TELE DANMARK A/S

ISDN NETWORK AND ACCESS DESCRIPTION (INAD)

Version 2

Contents:

Title:

Overview document

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Contents:

Appendices:

1 Introduction

Commercial ISDN was introduced in Denmark in January 1992 providing the services described in the document ISDN Network and Access Description (INAD) version 1 submitted in April 1991.
After a period of 1 year with commercial ISDN, Tele Danmark A/S will extend the number of services.

This document is version 2 of the INAD and it gives the functional description and the access specifications for the Danish commercial ISDN services to be introduced in 1993.

It should be noted that not all new services will be introduced at the same time. All INAD Version 2 services are planned as available at the end of 1993 or early 1994, while some of the services will be in introduced in the second quarter of 1993, but maybe not with complete capabilities in the entire network.
Furthermore, experiences have shown that when providing ISDN on different types of exchanges in the network, some deviations will arise related to service contents and interface protocol details.
These conditions are described in a maintenance document which can be found in Appendix P.

The ISDN is provided nationwide and with a service provision according to the Memorandum of Understanding (MoU), agreed and assigned by European Network Operators.
The services are implemented according to international standards from ETSI (Euro-ISDN), the European Telecommunications Standards Institute. A basic guide to these standards for the European ISDN can be found in the technical report ETR 010 [0].
It should be noticed that updating of the service level in ISDN will be performed when the conditions are adequate.
Attention to the ongoing work for development of description for ISDN services by ETSI is therefore of importance to the ISDN terminal manufactures.

1.1 Changes related to INAD version 1

INAD version 2 is a complete document, i.e. it does not only contain changes related to version 1. The main changes are the provision of the Packet mode bearer service and a number of new supplementary services. To increase readability, the following guidance is given:

- For this overview document, technical changes in existing version 1 sections are marked with a "*" in the left hand margin.
  In addition, sections 5, 7 and 8 have been restructured and enhanced with text concerning the Packet mode bearer service; and section 7 has been enhanced with the definition of Basic service (subsections 7.1.4.1 and 7.1.4.2);

- Concerning the Appendices only changes in existing version 1 requirements are explicitly marked.
  - Appendices A and E have been enhanced with new supplementary services;
  - the previous Appendix F has been replaced with application specification to the X.31 Case B scenario;
  - The privious appendix G has disappeared, as the content has been changed and included in subsection 10.3.
  - Appendices G and H are new and are application specifications to the

service description of the Packet mode bearer service;

- Appendix H is new and is an application specification to the Generic keypad protocol;
- and finally, Appendix K gives the stage 3 requirements for the Closed user group supplementary service using the keypad protocol.

2 Scope and application

This document describes the network functions and specifies the user access to these functions.

The document is primarily for use by the terminal manufacturers, but may also be used to provide some general information about ISDN. However, it is assumed that the reader of this document is familiar with the ISDN concept.
The document covers the following aspects:

- bearerservices, teleservices and supplementary services

- user-network interfaces

- signalling protocols

- approval requirements

- interworking with other networks and services

- numbering and addressing

- maintenance

The document is divided into two parts - an overall document giving the general descriptions and specifications - and a number of appendices attached to this document, giving the detailed descriptions and specifications.

The basis for the specifications to be used for the Danish ISDN is ETSI standards. If these are not available, CCITT recommendations, CEPT recommendations or national standards are used.
It should be noted that ETSI standards are provided in three stages, used as references in this document:

Stage 1: This part is an overall description from the user's standpoint.

Stage 2: This part is an overall description of the organization of the network functions to map service requirements into network capabilities.

Stage 3: This part is the definition of switching and signalling capabilities needed to support services at the access protocol.

The ETSI ETSs contain a number of items which are implementation dependent or network option. To close these open issues, national application documents have been prepared for the stages 1 and 3. These application documents are attached to this document as appendices and are also referred to in the text.

During the lifetime of this document some clarifications and enhancements are foreseen. Generally, to avoid a continuous updating of the document so-called INAD-notes will be submitted instead of revised versions of the document. These notes can be found in Appendix R.

3 Abbreviations and references

Abbreviations:

ASN.1	-	Abstract Syntax Notation no. 1
AU	-	Access Unit
BA	-	Basic Access
BC	-	Bearer Capability
CCITT	-	Comité Consultatif International Télégraphique et Téléphonique
CEPT	-	Conférence Européenne des Administrations des Postes et des Telecommunications
CLIP	-	Calling Line Identification Presentation
CLIR	-	Calling Line Identification Restriction
COLP	-	Connected Line Identification Presentation
COLR	-	Connected Line Identification Restriction
CSPDN	-	Circuit Switched Public Data Network
CUG	-	Closed User Group
CW	-	Call Waiting
Datex	-	Danish CSPDN
Datapak	-	Danish PSPDN
DCE	-	Data Circuit-Terminating Equipment
DDI	-	Direct Dialling In
DEC	-	Digital Equipment Corporation
DSS1	-	Digital Subscriber Signalling System no.1
DTE	-	Data terminal Equipment
DTMF	-	Dual Tone Multi Frequency
EMC	-	Electro-Magnetic Compatibility
ETR	-	European Technical Report
ETS	-	European Telecommunication Standard
ETSI	-	European Telecommunications Standards Institute
FAX	-	Facsimile
HDLC	-	High Level Data Link Control
HLC	-	High Layer Compatibility
HOLD	-	Call Hold
IBM	-	International Business Machines Corporation
INAD	-	ISDN Network and Access Description
ISDN	-	Integrated Services Digital Network
ISM	-	ISDN Standards Management
ISPBX	-	ISDN Private Branch Exchange (PBX)
IWU	-	Interworking Unit
LAPB	-	Link Access Procedures Balanced
LAPD	-	Link Access Procedures on the D-channel
LLC	-	Low Layer Compatibility
MOU	-	Memorandum Of Understanding
MHS	-	Message Handling System
MSN	-	Multiple Subscriber Number
NA	-	Network Aspects
NET	-	Normes Européennes de Télécommunications
NT	-	Network Termination
O&M	-	Operation & Maintenance
OSI	-	Open Systems Interconnection
PABX	-	Private Automatic Branch Exchange

PAD	-	Packet Assembler/Disassembler
PC	-	Personal Computer
PH	-	Packet Handler
PLL	-	Permanent Logical Link
PLP	-	Packet Layer Protocol
PMBS	-	Packet Mode Bearer Service
PRA	-	Primary Rate Access
PSPDN	-	Packet Switched Public Data Network
PSTN	-	Public Switched Telephone Network
PVC	-	Permanent Virtual Circuit
SAPI	-	Service Access Point Identifier
SDL	-	Structured Description Language
SNA	-	Systems Network Architecture
SPS	-	Signalling, Protocols and Switching
STC	-	Sub Technical Comittee
SUB	-	Subadressing
TA	-	Terminal Adaptor
TC	-	Technical Committee
TEI	-	Terminal Endpoint Identifier
TP	-	Terminal Portability
TR	-	Technical Report
UUS	-	User-to-User Signalling
VC	-	Virtual Call
VT	-	Virtual Terminal

References:

[0] ETSI ETR 010 - ISDN Standards Management (ISM); The ETSI basic guide on the European integrated services digital network.

[1] CCITT Recommendation X.28 - DTE/DCE interface for a start-stop mode data terminal equipment accessing the packet assembly/disassembly facility (PAD) in a public data network situated in the same contry.

[2] CCITT Recommendation V.110 - Support of data terminal equipment (DTEs) with V-series type interfaces by an integrated services digital network (ISDN).

[3] CCITT Recommendation V.120 - Support by an ISDN of data terminal equipment with V-series type interfaces with provision for statistical multiplexing.

[4] CCITT Recommendation X.21 - Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for synchronous operation on public data networks.

[5] CCITT Recommendation X.21 bis - Use on public data network of data terminal equipment (DTE) which is designed for interfacing to synchronous V-series modems.

[6] ETSI ETS 300 103 - Support of CCITT Recommendation X.21, X.21 bis and X.20 bis based Data Terminal Equipments (DTEs) by an ISDN. Synchronous and asynchronous terminal adapter functions.

[7] CCITT Recommendation X.25 - Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit.

[8] ETSI ETS 300 007 - Support of packet mode terminal equipment by an ISDN.

[9] CCITT Recommendation I.210 - Principles of telecommunication services supported by an ISDN and the means to describe them.

[10] ETSI ETS 300 108 - Circuit-mode 64 kbit/s unrestricted 8 kHz structured bearer service category, Service description.

[11] ETSI ETS 300 109 - Circuit-mode 64 kbit/s 8 kHz structured bearer service category, Service description.

[12] ETSI ETS 300 110 - Circuit-mode 64 kbit/s 8 kHz structured bearer service category usable for 3.1 kHz audio information transfer, Service description.

[13] ETSI ETR 018 - Application of the BC-, HLC- and LLC information elements by terminals supporting ISDN services.

[14] ETSI ETS 300 111 - Telephony 3.1 kHz telesevice, Service description.

[15] ETSI Draft ETS T/NA1(90)03 - Teletex teleservice, Service description.

[16] ETSI Draft ETS 300 120 - Telefax G4 teleservice, Service description.

[17] ETSI Draft ETS T/NA1(90)04 - ISDN syntax-based videotex teleservice, Service description.

[18] ETSI ETS 300 102-1 - ISDN user-network interface layer 3 specification for basic call control.

[19] ETSI ETS 300 089 - Calling Line Identification Presentation (CLIP) supplementary service. Service description.

[20] ETSI ETS 300 091 - Calling Line Identification Presentation and Restriction (CLIP and CLIR) supplementary service. Functional capabilities and information flows.

[21] ETSI ETS 300 090 - Calling Line Identification Restriction (CLIR) supplementary service. Service description.

[22] ETSI ETS 300 059 - Subaddressing (SUB) supplementary service. Service description.

[23] ETSI ETS 300 060 - Subaddressing (SUB) supplementary service. Functional capabilities and information flows.

[24] ETSI ETS 300 053 - Terminal Portability (TP) supplementary service. Service description.

[25] ETSI ETS 300 054 - Terminal portability (TP) supplementary service. Functional capabilities and information flows.

[26] ETSI ETS 300 056 - Call Waiting (CW) supplementary service. Service description.

[27] ETSI ETS 300 057 - Call Waiting (CW) supplementary service. Functional capabilities and information flows.

[28] ETSI ETS 300 062 - Direct Dialling In (DDI) supplementary service. Service description.

[29] ETSI ETS 300 063 - Direct Dialling In (DDI) supplemenary service. Functional capabilities and information flows.

[30] ETSI ETS 300 050 - Multiple Subscriber Number (MSN) supplementary service. Service description.

[31] ETSI ETS 300 051 - Multible Subscriber Number (MSN) supplementary service. Functional capabilities and information flows.

[32] ETSI Draft ETS T/NA1(89)06 - User to User Signalling (UUS) supplementary service. Service description.

[33] ETSI Draft ETS T/S 22-17 - User to User Signalling (UUS) supplementary service. Functional capabilities and information flows.

[34] ETSI ETS 300 012 - Integrated Services Digital Network, Basic User-Network Interface. Layer 1 specification and Test principles.

[35] ETSI ETS 300 125 - Digital Subscriber Signalling system No. 1 (DSS1). Data link layer.

[36] ETSI ETS 300 102-2 - ISDN user-network interface layer 3 specification for basic call control, SDL diagrams.

[37] ETSI ETS 300 092 - Calling Line Identification Presentation (CLIP) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[38] ETSI ETS 300 093 - Calling Line Identification Restriction (CLIR) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[39] ETSI ETS 300 061 - Subaddressing (SUB) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[40] ETSI ETS 300 055 - Terminal portability (TP) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[41] ETSI ETS 300 058 - Call Waiting (CW) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[42] ETSI ETS 300 064 - Direct Dialling In (DDI) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[43] ETSI ETS 300 052 - Multiple Subscriber Number (MSN) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[44] ETSI Draft ETS 300 195 - Supplementary services interactions. Digital subscriber signalling one (DSS1) protocol.

[45] ETSI ETS 300 011 - Integrated Services Digital Network, Primary rate user-network interface, Layer 1 specification and test principles.

[46] ETSI ETS 300 104 - Attachment requirements for terminal equipment to connect to an ISDN using ISDN basic access, Layer 3 aspects (NET 3 Part 2).

[47] ETSI Draft ETS 300 126 - Equipment with ISDN interface at basic and primary rate, EMC requirements.

[48] ETSI Draft ETS 300 047 - Basic access - safety and protection.

[49] ETSI ETS 300 156 - Attachment requirements for terminal equipment to connect to ISDN using ISDN primary rate access (NET 5).

[50] ETSI Draft ETS 300 046 - Primary rate access - safety and protection.

[51] CCITT Recommendation X.32 (1988) - Interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for terminals operating in the packet mode and accessing a Packet Switched Public Data Network through a Public Switched Telephone Network or an Integrated Services Digital Network or

a Circuit Switched Public Data Network.

[52] ETSI ETS 300 085 - 3.1 kHz telephony teleservice, attachment requirements for handset terminals (NET 33).

[53] CCITT Recommendation E.164 - Numbering plan for the ISDN era.

[54] CCITT Recommendation X.121 - International numbering plan for public data networks

[55] CCITT Recommendation I.330 - ISDN numbering and addressing principles.

[56] CCITT Recommendation I.331 - Numbering plan for the ISDN area.

[57] ETSI ETR 006 - Numbering and addressing for the MoU on ISDN (Priorities 1 and 2)

[58] ETSI ETR 026 - Terminal selection principles for priority 1 and 2 services of MoU.

[59] CCITT Recommendation I.332 - Numbering principles for interworking between ISDNs and dedicated networks with different numbering plans.

[60] CCITT Recommendation E.163 - Numbering plan for the international telephone service.

[61] ETSI ETS 300 153 - Attachment requirements for terminal equipment to connect to an ISDN using ISDN basic access, Layer 1 and 2 aspects (NET 3 Part 1).

[62] CCITT Recommendation X.20 bis - Use on public data networks of terminal equipment (DTE) which is designed for interfacing to asynchronous duplex V-series modems.

[63] CCITT Recommendation X.30 - Support of X.21, X.21 bis and X.20 bis based data terminal equipments (DTEs) by an integrated services digital network (ISDN).

[64] CCITT Recommendation X.31 - Support of packet mode terminal equipment by an ISDN.

[65] ETSI ETS 300 094 - Connected Line Identification (COLP) supplementary service. Service description.

[66] ETSI ETS 300 096 - Connected Line Identification, Presentation and Restriction (COLP and COLR) supplementary service. Functional capabilities and information flows.

[67] ETSI ETS 300 095 - Connected Line Identification Restriction (COLR) supplementary service. Service description.

[68] ETSI ETS 300 139 - Call Hold (HOLD) supplementary service. Service description.

[69] ETSI ETS 300 140 - Call Hold (HOLD) supplementary service. Functional capabilities and information flows.

[70] ETSI ETS 300 136 - Closed User Group (CUG) supplementary service. Service description.

[71] ETSI ETS 300 137 - Closed User Group (CUG) supplementary service. Functional capabilities and information flows.

[72] ETSI ETS 300 048 - ISDN Packet Mode Bearer Service (PMBS), ISDN Virtual Call (VC) and Permanent Virtual Circuits (PVC) bearer services provided by the B-channel of the user access - basic and primary rate.

[73] ETSI ETS 300 049 - ISDN Packet Mode Bearer Service (PMBS), ISDN Virtual Call (VC) and Permanent Virtual Circuits (PVC) bearer services provided by the D-channel of the user access - basic and primary rate.

[74] ETSI Draft ETS 300 196 - Generic functional protocol for the support of supplementary services. Digital Subscriber Signalling System No. one (DSS1) protocol.

[75] ETSI ETS 300 122 - Generic keypad protocol for the support of supplementary services. Digital Subscriber Signalling System No. one (DSS1) protocol.

[76] ETSI ETS 300 097 - Connected Line Identification Presentation (COLP) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[77] ETSI ETS 300 098 - Connected Line Identification Restriction (COLR) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[78] ETSI ETS 300 141 - Call Hold (HOLD) supplementary service. Digital Subscriber Signalling System No. one (DSS1) protocol.

[79] foTB92021 - Teknisk bestemmelse for terminaludstyr for tilslutning til ISDN Basic Rate Access, maj 1992.

[80] foTB92022 - Teknisk bestemmelse for terminaludstyr for tilslutning til ISDN Primary Rate Access, august 1992.

[81] foTB92023 - Teknisk bestemmelse for telefonapparater (3,1 kHz båndbredde) for tilslutning til ISDN Basic Rate Access, februar 1992.

[82] CCITT Recommendation X.200 (1988) - Data communications network: Open System Interconnection (OSI); Model and Notation, Service definition.

[83] CCITT Recommendation X.122 (1988) - Numbering plan interworking between a Packet Switched Public Data Network (PSPDN) and an Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN) in the short-term.

4 Network overview

Customers will be connected as far as possible by direct access to exchanges in the planned overlay network or in the case of too long distances to the exchange by means of adequate multiplexing or subscriber line equipment.

4.1 Telecommunication services

Bearer services (circuit switched):

- Speech
- 3.1 kHz audio
- 64 kbit/s unrestricted

* Bearer services (packet switched):

- Packet Mode Bearer Service, PMBS (X.31 case B) on the B-channel
- Packet Mode Bearer Service, PMBS (X.31 case B) on the D-channel

Teleservices:

- Telephony, 3.1 kHz
- Facsimile Group 2/3
- Facsimile Group 4
- Teletex/Facsimile Group 4, mixed mode
- Teletex
- Videotex
- Telex
- MHS
- OSI applications (X.200 [82])

Supplementary services, ETSI specified:

- Calling Line Identification Presentation/Restriction (CLIP/R)
- Subaddressing (SUB)
- Terminal Portability (TP)
- Call Waiting (CW)
- Direct Dialling In (DDI)
- Multiple Subscriber Number (MSN)
- User-to-User Signalling, Service 1 implicit (UUS)

* - Connected Line Identification Presentation/Restriction (COLP/R)

* - Call Hold (HOLD)

* - Closed User Group (CUG)

Note: The CUG supplementary service does not comply to the ETSI stage 3 ETS, but is provided using the Keypad signalling protocol (see Appendix K).

Supplementary services, nationally specified:

- Priority
- Interception
- Line Hunting
* - Trunk Offering
* - Outgoing Call Barring

More detailed description of the services can be found in sections 5, 6 and 7 respectively.

4.2 Access types

The network provides two types of accesses:

- Basic Access (BA) (market name, ISDN2) usable for a short passive bus, an extended bus or a point-to-point wiring figuration. The basic access gives the capability of up to 8 terminals in parallel.
- Primary Rate Access (PRA) (market name, ISDN30).

4.3 Interworking cases

The ISDN interworks with the exsisting networks PSTN and PSPDN (Datapak) as described in section 9.

4.4 Communication examples

Figure 1 gives an overview of typical types of equipment to be connected to the Danish commercial ISDN and the interworking cases to other public networks.

Basically, three different types of equipment can be connected to the ISDN:

i) Terminals with a basic access interface applicable for connection to the S/T reference point. The terminal types can be e.g.:

   - telephone terminals with the possibility of communicating within ISDN or with telephone terminals connected to PSTN
   - Fax group 4 terminals for communication primarily within ISDN
   - Personal Computers or other type of data communication terminals including multifunctional terminals with S/T interface, either provided basicly or by use of plug-in boards. These terminals may use standardized protocols as indicated in ii) below or user specific protocol for communication between users.

ii) Terminal adaptors (TA) providing an interface between already existing V and X type terminals and the S/T reference point.
TAs provide different kinds of interface at the R reference point and use a standardized way to tranfer the interface characteristics at the R reference point to the characteristics of the S/T reference point, both concerning signalling and mapping of data information to the B-channel.
Typical types of TAs are:

- TA-a/b, which gives an analogue interface similar to the interface known from PSTN. This type of TA is used for e.g. modem communication and Fax group 3 communication between ISDN and PSTN users, but may also be used for X.28 [1] communication via PSTN to the PAD function in PSPDN.

- TA-V.110 [2], which supports DTEs with different types of V-series interfaces, asynchronous as well as synchronous types. The TA's functionality follows CCITT Rec. V.110 [2] which specifies the protocol mapping and rate adaption between the R and S/T interfaces. This type of TA can only use the B-channel for transfer of information, and is used for communication within ISDN.

- TA-V.120 [3], which follows CCITT Rec. V.120 [3] and supports the same type of terminals and communication as the TA-V.110 [2], but provides the possibility of using multi-session terminals where each session has at its disposal a virtual frame based channel within the B-channel.

- TA-X.30 [63], which supports synchronous DTEs with, X.21 [4], X.21 bis [4] and asynchronous X.20 bis [62] interfaces according to the ETSI ETS 300 103 [6] (CCITT Rec. X.30 [63]). Only the B-channel can be used at the S/T interface and only communication within ISDN is possible.

- TA-X.31B [64] and TA-X.31D [64], which support communication for X.25 [7] packet switched terminals using the B or D-channel respectively according to ETSI ETS 300 007 [8] (CCITT Rec. X.31 [64]), Case B.
  This TA is used for packet communication between ISDN users or in connection with interworking with PSPDN.

  Note: Interworking with PSPDN according to ETS 300 007 [8], Case A will not be provided in general as the Case B scenario is preferred. However, Case A may be provided based on bilateral arrangement with individual users.

iii) ISDN PABXs (ISPBXs) connected to the ISDN via the T reference point, either by the use of basic access or primary rate access.
The ISPBXs may use the same services as the terminals connected to the ISDN. Except for the support of line hunting over a number of basic and/or primary rate accesses, no special functions are implemented in the network to support ISPBXs.

The different types of terminals described in item i) and ii) may coexist at the same S/T reference point with a upper limit of 8 terminals.

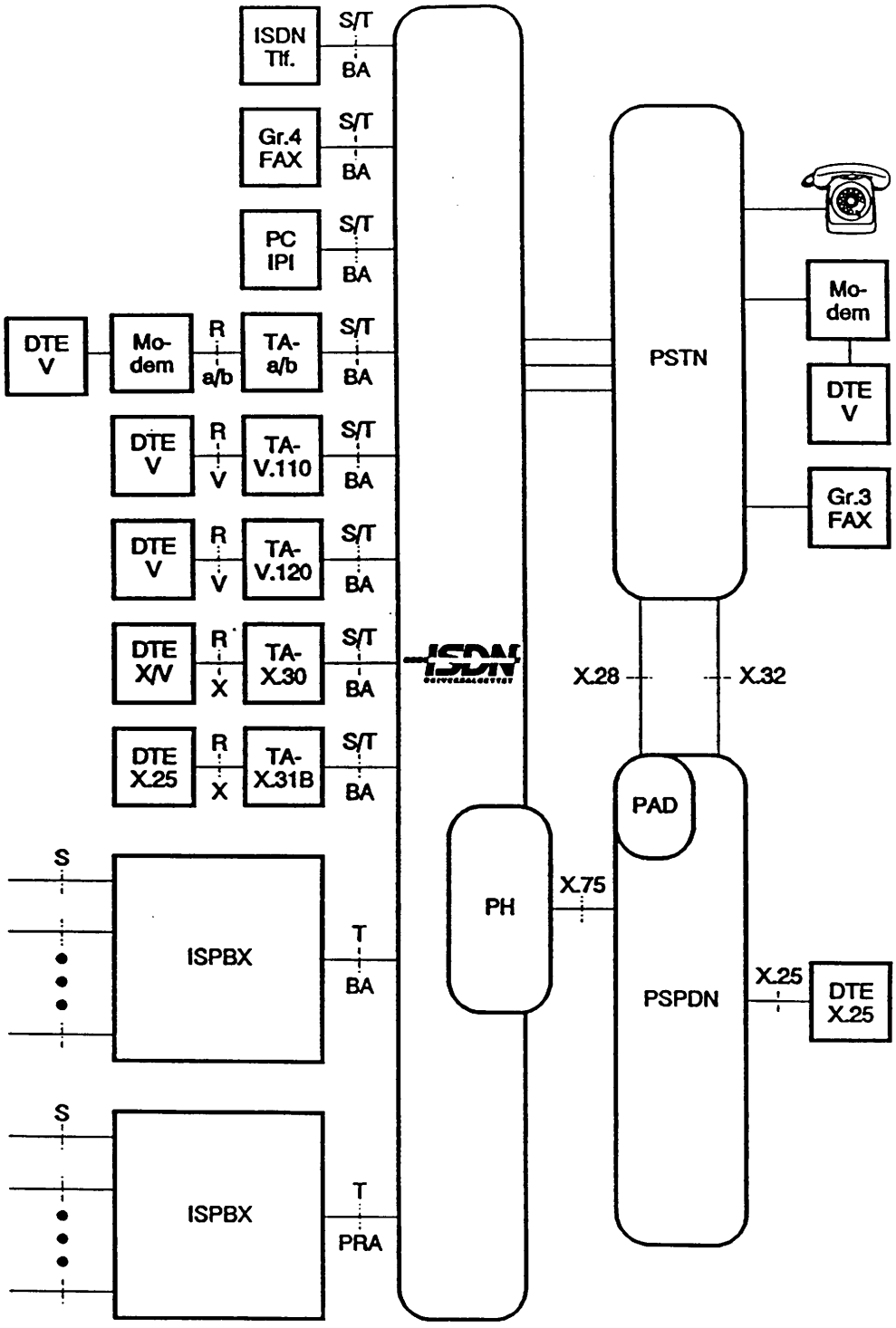


Figure 1. Network Overview

5 Bearer services

For a given connection between two users, the users' terminals use a bearer service for exchange of information.
The definition of bearer service can be found in I.210 [9].

Bearer services are defined by means of different characteristics.

The network will provide the following bearer services according to the stage 1 ETSs (service descriptions) from ETSI:

5.1 Circuit Mode Bearer Services:

i) 64 kbit/s unrestricted, 8 kHz structured bearer service category. ETS 300 108 [10].

This bearer service provides a 64 kbit/s transparent digital connection without perverting the bit pattern. It is used for data communication services within ISDN.

*

i) 64 kbit/s, 8 kHz structured bearer service category usable for speech information transfer. ETS 300 109 [11].

This bearer service shall be used for speech only. A connection using this bearer service may include e.g. echo cancelation mechanisms and is therefore not recommended for data communication.

iii) 64 kbit/s, 8 kHz structured bearer service category usable for 3.1 kHz audio information transfer. ETS 300 110 [12].

This bearer service is used for audio based data communication, e.g. modem communication and the Fax group 3 service.
In case of interworking with PSTN this bearer service is always offered by the ISDN when a call is received from PSTN. For calls in the direction ISDN to PSTN, the calling user may either indicate this bearer service or the "speech" bearer service.

5.1.1 Provision and withdrawal

When subscribing to ISDN the user may subscribe individually to each bearer services or to all provided bearer services. This depends on the current marketing strategy.
The subscription options described in ETSs 300 108, 300 109 and 300 110 [10-12] clause 6.1 will not be provided.
Consequently:

- the numbers of available channels will always be the maximum number for a given interface type

- it is not possible to restrict the number of calls to be less than the maximum number of channels.

5.1.2 Establishment of communication

To all the bearer services apply that connections shall be established on a demand basis. Reserved and permanent connections will not be supported.

5.1.3 Service handling

The protocol to be used to establish and release a bearer service connection (basic call) is described in sec. 8.

At call set-up the user shall indicate the requested bearer service to the network in the Bearer capability information element included in the call request. The content of the Bearer capability information element to be accepted by the network is specified in ETR 018 [13].

5.2 Packet Mode Bearer Services:

These bearer services provide the unrestricted transfer of user information in a packetised manner over a virtual circuit within the B and/or the D-channel and are based on the X.25 [7] protocol.

5.2.1 Provision and withdrawal

It is possible for a user to subscribe individually to the B-channel bearer service and/or the D-channel bearer service.

B-channel service:

When subscribing to the B-channel service, the following subscription options apply:

- Virtual Call (VC) with a default X.25 service profile; or
- Virtual Call (VC) with a standard X.25 service profile; or
- Virtual Call (VC) with a customised(specific) X.25 service profile; or
- Permanent Virtual Circuit (PVC) with a customised(specific) X.25 service profile.

D-channel service:

When subscribing to the D-channel service, the following subscription options apply:

- Virtual Call (VC) with a standard X.25 service profile; or
- Virtual Call (VC) with a customised(specific) X.25 service profile; or
- Permanent Virtual Circuit (PVC) with a customised X.25 service profile.

Service profiles:

The following characteristics will apply for the service profiles:

- The "Default" service profile may be provided without any specific subscription and registration.
- A "Standard" service profile contains one specific set of capabilities and therefore must be subscribed to. It is associated to a specific ISDN-number.

- The "Customised" service profile is created individually per user and therefore must be subscribed to.

Note: The above descrition of the use of the service profiles reflects the network's capabilities, but does not necessarily reflect what will be provided commercially.

5.2.2 **Service handling**

The network provides the following packet mode bearer services according to the stage 1 ETSs from ETSI:

i) Virtual Call (VC) and Permanent Virtual Circuit (PVC) bearer services provided by the B-channel. ETS 300 048 [72]

The following characteristics apply for the VC service:

- A B-channel shall be established between the user and the network before a virtual packet switched connection (VC) can be established.

- Once the B-channel is established, virtual calls are established by using X.25 signalling in-band in the B-channel.

- The "conditional notification class" applies for incoming virtual calls, i.e. the first incoming virtual call will cause establishment of a B-channel to a compatible user terminal; subsequent virtual calls will be offered on the same B-channel.

The following characteristics apply for the PVC service:

- A B-channel shall always be established between the user and the network before a PVC can be used for data transfer. It is the user's responsibility to establish the B-channel to the network, and to keep the B-channel established

- Once the B-channel is established, the user can exchange X.25 data immediately, as the virtual connection to the destination is configured in the network at subscription time.

- It is possible to support VCs together with PVCs. In this case the "no notification class" will apply for incoming VC calls, i.e. all incoming VC calls will be offered on the already established B-channel.

ii) Virtual Call (VC) and Permanent Virtual Circuit (PVC) bearer services provided by the D-channel. ETS 300 049 [73].

The option "On demand layer 2 with fixed TEI values (Permanent Logical Link (PLL))" is supported. For this option a one to one relationship between an ISDN number and a logical link to a specific user terminal will exist.

The following characteristics will apply for the VC service:

- A logical D-channel link (layer 2) shall be established between the user and the network before a virtual packet switched connection (VC) can be established.

- Once the D-channel link is established, virtual calls are established by using X.25 signalling.

- The "no notification class" will apply for incoming virtual calls, i.e. all incoming virtual calls will be offered on the logical link to the user corresponding to the called ISDN number.

The following characteristics will apply for the PVC service:

- A logical D-channel link shall always be established between the user and the network. The establishment will be performed by the network, and the network is responsible for keeping the logical link established.

- Once the D-channel link is established, the user can exchange X.25 data immediately, as the virtual connection to the destination is configured in the network at subscription time.

- It is possible to perform VCs together with PVCs.
  In this case the "no notification class" will apply for incoming VC calls.

The complete specification of the stage 1 service requirements is given in Appendix G and Appendix H, which are application specifications to ETS 300 048 [72] and ETS 300 049 [73] respectively.

6 Teleservices

6.1 Teleservice types

6.1.1 ETSI defined teleservices

Teleservices provides a user with the full capacity for communication by means of terminal and network functions and possibly functions provided by dedicated networks.

The network supports teleservices in different ways:

- provide an appropriate bearer service,
- convey indicators end-to-end between users,
- provide special functions for a dedicated teleservice or
- provide interworking with other networks;

or the network supports combinations of these mechanisms.

The list below indicates the teleservices supported by the network.
Note that supporting a teleservice does not always imply that interworking with a dedicated network is supported.
Some of the teleservices are described in stage 1 ETSs by the ETSI subworking group NA1 and these are explicitly indicated in the list.

- Telephony, 3,1 kHz	ETS 300 111 [14]	1)
- Facsimile Group 2/3		2)
- Facsimile Group 4	ETS 300 120 [16]	2)
- Teletex/Facsimile Group 4, mixed mode		2)
- Teletex	T/NA1(90)03 [15]	3)
- Videotex	T/NA1(90)04 [17]	2)
- Telex		3)
- Message Handling Systems (MHS)		2)
- OSI application		2)

1) This teleservice is fully supported by the network, i.e. interworking with PSTN and international ISDNs, telephony functions such as provision of in-band tones and announcements and conveyance of high layer indicators within ISDN as described in sec. 6.2.

2) These teleservices are supported by the basic bearer service and basic interworking with PSTN and PSPDN without any special functionality for these services. Also the conveyance of high layer indicators within ISDN is supported.

3) As 2), but note that interworking with dedicated networks (Datex and Telex) is not supported.

6.1.2 Nationally defined "teleservices"

Besides the above-mentioned ETSI teleservices users may indicate "national teleservices" by use of the high layer indicator as described in sec. 6.2.
These "teleservices" are only supported by the basic bearer services and interworking and the conveyance of high layer indicators within Nordic ISDNs.
The following list shows the "national teleservices" defined with-in the Nordic ISDN.

- SNA (different types)
- DECnet
- IBM 3270
- Digital VT 100
- Digital VT 200
- IBM 5250
- Kermit
- New textcommunication services

The coding values for the national "teleservices" can be found in Appendix D.

6.2 Service handling

For normal call handling (without supplementary services) the teleservice may be indicated in the High Layer Compatibility information element (HLC) by the calling user. This indication is transported transparently through the network to the called user. The called user may use the information for compatibility checking.

The network will check the ETSI defined HLC values received from the calling user to ensure that the indicated service is one of those listed in sec. 6.1.1. If not, the HLC will be discarded and the call handling proceed; for details, see ETS 300 102-1 [18] clause 5.8.7.

Where supplementary services are involved in a call, the HLC may be used as a means to handle service dependent activation and invocation of supplementary services. In such situations the network will handle HLC according to the procedures given explicitly for the relevant supplementary services.

The service handling described above applies to ETSI defined teleservices.

If the network receives a "national" HLC from the calling user, this will be transported transparently through the network without any checking.

The network will not be able to handle teleservice dependent activation and invocation based on "national" HLC values.

7 Supplementary services

Supplementary services supported by the network provide additional capabilities to be used with bearer services and teleservices. They cannot be offered to a user as a stand alone service.

This section describes the supplementary services from a service point of view. The protocol specifications are given in sec. 8.

7.1 Supplementary services for circuit mode bearer services

7.1.1 ETSI supplementary service types

The network will provide a set of supplementary services according to the stage 1 ETSs (service description) from ETSI technical sub-committee NA1 and the stage 2 ETSs (functional capabilities and information flows) from ETSI technical sub-committee SPS1. The network options given in the stage 1 descriptions are clarified in Appendix A, which is an application document to these ETSs.

- Calling Line Identification Presentation (CLIP).

  When an incoming call is indicated to the called user, the calling user's ISDN-number and subaddress, if available, are presented to the called user (if not restricted by the calling user).
  This service will be offered to the called user on a subscription basis.

  Stage 1: ETS 300 089 [19].
  Stage 2: ETS 300 091 [20].

- Calling Line Identification Restriction (CLIR).

  Gives the calling user the possibility of preventing that his ISDN-number and subaddress, if available, is sent to the called user.
  This service will be offered to the calling user on a subscription basis.

  Stage 1: ETS 300 090 [21].
  Stage 2: ETS 300 091 [20].

- Subaddressing (SUB).

  The calling user may, in addition to the called user's ISDN-number, include the called user's subaddress in the call request. This subaddress will be transported transparently through the network and will be delivered to the called user.
  This service will be offered to the called user on a subscription basis.

  Stage 1: ETS 300 059 [22].
  Stage 2: ETS 300 060 [23].

- Terminal Portability (TP).

  During an active call, the call may be moved to another terminal, or the terminal may be physically moved to another ISDN-connector on the same S-bus.

This service will be offered to the called or calling user on a subscription basis.

Stage 1: ETS 300 053 [24].
Stage 2: ETS 300 054 [25].

- Call Waiting (CW).

During an active call, a user may receive indication about a new incoming call, and may accept this call by clearing the active call or putting the active call on hold. Alternatively, the user may reject or ignore the new incoming call.
This service will be offered to the called user on a subscription basis.

Note: For an interim period of time, the calling user will not in all cases be notified that the call is waiting at the called user.

Stage 1: ETS 300 056 [26].
Stage 2: ETS 300 057 [27].

- Direct Dialling In (DDI).

In connection with private ISDNs (e.g. ISPBXs) a group of consecutive ISDN numbers may be assigned to the private ISDN. When an incoming call is indicated to the private ISDN the called ISDN number is included in the indication and may be used by the private ISDN to perform internal routing.
* The size of the number group may be 10, 100, 1000, 10,000 numbers.
This service will be offered to the called user on a subscription basis.

Stage 1: ETS 300 062 [28].
Stage 2: ETS 300 063 [29].

- Multiple Subscriber Number (MSN).

Provides the possibility of assigning a number of ISDN numbers to a basic access used primarily for terminal selection. Each subscriber can be assigned a maximum of 8 numbers.
This service will be offered to the called user on a subscription basis.

Stage 1: ETS 300 050 [30].
Stage 2: ETS 300 051 [31].

- User to user signalling (UUS), service 1 implicit.

During establishment and clearing of a call users may exchange user-to-user information included in signalling messages.
This service will be offered to the calling user on a subscription basis.

Stage 1: T/NA1(89)06 [32].
Stage 2: T/S 22-17 [33].

* - Connected Line Identification Presentation (COLP).

When a call is answered by the connected user, the connected user's ISDN-number and subaddress, if available, are presented to the calling user(if not restricted by the

connected user).
This service will be offered to the calling user on a subscription basis.

Stage 1: ETS 300 094 [65].
Stage 2: ETS 300 096 [66].

* - Connected Line Identification Restriction (COLR).

Gives the connected user the possibility of preventing that his ISDN-number and subaddress are sent to the calling user.
This service will be offered to the connected user on a subscription basis.

Stage 1: ETS 300 095 [67].
Stage 2: ETS 300 096 [66].

* - Call Hold (HOLD)

Gives the possibility to put a call on hold and thereby reserve a B-channel and use it for a new outgoing or incoming call. When appropriate, the held call may be retrieved.
This service will be offered to the called or calling user on a subscription basis.

Note: For an interim period of time, the remote user will not in all cases be notified that the call is put on hold.

Stage 1: ETS 300 139 [68].
Stage 2: ETS 300 140 [69].

* - Closed User Group (CUG)

Gives the possibility for a number of users to form a group to and from which calls are restricted. A user can be member of one or more closed user groups.
The service includes capabilities to allow group members to originate calls outside the group, and/or receive calls from outside the group. Additionally, capabilities exist to prevent group members from originating calls to or receiving calls from other members of the same group.
This service will be offered on a subscription basis to the calling and called user who must be member of the same group.

Stage 1: ETS 300 136 [70].
Stage 2: ETS 300 137 [71].

7.1.2 National supplementary service types

The following supplementary services are not specified by ETSI, but are provided according to national standards. They can be used by ordinary ISDN terminals as no specific user-network signalling exsists for these services.
These services are not described in details in this document further than as follows.

- Interception service

Users can request this service, e.g. during holidays, to reroute incoming calls to either a general announcement function or to a public operator who can then pass

a message, defined by the served user, to the calling user. The service is only applicable to the telephony telesevice.
This service will be offered to the called user on a subscription basis.

- Priority

During emergency situations this service will give priority to groups of users in the handling of calls.
This service will be offered to the calling user on a subscription basis.

Note: Subscription to Priority shall be based on permission from the authorities.

- Line hunting

For connection of ISPBXs to a number of basic or primary rate accesses at the T reference point some ETSI specifications are still needed e.g. the Line Hunting supplementary service.
For an interim period of time, the network will be able to perform line hunting over a number of BA and/or PRA interfaces with no other functionality than the hunting.
The service will be provided according to an agreement between the user and the service provider and no specific user-network signalling concerning the line hunting functionality is provided.
This service will be offered to the called user on a subscription basis.

* - Trunk Offering

This service provides telephony calls to ticket agencies, doctors, cinemas etc. with a higher degree of service.
Via a public operator, it is possible for a user to order establishment of a call towards a "heavy busy" user and have preference to normal call request. It is also possible for the operator to offer an incoming call to a busy user by use of spoken annoucement (intrusion).
This service shall not be subscribed to by users.

* - Outgoing Call Barring

This service makes it possible for the served user to prevent outgoing calls. The served user is able to subscribe to different categories of calls to be barred. Selection of a barring category is managed only via the network operator, i.e. the user cannot select category by means of user-network signalling.
This service will be offered to the calling user on a subscription basis.

7.1.3 Provision and withdrawal

* It will be possible to subscribe to each supplementary service individually for each ISDN-access or for specific basic services and/or ISDN-numbers within an access. For details, see the individual stage 1 descriptions.
If a user requests a supplementary service not suscribed to, the request will be rejected according to the procedures specified in the relevant stage 3 description.

7.1.4 Service handling

Generally, a supplementary service is offered as an addition to a Basic service. A Basic service is defined as a Bearer service or a Teleservice.

7.1.4.1 Basic services

A number of supplementary services can be operated (e.g. activeted or invoked) related to a Basic service.
Examples are the Closed user group supplementary service where a specific closed user group applies for one or a list of Basic services, and the Call diversion supplementary service (not part of this document) where call forwarding can be activated for incoming calls indicating a specific Basic service.

The following Basic services are defined by ETSI (see ETS 300 196, Annex D.5):

- Speech
- Unrestricted digital information
- Audio 3.1 kHz
- Telephony
- Teletex
- Telefax G4 class 1
- Videotex, syntax based
- Videotelephony (Note)
- Telefax G 2/3

Note: The Basic service Videotelephony is currently supported only by the provision of the 64 kbit/s unrestricted bearer service.

7.1.4.2 Basic service handling

During supplementary service operation, a Basic service can be indicated in two different ways:

- the Basic service is indicated explicitly in an ASN.1 coded parameter sent from the user to the network or visa versa. (Not used in this version of INAD).
  This method is used for e.g. the Call diversion supplementary service.

  Note: If the nationally defined keypad signalling is used, the Basic service may be indicated explicitly in the keypad information sent from the user to the network.

- The Basic service is implicitly indicated by the combination of the bearer capability information and the high layer compatibility information indicated as part of the basic call procedures. This method is used in e.g. the Closed user group supplementary service.

The association between the combination of the bearer capability and the high layer compatibility information and the Basic service is shown in table 1.

High layer compatibility	**Bearer capability**			
	Speech	3.1 kHz Audio	Unrestricted digital inf.	Other
Telephony	telephony	audio 3.1 kHz	unr. digital information	Note 1
Facsimile G 2/3	speech	telefax group 2/3	unr. digital information	Note 1
Facsimile G4 class 1	speech	audio 3.1 kHz	telefax G4 class 1	Note 1
Teletex basic mode	speech	audio 3.1 kHz	teletex	Note 1
Videotex	speech	audio 3.1 kHz	videotex syntax based	Note 1
Audiovisual G 2/3	speech	audio 3.1 kHz	unr. digital information Note 2	Note 1
Other	speech	audio 3.1 kHz	unr. digital information	Note 1

Table 1.

Note 1: The use of other bearer capabilites shall be rejected.

Note 2: The Basic service Videotelephony is only supported by the provison of the 64 kbit/s unrestricted bearer service.

7.2 Supplementary services for packet mode bearer services

Generally, the packet mode bearer services shall not use the supplementary services described i sec. 7.1.
However, the MSN and DDI supplementary services may be used for terminal selection and identification in the case of an incoming packet mode call and for calling party identification in case of an outgoing packet mode call.

In the case of an incoming call on the B-channel, the called party subaddress information element will be provided to the called user if the called address extension field is included in the X.25 incoming call packet, and if the called user subcribes to the SUB supplementary service. In this case the SUB supplementary service can be used for terminal/application selection purposes.
It should be noted that the use of this capability is restricted as only the first incoming call can make use of subaddress as a terminal/application selection mechanism, because the following calls will be provided in-band on the already established B-channel.

A number of X.25 based supplementary services, so-called user facilities, will be available for ISDN users subscribing to a packet mode bearer service.
These user facilities are defined in ETS 300 048 [72] and ETS 300 049 [73] and are completely specified in Appendix G and Appendix H respectively, which are application specifications to the ETSs.

Two levels of user facilities exist:

- User facilities provided when subscribing to the default or standard service profile. These user facilities are specific for the network and apply for all users.

- User facilities provided when subscribing to the customised (specific) service profile. In this case the user facilities are individually subscribed to per user.

8 Interfaces and signalling protocols

This section specifies the interfaces to the public ISDN and the stage 3 protocols for these interfaces.
Terminals connected to the public ISDN shall follow the protocol specifications given in this section.
The approval requirements are given in sec. 8.3.

8.1 Configuration

The following figure 2 identifies the interfaces between the user and the network.

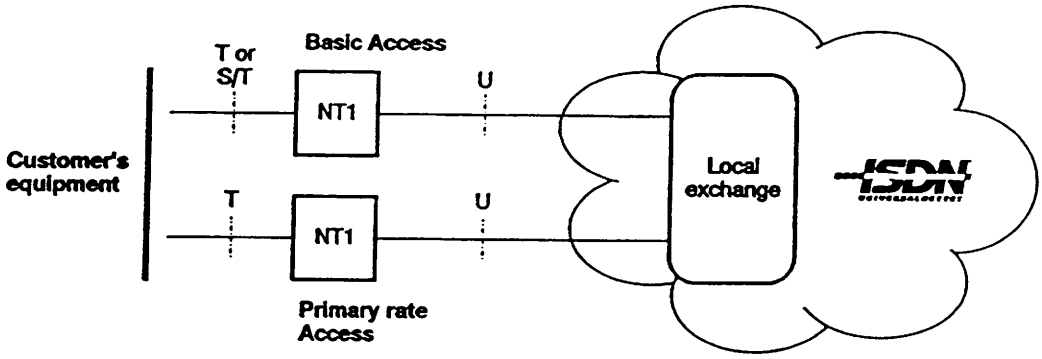


Figure 2: Interface configuration

8.2 User-Network interfaces

The network will provide the defined services for the user via the basic access interface with a 2B + D channel structure or via the primary rate access with a 30B + D channel structure.

The basic access will be provided for use in two different modes:

i) As coincident S/T reference point applicable for public terminal access on a passive bus using layer 3 point-to-multipoint procedures.

ii) As T reference point applicable for connection to private ISDN including a network termination NT2 (e.g an ISPBX) using layer 3 point-to-point procedures.

The primary rate access will be provided at the T reference point applicable for connection to private ISDN including a network termination NT2 (e.g an ISPBX) using layer 3 point-to-point procedures.

In the following subsections specifications are given for the interfaces and the stage 3 DSS1 signalling protocols.

8.2.1 Basic access, S/T and T reference points

8.2.1.1 Physical layer (layer 1)

At the coincident S/T and the T reference point the user shall be able to connect terminals on a short passive bus, an extended bus or a point-to-point configuration.

The standard ETS 300 012 [34] applies.

The complete layer 1 specification is given in Appendix B which is an application specification to ETS 300 012 [34].

8.2.1.2 DSS1 Link layer (layer 2)

The standard ETS 300 125 [35] shall apply.

The complete layer 2 specification is given in Appendix C which is an application specification to ETS 300 125 [35].

* Further requirements to layer 2 when used for packet mode bearer services are given in ETS 300 007 [8] and clarified in Appendix K which is an application specification to ETS 300 007.

8.2.1.3 DSS1 Network layer (layer 3)

The layer 3 protocol shall be able to handle point-to-multipoint procedures applicable to terminals connected to a passive bus in a point-to-multipoint configuration (the coinsident S/T reference point).
Furthermore, the layer 3 protocol shall be able to handle point-to-point procedures applicable for e.g. connection to private ISDN including an NT2 (the T reference point). The network's knowledge of which procedures are to be used at the user-network interface shall be given to the network operator at subscription time.

If point-to-point procedures are subscribed to, layer 1 and layer 2 are permanently. established.

8.2.1.3.1 Circuit mode procedures

Basic call:

The standards ETS 300 102-1 [18] and ETS 300 102-2 [36] shall apply concerning basic call handling for the defined bearer and teleservices.
The complete layer 3 specification is given in Appendix D, which is an application specification to ETS 300 102-1 [18].

ETSI supplementary services:

* In general, the protocols used for handling of supplementary services are based on the functional signalling procedures. The generic specification for these procedures can be found in ETS 300 196 [74]. The protocol requirements for the individual supplementary services are given in the individual stage 3 descriptions.

* However, the protocol for the CUG supplementary service will make use of Keypad

signalling procedures. These procedures are not standardized by ETSI for the individual supplementary services, but only concerning the generic procedures which can be found in ETS 300 122 [75]. The complete specification of the generic Keypad signalling procedures is given in Appendix I which is an application specification to ETS 300 122.

The protocol specifications for the individual supplementary services using functional procedures are given in the following ETSI standards:

- Calling Line Identification Presentation (CLIP).

  Stage 3: ETS 300 092 [37].

- Calling Line Identification Restriction (CLIR).

  Stage 3: ETS 300 093 [38].

- Subaddressing (SUB).

  Stage 3: ETS 300 061 [39].

- Terminal Portability (TP).

  Stage 3: ETS 300 055 [40].

- Call Waiting (CW).

  Stage 3: ETS 300 058 [41].

- Direct Dialling In (DDI).

  Stage 3: ETS 300 064 [42].

- Multiple Subscriber Number (MSN).

  Stage 3: ETS 300 052 [43].

- User to user signalling (UUS) service 1 implicit.

  Stage 3: ETS 300 102-1 [18]

* - Connected Line Identification Presentation (COLP).

  Stage 3: ETS 300 097 [76].

* - Connected Line Identification Restriction (COLR).

  Stage 3: ETS 300 098 [77].

* - Call Hold (HOLD).

  Stage 3: ETS 300 141 [78].

* - Closed User Group (CUG).

Stage 3: Appendix K.

- Interaction between supplementary services.

Stage 3: ETS 300 195 [44].

The complete layer 3 specification for supplementary services (except for CUG) is given in Appendix E, which is an application specification to the ETSs.

National supplementary services:

- Interception Service

No impact on the DSS1 protocol.

- Priority

No impact on the DSS1 protocol.

- Line Hunting

No impact on the DSS1 protocol.

* - Trunk Offering

No impact on the DSS1 protocol.

* - Outgoing Call Barring

No impact on the DSS1 protocol.

8.2.1.3.2 Packet mode procedures

Basic call:

The requirements given in ETS 300 007 [8] applies concerning basic call handling for the defined packet mode bearer services.
The complete specification of the stage 3 requirements is given in Appendix F which is an application specification to ETS 300 007, Case B.

The main characteristics of the handling of basic packet mode virtual calls (VCs) are briefly described in the following.

In ISDN, the packet switching is performed by a dedicated unit called a Packet Handler (PH). This applies to packet calls within ISDN as well as interworking with PSPDN.

i) Packet switched calls on the B-channel:

An outgoing call from an ISDN user is accomplished in to stages.

In the first stage, a circuit switched B-channel is set up on demand to the PH

using DSS1 signalling and indicating "packet mode" bearer capability in the SETUP message.
In the second stage, the ISDN user performs one or more normal packet switched calls using X.25 layer 2 (LAPB) and 3 (PLP) signalling in the B-channel, and including the called ISDN (or PSPDN) user's E.164 (X.121) number as called address and the ISDN user's E.164 number as calling address.

An incoming call to an ISDN user is also accomplished in to stages.

In the first stage, the PH sets up a B-channel to the ISDN user using DSS1 signalling and the ISDN user's E.164 ISDN number.

In the second stage, the PH conveys the X.25 layer 2 and X.25 layer 3 signalling to the ISDN user in the B-channel in order to establish a packet switched connection to the ISDN user.

In general, once the B-channel between the PH and the ISDN user's terminal equipment has been established, packet switched connections in both directions may be established on this B-channel. I.e. the first stage mentioned above is only necessary when establishing the first packet switched connection.

The PH surveys the packet connections on the B-channel and will disconnect the B-channel after a predefined time after clearing of the last X.25 packet connection. Furthermore, the ISDN user's terminal may perform the same surveillance functionallity.

ii) Packet switched calls on the D-channel:

At subscription time, a permanent logical link (PLL) is allocated (but not established) between the ISDN user's terminal and the PH. From the terminal's point of view, this PLL is recognized by means of the SAPI value 16 and the terminal's TEI value. The terminal must be able to support the fixed TEI values 0 - 63.

When an outgoing call from an ISDN user is initiated, the user first establishes the PLL using DSS1 layer 2 (LAPD) procedures.
Then the ISDN user performs one or more packet switched calls using X.25 layer 3 signalling in the D-channel, and including the called ISDN (or PSPDN) user's E.164 (X.121) number as called address and the ISDN user's E.164 number as calling address.

For incoming calls to an ISDN user, the PH first establishes the PLL to the ISDN user (if not already established). The PH identifies the user based on mapping between the user's E.164 number (as received from the calling user) and the user's PLL.
Then the PH conveys the X.25 layer 3 signalling to the ISDN user on the D-channel in order to perform one or more packet switched connections to the ISDN user.

In general, once the PLL between the PH and the ISDN user's terminal equipment has been established, packet switched connections in both directions may be established on this PLL.

The PH surveys the packet connections on the D-channel and will disconnect the D-channel after a predefined time after clearing of the last X.25 packet connection. Furthermore, the ISDN user's terminal may perform the same surveillance functionallity.

Supplementary services:

The protocol requirements for supplementary services (user facilities) are given in CCITT Recommendation X.25 [7].
However, if the user subscribes to MSN or DDI, these services can be used for terminal selection in case of incoming packet mode calls.

8.2.2 Primary rate access, T reference point

8.2.2.1 Physical layer (layer 1)

The standard ETS 300 011 [45] applies.
No application specification document is provided to this ETS.

8.2.2.2 DSS1 Link layer (layer 2)

The same specifications as for sec. 8.2.1.2 apply.

8.2.2.3 DSS1 Network layer (layer 3)

The same requirements as specified for the T reference point in sec. 8.2.1.3 apply.

Basic call:

The same specifications as for sec. 8.2.1.3.1 apply, but only the point-to-point procedures are applicable.

ETSI Supplementary services:

The same specifications as for sec. 8.2.1.3.1 apply.

National supplementary services:

The same specifications as for sec. 8.2.1.3.1 apply.

8.3 * Approval requirements

According to the Minister for Communications Executive Order No. 882 of 29th October 1992, all Telecommunications terminal equipment for connection to the public telecomminications network has to be approved by the National Telecom Agency.

For ISDN terminal equipment, the National Telecom Agency has laid down "Preliminary Technical Regulations" which are required to be met in order that a temporary approval may be given. The preliminary regulations are based on ETSs and draft ETSs. Parts of the regulations need not be verified since the test equipment of the laboratories cannot yet perform the complete test-suite.

The "Preliminary Technical Regulations" can be obgtained from the National Telecom

Agency and are subject for changes during 1993.

When as well agreed ETSs are available and the laboratories can verify all requirements of the ETSs, the National Telecom Agency will establish "Technical Regulations" which are required to be met in order that type approvals may be given.

By then, equipment under temporary approvals may be called in for renewed testing before a final type approval can be given.

CTRs (Common Technical Regulations) for ISDN terminal equipment will be implemented in Denmark according to directive 91/263/EEC.

Except from the requirements specified in the following, no requirements are stated for the approval of an ISDN terminal. However, it should be noted that ETSI is in the process of providing a number of conformance test standards for terminal equipment. It is strongly recommended that these standards are taken into consideration.

8.3.1 Approval requirements for ISDN basic access

For ISDN basic access, the Danish preliminary regulations (foTB92021 [79]) refer directly to a number of adopted and non-adopted ETSs and prETSs where all tests are not required to be verified to allow a temporary approval to be given.

These ETSs are:

ETS 300 153 [61] (NET3 part 1) contains the requirements and verification for:

- Basic access layer 1 (referring to ETS 300 012 [34]);
- DSS1, Layer 2 (referring to ETS 300 125 [35]);

ETS 300 104 [46] (NET 3 Part 2) contains the requirements and verification for:

- DSS1, Layer 3, basic circuit switched calls (referring to ETS 300 102-1 [18] and ETS 300 102-2 [36]).

8.3.2 Approval requirements for ISDN primary rate access

For ISDN primary rate access, the Danish preliminary regulations (foTB92022 [80]) refer directly to a number of adopted and non-adopted ETSs and prETSs.

These ETSs are:

ETS 300 156 [49] (NET 5) contains the requirements and verification for:

- Primary rate access layer 1 (referring to ETS 300 011 [45]);
- DSS1, Layer 2 (referring to ETS 300 125 [35]);
- DSS1, Layer 3, basic circuit switched calls (referring to ETS 300 102-1 [18] and ETS 300 102-2 [36]);

None of the specified tests are required to be verified at the moment, but a temporary

approval is based on a declaration by the manufacturer.

8.3.3 Approval requirements for ISDN telephony handset

For ISDN telephony handset terminals (3.1 kHz bandwith), the Danish preliminary regulations (foTB92023 [81]) refer to the above mentioned preliminary regulations for ISDN basic access and to the ETS adopted for 3.1 kHz telephony handset terminals, ETS 300 085 [52] (NET 33).

9 Interworking

This section gives a short description of the interworking between ISDN and other networks and network applications.
Interworking with services and applications which are based on terminals using only the basic services in ISDN are not included in this document.

9.1 Interworking with existing networks

9.1.1 Interworking with PSTN

9.1.1.1 Bearer/teleservice interworking

The interworking function to PSTN provides the use of "speech" or "3.1 kHz audio" bearer services between the two networks.

The interworking does not provide modem-pools for modem communication with PSTN users. This type of communication can be performed only by the use of modems and TA-a/b at the ISDN user's installation.

Furthermore, functions supporting DTMF in-band end-to-end signalling are not provided in the network, but are a matter of terminal implementation.

* Note: It is recommended that terminals support DTMF in-band signalling in the active state of a call as well as during call establishment.

Outgoing call characteristics:

When an ISDN user makes an outgoing call to PSTN the "speech" bearer service will be used for telephony and the "3.1 kHz audio" bearer service will be used for audio based data communication.

If the ISDN user provides a teleservice indicator in the call request this indicator will be discarded by the interworking unit, since such an indicator cannot be delivered through the PSTN to the called user.

When an alerting indication is received from the called PSTN user, an progress indication indicating "call is not end-to-end ISDN" is also received. This indication may be used by the ISDN user as an indication that the requested call may experience a decrease in service.

Incoming call characteristics:

When an ISDN user receives an incoming call from PSTN, the "3.1 kHz audio" bearer service is always used in the ISDN. Furthermore, a teleservice indicator cannot be provided. The only indication that the ISDN user gets is a progress indicator in the call request saying that the "call is not end-to-end ISDN".

Consequently, the called ISDN user cannot distinguish between incoming telephony calls and modem or Fax group 3 calls by the use of service indicators. In order to provide this distinction, the ISDN user must subscribe to the MSN or DDI supplementary service to allocate different ISDN numbers for selection of different types of terminals.

9.1.1.2 **Supplementary service interworking**

The interworking with PSTN has no impact on the use of supplementary services except for the following services:

- Calling Line Identification Presentation (CLIP).

  The calling line identification received from PSTN will not be delivered to the called ISDN user. Instead an indication saying that delivery is "not allowed due to interworking" will be given to the called user.

  Note: In the case the called user has the "override" category, the calling Line identification is delivered if received from PSTN.

- Calling Line Identification Restriction (CLIR).

  The calling line identification is permanently restricted for calls to PSTN and will therefore not be delivered to the PSTN user.

- Subaddressing

  Suaddressing cannot be used for calls interworking with PSTN.

- Call Waiting (CW)

  The notification of calling user is not supported.

* - Connected Line Identification Presentation/Restriction COLP/R)

  COLP/R are not supported by PSTN.

* - Call Hold (HOLD)

  The notification of remote user is not supported.

* - Closed User Group (CUG)

  CUG is not supported by PSTN. CUG calls towards PSTN will be rejected.

9.1.2 **Interworking with PSPDN**

The interworking with PSPDN is a bearer service interworking.

Except for the MSN and DDI supplementary services, which may be used for terminal selection at the called ISDN user's interface, there is no interworking between the supplementary services provided by the PSPDN and supplementary services provided by the ISDN. E.g. the ISDN supplementary service CLIR cannot be used to prevent the presentation of the calling party number to the called party.

Interworking between the X.25 based supplementary services in ISDN (provided by the Packet Handler) and the corresponding supplementary services in PSPDN is provided in the same way as between two PSPDNs.

9.1.2.1 X.25 interworking (access to DATAPAK)

* Interworking with PSPDN X.25 service is supported according to the Case B scenario specified in ETS 300 007 [8]. An application specification to this ETS can be found in Appendix F.
* Seen from an ISDN user's point of view, call to/from PSPDN will be provided with the same characteristics as packet mode calls between ISDN users.

9.1.2.2 X.32 interworking

There is no direct interworking with the X.32 [51] service in PSPDN (i.e. no dedicated network equipment to support this interworking will be provided).

Note: An indirect interworking may be used via the PSTN.
X.25/X.32 terminal equipment with modem (e.g. DTE + modem + TA-a/b) can access the PSPDN X.32 service via the PSTN using the "3.1 kHz Audio" bearer service.

9.1.2.3 X.28 interworking

There is no direct interworking with the X.28 [1] service in PSPDN (i.e. no dedicated network equipment to support this interworking will be provided).

Note: An indirect interworking may be used via the PSTN.
Asynchronous terminal equipment with modem (e.g. DTE + modem + TA-a/b) can access the PSPDN PAD service via the PSTN using the "3.1 kHz Audio" bearer service.

9.2 Interworking with network applications

In the first implementation of commercial ISDN there is no provision of interworking directly to network applications such as "Alarmnet", Datapost400 (X.400), etc.
Some of these network applications may be used via one of the existing networks by the use of terminal equipment applicable for communication via these networks.

10 Numbering, addressing and routing

10.1 General principles

ISDN numbering and addressing principles are based on CCITT Rec. E.164 [53], I.330 [55], I.331 [56], ETSI ETR 006 [57] and ETSI ETR 026 [58].
Numbering principles for interworking between ISDNs and dedicated networks with different numbering plans is based on CCITT Rec. I.332 [59].
For all types of services, an ISDN user is identified by a number in the E.164 [53] numbering plan which corresponds to the numbering plan in PSTN, E.163 [60].

10.1.1 Principles for circuit mode services

For national calls within ISDN or between ISDN and PSTN users, national E.164 numbers shall be used.

For calls towards international ISDNs or PSTNs, a prefix (currently "009"; in the future "00") and the country code shall precede the called user's national number.

10.1.2 Principles for packet mode services

In the case of packet mode communication, number information is contained in the X.25 signalling.
ISDN users are identified by E.164 numbers, while users connected to PSPDN are identified by means of the X.121 [54] numbering plan.

For national calls within ISDN, national E.164 numbers shall be used.
For calls towards international ISDN users, a prefix (currently "009"; in the future "00") and the country code shall precede the called user's national number.

Note: As the numbering principles are still under consideration, the above principles for ISDN calls may be replaced by the use of full international number format (i.e. country code + national ISDN number without prefix) for both national and international ISDN calls.

For communication between ISDN users and PSPDN users there is a requirement for interworking between the E.164 numbering plan and the PSPDN X.121 numbering plan used in PSPDN. In accordance with CCITT Recommendation X.122 [83] two short-term interworking methods exist. In the Danish network, the escape code method is used.
The escape code 0 (zero) indicates a change to another numbering plan, i.e. that the number following the escape code is foreign to the network.

For calls towards PSPDN (national or international), the ISDN user must indicate the full international X.121 number (DNIC + national number) preceded by the escape code (0).

The Packet Handler will "swap" the escape codes in the interworking situation.

10.3 Addressing possibilities

Direct Dialling In (DDI):

Direct calls to extension numbers belonging to ISPBXs can be accomplished by the use of the DDI supplementary service.

* DDI numbers are a set of consecutive ISDN numbers within a group assigned to the subscriber. The size of such a group may be 10, 100, 1000 or 10,000.
DDI numbers and ordinary subscriber numbers are never mixed, although loss of numbers may occur.

Normally, an extension number is a part, e.g. the last four digits, of the 8 digits DDI number so that the ISPBX can route an incoming call directly to the extension.
When an incoming call is indicated to the called ISPBX, the full called ISDN-number is included in the incoming call indication.

Multiple Subscriber Number (MSN):

In connection with public Basic Access, the MSN supplementary service may be used for terminal selection.
One or up to 8 numbers (not necessarily consecutive) may be assigned to the subscriber.

When an incoming call is indicated to the called user's interface, the full ISDN number of the called user is included in the incoming call indication. It is then up to the user's terminals to verify the received number.

Subaddressing (SUB):

Subaddressing may be used within ISDN for selection of terminals or applications within terminals.
A subaddress is not a part of the public numbering plan, but is transported transparently through the network from the calling user to the called user without any interpretation in the network.

10.4 Use of numbering indicators at the user-network interface.

From the user's point of view, number types and numbering plans can be indicated in different ways.

This section specifies how the user can indicate "number type" and "numbering plan" to the network, and how the network will react on these indications.

The requirements apply for the user-network DSS1 signalling for outgoing basic calls. The use of indications in connection with supplementary services is not included, but is explicitly indicated in relevant specifications.

The network is able to analyze a call request from the user according to the flow given i figure 3.

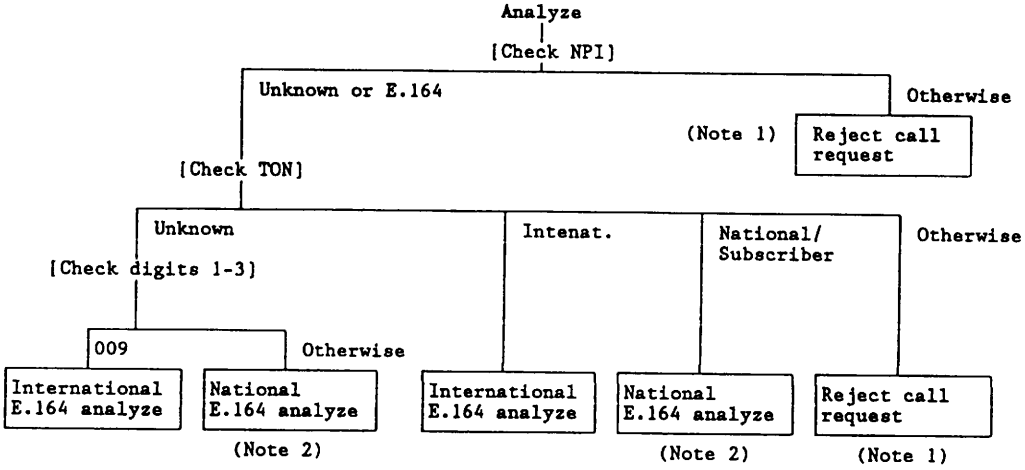
The following is assumed:

- The user may indicate "Number type" (e.g. international number) either by using the "Type of number" (TON) field in the Called party number information element according to ETS 300 102-1 [18] subclause 4.5.8, or by using prefix digits (currently "009", in the future "00").

- If prefix digits are used, TON shall be coded as "unknown".

- TON indicating values different from "unknown" is only relevant if "numbering plan" is E.164.

- If NPI indicates "unknown" the network shall interprete this as default E.164.



Note 1: When rejecting the call request from the user the network shall send cause # 28 "Invalid number format" in the reject message to the user.

Note 2: The national E.164 analyze does also include network specific administration/service numbers.

Figure 3

11 Maintenance for the ISDN user-network interface

There are no specifications for O&M-procedures at the user-network interface to be fulfilled by ISDN terminals except the specifications included in the protocol specifications (ETS 300 012 [34], ETS 300 011 [45], ETS 300 125 [35] and ETS 300 102-1 [18]).
The O&M-procedures used by the network for supervision of the user-network interface have no impact on the terminal equipment.

The Danish Public Telecommunication Interprises

ISDN Supplementary Services

Service Description

Application specification document to ETSI ETSs:

Integrated Services Digital Network (ISDN), Supplementary Services, Service description.

February 1993

Table of contens:

INTRODUCTION

This document gives the service descriptions (stage 1) for the supplementary services in the Danish ISDN.

The service descriptions are contained in ETSI ETSs and this document is an application specification to these ETSs.

Generally, this document is related to the service description and does not indicate any protocol related functions provided by the network.

Concerning interactions with other supplementary services only interactions between the supplementary services discussed in this document are included.

Structure of the document

The document contains a section for each supplementary service. Each main section deals with the following areas:

- selection of which options in the ETSs that are applicable in the Danish ISDN
- requirements to those cases which are indicated as implementation dependent in the network
- some clarifications to certain sections of the ETSs, where this is felt to be necessary.

Note: Only subclauses to which remarks apply are listed in the document. Subclauses not indicated shall be considered as "applicable".

DDI - Direct Dialling In

Application to ETSI ETS 300 062.

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

The network shall send the full ISDN-number to the called user.

6 Procedures

Applicable.

7 Intercommunication considerations

Applicable.

8 Interaction with other supplementary services

8.13 Multiple subscriber number

NOTE 1: Subscription to DDI and MSN supplementary services shall be mutually exclusive.

MSN - Multiple Subscriber Number

Application to ETSI ETS 300 050.

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

~~MSN is not applicable for primary rate access.~~

The full national ISDN number shall be transmitted whenever multiple subscriber number supplementary service is used.

NOTE 3: The actual method of relating the MSN to a particular terminal is a matter of the terminal manufacturer and/or the user's responsebility.

6 Procedures

6.1 Provision and withdrawal

NOTE:The network shall not support specific digits or sequence of digits for selection of all terminals on an interface. This functionallity is a matter of user's responsebility.

The user cannot make any requirements on the structure of the numbers, for example that the least significant digit shall be different among the various MSN-numbers assigned to the interface.

6.2.3 Invocation and operation

The full national ISDN number shall always be sent to the called user.
When MSN supplementary service is provided to a user, one of the numbers shall be treated like a default number to be used by the network for outgoing calls when the originating user does not deliver any originating address information.

7 Intercommunication considerations

Applicable.

8 Interaction with other supplementary services

Other supplementary services shall be applicable to the individual multiple subscriber number.

8.9 Direct dialling in

NOTE 1: Subscription to DDI and MSN supplementary services shall be mutually exclusive.

SUB - SUBaddressing

Application to ETSI ETS 300 059.

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

5.1 Size of subaddress

The maximum size of the subaddress shall be 20 octets.

Note:For an interim period the size of the subaddress is limited to 4 octets in connection with international calls.
It is the user's responsibility not to exceed this maximum size; if exceeded the network shall discard the subaddress information without any information to the calling user.

6 Procedures

6.1.2 Provision and withdrawal - called subscriber

The SUB supplementary service shall be applicable on a subscription basis.

7 Intercommunication considerations

Applicable.

8 Interaction with other supplementary services

Applicable.

CLIP - Calling Line Identification Presentation

Application to ETSI ETS 300 089.

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

Applicable.

6 Procedures

6.1 Provision and withdrawal.

The CLIP supplementary service shall be provided on a subscription basis.

Special arrangement shall not be provided.

6.2.3 Invocation and operation

Special arrangement shall not be provided.

6.2.3.1 Calling user side

Special arrangement shall not be provided.

7 Intercommunication considerations

Applicable.

7.1 Interworking with non-ISDNs

If the network cannot provide the calling line identity to the called ISDN user due to interworking, this shall be indicated to the called ISDN user.

8 Interaction with other supplementary services

8.5.2 Calling line identification restriction

If the served user has an override category then the CLIP supplementary service shall take precedence over the CLIR supplementary service.

8.9 Direct dialing in

Special arrangement shall not be provided.

8.13 Multiple subscriber number

Special arrangement shall not be provided.

CLIR - Calling Line Identification Restriction

Application to ETSI ETS 300 090.

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

Applicable.

6 Procedures

6.1 Provison and withdrawal

The CLIR supplementary service, temporary mode, shall be provided on a subscription basis.

The network shall provide all the subscription options.

6.2.3.2 Called user side

NOTE 1: The network shall be able to handle override category.

7 Intercommunication considerations

Restrictions concerning international calls between international ISDNs are a matter of bilateral agreement between service providers.

NOTE: Not applicable for national calls.

7.1 Interworking with non-ISDNs

It shall be possible to restrict any information identifying the calling party from being forwarded to the non-ISDN network.

7.2 Interworking with private ISDNs

On calls from the public ISDN to the private ISDN, the public ISDN shall restrict any information identifying the calling party from being sent to the private ISDN when the CLIR supplementary service has been invoked by the calling user.

8 Interaction with other supplementary services

8.5.1 Calling line identification presentation

If the served user has an override category then the CLIP supplementary service shall take precedence over the CLIR supplementary service.

TP - Terminal Portability

Application to ETSI ETS 300 053.

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

Applicable.

6 Procedures

6.1 Provision and withdrawal

The TP supplementary service shall be provided on a subscription basis.

6.2.3 Invocation and operation

The network shall send indications to the remote user.

Since an inconsistency exists between stage 1 and stage 3 concerning the call identity length, the following requirement shall apply for the network:
The maximum length of the call identity shall be 8 octets.

7 Intercommunication considerations

Applicable.

8 Interaction with other supplementary services

Applicable.

CW - Call Waiting

Application to ETSI ETS 300 056.

1 Scope

The CW supplementary service shall be applicable for all circuit switched on demand bearer services.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

Applicable.

6 Procedures

6.1 Provision and withdrawal

CW shall be provided on a subscription basis.

The subscription option "Calling user receives notification that their call is waiting" is not applicable, i.e., the network shall always send a notification to the calling user.

Note: For an interim period of time the notification will not be delivered to the remote user, if the ISDN user part (ISUP) is involved in the call.

The maximum number of waiting calls shall be limited to one.

T2 is not applicable. The timer is replaced by normal call control timer.

7 Intercommunication considerations

7.1 Interworking with non-ISDNs

No special in-band indication shall be given to the calling user.

8 Interaction with other supplementary services

Applicable.

UUS - User-to-user signalling, Service 1 implicit

Application to ETSI Draft ETS T/NA1 (89)06 Version 6.

This application specification deals only with User-to-user Service 1 implicitly requested supplementary service.

"Note ISDN93" indicates temporary notes. The content of such notes applies for the first phase of commercial ISDN (1993), and will be reviewed afterwards.

1. Scope

Applicable.

2. Normative references

Applicable.

3. Definitions

Point-to-point configuration:
The network shall not be able to detect the user's configuration through signalling on a per call basis.

4. Symbols and abbreviations

Applicable.

5. Description

The network shall support 128 octets per message.

5.1 Service 1

The first sentence in the first bullited item "UUI can be ....." shall be deleted since it generally applies for service 1, not only in point-to-multipoint arrangements.

5.2 Service 2

Note ISDN93: Service 2 is not applicable.

5.3 Service 3

Note ISDN93: Service 3 is not applicable.

6. Procedures

6.1 Provision/Withdrawal

The UUS supplementary service shall be provided on a subscription basis as separate services.

Note ISDN93: Only Service 1 is applicable.

6.2 Normal procedures

6.2.1 Activation/Deactivation/Registration

Note ISDN93: Only Service 1 implicitly requested is applicable.

6.2.3.2 Service 2

Note ISDN93: Not applicable.

6.2.3.3 Service 3

Note ISDN93: Not applicable.

6.3 Exceptional procedures

6.3.1 Activation/Deactivation/Registration

For Service 1 implicitly requested rejection cannot always be given.

7. Intercommunication conciderations

Note ISDN93: The described interworking is not applicable. The explicit request shall not be supported by the network, but shall be handled according to normal error handling (see stage 3).

7.1 Interworking with non-ISDN

If the destination network or user is non-ISDN, UUI cannot be conveyed and the calling user shall be given an appropriate indication.

8. Interaction with other supplementary services

Applicable.

COLP - COnnected Line identification Presentation

Application to ETSI ETS 300 094.

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

Applicable.

6 Procedures

6.1 Provision and withdrawal

The COLP supplementary service shall be provided on a subscription basis.

Special arrangement shall not be provided.

7 Intercommunication considerations

Applicable.

8 Interaction with other supplementary services

8.5.4 Connected line identification restriction

If the served user has an override category then the COLP supplementary service shall take precedence over the COLR supplementary service.

8.9 Direct dialing in

Special arrangement shall not be provided.

8.13 Multiple subscriber number

Special arrangement shall not be provided.

COLR - COnnected Line identification Restriction

Application to ETSI ETS 300 095.

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

Applicable.

6 Procedures

6.1 Provision and withdrawal

The COLR supplementary service shall be offered with all options on subscription basis for each options.

6.2.3.2 Called user side

NOTE 1: The network shall be able to handle override category.

7 Intercommunication considerations

Restrictions concerning international calls between international ISDNs are a matter of bilateral agreement between service providers.

NOTE 1: Not applicable for national calls.

7.1 Interworking with non-ISDNs

It shall be possible to restrict any information identifying the connected party from being forwarded to the non-ISDN network.

7.2 Interworking with private ISDNs

On calls from the public ISDN to the private ISDN, the public ISDN shall restrict any information identifying the connected party from being sent to the private ISDN when the COLR supplementary service has been invoked by the connected user.

8 Interaction with other supplementary services

8.5.3 Connected line identification presentation

If the served user has an override category then the COLP supplementary service shall take precedence over the COLR supplementary service.

HOLD - Call HOLD

Application to ETSI ETS 300 139.

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

Applicable.

6 Procedures

6.1 Provision and withdrawal

The HOLD supplementary service shall be provided on a subscription basis either together with other supplementary services or as a separate service.

6.2.3 Invocation and operation

6.2.3.1 Hold request

A call can be placed on hold on the calling user's interface after the call has been offered to the called user, but before the connection has been established.

For an interim period of time the notification will not be delivered to the remote user, if the ISDN user part (ISUP) is involved in the call.

6.2.3.2 Retrieve request

Note: For an interim period of time the notification will not be delivered to the remote user, if the ISDN user part (ISUP) is involved in the call.

7 Intercommunication considerations

In the hold/retrieve request situation no notification shall be sent to the remote PSTN user.

8 Interaction with other supplementary services

Applicable.

CUG - Closed User Group

Application to ETSI ETS 300 136.

1 Scope

The network shall as a network option be able to accept outgoing call attempt to specific emergency services, despite of any CUG restrictions.
The specification of this function is outside the scope of this application document.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

Applicable.

6 Procedures

6.1 Provision and withdrawal

An individual user can be member of maximum 100 CUGs.

The CUG supplementary service shall be offered with the subscription options shown in table 1A and 1B.
The relationship between the ISDN user, ISDN number, basic services and CUG with subscription options is summerized below.

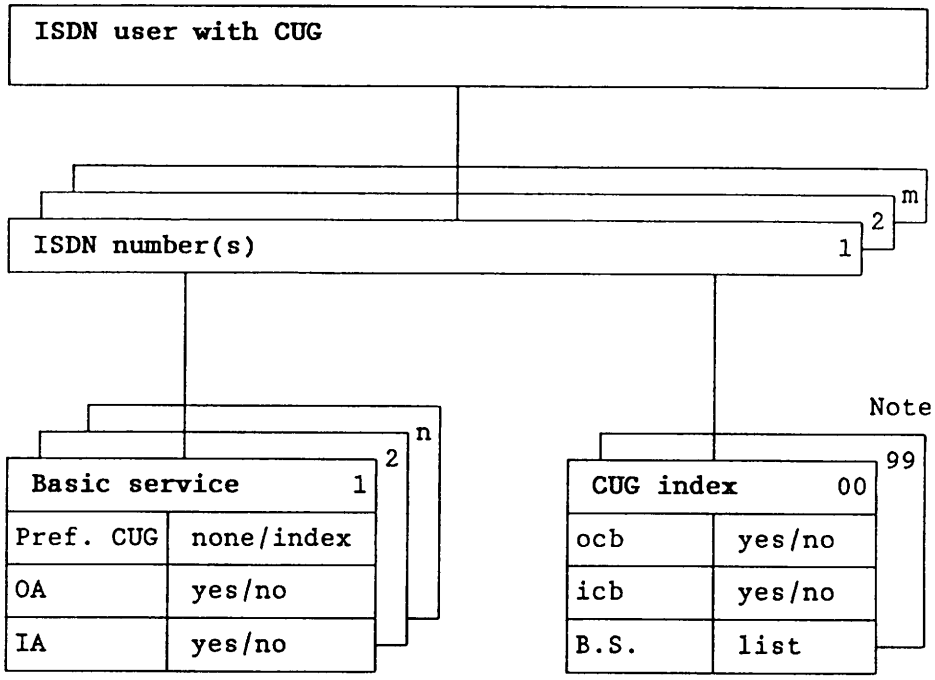


Figure 1. Relationship between ISDN subscriber, ISDN number, basic service and CUG.

Pref.: Preferential CUG.
OA: Outgoing access.
IA: Incoming access.
ocb: outgoing calls barred within the CUG.
icb: incoming calls barred within the CUG.
B.S.: Basic service.

Note: The maximum number of CUGs (100) applies to an ISDN user.

7 Intercommunication considerations

7.1 Interworking with non-ISDN

The CUG supplementary service defined in this document applies only to the Circuit Mode Bearer Service (CMBS) within ISDN.
If the Packet Mode Bearer Service (PMBS) is provided to ISDN subscribers, these can be members of CUGs in the X.25 environment. In such cases a CUG may span over ISDN(PMBS) and PSPDN.

Since the CUG supplementary service is not implemented in PSTN, incoming calls from PSTN will be handled as non-CUG calls.
Outgoing CUG calls to PSTN shall be rejected by the interworking function and an appropriate indication shall be given to the calling ISDN user.

8 Interaction with other supplementary services

Applicable.

Note: If the user subscribes to the Line Hunting (LH) supplementary service, the CUG membership shall be provided on the basis of the entire group of accesses.

The Danish Public Telecommunication Enterprises

Integrated Services Digital Network

Basic User-Network Interface

Layer 1 Specification and Test principles

Application specification document to ETSI standard Draft ETS/L 03-07

May 1990.

This document specifies the requirements and test principles for the ISDN basic rate user network interface in the Danish ISDN.

The document is a Danish application specification document, based on the ETSI standard ETS 3000?? (ETS/L 03-07 Draft N. 08 Date: Mar. 07, 1990), which again is based on CCITT recommendation I. 430 (blue book).
The ETSI standard has been sent out for public enquiry by ETSI. It is expected, that it will be finally agreed as an ETS in July 1990.

When the final ETS is available from ETSI the document will be revised to a final version.

Section/ subsection	Implementation options in ETS 3000?? <Comment>
4.4	Location of the interfaces. -Connection of NT to user premises wiring. <The Danish Telecom Administrations recommend, that the wiring in the user premises is connected directly to the NT without the use of a connector.>
4.5	NT and TE associated wiring. -Connection of the connection cord to equipment. -Location of the terminating resistor at the NT side. -Connection cord is part of TE, or TE is designed for use with "standard ISDN basic access TE cord". <As mentioned above, it is recommended that the NT is directly connected to the wiring of the user premises. The connection of the TE shall be done with either a hardwired connection cord with a connector as specified in ISO 8877 or with a standard ISDN basic access TE cord as specified in § 8.9 which has connectors according to ISO 8877.
5.3.2	TEs not powered accross the interface. -Connected/disconnected indication: a) or b) <In I. 430 it is mentioned, that it is desireable that case a) the detection of power source 1 or power source 2 is used to establish the connection status.>
6.1.4	Priority mechanism. -Priority class: fixed or under control of layer 2. <The priority class of a particular layer 2 frame shall be set at installation according to customers request.>
6.2.2	Signals. -TE not able to initiate activation: yes, no

Section/ subsection	Implementation options in ETS 3000?? <Comment>
	<It is accepted, that TEs which do not need the capability to activate a deactivated user-network interface. (e. g. TEs required to handle only incoming calls) does not need the capability to send INFO 1.
6.2.3.2	Specification of the procedure. -Activation/deactivation procedure according Table 5, Table C-1 or Table C-2/I.430: -TE powered from power source 1 or 2, -TE locally powered and unable to detect PS 1 or 2, -TE locally powered and able to detect PS 1 or 2. <The activation/deactivation procedure depend on the type of TE. All types of TEs are accepted in the danish ISDN. According to § 5.3.2 detection of power source 1 or 2 is desireable, so the activation/deactivation procedure according to Table C-1/I.430 is less relevant.
6.2.4.1 (Table 6)	Activation/deactivation for NTs. -Timer T2 in NT = 25 ms to 100 ms or T2 = 0. <Timer T2 in NT shall be 25 ms to 100ms.>
6.3.3	Multiframing. -TE supporting multiframing: yes, no. <The TE shall support multiframing.>
8.6.2	Receiver sensitivity - Noise and distortion immunity. -NT designed for configurations according 8.6.2.2, 8.6.2.3, 8.6.2.4 or 8.6.2.5 <The NT shall be designed to meet the specifications for short passive bus configuration, point to point configuration and extended passive bus configuration. E. g. the NT can be designed in a way that make it possible to chose one of the three busconfigurations with jumpers.>

Section/ subsection	Implementation options in ETS 3000?? <Comment>
8.6.3	NT receiver input delay characteristics. -NT designed for round trip delay according 8.6.3.1, 8.6.3.1, 8.6.3.3 or 8.6.3.4 <The NT shall be designed to meet the specifications for short passive bus configuration, point to point configuration and extended passive bus configuration. E. g. the NT can be designed in a way that make it possible to chose one of the three busconfigurations with jumpers.>
8.9	Standard ISDN basic access TE cord. - Standard cord length: a) 7 m or b) 7 - 10 m. <As mentioned in I. 430 the "standard ISDN basic access TE cord" shall not exceed a maximun of 10 meters, but it shall be remarked, that there are different requirements depending on the cord length.
9.1.2	Provision of power sources and sinks. -Provision of power source 1 (normal): integral part of NT or physically separated (APS). -Provision of power source 2: yes, no. -Provision of power sink 1: yes, no. -Provision of power sink 2: yes, no. <The capability of the provision of power source 1 shall be available as a part of the NT1. The administrations will not provide the power source 2).>
9.2.1	Power source 1 normal and restricted power conditions. -Power available from power source 1. <Power source 1 shall provide both normal and restricted power conditions.>
9.5.2.1	Power available to the TE "designated" for restricted power operation.

Section/ subsection	Implementation options in ETS 3000?? <Comment>
	-TE designed for restricted power operation: yes, no. <A TE designed for restricted power operation shall draw no more than 380 mW of power from power source 1 when it is activated. In low-power mode the TE shall draw no more than 25 mW of power.>
9.7.4.2	Power source 1 normal. -Power source characteristic a) or b) <Power source 1 shall be implemented with the characteristic a) Sources limiing the output current (fall back characteristic).>
9.7.4.4.2	TE connection surge capabilility. -Maximum number of terminals to be fed from power source 1. <The maximum number of terminals n to be fed from power source 1 shall be equal to 8.>
9.9.1	Power available from an APS. -Maximum number of terminals to be fed from APS, loading factor of APS. <The use of an APS is not foreseen.>
9.10	Additional requirements for NT1 restrictes mode source for compatibility with an APS. -NT designed to be compatible with an APS: yes, no. <The NT shall be designed to be compatible with an APS, but the use of an APS is normally not foreseen.>
9.10.1	PS1 restricted mode back-off. -NT1 normal mode voltage detector: yes, no. <The NT1 shall have a normal mode detector.>

Section/ subsection	Title <Comment>
Annex A	Test loopbacks defined for the basic user-network interface. -Implemented optional loopbacks (Tables A-2 and A-3). <No comments.>
Annex B	TE design to minimize power disturbance. -TE design to minimize power disturbance: yes, no. <No comments.>

The Danish Public Telecommunication Enterprises

ISDN Digital Subscriber Signalling No. 1

DSS1

Data link layer

Application specification document to ETSI ETS T/S 46-20:

ISDN User-network Interface Data Link Layer Specification, Application of CCITT Recommendations Q.920/I.440 and Q.921/I.441

July 1990

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INTRODUCTION

This document gives the requirements to DSS1, Data link layer (layer 2) procedures for Primary Rate Access and Basic Access to be implemeted for ISDN supplementary services in the Danish networks. The requirements stated here are the requirements to the network side of the user-network interface.

The D-channel layer 2 specification is contained in ETSI ETS T/S 46-20, which has been revised in March 1990 according to public comments.
This document is an application specification to this ETS.

Application to Recommendation Q.920(I.440) - General Aspects.

1 General

Applicable.

2 Concepts and terminology

Applicable.

3 Overview description of LAPD functions and procedures

3.4.3 TEI administration

The network shall provide the TEI check procedure if requested by the user.

4 Service characteristics

Applicable.

5 Data link layer - Management structure

The parameter initialization function shall not be supported.

Application to Recommendation Q.921(I.441) - Data link layer specification

1 General

Applicable.

2 Frame structure for peer-to-peer communication

2.3 Address field

LAPB data link connection shall not be supported.

3 Elements of procedures and formats of fields for data link layer peer-to-peer communication

3.3.3 Service access point identifier (SAPI)

In ISDN phase 1 (1992), SAPI 16 shall not be supported.

3.3.4.2 TEI for point-to-point data link connection

When the network has the knowledge that a point-to-point configureation exists at the users premises, The TEI value 0 shall be used according to Annex A.
In point-to-multipoint configurations TEI value 0 may be used by terminal equipment.

3.6.1 Commands and responses

The XID frame type is not applicable. If the network receives such a frame from a terminal, the network shall discard the frame and no action shall be taken as a result of that frame.

4 Elements for layer-to-layer communication

4.1.1.9 MDL-XID

Not applicable.

4.1.3.2

The MDL-XID primitive in table 6/Q.921 is not applicable.

5 Definition of the peer-to-peer procedures of the data link layer

5.1.2 Ackonwleged multiple frame information transfer

Use of LAPB data link layer entities is not applicable.

5.3 Terminal Endpoint Identifier (TEI) management procedures

In case of faultconditions at the local exchange, e.g. restart, the network shall perform a global TEI check procedure (Ai = 127) to update the networks knowledge about previously assigned TEI values.

5.3.3.1 Use of the TEI check procedure

The TEI check procedure requested by users shall be supported.

5.3.5 TEI identity verify procedure

The TEI Identity verify procedure shall be supported by the network.

Annex A, Provision of point-to-point signalling connection

When the network has the knowledge that a point-to-point configuration exists at the users premises, The TEI value 0 shall be used. In point-to-multipoint configurations TEI value 0 may be used by terminal equipment.

The Danish Public Telecommunication Enterprises

ISDN Digital Subscriber Signalling No. 1

DSS1

Network layer
Basic Call Control

Application specification document to ETSI ETS 300 102 Part 1:

ISDN USER-NETWORK INTERFACE LAYER 3 SPECIFICATION FOR BASIC CALL CONTROL
APPLICATION OF CCITT RECOMMENDATIONS Q.930/I.450 AND Q.931/I.451.

December 1990.

This document gives the requirements for DSS1, Network layer - Basic Call Control, in the Danish ISDN.

The document is a Nordic application specification document,

NT/SIG-SPEC-1, Issue 1, Rev. A.

against the ETSI ETS 300 102 Part 1 (T/S 46-30) which has been agreed as an ETS in April 1990.

NT/SIG-SPEC-1 is a common Nordic specification produced under the auspices of the NORDTEL organisation. Where special Danish requirements apply, the notation, NOTE - Denmark, is used.

In this Nordic document there is no application to clause 7, User-to-user signalling procedures. ETSI has decided to rewrite the stage 3 description for this service in a document according to the structure in the ETS T/S 46-33 series finalized in 1992.
For use in the first phase of commercial ISDN in Denmark, User-to-user signalling Service 1 implicit has been specified in the application specification document for supplementary services.

NORDTEL

NT/SIG-SPEC-1

NORDIC SPECIFICATION

APPLICATION DOCUMENT TO ETS 300 102-1
DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1
(DSS 1) - NETWORK LAYER - BASIC CALL CONTROL

Issue 1
Rev: A

ISSUE DATE: 90-07-01

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1. GENERAL

The following sections give the requirements to layer 3 procedures for Primary Rate Access and Basic Access to be implemented for ISDN services in the Nordic networks. The requirements stated here are the requirements to the network side of the user-network interface. The D-channel layer 3 specification is based on ETS T/S 46-30 (ETS 300 102 Part 1). This document selects which options in the ETS T/S 46-30 (ETS 300 102 Part 1) are applicable in the Nordic networks.

The ETSI specification contains a number of paragraphs which are implementation dependent. This document contains requirements to the implementation of these cases.

In addition, this document contains some clarifications to certain sections of the ETSI specification, where this is felt to be necessary.

The clarifications are related to protocol options and do not indicate the services that are provided by a network.

The ETSI D-channel protocol (DSS1) specification consists of a number of specifications:

a)	ETS T/S 46-30	Specified procedures for basic call
b)	ETS T/S 46-31	SDL diagrams for basic call
c)	ETS T/S 46-32A	Generic procedures for the control of ISDN supplementary services, Keypad protocol
d)	ETS T/S 46-32B	Generic procedures for the control of ISDN supplementary services, Functional protocol
e)	ETS T/S 46-33	ISDN supplementary services
f)	ETS T/S 46-50	Support of packet mode terminal equipment by an ISDN.

This application document deals only with ETS T/S 46-30. As a general rule, ETS T/S 46-30 is applicable. Generally all messages and information elements shall be received without a protocol error being the result of the reception - i.e. the exchange shall in general be able to receive all messages and information elements defined in ETS T/S 46-30. Any exception to this general rule shall be mentioned in this document.

1.1 SCOPE

Applicable

1.2 APPLICATION TO INTERFACE STRUCTURES

Applicable

2. OVERVIEW OF CALL CONTROL

Applicable.

2.1 CIRCUIT SWITCHED CALLS

Applicable.

2.2 PACKET MODE ACCESS CONNECTIONS

The support of packet mode equipment in accordance with ETS T/S 46-50 is outside the scope of this specification.

2.3 TEMPORARY SIGNALLING CONNECTIONS

Applicable.

2.4 STATES ASSOCIATED WITH THE GLOBAL CALL REFERENCE

Applicable.

3. MESSAGES FUNCTIONAL DEFINITIONS AND CONTENT

Applicable.

3.1 MESSAGES FOR CIRCUIT MODE CONNECTION CONTROL

SEGMENT

See the application to Annex K.

3.1.1 ALERTING

Applicable.

3.1.2 CALL PROCEEDING

Applicable.

3.1.3 CONGESTION CONTROL

Applicable.

3.1.4 CONNECT

Note 8: The network shall be able to convey Low layer compatibility information in the CONNECT message.

Note 12: Date/time shall be included by the network as a network provider default option.

NOTE - Norway: On a per teleservice basis date/time can be activated on a per exchange basis, i.e., this can vary from exchange to exchange, but not from subscriber to subscriber within an exchange.

3.1.5 CONNECT ACKNOWLEDGE

Applicable.

3.1.6 DISCONNECT

Applicable.

3.1.7 FACILITY

Applicable.

3.1.8 INFORMATION

Note 6: The Keypad facility information element is only used to convey supplementary service information.

ETSI requirement: The use of the Keypad facility information element in the network to user direction is applicable.

3.1.9 NOTIFY

Applicable.

3.1.10 PROGRESS

Applicable.

3.1.11 RELEASE

Applicable.

3.1.12 RELEASE COMPLETE

Applicable.

3.1.13 RESUME

Applicable.

3.1.14 RESUME ACKNOWLEDGE

Applicable.

3.1.15 RESUME REJECT

Applicable.

3.1.16 SETUP

Note 1: Sending complete information element is mandatory in the network to user direction.

NOTE - Finland: The Sending complete information element is not mandatory.

Note 7: Network specific facilities is not applicable.

Note 9: The Keypad facility information element is only used to convey supplementary service information.

Note 16: Transit network selection is not applicable.

ETSI requirement: The use of the Keypad facility information element in the network to user direction is applicable.

3.1.17 SETUP ACKNOWLEDGE

Applicable.

3.1.18 STATUS

Applicable.

3.1.19 STATUS ENQUIRY

Applicable.

3.1.20 SUSPEND

Applicable.

3.1.21 SUSPEND ACKNOWLEDGE

Applicable.

3.1.22 SUSPEND REJECT

Applicable.

3.1.23 USER INFORMATION

Note 2: The default maximum value shall be 131 octets.

3.2 MESSAGES FOR PACKET MODE CONNECTION CONTROL

The support of packet mode equipment in accordance with ETS T/S 46-50 is outside the scope of this specification.

3.3 MESSAGES FOR USER TO USER SIGNALLING NOT ASSOCIATED WITH CIRCUIT SWITCHED CALLS

This section has been deleted in ETS T/S 46-30.

3.4 MESSAGES USED WITH THE GLOBAL CALL REFERENCE

The SEGMENT message is not applicable.

3.4.1 RESTART

Applicable.

3.4.2 RESTART ACKNOWLEGE

Applicable.

3.4.3 STATUS

Applicable.

4. GENERAL MESSAGE FORMAT AND INFORMATION ELEMENTS CODING

4.1 OVERVIEW

Applicable.

4.2 PROTOCOL DISCRIMINATOR

Applicable.

4.3 CALL REFERENCE

Applicable.

4.4 MESSAGE TYPE

SEGMENT

See the application to Annex K.

No national message types are defined for the public ISDN.

4.5 OTHER INFORMATION ELEMENTS

4.5.1 Coding rules

Applicable.

4.5.1.1 Codeset 0

Table 4.3, Information element identifier coding:

Segmented message, Network-specific facilities, Transit network selection and Escape for extension information elements are not applicable. If the network receives one of these information elements, it shall be treated as an unrecognized information element.

NOTE - Norway: The Segmented message information element is applicable.

4.5.1.2 Codeset 5

Applicable.

4.5.2 Extensions of codesets

For the locking shift procedure, only a shift to a codeset with a higher numerical value than the codeset being left, shall be possible (according to § 4.5.3).

The network shall handle information elements belonging to other codesets than 0 or 5 according to the procedures for unrecognized information elements (see § 5.8.7.1).

4.5.3 Locking shift procedure

Applicable.

4.5.4 Non-locking shift procedure

Applicable.

4.5.5 Bearer capability

Coding standard (octet 3)

Only CCITT standardized coding shall be used. If a Bearer capability information element is received containing a different coding than CCITT coding, the information element shall be discarded.

4.5.6 Call identity

The maximum length (10 octets) is applicable.

4.5.7 Call state

Coding standard (octet 3)

Only CCITT standardized coding shall be used. If a Call state information element is received containing a different coding than CCITT coding, the information element shall be discarded.

4.5.8 Called party number

Applicable.

4.5.9 Called party subaddress

Applicable.

4.5.10 Calling party number

Applicable.

4.5.11 Calling party subaddress

Applicable.

4.5.12 Cause

Coding standard (octet 3)

The network shall be able to handle both CCITT standardized and national standard coding. If a Cause information element is received containing a different coding than CCITT coding or national standard, the information element shall be discarded.

Diagnostics (octet 5)

If the network receives a Cause information element containing a Diagnostic field, the network shall transport this information transparently through the network to the remote user.

NOTE - Finland: The diagnostic field is not required.

The diagnostic field shall be provided by the network according to table 1 below (x means that diagnostic shall be provided for that cause value).

C A U S E		
1	Unallocated (unassigned) number	
16	Normal call clearing	
22	Number changed	
29	Facility rejected	
43	Access information discarded	x
50	Requested facility not subscribed	
57	Bearer capability not authorized	x
58	Bearer capability not presently available	x
65	Bearer capability not implemented	x
66	Channel type not implemented	
69	Requested facility not implemented	
82	Identified channel does not exist	
86	Call having the requested call identity has been cleared	x
88	Incompatible destination	x
96	Mandatory information element is missing	x
97	Message type non-existent or not implemented	x
98	Message not compatible with call state or message type non-existent or not implemented	x
99	Information element non-existent or not implemented	x
100	Invalid information element contents	x
101	Message not compatible with call state	x
102	Recovery on timer expiry	x

Table 1. Diagnostic requirements.

4.5.13 Channel identification

Maximum length of Channel identification information element shall be such that up to 30 B-channels can be indicated simultaneously.

If the network receives multiple Channel identification information elements, the network shall be able to interpret all received.

Coding standard (octet 3.2)

Only CCITT standardized coding shall be used. If a Channel identification information element is received containing a different coding than CCITT coding, the information element shall be discarded.

4.5.14 Congestion level

Applicable.

4.5.15 Display

Applicable.

4.5.16 High layer compatibility

In connection with teleservices or supplementary services, the network shall be able to interpret the High layer compatibility information element.

Coding standard (octet 3)

If the network needs to interpret the High layer compatibility information element for a particular call, the coding of the High layer compatibility information element shall be according to the CCITT standard or the national standard (as defined below).

In the case that the network does not need to interpret the High layer compatibility information element for a particular call, the High layer compatibility information element shall be transported transparently through the network and any coding standard may be used.

In the case the coding standard is "national standard", the following applies for the coding of octets 3 and 4.

Octet 3

bits 7 6 = 1 0
bits 5 4 3 2 1 = 1 0 0 0 1

Octet 4

bits 7 6 5 4 3 2 1	
0 0 0 0 0 0 1	SNA LU 6.2/PU 2.1
0 0 0 0 0 1 0	SNA LU 6.2/PU 2.0
0 0 0 0 0 1 1	SNA LU 6.2/PU 2.1, DIA Services
0 0 0 0 1 0 0	SNA LU 6.2/PU 2.1, SNA Distribution Services
0 0 0 0 1 0 1	SNA LU 6.2/PU 2.1, Distributed Data Management
0 0 0 0 1 1 0	SNA-RJE (SNA LU 1/PU 2,0)
0 0 0 0 1 1 1	DECnet
0 0 0 1 0 0 0	IBM 3270/SNA (SNA LU 1, 2, 3/PU 2.0)
0 0 0 1 0 0 1	Digital VT 100
0 0 0 1 0 1 0	Digital VT 200
0 0 0 1 0 1 1	IBM 5250 (SNA LU 7)
0 0 0 1 1 0 0	Kermit
0 0 0 1 1 0 1	New textcommunication service based on T.62 protocol

NOTE - Finland: Support of national HLC values is not required.

4.5.17 Keypad facility

Applicable.

4.5.18 Low layer compatibility

Applicable.

4.5.19 More data

Applicable.

4.5.20 Network-specific facilities

Not applicable.

4.5.21 Notification indicator

Applicable.

4.5.22 Progress indicator

Coding standard (octet 3)

Only CCITT standardized coding shall be used. If a Progress indicator information element is received containing a different coding than CCITT coding, the information element shall be discarded.

4.5.23 Repeat indicator

Not applicable.

4.5.24 Restart indicator

Applicable.

4.5.25 Segmented message

Not applicable.

NOTE - Norway : Applicable.

4.5.26 Sending complete

Applicable.

4.5.27 Signal

Not applicable.

4.5.28 Transit network selection

Not applicable.

4.5.29 User-user

The maximum size of the User-user information element is:

- 131 octets in SETUP, ALERTING, CONNECT, DISCONNECT, RELEASE and RELEASE COMPLETE messages.
- 131 octets in USER INFORMATION messages sent in association with a circuit-mode connection.

4.6 SUPPLEMENTARY SERVICES INFORMATION ELEMENTS

4.6.1 Date/time

Applicable.

4.6.2 Facility

Applicable.

4.6.3 Feature activation

Not applicable.

4.6.4 Feature indication

Not applicable.

4.6.5 Switchhook

Not applicable.

4.7 INFORMATION ELEMENTS FOR PACKET COMMUNICATIONS

The support of packet mode equipment in accordance with ETS T/S 46-50 is outside the scope of this specification.

5. CIRCUIT-SWITCHED CALL CONTROL

The requirements to message segmentation and reassembly are described in Annex K.

An INFORMATION message received in the Release Request state shall be ignored.

5.1 CALL ESTABLISHMENT AT THE ORIGINATING INTERFACE

5.1.1 Call request

Applicable.

5.1.2 B-channel selection - originating

"No indication" shall be interpreted as Channel identification information element not being present in the SETUP message received from the user ("any channel is acceptable").

d) No B-channel Note

Note: This indication may be used in connection with supplementary services, the user signalling bearer service and packet switching on the D-channel. In all other cases a SETUP message containing this indication shall be rejected using a RELEASE COMPLETE message with cause #79 "Service or option not implemented, unspecified".

A graphical representation of the alternatives described in this section is given in Annex B.

5.1.3 Overlap sending

In case a) the network shall return progress indicator #8 "in band information or appropriate pattern now available" in a SETUP ACKNOWLEDGE message in case of Bearer Capability "3.1 kHz audio" or "speech" and additionally return inband dial tone.

5.1.4 Invalid call information

In case Bearer Capability is "3.1 kHz audio" or "speech" the network shall return progress indicator #8 "in band information or appropriate pattern now available" in accordance with Appendix A to this application document.

Note: Cause #3 shall not be generated by the network.

5.1.5 Call proceeding

5.1.5.1 Call proceeding - én-bloc sending

Applicable.

5.1.5.2 Call proceeding - overlap sending

Note 1: If the network receives INFORMATION messages from the calling user, containing called party number information, after a CALL PROCEEDING, ALERTING or CONNECT message has been sent, the Called party number information element shall be discarded without notifying the calling user and normal call handling shall continue.

5.1.6 Notification of interworking at the originating interface

Applicable.

5.1.7 Call confirmation indication

Applicable.

5.1.8 Call connected

Applicable.

5.1.9 Call rejection

Applicable.

5.1.10 Transit network selection

Not applicable.

5.2 CALL ESTABLISHMENT AT THE DESTINATION INTERFACE

The option to establish a data link connection by means of a TA, TE, or NT2 and to retain it indefinitely, shall be applicable.

Conditions for releasing the data link

A timer (T3xx) shall be implemented in order to ensure that layer 2 is released if during a time period (T3xx) no layer 3 connections are present on the data link. The timer is controlled in layer 3 and shall be started when a data link is established.

When a valid layer 3 message is sent or received, the timer shall be stopped (not restarted).

When the last layer 3 entity on that data link returns to the Null state, the timer shall be restarted. If no new call is set up on this data link, timer T3xx will expire and a DL-RELEASE-REQUEST shall be sent to layer 2.

Timer T3xx is applicable to all data link connections on point-to-multipoint configurations, except those which are established for an indefinite period of time.

The network shall normally not take the initiative to release a data link connection which has been established for an indefinite time period. These links shall be defined by MMC as a subscription option.

5.2.1 Incoming call

The knowledge that a single-point configuration exists shall be based on information entered at the time of configuration of the access.

When én-bloc receiving is used, the SETUP message sent from the network to the user shall:

- contain the complete called party number and/or sub-address, if provided, and
- always include a Sending complete information element.

NOTE - Finland: The Sending complete information element is not required.

5.2.2 Compatibility checking

Applicable.

5.2.3 B-channel selection-destination

5.2.3.1 SETUP message delivered by point-to-point data link

a)

- Options 1, 2 and 4 are applicable. Option 3 is covered by the functionality in option 2.

  NOTE - Denmark: Also option 3 is applicable.

- It shall be possible to give users different subscription options. The combinations which can be used are:

  - Option 1;
  - Option 2;
  - Option 1 and 4; or (Note)
  - Option 2 and 4. (Note)

  Note: This capability is used in relationship with supplementary services (e.g. Call Waiting).

A graphical representation of the alternatives described in this section is given in Appendix B.

5.2.3.2 SETUP message delivered by broadcast data link

Options a) and b) are applicable.

A graphical representation of the alternatives described in this section is given in Appendix B.

5.2.4 Overlap receiving

Overlap receiving is not applicable. However, if a SETUP ACKNOWLEDGE message is received while the network is in the Call present state (N6), it shall be treated as a message type, non-existent or not implemented.

NOTE - Finland and Denmark: Overlap receiving is optionally used in a point-to-point configuration.

5.2.5 Call confirmation

5.2.5.1 Response to én-bloc SETUP or completion of overlap receiving

The use of progress indicators shall follow the examples given in Annex I.

5.2.5.2 Receipt of CALL PROCEEDING and ALERTING

Applicable.

5.2.5.4 Call failure

Applicable.

5.2.6 Notification of interworking at the terminating interface

The note related to subsection a): This implies that the normal call handling procedures shall be applied at the terminating exchange (i.e. the terminating exchange shall only through-connect after a CONNECT message has been received from the called user).

5.2.7 Call accept

Applicable.

5.2.8 Active indication

Applicable.

5.2.9 Non-selected user clearing

Applicable.

5.3 CALL CLEARING

5.3.1 Terminology

Applicable.

5.3.2 Exception conditions

Applicable.

5.3.3 Clearing initiated by the user

In case a B-channel is placed in a maintenance condition, the actions to be taken are described in § 5.5. (Related to Note 1 and ETSI requirement).

5.3.4 Clearing initiated by the network

Applicable.

5.3.4.1 Clearing when tones/announcements provided

In case Bearer Capability is "3.1 kHz audio" or "speech", the network shall return progress indicator #8 "in band information or appropriate pattern now available" and the information in-band shall be according to Appendix A to this application document.

If in the case of én-bloc sending the network clears the call, when tones/announcements are provided, the network shall:

- send a CALL PROCEEDING message followed by a DISCONNECT message with progress indicator #8 "in-band information or appropriate pattern now available"; and,
- apply the tone/announcement in-band according to Appendix A of this application document.

5.3.4.2 Clearing when tones/announcements not provided

Applicable.

5.3.4.3 Completion of clearing

In case a B-channel is placed in a maintenance condition, the actions to be taken by the network are described in § 5.5.

5.3.5 Clear collision

Applicable.

5.4 IN-BAND TONES AND ANNOUNCEMENTS

For all calls where bearer capability is "speech" or "3.1 kHz audio", tones and/or announcements may be given when a call is released. The use of tones and/or announcements in connection with supplementary services is not specified in this document. The relationship between a particular cause value and tone and/or announcement is defined in Appendix A to this application document. When tones and/or announcements are sent to a user, the relevant message shall always include a progress indicator #8 "in-band information or appropriate pattern now available".

5.5 RESTART PROCEDURES

The restart procedure is not applicable for a point-to-multipoint configuration. Therefore, if a B-channel on a point-to-multipoint configuration is placed in a maintenance condition according to § 5.3.3, the maintenance entity shall release the B-channel. No further protocol actions shall be taken.

If the network receives a RESTART message indicating B-channel(s) on a point-to-multipoint configuration, the message shall be ignored and no further action shall be taken.

Table 2 below shows the possible combinations of coding of the Restart indicator and Channel identification information elements in the received RESTART message and the actions to be taken by the receiving entity. Table 2 assumes that the network is able to perform internal clearing on all B-channels that are allowed to be restarted (e.g. except semi-permanent channels).

Information indicated in the received RESTART message				Meaning	Action to be taken by the receiving entity
Restart indicator i.e.	Channel identification i.e.				
	Interface type	D-channel indicator	Information channel selection		
Indicated channel	Basic Access	Not the D-channel	No channel	Invalid	STATUS (#82)
			Any channel	Invalid	STATUS (#82)
			Bi (Note)	Restart channel	RESTART ACK (Bi) (Note)
			Bsp	Invalid	STATUS (#82)
		The D-channel	No channel	Invalid	STATUS (#82)
			Any channel	Invalid	STATUS (#82)
			Bi (Note)	Restart channel	RESTART ACK (Bi) (Note)
			Bsp	Invalid	STATUS (#82)
Single/ all interface	Not relevant			Restart B1 and B2 except if there exist semipermanent channel(s) on the interface. Restart all CR except the global CR.	No Bsp:RESTART ACK (single/all)
					1 Bsp:RESTART ACK (single/all)
					2 Bsp:RESTART ACK (single/all)
Indicated channel	Primary Rate Access	Not the D-channel	No channel	Invalid	STATUS (#82)
			Any channel	Invalid	STATUS (#82)
			Bi	Restart channel(s)	RESTART ACK (Bi)
			Bsp	Invalid	STATUS (#82)
			"B_{16}"	Invalid	STATUS (#82)
			Bi, Bsp, "B_{16}"	Restart channel(s) excluding Bsp and "B_{16}"	RESTART ACK (Bi)
		The D-channel	No channel	Invalid	STATUS (#82)
			Any channel	Invalid	STATUS (#82)
			Bi	Restart channel(s)	RESTART ACK (Bi)
			Bsp	Invalid	STATUS (#82)
			"B_{16}"	Invalid	STATUS (#82)
			Bi, Bsp, "B_{16}"	Restart channel(s) excluding Bsp and "B_{16}"	RESTART ACK (Bi)
Single/ all interface	Not relevant			Restart all B-channels except for those that are semipermanent. Restart all CR except the global CR.	No Bsp:RESTART ACK (single/all)
					1-29Bsp:RESTART ACK(single/all)
					30 Bsp:RESTART ACK (single/all)

Bi: one or more B-channels on the interface

Bsp: semipermanent B-channel

B_{16}: time-slot 16 on PRA used for D-channel signalling

#82: Identified channel does not exist

Note: If more than 1 B-channel shall be indicated, the Channel identification information element shall be repeated within the message.

Table 2.

Actions on the coding of the received Restart indicator and Channel identification information elements.

If a RESTART or RESTART ACKNOWLEDGE message is received while in the Restart state (Rest 2), the message shall be ignored and no further action shall be taken.

Restart collision

A collision of restarting B-channel(s) occurs if a RESTART message is received indicating one or more B-channels for which a RESTART message already has been sent but no RESTART ACKNOWLEDGE message has been received. This situation shall be treated as two separate events, and each event is treated according to the procedure defined in §§ 5.5.1 and 5.5.2.

A collision of RESTART messages will normally not occur. The call reference flag procedure avoids such a collision (as described in § 4.3). Nevertheless, if a RESTART message is received while in the Restart Request state (Rest 1), it shall be ignored.

5.5.1 Sending RESTART

An indication shall be given to the maintenance entity after two unsuccessful restart attempts.

If a RESTART ACKNOWLEDGE message is received indicating one or more channels that were not specified in the RESTART message, an indication shall be given to the maintenance entity to determine further actions to be taken on those channels.

5.5.2 Receipt of RESTART

Regarding ETSI requirement ...expires, a RESTART ACKNOWLEDGE message shall be transmitted to the originator, ...

In addition to the two points under the heading: "The following entities shall be released:", the following text shall apply:

c) Entities not related to a call (e.g. entities initiated by using a REGISTER message in connection with activating a supplementary service). Note.

Note: In case b) and c) entities cannot be restarted individually. All entities shall be restarted when a RESTART message indicating "single interface" or "all interface" in the Restart indicator information element is used.

Add the following text after the two paragraphs concerning semipermanent connections:

Generally, the network shall send a STATUS message with cause #82 "identified channel does not exist" if none of the specified channels can be restarted (semi-permanent B-channels and/or explicitly indicated D-channel). The diagnostic field in the cause information element shall not be used.

5.6 CALL REARRANGEMENTS

This procedure is only applicable for point-to-multipoint configurations.

5.6.1 Call suspension

Maximum length of Call identity value (8 octets) shall be supported.

5.6.2 Call suspended

Maximum length of Call identity value (8 octets) shall be supported.

The network shall send a NOTIFY message to the other user when a call is suspended.

5.6.3 Call suspend error

If the network receives a SUSPEND message in the Active state on a point-to-point access, the network shall respond by sending a SUSPEND REJECT message containing cause #50 "requested facility not subscribed" and the call shall remain in the Active state.

5.6.4 Call re-establishment

The network shall send a NOTIFY message to the other user when a call is resumed.

5.6.5 Call resume errors

If the network receives a RESUME message in the Null state on a point-to-point access, the network shall respond by sending a RESUME REJECT message containing cause #85 "no call suspended" and the call shall remain in the Null state.

The network shall preserve the call identity and the clearing cause during the period of timer T307.

5.6.6 Double suspension

Applicable.

5.6.7 Call re-arrangement notification controlled by NT2

Applicable.

5.7 CALL COLLISIONS

Applicable.

5.8 HANDLING OF ERROR CONDITIONS

Detailed operation and maintenance requirements may be found in separate national specifications.

5.8.1 Protocol discrimination error

Applicable.

5.8.2 Message too short

Applicable.

5.8.3 Call reference error

5.8.3.1 Invalid call reference format

Applicable.

5.8.3.2 Call reference procedural errors

a)
Whenever any message except SETUP, RELEASE, RELEASE COMPLETE, STATUS or RESUME is received specifying a call reference which is not recognized as relating to an active call or to a call in progress, clearing is initiated by sending a RELEASE COMPLETE message with cause #81 "invalid call reference value" and remain in the Null state.

5.8.4 Message type or message sequence errors

The network shall be able to distinguish between unimplemented (or non-existent) message types and implemented message types which are incompatible with the call state. In this case, the message type shall be included in the Diagnostic field.

NOTE - Finland: This requirement is not mandatory.

The status enquiry procedure is not required in order to handle this error situation.

5.8.5 General information element errors

The non-locking shift indicator shall be used by the network. However, the network shall be able to interpret both the non-locking and locking shift indicators in the diagnostic field.

5.8.5.1 Information element out of sequence

The network shall ignore any information element which is received out of sequence, and continue to process the remaining part of the message.

The note is not applicable.

5.8.5.2 Duplicate information elements

Applicable.

5.8.6 Mandatory information element errors

Applicable.

5.8.7 Non-mandatory information element errors

Applicable.

5.8.7.1 Unrecognized information element

Diagnostic shall be included for cause #99 in the STATUS message.

NOTE - Finland: The diagnostic field is not required.

5.8.7.2 Non-mandatory information element content error

When a message is received, containing one or more non-mandatory information elements with an invalid content, the network shall respond with a STATUS message containing Cause and diagnostic.

NOTE - Finland: The diagnostic field is not required.

Access information elements (e.g. User-user information element, Called party subaddress information element) exceeding the maximum length, shall be discarded.

5.8.8 Data link reset

Applicable.

5.8.9 Data link failure

2) STATUS ENQUIRY message shall be sent to verify the call state of the peer entity.

NOTE - Finland and Sweden: STATUS ENQUIRY is not required.

5.8.10 Status enquiry procedure

NOTE - Finland and Sweden: The status enquiry procedure is not required.

Only required in connection with the procedural error condition described in § 5.8.9. (Data link failure).

Maximum one retransmission of a STATUS ENQUIRY message is allowed.

5.8.11 Receiving a STATUS message

This section shall be considered as replacing section 5.8.11 in ETS T/S 46-30 with regard to receiving a STATUS message in the network.

When a STATUS message is received by the network the information concerning the users call state shall be checked against the current call state in the network. Furthermore, in some cases the received cause value shall be checked.

The actions to be taken are decided from the following tables:

Table 3: Used by a global state machine in the point-to-multipoint configuration.

Table 4: Used by an individual state machine in a point-to-multipoint configuration.

Table 5: Used by a state machine in a point-to-point configuration.

Table 6: Used by a state machine associated with a global call reference.

Table 3. Global state machine in a point-to-multipoint configuration

	Users call state received in a STATUS message															
Network call state	0	1	2	3	4	6	7	8	9	10	11	12	15	17	19	25
0 Null	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
1 Call initiated	D	E	C	C	C	C	C	C	C	C	C	C	C	C	C	C
2 Overlap sending	D	K	E	C	C	C	C	C	C	C	C	C	C	C	C	C
3 Outgoing call proceeding	D	K	K	E	C	C	C	C	C	C	C	C	C	C	C	C
4 Call delivered	D	C	K	K	E	C	C	C	C	C	C	C	C	C	C	C
6 Call present	I	H	H	H	H	E	H	H	H	H	H	H	H	H	H	H
7 Call received	I	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
8 Connect request	I	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
9 Incoming call proceeding	I	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
10 Active (Orig.)	D	C	K	K	K	C	C	C	C	E	C	C	C	C	C	C
10 Active (Dest.)	D	C	C	C	C	C	C	K	C	E	C	C	C	C	C	C
11 Disc request	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
12 Disc ind	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
15 Suspend request	D	C	C	C	C	C	C	C	C	C	C	C	E	C	C	C
17 Resume request	D	C	C	C	C	C	C	C	C	C	C	C	C	E	C	C
19 Release request	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
22 Call abort	I	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
25 Overlap receiving	I	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H

Table 4. Individual state machine in a point-to-multipoint configuration

	Users call state received in a STATUS message															
Network call state	0	1	2	3	4	6	7	8	9	10	11	12	15	17	19	25
7 Call received	L	M	M	M	M	M	N	M	M	M	M	M	M	M	M	M
8 Connect request	L	M	M	M	M	M	M	N	M	M	M	M	M	M	M	M
9 Incoming call proceeding	L	M	M	M	M	M	M	M	N	M	M	M	M	M	M	M
19 Release request	L	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
25 Overlap receiving	L	M	M	M	M	M	M	M	M	M	M	M	M	M	M	N

Table 5. State machine in a point-to-point configuration

	Users call state received in a STATUS message															
Network call state	0	1	2	3	4	6	7	8	9	10	11	12	15	17	19	25
6 Call present	I	C	C	C	C	E	C	C	C	C	C	C	C	C	C	C
7 Call received	D	C	C	C	C	C	E	C	C	C	C	C	C	C	C	C
8 Connect request	D	C	C	C	C	C	C	E	C	C	C	C	C	C	C	C
9 Incoming call proceeding	D	C	C	C	C	C	C	C	E	C	C	C	C	C	C	C
25 Overlap receiving	D	C	C	C	C	C	C	C	C	C	C	C	C	C	C	E

Note: For all other network call states applicable to a point-to-point configuration, the actions shall be the same as described in table 3.

Table 4. State machine associated with a global call reference

	Users call state received in a STATUS message		
Network call state	0	1	2
0 Rest 0	R	R	R
1 Rest 1	S	R	S
2 Rest 2	T	R	R

A) The network shall: discard the message; and remain in the Null state.

B) The network shall: send a RELEASE COMPLETE message with cause #101 "Message not compatible with call state" to the local user; and remain in the Null state.

C) The network shall: send a RELEASE COMPLETE message with cause #101 "Message not compatible with call state" to the local user; clear the call to the remote user with cause #111 "Protocol error, unspecified"; release all resources; release the call reference; and enter the Null state.

D) The network shall: clear the call to the remote user with cause #111 "Protocol error, unspecified"; release all resources; release the call reference; and enter the Null state.

E) The network shall check the received cause value as follows:

- Cause #96 "Mandatory information element is missing": The network shall: send a RELEASE COMPLETE message with cause #111, "Protocol error, unspecified" to the local user; clear the call to the remote user with cause #111 "Protocol error, unspecified"; release all resources; release the call reference; and enter the Null state.

- Any other cause value:
  No action shall be taken.

NOTE - Finland: The network actions to be taken on the received cause value are implementation dependent.

F) The network shall take no action on the STATUS message and continue normal call clearing procedure.

G) The network shall: release all resources; release the call reference; and enter the Null state.

H) The network shall: send a RELEASE COMPLETE message with cause #111 "Protocol error, unspecified" to that individual local user; and remain in the same global call state.

I) The network shall take no further action on the STATUS message.

K) The network shall check the received cause value as follows:

- Cause #30 "Response no status enquiry",
  cause #31 "Normal, unspecified",
  cause #96 "Mandatory information element is missing"
  or
  cause #97 "Message type non-existent or not implemented":
  The network shall: send a RELEASE COMPLETE message with cause #101 "Message not compatible with call state" to the local user; clear the call to the remote user with cause #111 "Protocol error, unspecified"; release all resources; release the call reference; and enter the Null state.

- Any other cause value:
  No action shall be taken.

NOTE - Sweden: If cause #30 is received, no action shall be taken.

NOTE - Finland: The network actions to be taken on the received cause value are implementation dependent.

L) The network shall: send an "internal release complete indication" to the global state machine; and release that individual state machine.

M) The network shall: send a RELEASE COMPLETE message with cause #101 "Message not compatible with call state" to that individual local user; send an "internal release complete indication" to the global state machine; and release that individual state machine.

N) The network shall check the received cause value as follows:

- Cause #96 "Mandatory information element is missing":
  The network shall: send a RELEASE COMPLETE message with cause #111 "Protocol error, unspecified" to that individual local user; send an "internal release complete indication" to the global state machine, and release that individual state machine.

- Any other cause value:
  No action shall be taken.

NOTE - Finland: The network actions to be taken on the received cause value are implementation dependent.

R) The network shall take no further action on the received STATUS message.

S) The network shall check the received cause value as follows:

- Cause #82 "identified channel does not exist": The maintenance entity shall be informed and no further action shall be taken on the STATUS message.

- Any other cause value: No action shall be taken.

T) The network shall: release the call reference and enter the Null state.

Criteria for sending a STATUS message:

- The call state to report in a STATUS message is the state which existed at the moment the incorrect message was received. An exception exist in the case a broadcast SETUP message has been sent by the network and the network needs to send a STATUS message to a user to which an individual state machine has not yet been established. In this case the network shall indicate call state 6 (Call Present) in the STATUS message if call state 7, 8, 9 or 25 exists in the network (see ETS T/S 46-31).

- In case also a response message has to be sent the STATUS message shall precede this response message.

5.9 USER NOTIFICATION PROCEDURE

Applicable.

6. PACKET COMMUNICATION AT THE S/T INTERFACE

The support of packet mode equipment in accordance with ETS T/S 46-50 is outside the scope of this specification.

7. USER-TO-USER SIGNALLING PROCEDURES

The procedures for user-to-user signalling will be described in a separate supplementary service document.

8. APPLICATION OF CIRCUIT-SWITCHED SUPPLEMENTARY SERVICES TO TERMINALS USING STIMULUS PROCEDURES

Applicable.

9. LIST OF SYSTEM PARAMETERS

The network timer values given in table 7 below shall be used.

	TIMER VALUE APPLICABLE IN EACH COUNTRY				
Timer	DENMARK	FINLAND	NORWAY	SWEDEN	ICELAND
T301	3 min	3 min	5 min	N. a.	N. a.
T302	15 s	10-15 s	15 s	15 s	15 s
T303	4 s	4 s	4 s	4 s	4 s
T304	20 s	20 s	N. a.	N. a.	N. a.
T305	30 s	30 s	30 s	30 s	30 s
T306	30 s	30 s	30 s	30 s	30 s
T307	3 min	3 min	3 min	3 min	3 min
T308	4 s	4 s	4 s	4 s	4 s
T309	90 s	90 s	90 s	90 s	90 s
T310	30 s	30-40 s	30 s	30 s	30 s
T312	6 s	6 s	6 s	6 s	6 s
T314	N. a.	N. a.	4 s	N. a.	N. a.
T316	2 min	2 min	2 min	2 min	2 min
T317	90 s	< 2 min	90 s	90 s	90 s
T320	Note 1	Note 1	Note 1	Note 1	Note 1
T321	N. a.	N. a.	N. a.	N. a.	N. a.
T322	4 s	N. a.	4 s	N. a.	N. a.
T3xx(Note2)	15 s	10-15 s	15 s	10-15 s	10-15 s

N. a. = Not applicable

Note 1: The support of packet mode equipment in accordance with ETS T/S 46-50 is outside the scope of this specification.

Note 2: See § 5.2.

Table 7. Network timer values

ANNEX A: USER SIDE AND NETWORK SIDE SDL DIAGRAMS

See ETS T/S 46-31

ANNEX B: COMPATIBILITY CHECKING

Applicable.

ANNEX C: TRANSIT NETWORK SELECTION

Not applicable.

ANNEX D: EXTENSIONS FOR SYMMETRIC CALL OPERATION

Applicable.

ANNEX E: NETWORK SPECIFIC FACILITY SELECTION

Not applicable.

ANNEX F: D-CHANNEL BACKUP PROCEDURES

Not applicable.

ANNEX G: CAUSE DEFINITIONS

Cause values # 2 and 91: Not applicable.

Cause value # 7: See ETS T/S 46-50 - Example message flow diagrams and example conditions for cause mapping.

Cause value # 49: See ETS T/S 46-50 - Mapping of Q.931 cause fields to X.25 cause fields.

Cause # 3 and # 70 shall not be generated by the network, but shall be passed to the user if received.

ANNEX H: EXAMPLES OF INFORMATION ELEMENTS CODING

H.1 BEARER CAPABILITY INFORMATION ELEMENT

See ETR T/S 46-39.

H.2 CHANNEL IDENTIFICATION INFORMATION ELEMENT

H.2.1: BASIC INTERFACE, CIRCUIT MODE, B-CHANNEL

H.2.1 b: Not required to be generated by the network. The network shall be able to receive and handle this coding.

NOTE - Denmark: Applicable.

H.2.2: PRIMARY RATE INTERFACE, CIRCUIT MODE, B-CHANNEL

Applicable.

H.2.3: PRIMARY RATE INTERFACE, CIRCUIT MODE, HO-CHANNEL

Not applicable.

H.3 CALLED/CALLING PARTY SUBADDRESS INFORMATION ELEMENT

Applicable.

ANNEX I: USE OF PROGRESS INDICATORS

Applicable.

ANNEX J: EXAMPLES OF CAUSE VALUE AND LOCATION FOR BUSY CONDITION

Applicable.

ANNEX K: MESSAGE SEGMENTATION PROCEDURES

Not applicable. It is assumed that a layer 3 message will exceed the maximum layer 2 frame length only in cases where a User-user information element is included in the message. If such a situation occurs in the network, it shall discard the User-user information element, and take appropriate actions according to § 7.

If the network receives a SEGMENT message it shall be handled according to § 5.8.3.2 item a) or § 5.8.4 as a not implemented message.

NOTE - Norway: Applicable.

ANNEX L: LOW LAYER INFORMATION CODING PRINCIPLES

Only Low layer information contained in the Bearer capability information element is examined by the network.

See ETR T/S 46-39 for further examples.

ANNEX M: LOW LAYER COMPATIBILITY NEGOTIATION

Applicable. The network shall be able to convey Low layer compatibility information in the CONNECT message.

See ETR T/S 46-39 for further examples.

ANNEX N: PROCEDURES FOR ESTABLISHMENT OF BEARER CONNECTION PRIOR TO CALL ACCEPTANCE

Not applicable; i.e. the network shall never through-connect in one or both directions at the terminating side prior to call acceptance.

ANNEX O: OPTIONAL PROCEDURES FOR BEARER SERVICE CHANGE

Not applicable.

ANNEX P: FORMAL DEFINITIONS FOR FACILITY INFORMATION ELEMENT

Applicable.

APPENDIX I. Usage of cause values.

Applicable.

APPENDIX II. Example message flow diagrams and example conditions for cause mapping

See ETS T/S 46-50.

APPENDIX III. Summary of assigned information element identifier and message type code points for the T/S 46-xx Series of ETSs.

TABLE III-1 (sheet 1 of 2) Codeset 0 Information element code points

The following ETS T/S 46-30 information elements are not applicable:

0000 0000	Segmented message
0010 0000	Network specific facilities
0111 1000	Transit network selection
0111 1111	Escape for extension

NOTE - Norway: The Segmented message information element is applicable.

TABLE III-1 (sheet 1 of 2) Codeset 5 Information element code points

0111 1100	Reserved
0111 1101	Reserved
0111 1111	Not applicable

TABLE III-2 Message type code points

The following ETS T/S 46-30 message type code point is not applicable:

0110 0000	SEGMENT

NOTE - Norway: The SEGMENT message is applicable.

TABLE III-3 Operation values assigned within the invoke component of the facility information element

Applicable.

NORDTEL

NT/SIG-SPEC-1

NORDIC SPECIFICATION

APPLICATION DOCUMENT TO ETS 300 102-1
DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1
(DSS 1) - NETWORK LAYER - BASIC CALL CONTROL

APPENDIX A

TRANSLATION TABLE BETWEEN CAUSE VALUES AND TONES AND/OR ANNOUNCEMENTS

Issue 1
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ISSUE DATE: 90-07-01

CAUSE NO.	CAUSE NAME	DSS1	ISUP		SWEDEN	NORWAY	DENMARK	FINLAND
63	Service or option not available, unspecif.	x	x		SIT/Rec.		SIT	SIT/Rec.
65	Bearer capability not implemented	x	x					
66	Channel type not implemented	x						
69	Requested facility not implemented	x	x		SIT/Rec.		SIT	SIT/Rec.
70	Only restricted digital information bearer capability is available	x	x					
79	Service or option not implemented, unspec.	x	x		SIT/Rec.		SIT	SIT/Rec.
81	Invalid call reference value	x						
82	Identified channel does not exist	x						
83	A suspended call exists, but this call identity does not	x						
84	Call identity in use	x						
85	No call suspended	x						
86	Call having the requested call identity has been cleared	x						
87	User not member of CUG		x		SIT/Rec.	Cong.	SIT	SIT/Rec.
88	Incompatible destination	x	x		SIT/Rec.	Cong.	SIT	SIT/Rec.
90	Non-existent CUG		x		SIT/Rec.	Cong.	SIT	SIT/Rec.
91	Invalid transit network selection	x	x		N.a.	N.a.	N.a.	N.a.
95	Invalid message, unspecified	x	x					
96	Mandatory information element is missing	x						
97	Message type non-existent or not implemented	x	x					
98	Message not compatible with call state or message type non-existent or not implem.	x						
99	Information element non-existent or not implemented	x	x					
100	Invalid information element contents	x						
101	Message not compatible with call state	x						
102	Recovery on timer expiry	x	x			Cong.	Busy 2)	Cong.
103	Parameter non-existent or not implemented - passed on		x					
111	Protocol error, unspecified	x	x					
127	Interworking , unspecified	x	x					

APPENDIX A: Translation table between cause values and tones and/or announcements

CAUSE NO.	CAUSE NAME	DSS1	ISUP	SWEDEN	NORWAY	DENMARK	FINLAND
1	Unallocated (unassigned) number	x	x	SIT/Rec.	Rec.	SIT	SIT/Rec.
2	No route to specified transit network	x	x	N.a.	N.a.	N.a.	N.a.
3	No route to destination	x	x				
4	Send special information tone		x	SIT/Rec.	SIT	SIT	SIT
5	Misdialled trunk prefix		x	SIT/Rec.	Rec.	SIT	SIT/Rec.
6	Channel unacceptable	x					
7	Call awarded and being delivered in an established channel	l)					
16	Normal call clearing	x	x		Cong.	Busy	Busy
17	User busy	x	x	Busy	Busy	Busy	Busy
18	No user responding	x	x		Cong.	Busy	Cong.
19	No answer from user (user alerted)	x	x		Cong.	Busy	Cong.
21	Call rejected	x	x		Cong.	Busy	Cong.
22	Number changed	x	x	SIT/Rec.	Rec.	SIT	SIT/Rec.
26	Non-selected user clearing	x					
27	Destination out of order	x	x		Rec.	Busy	SIT/Rec.
28	Invalid number format (address incomplete)	x	x	SIT/Rec.	Cong.	SIT	SIT/Rec.
29	Facility rejected	x	x	Cong.	1)	Busy	SIT/Rec.
30	Response to STATUS ENQUIRY	x					
31	Normal, unspecified	x	x		Cong.	Busy	SIT
34	No circuit/channel available	x	x	Cong./Busy 2)	Cong. 2)	Busy 2)	Cong. 2)
38	Network out of order	x	x	SIT/Rec.	Rec.	Busy	Cong.
41	Temporary failure	x	x	Cong.	Cong.	Busy	Cong.
42	Switching equipment congestion	x	x	Cong.	Cong.	Busy	Cong.
43	Access information discarded	x					
44	Requested circuit/channel not available	x	x		Cong.	Busy 2)	
47	Resource unavailable, unspecified	x	x	Cong.	Cong.	Busy	Cong.
49	Quality of service unavailable	l)					
50	Requested facility not subscribed	x	x	SIT/Rec.		SIT	SIT/Rec.
55	Incoming calls barred within CUG		x	SIT/Rec.			SIT/Rec.
57	Bearer capability not authorized	x	x				SIT/Rec.
58	Bearer capablity not presently available	x	x				Cong.

Abbreviations:

Rec. = Recorded announcement
Busy = Busy tone
Cong. = Congestion tone
SIT = Special information tone
N.a. = Not applicable

NOTE: No indication implies that no tone or announcement is sent.

x = The cause is applicable in the indicated signalling system
i) = The cause value is only used in ETS T/S 46-50.

Notes:

1): To be considered together with the individual supplementary services.

2): Not applicable if no B-channel is available at the local user-network interface.

NORDTEL

NT/SIG-SPEC-1

NORDIC SPECIFICATION

APPLICATION DOCUMENT TO ETS 300 102-1
DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1
(DSS 1) - NETWORK LAYER - BASIC CALL CONTROL

APPENDIX B

GRAPHICAL REPRESENTATION OF B-CHANNEL SELECTION PROCEDURES

Issue 1
Rev: A

ISSUE DATE: 90-07-01

APPENDIX B: GRAPHICAL REPRESENTATION OF B-CHANNEL SELECTION PROCEDURES.

This appendix gives graphical representations of the procedures for B-channel selection.

B.1 B-channel selection - originating (ref. sec. 5.1.2).

Case a) Content of the channel identification element:
channel is indicated, no acceptable alternative
=> CH-ID=A

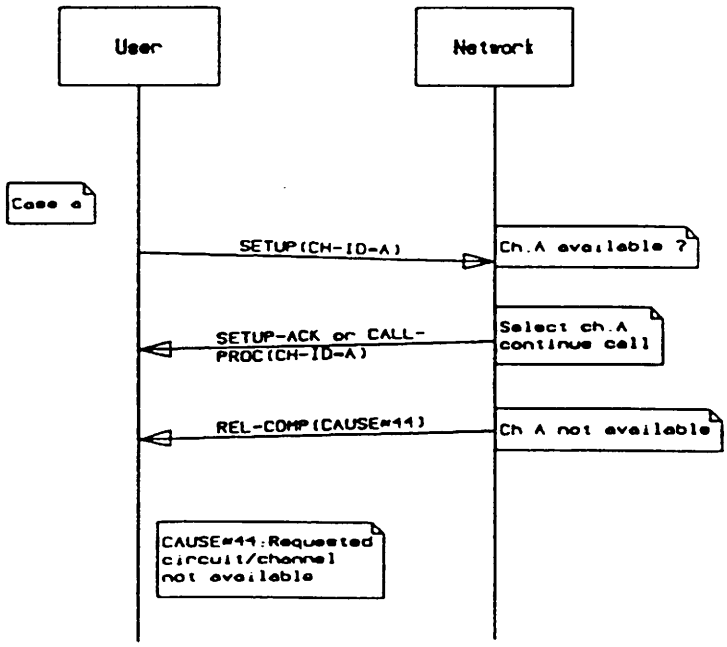
Case b) Content of the channel identification element:
channel is indicated, any alternative is acceptable
=> CH-ID=A,X

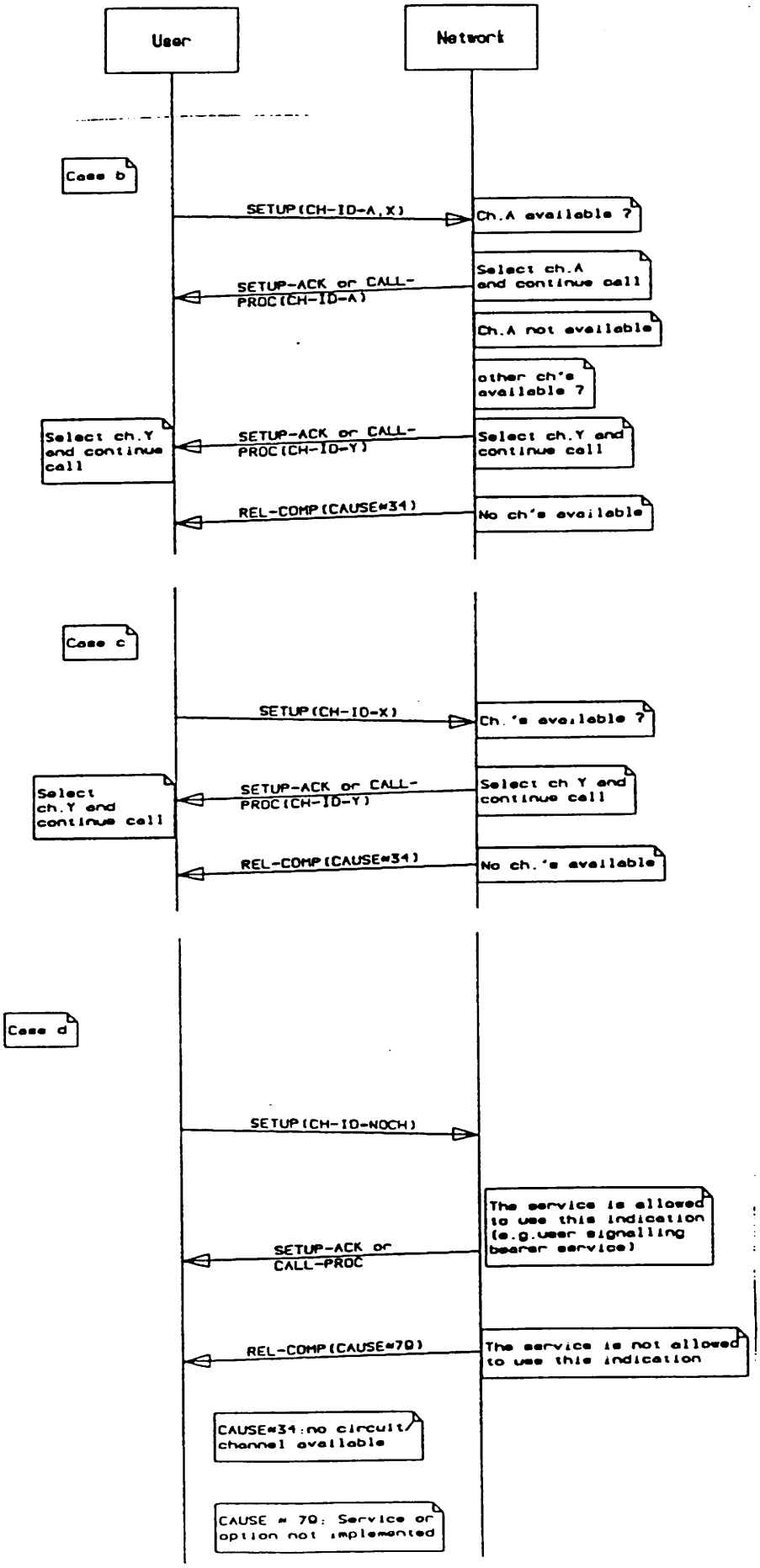
Case c) Content of the channel identification element:
any channel is acceptable
=> CH-ID=X

Case d) Content of the channel identification element:
no channel
=> CH-ID=NOCH

Additional abbreviations:

A channel, which is selected out of one or more available channels
=> CH-ID=Y




User
Network
Case b
SETUP(CH-ID-A,X)
Ch.A available ?
Select ch.A and continue call
SETUP-ACK or CALL-PROC(CH-ID-A)
Ch.A not available
other ch's available ?
Select ch.Y and continue call
SETUP-ACK or CALL-PROC(CH-ID-Y)
Select ch.Y and continue call
REL-COMP(CAUSE=34)
No ch's available
Case c
SETUP(CH-ID-X)
Ch.'s available ?
Select ch.Y and continue call
SETUP-ACK or CALL-PROC(CH-ID-Y)
Select ch.Y and continue call
REL-COMP(CAUSE=34)
No ch.'s available
Case d
SETUP(CH-ID-NOCH)
The service is allowed to use this indication (e.g.user signalling bearer service)
SETUP-ACK or CALL-PROC
REL-COMP(CAUSE=70)
The service is not allowed to use this indication
CAUSE=34:no circuit/channel available
CAUSE = 70: Service or option not implemented

B.2 B-channel selection - destination.

B.2.1 SETUP message delivered by a poin-to-point data link (ref. sec. 5.2.3.1)

Case 1) Content of the channel identification element:
channel is indicated, no acceptable alternative
=> CH-ID=A

Case 2) Content of the channel identification element:
channel is indicated, any alternative is acceptable
=> CH-ID=A,X

Case 3) Content of the channel identification element:
any channel is acceptable
=> CH-ID=X

Case 4) Content of the channel identification element:
no channel available
=> CH-ID=NOCH

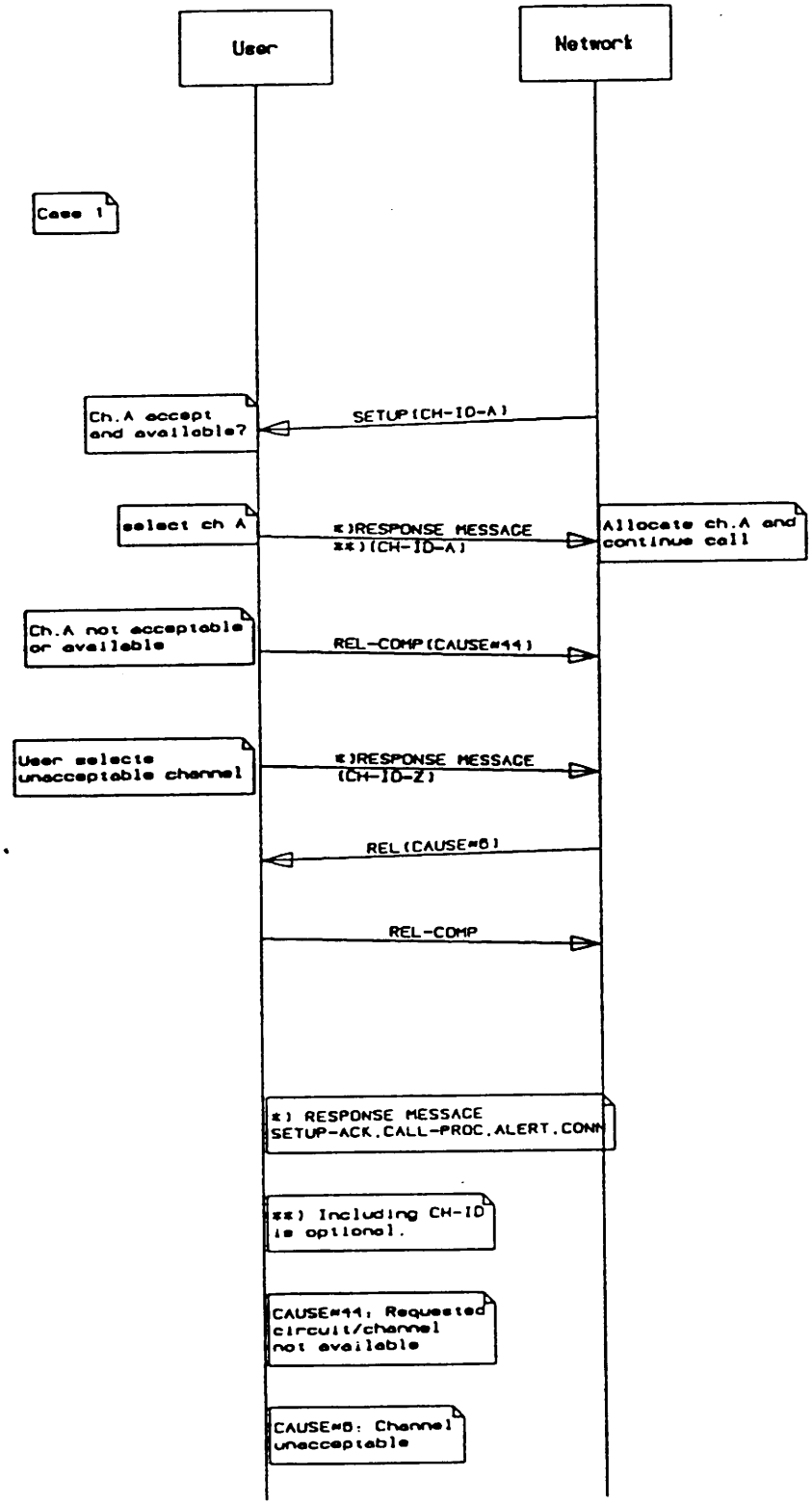
Additional abbreviations:

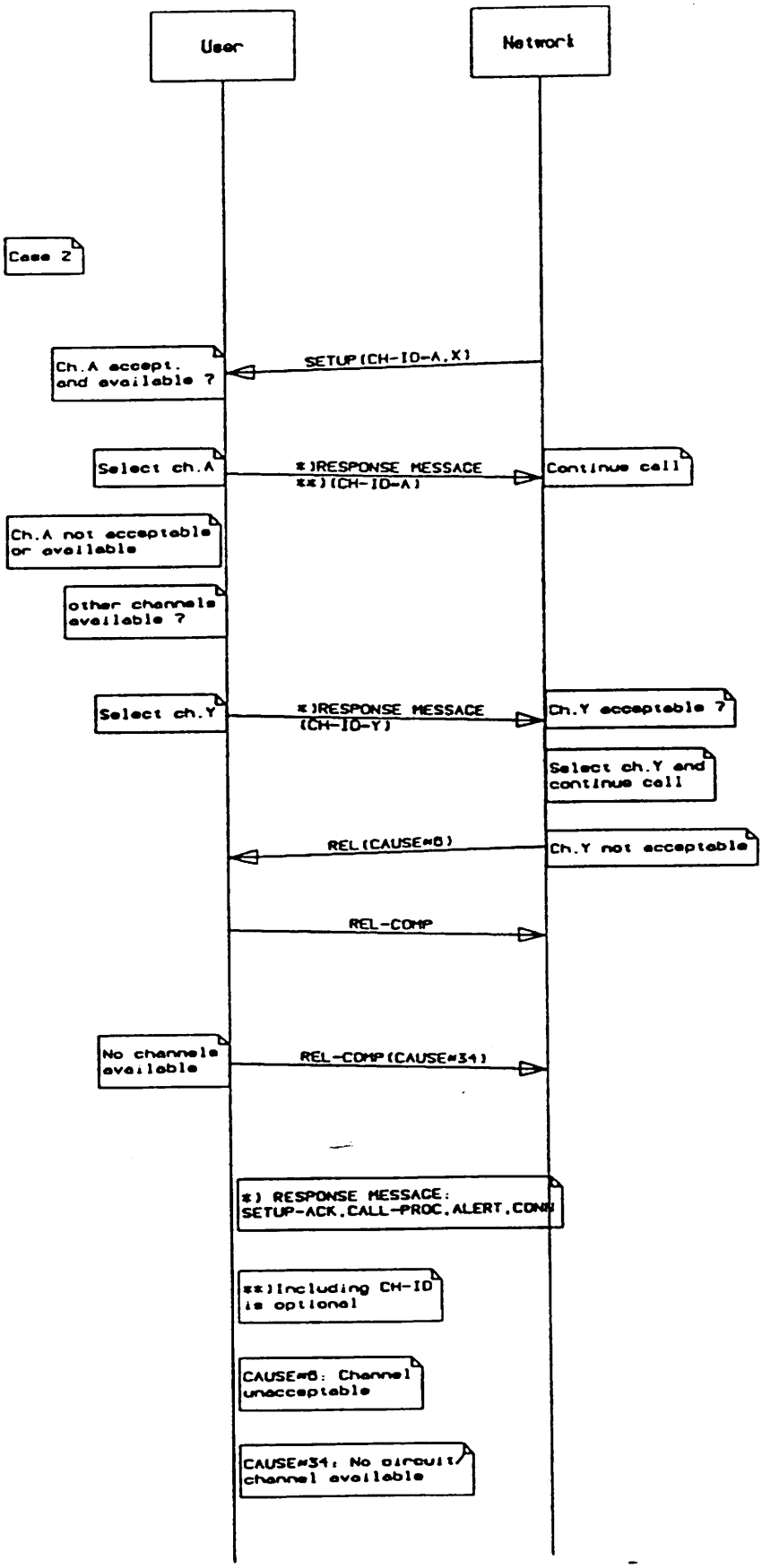
A channel, which is selected out of one or more available channels
=> CH-ID=Y

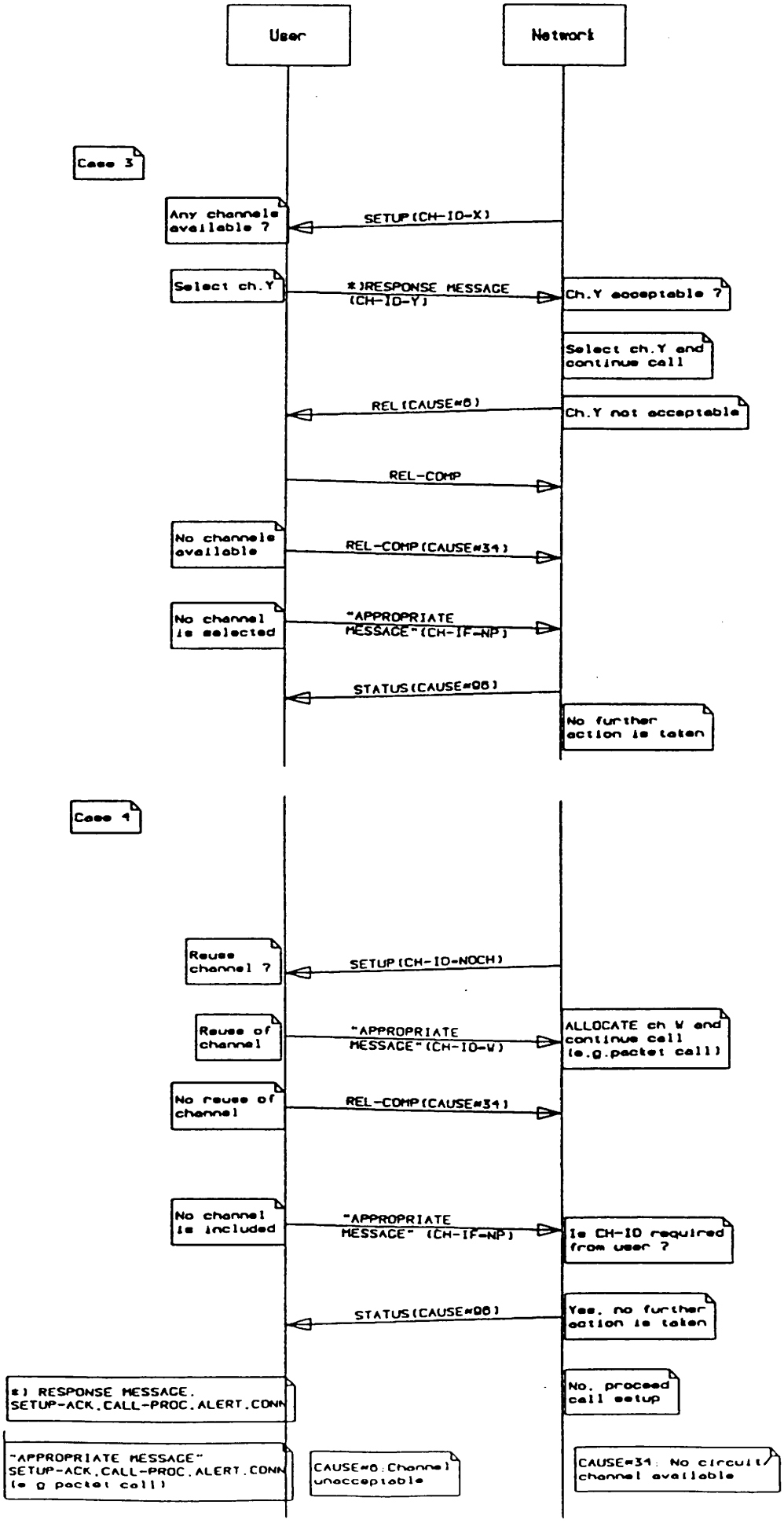
A channel, which the user wishes to reuse
=> CH-ID=W

A channel, which is not allowed to be selected
=> CH-ID=Z

Channel identification information element not present
=> CH-IF=NP


User
Network
Case 1
Ch.A accept and available?
SETUP(CH-ID-A)
select ch A
*)RESPONSE MESSAGE **)(CH-ID-A)
Allocate ch.A and continue call
Ch.A not acceptable or available
REL-COMP(CAUSE=44)
User selects unacceptable channel
*)RESPONSE MESSAGE (CH-ID-Z)
REL(CAUSE=6)
REL-COMP
*) RESPONSE MESSAGE SETUP-ACK,CALL-PROC,ALERT,CONN
**) Including CH-ID is optional.
CAUSE=44: Requested circuit/channel not available
CAUSE=6: Channel unacceptable


User
Network
Case 2
Ch.A accept. and available ?
SETUP(CH-ID-A,X)
Select ch.A
*)RESPONSE MESSAGE **)(CH-ID-A)
Continue call
Ch.A not acceptable or available
other channels available ?
Select ch.Y
*)RESPONSE MESSAGE (CH-ID-Y)
Ch.Y acceptable ?
Select ch.Y and continue call
REL(CAUSE=8)
Ch.Y not acceptable
REL-COMP
No channels available
REL-COMP(CAUSE=34)
*) RESPONSE MESSAGE: SETUP-ACK,CALL-PROC,ALERT,CONN
**)Including CH-ID is optional
CAUSE=8: Channel unacceptable
CAUSE=34: No circuit/channel available


User
Network
Case 3
Any channels available ?
SETUP(CH-ID-X)
Select ch.Y
*)RESPONSE MESSAGE (CH-ID-Y)
Ch.Y acceptable ?
Select ch.Y and continue call
REL(CAUSE=6)
Ch.Y not acceptable
REL-COMP
No channels available
REL-COMP(CAUSE=34)
No channel is selected
"APPROPRIATE MESSAGE"(CH-IF-NP)
STATUS(CAUSE=06)
No further action is taken
Case 4
Reuse channel ?
SETUP(CH-ID-NOCH)
Reuse of channel
"APPROPRIATE MESSAGE"(CH-ID-V)
ALLOCATE ch V and continue call (e.g.packet call)
No reuse of channel
REL-COMP(CAUSE=34)
No channel is included
"APPROPRIATE MESSAGE" (CH-IF-NP)
Is CH-ID required from user ?
STATUS(CAUSE=06)
Yes, no further action is taken
*) RESPONSE MESSAGE. SETUP-ACK,CALL-PROC,ALERT,CONN
No, proceed call setup
"APPROPRIATE MESSAGE" SETUP-ACK,CALL-PROC,ALERT,CONN (e.g packet call)
CAUSE=6 Channel unacceptable
CAUSE=34 No circuit/channel available

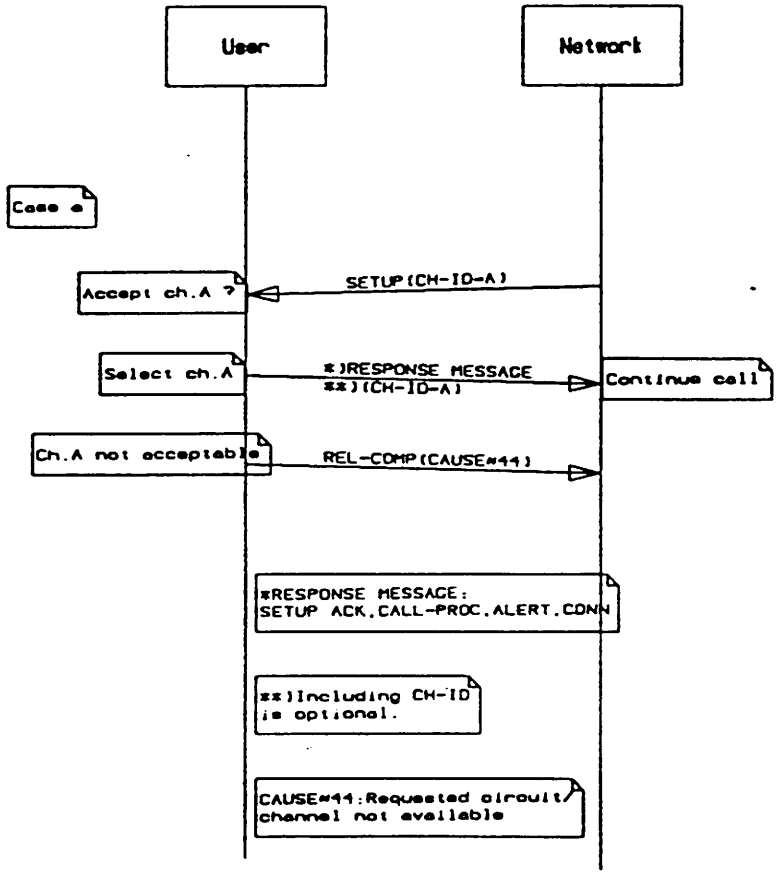
B.2.2 SETUP message delivered by a broadcast data link (ref. sec. 5.2.3.2)

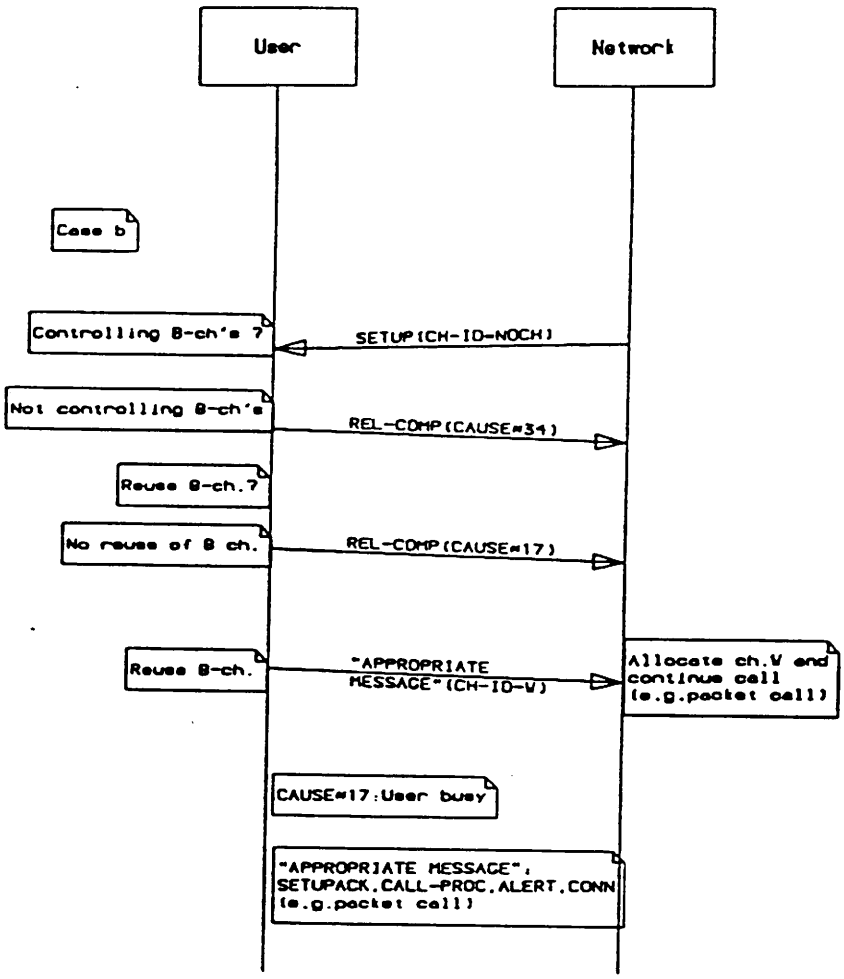
Case a) Content of the channel identification element:
channel is indicated, no acceptable alternative
=> CH-ID=A

Case b) Content of the channel identification element:
no channel available
=> CH-ID=NOCH

Additional abbreviations:

A channel, which the user wishes to reuse
=> CH-ID=W




User
Network
Case b
Controlling B-ch's ?
SETUP(CH-ID-NOCH)
Not controlling B-ch's
REL-COMP(CAUSE=34)
Reuse B-ch.?
No reuse of B ch.
REL-COMP(CAUSE=17)
Reuse B-ch.
"APPROPRIATE MESSAGE"(CH-ID-V)
Allocate ch.V and continue call (e.g.packet call)
CAUSE=17:User busy
"APPROPRIATE MESSAGE": SETUPACK,CALL-PROC,ALERT,CONN (e.g.packet call)

The Danish Public Telecommunication Enterprises

ISDN Digital Subscriber Signalling System No. 1

DSS1

Network layer
Supplementary Services

Application specification document to ETSI ETSs for supplementary services:

Integrated Services Digital Network (ISDN), Supplementary Services, Digital Subscriber Signalling one (DSS1) protocol.

February 1993

Table of contens:

INTRODUCTION

This document gives the specification for the layer 3 procedures for Primary Rate Access and Basic Access to be implemented for the supplementary services in the Danish ISDN.

The D-channel layer 3 specification for supplementary services is contained in ETSI ETSs and this document is an application specification to these ETSs.

The service descriptions (stage 1) are specified in another national application specification document "ISDN Supplementary Services, Service description".

Concerning interactions with other supplementary services only interactions between the supplementary services discussed in this document are included.
Comments to interactions are included in the comments to the individual supplementary services, but will in later issues be separated as comments to ETS T/S 46-33Z.

Structure of the document

The document contains a section for each supplementary service dealing with:

- selection of which options in the ETSs that are applicable in the Danish ISDN

- requirements to those cases which are indicated as implementation dependent in the network

- some clarifications to certain sections of the ETSs, where this is felt to be necessary.

Note: Only subclauses to which remarks apply are listed in the document. Subclauses not indicated shall be considered as "applicable".

DDI - Direct Dialling In

Application to stage 3 ETSI ETS 300 064

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

Only fixed number length is used in the network.

The DDI number shall always be sent en-bloc in the SETUP message from the network to the user, and with the Sending complete information element included.

6 Operational requirements

Applicable.

7 Coding requirements

Applicable.

8 State definitions

Applicable.

9 Signalling procedures at the coincident S and T reference point

Applicable

10 Procedures for interworking with private ISDNs

10.2.1 Normal operation

The network shall send the full ISDN-number to the called user.

11 Interactions with other networks

Applicable.

12 Interactions with other supplementary services

Applicable.

13 Parameter values (timers)

Applicable.

14 Dynamic description (SDLs)

Applicable.

Annex A (Informative) Signalling flows

Applicable.

MSN - Multiple Subscriber Number

Application to stage 3 ETSI ETS 300 052

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

The network shall always provide the full ISDN number to the called user.

6 Operational requirements

6.2 Requirements on the originating network side

If the access has the MSN supplementary service, and the Calling party number is received, the network shall use the information in the Calling party number information element to identify the calling terminal and the appropriate basic or supplementary service. If the calling party number is omitted, the services related to the default number shall be used.

7 Coding requirements

Applicable

8 State definitions

Applicable.

9 Signalling procedures at the coincident S and T reference point

9.2 Delivery of multiple subscriber number

9.2.1 Normal operation

The multiple subscriber number consist of the national ISDN number as specified in CCITT Recommendation E.164 [7]. The Type of number shall be coded "national number".

The numbering plan identification shall be coded as ISDN/Telephony numbering plan (CCITT Recommendation E.164/E.163).

9.2.2 Exceptional procedures

Applicable.

9.3 Receipt of multiple subscriber number

The network shall be able to distinguish among the multiple subscriber numbers based on receiving sufficient digits of the number sent by the calling user.

10 Procedures for interworking with private ISDNs

Applicable.

11 Interactions with other networks

Applicable.

12 Interactions with other supplementary services

Applicable.

13 Parameter values (timers)

Applicable.

14 Dynamic description (SDLs)

Applicable.

SUB - SUBaddressing

Application to stage 3 ETSI ETS 300 061

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

The maximum size of subaddress shall be 20 octets.

Note:For an interim period the size of the subaddress is limited to 4 octets in connection with internatinal calls.
It is the user's responsibility not to exceed this maximum size; if exceeded the network shall discard the subaddress information without giving any indication to the calling user.

6 Operational requirements

6.1 Provision and withdrawal

The SUB supplementary service shall be applicable on a subscription basis.

7 Coding requirements

Applicable.

8 State definitions

Applicable.

9 Signalling procedures at the coincident S and T reference point

Applicable.

10 Procedures for interworking with private ISDNs

Applicable.

11 Interactions with other networks

Applicable.

12 Interactions with other supplementary services

Applicable.

13 Parameter values (timers)

Applicable.

14 Dynamic description (SDLs)

Applicable.

Annex A (informative) Signalling flows

Applicable.

Annex B (informative) Relation of address information elements

Applicable.

CLIP - Calling Line Identification Presentation

Application to stage 3 ETSI 300 092

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

Applicable.

6 Operational requirements

6.2 Requirements on the originating network side

Special arrangement shall not be provided.

7 Coding requirements

Applicable.

8 State definitions

Applicable.

9 Signalling procedures at the coincident S and T reference point

9.3 Actions at the originating local exchange if a special arrangement does not apply

9.3.1 Normal operation

NOTE 7: When the network provides an international calling party number to the called user, the type of number shall be coded as "Unknown" and a prefix shall be added.

9.4 Actions at the destination local exchange if a special arrangement applies

Not applicable.

10 Procedures for interworking with private ISDNs

Applicable.

11 Interactions with other networks

On calls incoming from non-ISDN without an indication of calling line identity restriction, the network shall react according to the second hyphenated item.

Within the national network the calling line identity including restriction information shall be delivered to non-ISDN network.

For calls between international ISDNs the delivery of calling line identity is a matter of bilateral agreement between the service providers.

12 Interactions with other supplementary services

Applicable.

13 Parameter values (timers)

Applicable.

14 Dynamic description (SDLs)

Applicable.

Annex A (Informative) Signalling flows

Applicable.

Annex B (normative) Two calling party number information elements delivery options

Not applicable.

CLIR - Calling Line Identification Restriction

Application to stage 3 ETSI ETS 300 093

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

Applicable.

6 Operational requirements

Applicable.

7 Coding requirements

Applicable.

8 State definitions

Applicable.

9 Signalling procedures at the coincident S and T reference point

Applicable.

10 Procedures for interworking with private ISDNs

Applicable.

11 Interactions with other networks

For calls between international ISDNs the delivery of calling line identity is a matter of bilateral agreement between the service providers.

It shall be possible to restrict any information identifying the calling party from being forwarded to another network.

12 Interactions with other supplementary services

Applicable.

13 Parameter values (timers)

Applicable.

14 Dynamic description (SDLs)

Applicable.

TP - Terminal Portability

Application to stage 3 ETSI ETS 300 055

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

Applicable.

6 Operational requirements

6.1 Provision and withdrawal

The TP supplementary service shall be provided on a subscription basis.

7 Coding requirements

Applicable.

8 State definitions

Applicable.

9 Signalling procedures at the coincident S and T reference point

The network shall send notifications to the remote user.

Since an inconsistency exists between stage 1 and stage 3 concerning the call identity length, the following requirement shall apply for the network:
The maximum length of the call identity shall be 8 octets.

10 Procedures for interworking with private ISDNs

If timer T307 in the private network expires before a suspended call is resumed, the private network shall initiate clearing of the call by sending a DISCONNECT message with cause #102 "recovery on timer expiry" to the public network.

11 Interactions with other networks

No impact on the protocol. Notifications shall be provided in end-to-end ISDN networks only.

12 Interactions with other supplementary services

Applicable.

13 Parameter values (timers)

Applicable.

14 Dynamic description (SDLs)

Applicable.

Annex A (Informative) signalling flows

Applicable.

CW - Call Waiting

Application to stage 3 ETSI ETS 300 058

1 Scope

The CW supplementary service shall be applicable for all circuit switched on demand bearer services.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

Applicable.

6 Operational requirement

6.1 Provision and withdrawal

The CW supplementary service shall be provided on a subscription basis.

7 Coding requirements

Applicable.

8 State definitions

Applicable.

9 Signalling procedures at the coincident S and T reference point

9.1 Activation

When the service is provide by the network it is also activated in the network side.

9.5.1.1 Network determined user busy

Timer T-CW shall not be used by the network, i.e. the waiting call is supervised by the basic call timer T301 or an appropriate network timer.

The network shall include a Notification information element in the ALERTING message sent to the calling user.

Note: For an interim periode the notification information will not be delivered to user C if the ISDN user part (ISUP) is involved in the call.

9.5.1.2 Subscriber resources in use

T-CW is not applicable.

9.5.2 Exceptional procedures

T-CW is not applicable.

9.6.1 Normal operation

For an interim period of time, first paragraph case b) is not provided by the network as the Call hold supplementary service is not provided.

Timer T-CW is not applicable.

10 Procedures for interworking with private ISDNs

The network shall include a Notification indicator information element in the ALERTING message sent to the user if provided by the served user's network.

11 Interaction with other networks

Applicable.

12 Interaction with other supplementary services

Applicable.

13 Parameter values (timers)

Timer T-CW is not applicable.

14 Dynamic description (SDLs)

Timer T-CW is not applicable.

Annex A - Signalling flows

Generally, timer T-CW is not applicable.

UUS - User-to-user signalling, Service 1 implicit

Application to stage 3 ETSI ETS 300 102 Part 1 clause 7.1

This application specification deals only with User-to-user service 1 implicit requested supplementary service.

"Note ISDN93" indicates temporary notes. The content of such notes applies for the first phase of commercial ISDN (1993), and will be reviewed afterwards.

7.1.1 General

Note ISDN93: Only Service 1 is applicable.

Note ISDN93: The option specifying "required" is not applicable.

7.1.2 Explicit invocation procedures for service 1, 2 and 3.

Note ISDN93: Not applicable.

Note: It is not required that the network shall be able to recognise any explicit request.
If the network receives a FACILITY message, it shall handle according to the error handling procedures of ETS T/S 46-30 clause 5.8.4.
If the network receives a Facility information element in an acceptable message, it shall handle according to the error handling procedures of ETS T/S 46-30 clause 5.8.7.

7.1.3 User-to-user signalling Service 1

7.1.3.1 General characteristics

Note ISDN93: The explicit Service 1 request method is not applicable. Handling of an explicit request shall be as described in section 7.1.2.

7.1.3.2 User-to-user signalling in the call setup and clearing phases - Implicit service request (preferred, i.e. not required)

Service 1 shall be implicitly requested if used.

The service does not need any implicit acceptance from the network or called user to be used in subsequent call control messages.

The second and third paragraphs shall be replaced by the following text:

> A User-user information element may be included in the ALERTING and/or CONNECT messages transferred across the user-network interface at the called side as described in par. 5.2.5. The content of this information element is transported by the network and delivered in the User-user information element included in the corresponding message(s) transferred across the user-network interface at the calling side as described in par. 5.1.7 and 5.1.8.
>
> NOTE: In case of a point-to-multipoint arrangement at the called user's interface it is the called user's responsibility to avoid contention, i.e. cases where more than one ALERTING message is sent including different user information content.

ETSI Note: Not applicable.

7.1.3.3 User-to-user signalling in the call setup and clearing phases - Explicit service request (preffered or required)

Note ISDN93: Not applicable.

7.1.3.4 Interworking

In the case of interworking with a called user which is not an ISDN user, a PROGRESS or an ALERTING message with the Progress indicator information element indicating #2 "destination address is non-ISDN" is sent to the calling user to indicate that the service cannot be guaranteed.

7.1.3.5 Rejection of implicit service requests

Called users that cannot provide the service requested shall not return a rejection indication.

7.1.3.6 Rejection of explicit service requests

Note ISDN93: Not applicable.

7.1.3.7 User-to-user signalling in the call clearing phase

The third paragraph shall be read as follows:

> In addition, when a SETUP message has been delivered using the broadcast capability at the data link layer (i.e. the network knows that a point-to-multipoint configuration may exist), only the following user-to-user information transfer .....

If multiple clearing messages are received, the network shall retain the User-to-user information element along with the cause retained according to par. 5.2.5.3.

7.1.3.8 Unexpected user-user information in call control messages

A STATUS message shall not be sent in case a RELEASE COMPLETE message has been received.

7.1.4 User-to-user signalling Service 2

Note ISDN93: Not applicable.

7.1.5 User-to-user signalling Service 3

Note ISDN93: Not applicable.

7.1.6 Unexpected USER INFORMATION messages

Note ISDN93: Not applicable.

7.1.7 Requesting user-to-user signalling services 1, 2 and 3

Note ISDN93: Not applicable.

7.1.8 Summary of actions to be taken by the called side and subsequent network action

TABLE 7.1 Case 1:

Note ISDN93: Only Service 1 is applicable.

In case of Service 1 implicitly requested, the ACK indication is not required as a part of the activation procedure.
The called user may or may not include a User-user information element in the response message.

TABLE 7.1 Case 2:

Note ISDN93: Only the third row is applicable.

In case of Service 1 implicitly requested, the NACK indication is not required as a part of the activation procedure.

TABLE 7.1 Case 3:

Note ISDN93: Only Service 1 in the second row is applicable.

ETSI Note: Key:

The use of stimulus procedures for ACK and NACK is not appplicable.

In case of Service 1 implicitly requested, the ACK and NACK indications are not required as a part of the activation procedure.

Note ISDN93: Explicit ACK and NACK are not applicable.

COLP - COnnected Line identification Presentation

Application to stage 3 ETSI ETS 300 097

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

Applicable.

6 Operational requirements

6.3 Requirements on the destination network side

Special arrangement shall not be provided.

7 Coding requirements

Applicable.

8 State definitions

Applicable.

9 Signalling procedures at the coincident S and T reference point

9.3.1 Normal operation

NOTE 7: When the network provides an international called party number to the calling user, the type of number shall be coded as "Unknown" and a prefix shall be added.

9.4 Actions at the destination local exchange if a special arrangement applies

Not applicable.

10 Procedures for interworking with private ISDNs

Applicable.

11 Interactions with other networks

On calls destined for non-ISDN without an indication of connected line identity restriction, the network shall react according to the second hyphenated item.

Within the national network the calling line identity including restriction information shall be delivered to non-ISDN network.

For calls between international ISDNs the delivery of calling line identity is a matter of bilateral agreement between the service providers.

12 Interactions with other supplementary services

Applicable.

13 Parameter values (timers)

Applicable.

14 Dynamic description (SDLs)

Applicable.

Annex A (Informative) Signalling flows

Applicable.

COLR - COnnected Line identification Restriction

Application to stage 3 ETSI ETS 300 098

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

Applicable.

6 Operational requirements

Applicable.

7 Coding requirements

Applicable.

8 State definitions

Applicable.

9 Signalling procedures at the coincident S and T reference point

Applicable.

10 Procedures for interworking with private ISDNs

Applicable.

11 Interactions with other networks

For calls between international ISDNs the delivery of calling line identity is a matter of bilateral agreement between the service providers.

It shall be possible to restrict any information identifying the connected party from being forwarded to another network.

12 Interactions with other supplementary services

Applicable.

13 Parameter values (timers)

Applicable.

14 Dynamic description (SDLs)

Applicable.

Annex A (Informative) Signalling flows

Applicable.

HOLD - Call HOLD

Application to stage 3 ETSI ETS 300 141

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

Applicable.

6 Operational requirements

6.1 Provision and withdrawal

The Hold service shall be applicable on a subscription basis and may be provided as a separate service.

7 Coding requirements

Applicable.

8 State of definitions

Applicable.

9 Signalling procedures at the coincident S and T reference point

The user A at the originating side shall be allowed to hold a call in state U4 Call Delivered.

9.1 Holding a call - procedures at the interface of user A

9.1.1 Normal operation

The network option in relation to the network state N4 Call Delivered shall be applicable.

The explicit channel reservation function is not applicable.

9.2 Holding a call - procedures at the interface of user B

9.2.1 Normal operation

For an interim period of time the notification will not be delivered to the remote user, if the ISDN user part (ISUP) is involved in the call.

9.4 Retrieving a call - procedures at the interface of user B

9.4.1 Normal operation

For an interim period of time the notification will not be delivered to the remote user, if the ISDN user part (ISUP) is involved in the call.

10 Procedures for interworking with private ISDNs

Applicable.

11 Interactions with other networks

Applicable.

12 Interactions with other supplementary services

Applicable.

13 Parameter values (timers)

Applicable.

14 Dynamic Description (SDLs)

Applicable.

Supplementary Services Interactions

Comments to interactions are included in the comments to the individual supplementary services. Will be moved later to this paragraph.

The Public Danish Telecommunications Enterprises

Integrated Services Digital Network (ISDN):

Support of packet mode terminal equipment by an ISDN ETS 300 007, Case B.

Application specification document to ETSI ETS 300 007, Case B:

INTEGRATED SERVICES DIGITAL NETWORK (ISDN): SUPPORT OF PACKET MODE TERMINAL EQUIPMENT BY AN ISDN

1992-12-10

Table of contents.

Introduction.

This document is an application specification document to the ETS 300 007, *Case B*, for the danish ISDN.

An application specification to the ETS 300 007, *Case A*, for the danish ISDN is to be found in a separate document.

In this application specification document to ETS 300 007, Case B, all parts of ETS 300 007, which refer to Case A, will be designated "not applicable".

Application to ETSI ETS 300 007, November 1991 Case B:

INTEGRATED SERVICES DIGITAL NETWORK (ISDN): SUPPORT OF PACKET MODE TERMINAL EQUIPMENT BY AN ISDN

Foreword.

Applicable.

Introduction.

This application specification is aligned with the following stage 1 descriptions and the danish application specifications for these stage 1 descriptions:

* ETS 300 048 ISDN Packet Mode Bearer Service,
  ISDN Virtual Call (VC) and Permanent Virtual Circuit (PVC) bearer services provided by the B channel of the user access: basic and primary rate.

* ETS 300 049 ISDN Packet Mode Bearer Service,
  ISDN Virtual Call (VC) and Permanent Virtual Circuit (PVC) bearer services provided by the D channel of the user access: basic and primary rate.

This application specification is aligned with the ETS 300 099 (PHI) and the danish application specification for ETS 300 099 (PHI).

Normative references.

Applicable.

1 Scope.

Case A is not applicable.

2 General service aspects.

Case A is not applicable.

Both B-channel and D-channel access connections shall be supported.

3 Reference configurations.

Note: If a NT2 multiplexes several X.25 DTE's onto a single B-channel at layer 3, then this multiplexing shall be a solely internal function in the NT2 and be transparent to the network. That is, the procedures at the T reference point of the B-channel in question shall be exactly the same, as when only one X.25 DTE is connected to that B-channel.

Annex D is not applicable.

3.1 Configuration when accessing PSPDN services (Case A).

Not applicable.

3.2 Configuration for the ISDN virtual circuit service (Case B).

Applicable.

Note: The application specifications for the supported access types are to be found in the application specifications for clause 7.

4 Service aspects.

4.1 Access to PSPDN services (Case A).

Not applicable.

4.2 Access to the ISDN virtual circuit service (Case B).

Applicable.

4.2.1 Service Characteristics.

Applicable.

4.2.2 User Access Capabilities.

Both B-channel and D-channel access connections shall be supported.

Each B-channel access connection and each D-channel access connection shall be associated with one specific E.164 number.

Each E.164 number, which identifies an ISDN user's packet mode terminal equipment, shall be associated with exactly one of the following service types (according to the Danish Telecom Administration's application specification for ETS 300 099, clause 5.3.3):

1. Only B-channel on demand access.

2. Only D-channel on demand layer 2 connection with fixed TEI values (PLL) access. Only one such layer 2 connection per E.164 number is allowed.

3. Both B-channel on demand access and D-channel on demand layer 2 connection with fixed TEI values (PLL) access (only one such D-channel layer 2 access connection per E.164 number is allowed).

Note: A detailed description of the supported access connection types will be found in the application specifications for clause 7.

4.2.2.1 Access Through the B-channel.

Applicable.

4.2.2.2 Access Through the D-channel.

4.2.2.2.1 Service Limitations.

Applicable.

Note: According to ETS 300 049, clause 4, the following rules apply, when an ISDN packet mode TE1 terminal equipment (i.e. no terminal adaptor) is used:

* For the D-channel at the basic rate interface no distinct user class is defined.

* For the D-channel at the primary rate interface user class 30 is available.

4.2.2.2.2 Basic Rules.

Applicable.

4.2.3 Notification classes for incoming calls.

The network shall provide both No Notification Class and Conditional Notification Class.

Note: The notification class of each of the supported access connection types is specified in the application specifications for clause 7.

4.2.3.1 No Notification Class.

The network shall identify an established access connection to a packet mode terminal at the user's premises only by means of an ISDN number (not by means of an ISDN subaddress). This applies to both B-channel and D-channel access connections.
All incoming virtual calls to the same ISDN number shall be delivered on the same access connection, irrespective of the contents of the X.25 Called Address Extension facility.

No Notification Class, subclass with *semi-permanent connections* shall be supported for D-channel access connections.

No Notification Class, subclass with *user initiated demand connections* shall be supported for B-channel access connections.

Note: The application specifications for clause 7 contain details concerning the relations between access connection types and notification classes.

4.2.3.2 Conditional Notification Class.

Conditional Notification Class shall be supported for B-channel access connections.

Note: The application specifications for clause 7 contain details concerning the relations between access connection types and notification classes.

The network is not required to be able to maintain information related to the state of the user's packet access channel for load balancing purposes.

Note: However, the channel type selection algorithm for incoming virtual calls comprise load sharing considerations. See the application specifications for clause 7.2.2.3.1 for further details.

The use of ISDN subaddress on a users profile basis to determine, whether an active packet channel connection already exists, is not supported.

Note: Irrespective of this the network shall always perform the mapping of *Called Address Extension* to *Called Party Subaddress*, as indicated in the application specifications for clause 4.2.3.4.

4.2.3.3 Unconditional Notification Class.

Applicable (i.e. Unconditional Notification Class is not supported).

4.2.3.4 Information Mapping from the X.25 Incoming Call Packet to the ETS 300 102-1 Message.

Note: In table 1 *Called DTE subaddress* shall be replaced by *Called Address Extension.*

Only mapping of *Called DTE Address* to *Called Party Number* and mapping of *Called Address Extension* to *Called Party Subaddress* shall be performed. No other mapping shall be performed.

4.3 Compatibility checking.

Applicable.

5 Adressing and routing aspects.

5.1 Terminal interface selection.

B-channel access:

In general an ISDN number is used to identify an X.25 terminal.
If more than one X.25 terminal shall be identified by use of individual ISDN numbers, a non-private network user shall subscribe to the Multiple Subscriber Number (MSN) supplementary service and a private network user shall subscribe to the Direct Dialling In (DDI) supplementary service.

Note: Subscription to MSN or DDI does not in itself imply subscription to ISDN packet mode service for all the MSN or DDI numbers. For each MSN or DDI number a specific packet mode subscription shall be made.
Please refer to *Application specification Appendix 1 (Informative): Services and subscription* for further information concerning subscription.

When the network uses ETS 300 102-1 procedures to establish an on demand B-channel connection to the user (in the case of the conditional notification class), then the user may use the ISDN subaddress information in the ETS 300 102-1 SETUP message (which has been mapped from the X.25 Called Address Extension facility) to select the packet mode terminal, which shall accept the incoming call.
This will however have limited practical value for the user, because all subsequent incoming virtual calls to the same ISDN number will be delivered on the same access connection, irrespective of the contents of the X.25 Called Address Extension facility.

D-channel access:

For D-channel access only the no notification class shall be supported, and hence no ETS 300 102-1 procedures shall be used for incoming calls. For outgoing D-channel access no ETS 300 102-1 procedures shall be used according to ETS 300 007, clause 7.1.2.2.

Note: Further details concerning the supported access connection types and their notification classes will be found in the application specifications for clause 7.

According to the Danish Telecom Administration's application specification for ETS 300 099, clause 5.3.2, there shall be a one to one relation between a D-channel access connection and an ISDN number, used by the network to select that specific logical link (terminal) in the case of an incoming virtual call.

An ISDN subaddress (derived from the X.25 Called Address Extension facility) cannot be used to select a specific D-channel access connection.

Since there is a one to one relation between D-channel access connections and ISDN numbers, a non-private network user shall subscribe to the Multiple Subscriber Number (MSN) supplementary service, and a private network user shall subscribe to the Direct Dialling In (DDI) supplementary service, in order to have more than one D-channel access connection on a given ISDN user-network interface.

Note: Only the Packet Handler (cf. ETS 300 099) will actually use the ISDN numbers identifying the D-channel access connections. However, for other reasons it has been decided only to allow several D-channel access connections on an ISDN user-network interface, when subscription to MSN or DDI has been made.

Note: Subscription to MSN or DDI does not in itself imply subscription to ISDN D-channel packet mode service for all the MSN or DDI numbers. For each MSN or DDI number a specific packet mode subscription shall be made.
Please refer to *Application specification Appendix 1 (Informative): Services and subscription* for further information concerning subscription.

Note: D-channel services besides those specified in the application specifications for clause 7, as for instance a PABC with a Frame Handler function, which is connected directly to the Packet Handler (cf. ETS 300 099), shall not be supported.

5.2 Access to PSPDN services (Case A).

Not applicable.

5.3 Access to the ISDN virtual circuit service (Case B).

5.3.1 Channel type selection.

Only procedure b) shall be supported, i.e. for an incoming call the network shall select the channel type to be used.

Note: The network algorithm to be used when selecting the channel type to be used for an incoming call is specified in the application specification for clause 7.2.2.3.1.

Note: For an outgoing call the user shall select the channel type to be used, if the user subscribes to both B- and D-channel access.

5.3.2 Addressing scheme for outgoing calls.

Applicable.

6 Interworking with dedicated networks.

6.1 Circuit-mode access to PSPDN services (Case A).

Not applicable.

6.2 Access to PSPDNs via virtual circuit service (Case B).

Applicable.

7 Packet communications at the S/T reference point.

Case A is not applicable.

For case B both B- and D-channel access shall be supported.

Note: *Application specification Appendix 1 (Informative): Services and subscription* gives an overview of the supported access connection types and their X.25 services, together with information concerning subscription.

Note: Below the "*responsibility for keeping X.25 layer 2 in the activated state*" is discussed in connection with Permanent Virtual Circuits. Generally, the protocols used for X.25 layer 2 (LAPB on the B-channel and LAPD on the D-channel) contain error recovery procedures, in which both ends of the data link layer connection are responsible for detecting and recovering errors on the data link layer connection.
In the present context responsibility for keeping X.25 layer 2 in the activated state, means responsibility for taking an appropriate action to reestablish layer 2 in the case, where the error recovery procedures in the layer 2 protocol itself cannot recover from an error.
In this situation a typical error recovery action may be to disconnect, and hereafter reestablish, both layer 1 and layer 2.

B-channel access:

For B-channel access only on demand B-channel connections shall be supported.

On this access connection type the following X.25 services shall be supported:

1. *Virtual Call.*

   For these virtual calls the conditional notification class shall apply.

2. *Permanent virtual circuit (PVC).*

   Note: This service is defined in ETS 300 048, clause 5.2.2.2.

   For these PVC's the user is responsible for keeping layer 1 in the X.25 communication (i.e. the on demand ISDN B-channel connection between the user and the PH) and layer 2 in the X.25 communication (i.e. the LAPB data link layer connection on the established B-channel) in the activated state (according to ETS 300 099, clause 5.1.1.2 and informative annex C, clause C.2.4).

   An on demand B-channel connection used for PVC's can also be used for virtual calls. For these virtual calls the no notification class, subclass with *user initiated demand connections*, shall apply (cf. ETS 300 099, clause 5.1.1.2).

D-channel access:

For D-channel access only *on demand layer 2 connections with fixed TEI values* (i.e. TEI values assigned at subscription time (known by the network)) shall be supported (cf. *ETS 300 049, clause 5.2.2.1.2 Method 2 - On demand Layer 2 with fixed TEI values* and *ETS 300 099, clause 5.1.2.2 PLL access*).

Note: According to ETS 300 007, clause 7.2.2.2, the physical connection between the user and the PH is semi-permanently established for D-channel access.

However, layer 1 on an ISDN basic rate point-to-multipoint user-network interface can be activated/deactivated by means of ETS 300 012 procedures. Consequently layer 1 on a basic rate point-to-multipoint interface shall be regarded as an on demand connection. Layer 1 on such an interface will only be deactivated, when none of the terminals connected to the interface, are using the interface.

For layer 1 on a basic rate point-to-point user-network interface and for layer 1 on a primary rate user-network interface no corresponding activation/deactivation procedures have been defined, and these connections shall be regarded as semi-permanent.

Note: No other D-channel services, as for instance a PABC with a Frame Handler function, which is connected directly to the Packet Handler (cf. ETS 300 099), shall be supported.

On the D-channel *on demand layer 2 connection with fixed TEI value* access connection type the following X.25 services shall be supported:

1. Virtual Call.

For these virtual calls the no notification class, subclass with *semi-permanent connections*, shall apply (cf. ETS 300 099, clause 5.2.1.1).

Note: The D-channel *on demand layer 2 with fixed TEI value* access connection is regarded as an "established connection" with respect to the no notification class, subclass with *semi-permanent connections*, even though this *on demand layer 2 with fixed TEI value* access connection may not be active, when an incoming call arrives. In this case the network will first activate the *on demand layer 2 with fixed TEI value* access connection, and then deliver the X.25 Incoming Call packet to the user on this access connection (cf. ETS 300 099, clause 5.2.1.1).

2. *Permanent virtual circuit (PVC).*

For these PVC's the network is responsible for keeping layer 2 in the X.25 communication (i.e. the LAPD data link layer connection on the user's D-channel) in the activated state.
For a D-channel access connection on an ISDN basic rate user-network interface, the network is in addition responsible for keeping layer 1 in the activated state using ETS 300 012 procedures.
With respect to the definitions in this clause 7 in ETS 300 007, the above means, that the network shall provide a semi-permanent D-channel access connection of type b.

Such a D-channel access connection, which is being used for PVC's, can also be used for virtual calls. For these virtual calls the no notification class, subclass with *semi-permanent connections*, shall apply.

7.1 Outgoing access.

Case A is not applicable.

Both B-channel and D-channel access shall be supported (cf. the application specifications for clause 7).

7.1.1 Circuit switched access to PSPDN services (Case A).

Not applicable.

7.1.2 Access to the ISDN virtual circuit service (Case B).

7.1.2.1 B-channel.

The PH selects user service profile solely on basis of the Calling Party Number information, which is transferred to the PH by the ISDN. This implies, that the PH does not select user service profile on basis of Calling Party Subaddress information.

Note: If the user subscribes to the MSN or DDI supplementary service, it is the users responsibility to include suitable Calling Party Number information in the ETS 300 102-1 SETUP message in order to enable the PH to select a specific user service profile.

7.1.2.2 D-channel.

For D-channel access only on demand layer 2 connections with fixed TEI values (i.e. TEI values assigned at subscription time (known by the network)) shall be supported (cf. *ETS 300 049, clause 5.2.2.1.2 Method 2 - On demand Layer 2 with fixed TEI values* and *ETS 300 099, clause 5.1.2.2 PLL access*).

7.2 Incoming access.

7.2.1 Access from PSPDN services (Case A).

Not applicable.

7.2.2 Access from the ISDN virtual circuit service (Case B).

The channel selection algorithm to be used in step 1), is specified in the application specifications for clause 7.2.2.3.1.

Only no notification class and conditional notification class shall be supported.

7.2.2.1 B-channel.

Applicable.

7.2.2.2 D-channel.

Applicable.

7.2.2.3 Call offering.

7.2.2.3.1 Channel selection through call offering.

Call offering in order to allow the user to select channel type (B- or D-channel) for an incoming call is not supported (cf. the application specifications for clause 5.3.1).

For D-channel access only the no notification class is supported (cf. the application specifications for clause 7), and hence no ETS 300 102-1 procedures shall be used to offer incoming calls on D-channel access connections.

For on demand B-channel connections, which are used for permanent virtual circuits (PVC's), the no notification class, subclass with *user initiated demand connections*, applies, and hence no ETS 300 102-1 procedures shall be used to offer incoming calls on these access connections.

For on demand B-channel access connections, which are used only for virtual calls (VC's), the conditional notification class applies (cf. the application specifications for clause 7).

Therefore the only offering of incoming calls to the ISDN user by means of ETS 300 102-1 procedures, which shall be supported, is in connection with establishment of an on demand B-channel access connection, which shall be used to deliver a new incoming virtual call (the conditional notification class applies).

The following network algorithm for selecting channel type for a particular incoming call shall apply:

According to the Danish Telecom Administration's application specification for ETS 300 099, clause 5.3.3, each E.164 number, which is registered in the PH for a specific ISDN packet mode user, shall be associated with exactly one of the following service types:

1. Only B-channel on demand access.

2. Only D-channel on demand layer 2 connection with fixed TEI values (PLL) access. Only one such layer 2 connection per E.164 number is allowed.

3. Both B-channel on demand access and D-channel on demand layer 2 connection with fixed TEI values (PLL) access.

For the above service types 1 and 2 the network shall establish an on demand B-channel connection (if not already established), respectively activate the D-channel on demand layer 2 connection with fixed TEI values (PLL) (if not already activated), for delivery of the X.25 Incoming Call packet.

According to *ETS 300 099, clause 5.3.3 and annex K (normative): Selection mechanism for incoming calls*, the following rule shall apply for the above service type 3: the network shall activate the D-channel on demand layer 2 connection with fixed TEI values (PLL) (if not already activated), for delivery of the X.25 Incoming Call packet. Only in the case, where sufficient free ressources (see below) on the D-channel on demand layer 2 connection with fixed TEI values (PLL) do not exist, the network shall establish an on demand B-channel access connection (if not already established) and deliver the X.25 Incoming Call packet on this on demand B-channel access connection.

The ressources on the D-channel access connection to be considered in the above algorithm, are:

i) X.25 logical channels. Normally a predefined number of logical channels is allocated to an access connection.

ii) The throughput classes (one class for each direction), which can be allocated to the new incoming virtual call shall be greater than or equal to the throughput classes requested for the incoming virtual call (i.e. either the throughput classes requested by means of the X.25 *throughput class negotiation* facility, or the predefined default throughput classes).
If this requirement cannot be met, then the incoming virtual call shall be delivered on a B-channel access connection (unless this B-channel connection is already established, and has less free throughput capacity than the D-channel access connection).

Application specifications for table 4:

Since conditional notification class is only supported for on demand B-channel access connections (cf. the application specifications for clause 7), and since the network shall always select the channel type to be used for an incoming call (cf. the application specifications for clause 5.3.1), table 4 shall be replaced by the below table.

Channel indicated in the SETUP message network to user direction (Note 2)			Allowable user response network-user
Information Channel selection (Note 3)	Preferred or Exclusive	D-channel indicator (Note 4)	
Bi	Exclusive	No	Bi
Bi	Preferred	No	Bi, Bi'

Table replacing table 4.

7.2.2.3.2 Information element mapping.

Only mapping of *Called DTE Address* to *Called Party Number* and mapping of *Called Address Extension* to *Called Party Subaddress* shall be performed. No other mapping shall be performed.

7.2.2.3.3 Channel selection without call offering.

Applicable.

Note: Cf. the application specification for clause 7.2.2.3.1.

7.3 Virtual call establishment and release.

Since Case A is not applicable, no terminal identification procedure from recommendation X.32 is required.

7.3.1 Link layer establishment and release.

Case A is not applicable.

7.3.2 Packet layer virtual call setup and release.

The PH shall support timer T320 as specified in this clause.

Note: Timer T320 shall not be used for B-channel access connections and D-channel logical links, which are used for permanent virtual circuits (PVC's).

The value of timer T320 shall be 30 seconds.

7.4 Call clearing.

7.4.1 B-channel.

Case A is not applicable.

If a B-channel access connection with permanent virtual circuits or active virtual call(s) is cleared, either by the ISDN user by means of ETS 300 102-1 procedures, or as a result of a restart at the user-network interface of the B-channel in question or the entire interface, then the procedures of ETS 300 099, clause 12.1.4.2 shall apply.

At the expiration of timer T320 the network shall disconnect the X.25 link layer and the access connection.

7.4.2 D-channel.

Applicable.

7.4.3 Additional error handling information.

Application specification for rule #6:

* Unconditional notification class in not supported.

* For conditional notification class option a) shall apply.

7.4.4 Cause mapping.

7.4.4.1 Access to/from PSPDN services (Case A).

Not applicable.

7.4.4.2 Access to/from the ISDN virtual circuit service (Case B).

Applicable.

Application specification for *table 7, note*: the network option of coding the ETS 300 102-1 *cause information element* to indicate "CCITT Coding Standard" in octet 3, "X.25" in octet 3a, and coding octets 4 and 5 according to Recommendation X.25, shall not be supported.

7.5 Access collision.

Applicable.

8 Terminal adapter functionalities.

The terminal adaptor functionality shall comply with the application specifications for the previous clauses.

Only the HDLC interframe flag stuffing rate adaption method shall be supported. (This is the only rate adaption method supported by ETS 300 099, cf. ETS 300 099, clause 5.1.1).

Further application specifications for this clause 8 of ETS 300 007 are outside the scope of this document.

Appendix I (Informative): B-channel TA acting on layer 2 and 3 of CCITT Recommendation X.25.

Outside the scope of this document.

Appendix II (Informative): Interconnection of packet mode TE2s, which use the circuit-mode bearer service of the ISDN.

Outside the scope of this document.

Appendix III (Informative): Example message flow diagrams and example conditions for cause mapping.

Applicable with respect to the examples complying with the application specifications in this document.

Appendix IV (Informative): D-channel TAs requiring full protocol termination in the TA.

Outside the scope of this document.

Annex A (Informative): States applicable to packet-mode access connection (case B services).

Applicable.

Annex B (Normative): Messages for control of packet-mode access connections.

Applicable.

Annex C (Normative): Information elements for the control of packet-mode access connections.

Applicable.

Annex D (Informative): Example of ISDN CCITT Recommendation X.25 Packet Mode Bearer Service access on the D-channel through a NT2 with Frame handling functions.

Not applicable.

Application specification Appendix 1 (Informative): Services and subscription.

A1.1 Introduction.

This informative appendix contains two parts.

The first part gives an overview of the supported access connection types, and the X.25 and ISDN virtual circuit (ETS 300 007, Case B) services offered on each access connection type.
See section *A1.2 Supported access connection types.*

The second part describes the supported services and access connection types from a *subscription viewpoint.*

Generally all users of the ISDN virtual circuit (Case B) service will be ISDN subscribers. The use of certain ISDN virtual circuit services will require specific subscription to the ISDN virtual circuit service. For each virtual circuit subscriber it shall be possible for the network to register various individual data, including the subscriber's choice of virtual circuit facilities.

According to the Danish Telecom Administrations application specification for ETS 300 099, the PH shall be connected to the ISDN exchange(s) by means of an ETSI standardised PH interface (PHI, cf. ETS 300 099).

In some cases both the packet handler(s) (PH) and the ISDN exchange(s) (including the frame handler functions in the ISDN exchanges) need to register individual data for the virtual circuit subscriber.

Most of these individual subscriber data shall be registered in the PH in *user service profiles* (cf. ETS 300 099, clause clause 3.1). Some of the data in the PH user service profiles shall also be registered in other parts of the network (e.g. in the ET and the Frame Handler functions in the ISDN exchanges). Clarification of the distribution of the registered subscriber data within the network will be provided later.

According to the Danish Telecom Administrations application specification for ETS 300 099, clause 5.3.1, the ISDN number shall be used by the PH for charging purposes and for selection of user service profiles. Only one user service profile shall exist per ISDN number.

Use of a specific ISDN number to identify a specific ISDN packet mode terminal at the user's premises requires subscription to the Multiple Subscriber Number (MSN) (for non-private network users) or Direct Dialling In (DDI) (for private network users) supplementary service, if more than one packet mode terminal at the user-network interface shall be identified in this way.

Several D-channel access connections on one user-network interface requires subscription to MSN (non-private network users) or DDI (private network users) supplementary services.

Section *A1.3 PH user service profiles* describes the contents of the PH user service profiles in terms of attributes and their possible values.

A1.2 Supported access connection types.

The below table gives an overview of the supported access connection types, and the X.25 and ISDN virtual circuit services offered on each access connection type.

Key to the table:

*x	See note x.
BRA	Basic rate user-network interface.
PRA	Primary rate user-network interface.
p-t-mp	Point-to-multipoint.
p-t-p	Point-to-point.
VC	Virtual Call.
PVC	Permanent Virtual Circuit.

PH user service profile types:
These are described in details in section *A1.3 PH user service profiles.*

Notes to the table:

1. Only for the first virtual call.

2. The specifications in this column also apply, if the access connection is only used for PVC (i.e. no VC service offered on the access connection).

	Access connection type.			
	B-channel on demand.		D-channel: on demand layer 2 with fixed TEI-value (Permanent Logical Link (PLL)).	
	Service		Service	
	Virtual Call only.	Permanent Virtual Circuit and Virtual Call. *2	Virtual Call only.	Permanent Virtual Circuit and Virtual Call. *2
X.25 layer 3 establishment.	On demand using X.25 layer 3 procedures.	PVCs: layer 3 is permanently established. VCs: On demand using X.25 layer 3 procedures.	On demand using X.25 layer 3 procedures.	PVCs: layer 3 is permanently established. VCs: On demand using X.25 layer 3 procedures.
X.25 layer 2 establishment.	On demand using LAPB procedures.*1	User is responsible for keeping layer 2 in the activated state.	On demand using LAPD procedures (SAPI=16).*1	Network is responsible for keeping layer 2 in the activated state.
X.25 layer 1 (=ISDN physical connection) establishment.	On demand using ETS 300 102-1 procedures.*1	User is responsible for keeping layer 1 in the activated state (using ETS 300 102-1 procedures).	BRA, p-t-mp: on demand using ETS 300 012 procedures.*1 BRA, p-t-p and PRA: semi-permanent.	BRA, p-t-mp: network is responsible for keeping layer 1 in the activated state (using ETS 300 012 procedures). BRA, p-t-p and PRA: semi-permanent.

Table A1.2-1 Access connection types (part 1 of 2).

	Access connection type.			
	B-channel on demand.		D-channel: on demand layer 2 with fixed TEI-value (Permanent Logical Link (PLL)).	
	Service		Service	
	Virtual Call only.	Permanent Virtual Circuit and Virtual Call. *2	Virtual Call only.	Permanent Virtual Circuit and Virtual Call. *2
Notification class for *virtual calls.*	Conditional notification class.	No Notification Class, subclass with *user initiated demand connections.* (Not Applicable for PVC).	No Notification Class, subclass with *semi-permanent connections.*	No Notification Class, subclass with *semi-permanent connections.* (Not Applicable for PVC).
PH user service profile types.	Default. Standard. Customised.	Customised.	Standard. Customised.	Customised.

Table A1.2-1 Access connection types (part 2 of 2).

A1.3 PH user service profiles.

ETS 300 099 defines 3 user service profile types: *default*, *standard*, and *customised* (cf. ETS 300 099, clause 3.1).
The service profile types applicable to each access connection type are specified in ETS 300 099, clause 5.1.

The default service profile applies to ISDN subscribers, which are not registered in the PH with an individual service profile. However it may be required, that these ISDN subscribers are registered in the ISDN exchange(s) as virtual circuit users, in order to be permitted to use the virtual circuit bearer service (specified in the Bearer Capability information element).
There shall be only one default service profile in the network.
The default service profile can only be used on an on demand B-channel access connection, which is only used for virtual calls.

Standard and customised service profiles are used for ISDN virtual circuit subscribers, and requires a registration within the PH.
Both the standard profile and the customised profile are defined for a specific ISDN number, and both profiles contains individual user data. However, the standard service profile contains only a non-individual X.25 service profile. Certain X.25 facilities, e.g. Permanent Virtual Circuit and Closed User Group, requires the use of a customised service profile.

The below tables describes the contents of the default, standard and customised service profiles in terms of attributes and allowed values of these attributes. The tables are not complete and shall not restrict the contents of the service profiles.
Further information concerning PH service profiles will be found in ETS 300 099, clause 3.1.

Key to the tables:

**x*	See note x.
VC	Virtual Call.
PVC	Permanent Virtual Circuit.
Access connection type:	
	Refers to the access connection types defined in table A1.2-1 above. The D-channel *on demand layer 2 with fixed TEI value access connection* is designated *D-channel PLL* for short.
Underlined text	Indicates an attribute.
Italics	Indicate the value of an attribute.

Notes to the tables:

1. At least one of the access connection types *on demand B-channel* and *D-channel PLL* shall be supported. For a given ISDN number both connection types can be supported at the same time.

2. At least one of the X.25 service types *PVC* and *VC* shall be supported. For a given access connection both X.25 service types can be supported at the same time.

<table>
<tr><td colspan="4">Default user service profile.
This service profile is used for ISDN users, which are not registered in the PH. The profile contains only non-individual data.
The network will only contain one default service profile.</td></tr>
<tr><td colspan="4">Access connection types (primarily ETS 300 007 related data).</td></tr>
<tr><td rowspan="2">Supported access connection types:</td><td rowspan="2">On demand B-channel access:</td><td>Supported:</td><td>Yes.</td></tr>
<tr><td>X.25 service type:</td><td>VC only.</td></tr>
<tr><td colspan="4">X.25 related data.</td></tr>
<tr><td>X.25 service profile.</td><td>B-channel access:</td><td colspan="2">The standard service profile defined in ETS 300 048, Annex A (normative): Standard service profile.</td></tr>
</table>

Table A1.3-1 Default user service profile.

Standard user service profile. A user service profile of this type is defined for a specific ISDN number. The profile contains both individual data (the data related to access connection types) and non-individual data (the X.25 related data). It is the non-individual data, which are actually designated "standard service profile".			
Access connection types (primarily ETS 300 007 related data).			
ISDN number:	*E.164 number.*		
Supported access connection types:	On demand B-channel access:	Supported:*1	*Yes.*
			No.
		X.25 service type:	*VC only.*
	D-channel PLL access:	Supported:*1	*Yes.*
			No.
		X.25 service type:	*VC only.*
X.25 related data.			
X.25 service profile.	D-channel access:	*One or more standard service profiles shall be available.* *As a minimum the standard service profile defined in ETS 300 049, Annex A (normative): Standard service profile, shall be available.*	
	B-channel access:	*One or more standard service profiles shall be available.* *As a minimum the standard service profile defined in ETS 300 048, Annex A (normative): Standard service profile, shall be available.*	

Table A1.3-2 Standard user service profile.

Customised user service profile. A user service profile of this type is defined for a specific ISDN number. The profile contains individual data.				
Access connection types (primarily ETS 300 007 related data).				
ISDN number:	*E.164 number.*			
Supported access connection types:	On demand B-channel access:	Supported:*1	*Yes.*	
			No.	
		X.25 service type:	VC:*2	*Yes*
				No
			PVC:*2	*Yes*
				No
	D-channel PLL access:	Supported:*1	*Yes.*	
			No.	
		X.25 service type:	VC:*2	*Yes*
				No
			PVC:*2	*Yes*
				No
X.25 related data.				
X.25 service profile.	D-channel access:	Layer 2:	*Only non-individual data available.*	
		Layer 3:	*Individual data possible.*	
	B-channel access:	Layer 2:	*Individual data possible.*	
		Layer 3:	*Individual data possible.*	

Table A1.3-3 Customised user service profile.

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INTEGRATED SERVICES DIGITAL NETWORK (ISDN)

Specification of the
ISDN Packet Mode Bearer Service (PMBS)
ISDN Virtual Call (VC) and Permanent Virtual Circuit (PVC)
bearer services provided by the B channel of the user access.

Application specification document to ETS 300-048
January 1992
INTEGRATION SERVICES DIGITAL NETWORK (ISDN)
Specification of the ISDN Packet Mode Bearer Service (PMBS)
ISDN Virtual Call (VC) and Permanent Virtual Circuit (PVC)
bearer services provided by the B channel of the user access
- basic and primary rate.

---

0. **Foreword**
Applicable.

1. **Scope**
Applicable.

2. **Normative References**
Applicable.

3. **Definitions**
Applicable.

4. **Description**
Applicable.

5. **Procedures**

5.1 **Provision and withdrawal**
The service shall provide the possibility of both a standard and a specific service profile. It shall be possible to provide both VC and PVC service on the same B-channel.

5.2 **Normal procedures**

5.2.1 **Activation/deactivation/registration**
Applicable (i.e. Not Applicable).

5.2.2 **Invocation and operation**
Applicable.

5.2.2.1 **Virtual call procedures**
Applicable.

5.2.2.1.1 **Layer 1 activation and channel establishment**
Use of semipermanent B-channel access when standards are available is for further study.

5.2.2.1.2 **Layer 2 activation (B channel)**
Applicable.

5.2.2.1.2.1 **Method 1 - Semipermanent layer 2.**
Not applicable.
Note: Use of semipermanent B-channel access when standards are available is for further study.

5.2.2.1.2.2 **Method 2 - On demand layer 2**
Applicable.

5.2.2.1.3 **Terminal selection/identification**
For outgoing calls the use of Calling Party subaddress by the network for terminal identification or selection of the user's profile is not applicable.

5.2.2.1.4 **Call establishment**
The network must provide both No Notification Class and Conditional Notification Class.

Note: Use of semipermanent connections together with no notification class is for further study when standards for the semipermanent B-channel access are available.

5.2.2.1.5 **Data transfer**
Applicable.

5.2.2.1.6 **Terminating the call**
Applicable.

5.2.2.1.7 **Layer 2 deactivation**
Applicable.

5.2.2.1.8 **Layer 1 deactivation and channel release**
Applicable.

5.2.2.2 **Permanent virtual circuit procedures**

5.2.2.2.1 **Layer 1 activation and channel establishment**
Only PVC's using on demand connections shall be supported.

5.2.2.2.2 **Layer 2 activation**
Applicable.
Note: In case of failures, which can not be recovered in Layer 2, either end may release the B-channel. The PH will send a Reset packet with cause "DTE out of order" to the remote DTE and the local DTE will try to reestablish the B-channel as soon as possible.

5.2.2.2.3 **Terminal selection and identification**
Applicable.

5.2.2.2.4 **Call establishment**
Applicable. (i.e. not applicable).

5.2.2.2.5 **Data transfer**
Applicable.

5.2.2.2.6 **Terminating the call**
Applicable. (i.e. not applicable).

5.2.2.2.7 **Layer 2 deactivation**
Applicable.

5.2.2.2.8 **Layer 1 deactivation and channel release**
Applicable.

5.2.3 **Interrogation and Editing**
Applicable. (i.e. not applicable).

5.3 **Exceptional procedures**

5.3.1 **Activation,deactivation and registration**
Applicable. (i.e. not applicable).

5.3.2 **Invocation and operation**

5.3.2.1 **Virtual call**
Applicable.

5.3.2.2 **Permanent virtual circuit**
Applicable.

5.3.3 **Interrogation and editing**
Applicable. (i.e. not applicable).

6. **Network capabilities for charging**
Applicable. (i.e. outside the scope of this document).

7. **Interworking**

7.1 **Interworking between Public Networks**
Applicable.

7.2 **Interworking between Private and Public ISDNs**
Applicable.

8. **Interaction with supplementary services**
Generally, the packet bearer services shall not use the supplementary services. However the MSN or DDI supplementary services shall be used for terminal selection and identification.

9. **Attributes and values of attributes**

9.1 **Attributes and values**
Use of semipermanent (permanent) B-channel access when standards are available is for further study.

9.2 **Provision of individual bearer services**
Use of semipermanent (permanent) B-channel access when standards are available is for further study.

Annex A **Standard service profile**
Applicable

Annex B **User facilities**
User facilities marked E (essential) are applicable
In addition the following facilities are applicable for virtual calls due to interworking to the PSPDN.

1.3 Nonstandard default packet sizes (16,32,64,512,1024)
1.22 Charging information *.
1.23 Direct call *.
1.27 Local charging prevention.
1.29 Network user identification.
2.9 Charging information *.
2.11 Call redirection or forwarding to alternative DTE.
2.13 Network user identification.

* For further study

Annex C **Bibliography**
Applicable

The Danish Public Telecommunication Enterprises

INTEGRATED SERVICES DIGITAL NETWORK (ISDN)

Specification of the
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bearer services provided by the D channel of the user access.

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ISDN Virtual Call (VC) and Permanent Virtual Circuit (PVC)
bearer services provided by the D channel of the user access
- basic and primary rate.

0. **Foreword**
Applicable

1. **Scope**
Applicable

2. **Normative references**
Applicable

3. **Definitions**
Applicable

4. **Description**
Applicable

5. **Procedures**

5.1 **Provision and withdrawel**
The service shall provide the possibility of both a standard and a specific service profil. It shall be possible to provide both VC and PVC services on the same logical link.

5.2 **Normal procedures**
Applicable

5.2.1 **Activation,deactivation and registration**
Applicable (i.e. not applicable)

5.2.2 **Invocation and operation**
Applicable

5.2.2.1 **Virtual call procedures**
Applicable

5.2.2.1.1 **Layer 1 activation**
Applicable

5.2.2.1.2 **Layer 2 activation (logical link)**
Applicable

Method 1 - Semipermanent layer 2
Not applicable

Method 2 - On demand Layer 2 with fixed TEI values.
Applicable

Method 3 - On demand Layer 2 with dynamic TEI allocation.
Not applicable

5.2.2.1.3 **Terminal selection and identification**

5.2.2.1.3.1 **Terminal Interface identification - network to terminal.**
The use of X.25 called address extension to identify a specific logical link, in the case of the no notification class, is not supported. Use of X.121 numbers for terminal identification as described in annex C is not applicable.

5.2.2.1.3.2 **Terminal Interface identification - terminal to network.**
Only non-dynamic assignment of TEI is supported.

5.2.2.1.4 **Call establishment.**
As only method 2 (on demand layer 2 with fixed TEI-values) is supported, only no notification class is required.

5.2.2.1.5 **Datatransfer**
Applicable

5.2.2.1.6 **Terminating the call.**
Applicable

5.2.2.1.7 **Layer 2 deactivation.**
Applicable

5.2.2.1.8 **Layer 1 deactivation**
Applicable

5.2.2.2 **Permanent virtual circuit procedures.**
Applicable

5.2.2.2.1 **Layer 1 activation**
Applicable

5.2.2.2.2 **Layer 2 activation**
Layer 2 shall be activated by use of method 2 - On demand layer 2 with fixed TEI values, outlined in subclause 5.2.2.1.2. However the network shall keep the data-link layer in the active state.

5.2.2.2.3 **Terminal selection/identification**
Applicable

5.2.2.2.4 **Call establishment**
Applicable (i.e. not applicable)

5.2.2.2.5 **Data transfer**
Applicable

5.2.2.2.6 **Terminating the call**
Applicable (i.e. not applicable).

5.2.2.2.7 **Layer 2 deactivation**
The network shall keep layer 2 in the active state. Only method 2 is supported.

5.2.2.2.8 **Layer 1 deactivation**
Applicable

5.2.3 **Interrogation and Editing**
Applicable (i.e. not applicable)

5.3 **Exceptional procedures**

5.3.1 **Activation, deactivation and registration**
Applicable (i.e. not applicable)

5.3.2 **Invocation and operation**
Applicable

5.3.2.1 **Virtual call**
Applicable

5.3.2.2 **Permanent virtual circuit**
Applicable

5.3.3 **Interrogation/editing**
Applicable (i.e. not applicable)

6. **Network capabilities for charging**
Applicable (i.e. outside the scope of this document).

7. **Interworking**

7.1 **Interworking between Public Networks**
Applicable

7.2 **Interworking between Private and Public ISDNs**
No other D-channel services than those specified as applicable in the previous clauses shall be supported. A NT2 with frame handling functions is therefore not supported.

8. **Interaction with supplementary services**
Generally the packet bearer services shall not use the supplementary services. However the MSN and DDI supplementary services, may be used for terminal selection (c.f. sec. 5.2.2.1.3.1).

9. **Attributes and values of attributes (including the provision of individual bearer services).**

9.1 **Attributes/values**

1) **Establishment of communication**
Only the method 2 (on demand layer 2 with fixed TEI-values) service is applicable

9) Access protocol

b) **ISDN signalling access protocol layer 2**
Not required to support method 2

c) **ISDN signalling access protocol layer 3**
Not required to support method 2

9.2 **Provision of individual bearer services.**
Only the method 2 (on demand layer 2 with fixed TEI-values) service is applicable

Annex A **Standard service profile**
Applicable

Annex B **User facilities**
User facilities marked E (essential) are applicable
In addition the following facilities are applicable for virtual calls due to interworking to the PSPDN.

1.3 Nonstandard default packet sizes (16, 32, 64, 256)
1.22 Charging information *.
1.23 Direct call *.
1.27 Local charging prevention.
1.29 Network user identification.
2.9 Charging information *.
2.11 Call redirection or forwarding to alternative DTE.
2.13 Network user identification.

* For further study.

Annex C **Transition schemes for addressing and numbering**
Use of X.121 numbers for terminal identification is not applicable.

Annex D **Bibliography**
applicable.

The Danish Public Telecommunication Enterprises

ISDN Digital Subscriber Signalling No. 1

DSS1

Network layer
Generic Keypad Protocol

Application specification document to ETSI ETS 300 122:

ISDN Generic keypad protocol for the support of supplementary services

July 1992.

NORDTEL

NT/SIG-SPEC-2-1

NORDIC SPECIFICATION

APPLICATION DOCUMENT TO
ETSI ETS 300 122

GENERIC KEYPAD PROTOCOL FOR THE SUPPORT OF SUPPLEMENTARY SERVICES

ISSUE DATE: 92-06-01

Contents

FOREWORD

The following sections give the requirements to the generic keypad protocol for the support of supplementary services to be implemented for ISDN services in the Nordic networks. The requirements stated here are the requirements to the network side of the user-network interface.

This specification is an application document to ETSI ETS 300 122 (2) and selects which options in ETS 300 122 (2) are applicable in the Nordic networks.

In addition, this specification contains some clarifications to certain clauses of ETS 300 122 (2), where this is felt to be necessary. Where clarifying text is provided, the relevant clause in ETS 300 122 (2) shall be considered as being "Applicable" taking into consideration the additional text provided in that clause. If a clause is not mentioned it shall be interpreted as "Applicable".

The requirements stated in this document are generic in nature and do not indicate the services that are provided by a network.

1 Scope

This specification is an application document to ETSI ETS 300 122 (2), dated 1991. This specification makes reference to ETS 300 122 (2). The text in clause 6 of ETS 300 122 (2) is reproduced in its entirety in clause 6 of this specification in order to improve readability.

2 Normative references

(1): NORDTEL - Nordic Specification NT/SIG-SPEC-1 (1990), "Application Document to ETS 300 102-1; Digital Subscriber Signalling System No. 1 (DSS1); Network Layer - Basic Call Control"

(2): ETS 300 122 (1991), "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Generic keypad protocol for the support of supplementary services".

Note: References enclosed in square brackets ("[ ]") refer to the references defined by ETS 300 122 (2).

3 Definitions

Service code: Consists of two, and in exceptional cases, three digits that identify the supplementary service which is requested.

Basic service indicator: Consists of one or two digits that identify which basic service a supplementary service request is related to.

All numbers indicator: Consists of one digit that indicates that a supplementary service control request shall be applied to all numbers assigned to that access.

4 Symbols and abbreviations

TOA Tones and/or announcements

5 Coexistence with other supplementary service protocols

5.1 Support of the various generic protocols

ETSI is standardizing supplementary services based on the functional protocol. For some of these supplementary services both the keypad protocol and the functional protocol may be used in coexistence on the same user-network interfaces. The individual supplementary service specifications indicate whether the keypad protocol or the functional protocol or both protocols are applicable to that particular supplementary service. For a number of supplementary services which are not standardized by ETSI but are to be made available for ISDN users, only the keypad protocol will be used. This is specified in relation to the relevant supplementary services for which it applies.

5.2 Coexistence of generic protocols

Generally, the functional protocol shall be used at the remote user's interface even though the keypad protocol was used at the requesting user's interface. However, the keypad protocol (i.e. the Display

information element) may be used at the remote user's interface for some supplementary services also in coexistence with the functional protocol.

5.3 Arrangements by which coexistence of protocols may be supported by a network

If the network supports the keypad protocol, then the network shall support both the functional and the keypad protocol independent of the type of access (i.e. Basic or Primary Rate access).

At the remote user's interface, the functional protocol shall in general be used in the network-to-user direction. However, the keypad protocol (i.e. the Display information element) may be used at the remote user's interface for some supplementary services also in coexistence with the functional protocol.

6 Procedures for the keypad protocol

The text in this clause shall replace the text in clause 6 of ETS 300 122 (2) in its entirety.

The following text is written with the same clause numbering as in CCITT Recommendation Q.932 clause 4 [3].

The keypad protocol is based on the use of the Keypad facility and Display information elements. The Keypad facility information element may be included in the SETUP and INFORMATION messages. The Display information element may be included in any message sent by the network to the user according to ETS 300 102-1 [2].

Where a reference is made to CCITT Recommendation Q.931 [4], the equivalent clause in ETS 300 102-1 [2] shall be used.

Where a reference is made to CCITT Recommendation Q.932 [3], ETS T/S 46-32B [7] shall be used.

The procedures specified in CCITT Recommendation Q.932 [3] clause 4 shall apply with the following clarifications:

4 KEYPAD PROTOCOL

The service codes for the control of the individual supplementary services are defined in Appendix A to this document.

The interpretation and use of the basic services are defined in Appendix C.

The general principles for the use of the Display information element are defined in Appendix D to this document.

4.1 General

In case of Bearer capability "speech", "3.1 kHz audio" or "7 kHz audio", an in-band tone and/or announcement may be sent to the local user together with the Display information element. Generally, this is specified in relation to the relevant supplementary services for which it applies.

Text related to the Feature key management protocol shall be ignored.

The Keypad facility information element sent in the network-to-user direction is not applicable.

4.2 *Messages used in the keypad protocol*

Applicable.

4.3 *Coding of the Keypad facility information element*

The coding of the Keypad facility information element shall be as defined in NT/SIG-SPEC-1 (1), clause 4.5.17.

The service codes used for the control of individual supplementary services are defined in Appendix A to this document.

The formats and coding of the information within the Keypad facility information element shall follow the coding scheme given below.

The following description uses a notation based on Backus-Naur form to define the coding scheme. Table 1 show the guidelines that apply to this notation form.

Table 1: Guidelines for the Backus-Naur notation form.

1) A sequence of characters enclosed in the brackets < > is a description of an entity e.g. <KEYPAD INFORMATION>;

2) Braces { } are used to enclose a repeated item. The item may be repeated zero or more times (if the item is repeated zero times it is absent);

3) Square brackets [ ] indicate that the enclosed item is optional;

4) The character ::= means "is defined as";

5) The character | means "or";

6) Any other character not enclosed in the brackets < > represent itself.

Using the above notation the KEYPAD INFORMATION within the Keypad information field of a Keypad information element is defined as shown in table 2.

Table 2: Coding of the KEYPAD INFORMATION

<KEYPAD INFORMATION> ::= <FACILITY INFORMATION STRING> | <SWITCHING ORDER>

<SWITCHING ORDER> ::= <NUMERIC CHARACTER>

<FACILITY INFORMATION STRING> ::=

<* | # | * #> <SERVICE CODE> { <*> | <*> <PARAMETER> } <#>

or

<* *> <PARAMETER> Note

Note: This facility information string is only applicable to the Abbreviated Dialling supplementary service using the Prefix method.

<SERVICE CODE> ::= <ALPHA-NUMERIC CHARACTER SEQUENCE>

<PARAMETER> ::= <ALPHA-NUMERIC CHARACTER SEQUENCE>

<ALPHA-NUMERIC CHARACTER SEQUENCE> ::=

<ALPHA-NUMERIC CHARACTER> { <ALPHA-NUMERIC CHARACTER> }

<ALPHA-NUMERIC CHARACTER> ::=

<NUMERIC CHARACTER> | <ALPHA CHARACTER>

<NUMERIC CHARACTER> ::= 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9

<ALPHA CHARACTER> ::=

a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x | y | z

A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z

Note: Both numeric and alpha characters are encoded in accordance with the IA5 table.

<*> ::= <IA5 character 2/10>

<#> ::= <IA5 character 2/3>

Regarding the first character(s) in the facility information string the rules given below shall apply. When the first character(s) is:

a) <*> - it indicates that the remaining part of the facility information string is related to an activation, invocation or registration request;

b) <#> - it indicates that the remaining part of the facility information string is related to a deactivation or cancellation request; and,

c) <* #> - it indicates that the remaining part of the facility information string is related to an interrogation request.

d) <* *> - it indicates that the remaining part of the facility information string is related to an invocation of the Abbreviated Dialling supplementary service using the Prefix method.

The combinations <# #> and <# *>, providing they are the first two characters in a facility information string, are invalid and consequently the remaining part of the facility information string is also invalid.

One or more of the parameters in a facility information string may be optional parameters. For any given request the optional parameters may or may not be present.

The parameters (if any) shall be discriminated by the separator character <*>. If an optional parameter is not present in a facility information string, this shall be indicated in one of the following ways:

1) The parameter(s) can be left out if it(they) is(are) the last part of a facility information string sequence; or,

2) for all other cases a sequence of <* *> indicates that the associated optional parameter is not included.

4.4 Elements of procedure

4.4.1 General

Item 1 through 4 are an application to the same clause of CCITT Recommendation Q.932 [3], while item 5 through 7 are additional requirements.

1. A supplementary service request can either be:

   a) Related to the registration, cancellation, activation, deactivation or interrogation of a supplementary service independent of an active call to a remote user; or,

   b) Related to an active call to a remote user only when the requested supplementary service will have an impact on that call.

3. The procedures to be used in case the network shall prompt the user for further information, are defined in the specifications for those individual supplementary services where such functions are required.

4. The number of possible stages is supplementary service specific and is therefore defined in the specifications for those individual supplementary services where prompting is necessary.

5. Only one keypad supplementary service control procedure (i.e. activation, deactivation, invocation, interrogation, cancellation or registration) can be performed per request. However, a combination of a keypad and functional supplementary service control procedure is possible within the same message.

6. For all supplementary services except for the invocation of the Abbreviated Dialling supplementary service using the Prefix method, the <#> character is mandatory as the last character in the facility information string.

When the <#> character is received by the network as the third or subsequent character in the facility information string, it shall be interpreted as the "sending complete indication".

If the network receives the Sending complete information element, the network shall not interprete the Sending complete information element as being related to supplementary service control.

7. Item 7 is only applicable to the control of a supplementary service independent of an active call to a remote user. The same principles shall as far as possible apply for the functionality of the keypad protocol as for the functional protocol - i.e. the functionality regarding activation, deactivation, interrogation, registration and cancellation shall be the same regarding the capability to indicate served user identity, basic service, etc.

7.1 If a specific supplementary service allows that the user may indicate the served user identity in the supplementary service control procedure, the following information can be used (given in a prioritized sequence, with a) as the highest):

a) Served user number (SUN), provided in the Keypad facility information element; or,

b) Calling party number information element; or,

c) If neither of the above is present, then the network shall use the default number assigned to that access.

If the served user number is present in the Keypad facility information element the network shall screen this information for validity. If the served user number is valid for that access, the network shall use this information in the further processing of the supplementary service control procedure. If the served user number is invalid, the network shall reject the supplementary service control procedure and ignore the possible presence of the Calling party number information element.

If the Keypad facility information element does not include the served user number, the network shall use the contents of the Calling party number information element, if present. The network shall screen the information contained in the Calling party number information element for validity. If the calling party number is valid for that access, the network shall use this information in the further processing of the supplementary service control procedure. If the calling party number is invalid, the network shall use the default number assigned to that access for the further processing of the supplementary service control procedure.

In the case that the served user number, received in the Keypad facility information element, is coded as "0" the network shall assume that the supplementary service control procedure shall be applied to all numbers assigned to that access.

7.2 If a specific supplementary service allows that the user may indicate a basic service in the supplementary service control procedure, the basic service can be indicated either by including the Basic service indicator in the Keypad facility information element or by the use

of the Bearer capability information element and, if included, the High layer compatibility information element.

If the Basic service indicator is included, it takes precedence over the Bearer capability and High layer compatibility information elements. If the Basic service indicator is not included, the Bearer capability information element and, if included, the High layer compatibility information element shall be used as the basis for determining the basic service.

If the Basic service indicator is set to "all services", it represents a "short-hand" method for the user to indicate that a certain supplementary service control procedure shall be applied to all basic services which is subscribed to at that particular time. Any subsequent change in the subscribed basic services shall not impact any previously performed supplementary service control actions. Furthermore, a user may for instance indicate the basic service value "all services" when activating a specific supplementary service, and later deactivate this supplementary service related to only one of the basic services.

If the Basic service indicator contains an invalid value, the network shall reject the supplementary service control procedure.

Note: If the Bearer capability information element is not included in the SETUP message, it shall be treated as a mandatory information element error according to clause 5.8.6 of NT/SIG-SPEC-2-1 (1).

The relationships between basic service and the Basic service indicator and the combination of the Bearer capability and High layer compatibility information elements respectively are shown in Appendix C.

7.3 If a request for a specific supplementary service allows that the "called party" subaddress information can be included, the subaddress shall in this case be indicated as part of the information included in the Keypad facility information element. Any information contained in the Called party subaddress information element shall be ignored. The subaddress information included in the Keypad facility information element shall be interpreted as "IA5 characters". In this case, a maximum of 19 IA5 characters can be received.

7.4 If a request for a specific supplementary service requires that the called party identity shall be included, then the user shall include this information only as part of the facility information string in the Keypad facility information element.

If a request for a supplementary service also includes information in the Called party number information element, then the network shall treat this call as specified in clause 4.5.2.3.

4.5 Procedures at the invocation interface

Appendix B to this document contains SDL diagrams for én-bloc and overlap sending of information.

4.5.1 User procedures

Applicable.

4.5.1.1 *En-bloc sending of access codes*

When the <#> character is received by the network as the third or subsequent character in the facility information string, it shall be interpreted as the "sending complete indication".

If the network receives the Sending complete information element, the network shall not interprete the Sending complete information element as being related to supplementary service control.

4.5.1.2 ***Overlap sending of access codes***

Generally, the network shall only provide dial tone when the Bearer capability information element indicates "speech", "3.1 kHz audio", or "7 kHz audio".

Dial tone shall be applied when no called party digits are included in the SETUP message, i.e. irrespective of any information contained in the Keypad facility information element.

The SETUP ACKNOWLEDGE message shall be sent as a response to a SETUP message when the received called party number information (if any) is not complete.

Dial tone shall be removed (if applied previously) when the first INFORMATION message is received containing either keypad information or called party number information.

4.5.2 ***Network procedures***

4.5.2.1 ***Network responses to user requests***

2. When the network has received the first digit of the called party number, no further keypad information relevant for the call setup shall be accepted in INFORMATION messages in the call establishment phase, if sent by the user. The network shall send a CALL PROCEEDING message to the user after having received the "complete" called party number, if the received keypad information is accepted.

3. In the case the request is related to a registration, cancellation, activation, deactivation or interrogation of a supplementary service (independent of an active call to a remote user) and the network accepts the request, a DISCONNECT message shall be sent to the calling user with cause #31 "normal, unspecified". The Display information element shall be included containing the appropriate response to the supplementary service request. In addition, if the Bearer capability information element included in the SETUP message received from the calling user indicates "speech", "3.1 kHz audio" or "7 kHz audio", an announcement or acknowledgement tone may be applied. This is specified in relation to the specific supplementary service.

4. The procedures to prompt the user for further information are defined in the specifications for those individual supplementary services where such functions are required.

5. If the network receives a SETUP message containing keypad information only and the keypad information cannot be accepted (i.e. cannot be related to a specific supplementary service), the keypad information shall be discarded. In addition, the network shall send a SETUP ACKNOWLEDGE message and apply dial tone if the Bearer capability information element included in the SETUP message indicates "speech", "3.1 kHz audio" or "7 kHz audio". A Display information element containing Display GEN1 "facility request not accepted" shall be included to indicate to the calling user that the received keypad information has been discarded.

4.5.2.2 *Network prompting and in-band tone/announcement control*

Annex B of CCITT Recommendation Q.932 [3] is outside the scope of this standard.

The conditions under which the network will prompt for additional information, are defined in the specifications for those individual supplementary services where such functions are required.

If no appropriate call control message is to be sent by the network at the time that tones and/or announcements shall be applied, the network shall always send a PROGRESS message containing the Progress indicator #8.

The Signal information element shall not be used by the network.

4.5.2.3 *Error conditions and treatment*

The following text shall replace entirely the text in CCITT Recommendation Q.932 [3] clause 4.5.2.3.

An error condition exists in the following circumstances:

a) Timer T302 expires and the complete information has not been received. The network shall handle this error situation as described in clause 4.5.2.3.1 i) or ii).

b) Keypad information received in the SETUP message is indicated as being "complete" (i.e. a <#> character is received by the network as the third or subsequent character) but the network determines the information to be invalid (i.e. it cannot be related to a specific supplementary service) and no called party number information is included. The network shall handle this error situation as described in clause 4.5.2.3.1 iii) or iv).

c) Called party number information received by the network (complete or incomplete) is invalid. The network shall ignore any received keypad information and clear the call according to the basic call procedures.

d) If the user attempts to invoke a call-related supplementary service to which the user has not subscribed or to which the user is not allowed access or if the keypad information cannot be accepted by the specific supplementary service, then the network shall determine whether the call can continue or whether it shall be released. This is specified in relation to the specific supplementary service.

   If the call shall be released, the network shall handle this error situation as described in clause 4.5.2.3.1 i) or ii).

   In the case the call is allowed to continue, the keypad information shall be discarded. The information sent to the calling user is specified in relation to the specific supplementary service.

e) If the network receives a request to establish a connection to a called user (i.e. containing a valid called party number) and a valid request for activation, deactivation, interrogation, registration or cancellation of a supplementary service using the same call reference but not related to the call attempt, the network shall reject the supplementary service request, discard the received keypad information and continue to establish the call according to NT/SIG-SPEC-1 (1), clause 5. A Display information element containing Display GEN1

"facility request not accepted" shall be included in the CALL PROCEEDING message sent to the calling user to indicate that the keypad information has been discarded. No tone or announcement shall be applied.

f) If the request is related to a registration, cancellation, activation, deactivation or interrogation of a supplementary service (i.e. not related to a call) and the network rejects the request, the network shall use the error procedures as defined in clause 4.5.2.3.1 i) or ii).

g) If the network determines the called party number to be "complete" while the keypad information is determined to be incomplete (i.e. a <#> character has not been received by the network as the third or subsequent character), the network shall continue to handle the call according to NT/SIG-SPEC-1 (1) clause 5 and discard the incomplete keypad information. A Display information element containing Display GEN1 "facility request not accepted" shall be included in the CALL PROCEEDING message to indicate that the keypad information has been discarded. No tone or announcement shall be sent to the calling user.

4.5.2.3.1 Supplementary service being invoked during call establishment

The following text shall replace entirely the text in CCITT Recommendation Q.932 [3] clause 4.5.2.3.1.

The network shall take one of the following actions:

i) In-band tones or announcements are applied, and the call is released

If a SETUP ACKNOWLEDGE message has not already been sent, the network shall send a CALL PROCEEDING message to the calling user, indicating the B-channel to be used. Subsequently, the DISCONNECT message shall be sent to the calling user including the Progress indicator information element with progress descriptor #8, "In-band information or appropriate pattern is now available" and normal clearing procedures as described in clause 5.3 of NT/SIG-SPEC-1 (1) shall be followed.

The cause value to be used shall be one of the following:

- Service not implemented : Cause #69
- Service not subscribed : Cause #50
- Service not available : Cause #47 or #63
- Facility rejected : Cause #29

Cause #29 "facility rejected" shall be used also in the case a syntax fault is detected in the facility information string. This may be one of the following cases:

a) <# #> or <# *> received as the first two characters in the facility information string.

b) One or more mandatory parameters missing.

c) One or more parameters containing a value which is outside the range of the defined value.

d) Too many parameters.

The relevant parameter(s) are specified in relation to the specific supplementary services.

In the cases above, if the call is released due to reasons determined by a specific supplementary service, the display information and/or inband information is specified in relation to the specific supplementary service. If the call is released due to general reasons, the DISCONNECT message shall include a Display information element containing Display GEN1 "facility request not accepted". TOA GEN1 information may in addition be sent inband if the Bearer capability information element indicates "speech", "3.1kHz Audio" or "7 kHz Audio".

ii) ***No in-band tones or announcements are to be applied, and the call is released***

If a SETUP ACKNOWLEDGE message has not already been sent, the network shall send a RELEASE COMPLETE message to the calling user and complete the clearing procedures as specified in clause 5.3 of NT/SIG-SPEC-1 (1).

If a SETUP ACKNOWLEDGE message has already been sent, the network shall send a DISCONNECT message to the calling user and complete the clearing procedures as specified in clause 5.3 of NT/SIG-SPEC-1 (1).

The cause to be used shall be as defined in clause 4.5.2.3.1 i).

iii) ***In-band tones or announcements are applied, received keypad information is discarded and the call is continued***

The network shall:

- send a SETUP ACKNOWLEDGE message to the calling user, including the Progress indicator information element with progress descriptor #8, "In-band information or appropriate pattern is now available";
- discard the received keypad information;
- apply dial tone; and,
- enter the Overlap Sending state (N2).

The Display information element containing Display GEN1 "facility request not accepted" shall be included to indicate that the keypad information has been discarded.

iv) ***No in-band tones or announcements are to be applied, received keypad information is discarded and the call is continued***

The network shall:

- send a SETUP ACKNOWLEDGE message to the calling user;
- discard the received keypad information; and,
- enter the Overlap Sending state (N2).

The Display information element containing Display GEN1 "facility request not accepted" shall be included to indicate that the keypad information has been discarded.

4.5.2.3.2 *Supplementary service being invoked from the Active state or during the call clearing phase*

The procedures to prompt the user for further information, are defined in the specifications for those specific supplementary services where such functions are required.

4.6 *Procedures at the remote interface*

Generally, the functional protocol shall be used at the remote user's interface even though the keypad protocol was used at the requesting user's interface.

For some supplementary services, the Display information element may be used to notify the remote user, also in coexistence with the functional protocol at the remote user's interface.

The network shall not use the Signal information element.

7. Coding requirements

Applicable.

Annex A (informative) Example use of the keypad protocol

The examples illustrated in CCITT Recommendation Q.932 [3] Appendix I.2 are applicable with the following comment:

The network shall not use the Signal information element.

The example given in figure I-2 (and the associated text), is not applicable.

Annex B (informative) Functional reference model for the operation of supplementary services

Applicable (i.e. the functional reference model illustrated in CCITT Recommendation Q.932 [3] Appendix II is applicable with the exception that the feature key management protocol is not applicable).

APPENDIX A: List of Service codes and switching orders.

Table A.1 and table A.2 contain a list of the service codes and switching orders, respectively, which are used in connection with the keypad protocol for supplementary service control procedures. The tables does not imply that all of the supplementary services are implemented using keypad procedures in each of the Nordic countries.

Table A.1: Service codes (continued)

Supplementary service title	Service code
General Deactivation of Supplementary Services	001
Closed User Group	01
Call Forwarding Unconditional (CFU)	21
Call Forwarding To Fixed Announcement	24
Calling Line Identification Restriction (CLIR)	31
Outgoing Call Barring, Subscriber Controlled	33
Outgoing Call Barring, Subscriber Selected	34
Incoming Call Barring, Subscriber Controlled	35
Completion of Calls to Busy Subscriber	37
Malicious Call Identification	39
Call Waiting	43
Advice of Charge (AOC), At call setup time	461
Advice of Charge (AOC), During the call	462

Table A.1: Service codes (concluded).

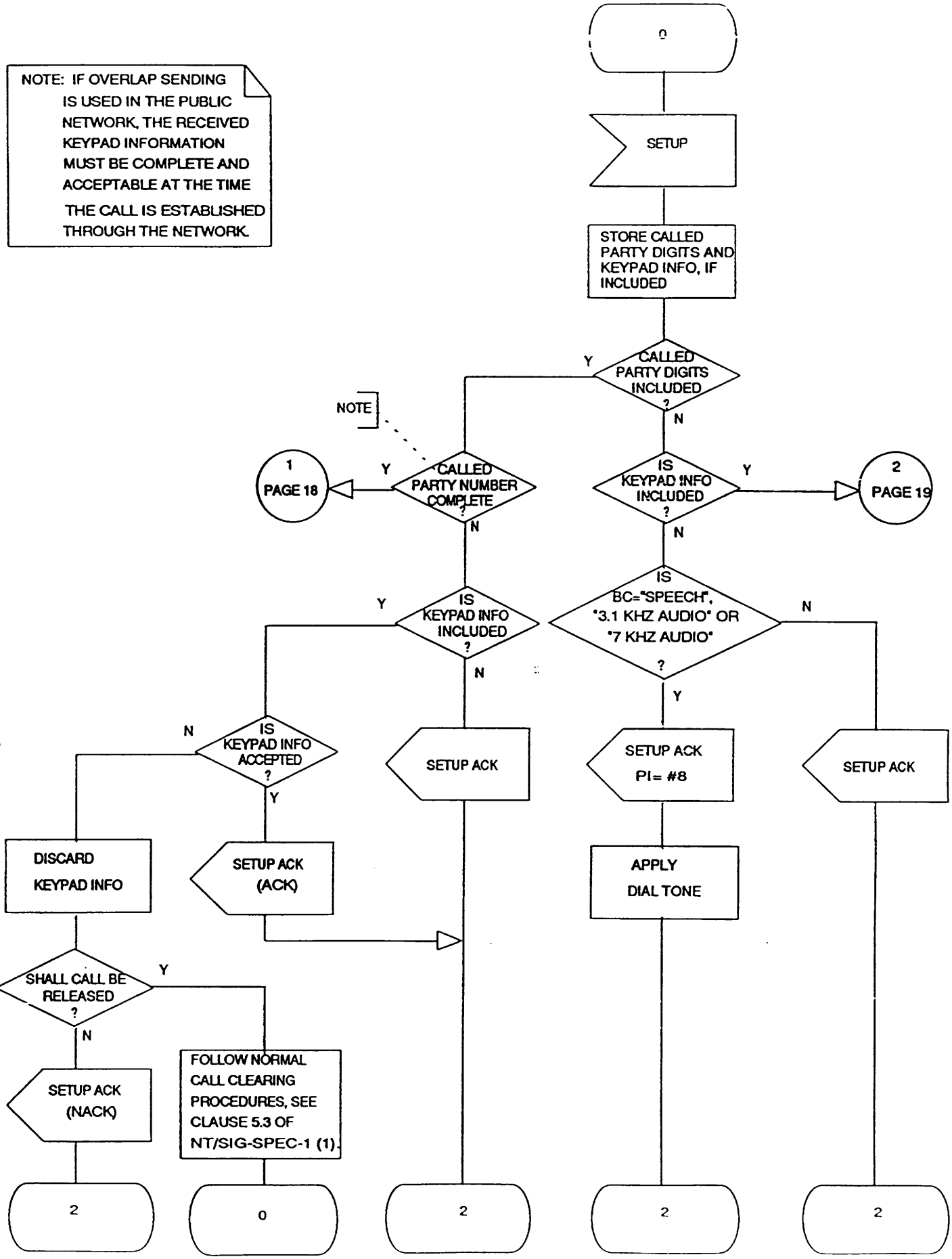
Advice of Charge (AOC), At the end of the call	464
Abbreviated Dialling, Registration	51
Last Number Repetition	52
Fixed Destination Call	53
Alarm Call, Casual	55
Alarm Call, Regular, Number of Days	56
Diversion on "No Reply", Operator or any Number	61
Diversion on "Busy", To any number (CFB)	67
Page Pick Up	82

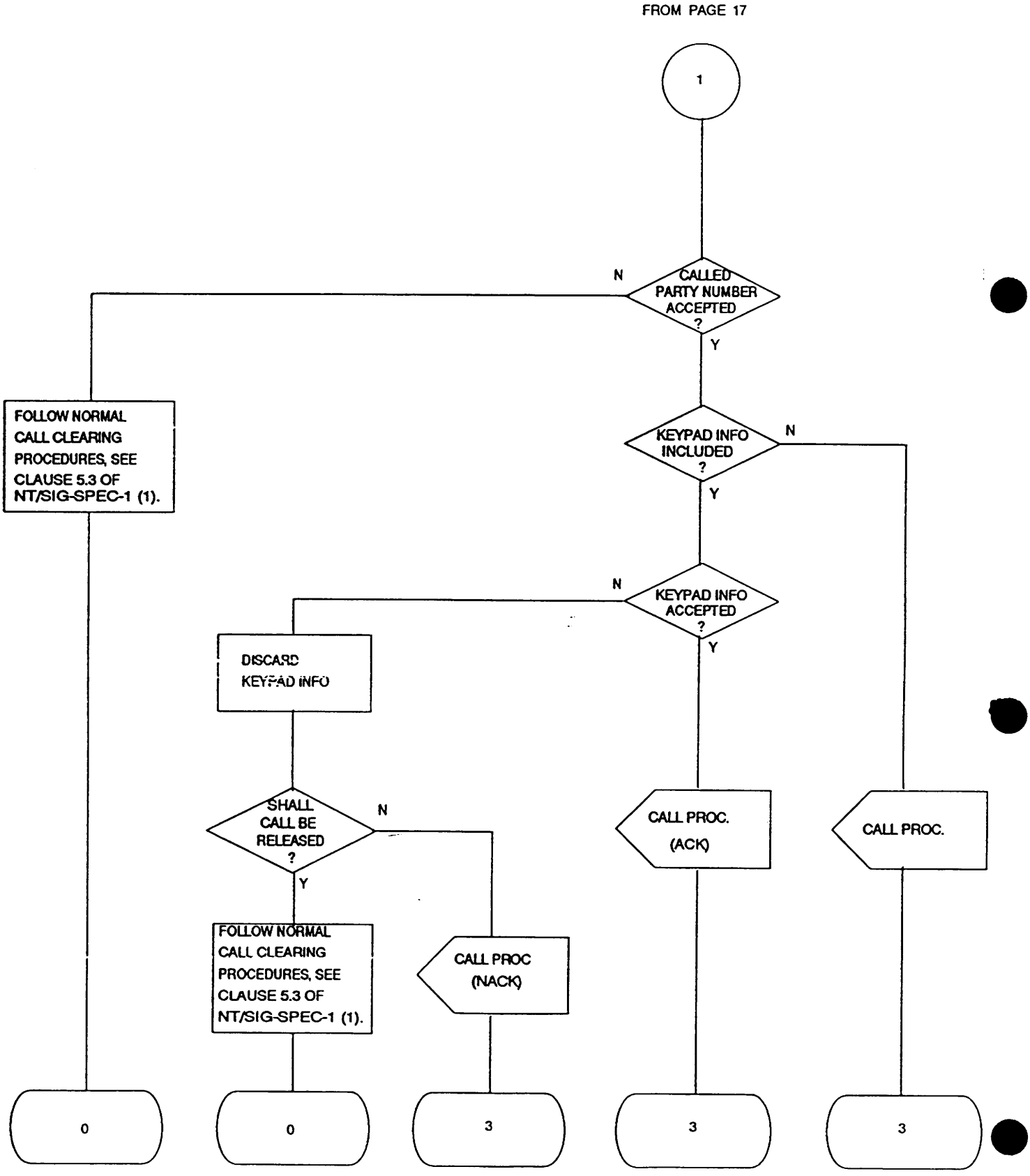
Table A.2: Switching orders

Switching order	Function	Supplementary service
0	Terminate held call	HOLD, 3PTY
1	Terminate and switch	HOLD, 3PTY
2	Hold and switch	HOLD, 3PTY
3	Establish three-way conversation	3PTY
4	Transfer	CT
5	Activate CCBS	CCBS

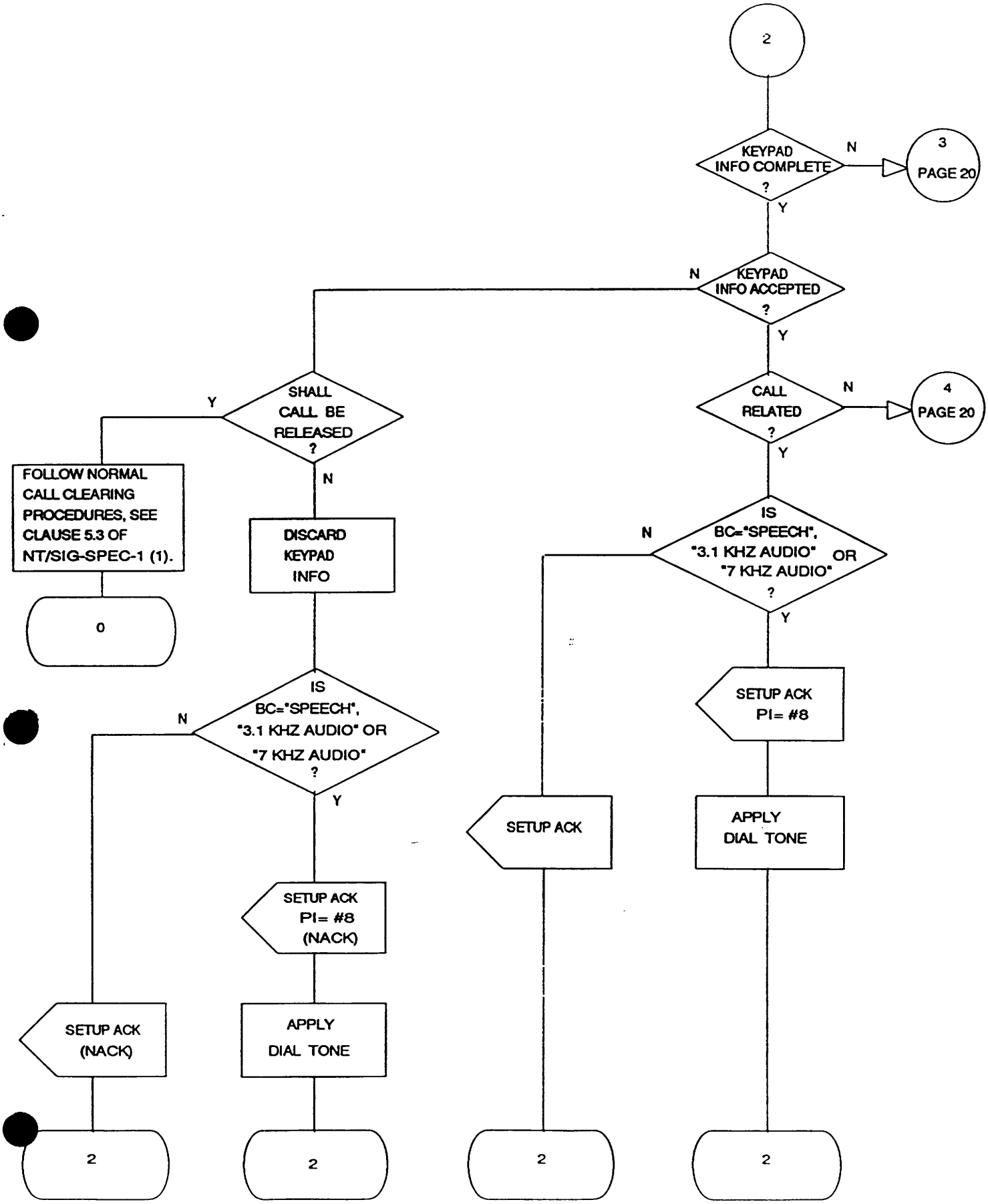
Note: The switching order shall be sent in the Keypad facility information element.

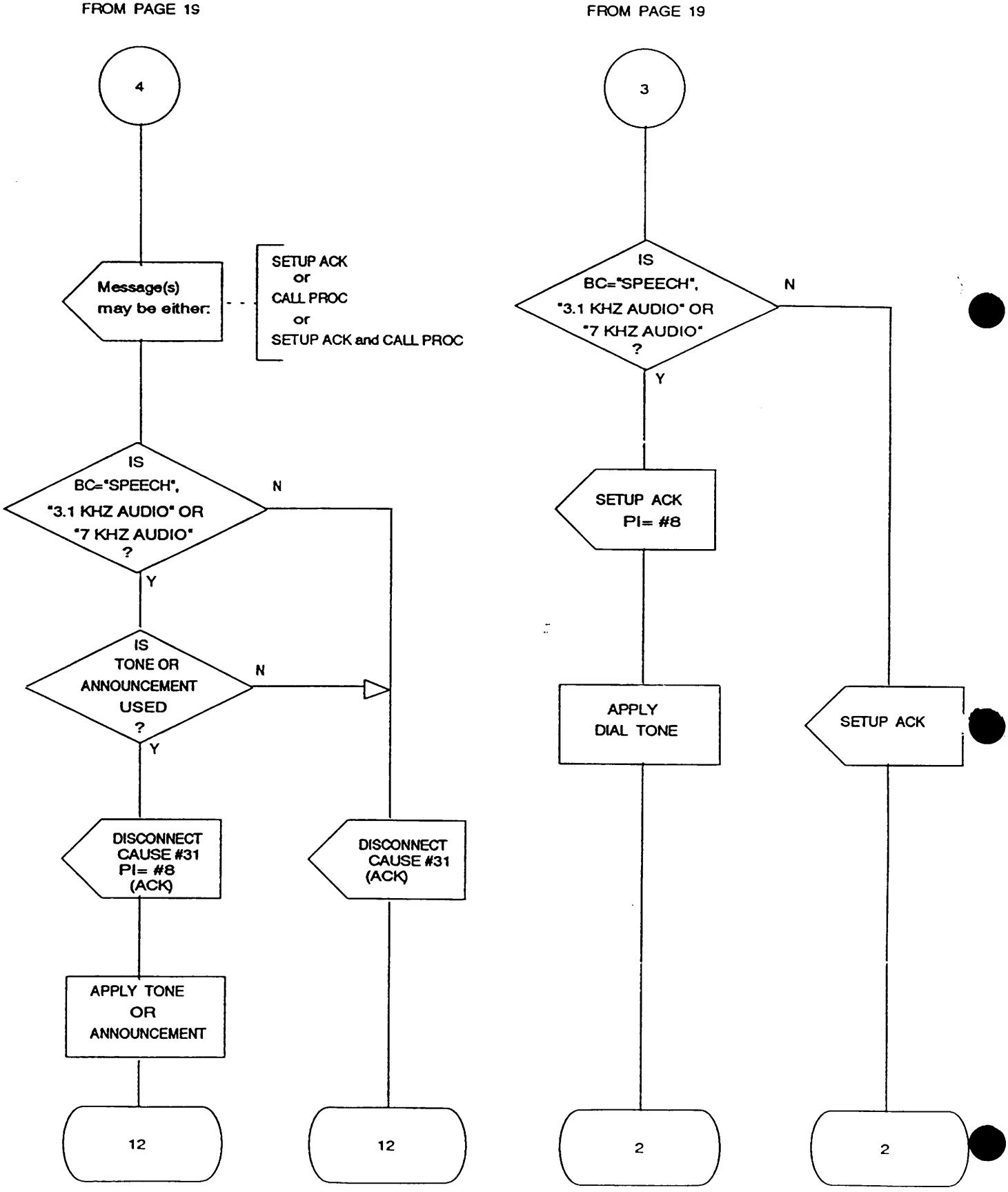
APPENDIX B: Network side SDL diagrams for en-bloc/overlap sending

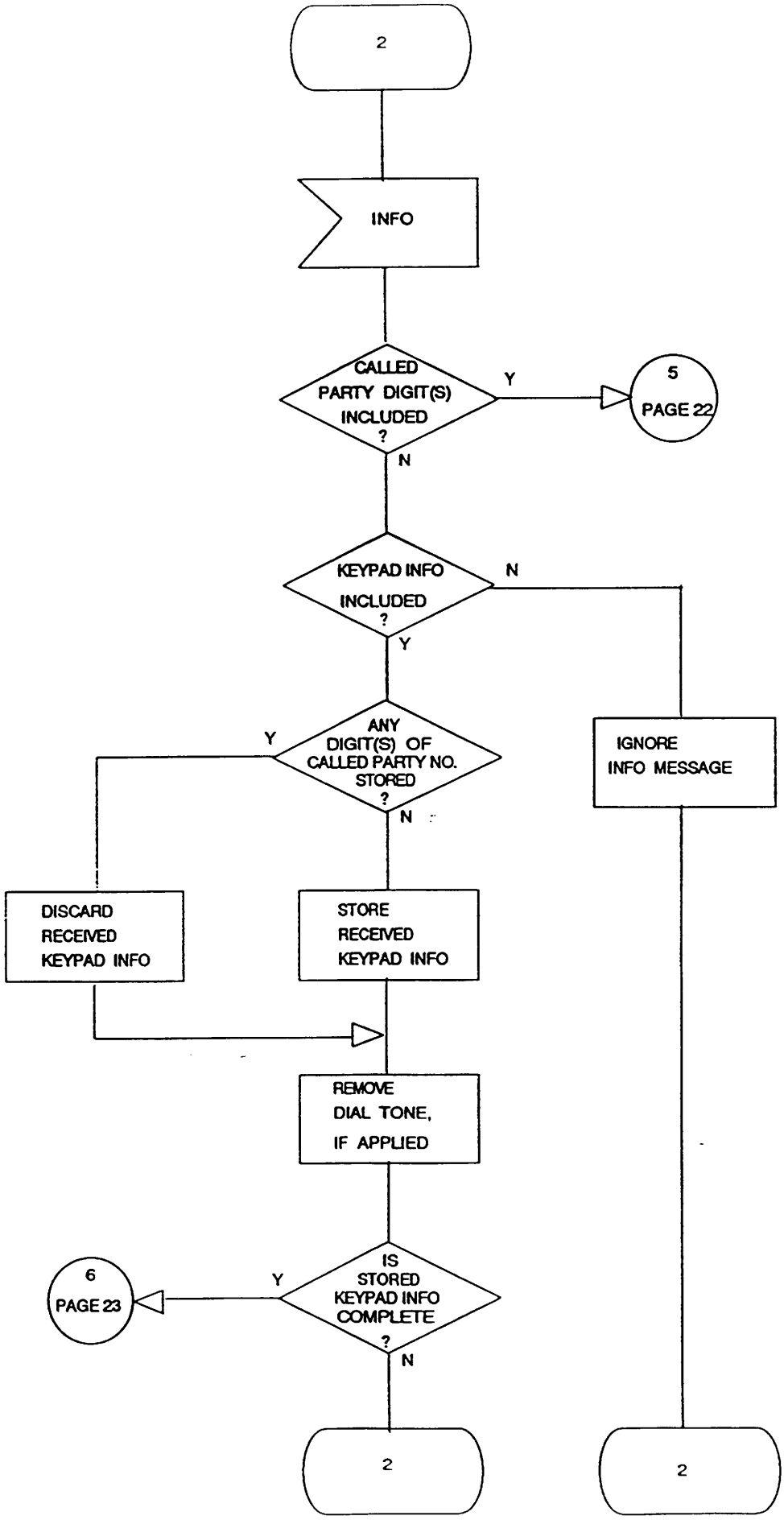



FROM PAGE 17
1
CALLED PARTY NUMBER ACCEPTED ?
N
Y
FOLLOW NORMAL CALL CLEARING PROCEDURES, SEE CLAUSE 5.3 OF NT/SIG-SPEC-1 (1).
KEYPAD INFO INCLUDED ?
N
Y
KEYPAD INFO ACCEPTED ?
N
Y
DISCARD KEYPAD INFO
SHALL CALL BE RELEASED ?
N
Y
FOLLOW NORMAL CALL CLEARING PROCEDURES, SEE CLAUSE 5.3 OF NT/SIG-SPEC-1 (1).
CALL PROC (NACK)
CALL PROC. (ACK)
CALL PROC.
0
0
3
3
3

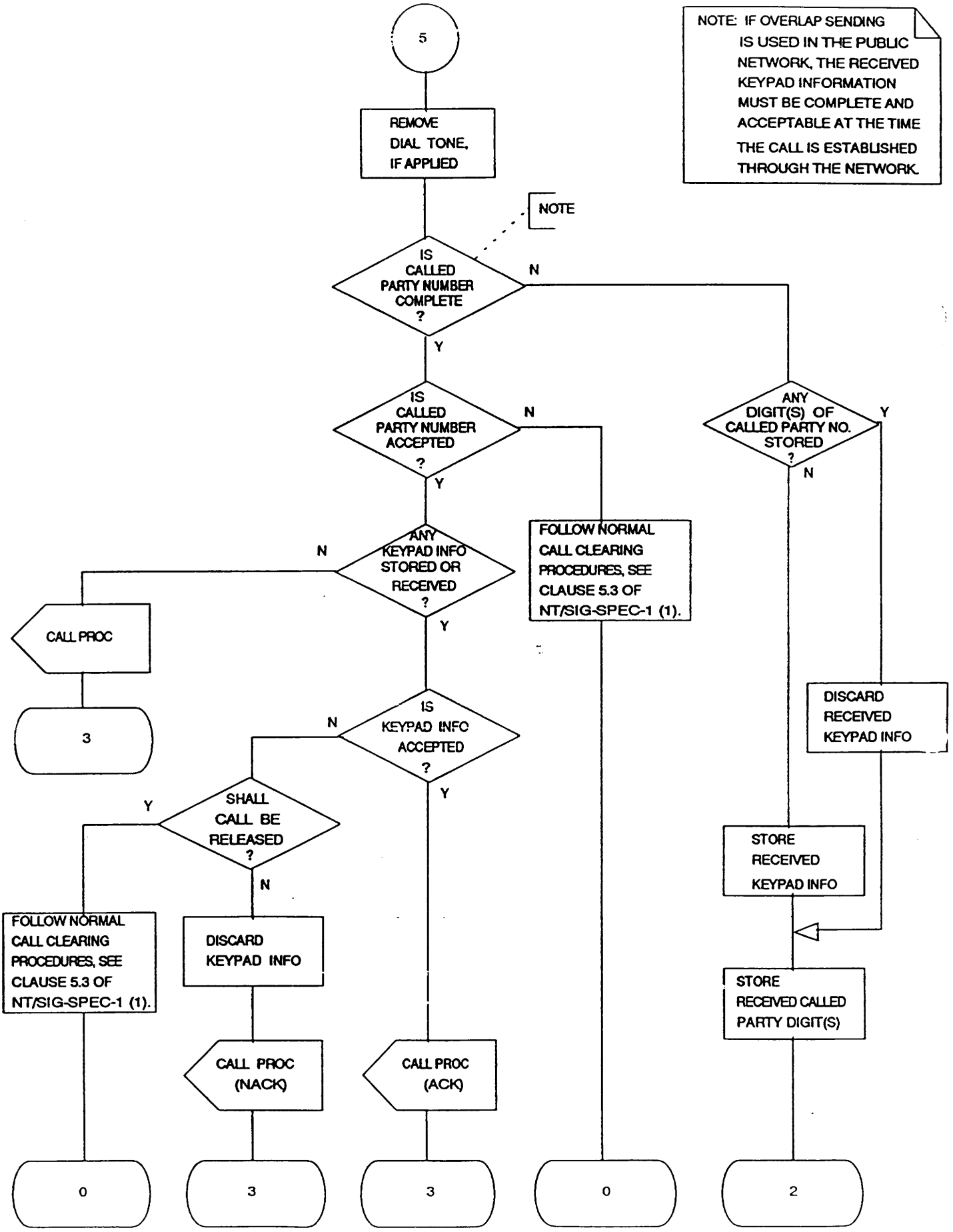
FROM PAGE 17


2
KEYPAD INFO COMPLETE ?
N
3
PAGE 20
Y
KEYPAD INFO ACCEPTED ?
N
Y
CALL RELATED ?
N
4
PAGE 20
Y
IS BC="SPEECH", "3.1 KHZ AUDIO" OR "7 KHZ AUDIO" ?
N
Y
SETUP ACK PI= #8
APPLY DIAL TONE
2
SETUP ACK
2
SHALL CALL BE RELEASED ?
Y
N
FOLLOW NORMAL CALL CLEARING PROCEDURES, SEE CLAUSE 5.3 OF NT/SIG-SPEC-1 (1).
0
DISCARD KEYPAD INFO
IS BC="SPEECH", "3.1 KHZ AUDIO" OR "7 KHZ AUDIO" ?
N
Y
SETUP ACK PI= #8 (NACK)
APPLY DIAL TONE
SETUP ACK (NACK)
2
2

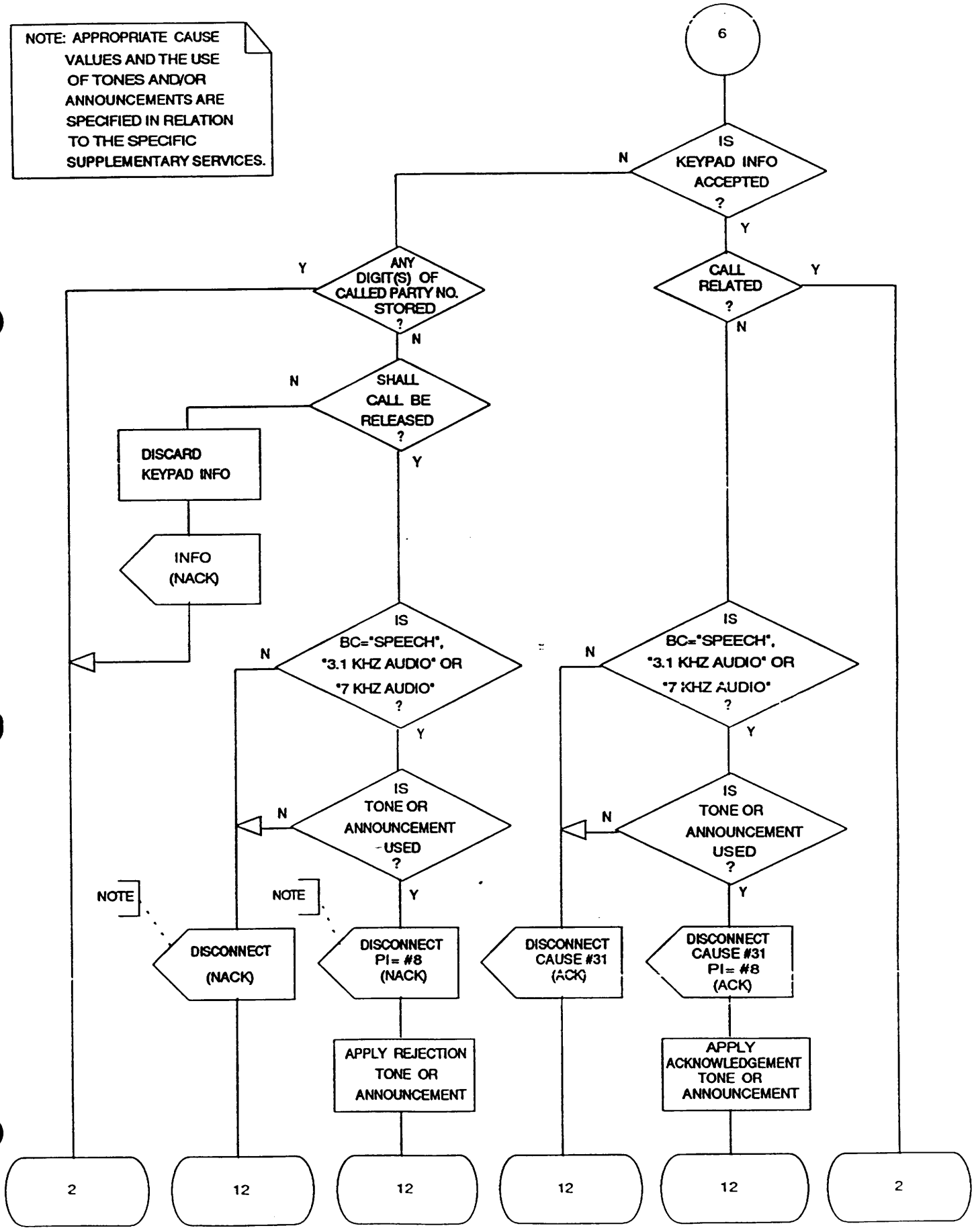

FROM PAGE 18
4
Message(s) may be either:
SETUP ACK or CALL PROC or SETUP ACK and CALL PROC
IS BC="SPEECH", "3.1 KHZ AUDIO" OR "7 KHZ AUDIO" ?
N
Y
IS TONE OR ANNOUNCEMENT USED ?
N
Y
DISCONNECT CAUSE #31 PI= #8 (ACK)
APPLY TONE OR ANNOUNCEMENT
12
DISCONNECT CAUSE #31 (ACK)
12
FROM PAGE 19
3
IS BC="SPEECH", "3.1 KHZ AUDIO" OR "7 KHZ AUDIO" ?
N
Y
SETUP ACK PI= #8
APPLY DIAL TONE
2
SETUP ACK
2


2
INFO
CALLED PARTY DIGIT(S) INCLUDED ?
Y
5
PAGE 22
N
KEYPAD INFO INCLUDED ?
N
Y
ANY DIGIT(S) OF CALLED PARTY NO. STORED ?
Y
N
IGNORE INFO MESSAGE
DISCARD RECEIVED KEYPAD INFO
STORE RECEIVED KEYPAD INFO
REMOVE DIAL TONE, IF APPLIED
IS STORED KEYPAD INFO COMPLETE ?
Y
6
PAGE 23
N
2
2

FROM PAGE 21


5
REMOVE DIAL TONE, IF APPLIED
NOTE
IS CALLED PARTY NUMBER COMPLETE ?
N
Y
IS CALLED PARTY NUMBER ACCEPTED ?
N
Y
ANY KEYPAD INFO STORED OR RECEIVED ?
N
Y
CALL PROC
3
IS KEYPAD INFO ACCEPTED ?
N
Y
SHALL CALL BE RELEASED ?
Y
N
FOLLOW NORMAL CALL CLEARING PROCEDURES, SEE CLAUSE 5.3 OF NT/SIG-SPEC-1 (1).
DISCARD KEYPAD INFO
CALL PROC (NACK)
CALL PROC (ACK)
FOLLOW NORMAL CALL CLEARING PROCEDURES, SEE CLAUSE 5.3 OF NT/SIG-SPEC-1 (1).
ANY DIGIT(S) OF CALLED PARTY NO. STORED ?
Y
N
DISCARD RECEIVED KEYPAD INFO
STORE RECEIVED KEYPAD INFO
STORE RECEIVED CALLED PARTY DIGIT(S)
NOTE: IF OVERLAP SENDING IS USED IN THE PUBLIC NETWORK, THE RECEIVED KEYPAD INFORMATION MUST BE COMPLETE AND ACCEPTABLE AT THE TIME THE CALL IS ESTABLISHED THROUGH THE NETWORK.
0
3
3
0
2

FROM PAGE 21


NOTE: APPROPRIATE CAUSE VALUES AND THE USE OF TONES AND/OR ANNOUNCEMENTS ARE SPECIFIED IN RELATION TO THE SPECIFIC SUPPLEMENTARY SERVICES.
6
IS KEYPAD INFO ACCEPTED ?
N
Y
ANY DIGIT(S) OF CALLED PARTY NO. STORED ?
Y
N
CALL RELATED ?
Y
N
SHALL CALL BE RELEASED ?
N
Y
DISCARD KEYPAD INFO
INFO (NACK)
IS BC="SPEECH", "3.1 KHZ AUDIO" OR "7 KHZ AUDIO" ?
N
Y
IS BC="SPEECH", "3.1 KHZ AUDIO" OR "7 KHZ AUDIO" ?
N
Y
IS TONE OR ANNOUNCEMENT USED ?
N
Y
IS TONE OR ANNOUNCEMENT USED ?
N
Y
NOTE
NOTE
DISCONNECT (NACK)
DISCONNECT PI= #8 (NACK)
DISCONNECT CAUSE #31 (ACK)
DISCONNECT CAUSE #31 PI= #8 (ACK)
APPLY REJECTION TONE OR ANNOUNCEMENT
APPLY ACKNOWLEDGEMENT TONE OR ANNOUNCEMENT
2
12
12
12
12
2

APPENDIX C: Basic service indicator

For a number of reasons it may be necessary that the network unambiguously identifies the telecommunications service it shall handle. The service information may be applied, e.g.:

- when a service is subscribed to and registered;
- for charging purposes;
- in the case of service interworking;
- in the case of supplementary service management, because some of the supplementary services can be activated, deactivated, interrogated, and invoked individually per basic service (e.g., Diversion and Closed User Group supplementary services).

The following clauses define a number of tables to be used for activation, deactivation, interrogation and invocation of supplementary services in relation to a basic service.

C.1 Basic services to be recognized by the network on invocation of a supplementary service.

A basic service is identified by a combination of values (codepoints) of the High layer compatibility and Bearer capability information elements.

Table C.1 summarizes the appropriate basic services to be recognized by the network on conditions of the High layer compatibility and the Bearer capability information element values.

Table C.1 shall be used by the network to determine if a supplementary service is to be invoked, depending on the indicated basic service.

Table C.1: Basic services identified by BC/HLC values

High layer compatibility (octet 4)	Bearer capability (octet 3) (Note 1)				
	Speech "00000"	3.1 kHz Audio "10000"	Unrestricted digital inf. "01000"	7 kHz Audio "10001"	Other
Telephony ("000 0001")	Telephony 3.1 kHz (Note 5)	Audio 3.1 kHz	Unrestricted digital information	Telephony 7 kHz (Note 5)	Note 4
Facsimile Group 2/3 ("000 0100")	Speech	Telefax group2/3 (Note 5)	Unrestricted digital information	Audio 7 kHz	Note 4
Facsimile Group 4 Class 1 ("010 0001")	Speech	Audio 3.1 kHz	Telefax Group 4 Class 1 (Note 5)	Audio 7 kHz	Note 4
Teletex Basic mode ("011 0001")	Speech	Audio 3.1 kHz	Teletex (Note 5)	Audio 7 kHz	Note 4
Videotex ("011 0010")	Speech	Audio 3.1 kHz	Videotex syntax based (Note 5)	Audio 7 kHz	Note 4
Audiovisual ("110 0000")	Speech	Audio 3.1 kHz	Video telephony (Note 2,5)	Video telephony (Note 3,5)	Note 4
Other, or no HLC present	Speech	Audio 3.1 kHz	Unrestricted digital information	Audio 7 kHz	Note 4

Note 1: This table assumes that octet 4 of the Bearer capability information element is encoded with "circuit mode" and "64 kBit/s". Actions for other values in octet 4 will require study.

Note 2: Used for the second connection of the video telephony teleservice.

Note 3: Used for the first connection of the video telephony teleservice.

Note 4: The use of other information transfer capabilities shall be rejected.

Note 5: If the indicated teleservice is not supported by the network, then the basic service related to the bearer service shall apply.

C.2 Interpretation of basic service in relation to the activation, deactivation or interrogation procedures

An activation, deactivation or interrogation request for a supplementary service may be related to a basic service. The user may indicate a specific basic service using either the Basic service indicator (BS) in the Keypad facility information element or by using the appropriate values in the Bearer capability and High layer compatibility information elements.

If the Basic service indicator (BS) is used, then the relationship between the basic service and the Basic service indicator value received in the Keypad iformation element shown in table C.2 shall apply.

Table C.2: Relationship between a basic service and the received Basic service indicator (BS)

Basic service	Basic service indicator
All services	0
Speech	1
64 kBit/s unrestricted	2
3.1 kHz Audio	3
7 kHz Audio	4
Telephony 3.1kHz	32 (Note)
Teletex	33
Telefax gr. 4	34
Videotex	35
Videotelephony	36
Telefax gr. 2/3	37
Telephony 7kHz	38 (Note)

Note: If BS= 32 or BS= 38 is indicated, the network shall interpret the request as if the user has indicated BS= 1, BS= 3 , BS= 32 and BS= 38 independently, but related to the same supplementary service request.

If no Basic service indicator is received in the Keypad facility information element, the network shall use the received value(s) indicated in the Bearer capability (BC) and High layer compatibility (HLC) information element (if any). The relationship between the value(s) indicated in the received BC/HLC information and the basic service shown in table C.3 shall apply.

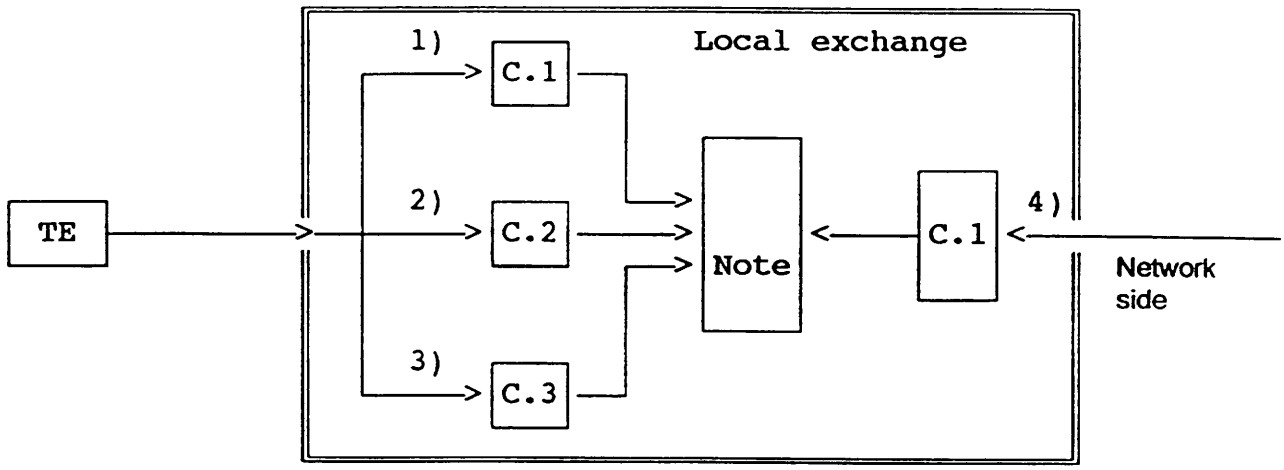
Table C.3: Relationship between a basic service and the received BC/HLC values

High layer compatibility (octet 4)	Bearer capability (octet 3) (Note 1)				
	Speech	3.1 kHz Audio	Unrestricted digital inf.	7 kHz Audio	Other
Telephony	Speech, Audio 3.1 kHz, Telephony 3.1 kHz, Telephony 7 kHz	Audio 3.1 kHz	Unrestricted digital information	Speech, Audio 3.1 kHz, Telephony 3.1 kHz, Telephony 7 kHz	Note
Facsimile Group 2/3	Speech	Telefax group2/3	Unrestricted digital information	Audio 7 kHz	Note
Facsimile Group 4 Class 1	Speech	Audio 3.1 kHz	Telefax Group 4 Class 1	Audio 7 kHz	Note
Teletex Basic mode	Speech	Audio 3.1 kHz	Teletex	Audio 7 kHz	Note
Videotex	Speech	Audio 3.1 kHz	Videotex syntax based	Audio 7 kHz	Note
Audiovisual	Speech	Audio 3.1 kHz	Video telephony	Video telephony	Note
Other	Speech	Audio 3.1 kHz	Unrestricted digital information	Audio 7 kHz	Note
None indicated	Speech, Audio 3.1 kHz, Telephony 3.1 kHz, Telephony 7 kHz	Audio 3.1 kHz	Video telephony	Audio 7 kHz	Note

Note: If the user indicates other information transfer capabilities, then the network shall reject the supplementary service request.

C.3 A schematic representation of the handling of basic service related to activation, deactivation, interrogation and invocation

Figure C.1 shows which tables are to be used when the input from the user side and the network side is managed.



Note: Specific supplementary service information, e.g., data record for activated call forwarding or for subscribed CUGs.

Figure C.1: Schematic representation of the handling of the basic service.

1) When a SETUP message is received by the network containing an invocation (e.g., CUG), the Bearer capability and High layer compatibility information elements shall be mapped to a basic service by the use of table C.1. The identified basic service is used when the specific supplementary service information is checked.

2) When a SETUP message is received by the network containing keypad information (e.g., for activation of call forwarding) including a basic service indicated by the Basic service indicator parameter, table C.2 shall be used. The identified basic service is used when creating the data record for the specific supplementary service.

3) If in item 2) no basic service is indicated in the keypad information, the Bearer capability and the High layer compatibility information elements shall be mapped to a basic service using table C.3.

4) When an incoming call is received by the network and a supplementary service is to be invoked in connection with that call (e.g., call forwarding), the network shall use table C.1 to determine the relevant basic service based on the indicated bearer and high layer information received with the incoming call.

APPENDIX D: General principles for the use of the Display information element

When stimulus procedures are used, the network may send information to the user in Display information elements containing IA5 characters.

The Display information elements will be delivered in appropriate messages as specified in relation to the relevant supplementary services for which they apply. However, the following principles apply for all services:

a) The network will structure the display information for a display size of 2 lines each of 20 characters.

b) Display information will be delivered in Display information elements each with a content of maximum 32 IA5 characters.

c) A "block" of information (a "block" contains maximum 40 characters) sent from the network will always be started with a "Form Feed" (FF). If a block of information exceeds 32 IA5 characters, the information will be sent in two Display information elements in which case the information in the second Display information element will not start with a FF.

d) For some applications (e.g. interrogation of the Call forwarding supplementary service), the network may provide more characters than can be shown by the display at one time. In this case the network will send blocks of information at specific intervals (e.g. one block each 5 seconds).

e) In some cases the Display information element is included in a message containing other information element(s) which also may result in a displayed message to the user. Examples are Cause, Notification indicator, Calling party number and Progress information elements. In such cases, the network will create information with a length of 20 IA5 characters as a maximum.

f) The network will assume that the terminal is able to handle the following IA5 characters:

- All graphic characters;
- Also the "Nordic" letters:

  For Denmark and Norway: æ(7/11), Æ(5/11), ø(7/12), Ø(5/12), å(7/13) and Å(5/13);

  For Finland and Sweden: ä(7/11), Ä(5/11), ö(7/12), Ö(5/12), å(7/13) and Å(5/13).
- The following format effectors of the control characters:

  SP(2/0), LF(0/10), FF(0/12), CR(0/13).

NORDTEL

NT/SIG-SPEC-2-1

NORDIC SPECIFICATION

APPLICATION DOCUMENT TO
ETSI ETS 300 122

GENERIC KEYPAD PROTOCOL FOR THE SUPPORT OF SUPPLEMENTARY SERVICES

APPENDIX E
DISPLAY INFORMATION AND
TONES AND/OR ANNOUNCEMENTS

ISSUE DATE: 92-06-01

APPENDIX E: DISPLAY INFORMATION AND TONES AND/OR ANNOUNCEMENTS

The specification of the display information in danish wording is given in figure B-1.

Furthermore, the specification of the tones and/or announcement is given in figure B-2. Only tones are applicable in relation to the generic keypad protocol.

Display type	Content in display information element
Display GEN1	Fejl i indtastning

Figure B-1: Content of the Display information in danish.

TOA type	Content of the tones and/or announcement
TOA GEN1	Special information tone

Figure B-2: Content of the tones and/or announcement.

The Danish Public Telecommunication Enterprises

ISDN Digital Subscriber Signalling No. 1

DSS1

Network layer
Glosed User Group (CUG) supplementary service
(Keypad Protocol)

Application specification document to ETSI ETS 300 138:

Closed User Group (CUG) supplementary service (DSS1)

July 1992.

NORDTEL

NT/SIG-SPEC-3-C

NORDIC SPECIFICATION

APPLICATION DOCUMENT TO
ETSI ETS 300 138

CLOSED USER GROUP SUPPLEMENTARY SERVICE USING KEYPAD PROTOCOL

ISSUE DATE: 92-06-02, Rev. A

CONTENTS

FOREWORD

The following sections give the requirements for the implementation of the Closed User Group supplementary service using keypad protocol for ISDN services in the Nordic networks. The requirements stated here are the requirements to the network side of the user-network interface.

This specification is an application document to ETSI ETS 300 138 (1) where the keypad protocol is applied instead of the functional protocol, and selects which options in ETS 300 138 (1) are applicable for the keypad protocol in the Nordic networks. The generic keypad protocol which is applied in this specification is defined in NT/SIG-SPEC-2-1 (2).

The text in clauses 9.2.1 to 9.2.5 replace entirely the text contained in the same clauses in ETS 300 138 (1). In addition, this specification contains some clarifications and/or additions to certain other clauses of ETS 300 138 (1), where this is felt to be necessary. Where clarifying text is provided, the relevant clause in ETS 300 138 (1) shall be considered as being "Applicable" taking into consideration the additional text provided in that clause. If a clause is not mentioned it shall be interpreted as "Applicable".

The provision of the Closed User Group supplementary service, using the keypad protocol, in each Nordic country is a national matter.

The provision of tones and/or announcements in connection with the Closed User Group supplementary service is a national matter.

1 Scope

This specification describes the operation of the Closed User Group (CUG) supplementary service using the keypad protocol. It is an application document to ETS 300 138 (1) and makes use of the generic keypad protocol defined in NT/SIG-SPEC-2-1 (2).

This stage 3 specification is based on the service requirements specified in ETS 300 136 [6]. If any service requirement cannot be fulfilled due to the reduced functionality of the keypad protocol, it is explicitly indicated in the text.

2 Normative references

(1) ETS 300 138 "Integrated Service Digital Network (ISDN), Closed User Group supplementary service, Digital Subscriber Signalling System No. one (DSS1) protocol".

(2) Nordic Specification NT/SIG-SPEC-2-1, dated 92-06-01 "Generic keypad protocol for the support of supplementary services".

Note: References enclosed in square brackets ("[]") refer to the references defined by ETS 300 138 (1).

3 Definitions

Speech type connection: A connection type where the bearer capability indicates "speech", "3.1 kHz Audio" or "7 kHz Audio".

4 Symbols and abbreviations

TOA Tones and/or announcement.

5 Description

Applicable.

6 Operational requirements

6.1 Provision and withdrawal

Applicable.

Note: The subscription option and the relationships between the ISDN subscriber, the ISDN number, the basic services and the CUGs are summarized in Appendix A.

6.2 Requirements on the originating network side

Applicable.

6.3 Requirements on the destination network side

Applicable.

7 Coding requirements

7.1 ASN.1 description of coding requirements

Not applicable.

7.2 Coding of the Cause information element

Applicable.

7.3 Coding of the Keypad facility information element

The coding requirements for the invocation procedure of the CUG supplementary service are specified in table 1.

Table 1: Closed User Group invocation procedure

```
CUG call invoke ::=

*CUG service code[*[CUG index][*OA request]]#

            CUG service code = 01
                   CUG index = 0 - 99 <NOTE-Norway>
                  OA request = 0 <Note>

   [ ] is used to indicate an optional parameter.

   Note: If the OA request parameter is not included or
         has a value different from "0" it shall be in-
         terpreted as OA not required.

   NOTE-Norway: CUG index 0 - 999
```

7.4 Coding of the Display information element

The semantics of the display information in relation to the CUG supplementary service are specified in table 2.

The Display information element will contain CUG related information coded in IA5 characters constituting a national text according to appendix B.

Table 2: The semantics of the display information for the CUG supplementary service.

```
Display CUG1 "invalid or unregistered CUG parameter(s)"
Display CUG2 "outgoing calls barred within CUG"
Display CUG3 "incoming calls barred within CUG"
Display CUG4 "user not a member of CUG"
Display CUG5 "CUG call with CUG index"
```

8 State definitions

Applicable.

9 Signalling procedures at the coincident S and T reference point

9.1 Activation, deactivation and registration

Activation, deactivation and registration procedures are not applicable.

9.2 Invocation and operation

Applicable.

9.2.1 Call originating from a user with the CUG supplementary service (explicit request)

9.2.1.1 Normal operation

In order to invoke the Closed User Group supplementary service by explicit request the calling user shall include in the outgoing SETUP or INFORMATION message a CUG invocation request in one or more Keypad facility information element(s) using én-bloc or overlap procedure according to NT/SIG-SPEC-2-1 (2).
If no Calling party number information element is included by the calling user in the SETUP message, the default number stored in the originating network shall be used for the assignment of the closed user group.

The network shall perform internal checks appropriate to the originating network based on the contents of the CUG invocation request and the CUG attributes of the calling user.
The outcomes of these checks are defined in table 3 (including notes).

Note: The network may respond to the SETUP message with a SETUP ACKNOWLEDGE or CALL PROCEEDING message or the call may be cleared for some reason unrelated to the CUG supplementary service before the checks are completed.

If the result of the checks relevant to the originating network allows the call to proceed then the destination network shall perform further internal checks based on the CUG attributes (if any) of the called user.
The outcomes of these checks are defined in table 4 (including notes).

If the call is successfully offered to the called user, then basic call control procedures shall apply at the calling user's interface.

9.2.1.2 Exceptional procedures

If, as a result of the checks relevant to either the originating or destination network, the network cannot allow the call to proceed for a CUG supplementary service related reason, then the network shall fail the call attempt and include in the first clearing message returned to the calling user (before the alerting phase) a Display information element containing a CUG display information with the appropriate indication as defined in table 3 and 4 (including notes). The cause in the clearing message shall be #29 "facility rejected".
For speech type connection the network may in addition send the in-band information TOA CUG1.

If the destination network is indicating either "icb" or "user not a member of CUG" the originating network shall send a DISCONNECT message to the calling user, and:

- if cause #55 indicating "icb" is received from the destination network, then the originating network shall map this indication to Display CUG3 "incoming calls barred within CUG" and the cause in the DISCONNECT message shall be #29 "facility rejected;
  For speech type connection the network may in addition send the in-band information TOA CUG2.

- if cause #87 indicating "user not a member of CUG" is received from the destination network, then the originating network shall include cause #87 "user not a member of CUG" in the DISCONNECT message and in addition send Display CUG4 "user not a member of CUG".
  For speech type connection the network may in addition send the in-band information TOA CUG3.

If a call attempt fails due to reasons unrelated to the CUG supplementary service, then no CUG display information shall be sent to the calling user.

The possibility of "simultaneous" failure for a CUG supplementary service related reason and a reason unrelated to the CUG supplementary service is not precluded. In this case no CUG display information shall be sent. The cause shall be determined by the event not related to the CUG supplementary service which caused the call failure.

9.2.2 Call originating from a user with the CUG supplementary service (default request)

9.2.2.1 Normal operation

If the calling user does not include a CUG call invoke in the call request, the network shall perform internal checks appropriate to the originating network based on the CUG attributes of the calling user. The outcomes of these checks are defined in table 3 (including notes). If no Calling party number information element is included by the calling user in the SETUP message, the default number stored in the originating network shall be used for the assignment of the closed user group.

Note: The network may respond to the SETUP message with a SETUP ACKNOWLEDGE or CALL PROCEEDING message or the call may be cleared for some reason unrelated to the CUG supplementary service before the checks are completed.

If the result of the checks relevant to the originating network allows the call to proceed then the destination network shall perform further internal checks based on the CUG attributes (if any) of the called user.
The outcomes of these checks are defined in table 4 (including notes).

If the call is successfully offered to the called user, then basic call control procedure shall apply at the calling user's interface.

If there is no subscription to a CUG for a specific combination of an ISDN number and a basic service, then a call request indicating this combination and without a CUG request, shall be treated as a normal call.

9.2.2.2 Exceptional procedures

If, as a result of the checks relevant to either the originating or destination network, the network cannot allow the call to proceed for a CUG supplementary service related reason, then the network shall initiate call clearing using one of the following causes/display information:

- if cause #87 indicating "user not a member of CUG" is received from the destination network, then the originating network shall include cause #87 "user not a member of CUG" in the DISCONNECT message and in addition send Display CUG4 "user not a member of CUG".
  For speech type connection the network may in addition send the in-band information TOA CUG3.

- #29 "Facility rejected" in the case of all other CUG supplementary service related reasons.
  For speech type connection the network may in addition send the in-band information TOA CUG1.

When a call fails for a reason unrelated to the CUG supplementary service then no CUG supplementary service related procedures shall apply.

9.2.3 Call originating from a user without the CUG supplementary service

9.2.3.1 Normal operation

A user without the CUG supplementary service can make a call to a user with the CUG supplementary service. If such a calling user does not include a CUG call invoke in the call request, then table 3 (including notes) shall apply.

The destination network shall then perform further internal checks based on the CUG attributes (if any) of the called user. The outcomes of these checks are defined in table 4 (including notes).

9.2.3.2 Exceptional procedures

If the calling user includes a CUG call invoke in the call request and if the network can recognise the CUG call invoke, then the network shall fail the call and initiate clearing with the cause value #50 "requested facility not subscribed".
For speech type connection the network may in addition send the in-band information TOA CUG4.

If the calling user includes a CUG call invoke in the call request but the network cannot recognise this CUG call invoke, then the procedures defined in clause 4.5 of NT/SIG-SPEC-2-1 (2) shall apply.

If the calling user does not include a CUG call invoke in the call request and the call fails as a result of the checks relevant to the destination network, then the network shall fail the call attempt and initiate clearing with cause #87 "user not a member of CUG" and in addition Display CUG4 "user not a member of CUG".
For speech type connection the network may in addition send the in-band information TOA CUG3.

If the call attempt fails for a reason unrelated to the CUG supplementary service, then no CUG supplementary service related procedure shall apply.

9.2.4 Call terminating at a user with the CUG supplementary service

9.2.4.1 Normal operation

If the destination network has only implemented the CUG supplementary service with keypad procedures, the destination network does not expect any CUG related response from the called user.

If the destination network has only implemented the CUG supplementary service with keypad procedures, then the network shall perform internal checks as defined in table 4 (including notes). If the destination network determines the call to be a CUG call then the incoming SETUP message shall include a Display information element containing Display CUG5 "CUG call with CUG index". Call handling shall continue in accordance with the basic call procedures.

If the destination network has implemented the CUG supplementary service with both keypad and functional procedures, then the procedures defined in ETS 300

138 (1), clause 9.2.4.1 shall apply with the addition that a Display information element containing Display CUG5 "CUG call with CUG index" shall be included in the SETUP message.

9.2.4.2 Exceptional procedures

If the destination network has only implemented the CUG supplementary service with keypad procedures, the destination network does not expect any CUG related response from the called user.

If the destination network has only implemented the CUG supplementary service with keypad procedures and if an unsuccessful call offering appears, then the network shall clear the call attempt in accordance with the basic call procedures.
If the destination network has implemented the CUG supplementary service with both keypad and functional procedures, then the procedures in ETS 300 138 (1), clause 9.2.4.2, shall apply.

9.2.5 CUG checks at the originating and destination network side

Table 3 shall be used to determine the type of call request sent to the destination network or rejection indication returned to the calling user.
The type of call request derived from the table shall determine the linkage to table 4.

Table 3: Closed User Group checks at the originating network

CUG attributes of the calling user for requested basic service			CUG information received from calling user				
			CUG call invocation request received				No CUG call invocation request received
			CUG index		no CUG index		
			OA not req.	OA req.	OA not req.	OA req.	
No preferential CUG	OA not allowed	not ocb	CUG call *1 IC: spec.CUG	CUG call *1 IC:spec.CUG	Rejected No D *3	Rejected No D *3	Rejected No D *3
		ocb	Rejected D=CUG2	Rejected D=CUG2			
	OA allowed	not ocb	CUG call *1 IC: spec.CUG	CUG call *1 IC:spec.CUG	Normal call *3	Normal call *3	Normal call *3
		ocb	Rejected D=CUG2	Rejected D=CUG2			
Preferential CUG	OA not allowed	not ocb	CUG call *1 IC: spec.CUG	CUG call *1 IC:spec.CUG	CUG call IC:pref.CUG	Rejected D=CUG1	CUG call IC:pref.CUG
		ocb	Rejected D=CUG2 *2	Rejected D=CUG2 *2	Rejected D=CUG2 *4		Rejected No D *4
	OA allowed	not ocb	CUG call *1 IC: spec.CUG	CUG call *1 IC:spec.CUG	CUG call IC:pref.CUG	Normal call	CUG call IC:pref.CUG
		ocb	Rejected D=CUG2 *2	Rejected D=CUG2 *2	Rejected D=CUG2 *4		Rejected No D *4
Not a CUG user			Rejected No D	Rejected No D	Rejected No D	Rejected No D	Normal call *5

D: CUG display information
IC: Interlock Code
OA: Outgoing Access
ocb: Outgoing calls barred within the CUG
CUG1: Display CUG1 "invalid or unregistered CUG parameter(s)"
CUG2: Display CUG2 "outgoing calls barred within CUG"

Notes to table 3:

*1 assumes match between CUG index and IC exists for the requested basic service.
If no match exists then:

- if the CUG index exists but is not appropriate to the requested basic service, the call shall be rejected with Display CUG1 "invalid or unregistered parameter(s)". If there is no subscription to a CUG for a specific combination of an ISDN number and a basic service, then a call request indicating this combination and without a CUG request, shall be treated as a normal call.

- if the CUG index does not exist, the call shall be rejected with Display CUG1 "invalid or unregitered parameter(s)".

*2 if the CUG index identifies the preferential CUG then this combination of CUG attribute values is not recommended.

*3 if there is no subscription to a CUG for a specific combination of an ISDN number and a basic service, then a call request indicating this combination and without a CUG request, shall be treated as a normal call.

*4 this combination of CUG attribute value is not recommended.

*5 this represents the normal case of a user without the CUG supplementary service making a normal call.

Table 4 shall be used to determine the type of call request sent to the destination user or the type of rejection indication sent to the calling user by the originating network.

Table 4: Closed User Group checks at the destination network

Type of CUG indication received at the destination network	M or NM	CUG attributes of the called user for the requested basic service				Not a CUG user
		IA not allowed		IA allowed		
		not icb	icb	not icb	icb	
CUG call with no OA indication	M	CUG call	rejected D=CUG3	CUG call	rejected D=CUG3	Rejected D=CUG4
	NM	Rejected D=CUG4 *1	Rejected D=CUG4 *1	Rejected D=CUG4 *1	Rejected D=CUG4 *1	
CUG call with OA indication *4	M	CUG call	rejected D=CUG3	CUG call	Normal call	Normal call
	NM	Rejected D=CUG4 *2	Rejected D=CUG4 *2	Normal call *2	Normal call *2	
Normal call		Rejected D=CUG4 *2	Rejected D=CUG4 *2	Normal call *2	Normal call *2	Normal call *3

OA: Outgoing Access.
IA: Incoming Access.
icb: Incoming calls barred within the CUG.
D: CUG display information sent to the calling user by the originating network.
M: Match between IC and CUG index exists for the requested Basic Service.
NM: No Match between IC and CUG index exists for the requested Basic Service.
IC: CUG Interlock code.
CUG3: Display CUG3 "incoming calls barred within CUG".
CUG4: Display CUG4 "user not a member of CUG".

Key to cross points in table:

CUG call: Display CUG5 "CUG call with CUG index" in the Display information element in the SETUP message identifies the CUG index.

Normal call: No Display information element in the SETUP message.

Notes to table 4:

*1 assumes that the match between the CUG index and IC fails because the IC does not exist for the called user. If the IC exists but is not appropriate to the requested basic service then the call shall be rejected with no CUG display information. If there is no subscription to a CUG for a specific combination of an ISDN number and a basic service, then a call request indicating this combination and without a CUG request shall be treated as a normal call.

*2 if there is no subscription to a CUG for a specific combination of an ISDN number and a basic service, then a call request indicating this combination and without a CUG request shall be treated as a normal call.

*3 this represents the normal case of a user without the CUG supplementary service receiving a normal call.

*4 originating network sides implementing the CUG supplementary service according to this specification cannot generate calls with this indication (i.e. this type is not an output from table 3). The actions on receipt of calls with this indication at destination network sides which implement this specification are included to enable interworking with originating network sides which, as a result of implementing a CUG supplementary service to a specification other than this specification, can generate the indication. The CUG display information shown as delivered to the calling user are notional since no assumption can be made about the service at the originating network side.

10 Procedures for interworking with private ISDNs

The procedures as specified in clause 9 shall apply.

11 Interactions with other networks

If a CUG call fails at a gateway to a network that does not support the CUG supplementary service then normal call clearing shall apply.

12 Interactions with other supplementary services

Applicable.

13 Parameter values (timers)

Applicable.

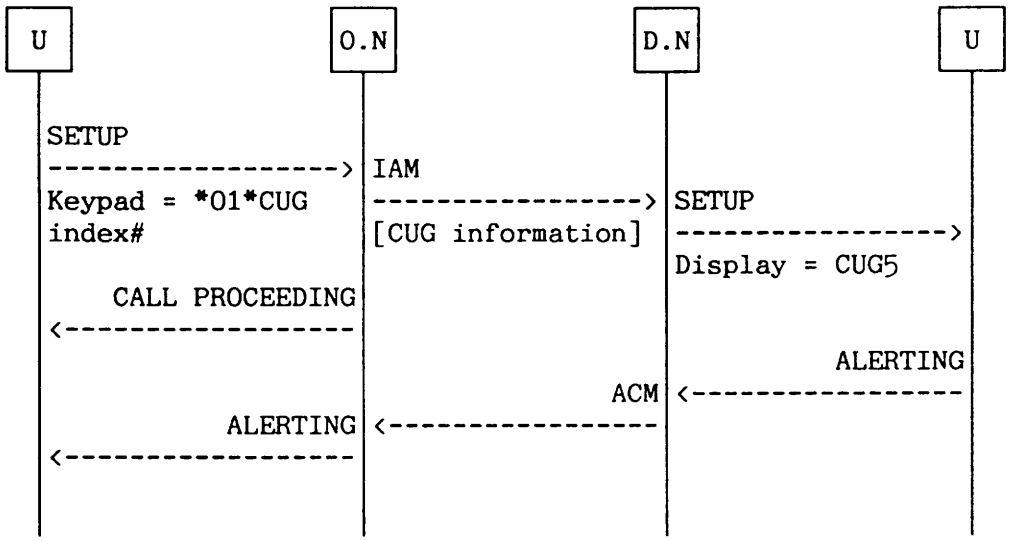
14 Dynamic description (SDL)

SDL diagrams for the keypad procedures for the CUG supplementary service will not be provided.

Annex A (Informative)

Signalling flows

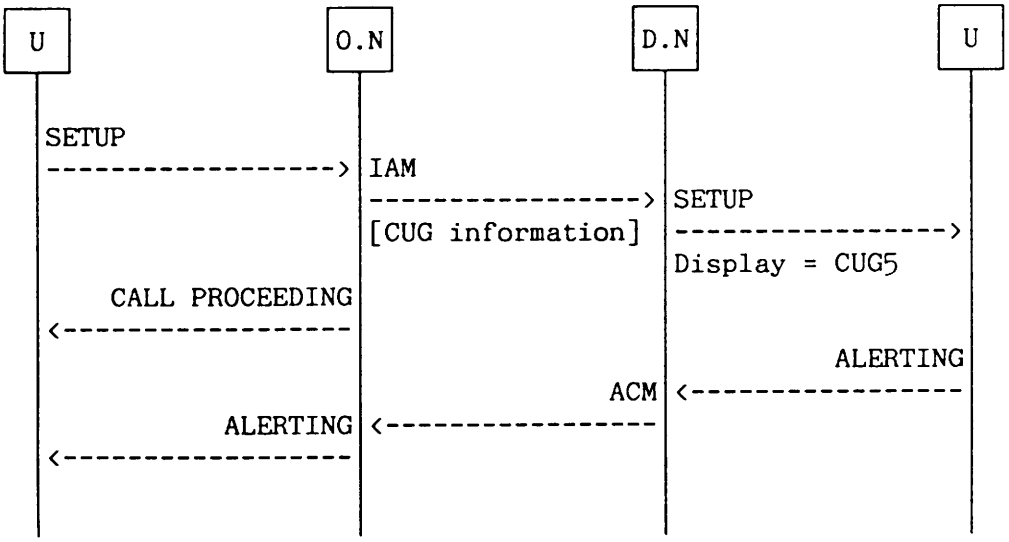
The examples in figures A.1 - A.7 show the messages related to the keypad procedures only and the example in figure A.8 shows the messages related to both the keypad procedures and functional procedures.



O.N: Originating network

D.N: Destination network

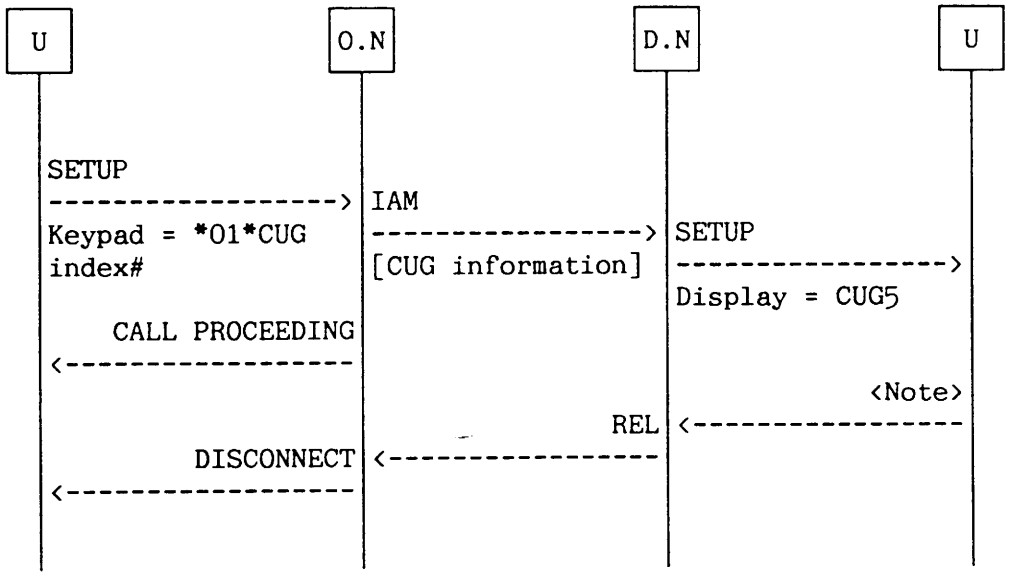
Figure A.1: Call passes both the originating and the destination network side checks successfully (explicit request).



O.N: Originating network

D.N: Destination network

Figure A.2: Call passes both the originating and the destination network side checks successfully (default request).

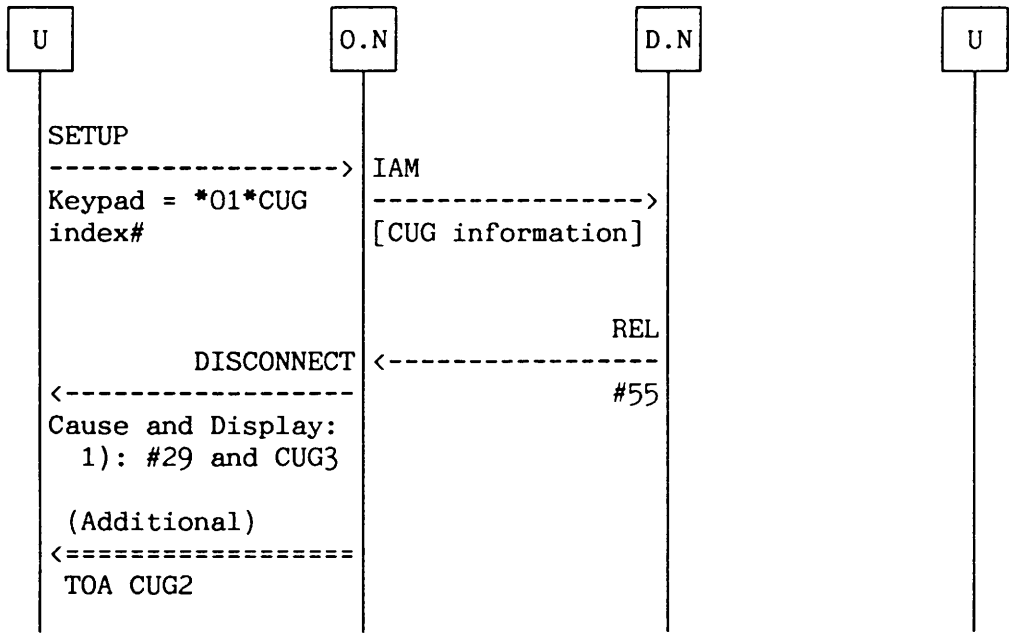


O.N: Originating network

D.N: Destination network

<Note>: DISCONNECT or RELEASE COMPLETE

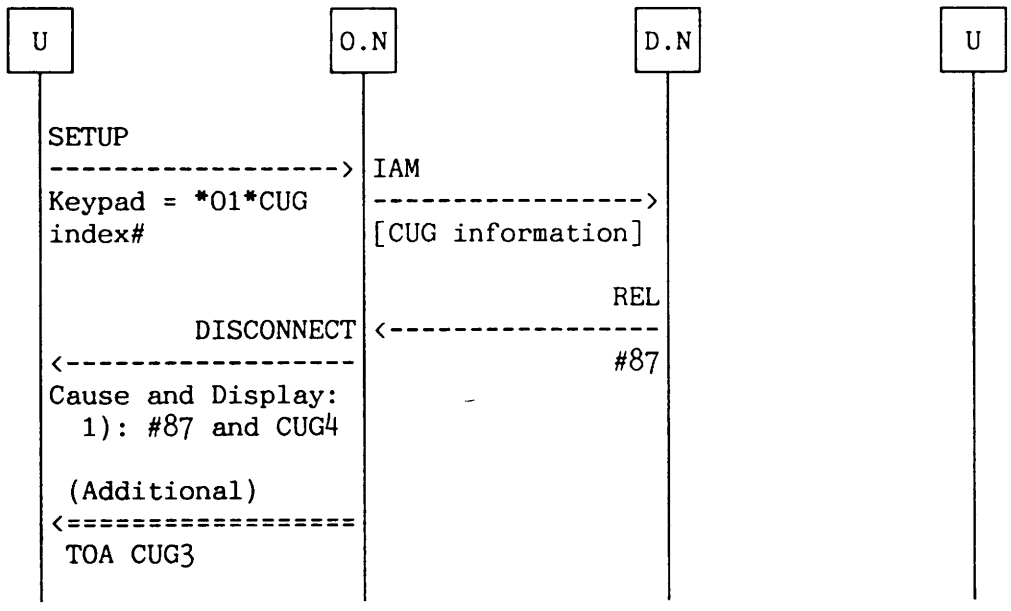
Figure A.3: Call passes both the originating and the destination network side checks but fails on the destination user's side.



O.N: Originating network

D.N: Destination network

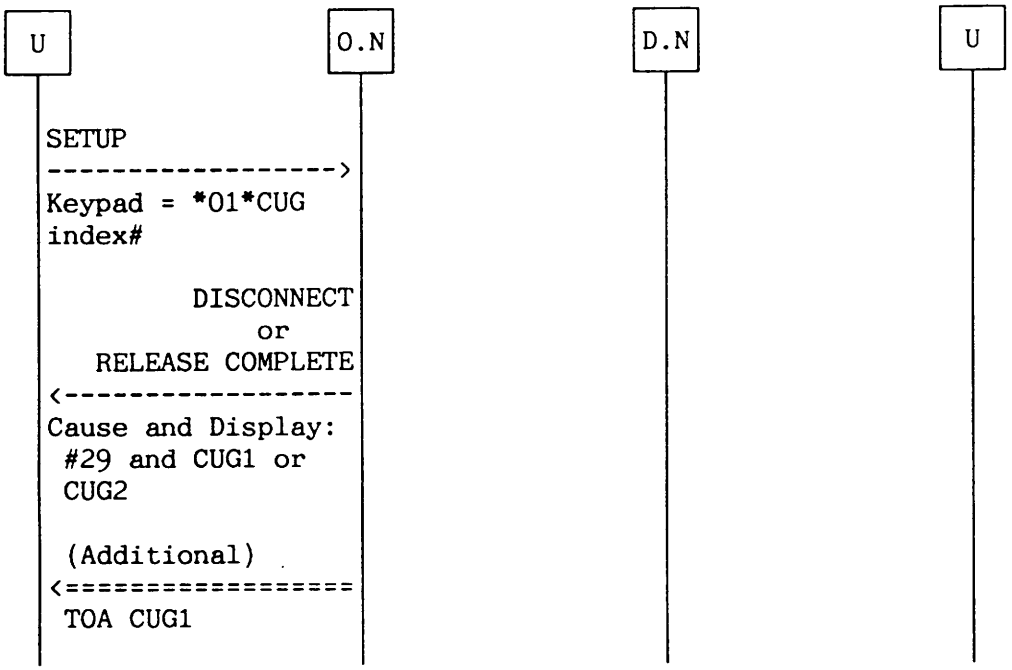
Figure A.4.1: Call fails destination network side checks (explicit request).



O.N: Originating network

D.N: Destination network

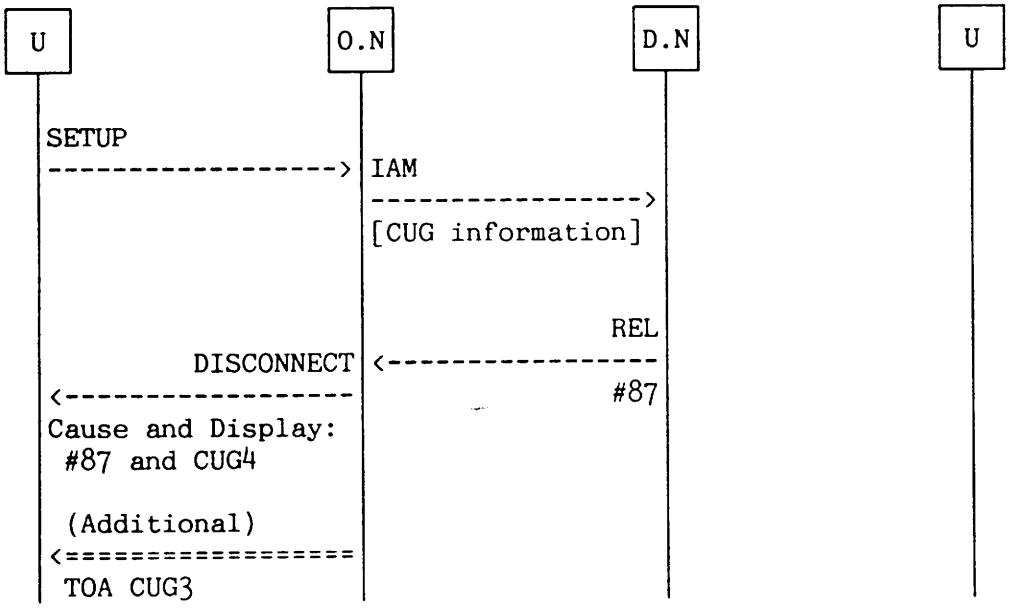
Figure A.4.2: Call fails destination network side checks (explicit request).



O.N: Originating network

D.N: Destination network

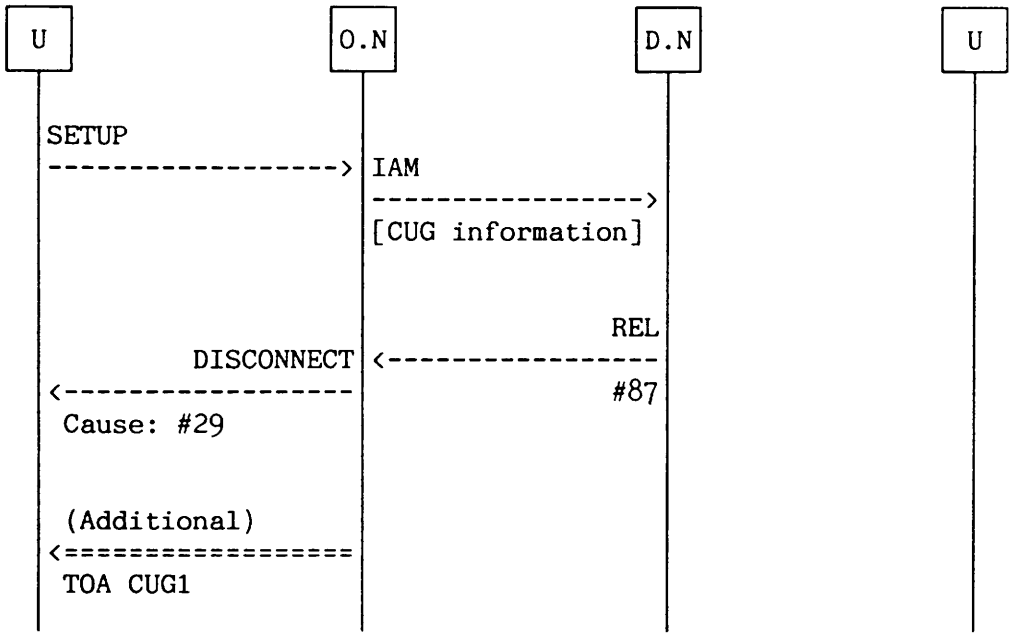
Figure A.5: Call fails originating network side checks (explicit request).



O.N: Originating network

D.N: Destination network

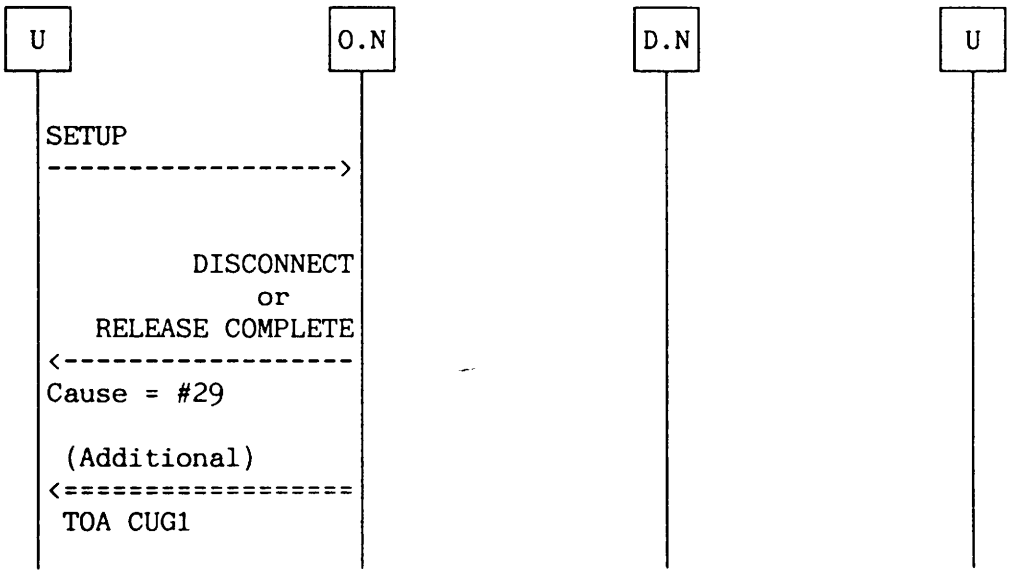
Figure A.6.1: Call fails destination network side checks (default request).



O.N: Originating network

D.N: Destination network

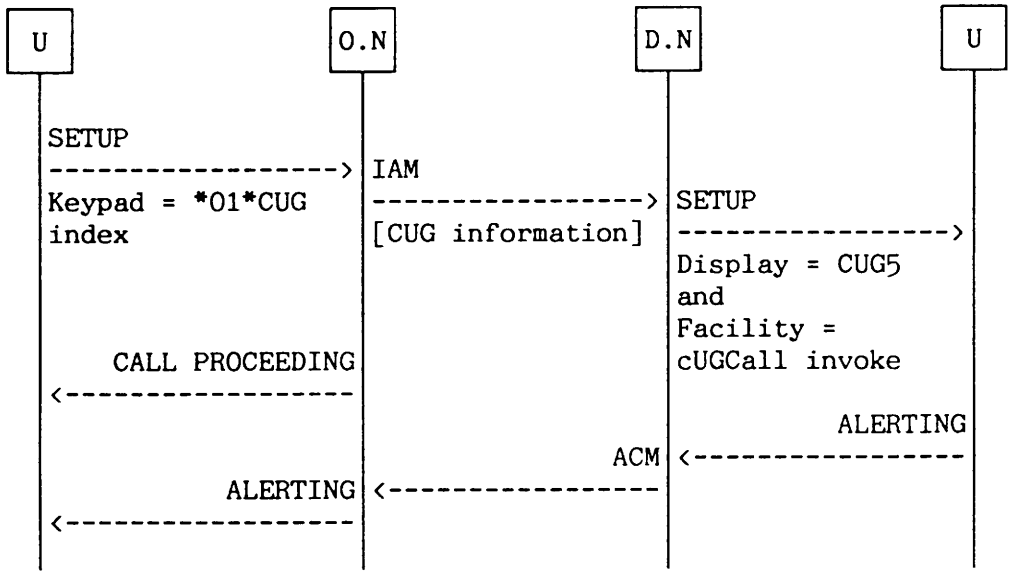
Figure A.6.2: Call fails destination network side checks (default request).



O.N: Originating network

D.N: Destination network

Figure A.7: Call fails originating network side checks (default request).



O.N: Originating network

D.N: Destination network

Figure A.8: Call passes both the originating and the destination network side checks and is successful in the destination user's side using either keypad or functional procedure.

Annex B (informative)

Diagrammatic description of coding requirements

The annexes B.1 and B.2 are not applicable to this application document.

Appendix A Relationships between the ISDN subscriber, the ISDN number, the basic service and the CUGs.

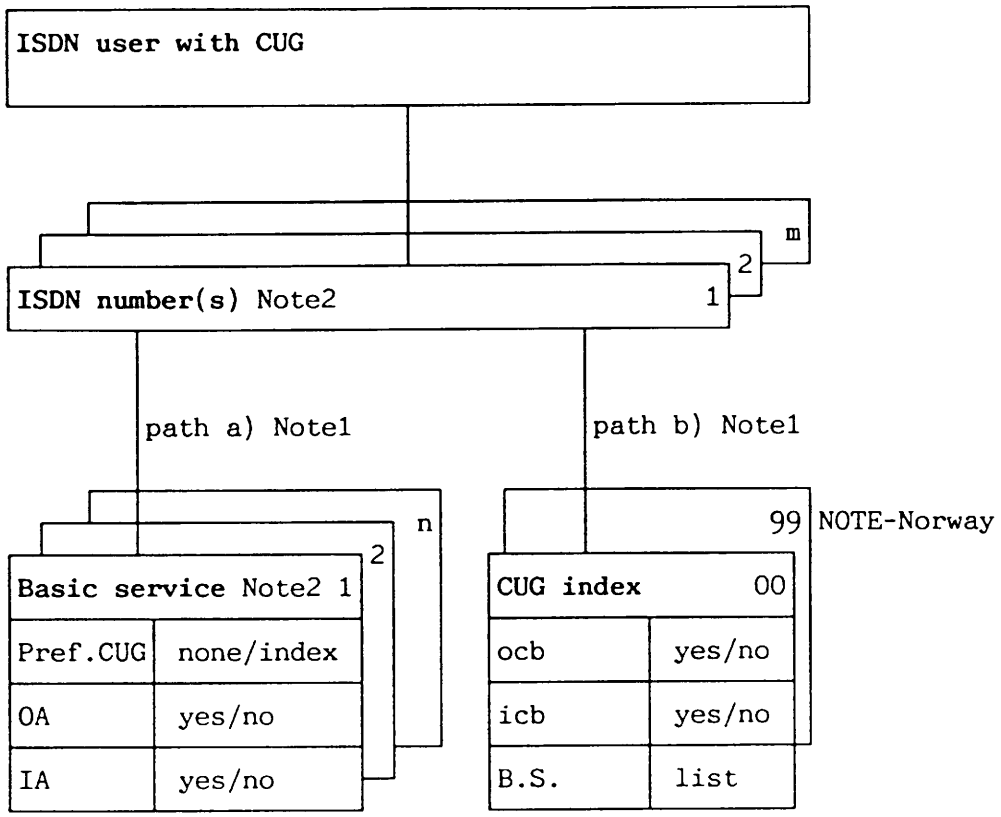


Figure 1. Relationship between the ISDN subscriber, the ISDN number, the basic service and the CUGs.

Pref.CUG: Preferential CUG.
OA: Outgoing access.
IA: Incoming access.
ocb: Outgoing calls barred within the CUG.
icb: Incoming calls barred within the CUG.
B.S.: Basic Service.

Note1: The CUG procedures depend on whether a CUG index is provided by the user or not. If provided, the procedures are in alignment with those of path b), if not with those of path a).

Note2: If there is no subscription to a CUG for a specific combination of an ISDN number and a basic service, then a call request indicating this combination and without a CUG request, shall be treated as a normal call.

NOTE-Norway: CUG index 0 - 999.

NORDTEL

NT/SIG-SPEC-3-C

NORDIC SPECIFICATION

APPLICATION DOCUMENT TO ETSI ETS 300 138 CLOSED USER GROUP SUPPLEMENTARY SERVICE USING KEYPAD PROTOCOL

APPENDIX B

DISPLAY INFORMATION AND TONES AND/OR ANNOUNCEMENTS

Issue 1
Rev: A

ISSUE DATE: 92-06-02

APPENDIX B: DISPLAY INFORMATION AND TONES AND/OR ANNOUNCEMENTS

The specification of the display information in danish wording is given in figure B–1.

Furthermore, the specification of the tones and/or announcement is given in figure B–2. Only tones are applicable to the Closed User Group supplementary service.

Display type	Content in display information element
Display CUG1	Fejl i LBG data <Note1>
Display CUG2	Spærret for LBG–kald <Note1>
Display CUG3	Modtager LBG–spærret <Note1>
Display CUG4	Modtager ikke i LBG <Note1>
Display CUG5	Opkald med LBG=xx <Note1> <Note2>

<Note1>: "LBG" is an abbreviation for the danish word "Lukket Bruger Gruppe".
<Note2>: "xx" is the CUG index (0 – 99).

Figure B–1: Content of the Display information in danish.

TOA type	Content of the tones and/or announcement
TOA CUG1	Special information tone
TOA CUG2	Special information tone
TOA CUG3	Special information tone
TOA CUG4	Special information tone

Figure B–2: Content of the tones and/or announcement.

TO BE PROVIDED

The following INAD-notes are published:

Date	Subject	New version	Changes in contents
930210	Full document	Issue 1	