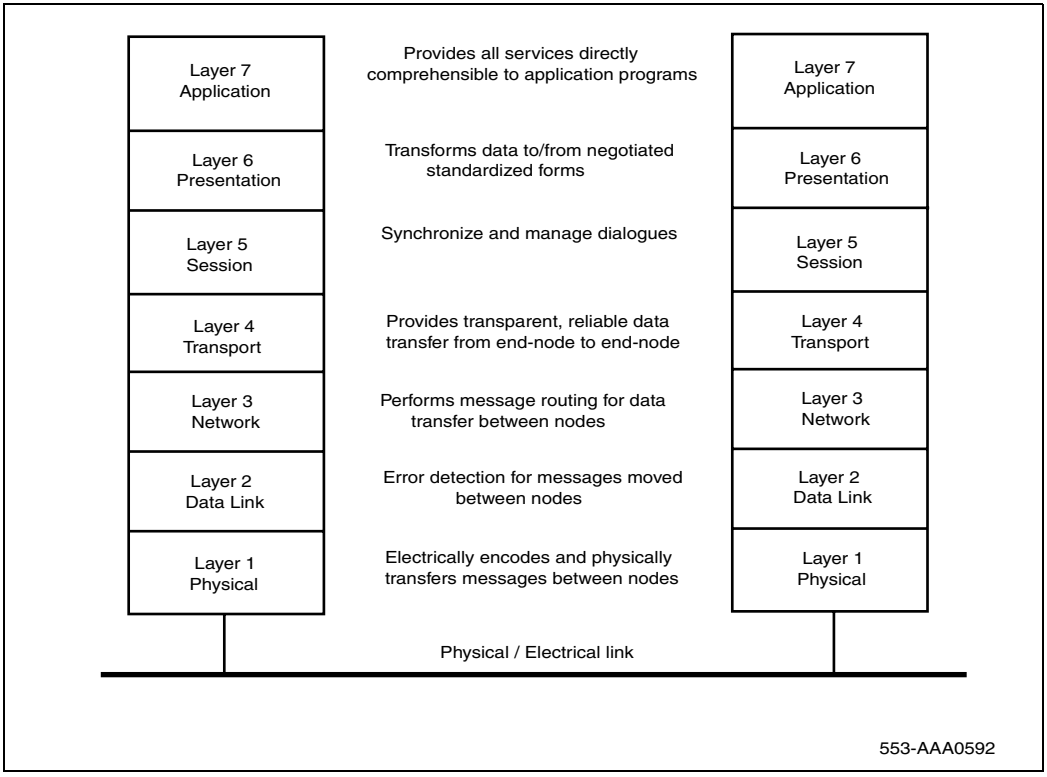
Each layer in the model depends on the services offered by the layer below it and, in turn, builds on those services to perform a specific set of communications functions. Protocols are the mechanism by which each layer accomplishes its communications functions. It then offers these functions to the layer above it in the form of its own set of services. Note that, while services are used between layers within a signaling entity (switch), protocols

operate within the same layer of the OSI model but between different signaling entities.

The OSI layering approach effectively divides the complex task of communication between network signaling entities into a series of more easily manageable pieces, each of which can be modified without affecting the other pieces. This allows more flexible evolution and compatibility with the ongoing standards activities.

Figure 2 shows the structure of the OSI Model and describes the functions of each layer.

Figure 2
The structure of the OSI Model together with the functions of each layer



Application principles

Transmission system

The 2.048 Mbit/s digital transmission is divided into 32 timeslots, numbered 0-31. Timeslots 1-15 and 17-31 provide 30 traffic channels. Timeslot 0 is used as a synchronization channel. DASS2 is a message-based signaling system that uses a common signaling channel in timeslot 16. Each traffic channel has an associated LAP. The LAPs operate in parallel over the signaling channel. Various messages are defined; each message has mandatory data elements and may include additional optional information.

> ***Note:*** British Telecom (BT) numbers the traffic channels 1-30 (that is, timeslot 17 and LAP 17 are associated with traffic channel 16), but in the implementation the timeslot numbers are used to number the traffic channels.

Each traffic channel, together with its LAP, represents one trunk and can be used for a call independently of the other channels for an incoming or outgoing call.

Each 2.048 Mbit/s link must be connected to an ISDN local public exchange. Some channels on the link may be configured to support the TIE Line Signaling facility, which allows a DPNSS1 connection to be established between PBXs through the public ISDN.

Link designation

The ends of each inter-PBX link are labelled arbitrarily A and B, and the ends of each DASS2 channel are designated X and Y. The X end has priority if both ends attempt to use the channel at the same time.

PBX functions

A PBX that connects a DASS2 channel to or from a non-DASS2 device is termed an end PBX. If that device is a trunk, then the PBX is termed a gateway. A PBX connecting two DASS2 channels is a transit.

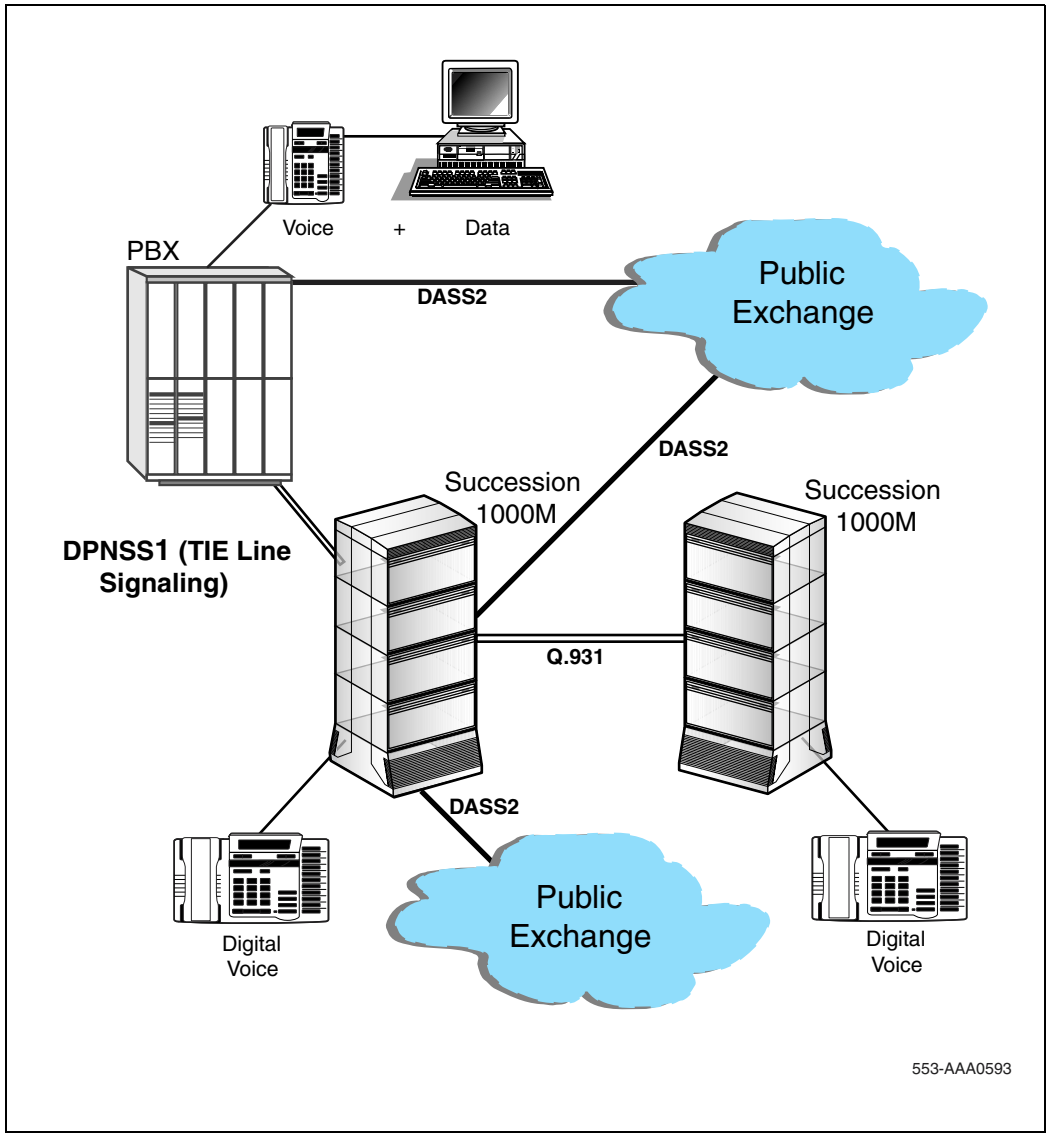
Configuration of trunks

DASS2 trunks are configured using the same route and member method used for other trunks, thus:

- Any number of routes may be associated with the same link.
- A route may be associated with any number of links.
- Each route member must be assigned to one channel.
- Not all channels need to be associated with members. These non-associated channels cannot, however, be used for calls.
- Members and channels must be numbered separately.
- Members are screened for outgoing calls using a linear search (Sequential Line) or round robin (Cyclic Line). For DASS2 links, a linear search should be used.
- Each route may be configured only for incoming calls, only for outgoing calls, or for both.
- Each route must be configured with DASS2 channels only.

Figure 3 shows a typical DASS2 system configuration with a Q.931-to-DASS2 gateway, a DPNSS1-to-DASS2 gateway, and the major public exchange types to which DASS2 connectivity is supported.

Figure 3
A typical DASS2 system configuration



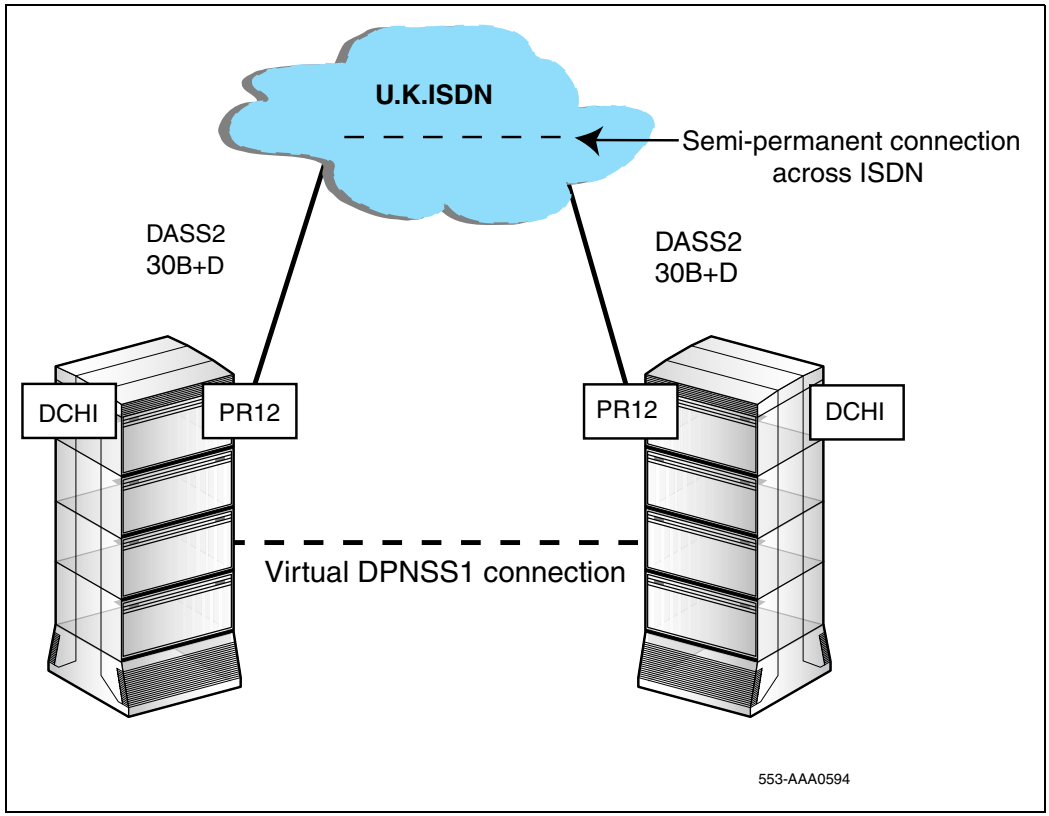
Channels

Within the DASS2 intelligent networking environment, a channel is a circuit that carries information between two PBXs via digital links. There are two types of channels — Bearer channels (B-channels) and Data channels (D-channels). The Bearer Channel (B-channel) is a digital trunk route carrying data/voice information — call processing signaling information is *not* carried over a B-channel. Voice and data transmission over DASS2 links is done at a rate of 64 Kbit/s. There may be up to 30 B-channels per D-channel.

The Data Channel (D-channel) carries call processing information between PBXs for the associated B-channels (call set-up and tear-down information, network feature activation information). The format is a High Level Data Link Control frame. For DASS2 applications, the D-channel must be a 64 Kbit/s digital channel. It may exist on the same or different carrying medium as the B-channels that it supports. One D-channel may support up to 30 B-channels.

Refer to Figure 4 for a depiction of how channels are typically configured for a DASS2 system.

Figure 4
Channel configurations for DASS2



Interworking with other signaling systems

DASS2 to ISDN PRA gateway

The preferred method of interconnection between PBX systems is the Q.931 intelligent private network signaling protocol. Please refer to the Nortel Networks technical publications *ISDN Primary Rate Interface: Installation and Configuration* (553-3001-201), *ISDN Primary Rate Interface: Features* (553-3001-369), or *ISDN Basic Rate Interface: Features* (553-3001-380) *ISDN Primary Rate Interface: Maintenance* (553-3001-517). for information

on international ISDN PRI functionality. Similarly, the preferred option for providing an intelligent 2Mbit/s digital connection to the ISDN public network is the Q.931 interface.

A gateway connects two different signaling schemes. DASS2 on the Succession 1000M, Succession 1000, and Meridian 1 systems offers transparent gateway working to the Q.931 signaling protocols, with the following functions:

- Basic Call Service
- Calling Line Identification
- Called Line Identification
- Display update on call diversion
- Call Charging Indication
- Coordinated Dialing Plan

DASS2 to ISDN BRI, QSIG, and EuroISDN gateway

The following services are provided with the DPNSS1 to ISDN BRI (line and trunk applications), QSIG, and EuroISDN gateways:

- Basic Call Service (3.1 kHz, speech, 64 Kbit/s restricted/ unrestricted digital information)
- Overlap Sending and Receiving
- 64 Kbit/s bearer capability

Gateway interworking with other signaling systems

Table 2 on page 27 outlines the gateway workings between DASS2 and other signaling systems, as well as the DASS2 services offered across the gateway.

Table 2
DASS2 gateway to other signaling systems

DASS2 Gateway to Signaling System	Yes/No
PSTN	Yes
DPNSS1	Yes
Q.931 (Meridian Customer Defined Network, MDCN)	Yes
Private ISDN/QSIG (ETS 300 172)	Yes
BRI line and trunk interface (NET3 compliant)	Yes
EuroISDN	Yes
10pps	Yes
SSMF5	No
Non-gateway able to make and receive calls to:	Yes/No
PSTN	Yes
DPNSS1	Yes
10pps	Yes
SSMF5	Yes

The DASS2-DPNSS1 gateway supports the following services:

- speech and data calls; outgoing calls are made at category 1 or category 2, as appropriate
- calling/called line identification

Numbering plans for DASS2 routes

With the exception of DPNSS Trunk Identities, there is very little difference between DASS2 routes and standard Direct Dial In (DDI)/Exchange routes

where numbering is concerned. For outgoing calls, DASS2 routes may be accessed by:

- dialing the route access code
- Coordinated Dialing Plan (Trunk Steering Code)
- NARS/BARS Special Numbers
- pre-translation giving any of the above

Examples of numbering plans which give access to DASS2 are presented in the following section.

Incoming DDI numbering facilities

If a DASS2 route is configured as DDI, then incoming routing digits will be received. These routing digits correspond with a DDI extension number of an extension on the private network. The received digits may not be the same as the internal extension number. Three facilities exist which allow conversion of the received digits before they are presented to the digit translator:

- Digit Insertion - INST
- DDI Incoming Digit Conversion - IDC
- Pre-translation - PREXL

Digit Insertion - INST

A fixed string of up to 8 digits, programmable on a route basis, may be inserted in front of any received digits on an incoming call.

DDI Incoming Digit Conversion - IDC

This feature allows the private network numbering plan to differ from the public numbering plan with respect to DDI extensions within the private network. Each DDI route may have a unique IDC table assigned to it which will allow full or partial conversion of the received DDI digits. For more details please refer to *Features and Services* (553-3001-306).

Pre-translation - PREXL

This feature allows the first dialed digit of a call to be pre-translated according to a table associated with the terminal originating the call. A table has 10

entries, one for each possible leading digit, 0 to 9. For each entry, one of four pretranslation options is possible:

- Block the call.
- Delete the leading digit.
- Pass the leading digit unchanged.
- Replace the leading digit by another digit sequence up to four digits in length.

The result of the pre-translation is then processed as a normal directory number.

All trunks are assigned table 0 (1 is reserved for consoles, and 2-255 for set groupings). For more details, please refer to the Nortel Networks technical publication *Features and Services* (553-3001-306).

Incoming Non-DDI numbering facilities

If a DASS2 route is configured as non-DDI, then operation is much the same as for a standard Exchange Line route. Incoming calls will usually be routed directly to the attendant. The system offers the following alternative methods of termination:

- Auto-terminate
- Private Line

Auto-terminate

If a route is defined as an auto-terminate route, then each trunk member of the route can be assigned an auto-terminate DN. Any incoming calls on the trunk will then be routed to this DN. This feature can be applied to DDI as well as non-DDI DASS2 trunks.

Private Line

This feature applies to non-DDI routes only. For incoming calls, it offers the same facility as Auto-terminate, that is, termination on a pre-assigned DN. For outgoing calls, a given trunk can only be accessed from the extension on which the assigned DN is located.

Dialed Number Identification Service - DNIS

DDI routes using auto-terminate or IDC may also be defined as DNIS routes. Dialed Number Identification Service (DNIS) is an Automatic Call Distribution feature designed to enhance call handling speed and quality. When used with an auto-terminate DDI route, DNIS allows the actual received digits and name to be displayed on the answering ACD agent. This can be used to indicate the service which the caller expects from the agent. If a route is configured as DNIS, then digit insertion and pre-translation may not be applied. Also, the number of digits which must be received on a DDI route is determined by the ISDN, and this may differ from the quantity defined for DNIS display purposes on the system.

Network Routing of DASS2 Calls

Incoming DDI DASS2 calls may be routed through the private network on DPNSS1 or non IDA trunks. To achieve this, the received digits must be converted into the appropriate CDP steering code or BARS Special Number.

Outgoing calls on DASS2 routes can be originated from DPNSS1 trunks. The way to configure this type of access is described in the Network Numbering section of *DPNSS1* (553-3001-372).

DASS2 - Line Identities

ISDN Access Code

Any ISDN Line Identities to be displayed on the system must be preceded by the “ISDN Access Code”. This is defined in the customer data block. It must be defined at each network node which has access to the ISDN, either locally or through the DPNSS1 network.

Provision of Line Identities to the ISDN

Normally, Line Identities will only be required of a DDI PBX. An option must be defined so that line identities will be supplied when necessary.

Line Identity Digit Conversion

If incoming digit conversion is required to terminate DDI calls, then this conversion must be reversed when line identities are being supplied to the ISDN.

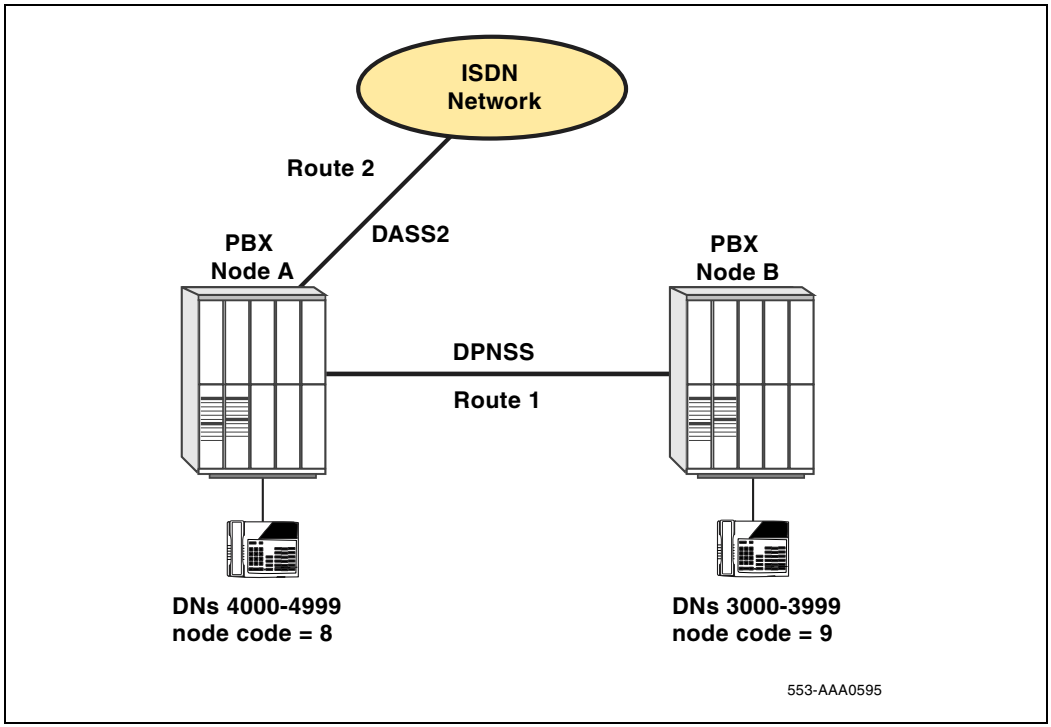
Trunk Identities

When used with DPNSS1, a “trunk identity” will be used for originating/called line identity exchange and display purposes, for DPNSS1 calls.

Example of a DASS2 numbering scheme

Figure 5 illustrates a basic application of a DASS2 numbering scheme.

Figure 5
DASS2 typical numbering scheme



The PBXs are identified by node codes 8 and 9. In this example figure, the Network Access Code is 5. To place a call to a remote extension, the following digit fields must be dialed:

> Network Access Code (5) + node code (8) + DN (4000 - the desired extension at the remote node.)

To make a local call the Network Access Code and node code part of the number can be omitted.

Access to the PSTN via the node A DASS2 route is obtained by dialing "9" followed by the required PSTN number. This applies to both nodes A and B. However, ISDN numbers 5541xx and 5542xx are the PSTN DDI numbers for extensions on nodes A and B respectively. The numbering plan ensures that calls to these numbers originated from within the private network are not routed via the DASS2 route (and thus do not incur call charges).

For incoming DASS2 DDI calls from the PSTN, three digits are received which must be converted into an internal network number. The sequence 1xx corresponds to the last three digits of a DN at node A, and 2xx to the last three digits of a DN at node B. Note that the Incoming Digit Conversion (IDC) feature can be used to provide flexible mapping from received digits to internal DNs. In this case the simplest mapping is chosen. 1xx maps to DNs 41xx on node A, and 2xx to DNs 32xx on node B. No other extensions on the network are accessible using DDI.

Digit Insertion

At both nodes, the DPNSS1 route is programmed to insert a leading digit of "5" (using the INST prompt in LD16), the network access code, for all incoming calls. The same effect could have been achieved by using Digit Manipulation at the originating end of the DPNSS1 call to insert the "5". The advantage of the method chosen is that configuration data relating to the network access code of node A is restricted to A (or B); thus if the access code should be changed, node A is the only node where reprogramming would be needed.

Dialing Network Numbers

Routing of calls from one network node to an extension on the other node is done using the CDP feature. The network coordinated dialing plan DN length

is six digits. Essentially, CDP is used to synthesize a location code dialing plan. The network access code, “5”, and the node location codes, “8” and “9”, are absorbed into the programmed distant steering codes and local steering codes.

Table 3 and Table 4 provide examples of how distant steering codes and local steering codes are applied.

Table 3
Distant Steering Codes application

PBX A					PBX B				
DSC	RLI	Route	DMI		SPN	RLI	Route	DMI	
			Del	Ins				Del	Ins
59	101	1	1	-	58	201	1	1	-

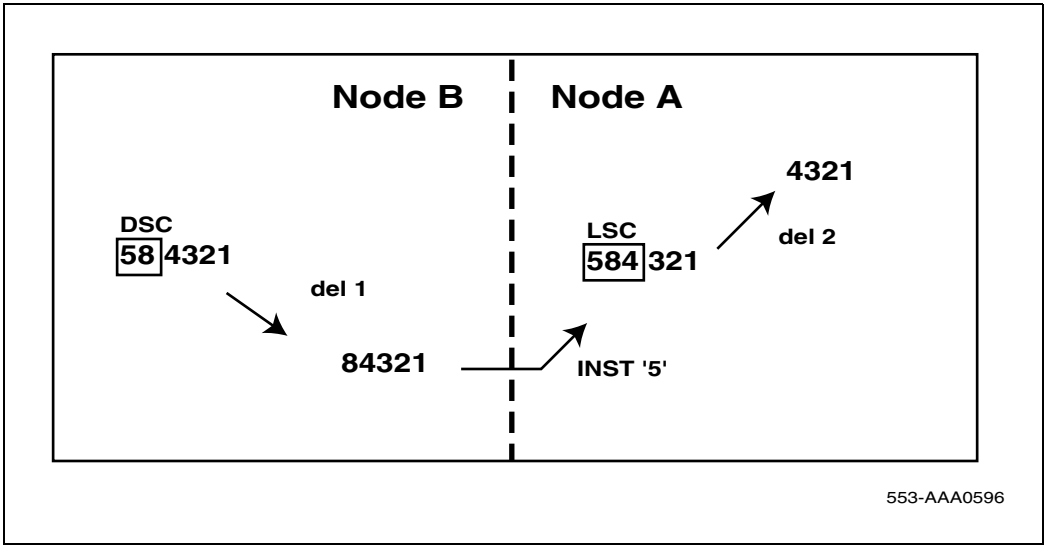
Table 4
Local Steering Codes application

PBX A			PBX B		
LSC	DMI		LSC	DMI	
	Del	Ins		Del	Ins
584	2	-	59	2	-

A three digit local steering code, “584” is required at node A, in order to distinguish from the trunk steering code used to route calls incoming from node B to DASS2, “589”.

Figure 6 shows the digit processing performed to terminate a network call from a node B user dialing 5-8-4321 to reach extension 4321 at node A.

Figure 6
Network call termination



Dialing PSTN numbers

PSTN numbers are handled using the BARS feature. The digit “9” is defined as the BARS access code at both nodes. A minimum of 10 Special Numbers will be programmed, “0”, “1”, “2”.....”9”. Note that calls to local PSTN numbers 5541xx and 5542xx must be programmed not to be routed onto the public network. These are DID extension numbers for PBXs A and B respectively. The Supplementary Digit Restriction/Recognition (SDRR) feature must be employed at both nodes to recognize these exceptions.

Special numbers

Special Number programming at node A

On node A, “5” is programmed as one of several Special Numbers. The special number defines the routing for PSTN numbers which begin with the

digit “5”. The basic programming for Special Number “5” is as shown in Table 5.

Table 5
Application of special number 5 at node A

PBX A				
			DMI	
SPN	RLI	Route	Del	Ins
5	103	2	-	-

If the number 5541xx is dialed, this must be recognized as an extension 41xx local to PBX A. The digits must be manipulated so that the call can terminate directly on 41xx. A Supplementary Digit Restriction and Recognition (SDRR) table must be created for SPN “5”. In the table, an entry of type LDID (Local DID) must be programmed, with digit sequence “5541”. A digit manipulation must be associated with LDID entries in the SDRR table which will delete the two leading digits and then present the remaining digits to the local digit translator.

If the number 5542xx is dialed, this must be recognized as an extension 32xx local to PBX B. Alternative routing of the call is required to route the call directly to PBX B on route 1 without including an out and back PSTN leg. Digit manipulation is also required to convert 5542xx to 32xx. An SDRR entry of type ARRN (Alternative Routing) can be added to the table, for digit sequence “542”. An alternative route list index must be entered which is shown in Table 6 on page 36.

Table 6
Application of an alternative route list index for digit sequence 542

SPN	Digit Sequence	Type	DMI		RLI
			Delete	Insert	
5	542	ARRN	-na-	-na-	104
	541	LDID	2	-	-na-

The alternative route list associated with the ARRN entry will be programmed as shown in Table 7.

Table 7
Application of an alternative route list associated with ARRN

RLI	Route No	Digit Manipulation	
		Delete	Insert
104	1	3	593

Special Number programming at node B

On node B, Special Number “5” is programmed as shown in Table 8.

Table 8
Application of Special Number 5 at node B

PBX B				
SPN	RLI	Route	DMI	
			Delete	Insert
5	203	1	-	89

If the number 5542xx is dialed by an extension on node B, this must be recognized as the DID number of extension 32xx, local to node B. An SDRR table with an LDID (Local DID) entry “542” must be created for SPN “5”.

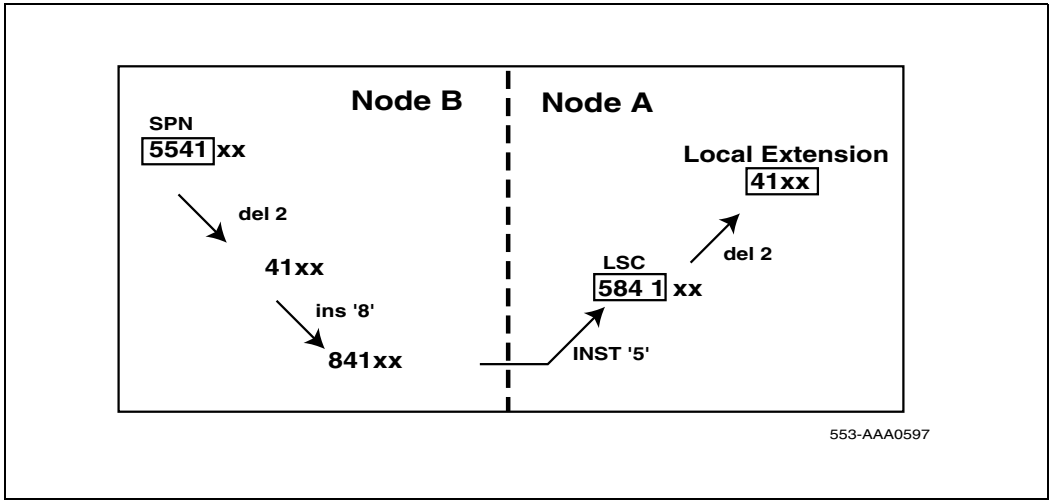
If the number 5541xx is dialed by an extension on node B, this must be recognized as the DID number of extension 41xx, local to node A. While the call should still be routed to node A, digit manipulation is required so that the call does not tandem through node A and out to the PSTN. An SDRR entry of type DID can be added to the table, for digit sequence “541” which will provide a unique digit manipulation for this digit sequence, to turn the digits into the internal DN of the extension dialed. Refer to Table 9.

Table 9
Application of an alternative route list index for digit sequence 541

SPN	Digit Sequence	Type	DMI		RLI
			Delete	Insert	
5	541	DID	2	8	-na-
	542	LDID	3	3	-na-

When the 5541xx special number is dialed from node B, the digits received at node A will be translated using to the coordinated dialing plan feature. Figure 7 shows the full sequence of digit conversion.

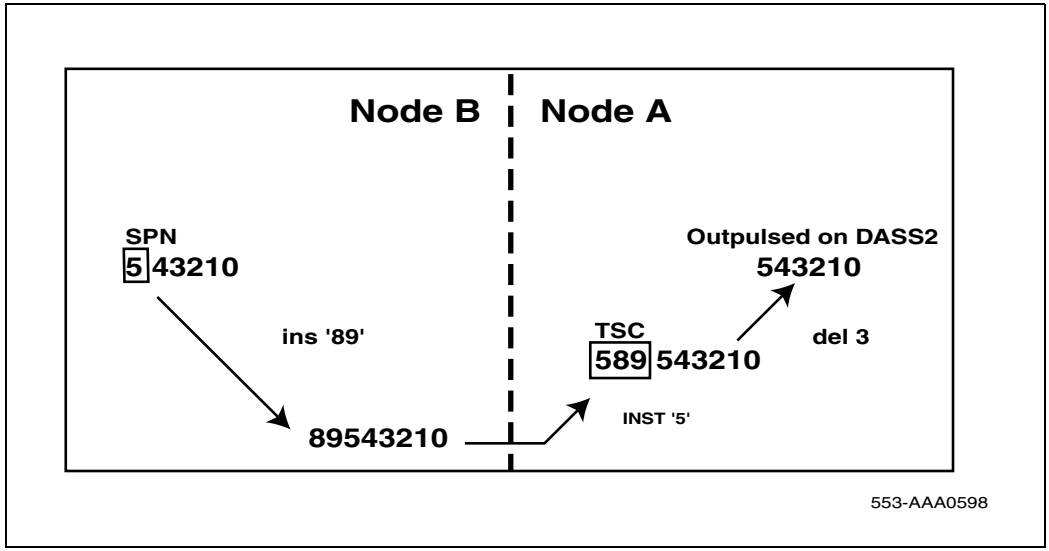
Figure 7
Digit conversion, node A and node B



The digits which are analyzed at node A, “5841xx”, equate to the local steering code “584”. The two leading digits are deleted to give the node A local extension number.

When another Special Number is dialed from node B, the digit manipulation at node B and the INST on the DPNSS1 route at node A combine to generate a trunk steering code which routes calls to the DASS2 route. This is shown in Figure 8.

Figure 8
Generation of a trunk steering code



PSTN number barring

There may be a requirement to allow callers to dial certain PSTN numbers whilst barring others. For example, network callers may be allowed to dial PSTN numbers within the UK, but are barred from international dialing. To achieve this, Special number ‘0’ can be defined and entered in an associated SDRR table as a DENY, (that is, barred) entry. Note that a sequence which may not be defined is ‘01’, (that is, 010, which is the international dialing code). There may be a requirement to allow callers to dial certain PSTN numbers whilst barring others.

Alternatively, there may be a requirement to bar PSTN dialing outside of the local area, with the exception of a few area codes. For example, if users are to be allowed to make local PSTN calls and calls to London, Liverpool,

Birmingham and Manchester only, then the following Special Numbers would be defined:

021 Birmingham
051 Liverpool
061 Manchester
071 Inner London
081 Outer London
1 Local
2 Local
3 Local
4 Local
5 Local
6 Local
7 Local
8 Local
9 Local

Routing of DDI Calls

An Incoming Digit Conversion (IDC) table must be assigned to the DASS2 route to convert the received “1xx” and “2xx” digit sequences. The “1xx” must be converted to the node A extension number “41xx”. The “2xx” is converted to the CDP DN which will permit routing and termination on the node B extension “32xx”. Refer to Table 10.

Table 10
Application of an incoming digit conversion table

IDC for DASS2 DDI on PBX A	
Received Digit	**Convert to**
1xx	41xx
2xx	5932xx

Programming for ISDN Line Identities

Most of the programming for ISDN line identities must be done at node A. At node B, only the ISDN access code, “9”, needs to be programmed. At node A, a digit conversion table is required to reverse the Incoming Digit Conversion performed on DDI calls on the DASS2 route. This conversion will provide the ISDN with consistent line identities. Refer to Table 11.

Table 11
Application of a Line Identity conversion table

Line ID Digit Conversion Table	
Internal Digits	**Convert to**
41xx	1xx
5932xx	2xx

Note that if a non-DDI extension on either node makes an outgoing call to the ISDN, no line identity will be supplied by the private network. The ISDN must provide a default line identity.

Hardware requirements

Contents

This section contains information on the following topics:

DASS2 hardware requirements

The following hardware is required for each DASS2 link on Succession 1000M, Succession 1000, and Meridian 1 systems.

- one NTAG54 Dual Daughterboard (for NTCK43AB or higher vintages of the Dual PRI)

  or

- one NT5K35 D-channel Handler Interface

  or

- one NT5K75 D-channel Handler Interface - an enhanced version of the NT5K35 which provides up to 160 D-channel port addresses. This card supports two switch-selectable modes of operation — standard mode and expanded mode. Standard mode D-channels may be assigned an input/output port address in the range 0-15; expanded mode D-channels may be assigned port addresses in the range 0-159. Each port has a set of DIP switches allowing full configuration flexibility. See the section entitled “Engineering note pertaining to port addressing modes” on page 46 in this chapter.

  or

- one NT6D11AE/AF D-channel Handler Interface - an enhanced version of the NT5K75 which is fully backward compatible with the NT5K75 and NT5K35. This card supports two switch-selectable modes of operation — standard mode and expanded mode. Standard mode D-channels may be assigned an input/output port address in the range 0-15; expanded mode D-channels may be assigned port addresses in the range 0-159. Each port has a set of DIP switches allowing full configuration flexibility. See the section entitled “Engineering note pertaining to port addressing modes” on page 46 in this chapter.
- one NTCK43 dual-port PRI card (NTCK43AB or higher)

  or

- one NT8D72 Primary Rate Interface card (NT8D72BA is required for EuroISDN applications)

  or

- one NT5D97 Primary Rate Interface card
- one QPC949D CPU ROM (up to and including Group G) and NTND08AA CPU ROM (up to and including Group H) are required to support the expanded capability of the NT5K75 and NT6D11AE/AF DCHI
- one loop of the QPC414 ENET dual loop network interface card
- one of the following cables:
  - NT5K40AA PRI to Line Terminating Equipment cable (15 pin D-type to twin BNC, 4 meters)
  - NT5K41AA PRI to Line Terminating Equipment cable (15 pin D-type to twin BNC, 8 meters)
  - NT5K86AA PRI to Line Terminating Equipment cable (15 pin D-type to twin BNC, 12 meters, TX shield connected to FGND)

— NT5K86BA PRI to Line Terminating Equipment cable (15 pin D-type to twin BNC, 12 meters, RX shield connected to FGND)

— NT5K86AA PRI to Line Terminating Equipment cable (15 pin D-type to twin BNC, 12 meters, TX and RX shields connected to FGND)

- one QCAD328 DCHI to PRI cable
- one NT8D85 ENET to PRI cable for the NTCK43 DPRI card, the following cables are used:
  - — NTCK45AA 120 Ohm Dual PRI to I/O Panel cable (8ft)
  - — NTCK78AA 120 Ohm Dual PRI cable for ST Machines (50ft
  - — NTCK79AA 75 Ohm Dual PRI Coax Cable (40ft)
  - — NT8D7217 Dual PRI I/O Panel to Multiplexer cable (50ft)
  - — NTCK46AA Dual PRI to DASS/DPNSS NT6D11 DCHI cable (6ft)
  - — NTCK46AB Dual PRI to DASS/DPNSS NT6D11 DCHI cable (18ft)
  - — NTCK46AC Dual PRI to DASS/DPNSS NT6D11 DCHI cable (35ft)
  - — NTCK46AD Dual PRI to DASS/DPNSS NT6D11 DCHI cable (50ft)
  - — Clock Controller cables (1 to 2 port cables):
    - – NTCK47AA Dual PRI to Clock Controller cable (2ft)
    - – NTCK47AB Dual PRI to Clock Controller cable (4ft)
    - – NTCK47AC Dual PRI to Clock Controller cable (6ft)
    - – NTCK47AD Dual PRI to Clock Controller cable (8ft)
    - – NTCK47AE/AF Dual PRI to Clock Controller cable (10ft)
  - — Clock Controller Cables (1 to 4 port cables)
    - – NTCK81AA Dual PRI to Clock Controller cable (2ft)
    - – NTCK81AB Dual PRI to Clock Controller cable (4ft)

  - NTCK81AC Dual PRI to Clock Controller cable (6ft)
  - NTCK81AD Dual PRI to Clock Controller cable (8ft)
  - NTCK81AE/AF Dual PRI to Clock Controller cable (10ft)

- one QPC775 Clock Controller (QPC775E is required on large systems, and where EuroISDN functionalities are supported). This cable is required if the DPNSS1 loop is to be used as a timing synchronization source.
- one NT8D79AD PRI to Clock Controller cable. This cable is required if the DPNSS1 loop is to be used as a timing synchronization source for the system PBX.

  Note: Presently, the network loop used for DASS2 cannot be odd-numbered if the associated even-numbered loop is programmed as being used for existing peripheral equipment, that is, as TERM, TERD, or TERQ in LD 17. If all peripheral equipment is IPE, this constraint applies only when Meridian Mail is equipped. Refer to Table 12.

Table 12
Programming network loops

ENET Loop	Allowed					Not Allowed
Even	Meridian Mail	PRI	PRI	Any	---	Meridian Mail
Odd	Meridian Mail	PRI	Meridian Mail	---	Any	PRI

Engineering note pertaining to port addressing modes

There is a distinction between functionality regarding port addressing modes in Group G and earlier, and Group H and later.

Group G and earlier

Standard address mode (0-15) can be any of the following:

- DPNSS1 (DDSL)
- DASS2 (DDSL)

- APNSS (LSSL)
- Q.931 (DCHI)
- ISL (DCHI)
- SDI
- ESDI

Expanded address mode (0-159) can be either of the following:

- DPNSS1 (DDSL)
- DASS2 (DDSL)

The expanded mode addressing has no impact on the standard mode addressing, that is, DASS2 D-channel (DDSL) 7 in the expanded mode can exist with the Q.931 D-channel (DCHI) 7 in the standard mode.

Theoretically, it is possible to have 160 DASS2 D-channels and 16 other I/O devices. In practise, however, there is a limit of 40 addresses in expanded mode and 16 in standard mode, for a total of 56 addresses.

The port address numbers assigned to the NT5K75 and NT6D11AE/AF operating in expanded mode must not conflict with addresses assigned to other I/O port types. To avoid potential conflicts and to simplify system configuration, it is recommended that, in the expanded mode, the port addresses for the NT5K75 and NT6D11AE/AF avoid the standard mode range (0-15) and be numbered in the range 16-159 instead.

Group H and later

Standard address mode (0-15) can be any of the following:

- DPNSS1 (DDSL)
- DASS2 (DDSL)
- APNSS (LSSL)
- Q.931 (DCHI)
- ISL (DCHI)

- SDI
- ESDI

If the MSDL is used, standard mode can have a range of 0-63, and can be any of the following:

- Q.931 (DCHI)
- ISL (DCHI)
- ESDI

Expanded address mode (0-159) can be either of the following:

- DPNSS1 (DDSL)
- DASS2 (DDSL)

The expanded mode addressing has no impact on the standard mode addressing, that is, DASS2 D-channel (DDSL) 7 in the expanded mode can exist with the Q.931 D-channel (DCHI) 7 in the standard mode.

Theoretically, it is possible to have 64 addresses using the MSDL with Q.931, ISDL, or ESDI, plus 160 addresses using the expanded mode for DPNSS1 for a total of 224 addresses. In practise, however, there is a limit of 64 addresses using MSDL with Q.931, ISDL, or ESDI, plus 40 addresses using the expanded mode for DASS2, for a total of 104 addresses.

Presently, MSDL does not support SDI ports on DASS2, so the likely configuration would involve a mixture of standard mode addressing, MSDL addressing, and expanded mode addressing for DPNSS1. Such an example could be as follows:

0-7 (8 addresses) in the standard mode;

8-15 (32 addresses) in the MSDL mode;

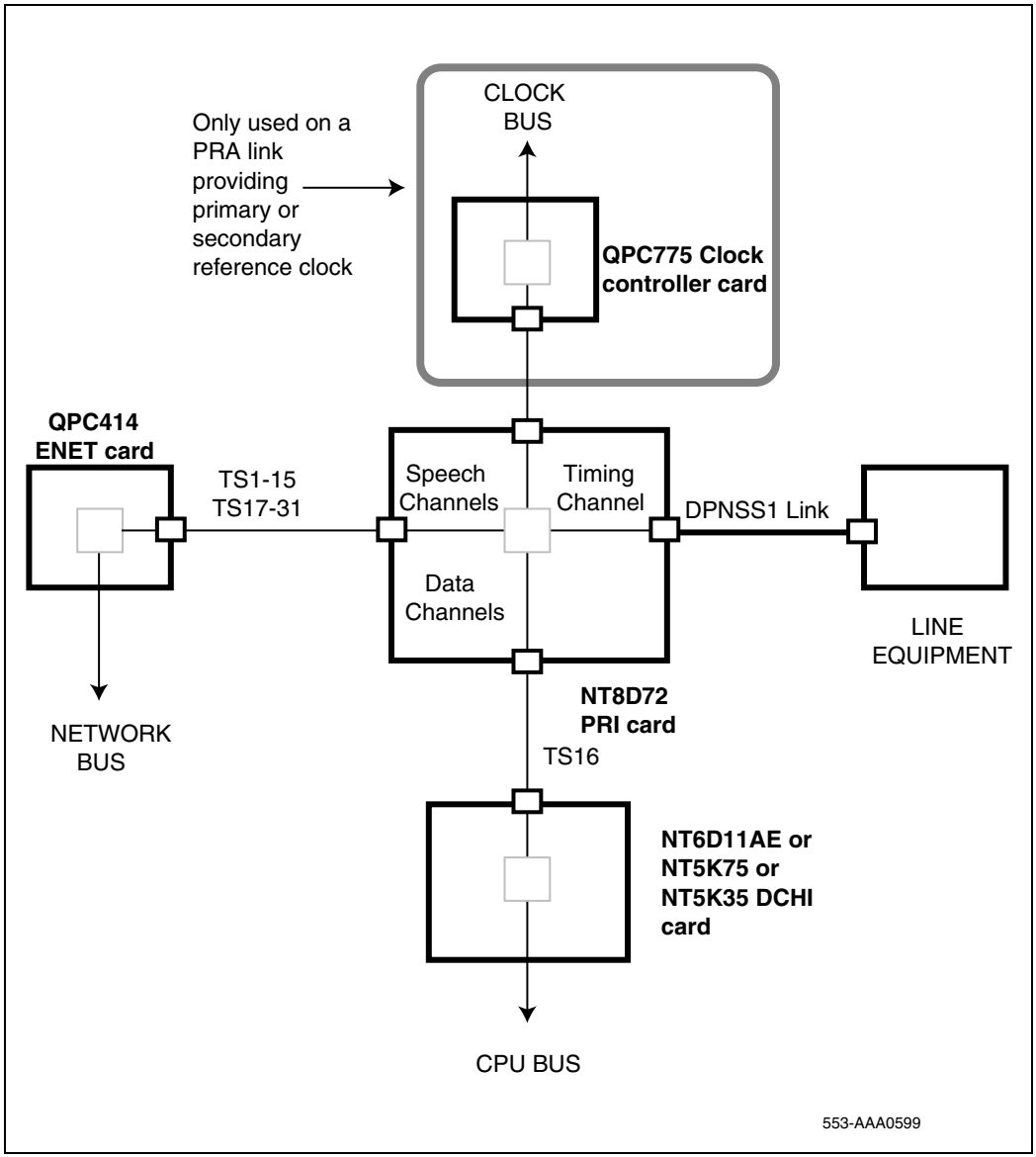
16-55 (40 addresses) in the expanded mode.

The port address numbers assigned to the NT5K75 and NT6D11AE/AF operating in expanded mode must not conflict with addresses assigned to other I/O port types. To avoid potential conflicts and to simplify system configuration, it is recommended that, in the expanded mode, the port

addresses for the NT5K75 and NT6D11AE/AF avoid the standard mode range (0-15) and be numbered in the range 16-159 instead.

Figure 9 illustrates a typical DASS2 hardware configuration.

Figure 9
A typical DASS2 hardware configuration



Basic configuration

Contents

This section contains information on the following topics:

Introduction

Table 13 on page 52 outlines steps to configure basic DASS2 capabilities.

Note: Please note the difference in configuration requirements in LD 17 for DASS2 systems running on software up to and including Group G, and systems running on software up to and including Group H. Refer to the "Note about port addressing modes" on page 53".

Table 13
Configuring DASS2 capabilities

Step	Overlay	Action
1	LD 17 Configuration Record	Group G and earlier Configure DASS2 D-channel port number for the NT5K35 DCHI, or the NT5K75 DCHI or NT6D11AE operating in standard mode. This is the number used to reference the D-channel in LD 74; the value is entered against the **DCHI** prompt, and is in the range of 0-15. Configure PRI loop number Group H and later Configure the DASS2 D-channel port number, which is a logical port number independent of the actual I/O port address. This is the number used to reference the D-channel in LD 74; the value is entered against the **ADAN** prompt, and is in the range of 0-63.
2	LD 73 Digital Data Block	Define clock synchronization control.
3	LD 74 DDSL Data Block	Define the data blocks used for the DASS2 protocols.
4	LD 15 Customer Data Block	Define a DASS2 customer.
5	LD 16 Route Data Block	Create the service routes to be used.
6	LD 14 Trunk Data Block	Create the channels within the service routes.
7	LD 75 IDA Trunk Maintenance	Bring the DASS2 link into service.

Note about port addressing modes

There is a distinction between Group G and Group H functionality regarding port addressing modes.

Group G and earlier

Standard address mode (0-15) can be any of the following:

- DPNSS1 (DDSL)
- DASS2 (DDSL)
- APNSS (LSSL)
- Q.931 (DCHI)
- ISL (DCHI)
- SDI
- ESDI

Expanded address mode (0-159) can be either of the following:

- DPNSS1 (DDSL)
- DASS2 (DDSL)

The expanded mode addressing has no impact on the standard mode addressing; that is, DASS2 D-channel (DDSL) 7 in the expanded mode can exist with the Q.931 D-channel (DCHI) 7 in the standard mode.

Theoretically, it is possible to have 160 DASS2 D-channels and 16 other I/O devices. In practise, however, there is a limit of 40 addresses in expanded mode and 16 in standard mode, for a total of 56 addresses.

The port address numbers assigned to the NT5K75 and NT6D11AE operating in expanded mode must not conflict with addresses assigned to other I/O port types. To avoid potential conflicts and to simplify system configuration, it is recommended that, in the expanded mode, the port addresses for the NT5K75 and NT6D11AE avoid the standard mode range (0-15) and be numbered in the range 16-159 instead.

Group H and later

Standard address mode (0-15) can be any of the following:

- DPNSS1 (DDSL)
- DASS2 (DDSL)
- APNSS (LSSL)
- Q.931 (DCHI)
- ISL (DCHI)
- SDI
- ESDI

If the MSDL is used, standard mode can have a range of 0-63, and can be any of the following:

- Q.931 (DCHI)
- ISL (DCHI)
- ESDI

Expanded address mode (0-159) can be either of the following:

- DPNSS1 (DDSL)
- DASS2 (DDSL)

The expanded mode addressing has no impact on the standard mode addressing; that is, DASS2 D-channel (DDSL) 7 in the expanded mode can exist with the Q.931 D-channel (DCHI) 7 in the standard mode.

Theoretically, it is possible to have 64 addresses using the MSDL with Q.931, ISDL, or ESDI, plus 160 addresses using the expanded mode for DASS2 for a total of 224 addresses. In practise, however, there is a limit of 64 addresses using MSDL with Q.931, ISDL, or ESDI, plus 40 addresses using the expanded mode for DASS2, for a total of 104 addresses.

Presently, MSDL does not support SDI ports on DASS2, so the likely configuration would involve a mixture of standard mode addressing, MSDL

addressing, and expanded mode addressing for DASS2. Such an example could be as follows:

0-7 (8 addresses) in the standard mode;

8-15 (32 addresses) in the MSDL mode;

16-55 (40 addresses) in the expanded mode.

The port address numbers assigned to the NT5K75 and NT6D11AE operating in expanded mode must not conflict with addresses assigned to other I/O port types. To avoid potential conflicts and to simplify system configuration, it is recommended that, in the expanded mode, the port addresses for the NT5K75 and NT6D11AE avoid the standard mode range (0-15) and be numbered in the range 16-159 instead.

Configuring basic capabilities

Note: The prompts have been presented according to Group G and Group H requirements.

LD 17 – Configure DASS2 DCHI and PRI loop number up to and including Group G software, for NT5K35, NT5K75, and NT6D11AE in standard mode. (Part 1 of 2)

Prompt	Response	Description
REQ	CHG	Modify existing data base.
TYPE	CFN	Configuration data block.
DPNS	YES	Allow next prompt.
DCHI	0-15	The DASS2 D-channel port number, for DCHIs operating in standard mode using an SDI port address. This number is used to reference the D-channel in LD 74.
.....		
PARM	YES	To allow changes to the system buffers.
.....		

LD 17 – Configure DASS2 DCHI and PRI loop number up to and including Group G software, for NT5K35, NT5K75, and NT6D11AE in standard mode. (Part 2 of 2)

Prompt	Response	Description
DTIB	35-1000	Size of IDA trunk input buffers for entire system (determined according to traffic). ***Note:*** The system must be initialized to invoke changes to DTIB.
DTOB	4-1000	To define the number of IDA trunk output buffers per DCHI (determined according to traffic). ***Note:*** The system must be initialized to invoke changes to DTOB.
.....		
CEQU	YES	To allow changes to the Common Equipment parameters.
.....		
DDCS	0-159	The PRI loop number for the new DASS2 link. Enter multiples separated with a space. ***Note:*** PRI loop numbers may have to be even values if the adjacent loop on the network card is programmed.

LD 17 – Configure DASS2 DCHI and PRI loop number (if NT5K75 or NT6D11AE DCHI is used in expanded mode) (Part 1 of 2)

Prompt	Response	Description
REQ	CHG	Modify existing data base.
TYPE	CFN	Configuration data block.
.....		
PARM	YES	To allow changes to the system buffers.

LD 17 – Configure DASS2 DCHI and PRI loop number (if NT5K75 or NT6D11AE DCHI is used in expanded mode) (Part 2 of 2)

Prompt	Response	Description
.....		
DTIB	35-1000	To define the number of trunk input buffers for the entire system.
DTOB	4-100	To define the number of trunk output buffers per DCHI.
.....		
CEQU	YES	To allow changes to the Common Equipment parameters.
.....		
DDCS	0-159	The PRI loop number for the new DASS2 link. Enter multiples separated with a space. ***Note:*** PRI loop numbers may have to be even values if the adjacent loop on the network card is programmed.

LD 17 – Configure DASS2 DCHI and PRI loop number. (Part 1 of 2)

Prompt	Response	Description
REQ	CHG	Modify existing data base.
TYPE	CFN	Configuration data block.
ADAN	0-63	The DASS2 D-channel port number. This is a logical port number, independent of the hardware I/O addresses. This number is used to reference the D-channel in LD 74.
CTYP	DCHI	Selects the card type as being DCHI.
DNUM	0-15	The hardware I/O address of the DCHI. The switches on the DCHI must be set to correspond to this address.

LD 17 – Configure DASS2 DCHI and PRI loop number. (Part 2 of 2)

Prompt	Response	Description
DPNS	YES	Indicates that the DCHI is being used for DASS2.
PARM	YES	To allow changes to the system buffers.
.....		
DTIB	35-1000	Size of IDA trunk input buffers for entire system (determined according to traffic). ***Note:*** The system must be initialized to invoke changes to DTIB.
DTOB	4-100	To define the number of IDA trunk output buffers per DCHI (determined according to traffic). ***Note:*** The system must be initialized to invoke changes to DTOB.
.....		
CEQU	YES	To allow changes to the Common Equipment parameters.
.....		
DDCS	0-159	The PRI loop number for the new DASS2 link. Enter multiples separated with a space. ***Note:*** PRI loop numbers may have to be even values if the adjacent loop on the network card is programmed.

LD 73 – Define clock synchronization control. (Part 1 of 2)

Prompt	Response	Description
REQ	CHG	Modify existing data base.
TYPE	PRI2	2.0 Mb/s PRI.
FEAT	SYTI	Digital system timers.

LD 73 – Define clock synchronization control. (Part 2 of 2)

Prompt	Response	Description
PREF CK0	0-159	The primary reference loop numbers for clock controller 0.
PREF CK1	0-159	The primary reference loop numbers for clock controller 1
SREF CK0	0-159	The secondary reference loop numbers for clock controller 0.
SREF CK1	0-159	The secondary reference loop numbers for clock controller 1. Notes: LD 73 must be run to set values. To remove a reference loop and return to free run, enter X. To leave a reference loop unchanged, enter <cr>. To enable synchronization, set the tracking LD 60. To track on a primary or secondary reference clock, the command is: TRCK PCK (for Primary) SCK (for Secondary) FRUN (for Free-Run) The Clock Controller will be in free-run mode when enabled. It should stay in this mode for several minutes before being switched to tracking mode.

LD 74 – Define data blocks for DASS2 protocols. (Part 1 of 4)

Prompt	Response	Description
REQ	NEW CHG OUT PRT END	Create new data base, modify existing data base, remove data block, print data block, terminate program activity
TYPE	DDSL	Digital Signaling Link

LD 74 – Define data blocks for DASS2 protocols. (Part 2 of 4)

Prompt	Response	Description
S2	(0)1	DCHI switch setting If the NT5K35 is used, then set S2 to 0; If the NT5K75 or NT6D11AE is used: set S2 to 0 for standard mode addressing; set S2 to 1 for expanded mode addressing.
DDSL		The D-channel port number, entered in LD 17.
	Group G	
	0-15	If 0 entered to S2 prompt;
	16-159	If 1 entered to S2 prompt.
	Group H	
	0-63	If 0 entered to S2 prompt;
	16-159	If 1 entered to S2 prompt.
SIGL	DA	DASS2 digital signaling.
DDCS	0-159	Loop number used for the PRI link.
PRIV	NO	DASS2 is a public exchange link.
SIDE	BNT	BNT end of a DASS2 link

LD 74 – Define data blocks for DASS2 protocols. (Part 3 of 4)

Prompt	Response	Description
FLOW CNTL	(NO) YES	Change flow control parameters. Flow control is used to control the number of messages that are sent across a DASS2 link when using user to user or TIE line signaling features. N = the number of messages that can be sent X = the value of BRST PARM Y = the value of REPL PARM On call set up, N = X. On every message sent, N = N - 1 Every 10 seconds, N = N + Y N can never be greater than X X must be equal to or greater than Y If N = 0, no messages can be sent. Must be set to NO if user to user or TIE line signaling are not used.
BRST PARM	0 4 8 16 32	Enter the flow control burst parameter set on the public network. Prompted only if FLOW CNTL =YES.
REPL PARM	1 2 4 8	Enter the flow control replenishment parameter set on the public network. This is only prompted if FLOW CNTL = YES.
CNTL	(NO) YES	YES = change DASS2 link parameters. NO = use default parameters.

LD 74 – Define data blocks for DASS2 protocols. (Part 4 of 4)

Prompt	Response	Description
ALRM	TBF PP MM CC FAE PP MM CC HER PP MM CC TSF PP MM CC AIS PP MM CC LOI PP MM CC DAI PP MM CC	Enter the desired persistence time (PP), monitor time (MM), and repeat count threshold (CC) for one of the seven types of alarms. The alarm condition thresholds are shown in the table that follows.
CNTR	0- 255 (CRT) (TMT) (SCT)	Only prompted if CNTL= YES. Enter the desired threshold for one of the three counters in the range 0-254. If 255 is entered, the threshold is set to infinity. The defaults are: CRT (channel reset threshold) 120 TMT (test message threshold) 50 SCT (stop count threshold) 20

Table 14 lists the alarm condition thresholds that pertain to the ALRM prompt in LD 74.

Table 14
Alarm condition thresholds for the ALRM prompt

Alarm Mnemonic	PP	MM	CC
TBF	0-15 secs (5)	0-24 hrs (0)	0-15 (1)
FAE	0-15 secs (2)	0-24 hrs (1)	0-15 (4)
HER	0-15 mins (1)	0-24 hrs (1)	0-15 (10)
TSF	0-15 secs (0)	0-24 hrs (0)	0-15 (0)
AIS	0-15 mins (1)	0-24 hrs (1)	0-15 (4)
LOI	0-15 secs (0)	0-24 hrs (0)	0-15 (0)
DAI	1-15 mins (1)	0-24 hrs (1)	0-15 (5)

LD 15 – Define a DASS2 customer.

Prompt	Response	Description
REQ:	NEW CHG	Add or Change
TYPE:	CDB	Customer Data Block
CUST 	 0-99 0-31	Customer number For Large Systems For Small Systems and Succession 1000 systems
LSC	dddd	Enter the location number that identifies this PBX.
TIDM	(NO) YES	Enter YES if the Trunk Group reference number of a Trunk Identity is meaningful (as part of the CDP DN). Enter NO if the PBX reference number is to be displayed without the Trunk Group Reference Number.
DASC	1-4	Enter the access code that is to be placed on displays before OLIs and TLIs received from the DASS2 trunk. Entering the attendant's DN will remove an existing value. The value defaults to nothing if <cr> is entered.

LD 16 – Create service routes. (Part 1 of 2)

Prompt	Response	Description
REQ	NEW CHG OUT PRT END	Create new data base, modify existing data base, remove data block, print data block, terminate program activity.
TYPE	RDB	Route Data Block.
CUST	xx	Customer number, as defined in LD 15.

LD 16 – Create service routes. (Part 2 of 2)

Prompt	Response	Description
ROUT	 0-511 0-127	Route number For Large Systems For Small Systems and Succession 1000 systems
TKTP	IDA	The trunk type (DASS2).
SIGL	DPN	Level 3 signaling.
	DAS	Enter DAS for DASS2 signaling.
....		
ICOG	IAO ICT OGT	Defines the route as both incoming and outgoing. Defines the route as incoming only. Defines the route as outgoing only.
....		
LID	(0)-2	The option number for ISDN Line Identities. This is only prompted if the IDC package is equipped. 0 - do not send 1 - send 2 - convert and send
LCNO	0-255	The tree number to be used for converting Line Identities.
....		
DTOS	(NO) YES	Enter YES if dial tone is required from the public exchange when an outgoing DASS2 trunk is seized.
TIDY	xxxx xxxx	The Trunk Identity (that is, the four-digit PBX Reference Number, followed by the four-digit Trunk Group Reference Number.)

LD 14 – Create channels within the service routes. (Part 1 of 2)

Prompt	Response	Description
REQ	NEW CHG OUT PRT END	Create new data base, modify existing data block, remove data block, print data block, terminate program activity. NEW and OUT may be followed by the number of channels being initialized (1-30)
TYPE	RDC	Real Digital Channel
TN		Terminal Number
	l s c u	For Large Systems
	c u	For Small Systems and Succession 1000 systems
	c u	For Small Systems and Succession 1000 Systems
DDSL		The D-channel port number, entered in LD 17.
	Group G	
	0-15	If the NT5K35 DCHI is used, or if the NT5K75 or NT6D11AE DCHI is used and is set in normal mode;
	16-159	If NT5K75 or NT6D11AE DCHI is set in expanded mode.
	Group H	
	0-63	If the NT5K35 DCHI is used, or if the NT5K75 or NT6D11AE DCHI is used and is set in normal mode;
	16-159	If NT5K75 or NT6D11AE DCHI is set in expanded mode.
SIGL	DAS	DASS2 channel
CUST	xx	Customer number, as defined in LD 15
....		
RTMB		Route number and Member number
	0-511 1-510	For Large Systems
	0-127 1-510	For Small Systems and Succession 1000 systems

LD 14 – Create channels within the service routes. (Part 2 of 2)

Prompt	Response	Description
INC		Applies when creating members in data blocks.
	(YES)	If YES, channel numbers will be associated with members starting at the TN, both channel and member numbers increasing.
	NO	If NO, member numbers decrease as channel numbers increase.
PRIO	(XHP) YLP	High priority on channel seizure. Low priority on channel seizure. The high/low priority must be different at each end.

Note: The NT8D72BA PRI card is required to support EuroISDN applications, and should be set to 120 ohm impedance. For more information on NT8D72BA switch settings, see *DPNSS1* (553-3001-372). The NT5D97 also supports the EuroISDN applications.

LD 75 - Bring the DASS2 link into service

Step	Action	Response
1	Enable all PRI loops: ENL DDCS l	 ENBL
2	Enable the DCHI: ENL DDSL n	 ENBL IDLE (DCHI enabled, but all channels are disabled)
3	Enable the D-channels: STRT n Both ends of the link should be started within 5 minutes of each other.	 ENBL STARTING (the configured D-channels are being enabled) ENBL ACTIVE (the configured D-channels are enabled)

Configuring call charging information

To obtain the call charge information in CDR output for an outgoing DASS2 call, message registration must be configured in LD 16 – Modify the Route Data Block.

Note: The Public Exchange must also be able to provide call charge information.

LD 16 – Modify the Route Data Block. (Part 1 of 2)

Prompt	Response	Description
REQ	CHG	Modify existing data base.
TYPE	RDB	Route Data Block.
...	...	...

LD 16 – Modify the Route Data Block. (Part 2 of 2)

Prompt	Response	Description
MR	XLD	Non-buffered message registration is used.

Configuring Calling Line Identity

Calling Line Identity for DASS2 is configured by defining the ISDN line identities in LD 16.

LD 16 – Modify the Route Data Block.

Prompt	Response	Description
REQ	CHG	Modify existing data base.
TYPE	RDB	Route Data Block.
...	...	...
LID	(0)-2	Option number for ISDN Line Identities 0 — do not send 1 — send 2 — convert and send
LCNO	0-255	Enter tree number to be used for converting Line Identities.
...		

Note: If an Incoming Digit Conversion (IDC) table is used to convert the public number dialed to an extension/DN, when sending the calling line ID to the public network, the reverse must take place. That is, if incoming dialed digits from the public exchange are 3572, then an IDC table is required to route the call to extension 2572.

DCNO xxx

IDGT
3572 2572

The reverse is then required to send the public number to the public network.

LCNO xxx

IDGT
2572 3572

Attendant Through Dialing Networkwide

Contents

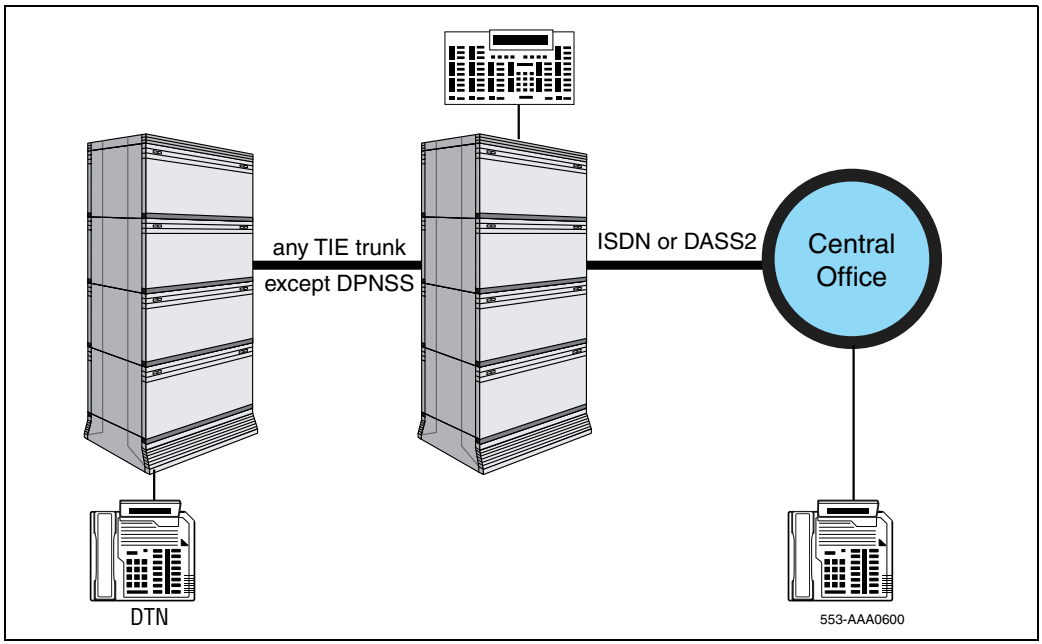
This section contains information on the following topics:

Introduction

Attendant Through Dialing Networkwide extends the functionality of through dialing with an attendant to any Integrated Services Digital Network (ISDN) or DASS2 outgoing trunk. This feature allows an attendant to seize an outgoing Integrated Services Digital Network (ISDN) or DASS2 trunk for a calling party located on the same or another node.

Figure 10 illustrates Attendant Through Dialing Networkwide.

Figure 10
Attendant Through Dialing Networkwide



In the existing standalone capacity, Attendant Through Dialing allows internal callers to request an outgoing trunk except DPNSS from an attendant. In the existing network capacity, Attendant Through Dialing allows callers linked by any TIE trunk to request an analog or DTI2 trunk from the attendant.

When requested, the attendant dials a specific code and extends the call once the Destination (DEST) lamp lights. When the attendant accessed the trunk, the caller was free to dial out. However, with standalone Attendant Through Dialing, the outgoing trunk seized must be either an analog or digital trunk. Attendant Through Dialing Networkwide enhances the through dialing networkwide capability to ISDN or DASS2 outgoing trunks.

When this feature is provisioned, an attendant seizes the outgoing trunk by pressing the Release (RLS) key. Following this, the call is extended back to the calling party who receives dial tone and dials the remaining digits.

This feature is applicable in situations where the calling party is not permitted to dial a defined code that provides access to a public or international network or other costly telecom services. In these situations, the calling party requests that the attendant dial a numbering plan for the calling party, seize an external trunk and extend the call back to the calling party. Table 15 shows situations when the attendant is allowed to press the Release (RLS) key depending on the type of numbering plan implemented by a customer.

Table 15
Numbering Plans and Attendant Release of external trunk

Numbering Plan used to seize external trunk	Destination (DEST) becomes lit
Route Access Code	After Route Access Code
Flexible Numbering Plan	After Special Number
Coordinated Dialing Plan	After Trunk Steering Code

Operating parameters

This feature supports all ISDN trunk types on Basic Rate Interface (BRI) and Primary Rate Interface (PRI). Attendant Through Dialing Networkwide is also supported over analog, DTI, and DIT2 trunks.

The Attendant Through Dialing Networkwide feature is not supported over DPNSS. Therefore, an established link cannot be a DPNSS trunk if the outgoing trunk is ISDN or DASS2.

Attendant Through Dialing Networkwide is configured to override/bypass Access Restrictions configured as New Flexible Code Restrictions. Other access restrictions such as Access Restrictions, Scheduled Access Restrictions and Trunk Barring are not affected by Attendant Through Dialing Networkwide.

This feature is not supported on sets configured with Dial Pulse (CLS = DIP). Attendant Through Dialing Networkwide is only supported on sets configured with Digitone (CLS = DTN).

Attendant Through Dialing Networkwide is available on all types of dialing configurations on ISDN routes, Enbloc, or Overlap Signaling. However, if the attendant dials a Trunk Steering Code or Special Number, the outgoing ISDN trunk must support Overlap Signaling.

If an attendant dials a Trunk Steering Code or Special Number over an ISDN trunk connected to a Central Office/Public Exchange, the outgoing trunk must support Overlap Signaling.

Attendant Through Dialing Networkwide allows a caller to bypass all trunk access restrictions at the set level. Once a caller begins dialing, an external number, the digits dialed are not analyzed for Access Restrictions, Call Connection Restrictions.

An attendant cannot extend a call back to a caller after dialing an Electronic Switched Network (ESN) access code (AC1/AC2) even if a tone is detected. The route being used is unknown at this time. Therefore, if the access code to the public network is defined as AC1 or AC2, the attendant must dial additional digits, such as a Special Number, before being allowed to press the Release key.

The Attendant Through Dialing Networkwide feature is not supported if the outgoing trunk on the attendant's node is a Virtual Network Service (VNS) trunk.

When a calling party requests through dialing, their set display is updated. The called party's display receives the attendant's name or number and maintains this information throughout the duration of the call.

Feature interactions

Autodial

Attendant Through Dialing Networkwide supports Autodial provided that the stored Autodial number excludes the digits previously dialled by an Attendant.

Call Detail Recording

The record on the outgoing trunk node shows the outgoing trunk in the terminating ID field.

No record is output on the Attendant's node for the Destination (DEST) side during call extension. This occurs regardless of the configuration for the outgoing trunk. All other records are produced according to configuration.

If the Calling Line Identification (CLID) option is activated in the Call Detail Recording, the calling party's Directory Number (DN) is printed in the Attendant's node.

If End-to-End Signaling is used to establish a link, the ECDR prompt in LD 15 can be used to print End-to-End Signaling digits in the CDR record.

ISDN QSIG/EuroISDN Call Completion

The Call Completion to Busy Subscriber and the Call Completion on No Reply functionalities are not supported if an external call is initiated by the Attendant Through Dialing Networkwide feature.

Last Number Redial

Last Number Redial is not supported when the attendant extends a call back and the caller begins dialing digits.

Network Attendant Service

Network Attendant Service can be used on the Meridian Customer Defined Network (MCDN) to automatically locate an attendant from one node to another.

When Attendant Through Dialing Networkwide is provisioned, the Attendant's Destination (DEST) lamp is updated after dialing Route Access Code, Trunk Steering Code or Special Number rather than waiting for the ALERTING message.

Pretranslation

Pretranslation is supported during the attendant dialing phase. The attendant dials a pretranslated digit in the Trunk Steering Code, Route Access Code or Special Number to seize an external trunk. Pretranslation is not supported in the through dialing phase. Therefore, once the attendant extends the call back to the caller, the first digit the calling party dials is not pretranslated even if the calling party has pretranslation configured.

Recovery on Misoperation of the Attendant Console

The Attendant Through Dialing feature allows the attendant to press the RLS (Release) key or another Loop key when the called is party is ringing without misoperating the console.

Speed Call

Speed Call is only supported in the attendant dialing phase. Speed Call is not supported once the caller begins dialing an external number. Once an external call is established, the caller cannot press the SCU (Speed Call User) key.

Stored Number Redial

Digits dialed by the caller using End-to-End Signaling are not retained by the Stored Number Redial feature.

Feature packaging

Attendant Through Dialing Networkwide requires the following packages:

- End-to-End Signaling (EES) package 10
- Integrated Services Digital Network (ISDN) package 145
- Overlap Signaling (OVLP) package 184
- New Format Call Detail Recording (FCDR) package 234

Attendant Through Dialing Networkwide also requires ***one*** of the following dialing plans:

- Flexible Number Plan (FNP) package 160
- Coordinated Dialing Plan (CDP) package 59
- Basic Automatic Route Selection (BARS) package 57
- Network Alternate Route Selection (NARS) package 58

Feature implementation

LD 15 – Allow Attendant Through Dialing Networkwide.

Prompt	Response	Description
REQ:	CHG	Change existing data.
TYPE:	ATT	Attendant Console data block.
CUST	 0-99 0-31	Customer number For Large Systems For Small Systems and Succession 1000 systems
OPT	(ATDA)	Attendant Through Dialing Allowed (default). ATDD = Attendant Through Dialing Denied.

Note: The configuration of Improved End-to-End Signaling in LD 15 and Calling Line Identification in the Call Detail Recording Record are optional. Improved End-to-End Signaling sends the digits dialed by the calling party on the established link in a more efficient manner than End-to-End Signaling. A Call Detail Recording record on the outgoing trunk node shows the outgoing trunk in the ID field and the calling Directory Number in the CLID field if the outgoing trunk is on the attendant's node.

LD 15 – Configure Improved End-to-End Signaling. (Part 1 of 2)

Prompt	Response	Description
REQ:	CHG	Change existing data.
TYPE:	FTR	Customer Features and options.
CUST	 0-99 0-31	Customer number For Large Systems For Small Systems and Succession 1000 systems
...		

LD 15 – Configure Improved End-to-End Signaling. (Part 2 of 2)

Prompt	Response	Description
EEST	YES	Send feedback tone to the originator of End-to-End Signaling.
- DTMF	NO	Use Improved End-to-End Signaling for single tone feedback.

Note: Improved End-to-End Signaling is provided when EEST = YES and DTMF = NO.

LD 17 – Allow Calling Line Identification (CLID) field in Call Detail Recording (CDR) records.

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	PARM	System parameters.
...		
- FCDR		Format for Call Detail Recording
	(OLD)	OLD CDR format (default).
	NEW	NEW CDR format.
...		
- CLID	YES	Calling Line Identification in Call Detail Recording.

Feature operation

Attendant Through Dialing Networkwide operates under the following parameters:

1 Calling party dials an attendant that is located either on the same node as the caller or another node.

2 Calling party requests the attendant to seize an outgoing external trunk. This external trunk is located on either the same node or on another node.

3 The attendant dials a Trunk Steering Code, Special Number or Route Access Code to access the public network and waits for the lighting of the DEST lamp on the console.

If the attendant dials either a Trunk Steering Code or a Special Number and the external trunk is an ISDN trunk, it must support Overlap Signaling. If the attendant dials a Route Access Code and the outgoing external is an type ISDN trunk then any type of dialing is supported.

4 When the DEST lamp is lit, then the attendant presses the Release (RLS) key or another loop key to extend the call back to the calling party requesting an outgoing external trunk.

5 The calling party hears dial tone and dials the external number.

DASS2/DPNSS1 INIT Call Cut Off

Contents

This section contains information on the following topics:

Introduction

During a system initialization, the system maintains all calls established prior to the initialization.While the system protects established calls, some third party switches can tear down active calls due to the resetting of data links in Layer 2.

The DASS2/DPNSS1 INIT Call Cut Off feature maintains established calls during a system initialization when the system is connected to third party Private Branch Exchanges (PBX) with DASS2/DPNSS1.

For this feature, the system initialization procedures are modified to prevent the following: LED from lighting and a disable message from being sent to the DASS2/DPNSS1 Dual D-channel Daughterboard (NTAG54).The system averts the disable message in Layer 2. This prevents the third party PBX from sending a the Clear Request Message (CRM). On some third party PBX's the

Clear Request Message is interpreted as a reset of Layer 3 which also leads to the resetting of Network Layer 3. In the event that Layer 3 is reset, all established calls would be cleared by some third party PBX's.

When the DASS2/DPNSS1 INIT Call Cut Off feature is configured, the Dual D-channel Daughterboard (NTAG54) is prevented from sending Layer 2 network messages in relating to alarms handled during initialization. When the system initializes, all established calls are preserved when connected to third party PBX's with DASS2/DPNSS1.

If this feature is configured on older hardware such as NT6011, NT5K75 and NT3K35, then the software message is still sent to the hardware. However, the hardware does not respond like the Dual D-channel Daughterboard (NTAG54). Instead, the hardware becomes disabled.

Operating parameters

This feature is not applicable to the small systems.

DASS2/DPNSS1 INIT Call Cut Off requires the following hardware: NTAG54AA and NTCK43AB.

The NTAG54AA is a Dual D-channel Daughterboard that supports DASS2/DPNSS1 with the Dual Primary Rate Interface (PRI) NTCK43AB vintage or higher.

This feature is not supported over Analog Private Network Signal Systems (APNSS) because of the Dual D-channel Daughterboard hardware requirement.

After system initialization is complete, the existing maintenance procedures attempt to enable all Dual D-channel Daughterboard (NTAG54) cards.

Feature interactions

There are no feature interactions associated with this feature.

Feature packaging

DASS2/DPNSS1 INIT Call Cut Off requires Integrated Digital Access (IDA) package 122. Depending on signaling type, **one** the following packages is also required:

- Digital Private Network Signaling System 1 (DPNSS) package 123
- Digital Access Signaling System 2 (DASS2) package 124

Feature implementation

LD 74 – Modify the Digital Private Network System Signaling No.1 link data block. (Part 1 of 2)

Prompt	Response	Description
REQ	CHG	Change existing data.
TYPE	DDLS	Digital Private Network System Signaling No.1 link data block.
...		
S2	(0)-1	Switch 2 mode (the mode selected with the switch S2 located on the NT5K75AA DCHI cards) where: 0 = NT5K35AA DCHI or NT5K75AA DCHI cards operating in standard mode (default) 1 = NT5K75AA DCHI card operating in expanded mode.
DDSL	0-n	DPNSS link number where: n = 63 for NT5K35AA or NT5K75AA in standard mode (S2 = 0) n =159 for NT5K75AA in expanded mode (S2 = 1).
SIGL	DA	DASS2 Level 2 Signaling.
DDCS	0-159	Digital Trunk Channel Switch loop number.

LD 74 – Modify the Digital Private Network System Signaling No.1 link data block. (Part 2 of 2)

Prompt	Response	Description
PRIV	(YES) NO	Private link: DPNSS1 DASS2
- SIDE	aaa	Side for termination where: aaa = AETBNT for DPNSS1 or BNT for DASS2.
- MWIF	(STD) ISDM	Message Waiting Indication.
- L2_RST	(YES) NO	Reset Layer 2 indication during system initialization. NO should only be entered when using the Dual D-channel Daughterboard (NTAG54) on a D-channel Primary Rate Interface (NTCK43) card. If this prompt is set to NO on an NTG011 or NT5K75 type card, the card will be left disabled after INIT occurs.

Feature operation

No specific operating procedures are required to use this feature.

Virtual Network Services in the UK with DASS2/DPNSS1 Bearers

Contents

This section contains information on the following topics:

Feature description

Virtual Network Services (VNS) provides ISDN features to customers when no ISDN Primary Rate Interface (PRI) or ISDN Signalling Link (ISL) Bearer Channels are available between two system switches.

The Virtual Network Services with DASS2/DPNSS1 Bearers feature introduced VNS in the UK using Digital Private Network Signalling System No.1 (DPNSS1) or Digital Access Signalling System No.2 (DASS2) trunks as VNS Bearer trunks.

Operating parameters

All operating parameters that pertain to the Basic VNS feature also apply to the Virtual Network Services with DASS2/DPNSS1 Bearers feature. The following parameters also apply:

Analog Private Networking Signaling System (APNSS) trunks cannot function as VNS Bearer trunks.

No DPNSS1 features are provided when DPNSS1 trunks are used as a VNS Bearer trunk. ISDN features are provided instead. If any of the DPNSS1 Supplementary Service features requires a DPNSS1 route, it cannot use a VNS route.

If ESN is configured, a route list entry with both VNS and DPNSS1 is not chosen.

For DPNSS1/VNS gateway nodes in mixed DASS2/DPNSS1 and VNS networks, the gateway nodes are subject to the same feature support and limitations as the standard DPNSS1/ISDN gateway without VNS. If there is no DPNSS1/ISDN gateway, the feature will be stopped at the DPNSS1/VNS node.

Feature interactions

Analog Private Networking Signaling System

Analog Private Networking Signaling System (APNSS) trunks cannot function as VNS Bearer trunks.

Data calls

Data calls are supported on DPNSS1 or DASS2 VNS Bearer trunks if the DPNSS1 or DASS2 VNS Bearer trunks are configured to support data calls. Similarly, data calls are supported on DPNSS1 or DASS2 Bearer trunks in VNS to DPNSS1/DASS2 gateways, if the DPNSS1 or DASS2 VNS Bearer trunks are configured to support data calls.

DPNSS1 Attendant Call Offer

DPNSS1 Attendant Call Offer is not supported over VNS Bearer trunks (DPNSS1 Attendant Call Offer allows an attendant-extended call, routed over a DPNSS1 trunk, to be camped-on to a remote busy extension). Standard ISDN Camp-on may be provided instead, if NAS is configured over the VNS Bearer trunks.

DPNSS1 Attendant Timed Reminder Recall and Attendant Three-Party Service

DPNSS1 Attendant Timed Reminder Recall and Attendant Three-Party Service are not supported over VNS Bearer trunks. If NAS is configured over the VNS Bearer trunks, NAS call extension and Attendant Recall will be offered instead.

DPNSS1 Call Back When Free and Call Back When Next Used

DPNSS1 Call Back When Free and Call Back When Next Used are not supported over VNS Bearer trunks. Network Ring Again or Network Ring Again on No Answer may be provided instead, if Network Ring Again or Network Ring Again on No Answer are configured over the VNS Bearer trunks.

DPNSS1 Diversion

DPNSS1 Diversion is not supported over VNS Bearer trunks. Network Call Redirection and Trunk Route Optimization can be provided instead, if configured over the VNS D-channel.

DPNSS1 Extension Three-Party Service

DPNSS1 Extension Three-Party Service is not supported over VNS Bearer trunks. Network Call Redirection and Trunk Route Optimization can be provided instead, if configured over the VNS D-channels.

DPNSS1 Loop Avoidance

DPNSS1 Loop Avoidance is not supported over VNS Bearer trunks (DPNSS1 Loop Avoidance prevents a call from being looped through a DPNSS1 network by placing a limit on the number of channels that a call can use). The ISDN Call Connection Limitation is provided, if it is configured over the VNS D-channel.

DPNSS1 Route Optimization

DPNSS1 Route Optimization is not supported over VNS Bearer trunks.

DPNSS1 Route Optimization/ISDN Trunk Anti-Tromboning Interworking

ISDN Trunk Anti-Tromboning may be applied to the VNS part of the call, if configured on the VNS D-channel.

DPNSS1 Step Back On Congestion

DPNSS1 Step Back On Congestion handles high traffic situations when congestion is encountered by DPNSS1 trunks. The following scenarios apply for interworking with VNS.

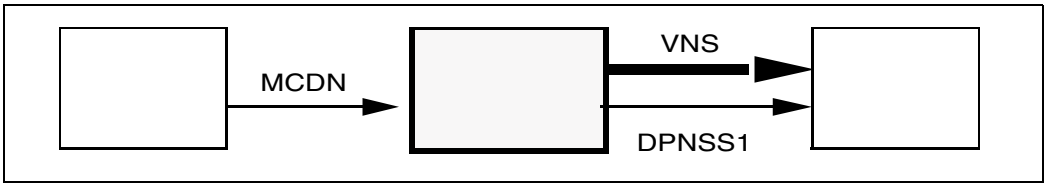
Homogeneous Networks

DPNSS1 Step Back On Congestion is supported over VNS Bearer trunks, if all the transit nodes within the DPNSS1 network used for VNS are configured accordingly:

- In LD 86, if the SBOC (Step Back On Congestion) prompt is set to NRR (No Reroute) or RRO (Reroute Originator), then it would be sufficient that the VNS originating node be configured with either RRO (Reroute Originator) or RRA (Reroute All).
- In LD 86, if the SBOC (Step Back On Congestion) prompt is set to RRA (Reroute All) for a transit node, then the different alternative routes at this node must be configured with VNS and must be configured as VNS Bearers.

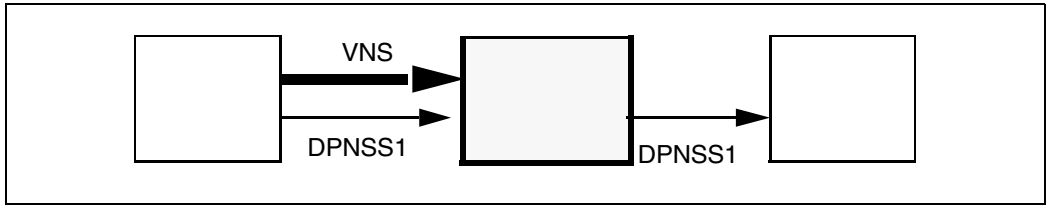
Hybrid Networks

Figure 11
MCDN/VNS with DPNSS1 node



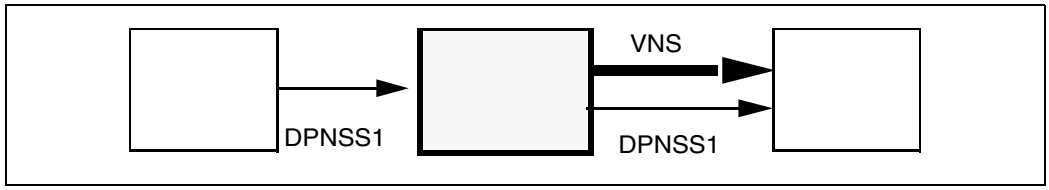
- If a congestion is encountered inside the VNS portion of the path, the node behaves as an MCDN/MCDN tandem. The ISDN Drop Back Busy (IDBB) and ISDN Off-Hook Queuing (IOHQ) are transmitted, so that they may be applied further along the VNS portion of the path, or at the tandem node.
- If a congestion is encountered within the DPNSS1 network, the VNS portion of the call is cleared and the disconnection is propagated back to the originating side of the MCDN path. Neither Drop Back Busy nor Off-Hook Queuing is activated at the tandem node, even if IDBB or IOHQ are activated.

Figure 12
VNS with DPNSS1/DPNSS1 node



This scenario is considered as an MCDN/DPNSS1 gateway. The functionality is the same as for the Step Back on Congestion feature, as documented in *DPNSS1* (553-3001-372).

Figure 13
DPNSS1/VNS with DPNSS1 node



- If a congestion is encountered inside the VNS portion of the path, the VNS portion of the call is cleared and the disconnection is propagated back to the originating DPNSS1 side. The Step Back on Congestion feature is then invoked, if it is configured.
- If a congestion is encountered within the DPNSS1 portion of the path, with the DPNSS1 trunk being used as a VNS Bearer, the VNS portion of the call is cleared and a normal disconnection is propagated back to the originating DPNSS1 side. The Step Back on Congestion feature is not invoked, even if it is configured.

DPNSS1 Executive Intrusion

DPNSS1 Extension Three-Party Service is not supported over VNS Bearer trunks. Attendant Break-in may be provided instead, if NAS is configured over the VNS Bearer trunks.

Standalone Meridian Mail

Standalone Meridian Mail is not supported over VNS Bearer trunks. A mailbox user may access Meridian Mail, if ISDN Network Message Services is configured.

DPNSS1 Enhancements for ISDN Interworking

Software enhancements support DPNSS1 for ISDN interworking with QSIG and EuroISDN. At an ISDN gateway, ISDN information may be carried into some DPNSS1 messages, if DPNSS_189I package 284 is equipped.

DPNSS1/DASS2 to ISDN PRI Gateway

A VNS call over a DPNSS1 or DASS2 Bearer trunk of an DPNSS1/DASS2 to ISDN PRI Gateway acts as the ISDN leg of the Gateway.

Feature packaging

For total functionality, this feature requires the following packages:

- Virtual Network Services (VNS) package 183
- Network Alternative Route Selection (NARS) package 58
- Network Class of Service (NCOS) package 32

- Basic Routing (BRTE) package 14
- Integrated Services Digital Networking (ISDN) package 145
- ISDN Signaling Link (ISL) package 147
- Advanced Network Services (NTWK) package 148
- Integrated Digital Access (IDA) package 122
- 2 MBit Primary Rate Interface (PRI2) package 154
- Digital Private Network Signaling System No.1 (DPNSS) package 123, for routes using DPNSS1 signaling
- Digital Access Signaling System No.2 (DASS2) package 124, for routes using DASS2 signaling

For ISDN to DPNSS1/DASS2 gateway:

- International Supplementary Features (SUPP) package 131
- Network Attendant Service (NAS) package 159

For the Step Back on Congestion Supplementary Service feature:

- DPNSS1 Network Services (DNWK) package 231

The following packages may also be used:

- Universal ISDN Gateway (UIGW) package 283
- ISDN SIS (BTNR-I on DPNSS1), (DPNSS1_189I) package 284

Feature implementation

LD 17 – Associate VNS D-channel with VNS route. D-channel must be associated with each node and customer (both ends of the D-channel link must be configured).

Prompt	Response	Description
REQ	CHG END	Change data or exit overlay.
TYPE	ADAN	Action Device and Number.
ADAN	CHG DCH 0-63	Change D-channel for Large Systems.
	CHG DCH 0-15	Change D-channel for Small Systems and Succession 1000 systems.
USR	VNS SHAV	VNS = Dedicated D-channel SHAV = Shared D-channel.
VNSM	0-300	The maximum number of VNS channels supported by the D-channel. This is the potential VNS capability for the D-channel, and is not associated with any other restriction placed on the VNS capability, such as the number of VNS Virtual DNs.
VNSC	0-99 0-31	Customer Number for Large System. Customer Number for Small System. At least one D-channel must be configured with USR = VNS or USR = SHAV.
VNSP	0-32700	Private Network Identifier (PNI) of the far-end customer.
VCNA	(NO) YES	Network Call Party Name Display is (not) available over the D-channel.

LD 17 – Associate VNS D-channel with VNS route. D-channel must be associated with each node and customer (both ends of the D-channel link must be configured).

Prompt	Response	Description
VCRD	(NO) YES	Network Call Redirection is (not) available over the D-channel.
VTRO	(NO) YES	Trunk Route optimisation Before Answer is (not) available over the D-channel.

LD 96 – Enable the D-channel that has been configured in LD 17.

Command	Description
ENL DCH 0-63 ENL DCH 0-15	Enable the D-channel 0-63 for Large System. Enable the D-channel 0-15 for Small System.

LD 79 – Define VNS DNs for both nodes/customers to be associated with the D-channel configured in LD 17. You can add a new individual VDN to an existing VNS VDN block, or create a new VNS VDN block.

Prompt	Response	Description
REQ	NEW	Add an individual VDN to Create a new VNS data block.
TYPE	VNS	Virtual Network Services.

LD 79 – Define VNS DNs for both nodes/customers to be associated with the D-channel configured in LD 17. You can add a new individual VDN to an existing VNS VDN block, or create a new VNS VDN block.

Prompt	Response	Description
CUST	xx	Customer Number, as defined in LD 15 At least one D-channel must be configured with USR = VNS or USR = SHAV and having VNS = customer number.
VNDN	xxxxxxx 1-4000 xxxxxxx	Individual VDN to be added. 1-4000 = number of contiguous VDN to be added, xxxxxxx = first VDN to be added.
	<CR>	You can add another single VDN by entering <CR> (VDN is prompted until <CR> is entered.) For the above entries, the VDNs must be part of the customer's numbering plan.

LD 16 – Set up the VNS Bearer Trunk. The Bearer trunk must be associated with each node and customer (both ends of the Bearer link must be configured).

Prompt	Response	Description
REQ	NEW, CHG	Add, or change data.
CUST	xx	Customer Number, as defined in LD 15 At least one D-channel must be configured with USR = VNS or USR = SHAV, in LD 17.
ROUT	 0-511 0-127 0-127	Route number For Large Systems For Small Systems and Succession 1000 systems For Small Systems and Succession 1000 systems
CNTL	YES	Change controls or timers.

LD 16 – Set up the VNS Bearer Trunk. The Bearer trunk must be associated with each node and customer (both ends of the Bearer link must be configured).

Prompt	Response	Description
TIMR	VSS (0) VSS (1) VSS (2-1023)	0 = Do not answer the Bearer channel until the terminating party answers. 1 = Answer the Bearer channel immediately on arrival. 2-1023 = Answer the Bearer Channel after specified seconds (rounded down to multiple of two seconds) if the terminating party has not already answered.
TIMR	VGD 0-(6)-31	Enter the guard timer on the associated VNS DN (the time allowed for the Bearer trunk call to disconnect, in seconds)
VRAT	(NO)YES	(Do not) immediately answer the attendant extended VNS call on the incoming Bearer trunk.

LD 86 – Configure the VNS trunk route.

Prompt	Response	Description
REQ	NEW CHG	Add, or change data.
CUST	xx	Customer Number, as defined in LD 15
FEAT	RLB	Route list data block feature.
RLI	0-MXRL	The Route List Index to be associated with the VNS Bearer Channel.
ENTR	0-63	The entry within the Route List Index to be associated with the VNS Bearer Channel.
ROUT	 0-511 0-127 0-127	Route number For Large Systems For Small Systems and Succession 1000 systems For Small Systems and Succession 1000 systems.

LD 86 – Configure the VNS trunk route.

Prompt	Response	Description
VNS	YES	Virtual Network Services.
- VDCH	0-63 0-15	The D-channel used for VNS call for Large Systems. The D-channel used for VNS call for Small Systems and Succession 1000 systems. At least one D-channel must be configured with USR = VNS or USR = SHAV, in LD 17.
- VDMI		VNS Digit Manipulation Table to be used on the VNS D-channel.
	(0) 1-31 1-255 0-999	0 = None 1-31 = with CDP. 1-255 = with NARS/BARS. 0-999 = with Flexible Numbering Plan.
- VTRK	1-(20)-100	Number of VNS trunks allowed on the VNS route.
...		
DMI		VNS Digit Manipulation Table to be used on the VNS Bearer.
	(0) 1-31 1-255 0-999	0 = None. 1-31 = with CDP. 1-255 = with NARS/BARS. 0-999 = with Flexible Numbering Plan.

Feature operation

No specific operating procedures are required to use this feature.

DCHI installation and removal

Contents

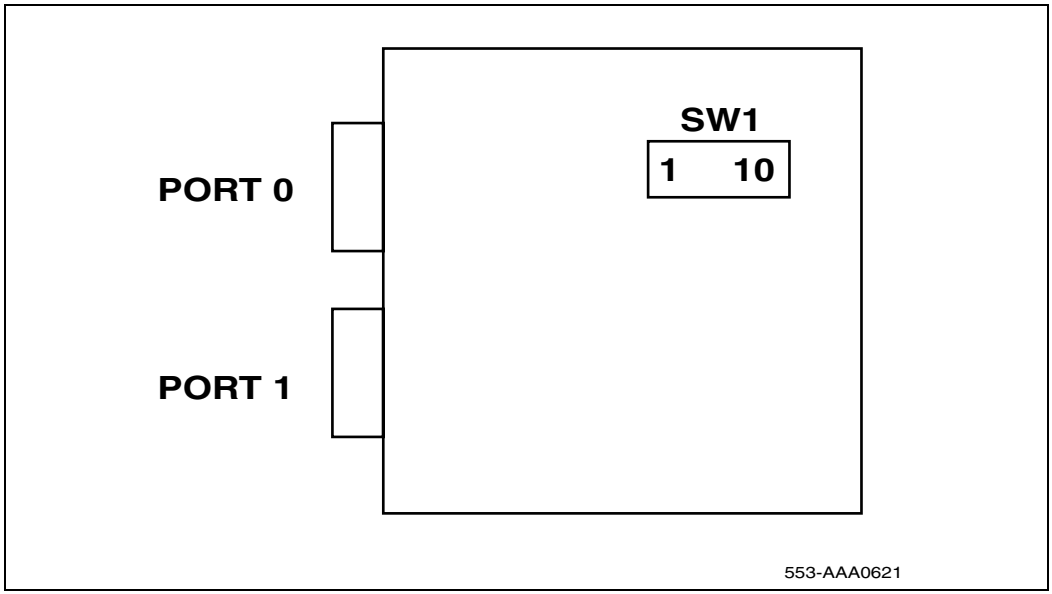
This section contains information on the following topics:

Setting up the NT5K35

DIP switch settings

The NT5K35 has a single bank of DIP switches, as shown in Figure 14.

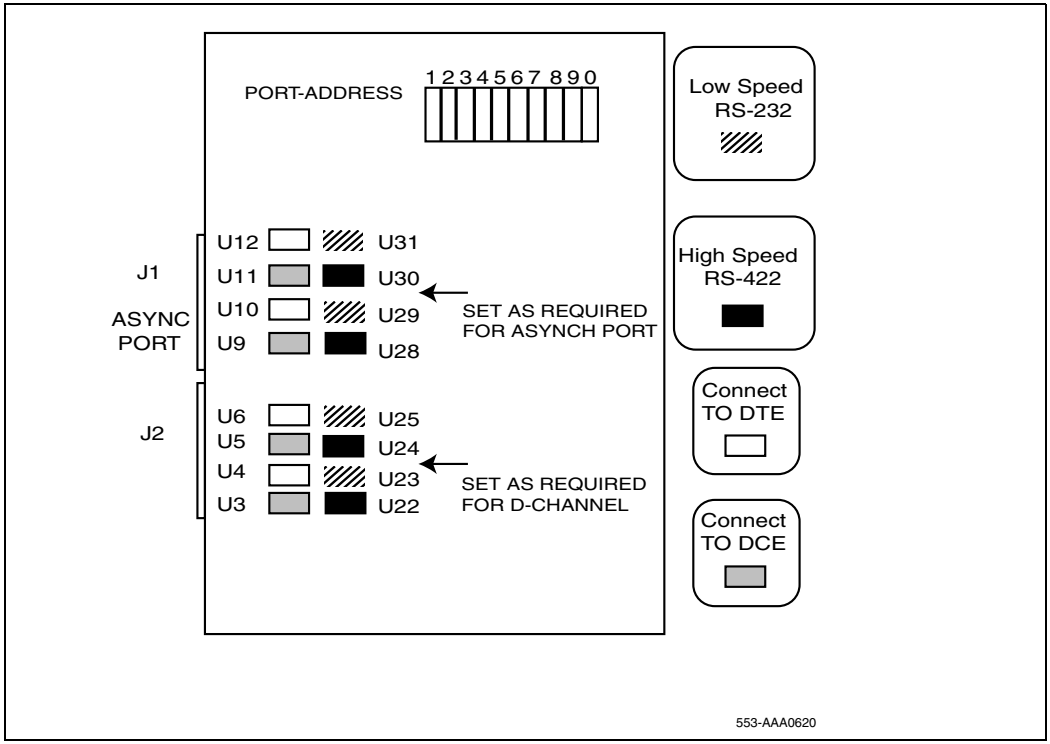
Figure 14
NT5K35 DIP switch settings



Jumper settings

The NT5K35 has two banks of option straps, one for each port. These select between DCE and DTE operation and whether the signaling interface is RS232 (asynchronous) or RS422 (DASS2). Figure 15 shows the jumper strap settings on the NT5K35 card.

Figure 15
NT5K35 Jumper strap settings



DASS2 configuration

For DASS2 high speed (64Kb/s) and DCE connection, insert plugs in positions U3 + U5 + U22 + U24. Please note that J1 is not used and the positions of plugs U9 - U12 and U28 - U31 are not relevant.

Port address switch settings

Table 16 lists the NT5K35 port address switch settings for dual-port operation.

Note: S7 and S9 have no effect for dual port operation.

Table 16
NT5K35 Port address switch settings for dual port operation

Port Number		Switch Settings				
Even	**Odd**	**S4**	**S5**	**S6**	**S8**	**S0**
0	1	OFF	OFF	OFF	OFF	OFF
2	3	OFF	OFF	ON	OFF	OFF
4	5	OFF	ON	OFF	OFF	OFF
6	7	OFF	ON	ON	OFF	OFF
8	9	ON	OFF	OFF	OFF	OFF
10	11	ON	OFF	ON	OFF	OFF
12	13	ON	ON	OFF	OFF	OFF
14	15	ON	ON	ON	OFF	OFF

Table 17 lists the NT5K35 port address switch settings for single-port operation.

Note: S1, S2, and S3 are reserved for future use and should be set to OFF.

Table 17
NT5K35 Port address switch settings for single port operation

Port Number	S4	S5	S6	S7	S8	S9	S0
0	OFF	OFF	OFF	OFF	ON	OFF	OFF
1	OFF	OFF	OFF	ON	ON	OFF	OFF
2	OFF	OFF	ON	OFF	ON	OFF	OFF
3	OFF	OFF	ON	ON	ON	OFF	OFF
4	OFF	ON	OFF	OFF	ON	OFF	OFF
5	OFF	ON	OFF	ON	ON	OFF	OFF
6	OFF	ON	ON	OFF	ON	OFF	OFF
7	OFF	ON	ON	ON	ON	OFF	OFF
8	ON	0	OFF	OFF	ON	OFF	OFF
9	ON	0	OFF	ON	ON	OFF	OFF
10	ON	0	ON	OFF	ON	OFF	OFF
11	ON	0	ON	ON	ON	OFF	OFF
12	ON	ON	OFF	OFF	ON	OFF	OFF
13	ON	ON	OFF	ON	ON	OFF	OFF
14	ON	ON	ON	OFF	ON	OFF	OFF
15	ON	ON	ON	ON	ON	OFF	OFF

Setting up the NT5K75

Prior to installing the NT5K75, the following switch and strap options must be set:

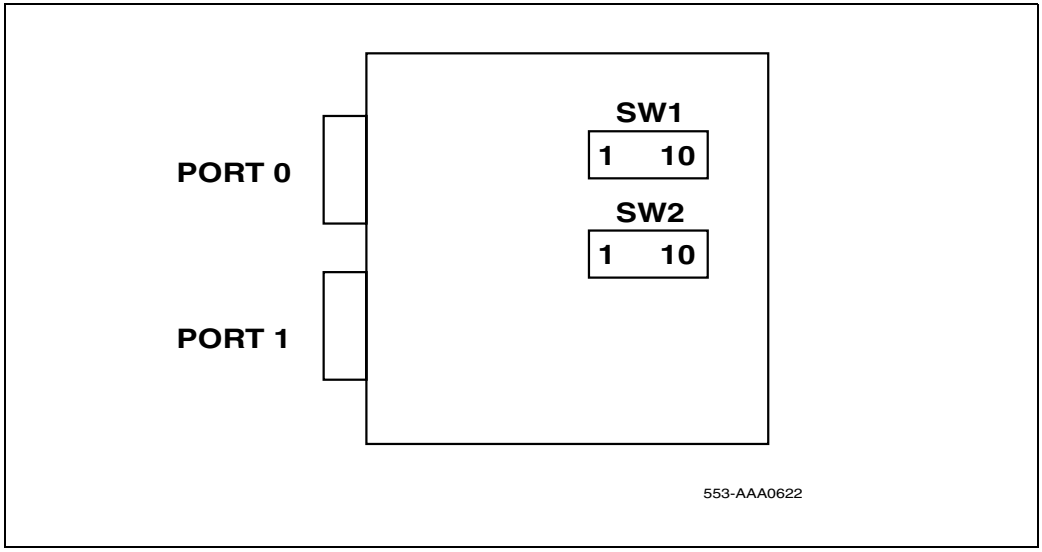
- Port addressing mode (standard, expanded, or disabled)
- Port addresses (standard mode: 0-15; expanded mode: 0-159 possible, 16-159)
- Line interface jumper options (RS232 or RS422, DTE or DCE)

NT5K75 DIP switch settings

The NT5K75 has two sets of DIP switches. Each port has it's own bank of 10 DIP switches (SW1 & SW2) to select the port address (8 bits) and mode of operation (2 bits). SW1 is used for port 0 settings, SW2 is used for port 1 settings. Port 0 is used to select whether the asynchronous ESDI port is to be disabled or not (must be set to “disable” for DASS2). Port 1 is used to select the standard or expanded D-channel addressing mode on the NT5K75.

The DIP switches are located as shown in Figure 16.

Figure 16
NT5K75 DIP switch settings



Port addressing modes

Port 0 Mode Selection

Port 0 is used to select whether the asynchronous ESDI port is be disabled or not. Table 18 describes port 0 mode selection for the NT5K75.

Note: The asynchronous ESDI port must be set to “disabled”.

Table 18
Port 0 mode selection for NT5K75

Port Mode	Switch Setting	
	SW1.1	SW1.2
Not used	0	-
Asynchronous ESDI	1	0
Port disabled	1	1

Port 1 mode selection

Port 1 is used to select the standard or expanded D-channel addressing mode on the NT5K75. Table 19 describes port 1 mode selection for the NT5K75.

Table 19
Port 1 mode selection for NT5K75

Port Mode	Switch Setting	
	SW2.1	SW2.2
Synchronous, D-channel, standard addressing (emulates the NT5K35)	0	0
Synchronous, D-channel, expanded addressing	0	1
Not used	1	0
Port disabled	1	1

Port address switch settings

Port address switch settings in the standard mode

These apply to either SW1 or SW2 when the card is in standard mode. Table 20 on page 105 describes the port address switch settings in the standard mode for the NT5K75.

Note: S3, S4, and S5 are reserved for future use and should be set to OFF.

Table 20
NT5K75 Port address switch settings in the standard mode (Part 1 of 2)

Port Address	Switch Setting							
	Group No.			Device No				
	S3	S4	S5	S6	S7	S8	S9	S10
0	0	0	0	0	0	0	0	x
1	0	0	0	0	0	0	1	x
2	0	0	0	0	0	1	0	x
3	0	0	0	0	0	1	1	x
4	0	0	0	0	1	0	0	x
5	0	0	0	0	1	0	1	x
6	0	0	0	0	1	1	0	x
7	0	0	0	0	1	1	1	x
8	0	0	0	1	0	0	0	x
9	0	0	0	1	0	0	1	x
10	0	0	0	1	0	1	0	x
11	0	0	0	1	0	1	1	x
12	0	0	0	1	1	0	0	x

Table 20
NT5K75 Port address switch settings in the standard mode (Part 2 of 2)

Port Address	Switch Setting							
	Group No.			Device No				
	S3	S4	S5	S6	S7	S8	S9	S10
13	0	0	0	1	1	0	1	x
14	0	0	0	1	1	1	0	x
15	0	0	0	1	1	1	1	x

Port address switch settings in the expanded mode

The port address switch settings, shown in Table 21, only apply to SW2 (that is, the D-channel port).

> ***Note:*** Half group numbers are required for expanded mode operation. Note that the port number is partially formed from the half group number of the shelf on which the NT5K75 DCHI resides. Refer to the information described in the Engineering note, found in the "DASS2 hardware requirements" on page 159 section for information pertaining to port addressing.

Table 21
NT5K75 Port address switch settings in the expanded mode (Part 1 of 3)

Port Address	Switch Setting							
	Half Group No.			Device No.				
	S3	S4	S5	S6	S7	S8	S9	S10
0	0	0	0	0	0	0	0	0
1				0	0	0	0	1
2				0	0	0	1	0
3				0	0	0	1	1
4				0	0	1	0	0
5				0	0	1	0	1
6				0	0	1	1	0
7				0	0	1	1	1
8				0	1	0	0	0
9				0	1	0	0	1
10				0	1	0	1	0
11				0	1	0	1	1
12				0	1	1	0	0

Table 21
NT5K75 Port address switch settings in the expanded mode (Part 2 of 3)

Port Address	Switch Setting							
	Half Group No.			Device No.				
	S3	S4	S5	S6	S7	S8	S9	S10
13				0	1	1	0	1
14				0	1	1	1	0
15				0	1	1	1	1
16				1	0	0	0	0
17				1	0	0	0	1
18				1	0	0	1	0
19				1	0	0	1	1
20				1	0	1	0	0
21				1	0	1	0	1
22				1	0	1	1	0
23				1	0	1	1	1
24				1	1	0	0	0
25				1	1	0	0	1
26				1	1	0	1	0
27				1	1	0	1	1
28				1	1	1	0	0
29				1	1	1	0	1
30				1	1	1	1	0
31				1	1	1	1	1
32-63	0	0	1					

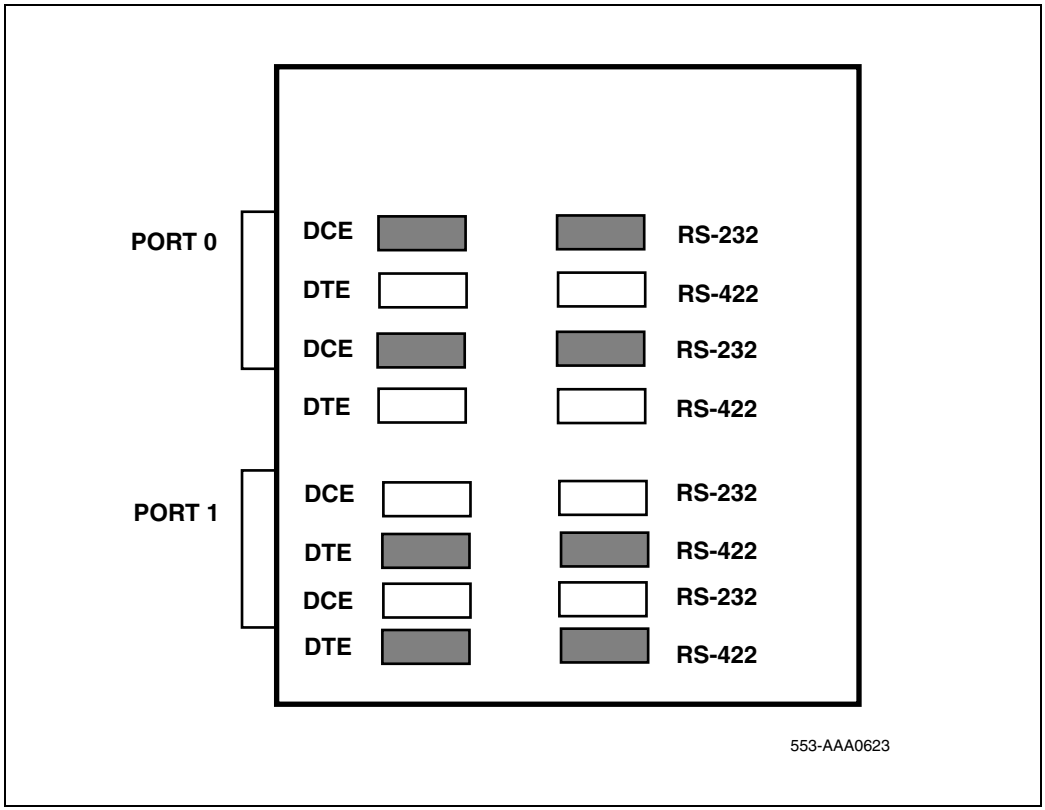
Table 21
NT5K75 Port address switch settings in the expanded mode (Part 3 of 3)

Port Address	Switch Setting							
	Half Group No.			Device No.				
	S3	S4	S5	S6	S7	S8	S9	S10
64-95	0	1	0					
96-127	0	1	1					
128-159	1	0	0					

Jumper settings

The NT5K75 has two banks of option straps, one for each port. These select between DCE and DTE operation and whether the signaling interface is RS232 (asynchronous) or RS422 (DASS2). The DASS2 configuration is shown in Figure 17.

Figure 17
NT5K75 Jumper strap settings for DASS2



Setting up the NT6D11AE/AF

Prior to installing the NT6D11AE/AF, the following switch and strap options must be set:

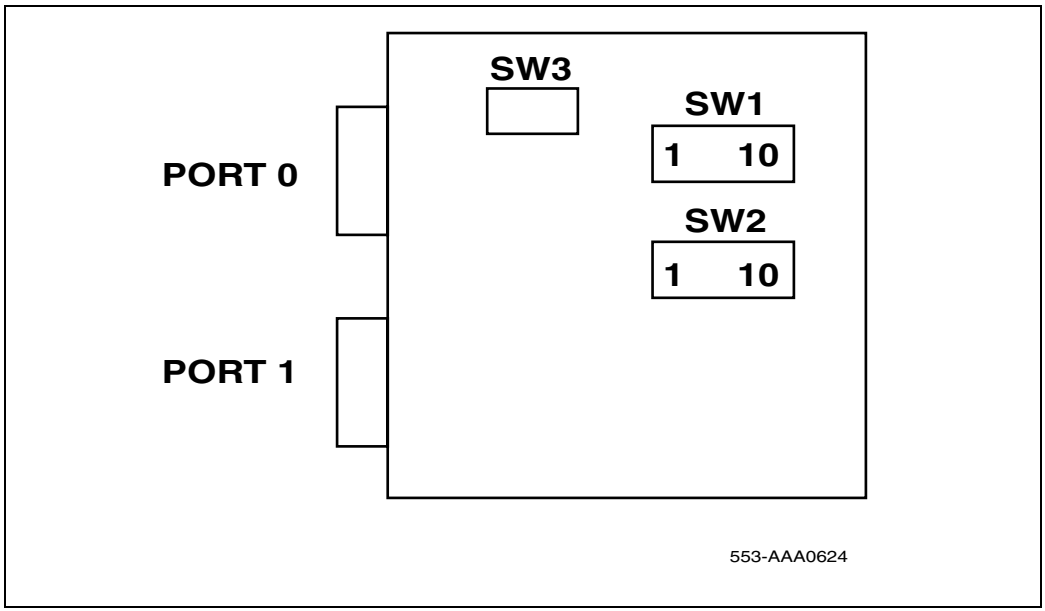
- Firmware selection (set for DASS2)
- Port addressing mode (standard, expanded, or disabled)
- Port addresses (standard mode: 0-15; expanded mode: 0-159 possible, 16-159 recommended)
- Line interface jumper options (RS232 or RS422, DTE or DCE)

DIP switch settings

The NT6D11AE/AF has three sets of DIP switches. Each port has it's own bank of 10 DIP switches (SW1 & SW2) to select the port address (8 bits) and mode of operation (2 bits). SW1 is used for port 0 settings, SW2 is used for port 1 settings. SW3 is used to select between ISDN or DASS2 signaling. Port 0 is used to select whether the asynchronous ESDI port is be disabled or not (must be set to “disable” for DASS2). Port 1 is used to select the standard or expanded D-channel addressing mode on the NT6D11AE/AF.

The DIP switches are located as shown in Figure 18.

Figure 18
NT6D11AE/AF DIP switch settings



Port addressing modes

Port 0 Mode selection

Port 0 is used to select whether the asynchronous ESDI port is to be disabled or not. Table 22 on page 113 describes the port 0 mode selection for the NT6D11AE/AF.

Note: The asynchronous ESDI port must be set to “disabled”.

Table 22
Port 0 mode selection for NT6D11AE/AF

Port Mode	Switch Setting	
	SW1.1	SW1.2
Not used	0	-
Asynchronous ESDI	1	0
Port disabled	1	1

Port 1 mode selection

Port 1 is used to select the standard or expanded D-channel addressing mode on the NT6D11AE/AF. Table 23 describes the port 1 mode selection for the NT6D11AE/AF.

Table 23
Port 1 mode selection for NT6D11AE/AF

Port Mode	Switch Setting	
	SW2.1	SW2.2
Synchronous, D-channel, standard addressing	0	0
Synchronous, D-channel, expanded addressing	0	1
Not used	1	0
Port disabled	1	1

Port address switch settings

Port address switch settings in the standard mode

Table 24 provides the port address switch settings in standard mode. These apply to either SW1 or SW2 when the NT6D11AE/AF is in standard mode.

Note: S3, S4, and S5 are reserved for future use and should be set to OFF.

Table 24
NT6D11AE/AF Port address switch settings in the standard mode (Part 1 of 2)

Port Address	Switch Setting							
	Group No.			Device No.				
	S3	S4	S5	S6	S7	S8	S9	S10
0	0	0	0	0	0	0	0	x
1	0	0	0	0	0	0	1	x
2	0	0	0	0	0	1	0	x
3	0	0	0	0	0	1	1	x
4	0	0	0	0	1	0	0	x
5	0	0	0	0	1	0	1	x
6	0	0	0	0	1	1	0	x
7	0	0	0	0	1	1	1	x
8	0	0	0	1	0	0	0	x
9	0	0	0	1	0	0	1	x
10	0	0	0	1	0	1	0	x
11	0	0	0	1	0	1	1	x
12	0	0	0	1	1	0	0	x
13	0	0	0	1	1	0	1	x

Table 24
NT6D11AE/AF Port address switch settings in the standard mode (Part 2 of 2)

Port Address	Switch Setting							
	Group No.			Device No.				
14	0	0	0	1	1	1	0	x
15	0	0	0	1	1	1	1	x

Port address switch settings in the expanded mode

Table 25 provides the port address switch settings in expanded mode. These settings only apply to SW2 (that is, the D-channel port).

Note: Half group numbers are required for expanded mode operation. Note that the port number is partially formed from the half group number of the shelf on which the NT6D11AE/AF resides. Refer to the information described in the Engineering note, found in the "DASS2 hardware requirements" on page 159 section for information pertaining to port addressing.

Table 25
NT6D11AE/AF Port address switch settings in expanded mode (Part 1 of 3)

Port Address	Switch Setting							
	Half Group No.			Device No.				
	S3	S4	S5	S6	S7	S8	S9	S10
0	0	0	0	0	0	0	0	0
1				0	0	0	0	1
2				0	0	0	1	0
3				0	0	0	1	1
4				0	0	1	0	0
5				0	0	1	0	1

Table 25
NT6D11AE/AF Port address switch settings in expanded mode (Part 2 of 3)

Port Address	Switch Setting							
	Half Group No.			Device No.				
	S3	S4	S5	S6	S7	S8	S9	S10
6				0	0	1	1	0
7				0	0	1	1	1
8				0	1	0	0	0
9				0	1	0	0	1
10				0	1	0	1	0
11				0	1	0	1	1
12				0	1	1	0	0
13				0	1	1	0	1
14				0	1	1	1	0
15				0	1	1	1	1
16				1	0	0	0	0
17				1	0	0	0	1
18				1	0	0	1	0
19				1	0	0	1	1
20				1	0	1	0	0
21				1	0	1	0	1
22				1	0	1	1	0
23				1	0	1	1	1
24				1	1	0	0	0
25				1	1	0	0	1

Table 25
NT6D11AE/AF Port address switch settings in expanded mode (Part 3 of 3)

Port Address	Switch Setting							
	Half Group No.			Device No.				
	S3	S4	S5	S6	S7	S8	S9	S10
26				1	1	0	1	0
27				1	1	0	1	1
28				1	1	1	0	0
29				1	1	1	0	1
30				1	1	1	1	0
31				1	1	1	1	1
32-63	0	0	1					
64-95	0	1	0					
96-127	0	1	1					
128-159	1	0	0					

Protocol selection

SW3 is used to select the D-channel protocol, as shown in Table 26.

Table 26
Protocol selection switch settings

Protocol	Switch Setting	
	SW3.1	SW3.2
DASS2 (NT5K35/NT5K75 emulation)	0	0
ISDN (NT6D11AB/AC emulation)	1	1

Valid switch combinations

Table 27 and Table 28 on page 118 show the only allowable switch setting combinations for the NT6D11AE/AF (not including address switch settings).

Port 0

Port 0 can be configured as asynchronous ESDI, or disabled. If the port is configured as disabled, it will not be visible to the system CPU.

Table 27
Port 0 switch settings

Mode	Switch setting			
	SW1.1	SW1.2	SW3.1	SW3.2
Asynchronous ESDI	1	0	0	0
Asynchronous ESDI	1	0	1	1
Port disabled	1	1	-	-

Port 1

The following are the only valid emulation modes combinations. If the port is configured as disabled, it will not be visible to the system CPU.

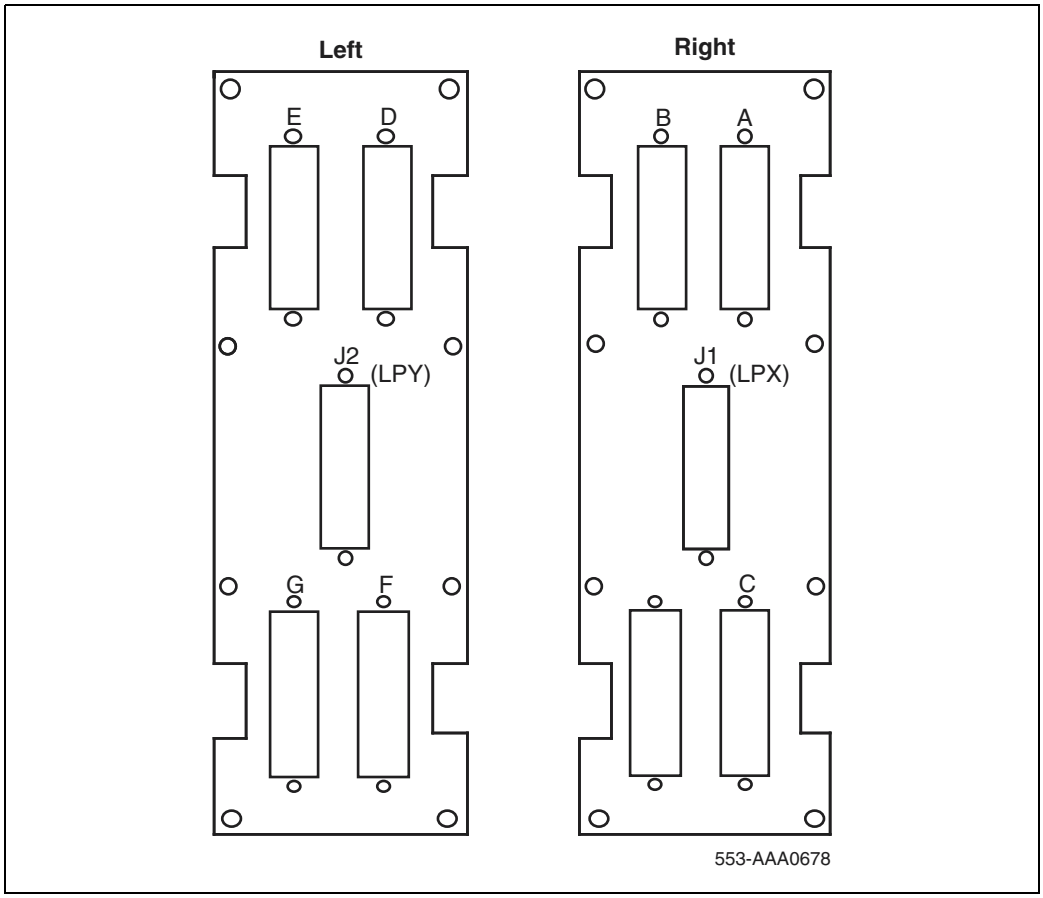
Table 28
Port 1 switch settings

Mode	Emulates	Switch setting			
		SW2.1	SW2.2	SW3.1	SW3.2
DASS2	NT5K35AA	0	0	0	0
ISDN	NT6D11AB/AC	0	0	1	1
Expanded DASS2	NT5K75AA	0	1	0	0
Port disabled		1	1	-	-

Jumper settings

The NT6D11AE/AF has two banks of option straps, one for each port. These select between DCE and DTE operation and whether the signaling interface is RS232 (asynchronous) or RS422 (DASS2). The DASS2 configuration is shown in Figure 19.

Figure 19
NT6D11AE/AF jumper strap settings for DASS2 configuration



Installing the DCHI

The procedures outlined in Table 29 apply when installing the NT5K35, NT5K75 or NT6D11AE/AF DCHI card on a large systems.

Note to installers

Either the DCHI card or the PRI card may be installed first. However, PRI loops must be configured in software before defining DCHI links.

> ***Note:*** The NT5K75 or NT6D11AE/AF in expanded mode, the port number is partially formed from the half group number of the shelf on which the card resides.

Before beginning an installation, do the following:

- Consult the *Spares Planning* (553-3001-153) document and follow the instructions
- Bring spares of all cables and boards
- Remember that the link test procedures require a successful 24-hour bit error-rate test before the link can be used for live system traffic.

Table 29
Steps for installing the DCHI (Part 1 of 2)

Step	Action
1	Determine the cabinet and shelf location for the DCHI card being installed. On systems with NT5D21 and NT4N41 Core Network Modules the DCHI card can be installed in any spare network shelf slot appropriate for I/O port card. ***Note:*** The NT5K75 or NT6D11AE/AF in expanded mode, the port number is partially formed from the half group number of the shelf on which the card resides.
2	Unpack and inspect card.
3	Set option switches on the DCHI card. Do not configure the asynchronous port on the NT5K35, NT5K75 or NT6D11AE/AF card.
4	Set faceplate toggle switch to DISABLE.
5	Install the DCHI card into the assigned shelf and slot.

Table 29
Steps for installing the DCHI (Part 2 of 2)

Step	Action
6	Connect the DCHI card port J2 to NT8D72 PRI port J5 with a QCAD328A cable.
7	Set faceplate toggle switch to ENABLE.
8	Enable the DCHI card using LD 75 to enable the circuit card with command ENL DDSL N. Refer to IDA Startup in the *DPNSS1* (553-3001-372) for additional information.

Removing the DCHI

Table 30 outlines the steps involved in removing a DCHI card.

CAUTION
Service Interruption
The NT5K35, NT5K75, or NT6D11AE/AF DCHI must be software disabled before it is hardware disabled, or initialization will occur.

Table 30
Steps for removing DCHI (Part 1 of 2)

Step	Action
1	Disable the DCHI using LD 75, command DIS DDSL N.
2	If the circuit card is being completely removed, not replaced, remove data from memory. See the *DPNSS1* (553-3001-372).
3	Determine the cabinet and shelf location of the DCHI card to be removed.
4	Set faceplate toggle switch to DISABLE.
5	Disconnect the DCHI cables.

Table 30
Steps for removing DCHI (Part 2 of 2)

Step	Action
6	Remove the DCHI card.
7	Pack and store the card

Setting up the NTAG54AA

The NTAG54AA is a dual (two port) daughterboard version of the NT6D11AF to support DPNSS1/DASS2 applications with the Dual PRI card (NTCK43AB vintage or higher). It is dual density, that is, it replaces two NT6D11 D Channel handlers, and supports two addressing modes:

- NT or standard mode: 128 I/O ports though only 16 unique addresses are supported by the current software;
- GPT or extended addressing mode: 160 ports available though there is a limit of 40 addresses.

NTAG54 installation and removal

Note to installers

Before beginning an installation, do the following:

- Consult the *Spares Planning* (553-3001-153) document and follow the instructions.
- Bring spares of all cables and boards.
- Remember that test procedures require a 24-hour minimum bit error-rate testing before being used. See the *ISDN Primary Rate Interface: Features* (553-3001-369) or *ISDN Basic Rate Interface: Features* (553-3001-380) document for these test procedures.
- Either the NTAG54 or the DPRI card may be installed first. However, DPRI loops must be configured in software before defining DCH links.

Installing the NTAG54 Daughterboard

Set the address for the NTAG54 (see the Switch settings section to set the address). If a NTAG54 is present on a Dual PRI card then an external D Channel should not be connected to P3. If a NTAG54 is present the LED DCH lights up.

CAUTION WITH ESDS DEVICES
The static discharge bracelet located inside the cabinet must be worn before handling circuit cards. Failure to wear the bracelet can result in damage to the circuit cards.

Procedure 1
Installing the NTAG54 card

1 Unpack and inspect the NTAG54 Daughterboard.

2 Mount the NTAG54. The NTAG54 can be mounted on any DDP2 NT5D97AD. Slots that are occupied by BTU's prevent the insertion of daughterboards.

The NTAG54 comes with 4 stand-offs so that it can be mounted onto the Dual PRI. These are easily pushed into 4 corresponding mounting holes on the Dual PRI.

The NTAG54 is mounted so that it mates correctly with P9 and P11 on the Dual PRI motherboard.

Removing the NTAG54 Daughterboard

Removing the NTAG54 card

CAUTION WITH ESDS DEVICES
The static discharge bracelet located inside the cabinet must be worn before handling circuit cards. Failure to wear the bracelet can result in damage to the circuit cards.

The NTAG54 can only be removed when it is disabled in S/W.

The associated PRI link must also be disabled.

Procedure 2
Disabling the associated PRI link

1. Disable the faceplate switch on the Dual PRI. If S1 is not disabled the system will initialize.
2. Remove the Dual PRI and DDCH.

PRI installation and removal

Contents

This section contains information on the following topics:

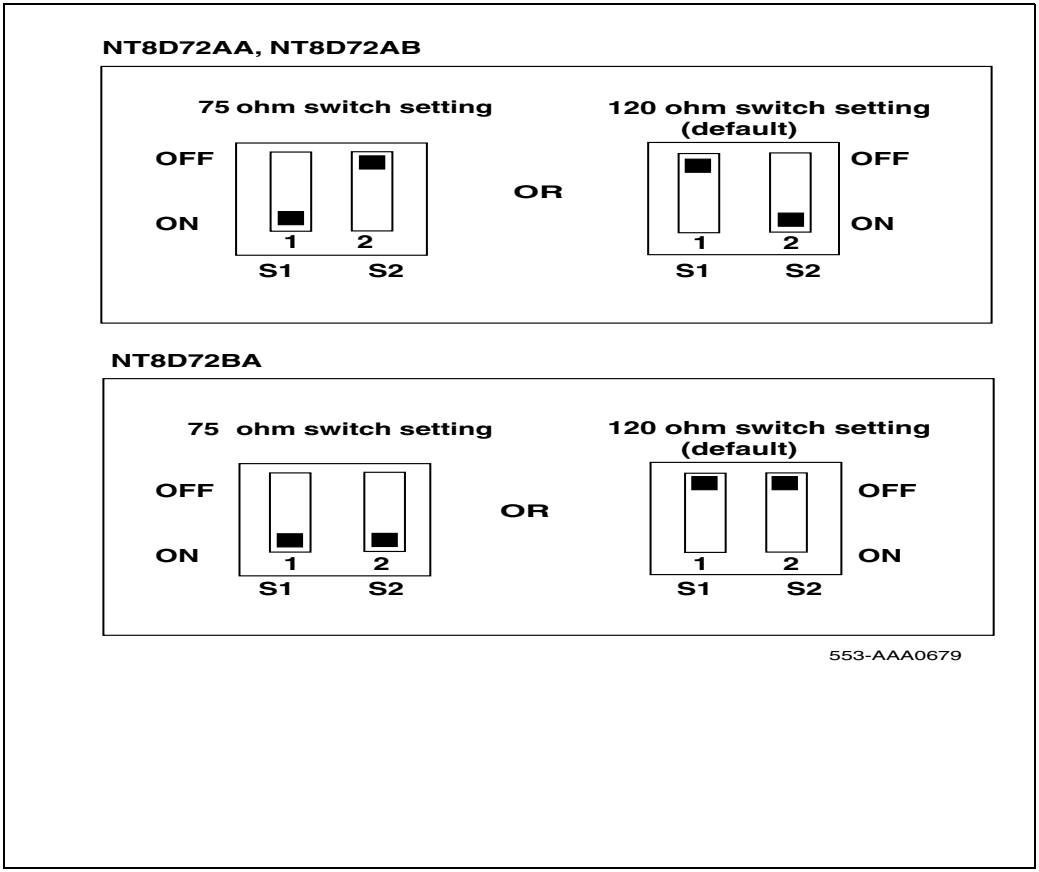
Non DPRI

Setting up the NT8D72

NT8D72 DIP switch settings

DASS2 links require that the DIP switch setting on the NT8D72 be at the 75 or 120 ohm position. Figure 20 illustrates the NT8D72 DIP switch settings.

Figure 20
NT8D72 DIP switch settings



NT8D72 connections

Table 31 describes NT8D72 connections.

Table 31
NT8D72 PRI connections

Connector	Description
J1 and J2	Connection to the Clock Controller(s), allowing the system to utilize clock from the connected system, as programmed in the software.
J3	Connection to the QPC414 network card.
J4 J4-1 J4-9 J4-2 J4-3 J4-11 J4-4	Front panel connection to Line Terminating Equipment. The following pin assignments are selected via the DIP switch on the NT8D72. XMIT-TIP - transmit to network XMIT-RING - transmit to network Shield return RCVR-TIP - receive from network RCVR-RING Shield return
J5	Connection to the NT5K35, NT5K75, or NT6D11AE/AF DCHI, via QCAD328 cable.
RCV MON	Miniature bantam connection, used for testing.
XMT MON	Miniature bantam connection, used for testing.

PRI circuit card locations

Each NT8D72 PRI card requires two adjacent slots on a shelf. The positioning of the PRI card is machine-specific, and must adhere to the following guidelines.

The following slots can be used if they are not required for other cards.

SHELF SLOT
Network 4 – 9

Half Group, SIngle Group

The NT8D72 PRI circuit card occupies two adjacent slots on a network shelf. As many as three circuit cards can be plugged into a network shelf. The actual number depends on the loops and superloops configured on the system.

The following slots can be used if they are not required for other cards.

SHELF SLOT
Network 3 – 8

When there are no vacant card slots on the network shelves for the installation of PRI2 cards, a network shelf with a power converter circuit card may be added to the system. Specific locations will depend on available space. Please refer to "Installing a system network expansion shelf" on page 130 for installation procedures.

If an additional cabinet is required to install more network shelves, use a QPC58 cabinet.

Multi Group

As many as four circuit cards can be plugged into an empty network shelf, along with a Power Converter circuit card. Specific locations will depend on available space.

When no vacant positions are available to install PRI cards, additional Network shelves can replace Peripheral Equipment shelves located on the rear of the Common Equipment or Disk shelves.

If an additional cabinet is required to install more Network shelves, use a QPC108 cabinet.

The following slots can be used if they are not required for other cards.

SHELF SLOT

Network 5 - 11, 13-14

Installing the NT8D72 PRI

Follow the steps in Table 32 to install the NT8D72 PRI.

Note: Do not fit the PRI card in the Bus Terminating Unit (BTU) position. Due to physical width restraints, BTUs and PRIs cannot fit next to each other on a shelf.

CAUTION
Service Interruption
The NT8D79AA cable connecting the Clock Controller and a PRI card must NOT be routed through the center of the cabinet past the power harness. Instead, it should be routed around the outside of the equipment shelves

Table 32
Steps for installing the NT8D72 PRI card (Part 1 of 2)

Step	Action
1	Determine the cabinet and shelf location of the circuit card to be installed; please refer to “PRI circuit card locations” on page 127 which immediately precedes this section.
2	Unpack and inspect circuit cards.
3	Set the option switch on the PRI circuit card to the 75/120 ohm position.
4	Install PRI circuit card in the assigned shelf and slot.
5	Install Network circuit card (if no Network loop connection is available).
6	If required, install I/O adapters in I/O panel.
7	Run and connect the PRI cables.
8	If required, install connecting blocks at MDF or wall mounted cross-connect terminal.
9	If required, designate connecting blocks at MDF or wall mounted cross-connect terminal.

Table 32
Steps for installing the NT8D72 PRI card (Part 2 of 2)

Step	Action
10	If required, install Network Channel Terminating Equipment (NCTE).
11	Cross-connect PRI circuits.
12	Add related office data into switch memory.
13	Run IDA status check. Refer to the *DASS2* (553-3001-371) for the IDA verification tests, IDA status check, and IDA startup test.

Installing a system network expansion shelf

The procedure in Table 33 on page 130 is used when additional network shelf space is required for PRI cards on. Please refer to the "Integrated Digital Access (IDA) equipment" on page 159 for a schematic representation of a network expansion shelf.

CAUTION
Service Interruption
Do not place the circuit cards in the shelf until Step 7 is completed.

Table 33
Steps for installing a network expansion shelf (Part 1 of 2)

Step	Action
1	Determine the cabinet and shelf location of the Network shelf to be installed.
2	Unpack and inspect the shelf.
3	Remove the existing left or right rear Peripheral Equipment (PE) shelf (if required).
4	Install the additional Network shelf in the PE (Step 3) location.
5	Install a QUD15 cooling unit directly below the Network shelf and secure with four mounting screws.

Table 33
Steps for installing a network expansion shelf (Part 2 of 2)

Step	Action
6	Install and connect the QCAD172A power cable to the added QUD15 cooling unit as follows: If the added QUD15 is located below the left Network shelf, unplug the C11 connector from the QCAD111 power harness that connects to the existing left side QUD15. If the added QUD15 is located below the right Network shelf, unplug the C21 connector from the QCAD111 power harness instead of the C11. • Plug the C11 or C21 connector into the single-ended connector of the QCAD172A power cable. • Plug one of the two connectors at the other end of the C11 or C21 connector that was removed. • Plug the remaining connector of the QCAD172A power cable into the added QUD15.
7	At the QCAD111 power wiring harness, untie and then connect: • the C17 power connection cable to the right rear Network shelf • the C19 power connection cable to the left rear Network shelf
8	Install PRA trunks and enter related shelf and PRI office data into switch memory.

NT5D97AD Dual-port DTI2/PRI2 installation and removal

Following is information required to install the NT5D97AD Dual-port DTI2/PRI2 (DDP2) card.

For installation and removal procedures for the NTAG54 Downloadable D-channel daughterboard, refer to the section “Installing the NTAG54 Daughterboard” on page 123 and “Removing the NTAG54 Daughterboard” on page 123.

NT5D97AD circuit card locations

Each NT5D97AD card requires one slot on a shelf. NT5D97AD cards can be placed in any card slot in the network bus.

Port definitions

Since the NT5D97AD card is a dual-card, it equips two ports; these ports are defined in Table 34.

Table 34
DDP2 loops configuration

Loop 0					
Loop 1		not configured	DTI2	PRI2	DDCS
	not configured	V	V	V	V
	DTI2	V	V	V	V
	PRI2	V	V	V	X
	DDCS	V	V	X	V

Note: Each loop DPNSS can be defined in Normal or Extended addressing mode.

Case Scenarios

The following are case scenarios for the replacement of a digital trunk NT8D72BA, QPC536E, or NTCK43 by a DDP2 card.

The following discussion describes possible scenarios when replacing a digital trunk NT8D72BA PRI2 card or QPC536E DTI2 card or NTCK43 Dual PRI card configuration with a NT5D97AD DDP2 card configuration.

Case 1 - The two ports of a QPC414 network card are connected to two digital trunks.

In this case, the QPC414 and the two digital trunks are replaced by a single DDP2 card, which is plugged into the network shelf in the QPC414 slot.

Case 2 - One port of the QPC414 card is connected to a digital trunk, and the second is connected to a peripheral buffer. Both cards are in network loop location.

In this case, the QPC414 should not be removed. The digital trunk is removed and the DDP2 card is plugged into one of the two empty slots.

Case 3 - The network shelf is full, one port of a QPC414 network card is connected to a digital trunk, and the second is connected to a peripheral buffer. This arrangement is repeated for another QPC414. The digital trunks are located in a shelf that provides only power.

In this case, the peripheral buffers will have to be re-assigned, so that each pair of buffers will use both ports of the same QPC414 card. The other QPC414 card can then be replaced by the NT5D97AD DDP2.

Note in all cases - If an NT8D72BA/NTCK43 card is being replaced by a DDP2 card, the D-channel Handler can be reconnected to the DDP2 card, or removed if an onboard NTAG54 DDCH card is used. Also, DIP Switches in the NT5D97AD must be set properly before insertion (NT5D97AD has a different DIP Switch setting from NTCK43AB). Refer to "NT5D97AD switch settings" on page 133 for DIP switch setting.

NT5D97AD switch settings

The the NT5D97 DDP2 card is equipped with 6x2 sets of DIP switches for trunk parameters settings for port0 and port1 respectively. Additionally, the DDP2 card is equipped with one set of four DIP switches for the Ring Ground setting and one two sets of ten DIP switches for the D-channel Handler parameters setting.

The DIP switches are used for setting of default values of certain parameters. The general purpose switches are read by the firmware which sets the default values accordingly.

The parameters as shown in the tables that follow are set by the DIP switches.

Note: Factory setups are shown in bold.

DIP switches

The DIP switches are used for setting of default values of certain parameters. The general purpose switches are read by the firmware, which sets the default values accordingly.

Table 35
DIP switches

	Card	Trunks 0 and 1	Port 0	Port 1	Trunk 0	Trunk 1
ENB/DBS mounted on the face plate	S1					
Ring Ground		S16				
MSDL			S9	S9		
DPNSS			S8	S9		
TX Mode					S2	S10
LBO Setting					S3	S13
					S4	S14
					S5	S15
Receiver interface					S6	S11
General purpose					S12	S7

Trunk interface switches

Following are the trunk interface switches.

Trunk 0 switches

Switch **S12** gives the MPU information about its environment.

Table 36
General purpose switches

Switch	Name	Description
S12_1	Impedance level	**OFF - 120 ohm** ON - 75 ohm
S12_2	Spare	
S12_3	Spare	
S12_4	loop mode	**OFF: loop operates in the DTI2 mode** ON: loop operates in the PRI2 mode

Factory setup of the switches is OFF, OFF, OFF, OFF.

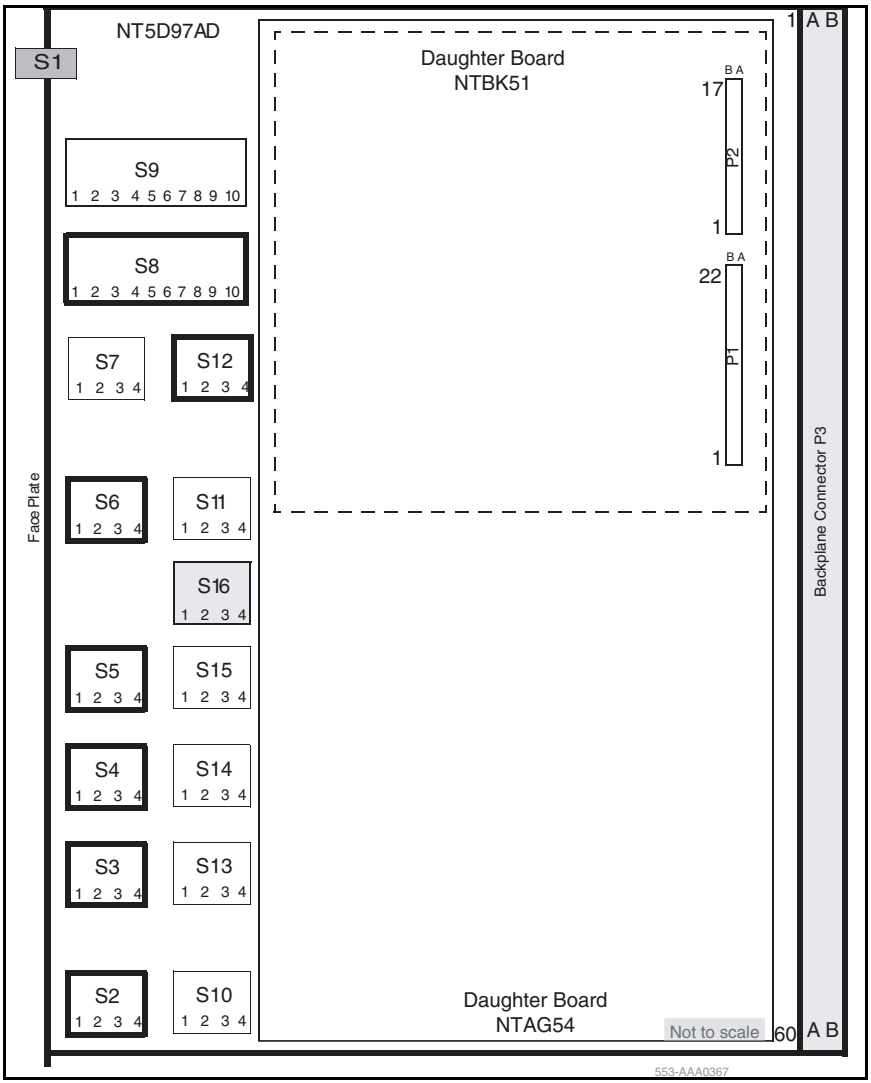
Switch **S2** selects the Transmission mode.

Table 37
TX mode switches

Tx mode	S2
E1	OFF
Not used	ON

Factory setup of the switches is OFF (E1). Do not change the setup of the switches.

Figure 21
Dip switches locations



Switches **S3**, **S4 and S5** select LBO function.

Table 38
Line build out switches

LBO setting	S3	S4	S5
0 dB	OFF	OFF	OFF
7.5 dB	ON	ON	ON
15 dB	ON	ON	ON

Factory setup of the switches is OFF, OFF, OFF (0 dB). Do not change the setup of the switches.

Switch **S6** selects the Receiver interface.

Table 39
Receiver interface switches

Impedance	S6-1	S6-2	S6-3	S6-4
75 Ω	OFF	OFF	ON	OFF
120 Ω	OFF	OFF	OFF	ON

Factory setup of the switches is OFF, OFF, OFF, ON (120 Ω). Make the setup of the switches 75Ω or 120Ω

Table 40
Trunk 1 switches

Switch	Function
S7	General purpose
S10	TX mode
S13, S14, S15	LBO
S11	RX impedance

Ring ground switches

Switch **S16** selects, which Ring lines are connected to ground. When set to ON, the Ring line is grounded.

Table 41
Ring ground switches

Switch	S2 switch setting
S16_1	Trunk 0 transmit
S16_2	Trunk 0 Receive
S16_3	Trunk 1 Transmit
S16_4	Trunk 1 Receive

Factory setup of the switches is OFF, OFF, OFF, OFF. Ring lines are not grounded.

DCH address select switch for NTAG54AA Daughterboard

Following are the normal and extended addressing modes.

Port 0, normal addressing mode

Switch S8 selects Port 0 in the NTAG54AA DCH daughter card.

Table 42
DCH switch_NTAG54AA normal mode

Switch	Function
S8_1	X
S8_2_8	D-channel daughterboard Address
S8_9	Set to ON (NTAG54 normal mode)
S8_10	Set to OFF (NTAG54 normal mode)

Note: X stands for ‘don’t care’

Port 1, normal addressing mode

Switch S9 selects Port 1 in the NTAG54AA DCH daughter card. Refer to on page 138.

Table 43
NTAG54AA_DCH card address normal mode

DNUM	Switch Setting S9 or S8							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
0	X	ON	ON	ON	ON	ON	ON	ON
1	X	OFF	ON	ON	ON	ON	ON	ON
2	X	ON	OFF	ON	ON	ON	ON	ON
3	X	OFF	OFF	ON	ON	ON	ON	ON
4	X	ON	ON	OFF	ON	ON	ON	ON
5	X	OFF	ON	OFF	ON	ON	ON	ON
6	X	ON	OFF	OFF	ON	ON	ON	ON
7	X	OFF	OFF	OFF	ON	ON	ON	ON
8	X	ON	ON	ON	OFF	ON	ON	ON
9	X	OFF	ON	ON	OFF	ON	ON	ON
10	X	ON	OFF	ON	OFF	ON	ON	ON
11	X	OFF	OFF	ON	OFF	ON	ON	ON
12	X	ON	ON	OFF	OFF	ON	ON	ON
13	X	OFF	ON	OFF	OFF	ON	ON	ON
14	X	ON	OFF	OFF	OFF	ON	ON	ON
15	X	OFF	OFF	OFF	OFF	ON	ON	ON

Note 1: X stands for “don’t care”.

Note 2: Due to S/W limitations, only DNUM 0 to 15 can be used.

Port 0, extended addressing mode

Switch S8 also selects Port 0 in the NTAG54AA DCH Daughterboard.

Table 44
DCH switchs_NTAG54AA extended mode

Switch	Function
S8_1_8	D-channel daughter card address
S8_9	Set to OFF (NTAG54 extended mode)
S8_10	Set to OFF (NTAG54 extended mode)

Port 1, extended addressing mode

Switch S9 selects Port 1 in the NTAG54AA DCH daughter card. Refer to Table 43 on page 139.

Table 45
NTAG54AA_DCH card address extended mode (Part 1 of 3)

DNUM	Switch Setting S9 or S8							
	1	2	3	4	5	6	7	8
0	ON	ON	ON	ON	ON	ON	ON	ON
	OFF	ON	ON	ON	ON	ON	ON	ON
	ON	OFF	ON	ON	ON	ON	ON	ON
	OFF	OFF	ON	ON	ON	ON	ON	ON
	ON	ON	OFF	ON	ON	ON	ON	ON
	OFF	ON	OFF	ON	ON	ON	ON	ON
	ON	OFF	OFF	ON	ON	ON	ON	ON
	OFF	OFF	OFF	ON	ON	ON	ON	ON
	ON	ON	ON	OFF	ON	ON	ON	ON
	OFF	ON	ON	OFF	ON	ON	ON	ON

Table 45
NTAG54AA_DCH card address extended mode (Part 2 of 3)

DNUM	Switch Setting S9 or S8							
	1	2	3	4	5	6	7	8
	ON	OFF	ON	OFF	ON	ON	ON	ON
	OFF	OFF	ON	OFF	ON	ON	ON	ON
	ON	ON	OFF	OFF	ON	ON	ON	ON
	OFF	ON	OFF	OFF	ON	ON	ON	ON
	ON	OFF	OFF	OFF	ON	ON	ON	ON
	OFF	OFF	OFF	OFF	ON	ON	ON	ON
	ON	ON	ON	ON	OFF	ON	ON	ON
	OFF	ON	ON	ON	OFF	ON	ON	ON
	ON	OFF	ON	ON	OFF	ON	ON	ON
	OFF	OFF	ON	ON	OFF	ON	ON	ON
	ON	ON	OFF	ON	OFF	ON	ON	ON
	OFF	ON	OFF	ON	OFF	ON	ON	ON
	ON	OFF	OFF	ON	OFF	ON	ON	ON
	OFF	OFF	OFF	ON	OFF	ON	ON	ON
	ON	ON	ON	OFF	OFF	ON	ON	ON
	OFF	ON	ON	OFF	OFF	ON	ON	ON
	ON	OFF	ON	OFF	OFF	ON	ON	ON
	OFF	OFF	ON	OFF	OFF	ON	ON	ON
	ON	ON	OFF	OFF	OFF	ON	ON	ON
	OFF	ON	OFF	OFF	OFF	ON	ON	ON
	ON	OFF	OFF	OFF	OFF	ON	ON	ON

Table 45
NTAG54AA_DCH card address extended mode (Part 3 of 3)

DNUM	Switch Setting S9 or S8							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
	OFF	OFF	OFF	OFF	OFF	ON	ON	ON
-63	as DDSL 0 to 31					OFF	ON	ON
64-95	"					ON	OFF	ON
96-127	"					OFF	OFF	ON
128-159	"					ON	ON	OFF
160-191	"					OFF	ON	OFF
192-223	"					ON	OFF	OFF
224-255	"					OFF	OFF	OFF

NTAG54AA daughterboard port disabled

Following are the disabling settings.

Port 0 disabled

Table 46
Port 0 disabled switches setting

Switch Number	Function
S8_9	Set to OFF
S8_10	Set to ON

Port 1 disabled

Switch S9 selects Port 1. Refer to Table 46 on page 142.

DPNSS External card

Table 47
DPNSS external card switches setting

Switch number	Function
S8_1-8	X
S8_9	Set to ON
S8_10	Set to OFF
S9_1-8	X
S9_1-9	Set to ON
S9_10	Set to OFF

Install the NT5D97AD DDP2

Complete Procedure 3 to install the NT5D97AD.

CAUTION
The static discharge bracelet located inside the cabinet must be worn before handling circuit cards. Failure to wear the bracelet can result in damage to the circuit cards.

Procedure 3
Installing the NT5D97AD

1 Determine the cabinet and shelf location where the NT5D97AD is to be installed. The NT5D97AD can be installed in any card slot in the Network bus.

2 Unpack and inspect the NT5D97AD and cables.

3 If a DDCH is installed, refer to the section NTAG54 installation and removal.

4 Set the option switches on the NT5D97AD card before installation. Refer to “NT5D97AD switch settings” on page 133.

The ENB/DIS (enable/disable faceplate switch) must be OFF (DIS) when installing the NT5D97AD, otherwise a system initialize can occur. The ENB/DIS on the NT5D97AD corresponds to the faceplate switch on the QPC414 Network card.

5 Install NT5D97AD card in the assigned shelf and slot.

6 Set the ENB/DIS faceplate switch to ON. If the DDCH is installed, the DDCH LED flashes three times.

7 If required, install the I/O adapters in the I/O panel.

8 Run and connect the NT5D97AD cables.

CAUTION
Clock Controller cables connecting the Clock Controller and NT5D97AD card must **NOT** be routed through the center of the cabinet past the power harness. Instead they should be routed around the outside of the equipment shelves.

9 If required, install connecting blocks at the MDF or wall mounted cross-connect terminal.

10 If required, designate connecting blocks at the MDF or wall mounted cross-connect terminal.

11 If required, install a Network Channel Terminating Equipment (NCTE) or Line Terminating Unit (LTU).

12 Add related office data into switch memory.

13 Enable faceplate switch S1. This is the “Loop Enable” switch.

The faceplate LEDs should go on for 4 seconds then go off and the OOS, DIS and ACT LEDs should go on again and stay on.

IF DDCH is installed, the DCH LED should flash 3 times.

14 Run the PRI/DTI Verification Test.

15 Run the PRI status check.

End of Procedure

Remove the NT5D97AD DDP2

Complete Procedure 4 to remove the NT5D97AD.

CAUTION
The static discharge bracelet located inside the cabinet must be worn before handling circuit cards. Failure to wear the bracelet can result in damage to the circuit cards.

Procedure 4
Removing the NT5D97AD

1. Determine the cabinet and shelf location of the NT5D97AD card to be removed.
2. Disable Network Loop using LD 60. The command is DISL “loop number.”

   The associated DCHI might have to be disabled first. The faceplate switch ENB/DIS should not be disabled until both PRI2/DTI2 loops are disabled first.
3. If the NT5D97AD card is being completely removed, not replaced, remove data from memory.
4. Remove cross connections at MDF to wall-mounted cross-connect terminal.
5. Tag and disconnect cables from card.
6. Rearrange Clock Controller cables if required.

CAUTION
Clock Controller cables connecting the Clock Controller and DDP2 card must **NOT** be routed through the center of the cabinet past the power harness. Instead, they should be routed around the outside of the equipment shelves.

7. Remove the DDP2 card only if both loops are disabled. If the other circuit of a DDP2 card is in use, **DO NOT** remove the card. The Faceplate switch ENB/DIS must be in the OFF (DIS) position before the card is removed, otherwise the system will initialize.

8 Pack and store the NT5D97AD card and circuit card.

End of Procedure

Clock Controller installation and removal

Contents

This section contains information on the following topics:

Setting up the QPC775

The switch settings for the QPC775A/B/C/D Clock Controller card are shown in Figure 22 and Table 48 on page 148.

Figure 22
QPC775A/B/C/D switch settings

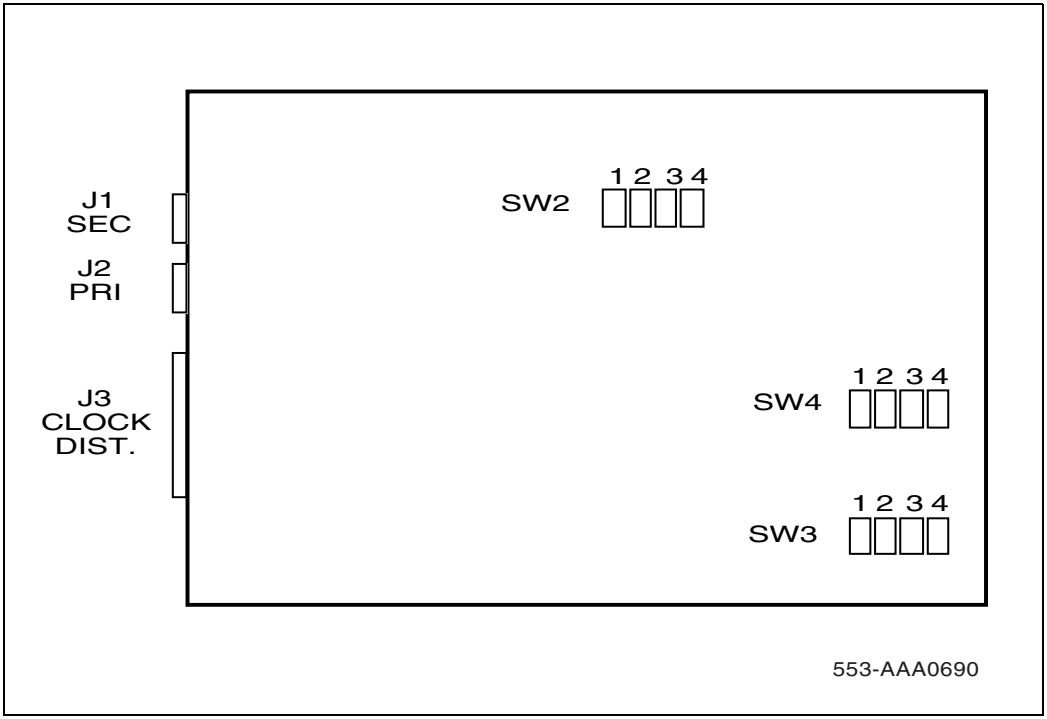


Table 48
QPC775A/B/C/D

System	Switch 1 1 2 3 4	Switch 2 1 2 3 4	Switch 4 1 2 3 4
Multi Group	OFF	OFF	ON
Half Group, Single Group	ON	OFF	ON

QPC775E switch settings

Figure 23 shows the switch settings for the QPC775E. Table 49 describes the switch settings for the QPC775E.

Figure 23
QPC775E switch settings

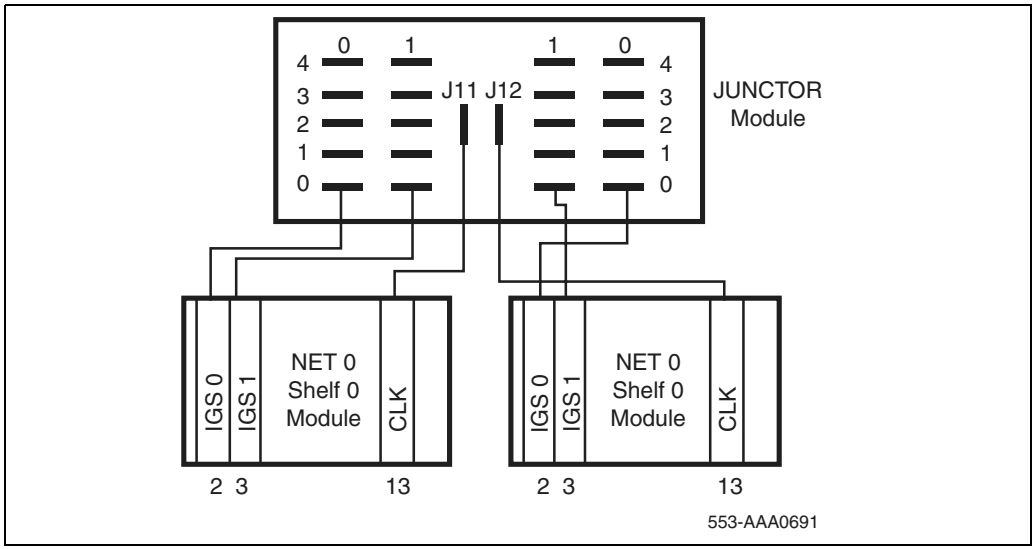


Table 49
QPC775E switch settings (Part 1 of 2)

System	SW1	SW2	SW4			
	1 2 3 4	**1 2 3 4**	**1**	**2**	**3**	**4**
Half Group, Single Group	ON	OFF	OFF	ON		
Cable length between faceplate connectors: 0 - 4.3 m 4.6 - 6.1 m 6.4 - 10.1 m 10.4 - 15.2 m					 OFF OFF **ON** **ON**	 OFF **ON** OFF **ON**

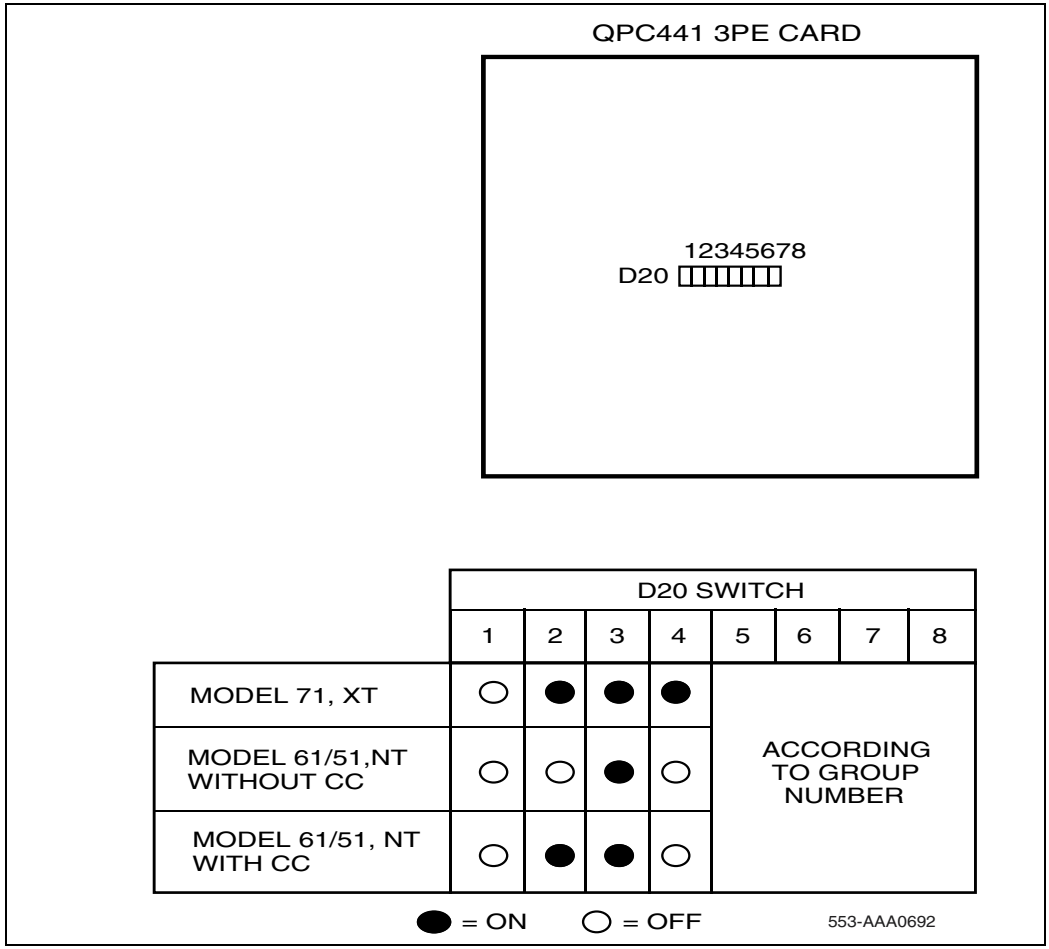
Table 49
QPC775E switch settings (Part 2 of 2)

System	SW1	SW2	SW4			
	1 2 3 4	**1 2 3 4**	**1**	**2**	**3**	**4**
Multi Group	OFF	OFF	OFF	ON		
Cable length between faceplate connectors: 0 - 4.3 m 4.6 - 6.1 m 6.4 - 10.1 m 10.4 - 15.2 m					 OFF OFF **ON** **ON**	 OFF **ON** OFF **ON**

QPC441 3PE card switch settings

The Three-Port Extender (3PE) extends CPU data, address and control signals between one segmented network shelf (half-group) and a QPC215 Segmented Bus Extender on a CPU shelf. For the QPC441 3PE cards in Network Shelves housing Clock Controller cards, the switch settings shown in Figure 24 are set.

Figure 24
QPC441 3PE card switch settings



	D20 SWITCH							
	1	2	3	4	5	6	7	8
MODEL 71, XT	○	●	●	●	ACCORDING TO GROUP NUMBER			
MODEL 61/51,NT WITHOUT CC	○	○	●	○				
MODEL 61/51, NT WITH CC	○	●	●	○				

● = ON ○ = OFF 553-AAA0692

Installing or replacing the QPC775 or NTRB53 on Half Group and Single Group Systems

Table 50 on page 153 outlines the steps used to install or replace the QPC775 or NTRB53 Clock Controller.

CAUTION
Service Interruption
Do not deviate from this procedure. Deviation will not cause the switch to SYSLOAD or initialize, but will stop call processing.

CAUTION
Service Interruption
If CC-0 is to be replaced, CC-1 and CPU-1 must be active. Similarly, if CC-1 is to be replaced, CC-0 and CPU-0 must be active.

Installing or replacing the QPC775 or NTRB53 on Multi Group System

Table 50
installing or replacing the QPC775 or NTRB53 Clock Controller (Part 1 of 3)

Step	Action
1	Determine the cabinet and shelf location of the circuit card to be installed. ***Note:*** The system contains card slots that are dedicated for the Clock Controller. The card slot is number 9 on the Network shelf.
2	Unpack and inspect circuit cards.
3	Set option switches and insert option plugs on the Clock Controller being added. For information about QPC775 switch settings, see “QPC775E switch settings” on page 149.
4	For the QPC441 3PE cards in Network Shelves housing Clock Controller cards: For models with a Clock Controller, set option switch positions 1 and 4 to OFF, and positions 2 and 3 to ON. For models without a Clock Controller, set option switch positions 1, 2 and 4 to OFF, and position 3 to ON. (Refer to QPC441 3PE card schematic.)
5	On the Clock Controller being added, set faceplate toggle switch to DISABLE.
6	When replacing an existing Clock Controller, make sure the existing card is software disabled, using LD 60. ***Note:*** ERR20 messages may be generated. These can usually be ignored. However, excessive clock switching should be avoided, especially when counters are near the maintenance or out-of-service thresholds. **Response**: Excessive switching could generate threshold-exceeded messages or cause the PRI to be automatically disabled.
7	Check the counters in LD 60. If necessary, reset the counters using the RCNT command.
8	On the Clock Controller being replaced, set the faceplate toggle to DISABLE.

Table 50
installing or replacing the QPC775 or NTRB53 Clock Controller (Part 2 of 3)

Step	Action
Call processing will cease if the CC-to-CC cable (J3 connector) is connected and BOTH Clock Controller cards are disabled by their faceplate switches.	
9	Disconnect cables from Clock Controller (CC) card. **Response**: If the CC to CC cable (connector J3) is disconnected, the card in the active shelf will be active. The clock cannot be switched unless this cable is connected at both ends. The clock status display will indicate NO UART (no universal asynchronous receiver transmitter). This is normal, however, do not perform a clock status check when receiving this code.
10	Remove CC card from shelf. **Response**: If the CC card is removed from the active shelf, the Peripheral Shelf (PS) card will distribute clock. If the CC to CC cable (connector J3) is disconnected, and the faceplate switch of the CC in the active shelf is or becomes disabled then the clock control will become disabled and the PS card will distribute clock, and when clock status is read by the CPU, the CC card will respond as being active clock, but disabled.
11	Install replacement Clock Controller in the same slot. The Clock Controller card can also be plugged into the active shelf without switching the CPU.
12	Run and connect cables. Always set the faceplate switch to DISABLE before removing or installing the CC-to-CC cable (J3 connector), but remember, call processing will cease if the cable is connected and BOTH Clock Controllers are disabled. • Connect Primary reference to J2. • If available, connect Secondary reference to J1. • Connect cables between Clock Controllers (J3 to J3), for single group systems only.
13	Set faceplate toggle switch to ENABLE.
14	Turn off DISABLE LED using LD 60 and the ENL command.

Table 50
installing or replacing the QPC775 or NTRB53 Clock Controller (Part 3 of 3)

Step	Action
15	Add related office data into switch memory.
16	Repeat steps 2 to 14 for second Clock Controller.
17	To track on a primary or secondary reference clock, use LD 60. The command is: TRCKPCK (for Primary) SCK (for Secondary) FRUN (for Free-Run) **Tracking on a Reference Clock:** The Clock Controller will be in free-run mode when enabled. It should stay in this mode for several minutes before being switched to tracking mode.

Table 51 on page 156 outlines the steps used to install or replace the QPC775 or NTRB53 Clock Controller card.

CAUTION
Service Interruption
Do not deviate from this procedure. Deviation will not cause the switch to SYSLOAD or initialize, but will stop call processing.

CAUTION
Service Interruption
If CC-0 is to be replaced, CC-1 and CPU-1 must be active. Similarly, if CC-1 is to be replaced, CC-0 and CPU-0 must be active.

Table 51
Installing or replacing the QPC775 or NTRB53 Clock Controller
(Part 1 of 3)

Step	Action
1	Unpack and inspect circuit cards. (Note that Multi Group systems require QPC775E or NTRB53 cards.)
2	Set option switches and insert option plugs on the Clock Controller being added. SW2 - OFF SW3 - OFF SW4 (1,2) - ON "ON" in switch setting also means "1" or "CLOSED". "OFF" in switch setting also means "0" or "OPEN".
3	For the QPC441 3PE cards in Network Shelves housing Clock Controller cards: Set option switch position 1 to OFF, and positions 2, 3, and 4 to ON (refer to QPC441 3PE card schematic).
4	On the Clock Controller being added, set faceplate toggle switch to DISABLE.
5	When replacing an existing Clock Controller, make sure the existing card is software disabled, using LD 60. ***Note:*** ERR20 messages may be generated. These can usually be ignored. However, excessive clock switching should be avoided, especially when counters are near the maintenance or out-of-service thresholds. **Response**: Excessive switching could generate threshold-exceeded messages or cause the PRI to be automatically disabled.
6	Check the counters in LD 60. If necessary, reset the counters using the RCNT command.
7	On the Clock Controller being replaced, set the faceplate toggle to DISABLE.
Note: Call processing will cease if the CC-to-CC cable (J3 connector) is connected and BOTH Clock Controller cards are disabled by their faceplate switches.	

Table 51
Installing or replacing the QPC775 or NTRB53 Clock Controller
(Part 2 of 3)

Step	Action
8	Disconnect cables from Clock Controller card. **Response**: If the Clock Controller to Clock Controller cable (connector J3) is disconnected, the card in the active shelf will be active. The clock cannot be switched unless this cable is connected at both ends. The clock status display will indicate NO UART (no universal asynchronous receiver transmitter). This is normal, however, do not perform a clock status check when receiving this code.
9	Remove card from shelf. **Response**: If the Clock Controller card is removed from the active shelf, the Peripheral Shelf (PS) card will distribute clock.If the Clock Controller to Clock Controller cable (connector J3) is disconnected, and the faceplate switch of the Clock Controller in the active shelf is or becomes disabled Then:— clock control will become disabled and the PS card will distribute clock, and when clock status is read by the CPU, the Clock Controller card will respond as being active clock, but disabled.
10	Install replacement Clock Controller in the same slot. The Clock Controller card can also be plugged into the active shelf without switching the CPU.
11	Run and connect cables: • Always set the faceplate switch to DISABLE before removing or installing the CC-to-CC cable (J3 connector), but remember, call processing will cease if the cable is connected and BOTH Clock Controllers are disabled. • Connect Primary reference to J2. • If available, connect Secondary reference to J1. • Connect cables between Clock Controllers (J3 to J3) for Succession 1000M Single Group and Meridian 1 Option 61C CP PII only.
12	Set faceplate toggle switch to ENABLE.
13	Turn off DISABLE LED using LD 60 and the ENL command.

Table 51
Installing or replacing the QPC775 or NTRB53 Clock Controller
(Part 3 of 3)

Step	Action
14	Add related office data into switch memory.
15	Repeat steps 2 to 14 for second Clock Controller.
16	To track on a primary or secondary reference clock, use LD 60. The command is: TRCKPCK (for Primary) SCK (for Secondary) FRUN (for Free-Run) **Tracking on a Reference Clock:** The Clock Controller will be in free-run mode when enabled. It should stay in this mode for several minutes before being switched to tracking mode.

Integrated Digital Access (IDA) equipment

Contents

This section contains information on the following topics:

DASS2 hardware requirements

The following hardware is required for each DASS2 link on large and Small Systems:

- one NTAG54 Dual Daughterboard for NT5D97AD or higher vintages of the DDP2. The system supports DASS2/DPNSS for DDP2 only from the NT5D97AD vintage and up.

  or

- one NT5K35 D-channel Handler Interface

  or

- one NT5K75 D-channel Handler Interface - an enhanced version of the NT5K35 which provides up to 160 D-channel port addresses. This card supports two switch-selectable modes of operation — standard mode and expanded mode. Standard mode D-channels may be assigned an input/output port address in the range 0-15; expanded mode D-channels may be assigned port addresses in the range 0-159. Each port has a set of DIP switches allowing full configuration flexibility. See the section entitled "Engineering note pertaining to port addressing modes" on page 162 in this chapter.

  or

- one NT6D11AE D-channel Handler Interface - an enhanced version of the NT5K75 which is fully backward compatible with the NT5K75 and NT5K35. This card supports two switch-selectable modes of operation - standard mode and expanded mode. Standard mode D-channels may be assigned an input/output port address in the range 0-15; expanded mode D-channels may be assigned port addresses in the range 0-159. Each port has a set of DIP switches allowing full configuration flexibility. See the section entitled "Engineering note pertaining to port addressing modes" on page 162 in this chapter.
- one NT8D72 Primary Rate Interface card (NT8D72BA is required for EuroISDN applications)

  or

- one NT5D97AD Primary Rate Interface card.
- one QPC949D CPU ROM (up to and including Group G) and NTND08AA CPU ROM (up to and including Group H) are required to support the expanded capability of the NT5K75 and NT6D11AE DCHI
- one of the following cables:
  - NT5K40AA PRI to Line Terminating Equipment cable (15 pin D-type to twin BNC, 4 meters)
  - NT5K41AA PRI to Line Terminating Equipment cable (15 pin D-type to twin BNC, 8 meters)
  - NT5K86AA PRI to Line Terminating Equipment cable (15 pin D-type to twin BNC, 12 meters, TX shield connected to FGND)

— NT5K86BA PRI to Line Terminating Equipment cable (15 pin D-type to twin BNC, 12 meters, RX shield connected to FGND)

— NT5K86AA PRI to Line Terminating Equipment cable (15 pin D-type to twin BNC, 12 meters, TX and RX shields connected to FGND)

- one QCAD328 DCHI to PRI cable
- one NT8D85 ENET to PRI cable
- one QPC775 or NTRB53 Clock Controller (QPC775 is required on Large Systems, and where EuroISDN is being supported.) This cable is required if the DASS2 loop is to be used as a timing synchronisation source.
- one NT8D79AD PRI to Clock Controller cable. This cable is required if the DASS2 loop is to be used as a timing synchronisation source.
- one loop of the QPC414 ENET dual loop network interface card
- for the NT5D97AD DPRI card, the following cables are used:
  - — NTCK45AA 120 Ohm Dual PRI to I/O Panel cable (8ft)
  - — NTCK79AA 75 Ohm Dual PRI Coax Cable (40ft)
  - — NT8D7217 Dual PRI I/O Panel to Multiplexer cable (50ft)
  - — NTCK46AA Dual PRI to DASS/DPNSS NT6D11 DCHI cable (6ft)
  - — NTCK46AB Dual PRI to DASS/DPNSS NT6D11 DCHI cable (18ft)
  - — NTCK46AC Dual PRI to DASS/DPNSS NT6D11 DCHI cable (35ft)
  - — NTCK46AD Dual PRI to DASS/DPNSS NT6D11 DCHI cable (50ft)
  - — Clock Controller cables (1 to 2 port cables):
    - – NTCK47AA Dual PRI to Clock Controller cable (2ft)
    - – NTCK47AB Dual PRI to Clock Controller cable (4ft)
    - – NTCK47AC Dual PRI to Clock Controller cable (6ft)

- NTCK47AD Dual PRI to Clock Controller cable (8ft)
- NTCK47AE Dual PRI to Clock Controller cable (10ft)

— Clock Controller Cables (1 to 4 port cables)

- NTCK81AA Dual PRI to Clock Controller cable (2ft)
- NTCK81AB Dual PRI to Clock Controller cable (4ft)
- NTCK81AC Dual PRI to Clock Controller cable (6ft)
- NTCK81AD Dual PRI to Clock Controller cable (8ft)
- NTCK81AE Dual PRI to Clock Controller cable (10ft)

Note: Presently, the network loop used for DASS2 cannot be odd-numbered if the associated even-numbered loop is programmed as being used for existing peripheral equipment, that is, as TERM, TERD, or TERQ in LD17. If all peripheral equipment is IPE, this constraint applies only when Meridian Mail is equipped. Refer to Table 52.

Table 52
Programming network loops

ENET Loop	Allowed					Not Allowed
Even	Meridian Mail	PRI	PRI	Any	---	Meridian Mail
Odd	Meridian Mail	PRI	Meridian Mail	---	Any	PRI

Engineering note pertaining to port addressing modes

There is a distinction between Group G and Group H functionality regarding port addressing modes.

Group G

Standard address mode (0-15) can be any of the following:

- DPNSS1 (DDSL)
- DASS2 (DDSL)

- APNSS (LSSL)
- Q.931 (DCHI)
- ISL (DCHI)
- SDI
- ESDI

Expanded address mode (0-159) can be either of the following:

- DPNSS1 (DDSL)
- DASS2 (DDSL)

The expanded mode addressing has no impact on the standard mode addressing, that is, DASS2 D-channel (DDSL) 7 in the expanded mode can exist with the Q.931 D-channel (DCHI) 7 in the standard mode.

Theoretically, it is possible to have 160 DASS2 D-channels and 16 other I/O devices. In practise, however, there is a limit of 40 addresses in expanded mode and 16 in standard mode, for a total of 56 addresses.

The port address numbers assigned to the NT5K75 and NT6D11AE operating in expanded mode must not conflict with addresses assigned to other I/O port types. To avoid potential conflicts and to simplify system configuration, it is recommended that, in the expanded mode, the port addresses for the NT5K75 and NT6D11AE avoid the standard mode range (0-15) and be numbered in the range 16-159 instead.

Group H

Standard address mode (0-15) can be any of the following:

- DPNSS1 (DDSL)
- DASS2 (DDSL)
- APNSS (LSSL)
- Q.931 (DCHI)
- ISL (DCHI)

- SDI
- ESDI

If the MSDL is used, standard mode can have a range of 0-63, and can be any of the following:

- Q.931 (DCHI)
- ISL (DCHI)
- ESDI

Expanded address mode (0-159) can be either of the following:

- DPNSS1 (DDSL)
- DASS2 (DDSL)

The expanded mode addressing has no impact on the standard mode addressing, that is, DASS2 D-channel (DDSL) 7 in the expanded mode can exist with the Q.931 D-channel (DCHI) 7 in the standard mode.

Theoretically, it is possible to have 64 addresses using the MSDL with Q.931, ISDL, or ESDI, plus 160 addresses using the expanded mode for DASS2 for a total of 224 addresses. In practise, however, there is a limit of 64 addresses using MSDL with Q.931, ISDL, or ESDI, plus 40 addresses using the expanded mode for DASS2, for a total of 104 addresses.

Presently, MSDL does not support SDI ports on DASS2, so the likely configuration would involve a mixture of standard mode addressing, MSDL addressing, and expanded mode addressing for DASS2. Such an example could be as follows:

- 0-7 (8 addresses) in the standard mode
- 8-15 (32 addresses) in the MSDL mode
- 16-55 (40 addresses) in the expanded mode

The port address numbers assigned to the NT5K75 and NT6D11AE operating in expanded mode must not conflict with addresses assigned to other I/O port types. To avoid potential conflicts and to simplify system configuration, it is recommended that, in the expanded mode, the port addresses for the NT5K75

and NT6D11AE avoid the standard mode range (0-15) and be numbered in the range 16-159 instead.

Note to installers

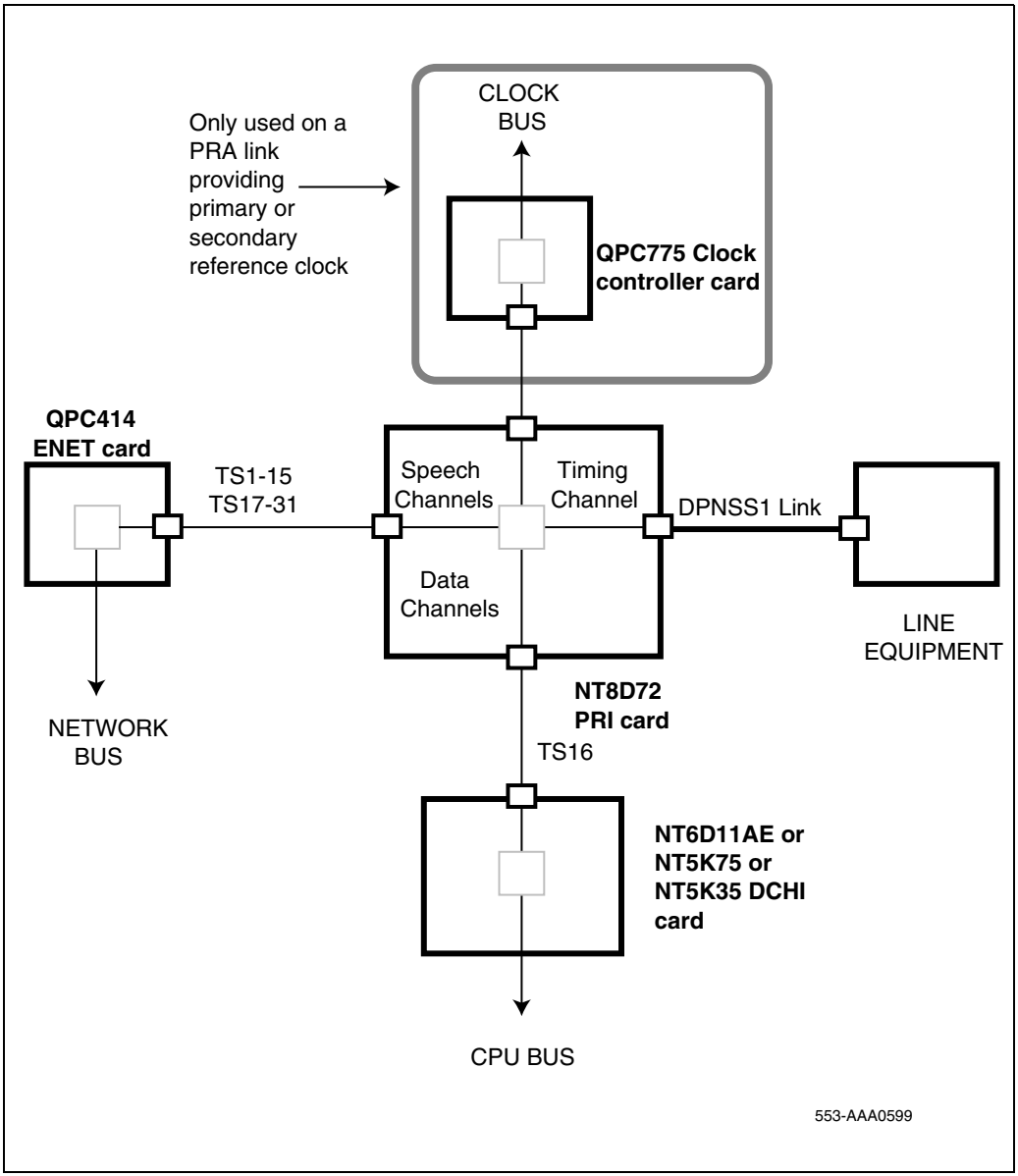
Either the DCHI or the NT8D72 PRI /NT5D97AD DDP2 can be installed first. However, PRI loops must be configured in software before defining DCHI links.

Before beginning an installation, do the following:

- Consult the *Spares Planning* (553-3001-153) document and follow the instructions.
- Bring spares of all cables and boards.
- Remember that the link test procedures require a successful 24-hour bit error-rate test before the link can be used for live system traffic.

Figure 25 illustrates a typical DASS2 hardware configuration.

Figure 25
A typical DASS2 hardware configuration



NT5K35, NT5K75 and NT6D11AE DCHI cards

NT5K35 and NT5K75 power requirements

The NT5K35 and NT5K75 DCHI power requirements are shown in Table 53.

Table 53
NT5K23 and NT5K75 power requirements

Voltage	Worst case consumption
+5 Volt	3.0 Amp
+12 Volt	50 milliamperes
-12 Volt	50 milliamperes

NT6D11AE power requirements

The power requirements for the NT6D11AE are shown in Table 54.

Table 54
NT6D11AE power requirements

Voltage	Worst case consumption
+5 Volt	3.0 Amp
+12 Volt	0.75 Amp
-12 Volt	0.75 Amp

NT5K35, NT5K75, NT6D11AE faceplates

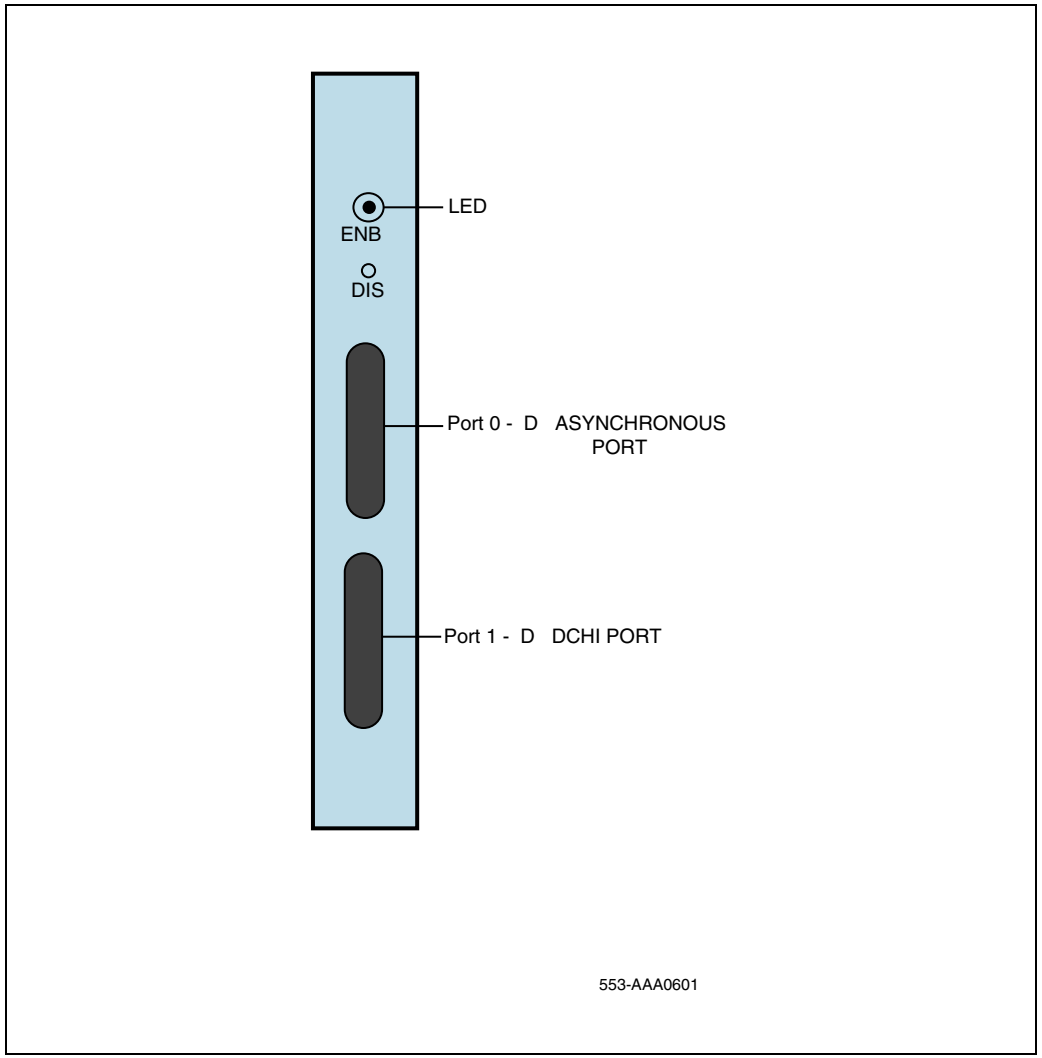
The NT5K35, NT5K75 and NT6D11AE DCHIs have one light-emitting-diode (LED) to indicate an active or inactive state and two external connectors:

- Port 0 is a standard asynchronous port providing an interface for non-IDA applications. This port should only be used for testing or debugging DASS2 links.

- Port 1 is the D-channel Interface port.

Figure 26 illustrates the layout of the NT5K35, NT5K75 and NT6D11AE card faceplates.

Figure 26
NT5K35, NT5K75, NT6D11AE DCHI faceplate layout



NT8D72 PRI

Power requirements

The NT8D72 PRI uses power and ground connections from the CE backplane. Table 55 describes the power requirements of the NT8D72 PRI card.

Table 55
NT8D72 power requirements

Voltage	Worst case consumption
+5 Volt	6 Amp
+12 Volt	50 milliamperes
-12 Volt	50 milliamperes

NT8D72 faceplate

The NT8D72 PRI contains five LEDs and six external connectors. Table 56 describes the NT8D 72 PRI card's external connectors. Figure 27 shows the NT8D72 faceplate layout.

Table 56
NT8D72 external connectors (Part 1 of 2)

Faceplate Designation	Type	Connect to
J1	9-pin female, D-connector	CC - CPU 0
J2	9-pin female, D-connector	CC - CPU1
J3	36-pin connector	Network Loop
J4	15-pin male, D-connector	Line
J5	15-pin male, D-connector	DCHI
J6	15-pin female, D-connector	Not used for DASS2

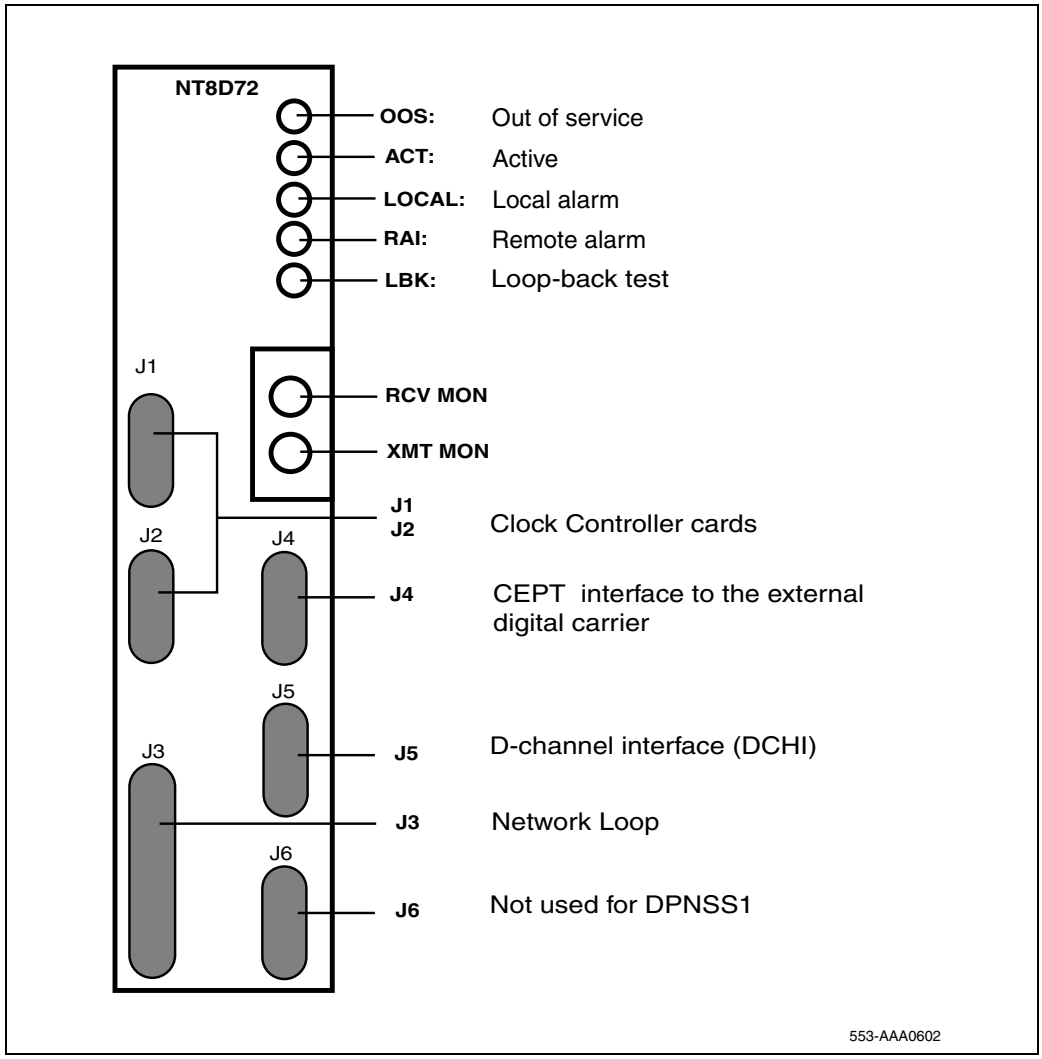
Table 56
NT8D72 external connectors (Part 2 of 2)

Faceplate Designation	Type	Connect to
RCV MON	Miniature bantam jack	Test
XMT MON	Miniature bantam jack	Test

Carrier interface

The NT8D72 PRI provides an interface to the 2Mb/s external digital line either directly or through an office repeater or line terminating unit (LTU).

Figure 27
NT8D72 PRI faceplate layout



NT5D97AD Dual-port DTI2/PRI2 card

The DDP2 NT5D97AD is a dual-port 2.0 Mb DTI2/PRI2 card. The DDP2 card integrates the functionality of one ENET card (two terminal loops) and two DTI2/PRI2 cards on a single CE slot format card. Each of the two DDP2 loops may be independently configured to provide the 2.048 Mbps Digital Trunk Interface (DTI2) or the Primary Rate Interface (PRI2). The DDP2 card includes the equivalent circuitry of ENET (QPC414), two E1 trunk interface cards (QPC536E or NT8D72BA), an interface to an external D-channel handler card (DCHI NT6D11AF/QPC757/NT5K75AA/NT5K35AA) and an optional DDCH (NTBK51AA) or DPNSS (NTAG54AA) daughterboard.

The NT5D97AD DDP2 card can be mixed in the same machine with PRI2 NT8D72BA cards.

The NT5D97AD DDP2 card hardware design uses a B57 ASIC E1/T1 framer. The carrier specifications comply with the ANSI TI.403 specification. The NT5D97AD provides an interface to the 2.048 Mbps external digital line either directly or through an office repeater, Network Channel Terminating Equipment (NCTE), or Line Terminating Unit (LTU).

DANGER OF ELECTRIC SHOCK

The NT5D97AD DDP2 card is not designed to be connected directly to the Public Switched Network, or other exposed plant networks. Such a connection should only be done using an isolating-type networking terminating device that provides voltage surge protection, such as a Line Terminating Unit (LTU), Network Channel Terminating Equipment (NCTE), or Network Termination 1 (NT1), as certified by your local, regional, or national safety agency and telecommunications authority.

External D-Channel Interface DCH

The connection between the DDP2 card and the external DCH is through a 26 pin female D type connector. The data signals conform to the electrical characteristics of the EIA standard RS-422.

Two control signals are used to communicate the D-channel link status to the DCH. These are:

- Receiver Ready (RR), originating at the DDP2 card, to indicate to the DCH that the D-channel link is operational.
- Transmitter Ready (TR), originating at the DCH, to indicate to the DDP2 card that the DCH are ready to use the D-channel link.

Table 57 indicates how the RR control signal operates with regard to the DDP2 status.

Table 57
DCH Receiver Ready control signals

RR State	Condition
ON	D-Channel data rate selected at 64 Kbps and PRI2 loop is enabled and PRI2 link is not in OOS or Local Alarm mode state and PRI2 link is not transmitting a Remote Alarm pattern and PRI2 link is not receiving a Remote Alarm Indication from a remote facility
OFF	All other conditions

NT5D97AD faceplate

Figure 28 illustrates the faceplate layout for the NT5D97AD DDP card. The faceplate contains an enable/disable switch; a DDCH status LED; 6 x 2 trunk port status LEDs; and six external connectors.

Figure 28
NT5D97AD faceplate

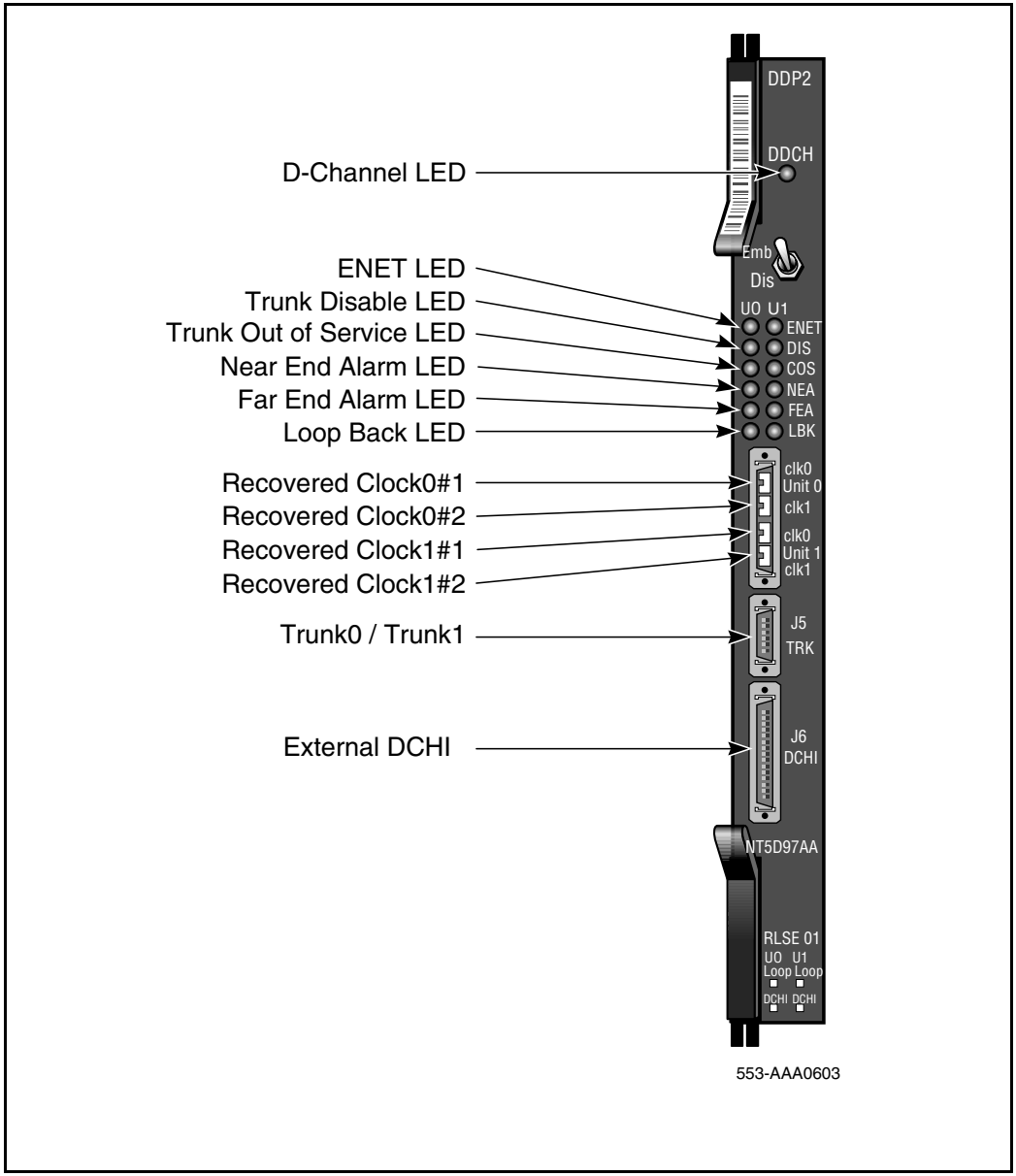


Table 58
External connectors and LEDs

Function	Faceplate Designator	Type	Description
Switch	ENB/DIS	Plastic, ESD protected	Card Enable/disable switch
Connectors	Unit 0 Clock 0	RJ11 Connector	Connects reference clock 0 to Clock Controller card 0
	Unit 0 Clock 1	RJ11 Connector	Connects reference clock 0 to Clock Controller card 1
	Unit 1 Clock 0	RJ11 Connector	Connects reference clock 1 to Clock Controller card 0
	Unit 1 Clock 1	RJ11 Connector	Connects reference clock 1 to Clock Controller card 1
	J5 TRK	9 Pin Female D Connector	Two external E1 Trunk 0 and Trunk 1
	J6 DCH	26 Pin Female D Connector	Connects to external DCH
LEDs	ENET	2 Red LEDs	ENET 0 or ENET 1 is disabled
	DIS	2 Red LEDs	Trunk 0 or Trunk 1 is disabled
	OOS	2 Yellow LEDs	Trunk is out of service
	NEA	2 Yellow LEDs	Local (Near End) Alarm
	FEA	2 Yellow LEDs	Far End Alarm
	LBK	2 Yellow LEDs	Loop Back test being performed on Trunk 0 or Trunk 1
	DCH	Bicolor Red/Green LED	NTBK51AA status

Table on page 175 shows the name of each connector, its designation with respect to the faceplate and the name and description of the card it is connected to. Also shown are the names of the LEDs. The following is a brief description of each element on the faceplate.

Enable/Disable Switch

This switch is used to disable the card prior to insertion or removal from the network shelf. While this switch is in disable position, the card will not respond to the system CPU.

ENET LEDs

Two red LEDs indicate if the “ENET0” and “ENET1” portions of the card are disabled. These LEDs are lit in the following cases:

- When the enable/disable switch is in disabled state (lit by hardware).
- After power-up, before the card is enabled.
- When the ENET port on the card is disabled by software.

Trunk Disable (DIS) LEDs

Two red LEDs indicate if the “trunk port 0” or “trunk port 1” portions of the card are disabled. These LEDs are lit in the following cases:

- Upon reception of the “disable loop” message from the software.
- After power-up.

OOS LEDs

Two yellow LEDs indicate if the “trunk port 0” and “trunk port 1” portions of the card are out of service.

NEA LEDs

Two yellow LEDs indicate if the near end detects absence of incoming signal or loss of synchronization in “trunk port 0” or “trunk port 1” respectively. The Near End Alarm causes a Far End Alarm signal to be transmitted to the far end.

FEA LEDs

Two yellow LEDs indicate if a Far End Alarm has been reported by the far end (usually in response to a Near End Alarm condition at the far end) on “trunk port 0” or “trunk port 1”.

LBK LEDs

Two yellow LEDs indicate if a remote loopback test is being performed on trunk port 0 or trunk port 1. The loopback indication is active when the digital trunk is in remote loopback mode. Normal call processing is inhibited during the remote loopback test.

DCH LED

When the dual colored LED is red, it indicates the on-board DDCH is present but disabled. When the dual colored LED is green, it indicates the on-board DDCH is present and enabled. If a DDCH is not configured on the DDP2 card, this lamp is not lit.

Unit 0 Clk Connectors

Two RJ11 connectors for connecting:

- Digital trunk unit 0 recovered clock to primary or secondary reference source on clock controller card 0.
- Digital trunk unit 0 recovered clock to primary or secondary reference source on clock controller card 1.

Unit 1 Clk Connectors

Two RJ11 connectors for connecting:

- Digital trunk unit 1 recovered clock to primary or secondary reference source on clock controller card 0.
- Digital trunk unit 1 recovered clock to primary or secondary reference source on clock controller card 1.

Connector J5 (TRK)

A 9 pin D-Type connector used to connect:

- Digital trunk unit 0 receive and transmit Tip / Ring pairs.
- Digital trunk unit 1 receive and transmit Tip / Ring pairs.

Connector J6 (DCH)

A 26 pin D-type connector is used to connect the DDP2 card to the external D-channel handler.

System capacity and performance

Physical capacity

Each NT5D97AD DDP2 card occupies one slot on the network shelf. Each card supports two digital trunk circuits and two network loops. The total number of DDP2 cards per system is limited by the number of network loops, physical capacity of the shelf, number of DTI2/PRI2 interfaces allowed by the software and the range of DCH addresses.

D-Channel capacity

The software configuration for the NTAG54 DDCH supports D-channel functionality only.

The system has a total capacity of 16 addresses (Device Addresses or DNUM) that can be reserved for DCH card, or DDCH card. One exception is DNUM 0 which is commonly assigned to the TTY terminal.

No two different D-Channel providers can share the same DNUM. Hence, the combined maximum number of DCH, and DDCH cards in the system is 16.

The DCH has one D-Channel unit, the DDCH has two D-Channel units. Therefore, the total number of D-Channels in a system is derived by the following formula:

Total_Num_DCH-Units = Num_DCHx1 + Num_DDCHx2

Therefore, Total_Num_DCH-Units in any given system is between 0-63.

CPU capacity

Using a NT5D97AD DDP2 card instead of DTI2/PRI2 cards does not increase the load on the system CPU. The DDP2 replaces an ENET card and two DTI2/PRI2 cards. Emulating the ENET card and the overall CPU capacity is not impacted by using a DDP2 card instead of a DTI2/PRI2 card.

Power requirements

Table 59 on page 179 lists the power requirements for the NT5D97AD DDP2 card.

Table 59
NT5D97AD DDP2 power requirements

Voltage	Source	Current	
		DDP2 (without NTBK51AA)	DDP2 (with NTBK51AA)
+5V	Backplane	3A	3.8A
+12V	Backplane	25mA	75mA
-12V	Backplane	25mA	75mA
Total Power (Maximum)		15.6W	20.8W

Testability and diagnostics

The DDP2 card supports testing and maintenance functions through the following procedures:

- Selftest upon power up or reset
- Signalling test performed in the LD 30
- Loopback tests, self tests, and continuity tests performed by LD 60 and LD 45
- The D-Channel, (DCH, DDCH) maintenance is supported by LD 96.

Cable requirements

This section lists the types of cable used and the lengths required for internal and external NT5D97AD DDP2 connections.

> ***Note:*** No additional cabling is required for nB+D configurations. Multiple DDP2 cards and the D-channel are associated through software in LD 17.

DDP2 cable assemblies include:

- E1 carrier cables
  - NTCK45AA (A0407956)
  - NT8D7217 (A0617192)
  - NTCK78AA (A0618294)
  - NTCK79AA (A0618296)
- DDP2 to QPC471/QPC775 Clock Controller Cables
  - NTCG03AA
  - NTCG03AB
  - NTCG03AC
  - NTCG03AD
- DDP2 to DCH cables
  - NTCK46AA
  - NTCK46AB
  - NTCK46AC
  - NTCK46AD

A description of each type of DDP2 cable follows.

E1 carrier cables

NTCK45AA (A0407956)

The NTCK45AA (8 ft.) is an 120Ω cable for systems equipped with an I/O filter panel, connecting the TRK port (P1, D-type 9 pin male) on the DDP2 faceplate to the I/O filter (P2, P3 D-type 9 pin males).

Figure 29
NTCK45AA

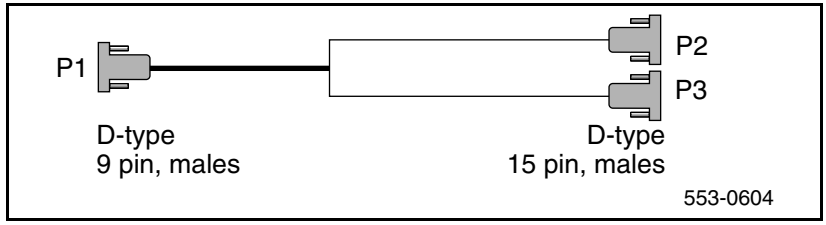


Table 60 lists the pin attributes for the NTCK45AA cable NT8D7217 (A0617192)

Table 60
NTCK45AA cable pins (Part 1 of 2)

Cable	Name	Description	Color	DDP2 pins	I/O Panel pins
0	T-PRI0TX	Trunk 0 Transmit Tip	Black	P1-1	P2-6
0	R-PRI0TX	Trunk 0 Transmit Ring	Red	P2-2	P2-7
0	T-PRI0RX	Trunk 0 Receive Tip	Black	P1-3	P2-2
0	R-PRI0RX	Trunk 0 Receive Ring	White	P1-4	P2-3
0		GND Shield Wire	Bare	N/C	Case P2
0		GND Shield Wire	Bare	N/C	Case P2
0		Standard Wire (3”)	Bare	Case P2	P2-5
0		Standard Wire (3”)	Bare	Case P2	P2-9
1	T-PRI1TX	Trunk 1 Transmit Tip	Black	P1-5	P3-6

Table 60
NTCK45AA cable pins (Part 2 of 2)

Cable	Name	Description	Color	DDP2 pins	I/O Panel pins
1	R-PRI1TX	Trunk 1 Transmit Ring	Red	P1-6	P3-7
1	T-PRI1RX	Trunk 1 Receive Tip	Black	P1-7	P3-2
1	R-PRI1RX	Trunk 1 Receive Ring	White	P1-8	P3-3
1		GND Shield Wire	Bare	N/C	Case P3
1		GND Shield Wire	Bare	N/C	Case P3
1		Standard Wire (3”)	Bare	Case P3	P3-5
1		Standard Wire (3”)	Bare	Case P3	P3-9

The NT8D7217 (50 ft.) is a 120Ω cable for systems with an I/O filter panel, connecting the 9 pin I/O filter connector to the 9 pin NCTE connector.

Figure 30
NT8D7217

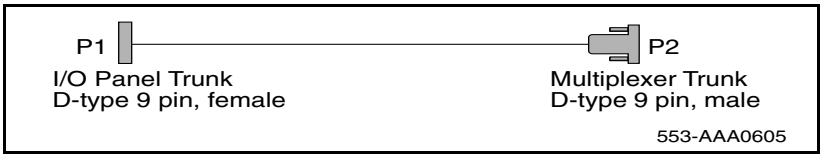


Table 61 lists the pin attributes for the NT8D7217 cable.

Table 61
NT8D7212 cable pins

Cable	Name	Description	Color	DDP2 pins	I/O Panel pins
0	T-PRI0TX	Trunk 0 Transmit Tip	Black	P1-6	P2-6
0	R-PRI0TX	Trunk 0 Transmit Ring	White	P1-7	P2-7
0	T-PRI0RX	Trunk 0 Receive Tip	Black	P1-2	P2-2
0	R-PRI0RX	Trunk 0 Receive Ring	Red	P1-3	P2-3
0		GND Shield Wire	Bare	P1-5	N/C
0		GND Shield Wire	Bare	P1-9	N/C
1	T-PRI1TX	Trunk 1 Transmit Tip	Black	P1-6	P2-6
1	R-PRI1TX	Trunk 1 Transmit Ring	White	P1-7	P2-7
1	T-PRI1RX	Trunk 1 Receive Tip	Black	P1-2	P2-2
1	R-PRI1RX	Trunk 1 Receive Ring	Red	P1-3	P2-3
1		GND Shield Wire	Bare	P1-5	N/C
1		GND Shield Wire	Bare	P1-9	N/C

NTCK78AA (A0618294)

The NTCK78AA (50 ft.) is an 120Ω cable for connecting the TRK port on the DDP2 faceplate (P1, D-type 9 pin male) to the Main Distribution Frame (MDF) (P2, P3 D-type 15 pin males). The NTCK78AA is used for systems not equipped with an I/O filter panel.

Figure 31
NTCK78AA

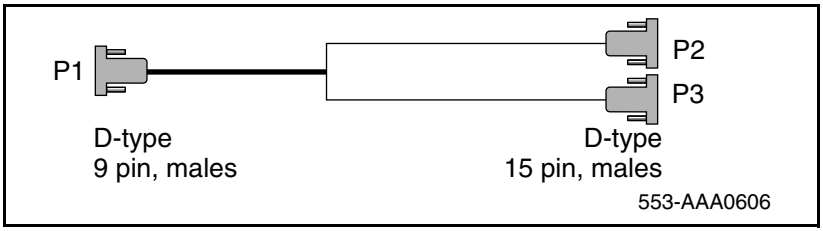


Table 62 on page 184 lists the pin attributes for the NTCK78AA cable.

Table 62
NTCK78AA cable pins

Cable	Name	Description	Color	DDP2 pins	NCTE pins
0	T-PRI0TX	Trunk 0 Transmit Tip	Black	P1-1	P2-1
0	R-PRI0TX	Trunk 0 Transmit Ring	Red	P1-2	P2-9
0	T-PRI0RX	Trunk 0 Receive Tip	Black	P1-3	P2-3
0	R-PRI0RX	Trunk 0 Receive Ring	White	P1-4	P2-11
0		GND Shield Wire	Bare	P1 Case	P2-2
0		GND Shield Wire	Bare	P1 Case	P2-4
1	T-PRI1TX	Trunk 1 Transmit Tip	Black	P1-5	P3-1
1	R-PRI1TX	Trunk 1 Transmit Ring	Red	P1-6	P3-9
1	T-PRI1RX	Trunk 1 Receive Tip	Black	P1-7	P3-3
1	R-PRI1RX	Trunk 1 Receive Ring	White	P1-8	P3-11
1		GND Shield Wire	Bare	P1 Case	P3-2
1		GND Shield Wire	Bare	P1 Case	P3-4

NTCK79AA (A0618296)

The NTCK79AA (40 ft) is a 75Ω coaxial cable for connecting the TRK port on the DDP2 faceplate (P1, D-type 9 pin male) to the Line Terminating Unit (LTU) (P2, P3, P4, P5 BNC males).

Figure 32
NTCK79AA

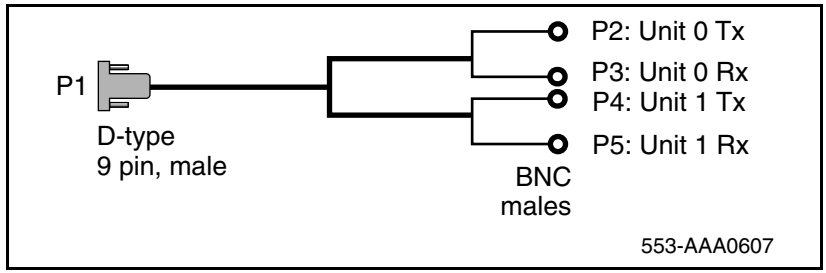


Table 63 lists the pin attributes for the NTCK79AA cable.

Table 63
NTCK79AA cable pins (Part 1 of 2)

Cable	Name	Description	Color	DDP2 pins	NCTE pins
0	T-PRI0TX	Trunk 0 Transmit Tip	Red	P1-1	P2 inner conductor
0	R-PRI0TX	Trunk 0 Transmit Ring	Red	P1-2	P2 shield
0	T-PRI0RX	Trunk 0 Receive Tip	Green	P1-3	P3 inner conductor
0	R-PRI0RX	Trunk 0 Receive Ring	Green	P1-4	P3 shield
1	T-PRI1TX	Trunk 1 Transmit Tip	Red	P1-5	P4 inner conductor
1	R-PRI1TX	Trunk 1 Transmit Ring	Red	P1-6	P4 shield
1	T-PRI1RX	Trunk 1 Transmit Tip	Green	P1-7	P5 inner conductor

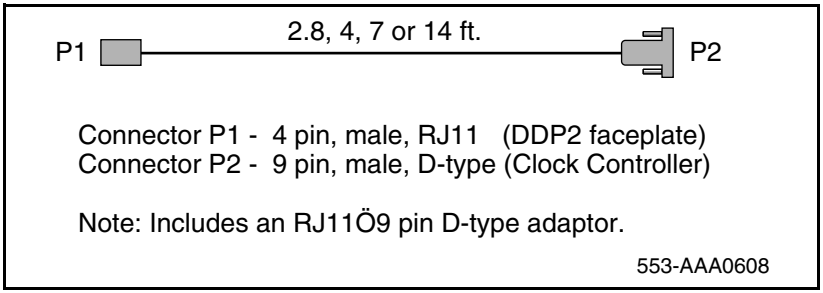
Table 63
NTCK79AA cable pins (Part 2 of 2)

Cable	Name	Description	Color	DDP2 pins	NCTE pins
1	R-PRI1RX	Trunk 1 Receive Ring	Green	P1-8	P5 shield
1		Outer metalized PVC shield	Bare	N/C	P1 Case
1		3 stranded wire	Bare	N/C	P1 Case

Reference clock cables

The NTCG03AA (14 ft), NTCG03AB (2.8 ft), NTCG03AC (4.0 ft), or NTCG03AD (7 ft), is a DDP2 card to Clock Controller cable, connecting each of the CLK0 or CLK1 ports on the DDP2 faceplate to the primary or secondary source ports on Clock Controller card 0 or 1.

Figure 33
NTCG03AA/AB/AC/AD



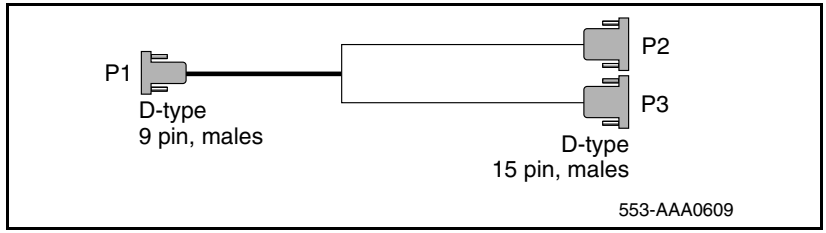
External DCH cable

The NTCK46 cable connects the DDP2 card to the NT6D11AF/NT5K75AA/NT5K35AA D-Channel Handler card. The cable is available in four different sizes:

- NTCK46AA (6 ft.) - DDP2 to DCH cable
- NTCK46AB (18 ft.) - DDP2 to DCH cable

- NTCK46AC (35 ft.) - DDP2 to DCH cable
- NTCK46AD (50 ft.) - DDP2 to DCH cable

Figure 34
NTCK46AA/AB/AC/AD



Cable diagrams

Figure 35 and Figure 36 provide examples of typical cabling configurations for the DDP2.

Figure 35 shows a typical DDP2 cabling for a system with an I/O panel, with the connection between the I/O panel and a Network Channel Terminating Equipment (NCTE).

Figure 36 shows cabling for a system without an I/O panel. Here, the DDP2 faceplate is cabled directly to the NCTE.

> ***Note:*** Since several clock cabling options exists, none has been represented in the diagrams. Refer to "Clock configurations" on page 193 for a description on each available option.

Figure 35
DDP2 cable with an I/O panel

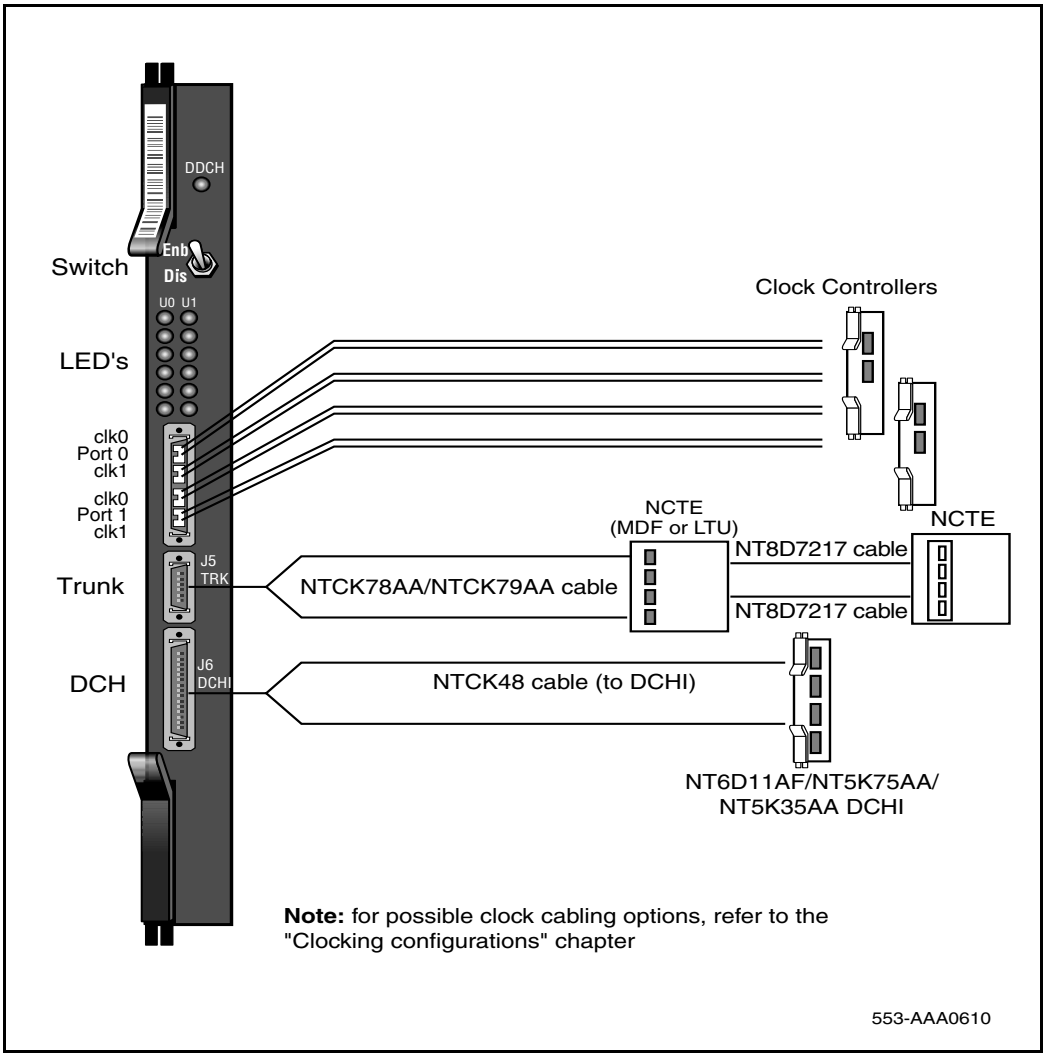
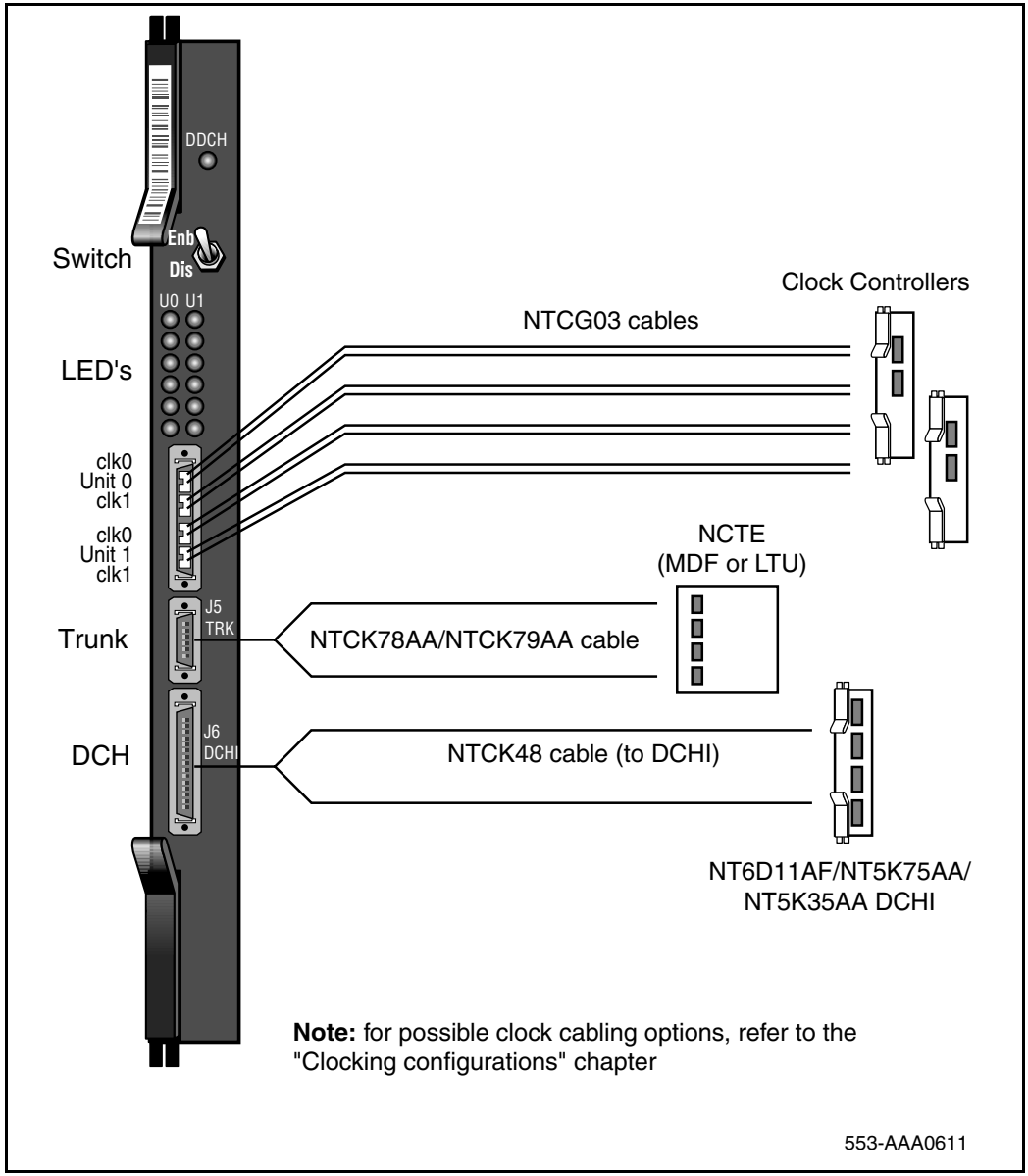


Figure 36
DDP2 cable without an I/O panel



Clock for the NT5D97AD

Clock operation

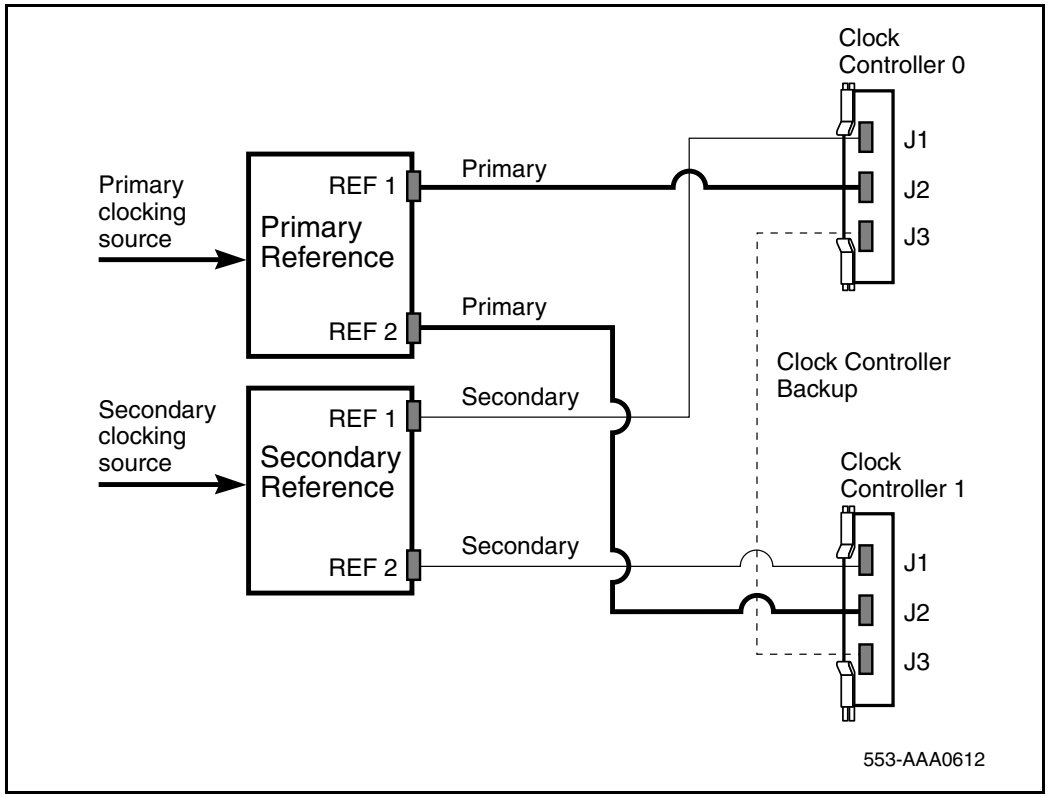
There are two types of clock operation - tracking mode and free-run mode.

Tracking mode

In tracking mode, the DDP2 loop supplies an external clock reference to a clock controller. Two DDP2 loops can operate in tracking mode, with one defined as the primary reference source for clock synchronization, the other defined as the secondary reference source. The secondary reference acts as a back-up to the primary reference.

As shown in Figure 37, a system with dual CPUs can have two clock controllers (CC-0 and CC-1). One clock controller acts as a back-up to the other. The clock controllers should be completely locked to the reference clock.

Figure 37
Clock Controller primary and secondary tracking



Free run (non-tracking) mode

The clock synchronization of the system can operate in free-run mode if:

- no loop is defined as the primary or secondary clock reference,
- the primary and secondary references are disabled, or
- the primary and secondary references are in local (near end) alarm

Reference clock errors

System software checks at intervals of 1 to 15 minutes to see if a clock controller or reference-clock error has occurred. (The interval of this check can be configured in LD 73).

In tracking mode, at any one time, there is one active clock controller which is tracking on one reference clock. If a clock controller error is detected, the system switches to the back-up clock controller, without affecting which reference clock is being tracked.

A reference-clock error occurs when there is a problem with the clock driver or with the reference clock at the far end. If the clock controller detects a reference-clock error, the reference clocks are switched.

Automatic clock recovery

A command for automatic clock recovery can be selected in LD 60 with the command EREF.

A DDP2 loop is disabled when it enters a local-alarm condition. If the local alarm is cleared, the loop is enabled automatically. When the loop is enabled, clock tracking is restored in the following conditions:

- If the loop is assigned as the primary reference clock but the clock controller is tracking on the secondary reference or in free-run mode, it is restored to tracking on primary.
- If the loop is assigned as the secondary reference clock but the clock controller is in free-run mode, it is restored to tracking on secondary.
- If the clock check indicates the switch is in free-run mode:
  - — Tracking is restored to the primary reference clock if defined.
  - — If the primary reference is disabled or in local alarm, tracking is restored to the secondary reference clock if defined.

  Note: If the system is put into free-run mode by the craftsperson, it resumes tracking on a reference clock unless the clock-switching option is disabled (LD 60, command MREF), or the reference clock is “undefined” in the database.

Automatic clock switching

If the EREF command is selected in LD 60, tracking on the primary or secondary reference clock is automatically switched in the following manner:

- If software is unable to track on the assigned primary reference clock, it switches to the secondary reference clock and sends appropriate DTC maintenance messages.
- If software is unable to track on the assigned secondary reference clock, it switches to free run.

Clock configurations

Clock Controllers can be used in a single or a dual CPU system.

A single CPU system has one Clock Controller card. This card can receive reference clocks from two sources referred to as the primary and secondary sources. These two sources can originate from a PRI2, DTI2, etc. PRI2 cards such as the NT8D72BA are capable of supplying two references of the same clock source. These are known as Ref1 (available at J1) and Ref2 (available at J2) on the NT8D72BA.

The NT5D97AD card is capable of supplying two references from each clock source, that is, four references in total. NT5D97AD can supply Clk0 and Clk1 from Unit 0 and Clk0 and Clk1 from Unit 1. Either Unit 0 or Unit 1 can originate primary source, as shown in Figure 38 through Figure 41.

There is one Clock Controller cable required for the DDP2 card, which is available in four sizes; this is the NTCG03AA/AB/AC/AD. Refer to “Reference clock cables” on page 186 for more information.

Table 64 summarizes the clocking options. Table 65 on page 195 explains the options in more detail.

Table 64
Clock Controller options - summary

CC Option	CPU Type	Notes
Option 1	Single	Ref from P0 on Clk0 Ref from P1 on Clk0
Option 2	Dual	Ref from P0 on Clk0 Ref from P0 on Clk1
Option 3	Dual	Ref from P1 on Clk0 Ref from P1 on Clk1
Option 4	Dual	Ref from P0 on Clk0 Ref from P0 on Clk1 Ref from P1 on Clk0 Ref from P1 on Clk1

Table 65
Clock Controller options - description

Clock Option	Notes
Option 1	This option provides a single CPU system with 2 clock sources derived from the 2 ports of the DDP2. Connector Clk0 provides a clock source from Unit 0. Connector Clk0 provides a clock source from Unit 1. Refer to Figure 38.
Option 2	This option provides a Dual CPU system with 2 references of a clock source derived from port 0 of the DDP2. Connector Clk0 provides a Ref 1 clock source from Unit 0. Connector Clk1 provides a Ref 2 clock source from Unit 0. Refer to Figure 39.
Option 3	This option provides a Dual CPU system with 2 references of a clock source derived from port 1 of the DDP2. Connector Clk0 provides a Ref 1 clock source from Unit 1. Connector Clk1 provides a Ref 2 clock source from Unit 1. Refer to Figure 40.
Option 4	This option provides a Dual CPU system with 2 references from each clock source derived from the DDP2. Connector Clk0 provides a Ref 1 clock source from Unit 0. Connector Clk1 provides a Ref 2 clock source from Unit 0. Connector Clk0 provides a Ref 1 clock source from Unit 1. Connector Clk1 provides a Ref 2 clock source from Unit 1. Refer to Figure 41.

Figure 38
Clock Controller – Option 1

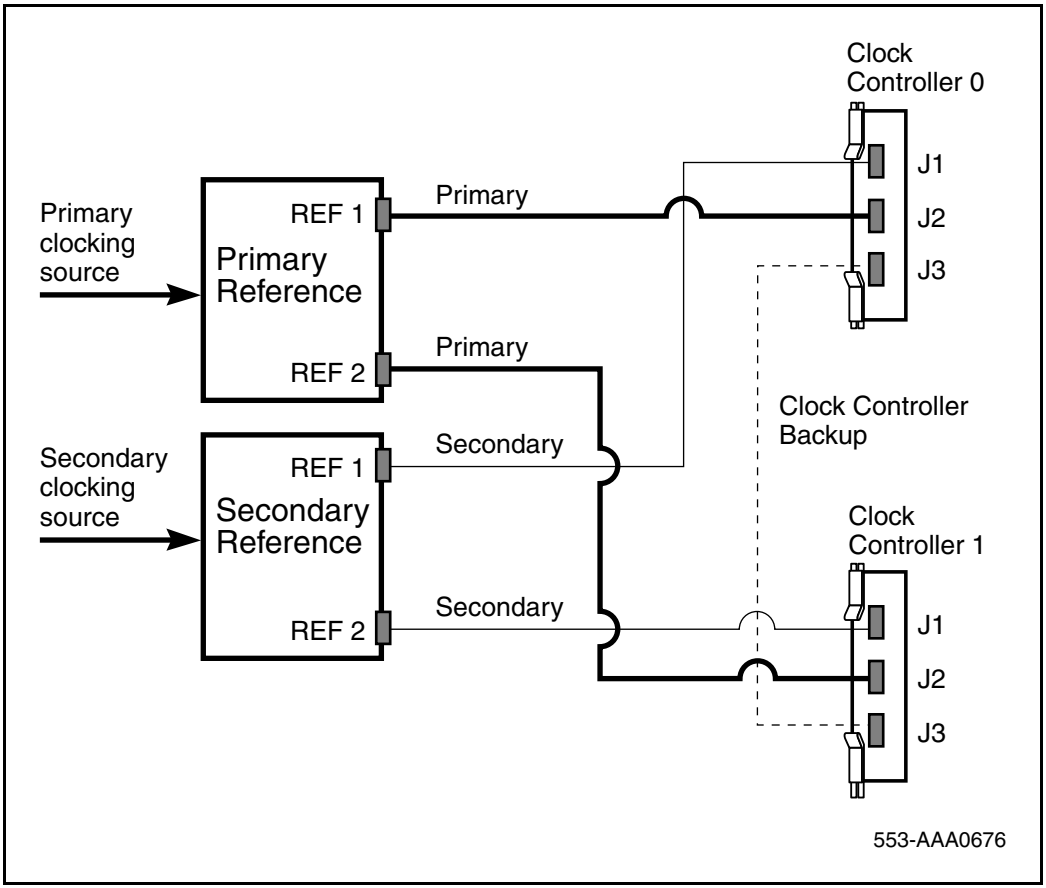


Figure 39
Clock Controller – Option 2

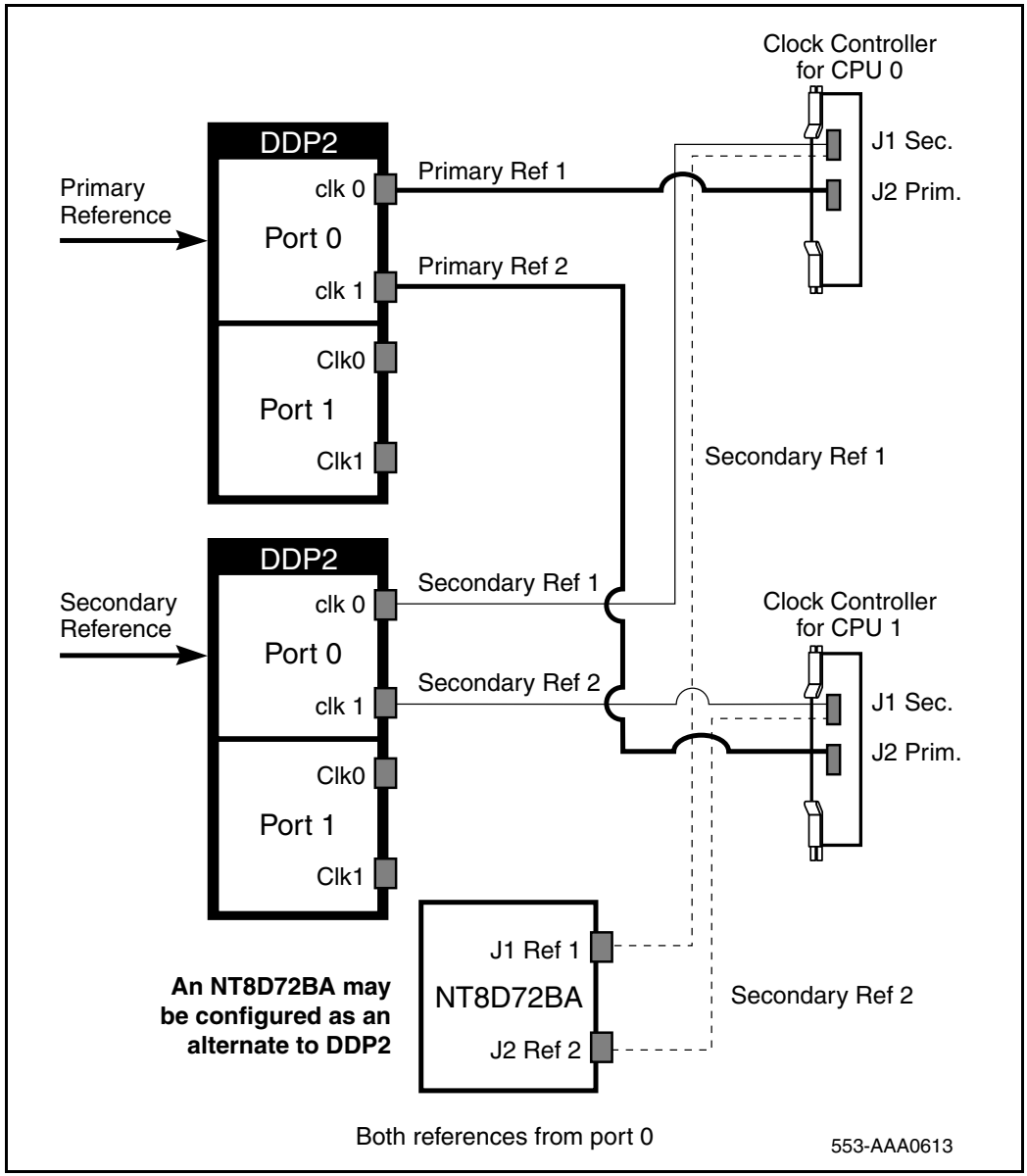


Figure 40
Clock Controller – Option 3

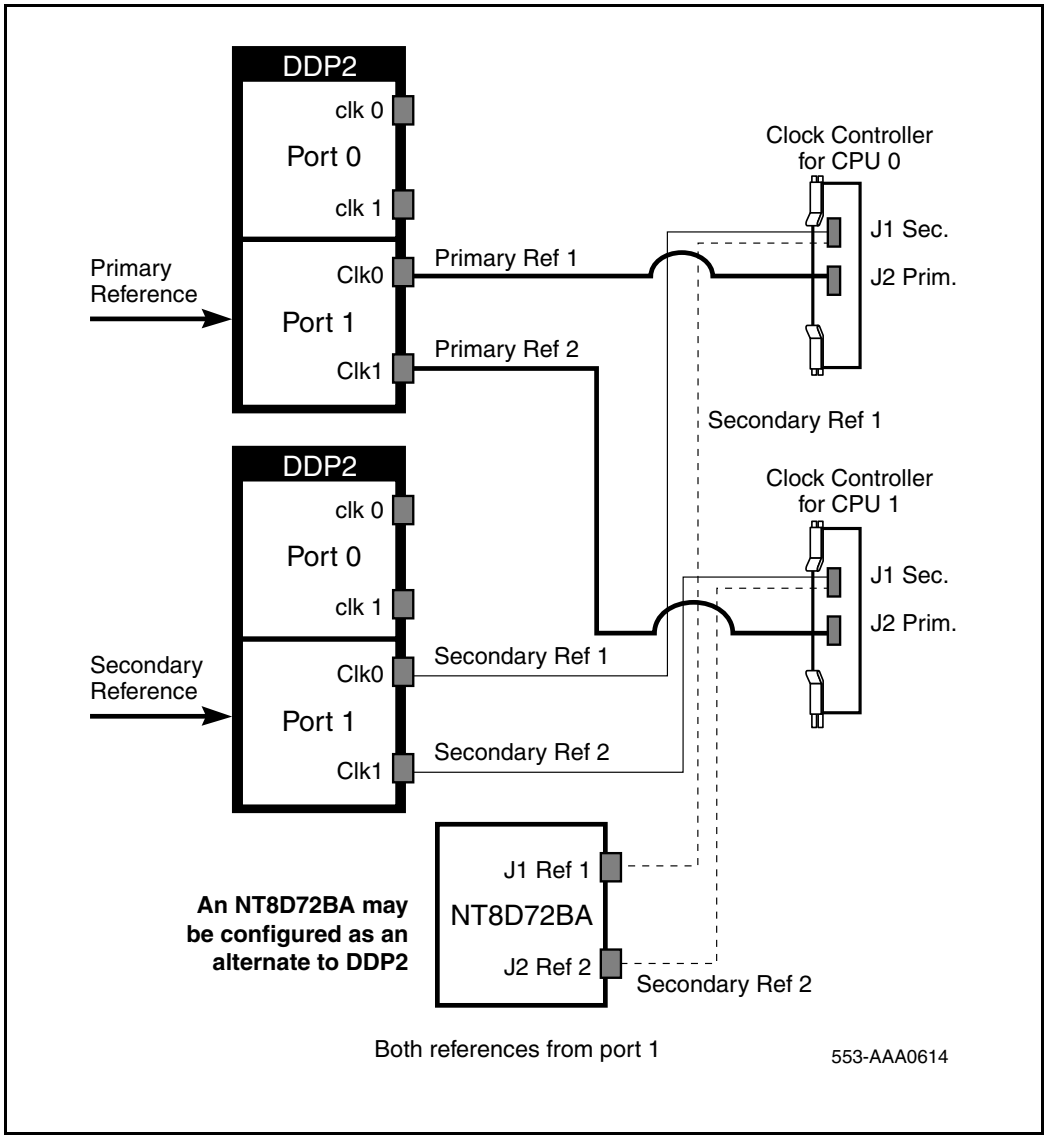
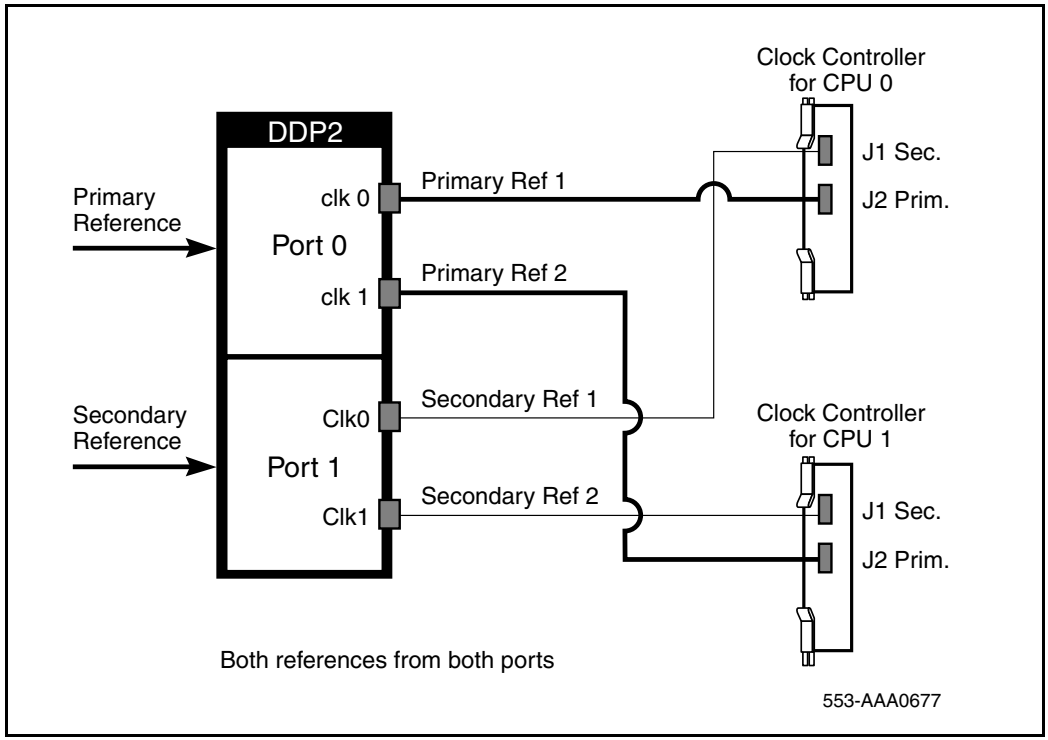


Figure 41
Clock Controller – Option 4



Hardware required for DDP2 configuration

The following hardware is required when configuring the NT5D97AD DDP2.

Note: Either the DCHI card or the DDP2 card can be installed first. However, DDP2 loops must be configured in software before defining DCH links.

- PRI - one NT5D97AD DDP2
- DCHI - one externally connected NT6D11 (ISDN PRI and DPNSS1/DASS2 applications)

Note: For DPNSS1/DASS2 applications, the NTND08AA CPU ROM is required to support the NT6D11AD DCHI operating in the expanded mode. For the NT6D11 operating in standard mode, the SDI/ESDI ports must be assigned a unique port address in the range 0-15. The port address numbers assigned to the NT6D11 operating in expanded mode must not conflict with addresses assigned to other I/O port types. To avoid potential conflicts and to simplify system configuration, it is recommended that, in the expanded mode, the port addresses for the NT6D11 be numbered in the range 16-159.

or

- one NT5K35 or one NT5K75,

  or

- the Dual DASS/DPNSS Daughterboard NTAG54AA (interfaces to NT5D97AD and later)

  Note: The NTND08AA or QPC949D CPU ROM is required to support the NTAG54AA operating in the expanded mode (GPT addressing).

Clock Controller

- QPC471 or QPC775 or NTRB53 Clock Controller(s)

For EuroISDN applications, and for use on multi group systems in international markets, vintage QPC77E is required.

Note: The QPC775 Clock Controller card is not compatible with Stratum 3 clocking in the U.S.A. Therefore, it is available for only the Canadian and International markets.

Other hardware

Additional hardware may also required for PRI capability and applications. Installation instructions are given in other Nortel Networks publications or supplied by the manufacturer. This additional hardware may include:

- one Channel Service Unit (CSU), or Line Terminating Unit (LTU)
- one office repeater
- one QMT8 Asynchronous Data Module (ADM)

Clock Controller

QPC775 or NTRB53

Clock Controller card(s) must be installed when DASS2 links are installed. On some systems, card slots are dedicated for the Clock Controller.

For Large Systems, two Clock Controller cards are used for synchronization; the Clock Controllers extend timing signals to multiple groups via a junctor board. The QPC775E must be used on Large Systems.

In a standalone switch or one with only analogue networking, the Clock Controller is not normally fitted.

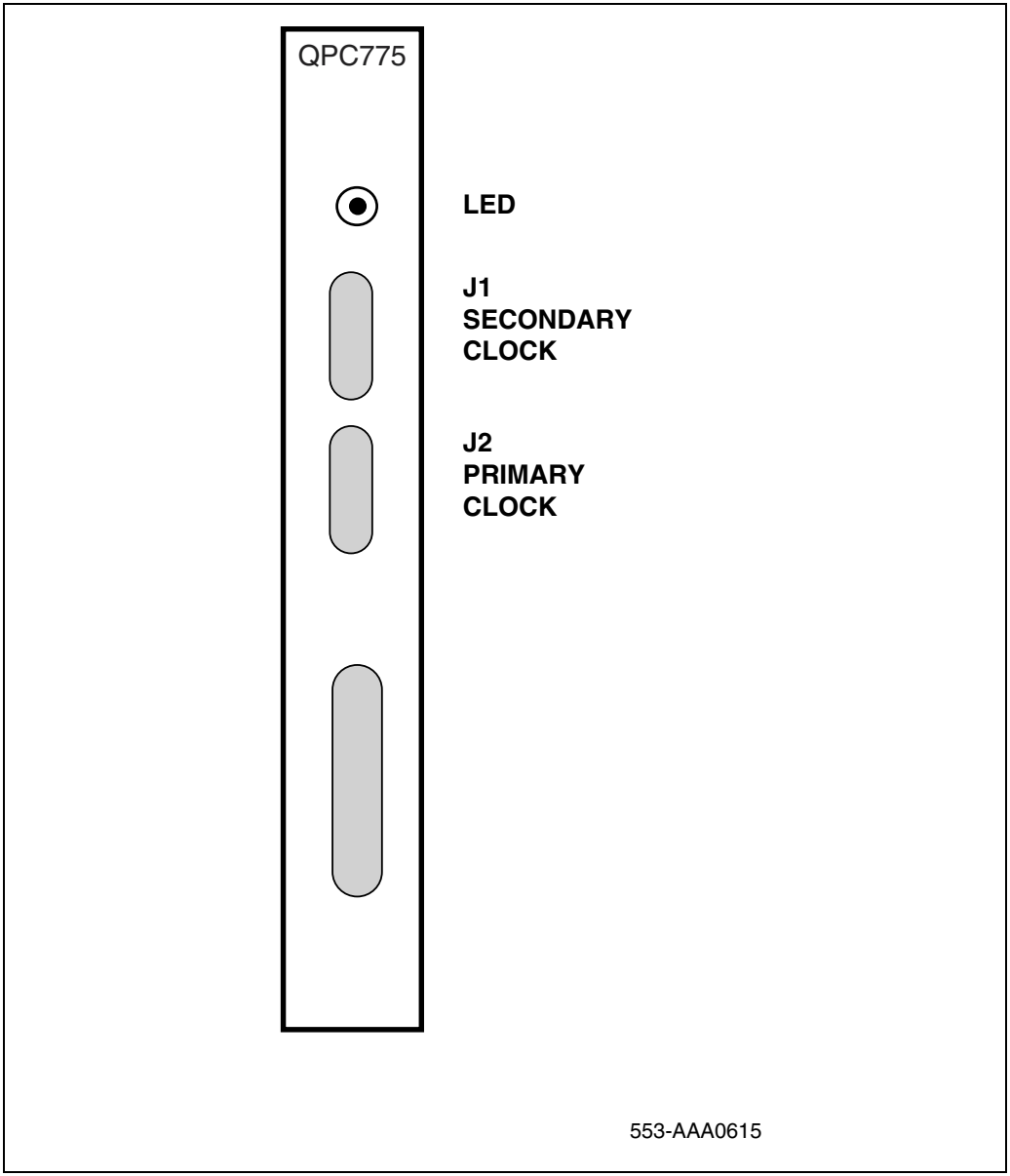
Synchronization between switches must always be provided in the case of DASS2 trunks, and every digital network must be individually checked for clocking configurations. If the system is to provide clocking over a link, then there are no additional configuration changes required on the system. If the system is to be synchronized to a particular link, then the associated PRI card must be physically connected to the Clock Controllers of the system.

In a dual processor system, the synchronization link must be connected to both Clock Controllers to allow for change over. The Clock Controller(s) can be connected to two synchronization links, the second being programmed to provide the system clocking if the first choice fails.

DIP switches are set on the Clock Controller card according to the system type, and in systems with 3PE board(s), DIP switches must be set accordingly on the 3PE.

Figure 42 illustrates the layout of a QPC775 Clock Controller faceplate.

Figure 42
QPC775 Clock Controller faceplate layout

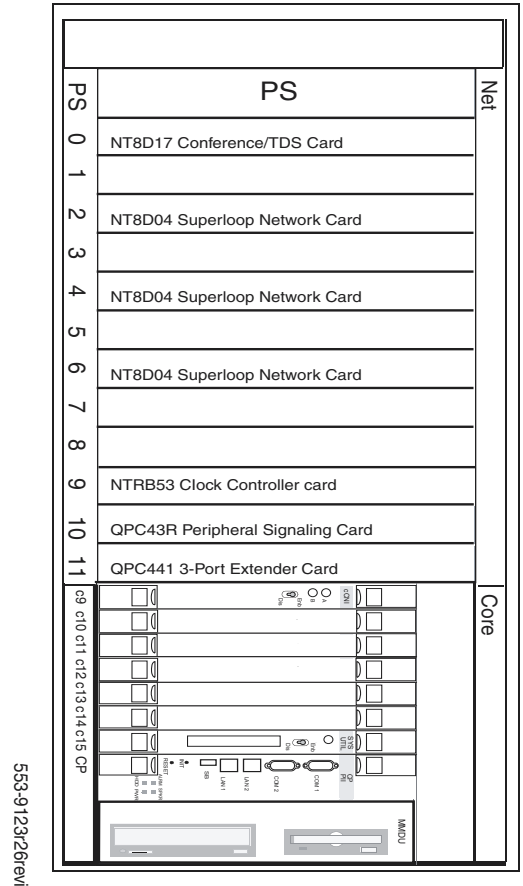


Schematics

Core Network Module

Figure 43 shows typical locations for a Clock Controller and PRI.

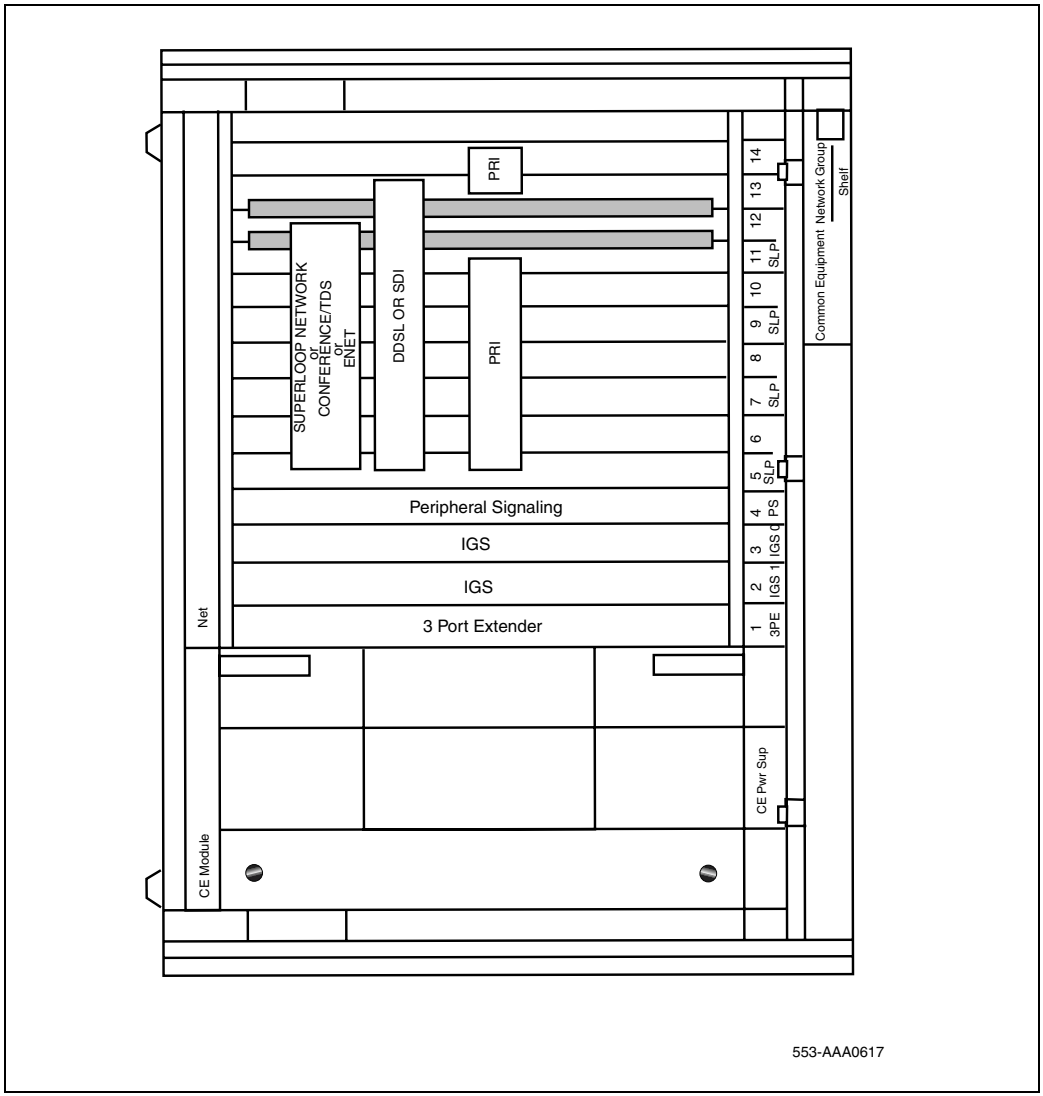
Figure 43
Core Network Module



Common Equipment Network Module

Figure 44 shows a schematic of a Common Equipment Network Module.

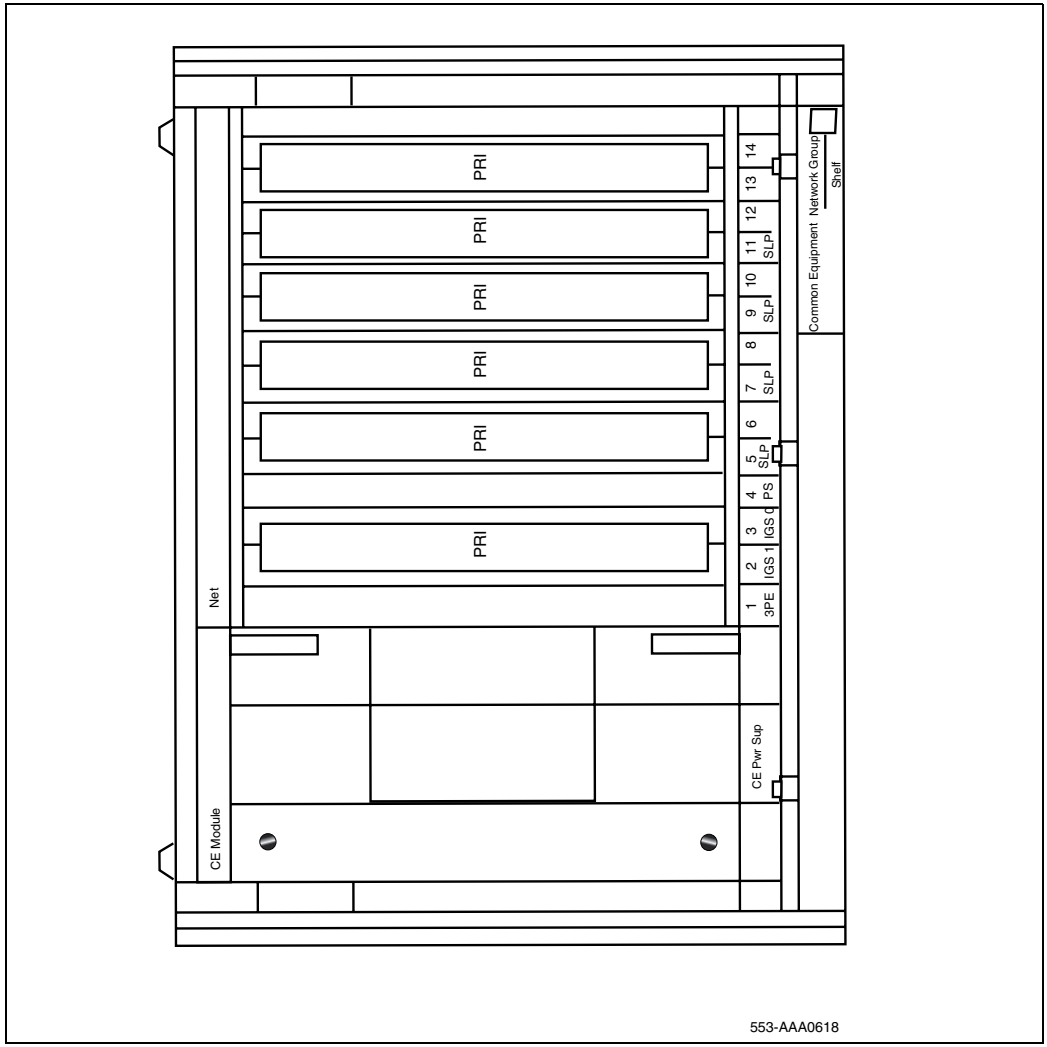
Figure 44
Common Equipment Network Module



Large System network expansion shelf

Figure 45 shows a schematic of a Large System Network Expansion Module with six PRI cards.

Figure 45
Large System network expansion module with six PRI cards



Cabling requirements

Cables and cable lengths

Table 66 describes the cable types and cable lengths.

Table 66
Cables and cable lengths

Cable Type	From	To	Maximum length (meters)
NT5K40AA or NT5K41AA or NT5K86AA or NT5K86BA or NT5K86CA	NT8D72 PRI	Line Terminating Equipment	NT5K40AA - 4 NT5K41AA - 8 NT5K86AA - 12 NT5K86BA - 12 NT5K86CA - 12
QCAD328A	NT8D72 PRI	NT5K35 or NT5K75 or NT6D11AE DCHI	1.8
NT8D85AD	QPC414 ENET	NT8D72 PRI	1.8
NT8D75AC/AD (Single Group only)	QPC775 or NTRB53 Clock Controller	QPC775 or NTRB53 Clock Controller	NT8D75AC - 1.2 NT8D75AC - 1.8
NT8D82AD	NT5K35 or NT5K75 or NT6D11AE DCHI	I/O panel	1.8
NT8D79AD	NT8D72 PRI	QPC775 or NTRB53 Clock Controller	1.8 m

NT5K40AA, NT5K41AA

- Construction - 75 ohm dual co-axial type with solid inner conductor and braided shield
- PRI connection (front) - J4, 15-pin, male, subminiature D with jack-screws

- LTE connection (rear) - twin 75 ohm BNC crimp plug, transmit and receive

NT5K86AA/BA/CA

- Construction - 75 ohm dual co-axial type with solid inner conductor and braided shield
- NT5K86AA TX shield connected to FGND
  NT5K86BA RX shield connected to FGND
  NT5K86CA TX and RX shields connected to FGND
- PRI connection (front) - J4, 15-pin, male, subminiature D with jack-screws
- LTE connection (rear) - twin 75 ohm BNC crimp plug, transmit and receive

NT5K40AA, NT5K41AA wire list

Table 67 provides a wire list for the NT5K40AA and NT5K41AA cables.

Table 67
NT5K40AA and NT5K41AA wire list

Signal	From (card end)	To (I/O end)
XTIP (transmit)	J1-1	J2 Inner Conductor
XRING (transmit)	J1-9	J2 Shield
RTIP (receive)	J1-3	J3 Inner Conductor
RRING (receive)	J1-11	J3 Shield

NT5K86AA wire list

Table 68 provides a wire list for the NT5K86AA cable.

Table 68
NT5K86AA wire list

Signal	From (card end)	To (I/O end)
XTIP (transmit)	J1-1	J2 Inner Conductor
XRING (transmit)	J1-9	J2 Shield
RTIP (receive)	J1-3	J3 Inner Conductor
RRING (receive)	J1-11	J3 Shield
FRAME GROUND	J1-2	J2 Shield

NT5K86BA wire list

Table 69 provides a wire list for the NT5K86BA cable.

Table 69
NT5K86BA wire list

Signal	From (card end)	To (I/O end)
XTIP (transmit)	J1-1	J2 Inner Conductor
XRING (transmit)	J1-9	J2 Shield
RTIP (receive)	J1-3	J3 Inner Conductor
RRING (receive)	J1-11	J3 Shield
FRAME GROUND	J1-2	J3 Shield

NT5K86CA wire list

Table 70 provides a wire list for the NT5K86CA cable.

Table 70
NT5K86CA wire list

Signal	From (card end)	To (I/O end)
XTIP (transmit)	J1-1	J2 Inner Conductor
XRING (transmit)	J1-9	J2 Shield
RTIP (receive)	J1-3	J3 Inner Conductor
RRING (receive)	J1-11	J3 Shield
FRAME GROUND	J1-2	J2 Shield, J3 Shield

QCAD328A

The NT5K35, NT5K75 and NT6D11AE D-channel interface connects to the NT8D72 PRI by means of the QCAD328A, which is a special RS422 cable. This cable has the following attributes:

- Construction - 24 AWG (0.511 mm), stranded
- P1 Connector (from DCHI) - 25-pin male, subminiature D
- P2 Connector (to PRI) - 15-pin male, subminiature D

QCAD328A wire list

Table 71 provides a wire list for the QCAD328 cable.

Table 71
QCAD328A wire list (Part 1 of 2)

From DCHI (25 Pin)	To PRI (15 Pin)
P1-2	P2-2
P1-13	P2-10
P1-20	P2-15

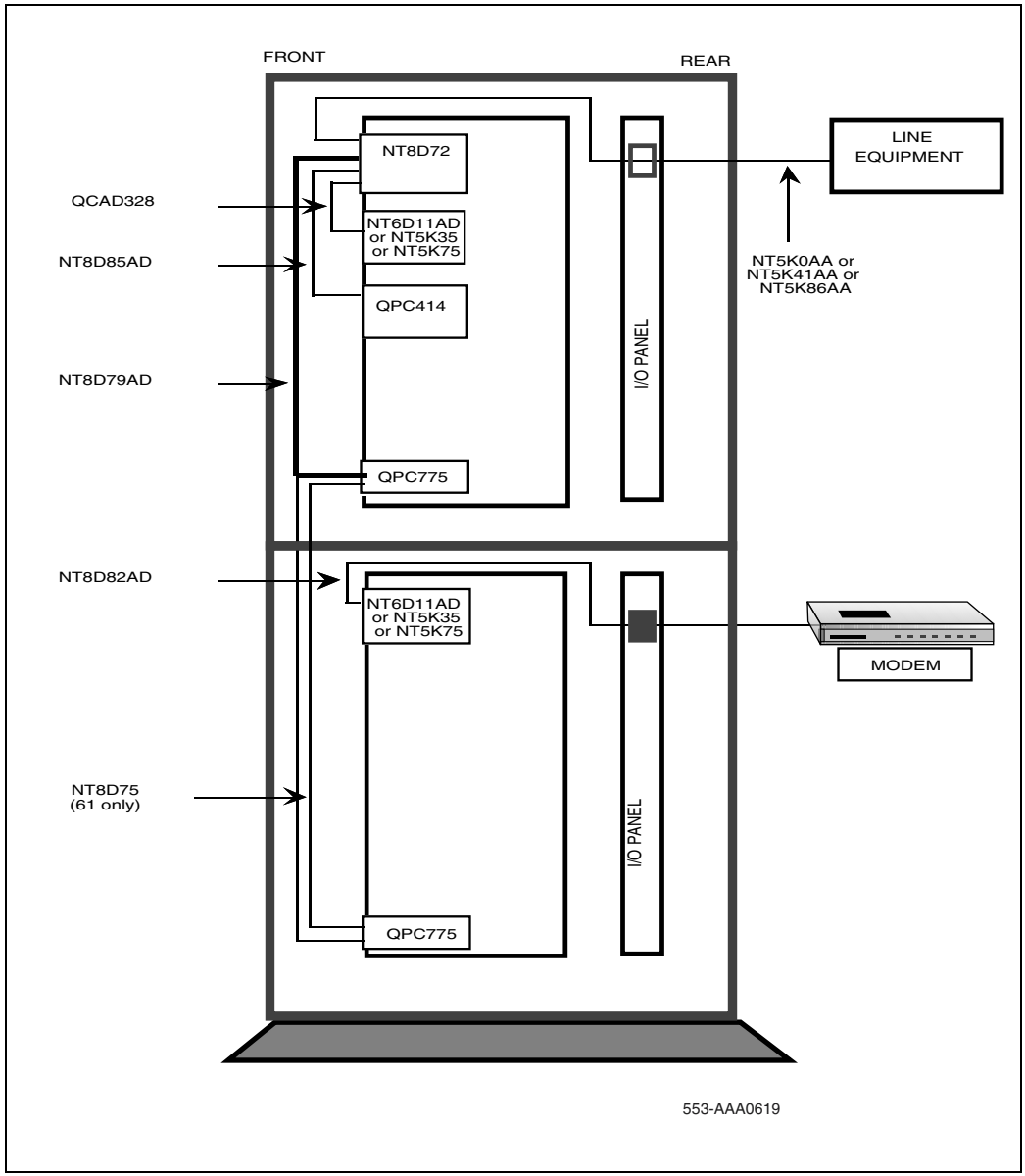
Table 71
QCAD328A wire list (Part 2 of 2)

From DCHI (25 Pin)	To PRI (15 Pin)
P1-15	P2-9
P1-14	P2-11
P1-3	P2-4
P1-16	P2-12
P1-17	P2-5
P1-12	P2-13
P1-8	P2-8
P1-1	P2-1
P1-5 TO P1-8	
P1-7 TO P1-1	

Cabling schematic

Figure 46 provides a schematic illustration of IDA cabling.

Figure 46
Cabling schematic for a generic system



IDA status check and start-up

Contents

This section contains information on the following topics:

Description

This chapter describes the status check to verify that an IDA link is working normally, and provides procedures required to take PRI and DCHI from a disabled to an operational state. Lists and defines trunk maintenance and commands and messages. Lists and describes digital trunk maintenance (DTM) error messages, initialize (INI) error messages, link reset error messages, channel reset error messages, stop count error message, test messages reset errors, channel configuration error messages, and Clock Controller (DTC) error messages.

Note: The Integrated Digital Access (IDA) feature provides the hardware and software platform to support DASS2 signaling protocols. The maintenance facilities and procedures are defined at the IDA level.

IDA status check

This status check outlined in Table 72 is used to verify that an IDA link is working normally. It assumes the PRI and DCHI are properly installed (for example, correctly cabled) and operational. If the IDA status is not as shown in the steps below, complete the check and proceed to IDA fault clearing procedures.

Once all problems are cleared, go to IDA start-up.

Table 72
IDA status check (Part 1 of 2)

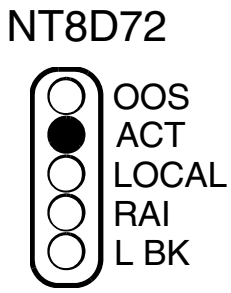
Step	Action	Response
1	Check the status LEDs on PRI cards.	For normal operation, only the green ACT LED is lit. 
2	Note whether any other LED is lit and continue with the status check.	
3	Check the LED on the DCHI faceplate.	If the LED is lit, the D-channel is disabled.

Table 72
IDA status check (Part 2 of 2)

Step	Action	Response
4	Check the status of all DCHI ports using: **LD 75** **STAT DDSL**	The DCHI status should be ENBL ACTIVE (DCHI enabled, and all configured channels are normally enabled).
5	Check the status of PRIs using: **LD 75** **STAT DDCS** **STAT DDCS n**	Sample response: DDCS 003 ENBL DDCS 004 ENBL 32 UNEQ 30 DSBL
6	Check to assure the following IDA cables are connected correctly: • PRI to DCHI cable • 2Mb/s transmission cable from NT8D72BA to DSX (the digital cross connect)	

IDA start-up

Table 73 provides the steps required to take the PRI and DCHI from a disabled to an operational state.

Table 73
DASS2 start-up (Part 1 of 2)

Step	Action	Response
1	Check the status of PRI cards.	The PRI shown is disabled. 
2	Enable PRI using: **LD 75** **ENL DDCS l(loop)**	 ENBL

Table 73
DASS2 start-up (Part 2 of 2)

Step	Action	Response
3	Enable the DCHI: **LD 75** **ENL DDSL n**	ENBL IDLE (DCHI enabled, but all channels are disabled)
4	Enable the LAP protocols for each real channel configured on the DASS2 link: **LD 75** **STRT n** Both ends of the link should be started within 5 minutes of each other.	ENBL STARTING (the configured LAP protocols for each real channel configured on the DASS2 link are being enabled) ENBL ACTIVE (the configured LAP protocols for each real channel configured on the DASS2 link are enabled)

IDA trunk maintenance commands and messages

IDA trunk maintenance is performed using LD 75. Table 74 is a general list of commands and status messages available in LD 75.

Table 74
IDA trunk maintenance commands available in LD 75 (Part 1 of 2)

Command	Description
ENL DDSL n	Enable DCHI port n
ENL DDCS l	Enable PRI loop l
ENL DTRC l c	Enable real channel (loop, channel)

Table 74
IDA trunk maintenance commands available in LD 75 (Part 2 of 2)

Command	Description
DIS DDSL n	Disable DCHI port n
DIS DDCS l	Disable PRI loop n
DISI DDCS l	Disable all channels on loop l as they become idle. The message "OK DISABLING" is displayed and further commands may be entered. Message DTM055 is displayed when all channels are disabled.
DIS DTRC l c	Disable real digital channel (loop, channel)
STAT DDSL	Give status of entire DCHI
STAT DDSL n	Give status of DCHI port n
STAT DDCS	Give status of all PRI loops
STAT DDCS l	Give status of PRI loop l, and a count of the number of channels in each state.
STAT DTRC l c	Give status of real digital channel (loop, channel)
STRT n	Start DCHI port n. The message "OK STARTING" is displayed and further commands may be entered. Message DTM301 is displayed when the link is started successfully.
CDSP	Clear the display
CMIN u	Clear the minor alarm for customer u.

Table 75
IDA trunk maintenance messages available in LD 75 – DCHI (Part 1 of 2)

Message	Description
DSBL NOT RESPONDING	The D Channel Handler is disabled and does not respond to a read/write test. All channels are disabled.
DSBL RESPONDING	The D Channel Handler is disabled. All channels are disabled.

Table 75
IDA trunk maintenance messages available in LD 75 – DCHI (Part 2 of 2)

Message	Description
ENBL IDLE	The D Channel Handler is enabled, but all channels are disabled.
ENBL STARTING	The D Channel Handler is enabled, but all channels are being enabled.
ENBL ACTIVE	The D Channel Handler is enabled, and all channels are enabled.

Table 76
IDA trunk maintenance messages available in LD 75 – PRI2 card

Message	Description
DSBL NOT RESPONDING	The Network card is disabled and does not respond to a read/write test.
DSBL RESPONDING	The Network card is disabled.
ENBL	The Network card is enabled.

Table 77
IDA trunk maintenance messages available in LD 75 – B-Channels

Message	Description
UNEQ	Not configured.
DSBL	Disabled.
ENBL IDLE	Enabled and available for a call.
ENBL BUSY	In use for a call.
ENBL MBSY	Maintenance busy; that is, unusable.
DSBL RST, ENBL IDLE RST, ENBL BUSY RST, ENBL MBSY RST	Being reset; that is, unusable.

Clock synchronization

Synchronization between switches must always be provided in the case of DASS2 trunks, and every digital network must be individually checked for clocking configurations.

QPC775 Clock Controller cards must be installed in half group and single group systems, when a DASS2 link is installed. On multi group systems, two Clock Controller cards are used for synchronization. On multi group systems supporting EuroISDN applications, the QPC775E Clock Controller card is required.

In a standalone switch or one with only analogue networking, the Clock Controller is not normally fitted.

In a dual processor system, the synchronization link must be connected to both Clock Controllers to allow for change over. The Clock Controller(s) can be connected to two synchronization links, the second being programmed to provide the system clocking if the first choice fails.

If the system is to provide clocking over a link, then there are no additional configuration changes required. If the system is to be synchronized to a particular link, then the PRI must be physically connected to the Clock Controller of the system.

Clock Controller maintenance commands

Clock Controller maintenance is performed using LD 60. Table 78 provides a general list of commands and status messages available in LD 60.

Table 78
Clock controller commands available in LD 60 (Part 1 of 2)

Command	Description
DIS CC N	Disable specified system clock controller.
DSYL L	Disables remote alarm processing for loop L.
ENL CC N	Enable specified system clock controller.

Table 78
Clock controller commands available in LD 60 (Part 2 of 2)

Command	Description
ENYL L	Enables remote alarm processing for loop L.
EREF	Enables automatic switching and recovery of primary and secondary reference clocks when loops associated with these clocks are automatically enabled.
MREF	Disables automatic switching and recovery of the primary and secondary reference clocks when loops associated with these clocks are automatically disabled or in local alarm.
SSCK N	Provides status of system clock N. Indicates the active controller as well as active primary or secondary reference-clock source or free run.
SWCK	Switches the system clock from the active to the standby clock. The reference-clock source remains unchanged.
TRCK xxx	Set clock-controller tracking. Where xxx represents one of the following mnemonics: **PCK** track primary clock **SCK** track secondary clock **FRUN** free-run mode

Resident fault monitoring

The software currently monitors the alarms associated with a DASS2 link. DASS2 link alarms are described in Table 79.

Table 79
Alarms associated with a DASS2 link (Part 1 of 2)

Alarm	Description
TBF	Transmit Buffer Full
FAE	Frame Alignment Error
HER	High Error Rate

Table 79
Alarms associated with a DASS2 link (Part 2 of 2)

Alarm	Description
TSF	Transmit Signaling Failure
AIS	Alarm Indication Signal
LOI	Loss of Input
DAI	Distant Alarm Indication

There are two criteria:

- An alarm is present for more than the ‘persistence time' defined for that alarm.
- An alarm occurs more times than the 'reset count threshold' within the period defined by the 'monitor time' for that alarm.

In either case, the link is stopped, and a minor alarm is raised. When all alarms are cleared, the link is restarted. Various diagnostic messages are issued for alarms — please refer to the “Diagnostic error messages” on page 224.

To support BTNR 190, four alarms are mandatory:

- Bit errors of worse than 10^{-3}
- Alarm Indication Signal
- Loss of Frame Alignment
- Loss of Signal

Hardware supported alarm summary

The following is a summary of all alarms supported by hardware:

- Loss of Frame Alignment
- Frame Bit Error
- Alarm Indication Signal
- Loss of Signal

- Remote Alarm Indication
- Bipolar Violation
- CRC-4
- Loss of Multiframe Align
- Slip Error

Setting alarm thresholds

In LD 74, values are set against the parameters shown in Table 80. The alarm condition thresholds are shown in Table 81.

Table 80
Alarm thresholds in LD 74

CNTL	(NO) YES	Display the following prompts
ALRM	TBF PP MM CC FAE PP MM CC HER PP MM CC TSF PP MM CC AIS PP MM CC LOI PP MM CC DAI PP MM CC	Enter the desired persistence time (PP), monitor time (MM), and repeat count threshold (CC) for one of the seven types of alarms. ***Note:*** The alarm condition thresholds are shown in the table that follows.
CNTR	0- 255 (CRT) (TMT) (SCT)	Only prompted if CNTL = YES. Enter the desired threshold for one of the three counters in the range 0-254. If 255 is entered, the threshold is set to infinity. The defaults are: CRT (channel reset threshold) 120 TMT (test message threshold) 50 SCT (stop count threshold) 20

Table 81
Alarm condition thresholds

Alarm Mnemonic	PP	MM	CC
TBF	0-15 secs (5)	0-24 hrs (0)	0-15 (1)
FAE	0-15 secs (2)	0-24 hrs (1)	0-15 (4)
HER	0-15 mins (1)	0-24 hrs (1)	0-15 (10)
TSF	0-15 secs (0)	0-24 hrs (0)	0-15 (0)
AIS	0-15 mins (1)	0-24 hrs (1)	0-15 (4)
LOI	0-15 secs (0)	0-24 hrs (0)	0-15 (0)
DAI	1-15 mins (1)	0-24 hrs (1)	0-15 (5)

Diagnostic error messages

The error messages shown in Table 82 through Table 89 are issued for diagnostic alarms.

Digital Trunk Maintenance (DTM) error messages (LD 75)

The DTM messages indicate problems with digital trunks detected by the Digital Trunk Maintenance program (LD 75).

Table 82
DTM error messages (Part 1 of 8)

Code	Description	Action
DTM000	Program Identifier	
DTM001	Too many characters	Check input and re-enter
DTM002	Invalid character input	Check input and re-enter
DTM003	Invalid command	Check input and re-enter
DTM004	Wrong number of parameters	Check input and re-enter

Table 82
DTM error messages (Part 2 of 8)

Code	Description	Action
DTM005	Invalid parameter	Check input and re-enter
DTM006	Invalid customer number	Check input and re-enter
DTM020	Card is not configured	Check input and re-enter; If DTM020 is still output, check that the DTCS and DTSL are configured
DTM021	Card number is not specified	Check input and re-enter
DTM022	Card number is out of range	Check input and re-enter
DTM023	Card is already enabled	
DTM024	Card does not respond	Check that the card switch is enabled and properly configured
DTM025	Loop is not a DTCS/DDCS	Check input and re-enter; If DTM025 is still output, check the configuration record
DTM026	DTSL/DDSL is disabled	
DTM027	Signaling link is not available	Perform STAT on DTSL; if in service or enabled, then the far end of link is suspect
DTM030	Command is not allowed	
DTM040	Message input failed	Check that sufficient digital trunk I/O buffers are configured
DTM042	DTCS/DDCS cannot be disabled while its DTSL/DDSL is still enabled	DTSL must be disabled before DTCS is disabled
DTM043	Not a DTSL/DDSL	Check input and re-enter
DTM047	DTCS/DDCS is disabled	
DTM048	Channel is already disabled	

Table 82
DTM error messages (Part 3 of 8)

Code	Description	Action
DTM049	A previous DISI has not been completed	Wait and re-enter DISI when current one has ended
DTM050	Message not defined by MSG	Format the message using MSG command first
DTM051	Invalid byte	Check input and re-enter
DTM052	Invalid channel number	Check input and re-enter
DTM053	Peripheral signaling card is disabled	Enable peripheral signaling card and re-enter command
DTM054	Action not successful	
DTM055	DISI complete	
DTM300 n	DTSL/DDSL n has been stopped and is in the ENBL IDLE state	
DTM301 n	DTSL/DDSL n has been started and is in the ENBL ACTIVE state	
DTM302 n	DTSL/DDSL n has been stopped and is in the ENBL ACTIVE state but has all the channels in the disabled state	Check the switch settings on the card. If they are correct, check that the far end has started. If accompanied by a DTM334 message, then check the configuration at both ends of the link.
DTM303 n	DTSL/DDSL n has failed to start and is still in the ENBL STARTING state but	Suspect faulty DCHI; may be accompanied by a major alarm

Table 82
DTM error messages (Part 4 of 8)

Code	Description	Action
DTM304 n f	DTSL/DDSL n has failed its memory test while being enabled and remains in the disabled state, with “f being one of the following reasons for failure: 0 — test not completed in time 1 — ROM check failed 2 — RAM check failed 4 — HDLC test failed	Suspect faulty DCHI; may be accompanied by a major alarm
DTM305 n	DTSL/DDSL n is undergoing memory test, command ignored	Wait until the memory test has ended and then re-issue the command
DTM306 n	DTSL/DDSL n being started, command ignored	Wait until the command has ended and the re-issue the command
DTM307 n	DTSL/DDSL n being stopped, command ignored	Wait until the command has ended and then re-issue the command
DTM308 n	Five minutes have elapsed since DTSL/DDSL n was started and placed in the active state, and no channel reset acknowledgements have been received	Check that the far end has started
DTM309 n	DTSL/DDSL n has failed to start; it will return to the idle state	Attempt a reset; If the fault persists, suspect a faulty DCHI; may be accompanied by a major alarm
DTM310 n z (see note)	Alarm z has been detected by DTSL/DDSL n and it has exceeded its persistence limit	Accompanied by a major alarm when <alarm> = 1-5; accompanied by a minor alarm when <alarm> = 6
DTM311 n z (see note)	Alarm z has been detected by DTSL/DDSL n but has not exceeded its persistence limit	Accompanied by a major alarm

Table 82
DTM error messages (Part 5 of 8)

Code	Description	Action
DTM312 n z (see note)	Alarm repeat count threshold has been exceeded for alarm z on DTSL/DDSL n	Accompanied by a major alarm
DTM313 n	Stop count threshold has been exceeded for DTSL/DDSL n	May be accompanied by a major alarm
DTM314 n	DTSL/DDSL n has been disabled	
DTM315 n	DTSL/DDSL n has failed to respond to numerous “stop” messages and therefore will be disabled instead	Attempt a reset; If the fault persists, suspect a faulty DCHI; accompanied by a major alarm
DTM316 n z (see note)	Alarm z has been detected by DTSL/DDSL n; DTSL/DDSL n is not in the active state	
DTM317 n	DTSL/DDSL n does not respond	Check switch settings on DCHI card
DTM318 n	DTSL/DDSL n has been enabled	
DTM319 n	DTSL/DDSL n is about to be started	
DTM320 n c	Real channel c on DTSL/DDSL n has failed to reset and remains in the disabled state	If multiple DTM320 messages occur, then suspect one of the following: link fault (check if an alarm is present) faulty DCHI far end signaling card faulty
DTM322 n c	Real channel c on DTSL/DDSL n has been reset	

Table 82
DTM error messages (Part 6 of 8)

Code	Description	Action
DTM324 n	Channel reset threshold exceeded for DTSL/DDSL n	Suspect one of the following: link fault (check if an alarm is present) faulty DCHI far end signaling card faulty
DTM325 n	DTSL/DDSL n is being reset	
DTM326 n	DTSL/DDSL n has been reset	
DTM329 n c	Channel is not in a state where it can be reset	
DTM330 n	Invalid command for the state that DTSL/DDSL n is in	Check the DTSL status and re-enter
DTM331 n	Test message threshold has been exceeded for DTSL/DDSL n	If fault persists, suspect a faulty DCHI
DTM332 n	A level 3 to level 2 signaling test has failed for DTSL/DDSL n	Link will be reset if this error persists
DTM335 n mi	DTSL/DDSL n has failed to a message sent to it; mi is the message indicator code for the message	If issued after a command has been entered, then repeat the command; If error continues, suspect a faulty DCHI
DTM336 n mi	An attempt to send a message to DTSL/DDSL n has failed; mi is the message indicator code for the message. Note: a spurious DTM335 is likely to follow	
DTM337 n li mi	Invalid input from DTSL/DDSL n; l is the length indicator, mi is the message indicator code for the message	

Table 82
DTM error messages (Part 7 of 8)

Code	Description	Action
DTM338 n	DTSL/DDSL n cannot be disabled because the DTCS/DDCS is disabled	DTCS(s) must be enabled first.
DTM339 n x	Five minutes have elapsed since DTSL/DDSL n was started and placed in the active state; some channel reset acknowledgements have bee received, but “x” channels fail to start	
DTM340 n	Although DTSL/DDSL n is active according to level 3, a report has been received from level 2 indicating the link is idle	If fault persists, suspect a faulty DCHI.
DTM341 n	Although DTSL/DDSL n is idle according to level 3, a report has been received from level 2 indicating the link is starting or active	If fault persists, suspect a faulty DCHI.
DTM342 n c p	Level 2 has detected a discrepancy in the configuration of real channel c on DTSL/DDSL n when a message was sent from level 3; “p” indicates one of the following problems: 0 — channel number out of range 1 — channel not configured 4 — channel not active 5 — li is incorrect 6 — already configured 7 — mi is out of range	Check the state and configuration of the channel.

Table 82
DTM error messages (Part 8 of 8)

Code	Description	Action
DTM344 n c p	Level 2 has detected a discrepancy in the configuration of real channel c on DTSL/DDSL n when a message was sent from level 3; "p" indicates one of the following problems: 0 — channel number out of range 1 — channel not configured 2 — type (DASS2) is wrong 3 — side (A/B) is wrong 4 — channel is not active	Check the channel configuration at the far end. A DTM344 with a "p" = 3 is only printed **once** after the STRT command is assigned, when the side of a DTSL is wrongly configured; DTM334 messages with other values for "p" printed every time that a discrepancy is found.
DTM346 n c p	Level 3 has detected a discrepancy in the configuration of real channel c on DTSL/DDSL n when a message was sent from level 2; "p" indicates one of the following problems: 2 — type (DASS2) is wrong 3 — side (A/B) is wrong	Level 3 will attempt to update level 2.
DTM348 n	All alarms cleared on DTSL/DDSL n	
DTM350	Must switch reference clock before disabling	
	for DTM310, DTM311, DTM312, and DTM316 the alarm "z" is one of the following code numbers: 0 — TBF (Transmit Buffer Full) 1 — FAE (Frame Alignment Error) 2 — HER (High Error Rate) 3 — TSF (Transmit Signal Failure) 4 — AIS (Alarm Indicator Signal) 5 — LOI (Loss of Input) 6 — DAI (Distant Alarm Indication)	

Initialize (INI) error messages

When the system is initialized, all network cards are tested for read/write response, and all DCHIs are tested for read/write response and stuck interrupts.

If initialization follows a system reload or is manually invoked, then all links are brought into service (resembling a link reset). If initialization occurs for any other reason, then the links which are not disabled are reset. All calls that were established before initialization are rebuilt. The error messages described in Table 83 may be generated during system initialization.

Table 83
INI messages

Code	Description
INI003 (fault codes 90 - 12F)	Network card does not respond
INI009 (fault codes 90 - 12F)	The network card does not respond
INI100	DCHI does not respond from active CPU
INI101	DCHI does not respond from standby CPU
INI1006	Unequipped card is responding

Link reset error messages

When certain faults are detected, the DCHI is reset. This involves taking the link out of service (so that the DCHI is disabled) and then bringing it back into

service. This sequence may fail, leaving the link disabled or idle. The failure messages described in Table 84 may be generated for a link reset.

Table 84
Link reset messages

Code	Description
DTM320 n c	Real channel c on DTSL/DDSL n has failed to reset and remains in the disabled state

Channel reset error messages

A channel may be reset if there is difficulty in clearing a call, each time that a channel is enabled, if the channel buffer on the DCHI card overflows. If a channel is disabled, any call in progress is force-disconnected, and the DCHI is instructed to reset the associated Link Access Protocol. The channel is enabled when the reset is completed.

A channel reset may also be initiated by the DCHI, if there is difficulty in communicating with the far end.

If the number of channel resets since midnight exceeds the value defined as the “channel reset threshold” (CRT) defined in LD 74, then the link is reset and a minor alarm is raised. CRT may be set to infinity, in which case the link will not be reset due to channel reset failure.

The error messages may be generated for a channel reset as described in Table 85.

Table 85
Channel reset error messages

Code	Description
DTM325 n	DTSL/DDSL n is being reset
DTM326 n	DTSL/DDSL n has been reset

Stop count error message

A count is kept of the number of times since midnight that a link is stopped due to an alarm or link reset. If this count exceeds the "stop count threshold" (SCT) defined in LD 74, then the link is disabled. It remains disabled until it is manually brought back to service. SCT may be set to infinity, in which case the link will not be reset due to excessive stopping.

The error message described in Table 86 is generated for a stop count reset.

Table 86
Stop count message

Code	DESCRIPTION
DTM313 n	Stop count threshold has been exceeded for DTSL/DDSL n

Test messages reset errors

Test messages are sent to all DCHIs every 30 seconds in order to check the level 3/level 2 interface. The test patterns should be echoed back unchanged. If the number of failed tests since midnight exceeds the "test message threshold" (TMT) defined in LD 74, then the link is reset and a minor alarm is raised. TMT may be set to infinity, in which case the link will not be reset due to test failure.

A check is also performed every 30 seconds on the DCHI states as read by the hardware and software. If there is a difference in the reading, then the link is reset and a minor alarm raised.

The error messages described in Table 87 are generated for test messages reset.

Table 87
Test messages reset errors

Code	Description
DTM331 n	Test message threshold has been exceeded for DTSL/DDSL n
DTM332 n	A level 3 to level 2 signaling test has failed for DTSL/DDSL n

Channel configuration error messages

Each time that a DCHI is enabled, it is informed of the configuration of its Link Access Protocols. If a discrepancy between the hardware and software is detected during call processing, the software attempts to correct configuration. Diagnostic messages are generated for these faults.

If the software cannot send a message to the DCHI because no output buffer is available, a diagnostic message is generated. If the DCHI cannot send a message to the software because an input buffer is not available, no immediate message is sent. Both conditions are recorded in traffic printouts.

Input messages received by the software verify that the length is consistent with the message type. A diagnostic message is generated for any discrepancy. Table 88 describes the channel configuration error messages.

Table 88
Channel configuration error messages

Code	Description
DTM342 n c p	Level 2 has detected a discrepancy in the configuration of real channel c on DTSL/DDSL n when a message was sent from level 3; “p” indicates one of the following problems: 0 — channel number out of range 1 — channel not configured 4 — channel not active 5 — li is incorrect 6 — already configured 7 — mi is out of range

Table 88
Channel configuration error messages

DTM344 n c p	Level 2 has detected a discrepancy in the configuration of real channel c on DTSL/DDSL n when a message was sent from level 3; “p” indicates one of the following problems: 0 — channel number out of range 1 — channel not configured 2 — type (DASS2) is wrong 3 — side (A/B) is wrong 4 — channel is not active
DTM346 n c p	Level 3 has detected a discrepancy in the configuration of real channel c on DTSL/DDSL n when a message was sent from level 2; “p” indicates one of the following problems: 2 — type (DASS2) is wrong 3 — side (A/B) is wrong

Clock Controller (DTC) error messages (LD 60)

Table 89 describes the Digital Trunk Clock Controller (DTC) error messages in LD 60 which indicate problems with the Clock Controllers.

Table 89
Clock controller status and error messages

Code	Description
DTC001	Clock controller tracking on primary source loop.
DTC002	Clock controller tracking on secondary source loop.
DTC003	Clock controller cannot be accessed.
DTC004	Clock controller indicates clock-aging error.
DTC005	Reference clock switched to secondary source from primary.
DTC006	Reference clock switched to free-run mode from secondary or primary.
DTC007	Active reference clock is set to re-track primary.
DTC008	Active reference is free run or the clock controller cannot be accessed.
DTC009	Clock controller has been switched.
DTC010	Universal asynchronous receiver/transmitter (UART) error is detected.
DTC011	Clock control self-test failed; error exists.
DTC012	Clock control has reference-clock problem.
DTC013	Clock control has tracking problem.
DTC014	Clock control set to free run.
DTC015	Clock control set to secondary.
DTC016	Clock controller restored from free run or secondary to tracking on primary.
DTC017	Clock controller restored from free run to tracking on secondary.
DTC018	Cannot switch or restore to a reference clock because automatic reference-clock switching option is disabled.

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DASS2

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