

# **Specification Number DPNSS [189] — Interworking between DPNSS 1 and other Signalling Systems**

ICS 33.040.30

# National foreword

This Published Document has been prepared by Technical Committee TCT/50. It details the additional requirements including procedural changes to those given in DPNSS[188] that are necessary for DPNSS 1 to interwork with: PSTN, DASS 2, Decadic Private Circuit and SSMF5. Interworking with ETSI ISDN signalling systems is specified in DPNSS[189-I]. No changes are necessary to the non-DPNSS 1 signalling systems.

This Published Document has been produced with place markers for some sections, not yet available, which will be issued as amendments to this Published Document when they become available.

**This Published Document is not to be regarded as a British Standard.**

This Published Document, having been prepared under the direction of the DISC Board Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 6 May 2002

## Summary of pages

This document comprises a front cover, an inside front cover, the NICC title page, the NICC disclaimer page, sections 1 to 41 (consisting of 313 pages) and a back cover.

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## Amendments issued since publication

| Amd. No. | Date | Comments |
|----------|------|----------|
|          |      |          |
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ISBN 0 580 39494 8

# **SPECIFICATION NUMBER DPNSS[189]**

## **INTERWORKING BETWEEN DPNSS 1 AND OTHER SIGNALLING SYSTEMS**

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INTERWORKING BETWEEN DPNSS 1 AND OTHER SIGNALLING SYSTEMS

SECTION 1 - FOREWORD AND TABLE OF CONTENTS

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HISTORY

- Issue 1 - July 1984
- Issue 2 - May 1985
- Issue 3 - March 1988
  
- Issue 4 - December 2001 - Specification renamed as DPNSS[189]  
- Unused references removed

## 1 FOREWORD

This specification details the additional requirements including procedural changes to those given in DPNSS[188] that are necessary for DPNSS 1 to interwork with: PSTN, DASS 2, Decadic Private Circuit and SSMF5. Interworking with ETSI ISDN signalling systems is specified in DPNSS[189-I]. No changes are necessary to the non-DPNSS 1 signalling systems.

**NOTE: For a given DPNSS 1 Service or Supplementary Service there is an exact correspondence between the SECTION numbering of this specification and DPNSS[188], except for SECTION 27 which is NOT APPLICABLE and SECTIONS 42-49 which are NOT AVAILABLE.**

Interworking with other signalling systems involves both the Gateway PBX, (which converts between DPNSS 1 and the other signalling system), and the DPNSS 1 PBX which is making or receiving the call. In the case of interworking with SSMF5 the action of the Transit PBXs is also affected.

A PBX that supports DPNSS 1 and acts as a Gateway to another signalling system shall, as a minimum, conform to the Gateway requirements for the Simple Telephony Call or the Circuit Switched Data Call as specified in SECTIONS 6 or 7 of this specification for that signalling system.

In addition if the PBX supports a Supplementary Service from SECTION 8 onwards in DPNSS[188] it must conform to the requirements of the corresponding section of this specification for each of the signalling systems supported.

In general the other signalling systems covered in this specification do not provide the Supplementary Services that are available in DPNSS 1. Where a Supplementary Service is not provided by the other signalling system then interworking with DPNSS 1 normally defaults to simple call. This is detailed in SECTION 8 onwards of this specification.

However, SSMF5 and DASS 2 can provide some of the DPNSS 1 Supplementary Services and with these two signalling systems a higher degree of interworking may optionally be provided. The additional requirements for "full" Supplementary Service interworking are included in those sections of this specification where such interworking is possible.

TABLES 1 and 2 are provided as an aid to specify the interworking requirements/capabilities of a PBX. The degree of interworking required/provided by a PBX for each Supplementary Service or signalling system is shown in TABLE 2, as follows:

- 1 Indicates interworking but not with an equivalent Supplementary Service in the other signalling system.

- 2 Indicates interworking between the DPNSS 1 Supplementary Service and an equivalent in the other signalling system.

If either the DPNSS 1 Supplementary Service or the other signalling system is not supported then the associated boxes in TABLE 2 should be left blank. Therefore if a Gateway PBX supports a DPNSS 1 Supplementary Service it must support interworking to at least "degree 1" for each signalling system that is shown in TABLE 1 as being supported by that PBX.

If a non-Gateway PBX supports a DPNSS 1 Supplementary Service it must support interworking to at least "degree 1" for each signalling system to which the PBX is required to originate or receive calls, as shown in TABLE 1.

The requirements of SECTIONS 1 to 5 of this specification must be met by any Gateway or non-Gateway PBX that interworks in any way with another signalling system.

## 2 COMPLIANCE TABLES FOR DPNSS 1 INTERWORKING WITH OTHER SIGNALLING SYSTEMS

TABLE 1

| PBX FUNCTION                                        |         |
|-----------------------------------------------------|---------|
| GATEWAY WITH THE PSTN                               |         |
| GATEWAY WITH DASS 2                                 |         |
| GATEWAY WITH DECADIC PRIVATE CIRCUIT                |         |
| GATEWAY WITH SSMF5                                  |         |
| NON GATEWAY ABLE TO MAKE AND RECEIVE CALLS TO: PSTN |         |
|                                                     | DASS 2  |
|                                                     | DECADIC |
|                                                     | SSMF5   |

**TABLE 2**

| DPNSS 1 SERVICES SUPPORTED |                             | OTHER SIGNALLING SYSTEM |        |         |       |
|----------------------------|-----------------------------|-------------------------|--------|---------|-------|
| SECTION                    | TITLE                       | PSTN                    | DASS 2 | DECADIC | SSMF5 |
| 6                          | SIMPLE TELEPHONY CALL       |                         |        |         |       |
| 7                          | CIRCUIT SWITCHED DATA CALL  |                         |        |         |       |
| 8                          | SWAP                        |                         |        |         |       |
| 9                          | CALL BACK WHEN FREE         |                         |        |         |       |
| 10                         | EXECUTIVE INTRUSION         |                         |        |         |       |
| 11                         | DIVERSION                   |                         |        |         |       |
| 12                         | HOLD                        |                         |        |         |       |
| 13                         | THREE PARTY                 |                         |        |         |       |
| 14                         | CALL OFFER                  |                         |        |         |       |
| 15                         | NON-SPECIFIED INFORMATION   |                         |        |         |       |
| 16                         | SERVICE INDEPENDENT STRINGS |                         |        |         |       |
| 17                         | CALL WAITING                |                         |        |         |       |
| 18                         | BEARER SERVICE SELECTION    |                         |        |         |       |
| 19                         | ROUTE OPTIMISATION          |                         |        |         |       |
| 20                         | EXTENSION STATUS            |                         |        |         |       |
| 21                         | CONTROLLED DIVERSION        |                         |        |         |       |
| 22                         | REDIRECTION                 |                         |        |         |       |
| 23                         | SERIES CALL                 |                         |        |         |       |
| 24                         | THREE PARTY TAKEOVER        |                         |        |         |       |
| 25                         | NIGHT SERVICE               |                         |        |         |       |
| 26                         | CENTRALISED OPERATOR        | See NOTE                |        |         |       |
| 27                         | TRAFFIC CHANNEL MNTCE       | Not Applicable          |        |         |       |
| 28                         | REMOTE ALARM REPORTING      |                         |        |         |       |
| 29                         | ADD-ON CONFERENCE           |                         |        |         |       |

**TABLE 2 - (Continued)**

| DPNSS 1 SERVICES SUPPORTED |                                       | OTHER SIGNALLING SYSTEM |        |         |       |
|----------------------------|---------------------------------------|-------------------------|--------|---------|-------|
| SECTION                    | TITLE                                 | PSTN                    | DASS 2 | DECADIC | SSMF5 |
| 30                         | TIME SYNCHRONISATION                  |                         |        |         |       |
| 31                         | CALL BACK WHEN NEXT USED              |                         |        |         |       |
| 32                         | DO NOT DISTURB                        |                         |        |         |       |
| 33                         | REMOTE REGISTRATION OF DIVERSION      |                         |        |         |       |
| 34                         | REMOTE REGISTRATION OF DO NOT DISTURB |                         |        |         |       |
| 35                         | PRIORITY BREAKDOWN                    |                         |        |         |       |
| 36                         | CALL BACK MESSAGING                   |                         |        |         |       |
| 37                         | LOOP AVOIDANCE                        |                         |        |         |       |
| 38                         | FORCED RELEASE                        |                         |        |         |       |
| 39                         | TEXT MESSAGE                          |                         |        |         |       |
| 40                         | CHARGE REPORTING                      |                         |        |         |       |
| 41                         | NETWORK ADDRESS EXTENSION             |                         |        |         |       |
| 42                         | CALL PARK                             | Not Available           |        |         |       |
| 43                         | CALL DISTRIBUTION                     | Not Available           |        |         |       |
| 44                         | ROUTE CAPACITY CONTROL                | Not Available           |        |         |       |
| 45                         | WAIT ON BUSY                          | Not Available           |        |         |       |
| 46                         | CALL PICK-UP                          | Not Available           |        |         |       |
| 47                         | TRAVELLING CLASS OF SERVICE           | Not Available           |        |         |       |
| 48                         | NUMBER PRESENTATION RESTRICTION       | Not Available           |        |         |       |
| 49                         | NON SPECIFIED INFORMATION MESSAGE     | Not Available           |        |         |       |

**NOTE: In the case of the Centralised Operator Supplementary Service the Compliance for each of the constituent Supplementary Services should be consulted/entered.**

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|            |                                                                 |                   |
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| SECTION 27 | SUPPLEMENTARY SERVICE: TRAFFIC CHANNEL<br>MAINTENANCE           | NOT<br>APPLICABLE |
| SECTION 28 | SUPPLEMENTARY SERVICE: REMOTE ALARM<br>REPORTING                | Issue 2           |
| SECTION 29 | SUPPLEMENTARY SERVICE: ADD-ON CONFERENCE                        | Issue 2           |
| SECTION 30 | SUPPLEMENTARY SERVICE: TIME SYNCHRONISATION                     | Issue 2           |
| SECTION 31 | SUPPLEMENTARY SERVICE: CALL BACK WHEN NEXT<br>USED              | Issue 2           |
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## 4 HISTORY OF DPNSS[189]

**NOTE: From Issue 1 to Issue 3 this specification was known as BTNR 189.**

- |                         |                                                                                                                                                                                                                                   |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Issue 1 - July 1984     | - Interworking with the PSTN and 10pps was previously shown in BTNR 188 Issue 1                                                                                                                                                   |
| Issue 2 - May 1985      | - SECTIONS 1-6 made Issue 2<br>- SECTIONS 7-26 Issued                                                                                                                                                                             |
| Issue 3 - March 1988    | - SECTIONS 1-6 made Issue 3<br>- SECTIONS 7-26 made Issue 2<br>- SECTIONS 27-41 Issued<br>- SECTION 16 Issued                                                                                                                     |
| Issue 4 - December 2001 | - Specification renamed as DPNSS[189]<br>- CLC-DASS2 renamed CLC-ISDN throughout<br>- Specific changes made to the following sections:<br>SECTION 1<br>SECTION 2<br>SECTION 3<br>SECTION 4<br>SECTION 5<br>SECTION 6<br>SECTION 7 |

## 5 REFERENCES

DPNSS[188] Global Issue 7  
DPNSS[189-I] Global Issue 2  
BTNR 190 Issue 2

INTERWORKING BETWEEN DPNSS 1 AND OTHER SIGNALLING SYSTEMS

SECTION 2 - GENERAL

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HISTORY

- Issue 1 - July 1984
- Issue 2 - May 1985
- Issue 3 - March 1988
- Issue 4 - December 2001 - Specification renamed as DPNSS[189]  
- Glossary referred to DPNSS[188]

REFERENCES

- DPNSS[188] Global Issue 7
- DPNSS[189-I] Global Issue 2

## 1 GENERAL

**1.1** When DPNSS 1 interworks with other signalling systems there are two aspects to consider:

- i. The signal mapping and conversion required at Gateway PBXs
- and ii. The effect interworking with other signalling systems has on the procedures performed by non-Gateway PBXs within the network.

In general the above aspects are detailed in each Service section. However when Calling Line Categories (CLCs) are received at non-Gateway PBXs the following applies:

- Receipt of a message containing CLC-PSTN or CLC-ISDN shall be used by the PBX to determine whether any special action is required on the call eg bar the call, connect caller to an operator etc. If no special action is required the PBX will process the message as if it contained CLC-ORD.
- Action on receipt of CLC-PSTN or CLC-ISDN is a matter for agreement between the purchaser and the supplier but care should be taken that a connection which does not comply with current regulations of the country concerned is not allowed.

**NOTE: Reading the contents of a NAM at Transit PBXs is not a mandatory feature of DPNSS 1 but may be used as a method of restricting access on the basis of CLC.**

**1.2** Any tones and announcements that are applied by a private network to a public network must comply with the current regulations of the country concerned. This will be of particular importance if incoming public network calls encounter either:

- a DPNSS 1 Supplementary Service, eg Diversion;
- or - a Gateway PBX which automatically invokes a DPNSS 1 Supplementary Service, eg Call Offer.

**1.3** The signalling requirements for PBXs in a Network which supports interworking between Digital Private Network Signalling System No 1 (DPNSS 1), Public Access and other Private Network signalling systems are detailed in this specification and in DPNSS[189-I].

**1.4** The Physical Characteristics (Layer 1) and Link Access Protocol (Layer 2) requirements of DPNSS 1 are unchanged for the purpose of interworking and are detailed in DPNSS[188].

**1.5** The Layer 3 requirements of DPNSS 1 when interworking with other signalling systems are shown in this specification.

**1.6** This specification is structured such that SECTIONS 3, 4 and 5 specify the essential core of the interworking requirements including common procedures.

**1.7** Each section, from SECTION 6 onwards, deals with interworking for a DPNSS 1 service. Interworking with specific signalling systems is shown in separate Paragraphs within these sections.

**1.8** SECTION 6 details a Simple Telephony call; if interworking with another signalling system is provided then the Simple Telephony Call is a minimum requirement.

## **2 GLOSSARY OF TERMS**

The glossary for DPNSS 1 appears in SECTION 1 of DPNSS[188].



INTERWORKING BETWEEN DPNSS 1 AND OTHER SIGNALLING SYSTEMS

SECTION 3 - GATEWAY PBX REQUIREMENTS

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HISTORY

- Issue 1 - July 1984
- Issue 2 - May 1985
- Issue 3 - March 1988
- Issue 4 - December 2001
  - Specification renamed as DPNSS[189]
  - Reference to DASS 2 Subset removed
  - References to specific PSTN, Decadic and SSMF5 specifications removed

REFERENCES

- DPNSS[188] Global Issue 7
- DPNSS[189-I] Global Issue 2
- BTNR 190 Issue 2

## 1 GENERAL

**1.1** This specification details the interworking requirements for providing Simple Telephony Calls and, where appropriate, Supplementary Services between DPNSS 1 routes and routes supported by signalling systems of the types described in this section. Interworking between DPNSS 1 and ETSI ISDN signalling systems is described in a separate specification, DPNSS[189-I].

**1.2** The interworking point between the two signalling systems is, for the purpose of this specification, termed the Gateway PBX.

**1.3** For a Gateway PBX to provide interworking between DPNSS 1 and another signalling system, it must be capable of sending and receiving the necessary signals/messages of both signalling systems to establish a call.

**1.4** Additionally:

A Gateway PBX to another signalling system must be capable of responding to an EEM containing TRFD with an EEM containing the CLC of the signalling system (eg PSTN, DEC) and optionally the CLI.

If a Gateway PBX to another signalling system receives an EEM containing a CLC (eg a Gateway to the PSTN receives an EEM containing CLC-PSTN) it should take care that it does not allow connection of the call if the connection does not comply with the current regulatory rules of the country concerned.

**1.5** The signalling procedures of the other signalling systems are unaffected by interworking with DPNSS 1.

The procedures of DPNSS 1 itself are modified when interworking with some signalling systems.

These changes are detailed in SECTION 6 onwards of this specification.

**1.6** Interworking between DPNSS 1 and signalling systems other than those specified in this specification may be possible. Their exclusion from this specification and from DPNSS[189-I] does not imply that an interworking facility cannot be achieved.

## 2 REQUIREMENTS FOR DPNSS 1

The Layer 2 (Link Access Protocol) requirements for DPNSS 1 are detailed in DPNSS[188] SECTION 3.

Changes to the Layer 3 requirements from the normal DPNSS 1 signalling protocols are shown in each individual Section of this specification.

### **3 REQUIREMENTS FOR THE OTHER SIGNALLING SYSTEMS**

The Layer 2 and Layer 3 requirements for DASS 2 are shown in BTNR 190.

DASS 2 supports its own set of Supplementary Services. Where possible these Supplementary Services have been mapped onto DPNSS 1 as described in later Sections of this specification. However, there are DASS 2 Supplementary Services which have no DPNSS 1 equivalent. Also the possibility exists that a PBX which supports a DASS 2 Supplementary Service may not support the equivalent DPNSS 1 Supplementary Service. In cases where the Gateway PBX receives DASS 2 signalling and cannot pass any corresponding information on, via DPNSS 1, the Gateway PBX must handle the DASS 2 signalling in accordance with the relevant section of BTNR 190 by treating the DPNSS 1 channel as a DASS 2 destination which cannot take part in the DASS 2 Supplementary Service.

PSTN, Private Decadic and SSMF5 signalling systems are treated generically in this specification.

The requirements for the electrical conditions and signalling protocols for a particular interface shall be in accordance with the relevant specification.



## SECTION 4 - MESSAGE CONTENTS

1 GENERAL ..... Page 2

Issue 1 - July 1984  
Issue 2 - May 1985  
Issue 3 - March 1988

Issue 4 - December 2001 - Specification renamed as DPNSS[189]  
- Annex 1 and 2 removed to DPNSS[188]

## DPNSS[188] Global Issue 7

## **1 GENERAL**

All requirements relating to the coding of DPNSS 1 Messages and Message Contents are specified in DPNSS[188], SECTION 4.

INTERWORKING BETWEEN DPNSS 1 AND OTHER SIGNALLING SYSTEMS

SECTION 5 - GENERAL SIGNALLING PROCEDURES

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HISTORY

- Issue 1 - July 1984
- Issue 2 - May 1985
- Issue 3 - March 1988
  
- Issue 4 - December 2001 - Specification renamed as DPNSS[189]
  - Subsections restructured
  - Unused references removed

REFERENCES

- DPNSS[188] Global Issue 7
- DPNSS[189-I] Global Issue 2
- BTNR 190 Issue 2

## 1 GENERAL

**1.1** The level 3 signalling procedures detailed in this specification are considered in two parts:

- i) General signalling procedures that are common to all services
- ii) The signalling procedures for each individual service

The requirements of i) are given in this Section of this specification; the signalling procedures for each service ii) are given in separate Sections of this specification, commencing at SECTION 6.

Layer 3 signalling procedures for interworking between DPNSS 1 and other signalling systems covered by this specification are defined by the details given in SECTION 6 onwards of this specification, in conjunction with the general signalling procedures of the other signalling systems.

**NOTE: The interworking between DPNSS 1 and ETSI ISDN signalling systems is described in a separate specification, DPNSS[189-I].**

**1.2** Subsection 2 describes the conventions used for the specification of Layer 3 procedures used in SECTION 6 onwards of this specification.

**1.3** Subsection 3 describes the general signalling procedures applicable for interworking with other signalling systems.

## 2 SPECIFICATION FORMAT

### 2.1 SERVICE SECTION FORMAT

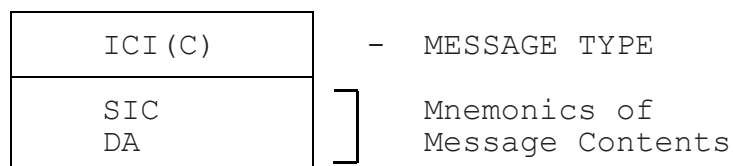
The Service Sections (SECTION 6 onwards) are written to a standard format as follows:

- a separate Subsection is allocated to each signalling system for which interworking with DPNSS 1 is described;
- each Subsection begins with a definition of the interworking to be described;
- an Outline of Operation indicates a breakdown of the description into separate aspects of the interworking;
- each aspect of interworking is described by means of explanatory text supported by Message Sequence Diagrams (MSDs).

### 2.2 MSD SYMBOLS

The Message Sequence Diagrams conform to a standard layout and use the following symbols and conventions:

#### 2.2.1 DPNSS 1 and DASS 2 Messages



Coding details for and the meaning of the mnemonics relating to DPNSS 1 Messages are given in SECTION 4 of DPNSS[188].

Coding details for and the meaning of the mnemonics relating to DASS 2 messages are given in BTNR 190.

#### 2.2.2 PSTN, Decadic and SSMF5 Signals



A signal used on an Incoming or Outgoing Junction to or from a Gateway PBX.  
The name of the actual signal used is shown above the signal arrow.

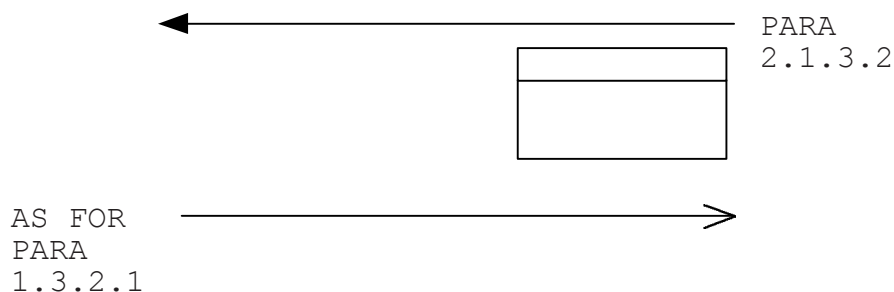
For details of the signals see the relevant signalling specification.

---

### 2.2.3 Signalling Flow



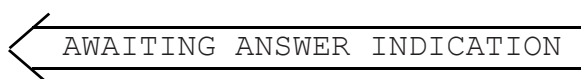
### 2.2.4 Reference to Text for Explanation of PBX Action and Possible Alternative Sequences



References are to paragraphs within the same Section as the MSD unless specifically indicated by a prefix, eg:

|               |    |               |
|---------------|----|---------------|
| AS FOR        |    | AS FOR        |
| SECTION 6     | or | DPNSS[188]    |
| PARA. 2.1.1.2 |    | SECTION 6     |
|               |    | PARA. 2.3.2.1 |

### 2.2.5 An Audible Supervisory Indication



### 2.2.6 Connection State of a Traffic Channel



## **2.3 TEXT AND MSD CONVENTIONS**

### **2.3.1 Terminology**

The terminology used throughout this specification is based on the standards set in DPNSS[188], DPNSS[189] and DPNSS[189-I] for text relating to DPNSS 1 signalling; text relating to other signalling systems adopts the style and nomenclature of the relevant signalling systems.

### **2.3.2 ISRM Convention**

In the text and MSDs the use of the term "ISRM" indicates that either a single ISRM(C), a single ISRM(I) or an ISRM(I) followed by one or more SSRMs [the last of which may be an SSRM(C)] may be used to convey the contents of the Selection Block.

The use of the term "ISRM(C)" represents either a single ISRM(C) or an ISRM(I) followed by one or more SSRMs, the last of which is an SSRM(C).

The use of the term "ISRM(I)" represents either a single ISRM(I) or an ISRM(I) followed by one or more SSRM(I)s.

The use of the term "SSRM(I)" represents either a single SSRM(I) or a sequence of SSRM(I)s.

The use of the term "SSRM(C)" represents either a single SSRM(C) or a sequence of one or more SSRM(I)s followed by an SSRM(C).

## **2.4 SDL DIAGRAMS**

The SDL conventions used for the description of DPNSS 1 are detailed in DPNSS[188] SECTION 5. The SDL given in this specification forms a part of the DPNSS 1 Service Process.

SDL diagrams covering DPNSS 1 interworking for a Simple Telephony Call are given in SECTION 6 of this specification.

SDL diagrams for Supplementary Service interworking are not shown.

### **3 PBX FUNCTIONS AND GENERAL SIGNALLING PROCEDURES**

#### **3.1 DPNSS 1**

**3.1.1** The handling of messages and message contents, and the control of simple circuit switched calls, on the DPNSS 1 side of a Gateway PBX shall be as defined in DPNSS[188] and DPNSS[189-I], and shall be in addition to those Interworking Procedures that are supported by the Gateway PBX.

**3.1.2** Any exceptions to signalling procedures occurring on interworking for particular Services are detailed in the MSDs and explanatory text which specify those Services in this specification.

**3.1.3** Where a Supplementary Service is not supported by a Gateway PBX the DPNSS 1 Channel Process will handle the Supplementary Information Strings as unrecognised (see DPNSS[188] SECTION 5). Subject to the String suffix, the call will either be rejected or the unrecognised String will be discarded and the call presented to the Service Process as an interworking Simple Telephony Call.

**3.1.4** During the signalling for any Service an Originating or Terminating PBX may receive a message containing CLC-PSTN, CLC-DEC, CLC-ISDN, or CLC-MF5. In this case it must use that information to determine whether any special action is required on the call eg bar the call, connect the caller to an Operator etc. If no special action is required the PBX will process the message as if it contained the Calling Line Category - Ordinary (CLC-ORD).

In the case of CLC-PSTN or CLC-ISDN the action to be taken may be influenced by the Government regulations of the Country concerned.

#### **3.2 DASS 2**

The handling of messages and message contents, and the control of simple circuit switched calls, on the DASS 2 side of a Gateway PBX shall be as defined in the DASS 2 specification.

The signalling procedures for DASS 2 are detailed in BTNR 190 Issue 2.

#### **3.3 PSTN**

PSTN interworking is described in this specification in terms of interworking with a loop disconnect signalling system that connects a PBX to the public network. The interworking principles are intended, however, to be applicable when interworking with any public access signalling system that is similar in nature.

The handling of signalling, and the control of simple circuit switched calls, on the PSTN side of a Gateway PBX shall be as defined in the appropriate PSTN signalling specification.

### **3.4 Decadic**

Decadic interworking is described in this specification in terms of interworking with a 10pps signalling system that connects a PBX to another PBX over a private circuit. The interworking principles are intended, however, to be applicable when interworking with any inter-PBX signalling system that is similar in nature.

The handling of signalling, and the control of simple circuit switched calls, on the Decadic side of a Gateway PBX shall be as defined in the appropriate Decadic signalling specification.

### **3.5 SSMF5**

SSMF5 interworking is described in this specification in terms of interworking with a compelled inter-register signalling system that connects a PBX to another PBX over a private circuit. The interworking principles are intended, however, to be applicable when interworking with any inter-PBX signalling system that is similar in nature.

The handling of signalling, and the control of simple circuit switched calls, on the SSMF5 side of a Gateway PBX shall be as defined in the appropriate SSMF5 signalling specification.



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## INTERWORKING BETWEEN DPNSS 1 AND OTHER SIGNALLING SYSTEMS

### SECTION 6 - SIMPLE TELEPHONY CALL

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#### HISTORY

Issue 1 - July 1984  
Issue 2 - May 1985  
Issue 3 - March 1988

Issue 4 - December 2001 - Specification renamed as DPNSS[189]  
- Unused references removed  
- Reference to use of ISDN interworking strings added

#### REFERENCES

DPNSS[188] Global Issue 7  
DPNSS[189-I] Global Issue 2  
BTNR 190 Issue 2

## **1 GENERAL**

**1.1** This Section details the signalling requirements for PBXs which support interworking between DPNSS 1 and other signalling systems for Simple Telephony Calls.

**1.2** Subsection 2 details Simple Telephony calls when DPNSS 1 interworks with other signalling systems.

**1.3** The description is given in the form of Message Sequence Diagrams (MSDs) followed by explanatory text.

**1.4** Alternative action (eg for unsuccessful calls) not shown in MSDs is included in the text. The text is referred to in MSDs at appropriate points in the sequences.

**1.5** Subsection 3 details the service in SDL format.

**1.6** Coding of the contents of messages is given in SECTION 4 of DPNSS[188].

## **2 INTERWORKING WITH OTHER SIGNALLING SYSTEMS**

### **2.1 INTERWORKING WITH THE PSTN**

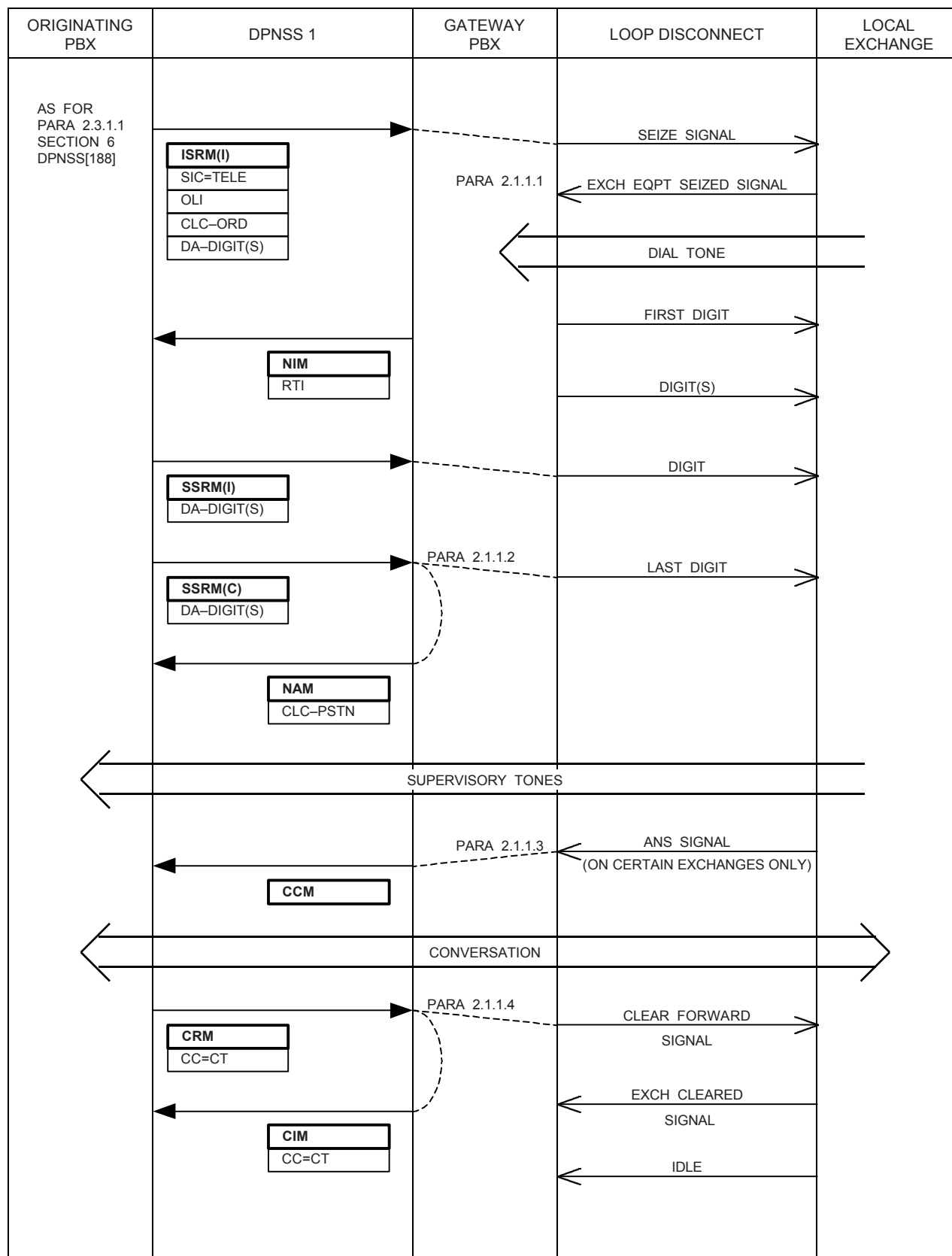
This Paragraph deals only with a Simple (Automatic) Telephony call between an extension within a DPNSS 1 Private Network and a telephony terminal within the PSTN.

#### **OUTLINE OF OPERATION**

The signalling procedures are divided into three parts:

- 2.1.1 A Simple Call from a DPNSS 1 extension to the PSTN
- 2.1.2 A Simple Call from the PSTN (DDI) to a DPNSS 1 extension.
- 2.1.3 A Simple Call from the PSTN (Non-DDI) to a DPNSS 1 extension.

## 2.1.1 SIMPLE CALL FROM A DPNSS 1 EXTENSION TO THE PSTN



---

**2.1.1.1** When the Destination Address within an ISRM(C) or ISRM(I) plus one or more SSRMs identifies an outgoing PSTN route, the Gateway PBX selects a free PSTN line and sends a Seizing Signal to the Local Exchange.

If CLC-ORD (PSTN barred) is contained in the ISRM the call should not be allowed and a CRM containing the Clearing Cause: AB shall be sent to the Originating PBX.

The Local Exchange will return an 'Exchange Equipment Seized' Signal followed by dial tone. The dial tone may be blocked at the Gateway PBX. Alternatively, the transmission path may be connected so that the caller may hear the tone. This is dependent on the design of the Gateway PBX.

The Gateway PBX will send the PSTN Destination Address to the PSTN digit by digit in accordance with the appropriate specification.

A NIM, containing RTI indicating PSTN encountered, should be sent as soon as possible to indicate that the call is being made to the PSTN.

If the PSTN route is an alternative route the RTI string should also indicate Alternative Route.

The transmission path should be connected through as soon as possible thus enabling the caller to hear any supervisory tones returned from the PSTN.

In the event of all PSTN lines from the Gateway PBX being busy and no alternative route being available or acceptable the call will be cleared by sending a CRM containing the Clearing Cause: CON. A CIM should be expected in response.

**2.1.1.2** Once end of selection has been determined, by receipt of either an ISRM(C) or an SSRM(C) or a Timeout, whichever is the sooner, a NAM will be returned. The NAM shall be sent without unnecessary delay in order to prevent any timeouts that are based on end of selection from expiring elsewhere in the private network (eg at the originating PBX) or outside the private network (eg in the ISDN). This NAM should contain the CLC-PSTN and optionally the Trunk Identity (TID) indicating the Trunk Number.

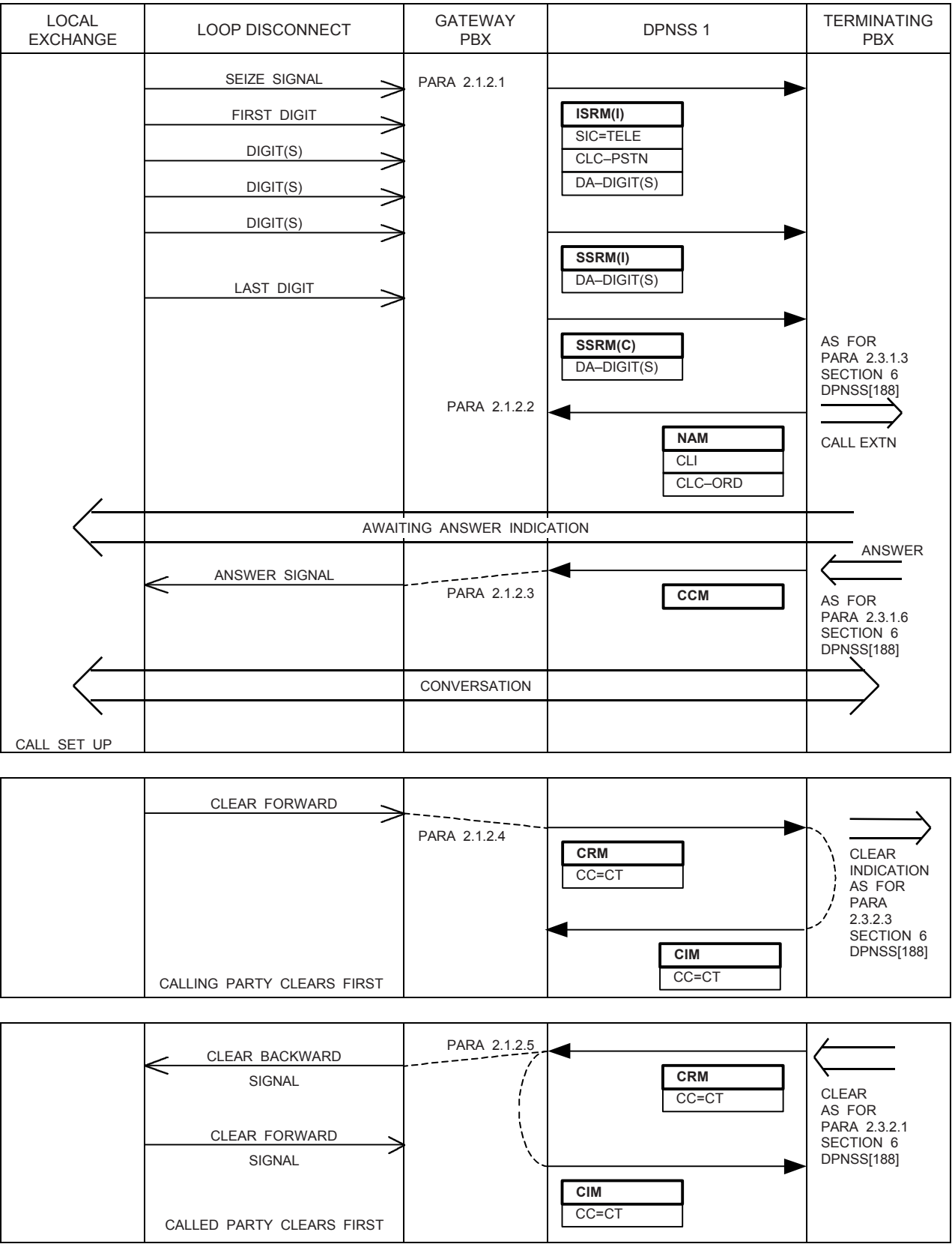
**NOTE: PBXs manufactured to earlier issues of this specification may use the CLI string to indicate the Trunk Number.**

**2.1.1.3** If an Answer signal is received from the PSTN a CCM shall be sent on the DPNSS 1 signalling channel.

Where no Answer signal is available but SPM signals are available the first meter pulse may be used to generate a CCM. If neither an Answer signal nor SPM is available a CCM containing SIM-A will be sent after sending the NAM (eg 60 seconds after sending the NAM).

**2.1.1.4** Normally the clearing of outgoing PSTN calls is under the control of the originating party. However in the case where the PSTN provides a Clear Back signal the Gateway PBX, on receipt of this signal, may initiate clearing of the call through the DPNSS 1 network in the backward direction.

2.1.2 SIMPLE CALL FROM THE PSTN (DDI) TO A DPNSS 1 EXTENSION



**2.1.2.1** When an incoming PSTN DDI call arrives and digit analysis indicates a DPNSS 1 route within a Private Network, a transmission channel is reserved and an ISRM is sent on the signalling channel.

The ISRM contains the Service Indicator Code=TELE, Calling Line Category-PSTN, Destination Address and optionally the Trunk Identity (TID) indicating the trunk number.

**NOTE: PBXs manufactured to earlier issues of this specification may use the OLI string to indicate the Trunk Number.**

Whenever possible an ISRM(C) should be used. However where the possibility of interworking with a slower speed signalling system exists, or the Gateway does not know the number length (either of which could result in excessive post dialling delays) an ISRM(I) may be used together with one or more SSRMs to send the Destination Address digits. If the End-of-Selection is recognised by the Gateway PBX (eg register timeout) before a NAM is received, then an SSRM(C) is used to indicate the end of selection information.

In order that any supervisory indications or verbal announcements may be heard by the caller the transmission path should be switched through as soon as possible.

**2.1.2.2** Receipt of a NAM containing no Supplementary Information other than CLC and CLI indicates a successful routing within the DPNSS 1 Network and that Supervisory tones are being returned in the traffic channel. No further SSRMs should be sent following receipt of the NAM.

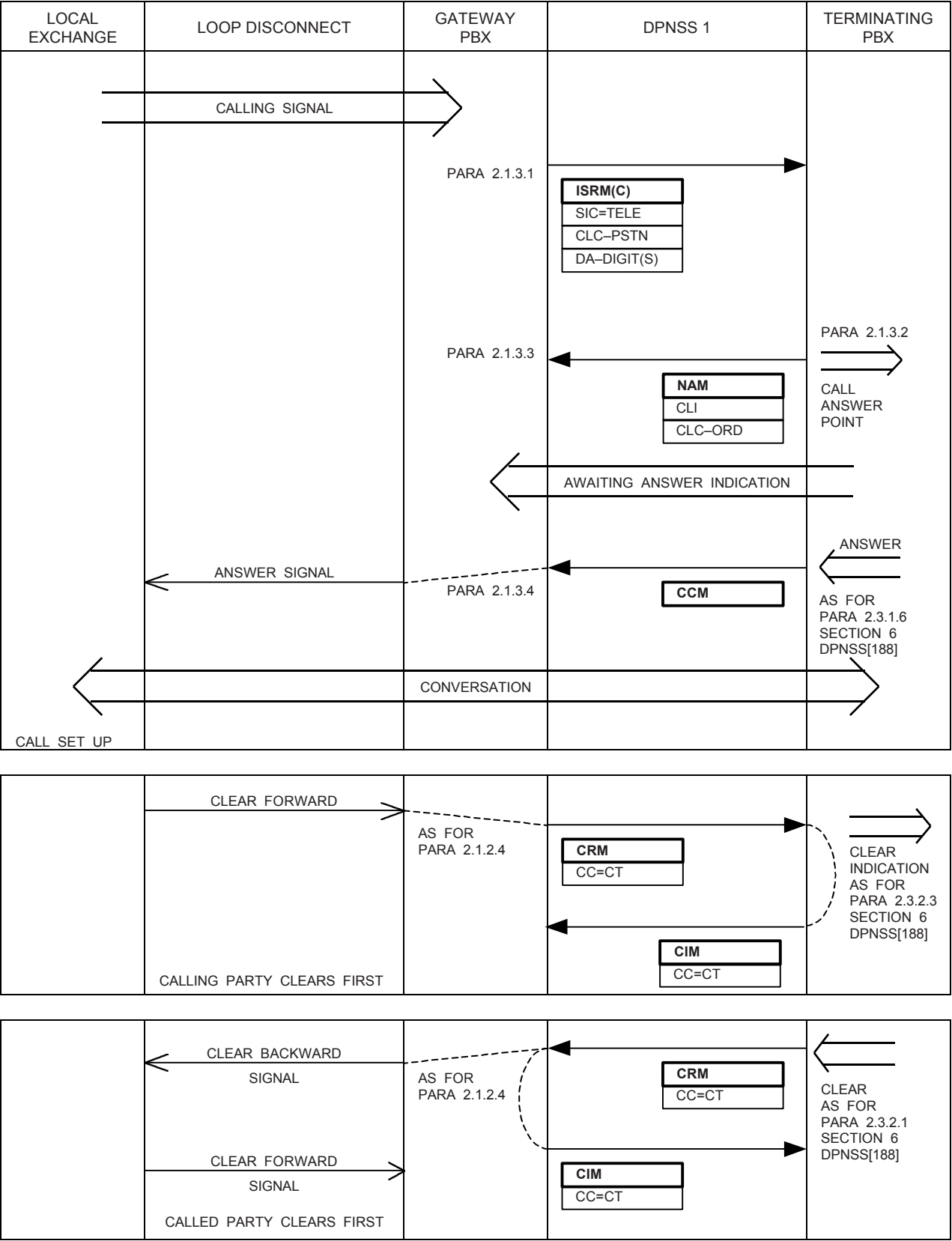
In the case of call failure within the DPNSS 1 network a CRM with the appropriate Clearing Cause will be used to drop the call back to the Gateway PBX from which an appropriate call failure tone will be applied to the incoming PSTN line. When a CRM is received, a CIM will be sent in response.

**2.1.2.3** On receipt of a CCM the Gateway PBX applies an Answer Signal to the incoming PSTN line.

**2.1.2.4** On Receipt of a Clear Forward Signal, the Gateway PBX shall release the switched path and send a CRM in the signalling channel containing a Clearing Cause: CT. A CIM is expected in response.

**2.1.2.5** On receipt of a CRM from the destination PBX the Gateway shall return a CIM and apply a Clear Back Signal to the incoming line.

2.1.3 SIMPLE CALL FROM THE PSTN (NON-DDI) TO A DPNSS 1 EXTENSION



**2.1.3.1** When a Calling Signal (Ringing Current) is received, on a Non-DDI incoming PSTN line, the Gateway PBX routes the call to a previously determined Answer Point. If the Answer Point is on the Gateway PBX there is no DPNSS 1 involved. If the Answer Point (normally an Operator position) is on another PBX a call is made to the Answer Point by sending an ISRM on the signalling channel. It should be noted that, since the line is free at the Local Exchange, Ringing Tone will be sent to the calling party. Therefore if the Answer Point is off PBX care should be taken to ensure that the call has a good chance of being successful.

The ISRM contains a Service Indicator Code (SIC), the CLC-PSTN with the Status Parameter set to Non-DDI, the TID indicating the Trunk Number (if available), and the Destination Address of the Answer Point.

**NOTE: PBXs manufactured to earlier issues of this specification may use the OLI string to indicate the Trunk Number.**

The transmission path shall not be switched through beyond the Gateway PBX.

**2.1.3.2** The call shall be dealt with as detailed in DPNSS[188] SECTION 6 Paragraph 2.3.1.3, except that the Non-DDI status information may cause special action to take place eg Call Waiting etc.

**2.1.3.3** Receipt of a NAM containing no Supplementary Information other than CLC and CLI indicates a successful call.

In the case of call failure within the DPNSS 1 network a CRM with the appropriate Clearing Cause will be used to drop the call back to the Gateway PBX. The Gateway PBX should then redirect the call to an alternative Answer Point.

**2.1.3.4** On receipt of a CCM the Gateway PBX shall apply an Answer Signal to the incoming PSTN line and switch through the transmission path.

## 2.2 INTERWORKING WITH DASS 2

This Paragraph deals with a simple automatic telephony call between an extension within a DPNSS 1 Private Network and DASS 2.

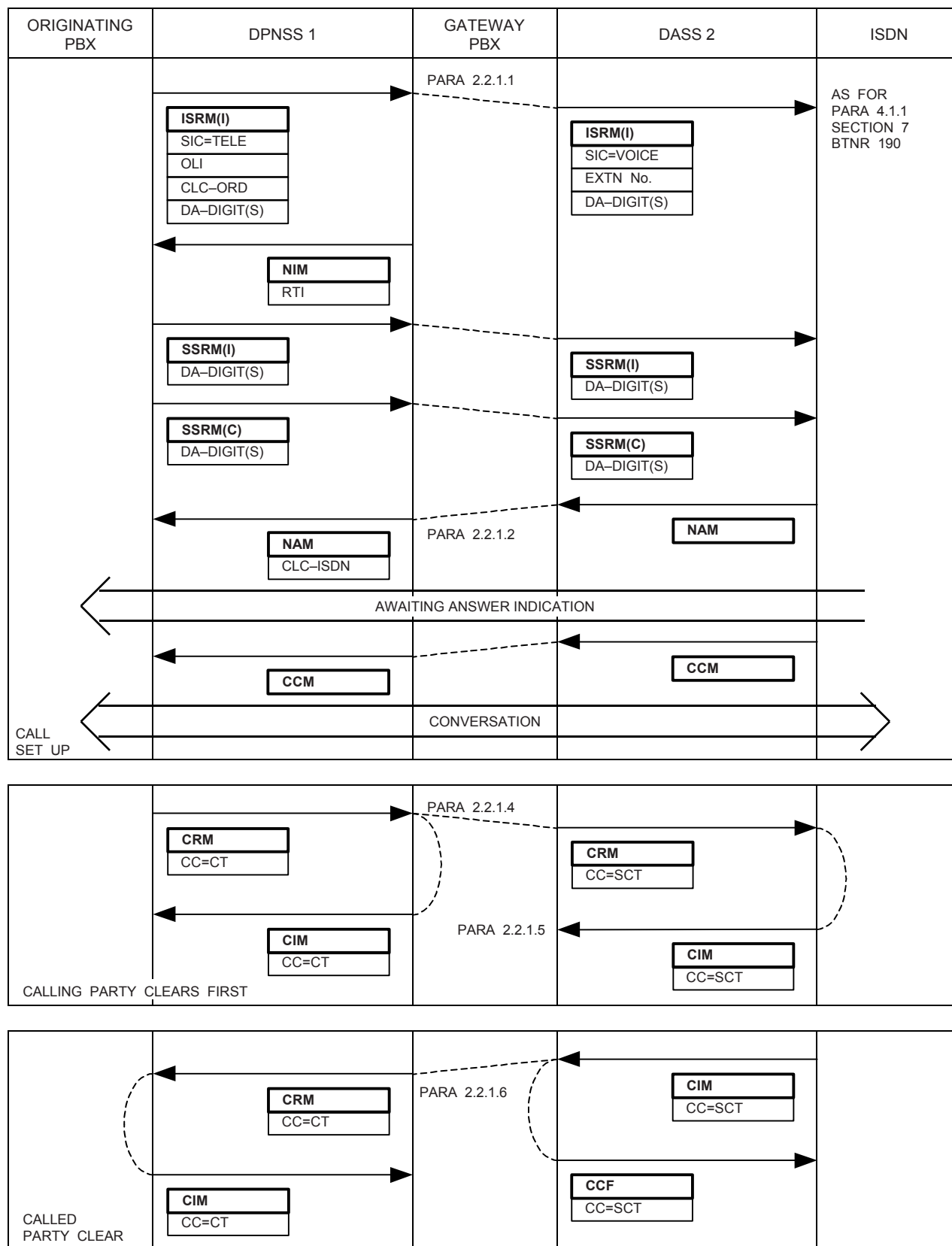
Attention is drawn to Paragraph 1.10 of Section 1 of DPNSS[189-I] which permits the use of Supplementary Information Strings defined for interworking with ISDN signalling protocols to be used in conjunction with other signalling systems with similar characteristics. In particular these Strings may be used instead of, or as well as, the BSS and D-SIC Strings explicitly mentioned below to aid in the mapping between DPNSS 1 and DASS 2 Service Indicator Codes.

### OUTLINE OF OPERATION

The signalling procedures are divided into two parts:

- 2.2.1 A Simple Call from a DPNSS 1 extension to DASS 2.
- 2.2.2 A Simple Call from DASS 2 to a DPNSS 1 extension.

## 2.2.1 SIMPLE TELEPHONY CALL FROM A DPNSS 1 EXTENSION TO DASS 2



**2.2.1.1** When the Destination Address within an ISRM identifies an outgoing DASS 2 route the Gateway PBX reserves a traffic channel to the local exchange and sends a DASS 2 ISRM on the signalling channel. The Gateway PBX returns a NIM with Routing Information (RTI) indicating public ISDN encountered.

The DASS 2 ISRM, in accordance with BTNR 190, contains a SIC, the calling extensions DDI identity if available and the Destination Address of the required terminal. The Calling Extensions DDI identity is coded as for the OLI as shown in BTNR 190 and must not exceed 6 digits.

If the CLC-ORD (Service Marking Parameter set to PSTN barred) is contained in the ISRM, the call should not be allowed and a CRM containing the Clearing Cause: AB is sent to the Originating PBX. A CIM is expected in response.

**NOTE: On receipt of an SIC=TELE in the DPNSS 1 ISRM, the Gateway PBX will make a Category 2 Voice call on DASS 2. However if the DPNSS 1 ISRM contains Supplementary Information Strings BSS or D-SIC then reference should be made to SECTIONS 18 or 16 of this specification.**

Whenever possible a DASS 2 ISRM (Complete) should be used. However, where the number length is not known a DASS 2 ISRM (Incomplete) may be used together with one or more Subsequent Service Request Messages (SSRMs) to send the remaining address information.

If a DASS 2 ISRM with no Selection Block is sent, a Proceed Indication (Dial Tone) will be received and may be blocked by the Gateway PBX. In this case the calling extensions DDI identity and the Destination Address are sent in SSRMs.

In order that any supervisory indications or announcements are returned to the Originating user the transmission path should be connected through as soon as possible.

**2.2.1.2** A DASS 2 NAM will be received if the Public Network call succeeds or fails. However in the event of call failure the NAM will contain the End of Call (EOC) String, the Parameter of which is the Clearing Cause. On receipt of a DASS 2 NAM which does not contain EOC the Gateway PBX sends a DPNSS 1 NAM to the Originating PBX containing CLC-ISDN and optionally the Trunk Identity (TID). If the DASS 2 Calling Line Identity (CLI) service is subscribed to by the calling party, the DASS 2 NAM will contain the Terminating Line Identity (TLI) of the called party.

If a TLI containing other than the single character "X" is received in the DASS 2 NAM then it shall be copied into a CLI string in the DPNSS 1 NAM. If the DASS 2 TLI contains any "X" character(s) they shall be discarded.

It should be noted that a CLI in a DPNSS 1 NAM that also contains a CLC-ISDN will represent the Destination Address within the public network. This CLI cannot therefore be used, unchanged, as a Destination Address within the DPNSS 1 network.

If a DASS 2 CIM is received in response to the DASS 2 ISRM then a DASS 2 CCF shall be returned and the DPNSS 1 path shall be cleared by sending a CRM containing Clearing Cause: NT.

If the call is not entirely across a 64kbit/s path within the Public Network, receipt of a DASS 2 NAM does not imply that the called party is free. In this case the call state will be indicated by an associated supervisory tone in the transmission channel. The Gateway PBX sends a DPNSS 1 NAM containing CLC-ISDN to the calling PBX. If the tone received indicates that the call is unsuccessful then the responsibility of clearing the call is left to the calling party.

On receipt of the DASS 2 NAM containing EOC the Gateway PBX sends a DPNSS 1 CRM towards the Originating PBX. Except in the cases shown below the DASS 2 Clearing Cause contained in the EOC String shall be used as the DPNSS 1 Clearing Cause:

| <u>EOC String Parameter</u> | <u>DPNSS 1 Clearing Cause</u> |
|-----------------------------|-------------------------------|
| Message Not Understood      | Network Termination           |
| Service Incompatible        | Subscriber Incompatible       |
| Signal Not Understood       | Network Termination           |

**NOTE: In view of the above not all Clearing Causes received by DPNSS 1 PBXs will be genuine DPNSS 1 Clearing Causes. However, Originating PBXs, having earlier received RTI indicating public ISDN encountered, may thus be able to interpret the DASS 2 Clearing Causes correctly.**

The Indication field of the DPNSS 1 CRM may convey the textual display provided by String "AA" in the DASS 2 NAM. The Supplementary Information Identifier \*AA\* is converted to \*100\* at the Gateway PBX.

A DASS 2 CRM containing the same Clearing Cause as that received in the EOC String is sent to the Local Exchange.

A CIM is expected on both the DASS 2 and DPNSS 1 paths in response to the CRMs.

**2.2.1.3** On receipt of a DASS 2 CCM (Answer) the Gateway PBX sends a DPNSS 1 CCM to the Originating PBX.

If the call is not entirely across a 64kbit/s path the CCM will contain the Textual Display information 'Not Suitable for Data' coded as shown in BTNR 190 SECTION 4.

**NOTE: \*AA\*Not Suitable For Data# on DASS 2 becomes \*100\*Not Suitable For Data# on DPNSS 1.**

**2.2.1.4** When the caller clears the DPNSS 1 links will be released in the normal way with an exchange of CRM and CIM. The Gateway PBX on receipt of a DPNSS 1 CRM sends a DASS 2 CRM containing the Clearing Cause: SCT. The DASS 2 code for Clearing Cause: SCT is the same as the DPNSS 1 Clearing Cause: CT.

**2.2.1.5** The Gateway PBX must retain the address of the now cleared DPNSS 1 extension until the DASS 2 CIM is received in case the Public Network wishes to hold the connection (eg to provide the Supplementary Service: Call Charge Indication).

Refusal by the Public Network to allow release of the call is indicated by the Local Exchange delaying sending of the DASS 2 CIM in response to the DASS 2 CRM.

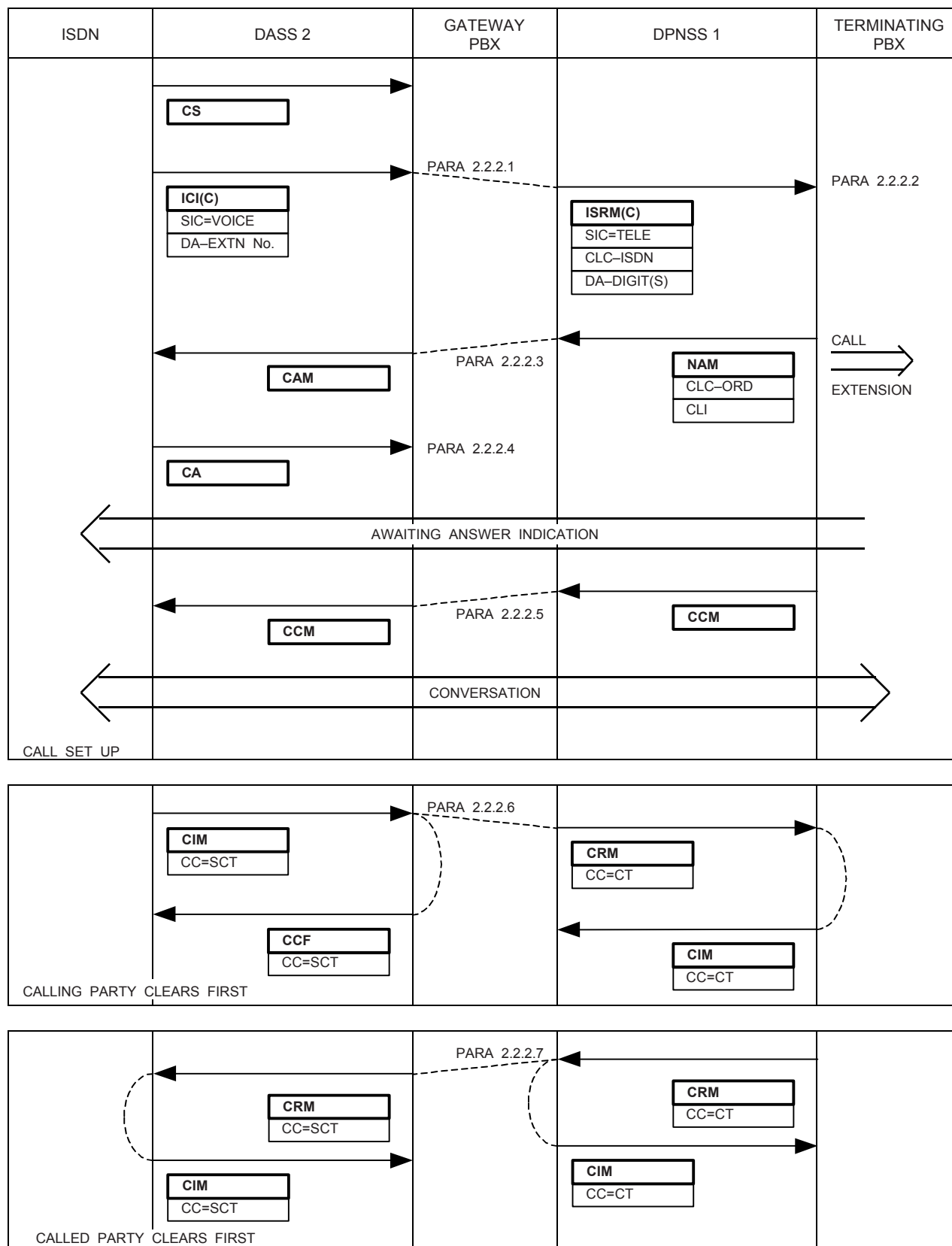
**2.2.1.6** Receipt of a DASS 2 CIM indicates that the call has been released by the Public Network following a clear by the called party, and subsequent CSH timeout expiry.

The Gateway PBX will return CCF to the Local Exchange and release the DPNSS 1 link by sending a CRM containing the Clearing Cause received from DASS 2.

A CIM will be expected in response.

**NOTE: If the Clearing Cause: INC is received by the Gateway PBX from DASS 2 the CRM sent on the DPNSS 1 path should contain the Clearing Cause: SI.**

## 2.2.2 SIMPLE TELEPHONY CALL FROM DASS 2 TO A DPNSS 1 EXTENSION



---

**2.2.2.1** On receipt of a Channel Seize (CS) message, the Gateway PBX reserves the transmission channel.

When the DDI digits in the DASS 2 ICI(C) or an ICI(I) and any SSRMs identify an outgoing DPNSS 1 route the Gateway PBX reserves a transmission channel on the required route and sends a DPNSS 1 ISRM on the signalling channel.

If the ICI has no Destination Address the call shall be routed to a NON DDI Answer Point which has been previously arranged. The Destination Address in the DPNSS 1 ISRM will be the Private Network number of the Answer Point.

The DPNSS 1 ISRM contains the SIC, the Destination Address and the Calling Line Category CLC-ISDN.

In addition if an OLI String containing other than the single character "X" is received from DASS 2, It shall be copied into an OLI String in the DPNSS 1 ISRM. If the DASS 2 OLI contains any "X" characters they shall be discarded.

It should be noted that an OLI in a DPNSS 1 ISRM that also contains a CLC-ISDN will represent the Destination Address within the public network. This OLI cannot therefore be used, unchanged, as a Destination Address within the DPNSS 1 network.

A Trunk Identity String (TID) may optionally be included in the DPNSS 1 ISRM.

**NOTE: Four types of Voice call may be requested by DASS 2:**

- |                    |                  |          |
|--------------------|------------------|----------|
| - Category 1 Voice | - SIC = 00010010 |          |
| - Category 2 Voice | - SIC = 00010000 |          |
| - 3.1kHz Audio     | - SIC = 10011NNN | NNNNNNNN |
| - TELE             | - SIC = 00000000 |          |

**DPNSS 1 has only one type of Voice call:**

- |        |                  |
|--------|------------------|
| - TELE | - SIC = 00010000 |
|--------|------------------|

However the BSS Supplementary Information String specified in Bearer Service Selection and the D-SIC String specified in Service Independent Strings may be used to supplement the DPNSS 1 SIC.

When the Gateway PBX receives a DASS 2 Category 1 Voice call it sends a DPNSS 1 ISRM containing the SIC=TELE. The route within DPNSS 1 must be a fully 64kbit/s path, and where a Private Network contains a mixture of analogue and digital routes Bearer Service Selection must be used as described in SECTION 18 (ie BSS-M). If the Gateway PBX cannot select a 64 kbit/s path or does not support Bearer Service Selection as an Originating PBX, it shall clear the call by sending a DASS 2 CRM containing the Clearing Cause: SI, and expect a CIM in response.

When the Gateway PBX receives a DASS 2 Category 2 call it sends a DPNSS 1 ISRM containing the SIC=TELE. Ideally the route within DPNSS 1 will be a fully 64kbit/s path, and where a Private Network contains a mixture of analogue and digital routes Bearer Service Selection may be used as described in SECTION 18 to indicate that a digital path is preferable (ie BSS-P).

When the Gateway PBX receives a DASS 2 Telephony call it sends a DPNSS 1 ISRM containing the SIC=TELE. The route within DPNSS 1 may be either analogue or digital.

When the Gateway receives a DASS 2 3.1kHz Audio Call it sends a DPNSS 1 ISRM containing the SIC=TELE. The route chosen within the DPNSS 1 network will be either an analogue circuit or a digital channel with the ability to support A-Law PCM speech.

Where transfer of the data characteristics contained in the DASS 2 SIC is required the D-SIC string may be used as described in SECTION 16 of this specification.

**2.2.2.2** On receipt of an ISRM (C) or an ISRM (I) plus any SSRMs containing the CLC-ISDN, the Terminating PBX shall proceed as shown in DPNSS[188] SECTION 6, Paragraph 2.3.1.3.

**2.2.2.3** On receipt of a DPNSS 1 NAM the Gateway PBX sends a DASS 2 Call Accepted Message (CAM) to the Local Exchange to indicate that the requested extension is compatible and free. The DDI extension number of the called party is contained in the DASS 2 CAM, coded as shown in BTNR 190.

On receipt of a DPNSS 1 CRM indicating call failure, a CIM is returned to the Terminating PBX and a DASS 2 CRM is sent. The mapping between the DPNSS 1 Clearing Cause and the DASS 2 Clearing Cause is shown in the following table. A CIM is expected in response from the Public Network.

---

**DPNSS 1 Clearing Cause**

Subscriber Incompatible  
Congestion  
Busy  
Service Incompatible  
NAE Error  
DTE Controlled Not Ready  
DTE Uncontrolled Not Ready

**DASS 2 Clearing Causes**

Service Incompatible  
Subscriber Engaged  
Subscriber Engaged  
Service Incompatible  
NAE Error  
DTE Controlled Not Ready  
DTE Uncontrolled Not Ready

Any DPNSS 1 Clearing Causes that are not listed above shall be mapped onto the DASS 2 Clearing Cause: NU except in the following cases.

If the DPNSS 1 CRM contains CC: SU accompanied by String SU with parameter BSS-M then, the DASS 2 Clearing Cause shall be Service Incompatible.

If the DPNSS 1 CRM contains CC: SNU accompanied by String SNU with parameter BSS-M, then the DASS 2 Clearing Cause shall be Service Incompatible.

**2.2.2.4** The Local Exchange connects the call and sends a Call Arrival (CA) message. The Gateway PBX merely notes receipt of this message.

**2.2.2.5** When the called extension answers, the Terminating PBX sends a DPNSS 1 CCM. The Gateway PBX repeats this information as a DASS 2 CCM. If a DASS 2 Call Arrival message (CA) has not been received the DASS 2 CCM must be withheld until the CA is received.

**2.2.2.6** On Receipt of a DASS 2 CIM the Gateway PBX returns a DASS 2 CCF. The DPNSS 1 path will be released in the normal way (as in DPNSS[188]) with an exchange of CRM and CIM.

**2.2.2.7** When the called party clears, the DPNSS 1 path will be released in the normal way (as in DPNSS[188]) with an exchange of CRM and CIM. The Gateway PBX on receipt of the DPNSS 1 CRM sends a DASS 2 CRM and expects a DASS 2 CIM in response.

**NOTE: If the Clearing Cause: SI is received by the Gateway PBX at any time from the DPNSS 1 path, the CRM sent on the DASS 2 path should contain the Clearing Cause: SI.**

## **2.3 INTERWORKING VIA DASS 2**

NOT ISSUED

## **2.4 INTERWORKING WITH A DECADIC PRIVATE CIRCUIT**

This Paragraph deals only with a simple automatic telephony call between an extension within a DPNSS 1 part of a Private Network and a telephony terminal within a Decadic part of a Private Network.

### **OUTLINE OF OPERATION**

The signalling procedures are divided into two parts:

- 2.4.1 A Simple Call from a DPNSS 1 extension to a Decadic Private Circuit.
- 2.4.2 A Simple Call from a Decadic Private Circuit to a DPNSS 1 extension.