Meridian 1

Succession 1000

Succession 1000M

Succession 3.0 Software

DPNSSI

Document Number: 553-3001-372
Document Release: Standard 1.00
Date: October 2003

Produced in Canada

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:

- *DPNSS1 Product Overview Guide (553-3921-100)*
- *DPNSS1 Installation Guide (553-3921-200)*
- *DPNSS1 Features and Services Guide (553-3921-300)*
- *DPNSS1 Maintenance Guide (553-3921-500)*

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 are supported in your area.

Subject

This document describes DPNSS1. It includes the following information:

- application protocols and principles
- hardware and software requirements
- hardware descriptions and schematics required to install DPNSS1 and APNSS links
- overlay program administration procedures for DPNSS1 features
- DPNSS1 links maintenance procedures and lists of 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 Cabinet
- Succession 1000M Chassis
- 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

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

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)

This document applies to the Succession 1000 system.

Intended audience

This document is intended for design, marketing and technical personnel, network data managers and administrators, and individuals installing and maintaining DPNSS1 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

This section lists information sources that relate to this document.

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)
- *DASS2* (553-3001-371)
- *Basic Network Features* (553-3001-379)
- *Traffic Measurement: Formats and Output* (553-3001-450)
- *Software Input/Output: Maintenance* (553-3001-511)
- *ISDN Primary Rate Interface: Maintenance* (553-3001-517)
- *Large System: Overview* (553-3021-010)
- *Large System: Installation and Configuration* (553-3021-210)
- *Large System: Maintenance* (553-3021-500)

Online

To access Nortel Networks documentation online, click the **Technical Documentation** link under **Support** on the Nortel Networks home page:

http://www.nortelnetworks.com/

CD-ROM

To obtain Nortel Networks documentation on CD-ROM, contact your Nortel Networks customer representative.

Overview

Contents

This section contains information on the following topics:

Description

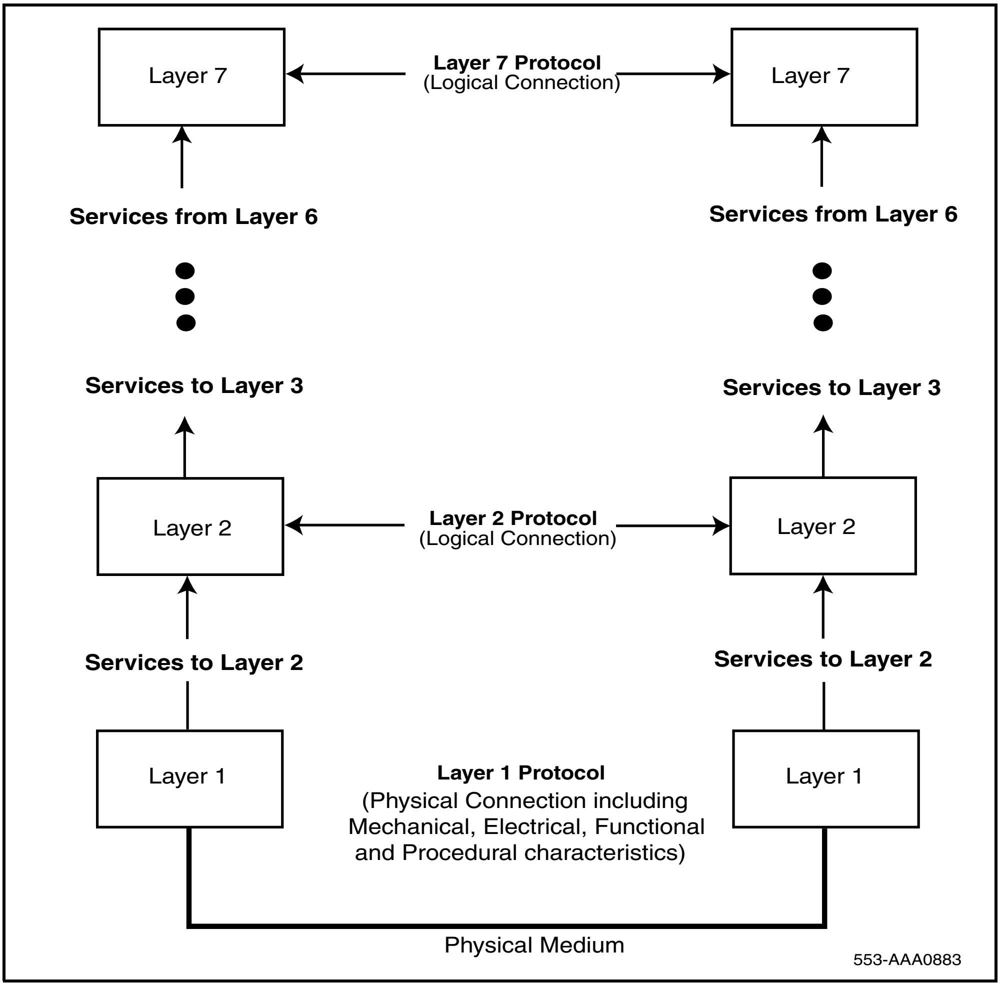
British Telecom's Digital Private Network Signaling System No. 1 (DPNSS1) is the open signaling protocol standard for intelligent private network digital connections. DPNSS1 provides the signaling capability to establish simple telephony and data calls, as well as supplementary services (features).

> ***Note:*** DPNSS is supported only in the Media Gateway. It is not supported in the Media Gateway Expansion or Option 11C Chassis Expander.

DPNSS1 is a common channel signaling system. It is intended to be used between switches in a private network (via timeslot 16 of a 2.048 MBit/s digital transmission system), but can also be connected between switches through a dumb modem using a dedicated analog or digital signaling path. This latter facility is known as the Analog Private Network Signaling System (APNSS).

DPNSS1 is specified in terms of the International Standards Organisation (ISO) reference model for Open Systems Interconnection (OSI). Level 1 (Physical) of the model is a 2.048 Mb/s digital interface and level 2 (Data Link) is the Link Access Protocol (LAP) defined for Digital Access Signaling System No.2 (DASS2). Level 3 (Network) is the message layer unique to DPNSS1. Figure 1 on page 25 illustrates the OSI Model.

Figure 1
How the OSI Model works

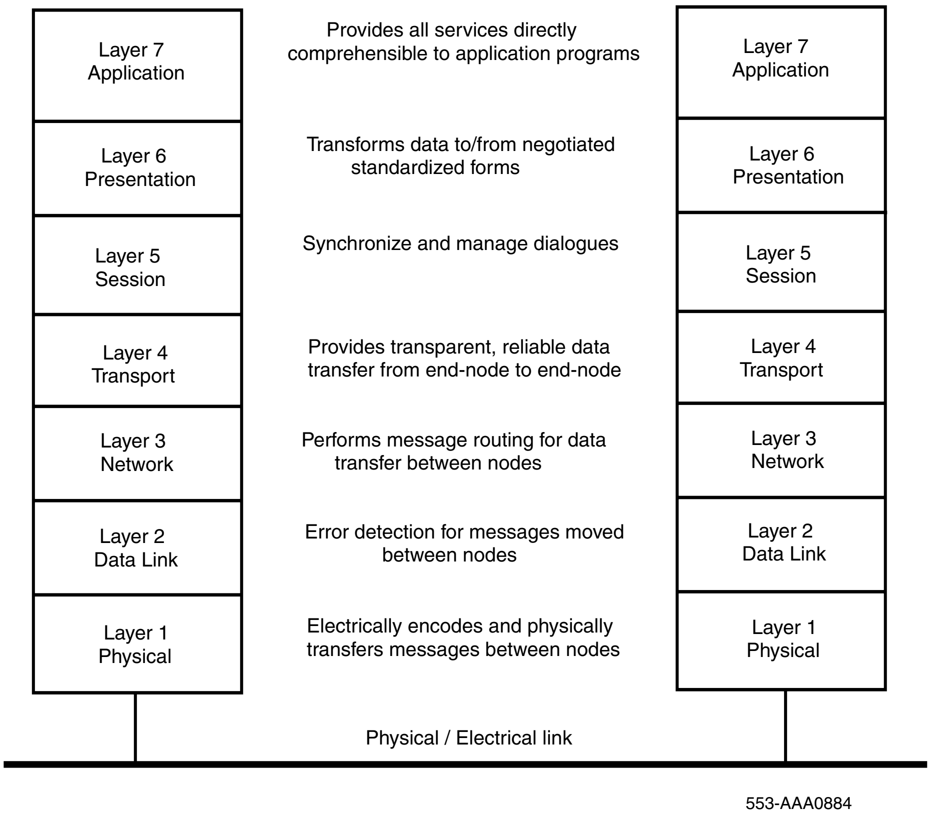


Each layer in the model depends on the services offered by the layer below it and, in turn, builds on those services to perform a specific set of communications functions. Protocols are the mechanism by which each layer accomplishes its communication functions. It then offers these functions to the layer 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 and the functions of each layer



DPNSS1 application principles

Transmission system

The 2.048 Mb/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 synchronisation channel. DPNSS1 is a message-based signaling system that uses a common signaling channel in timeslot 16. Each traffic channel has an associated Link Access Protocol (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 Nortel 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 an incoming or outgoing call independently of the other channels.

Each 2.048 Mb/s link can be connected to another PBX, using DPNSS1 signaling.

Link designation

The ends of each inter-PBX link are labelled arbitrarily A and B, and the ends of each DPNSS1 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 DPNSS1 channel to or from a non-DPNSS1 device is termed an end PBX. If that device is a trunk, then the PBX is termed a gateway. A PBX connecting two DPNSS1 channels is a transit.

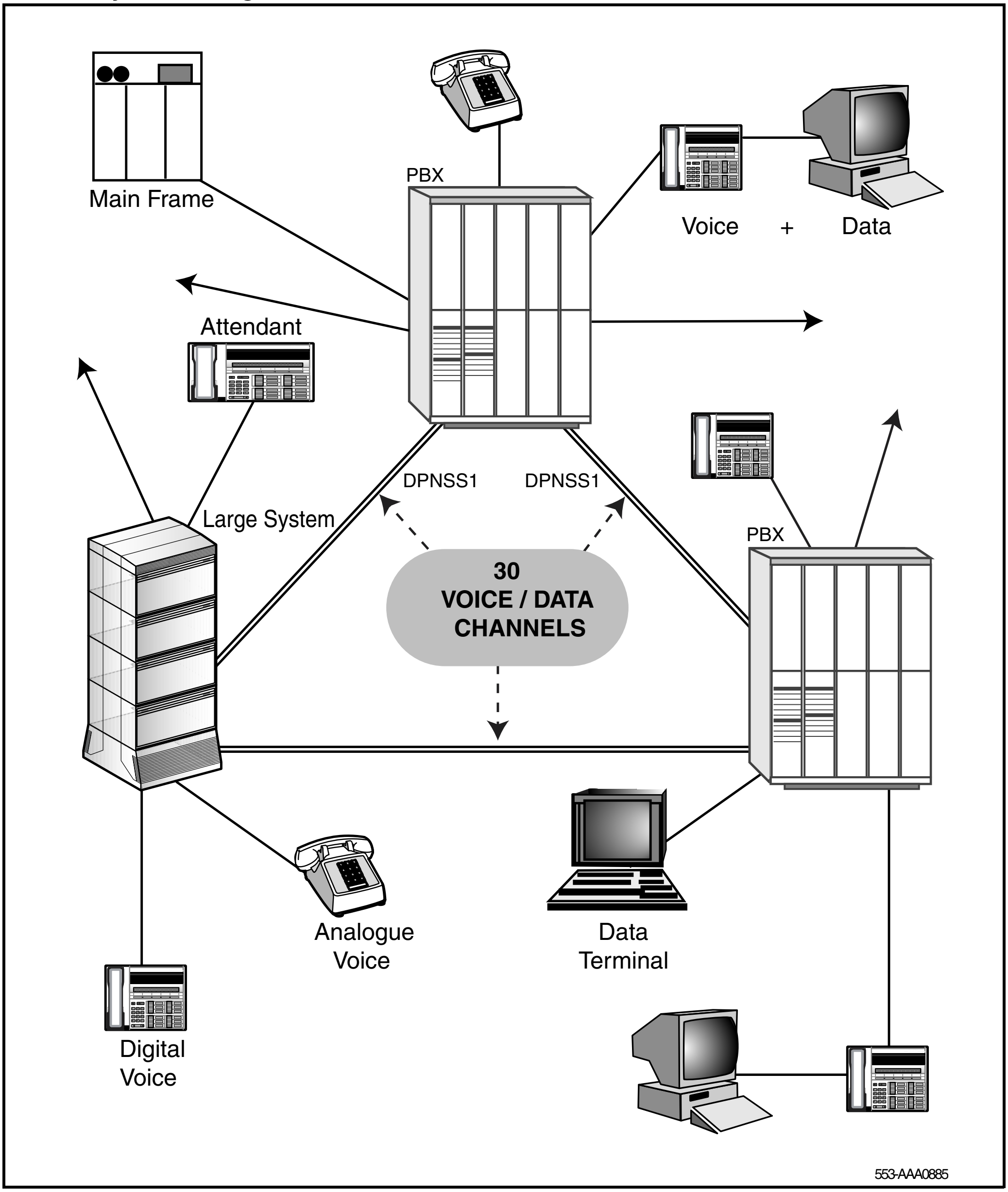
Configuration of trunks

DPNSS1 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 DPNSS1 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 DPNSS1 channels only

Figure 3 on page 29 shows a typical DPNSS1 system configuration.

Figure 3
DPNSS1 system configuration



DPNSS1 and the system

DPNSS1 is the prevalent intelligent private network signaling system in the United Kingdom, and is unique in its allowance of intelligent networking between different-vendor PBXs.

The system uses unique hardware and software elements to provide the DPNSS1 functionality. This includes the implementation of BTNR 188 sections as indicated by Table 2. Also, the system offers the same network functionality over analog trunks and DTI2 or E-1 digital trunks (that is, APNSS) using a dedicated signaling link.

Table 2 forms the compliance statement for DPNSS1.The table indicates the applicable BTNR 188 Section, and whether the service is supported on transit and/or end system PBXs.

Table 2
BTNR 188 DPNSS1 to system compliance (Part 1 of 3)

	Function	
Sections	**End**	**Transit Only**
1 General	Mandatory	Mandatory
2 Physical Characteristics	Mandatory	Mandatory
3 Link Access Protocol	Mandatory	Mandatory
4 Message Types and Formats	Mandatory	Mandatory
5 Signaling Procedures	Mandatory	Mandatory
6 Simple Telephony Call	Mandatory	Mandatory
7 Circuit Switched Data Call	No	Yes
8 Swap	No	Yes
9 Call Back When Free	Yes	Yes
10 Executive Intrusion	No	Yes
11 Diversion	No	Yes

Table 2
BTNR 188 DPNSS1 to system compliance (Part 2 of 3)

	Function	
Sections	**End**	**Transit Only**
12 Hold	No	Yes
13 Three Party Service	Yes	Yes
14 Call Offer	Yes	Yes
15 Non-specified Information	Yes	Yes
16 Service Strings	Yes	Yes
17 Call Waiting	No	Yes
18 Bearer Service Selection	No	Yes
19 Route Optimization	Yes	Yes
20 Extension Status	No	Yes
21 Controlled Diversion	No	Yes
22 Redirection	Yes	Yes
25 Night Service	No	Yes
26 Centralized Operator	No	Yes
27 Traffic Maintenance	No	NA
28 Remote Alarm Reporting	No	Yes
29 Add-on Conference	No	Yes
30 Time Synchronisation	No	Yes
31 Call Back When Next Used	Yes	Yes
32 Do Not Disturb	No	Yes

Table 2
BTNR 188 DPNSS1 to system compliance (Part 3 of 3)

	Function	
Sections	**End**	**Transit Only**
33 Remote Registration of Diversion	No	Yes
34 Remote Registration of Do Not Disturb	No	Yes
35 Priority Breakdown	No	No
36 Call Back Messaging	No	Yes
37 Loop Avoidance	Yes	Yes
38 Forced Release	No	Yes
39 Text Message	No	Yes
40 Charge Reporting	No	Yes
41 Network Address Extension	No	Yes
42 Call Park	No	Yes

APNSS

The Analog Private Network Signaling System (APNSS) replaces analog trunk signaling with DPNSS1 D-channel signaling, to provide the same basic capabilities as 2 MBit Digital Private Network Signaling System No.1 (DPNSS1).

APNSS is configured on a route basis, with each trunk on that route being associated with a D-channel number and a trunk identifier to identify the signaling channel for the trunk. Call set-up, establishment, and tear-down are controlled by the DPNSS1 signaling messages and call states.

A D-channel dedicated for APNSS signaling is used exclusively for analog bearers, and cannot be used to support DPNSS1 digital bearers. One D-channel can support a maximum of 30 B-channels.

The B-channels for APNSS are normally carried over analog two- or four-wire E&M trunk circuits, or AC15 trunks. However, digital (DTI2) TIE B-channels can also be used for APNSS.

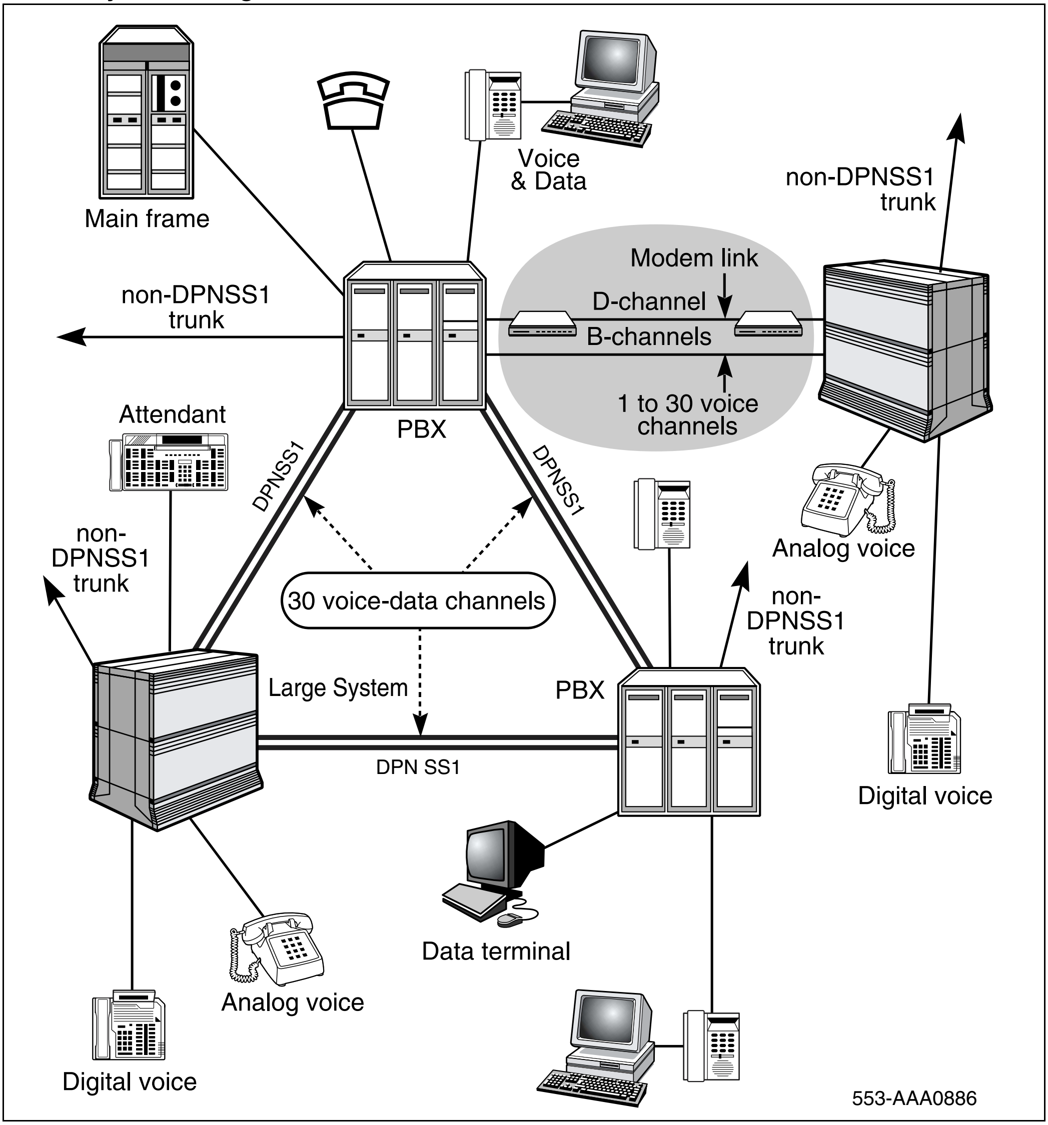
The D-channel can be carried over a 64 Kbit/s digital link, or an analog link using modem equipment. Normally, the D-channel is run using leased-line modems, but can also be connected using dial-up modems, a 500 line card and any trunk circuit.

Virtual channels for APNSS are programmed on an unused loop within the system.

Certain limitations apply to APNSS. APNSS supports only PBX to PBX (similar or different) connectivity; with APNSS there is no check for B-channel speech transmission.

Figure 4 on page 34 illustrates an APNSS system configuration.

Figure 4
APNSS system configuration



Channels

A channel is a circuit that carries information between two PBXs. Within an intelligent network, there are two types of channels — Bearer channels (B-channels) and Data channels (D-channels).

B-channel

The Bearer Channel (B-channel) carries the voice/data traffic for established connections; the call processing signaling information is *not* carried over a B-channel. Voice transmission can be over a digital or analog B-channel. An analog B-channel can be any type that is supported within a particular network. Data transmission requires that the B-channel be digital, with a transmission rate of 64 Kbit/s. There may be up to 30 B-channels per DPNSS1 link.

D-channel

The 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 message format is a High Level Data Link Control (HDLC) frame.

The D-channel may be a 64 Kbit/s digital channel, or an analog 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.

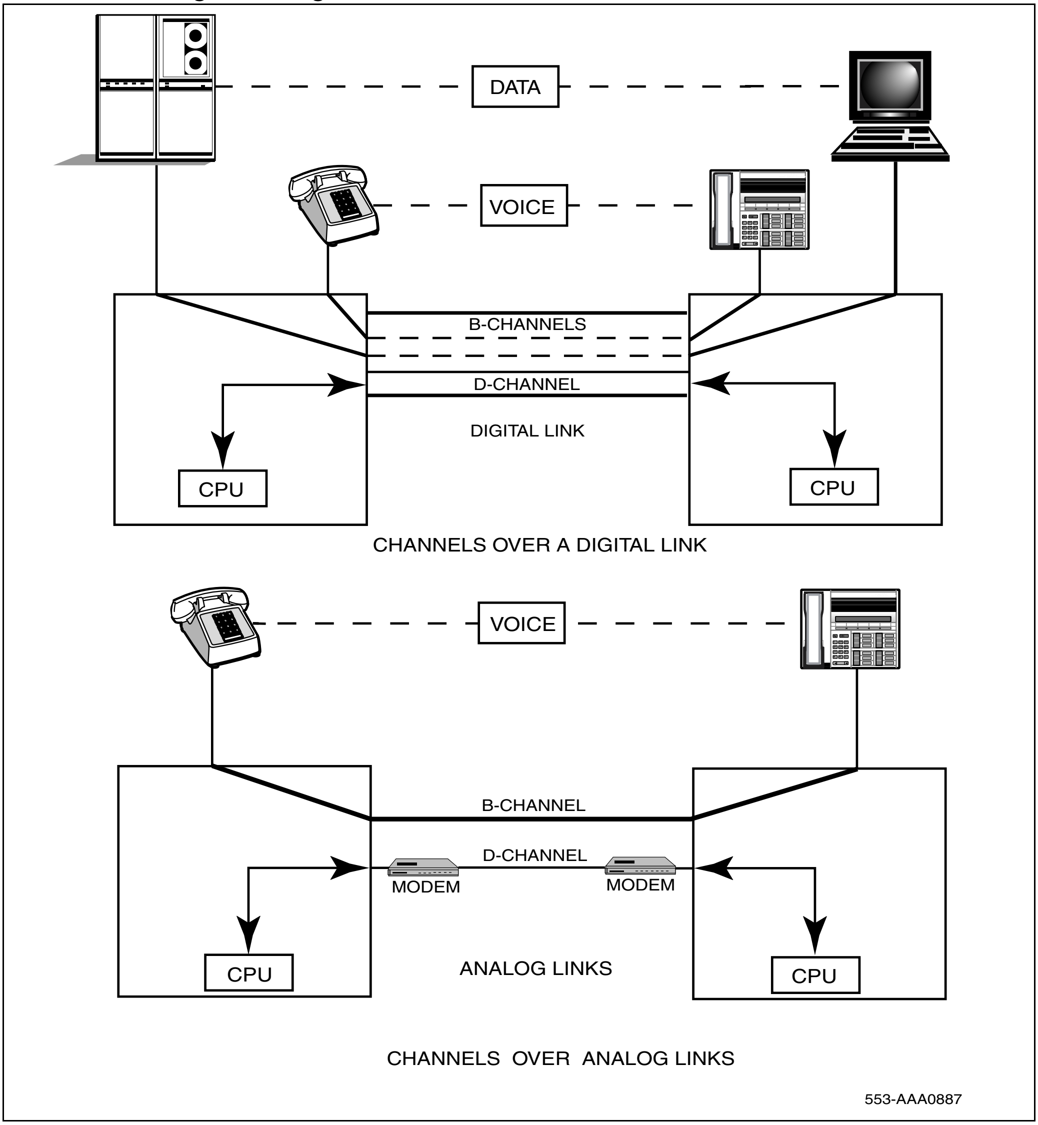
Virtual channel

A virtual channel is a layer 3 Link Access Protocol on D-channel (LAPD) which is not associated with a physical B-channel. Typically, a virtual channel is used to support a call processing activity which does not require a speech or data path. An example would be if the Call Back When Free supplementary service were to be requested due to congestion being encountered on DPNSS1 B-channels on a PBX to PBX link.

The virtual channel is supported by the DPNSS1 D-channel Interface. There may be up to 30 virtual channels on a DPNSS1 link.

Figure 5 on page 36 shows channels over digital and analog links.

Figure 5
Channels over digital/analog links



Channel configuration

DPNSS1

DPNSS1 channels are carried over 30B+D Primary Rate Access (PRA) 2 Mbs digital links. Up to 30 B-channels and one D-channel may be configured for each 2 Mbs digital link. However, on terminating PBXs, it is not necessary to configure all 30 B-channels.

Virtual B-channels do not have any effect on normal call processing over the real B-channels.

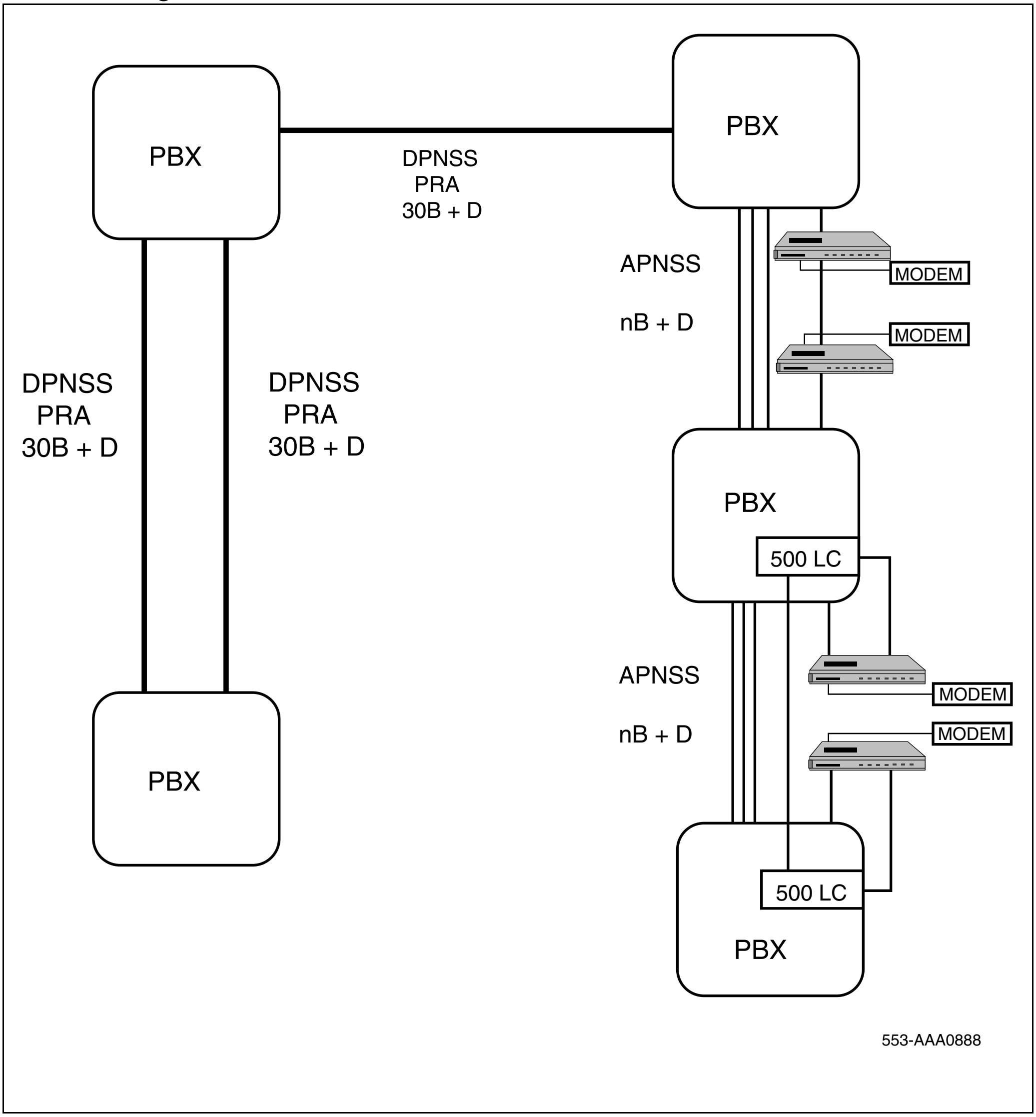
APNSS

The B-channels for APNSS are normally carried over analog two- or four-wire E&M, or AC15 trunk circuits. However, digital (DTI2) TIE B-channels can also be used. Up to 30 B-channels, 30 virtual channels, and one D-channel may be configured per APNSS link. Virtual B-channels for APNSS are configured on an unused network loop within the network.

The D-channel may run at any speed and may be carried over a digital or analog link. If it is carried over a 64KBit/s digital link, a data line card must be provided. An analog D-channel is normally run through a leased line modem, but may be connected through a dial-up modem, a 500 data line card, and any trunk circuit.

The channel configurations for DPNSS1 and APNSS are illustrated in Figure 6 on page 38.

Figure 6
Channel configurations for DPNSS1 and APNSS



Interworking with other signaling systems

DPNSS1 to ISDN PRI gateway

The preferred method of interconnection between system PBXs and other products in the system family is the Q.931 intelligent private network signaling protocol (please refer to *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) and *ISDN Primary Rate Interface: Maintenance* (553-3001-517) for information on international ISDN PRA functionality on the system). The Q.931 interface is also the preferred option for providing an intelligent 2Mbs digital connection to the ISDN public network.

A gateway is a means of connecting two different signaling schemes. DPNSS1 on the system 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
- Coordinated Dialing Plan

DPNSS1 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

DPNSS1 to R2MFC gateway

The DPNSS1 to R2MFC interworking provides an interface for R2MFC DID and DOD calls. For R2MFC DID calls routing onto DPNSS1 TIE trunks, this feature offers the following capabilities:

- an option is provided in the DPNSS1 route data to define whether the DPNSS1 route can accept Calling Number Identification (CNI) in the call setup messages
- the feedback message from the far end of the DPNSS route is mapped into the appropriate R2MFC backward signal

For R2MFC DOD calls originating from DPNSS trunks, this feature provides the following enhancement:

- The R2MFC backward status signal received from the Central Office is mapped into the appropriate message

The R2MFC to DPNSS Gateway feature also provides the following enhancements in order to provide CNI support for R2MFC DID to DPNSS tandem calls:

- The ability to request CNI for an incoming R2MFC call is possible immediately after a predetermined number of digits are received. The allowable range for this option is 0 to 7.
- The ability to request CNI for an incoming R2MFC call is possible immediately after an ESN code is dialed. The ESN codes recognized for this purpose are Distance Steering Codes (DSC), Trunk Steering Codes (TSC), AC1s, and AC2s.

Gateway interworking with other signaling systems

Table 3 on page 41 and Table 4 on page 42 outline the gateway working between DPNSS1 and other signaling systems, as well as the DPNSS1 services offered across the gateway.

Note: Please be advised that, to date, DPNSS1 has only been launched as part of the system in the United Kingdom, and that the gateway working is only supported between DPNSS1 and the interfaces listed below. For information regarding gateway working to a signaling system not listed in the table, please contact Nortel Networks Product Management.

Table 3
DPNSS1 gateway to other signaling systems

DPNSS1 Gateway to Signaling System	Yes/No
PSTN	Yes
DASS2	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
R2MFC	Yes
10pps	Yes
SSMF5	No
Non-gateway able to make and receive calls to:	Yes/No
PSTN	Yes
DASS2	Yes
10pps	Yes
SSMF5	Yes

Table 4
DPNSS1 services offered across gateway to signaling system

DPNSS1 Services		Signaling System				
BTNR Section	Title	PSTN	DASS2	10pps	SSMF5	Q.931
6	Simple telephony call	2	2	2	2	2
7	Circuit switched data call		2			
16	Supplementary information strings	1	1	1	1	2
18	Bearer service selection		1*			
9	Call Back When Free					2
14	Call Offer					2
31	Call Back When Next Used					2
37	Loop Avoidance					2

1 = interworking supported, but not with an equivalent service of the other signaling system.
2 = interworking between DPNSS1 service and equivalent service of the other signaling system.
blank = no interworking
* = Bearer Service Selection to request specific transmission path capabilities on outgoing calls, as required at the DASS2 to DPNSS1 gateway.

DPNSS1 dialing plans

When a system with DPNSS1 is to be incorporated into a Private Network, it's numbering plan is implemented using the Coordinated Dialing Plan feature (CDP).

The Uniform Dialing Plan (UDP) feature supplements CDP. UDP uses BARS translations to route calls originated from a telephone or non-DPNSS1 trunk at a system node. Usually, BARS Special Numbers (refer to the section explaining Special Numbers) are programmed to route calls to public network numbers via the private network, before “breaking out” into the public network. The digits received for an incoming DPNSS1 call may not be translated using UDP.

In practice, the uniform dialing plans, normally implemented using the BARS feature, may be implemented on the system using the CDP feature.

The nature of DPNSS1 imposes certain constraints on numbering plan flexibility, in order that supplementary services may function correctly between network nodes. These constraints mean that close attention must be paid to numbering plans when including a Succession 1000M, Succession 1000, and Meridian 1 in a DPNSS1 network.

The following sections describe the network facilities which are available to implement DPNSS1 network numbering plans. After these descriptions have been presented, examples of DPNSS1 numbering plan configurations are provided.

Network routing facilities on DPNSS1

The network routing facilities which can be used to implement DPNSS1 numbering plans are briefly described. For each one, an NTP reference is quoted where more complete information can be obtained.

Basic Alternate Route Selection and Special Numbers

In DPNSS1 networks, the BARS feature is used to implement the routing of calls outside the private network using Special Numbers (SPNs). SPNs may be between 1-10 digits long. To allow access to a DPNSS1 network, a one- or two-digit NARS access code can be programmed.

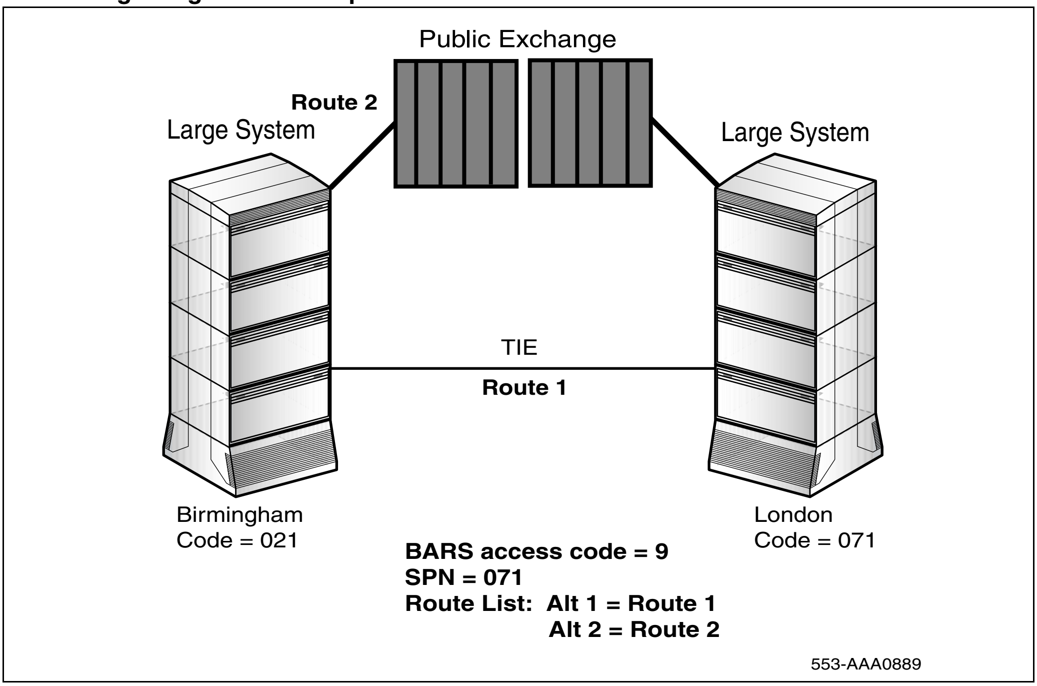
In the example that follows, a customer has two PBX sites in major cities, Birmingham and Central London. The two sites are connected by a DPNSS1 link. If a user of the Birmingham PBX calls a PSTN number in the London area, rather than routing the call via the public network all the way from Birmingham to London, the call is routed to the London area on the private network, and then “breaks out,” or “hops off,” onto the public network. In this way, a long distance call is made at local call cost.

To achieve this, the following configuration is required at the Birmingham PBX. The BARS access code is given to users as the PSTN access code

("9" - in this case). The London code 071 is programmed as a special number. The first choice route for this SPN is the DPNSS1 route to the London PBX.

Digit manipulation may be applied to the dialed digits, so that the digits received at the London PBX are not the same as those dialed. Figure 7 illustrates call routing using BARS and Special Numbers.

Figure 7
Call routing using BARS and Special Numbers



Coordinated Dialing Plan

A Coordinated Dialing Plan (CDP) permits a customer to define a simple dialing plan for an entire network. Each user within the network is assigned a unique 3-10 digit telephone number that does not conflict with any other in the network. All telephone numbers at a particular location must be the same length.

A calling party at one node calls a destination party at another node by simply dialing the telephone number assigned to the destination party. No access codes or pauses for dial tone are required with CDP.

A Coordinated Dialing Plan telephone number is composed of a unique 1-7 digit prefix, known as a Steering Code, which identifies the network node on which an extension is located, followed by the remaining digits that uniquely identify the extension. A Steering Code cannot be the same as any access code or other extension number.

There are three types of Steering Codes:

- Distant Steering Code
- Local Steering Code
- Trunk Steering Code

Distant Steering Code

A Distant Steering Code (DSC) is uniquely associated with one PBX in the private network. A Steering Code for one node in a network must be programmed, along with the necessary routing information, at all the other PBXs in the network. Each node may have many Steering Codes associated with it (there may be up to 10,000 Steering Codes defined in a-system network). The Distant Steering Code will be a prefix of the full number of one or more telephone sets on its associated node.

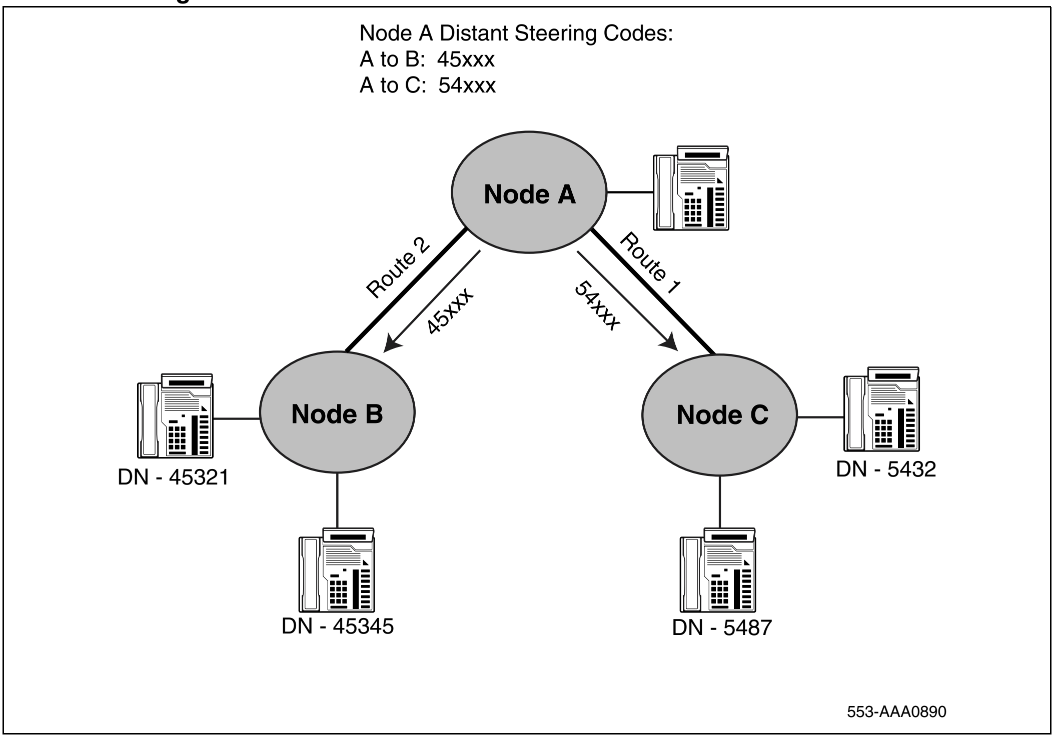
Distant Steering Codes are generally used to program network routing for numbers of a predetermined length, usually numbers internal to the private network, (that is, network extensions). The Flexible Numbering Plan feature allows extension numbers of different lengths to exist in a private network. Extension numbers on a single network node may also be of varying lengths. Note that the requirement for all network numbers to be leftwise unique still applies. Refer to *ISDN Primary Rate Interface: Features* (553-3001-369) or *ISDN Basic Rate Interface: Features* (553-3001-380) for details on the Flexible Numbering Plan feature.

In the example which follows, all DNs in the network with the leading digits “45” are located at node B, and are five digit DNs (fixed length, so distant Steering Codes are used). Similarly, all DNs in the network with the leading digits “54” are located at node C, but are four digit DNs (fixed length, so Distant Steering Codes are used).

Distant Steering Codes are programmed at node A. If a DN “45xxx” is dialed, it will be routed via route 2 to node B. If a DN “54xx” is dialed, it will be routed via route 1 to node C.

The system allows digit discrimination on the first seven digits of a Distant Steering Code. The maximum length of a network number programmed using a Distant Steering Code is ten digits. Figure 8 illustrates a Distant Steering Code.

Figure 8
Distant Steering Code



Trunk Steering Code

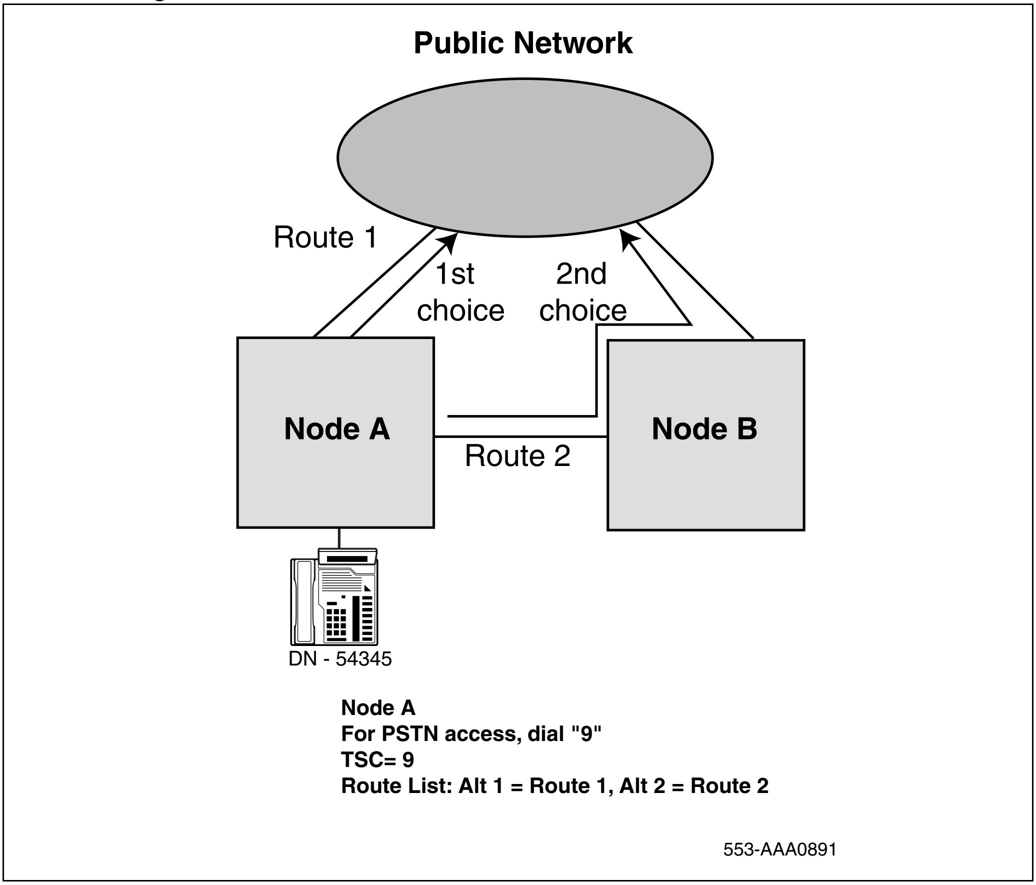
A Trunk Steering Code (TSC) is not necessarily uniquely associated with one PBX in the private network (although in most cases it is). It differs from a Distant Steering Code in that it is used to program network routing for numbers which are not of the fixed CDP length. For example, when calling a foreign country via the PSTN from a private network, the total number of digits dialed will depend on the country which is called.

Typically, a Trunk Steering Code is used to access a particular remote trunk route, a trunk route type (such as a PSTN), or to route to a remote attendant console group. A Trunk Steering Code is also used to program Steering Codes for network numbers which are longer than ten digits.

In the example that follows, if a private network has more than one node which is linked to the PSTN, routing to the PSTN would be done using a Trunk Steering Code. The Trunk Steering Code would allow a call to route across the private network to a remote PSTN access point if local PSTN access was blocked.

Trunk Steering Codes allow discrimination on the first seven dialed digits. Figure 9 illustrates Trunk Steering Codes.

Figure 9
Trunk Steering Codes



Local Steering Code

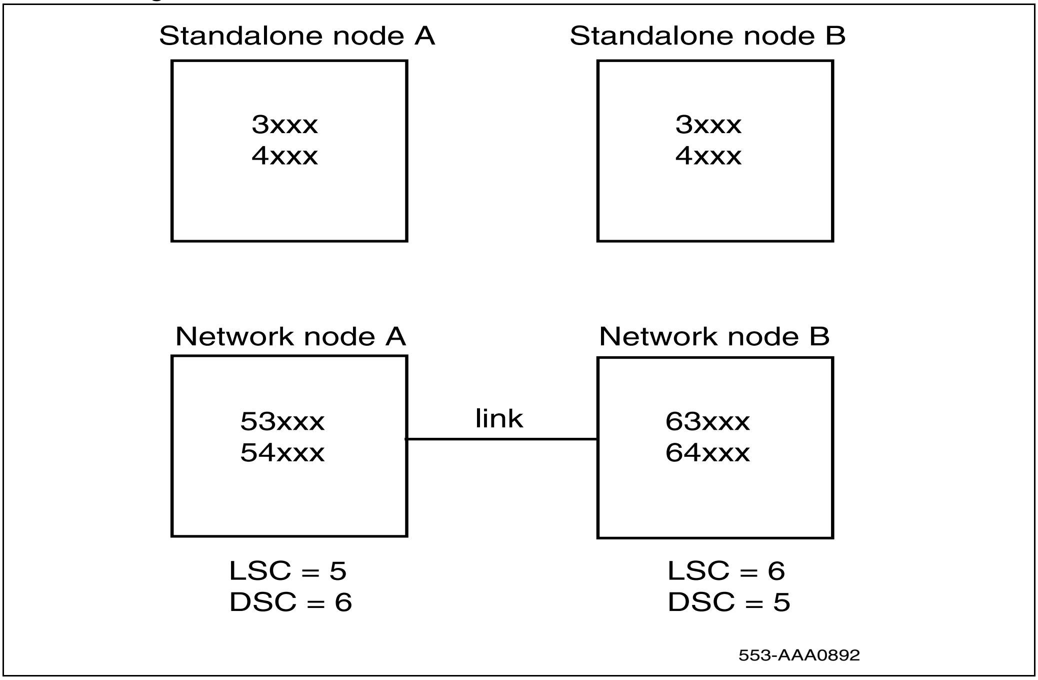
A Local Steering Code (LSC) can be used to keep locally programmed DNs shorter than the overall network dialing plan, or to overcome conflicts between local extension numbers and a network numbering plan such as, for example, when an existing standalone node is absorbed into a private network. Its function is most easily illustrated with an example.

Standalone node A uses a 4 digit numbering scheme and all extensions start with a leading 3 (3xxx) or 4 (4xxx). Standalone node B also uses a 4 digit numbering scheme, all extensions start with a leading 3 (3xxx) or 4 (4xxx).

If the two nodes are to be combined into a network without the need to reprogram every extension number, then an additional leading digit can be introduced at both sites. At node A, all extensions now begin with 53xxx or 54xxx. At node B, all extensions now begin with 63xxx or 64xxx.

At node A, ‘5’ is defined as a Local Steering Code. When a number beginning with 5 is presented to the digit translator, the leading digit is stripped, then the DN is presented a second time to the translator. At node A, ‘6’ is programmed as a Distant Steering Code routing calls to node B. At node B, ‘6’ is defined as a Local Steering Code. When a number beginning with ‘6’ is presented to the digit translator, the leading digit is stripped, then the DN is presented a second time to the translator. At node B, ‘5’ is programmed as a Distant Steering Code routing the calls to node A. Figure 10 on page 50 shows an example of Local Steering Codes.

Figure 10
Local Steering Codes



Digit Insertion

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. This facility can be used to overcome numbering plan conflicts between network and local DNs on system nodes in DPNSS1 networks.

DDI Incoming Digit Conversion

DDI Incoming Digit Conversion 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 digit conversion. For more details see *Features and Services* (553-3001-306).

Numbering plan recommendations

When a DPNSS1 call is originated, be this by a telephone or incoming non-DPNSS1 trunk, the routing digits which are “outpulsed” down the DPNSS1 trunk are referred to as the Destination Address (DA). The specification for DPNSS1 requires that the DA pass through each transit node, enroute to the destination PBX, without being changed. In other words, for DPNSS1 incoming to DPNSS1 outgoing, “what goes in must come out.” This consistency of DA is essential in order for many of the DPNSS1 supplementary features to work correctly.

With this overall constraint in mind, the following recommendations are made about the way in which digit insertion and manipulation features are used in DPNSS1 networks.

DPNSS1 and Digit Insertion

On any particular system node, it is recommended that the same digits be inserted on all incoming DPNSS1 routes (that is, the same response to the INST prompt in LD 16).

DPNSS1 and Local Steering Codes

When an incoming DPNSS1 call terminates locally, following digit insertion and pretranslation, a Local Steering Code may be used to delete some of the leading digits of the received Destination Address. The LSC might also be used to insert digits in place of the deleted digits. Where possible, the insertion of digits should be avoided. Also, if digits are to be deleted, then the same number of digits should be deleted from every LSC. For example, do not allow the following manipulation:

Received DALocal DN

[23]456------->456

[245]36------->36

DPNSS1, Digit Insertion and Outgoing Digit Manipulation

If the Digit Insertion feature is used to insert digits on an incoming DPNSS1 call, and the call is to be routed through the system node and out on a DPNSS1 trunk, this will be achieved using either a DSC or a Trunk Steering Code. In either case, digit manipulation may be applied to the call to modify the outpulsed digits. The manipulation should be used to delete the digits inserted by the Digit Insertion feature. This ensures that the Destination Address passes through the transit node unchanged.

DPNSS1 and Trunk Identities

In order for the Calling Line Identity feature to function correctly, a pair of numbers, the PBX Reference Number and the Trunk Group Reference Number, must be assigned to each non-DPNSS1 route.

DPNSS1 and the use of BARS

BARS is used to translate the number dialed into the outgoing Destination Address (DA) but cannot be used to translate digits for incoming DPNSS1 calls. Therefore, two sets of routing data are required; one for locally originated calls and one for DAs received from other PBXs.

For further information, please refer to the following examples of DPNSS1 network numbering schemes.

Network numbering schemes

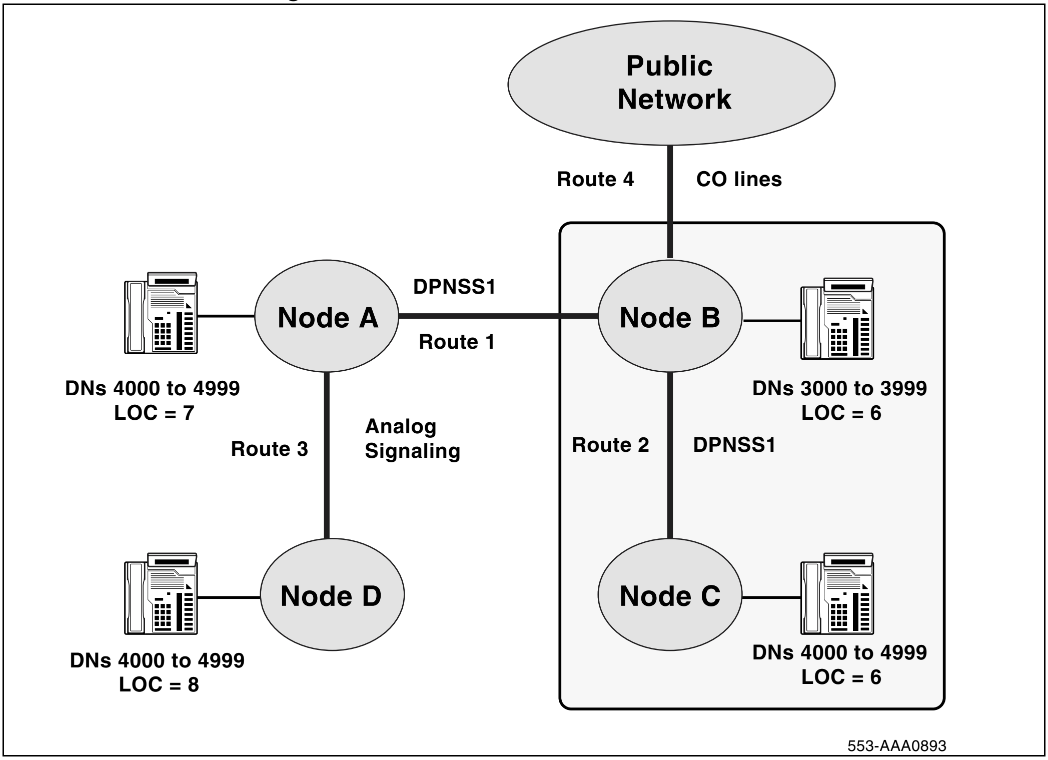
The following sections provide examples of numbering scheme applications for DPNSS1 networks.

Location Code numbering scheme

In the DPNSS1 network configuration illustrated in Figure 11 on page 53, the PBXs are identified by Location Codes. The Location Codes used are 6, 7 and 8.

Nodes B and C share the same Location Code 6. To the other nodes in the network, B and C are seen as a single PBX. When a call from node A reaches node B, the first digit of the DN following the Location Code is used to determine whether the call is intended for node B or node C.

Figure 11
Location Code numbering scheme



In effect, there is a localized coordinated dialing plan between B and C. A caller on B will always be aware that an extension on D is remote because a Location Code must be dialed. However, from B, to reach a remote extension on C, an apparently local DN is dialed, so the caller is unaware that the extension is remote.

Normally, on a non-DPNSS1 network, this type of numbering scheme would be implemented primarily using the BARS/NARS features, with the CDP feature being used to implement only the dialing between B and C.

This example shows how the Coordinated Dialing Plan feature can be used to emulate NARS/BARS, and thus to implement the entire numbering plan. The telephone user's view of the dialing plan is as follows.

To place a call to a remote extension, the following digit fields must be dialed:

AC (5) + LOC (7) + DN (4000)

where AC is the network access code, LOC is the Location Code, and DN is the extension at the remote node.

To make a local call the "AC+LOC" part of the number can be omitted. This applies equally to calls made between nodes B and C. Only node B has exchange lines and attendants. Access to these facilities from other nodes is obtained by dialing 9 and 0 respectively. Routing to node B for these facilities is done using Trunk Steering Codes.

Call Routing - Distant Steering Codes

Variable length Distant Steering Codes are to be used. Six digit codes are required for calls between nodes with different Location Codes, when the full AC+LOC+DN must be dialed. Four digit codes are defined for calls between nodes A and B, when only the extension number is dialed. See Table 5 for examples of call routing - Distant Steering Codes.

Table 5
Example of Call Routing - Distant Steering Codes

PBX A			PBX B			PBX C		
DSC	Flen	Route List	DSC	Flen	Route List	DSC	Flen	Route List
563	6	101	4	4	201	3	4	301
564	6	101	57	6	202	57	6	302
58	6	102	58	6	202	58	6	302

Call Routing - Trunk Steering Codes

Trunk Steering Codes are defined at nodes A and C to allow access to exchange lines and attendant consoles at node B with single digit dialing. The Trunk Steering Codes are defined in Table 6.

Table 6
Example of Call Routing - Trunk Steering Codes

PBX A		PBX C	
TSC	**Route List**	**TSC**	**Route List**
0	103	0	303
9	103	9	303

The Trunk Steering Codes are subject to digit manipulations which are described below.

Call Routing - Routing Lists

Digit manipulations are required in the route lists associated with attendant and PSTN access codes at nodes A and C, so that the digits actually sent to node B correspond to the appropriate Local Steering Code. Similarly, digit manipulations are required in the route lists used for dialing ‘4000’ extensions from node A, and ‘3000’ extensions from node B, so that the digits actually sent correspond to the full network number of the extension. See Table 7 for examples of call routing - routing lists.

Table 7
Examples of call routing - routing lists

PBX A				PBX B				PBX C			
Route List	Route No	DMI		Route List	Route No	DMI		Route List	Route No	DMI	
		Del	Ins			Del	Ins			Del	Ins
101	1	-	-	201	1	-	56	301	2	-	56
102	3	-	-	202	2	-	-	302	2	-	-
103	1	-	56	203	2	-	-	303	2	-	56

Call Termination for Internal Network Calls - Local Steering Codes

For incoming network calls which are to terminate on local extensions, Local Steering Codes are required which will translate the received Destination Address (DA) into the correct local DN. For example, an incoming call to node A, with the DA 574100 is identified as being intended for a local extension 4100. In order to terminate on the local extension, the leading two digits must be stripped away. Table 8 on page 57 provides examples of call termination where Local Steering Codes are required to translate the received DA into the correct local DNs.

Table 8
Examples of Call Termination – Local Steering Code translations

PBX A			PBX B			PBX C		
LSC	**DMI**		**LSC**	**DMI**		**LSC**	**DMI**	
	Del	**Ins**		**Del**	**Ins**		**Del**	**Ins**
57	2	-	563	2	-	564	2	-
			560	2	-			

Note that LSC 560 defined at node B is reduced to ‘0’, the local attendant DN. This corresponds to the TSCs defined at nodes A and C.

Call Termination at node B - PSTN Access

The route access code for the PSTN route located at a transit node B is “569”. When “9” is dialed from a node B extension, it is programmed as a Trunk Steering Code. Digit manipulation is used to convert the outpulsed digits to “569”. The call is then routed to node B, were the “569” is programmed as the PSTN route access code.

Basic Configuration

Contents

This section contains information on the following topics:

Description

The Digital Private Networking Signalling System No.1 (DPNSS1) Route Optimisation (RO)/Meridian Customer Defined Networking (MCDN) Trunk Anti-Tromboning (TAT) Interworking feature provides RO and TAT interworking at DPNSS1/MCDN gateway nodes.

> ***Note:*** For detailed information on the DPNSS1 Route Optimisation feature, please refer to the DPNSS1 Route Optimisation feature description in this document. For detailed information on the Trunk Anti-Tromboning feature, please refer to the *ISDN Primary Rate Interface: Features* (553-3001-369) or *ISDN Basic Rate Interface: Features* (553-3001-380).

This section contains the prompts and responses for each overlay program required to configure basic DPNSS1 capabilities. Configuration instructions are given for the following:

- Configuring the DPNSS1 DCHI and PRI loop number
- Setting the clock synchronization control

- Adding a DCHI card and the D-channel link
- Defining a customer
- Defining service routes, and defining the associated list of service trunks
- Enabling the DPNSS1 link
- Configuring DPNSS1 features

Configuring basic DPNSS1 capabilities

Follow the steps described in Table 9 on page 61 to configure basic DPNSS1 capabilities. The prompts and responses for these steps are explained in the overlays that follow. Responses in parentheses are default values.

Note: The difference in configuration requirements in LD 17 for DPNSS1 systems running on software up to and including Group G, and systems running on software up to and including Group H. Refer to the "Configuration note pertaining to port addressing modes" on page 62 which follows this table.

Table 9
Steps for configuring basic DPNSS1 capabilities

Step	Overlay	Action
1	LD 17 Configuration Record	**Group G** Configure DPNSS1 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 Overlays 74 and 14; the value is entered against the **DCHI** prompt, and is in the range of 0-15. Configure PRI loop number **Group H** Configure the DPNSS1 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 Overlays 74 and 14; 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 DPNSS1 protocols
4 **5**	LD 15 Customer Data Block LD 16 Route Data Block	Define a DPNSS1 customer 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 DPNSS1 link into service

Configuration note pertaining to 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, DPNSS1 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 DPNSS1 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, DPNSS1 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 DPNSS1, for a total of 104 addresses.

Presently, MSDL does not support SDI ports on DPNSS1 or APNSS, 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 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.

Implementation of basic DPNSS1 capabilities

LD 17 – Configure the DPNSS1 DCHI and the DCHI port number.

Note: The prompts have been presented according to Group G and Group H requirements. Up to and including Group G software, for the NT5K35 and for the NT5K75 and NT6D11AE operating in standard mode.

Prompt	Response	Description
REQ	CHG	Modify existing data
TYPE	CFN	Configuration data block
DPNS	YES	Allow next prompt
DCHI	0-15	The DPNSS1 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 Overlay 74. This prompt is only given if DPNS is YES
....		
PARM	YES	To allow changes to the system buffers

Prompt	Response	Description
....		
DTIB	35-1000	Size of IDA trunk input buffers for entire system (determined according to traffic) 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) The system must be initialized to invoke changes to DTOB
....		
CEQU	YES	To allow changes to the Common Equipment parameters
....		
DDCS	0-255	The PRI loop number for the new DPNSS1 link. Enter multiples separated with a space. PRI loop numbers may have to be even values if the adjacent loop on the network pack is programmed

Note: If the NT5K75 or NT6D11AE DCHI is used in expanded mode, use the following prompts in LD 17

LD 17 – Configure the DPNSS1 DCHI and the DCHI port number

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

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 0-255	The PRI loop number for the new DPNSS1 link. Enter multiples separated with a space. PRI loop numbers may have to be even values if the adjacent loop on the network pack is programmed

Up to and including Group H software

LD 17 – Configure the DPNSS1 DCHI and the DCHI port number.

Prompt	Response	Description
REQ	CHG	Modify existing data base
TYPE	CFN	Configuration data block
ADAN	0-63	The DPNSS1 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 Overlay 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.**
DPNS	YES	Indicates that the DCHI is being used for DPNSS1
PARM	YES	To allow changes to the system buffers
....		

Prompt	Response	Description
DTIB	35-1000	Size of IDA trunk input buffers for entire system (determined according to traffic) 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) The system must be initialized to invoke changes to DTOB
....		
CEQU	YES	To allow changes to the Common Equipment parameters
....		
DDCS	0-159 0-255	The PRI loop number for the new DPNSS1 link. Enter multiples separated with a space. PRI loop numbers may have to be even values if the adjacent loop on the network pack is programmed

LD 73 – Define clock synchronization control.

Prompt	Response	Description
REQ	CHG	Modify existing data base
TYPE	PRI2	2.0 Mb/s PRI
FEAT	SYTI	Digital system timers
PREF CK0	0-159 0-255	The primary reference loop numbers for clock controller 0
PREF CK1	0-159 0-255	The primary reference loop numbers for clock controller 1
SREF CK0	0-159 0-255	The secondary reference loop numbers for clock controller 0

Prompt	Response	Description
SREF CK1	0-159 0-255	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 in LD 60. To track on a primary or secondary reference clock, the command is: TRCKPCK(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 the data blocks used for the DPNSS1 protocols.

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

Prompt	Response	Description
DDSL		The D Channel port number, entered in LD 17
		Group G
	0-15	If 0 entered to S2 prompt
	16-255	If 1 entered to S2 prompt
		Group H
	0-63	If 0 entered to S2 prompt
	16-255	If 1 entered to S2 prompt
SIGL	DA	DPNSS1 digital signaling
DDCS	0-159	Loop number used for the PRI link
PRIV	YES	Private DPNSS1 link
SIDE	BNT	The BNT end of DPNSS1 link
CNTL	YES (NO)	YES = change DPNSS1 link parameters NO = use default parameters
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 on the following page.
CNTR	0- 255	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.
	(CRT) (TMT) (SCT)	The defaults are: CRT (channel reset threshold) 120 TMT (test message threshold) 50 SCT (stop count threshold) 20

Table 10 on page 70 lists the alarm condition thresholds that pertain to the ALRM prompt in LD 74.

Table 10
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 TSF	0-15 mins (1) 0-15 secs (0)	0-24 hrs (1) 0-24 hrs (0)	0-15 (10) 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 DPNSS1 customer.

Prompt	Response	Description
REQ:	NEW CHG	
TYPE:	NET	Networking Data)
CUST		Customer number
	0-99	For Large Systems
	0-31	For Small Systems and Succession 1000 systems
LSC	1-9999	Local Steering Code of one to four digits, if required in the Coordinated Dialing Plan (CDP).
....		

Prompt	Response	Description
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 xxxx	Enter the access code that is to be placed on displays before OLIs and TLIs received from the DPNSS1 trunk Entering the attendant's DN will remove an existing value. The value defaults to nothing if <cr> is entered.

LD 16 – Create the service routes.

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
ROUT	 0-511 0-127	Route number For Large Systems For Small Systems and Succession 1000 systems
TKTP	IDA	The trunk type (DPNSS1)
SIGL	DPN	The route type (DPNSS1)
....		
ICOG	IAO ICT OGT	Defines the route as both incoming and outgoing Defines the route as incoming only Defines the route as outgoing only

Prompt	**Response**	**Description**
....		
ACOD	xxxx	The four-digit network access code for direct access to the route Note that after the initial set up, the ACOD will only be used for testing purposes

LD 14 – Create the channels within the service routes.

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. NEW and OUT may be followed by the number of channels being initialized (1-30)
TYPE	RDC VDC	Real Digital Channel Virtual Digital Channel
TN	lll c l s c u c u	Terminal Number loop number (0-159) and channel number (1-15/17-31) for Real channel For DPNSS1, real and virtual channels use the same TN. For Large Systems 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
	16-255	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
	16-255	If NT5K75 or NT6D11AE DCHI is set in expanded mode

Prompt	Response	Description
SIGL	DPN	DPNSS1 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
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
		<u>Loop X Member Channel</u> <u>Loop Y Member Channel</u> 1 1 31 1 2 2 30 2 . . . . 15 15 17 15 17 17 15 17 . . . . 31 31 1 31
PRIO	(XHP)	High priority on channel seizure
	YLP	Low priority on channel seizure
		The high/low priority must be different at each end.

LD 75 – Bring the DPNSS1 link into service, using the IDA Trunk Maintenance program

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)

Note: The NT8D72BA PRI card is required to support EuroISDN applications, and should be set to 120 ohm impedance. The NT5D97 PRI card also supports the EuroISDN applications

Attendant Call Offer

Contents

This section contains information on the following topics:

Feature description

The DPNSS1 Attendant Call Offer feature allows attendant-extended calls routed over DPNSS1 to be camped-on to a remote busy extension. This Call Offer functionality is provided over a DPNSS1 network or over a DPNSS1 to ISDN gateway.

After being offered the camp-on, the destination party has the option of either accepting the offer, or not. During the camp-on offer, the destination party receives camp-on tone, heard over the conversation. The destination party accepts the call offer by clearing the established call (the offered call may not be accepted by simply placing the established call on hold). The destination party rejects the call offer by not answering it.

If the busy party goes on hook, allowing the offered call to ring the telephone, the recall timer for the call is reset to the value programmed for ringing calls.

If the call remains unanswered when this timer expires, the offered call is recalled to the attendant queue. If the call is accepted, the originating party receives ringback until the destination party goes off hook to answer the call.

If the call is not accepted, the camp-on is recalled to the attendant after the camp-on timer times out. Timing for camp-on recall begins as soon as the attendant presses the Release key to extend the camp-on to the destination party. The destination party may still answer the camp-on as long as the call is still on the attendant console (that is, while the attendant is talking to the source). The attendant may clear the camp-on by releasing the destination.

Operating parameters

The Timed Reminder Recall feature for DPNSS1 must be equipped.

Call Offer over DPNSS1 applies only to attendants with an established call on the source side. An attendant can then camp-on a call only if the destination station is on an established call.

An enquiry call cannot camp-on to a busy station without attendant intervention — the camp-on attempt is rejected. An enquiry call exists when two stations are established in a simple connection, and one station offers a call transfer to another station. The set making the call transfer places the other established station on hold before making the call transfer. If the busy station has Call Waiting Allowed Class of Service, the call offer will be presented to the busy station as a call waiting call.

Only one call at a time may be camped-on to a busy destination station.

Camping-on is possible to a telephone in a ringback or dialing state.

Calls cannot be camped-on to a busy destination station with Call Waiting Allowed Class of Service, or that is second degree busy.

During Night Service, any camped-on call is cancelled and recalled to the night DN or re-routed to an attendant at another node if NAS is configured and active.

If mixed ISDN/DPNSS1 route lists are programmed at a gateway node, an incoming call over an ISDN route that uses an outgoing DPNSS1 route for a first call without call offer, will use the same DPNSS1 route for a call offer.

Feature interactions

Camp-on

The destination receives camp-on tone if the destination set has Warning Tone Allowed Class of Service, and Camp-on Tone Allowed has been configured for the customer in Overlay 15 (the Customer Data Block).

Semi-Automatic Camp-on

Semi-Automatic Camp-on does not function over DPNSS1.

DPNSS1 Executive Intrusion Conversion

DPNSS1 Executive Intrusion Conversion is not supported on the system.

The Flexible Orbit Prevention Timer *should be set* to a value of “0” in LD 15. A non-zero value may cause problems for DPNSS1 calls encountering call forwarding, since two consecutive calls would be initiated from the originating station to the terminating station – refer to the feature interaction description for DPNSS1 Diversion.

DPNSS1 Diversion

In the case of DPNSS1 Diversion, if a call encounters a station with Call Forward active, then a new call is initiated from the originating node to the call forward extension. The following situations are considered involving attendant-extended calls:

- An attendant extends a DPNSS1 call originating from a system, and the call does not contain a request for call offer. If the destination has Divert Busy or Divert Immediate active, then a new call is initiated as a simple call.
- If the call contains a call offer request, a new call is initiated using the new address and containing a Call Offer String.

- An attendant extends a DPNSS1 call terminating at a system, and the call does not contain a request for call offer. If the destination has Call Forward All Calls active, then the call is routed to the call forward extension. This also applies if the destination is busy, and active with Call Forward Busy.
- If the call contains a request for call offer and encounters a destination with Call Forward All Calls active, then the call is routed to the call forward extension. If the routing involves a DPNSS1 trunk, then the call will contain a Call Offer Supplementary Information String. If the call encounters a destination with Call Forward Busy active, the call is camped-on to the destination, if camp-on is allowed. If camp-on is *not* allowed, the call is routed to the call forward busy extension. If the routing involves a DPNSS1 trunk, then the call will contain a Call Offer Supplementary Information String.
- If an attendant-extended DPNSS1 call encounters Diversion Busy or Diversion Immediate at a gateway node, then a new call is initiated from the gateway node to the diverted destination. If a request for call offer was contained in the original DPNSS1 call, it will also be contained in the new call. If a request for call offer was *not* contained in the original DPNSS1 call, and if the new destination is busy and camp-on is allowed on it, then the call offer request will be included in the new call.
- The displayed information normally provided by the Attendant First-Second Degree Busy Indication that indicates that a station on a far node is in first or second degree busy status, is *not* provided in an ISDN/DPNSS1 gateway scenario.
- The Slow Answer Recall Modification feature, upon recall to the attendant from the original camp-on destination, requires the attendant to dial the extension again to be able to extend and camp-on the call again.
- Integrated Services Access (ISA) Call Types are not supported over DPNSS1.
- DPNSS1 operation and features are not supported with Meridian Link.
- Where the Secrecy feature is concerned, DPNSS1 calls, while at the source of the attendant, are considered as internal calls, unless the destination is a trunk.

Feature packaging

DPNSS1 Attendant Call Offer requires DPNSS1 Network Services (DNWK) package 231.

Feature implementation

There are no specific implementation procedures for this feature.

Feature operation

No specific operating procedures are required to use this feature.

Attendant Timed Reminder Recall and Attendant Three Party Service

Contents

This section contains information on the following topics:

Feature description

This feature implements the portion of the DPNSS1 Three Party Service which relates to attendant console operation. It also extends the operation of the DPNSS1 Timed Reminder Recall feature to calls extended from attendant consoles over DPNSS1 links.

Timed Reminder Recall allows a call that is extended by an attendant over a DPNSS1 trunk, to be recalled to the attendant if not answered within a customer-defined period of time. The source and destination parties remain active in the call.

Three Party Service allows the source and destination set displays to be updated, after the extended call has been answered at the destination set.

The recall timing is implemented at the attendant node in the form of the slow answer recall timer and the camp-on timer. When the attendant extends a call to a destination extension in the ringing or call waiting state, by pressing the RLS key, the slow answer timer is started. If the extended call is camped on to a busy destination set, the camp-on timer is started.

If the idle set answers the call extension or the busy set answers the call waiting, the slow answer timer is stopped and the attendant node becomes a standard transit node. Messaging is immediately sent to update, by the Three Party Service feature, the displays on the source and destination sets.

If the busy set becomes free to answer the camp-on, the camp-on timer is stopped, the set receives ringing and the slow answer timer is started. If the call is answered, the slow answer timer is stopped and the attendant node becomes a standard transit node. The displays on the source and destination sets are updated.

If the slow answer recall timer expires, the source is recalled to the attendant, with the destination party still ringing or busy (in the case of call waiting). The attendant may extend the call once more by pressing the Release key. This causes the slow answer timer to start again. If the camp-on timer expires, the source is recalled to the attendant. The attendant may extend the camp-on once more by pressing the Release key. This causes the camp-on timer to start again.

It may be that the attendant node is a gateway node. If a call on the source comes in over an ISDN trunk and is extended to the destination over a DPNSS1 trunk, then recall timing is done by the DPNSS1 Timed Reminder Recall feature. After the attendant extends the call and the destination answers, the recall timer is stopped. The controlling (attendant) node sends signaling to the destination node, to update the display of the destination set. The display on the source set is updated only if Network Call Redirection feature is equipped. If the recall timer expires before the destination answers the call, the source is recalled to the attendant with no messaging being sent over the ISDN link.

If the source comes in over a DPNSS1 link and is extended to the destination over an ISDN link, then the recall timing is done by the Network Attendant Service (NAS) feature. After the attendant extends the call and the destination answers, the recall timer is stopped. The controlling (attendant) node sends signaling to the source node, to update the display of the source set. The display on the destination set is not updated by NAS; it is updated only if Network Call Redirection feature is equipped, and the call has been extended after the destination party has answered. If the recall timer expires before the destination answers the call, the source is recalled to the attendant with no messaging being sent over the DPNSS1 link. If the attendant transfers the call after it has been answered by the destination, the display of the source set is updated by Three Party Service signaling. The display of the destination set is updated if Network Call Redirection is equipped.

Operating parameters

The slow answer timer is used for calls extended to a set in the call waiting state.

Feature interactions

Automatic Call Distribution

If a call is extended over a DPNSS1 link to an Automatic Call Distribution (ACD) set, the controlling node will time for a slow answer recall while the call is in the ACD queue at the destination node.

Attendant to Attendant calls

Recall timing is not performed for attendant-to-attendant calls.

Call waiting

For calls extended over a DPNSS1 link, the slow answer recall timer is used instead of the call waiting recall timer, since the system does not distinguish between a call extended to a set that is idle or in call waiting state.

DPNSS Call Redirection

To prevent recall timing from being done at the originating node if the timing is done at the controlling node, the EEM messages TRFD and RECON are not sent from the controlling node to other parties involved in the call (this inhibits the DPNSS1 Call Redirection feature).

DPNSS Loop Avoidance

The DPNSS1 Loop Avoidance string (LA) may be added to the Initial Service Request Message (ISRM) of an enquiry call.

DPNSS Route Optimization

The Attendant Three Party Service at a controlling node initiates the signaling sequence that causes the DPNSS1 Route Optimization feature, equipped on the originating node, to optimize the route between the originating and destination parties.

ICI key

A Recall ICI key that has been defined in the customer data block lights up when DPNSS1 timed reminder recall occurs.

Night Service

If the recall occurs when the customer is in Night Service, then external calls are routed to the Night DN. Internal calls will remain in the queue, waiting for the called party to answer. This functionality applies to calls extended over ISDN and DPNSS1 trunks.

Permanently Held calls

If, while extending a call, the attendant presses the HOLD key before pressing the RLS key, the call is placed on permanent hold on the loop key. The call is subject to the Timed Recall feature.

Recall key

Pressing the Recall key on a set has no effect, if the set is connected to the attendant over a DPNSS1 trunk and is being timed for slow answer recall or camp-on recall.

Recall to the Same Attendant

If the Recall to the Same Attendant feature is configured for an attendant, slow answer recalls and camp-on recalls occur to the same attendant.

Secrecy

If the Secrecy feature is activated by the attendant, the source side of a call being extended by the attendant is excluded if the destination is a trunk. As applied to a DPNSS1 trunk, the Calling Line Category received from the trunk must be DEC, DASS2, PSTN, or MF5.

Slow Answer Modification

If the Slow Answer Modification feature is activated by the attendant, the destination party is dropped when the recall occurs to the attendant.

Semi-Automatic Camp-on

The Semi-Automatic Camp-on feature does not apply to calls extended over a DPNSS1 trunk.

Night Forward No Answer

If a call is routed during Night Service by the Network Attendant Service feature to a set over a DPNSS1 link, the Night Forward No Answer feature will not apply since the information indicating that the call has been answered cannot be sent.

Group Hunt/Group Hunt Queuing

DPNSS1 does not support either the Group Hunt or Group Hunt Queuing features.

Dialed Number Identification Service

Dialed Number Identification Service (DNIS) information (number and name) for redirected calls will be retained and available to the called party if the redirection terminates on the original node where the DNIS information is available.

Feature packaging

DPNSS1 Attendant Timed Reminder Recall and Attendant Three Party Service require DPNSS1 Network Services (DNWK) package 231.

Feature implementation

LD 15 – Define the recall attendant DN and recall timers.

Prompt	Response	Description
REQ	CHG	Modify existing data base
TYPE	ATT	Attendant Data
CUST		Customer number
	0-99	For Large Systems
	0-31	For Small Systems and Succession 1000 systems
OPT	aaa	Options
ATDN	xxxx(xxx)	The attendant DN. Recalls occur to this DN, upon expiration of the recall timer. If the DNXP package is equipped, up to 7 digits are allowed, otherwise only 4 digits can be entered
....		
RTIM	0-(30)-378	Slow answer recall timer
	0-(30)-510	Camp-on recall timer
	0-(30)-510	Call waiting recall timer

Feature operation

No specific operating procedures are required to use this feature.

Call Back When Free and Call Back When Next Used

Contents

This section contains information on the following topics:

Feature description

The DPNSS1 Call Back When Free (CBWF) and Call Back When Next Used (CBWNU) feature allows a user, upon calling a station that and finding that station to be busy or receiving no reply from a station, or upon finding congestion off a PBX to the called station, to request an automatic call-back notification when the called party becomes free (if the party was busy), or having been used (if there was no reply), or when a path between the two parties can be found (the congestion has cleared up).

On digital telephones (excluding the M2317 and M3000 sets, which are not supported in the UK), activation of CBWF and CBWNU PNSS1 CBWF and CBWNU call back requests may be initiated by pressing a set-equipped Ring Again (RGA) key or dialing a Special Prefix Code (SPRE) + 1 on digital telephones (excluding the M2317 and M3000 sets, which are not supported in the UK), or by dialing a Special Prefix Code (SPRE) + 1 on analog (500/2500-type) telephones.

After receiving a free notification, in the form of a burst of ring tone lasting for six ring cycles, the caller may ring the desired party by simply going off-hook. The call is made automatically.

Operating parameters

The following capabilities are not supported by the DPNSS1 CBWF and CBWNU feature:

- M2317 and M3000 telephone sets
- data call backs requests against data terminals
- call back requests to or from an attendant console, or from an ACD set
- call back requests from a conference call attempt
- call back requests from an enquiry call, for DPNSS1 Three Party Service
- CBWF call back requests against a set which is in maintenance busy state

DPNSS1 CBWF and CBWNU cannot be used to override access restrictions.

The Call Trace feature cannot be used to trace virtual calls used for DPNSS1 CBWF and CBWNU.

It will not be possible to pick-up a DPNSS1 CBWF notification.

DPNSS1 CBWF and CBWNU cannot be used in conjunction with the Hot Line and Enhanced Hotline features, which have their own form of call back.

An analog (500/2500-type) telephone may have only one call back request active at a time. Digital telephones may make as many call back requests as keys are available.

Subsequent call back requests from either an analog (500/2500-type) telephone or digital telephone automatically cancel an existing call back request on a set.

The Last Number Redial feature cannot be used to repeat the Ring Again SPRE or FFC used to access a DPNSS1 CBWF and CBWNU request.

DPNSS1 supports a form of interworking for MF5 call back requests. This interworking is not supported with the DPNSS1 CBWF and CBWNU feature.

DPNSS1 CBWF and CBWNU requests may not be made following a call attempt over a DPNSS1 trunk configured as a private line.

Traffic measurements are not made for virtual channels. Therefore, the virtual calls made for DPNSS1 CBWF and CBWNU requests will not affect traffic measurements.

Blocking of the called party against new incoming calls in order to allow the calling party time to accept the free notification will not be supported by the DPNSS1 CBWF and CBWNU feature.

Feature interactions

Auto-Terminate trunks

DPNSS1 CBWF and CBWNU call back requests will work in conjunction with the auto-terminate feature if the digits dialed at the originating PBX can identify both a virtual and real route to the terminating party. Also, the Originating Line Identity (OLI) and Called Line Identity (CLI) of the calling and called party, respectively, must correspond to the digits to be dialed to reach the other party from a Foreign Exchange.

Call Detail Recording

No Call Detail Recording record is produced for DPNSS1 virtual calls, which means that the DPNSS1 CBWF and CBWNU Request, Free Notify, and Cancellation activities for virtual calls will not be recorded. Call set up will be recorded if the requesting party accepts the call.

Call Forward

When an incoming DPNSS1 CBWF and CBWNU request is received and the local Call Forward feature is active, the call back request will be registered against the DN to which the set has been call forwarded. If the call has been forwarded to a DN that is outside the DPNSS1 network, the call back request will not be invoked.

Call Forward No Answer

The Call Forward No Answer feature is the non-DPNSS1 version of the DPNSS1 Diversion On No Reply, and behaves as for the DPNSS1 case.

Call Transfer

A DPNSS1 CBWF notification cannot be call transferred while it is in the ringing state. It can, however, be transferred once it is in the established state.

Call Waiting

If there is an active call on an analog (500/2500-type) telephone, the DPNSS1 CBWF notification will call wait on the set until it has finished with the active call. If there is a call waiting on an analog (500/2500-type) telephone, the DPNSS1 CBWF notification will be presented after the call waiting has been answered. If another call is presented to the set as a call waiting while CBWF notification is call waiting on the set, the waiting call will take precedence over the call back notification.

Daily Routines

At the scheduled time for daily routines, all DPNSS1 CBWNU requests will be cancelled at the called party’s exchange.

Digit Display

As for local Ring Again, the display associated with the RGA key associated with a DPNSS1 CBWF and CBWNU request will comprise of the Called Line Identity (CLI) of the called party plus any Insert Digits (INST) for the incoming route.

Directed Call Pick-Up

It will not be possible to pick-up a DPNSS1 CBWF notification.

Do Not Disturb

Sets with the Do Not Disturb (DND) feature active may make call back requests against other sets. The incoming free notification will override the DND state.

Call back requests may be made against sets that have DND active, but will not be presented to the set until DND has been deactivated.

DPNSS1 Diversion Immediate

Since DPNSS1 Diversion is not supported at a terminating exchange, incoming CBWF requests at a terminating exchange encountering Diversion will be rejected.

DPNSS1 Diversion On Busy

Incoming CBWF requests at a terminating exchange encountering Diversion On Busy will override it, with the request being presented at the called extension.

DPNSS1 Diversion On No Reply

Incoming CBWF requests at a terminating exchange encountering Diversion On No Reply will override it, with the request being presented at the called extension.

Feature Peg

DPNSS1 CBWF and CBWNU requests will be recorded against the Ring Again feature peg, if configured to do so.

Hunting and Group Hunting

An incoming CBWF free notification will not call hunt.

Initialisation

If a system initialisation occurs at an exchange, all of the call back requests will be deleted.

Insert Digits (INST) prompt

The INST prompt in Overlay 16 allows digits to be inserted as leading digits for all incoming DPNSS1 calls on an Integrated Digital Access route. To form the Destination Address (DA) for free notify, cancellation, and call set-up messages, the INST digits and the received Originating Line Identity (OLI)/ Called Line Identity (CLI) will be used to route the call for these messages.

Make Set Busy

Sets with the Make Set Busy (MSB) feature active may make call back requests against other sets. The incoming free notification will override the MSB state.

Call back requests may be made against sets that have MSB active, but will not be presented to the set until MSB has been deactivated.

Manual Line Service

Manual Line Service (MNL) sets cannot make call back requests, but call back requests may be made against MNL sets.

Multiple Appearance Directory Numbers

DPNSS1 CBWF and CBWNU requests may be made from and against a Multiple Appearance Directory Number (MADN).

Network Congestion

DPNSS1 CBWF requests may be made when network congestion is encountered, provided that dialling had been completed before busy indication was returned to the user.

Numbering Plan

A consistent DPNSS1 numbering plan is essential for the correct operation of the DPNSS1 CBWF and CBWNU feature.

Permanent Hold

An analog (500/2500-type) telephone with a call on Permanent Hold may not invoke RGA.

Pretranslation

Pretranslation may be used with DPNSS1 CBWF and CBWNU requests.

Trunk Group Busy

DPNSS1 CBWF and CBWNU call back free notifications cannot override Trunk Group Busy (TGB). This also applies to the trunk set-up for the trunk reservation.

Feature packaging

The DPNSS1 CBWF and CBWNU feature requires the following packages:

- Digital Private Networking Services No.1 (DPNSS1) package 123
- Optional Features (OPTF) package 1 is required for the Ring Again component of Call Back When Free
- Basic Call Processing (BASIC) package 0 is required for Call Back When Next Used
- Integrated Digital Access (IDA) package 122
- Supplementary Services (SUPP) package 131

Feature implementation

LD 15 – Define the special prefix code (SPRE) to be able to activate Ring Again.

Prompt	Response	Description
REQ:	CHG	Change
TYPE:	FTR	Features and options
CUST		Customer number
	0-99	For Large Systems
	0-31	For Small Systems and Succession 1000 systems
...		
- SPRE	xxxx	Special Prefix number for this customer

Prompt	Response	Description
...		

LD 57 – Define the Flexible Feature Codes (FFCs) RGA from an analog (500/2500-type) telephone. The FFCs may also be used on digital telephones.

Prompt	Response	Description
REQ	NEW CHG	New, or change
TYPE	FFC	Flexible Feature Code
CUST	xx	Customer number, as defined in LD 15
FFCT	(NO) YES	Flexible Feature Confirmation tone
CODE	mmmm	Specific FFC type
...		
- RGA	RGA xxxx	Ring Again code Enter the Flexible Feature Code
...		

LD 11 – Add/Change a Ring Again Key on digital telephones.

Prompt	Response	Description
REQ:	NEW CHG	New, or change
TYPE:	xxxx	Telephone type
TN	 l s c u c u	Terminal Number For Large Systems For Small Systems and Succession 1000 systems
KEY	xx RGA	Key assignment for Ring Again

LD 15 – Enable Ring Again On No Answer for Call Back When Next Used.

Prompt	Response	Description
REQ:	CHG	Change.
TYPE:	FTR	Features and options.
CUST		Customer number.
	0-99	For Large Systems
	0-31	For Small Systems and Succession 1000 systems
- OPT	RNA	Enable Ring Again On No Answer.
...		

LD 16 – Configure the Network Ring Again timer over IDA routes.

Prompt	Response	Description
REQ	NEW	New.
TYPE	RDB	Route Data Block.
CUST	xx	Customer number, as defined in LD 15.
...		
TKTP	IDA	Integrated Digital Access route.
...		
CNTL	YES	To display the TIMR prompt.
...		
TIMR	NRAG (30)-240	Network Ring Again Timer for IDA routes.
...		

Feature operation

To activate DPNSS1 CBWF and CBWNU call back requests, follow these procedures.

Digital set (except the M2317 and M3000)

1 Press RGA key, or dial SPRE + 1 or RGA FFC.

2 Wait for confirmation tone, and then hang up.

When the busy party becomes free or a clear path has been found, your set will receive a burst of ring tone lasting six ring cycles.

3 To place a call to the other party, simply go off hook, and the party's extension will be rung.

Analog (500/2500-type) telephones

1 Dial SPRE + 1 or RGA FFC.

2 Wait for confirmation tone, and then hang up.

When the busy party becomes free or a clear path has been found, your set will receive a burst of ring tone lasting six ring cycles.

3 To place a call to the other party, simply go off hook, and the party's extension will be rung.

Customer Controlled Routing with Digital Private Network Signaling System

Contents

This section contains information on the following topics:

Feature description

Previously, the Customer Controlled Routing (CCR) application did not apply to Digital Access Signaling System (DASS) or Digital Private Network Signaling System (DPNSS) trunks; therefore, if a call was made to a Control DN (CDN) from a DASS/DPNSS trunk it would be rejected.

The CCR with DPNSS feature enables incoming calls to a CDN over DASS/DPNSS trunks to be controlled by the CCR application script.

Operating parameters

DPNSS signaling will support CCR in the same manner as it is supported by ISDN trunks. DASS signaling will support CCR in the same manner as it is supported by CO (non ISDN)/DID trunks, except when Force Busy is the first treatment (busy tone will be provided to DASS instead of the default treatment provided by the CO/DID trunk).

DPNSS Signaling Timers

For DPNSS trunks, a timer is set on the originating switch on a route basis (from 128 to 32640 ms) that will clear the call if it times-out. This timer will time-out if no message is received in acknowledgment after sending out a message on the link. Therefore, calls may be cleared by the originating side of any transit DPNSS link.

The CCR timer has a value of from four to six seconds. If the CCR application fails to respond to an incoming call within the six-second time frame, the call will be given default treatment by the switch.

When configuring a network attention must be paid to setting the DPNSS route timers on transit nodes, because these timers may cause the clearing of some calls. A 10-second value for DPNSS trunks is recommended so that even if the CCR application cannot respond with in the CCR timer, the call can still receive default treatment, instead of being cleared (abandoned).

Networking

If the CDN is not on the terminating node of the DASS trunk but the call goes through a DASS/DPNSS or DASS/ISDN gateway, in cases such as unanswered calls receiving second or third treatment, tones are provided to the transit node, but not to the Public Exchange because of DASS operation specifications. An example is when it is desired to provide tones (e.g., silence, ringback, or busy) to an unanswered DASS call where the CDN is reached through a DPNSS or ISDN trunk. In this situation, the tone will not reach the Public Exchange and therefore the originator of the call. The originator does not receive the tone that is sent; instead the previous treatment continues.

One potential result from this operation of when the CCR sends a tone, and waits for the originator to clear the call, is that the originator may be listening to ringback, but in fact should be hearing a busy tone.

A user may also receive different handling of the call than desired, depending on the routing of the call. For example, the CDN may be reached directly through DASS, or directly through an ISDN Central Office, through a transit node with DASS/DPNSS, or through a DASS/ISDN gateway. Call handling might vary depending on which one of these paths the call traversed.

The following hardware is required to operate this feature: NTRB53 or QPC775 Clock Controllers; QPC414 network card; NT8D72AA PRI2 pack, and NT5K75AA DCH card.

Feature interactions

Calling Line Identification (CLID)

Most of the time DPNSS provides Originating Line Identities (OLIs). DASS may provide this information, but it is not required. OLI, similar to CLID, identifies the calling party number when a switch terminates an incoming call. If OLI is not provided, the Trunk Access Code/Trunk Member Number are passed in the enhanced Application Module Link (AML) messages.

Although the maximum number of digits provided by the DASS/DPNSS OLI is 24, only the last 16 are passed as identification of the caller in the enhanced AML messages.

DPSNSS Supplementary Services

All DPNSS Supplementary Services might not be triggered for all CCR treatments. Supplementary Services might not work with certain CCR treatments because messages (NAM/CAM or CCM) can be sent without the corresponding action as expected by the Supplementary Services, or some busy or overflow situations are indicated only by tones and not with the corresponding signaling.

Route Optimization, Call Offer, Redirection, Timed Reminder Recall, and Three-party Service are supported for CCR calls.

Call Back When Free, Call Back When Next Used, Loop Avoidance, and Step Back on Congestion are not supported for CCR calls.

Gateways

The gateway interaction can only occur when the CCR “Route to” command is used to route a call to another destination over another trunk. For incoming calls on DASS/DPNSS, “Route to” over trunks for which no gateway already exists is not supported.

If a gateway already exists with another type of trunk, there is no interaction if the command “Route to” is used as a first treatment. Interactions may occur if it is used as a second or later treatment.

Incoming DASS/DPNSS Calls Routed over ISDN with the Existing DASS/DPNSS – ISDN Gateway

The current gateway triggers DASS/DPNSS signaling messages related to the ISDN signaling messages received. If the command “Route to” is used as a first treatment, these messages are provided (i.e., NIM, CAM/NAM, CCM, CRM) as usual, without any interaction. The called/calling party is displayed correctly at the originator and destination sides.

With the existing gateway, interactions may only occur if “Route to” is used as a second or later treatment in the following situations:

- on incoming DASS/DPNSS calls that are routed over ISDN then an analog network, and
- on incoming DASS/DPNSS calls that are routed over ISDN to a destination that is busy.

In these situations, there is a chance that the displays will not be updated when the final destination answers the call (especially when the call has been already answered via a previous CCR treatment).

Interactions may result because a DPNSS NIM message can be sent if an ISDN PROGRESS message is received, a DASS/DPNSS CRM can be sent if an ISDN DISCONNECT message is received, or a DASS/DPNSS CRM can be sent if an ISDN FACILITY message is received.

The other signaling messages (NAM/CAM and CCM) do not interact (e.g., they are not sent if not allowed).

Incoming DASS/DPNSS Call Routed over DPNSS

If the command “Route to” is used as a first treatment, the messages are provided (NIM, CAM/NAM, CCM, CRM) as usual without any interaction when the call has been routed directly from DASS/DPNSS to DASS/DPNSS.

The called/calling party will be displayed correctly on both the originator and destination sides.

Interactions only occur if “Route to” is used as a second or later treatment on incoming DASS/DPNSS calls that are routed over DPNSS to a busy or invalid destination (any state generating a disconnection resulting in a CRM message that is not consistent with the previous ringing or established call state due to CCR). There is a chance that the displays will not be updated when the final destination answers the call (especially when the call has been already answered via a previous CCR treatment).

Incoming DASS/DPNSS Call Routed over analog or DTI2 Trunks

If the command “Route to” is used as a first treatment to route a DASS/DPNSS call over these trunks, there is no interaction. The call should evolve as it had been routed directly over analog or DTI2 trunks.

If “Route to” is a second or later treatment, there is no interaction if the termination is idle and the call is answered by the destination (no CCM message will be returned if it was already returned due to a previous CCR treatment).

If the call over the analog or DTI2 trunk cannot terminate (e.g., invalid DN, busy DN or congestion) a potential interaction is that a CRM can be sent with a clearing cause incompatible with the current state of the call (ringing or established) due to previous CCR treatments.

Incoming ISDN Call Routed over DPNSS with the Existing ISDN – DASS/DPNSS gateway

The current gateway triggers ISDN signaling messages related to the DASS/DPNSS signaling messages received. The existing gateway interactions should only occur if “Route to” is used as a second or later command in the following situations:

- an incoming ISDN call is routed over DASS/DPNSS to an idle set, if the call is in the unanswered state

- the call is routed over DASS/DPNSS and analog trunks or any non IDA trunk, and
- the call is routed over DASS/DPNSS to a destination busy (i.e., any state generating disconnection or a facility message that is not consistent with the previous ringing or established state of the call due to CCR).

There is a chance that the displays will not be updated when the final destination answers the call if a second or later treatment has been used (especially when the call has been already answered via a previous CCR treatment).

If "Route to" is used as a second or later treatment (an ALERT or ALERT + CONNECT has already been sent by the CCR previous treatment), there are potential interactions in the following situations:

- an ALERT message is sent when an NAM/CAM message is received, if the call is not yet established (e.g., only an ALERT has been already returned because of previous CCR treatments)
- a PROGRESS message is sent when an NAM/CAM or NIM message is received
- a DISCONNECT message is sent when a CRM message is received (an interaction may occur if the reason for disconnection passed is not consistent with the previous state of the call due to CCR), and
- a FACILITY message is returned because of a CRM received (related to busy state with camp-on).

The answer should not trigger additional CONNECT messages and consequently should not trigger interactions.

Feature packaging

There is no new software package for this feature; however, the following packages are required for DASS/DPNSS signaling:

- Integrated Digital Access (IDA) package 122

- 2 Mbit Primary Rate Access (PRI2) package 154
- Digital Private Network Signaling System 1 (DPN) package 123 for DPNSS or Digital Access Signaling System 2 (DAS) for DASS.

Feature implementation

There are no specific implementation procedures for this feature.

Feature operation

No specific operating procedures are required to use this feature.

DASS2/DPNSS1 INIT Call Cut Off

Contents

This section contains information on the following topics:

Feature description

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 the Clear Request Message (CRM). On some third-party PBXs 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 PBXs.

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 or Succession 1000.

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 Signaling 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 signalling type, one of 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 Signalling No.1 link data block.

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
PRIV	 (YES) NO	Private link where: DPNSS1 DASS2

Prompt	Response	Description
- 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 will be left disabled after INIT occurs.

Feature operation

No specific operating procedures are required to use this feature.

DPNSS1/DASS2 Uniform Dialing Plan Interworking

Contents

This section contains information on the following topics:

Feature description

The Digital Private Network Signaling System (DPNSS1)/Digital Access Signaling System (DASS2) Uniform Dialing Plan (UDP) Interworking feature enables DPNSS1 to use Uniform Dialing Plan numbering. The feature allows DPNSS1 calls to be routed from a switch in one geographical location to another switch in any other geographical location in a cost-effective and easy-to-use manner via the Network Alternate Route Selection (NARS) and Basic Alternate Route Selection (BARS) features.

The following NARS/BARS functions are supported by this development:

- On-network routing over DPNSS1 using a standardized dialing format (Access Code (AC) - Location Code (LOC) - destination DN).

- Off-network routing and break-outs to supported public network interfaces.
- Incoming DASS2 calls routed through the UDP DPNSS1 with NARS if the received digits are in the format AC - LOC or AC-SPN Special Number (SPN) - X...X, or if an Incoming Digit Conversion (IDC) table is applied to generate a number in such a format. In this case, all NARS functionalities supported on DPNSS1 apply to the incoming DASS2 call.
- Least cost route selection by arranging the routes based on relative cost.
- Route control allowing or restricting access to routes based on their restriction level, the time of day, or the dialed sequence.
- Simple calls using UDP numbering across the DPNSS1 Meridian Customer Defined Network (MCDN) gateway, operating with either enbloc or overlap sending and receiving.
- The following DPNSS1 Supplementary Services are supported on UDP DPNSS1 and across the DPNSS1 MCDN gateway:
  - Call Back When Free
  - Call Back When Next Used
  - Executive Intrusion
  - Loop Avoidance
- The following DPNSS1 Supplementary Services are supported on UDP DPNSS1
  - Three-Party
  - Call Offer
  - Redirection
  - Step Back on Congestion
  - Route Optimisation

With DPNSS1, no parameters are exchanged between the switches to indicate whether a Coordinated Dialing Plan (CDP) or UDP number is being sent. To bypass this situation, the MCDN Insert Access Code (INAC) prompt is extended to DPNSS1 on a per route basis to indicate whether the route is dedicated for the reception of UDP numbers, or non-UDP numbers and UDP numbers with a NARS access code.

Operating parameters

The BARS feature by itself (i.e., without NARS) is not supported.

If INAC = YES, an incoming DPNSS1 route only supports UDP numbers with or without the NARS Access Code. If INAC = NO, both non-UDP and UDP numbers are supported providing UDP numbers are appended with the local NARS Access Code.

All HLOCs, LOCs and SPNs NARS codes for a customer must be leftwise unique.

At an originating node, the Traveling Class of Service (TCOS) is not transmitted over DPNSS1. At a receiving node, the Network Class of Service's Facility Restriction Level of the incoming trunk group is used for any further check on access restrictions.

Any number made up of a Route Access Code followed by a DN, received on a route configured with the INAC prompt set to YES, is blocked.

CBWF/CBWNU, Loop Avoidance, Three-Party, Call Offer, Redirection, Step Back on Congestion, Route Optimisation, and Executive Intrusion are the only supported Supplementary Services on a DPNSS1 UDP.

The following hardware is required (minimum vintage):

- DASS2/DPNSS1 D-channel Interface Handler
  - Standard Mode (0-15 D-channels) – NT5K35AA
  - Expanded Mode (0-159 D-channels) – NT5K75AA
- 2 Mbps Primary Rate Interface Card – NT8D72AA
- PRI card for MCDN/DPNSS1 – NT6D11AE
- Network Interface Card – QPC414

- Clock Controller Card – QPC775D
- D-channel Handler (for small systems)

Feature interactions

Access Restrictions

The connection between the network user (extension or trunk) and the DPNSS1 UDP trunk can be barred based on the Class of Service Restrictions of the parties involved. The connection between the network user (extension or trunk) and the DPNSS1 trunk can also be barred based on the Trunk Group Access Restrictions feature. It is possible to bar the connection between originator and terminator through a DPNSS1 UDP trunk based on the DPNSS1 signaling information.

The Code Restriction sub-feature is not supported.

Attendant Alternate Answering

If an incoming DPNSS1 UDP call presented to an idle loop key of an attendant is not answered within a predefined period of time, the call can be rerouted to the Attendant Alternate DN.

Attendant Interpositional Transfer

This feature is supported in a UDP DPNSS1 network. An attendant can call or transfer a call to another attendant in a multiple-console group, even when the destination attendant console is busy.

Attendant Overflow Position

This feature is supported on a UDP DPNSS1 network. If an incoming DPNSS1 UDP call is queued to the attendant, and if the call is not answered within a predefined period of time, the call can be redirected to the Attendant Overflow DN.

Automatic Call Distribution (ACD)

This feature is supported; however, when a call is answered by an agent through a DPNSS1 UDP route, the display on the originator’s set is not updated when the ACD agent answers the call.

Call Detail Recording

This feature is supported in a DPNSS1 UDP network. The following items should be noted:

- If an expensive route (EXP prompt in the Route List Index block) is used to route the call, and if the calling party is allowed the expensive route warning tone (RWTA prompt in Network Control block), the Digit Type Identifier field is "E" in the call record output; otherwise it is "A".
- If both NARS and BARS packages are equipped in a DPNSS1 UDP network, the Digits field in the call record follows the BARS format. If the Outpulsed Digits feature is used, and OPD = NO, the Route Access Code (ACOD) + the digits dialed after the NARS/BARS Access Code are displayed in the call output record. If the Outpulsed Digits feature is used, and OPD = YES, the Route Access Code + the outpulsed digits are displayed in the call output record.

Call Forward

Calls can be forwarded to and from a DPNSS1 UDP network.

Call Party Name Display

This feature is supported in a DPNSS1 UDP network. Names can be associated with the access codes of the DPNSS1 UDP routes defined in LD 95.

Call Pickup

This feature is supported in a DPNSS1 UDP network.

Custom Call Routing

This feature is not supported in a DPNSS1 UDP network.

Digit Display

The digit display rules for DPNSS1 UDP are based on what is currently done on an MCDN network.

Direct Inward Dialing

This feature is supported in a DPNSS1 UDP network. A connection between a DASS2 DID trunk and a DPNSS1 UDP trunk can be barred using the DITI option in the Customer Data Block.

Direct Inward System Access

This feature is not supported.

DPNSS1 Gateway

The supplementary services supported in a DPNSS1 UDP network are Call Back When Free/Call Back When Next Used, Loop Avoidance, Three-Party, Call Offer, Redirection, and Executive Intrusion.

Electronic Switched Network (ESN)

The DPNSS1/DASS2 Uniform Dialing Plan Interworking feature is a form of ESN routing. The following list describes which ESN functionalities are applicable to a DPNSS1 UDP network.

Alternative Routing for DID/DOD

This feature is supported in a DPNSS1 UDP network.

Basic Alternate Route Selection

The BARS feature alone is not supported.

Coordinated Dialing Plan

Non-UDP and UDP numbers, if they are appended with the NARS access code, received on a route configured with INAC set to NO are now able to terminate, transit, or be sent across the gateway if they are valid.

ESN Signaling (Network Signaling)

The Network Signaling feature is incompatible with DPNSS1 routes.

Eleven Digit Translation

This feature is supported in a DPNSS1 UDP network. Numbers received on an incoming UDP DPNSS1 route can be translated with the existing NARS translator up to 11 digits for route selection.

Flexible Call Back Queuing

This feature is incompatible with DPNSS1 routes.

Flexible ESN 0 Routing

This feature is not supported in a DPNSS1 UDP network.

Flexible Numbering Plan

This feature is supported in a DPNSS1 UDP network.

Free Calling Area Screening
Free Special Number Screening

These features are not supported in a DPNSS1 UDP network.

Incoming Trunk Group Exclusion

This feature is supported in a DPNSS1 UDP network.

Multiple DID Office Code Screening

This feature is not supported in a DPNSS1 UDP network.

NARS Traffic Measurement (Network Traffic Measurement)

This feature is supported in a DPNSS1 UDP network in the following areas:

- Routing Traffic Measurements – provides data related to route list utilization, and
- NCOS Measurements – provides data about the quality of service for a defined NCOS group.

Network Authorization Code

This feature is supported in a DPNSS1 UDP network.

Network Control

This feature is supported in a DPNSS1 UDP network.

Network Routing Control

This feature is supported in a DPNSS1 UDP network.

Network Speed Call

This feature is supported in a DPNSS1 UDP network.

Network Call Transfer

This feature is not applicable to a DPNSS1 UDP network, as it only applies to analog trunks.

Network Queuing (Call Back Queuing)

This feature is incompatible with DPNSS1 routes.

Off-Hook Queuing

This feature is not supported in a DPNSS1 UDP network.

Off-Network Number Recognition

This feature is supported in a DPNSS1 UDP network.

Priority Queuing

This feature is incompatible with DPNSS1 routes.

Special Common Carrier Access

This feature is not supported in a DPNSS1 UDP network.

Tone Detection

This feature is not supported in a DPNSS1 UDP network.

1+ Dialing

This feature is not supported in a DPNSS1 UDP network.

Group Hunting

Only basic DPNSS1 UDP calls are supported with group hunting. Interactions between DPNSS1 Supplementary Services and Group Hunting are not supported.

Incoming DID Digit Conversion (IDC)

An IDC table can be used to convert digits received on a DASS2 DID trunk into a digit string having the UDP format. This allows a DASS2 DID call to access the DPNSS1 UDP network.

Intercept

The NARS blocking treatments that can be defined through the Intercept feature are applicable to a DPNSS1 UDP network.

Intercept Computer

This feature is not supported in a DPNSS1 UDP network.

Interchangeable NPA/NXX

This feature is not supported in a DPNSS1 UDP network.

Meridian Link

This feature is not supported in a DPNSS1-UDP network.

Meridian Mail

This feature is not supported in a DPNSS1 network.

Meridian Mail, Standalone

This feature is supported in a DPNSS1 UDP network.

Network Message Services

This feature is not supported in a DPNSS1 UDP network.

New Flexible Code Restrictions (NFCR)

Toll-denied users (CLS = TLD) may be subject to NFCR if they make a NARS call across the DPNSS1 UDP network. This feature is supported in a DPNSS1 UDP network.

Overlap Signaling

This feature is supported in a DPNSS1 UDP network.

Pretranslation

This feature is supported in a DPNSS1 UDP network.

Recorded Announcement for Calls Diverted to External Trunks

This feature is not supported in a DPNSS1 UDP network.

Route Optimisation

This DPNSS1 feature is supported.

R2MFC to DPNSS1 Gateway

This gateway is supported with UDP numbers at the same level as it is supported with CDP numbers.

Special Dial Tone after Dialed Numbers

This feature is supported in a DPNSS1 UDP network.

Feature packaging

The DPNSS1/DASS2 Uniform Dialing Plan Interworking feature is part of basic system software. The following package is also required:

- Network Alternate Route Selection (NARS) package 58

Basic Alternate Route Selection (BARS) package 57 may also be equipped

For on-net and off-net routing capabilities, the following package is required:

- Flexible Numbering Plan (FNP) package 160

If more ESN functions are desired, the following packages are required:

- Network Traffic Measurement (NTRF) package 29
- Network Authorization Code (NAUT) package 63
- Basic Authorization Code (BAUT) package 25
- System Speed Call (SSC) package 34
- Network Speed Call (NSCL) package 39
- Directory Number Expansion (DNXP) package 150

If a Group Dialing Plan is to be used, the following package is required:

- Coordinated Dialing Plan (CDP) package 59

If displays are required, the following package must be equipped:

- Digit Display (DDSP) package 19

The following packages are required for DASS2/DPNSS1:

- Integrated Digital Access (IDA) package 122
- Digital Private Network Signaling System 1 (DPNSS) package 123
- Digital Access Signaling System 2 (DASS2) package 124
- International Supplementary Features (SUPP) package 131
- 2.0 Mbps Primary Rate Interface (PRI2) package 154 is a prerequisite.

Feature implementation

LD 87 – Define the NCOS groups to which the users will belong.

Prompt	Response	Description
REQ	NEW	New
CUST	xx	Customer number, as defined in LD 15
FEAT	NCTL	Network Control Block

Prompt	Response	Description
NCOS	0-99	Network Class of Service
FRL	0-7	Facility Restriction Level
RWTA	(NO), YES	Expensive Route Warning Tone

LD 86 – Define the NARS feature parameters (all prompts of the ESN Block are applicable to a DPNSS1 UDP network).

Prompt	Response	Description
REQ	NEW	New
	xx	Customer number, as defined in Load 15
FEAT	ESN	Electronic Switched Network
...		
AC1	xx	NARS Access Code 1 (1-4 digits if Flexible Numbering Plan (FNP) package 160 is equipped; otherwise 1-2 digits)
AC2	xx	NARS Access Code 2 (1-4 digits if Flexible Numbering Plan (FNP) package 160 is equipped; otherwise 1-2 digits)

LD 86 – Define the Digit Manipulation tables.

Prompt	Response	Description
REQ	NEW	New
CUST	xx	Customer number, as defined in LD 15
FEAT	DGT	Digit Manipulation Table
DMI	x...x	Digit Manipulation Table Index

LD 86 – Define the Route List blocks.

Prompt	Response	Description
REQ	NEW	New
CUST	xx	Customer number, as defined in Load 15
FEAT	RLB	Route List Block
RLI	x...x	Route List Index number
ENTR	0-63	Entry number
ROUT	 0-511 0-127	Route number associated with the index For Large Systems For Small Systems and Succession 1000 systems
...		
OHQ	NO	On-Hook Queuing is not supported in a DPNSS1 UDP network (ROUT is a DPNSS1 route)
CBQ	NO	Call Back Queuing is not supported in a DPNSS1 UDP network (ROUT is a DPNSS1 route)

LD 90 – Define the NARS LOC translation table.

Prompt	Response	Description
REQ	NEW	New
CUST	xx	Customer number, as defined in LD 15
FEAT	NET	Network Translation Table
TRAN	AC1	NARS Access Code 1 (1-2 digits)
TYPE	LOC	Location Code
LOC	x...x	Location Code (3-7 digits)

Prompt	Response	Description
FLEN	(0)-10	Flexible number of digits for Location Code (prompted if Flexible Numbering Plan (FNP) package 160 is equipped)
RLI	x...x	Route Line Index

LD 90 – Define the NARS HLOC translation table.

Prompt	Response	Description
REQ	NEW	New
CUST	xx	Customer number, as defined in Load 15
FEAT	NET	Network Translation Table
TRAN	AC1	NARS Access Code 1 (1-2 digits)
TYPE	HLOC	Home Location Code
LOC	x...x	Home Location Code (3-7 digits)
DMI	x...x	Digit Manipulation Table Index

LD 16 – Select the DPNSS1 UDP routes.

Prompt	Response	Description
REQ	CHG	Change
TYPE	RDB	Route Data Block
...		
TKTP	IDA	Integrated Digital Access
SIGL	DPN	DPNSS1 signaling on this route
...		
RCLS	...	

Prompt	Response	Description
- INAC	YES	NARS DPNSS1 UDP route
- SPN	(YES), NO	Insert first the LOC's Access Code to search for a valid UDP number

LD 15 – Configure the Home Location Code (HLOC) in the Customer Data Block to use the UDP digit format on DPNSS1 UDP routes.

Prompt	Response	Description
REQ:	CHG	Change
TYPE:	NET	Networking data
...		
HLOC	100-9999	Home Location Code (the HLOC entered here should be the same as that defined in the NET block)

LD 90 – Define SPN numbers.

Prompt	Response	Description
REQ	NEW CHG OUT	Create, change, or remove data.
CUST	xx	Customer number, as defined in Load 15
FEAT	NET	Network Translation Tables.
TRAN	AC1 AC2 SUM	Access Code 1, 2, or summary tables.
TYPE	SPN	Special Number translation code.
SPN	xxxx xxxx x..	Special Number translation.
RLI	0-999	Route List Index.
SDRR	aaa	Type of supplemental restriction or recognition.

Prompt	Response	Description
- DENY	x...x	A number to be denied within the SPN. The maximum number of digits allowed is 10 minus n, where n is the number of digits entered for the prompt SPN. Repeat to deny other numbers.
- ARRN	xxxxx	Alternate Routing Remote Number.
- - ARLI	0-999, <CR>	Only output if ARRN is output.
- LDID	x...x	Local DID number recognized with the NPA, NXX, or SPN.
- DMI	1-255	Digit Manipulation Table Index.
- LDDD	x...x	Local DDD number recognized within the NPA, NXX, or SPN.
- DID	x...x	Remote DID number recognized within the NPA, NXX, or SPN.
- DDD	x...x	Remote DDD number recognized within the NPA, NXX, or SPN.
- ITED	x...x	Incoming trunk group exclusion codes for NPA, NXX, or SPN.
ITEI		Incoming trunk group exclusion index.

LD 16 – Configure a Conventional Main for Off-net recognition.

Prompt	Response	Description
REQ	NEW CHG	New, or change.
TYPE	RDB	Route Data Block.
CUST	xx	Customer number, as defined in Load 15.
TKTP	TIE	TIE trunk.

Prompt	Response	Description
CNVT	(NO), YES	Route to conventional switch (prompted if the response to TKTP is TIE).
DDMI	(0)-255	Digit Manipulation Index (prompted if the response to CNVT is YES).
ATDN	xxxx	Attendant DN of Conventional Main (prompted if the response to CNVT is YES).

Feature operation

No specific operating instructions are required to use this feature; however, the following validation algorithm is used by the system.

Validation Algorithm

If a DPNSS1 UDP route is configured with INAC = YES, the following validation algorithm applies, if SPN is set to YES in the Route Data Block:

1 The SPNs NARS Access Code is appended to the received number and a valid NARS code is searched for.

2 If no valid NARS code is found, the appended SPN's NARS Access Code is stripped off and a valid SPN or LOC NARS code is searched for.

3 If no NARS code is found and if the LOC's NARS Access Code differs from the SPN's NARS Access Code, the LOC's NARS Access Code is appended to the received number and a valid LOC code is searched for.

4 If no valid LOC code is found, the appended LOC's NARS Access Code is striped off and the received number is considered invalid, and the call is released. If SPN was set to NO in the Route Data Block a similar validation algorithm applies, except that the LOC's NARS Access Code is appended first in front of the received number.

DPNSS1 to R2MFC Gateway

Contents

This section contains information on the following topics:

Feature description

There are a number of countries in Europe, Central America, and South America that require interworking to Other Equipment Manufacturer's PBXs in multivendor networking environments using Digital Private Network Signaling System One (DPNSS1). In these countries, the Central Office protocol is R2 Multifrequency Compelled Signaling (R2MFC) Direct Inward Dialing (DID) and in some cases R2MFC Direct Outward Dialing (DOD). In order for the system to operate in these environments, interworking of DPNSS1 and R2MFC trunks must be provided.

The R2MFC to DPNSS1 Gateway feature provides an interface between R2MFC DID/DOD trunks and DPNSS1 trunks, and can also provide Calling Number Identification (CNI) support for incoming calls.

In addition, the R2MFC to DPNSS1 Gateway feature introduces the following enhancements to the R2MFC incoming CNI request functionalities:

- The ability to request CNI for an incoming R2MFC call is possible immediately after a predetermined number of digits are received. The allowable range for this option is 0 to 7.
- The ability to request CNI for an incoming R2MFC call is possible immediately after an Electronic Switched Network (ESN) code is dialed. The ESN codes recognized for this purpose are Distant Steering Codes (DSC), Trunk Steering Codes (TSC), and NARS/BARS Access Codes (AC1 and AC2).

By using these CNI request options, CNI information will be available before the incoming R2MFC call is routed. This is necessary to provide CNI support for R2MFC DID to DPNSS1 gateway calls, but also provides an alternative for supporting CNI requests for incoming R2MFC calls in general. These options are applicable for incoming R2MFC DID/TIE calls.

Operating parameters

DPNSS1 networks currently support only Coordinated Dialing Plan (CDP), Special Numbers (SPNs), and Basic Automatic Route Selection (BARS) (for outgoing calls), therefore the R2MFC to DPNSS1 feature does not support Universal Dialing Plans (UDPs).

For R2MFC DID calls routing to DPNSS1 trunks, the option Accept CNI (ACNI) is provided in the DPNSS1 route data block to identify if CNI information should be passed at the gateway. If the ACNI option is set to YES, the far-end PBX must accept the Originating Line Identity (OLI) string for Called/Calling Line Category (CLC) Public Switched Telephone Network (PSTN) calls in the Initial Service Request Message (ISRM).

Two additional options are provided for requesting CNI before the R2MFC DID call is even routed as previously described. Using one of these options is the only mechanism that will provide CNI for an R2MFC-DPNSS1 gateway call (unless the call is the result of call redirection). If the interfacing Central Office cannot support such options, both of these options have to be disabled and therefore no CNI will be available for the R2MFC-DPNSS1 gateway call.

CNI is for R2MFC trunks tandeming to DPNSS1 trunks only. For calls originating from DPNSS1 trunks, and tandeming to an outgoing R2MFC trunk, the CNI information in the DPNSS1 call is not used. Existing methods of generating the CNI locally at the gateway node are used.

Interworking of R2MFC TIE trunks and DPNSS1 trunks is not supported for this feature.

Interworking between MFE DID/DOD trunks and DPNSS1 trunks is not supported by this feature. Interworking between MFE KD3 DID/DOD trunks and DPNSS1 trunks is also not supported by this feature.

External Operator Features and Toll Call Identification (from China Number 1 signaling) are not supported by this feature.

No new hardware is required for this feature.

Feature interactions

CDR Calling Line ID for DPNSS1

At the terminating PBX, the OLI string for the R2MFC DID originated call may contain the CNI information. The CDR Enhancement feature automatically prints the contents of the OLI string in the CLID field of the CDR. Hence, the CNI information will be made available in the CDR record (i.e., it will be printed in the CLID field).

DPNSS1 Basic Call

The R2MFC Gateway feature introduces a change in the content sent in the Initial Service Request Message (ISRM) when the originator of a DPNSS1 call is an R2MFC DID trunk. If CNI information has been obtained from the incoming trunk, the CNI digits are sent as an OLI string in the IRSM. In that case, the Trunk Identity (TID) string is not sent. If no CNI information is available from the originating trunk, the TID string is sent. The transport of the CNI digits as an OLI is controlled by the Accept CNI (ACNI) option on the outgoing DPNSS1 route.

At the terminating node of the DPNSS1 call, an OLI string instead of a TID string may now be received for calls that originate from trunks which are not using ISDN or Integrated Digital Access (IDA) signaling. The information available for call display is now different. If the terminating node cannot handle receiving an OLI from such trunk calls, the ACNI option should be set to NO on the outgoing DPNSS1 route at that gateway.

The Step Back on Congestion (SBOC) option programmed for an outgoing DPNSS1 route is ignored for R2MFC-DPNSS1 gateway calls. Specifically, if an R2MFC DID to DPNSS1 gateway call receives a Clear Request Message (CRM) due to congestion, the call is not rerouted (i.e., does not search for an idle trunk based on the next entry in the Route List Block), regardless of whether or not the SBOC option is programmed. Instead, the call is treated as a congested call and intercept is provided if necessary. If the SBOC option is allowed, there is a potential problem in the gateway signaling because the next outgoing route may not be a DPNSS1 route.

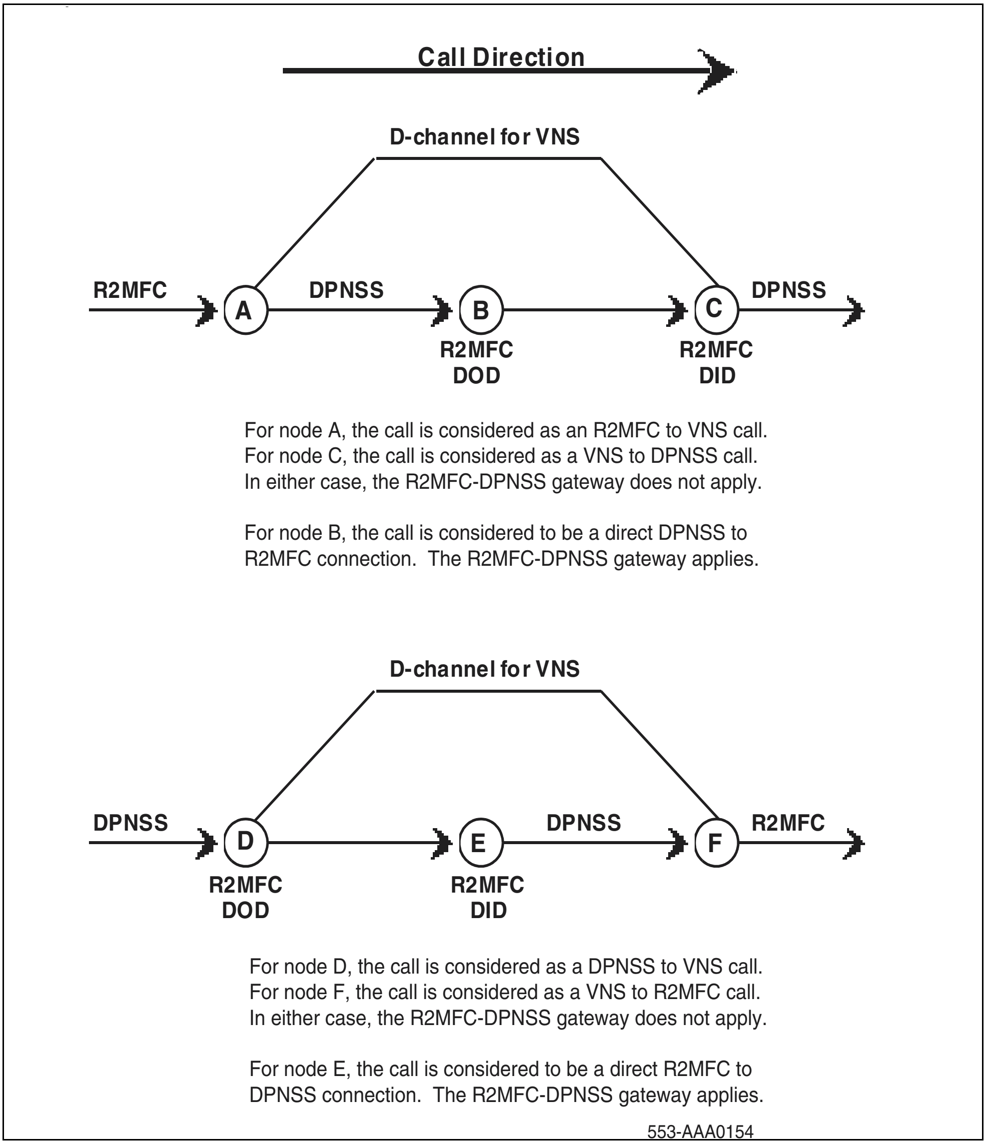
Digital Private Network Signaling System (DPNSS1)/Digital Access Signaling System (DASS2) Uniform Dialing Plan (UDP) Interworking

The R2MFC to DPNSS1 Gateway is supported with UDP numbers at the same level as it is supported with CDP numbers.

Virtual Network Services (VNS)

If the call on the DPNSS1 (or R2MFC) trunk is tandeming to the R2MFC or (DPNSS1) trunk on a Virtual Network Services (VNS) call, the R2MFC to DPNSS1 Gateway feature does not apply. If a DPNSS1/R2MFC tandem is encountered during the routing of a VNS call, the R2MFC to DPNSS1 Gateway feature applies. Figure 12 on page 131 illustrates how the R2MFC-DPNSS1 gateway may apply to a VNS call.

Figure 12
Applicability of R2MFC-DPNSS1 Gateway to VNS Calls



Feature packaging

No new software option package has been introduced with this feature; however, the following packages are required at the gateway system to provide the basic DPNSS1 and R2MFC signaling functionality:

- Integrated Digital Access (IDA) package 122
- Digital Private Network Signaling System 1 (DPNSS1) package 123
- Multifrequency Compelled Signaling (MFC) package 128

For network numbering the following packages are recommended:

- Coordinated Dialing Plan (CDP) package 59
- Basic Automatic Route Selection (BARS) package 57
- Pretranslation (PXLT) package 92
- Incoming Digit Conversion (IDC) package 113
- Flexible Numbering Plan (FNP) package 160

The CNI request enhancements are packaged under the existing Multifrequency Compelled Signaling (MFC) package 128.

Feature implementation

LD 16 – Configure the R2MFC Call Number Identification for the DPNSS1 route.

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

Prompt	Response	Description
ACNI	YES/(NO)	Accept (do not accept) R2MFC CNI over the DPNSS1 route Prompted if the IDA and MFC packages are equipped, and TKPT = IDA, and SIGL = DPN/APNS
...	...	...
NCNI	(0)-7	Request CNI after the defined number of digits are received If NCNI = 0, the CNI does not depend on the number of digits received If NCNI is defined to be greater than the number of digits required for routing the call, the call is routed without CNI being requested. Prompted if the MFC package is equipped, TKPT = DID or TIE, MFC = R2MF, and the MFC signaling table is defined
CNIE	YES/(NO)	Request (do not request) R2MFC CNI after an ESN code is dialed The ESN code could be a Distant Steering Code, a Trunk Steering Code, the NARS Access Code 1 (AC1) or NARS Access Code 2 (AC2) If NCNI > 0 and CNIE = YES, then CNI is requested when either of the conditions is first met Prompted if the MFC package is equipped, TKPT = DID or TIE, MFC = R2MF, and the MFC signaling table is defined
CNIT	...	...

LD 87 – Define the NCOS groups to which the users will belong.

Prompt	Response	Description
REQ	NEW	New
CUST	xx	Customer number, as defined in LD 15
FEAT	NCTL	Network Control Block

NCOS	0-99	Network Class of Service
FRL	0-7	Facility Restriction Level
RWTA	(NO), YES	Expensive Route Warning Tone

LD 86 – Define the NARS feature parameters (all prompts of the ESN Block are applicable to a DPNSS1 UDP network).

Prompt	Response	Description
REQ	NEW	New
CUST	xx	Customer number, as defined in LD 15
FEAT	ESN	Electronic Switched Network Block
...		
AC1	xx	NARS Access Code 1 (1-4 digits if Flexible Numbering Plan (FNP) package 160 is equipped; otherwise 1-2 digits)
AC2	xx	NARS Access Code 2 (1-4 digits if Flexible Numbering Plan (FNP) package 160 is equipped; otherwise 1-2 digits)

LD 86 – Define the Digit Manipulation tables.

Prompt	Response	Description
REQ	NEW	New
CUST	xx	Customer number, as defined in LD 15
FEAT	DGT	Digit Manipulation Table
DMI	x...x	Digit Manipulation Table Index

LD 86 – Define the Route List blocks.

Prompt	Response	Description
REQ	NEW	New
CUST	xx	Customer number, as defined in LD 15
FEAT	RLB	Route List Block
RLI	x...x	Route List Index number
ENTR	0-63	Entry number
ROUT	 0-511 0-127	Route number associated with the index For Large Systems For Small Systems and Succession 1000 systems
...		
OHQ	NO	On-Hook Queuing is not supported in a DPNSS1 UDP network (ROUT is a DPNSS1 route)
CBQ	NO	Call Back Queuing is not supported in a DPNSS1 UDP network (ROUT is a DPNSS1 route)

LD 90 – Define the NARS LOC translation table.

Prompt	Response	Description
REQ	NEW	New
CUST	xx	Customer number, as defined in LD 15
FEAT	NET	Network Translation Table
TRAN	AC1	NARS Access Code 1 (1-2 digits)
TYPE	LOC	Location Code
LOC	x...x	Location Code (3-7 digits)

Prompt	Response	Description
FLEN	(0)-10	Flexible number of digits for Location Code (prompted if Flexible Numbering Plan (FNP) package 160 is equipped)
RLI	x...x	Route Line Index

LD 90 – Define the NARS HLOC translation table.

Prompt	Response	Description
REQ	NEW	New
CUST	xx	Customer number, as defined in LD 15
FEAT	NET	Network Translation Table
TRAN	AC1	NARS Access Code 1 (1-2 digits)
TYPE	HLOC	Home Location Code
LOC	x...x	Home Location Code (3-7 digits)
DMI	x...x	Digit Manipulation Table Index

LD 16 – Select the DPNSS1 UDP routes.

Prompt	Response	Description
REQ	CHG	Change
TYPE	RDB	Route Data Block
...		
TKTP	IDA	Integrated Digital Access
SIGL	DPN	DPNSS1 signaling on this route
...		
RCLS	...	

Prompt	Response	Description
- INAC	YES	NARS DPNSS1 UDP route
- SPN	(YES), NO	Insert first the LOC's Access Code to search for a valid UDP number

LD 15 – Configure the Home Location Code (HLOC) in the Customer Data Block to use the UDP digit format on DPNSS1 UDP routes.

Prompt	Response	Description
REQ:	CHG	Change
TYPE:	NET	Networking data
...		
HLOC	100-9999	Home Location Code (the HLOC entered here should be the same as that defined in the NET block)

LD 90 – Define SPN numbers.

Prompt	Response	Description
REQ	NEW CHG OUT	Create, change, or remove data
CUST	xx	Customer number, as defined in LD 15
FEAT	NET	Network Translation Tables
TRAN	AC1 AC2 SUM	Access Code 1, 2, or summary tables
TYPE	SPN	Special Number translation code
SPN	xxxx xxxx x..	Special Number translation
RLI	0-999	Route List Index
SDRR	aaa	Type of supplemental restriction or recognition

Prompt	Response	Description
- DENY	x...x	A number to be denied within the SPN. The maximum number of digits allowed is 10 minus n, where n is the number of digits entered for the prompt SPN. Repeat to deny other numbers.
- ARRN	xxxxx	Alternate Routing Remote Number
- - ARLI	0-999, <CR>	Only output if ARRN is output
- LDID	x...x	Local DID number recognized with the NPA, NXX, or SPN
- DMI	1-255	Digit Manipulation Table Index
- LDDD	x...x	Local DDD number recognized within the NPA, NXX, or SPN
- DID	x...x	Remote DID number recognized within the NPA, NXX, or SPN
- DDD	x...x	Remote DDD number recognized within the NPA, NXX, or SPN
- ITED	x...x	Incoming trunk group exclusion codes for NPA, NXX, or SPN
ITEI		Incoming trunk group exclusion index

LD 16 – Configure a Conventional Main for Off-net recognition.

Prompt	Response	Description
REQ	NEW CHG	New, or change
TYPE	RDB	Route Data Block
CUST	xx	Customer number, as defined in LD 15
TKTP	TIE	TIE trunk

Prompt	Response	Description
CNVT	(NO) YES	Route to conventional switch (prompted if the response to TKTP is TIE)
DDMI	(0)-255	Digit Manipulation Index (prompted if the response to CNVT is YES)
ATDN	xxxx	Attendant DN of Conventional Main (prompted if the response to CNVT is YES)

Feature operation

No specific operating procedures are required to use this feature.

Diversion

Contents

This section contains information on the following topics:

Feature description

DPNSS1 Diversion is a British Telecom Network Requirement (BTNR) service that provides full DPNSS1 Diversion signaling on DPNSS1 links, when one of the redirection features listed below is invoked:

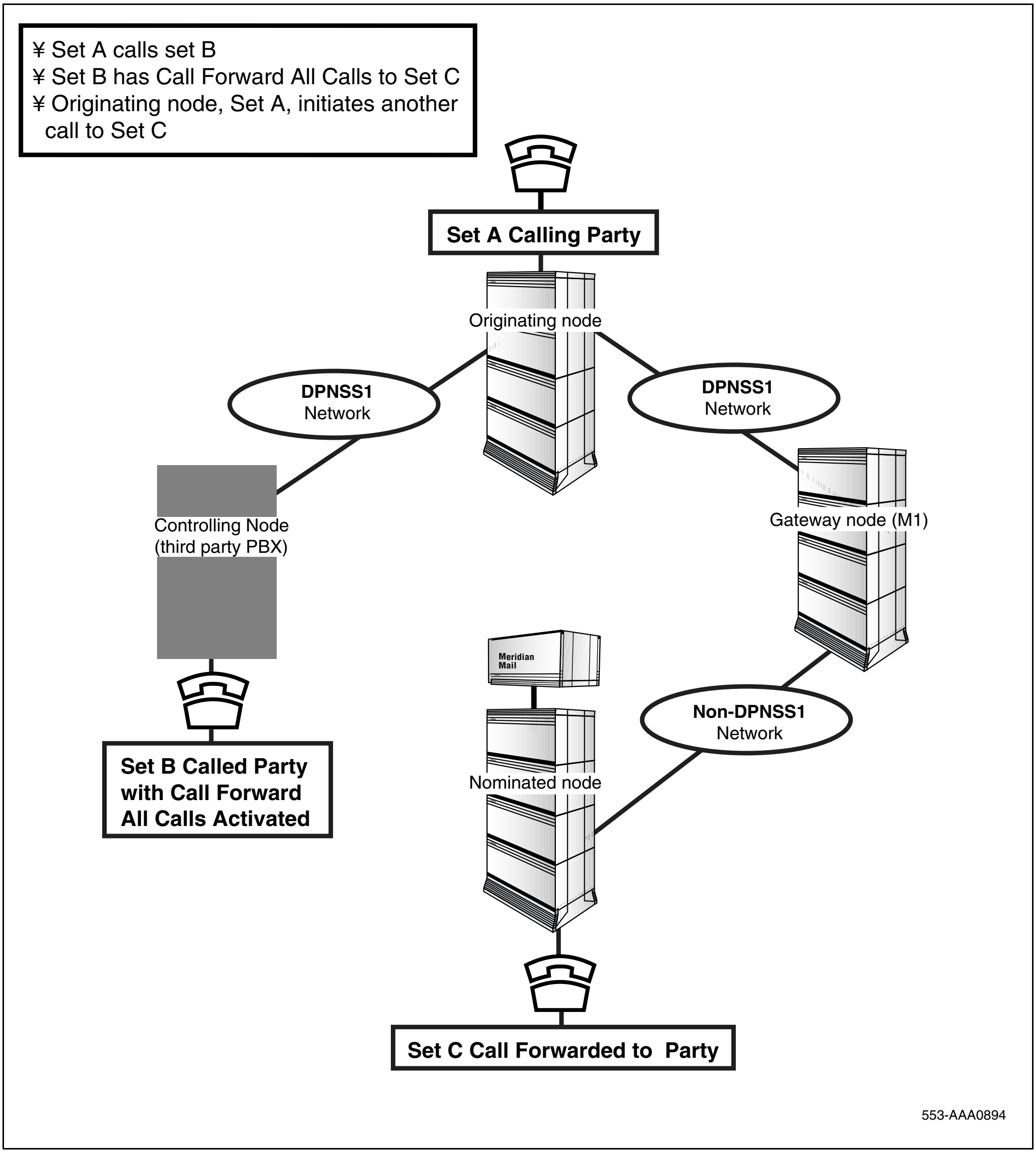
- Call Forward All Calls
- Call Forward No Answer

- Call Forward by Call Type
- Call Forward Busy
- Hunting/Group Hunting
- Intercept Computer Call Forward All Calls
- Call Forward Internal Calls
- Meridian Customer Defined Network Call Redirection
- Call Party Name Display

When a set activates a redirection feature such as Call Forward All Calls, DPNSS1 signaling informs the call originating node that the call is being forwarded to another telephone. If the forwarded party is located on another node, the call originating node is requested to initiate a new call. When the forwarded to party is reached by the call originator via DPNSS1, the forwarded to party is notified that the incoming call has been forwarded.

As illustrated in Figure 13 on page 143, Call Diversion functions on Meridian 1, Succession 1000, and Succession 1000M system nodes that are linked to third-party Private Branch Exchanges (PBXs) within a DPNSS1 network. Meridian 1, Succession 1000, and Succession 1000M system gateway nodes provide links to other system nodes by Meridian Customer Defined Network (MCDN) and to other system and third-party PBXs through DPNSS1.

Figure 13
DPNSS1 Diversion Environment



The following capabilities are provided as part of the DPNSS1 Diversion: Diversion Validation, Diversion Cancellation, Diversion Follow-Me, Diversion By-Pass, Diversion Immediate, Diversion On Busy and Diversion On No Reply. These capabilities are described as follows.

Diversion Validation

DPNSS1 Diversion must operate on system nodes that are linked to third-party PBXs, within a full DPNSS1 environment. Validation is performed on forwarded-to DNs, for example.

System gateway nodes are linked with other system nodes through a Meridian Customer Defined Network (MCDN) and the other system, or to other third-party PBXs via a DPNSS1 network.

Diversion Cancellation

Diversion Cancellation allows the forwarded to party to remotely deactivate call diversion initiated by the forwarding party.System DNs cannot originate Diversion Cancellation requests; however, system PBXs can process Diversion Cancellation requests.

The sequence for Diversion Cancellation is as follows:

- Telephone A has activated Call Forward All Calls (CFAC) to Telephone B.
- Telephone B, the forwarded to party, requests either Diversion Immediate or Diversion-All Cancellation to Telephone A.
- Upon receipt to the cancellation request, Telephone A’s node determines that Telephone B is currently Call Forward All Calls (CFAC) activated to Telephone A’s DN.
- If the DN is confirmed, then the CFAC feature is deactivated.
- Telephone B is notified that the cancellation request is successful.

If Diversion Cancellation request encounters any gateway, the gateway responds with a “Service Unavailable” notification.

Diversion Follow-Me

Diversion Follow-Me allows the forwarding party to remotely request and change the forwarded-to DN. As an example, Telephone A has activated Call Forward All Calls to Telephone B, in a full DPNSS1 environment. Telephone A then decides to change the forwarded-to party to Telephone C. When Diversion Follow-Me is activated, Telephone A's node uses Diversion Validation to confirm that the new forwarded-to DN is valid.

If a Diversion Follow-Me request encounters any gateway, the gateway responds with a "Service Unavailable" notification. A Follow-Me request is always rejected when routed through a gateway.

The system can process Diversion Follow-Me requests but cannot initiate any requests.

Diversion By-Pass

Diversion By-Pass allows the calling party to ignore the diversion assigned by the party that activated call redirection. System DNs cannot originate Diversion By-Pass requests, but can process requests.

Diversion Immediate

With Diversion Immediate, the calling party, Telephone A, dials Telephone B that has activated Call Forward All Calls (CFAC) to Telephone C. Upon receipt of the call, Telephone B's node instructs Telephone A's node to Divert-Immediate to Telephone C.

When instructed to divert, Telephone A's node clears the old call and initiates a new call to Telephone C. Telephone A's display is updated with diversion information, when the call is established with Telephone C.

Diversion On Busy

The sequence for Diversion On Busy via Separate Channel is similar to Diversion-Immediate. The differences occur with message contents and the reason for diversion, if Call Party Name Display is activated.

If Diversion on Busy is triggered by the Hunt feature, it is also triggered by Call Forward By Call Type applied to Hunt. A node determines an internal call on the Calling Line Category (CLC) received with the incoming call.

For Call Forward Busy, the following two cases exist. If the forwarded set has enabled Message Waiting Forward Busy, the call may be directed to the FDN or Message Waiting key. In this case, the Diversion On Busy signaling applies. However, if the forwarded set is not equipped with Message Waiting Forward Busy, the call is always routed to the Attendant.

Diversion On No Reply

Call Diversion on No Reply ensures that a Call Forward No Answer (CFNA) call is not disconnected until the new diversion call is successful.

The following is the sequence for Diversion On No Reply functionality. Telephone A, the calling party, dials Telephone B. Telephone B rings and has Call Forward No Answer activated to Telephone C. When requested by Telephone B's node to Divert the call on No Reply, Telephone A's node initiates a new call to Telephone C. When Telephone C answers the diverted call, the original call between Telephone A and Telephone B is disconnected.

Operating parameters

Interworking with MCDN Trunk Route Optimization (TRO) is supported.

Onsystem nodes, M3000 Meridian 1 proprietary sets are not supported when using DPNSS1 signaling.

The Nominated party's, the forwarded-to telephone, display is updated in full DPNSS1 or mixed DPNSS1/MCDN routes. The Nominated party can be Meridian Mail.

Access forwarding to Meridian Mail via full MCDN/DPNSS1 gateway is supported.

The Message Waiting Indication (MWI) key of a system DN is never lit if reached from a system Meridian Mail node via DPNSS1. No Message Waiting Indication signaling is implemented on DPNSS1 between system nodes. No MCDN/DPNSS1 functionalities exist for Meridian Mail Message Waiting Indication capabilities.

In a mixed Uniform and Coordinated Dialing Plan environment, it is recommended to always use the Uniform Dialing Plan (UDP) format for forwarded data.

Feature interactions

Attendant Forward No Answer

If an incoming call is handled for Network Attendant Services routing towards DPNSS1, no diversion signaling is sent back to the calling party.

Call Forward All Types

The Call Forward All Types features on unanswered calls are activated in the following order: Call Forward All Calls, Message Waiting, Call Forward No Answer, Slow Answer Recall. For busy sets the order is: Call Forward All Calls, Hunting, Calling Waiting/Camp On, Message Waiting Busy Forward, Call Forward Busy.

Group Hunting

Only simple DPNSS1 calls support Group Hunting. Group Hunting is not supported on all DPNSS1 features.

Meridian Mail

Following DPNSS1 Diversion, the new call can reach Meridian Mail via full MCDN, full DPNSS1 and mixed MCDN/DPNSS1 links. Following MCDN Call Forward towards DPNSS1, the new call can reach Meridian Mail via full MCDN, full DPNSS1 and mixed MCDN/DPNSS1 links.

Night Service

If a diverted call encounters an attendant in night service, the call receives Night Service Diversion if available.

Phantom Directory Numbers
Phantom Terminal Numbers

If an incoming call to a Phantom TN contains a DIVERSION BY-PASS REQUEST, Call Forward All Calls applies.

Route Optimization

If a Route Optimization call setup encounters any redirection features, these features are ignored.The condition for a diverted call to have Route Optimization after connection is the same as a simple DPNSS1 call. Route Optimization starts if the diverted call is routed through a non-first choice route or when a call transfer involving the diverted call is completed.

User Selectable Call Redirection

The User Selectable Call Redirection feature triggers Diversion Validation. If the numbering plan is DPNSS1 then diversion occurs. Numbering plan routes are checked to determine if redirection DN's are through DPNSS1 on a first choice route basis. If the number plan is not a DN through DPNSS1, then User Selectable Call Redirection works as usual.

Feature packaging

DPNSS1 Diversion requires DPNSS1 Network Services (DNWK) package 231.

Basic DPNSS1 networking requires:

- Integrated Digital Access (IDA) package 122
- Digital Private Network Signaling System 1 (DPNSS) package 123
- 2.0 Mbps Primary Rate Interface (PRI2) package 154

DPNSS1/MCDN Gateway requires:

- International Supplementary Features (SUPP) package 131
- Integrated Services Digital Network (ISDN) package 145
- ISDN Advanced Network Services (NTWK_SRVC) package 148

- Network Attendant Services (NAS) package 159
- ISDN Call Connection Limitations (ICCL) package 161 for gateway with loop avoidance

Feature implementation

For DPNSS1 Diversion to occur the redirection features DPNSS1 Three-Party Service and Network Call Redirection must be configured. DPNSS1 Three-Party Service is configured in Overlay 95. Network Call Redirection is configured in Overlays 15,16, 95, 10 and 11.

LD 95 – Configure call display transfer indication for DPNSS1 Three-Party Service.

Prompt	Response	Description
REQ	NEW CHG	Add new data Change existing data
TYPE	CPND	Calling Party Name Display data block
CUST	xx	Customer number, as defined in LD 15
...		
RESN	YES	Display of Reason for redirecting calls allowed
- XFER	 xxxx (T)	Call Transfer display mnemonic (Mnemonic for call transfer display in Network Call Redirection (NCRD). One to four characters are accepted. (Default)

LD 15 – Forward calls to a forwarding DN.

Prompt	Response	Description
REQ:	CHG	Change existing data block
TYPE:	RDR	Call Redirection data

CUST	 0-99 0-31	Customer number For Large Systems For Small Systems and Succession 1000 systems
...		
- FNAD	FDN	Call forward no answer DID calls—Flexible CFNA DN
- FNAT	FDN	Treatment for External CFNA calls (non-DID—when FDN is selected, CFCT handles the call)
- FNAL	FDN	Requests treatment for CFNA—when FDN is selected, DID calls are forwarded
...		

LD 16 – Allow Network Call Redirection.

Prompt	Response	Description
REQ	CHG	Change
TYPE	RDB	Route Data Block
CUST	xx	Customer number, as defined in LD 15
ROUT	 0-511 0-127	Route Number For Large Systems For Small Systems and Succession 1000 systems
...		
NCNA	(NO) YES	Network Call Name is (is not) allowed
NCRD	(NO) YES	Network Call Redirection. Allows network call redirection messages to be sent (or blocks messages if NCRD= NO)

Prompt	Response	Description
		Network Call Redirection can occur without answering YES to the NCRD prompt. This prompt only controls the sending of Network Call Redirection messages, not the actual redirection of the call. The message supplied when NCRD = yes provides the information for the CLID display. When NCRD is NO, the call is redirected without the CLID redirection information.
TRO	(NO) YES	Trunk Optimization TRO economizes trunk use throughout the network as part of the NCRD feature

LD 95 – Display the reason calls are redirected.

Prompt	Response	Description
REQ	CHG	Change
TYPE	CPND	Call Party Name Display data block
CUST	xx	Customer number, as defined in LD 15
ROUT	 0-511 0-127	Route Number For Large Systems For Small Systems and Succession 1000 systems
...		
DES	(NO) YES	Designator for Multiple Appearance DNs allowed
RESN	YES	Allow display of reason for redirecting calls
CFWD	(F) xxxx	Display mnemonic for (Network) Call Forward All Calls. Default is “F.” Enter the mnemonic that represents NCFAC on a set’s CLID display.
CFNA	(N) xxxx	Mnemonic for (Network) Call Forward No Answer display. Enter the mnemonic that represents NCFNA on a set’s CLID display. Default is “N.”

Prompt	Response	Description
HUNT	(B) xxxx	Mnemonic for Network Hunting display
PKUP	(P) xxxx	Mnemonic to allow Call Pickup display
XFER	(T) xxxx	Mnemonic for Call Transfer display

LD 95 – Give each DN a name.

Prompt	Response	Description
REQ	CHG	Change
TYPE	NAME	Call Party Name Display name entry
CUST	xx	Customer number, as defined in LD 15
DIG	xxx xx	An existing Dial Intercom Group number (0-253) and member number (0-99)
NAME	aaa...a	CPND name using ASCII characters. The DIG prompt is re-prompted. Enter <CR> to get the DN prompt
DN	xxxx	DN of eligible type

LD 10 – Enable the appropriate feature in the data block.

Prompt	Response	Description
REQ:	CHG	Change
TYPE:	500	Enter set type
HUNT	xxxx	Hunt DN for internal calls
FTR	EFD xxx	External Flexible call forward DN Only allowed if LD15 is properly configured: FNAD = FDN FNAL = FDN FNAT = FDN

Prompt	Response	Description
		If the DNXP package is equipped, up to 7 digits are allowed; otherwise, only 4 digits can be entered. Accepted only if CLS is MWA or FNA.
	EHT xxxx	External Hunt DN
		Only allowed if CLS = CFTA
		Same digits defined as above
	FDN xxxxxxx	Flexible Call Forward No Answer DN (cannot be an LDN)
		Same digits defined as above

LD 11 – Enable the appropriate feature in the data block.

Prompt	Response	Description
REQ:	CHG	Change.
TYPE:	xxxx	Enter set type
FDN	x..x	Flexible CFNA DN where xx is the MCDN. The FDN value should include AC1/AC2 when applicable (up to 13 digits).
EFD	xxxx	Network CFNA DN for External calls
HUNT	xxxx	Network Hunt DN for calls with CLS = CFTD
EHT	xxxx	Network Hunt DN for External calls

Feature operation

Activating Call Forward All Calls over DPNSS1

Telephone A invokes Call Forward All Calls (CFAC) to Telephone B, the forwarded to party over a DPNSS1 network. In a non-DPNSS1 network environment, then the Call Forward All Calls is normal operation.

1 If the dialing plan reaches Telephone B via DPNSS1, a VALIDATION REQUEST is sent to Telephone B. The CFAC key remains flashing.

2 Upon receipt of the request, Telephone B's node responds to the validity of Telephone B's DN. If the DN is valid, the CFAC feature is activated. The CFAC key is lit. However, if the DN is not valid, Telephone A hears an overflow tone, and the CFAC key remains flashing.

3 If the forwarded DN is local or reached through a non-DPNSS1 network, the usual CFAC activation process applies. No DPNSS1 messaging occurs.

Executive Intrusion

Contents

This section contains information on the following topics:

Feature description

Digital Private Network Signaling System 1 (DPNSS1) Executive Intrusion enables an originating party to break-in to an established call under certain circumstances. The system only allows this feature to be activated from attendant consoles; however, it will accept an Executive Intrusion activation request from a regular telephone on a third-party PBX.

For the purposes of this feature description, the term “requested” party will be used to describe the person on the established call who the originating party desires to talk with, and the “unrequested” party will mean the person on other end of the call. On a system, Executive Intrusion is only activated if the attendant places the call to the requested party over a DPNSS1 link. If the attendant and the requested party are located on the same node, the current

Attendant Break-in feature is activated. Executive Intrusion is activated by using the existing Break-In key on an attendant console.

When an attendant presses the Break-In (BKI) key to invoke Executive Intrusion, the node where the requested party resides checks the Intrusion Capability Level (ICL) of the attendant console against the Intrusion Protection Levels (IPLs) of the parties involved in the call. If the ICL is higher than the IPLs, Executive Intrusion is allowed and a conference is set up between the attendant, requested, and unrequested parties.

Operating parameters

The system implementation of Executive Intrusion can be used on a system in any environment where DPNSS1 connectivity is involved.

Executive Intrusion with prior validation is not supported.

Withdrawal from Intrusion is not supported.

Executive Intrusion has the same limitations as Post-Dial Attendant Break-In as follows:

- Only one Break-In/Executive Intrusion key is allowed per attendant console
- An Executive Intrusion connection cannot be put on hold
- Only one attendant at a time is allowed to intrude for a given connection
- Executive Intrusion is permitted only if the requested party is a BCS or PBX set and has Warning Tone Allowed (WTA) Class of Service

In a full DPNSS1 environment, Executive Intrusion adds the following limitations:

- Executive Intrusion is permitted only if the unrequested party is a BCS or PBX set having Warning Tone Allowed (WTA) Class of Service
- Executive Intrusion is not permitted if the requested or unrequested party is involved in a conference

In a DPNSS1/Meridian Customer Defined Network (MCDN) gateway between the originating party and the requested party, Executive Intrusion is not permitted if Call Offer has been activated at the terminating node by the same attendant. Call Offer takes precedence over Executive Intrusion in a DPNSS1/MCDN gateway.

In a DPNSS1/MCDN or MCDN/DPNSS1 gateway between the originating party and the requested party, only Executive Intrusion activation requests from attendants are supported. Executive Intrusion from sets on a third-party PBX are ignored in an DPNSS1 Initial Service Request Message (ISRM) and rejected in a DPNSS1 End-to-End Message (EEM).

At the gateway node, if mixed MCDN/DPNSS1 route lists are programmed, an incoming MCDN call using an outgoing DPNSS1 route for the first call attempt (without Executive Intrusion) will also use a DPNSS1 route for the Executive Intrusion request.

The following hardware is required for all systems other than Small Systems and Succession 1000 systems:

- DASS2/DPNSS1 D-channel Interface Handler
  - Standard Mode (0-15 D-channels) – NT5K35AA
  - Expanded Mode (0-159 D-channels) – NT5K75AA or NT6D11AE
- 2 Mbps Primary Rate Interface Card – NT8D72
- Network Interface Card – QPC414
- Clock Controller Card – QPC775/NTBR5

On Small Systems and Succession 1000 systems the following hardware is required:

- DPNSS1 XPRI2 – NTAK799

Feature interactions

Interactions with other DPNSS1 Services

DPNSS1 Diversion

In the following scenario an Executive Intrusion request is made on a diverted call (Immediate). Telephone B has diversion immediate active to Telephone C (Telephone B is on a third-party PBX). Telephone C may be on the same node or on another node. C is busy on an call with another set. The attendant calls B. The answer to the Initial Service Request Message (ISRM) is a Number Acknowledge Message (NAM) with a Destination Address of C. The attendant position then sends a regular ISRM to C. Since C is busy, the attendant receives Clear Request Message (CRM) in response to the ISRM. The attendant presses the BKI key. In this case, an Executive Intrusion ISRM is sent to C, and C is considered the requested party.

In the following scenario an Executive Intrusion request is made on a diverted call (Busy). Telephone B has diversion on busy active to Telephone C. Telephone C may be on the same node or on another node. Both B and C are busy on calls with other sets. The attendant sends a regular ISRM to C. Since C is busy, the attendant position receives a Clear Request Message in response. The attendant presses the BKI key. In this case, an Executive Intrusion ISRM is sent to C, and C is considered the requested party.

DPNSS1 Route Optimization

If the requested party is involved in a Route Optimization process when it receives an Executive Intrusion request, the request is rejected. Conversely, the originating, requested and unrequested parties will be able to send a Route Optimization request only after the Executive Intrusion conference reverts to a simple call. Finally, if an Executive Intrusion request is received after a Route Optimization Request Supplementary Information String has been sent but Route Optimization has not actually commenced, the Route Optimization process is aborted and the Executive Intrusion may proceed.

DPNSS1/Uniform Dialing Plan Interworking

DPNSS1/Uniform Dialing Plan Interworking does not affect Executive Intrusion operation, except with regard to displays. The Executive Intrusion states normally displayed are Coordinated Dialing Plan Calling Line IDs and Originating Line IDs. If a Uniform Dialing Plan is active in the network, displays will change to Uniform Dialing Plan Calling Line IDs and Originating Line IDs.

Executive Intrusion denied for the Wanted Node during DPNSS1 Three-party Service

Executive Intrusion will not be allowed if either the requested or unrequested party is involved in an enquiry call. In addition, Executive Intrusion will be denied if the requested party or the unrequested party is the controlling or the added-on party of a three-party conference call. The third-party (the one held during the enquiry call before the conference is completed) is not subject to this restriction.

Step Back on Congestion

If Step Back on Congestion (SBOC) is active, an ISRM containing an Executive Intrusion request will undergo the SBOC routing process as per any other call.

Other interactions

Attendant Blocking of DN

If an Executive Intrusion attempt is made for an Attendant Blocking of DN call, the Executive Intrusion attempt is denied.

Attendant Conference

If an Executive Intrusion conference is established on the Destination side, pressing the Attendant conference key is ignored.

Attendant Secrecy
Enhanced Secrecy

If Attendant Secrecy is not active when the attendant attempts Executive Intrusion, the source is automatically excluded. If Enhanced Secrecy is equipped, source exclusion includes the removal of the Enhanced Secrecy warning tone when Executive Intrusion is activated.

Automatic Call Distribution (ACD)

Once the requested party has established the call with an ACD agent, the attendant is able to intrude into the call. However, if the requested party is in an ACD queue, Executive Intrusion is denied.

Break-In
Break-In to Enquiry Calls
Break-In with Secrecy
Break-In Indication – Prevention

Executive Intrusion and Break-In are mutually exclusive. Pressing the BKI key will activate Break-In or Executive Intrusion. In addition, intrusion is not allowed into a Break-In conference.

Call Park

Attempts to intrude into a parked call receive Executive Intrusion Denied treatment.

Call Waiting

Executive Intrusion is permitted (consult-only state) into a requested party having call waiting.

Conference
Enquiry Calls

Executive Intrusion is denied if the requested party is established in a local conference, or if the requested party is involved in an enquiry call. These restrictions may apply to the unrequested party depending on the connection being used between the requested and unrequested parties.

Data Calls

Executive Intrusion cannot be applied to data calls.

Hold or Permanent Hold

Executive Intrusion is denied if the requested party is put on hold by another station at the same node. This restriction also applies to the unrequested party if the unrequested party is located at the same node as the requested party (standalone) or if the requested party and the unrequested party are linked via DPNSS1.

Hunting

If Executive Intrusion is attempted against an extension with a Hunt DN configured, an attempt will be made to reroute the call to the hunt DN provided the Hunt DN is on the same node. If the Hunt DN is busy, this rerouting process is repeated. If all DNs in the Hunt chain are busy, Executive Intrusion is attempted against the wanted extension originally dialed. Otherwise, the call will terminate as a simple call on the first idle extension in the Hunt chain.

Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI) Extension

Activation of Executive Intrusion for an ISDN BRI extension is not possible. Attempts to intrude on ISDN BRI extensions (either the requested or unrequested party) will fail.

Intercept Computer (Dial from Directory)

Executive Intrusion can be activated by dialing an extension DN from the Intercept Computer Terminal, and then pressing the BKI key on the attendant console.

Line Lockout

Executive Intrusion is not allowed for any set that is in Line Lockout state.

Make Set Busy
Do Not Disturb

Executive Intrusion is not allowed if either of these features is active at the requested party.

Multiple Appearance DN

If the attendant tries to extend a call to a DN which appears on more than one set, this DN can either be:

- Multiple-Call Arrangement with Ringing (MCR): when a call terminates on this DN, all idle stations on which the DN appears are rung. The call is established only with the station which has answered first. All others are idle.
- Multiple-Call Arrangement with No Ringing (MCN): the only difference between MCN and MCR is that the called stations are not rung (only their DN keys flash).
- Single-Call Arrangement with Ringing (SCR): when a call terminates on this DN, all idle stations on which the DN appears are rung. The call is established only with the station which has answered first. All others are busy.
- Single-Call Arrangement with No Ringing (SCN): the only difference between SCN and SCR is that the called stations are not rung (only their DN keys flash).

Switchhook Flash

If an analog (500/250-type) telephone is part of an Executive Intrusion conference, any Switchhook Flash is ignored.

Feature packaging

DPNSS1 Executive Intrusion is included in Enhanced DPNSS1 Services (DPNSS_ES) package 288.

For configuration of attendant consoles the following package is required:

- Attendant Break-In/Trunk Offer (BKI) package 127

For basic DPNSS1 network functionalities the following packages are required:

- Integrated Digital Access (IDA) package 122
- Digital Private Signaling System 1 (DPNSS) package 123

- International Supplementary Features (SUPP) package 131
- Integrated Services Digital Network (ISDN) package 145
- 2.0 Mbps Primary Rate Interface (PRI2) package 154

The following package is required to provide DPNSS1 Loop Avoidance, Three-Party Service, Call Offer, Step Back on Congestion, and Route Optimization:

- DPNSS1 Network Services (DNWK) package 231

The following packages are required to provide DPNSS1/MCDN Gateway functionality:

- Advanced ISDN Network Services (NTWK) package 148
- Network Attendant Services (NAS) package 159
- ISDN Supplementary Features (ISDNS) package 161 (required to support MCDN/DPNSS1 gateway with Loop Avoidance)

Feature implementation

LD 10 – Allow warning tone for analog (500/2500-type) telephones.

Prompt	Response	Description
REQ:	CHG	Change
TYPE:	500	Telephone type
TN		Terminal number
	l s c u	For Large Systems
	c u	For Small Systems and Succession 1000 systems
CLS	WTA	Class of Service. Warning tone allowed (WTA) must be set for Executive Intrusion

LD 11 – Allow warning tone for digital telephones

Prompt	Response	Description
REQ:	CHG	Change
TYPE:	aaaa	Telephone type
TN		Terminal number
	l s c u	For Large Systems
	c u	For Small Systems and Succession 1000 systems
CLS	WTA	Class of Service. Warning tone allowed (WTA) must be set for Executive Intrusion

LD 14 – Allow warning tone for trunks to permit Executive Intrusion.

Prompt	Response	Description
REQ	CHG	Change
TYPE	aaa	Trunk type, where aaa = ADM, AID, ATVN, AWR, CAA, CAM, COT, CSA, DIC, DID, FEX, ISA, MDM, MUS, PAG, RAN, RCD, RLM, RLR, TIE, or WAT
TN		Terminal number
	l s c u	For Large Systems
	c u	For Small Systems and Succession 1000 systems
CLS	WTA	Class of Service. Warning tone allowed (WTA) must be set for Executive Intrusion.

LD 10 – Define PLEV for analog (500/2500-type) telephone.

Prompt	Response	Description
REQ:	CHG	Change
TYPE:	500	Telephone type

Prompt	Response	Description
TN	 l s c u c u	Terminal number For Large Systems For Small Systems and Succession 1000 systems
PLEV	0-(2)-7	Priority Level

LD 11 –Define PLEV for digital telephones.

Prompt	Response	Description
REQ:	CHG	Change
TYPE:	aaaa	Telephone type
TN	 l s c u c u	Terminal number For Large Systems For Small Systems and Succession 1000 systems
PLEV	0-(2)-7	Priority Level

LD 16 – Define PLEV for routes.

Prompt	**Response**	**Description**
REQ	CHG	Change
TYPE	RDB	Route Data Block
PLEV	0-(2)-7	Priority Level

The system ICL/IPL implementation uses the existing PLEV scale. PLEVs are defined in LDs 10 and 11 for sets, and LD 16 for routes. Make the IPL/PLEV mapping consistent with Priority Override/Forced Camp-On (POVR) operation in case both features exist.

The mapping is as follows:

- ICL/IPL for Attendants:

  Since attendants do not have any POVR priority, there is no PLEV – ICL and no PLEV – IPL mapping for attendants. When ICL information must be sent through DPNSS1, ICL =3 (maximum capability level) is assumed for the attendant. When an Executive Intrusion request is received from another node, IPL = 3 (maximum protection level: non intrudable) is assumed for the attendant.

- ICL for sets:

  Since sets cannot originate Executive Intrusion requests on the system, there is no PLEV – ICL mapping for sets.

- IPL for sets (or routes):

  Make the PLEV – IPL mapping consistent with the meaning of PLEV for the POVR feature.

  The mapping is as shown in Table 11 on page 166.

Table 11
PLEV/IPL mapping for sets (Part 1 of 2)

PLEV of Set A	Meaning of POVR	IPL set A is considered to have	Meaning for Executive Intrusion
0	POVR not active: cannot override, cannot be overridden	3	Total protection: cannot be intruded
1	Cannot override, can be overridden by PLEVs 1-7	0	Minimum protection: can be intruded by ICLs 1-3
2	Can override PLEVs 1-2, can be overridden by PLEVs 2-7	1	Intermediate protection: can be intruded by ICLs 2-3
3	Can override PLEVs 1-3, can be overridden by PLEVs 3-7	2	Intermediate protection: can be intruded by ICL 3

Table 11
PLEV/IPL mapping for sets (Part 2 of 2)

<table>
<tr><th>PLEV of Set A</th><th>Meaning of POVR</th><th>IPL set A is considered to have</th><th>Meaning for Executive Intrusion</th></tr>
<tr><td>4</td><td>Can override PLEVs 1-4, can be overridden by PLEVs 4-7</td><td rowspan="4">3</td><td rowspan="4">Maximum protection: cannot be intruded</td></tr>
<tr><td>5</td><td>Can override PLEVs 1-5, can be overridden by PLEVs 5-7</td></tr>
<tr><td>6</td><td>Can override PLEVs 1-6, can be overridden b PLEVs 6-7</td></tr>
<tr><td>7</td><td>Can override PLEV 7, can be overridden by PLEV 7</td></tr>
</table>

As a consequence, the effect on an incoming EI request (ICL included) on a set with a PLEV configured is as shown in Table 12 on page 167.

Table 12
Effect of ICLs on different PLEVs for an EI request

ICL in the incoming EI request	PLEVs for which Executive Intrusion is allowed
1	1
2	1-2
3	1-3

LD 12 – Define a BKI/Intrusion key on the attendant console.

Prompt	Response	Description
REQ	CHG	Change
TYPE	1250 or 2250	Attendant console type
TN		Terminal number
	l s c u	For Large Systems
	c u	For Small Systems and Succession 1000 systems
KEY	xx BKI	Define key xx as the BKI key

Feature operation

From attendant consoles, the Executive Intrusion feature operates in a similar manner to that of the existing Attendant Break-In feature as follows:

1. The attendant dials the destination DN.
2. The attendant receives busy tone.
3. The attendant presses the Break-In (BKI) key on the console.
4. If the ICL on the attendant console is higher than the IPLs of both the requested and the unrequested parties, a conference is established between all three parties.
5. After the unrequested party disconnects, the attendant can extend the incoming call to another DN if desired.

Extension Three Party Service

Contents

This section contains information on the following topics:

Feature description

The DPNSS1 Three-party Service feature allows a controlling party to place an established party on hold and make an inquiry call to a third-party. The controlling party may then transfer the held party to the inquired-to party, or form a three-party conference. The three parties may be located anywhere across a DPNSS1 network.

The controlling party may use an analog (500/2500-type) set, or a digital set. On an analog (500/2500-type) set an inquiry call may be initiated by pressing the Recall key or performing a switch-hook flash. On a digital set, an inquiry call may be initiated by pressing the Transfer or Conference key.

After a call transfer, this feature provides messaging that allows DPNSS1 Route Optimisation service to be invoked, in order to optimize the routing of the call through the DPNSS1 network. Also, user set displays are updated, and applicable DPNSS1 access restrictions are applied. These include:

- restrictions configured as part of the Trunk Barring feature
- Public Switch Telephone Network call barring, configured at the telephone set level
- system restrictions dependent on trunk types (not configurable)

The following access restrictions are not supported:

- Tenant Service restrictions
- Network Class of Service restrictions

This feature handles various types of misoperation when the controlling party attempts to transfer from the held party to the inquired-to party. If the user of a digital telephone presses the Transfer key a second time after having already pressed it once to transfer the call, the action is ignored.

For an analog (500/2500-type) set, misoperation may occur if the controlling party attempts to transfer after performing an unsuccessful inquiry call to the third-party. The inquiry call may have failed due to the controlling party dialing an incomplete number, the inquiry call still being in the set-up stage, or the inquiry call encountering busy tone, overflow tone, or recorded announcement. The held call, if external, is intercepted to the attendant rather than dropped (the held call is dropped if it is an internal call). However, in the cases of overflow and recorded announcement, if the inquiry call remains connected to the overflow tone or recorded announcement until time out occurs, then the held party is dropped.

Misoperation from an analog (500/2500-type) set is also prevented in cases where an inquiry call to the third-party is successful, but a transfer connection between the held party and inquired-to party is prevented due to trunk-to-trunk access restriction. If the controlling set hangs up, then the inquiry call is disconnected. If the held call is external, it is recalled to the controlling party. If the held call is internal, it is disconnected.

In cases where a call transfer from a held party to an inquired-to party is successful when it should not have been allowed, the call is forced to disconnect.

Operating parameters

There are no operating parameters associated with this feature.

Feature interactions

Within a mixed ISDN/DPNSS1 environment, all nodes with ISDN links must be equipped with the Network Attendant Service feature.

Call Forward No Answer

Call Forward No Answer may override the DPNSS1 access restrictions placed on transfer after inquiry in the following scenario. An inquiry call is made to a set with Call Forward No Answer active. If a transfer is attempted while the inquired-to set is ringing, messaging is not sent to the controlling node. The DPNSS1 access restrictions are checked between the held party and the forwarding party, and not between the held party and forwarded-to party. If the forwarded-to party answers before the transfer is attempted, or if the call is successfully transferred before it is call-forwarded, then the DPNSS1 access restrictions are properly checked.

Call Hold

The held party may be transferred to the inquired-to party over an ISDN/DPNSS1 tandem. DPNSS1 calls may be held by the controlling party in the normal way.

Call Join

Call Join allows a user of a digital telephone to conference into an active call, a party waiting on a secondary DN or the Call Waiting key. The call is then treated as a conference. If the controlling set disconnects during the conference, and if transfer is allowed, the remaining parties remain connected. Notification of the transfer is sent via end-to-end messaging.

Call Transfer

A call transferred to a party that has answered may be route optimized, upon completion of the transfer. A call transferred to a ringing set may be optimized upon answering. A held call at the originating or terminating node may be optimized upon establishing a simple call.

Transfer after inquiry has priority over route optimisation. If a node receives end-to-end messaging indicating ‘transferred’ after sending end-to-end messaging containing ‘route optimisation’, the request for route optimisation is aborted.

Call Waiting

If an inquiry call is made to a busy set with Call Waiting active, the call is placed in call waiting to the inquired-to set. The controlling party, while receiving ringing, may transfer the call.

Conference

If three-party conference is provided as part of Multi-party Operation, and if MPO is configured as ‘disconnect during consultation connection’, then a held party cannot be transferred directly from an inquiry — the controlling party must first form a three-party conference, and then hang up, in order to connect the held party to the inquired-to party as a simple call.

If six-party conference is configured, up to six parties can be included in a conference. If the controlling party hangs up during the conference, the conference is disconnected *if all remaining parties are trunks.* If at least one of the remaining parties is local, then the conference remains established. If the conference reaches a state where there is connection between a set on the controlling node and two other trunks, and the controlling set disconnects, then it becomes a simple call connection between the two trunks. In a simple call connection, if one of the remaining parties is external, it becomes the originating party and the other becomes the terminating party. If both parties are external, this implies that at least one of the parties is a set. The set then becomes the originating party, and the other party becomes the terminating party.

Group Hunt/Group Hunt Queuing

DPNSS1 does not support either the Group Hunt or Group Hunt Queuing features.

Multi-party Operation

As part of Multi-party Operation, a control digit (0-9, or an # or *) must be dialed to toggle, disconnect, or conference.

If Multi-party Operation is equipped at the controlling node, the controlling party may toggle between the held party and inquired-to party, after the inquired-to party has answered the inquiry call from the controlling party.

Multi-party Operation is a stand-alone feature, and does not support network-wide misoperation. It does allow local misoperation treatment to be configured for call transfer, for external and internal calls. The options that may be configured are ATN (route to attendant), DAR (disconnect after re-ring cycle of 1-15), AAR (route to attendant after re-ring cycle), OVF (overflow tone), DIS (disconnect), or STD (standard operation, which is disconnect for internal and route to attendant for external).

Feature packaging

DPNSS1 Extension Three Party Service requires DPNSS1 Network Services (DNWK) package 231.

Feature implementation

LD 10 – Configuring the transfer/conference capabilities when Multi-Party Operation is not equipped.

Prompt	Response	Description
REQ:	NEW CHG	Add new data Change existing data
...		

Prompt	Response	Description
CLS	(XFD)	Call Transfer Denied. This will also deny three-party conference.
	XFA	Call Transfer Allowed. This will also allow three-party conference.
	(C6D)	Six-Party Conference denied
	C6A	Six-Party Conference allowed

LD 10 – Configuring the transfer/conference capabilities when Multi-Party Operation is equipped.

Prompt	Response	Description
REQ:	NEW	Add new data
	CHG	Change existing data
...		
CLS	(XFD)	Call Transfer Denied. This will deny three-party service.
	TSA	Three-Party Service Allowed
	(C6D)	Six-Party Conference Denied
	C6A	Six Party Conference Allowed

LD 11 – Configure transfer/conference capabilities.

Prompt	Response	Description
REQ:	NEW	Add new data
	CHG	Change existing data
...		
KEY	xx TRN	Call Transfer key
	xx AO3	Three-Party Conference key
	xx AO6	Six-Party Conference key

LD 95 – For Calling Party Name Display data, configure the transfer indication mnemonic displayed on the telephone sets.

Prompt	Response	Description
REQ	NEW CHG	Add new data Change existing data
TYPE	CPND	Calling Party Name Display data block
CUST	xx	Customer number, as defined in LD 15
...		
RESN	YES	Display of Reason for redirecting calls allowed
- XFER	 xxxx (T)	Call Transfer display mnemonic Mnemonic for call transfer display in Network Call Redirection (NCRD). One to four characters are accepted (Default)

LD 15 – Configure the Multi-Party Operation attributes.

Prompt	Response	Description
REQ:	CHG	Change existing data
TYPE:	MPO	Multi-Party Operations
CUST	 0-99 0-31	Customer number For Large Systems For Small Systems and Succession 1000 systems
FMOP	YES	Flexible Misoperation Options

Prompt	Response	Description
- AOCS	xxx yyy	All Other Cases, xxx is for internal calls and yyy is for external calls When xxx/yyy = ATN, the call will route to attendant When xxx/yyy = DAR, the call will disconnect after re-ring cycle of 1-15 When xxx/yyy = AAR, the call will route to attendant after re-ring cycle When xxx/yyy = OVF, the call will receive overflow tone When xxx/yyy = DIS, the call will disconnect When xxx/yyy = STD, the call will disconnect for internal and route to attendant for external
- RALL	(NO) YES	Deny mandatory recall Allow mandatory recall
- CDTO	2 - (-14)	Control digit timeout, in two second increments
IFLS	(NO) YES	Allow switch-hook flash operation Ignore switch-hook flash operation
MHLD	(NO) YES	No Manual Hold required Manual Hold is required
PCDS	(NO) YES	Deny the programming of Controlled Digits Allow the programming of Controlled Digits
- CNFD	0-(1)-9,#,*	Define the control digit for conference
- TGLD	0-(2)-9,#,*	Define the control digit for toggle
- DISD	0-(3)-9,#,*	Define the control digit for disconnect
CCDO	(NO) YES	Deny transfer after inquiry Allow transfer after inquiry

Feature operation

No specific operating procedures are required to use this feature.

Loop Avoidance

Contents

This section contains information on the following topics:

Feature description

The DPNSS1 Loop Avoidance feature prevents a DPNSS1 call from being looped through a network, due to errors in configuration, by placing a limit on the number of channels that a call may use.

A Loop Avoidance (LA) Supplementary Information String (SIS) has been added in all outgoing Initial Service Request Messages (ISRMs), for each call at the originating PBX. The SIS contains a parameter that sets the limit on the number of DPNSS1 transit nodes that a call may use, as defined in the customer data block (Overlay 15). The maximum value to which this limit may be defined is 25.

At each system transit node, the parameter of the Loop Avoidance Supplementary Information String is decremented by one, and a check is done to see if the limit has been reached. If the limit has not been reached, an

Initial Service Request Message is sent along the outward channel to route the call onward. If the limit has been reached, the call is cleared back to the originating node and the originating exchange receives a Clear Request Message (CRM) message. The request message contains a specific clearing reason for Loop Avoidance.

The call is treated as if clearing has occurred due to congestion. If configured, alternative routing using Step Back on Congestion is attempted at the originating end only, if all of the available routes for the call have not been used. If alternative routing using Step Back on Congestion is not available, the treatment that the call receives depends on the originating party.

If the originating party is a non-ISDN trunk, the originating party receives congestion treatment as customer-defined in the customer data block (LD 15). This may be a busy or overflow tone. If the call was routed due to Network Alternate Route Selection (NARS), NARS call blocking intercept treatment is given (either overflow, busy, recorded announcement, or route to attendant). If the originating party is an ISDN trunk, the originating party receives congestion treatment as customer-defined in LD 15 (busy or overflow).

If the originating party is a local set, treatment depends on the customer-defined congestion treatment (either busy or overflow) or NARS call blocking intercept treatment (either overflow, busy, recorded announcement, or route to attendant). If the originating party is a local attendant, busy indication is given. At this point, the DPNSS1 Attendant Camp-on feature may not be used.

If a system transit node receives an Initial Service Request Message that does not contain a Loop Avoidance Supplementary Information String, before the ISRM is sent over a new channel, a Loop Avoidance Supplementary Information String is added to the ISRM. The Loop Avoidance parameter is set to the pre-defined Loop Avoidance limit (as programmed against the TNDM prompt in the Customer Data Block, Overlay 15, less one, to account for the incoming DPNSS1 channel.

The Loop Avoidance Supplementary Information String is ignored at a terminating system node that is not a gateway. If a terminating system node is a DPNSS1 to ISDN gateway, then the call is cleared back if the loop avoidance limit has been reached. If the ISDN Call Connection Limitation

(ICCL) feature is equipped, the Loop Avoidance Limit is used to create the ICCL Tandem Threshold Limit.

Operating parameters

The intercept treatment for Network Alternate Route Selection calls that are blocked, configured in LD 15 in response to the INTR prompt, should be the same as for calls receiving Loop Avoidance call-back treatment, configured in LD 15 in response to the CONG prompt.

Feature interactions

Attendant Extended Calls

Calls extended by the attendant across a DPNSS1 trunk contain a Loop Avoidance String, with the value of the loop avoidance parameter being customer-defined in LD 15.

A Loop Avoidance Supplementary Information String is included in an Initial Service Request Message requesting the following:

- Camp-on/Call offer
- Route optimisation call set-up
- DPNSS1 Call Back When Next Used
- DPNSS1 Call Back When Free
- DPNSS1 Redirection
- DPNSS1 Three Party Service enquiry call

Camp On

The DPNSS1 Attendant Camp-on feature may not be used following call failure due to loop avoidance.

Call Back When Free

DPNSS1 Call Back When Free cannot be used from an originating set receiving overflow as a loop avoidance clear-back treatment.

DPNSS1 Diversion

After originating a DPNSS1 call, a system will attempt a new call if a Divert Immediate or Busy Instruction is received in a Number Acknowledgment Message (NAM). If the originating item is ISDN containing a Tandem Count value, this value is used to determine the Loop Avoidance Limit of the new DPNSS1 call; otherwise, the Tandem Count value defined in the Customer Data Block, LD 15, is used.

Step Back On Congestion

The Loop Avoidance Limit configured at an originating DPNSS1 system overrides the Step Back On Congestion configuration at a transit PBX.

Transfer

When a Call Transfer occurs over DPNSS1 links, the held and enquiry segments of the call must not individually exceed the Loop Avoidance parameter limit for the DPNSS1 channels that are used. On completion of the call transfer, the limit may be exceeded.

Remote Virtual Queuing

Remote Virtual Queuing is not allowed on an ISDN call cleared back due to Tandem Threshold Exceeded.

Call Forward

If an incoming DPNSS1 or ISDN call is call forwarded all calls on busy over a DPNSS1 or ISDN trunk, the Loop Avoidance Limit of the incoming call is used for the forwarded call.

ISDN Call Connection Limitation

If the ISDN Call Connection Limitation (ICCL) feature is equipped, when an ISDN call reaches the terminating system node, it returns the Tandem Threshold count in the ALERT message to the originating node. If an ISDN call encounters a DPNSS1 gateway while being channeled, the complete tandem count is not known since DPNSS1 does not pass this information back to the originating node. Therefore, the ICCL Tandem Threshold count in the ALERT message passed from the DPNSS1 gateway to the originating node is incorrect (the actual value returned is that received at the gateway node, increased by one).

For the outgoing portion of a call, the gateway will use the received value of the Loop Avoidance Supplementary Information String or Tandem Count to adjust the Tandem Count or Loop Avoidance Limit information.

Call Hunt

When an incoming DPNSS1 call to a local station hunts across a DPNSS1 trunk, the Loop Avoidance Limit will be used for the outgoing call to avoid the possibility of a call looping continuously because of the Call Hunt feature.

Feature packaging

DPNSS1 Loop Avoidance requires DPNSS1 Network Services (DNWK) package 231.

Feature implementation

LD 15 – Define the Loop Avoidance Limit for DPNSS1 calls or the Tandem Threshold Limit for ISDN calls if ISDN and ISDN SUPP packages are configured.

Prompt	Response	Description
REQ:	CHG	Modify existing data base
TYPE:	NET	Networking Data
CUST		Customer number
	0-99	For Large Systems
	0-31	For Small Systems and Succession 1000 systems
OPT	aaa	Options
....		
ISDN	YES	Integrated Services Digital Network
PNI	1-32700	Private Network Identifier

Prompt	Response	Description
....		
TNDM	0-(15)-31	The Tandem Threshold Limit for ISDN calls, or the Loop Avoidance Limit for DPNSS1 calls if the DNWK package 231 is equipped

LD 15 – Define the Loop Avoidance Limit for DPNSS1 calls or the Tandem Threshold Limit for ISDN calls. If ISDN and ISDN SUPP packages are not configured, but the DNWK package 231 is equipped, note that the ISDN prompt does not appear.

Prompt	Response	Description
REQ:	CHG	Modify existing data base
TYPE:	NET	Networking Data
CUST		Customer number
	0-99	For Large Systems
	0-31	For Small Systems and Succession 1000 systems
OPT	aaa	Options
....		
TNDM	0-(15)-25	Loop Avoidance Limit for DPNSS1 calls

LD 15 – Define congestion treatment and NARS/BARS blocking treatment.

Prompt	Response	Description
REQ:	CHG	Modify existing data
TYPE:	INT	Intercept, treatment options
CUST		Customer number
	0-99	For Large Systems
	0-31	For Small Systems and Succession 1000 systems

Prompt	Response	Description
....		
NBLK		Network blocking treatment. Four entries are required.
	OVF	Overflow Treatment
	ATN	Route to Attendant
	RAN	Recorded Announcement
	BSY	Busy Tone
	SRC1... SRC8	caller is relinked to source queue
	(OVF OVF OVF ATN)	Default entry
CONG	(OVFL) BUSY	Congestion treatment
		Overflow tone for all trunks busy condition, or Busy tone for all trunks busy condition

Feature operation

No specific operating procedures are required to use this feature.

Message Waiting Indication

Contents

This section contains information on the following topics:

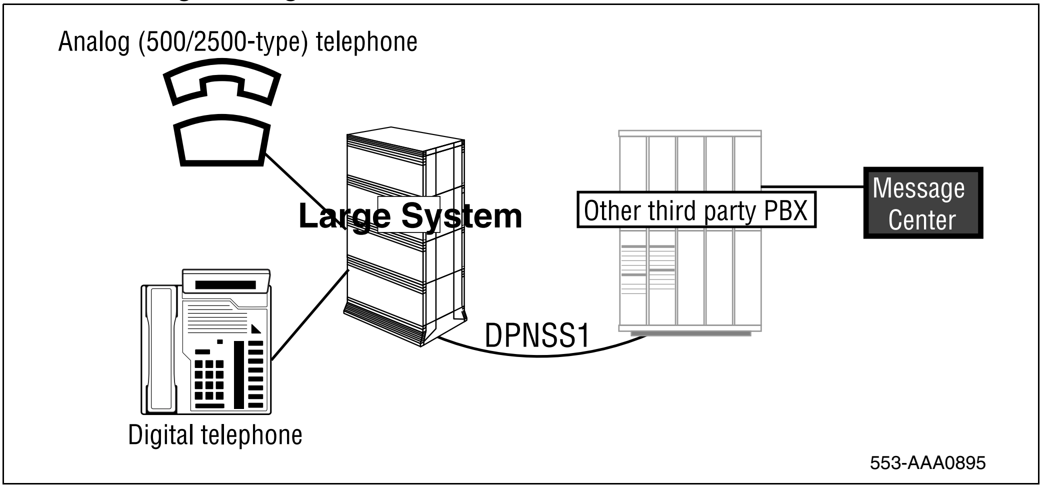
Feature description

With the DPNSS1 Message Waiting Indication (DMWI) feature, system users can subscribe to a third-party voice message system across a Digital Private Network Signalling System No. 1 (DPNSS1) network.

When provisioned, this feature provides a means to pass Message Waiting Indication across a private DPNSS1 network with system and other third-party PBXs. This feature allows the system to recognize DPNSS1 Non-Specified Information (NSI) from a third-party voice message node. This recognition capability allows a voice message system located on another node to notify or cancel Message Waiting Indication for system users.

Figure 14 on page 186 illustrates DPNSS1 Message Waiting Indication.

Figure 14
DPNSS1 Message Waiting Indication



DPNSS1 Message Waiting Indication interworks with the DPNSS1 Call Diversion feature. The DPNSS1 Call Diversion Feature automatically routes an incoming trunk or an internal call to a third-party voice message node if the call is not answered on the system node. When a calling party leaves a message for the called party, the voice message node sends a message waiting notification to the controlling node. When the called party retrieves the voice message, a message waiting cancellation is sent by the host node to the controlling node where the user is located.

For telephones equipped with a visual message waiting device, such as an LCD or LED, message notification is provided by lighting the device. Message cancellation is provided by switching off the device. Otherwise, the indication and cancellation is provided by an audible indication when the called party goes off-hook.

Operating parameters

The DPNSS1 Call Diversion feature is a prerequisite for the DPNSS1 Message Waiting Indication feature. With DPNSS1 Call Diversion, one of the following redirection features must be configured: Call Forward All Calls, Call Forward No Answer, Call Forward by Call Type, Call Forward

Busy, Hunting/Group Hunting, ICP Forward All Calls or Internal Call Forward.

This feature is supported on analog (500/2500-type) sets and digital sets.

DPNSS1 Message Waiting Indication is supported across Analog Private Network Signaling System (APNSS).

The size of a parameter for a Message Waiting Indication non-specified information (NSI) string is limited to 80 characters. The size of all parameters for a Message Waiting Indication non-specified information (NSI) string is limited to 126 characters. String size limitations do not include octothorpe (#) or asterisk (*) delimiters.

The DPNSS1 Message Waiting Indication does not check the presence and validity of a suffix following a non-specified information identifier.

This feature supports Coordinated Dialing Plan (CDP) and Uniform Dialing Plan (UDP).

The total limit of configured Message Waiting Indication (MWI) Non-Specified Information (NSI) tables must not exceed 512. The size of an MWI NSI consists of adding up the table's number of parameters, the total number of characters for the table's parameters and the number 7. Any creation or change that causes this limit to be exceeded, results in the output of an error message (SCH0097).

Any number of DPNSS1 trunks can be involved in the path between the Voice Messaging System and the system.

A Message Waiting Indicator message can pass across a DPNSS to a Meridian Customer Defined Network (MCDN) or an MCDN to DPNSS gateway. The gateway feature is only applicable when the controlling set is on a Meridian 1, Succession 1000, or Succession 1000M system. This feature only creates a gateway between a DPNSS and an MCDN link to another Meridian 1, Succession 1000, or Succession 1000M system switch.

> ***Note:*** The MWI NSI string must be configured at the gateway node and at both ends of the DPNSS link for the receiving system to recognize the NSI string in the incoming Initial Services Request Message (ISRM).

Feature interactions

Network Messaging Service

An MCDN-DPNSS gateway functionality exists for Meridian Mail access and message waiting capabilities.

Feature packaging

The DPNSS1 Message Waiting Indication requires DPNSS Message Waiting Indication (DMWI) package 325.

All system nodes require the following packages:

- Integrated Digital Access (IDA) package 122
- Digital Privsystem originating node (i.e. node with calling party) and controlling node (i.e. node with Message Center users) require DPNSS1 Network Services (DNWK) package 231 for the DPNSS1 Call Diversion feature.

System controlling nodes require the following packages:

- End-to-End Signaling (EES) package 10
- Message Waiting Center (MWC) package 46

For an audible Message Waiting Indication on analog (500/2500-type) sets, Flexible Tones and Cadences (FTC) package 125 is required.

For a Message Waiting announcement, Message Intercept (MINT) package 163 is required.

Feature implementation

Prior to configuring DPNSS1 Message Waiting Indication, the DPNSS1 Call Diversion feature must be configured and one of the following redirection features must also be activated:

- Call Forward All Calls
- Call Forward No Answer

- Call Forward by Call Type
- Call Forward Busy
- Hunting/Group Hunting
- ICP Call Forward All Calls
- Internal Call Forward.

To configure DPNSS1 Call Diversion, refer to the DPNSS1 Call Diversion feature in this guide.

LD 15 – Add, change or delete a Message Waiting Indication NSI table.

Prompt	Response	Description
REQ:	NEW CHG	Add new data Change existing data
TYPE:	NET	Networking data block
CUST	 0-99 0-31	Customer number For Large Systems For Small Systems and Succession 1000 systems
...		
DMWM	YES	Enable output of error messages (NO) = disables output of error messages (default)
MWNS	YES	Recognize Message Waiting Indication NSI string (NO)= Do not recognize Message Indication NSI string (default)
- REQ	(NEW)	Create new NSI table (default) OUT = Delete Message Waiting Indication table

Prompt	Response	Description
- MFID	a	Enter the Manufacturer Identifier of the Message Waiting Indication NSI table to add, change, or delete, where a = any alpha character or <CR> SCH9996 message will appear if the command CHG is entered and no Message Waiting Indication NSI tables corresponds to the alpha character entered. When this occurs, the MFID prompt is re-prompted. SCH0097 will appear if the NEW or CHG commands are entered and if the number of MWI NSI tables for the customer exceeds the limit (512). If the prompt XALL is entered, then all existing Message Waiting Indication NSI tables are deleted.
- - NOTI	YES NO	YES = NSI string for Message Waiting Notification If NO or <CR> is entered on NEW command then the SCH0274 message is output If NO or <CR> is entered on CHG command then CANC is prompted
- - MSSC	a	Manufacturer-specific service character for MW notification where a = any alphanumeric character is accepted for an SIS parameter. If <CR> is entered on NEW command then the SCH0274 message appears and MSSC is re-prompted. If <CR> is entered on CHG command then PRMT prompt appears. If a = a character that is not an alphanumeric character, then SCH008 appears and MSSC is reprompted.
- - - PRMT	aaa	NSI parameter(s) for Message Waiting Notification, where aaa = any alphanumeric sequence is accepted for a SIS parameter to a maximum of 126 characters PRMT appears until <CR> is entered If aaa includes a character that is not an alphanumeric character, then SCH008 appears and PRMT is reprompted.

Prompt	Response	Description
- - CANC	YES NO	YES = NSI string for Message Waiting Cancellation. If NO or <CR> is entered on NEW command then the SCH0274 message appears and CANC is re-prompted. If NO or <CR> is entered on CHG command then the MFID prompt appears.
- - - MSSC	a	Manufacturer-specific service character for Message Waiting cancellation where a = any alphanumeric character is accepted for an SIS parameter.
- - - PRMT	aaa	NSI parameter(s) for Message Waiting Cancellation where aaa = any alphanumeric sequence is accepted for an SIS parameter to a maximum of 126 characters. PRMT appears until <CR> is entered. When REQ = CHG, both cancellation and notification, once <CR> is entered at the PRMT prompt, the only parameters kept are the ones that have just been entered. Any existing parameters not re-entered are removed from the MWNS.

LD 10 – Allow Message Waiting Class of Service.

Prompt	Response	Description
REQ:	NEW CHG	Add new data Change existing data
TYPE:	500	Type of telephone set
TN	 l s c u c u	Terminal Number For Large Systems For Small Systems and Succession 1000 systems
...		

Prompt	Response	Description
CLS	MINA	Message Interrupt Allowed MIND = Message Interrupt Denied (default)
CLS	MWA	Message Waiting Allowed MWD = Message Waiting Denied (default)

Note: To receive an announcement as a message waiting indication, analog (500/2500-type) sets must configure the Message Intercept feature and activate Flexible Tones and Cadences (FTC) in LD 56.

LD 56 – Message Intercept and Flexible Tones and Cadences.

Prompt	Response	Description
REQ	NEW CHG	Add new data Change existing data
TYPE	FTC	Flexible Tones and Cadences data block
TABL	0 - 31	Flexible Tones and Cadences Table number
...		
MINT	YES	Allow tones or announcements NO = Deny tones or announcements (default)
- MWAN	0 - 255 0 - 255	Message Waiting

Note: If the Message Intercept feature is not equipped, a Message Waiting dial tone is provided on a set basis if this tone has been defined in Tones and Cadences data block in LD 56. Or, Call Forward Message Waiting tone is provided if Call Forward Message Waiting has been defined in LD 56 and the set has Call Forward Active.

LD 11 – Allow Message Waiting Class of Service.

Prompt	Response	Description
REQ:	NEW CHG	Add new data Change existing data
TYPE:	xxxx	Telephone type
TN	 l s c u c u	Terminal Number For Large systems For Small Systems and Succession 1000 systems
...		
CLS	MWA	Message Waiting Allowed (MWD) = Message Waiting Denied (default) If CLS = MWA and no Message Waiting Key (MWK) is defined, then broken dial tone is provided for message waiting notification

Feature operation

No specific operating procedures are required to use this feature.

Night Service

Contents

This section contains information on the following topics:

Feature description

The Digital Private Networking Signaling System No.1 (DPNSS1) Night Service feature introduces the "Diversion via a Different Channel" capability of the DPNSS1 Night Service Supplementary Service. That is, it allows a system to treat a third-party PBX's request to divert a call queued to an attendant that is in Night Service mode, back to the local attendant queue of the originating DPNSS1 node.

The following example illustrates a DPNSS1 Night Service call processing scenario. Also refer to Figure 15 on page 197.

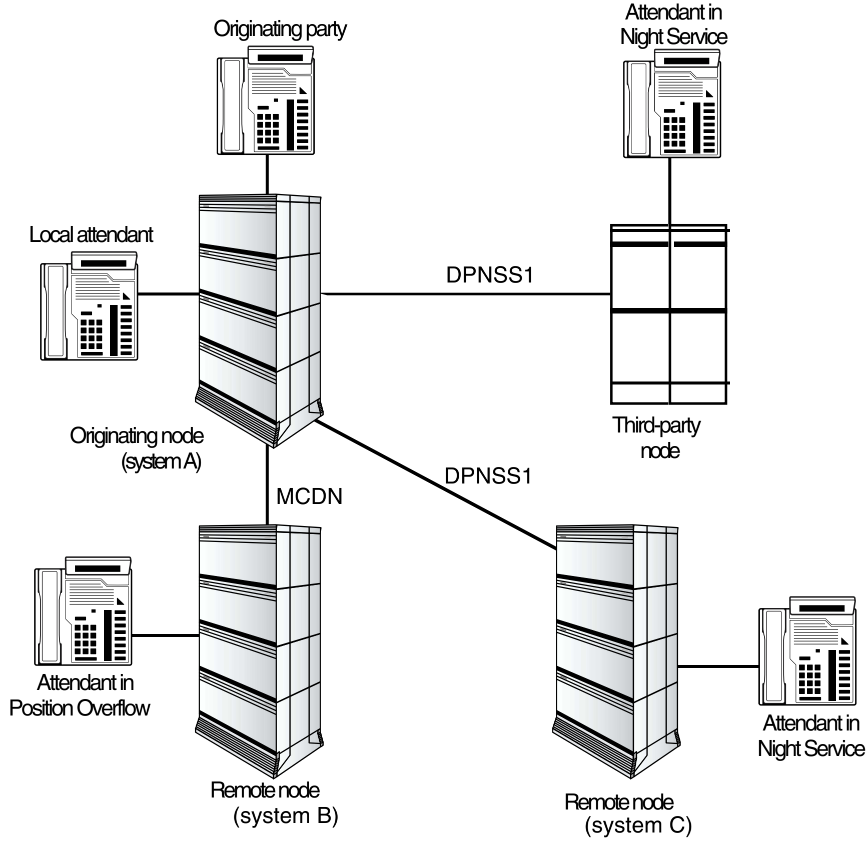
A DPNSS1 call from the originating system node (system A) terminates to the attendant on a third-party PBX. The attendant is in Night Service. The third-party PBX signals the system to initiate Night Service Diversion. The call is then diverted back to the originating node, where a new call is initiated to the queue of the local attendant.

> ***Note:*** This diversion is the functionality that has been introduced by the DPNSS1 Night Service feature. The call processing which follows is part of the standard Network Attendant Service (NAS) functionality.

At this point, the call is treated as a standard call to the local attendant. If the local attendant is also in Night Service, Network Attendant Service (NAS) routing is applied. The call is routed to a remote attendant (on system B.) Since this attendant is in Position Overflow, it cannot take the call and clears it. The next alternative in the NAS routing table is tried, which is for the originating system to route the call to the remote attendant (system C). Here, the attendant is also in Night Service and clears the call. Eventually, the Night DN is tried successfully. The new call from the originating system to the NIGHT DN is kept, and the old call to the third-party PBX is released.

Figure 15 on page 197 is an example of DPNASS1 Night Service Diversion.

Figure 15
Example of DPNSS1 Night Service Diversion



Operating parameters

There are no operating parameters associated with this feature.

Feature interactions

DPNSS1 Redirection

A redirected call may undergo Night Service Diversion, if a new call is attempted to an attendant on a third-party PBX that initiates Night Service Diversion.

DPNSS1 Route Optimisation

Route Optimisation is applied if a non-optimum path has been taken by a call answered by either the third-party PBX on which the target operator is located, the local attendant, remote attendant, or the Night DN.

DPNSS1 Step Back on Congestion

If a call to the remote attendant encounters congestion, Step Back on Congestion is initiated and attempted at any node.

DPNSS1 Extension Three Party Service

An enquiry call reaching an attendant in Night Service will undergo Night Service diversion, if available.

Diversion

A diverted call reaching an attendant in Night Service will undergo Night Service diversion, if available.

Attendant Incoming Call Indicators

When a Night Service call is diverted to an attendant, the Incoming Call Indicator is the number of the incoming route (this is the same as for a NAS MCDN call routed to an attendant.)

Call Waiting

If a call is diverted to a third-party operator Night DN that is busy, Call Waiting may be activated (if equipped). The call to the third-party operator PBX is released.

Feature packaging

The following software packages are required for the DPNSS1 Night Service feature:

For basic DPNSS1 network functionality:

- Integrated Digital Access (IDA) package 122
- Digital Private Networking Signaling System No.1 (DPNSS) package 123
- 2.0 Mbps Primary Rate Interface (PRI2) package 154

For enhanced functionality:

- International Supplementary Features (SUPP) package 131
- DPNSS1 Networking Services (DNWK) package 231

For Network Attendant Service interworking:

- Integrated Services Digital Network (ISDN) package 145
- Advanced ISDN Network Services (NTWK) package 148
- Network Attendant Service (NAS) package 159
- ISDN International Features (ISDN INTL SUP) package 166 (to support the MCDN/DPNSS1 gateway with Loop Avoidance)

Feature implementation

LD 15 – Configure the local attendant DN.

Prompt	Response	Description
REQ:	CHG	Change the existing data
TYPE:	ATT	Attendant consoles data
CUST		Customer number
	0-99	For Large Systems
	0-31	For Small Systems and Succession 1000 systems

Prompt	Response	Description
- ATDN	(0)-xxxx(xxx)	Four-digit Attendant Directory Number (up to seven digits with the Directory Number Expansion (DNXP) package 150

LD 15 – Configure the Night Service DN.

Prompt	Response	Description
REQ:	CHG	Change the existing data
TYPE:	NIT	Night Service data
CUST		Customer number
	0-99	For Large Systems
	0-31	For Small Systems and Succession 1000 systems
- NIT1	xxxx	First Night Service DN

LD 86 – Define the Remote Attendant data.

Prompt	Response	Description
REQ	NEW CHG	Add, or Change
CUST	xx	Customer number, as defined in LD 15
FEAT	NAS	Network Attendant Services
TBL	(0)-63	NAS routing table. 0 is the customer routing table; it is also associated with attendant console Group 0
...		
ALT	1-7	Attendant Alternative number
ID	x....x	Digits (up to 16) dialed to reach a remote attendant
TODS	1-31	Schedule period to be changed

Feature operation

No specific operating procedures are required to use this feature.

Redirection

Contents

This section contains information on the following topics:

Feature description

The DPNSS1 Redirection feature allows a DPNSS1 call that is extended by an attendant and not answered after a defined period of time, to be recalled to an attendant. This attendant may be the attendant that originally extended the call, or another attendant on the same or different node within the network.

> ***Note:*** The DPNSS1 Redirection feature is required for DPNSS1 networks using a Centralized Operator Service, if the network nodes on which operator consoles are located use DPNSS1 Redirection to provide timed operator recall functionality. If operator consoles are located on a system PBX, timed operator recall is provided by the DPNSS1 Timed Recall feature described in this section.

When an attendant extends a call to a destination, and the destination does not answer before the attendant releases the call, information is passed to the originating DPNSS1 node to initiate recall timing. If the information indicates that the destination is free, then the slow answer recall timer is started. If the information indicates that the destination is busy, then the camp-on recall timer is started. For camp-on timing, if the destination party becomes free before the camp-on timer expires, then the destination party receives ringing. The camp-on timer is cancelled, and the slow answer recall timer is started.

If the destination answers the call extension before the recall timer expires, the recall timer is cancelled and the source and destination are connected. If the recall timer expires before the call extension is answered, a new call is initiated to the local attendant. If the local attendant is not available, Network Attendant Service (NAS) routes the call to another node. If the call reaches a state of attendant receiving buzzing, attendant receiving ringing, or queued to attendant, then the originating party is connected to the new call and the original call is dropped.

If a new call cannot be established, a Clear Request Message (CRM) is sent to the originating node and the original call remains connected. If the original call, while in call waiting or camp-on, is answered by the destination party before ringing state is attained, a Call Connected Message (CCM) is sent to the originating node. The new call is cleared and the original call remains connected.

If the original call progresses to ringing before a Number Acknowledgment Message (NAM) is received, the new call is cleared forward and a Call Connected Message (CCM) is sent to the originating node.

Operating parameters

The DPNSS1 Extension Three Party Service must be equipped in order for the Redirection feature to function, since the Redirection feature uses the Three Party Service messaging to perform recall timing.

Special care must be taken when configuring NAS routing for call redirection. If NAS routing is to be used to make the redirected call, a Location Code (LOC) or Distant Steering Code (DSC) must be used and entered in response to the ID prompt in Overlay 86. The digits entered for the ID prompt must allow the call to be routed immediately, without any timing.

It is strongly suggested that separate DSCs be used for programming the NAS alternatives.

Flexible Numbering must not be used for the configuration of the NAS alternatives. The FLEN prompt should be given a value of “0” in LD 86 for the LOC and in LD 90 for the DSC.

Since there is no system verification during configuration, it is up to the technical personnel to ensure proper programming. If these guidelines are not followed, when the new call is attempted, it will be dropped and the old call retained.

Feature interactions

ISDN/IDA Gateway

The Redirection feature does not apply to calls passing through an DPNSS1/ISDN gateway. If a call comes in from an originating node over an ISDN trunk, passes through a system gateway PBX, is routed to an attendant over a DPNSS1 trunk, and is then extended to a set over a DPNSS1 trunk, then the Redirection feature may only initiate recall timing at the ISDN/DPNSS1 boundary.

The destination party must be within the DPNSS1 or DPNSS1/ISDN network in order for recall timing to be activated at the originating node.

If the destination party to which call waiting or camp-on is applied is on a third-party system node, or on a node that does not treat call waiting as does a system node, then it may not be possible to distinguish a call waiting call from a camp-on call. In this case, the call is timed as if it were a camp-on call.

If an attendant at one node is established in a call to an attendant at another node, this feature does not apply if the second attendant transfers the call.

Attendant Forward No Answer

If Attendant Forward No Answer is active, a call that has been redirected to an attendant may be passed from one console to another, if the call has been presented but not yet answered. The previous console is placed in night service. If a call is passed to the last console which is in-service, the call is passed from this console to the night DN.

Call Forward No Answer

If a call is extended from an attendant node that relies on the originating node for recall timing using the Redirection feature, to a ringing set on a system node with Call Forward No Answer (CFNA) active, the recall timing takes precedence over the CFNA timing. When the call is extended to the set, the recall timer is started at the originating node. When the set begins to ring, the CFNA timer is started. If the CFNA timeout is less than the recall timer timeout, then the call is forwarded to the CFNA DN. The CFNA DN is rung until the recall timer expires, at which time the CFNA DN stops ringing and the call is routed to the attendant. If the CFNA timeout is greater than the recall timer timeout, then, when the recall timer expires, the set ceases to ring and the call is routed to the attendant rather than to the CFNA DN.

Call Transfer

Redirection timing is not done at a system DPNSS1 originating node for DPNSS1 calls transferred from sets.

DPNSS1 Loop Avoidance

DPNSS1 Loop Avoidance string (LA) added for a normal call is also added to the redirected call.

DPNSS1 Step Back On Congestion

If a redirected call encounters congestion, the DPNSS1 Step Back on Congestion feature, if active, may cause the call to step back. Another call may be redirected using an alternate, non-congested route.

Initialize

During system initialisation, calls not yet established are dropped.

Splitting

After the Redirection recall timer expires, recalls to the attendant leave only the source active, with the destination being dropped. Therefore, there is no splitting with the Redirection feature.

Slow Answer Recall Modification

The Slow Answer Modification feature may be used in a mixed network environment consisting of attendant nodes that do their own recall timing, and nodes using the Redirection feature for recall timing. This application would result in a more consistent console operation within the network. Where recall timing is done by the attendant node, when a recall occurs to the attendant, the Slow Answer Modification feature causes the destination to be dropped when the attendant answers the recall. Where recall timing is done by the Redirection feature, when a recall occurs to the attendant, the source remains active while the destination is dropped.

Recall to Same Attendant

After the Redirection recall timer expires, a call extended by an attendant may or may not recall to the attendant that originally extended the call, since the original call is dropped and a new call is originated.

Feature packaging

DPNSS1 Redirection requires DPNSS1 Network Services (DNWK) package 231.

Feature implementation

LD 15 – Define the parameters for recall timers and the attendant DN

Prompt	Response	Description
REQ:	NEW CHG	Add new data Change existing data
TYPE:	CDB	Customer Data Block
CUST	 0-99 0-31	Customer number For Large Systems For Small Systems and Succession 1000 systems
...		

Prompt	Response	Description
ATDN	(0) - x..x	Attendant DN. Recalls occur to this DN, upon expiration of the recall timer.
...		
AATT	xxxx	Automatic Identification of Outward Dial Attendant Identifier
RTIM	xxx yyy zzz 0 - (30) - 378 0 - (30) - 510 0 - (30) - 510	Recall Timers xxx = Slow answer recall timer yyy = Camp-on recall timer zzz = Call waiting recall timer Note that for recalls timed at the local node, no distinction is made between call waiting calls and slow answer recalls. The slow answer value is used in both cases.

Feature operation

No specific operating procedures are required to use this feature.

Route Optimisation

Contents

This section contains information on the following topics:

Feature description

The DPNSS1 Route Optimisation feature has been developed to optimise trunk usage within a DPNSS1 network, by replacing non-optimum call paths through a DPNSS1 private network with optimum paths. An optimum path is the path that uses only the first choice routes to link two PBXs across the network. The first choice is determined by the programming of the network numbering and routing at each PBX. This optimisation applies to established simple voice calls which were routed during set-up, or transferred or attendant-extended to another party.

Route optimisation is initiated by the originating PBX, after recognizing that a DPNSS1 call may have been set up over a non-optimum path due to alternative routing or call modification. If the call is ringing, the originating PBX waits for an answer signal before initiating optimisation. If the call has been transferred, on answer, or attendant-extended to a another party, then the transfer or extension signaling sequence initiates the optimisation.

The originating PBX sends a Route Optimisation Request message, which contains a Call Reference Number (CRN) field, to the terminating PBX. The CRN is used as a destination address to route the call back to the originating PBX and uniquely identify the call being optimized (the Originating Line Identity sent in the Initial Service Request Message is used for this purpose). The set-up message for the backward call contains a field that identifies the call set-up as route optimisation. This causes the call, throughout its path, to be restricted to only first choice routes.

If the route optimisation request call set-up successfully gets back to the originating PBX, a conference is established at the originating node between the originating party, the original path still carrying the speech, and the silent new path. A message of acknowledgement is returned to the terminating PBX on the new path. Upon receiving this acknowledgement, the terminating PBX replaces the old path with the new (optimized) path, and sends a connect indication across the new path to the originating PBX. The old path is silenced. Upon receiving the connect indication, the originating PBX terminates the conference, connects the originating party to the optimized path, and clears the original path.

If the route optimisation request call set-up fails, the originating PBX receives a notification message that the route optimisation request was not successful. The originating PBX may then attempt route optimisation again, at 60-second intervals. During this interval, the system may initiate route optimisation requests for other DPNSS1 calls.

A customer may define the following route optimisation options in LD 15, the Customer Data Block:

- NRO (no route optimisation). Route optimisation is inhibited for all calls (this option would typically be used on PBXs having high levels of call traffic).

- ROA (route optimisation for alternatively routed calls). Route optimisation is initiated for calls which have undergone alternative routing. A call is considered to be alternatively routed if it originated over a route which was not the first choice route, or if alternative routing indication is sent in the Routing Information (RTI) of a Network Indication Message (NIM).
- ROX (route optimisation for transferred calls). Route optimisation is initiated for transferred or attended-extended calls.
- RAX (route optimisation for transferred or alternatively routed calls). Route optimisation is initiated for calls which have been alternatively routed, such as by Step Back on Congestion, or for transferred or attended-extended calls.

Operating parameters

While a PBX may respond to simultaneous requests for route optimisation, only one call at a time may be optimized from any PBX (this is to prevent ambiguity as to which call is being optimized if a route optimisation request was simultaneously made for two or more calls on the same DN of a multiple appearance DN).

Care must be taken when configuring the incoming and outgoing digit manipulation for the system, so that when the insert (INST) digits followed by the Call Reference Number (CRN) are dialed at the terminating PBX, then the call is routed back to the originating PBX.

Some special configuration needs have to be considered for the optimisation of incoming trunk calls. If the Coordinated Dialing Plan (CDP) uses Local Steering Codes (LSCs), then the prompt LSC has to be configured in LD 15. If the CDP uses only Distant Steering Codes (DSCs) as part of the DNs, then a Trunk Steering Code (TSC) has to be configured at each network node, for each network non-DPNSS1 trunk in the network.

For a Coordinated Dialing Plan (CDP) configuration, each Steering Code (Distant or Trunk) has to be defined, in LD 87, with a Flexible Numbering Plan (FLEN) prompt other than 0 in order to have route optimisation working.

Route optimisation may be applied on a private line, which may cause the private line being removed from a call and replaced by another trunk. This may likely occur when a call is being transferred. It is recommended that a network is not configured to have calls alternatively routed to private lines or alternatively routed after using private lines.

When defining a numbering plan, the insert (INST) digits followed by the Call Reference Number (CRN) should exactly represent the digits to be dialed to reach the DN represented by the Originating Line Identity (OLI) in the Route Optimisation Request message.

Feature interactions

DPNSS1 calls in the ringing state are optimized immediately upon being answered. Transferred calls, on answer, are optimized as soon as the call transfer has been completed.

Route optimisation cannot be applied to the following calls:

- data calls
- conference calls (however, route optimisation may be applied when the conference call reverts to a normal two-party connection)
- calls on hold
- attendant-originated calls
- Single channel working is not supported on the system

If the conference tone is not switched off on the conference card, the parties involved in the call may hear conference tone during the optimisation sequence.

During a route optimisation attempt, the originating PBX and terminating PBX do not initiate signaling for any other DPNSS1 supplementary service for the call.

During a route optimisation attempt, any key operation from a set involved in the call is ignored, except the release or onhook function. If a set not involved in a call is configured in a single call multiple appearance DN arrangement with a set involved in a route optimisation attempt, then any key operation that interferes with the route optimisation attempt is ignored. Therefore, the set is inhibited from joining the call during the route optimisation attempt.

Analog trunks

Route optimisation is only supported on DPNSS1/APNSS trunks. If a call from a non DPNSS1/APNSS trunk comes in to a set within a DPNSS1 network, the call takes the optimum path (if route optimized) from the non-DPNSS1/APNSS trunk to the set.

Access Restrictions

Access Restrictions placed on sets give them pretranslation, which prevents the sets from dialing certain numbers (a different DN is substituted for the dialed DN). When implementing route optimisation, access restriction must not be set up to substitute a dialed DN with another DN that would prevent optimisation. The terminating PBX must be allowed to originate a call to the originating PBX.

Break-In

Break-in is not allowed during route optimisation, and route optimisation is not allowed during a break-in. After break-in has ended for a call, route optimisation may be applied to the call if it is eligible.

Call Detail Recording

Call Detail Recording (CDR) records are not printed at the originating or terminating PBX, during route optimisation. CDR records are printed at tandem nodes when the non-optimum path is released. The CDR records contain the same information as if the call had occurred on the new path at the time that the original trunks were seized. The cost of the call (that is, the Periodic Pulse Metering information) that has been optimized is the sum of the cost before route optimisation plus the cost after optimisation. The originator of the original call is shown as the originator of the new call, at the originating PBX. The terminator of the call is shown as the terminator of the new call, at the terminating PBX. At transit PBXs, normal information is printed, showing original tandem connections being released as if for calls being cleared at the time of route optimisation, and new tandem connections being released as if for calls being originated at the time of route optimisation.

If an optimized call does not use any trunks, that is, the originating party and terminating party are on the same PBX, then CDR records show the call as being cleared as normal.

Call Forward

A call that has been call-forwarded may be optimized upon being answered only if it has undergone alternative routing. If the forwarded call was not alternatively routed, it may use a non-optimum path.

Hunting

A call that has been picked up or that has undergone hunting may be optimized upon being answered only if it has undergone alternative routing.

Ring Again

A Ring Again new call may be optimized only if it has undergone alternative routing.

Transfer

A call transferred to another party may be optimized only after the call transfer has been completed. A call transferred to a ringing set may be optimized only after being answered.

Step Back On Congestion

A call that has been rerouted due to Step Back on Congestion may be optimized after it is answered.

Group Hunting

During a group hunt, a call to a Pilot DN which has been defined as a trunk access code may be optimized upon being answered only if it has undergone alternative routing.

Camp-On/Call Waiting

A call which is camped-on or call-waiting to a set may not be optimized until the call is answered on the set.

Override

Route Optimisation may be applied to a call that is being overridden only after it becomes a simple call.

Initialize

After system initialisation, conference calls are lost. Thus, Route Optimisation may cause some established calls over non-optimum paths to be lost. Also, after system initialisation, all Route Optimisation requests are dropped at the PBX where the initialisation has occurred. If the requesting party is not on this PBX, the requesting party is not informed that the request has been dropped.

Pretranslation

Pretranslation may be used with route optimisation. The stored Call Reference Number (CRN) and the insert (INST) digits are pretranslated by the Initial Service Request Message (ISRM) before being sent, as if being pretranslated after been dialed by terminating party. Similarly, the Destination Address (DA) digits at the terminating PBX are pretranslated as if being dialed by the called party.

Incoming Digit Conversion

Incoming Digit Conversion is not applied to the INST and CNR digits sent in the Route Optimisation call set-up message. This interaction is intended to prevent the CNR digits from being corrupted by Incoming Digit Conversion.

Trunk Barring

It is possible to configure Trunk Barring (TBAR) to prevent trunk-to-trunk connections on a local node. If a trunk call has tromboned over the network to another local trunk, the call will not be optimized if the TBAR configuration restricts the local connection.

Feature packaging

DPNSS1 Route Optimisation requires DPNSS1 Network Services (DNWK) package 231.

Feature implementation

LD 15 – Define Route Optimisation.

Prompt	Response	Description
REQ:	CHG	Modify existing data
TYPE:	NET	Networking Data
CUST		Customer number
	0-99	For Large Systems
	0-31	For Small Systems and Succession 1000 systems
OPT	aaa	Options
....		
ROPT	(NRO)	NRO = inhibit route optimisation;
	ROA	ROA = initiate route optimisation only for alternatively routed calls;
	ROX	ROX = initiate route optimisation only for calls which have been transferred or attendant-extended;
	RAX	RAX = initiate route optimisation only for alternatively routed calls or for calls which have been transferred or attendant-extended.

Feature operation

No specific operating procedures are required to use this feature.

Route Optimisation/MCDN Trunk Anti-Tromboning Interworking

Contents

This section contains information on the following topics:

Feature description

RO/TAT interworking scenarios

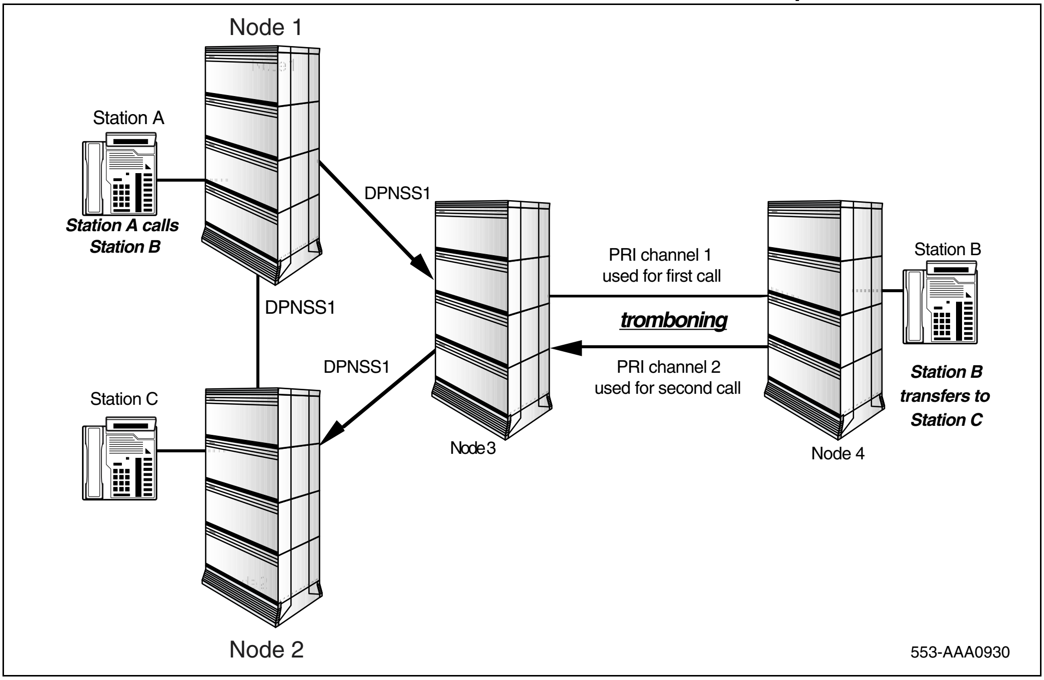
The following example presents a case where RO/TAT interworking occurs within a DPNSS1 to MCDN gateway.

> ***Note:*** In this example, we have used the case where a call has been redirected due to Network Call Transfer. The same functionality would apply if the call had been redirected by Network Call Forward No Answer, and Network Hunting, or modified by Network Call Transfer or Attendant Call Transfer.

Referring to Figure 16 on page 218, Station A, located at Node 1 on the DPNSS1 side of the DPNSS1/MCDN gateway, calls Station B located at Node 4 on the MCDN side of the gateway. It is to be assumed that the optimum DPNSS1 route has been selected at the originating node (the case where a non-optimum route is selected is discussed in the note following Figure 17 on page 219.) Station B activates Network Call Transfer to Station C, located at Node 2 on the DPNSS1 side of the gateway.

Upon activation, the existing call is put on hold and a new call is originated to Station C. Station C Answers. Station B completes the call transfer, leaving A connected to C using two DPNSS1 trunks and two PRI trunks.

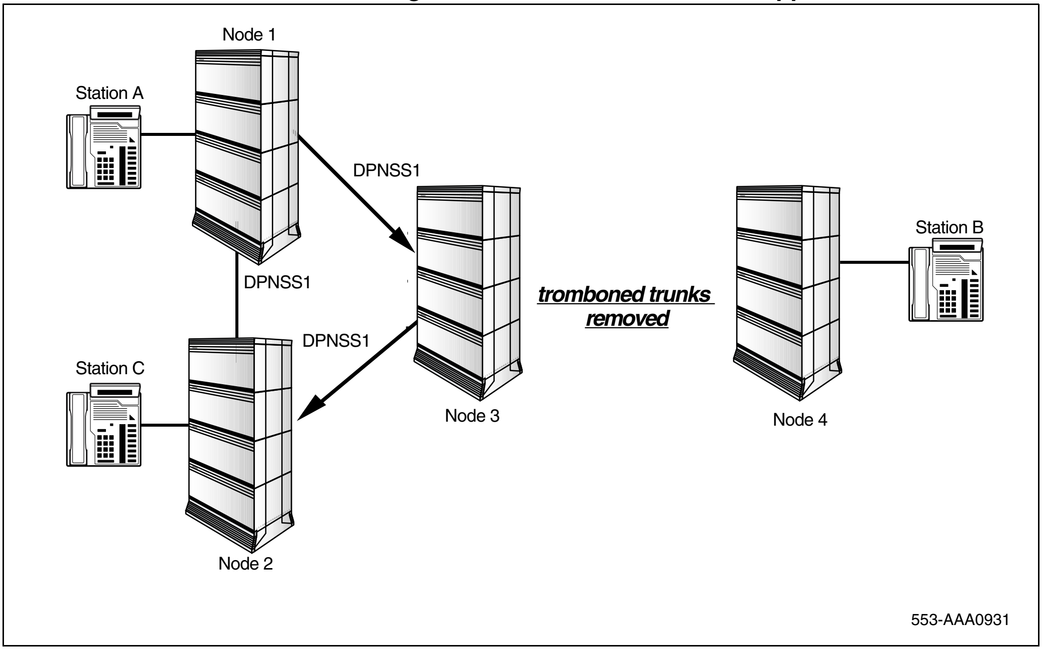
Figure 16
DPNSS1/MCDN scenario with Network Call Transfer, before RO/TAT optimisation



Note: The Network Call Transfer/Three Party Service gateway is not supported at the gateway Node 3. Therefore, RO is not initiated at Node 1, and the non-optimised DPNSS1 trunks remain connected.

On the MCDN side, TAT is initiated at Node 4. The call between A and C is bridged, and the redundant PRI trunks are removed between Node 4 and Node 3. For the meantime, the non-optimised DPNSS1 trunks remain connected, as shown in Figure 17 on page 219.

Figure 17
DPNSS1/MCDN RO/TAT Interworking scenario, after TAT has been applied

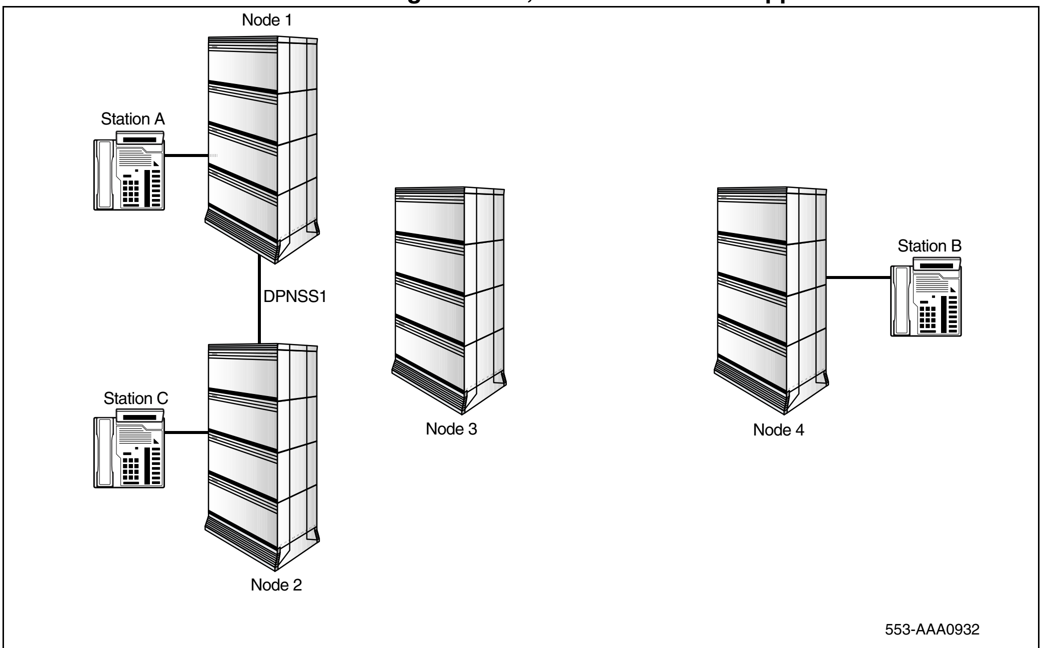


When TAT is completed on the MCDN side, The RO/TAT Interworking feature initiates RO on the DPNSS1 side by simulating a transfer at the gateway Node 3. The Three Party Service feature initiates signaling to update displays. Then, RO is initiated at Node 1, the originating node. The DPNSS1 trunks are dropped between Node 3 and 2 and Node 3 and Node 1, with Station A and Station C being connected over one DPNSS1 trunk. This is shown in Figure 18 on page 220.

Note: If a non-optimum route is used at the originating node or at any transit node, Route Optimisation may start from Node 1 (the normal RO operation for the first call optimisation) or Node 3 (the normal RO operation for the second call optimisation), before TAT is completed. If TAT invocation is received on Node 3 while RO is being applied between Node 1 and Node 3 or Node 3 and Node 2, the completion of TAT is delayed until RO is totally finished.

Upon the completion of TAT on Node 3, a call transfer operation is simulated, and a new RO operation is initiated to remove any potential triangulation of routes.

Figure 18
DPNSS1/MCDN RO/TAT Interworking scenario, after RO has been applied



Note: If Station A is an attendant, TAT takes place on the MCDN side of the gateway but RO cannot take place on the DPNSS1 side. This is a RO limitation.

RO/TAT interworking within a DPNSS1 to MCDN gateway

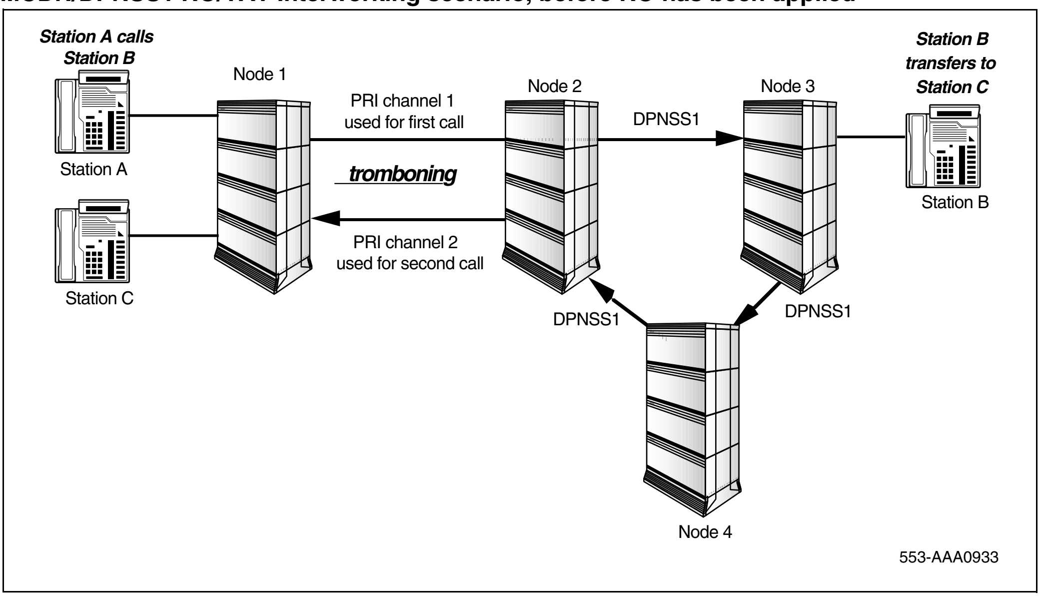
The following example presents a case where RO/TAT interworking occurs within an MCDN to DPNSS1 gateway. Here, too, we are using the case of a call being transferred (using the DPNSS1 Three Party Service feature) across the gateway.

Referring to Figure 19 on page 221, Station A, located at Node 1 on the MCDN side of the MCDN/DPNSS1 gateway, calls Station B located at Node 3 on the DPNSS1 side of the MCDN/DPNSS1 gateway. Station B transfers the call (using the Three Party Service feature) to Station C, also located at Node 1 on the MCDN side of the gateway.

Upon activation, the existing call is put on hold and a new call is originated to Station C.

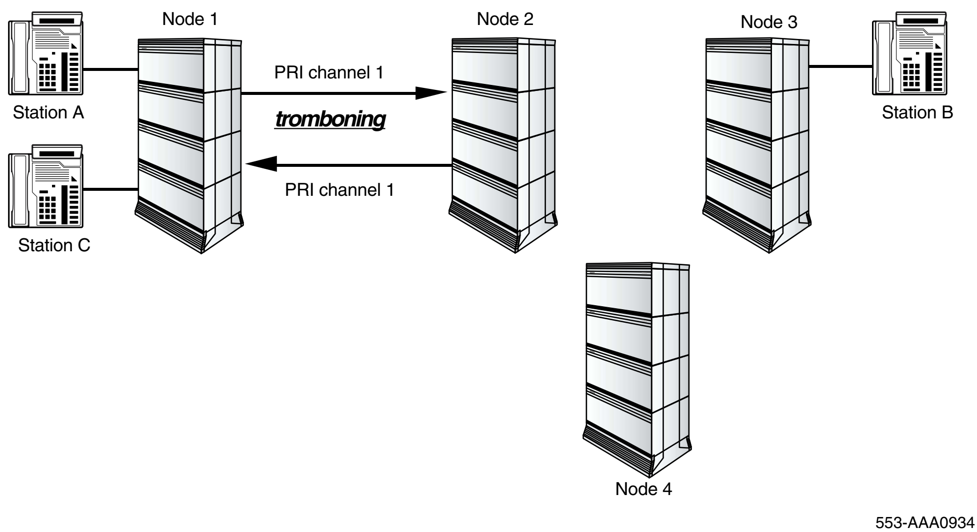
Station C Answers. Station B completes the call transfer, leaving A connected to C using three DPNSS1 trunks (in the example, the call is routed through Node 4) trunks and two PRI trunks.

Figure 19
MCDN/DPNSS1 RO/TAT Interworking scenario, before RO has been applied



Once Three Party Service messaging has taken place, Node 2 initiates RO. The initial DPNSS1 routes are cleared. Node 2 becomes a MCDN/MCDN transit node, and the two tromboning PRI routes between Node 2 and Node 1 remain, as shown in Figure 20.

Figure 20
MCDN/DPNSS1 RO/TAT Interworking scenario, after RO has been applied

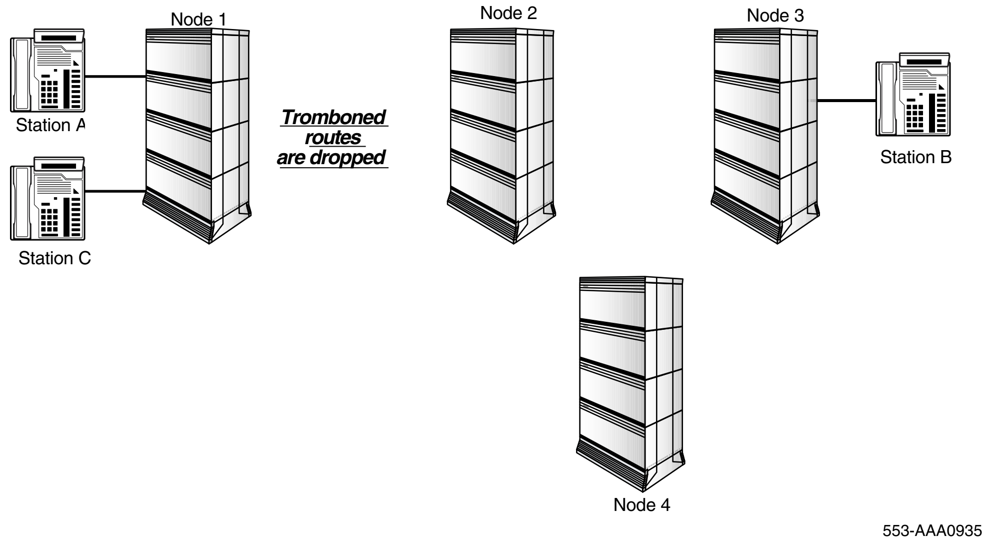


As soon as RO is completed, the RO/TAT initiates TAT at gateway Node 2. After TAT has been completed at Node 1, Node 2 simulates a transfer message to both Station A and Station C. This allows the Network Call Redirection feature to update the displays.

> ***Note:*** If the originating and terminating nodes are one and the same, and if this node is not a tandem node, as is the case for Node 1 in our example, the displays are updated without the notification from the Network Call Redirection feature.

TAT is then completed. The redundant routes are cleared, and Station A and Station C are bridged, as shown in Figure 21 on page 223.

Figure 21
MCDN/DPNSS1 RO/TAT Interworking scenario, after TAT has been applied



Note 1: If Station A is an attendant, and the Network Attendant Service feature is configured, Station B cannot transfer to Station C, and no optimisation can take place. If NAS is not configured, Station B may transfer to Station C, and optimisation takes place as described in this example.

Note 2: In the case of call diversion on the DPNSS1 side (Diversion Immediate, Diversion on Busy, and Diversion on No Reply), there is no interaction with the RO/TAT Interworking feature (the interaction occurs between the Diversion and TAT features.) In the case of tromboning on the DPNSS1 side, the Diversion feature clears the DPNSS1 tromboning trunks before Station C answers the call. When C answers, TAT is applied transparently.

Note 3: Node 1 cannot be a DMS switch for the RO/TAT Interworking feature to operate.

RO/TAT interworking within multiple MCDN/DPNSS1 gateways

RO/TAT Interworking is supported within a multiple gateway scenario, as illustrated by the following example. Referring to Figure 22 on page 224, Station A on the originating node call Station B across the multiple gateway scenario over PRI and DPNSS1 trunks, as shown below. Station B then transfers to Station C, over different PRI/DPNSS1 trunks. When Station C has completed the call transfer, and Station C answers, TAT is first activated at the far end node, removing the two end PRI trunks. The RO/TAT Interworking feature then activates RO on the DPNSS1 portion of the gateway, removing the DPNSS1 trunks. Then, TAT is activated to remove the last two PRI trunks at the near end of the gateway, leaving Station C and Station A bridged, as shown in Figure 23.

Figure 22
RO/TAT Interworking within multiple DPNSS1/MCDN gateways, before RO/TAT

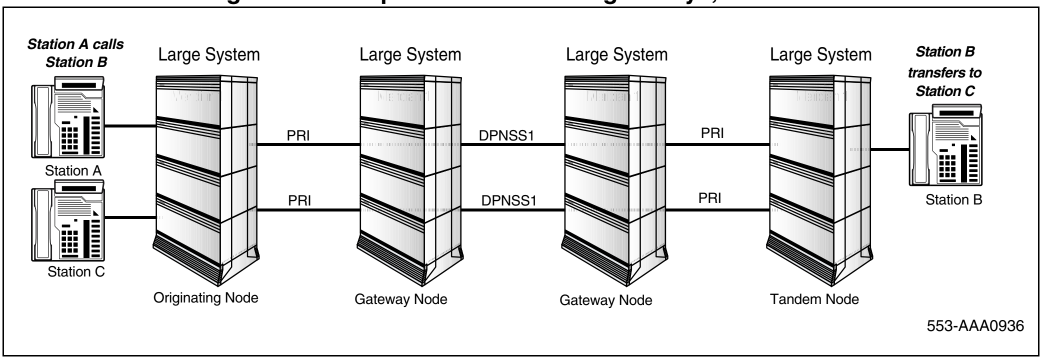
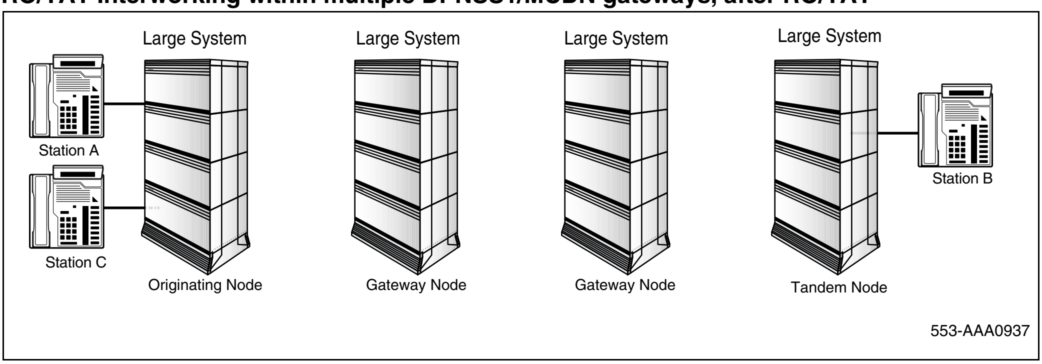


Figure 23
RO/TAT Interworking within multiple DPNSS1/MCDN gateways, after RO/TAT



Abnormal RO/TAT interworking scenarios

The following are possible scenarios whereby the RO/TAT Interworking feature may function abnormally.

- RO fails or is not configured, and TAT is configured.

In the case of a DPNSS1/MCDN gateway, TAT optimises the PRI trunks on the MCDN side, but the DPNSS1 trunks are not optimised on the DPNSS1 side.

In the case of an MCDN/DPNSS1 gateway, RO is not activated and the DPNSS1 side is not optimised. Since the DPNSS1 trunks remain, TAT is not invoked at the gateway node, even though it is equipped. Therefore, if RO is not activated, the RO/TAT Interworking functionality is not invoked.

- TAT fails or is not configured, and RO is configured.

In the case of an MCDN/DPNSS1 gateway, RO optimises the DPNSS1 trunks on the DPNSS1 side, but the MCDN trunks are not optimised on the MCDN side.

In the case of a DPNSS1/MCDN gateway, TAT is not activated on the MCDN side and the tromboning PRI trunks remain. Since the PRI trunks remain, RO is not invoked at the gateway node, even though it is equipped, and DPNSS1 trunks are not optimised on the DPNSS1 side. Therefore, if TAT is not activated, the RO/TAT Interworking functionality is not invoked.

Operating parameters

Although Trunk Anti-Tromboning functions between a Meridian 1, Succession 1000, or Succession 1000M system switch and a DMS switch, no TAT messaging is initiated to a DMS switch after Route Optimisation is activated on the DPNSS1 side of an ISDN MCDN/DPNSS1 gateway.

As explained in “Abnormal RO/TAT interworking scenarios” on page 225, both RO and TAT must be activated in order for the RO/TAT Interworking functionality to operate.

The RO/TAT Interworking functionality is only activated after call connection.

RO/TAT Interworking functionality is not applied if the originating party of the first call or the terminating party of the second call is on a conference call.

RO/TAT Interworking functionality is not applied if the originating party of the first call is an attendant.

RO/TAT Interworking functionality is not applied to data calls.

Route Optimisation may be applied to any portion of a DPNSS1 network, as long as both the originating node and terminating nodes are equipped with the RO feature. This is because optimisation is performed by initializing a new call between the originating node and terminating node. However, for the same to apply to Trunk Anti-Tromboning within an MCDN network, every exchange along the network must be equipped with the TAT feature. This is because TAT releases trunks step-by-step.

Multiple hops across a gateway are supported separately by RO and TAT.

Feature interactions

Multiple Hops

Multiple hops are supported within every RO/TAT Interworking gateway scenario, since they are supported separately by RO and TAT.

Network Attendant Service

If tromboning trunks are removed on the MCDN side of a RO/TAT Interworking gateway scenario by the Network Attendant Service feature (since NAS has precedence over TAT), the RO/TAT Interworking functionality is not invoked. The result is that, if NAS is equipped, attendant-extended calls that are in a tromboning state are optimised on the MCDN side, but DPNSS1 trunks are not optimised on the DPNSS1 side of the RO/TAT Interworking gateway scenario.

Network Call Pickup

If tromboning trunks are removed on the MCDN side of a gateway scenario by the Network Call Pickup feature (since Network Call Pickup has precedence over TAT), TAT is invoked since the Network Call Pickup action is considered as a call forward action. RO/TAT functionality is invoked upon completion of the TAT operation.

Network Call Redirection

If Network Call Redirection is not configured in an DPNSS1/MCDN gateway, the displays are updated normally, since the RO/TAT Interworking feature is not affected.

If Network Call Redirection is not configured in an MCDN/DPNSS1 gateway, the displays are not updated on the bridged sets on the MCDN side. However, if the bridged sets are on the same node, the displays are updated even though NCRD is not configured.

Three Party Service

DPNSS1 Three Party Service is required for every RO/TAT Interworking scenario.

Trunk Route Optimization before Answer

There is no interaction between the Trunk Route Optimization before Answer feature and the RO/TAT Interworking feature, since Trunk Route Optimization before Answer is activated before call completion, and the RO/TAT Interworking functionality is only activated after call connection.

Virtual Network Services

The RO/TAT Interworking feature is not supported over VNS trunks, since VNS uses only MCDN signaling (DPNSS1 is not supported.)

Feature packaging

For the software packages required to support the DPNSS1 Route Optimisation/MCDN Trunk Anti-Tromboning Interworking feature, consult the following publications:

- For DPNSS1 network functionality, please refer to the DPNSS1 Route Optimisation feature description in this document.
- For MCDN Network Attendant Service interworking, consult the *ISDN Primary Rate Interface: Features* (553-3001-369) *or ISDN Basic Rate Interface: Features* (553-3001-380).

Feature implementation

LD 17 – Configure MCDN Trunk Anti-Tromboning at the far-end switch. TAT is configured on a D-channel basis, and not on a route basis.

Prompt	Response	Description
REQ	CHG	Change existing data
TYPE	ADAN	Type of change
- ADAN		Action Device and Number
	NEW DCH x CHG DCH x	Add D-channel x Change D-channel x
- CTYP		Card type.
	MSDL	MSDL = Multi-purpose Serial Data Link (for Large Systems). MSDL = Downloadable D-channel for Small Systems and Succession 1000 systems
- CDNO	1-10	For Small Systems and Succession 1000 systems The card number for the Downloadable D-channel
- PORT	0-3 1	Port number on MSDL cards Only port 1 is valid for Small Systems and the Succession 1000 system

Prompt	Response	Description
...		
- IFC	SL1 S100 D100 D250	Interface type for D-channel.
...		
- RLS	xx	Release ID of the switch at the far end of the D-channel.
- RCAP	TAT	Remote Capabilities. TAT must be entered to enable Trunk Anti-Tromboning.

LD 15 – Define Route Optimisation.

Prompt	Response	Description
REQ:	CHG	Modify existing data
TYPE:	NET	Networking Data
CUST	 0-99 0-31	Customer number For Large Systems For Small Systems and Succession 1000 systems
OPT	aaa	Options
....		
ROPT	(NRO) ROA ROX RAX	NRO = inhibit route optimisation ROA = initiate route optimisation only for alternatively routed calls ROX = initiate route optimisation only for calls which have been transferred or attendant-extended RAX = initiate route optimisation only for alternatively routed calls or for calls which have been transferred or attendant-extended

LD 95 – Configure the transfer indication mnemonic displayed on telephone sets.

Prompt	Response	Description
REQ	NEW CHG	Add new data Change existing data
TYPE	CPND	Calling Party Name Display data block
CUST	xx	Customer number, as defined in LD 15
...		
RESN	YES	Display of Reason for redirecting calls allowed.
- XFER	 xxxx (T)	Call Transfer display mnemonic Mnemonic for call transfer display in Network Call Redirection (NCRD). One to four characters are accepted. (Default)

LD 15 – Forward calls to a forwarding DN to update terminal displays

Prompt	Response	Description
REQ:	CHG	Change existing data block
TYPE:	RDR	Call Redirection data
CUST	 0-99 0-31	Customer number For Large Systems For Small Systems and Succession 1000 systems
...		
- FNAD	FDN	Call forward no answer DID calls—Flexible CFNA DN
- FNAT	FDN	Treatment for External CFNA calls (non-DID) – when FDN is selected, CFCT handles the call
- FNAL	FDN	Requests treatment for CFNA – when FDN is selected, DID calls are forwarded
...		

LD 16 – Allow Network Call Redirection to update terminal displays.

Prompt	Response	Description
REQ	CHG	Change
TYPE	RDB	Route Data Block
CUST	xx	Customer number, as defined in LD 15
ROUT		Route Number
	0-511	For Large Systems
	0-127	For Small Systems and Succession 1000 systems
...		
NCNA	(NO) YES	Network Call Name is (is not) allowed
NCRD	(NO) YES	Network Call Redirection. Allows network call redirection messages to be sent (or blocks messages if NCRD= NO)
		Network Call Redirection can occur without answering YES to the NCRD prompt. This prompt only controls the sending of Network Call Redirection messages, not the actual redirection of the call. The message supplied when NCRD = yes provides the information for the CLID display. When NCRD is NO, the call is redirected without the CLID redirection information.
TRO	(NO) YES	Trunk Optimization
		TRO economizes trunk use throughout the network as part of the NCRD feature

LD 95 – Display the reason calls are redirected to update terminal displays

Prompt	Response	Description
REQ	CHG	Change
TYPE	CPND	Call Party Name Display data block
CUST	xx	Customer number, as defined in LD 15

Prompt	Response	Description
ROUT		Route Number
	0-511	For Large Systems
	0-127	For Small Systems and Succession 1000 systems
...		
DES	(NO) YES	Designator for Multiple Appearance DNs allowed
RESN	YES	Allow display of reason for redirecting call
CFWD	(F) xxxx	Display mnemonic for (Network) Call Forward All Calls. Default is “F.” Enter the mnemonic that represents NCFAC on a set’s CLID display.
CFNA	(N) xxxx	Mnemonic for (Network) Call Forward No Answer display. Enter the mnemonic that represents NCFNA on a set’s CLID display. Default is “N.”
HUNT	(B) xxxx	Mnemonic for Network Hunting display
PKUP	(P) xxxx	Mnemonic to allow Call Pickup display
XFER	(T) xxxx	Mnemonic for Call Transfer display

LD 95 – Give each DN a name to update terminal displays.

Prompt	Response	Description
REQ	CHG	Change
TYPE	NAME	Call Party Name Display name entry
CUST	xx	Customer number, as defined in LD 15
DIG	xxx xx	An existing Dial Intercom Group number (0-253) and member number (0-99)

NAME	aaa...a	CPND name using ASCII characters. The DIG prompt is reprompted. Enter <CR> to get the DN prompt.
DN	xxxx	DN of eligible type

LD 10 – Enable the appropriate feature in the data block to update terminal displays.

Prompt	Response	Description
REQ:	CHG	Change
TYPE:	500	Enter set type
HUNT	xxxx	Hunt DN for internal calls
FTR	EFD xxx	External Flexible call forward DN Only allowed if LD15 is properly configured: FNAD = FDN FNAL = FDN FNAT = FDN If the DNXP package is equipped, up to 7 digits are allowed; otherwise, only 4 digits can be entered. Accepted only if CLS is MWA or FNA.
	EHT xxxx	External Hunt DN Only allowed if CLS = CFTA Same digits defined as above
	FDN xxxxxxx	Flexible Call Forward No Answer DN (cannot be an LDN) Same digits defined as above

LD 11 – Enable the appropriate feature in the data block to update terminal displays.

Prompt	Response	Description
REQ:	CHG	Change
TYPE:	xxxx	Enter set type
FDN	x..x	Flexible CFNA DN where xx is the MCDN. The FDN value should include AC1/AC2 when applicable (up to 13 digits).
EFD	xxxx	Network CFNA DN for External calls
HUNT	xxxx	Network Hunt DN for calls with CLS = CFTD
EHT	xxxx	Network Hunt DN for External calls

Feature operation

No specific operating procedures are required to use this feature.

Standalone Meridian Mail

Contents

This section contains information on the following topics:

Feature description

The Standalone Meridian Mail feature provides a Meridian Mail system interface to third-party vendors' networks through a DPNSS1 interface. Users on a third-party vendor's exchange can be alerted if messages are waiting and can then access those messages from a remote telephone.

With the Standalone Meridian Mail feature it is possible to exchange messages with a remote DPNSS1 node. Calls to busy sets, calls to sets with call forwarding activated, or calls that are not answered can be routed to Meridian Mail across the DPNSS1 link, providing voice mail service. All features present on Meridian Mail can then be used as required.The identity of the calling and called parties is provided in the Calling Line Category (CLC) of the DPNSS1 message sent by the third-party vendor's PBX. The Standalone Meridian Mail feature uses this information to access the correct mailbox on the Meridian Mail system.

The Standalone Meridian Mail feature depends on the features supported by DPNSS1 on the user's PBX.

Standalone Meridian Mail introduces the following enhancements:

Automatic Login to Personal Mailbox from User on Third-party PBX

Meridian Mail users can login to the Meridian Mail system from their telephones by pressing the octothorpe (#) key on their telephone.

Busy Notification

When a call is routed from the third-party PBX to Meridian Mail because the called party is on another call, Standalone Meridian Mail informs the caller of this, using a voice message.

Call Answer

Call Answer allows access to the correct mailbox for calls that have been diverted to Meridian Mail from the third-party PBX.

Custom System Greeting

This enhancement is provided to inform callers to the third-party PBX of the organization they have called (if they are calling in on a DID trunk). This announcement comes before the regular voice greeting.

Dual Personal Greeting

For callers terminating on the Meridian Mail system, this enhancement provides the option of delivering different messages to internal or external users.

Remote Message Notification

With this enhancement, a Message Waiting lamp can be lit on the remote PBX user's telephone to indicate that a Meridian Mail message is waiting for that extension. Currently, this feature is only supported on the Plessey iSDX system.

Operating parameters

Signaling from mail users to Standalone Meridian Mail must be in-band DTMF. Post End-of-Dialing digits cannot be supported by way of DPNSS1 out-of-band signaling. For the Meridian Mail user, in-band DTMF tones are required from the originating party, wherever they originate.

Standalone Meridian Mail allows only the first eight digits received in the Bearer party address to be transported across the DPNSS1 link.

The third-party exchange must be able to allow diversion to a remote switch to allow the recording of messages.

Call Sender (a Meridian Mail feature) is not supported by the Standalone Meridian Mail feature.

No gateway functionality between ISDN and DPNSS1 for Meridian Mail access or message waiting capability is implemented with this feature. Access to Meridian Mail for any mailbox user on a network must be provided via a single signaling system (either Q.931 for a Meridian 1 or DPNSS1 for other PBXs).

No gateway functionality between ISDN and DPNSS1 for DPNSS1 originator diversion is implemented with this feature. Specifically, if a call originates via a DPNSS1 trunk and is redirected via Q.931,then no notification of this diversion is made to the originator. The reverse also applies.

The following hardware is required for Standalone Meridian Mail:

- Meridian Mail module and standard attachments
- third-party PBXs with DPNSS1 (as needed)
- a system with DPNSS1 and Meridian Mail hardware
- Q.931 networking trunks

Feature interactions

DPNSS1

New messaging is introduced for Remote Notification. These virtual messages are sent in order to remotely activate or deactivate the Message Waiting lamp.

New message sequences are introduced for diversion at the originating party.

DPNSS1/DASS2 Uniform Dialing Plan Interworking

The Standalone Meridian Mail feature is not supported in a DPNSS1 Uniform Dialing Plan (UDP) environment.

Feature packaging

DPNSS1 Standalone Meridian Mail requires DPNSS1 Standalone Meridian Mail (SAMM) package 262.

For DPNSS1 interworking, the following packages are required:

- Integrated Digital Access (IDA) package 122
- Digital Private Network Signaling System 1 (DPNSS) package 123

For Meridian Mail, the following packages are required:

- Make Set Busy (MSB) package 17
- Integrated Message Services (IMS) package 35
- Automatic Call Distribution (ACDB) package 40
- Automatic Call Distribution (ACDA) package 45
- Message Waiting Center (MWC) package 46
- Command Status Link (CSL) package 77
- Auxiliary Processor Link (APL) package 109

For remote Meridian Mail operation, the following packages are required:

- Advanced ISDN Network Services (NTWK) package 148
- Network Message Services (NMS) package 175

Feature implementation

LD 74 – Configure the DPNSS1 interface.

Prompt	Response	Description
REQ	NEW CHG	Add new interface Change existing interface
TYPE	DDSL	DPNSS1 Signaling Link
...		
PRIV	(YES) NO	Private Link to another PBX Link to public exchange
- MWIF	 (STD) ISDM	Message Waiting Interface Standard message waiting interface (default) Plessey ISDX switch with remote message notification

LD 15 – Enable Standalone Meridian Mail as part of the Integrated Messaging System.

Prompt	Response	Description
REQ:	NEW CHG	Add new data Change existing data
TYPE:	IMS	Integrated Messaging System data
...		
IMS	YES	Change Integrated Messaging System features NO = Do not change Integrated Messaging System features (default)

Prompt	Response	Description
- SAMM	YES	Allow Standalone Meridian Mail NO = Do not allow Standalone Meridian Mail (default)

LD 10 – Configure Standalone Meridian Mail on analog (500/2500-type) sets.

Prompt	Response	Description
REQ:	NEW	Add new data
TYPE:	500	Analog (500/2500-type) telephone
...		
CLS	(SMSD) SMSA	Standalone Mail Server Denied (default) Standalone Mail Server Allowed

LD 23 – Define Voice Services ACD queues for Express Messaging and Voice menus.

Prompt	Response	Description
REQ	NEW	Add new data
TYPE	CDN	Control Directory Number data block
CUST	xx	Customer number, as defined in LD 15
CDN	x...x	Control DN At the CDN prompt, enter the DN of the Voice Service. CDN can be up to four digits, or up to seven digits with the DNXP package 150 equipped
...		
DFDN	x...x	Local default ACD-DN At the DFDN prompt, enter the Meridian Mail DN. DFDN can be up to four digits, or up to seven digits with the DNXP package 150 equipped.

Feature operation

Standalone Meridian Mail requires the same operating procedures from a telephone set as Meridian Mail.

Step Back on Congestion

Contents

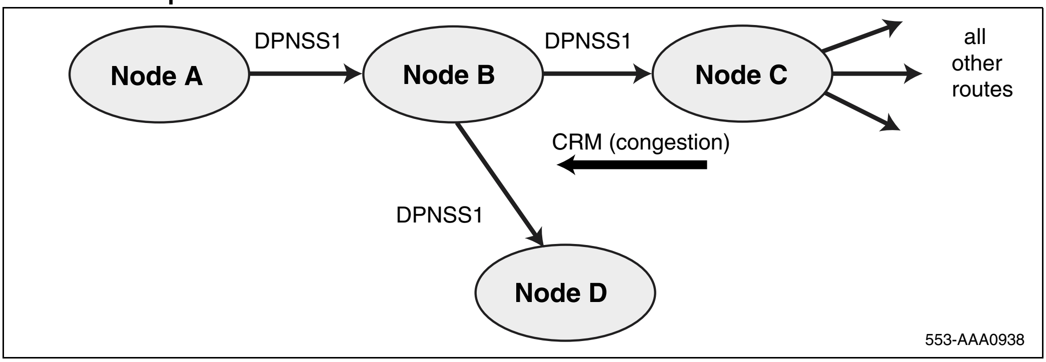
This section contains information on the following topics:

Feature description

This feature has been developed to handle high traffic situations, when DPNSS1 calls may encounter congestion. If a call over a DPNSS1 network is blocked due to congestion, a Clear Request Message (CRM) is sent back to the preceding node. A transit node or a DPNSS1/ISDN gateway node may receive a CRM with a clearing cause of congestion. An originating node may receive either a CRM containing a clearing cause of congestion, or a CRM containing a clearing cause of Network Termination and a Loop Avoidance Supplementary string. Depending on the SBOC option configured in LD 86, the Electronic Switched Network overlay, the call may be passed back or re-routed using the next free alternative route.

If a CRM with a clearing cause of congestion is received at a transit node, the call may be passed back or re-routed. If a CRM of congestion is received at an DPNSS1/ISDN gateway node, the ISDN Drop Back Busy options, included in the SETUP message according to the Route List Block, are checked to determine whether the call is to be dropped back. If not, the DPNSS1 Step Back on Congestion feature is invoked. If an originating node receives either a CRM containing a clearing cause of congestion, or a CRM containing a clearing cause of Network Termination and a Loop Avoidance Supplementary string. The call may be routed using the next free alternative route, or receive call blocking treatment if no re-routing is configured or if no alternative route is available.

Figure 24
Transit node operation



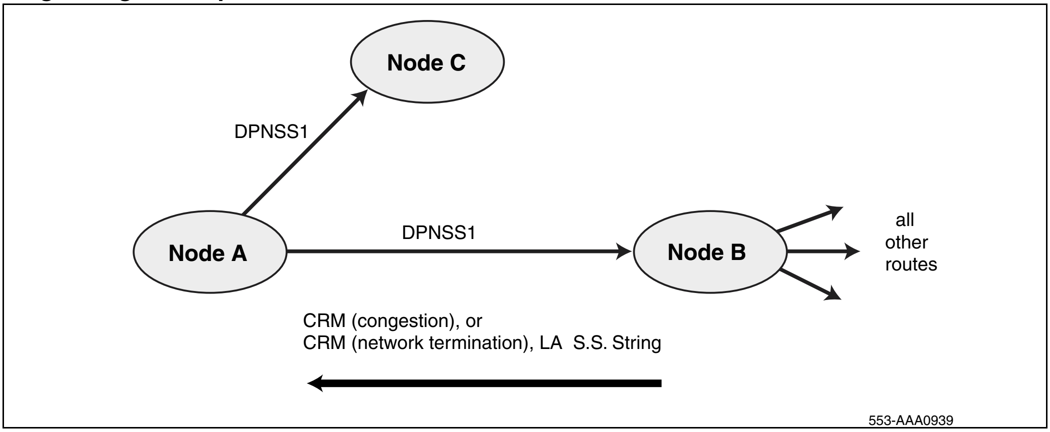
An attempt is being made to establish a call through a DPNSS1 network, from originating node A to terminating node C, via transit node B. All the trunks at node C are busy, so that a CRM with a clearing cause of congestion is sent to the preceding node (node B). At transit node B, alternative 1 is to re-route to node C, and alternative 2 is to re-route to node D.

The SBOC option for node B is checked in LD 86 to determine the treatment. If SBOC = RRA, the next free alternative is tried. If the Class of Service and Network Class of Service access checks are passed, the call is re-routed to the next free alternative, which is node D. A Network Indication Message indicating alternative routing is sent to the preceding node (node A). If there would have been no free alternatives, a CRM of congestion would have been sent back to node A.

If SBOC = NRR or RRO, a CRM of congestion is passed back from transit node B to the preceding node A.

Note: If the call is a route optimisation attempt, there is no attempt made to re-route it — a CRM of congestion is passed back to the preceding node.

Figure 25
Originating node operation



An attempt is being made to establish a call through a DPNSS1 network, from originating node A to terminating node B. All the trunks at node B are busy, so that a CRM with a clearing cause of congestion, or a CRM containing a clearing cause of Network Termination and a Loop Avoidance Supplementary string, is sent to the preceding node (node A).

The SBOC option for node A is checked in LD 86 to determine the treatment. If SBOC = RRA or RRO, the next free alternative (node C) is tried.

If SBOC = NRR, or if no alternatives are available, the network blocking treatment, as defined by prompt NBLK in LD 15, is applied to the call at node A. Note that, for local extensions, if the dialing has not been completed, the provision of busy tone treatment (if defined) is delayed so that digits may be dialed for other features such as Ring Again.

Operating parameters

This feature uses the ESN Coordinated Dialing Plan, or Network Alternate Route Selection (NARS) or Basic Alternate Route Selection (BARS) to re-route a congested call. Re-routing is not attempted if a trunk access code was used to originate the call.

Feature interactions

If a call that has undergone digit manipulation encounters congestion, digit manipulation is re-applied using the originally dialed digits before re-routing is attempted.

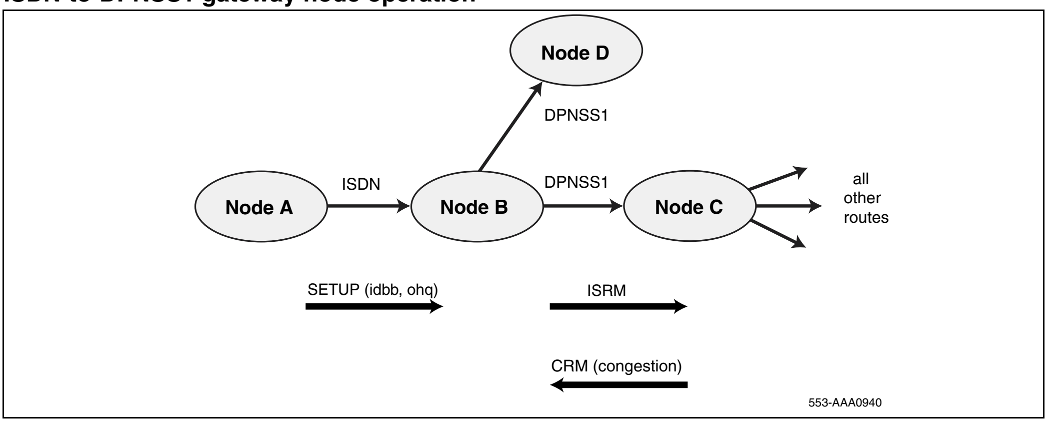
A call that is blocked due to the DPNSS1 Loop Avoidance feature may be re-routed at the originating node, but not at a transit node.

DPNSS1 route optimized calls that encounter congestion are not re-routed, since route optimisation only uses first choice routes.

The intercept treatment applied due to network blocking is customer-defined in LD 15.

DPNSS1/ISDN gateway interworking is illustrated as follows:

Figure 26
ISDN-to-DPNSS1 gateway node operation



An attempt is being made to establish a call through an ISDN-to-DPNSS1 gateway, from originating node A to terminating node C, via gateway node B. When a gateway node (node B) receives a SETUP message, the IDBB and OHQ options are stored. The IDBB option is used to determine which route sets can be used for ISDN Drop Back Busy, and the OHQ option is used to decide if Off Hook Queuing is to be applied at the congested node.

If all the trunks at node C are busy, a CRM with a clearing cause of congestion is sent to the gateway node (node B). At node B, the decision is made whether to apply Drop Back Busy or Off Hook Queuing. If

OHQ = NO

the call is dropped back to the originating node – the SBOC option is not checked. If

OHQ = YES

treatment is applied according to the SBOC option. If

SBOC = RRA

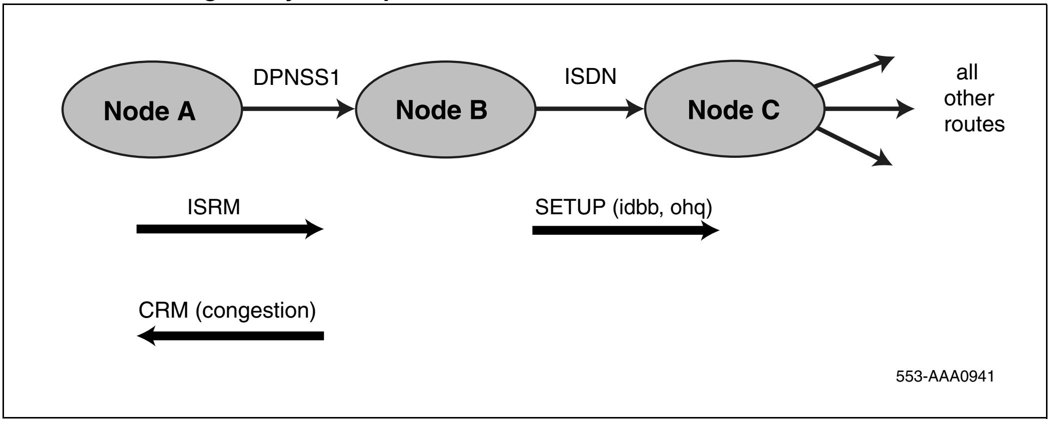
an attempt is made to find a free alternative route, as defined by the IDBB option (if IDBB = DBI, then only I-SET routes may be used to route the call; if IDBB = DBA, then all E-SET routes may be used to route the call). If a free alternative route is found, the call is routed to node D. If no free alternative route is found, the call is dropped back to node A. If

SBOC = RRO or NRR

node B drops the call back to node A by sending a DISCONNECT message with a cause of normal clear.

The following illustrations depict the DPNSS1 Step Back on Congestion functionality as applied to a call trying to be established through a DPNSS1 network at the originating node, at a transit node, at an ISDN-to-DPNSS1 gateway, and at an DPNSS1-to-ISDN gateway.

Figure 27
DPNSS1-to-ISDN gateway node operation



An attempt is being made to establish a call through a DPNSS1-to-ISDN gateway, from originating node A to terminating node C, via gateway node B. In order to provide a consistent interworking between ISDN Drop Back Busy and DPNSS1 Step Back on Congestion, the options for IDBB and OHQ are included at gateway node B in the SETUP message from the outgoing route list block. If all the trunks at node C are busy, and drop back occurs, a DISONNECT message with a cause of normal clear is sent to gateway node B, where it is recognized as a drop back attempt. The DISONNECT message is mapped to a CRM with a reason of congestion, so that Step Back on Congestion is invoked in the DPNSS1 segment of the path.

Feature packaging

DPNSS1 Step Back on Congestion requires DPNSS1 Network Services (DNWK) package 231.

Feature implementation

LD 86 – Define the Step Back on Congestion options.

Prompt	Response	Description
REQ	CHG	Modify existing data base
CUST	xx	Customer number, as defined in LD 15
FEAT	RLB	Route list data block
RLI	0-999 0-255 0-31 0-127	Route list index (to be accessed for the flexible numbering plan); Route list index to be accessed for NARS; Route list index to be accessed for CDP; Route list index to be accessed for BARS.
ENTR	0-63 0-6	Route list entry number for NARS/BARS Route list entry number for CDP
CNTL	YES/(NO)	YES = change APNSS link parameters NO = use default parameters
ROUT	 0-511 0-127	Route number For Large Systems For Small Systems and Succession 1000 systems
....		
SBOC	 (NRR) RRO RRA	Step Back on Congestion No rerouting Reroute if an originating node, or step back if a transit node
IDBB	 (DBA) DBI	ISDN Drop Back Busy All E-SET routes may be used to route calls Only I-SET routes may be used to route calls

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 of the 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 Signalling System (APNSS) trunks cannot function as VNS Bearer trunks.

No DPNSS1 Supplementary Service is 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 Signalling System (APNSS)

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 DPNNS1/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 VNNS 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.

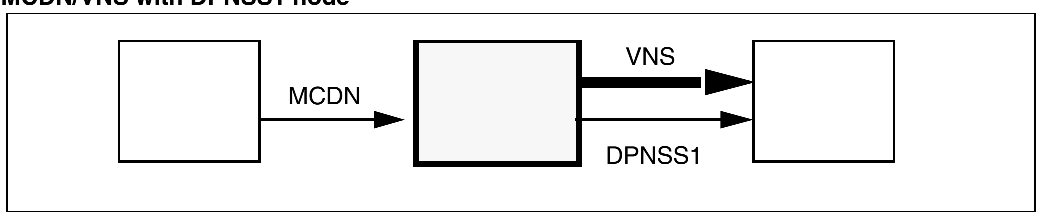
Homogeneous Networks

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.

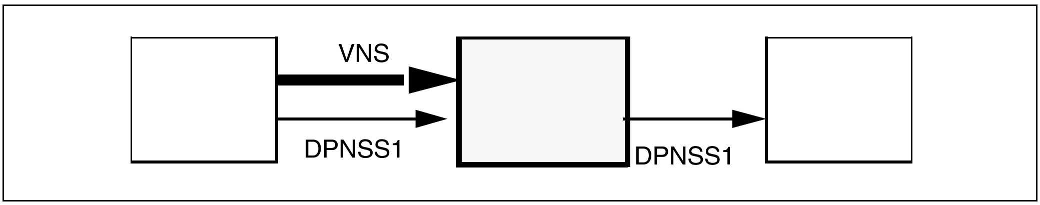
Hybrid Networks

Figure 28
MCDN/VNS with DPNSS1 node



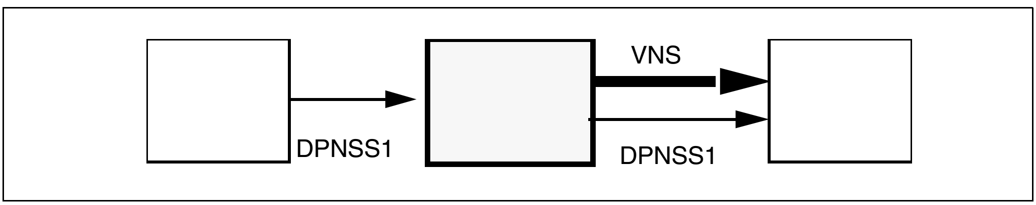
- If a congestion is encountered inside the VNS portion of the path, the node behaves as an MCDN/MCDN tandem. The ISDN Drop Back Busy (IDBB) and ISDN Off-Hook Queuing (IOHQ) are transmitted, so that they may applied further along the VNS portion of the path, or at the tandem node.
- If a congestion is 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 29
VNS with DPNSS1/DPNSS1 node



This scenario is considered as an MCDN/DPNSS1 gateway. The functionality is the same as for the DPNSS1 Step Back on Congestion feature.

Figure 30
DPNSS1/VNS with DPNSS1 node



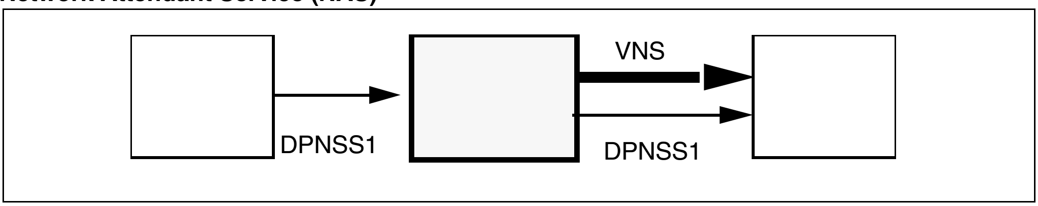
- If a congestion is encountered inside the VNS portion of the path, the VNS portion of the call is cleared and the disconnection is propagated back to the originating DPNSS1 side. The Step Back on Congestion feature is invoked, if it is configured.

- If a congestion is encountered the 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.
- Refer to "Network Attendant Service (NAS)" on page 256 for information on the interaction with NAS in a similar scenario.

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.

Figure 31
Network Attendant Service (NAS)



- NAS calls being routed over the DPNSS1 network used as VNS Bearer will get dropped if there is congestion in the bearer call setup. NAS DBK (drop back) will not occur even if it is configured.

Standalone Meridian Mail

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

DPNSS1 Enhancements for ISDN Interworking

DPNSS1 can interwork with QSIG and EuroISDN. At an ISDN gateway, ISDN information can be carried into some DPNSS1 messages, if the Enhanced DPNSS1 Gateway (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 feature functionality, the following packages are required:

- 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 – Configure the VNS D-channel to be associated with the VNS route.

The D-channel should be associated with each node and customer, that is, both ends of the D-channel link should be configured.

Prompt	Response	Description
REQ	CHG END	Change data, or exit the Overlay
TYPE	ADAN	Action Device and Number
ADAN	CHG DCH 0-63 CHG DCH 0-15	Change the D-channel for Large Systems Change the 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	Virtual Network Services Customer number for Large Systems Virtual Network Services Customer number for Small Systems and Succession 1000 systems 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	YES (NO)	Network Call Party Name Display is (not) available over the D-channel

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

Prompt	Response	Description
...	ENL DCH 0-63 ENL DCH 0-15	Enable the D-channel 0-63 for Large Systems Enable the D-channel 0-15 for Small Systems and Succession 1000 systems

LD 79 – Define the VNS DNs for both nodes/customers to be associated with the D-channel configured in LD 17. You may 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
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 may add another single VDN by entering <cr> (VDN is prompted until <cr> is entered.)
		For the above entries, the VDNs must be pat of the customer's numbering plan.

LD 16 – Set up the VNS Bearer Trunk.
The Bearer trunk should be associated with each node and customer, that is, both ends of the Bearer link should 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	The route number associated with the VNS Bearer Channel For Large Systems For Small Systems and Succession 1000 systems
CNTL	YES	Change controls or timers

Prompt	Response	Description
TIMR	VSS (0) 1 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	The Route Number associated with the VNS Bearer Channel For Large Systems For Small Systems and Succession 1000 systems
VNS	YES	Virtual Network Services

Prompt	Response	Description
- 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.

APNSS installation and link configuration

Contents

This section contains information on the following topics:

Description

The *APNSS installation and link configuration* chapter describes APNSS shared mode and dedicated mode configurations, and explains how to set up a modem as required by the APNSS link. The chapter also explains how to configure basic capabilities for an APNSS link.

APNSS configurations

The Analog Private Network Signaling System (APNSS) operates in various forms of dedicated mode operation. These are:

- Dedicated mode using a leased line
- Dedicated mode using a dial-up modem
- Dedicated mode using DTI2 trunks

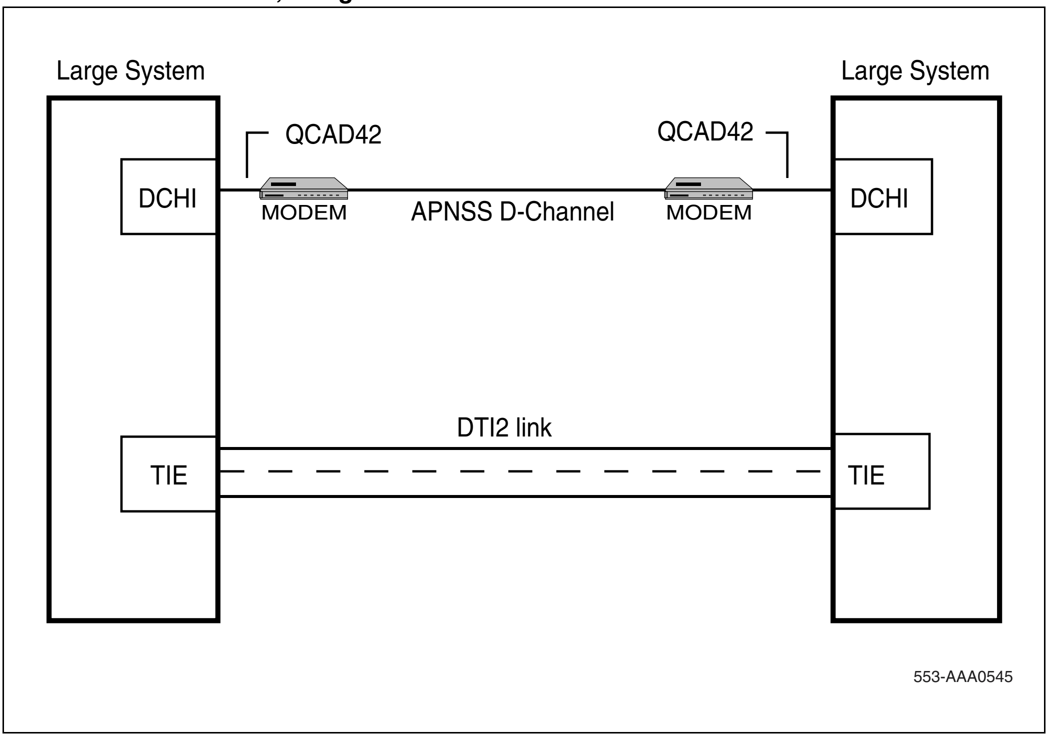
In dedicated mode, the DCHI supports APNSS trunks using DPNSS1 signaling. The D-channel communicates with the far end using a dedicated leased line, dial-up modem, or DTI2 trunk.

Dedicated mode using leased line

In this configuration, the D-channel connects the DCHI to a modem which communicates with a far-end modem over a dedicated leased line. Both modems must be set in the synchronous mode.

Figure 32 shows APNSS in dedicated mode using a leased line.

Figure 32
APNSS dedicated mode, using leased line



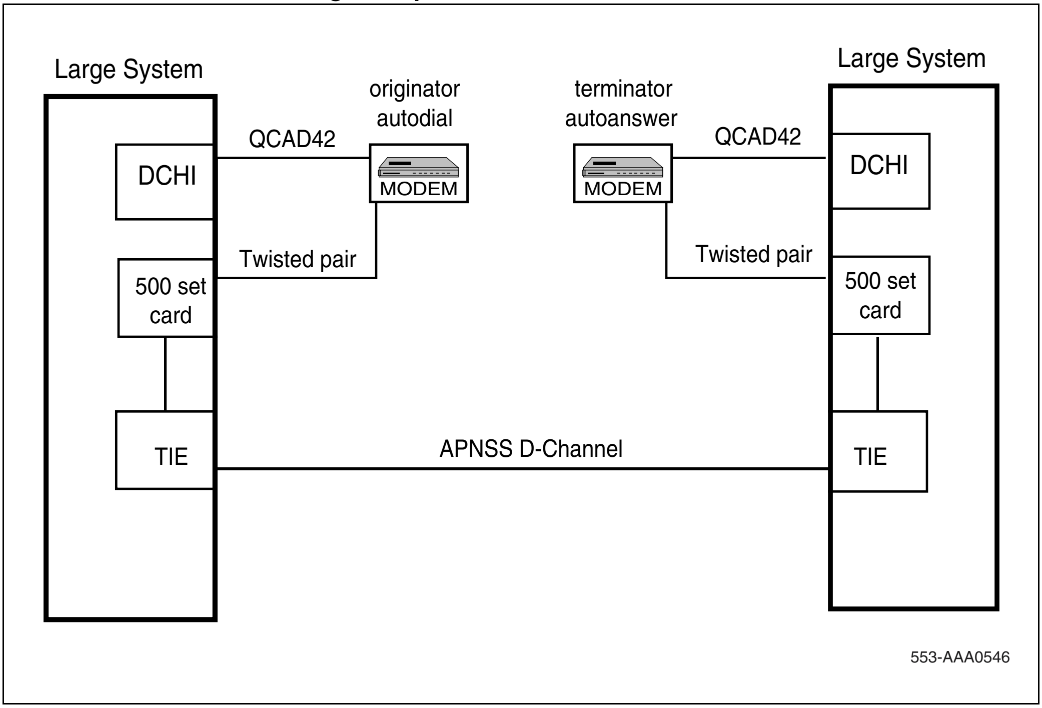
Dedicated mode using dial-up modem

In this configuration, the DCHI is connected to a modem which is connected to a 500-set line card. The call is connected to the far end through the 500-set to TIE-trunk path.

To set up the D-Channel, program the modem at one end in the auto-dial mode, so it will automatically initiate a call to the other end at power up. The auto-dial DN must be coordinated with personnel at the far-end switch.

Figure 33 shows APNSS in dedicated mode using a dial-up modem.

Figure 33
APNSS dedicated mode using dial-up modem



Dedicated mode using DTI2 trunks

This configuration is the same as that for dedicated mode using dial-up modem, described previously in this section.

Modem settings for APNSS

Two modems have been tested and approved by Nortel Networks for APNSS applications:

- BT 4242VSX modem
- Datel 4960FTX modem

BT 4242VSX modem switch and strap settings

If the BT 4242VSX modem is used, set the switch option strap settings as shown in Table 13 on page 266 and Table 14 on page 266.

Table 13
4242VSX switch settings

SW1	**ON**	OFF	OFF	**ON**	OFF	OFF	**ON**	OFF
SW2	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
SW3	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
SW4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
SW5	**ON**	**ON**	**ON**	OFF	OFF			
SW6	OFF	OFF	OFF	**ON**				

Table 14
4242VSX strap settings

LKA	X Y-Z
LKB	U-V W
LKC	R S-T

Datel 4960FTX modem switch and strap settings

If the Datel 4960FTX modem is used, set the switch and option strap settings as shown in Table 15 on page 266 and Table 16 on page 268.

Table 15
4960FTX switch settings

SW1	**ON**	**ON**	**ON**	**ON**	OFF	OFF	OFF	OFF

APNSS link configuration

This section describes how to configure basic capabilities for an APNSS link. The procedure explains how to:

- Configure the DCHI and the spare loop for the virtual B-Channel
- Define the D-channel data blocks
- Initialize the service routes to be used in the link
- Initialize the channels within the service routes
- Enable the APNSS link

The steps outlined in Table 16 on page 268 must be followed in sequence. The prompts and responses for these steps are explained in the text that follows. Responses in parentheses are default values throughout the procedure.

Note: Please note the difference in configuration requirements in LD 17 for DPNSS1 systems running on software up to and including Group G, and systems running on software up to and including Group H.

Table 16
Steps for configuring an APNSS link

Step	Overlay	Action
1	LD 17 Configuration Record	**Group G** Configure the APNSS D-channel port number for the NT5K35 DCHI, or the NT5K75 DCHI or NT6D11AE operating in standard mode (only standard mode is allowed for APNSS.) This is the number used to reference the D-channel in Overlay 74; the value is entered against the **DCHI** prompt, and is in the range of 0-15. Configure the unused loop for virtual channels. **Group H** Configure the APNSS 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 Overlays 74 and 14; the value is entered against the **ADAN** prompt, and is in the range of 0-63. Configure the unused loop for virtual channels
2	LD 74 DDSL Data Block	Define the data blocks used for the APNSS protocols
3	LD 16 Route Data Block	Initialize the service routes to be used
4	LD 14 Trunk Data Block	Initialize the channels within the service routes
5	LD 75 IDA Trunk Maintenance	Enable the APNSS link

LD 17 – Configure the APNSS DCHI and the unused loop for virtual channels, up to and including Group G software

Prompt	Response	Description
REQ	CHG	Change existing data base
TYPE	CFN	Configuration data block
DPNS	YES	Allow next prompt
DCHI	0-15	The D Channel port number
PARM	YES	To allow changes to the system buffers
DTIB	35-1000	To define the number of trunk input buffers for the entire system The system must be initialized to invoke changes to DTIB.
DTOB	4-100	To define the number of trunk output buffers per DCHI The system must be initialized to invoke changes to DTOB.
...		
CEQU	YES	To allow changes to the CE parameters
...		
APVL	0-159	The spare loop number for APNSS Virtual channel The specified loop must be unused; it may be used for more than one APNSS link, as long as different channels are used for each link.

LD 17 – Configure the APNSS DCHI and the unused loop for virtual channels, up to and including Group H software

Prompt	Response	Description
REQ	CHG	Modify existing data base
TYPE	CFN	Configuration data block

Prompt	Response	Description
ADAN	0-63	The APNSS 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.**
DPNS	YES	Allow next prompt
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). 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) The system must be initialized to invoke changes to DTOB.
...		
CEQU	YES	To allow changes to the Common Equipment parameters
...		
APVL	0-159	The spare loop number for APNSS Virtual channel The specified loop must be unused; it may be used for more than one APNSS link, as long as different channels are used for each link.

LD 74 – Define the data blocks used for the APNSS link.

Prompt	Response	Description
REQ	CHG NEW OUT PRT END	Create new data base, modify existing data base, remove data block, print data block, terminate program activity
TYPE	LSSL	Low Speed Signaling Link, identifies this channel as APNSS
LSSL	Group G 0-15 Group H 0-63	The D Channel port number, entered in LD 17
RATE	110 150 300 600 1200 2400 4800 9600 19K 56K 64K (EXT)	Modem clock baud rates. The default is external clocking.
SIDE	AET/BNT	AET or BNT end of APNSS link (an APNSS link must have one end set to AET and the end set to BNT)
CNTL	YES/(NO)	YES = change APNSS link parameters NO = use default parameters
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 17
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 TSF	0-15 mins (1) 0-15 secs (0)	0-24 hrs (1) 0-24 hrs (0)	0-15 (10) 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 16 – Create the service routes.

Prompt	Response	Description
REQ	CHG NEW 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
ROUT	 0-511 0-127	Route number For Large Systems For Small Systems and Succession 1000 systems
TKTP	IDA	The trunk type (APNSS)
SIGL	APNS	The route type (APNSS)
....		
ICOG	IAO ICT OGT	The route is both ingoing and outgoing The route is ingoing The route is outgoing

Prompt	Response	Description
ACOD	xx	The four-digit network access code for direct access to the route After the initial set up, the ACOD will only be used for testing purposes.

LD 14 – Initialize the channels within the service routes.

Prompt	Response	Description
REQ	CHG NEW OUT PRT END	Create new data base, modify existing data base, 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	RAC VAC	Real Analog Channel Virtual Analog Channel
TN	 l s c u l u	Terminal Number For Large Systems For Small Systems and Succession 1000 systems
TOTN	l s c u	Destination TN New loop, shelf, card and unit when telephone data is to be moved to a new TN Not prompted if the response to TYPE was VAC.
CUST	xx	Customer number, as defined in LD 15
...		
RTMB	 0-511 1-510 0-127 1-510	Route number and Member number For Large Systems For Small Systems and Succession 1000 systems
CHID	1-31	Channel ID for each TN The entry 16 is not allowed.
INC	(YES)/NO	Whether or not the member number is (increased) or decreased with the channel number

PRIO	(XHP) YLP	High priority on channel seizure Low priority on channel seizure The high/low priority must be different at each end.

LD 75 – Bring the APNSS link into service.

Step	Action	Response
1	Enable the DCHI: **ENL DDSL n**	ENBL IDLE (DCHI enabled, but all channels are disabled)
2	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)

Clock Controller installation and removal

Contents

This section contains information on the following topics:

Description

The Global Clock Controller NTRB53AA (A0854995) was introduced concurrently with configuration rules and guidelines to implement enhancements over the clock cards (QPC471 and QPC 775) and Fiber Network Fabric (FNF). The changes incorporated both phase and frequency locking while utilizing the best of Stratum 3 and Stratum 4 features.

Global Clock Controller NTRB53AA

Overview

The Global Clock Controller, when used with release 25.40 and above, supports Card Inventory and Downloadable Firmware.

Resolutions delivered

When used with proper lengths of cables, compatible vintages of Fiber Junctor Interface Card (FIJI NTRB33AC or AD) cards, and the recommended patches, the Global Clock Controller Card provides solutions for many of the limitations and problems on the Large Systems equipped with FNF. Individually, the parts of the solution may not resolve any limitations or issues. The following points are corrected by the implementation of the solution described above:

- Switching clocks when Segmented IPE shelves are configured utilizing loops assigned from different groups. When this occurs, the message RSIG LINK LOST ON PORT #x - REINITIALIZED repeats on the terminal. The previous work around removed LD 30 or installed patch MPLR16558 to suppress the clock switch.
- Switching clock and impacted Carrier Remote loops. On clock switch, many bit errors are generated which cause an alarm condition for the carrier remote span. A burst of noise of varying length accompanies the clock switch on all active calls. Duration of noise (crackling, high pitched whine, and/or white noise) varies from milliseconds to 10 or 15 seconds. Usually, the call itself is not disrupted, but the ability to transmit/receive is impacted.
- Occasionally, when the clocks are switched, an alarm becomes active on one side of the FIJI ring. This is frequently a NEWK error, which is indicated by a FIJI010 message. The result of this is to have all traffic pushed onto the other side until the error condition goes away, which is indicated by a FIJI007 message.
- IPE shelves connected to the system via Fiber Remote IPE are affected by clock switchovers. Similar to the carrier remote, when clock switch occurs, bit errors sometimes are generated. Unlike the carrier remote, when the fiber remote encounters too many bit errors, it drops the link. All calls using that span are dropped and unrecoverable.
- IPE shelves connected to the system via Fiber Remote Multi-IPE that were experiencing problems were cleared at all of the beta sites.

Note: Due to the architecture of this product we can not guarantee fault free operation if configured using loops from different network groups attached to the same Fiber Remote Multi-IPE Interface Card.

Note: The Auto Recovery should be set to on through the MMI interface.

- A clock switch causes a PLL UNLOCK EVENT on most or all XNETs. This means that the XNET is no longer synchronized with the system clock. The out of phase clock references are the cause of this.
- When clock switchover occurs, all active calls hear a burst of white noise and crackling for a brief time. Normally, this lasts for approximately a second (excluding the special case of carrier remote). A click can be heard, however, the sound is not intrusive.

Configuration rules and guidelines

The solutions introduced with the NTRB53AA are achieved through the combination of proper cable lengths, vintage of FIJI (NTRB33AC or AD cards, vintage of Dual Port DTI/PRI cards, and recommended patches. The steps to insure proper operation of a Succession 1000M Multi Group and Meridian 1 Option 81C CP PII with FNF are as follows:

1 Insure the system is fully operational.

2 Identify pre-existing conditions.

Note: Proper grounding is mandatory to insure correct clocking operation.

3 Insure the system has the proper patches installed and active. (Find FNF and clock patches in this section.)

4 Verify that the proper cables are in place.

5 Check for proper vintages on FIJI (NTRB33AC and AD).

6 Check for proper vintages on Dual Port DTI/PRI (NT5D12AC, AD, and AG (1.54MB) and NT5D97AB and AD (2.0MB).

7 Upgrade to the new Global Clock Controller NTRB53AA.

The required time for upgrade to the FIJI Cards, Cables and Clock Controllers is estimated at 3 hours plus the time required for system testing.

FIJI to FIJI fiber cable

Following is a list of rules for FIJI to FIJI fiber cables:

1 Always use the shortest Fiber Cable.

2 Insure the cables from group 0 to group 1 are the same length as the cables from the last group back to group 0

3 Insure the delta between the lengths of each fiber ring from group 0 to any other group does not exceed 50'. Remember that the rings are directional, ring 0 is ascending and ring 1 is descending.

Note: When adding an additional network group, the fiber cables need to be changed to adhere to the above rules.

4 Use only the NTRC49x type cables.

5 Do not tie or lash the fiber cables for the sake of visual neatness. The maxim bend radius is 5.0 cm. or 2 in. Cables placed without lashing naturally conform to this rule.

6 Store excess cable using the Optical Cable Management Card (OCMC).

7 Use dust caps. The dust caps are an important preventive measure to insure contaminates are not introduced between the Fiber Cable and the Fiber Connector.

Example 1

In an 8 group system, use 26.25' cables from network group 0 to 1 and 7 to 0. All other cables are 6.5'. The delta between the cable length from network group 5 to network group 0 is calculated as follows:

Table 18
Cable length delta

Cable from 0.0 to 0.1	26.25	Cable from 1.0 to 1.7	26.25'
Cable from 0.1 to 0.2	6.5'	Cable from 1.7 to 1.6	6.5'
Cable from 0.2 to 0.3	6.5	Cable from 1.6 to 1.5	6.5'
Cable from 0.3 to 0.4	6.5		
Cable from 0.4 to 0.5	6.5		
Total	52.25	Total	39.25'

The delta is 13'. This is acceptable according to the rules defined in this section.

Example 2

In an 8 group system use all 26.25'cables. The delta between the cable length from network group 5 to network group 0 is calculated as follows:

Table 19
Cable length delta

Cable from 0.0 to 0.1	26.25	'Cable from 1.0 to 1.7	26.25'
Cable from 0.1 to 0.2	26.25	Cable from 1.7 to 1.6	26.25
Cable from 0.2 to 0.3	26.25	Cable from 1.6 to 1.5	26.25
Cable from 0.3 to 0.4	26.25		
Cable from 0.4 to 0.5	26.25		
Total	131.25	Total	78.75

The delta is 52.25'. This is unacceptable according to the rules defined in this section.

In a new system configuration layout the NTRC48AA (6.5'), Fiber Cable is used in all connections between FIJI cards, with the exception of the cables from group 0 to 1 and 0 to 7. The following are the lengths for each system configuration.

Table 20
Cable lengths for system configuration

Number of groups in system	Cable lengths used from group 0 to 1 and 0 to the last group
8	26.25 (NTRC48FA)
7	26.25 (NTRC48FA)
6	19.69 (NTRC48EA)
5	14.75 (NTRC48DA)
4	9.8 (NTRC48CA)
3	6.5 (NTRC48AA)
2	6.5 (NTRC48AA)

Use Table 21to determine the FIJI to FIJI existing cable lengths starting from 0-0. The length is given in feet

Table 21
FIJI to FIJI fiber cable length

		Number of Modules across							
		0	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Number of Modules up or down	**3**	6.5	9.8	14.75	14.75	n/a	n/a	n/a	n/a
	2	6.5	6.5	9.8	14.75	19.69	19.69	26.25	26.25
	1	6.5	6.5	6.5	9.8	14.75	19.25	19.25	26.25
	0	n/a	6.5	6.5	9.8	12	14.75	19.25	26.25

Meridian Mail cables

Each shelf containing a Meridian Mail node must be assigned to the same network group and have the same length of cables between the ENET cards and the Meridian Mail Node. Meridian Mail does not tolerate the smallest of timing deviations due to the use of ENET cards to interface with Meridian Mail. Failure to comply can result in intermittent static.

> ***Note:*** Call Pilot's architecture does not have this limitation.

Required FIJI card vintage

The minimum FIJI card vintages to support the Global Clock Controller with the entire product improvements referenced in this section are NTRB33AC and NTRB33AD. The Global Clock Controller works with the NTRB33AA; however, the product improvements are not realized. The NTRB33AC and NTRB33AD cards are functionally equivalent.

> ***Note:*** Do not mix NTRB33AA in network group 0 with NTRB33AC/AD.

Required DDP card vintages

The following cards are supported on FNF systems:

- NT5D12AC, AD, and AG (1.54MB)
- NT5D97AB, AD (2.0MB)

This prerequisite was identified in Product bulletin 2000-047 rev1.

Clock Cable Lengths

The cable length DIP switch settings used on the QPC471 and QPC775 have minimal impact. This is not so with the NTRB53 clock controller.

> **IMPORTANT!**
>
> Setting the correct cable length is necessary to insure the cleanest clock switch over possible.

The cable length setting used is based on the type of cable connecting the clocks to each other. For a FIJI system, use the NTRC49xx cable. The NTRC49xx determines the switch settings: 6’ for the AA, and 20’ for the BA. The NTRC49xx cable connects to the FIJI by the NTRB46xx cables. Do not use the NTRB46xx cables to calculate the switch settings.

Note: Both of the NTRC46 cables should be the same length.

On an IGS system, the cable is an NT8D74xx. For a Succession 1000M Single Group and Meridian 1 Option 61C CP PII system the cable is NT8D75xx. IGS systems have more combinations of cables with which to work. Ideally, the cables running from each clock to the intergroup module are the same length. The combined cable length is the determining factor for DIP switch settings. Add the length of the two clocks to IGM cables and set the switches appropriately. The Succession 1000M Single Group and Meridian 1 Option 61C CP PII settings are simple. The cable configuration is one cable that connects from the faceplate of one clock controller to the other. The only option is 6 feet.

Midnight routines

If the site has removed LD 30 from the midnight routines as a temporary work around, LD 30 should be added back in LD 17.

Some sites still have LD 30 in their midnight routines and loaded the patch MPLR15446. Remove the patch when the configuration rules and guidelines have been implemented.

FIJI Card replacement

Follow the steps in Procedure 1to remove the FIJI card.

> ***Note:*** When removing a FIJI card, disable the ring and set the Faceplate switch to disable before removing the FIJI.

Procedure 1
Removing the FIJI card

1 Verify the status of the system clocks.

LD 60	
SSCK	Get status of system clock (x=0 or 1)

2 Switch system clocks, if it is necessary to ensure that the inactive clock is associated with the ring that includes the target FIJI card to be replaced.

LD 60	
SSCK	Switch system clock from active to standby.
******Exit**	

3 Obtain the status of both rings.

LD 39	
STAT RiNG x	Obtain status of ring (x=0 or 1). Normal response is Half/Half
******Exit**	

4 Query the alarm condition for all FIJI cards.

LD 39
STAT ALRM x y FULL Query status of all alarms (active and inactive) for FIJI card in group x, side y.
******Exit**

5 Disable auto-recovery.

LD 39
ARCV OFF Disable auto-recovery operation for ring.

6 Switch call processing to ring with active clock.

LD 39
SWRG y Switch call processing to ring (y = 0 or 1).

7 Obtain the status of both rings.

LD 39
STAT RING x Get status of ring on side x (x = 0 or 1).

8 Disable the idle ring.

LD 39
DIS RING x Disable all FIJI cards on ring (x = 0 or 1).

9 Confirm the ring is disabled.

LD 39
STAT RING x Disable all FIJI cards on ring (x = 0 or 1).

10 Set the ENB/DIS switch to DIS on the target FIJI card.

> **CAUTION — Service Interruption**
>
> To avoid interrupting service, set ENB/DIS switches to DIS before disconnecting or connecting cables.

11 Tag and disconnect cables to the card being removed.

12 Unhook the locking devices on the card.

13 Pull the card out of the card cage.

End of Procedure

Follow the steps in Procedure 2to install the FIJI card.

Procedure 2
Installing the FIJI card

1 Set the ENB/DIS switch to DIS on the replacement FIJI card.

2 Insert the replacement FIJI card into the vacated slot.

3 Hook the locking devices.

4 Connect cables to the replacement FIJI card.

5 Set the ENB/DIS switch to ENB on the replacement FIJI card.

Note: Wait until the FIJI finishes the Self Test before proceeding. When the display indicates the Group and Shelf where the FIJI card is located, the self test is completed.

6 Software enable the ring.

LD 39
ENL RING x Enable all FIJI cards on ring (x = 0 or 1).

7 Confirm the ring is enabled.

LD 39
STAT RING x Get status of ring on side x (x = 0 or 1).

8 Test the replacement FIJI card.

TEST 360 x y z	Perform 360 test on FIJI card group (x = group 0 to 7, y = side 0 or 1, z = time in 2 second intervals. Repeat this test on the next FIJI card in the ring for a complete test.

9 Reset the threshold for switchover functionality.

LD 39	
RESET	Reset the threshold for switchover functionality.

10 Restore the ring.

LD 39	
RSTR	Restore ring.

11 Enable auto-recovery.

LD 39	
ARCV ON	Enable auto-recovery operation for ring.

12 Confirm ring is enabled and in Half/Half state.

LD 39	
STAT RING x	Get status of ring (x = 0 or 1).
******Exit**	

13 Verify status of system clocks.

LD 60	
SSCK x	Get status of system clock, where x = 0 or 1.
******Exit**	

End of Procedure

Upgrade to an NTRB53xx Clock Controller on Single Group and Multi-group systems

Follow the steps in Procedure 3 to replace the existing clock controller with the NTRB53xx Clock Controller on Single Group and Multi-group systems.

> ***Note:*** The NTRB53xx Clock Controller cannot be combined with a QPC775 or a QPC471 card in one system.

Procedure 3
Upgrading to an NTRB53xx Clock Controller on Large Multi-group Systems

1 Remove old equipment.

> **CAUTION — Service Interruption**
>
> Never connect Clock-to-Clock cable J3 between the old clock (QPC471 or QPC775) and the new clock (NTRB53).

2 For dual core systems, ensure the clock controller card being removed is on the inactive core. If you need to switch cores, go to LD 135 and enter:

LD 135	
SCPU	Switch cores
********	Exit the overlay

3 Disable the QPC775 or QPC471 Clock Controller card. At the prompt, enter:

LD 60	Load the program
SSCK x	Get status of system clock where x = 0 or 1

4 If the clock is active, switch clocks. At the prompt, enter:

SWCK	Switch system clock from active to standby
SSCK x	Get status of system clock where x = 0 or 1

5 Ensure the other clock controller is active and in the free run mode. At the prompt, enter:

SSCK x	Get status of system clock where x = 0 or 1
TRCK FRUN	Set clock controller tracking to free run

CAUTION — Service Interruption

When the system is equipped with PRI and tracks to an external source, the T1 spans see slips and can exceed the thresholds. Voice quality over PRI can start to hear degradation.

6 Disable the clock controller card you are removing. At the prompt, enter:

DIS CC x	Disable system clock controller where x = 0 or 1

7 Set the ENL/DIS switch to DIS on the card being removed.

Note: Disabling the clock causes the system message FIJI0022 to display.

8 Tag and disconnect the cables to the card being removing.

9 Unhook the locking devices on the card.

10 Pull the card out of the card cage.

End of Procedure

Installing new equipment

Follow the steps in Procedure 4 to install new equipment.

Procedure 4
Installing new equipment

1 Set the ENB/DIS switch to DIS on the replacement card.

2 Set the option switches on the replacement card (NTRB53). Refer to Table 8, "Clock Controller switch settings for NTRB53", on page 102 in the What's New Guide for 25.40.

3 Insert the replacement card into the vacated slot and hook the locking devices.

> **CAUTION — Service Interruption**
>
> Never connect the Clock-to-Clock cable J3 between the old clock (QPC471 or QPC775) and the new clock (NTRB53)

4 Connect the reference cables (J1 and J2) to the replacement card.

Note: Do not connect J3.

5 Set the ENB/DIS switch to ENB on the replacement card.

6 Software enable the card. At the prompt, enter:

LD 60	
ENL CC x	Enable clock controller card, where x = 0 or 1

7 Verify that the card is active. At the prompt, enter:

SSCK x	Get status of system clock where x = 0 or 1
****	Exit the overlay

Note: Enabling the new clock card can initiate a F/W download.The card resets and executes a self test. This is recognized by the 2 faceplate LEDs flashing 3 times, indicating a pass. The completion of the download is indicated on the system terminal.

Note: Wait one minute before proceeding to the next step.

8 Switch to the core with the new clock. At the prompt, enter:

LD 135	
SCPU	Switch CPU

> **CAUTION — Service Interruption**
>
> Noise is experienced over local and trunk calls. System FIJI alarms are also displayed. The noise and alarms are resolved after the new clock begins tracking to the selected reference.

9 Faceplate-disable the old clock controller to force the newly installed clock controller to activate.

10 Connect the Clock-to-Clock faceplate cable to J3 of the new clock controller card in the active CPU side. This provides system clocking through this cable.

Note: The old and new clocks are cabled together. This is acceptable because the old clock was faceplate disabled in the previous step.

11 Verify that the clock controller is active. At the prompt, enter:

LD 60	
SSCK	Get status of the new system clock, where x = 0 or 1.
TRCK PCK	Track primary clock, where x = 0 or 1.
RCNT	Resets all alarm counters of all digital cards.
****	Exit the overlay.

Note: Replacing the clock controller generates errors on the network equipment. It is recommended that all counters be reset.

> **IMPORTANT!**
>
> Perform the following steps in rapid succession to minimize potential slips on the PRI.

12 To replace the remaining QPC775 or QPC471 clock controller card, tag and disconnect the cables to the card being removed.

13 Unhook the locking devices on the card.

14 Pull the card out of the card cage.

15 Set the ENB/DIS switch to DIS on the replacement card.

16 Set the option switches on the replacement card (NTRB53). Refer to Table 8, “Clock Controller switch settings for NTRB53”, on page 102 in the What’s New Guide for 25.40.

17 Insert the replacement card into the selected slot and hook the locking devices.

18 Connect the reference cables (J1 and J2) and the clock-to-clock cable (J3) to the replacement card.

19 Set the ENB/DIS switch to ENB on the replacement card.

20 Software disable and enable the card. At the prompt, enter:

LD 60	
DIS CC x	Disable clock controller card, where x=0 or 1
ENL CC x	Enable clock controller card, where x=0 or 1

Note: If necessary, the clock card can download F/W.

21 Verify that the card is enabled. At the prompt, enter:

SSCK x	Get status of system clock, where x=0 or 1
****	Exit the overlay

Note: Wait two minutes before proceeding to next step.

22 Activate the new card and verify that it is active. At the prompt enter:

LD60	
SWCK	Switch system clock from active to standby.
SSCK x	Get status of system clock, where x = 0 or 1.
TRCK PCK	Track primary clock, where x = 0 or 1.
RCNT	Reset alarm counters of all digital cards.
****	Exit the overlay.

23 Set the clock source to the status it was in before the replacement procedure.

Note: Wait one minute between clock switch.

24 Verify clock switch-over and tracking. At the prompt, enter:

SWCK	Switch system clock from active to standby.
SSCK x	Get status of system clock, where x = 0 or 1.
****	Exit the overlay.

DCHI installation and removal

Contents

This section contains information on the following topics:

Description

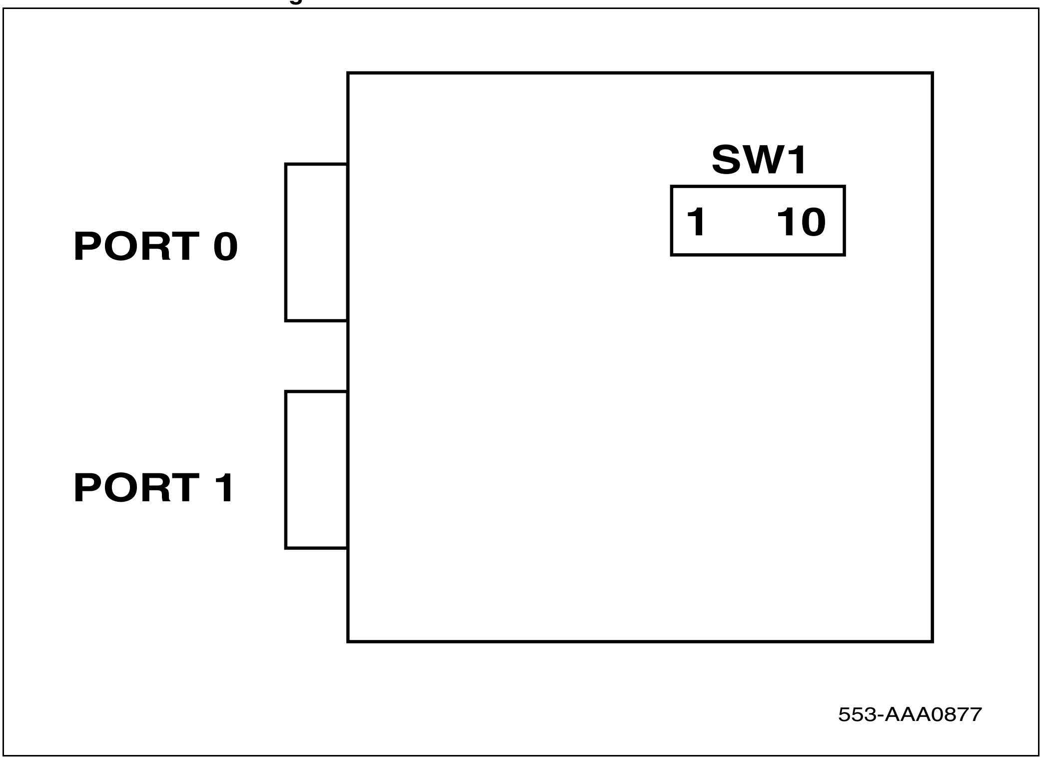
The DCHI installation and removal chapter describes the procedures required to install and remove the NT5K35, NT5K75, and NT6D11AD DCHI cards.

Setting up the NT5K35

NT5K35 DIP switch settings

The NT5K35 has a single bank of DIP switches, as shown in Figure 34 on page 294.

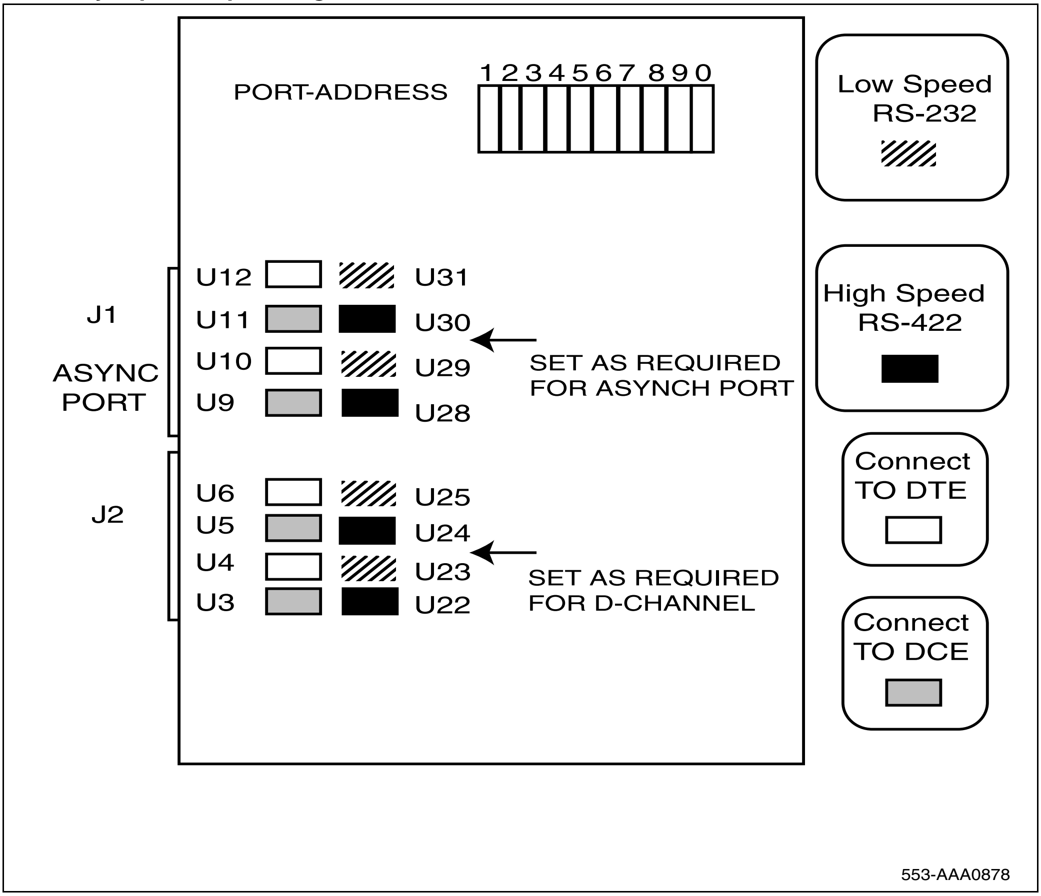
Figure 34
NT5K35 DIP switch settings



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 (APNSS or asynchronous) or RS422 (DPNSS1). Figure 35 shows the jumper strap settings on the NT5K35 card.

Figure 35
NT5K35 jumper strap settings



DPNSS1 configuration

For DPNSS1 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.

APNSS configuration

For APNSS via modem low speed and DCE connection, insert plugs in positions U3 + U5 + U23 + U25. 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 22 on page 296 lists the NT5K35 port address switch settings for dual port operation.

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

Table 22
NT5K35 Port address switch settings for dual port operation

Port Number		S4	S5	S6	S8	S0
Even	**Odd**					
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 23 on page 297 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 23
NT5K35 Port address switch settings for single port operation (Part 1 of 2)

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

Table 23
NT5K35 Port address switch settings for single port operation (Part 2 of 2)

Port Number	S4	S5	S6	S7	S8	S9	S0
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:

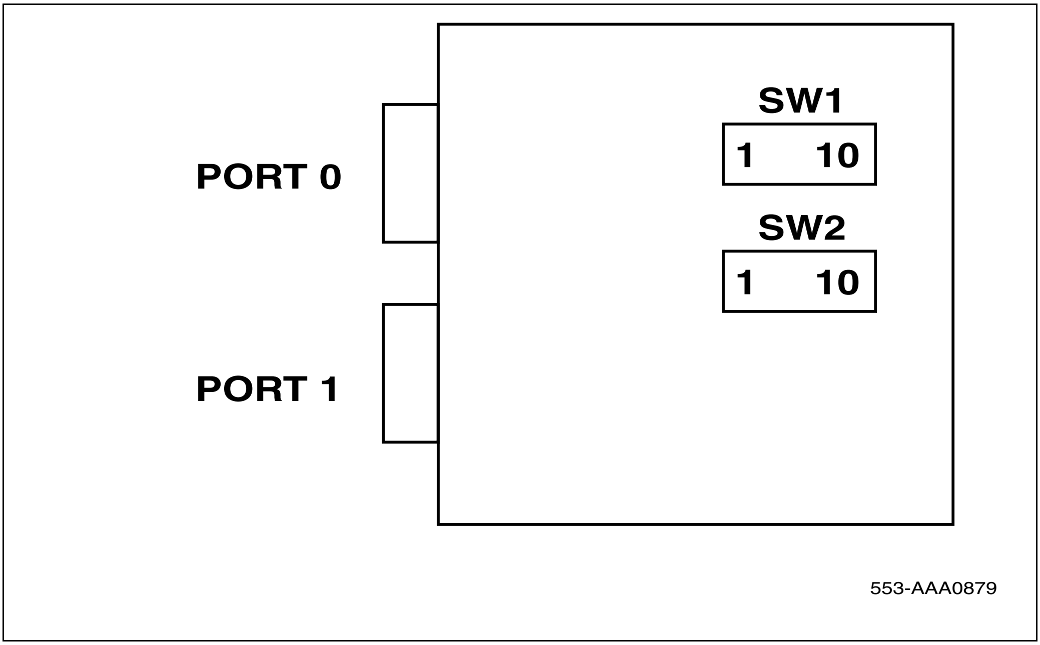
- Port addressing mode (standard, expanded, or disabled)
- Port addresses (standard mode: 0-15; expanded mode: 0-159 possible, 16-159 recommended)
- Line interface jumper options (RS232 or RS422, DTE or DCE)

NT5K75 DIP switch settings

The NT5K75 has two sets of DIP switches. Each port has its 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 be disabled or not (must be set to “disable” for DPNSS1). 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 36 on page 299.

Figure 36
NT5K75 DIP switches



Port addressing modes

Port 0 Mode Selection

Port 0 is used to select whether the asynchronous ESDI port is be disabled or not. Table 24 on page 300 describes port 0 mode selection for the NT5K75.

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

Table 24
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 25 describes port 1 mode selection for the NT5K75.

Table 25
Port 1 mode selection for NT5K75 (Part 1 of 2)

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

Table 25
Port 1 mode selection for NT5K75 (Part 2 of 2)

Port Mode	Switch Setting	
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 26 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 26
NT5K75 Port address switch settings in the standard mode (Part 1 of 3)

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

Table 26
NT5K75 Port address switch settings in the standard mode (Part 2 of 3)

Port Address	Switch Setting						
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
14	0	0	0	1	1	1	0	x

Table 26
NT5K75 Port address switch settings in the standard mode (Part 3 of 3)

Port Address	Switch Setting							
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 27 on page 303, only apply to SW2 (that is, the D-channel port).

> *Note:* Half group numbers are required for expanded mode operation. Please note that the port number is partially formed from the half group number of the shelf on which the NT5K75 DCHI resides. Please refer to the information described in the Engineering note, found in the "DPNSS1 hardware requirements" section for information pertaining to port addressing.

Table 27
NT5K75 Port address switch settings in the expanded mode (Part 1 of 5)

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

Table 27
NT5K75 Port address switch settings in the expanded mode (Part 2 of 5)

Port Address	Switch Setting							
	Half Group No.			Device No.				
	S3	S4	S5	S6	S7	S8	S9	S10
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

Table 27
NT5K75 Port address switch settings in the expanded mode (Part 3 of 5)

Port Address	Switch Setting							
	Half Group No.			Device No.				
	S3	S4	S5	S6	S7	S8	S9	S10
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

Table 27
NT5K75 Port address switch settings in the expanded mode (Part 4 of 5)

Port Address	Switch Setting							
	Half Group No.			Device No.				
	S3	S4	S5	S6	S7	S8	S9	S10
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

Table 27
NT5K75 Port address switch settings in the expanded mode (Part 5 of 5)

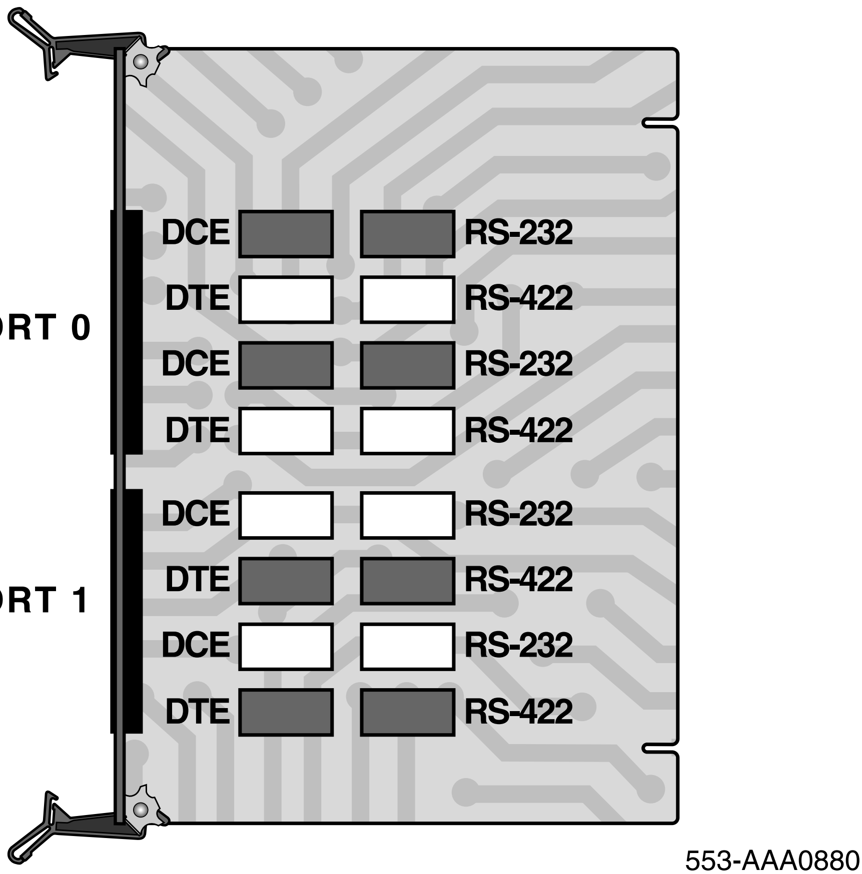
Port Address	Switch Setting							
	Half Group No.			Device No.				
	S3	S4	S5	S6	S7	S8	S9	S10
32-63	0	0	1					
64-95	0	1	0					
96-127	0	1	1					
128-159	1	0	0					

Jumper settings

DPNSS1 configuration

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 (APNSS or asynchronous) or RS422 (DPNSS1). The DPNSS1 configuration is shown in Figure 37 on page 308.

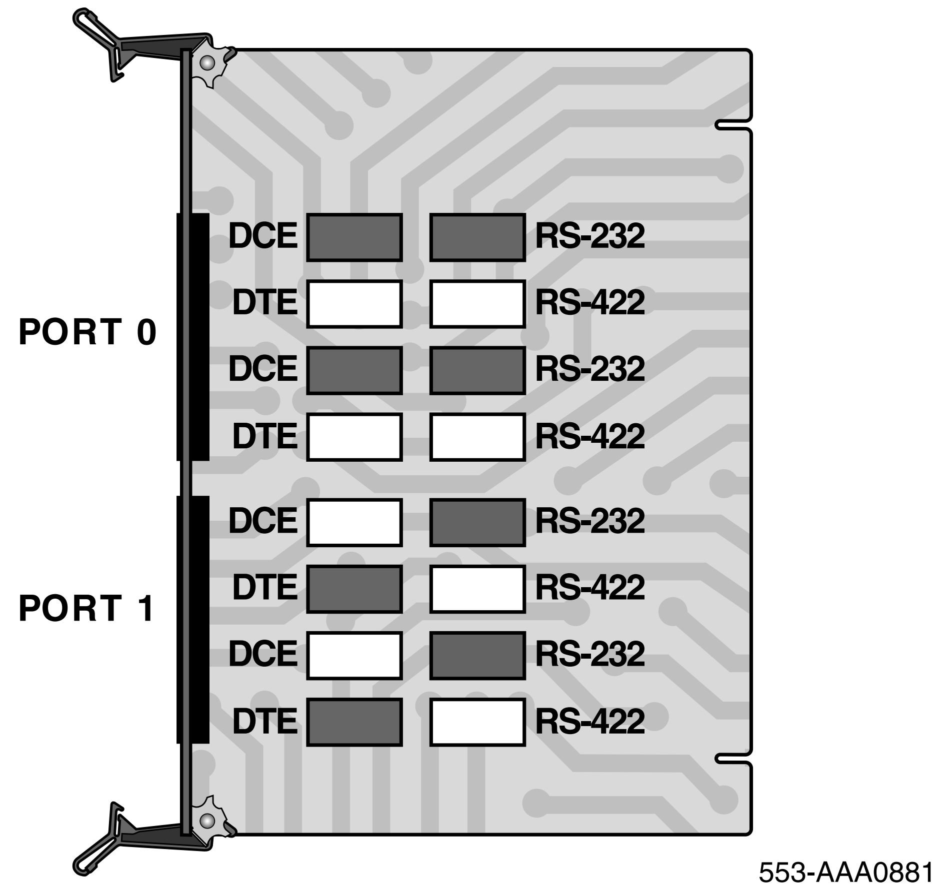
Figure 37
NT5K75 jumper strap settings for DPNSS1



APNSS configuration

For APNSS via modem low speed and DTE connection, insert Port 1 straps, as illustrated by Figure 38 on page 309.

Figure 38
NT5K75 jumper straps for APNSS1 configuration



Setting up the NT6D11AE/AF

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

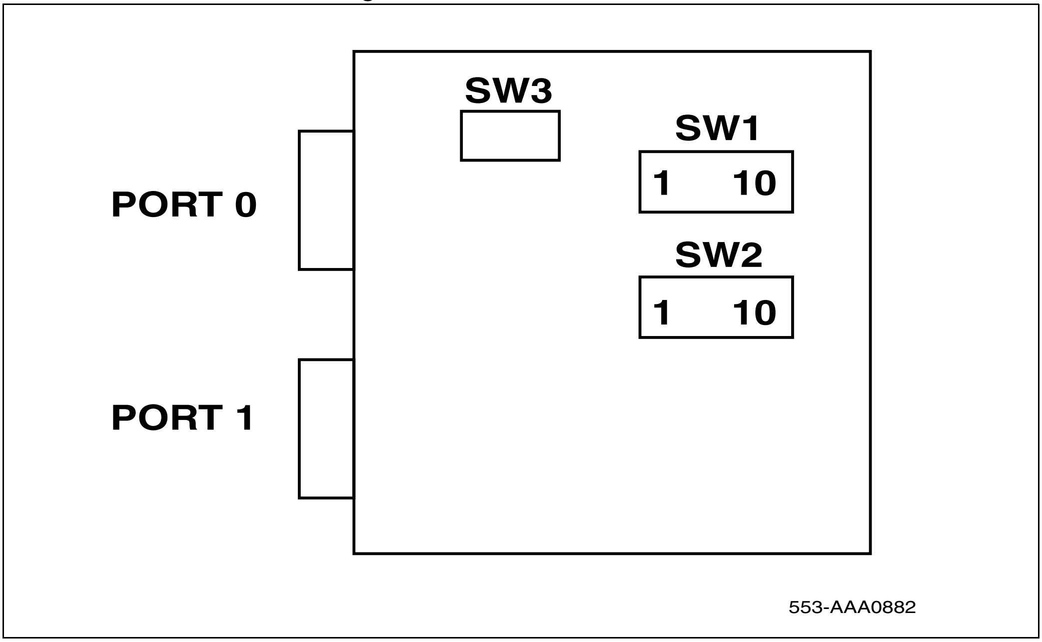
- Firmware selection (set for DPNSS1)
- Port addressing mode (standard, expanded, or disabled)
- Port addresses (standard mode: 0-15; expanded mode: 0-159 possible, 16-159 recommended)
- Line interface jumper options (RS232 or RS422, DTE or DCE)

DIP switch settings

The NT6D11AE/AF has three sets of DIP switches. Each port has its 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 DPNSS1 signaling. Port 0 is used to select whether the asynchronous ESDI port is be disabled or not (must be set to “disable” for DPNSS1). 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 39 on page 311.

Figure 39
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 28 on page 312 describes the port 0 mode selection for the NT6D11AE/AF.

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

Table 28
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 29 describes the port 1 mode selection for the NT6D11AE/AF.

Table 29
Port 1 mode selection for NT6D11AE/AF (Part 1 of 2)

Port Mode	**Switch Setting**	
	SW2.1	**SW2.2**
Synchronous, D-channel, standard addressing	0	0

Table 29
Port 1 mode selection for NT6D11AE/AF (Part 2 of 2)

Port Mode	**Switch Setting**	
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 30 on page 314 describes the ports address switch settings in the 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 30
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

Table 30
NT6D11AE/AF 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
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
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

These settings only apply to SW2 (that is, the D-channel port). The port address switch settings in the expanded mode are shown in Table 31 on page 316.

> ***Note:*** Half group numbers are required for expanded mode operation. Please note also that the port number is partially formed from the half group number of the shelf on which the NT6D11AE/AF resides. Please refer to the information described in the Engineering note, found in the "DPNSS1 hardware requirements" section for information pertaining to port addressing.

Table 31
NT6D11AE/AF Port address switch settings in the expanded mode (Part 1 of 4)

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 31
NT6D11AE/AF Port address switch settings in the expanded mode (Part 2 of 4)

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

Table 31
NT6D11AE/AF Port address switch settings in the expanded mode (Part 3 of 4)

Port Address	Switch Setting							
	Half Group No.			Device No.				
	S3	S4	S5	S6	S7	S8	S9	S10
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 31
NT6D11AE/AF Port address switch settings in the expanded mode (Part 4 of 4)

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 32 on page 320.

Table 32
Protocol selection switch settings

Protocol	Switch Setting	
	SW3.1	**SW3.2**
DPNSS1 (NT5K35/NT5K75 emulation)	0	0
ISDN (NT6D11AB/AC emulation)	1	1

Valid switch combinations

Table 33 and Table 34 on page 321 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 33
NT6D11AE/AF Port 0 settings (Part 1 of 2)

Mode	Switch setting			
	SW1.1	**SW1.2**	**SW3.1**	**SW3.2**
Asynchronous ESDI	1	0	0	0

Table 33
NT6D11AE/AF Port 0 settings (Part 2 of 2)

Mode	Switch setting			
Asynchronous ESDI	1	0	1	1
Port disabled	1	1	-	-

Port 1

Table 34 shows the only valid emulation modes combinations. If the port is configured as disabled, it will not be visible to the system CPU.

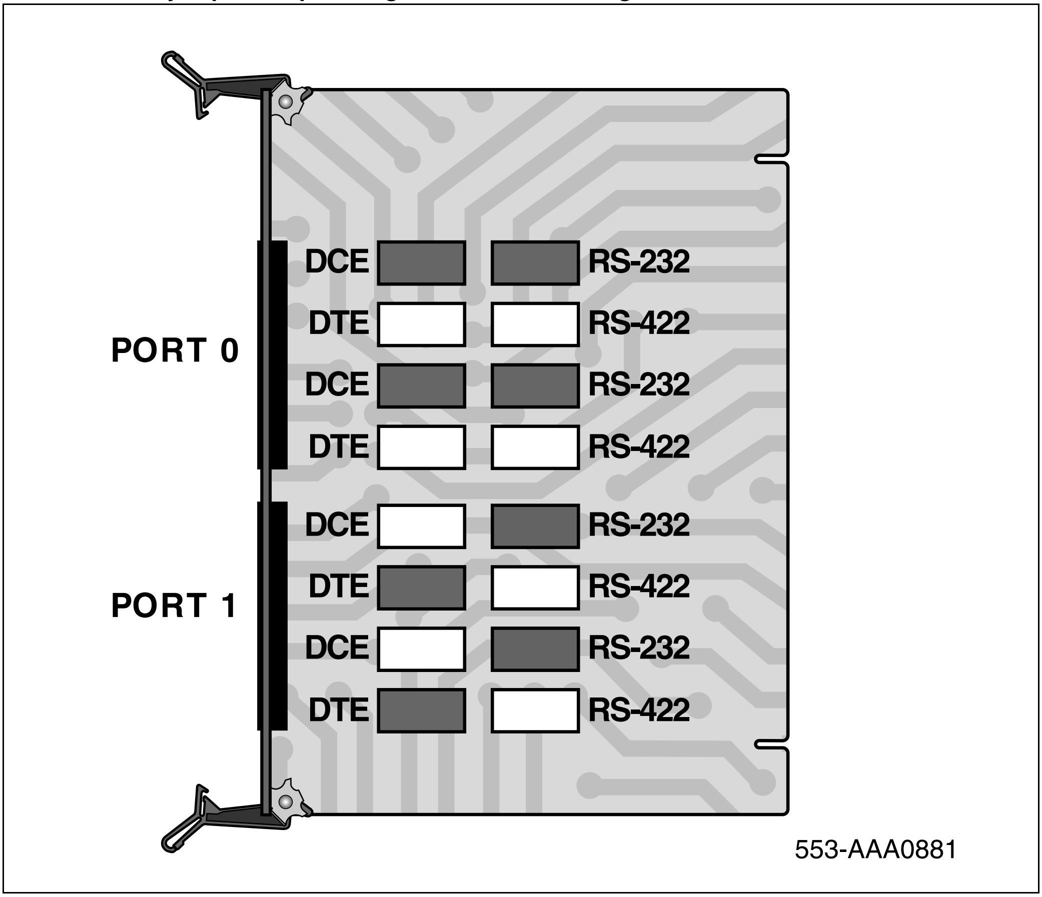
Table 34
NT6D11AE/AF Port 1 settings

Mode	Emulates	Switch setting			
		SW 2.1	SW 2.2	SW 3.1	SW3.2
DPNSS1	NT5K35AA	0	0	0	0
ISDN	NT6D11AB/AC	0	0	1	1
Expanded DPNSS1	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 (APNSS or asynchronous) or RS422 (DPNSS1). The DPNSS1 configuration is shown in Figure 40.

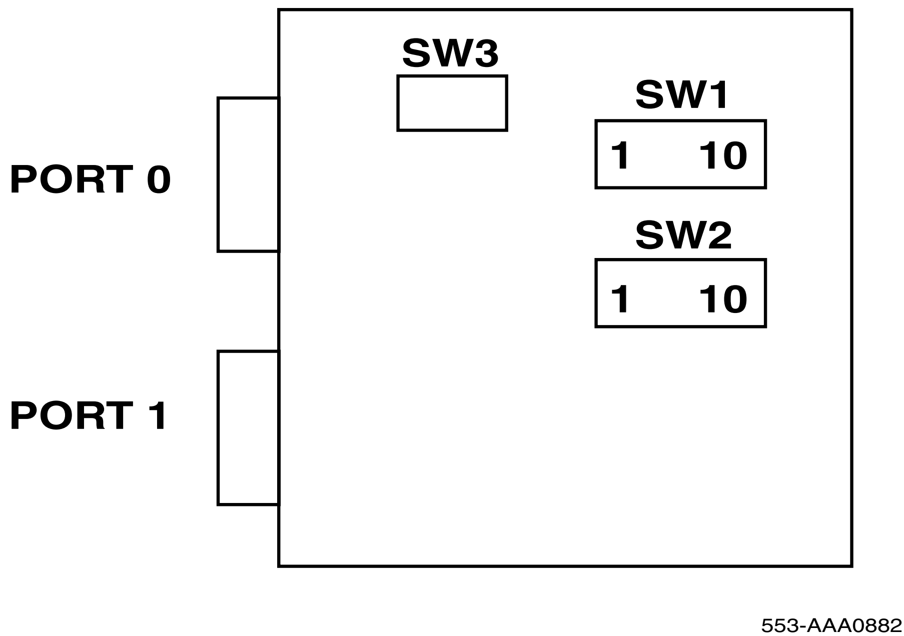
Figure 40
NT6D11AE/AF jumper strap settings for DPNSS1 configuration



APNSS configuration

For APNSS via modem low speed and DTE connection, insert Port 1 straps, as illustrated by Figure 41.

Figure 41
NT6D11AE/AF jumper strap settings for APNSS configuration



Installing the DCHI

The procedures outlined in Table 35 on page 325 apply when installing the NT5K35, NT5K75 or NT6D11AE/AF DCHI cards on Large Systems.

Note to installers

Either the DCHI card or the NT8D72 PRI/NT5D97AD card can 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.

Removing the DCHI

Table 35 on page 325 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 35
Steps for removing DCHI

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.
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.
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, i.e. 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

Installation instructions for the NTAG54 card are the same for Large Systems.

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” will light up.

Installing 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.

1 Unpack and inspect the NTAG54 Daughterboard.

2 Mount the NTAG54. The NTAG54 can be mounted on any Dual PRI of vintage NTCK43AB or higher. Slots that are occupied by BTUs 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 four 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

Removal instructions for the NTAG54 are the same for all Large Systems.

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

The associated PRI link must also be disabled.

1 Disable the faceplate switch on the Dual PRI. If S1 is not disabled, the system will initialise.

2 Remove the Dual PRI and DDCH.

Integrated Digital Access (IDA) equipment overview

Contents

This section contains information on the following topics:

Description

The Integrated Digital Access (IDA) feature provides the hardware and software platform for the support of DPNSS1 signaling protocols. The information contained in this section is defined at the IDA level.

DPNSS1 hardware requirements

The following hardware is required for each DPNSS1 link on Large 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 332 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. Please see the section entitled "Engineering note pertaining to port addressing modes" on page 332 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/AF 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 Clock Controller or NTRB53AA Clock Controller (QPC775 is required on Succession 1000M Multi Group and Meridian 1 Option 81C CP PII, and where EuroISDN is supported.) This cable is required if the DASS2 loop is to be used as a timing synchronisation source for the PBX.
- one NT8D79AD PRI to Clock Controller cable. This cable is required if the DASS2 loop is to be used as a timing synchronisation source for the PBX.
- one loop of the QPC414 ENET dual loop network interface card

Note: The network loop used for DPNSS1 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.

Table 36
Programming of network loops

ENET LOOP	ALLOWED					NOT ALLOWED
EVEN	Meridian Mail	PRI	PRI	ANY	---	Meridian Mail
ODD	Meridian Mail	PRI	Meridian Mail	---	ANY	PRI

Hardware requirements for DPNSS Standalone Meridian Mail

To support Standalone Meridian Mail access over DPNSS, a Meridian Mail module and standard attachments are required.

Engineering note pertaining to 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, DPNSS1 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 DPNSS1 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, DPNSS1 D-channel (DDSL) 7 in the expanded mode can exist with the Q.931 D-channel (DCHI) 7 in the standard mode.

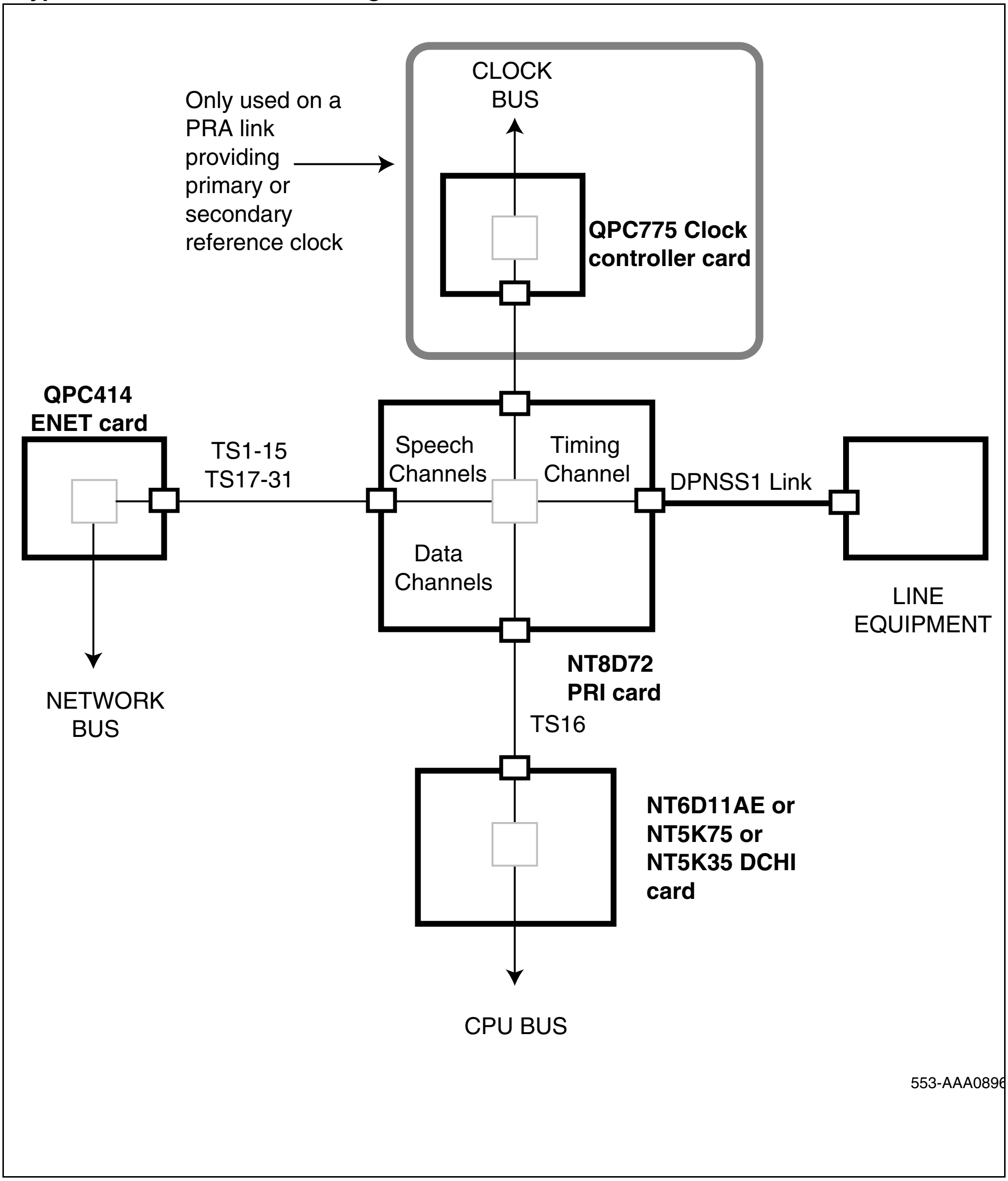
Theoretically, it is possible to have 64 addresses using the MSDL with Q.931, ISDL, or ESDI, plus 160 addresses using the expanded mode for DPNSS1 for a total of 224 addresses. In practise, however, there is a limit of 64 addresses using MSDL with Q.931, ISDL, or ESDI, plus 40 addresses using the expanded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

Presently, MSDL does not support SDI ports on DPNSS1 or APNSS, 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 42 on page 335 illustrates a typical DPNSS1 hardware configuration.

Figure 42
A typical DPNSS1 hardware configuration



APNSS hardware requirements

The following hardware is required to support APNSS on Large Systems:

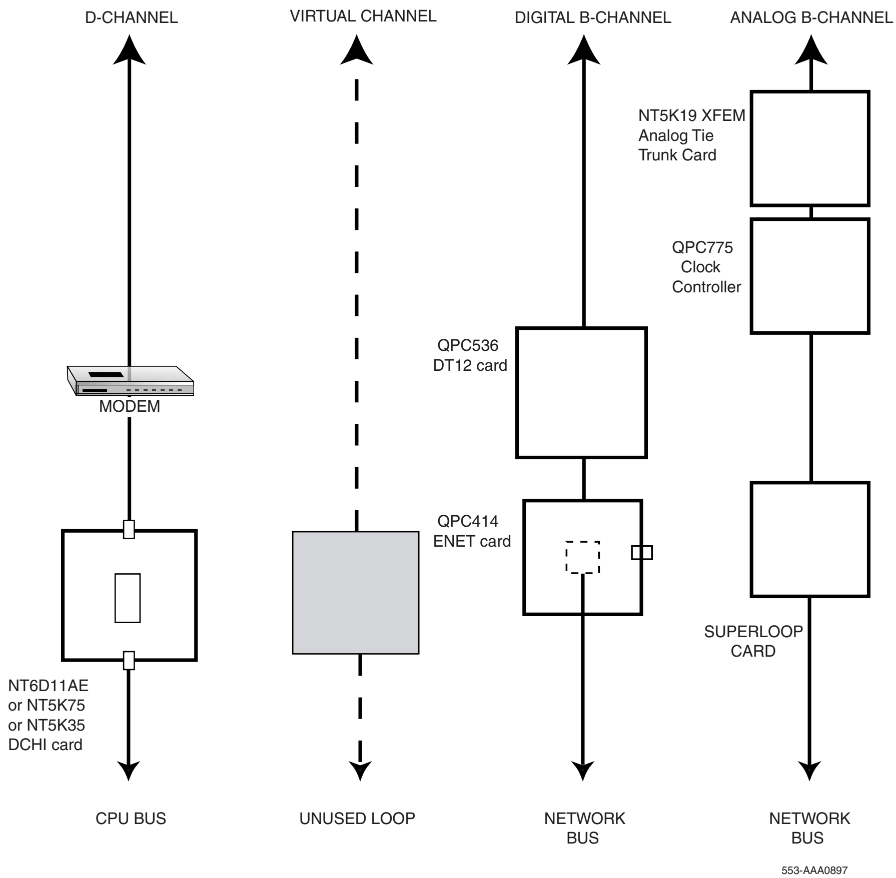
- one NT5K35 DCHI, **or** the NT5K75 DCHI **or** the NT6D11AE/AF DCHI

  Note: Standard mode addressing 0-15 only is allowed for the NT5K75 or NT6D11AE/AF; the expanded addressing mode is not allowed.

- one NT5K19 XFEM Analog TIE Trunk Card. It is equipped with an Intel 8052-type microprocessor which performs several function, such as card identification, self-test, status reporting to the controller, and maintenance diagnostics. The NT5K19 provides four analog trunks, the following which may be configured for APNSS: 4 wire E&M Type 1 TIE trunk (DC5), or 2 wire E&M TYPE 1 TIE trunk (DC5).
- either one of the following modems (the list of modems supporting APNSS working is subject to change. Please contact NT Product Management for information specific to a particular requirement):
  - — BT 4242VSX modem
  - — Datel 4960FTX modem
- one 500 set line card

Figure 43 on page 337 illustrates a typical APNSS hardware configuration.

Figure 43
A typical APNSS hardware configuration



NT5K35, NT5K75, and NT6D11AE/AF DCHI cards

NT5K35 and NT5K75 power requirements

The NT5K35 and NT5K75 DCHI power requirements are shown in Table 37.

Table 37
NT5K35 and NT5K75 power requirements

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

NT6D11AE/AF power requirements

The power requirements for the NT6D11AE/AF are shown in Table 38.

Table 38
NT6D11AE/AF power requirements

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

NT5K35, NT5K75, NT6D11AE/AF faceplates

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

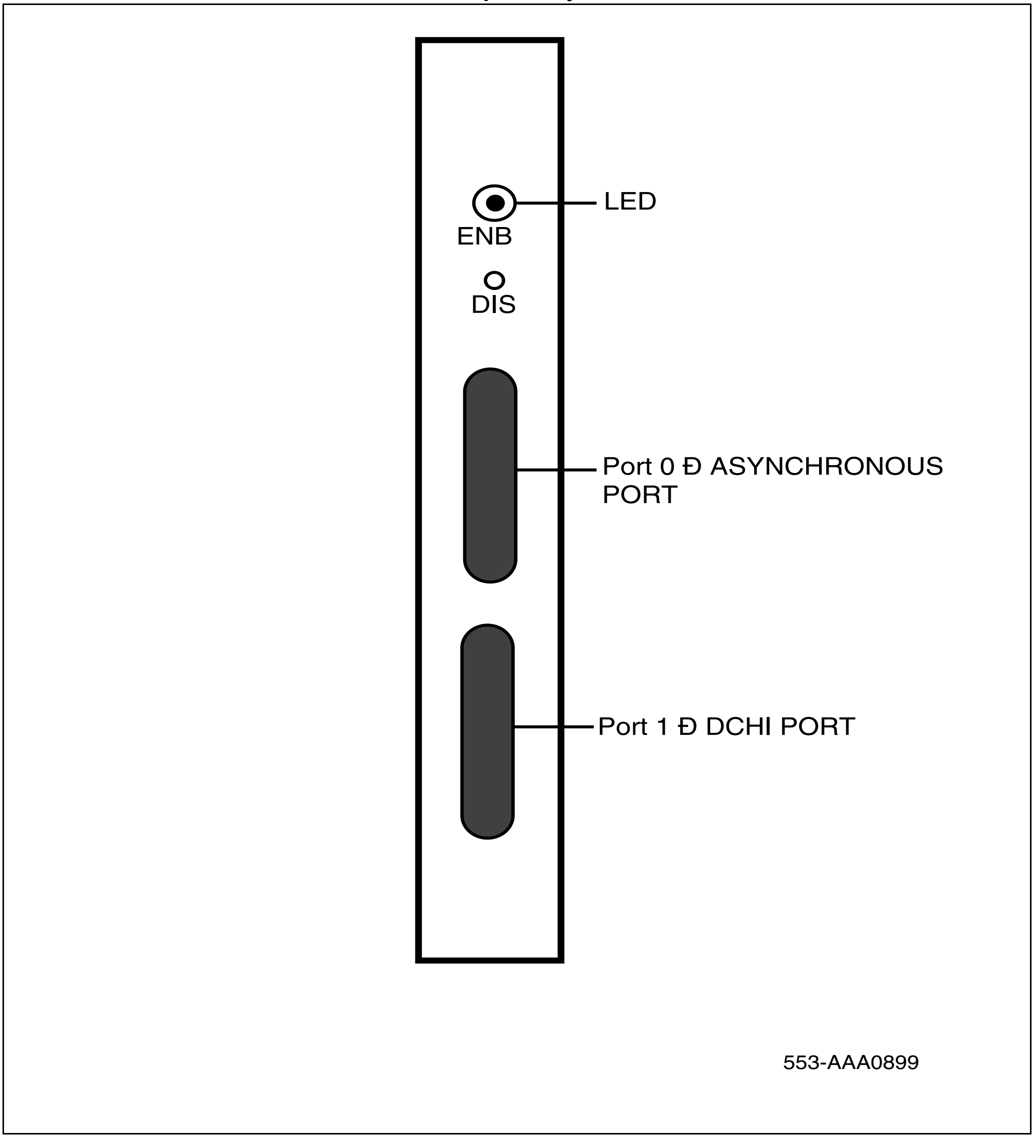
1 Port 0 is a standard asynchronous port providing an interface for non-IDA applications.

Note: This port should only be used for testing or debugging DPNSS1 links.

2 Port 1 is the D-Channel Interface port.

Figure 44 on page 339 illustrates the faceplate layout of the NT5K35, NT5K75, and NT6D11AE/AF cards.

Figure 44
NT5K35, NT5K75, NT6D11AE/AF DCHI faceplate layout



NTAG54AA DASS/DPNSS Dual Daughterboard

The NTAG54AA is a dual (two-port) daughterboard version of the NT6D11AF to support DPNSS1/DASS2 applications with the Dual PRI card. It is dual density. For example: 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.

The selection of the addressing modes is done on a port basis through two sets of DIP switches. (refer to the “DPRI switch settings” chapter, in the “DPRI installation and removal” section for details).

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

The NTBK54AA will displace all current NT6D11 cards in Europe. Configuration is identical to the NT6D11.

Product compatibility

The NTAG54AA can coexist with the NTBK50, NT6D11, NT5K35, NT5K75 external DCHI cards (as well as the NT6D80 and NTBK51).

The NTBK54AA does not support Q.931 applications.

NT8D72 PRI card

Power requirements

The NT8D72 PRI uses power and ground connections from the CE backplane. Power requirements are shown in Table 39.

Table 39
NT8D72 PRI 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. The connections are shown in Table 40. Figure 45 on page 342 illustrates the faceplate layout of the NT8D72 PRI card.

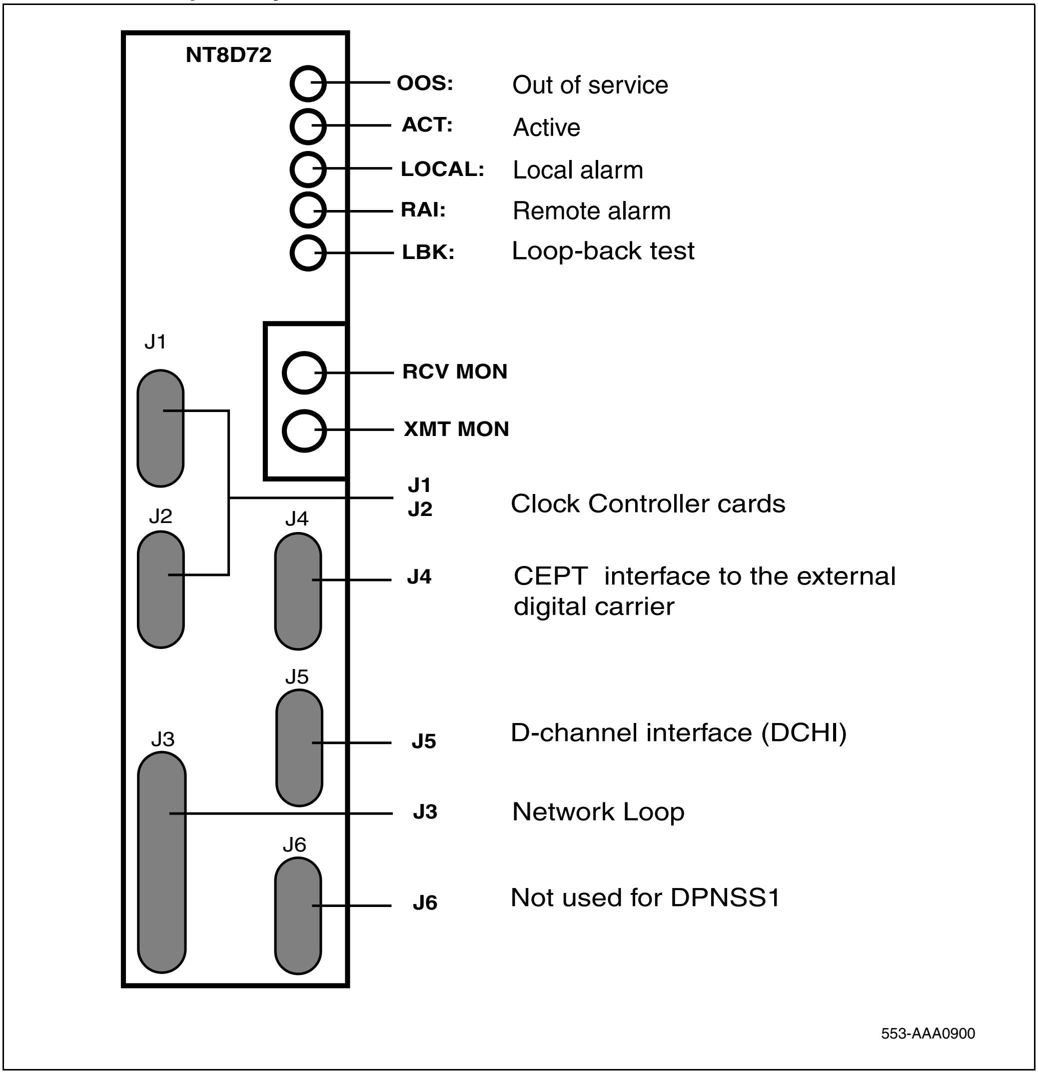
Table 40
NT8D72 PRI - external connections

Faceplate Designation	Type	Connect to
J1	9-pin female, D-connector	CC - CPU 0
J2	9-pin female, D-connector	CC - CPU 1
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 DPNSS1
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 45
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 41 indicates how the RR control signal operates with regard to the DDP2 status.

Table 41
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 46 on page 345 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. Table 42 on page 346 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.

Figure 46
NT5D97AD faceplate

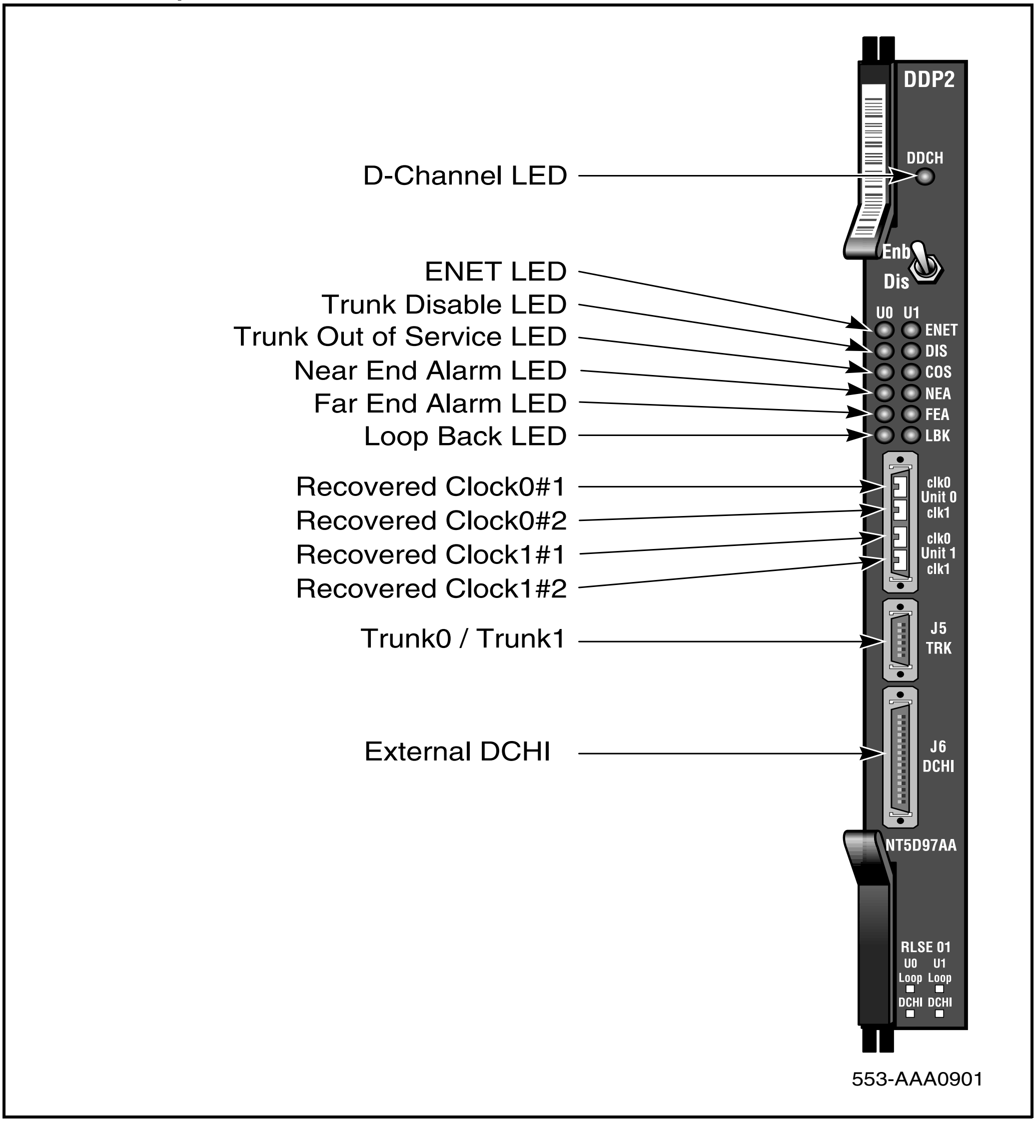


Table 42
External connectors and LEDs

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

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 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 only supports D-channel functionality.

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 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 43 on page 350 lists the power requirements for the NT5D97AD DDP2 card.

Table 43
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 Overlay 30
- Loopback tests, self tests, and continuity tests performed by Overlay 60 and Overlay 45
- The D-Channel (DCH, DDCH) maintenance is supported by Overlay 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 Overlay 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 an120Ω 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). See Figure 47 on page 352.

Figure 47
NTCK45AA

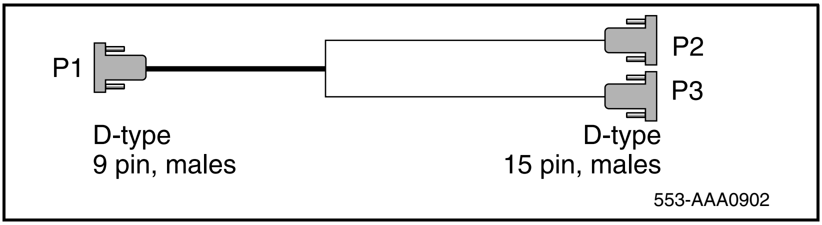


Table 44 lists the pin attributes for the NTCK45AA cable.

Table 44
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
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

Table 44
NTCK45AA cable pins (Part 2 of 2)

Cable	Name	Description	Color	DDP2 pins	I/O Panel pins
1		Standard Wire (3”)	Bare	Case P3	P3-5
1		Standard Wire (3”)	Bare	Case P3	P3-9

NT8D7217 (A0617192)

The NT8D7217 (50 ft.) is an 120Ω cable for systems equipped with an I/O filter panel, connecting the 9 pin I/O filter connector to the 9 pin NCTE connector. See Figure 48.

Figure 48
NT8D7217

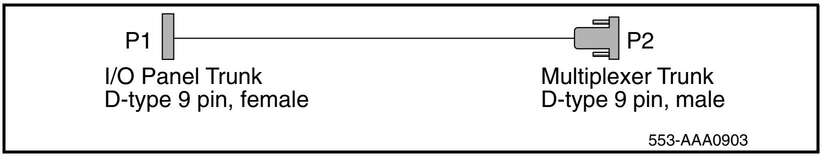


Table 45 lists the pin attributes for the NT8D7217 cable.

Table 45
NT8D7217 Cable Pins (Part 1 of 2)

Cable	Name	Description	Color	DDP2 pins	I/O Panel pins
0	T-PRI0TX	Trunk 0 Transmit Tip	Black	P1-6	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

Table 45
NT8D7217 Cable Pins (Part 2 of 2)

Cable	Name	Description	Color	DDP2 pins	I/O Panel pins
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. See Figure 49 on page 354.

Figure 49
NTCK78AA

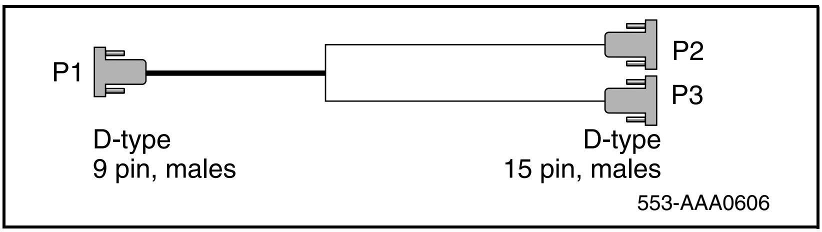


Table 46 lists the pin attributes for the NTCK78AA cable.

Table 46
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). See Figure 50.

Figure 50
NTCK79AA

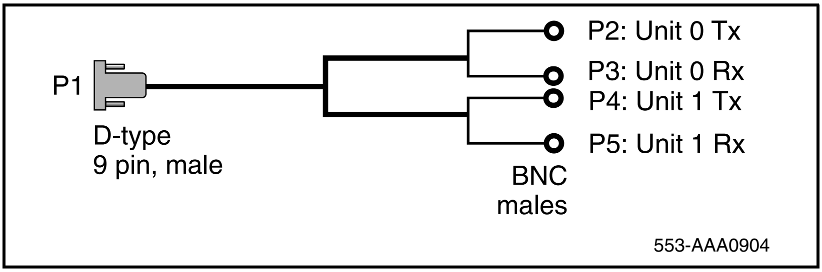


Table 47 lists the pin attributes for the NTCK79AA cable.

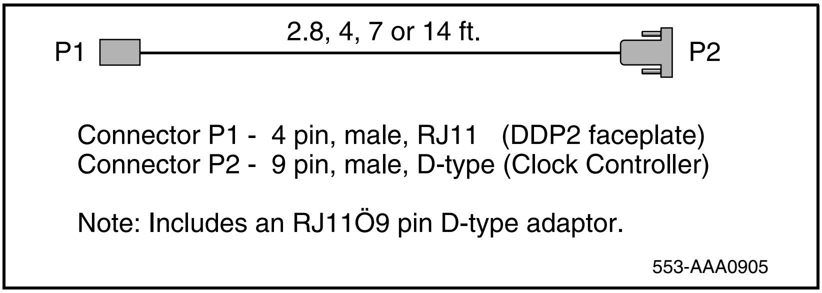
Table 47
NTCK79AA cable pins

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
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. See Figure 51.

Figure 51
NTCG03AA/AB/AC/AD

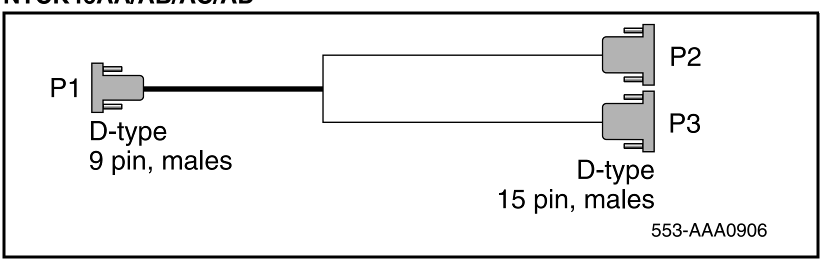


External DCH cable

The NTCK46 cable connects the DDP2 card to the NT6D11AF/NT5K75AA/NT5K35AA D-Channel Handler card. See Figure 52 on page 357. 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 52
NTCK46AA/AB/AC/AD



Cable diagrams

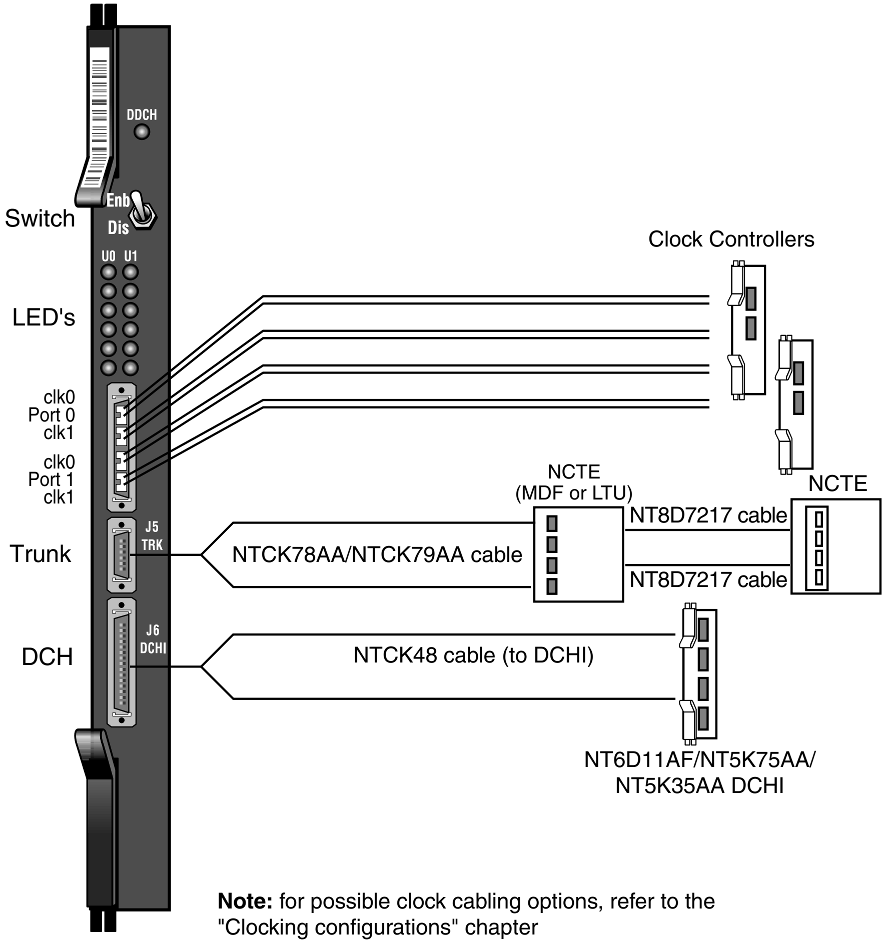
Figure 53 on page 359 and Figure 54 on page 360 provide examples of typical cabling configurations for the DDP2.

Figure 53 on page 359 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 54 on page 360 shows cabling for a system without an I/O panel. Here, the DDP2 faceplate is cabled directly to the NCTE.

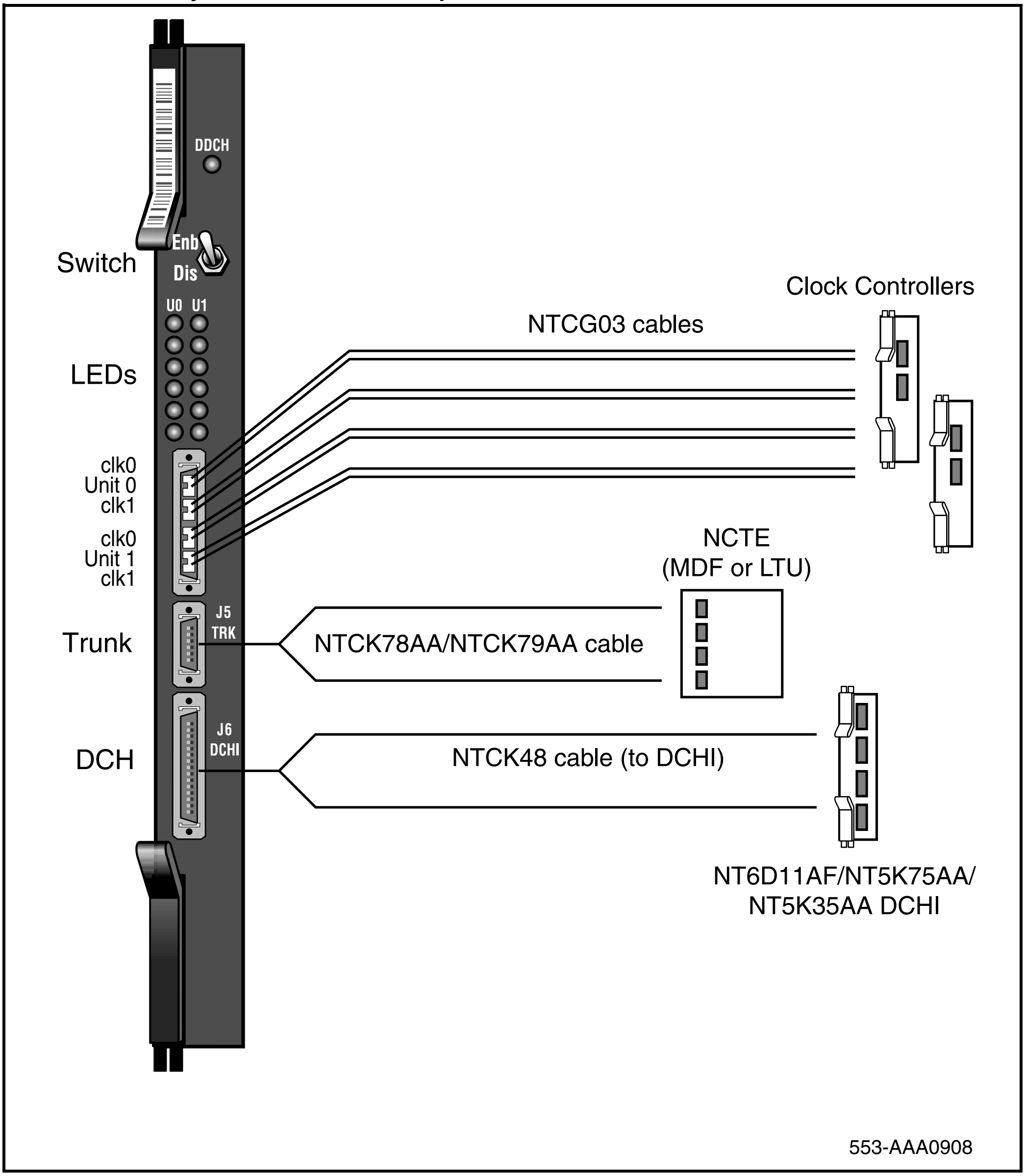
> ***Note:*** Since several clock cabling options exists, none has been represented in the diagrams. Refer to “Clock configurations” on page 364 for a description on each available option.

Figure 53
DDP2 cable for systems with an I/O panel



Note: for possible clock cabling options, refer to the "Clocking configurations" chapter

Figure 54
DDP2 cable for systems without an I/O panel



Clock for the NT5D97AD

Clock operation

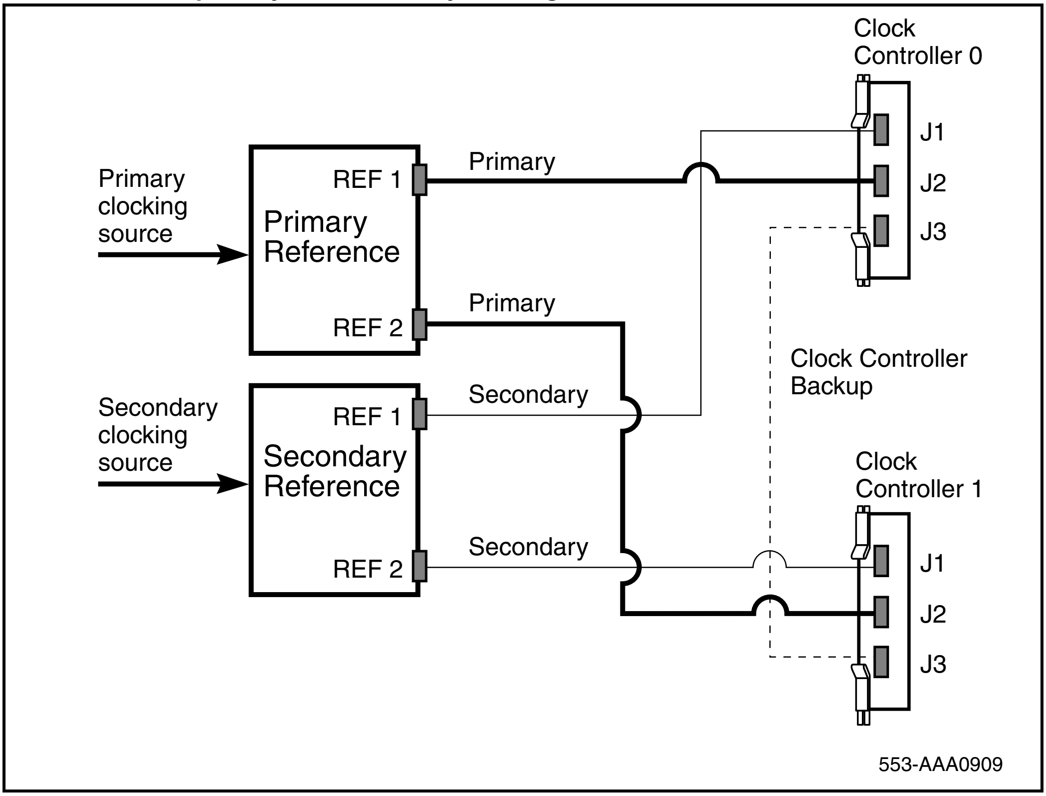
There are two types of clock operation: tracking mode and free-run mode.

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 55 on page 362, 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 55
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 Overlay 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 Overlay 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 Overlay 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 (i.e., 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 56 through Figure 59.

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 357 for more information.

Table 48 summarizes the clocking options. Table 49 on page 366 explains the options in more detail.

Table 48
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 49
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 56 on page 367.
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 57 on page 368.
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 58 on page 369.
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 59 on page 370.

Figure 56
Clock Controller – Option 1

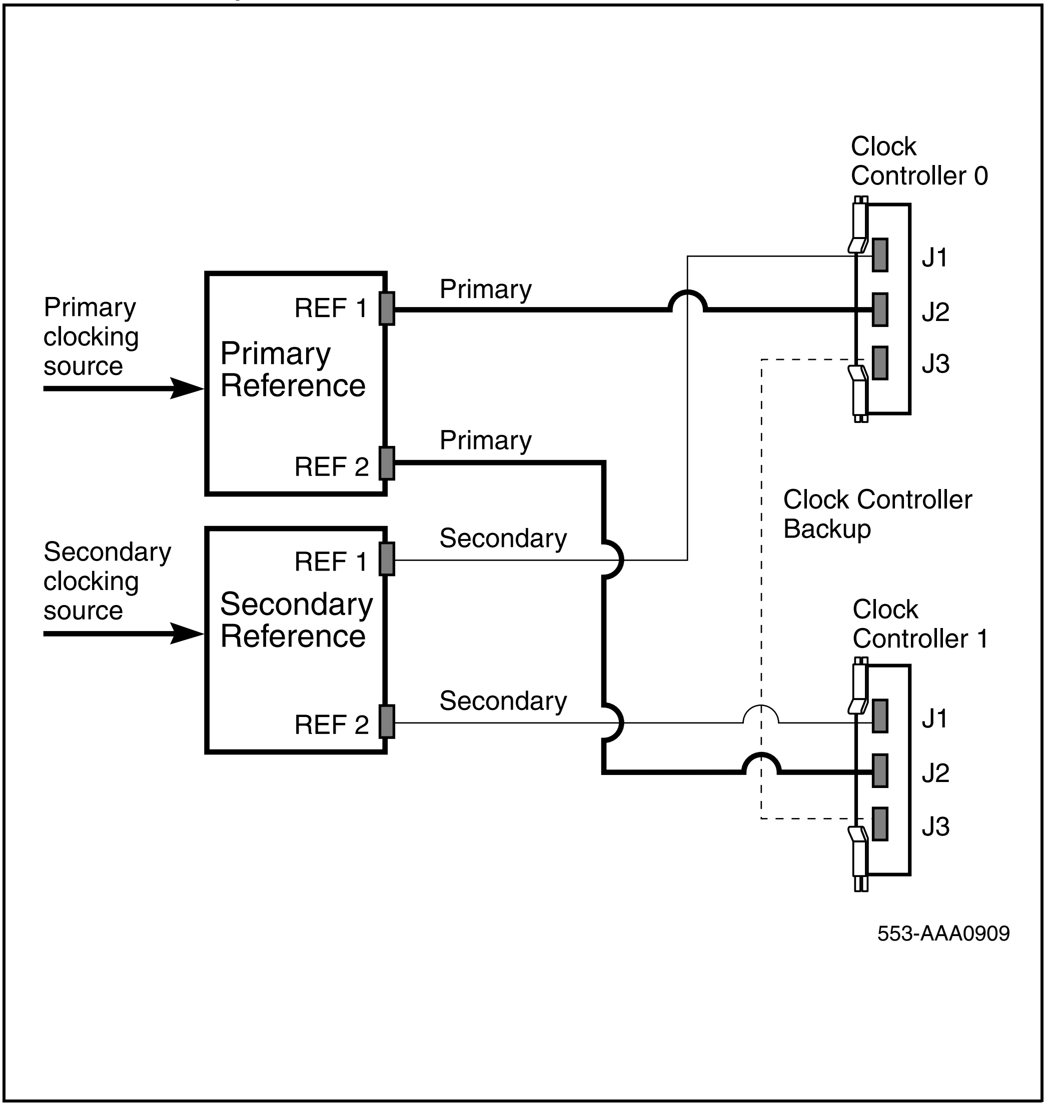


Figure 57
Clock Controller – Option 2

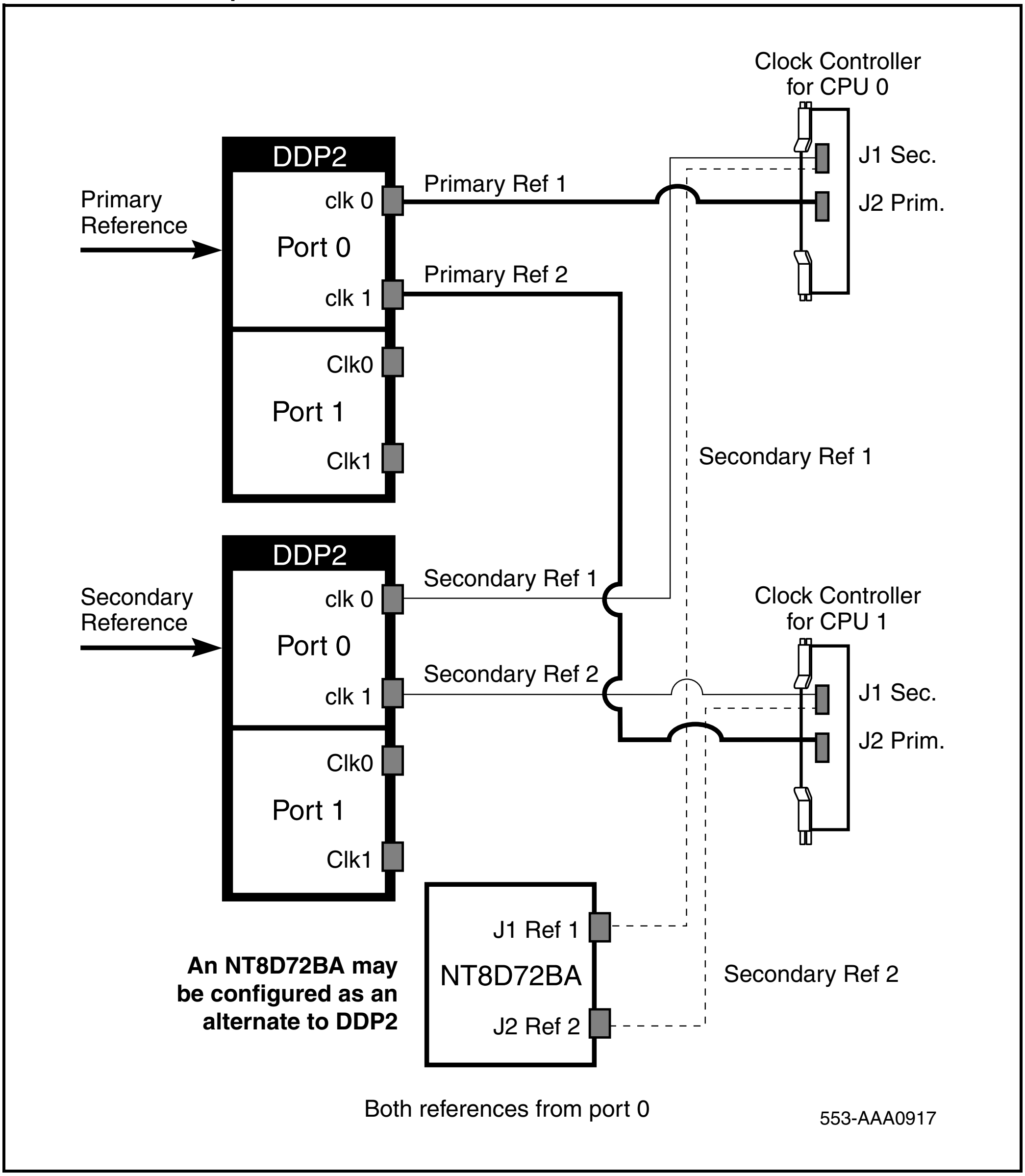


Figure 58
Clock Controller – Option 3

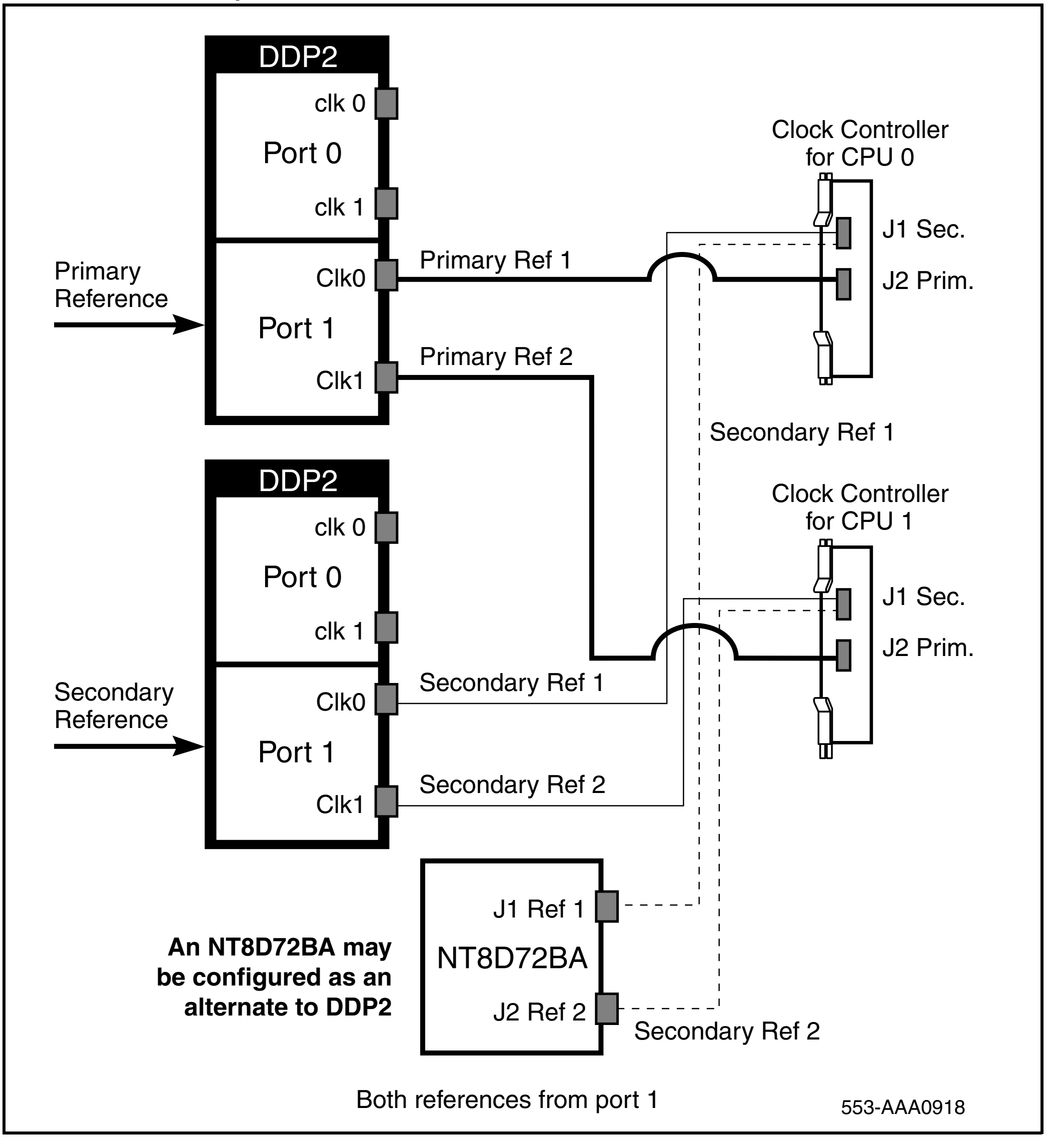
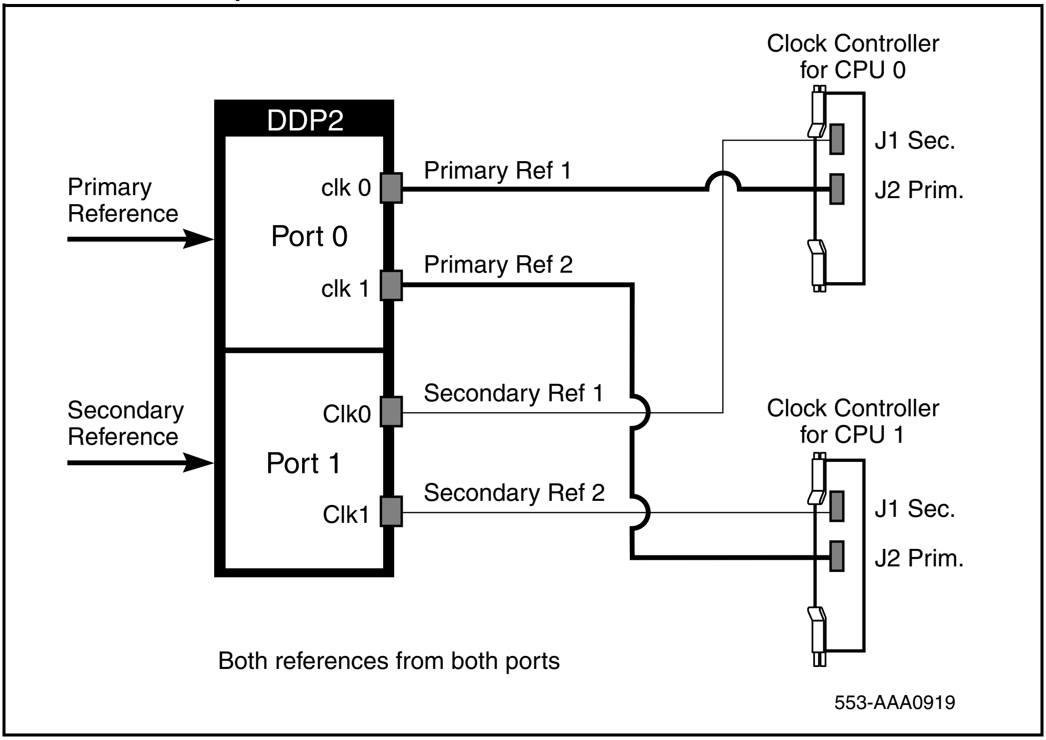


Figure 59
Clock Controller – Option 4



Hardware required for DDP2 configuration

The following hardware is required when configuring the NT5D97AD DPRI on Large Systems.

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

- PRI - one NT5D97AD
- 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 optionally

- one NT5K35 or one NT5K75,

or optionally

- the Dual DASS/DPNSS Daughterboard NTAG54AA (interfaces to NT5D97 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, QPC775, or NTRB53 Clock Controller(s)

For EuroISDN applications, and for use on Succession 1000M Multi Group and Meridian 1 Option 81C CP PII in international markets, vintage QPC77E is required.

Note: The QPC775 Clock Controller card currently 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

A Clock Controller card or cards have to be installed in Large Systems when DPNSS links are installed.

For Succession 1000M Multi Group and Meridian 1 Option 81C CP PII, two Clock Controller cards are used for synchronization; the Clock Controllers extend timing signals to multiple groups by way of a junctor board. On these systems, a QPC775E or NTRB53AA must be used.

QPC775E clock controller cards are also required on any system supporting EuroISDN applications.

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

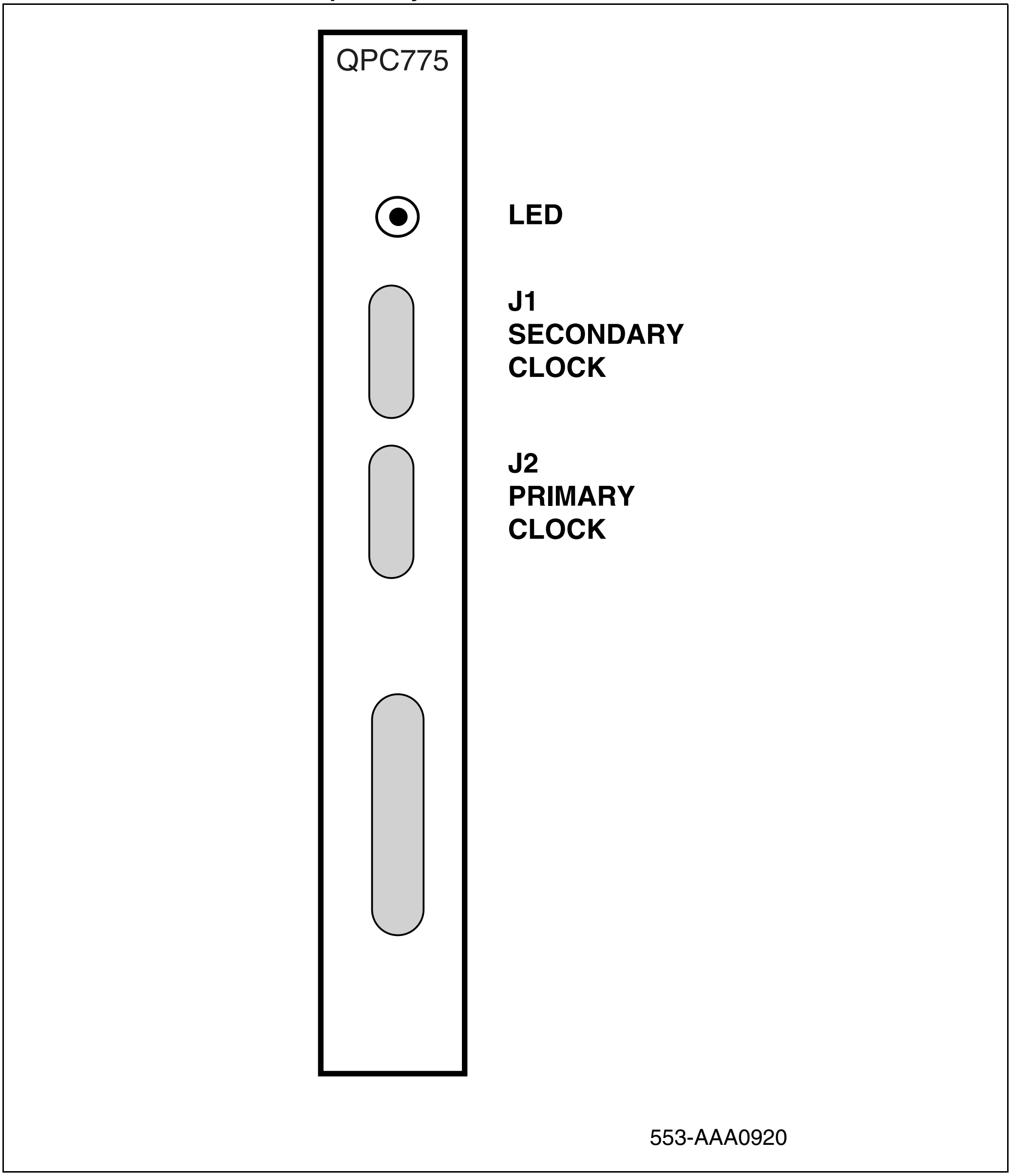
Synchronization between switches must always be provided in the case of DPNSS1 trunks, and every digital network must be individually checked for clocking configurations. If the system is to provide clocking over a link, then there are no additional configuration changes required. If the system is to 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 60 on page 374 shows the QPC775 Clock Controller faceplate layout.

Figure 60
QPC775 Clock Controller faceplate layout

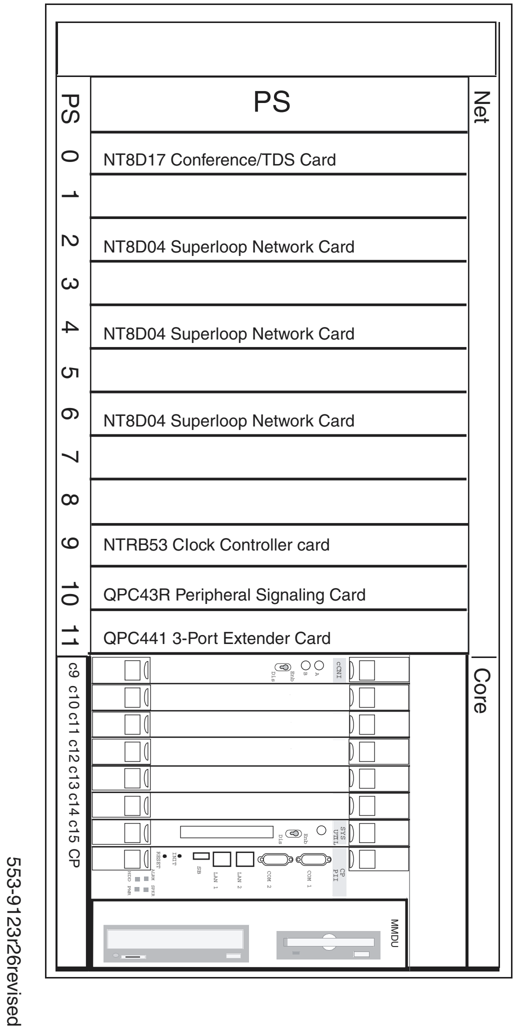


Schematics for systems

Succession 1000M Half Group, Succession 1000M Single Group and Meridian 1 Option 61C CP PII

Figure 61 on page 376 shows a schematic of a Core/Network module in Succession 1000M Half Group, Succession 1000M Single Group and Meridian 1 Option 61C CP PII.

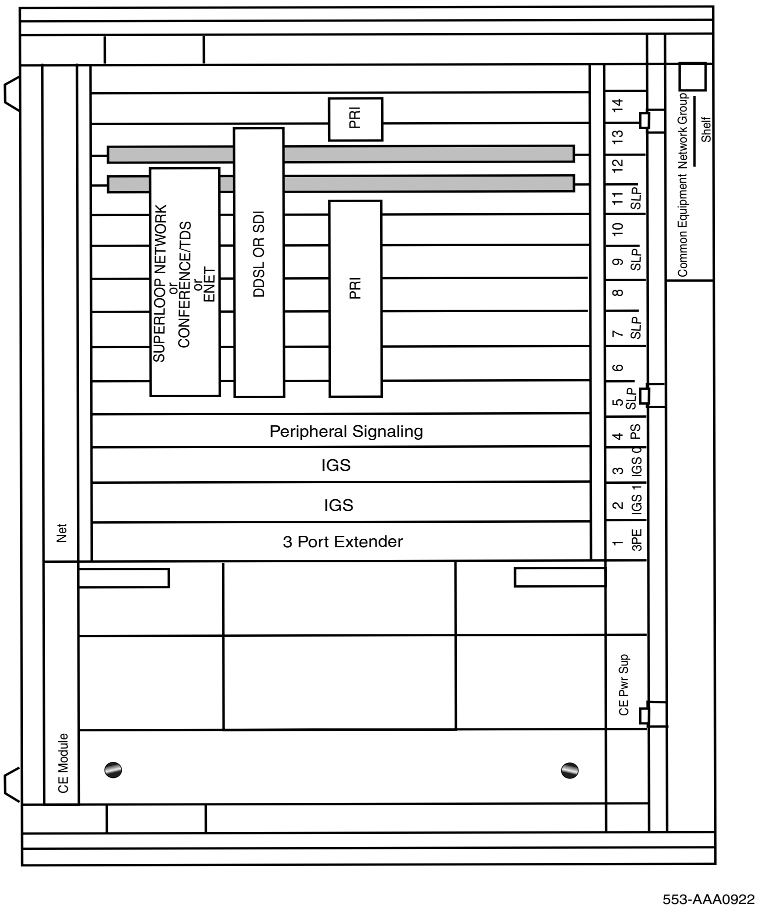
Figure 61
Meridian 1 Option 61C CP PII Core Network module



Succession 1000M Multi Group and Meridian 1 Option 81C CP PII

Figure 62 shows a schematic of a Network module in Succession 1000M Multi Group and Meridian 1 Option 81C CP PII

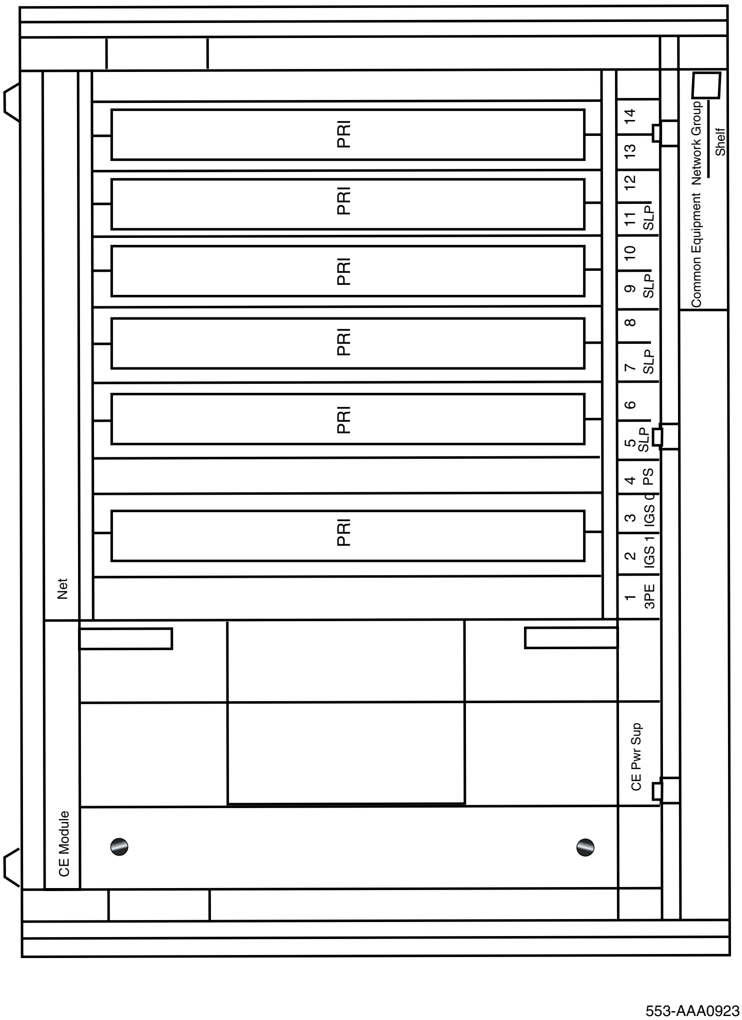
Figure 62
Succession 1000M Multi Group and Meridian 1 Option 81C CP PII Network module



Network Expansion shelf

Figure 63 shows a schematic of a Network Expansion module with six PRI cards.

Figure 63
Network Expansion module with six PRI cards



Cabling requirements (non NTCK43 DPRI)

Cables and cable lengths

Table 50 describes cables and cable lengths.

Table 50
Cables and cable lengths

Cable Type	From	To	Maximum length (meters)
NT5K40AA or NT5K41AA or NT5K86AA	NT8D72 PRI	Line Terminating Equipment	NT5K40AA - 4 NT5K41AA - 8 NT5K86AA - 12
QCAD328A	NT8D72 PRI	NT5K35 or NT5K75 or NT6D11AE/AF DCHI	1.8
NT8D85AD	QPC414 ENET	NT8D72 PRI	1.8
NT8D75AC/AD Succession 1000M Single Group and Meridian 1 Option 61C CP PII only)	QPC775 Clock Controller	QPC775 Clock Controller	NT8D75AC - 1.2 NT8D75AC - 1.8
NT8D82AD	NT5K35 or NT5K75 or NT6D11AE/AF DCHI	I/O panel	1.8
NT8D79AD	NT8D72 PRI	QPC775 Clock Controller	1.8 m

NT5K40AA, NT5K41AA, NT5K86AA

- 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.

NT5K40AA, NT5K41AA wire list

Table 51 provides the wire list for the NT5K40AA and NT5K41AA cables.

Table 51
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 52 provides the wire list for the NT5K86AA cable.

Table 52
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

QCAD328A

The NT5K35 or NT5K75 or NT6D11AE/AF 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 53 provides the wire list for the QCAD328A cable.

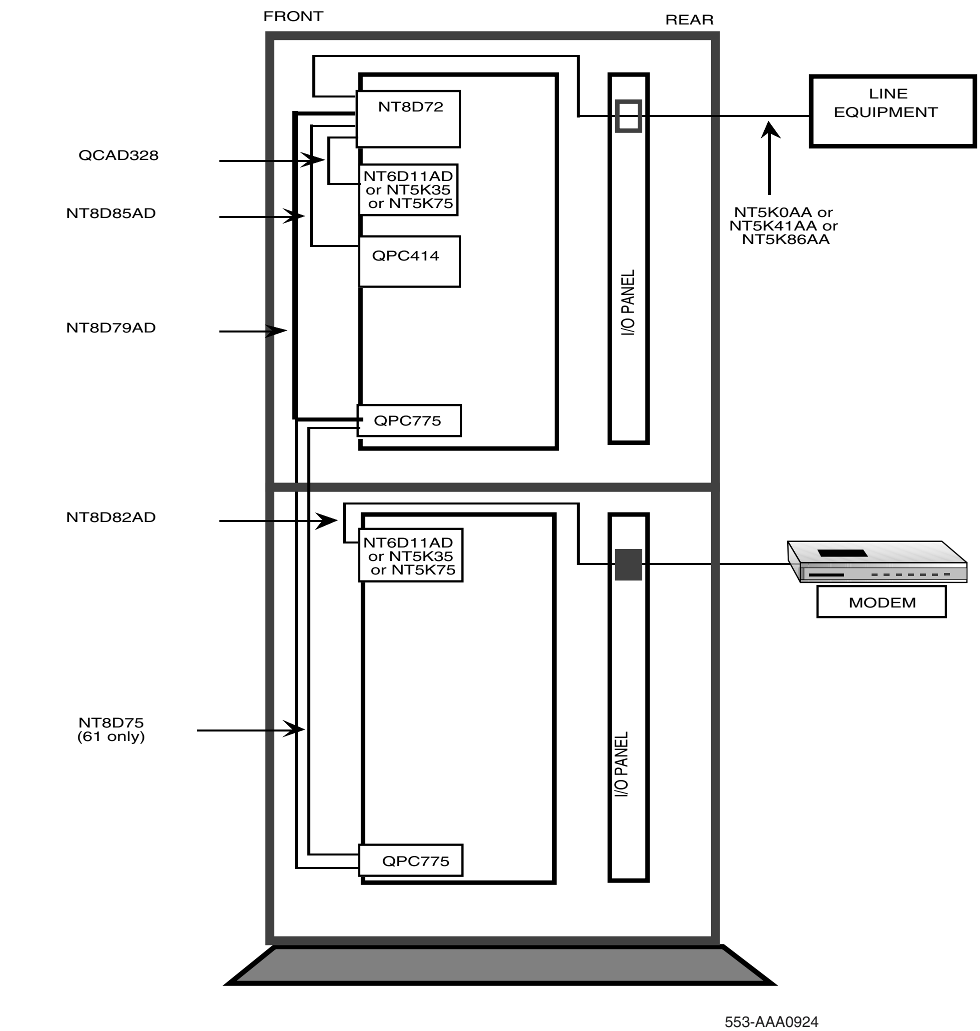
Table 53
QCAD328A wire list

From DCHI (25 Pin)	To PRI (15 Pin)
P1-2	P2-2
P1-13	P2-10
P1-20	P2-15
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 64 provides a schematic illustration of IDA cabling.

Figure 64
Cabling schematic for a generic-system



IDA status check and start-up

Contents

This section contains information on the following topics:

Description

The IDA status check and start-up chapter describes the status check that is used to verify that an IDA link is working normally, and the procedures required to take the PRI and DCHI from a disabled to an operational state; lists and defines trunk maintenance 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.

IDA status check

The status check outlined in Table 54 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 54
IDA status check (Part 1 of 2)

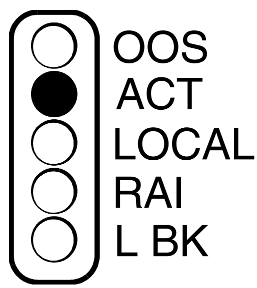
Step	Action	Response
1	Check the status LEDs on PRI cards	For normal operation, only the green ACT LED is lit. NT8D72 
2	Note whether any other LED is lit and continue with the status check	
3	Check the LED on the DCHI faceplate.	If the LED is lit, the D-channel is disabled.

Table 54
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 55 provides the steps required to take the PRI and DCHI from a disabled to an operational state.

Table 55
IDA startup - taking the PRI and DCHI from disabled to operational

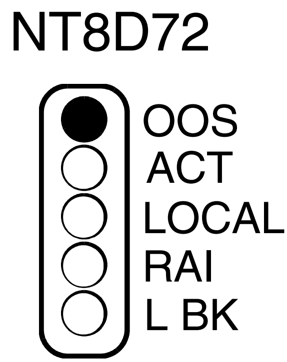
Step	Action	Response
1	Check the status of PRI cards	The PRI shown is disabled 
2	Enable PRI using: LD 75 ENL DDCS l(loop)	 ENBL
3	Enable the DCHI: LD 75 ENL DDSL n	 ENBL IDLE (DCHI enabled, but all channels are disabled)

Table 55
IDA startup - taking the PRI and DCHI from disabled to operational

Step	Action	Response
4	Enable the LAP protocols for each real and virtual channel configured on the DPNSS1 link: LD 75	
	STRT n	ENBL STARTING (the configured LAP protocols for each real and virtual channel configured on the DPNSS1 link are being enabled)
	Both ends of the link should be started within 5 minutes of each other.	ENBL ACTIVE (the configured LAP protocols for each real and virtual channel configured on the DPNSS1 link are enabled)

IDA trunk maintenance commands and messages

IDA trunk maintenance is performed using LD 75. Table 56 on page 387 is a general list of commands and status messages available in LD 75. Table 57 on page 388, Table 58 on page 389, and Table 59 on page 389 describe the various IDA trunk maintenance messages in LD 75.

Table 56
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)
DIS DDSL n	Disable DCHI, port n
DIS DDCS l	Disable PRI loop n
DISI DDCS l	Disable all channels, 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.

Table 56
IDA trunk maintenance commands available in LD 75 (Part 2 of 2)

Command	Description
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 57
IDA trunk maintenance messages available in LD 75 — DCHI

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.
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 58
IDA trunk maintenance messages available in LD 75 — PRI2 card

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

Table 59
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

Synchronization

Synchronization between switches must always be provided in the case of DPNSS1 trunks, and every digital network must be individually checked for clocking configurations.

QPC775 Clock Controller cards have to be installed in Succession 1000M Half Group, Succession 1000M Single Group, and Meridian 1 Option 61C CP PII, and machine type STE when a DPNSS1 link is installed. On Succession 1000M Multi Group and Meridian 1 Option 81C CP PII two Clock Controller cards are used for synchronization. On Succession 1000M Multi Group and Meridian 1 Option 81C CP PII systems, and on systems supporting EuroISDN applications, the QPC775E Clock Controller card is required.

In a stand-alone switch or one with only analog networking, the Clock Controller is not normally fitted. On Succession 1000M Half Group, Succession 1000M Single Group, and Meridian 1 Option 61C CP PII, card slots are dedicated for the Clock Controller.

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.

Clock controller maintenance commands

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

Table 60
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
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

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

Command	Description
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 DPNSS1 link. These alarms are described in Table 61.

Table 61
Alarms (Part 1 of 2)

Alarm	Description
TBF	Transmit Buffer Full
FAE	Frame Alignment Error
HER	High Error Rate
TSF	Transmit Signaling Failure
AIS	Alarm Indication Signal
LOI	Loss of Input

Table 61
Alarms (Part 2 of 2)

Alarm	Description
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 “Diagnostic error messages” on page 394.

To support BTNR 188, 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 list provides 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

LD 74 defines the parameters of the alarm thresholds. Table 62 on page 394 shows the alarm condition thresholds.

LD 74 – Alarm threshold values

Prompt	Response	Description
CNTL	YES (NO)	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 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 62
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 following sections list the error messages which 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 63
DTM error messages (Part 1 of 8)

DTM error code	Description	Action to take
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

Table 63
DTM error messages (Part 2 of 8)

DTM error code	Description	Action to take
DTM004	Wrong number of parameters	Check input and re-enter
DTM005	Invalid parameter	Check input and re-enter
DTM006	Invalid customer number	Check input and re-enter
DTM020	Pack is not configured	Check input and re-enter; If DTM020 is still output, check that the DTCS and DTSL are configured
DTM021	Pack number is not specified	Check input and re-enter
DTM022	Pack number is out of range	Check input and re-enter
DTM023	Pack is already enabled	
DTM024	Pack does not respond	Check that the pack 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	

Table 63
DTM error messages (Part 3 of 8)

DTM error code	Description	Action to take
DTM048	Channel is already disabled	
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 pack. 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 63
DTM error messages (Part 4 of 8)

DTM error code	Description	Action to take
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 the 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 acknowledgments 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 63
DTM error messages (Part 5 of 8)

DTM error code	Description	Action to take
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 pack
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 pack faulty
DTM322 n c	Real channel c on DTSL/DDSL n has been reset	

Table 63
DTM error messages (Part 6 of 8)

DTM error code	Description	Action to take
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 pack 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 63
DTM error messages (Part 7 of 8)

DTM error code	Description	Action to take
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 acknowledgments 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 63
DTM error messages (Part 8 of 8)

DTM error code	Description	Action to take
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 (DPNSS1) is wrong 3 — side (A/B) is wrong 4 — channel is not active	Check the channel configuration at the far end. ***Note:*** 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 (DPNSS1) 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	
	Note: 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. Table 64 defines the error messages that may be issued during a system initialization.

Table 64
INI messages

Message	Description
INI003 (fault codes 90 - 12F)	Network pack does not respond
INI009 (fault codes 90 - 12F)	The network pack does not respond
INI100	DCHI does not respond from active CPU
INI101	DCHI does not respond from standby CPU
INI1006	Unequipped pack 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. Table 65 defines link reset messages.

Table 65
Link reset messages

Message	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 clearing a call is difficult each time that a channel is enabled and 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.

Table 66 defines the error messages which may be generated for a channel reset.

Table 66
Channel reset error messages

Message	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.

Table 67 defines the error messages which may be generated for a stop count reset.

Table 67
Stop count message

Message	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.

Table 68 defines the error messages which may be generated for test messages reset:

Table 68
Test messages reset errors

Message	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 are verified that the length is consistent with the message type. A diagnostic message is generated for any discrepancy. Table 69 defines channel configuration error messages.

Table 69
Channel configuration error messages

Message	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
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 (DPNSS1) 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 (DPNSS1) is wrong 3 — side (A/B) is wrong

Clock Controller (DTC) error messages (LD 60)

The Digital Trunk Clock Controller (DTC) error messages in LD 60 indicate problems with the Clock Controllers. They are listed in Table 70.

Table 70
Clock controller status and error messages

Command	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.

PRI installation and removal

Contents

This section contains information on the following topics:

Description

The PRI installation and removal chapter describes the procedures required to install and remove the NT8D72 PRI card and the NT5D97AD DPRI card

Non DPRI

Setting up the NT8D72

NT8D72 DIP switch settings

DPNSS1 links require that the DIP switch setting on the NT8D72 be at the 75 or 120 ohm position. Figure 64 on page 427 illustrates the NT8D72 DIP switch settings. Table 77 on page 428 describes NT8D72 connections.

Figure 65
NT8D72 DIP switch settings

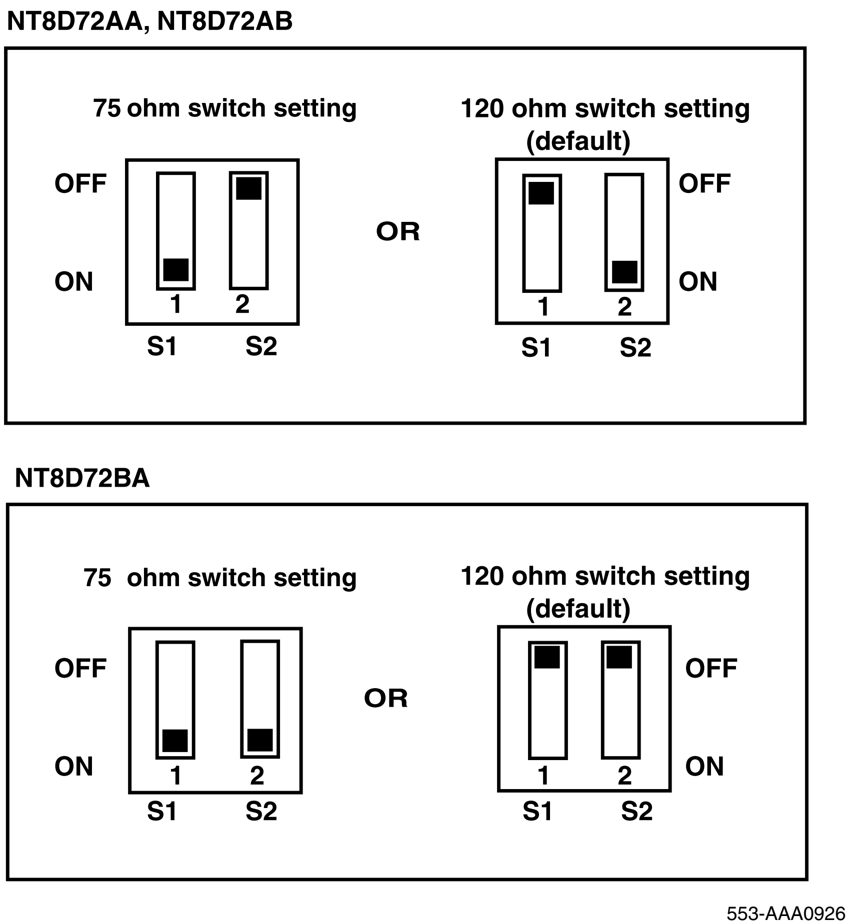


Table 71
NT8D72 PRI connections

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	Front panel connection to Line Terminating Equipment. The following pin assignments are selected via the DIP switch on the NT8D72.
J4-1	XMIT-TIP - transmit to network
J4-9	XMIT-RING - transmit to network
J4-2	Shield return
J4-3	RCVR-TIP - receive from network
J4-11	RCVR-RING
J4-4	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 circuit card requires two adjacent slots on a shelf. The positioning of the PRI card is machine-specific, and must adhere to the h the power converter card.

The slots shown in Table 78 on page 429 can be used if they are not required for other cards.

Table 72
Shelf and slot location of the NT8D72 PRI card in Meridian 1 Option 61C CP PII

System	Shelf	Slot
Half Group and Single Group Systems	NT4N41 Core Network Module	1—7

Succession 1000M Multi Group and Meridian 1 Option 81C CP PII

As many as five NT8D72 PRI circuit cards can be plugged into an empty network shelf, along with the Power converter card, depending on the shelf type.

The slots shown in Table 79 on page 429 can be used if they are not required for other cards.

Table 73
Shelf and slot location of NT8D72 PRI in Succession 1000M Multi Group and Meridian 1 Option 81C CP PII

System	Shelf	Slot
Multi-Group	4N41 Core Network Module	1-7

Installing the NT8D72 PRI

The steps outlined in Table 79 on page 430 should be followed when installing the NT8D72 PRI on large systems.

CAUTION
Loss of Data
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 must be routed around the outside of the equipment shelves.

Table 74
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; refer to “PRI circuit card locations” 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.

Table 74
Steps for installing the NT8D72 PRI card (Part 2 of 2)

Step	Action
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.
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 IDA status check and start-up and Integrated Digital Access (IDA) equipment overview chapters in this NTP for the IDA verification tests, IDA status check, and IDA startup test.

Removing the NT8D72 PRI on systems

The procedures outlined in Table 80 should be followed when removing the NT8D72 PRI.

Table 75
Steps for removing the NT8D72 PRI card

Step	Action
1	Disable Network Loop using LD 75. The command is DIS DDCS “loop number.”
2	If the circuit card is being completely removed, not replaced, remove data from memory.
3	Determine the cabinet and shelf location of the circuit cards to be removed.
4	Remove cross connections at MDF to wall-mounted cross-connect terminal.
5	Tag and disconnect cables from card. Rearrange Clock Controller card cables if required.
6	Remove PRI and Network circuit cards. ***Note:*** If the other circuit of a dual Network card is in use, do NOT remove the Network card.
7	Pack and store circuit card.

NT5D97AD Dual-port DTI2/PRI2 installation and removal

The following is information required to install the NT5D97AD Dual-port DTI2/PRI2 (DDP2) card on Succession 1000M Single Group, Meridian 1 Option 61C CP PII, Succession 1000M Multi Group, and Meridian 1 Option 81C CP PII.

For installation and removal procedures for the NTAG54 Downloadable D-channel daughterboard, refer to the section NTAG 54 DDCH installation and removal.

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 the following combinations:

Table 76
DDP2 loops configuration

		Loop 0			
		not configured	DTI2	PRI2	DDCS
Loop 1	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 434 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 the default values of certain parameters. The general purpose switches are read by the firmware, which sets the default values accordingly.

Table 77
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

The following are the trunk interface switches:

Trunk 0 switches

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

Table 78
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.

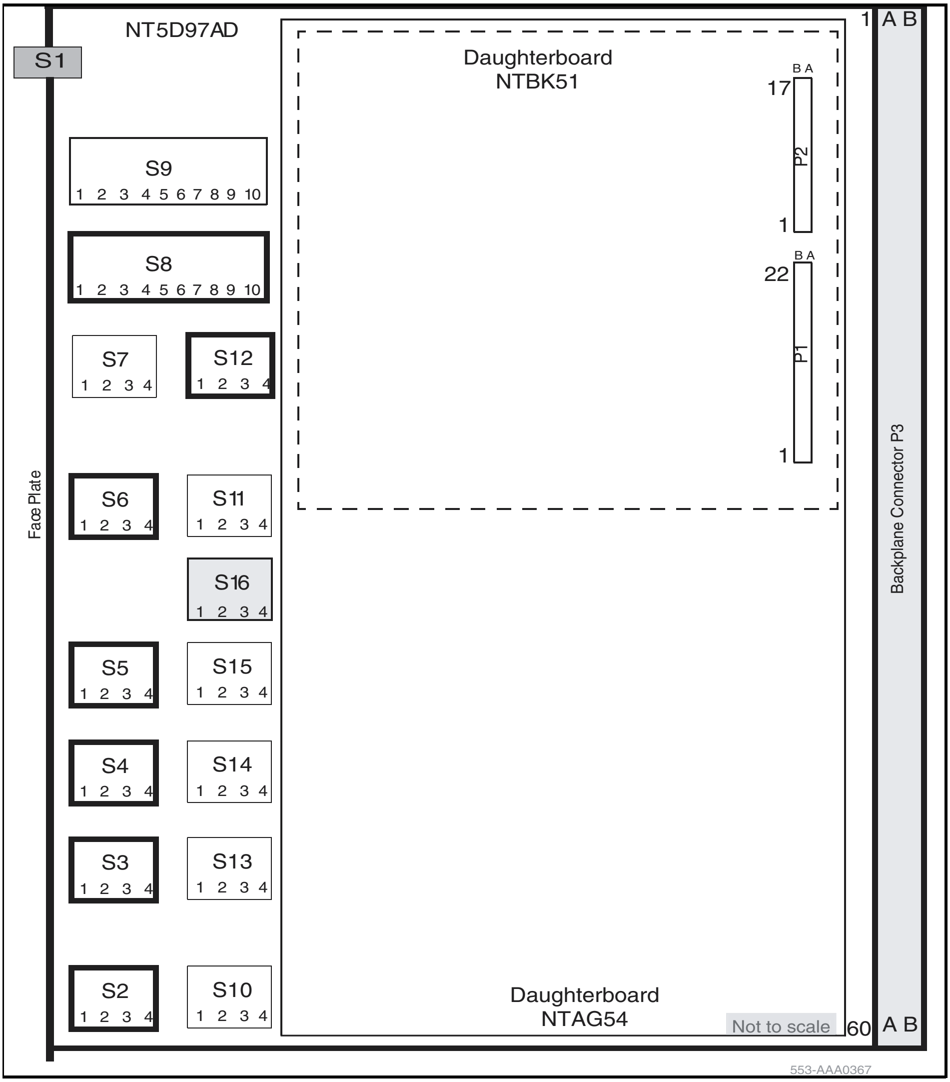
Switch **S2** selects the Transmission mode.

Table 79
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 66
Dip switches locations



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

Table 80
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 81
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 82
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 83
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 Daughter Board

Following are the normal and extended addressing modes.

Port 0, normal addressing mode

Switch S8 selects Port 0 in the NTAG54AA DCH daughterboard.

Table 84
DCH switchs_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 = N/A

Port 1, normal addressing mode

Switch S9 selects Port 1 in the NTAG54AA DCH daughterboard. Refer to Table 89 on page 439.

Table 85
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 = N/A

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 86
DCH switchs_NTAG54AA extended mode

Switch	Function
S8_1_8	D-channel daughterboard 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 daughterboard. Refer to Table 90 on page 440.

Table 87
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
1	OFF	ON	ON	ON	ON	ON	ON	ON
2	ON	OFF	ON	ON	ON	ON	ON	ON
3	OFF	OFF	ON	ON	ON	ON	ON	ON
4	ON	ON	OFF	ON	ON	ON	ON	ON
5	OFF	ON	OFF	ON	ON	ON	ON	ON
6	ON	OFF	OFF	ON	ON	ON	ON	ON
7	OFF	OFF	OFF	ON	ON	ON	ON	ON

Table 87
NTAG54AA_DCH card address extended mode (Part 2 of 3)

DNUM	Switch Setting S9 or S8							
	1	2	3	4	5	6	7	8
8	ON	ON	ON	OFF	ON	ON	ON	ON
9	OFF	ON	ON	OFF	ON	ON	ON	ON
10	ON	OFF	ON	OFF	ON	ON	ON	ON
11	OFF	OFF	ON	OFF	ON	ON	ON	ON
12	ON	ON	OFF	OFF	ON	ON	ON	ON
13	OFF	ON	OFF	OFF	ON	ON	ON	ON
14	ON	OFF	OFF	OFF	ON	ON	ON	ON
15	OFF	OFF	OFF	OFF	ON	ON	ON	ON
16	ON	ON	ON	ON	OFF	ON	ON	ON
17	OFF	ON	ON	ON	OFF	ON	ON	ON
18	ON	OFF	ON	ON	OFF	ON	ON	ON
19	OFF	OFF	ON	ON	OFF	ON	ON	ON
20	ON	ON	OFF	ON	OFF	ON	ON	ON
21	OFF	ON	OFF	ON	OFF	ON	ON	ON
22	ON	OFF	OFF	ON	OFF	ON	ON	ON
23	OFF	OFF	OFF	ON	OFF	ON	ON	ON
24	ON	ON	ON	OFF	OFF	ON	ON	ON
25	OFF	ON	ON	OFF	OFF	ON	ON	ON
26	ON	OFF	ON	OFF	OFF	ON	ON	ON
27	OFF	OFF	ON	OFF	OFF	ON	ON	ON
28	ON	ON	OFF	OFF	OFF	ON	ON	ON

Table 87
NTAG54AA_DCH card address extended mode (Part 3 of 3)

DNUM	Switch Setting S9 or S8							
	1	2	3	4	5	6	7	8
29	OFF	ON	OFF	OFF	OFF	ON	ON	ON
30	ON	OFF	OFF	OFF	OFF	ON	ON	ON
31	OFF	OFF	OFF	OFF	OFF	ON	ON	ON
32-63	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 88
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 93 on page 443.

DPNSS External card

Table 89
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

Task summary list

The following is a summary of the tasks in this section:

1 Install the NT5D97AD on Succession 1000M Single Group, Meridian 1 Option 61C CP PII, Succession 1000M Multi Group, and Meridian 1 Option 81C CP PII systems.

Use Procedure 5 to install the NT5D97AD on Succession 1000M Single Group, Meridian 1 Option 61C CP PII, Succession 1000M Multi Group, and Meridian 1 Option 81C CP PII systems.

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 5
Install the NT5D97AD on Large Systems

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 434.

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.

Remove the NT5D97AD DDP2

Use Procedure 6 to remove the NT5D97AD from Large Systems..

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 6
Remove the NT5D97AD from Large Systems

1 Determine the cabinet and shelf location of the NT5D97AD card to be removed.

2 Disable Network Loop using Overlay 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 the 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.

Meridian 1, Succession 1000, Succession 1000M

DPNSSI

Publication number: 553-3001-372
Document release: Standard 1.00
Date: October 2003
Produced in Canada

NORTEL NETWORKS™