TELE DANMARK

INAD-3
ISDN NETWORK AND ACCESS DESCRIPTION

Contents:

Title:

Overview document

TELE DANMARK

INAD-3
ISDN NETWORK AND ACCESS DESCRIPTION
Overview Document

Issue: .1

Date: 1-1-1997

Blank page

Contents

Appendices:

A: Application specification to ETSI ISDN Bearer Services - Service description

- A1: ISDN Packet Mode Bearer Service (PMBS), B-channel.
- A2: ISDN Packet Mode Bearer Service (PMBS), D-channel.
- A3: ISDN Circuit Mode Bearer Services

B: Application specification to ETSI ISDN Teleservices - Service description

C: Application specification to ETSI ISDN Supplementary Services - Service description.

D: Application specification to DSS1 - Physical layer

- D1: Basic Access
- D2: Primary Rate Access

E: Application specification to DSS1 - Data link layer

F: Application specification to DSS1 - Network layer - ETSI Bearer Services

- F1: Basic call control
- F2: Support of packet mode terminal equipment by an ISDN

G: Application specification to DSS1 - Network layer - ETSI Teleservices

H: Application specification to DSS1 - Network layer - Generic functional protocol for the support of supplementary services

I: Application specification to DSS1 - Network layer - ETSI Supplementary services

K: Application specification to DSS1 - Network layer - Generic keypad protocol for the support of supplementary services

L: Keypad based supplementary service - stage 3 description.

- L1: Closed User Group (CUG) supplementary service - stage 3 description.
- L2: Diversion (DIV) supplementary service - stage 3 description.
- L3: Malicious Call IDentification (MCID) supplementary service - stage 3 description.
- L4: Advice Of Charge at the end of a call (AOC-E) supplementary service - stage 3 description.
- L5: Line hunting (LH) supplementary service - stage 3 description.

L6: Outgoing Call Barring - User Controlled (OCB-UC) supplementary service - stage 3 description.

M: Guidance requirements to ISDN terminal manufacturers on the implernentation of the Keypad facility protocol and the sending of DTMF for an ISDN terminal

P: INAD-3 Maintenance document

R: Notes to INAD-3

S: Revision history

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.

INAD version 2 was submitted in February 1993 to introduce a number of new services and functions (ISDN phase 2) which were implemented in the network in 1993/1994.

This document is version 3 of the INAD (named INAD-3) and it gives the functional description and the access specifications for Tele Danmark ISDN services to be introduced in the beginning of 1998 (ISDN phase 3).

It should be noted that not all new services will be introduced at the same time as the introduction is planned in two steps. The first step provides the most needed services and is scheduled to the first quarter of 1998. Step two is scheduled to second quarter of 1998.

It should also be noted that INAD-3 reflects the technically available services and functions, and the subscriber's options related to these services and functions. However, due to marketing policy not all services, functions and options may be commercially available.

Furthermore, experiences have shown that when providing ISDN on different types of exchanges in the network, some deviations will be identified 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 nation-wide 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, where available. A basic guide to these standards for the European ISDN can be found in the technical report ETR 076 [0].

1.1 Changes related to INAD version 2

INAD-3 is a complete document, i.e. it does not only contain changes related to version 2. The main changes are the addition of a number of new supplementary services. To increase readability, the following guidance is given:

- For this overview document, the main changes are:
  - Inclusion of the videotelephony and telephony 7 kHz teleservices (section 6 and Appendices B and G)
  - Inclusion of a number of new supplementary services (sections 7 and 8, and Appendices C and I)
- Concerning the Appendices their numbering has been restructured. Except from that, changes have been made to the following Appendices:
  - Appendix A3 is new and contains clarifications to the ETSI defined bearer services stage 1.
  - Appendix B is new and contains clarifications to the ETSI defined teleservices stage 1.
  - Appendix C (former Appendix A) is extended with a number of new supplementary services stage 1. Changes in existing service requirements are explicitly marked.
  - Appendix D1 (former Appendix B) has been updated according to the latest ETSI ETS.
  - Appendix D2 is new and contains clarifications to the PRA layer 1.
  - Appendix E (former Appendix C) has been updated according to the latest ETSI ETS.

- Appendix F1 (former Appendix D) has been updated according to the latest ETSI ETS.
- Appendix G is new and contains clarifications to the ETSI defined teleservices stage 3.
- Appendix H is new and contains clarifications to the ETSI defined generic functional protocol.
- Appendix I (former Appendix E) is extended with a number of new supplementary services stage 3. Changes in existing service requirements are explicitly marked.
- Appendices L2, L3, L4, L5 and L6 are new appendices containing the Keypad facility protocol specification for the Diversion, Malicious Call IDentification, Advice Of Charge, Line Hunting and User Controlled Outgoing Call Barring supplementary services.
- Appendix M is new and contains guidance to terminal manufacturers on the implementation of the Keypad facility protocol in ISDN terminals.

2 Scope and application

INAD-3 describes the network services and specifies the user access to these services in Tele Danmark's public ISDN.

INAD-3 is primarily addressing terminal manufacturers, but may also be used to provide some general information about Tele Danmark's ISDN. However, it is assumed that the reader of this document is familiar with the ISDN concept.

INAD-3 covers the following aspects:

- bearer services, 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 overview document (this document) providing the general descriptions and specifications of the network services and protocols - and a number of appendices attached to this document, providing 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, ITU-T recommendations or Tele Danmark standards are used.

It should be noted that ETSI standards for ISDN services 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 organisation 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, Tele Danmark application documents have been prepared for the stages 1 and 3. These application documents are included as appendices and are referred to in this overview document.

During the lifetime of this document some clarifications and enhancements are foreseen. However, 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:

AOC	Advice Of Charge
ASN.1	Abstract Syntax Notation no. 1
BA	Basic Access
BC	Bearer Capability
CCBS	Completion of Calls to Busy Subscriber
CCITT	Comité Consultatif International Télegraphique et Téléphonique
CD	Call Deflection
CFB	Call Forwarding Busy
CFNR	Call Forwarding No Reply
CFU	Call Forwarding Unconditional
DIV	DIVersion
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
HLC	High Layer Compatibility
HOLD	Call Hold
IBM	International Business Machines Corporation
INAD	ISDN Network and Access Description
IPI	ISDN PC Interface
ISDN	Integrated Services Digital Network
ISPBX	ISDN Private Branch Exchange (PBX)
ITU-T	International Telecommunication Union - Telecommunication Standardization Sector
LAPB	Link Access Procedures Balanced
LAPD	Link Access Procedures on the D-channel
LH	Line Hunting
LLC	Low Layer Compatibility
MCID	Malicious Call IDentification
MHS	Message Handling System
MoU	Memorandum of Understanding
MSN	Multiple Subscriber Number
NA	Network Aspects
NET	Normes Européennes de Télécommunications
NT	Network Termination
O&M	Operation & Maintenance
OCB-F	Outgoing Call Barring Fixed
OCB-UC	Outgoing Call Barring User Controlled
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
SUB	Subadressing
TA	Terminal Adapter
TC	Technical Committee
TH	Trunk Hunting
3-PTY	Three ParTY
TEI	Terminal Endpoint Identifier
TP	Terminal Portability
TR	Technical Report
UDI-TA	Unrestricted Digital Information with Tones and Announcements
UUS	User-to-User Signalling
VC	Virtual Call
VT	Virtual Terminal

References:

[0] ETSI ETR 076 - Integrated Services Digital Network (ISDN); Standards guide

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

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

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

[5] ITU-T Recommendation X.21bis - 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.20bis based Data Terminal Equipments (DTEs) by an ISDN. Synchronous and asynchronous terminal adapter functions.

[7] ITU-T 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] ITU-T 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 teleservice, 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 300 403-1 - 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) supplementary 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 ETS 300 284 - User to User Signalling (UUS) supplementary service. Service description.

[33] ETSI ETS 300 285 - 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 300 403-2 - ISDN user-network interface layer 3 specification for basic call control, SDL diagrams.

[37] ETSI ETS 300 092-1 - Calling Line Identification Presentation (CLIP) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[38] ETSI ETS 300 093-1 - Calling Line Identification Restriction (CLIR) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[39] ETSI ETS 300 061-1 - Subaddressing (SUB) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[40] ETSI ETS 300 055-1 - Terminal protability (TP) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[41] ETSI ETS 300 058-1 - Call Waiting (CW) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[42] ETSI ETS 300 064-1 - Direct Dialling In (DDI) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[43] ETSI ETS 300 052-1 - Multiple Subscriber Number (MSN) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[44] ETSI Draft ETS 300 195-1 - 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] ITU-T 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] ITU-T Recommendation E.164 - Numbering plan for the ISDN era.

[54] ITU-T Recommendation X121 - International numbering plan for public data networks.

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

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

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

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

[64] ITU-T 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 300 196-1 - 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 300 097-1 - Connected Line Identification Presentation (COLP) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[77] ETSI ETS 300 098-1 - Connected Line Identification Restriction (COLR) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[78] ETSI ETS 300 141-1 - Call Hold (HOLD) supplementary service. Digital Subscriber Signalling System No. one (DSS1) protocol.

[79] ETSI TBR3 - Integrated Services Digital Network (ISDN); Attachment requirements for Terminal Equipment to connect to an ISDN using ISDN Basic Access

[80] ETSI TBR4 - Integrated Services Digital Network (ISDN); Attachment requirements for Terminal Equipment to connect to an ISDN using ISDN Primary Rate Access

[81] ETSI TBR8 - Integrated Services Digital Network (ISDN); Telephy 3, 1 kHz teleservice Attachment requirements for handset terminals.

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

[83] ITU-T 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.

[84] ETSI ETS 300 263 - Telephony 7 kHz teleservice, Service description

[85] ETSI ETS 300 264 - Videotelephony teleservice, Service description

[86] ETSI ETS 300 200 - Call Forwarding Unconditional (CFU) supplementary service. Service description.

[87] ETSI ETS 300 199 - Call Forwarding Busy (CFB) supplementary service. Service description.

[88] ETSI ETS 300 201 - Call Forwarding No Reply (CFNR) supplementary service. Service description.

[89] ETSI ETS 300 203 - Diversion (DIV) supplementary service. Functional capabilities and information flows.

[90] ETSI ETS 300 357 - Completion of Calls to Busy Subscriber (CCBS) supplementary service. Service description.

[91] ETSI ETS 300 358 - Completion of Calls to Busy Subscriber (CCBS) supplementary service. Functional capabilities and information flows.

[92] ETSI ETS 300 186 - Three Party Service (3PTY) supplementary service. Service description.

[93] ETSI ETS 300 187 - Three Party Service (3PTY) supplementary service. Functional capabilities and information flows.

[94] ETSI ETS 300 178 - Advice Of Charge, Charging information at call set-up time (AOC-S) supplementary service. Service description.

[95] ETSI ETS 300 180 - Advice Of Charge, Charging information at the end of a call (AOC-E) supplementary service. Service description.

[96] ETSI ETS 300 181 - Advice Of Charge (AOC) supplementary service. Functional capabilities and information flows.

[97] ETSI ETS 300 128 - Malicious Call IDentification (MCID) supplementary service. Service description.

[98] ETSI ETS 300 129 - Malicious Call IDentification (MCID) supplementary service. Functional capabilities and information flows.

[99] ETSI DE/NA-10006 - Fixed Outgoing Call Barring (OCB-F) supplementary service. Service description.

[100] ETSI DE/NA-10022 - User Controlled Outgoing Call Barring (OCB-UC) supplementary service. Service description.

[101] ETSI DE/NA-10003 - Line Hunting (LH) supplementary service. Service description.

[102] ETSI DE/NA-10028 - Trunk Hunting (TH) supplementary service. Service description.

[103] ETSI ETS 300 138-1 - Closed User Group (CUG) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[104] ETSI ETS 300 207-1 - Diversion (DIV) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[105] ETSI ETS 300 359-1 - Completion of Calls to Busy Subscriber (CCBS) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[106] ETSI ETS 300 188-1 - Three Party Seervice (3PTY) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[107] ETSI ETS 300 182-1 - Advice Of Charge (AOC) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[108] ETSI ETS 300 130-1 - Malicious Call IDentification (MCID) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[109] ETSI ETS 300 286-1 - User to User Signalling (UUS) supplementary service. Digital subscriber signalling one (DSS1) protocol.

[110] CENELEC EN 500098-1 - Customer premises cabling for information technology, Part 1: ISDN basic access.

[111] TR 92 021 rev. A, January 1995 - Technical Regulation; Terminal equipment for connection to ISDN Bassic Access.

[112] TR 92 022 rev. A, January 1995 - Technical Regulation; Terminal equipment for connection to ISDN Primary Rate Access.

[113] TR 92 023 rev. B, January 1995 - Technical Regulation; Terminal equipment intended for the 3.1 kHz telephony teleservice for connection to ISDN Bassic Access.

4 Network overview

Customers will be connected to the network exchanges directly or, in the case of too long distances to the exchange, by means of adequate multiplexing or subscriber line equipment.

When ISDN phase 3 is available in the network, then, depending on the actual marketing strategy, customers will be provided with the following set of services:

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
- Telephony, 7 kHz
- Videotelephony
- 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)
- Subadressing (SUB)
- Terminal Portability (TP)
- Call Waiting (CW)
- Direct Dialling In (DDI)
- Multiple Subscriber Number (MSN)
- User-to-User Signalling: Service 1 implicit, Service 1 explicit, Service 2 and Service 3 (UUS)
- Connected Line Identification Presentation/Restriction (COLP/R)
- Call Hold (HOLD)
- Closed User Group (CUG)
- Diversion: Call Forwarding Unconditional (CFU), Call Forwarding Busy (CFB), Call Forwarding on No Reply (CFNR) and Call Deflection (CD)
- Completion of Calls to Busy Subscriber (CCBS)
- Three Party Service (3-PTY)
- Advice Of Charge: charging information at call set-up time (AOC-S) and charging information at the end of a call (AOC-E)
- Malicious Call IDentification (MCID)
- Outgoing Call Barring - Fixed (OCB-F)
- Outgoing Call Barring - User Controlled (OCB-UC)
- Line Hunting (LH)
- Trunk Hunting (TH)

Supplementary services, Tele Danmark specified:

- Priority
- Interception

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 configuration. 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 existing 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 Tele Danmark's 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 basically or by use of plug-in boards. These terminals may use standardised protocols as indicated in ii) below or user specific protocol for communication between users.

ii) Terminal adapters (TA) providing an interface between already existing V and X type terminals and the S/T reference point.
TAs provide different kinds of interfaces at the R reference point and use a standardised way of transferring 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, and for ordinary telephone equipment. Attention should be drawn to the fact that the analogue interface does not give access to PSTN services but to ISDN service, and that not all ISDN supplementary services may be operated via a TA-a/b.

   - TA-V.110 [2], which supports DTEs with different types of V-series interfaces, asynchronous as well as synchronous types. The TAs functionality follows ITU-T Rec. V.110 [2] which specifies the protocol mapping and rate adaptation 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 ITU-T 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.21bis [4] and asynchronous X.20 bis [62] interfaces according to the ETSI ETS 300 103 [6] (ITU-T Rec. X.30 [63]). Only the B-channel can be used 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] (ITU-T 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 in general use the same services as the terminals connected to the ISDN.

Note: In the contex of this document the use of ISPBX also covers routers, multiplexers and similar equipment.

The different types of terminals described in item i) and ii) may coexist at the same S/T reference point with an upper limit of 8 terminals (see 8.2.1.1).

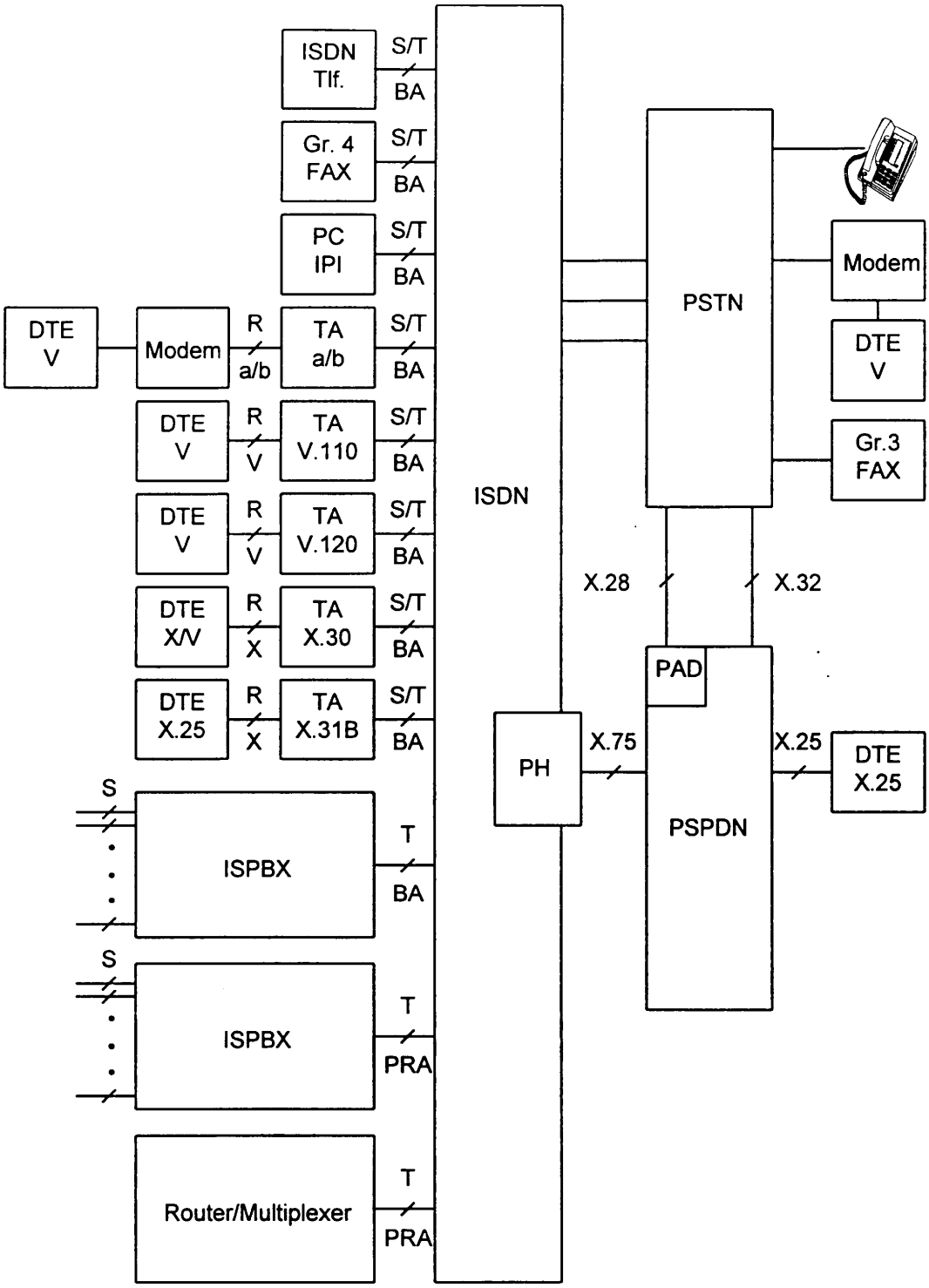


Figure 1. Network Overview

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 ITU-T recommendation I.210 [9]. Bearer services are defined by means of different characteristics related to the transmission medium capability used.

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

5.1 Circuit Mode Bearer Services

The following circuit mode bearer services are available:

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 corrupting the bit pattern. It is used for data communication services within ISDN.

ii) 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 cancellation 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 to the called user when a call is received from PSTN. For calls in the direction ISDN to PSTN, the calling user may either request this bearer service or the "speech" bearer service.

The network options given in the stage 1 descriptions are clarified in Appendix A3, which is an application document to these ETSs. This implies that complete knowledge to a bearer service can only be obtained by considering both the relevant ETSs and the clarifications in Appendix A3.

In addition to the bearer services mentioned above, the network will support the 64 kbit/s unrestricted with tones/announcements (UDI-TA) bearer capability. This bearer capability supports the telephony 7 kHz and videotelephony teleservices.

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.

5.1.2 Establishment of communication

For 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 protocols to be used to establish and release a bearer service connection (basic call) is described in section 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 contents of the Bearer capability information element to be accepted by the network are 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. The following packet mode bearer services are provided:

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

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

The characteristics are detailed in section 5.2.2.

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 description 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 PVC. 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 A1 and Appendix A2, 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 capability for communication by means of terminal and network functions and possibly functions provided by dedicated networks.

The network supports teleservices in different ways i.e. by:

- providing an appropriate bearer service,
- conveying indicators end-to-end between users,
- providing special functions for a dedicated teleservice or
- providing 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 ETSI and these are explicitly indicated in the list.

• Telephony, 3,1 kHz	ETS 300 111 [14]	1)
• Telephony, 7 kHz	ETS 300 263 [84]	1)
• Videotelephony	ETS 300 264 [85]	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 section 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.

Concerning the teleservices 7 kHz telephony and videotelephony, the network options given in the stage 1 descriptions are clarified in Appendix B, which is an application document to these ETSs. This implies that complete knowledge to a teleservice can only be obtained by considering both the relevant ETSs and the clarifications in Appendix B. Other teleservices are not considered in details on a Tele Danmark level.

6.1.2 Tele Danmark defined "teleservices"

In addition to the above-mentioned ETSI teleservices users may indicate "national teleservices" by use of the high layer indicator as described in section 6.2.

These "teleservices" are only supported by the basic bearer services and interworking and the conveyance of high layer indicators within ISDNs.

The following list shows the "national teleservices" defined within Tele Danmark's 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 F1.

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 section 6.1.1. If not, the HLC will be discarded and the call handling proceed; for details, see ETS 300 403-1 [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 control 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 control of supplementary services 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. A supplementary service may either be offered on a subscription basis or be part of the basic ISDN subscription, depending on the actual marketing policy.

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

7.1 Supplementary services for circuit mode bearer services

7.1.1 ETSI supplementary services

The network will provide a set of supplementary services according to the stage 1 ETSs (service description) and the stage 2 ETSs (functional capabilities and information flows).

The network options given in the stage 1 descriptions are clarified in Appendix C, which is an application document to these ETSs. This implies that complete knowledge to a supplementary service can only be obtained by considering both the relevant ETSs and the clarifications in Appendix C.

- 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 is related to the called user.

  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 subadress, if available, are presented to the called user.

  This service is related to the calling user.

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

- Subadressing (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 is related to the called user .

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

- Terminal Portability (TP).

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

  This service is related to the called or calling user.

  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 is related to 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 is related to the called user.

  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 is related to the called user.

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

- User to user signalling (UUS).

  The UUS supplementary service consists of three types of services:

  UUS service 1 (UUS1): During establishment and clearing of a call, users may exchange user-to-user information included in signalling messages used for call control. UUS1 can be requested either implicitly (by the presence of user-to-user information) or explicitly (by means of a specific request). 128 octets can, as a maximum, be included in each signalling message.

  UUS service 2 (UUS2): In the alerting phase of a call (while user B is being alerted) user A can send two messages containing 128 octets each to user B, and visa versa.

  UUS service 3 (UUS3): During an established call between user A and user B, user A and B can send user-to-user information between each other. The maximum average throughput is limited to eight messages per ten seconds, each containing 128 octets as a maximum.

  This service is related to the calling user and, in the case of UUS service 3 activation during the active call, also to the called user.

  Stage 1: ETS 300 284 [32]
  Stage 2: ETS 300 285 [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 is related to the calling user.

  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 presented to the calling user.

  This service is related to the connected user.

  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 is related to the called or calling user.

  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 terminate 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 is related 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]

- Diversion (DIV)

  The DIV supplementary service consists of three types of services:

  Call Forwarding Unconditional (CFU): a user can activate CFU and as part of this activation indicate to the network to whom incoming calls shall be forwarded. When CFU is activated, all incoming calls to the user will be forwarded unconditionally.

  Call Forwarding Busy (CFB): a user can activate CFB and as part of this activation indicate to the network to whom incoming calls shall be forwarded. When CFB is activated, all incoming calls to the user will be forwarded provided the user is busy.

  Call Forwarding Unconditional (CFNR): a user can activate CFNR and as part of this activation indicate to the network to whom incoming calls shall be forwarded. When CFNR is activated, all incoming calls to the user will be forwarded provided the user does not answer the incoming call within a certain time (typical 15 seconds). If the incoming call is answered before this time expires, the call is established as normal.

  Call Deflection (CD): when a user receives an incoming call he can decide to forward (deflect) this call to another destination by indicating the destination address to the network.

  For all the three types of diversion services apply that they can be activated per MSN number and per basic service. As an example, this impiies that a user can get his incoming telephony call forwarded while incoming data calls will be received as usual.

  If an ISPBX is connected to the public ISDN it can make use of the partial rerouting function. If the ISPBX decides that an incoming call from the public ISDN shall be forwarded to another destination located in the public ISDN, an indication containing the number of this destination can be sent to the public ISDN. The public ISDN will then reroute the incoming call to the indicated destination. Thereby, a waste of channels on the access is avoided.

  This service is related to the called user.

  Stage 1 for CFU: ETS 300 200 [86]
  Stage 1 for CFB: ETS 300 199 [87]
  Stage 1 for CFNR: ETS 300 201 [88]
  Stage 2: ETS 300 203 [89]

- Completion of Calls to Busy Subscriber (CCBS)

  If a calling user makes a call, and the called user is busy, the calling user can activate the CCBS supplementary service. The network will start monitoring the called user. When the called user becomes idle again, the network will alert the calling user who can then decide either to make a new call attempt or simply ignore the alert.

  If an ISPBX has implemented the ETSI CCBS supplementary service, this service can be used by calling users and towards called users connected to the ISPBX extension lines.

This service is related to the calling user.

Stage 1: ETS 300 357 [90]
Stage 2: ETS 300 358 [91]

- Three Party Service (3-PTY)

If a user already has established a call to another user, he can put this call on hold and make a new call to a third user by making use of the HOLD supplementary service. By invoking the 3-PTY supplementary service the user can join all three users together in a three-way conference. During this conference, the user can decide to "isolate" either of the other users in order to talk privately with the other user.

This service is related to the calling or called user.

Stage 1: ETS 300 186 [92]
Stage 2: ETS 300 187 [93]

- Advice Of Charge (AOC)

The AOC supplementary service consists of two types of services:

Charging information at call set-up time (AOC-S): When a calling user makes an outgoing call and at the same time requests AOC-S, the charging information for this particular call will be sent to the calling user no later than when the called user answers the call. The charging information provides the calling user with the charge per minute for the duration of the call and, in addition, the call attempt charge and the charge for requested supplementary services. If the charge changes during the call, the calling user will be informed.

Charging information at the end of a call (AOC-E): When a calling user terminates a call and provided the AOC-E supplementary service has been requested, the calling user will receive information about the total charge for the call.

This service is related to the calling user.

Stage 1 for AOC-S: ETS 300 178 [94]
Stage 1 for AOC-E: ETS 300 180 [95]
Stage 2: ETS 300 181 [96]

- Malicious Call IDentification (MCID)

If a called user for some reason wants to register specific incoming calls in the network by logging the calling party number of the incoming call, the user can be provided with the MCID supplementary service. An example is if the called user is harassed by calling users that restrict the calling party number conveyance to the called user. The MCID supplementary service cannot be provided to user by normal subscription but requires permission from the authorities.

This service is related to the called user.

Stage 1: ETS 300 128 [97]
Stage 2: ETS 300 129 [98]

- Outgoing Call Barring - Fixed (OCB-F)

This service makes it possible for the calling user to prevent outgoing calls to certain destinations. The user is able to subscribe to different barring categories, e.g. barring of international calls or barring of calls outside a specific area etc. The barring categories are designed by the network operator and the selection of a barring category is managed by the network operator at subscription time, i.e. the user cannot select the barring category by means of user-network signalling.

This service is related to the calling user.

Stage 1: DE/NA-10006 [99]
Stage 2: Not applicable.

- Outgoing Call Barring - User Controlled (OCB-UC)

  OCB-UC has the same service contents as OCB-F except that the barring categories can be selected by the user by means of signalling.

  This service is related to the calling user.

  Stage 1: DE/NA-10022 [100]
  Stage 2: Not applicable

- Line Hunting (LH)

  With this supplementary service, a number of basic accesses (hunt group) can be assigned to one ISDN-number (Hunt group number). When an incoming call to a Hunt group number arrives, the network will select an idle channel among the accesses and provide the incoming call to the user on that channel. A channel can be selected using three different methods, sequential hunting, uniform hunting and cyclic hunting. The user can withdraw/insert individual accesses from/to the hunt group by means of signalling procedures. This service is designed for hunting among a number of terminals connected to basic accesses (point-to-mulitipoint procedures).

  This service is related to the called user.

  Stage 1: DE/NA-10003 [101]
  Stage 2: Not applicable

- Trunk Hunting (TH)

  With this supplementary service, a number of basic accesses and/or primary rate accesses(hunt group) can be assigned to one ISDN-number (Hunt group number) with or without a designated DDI number group. When an incoming call to a Hunt group number/DDI number arrives, the network will select an idle channel among the accesses and provide the incoming call to the user on that channel. A channel can be selected using three different methods, sequential hunting, uniform hunting and cyclic hunting. This service is designed for hunting among a number of trunks connected to an ISPBX (point-to-point procedures).

  Note: Although Appendix C indicates that an access in a trunk hunt group can be withdrawn, there are currently no signalling procedures defined by ETSI or Tele Danmark for activation of withdrawal.

  This service is related to the called user.

  Stage 1: DE/NA-10028 [102]
  Stage 2: Not applicable

7.1.2 Tele Danmark supplementary services

The following supplementary services are not specified by ETSI, but are provided according to Tele Danmark standards. They can be used by ordinary ISDN terminals as no specific user-network signalling exists 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 teleservices. This service is related 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 is related to the calling user on a subscription basis.

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

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 subscribed 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. activated 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 Diversion supplementary service 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
- Unrestricted digital information with tones and announcements
- Telephony 3,1 kHz
- Telephony 7 kHz
- 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.

This method is used for e.g. the Diversion supplementary service.

- 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 information	Unrestricted digital inf. with tones/announce	other
Telephony	telephony 3,1 kHz	audio 3,1 kHz	unrestricted digital information	telephony 7 kHz	Note 1
Facsimile G 2/3	speech	telefax group 2/3	unrestricted digital information	unrestricted digital inf. with tones/announce	Note 1
Facsimile G4 class 1	speech	audio 3,1 kHz	telefax G4 class 1	unrestricted digital inf. with tones/announce	Note 1
Teletex basic mode	speech	audio 3,1 kHz	teletex	unrestricted digital inf. with tones/announce	Note 1
Videotex	speech	audio 3,1 kHz	videotex syntax based	unrestricted digital inf. with tones/announce	Note 1
Videotelephony	speech	audio 3,1 kHz	videotelephony Note 2	videotelephony Note 3	Note 1
Other	speech	audio 3,1 kHz	unrestricted digital information	unrestricted digital inf. with tones/announce	Note 1

Table 1: Basic service associations

Note 1: The use of other bearer capabilities will be rejected.

Note 2: Used for the second connection of a videotelephony call

Note 3: Used for the first connection of a videotelephony call

7.2 Supplementary services for packet mode bearer services

Generally, the packet mode bearer services shall not use the supplementary services described in section 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 subscribes 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 A1 and Appendix A2 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 section 8.3.

8.1 Configuration

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

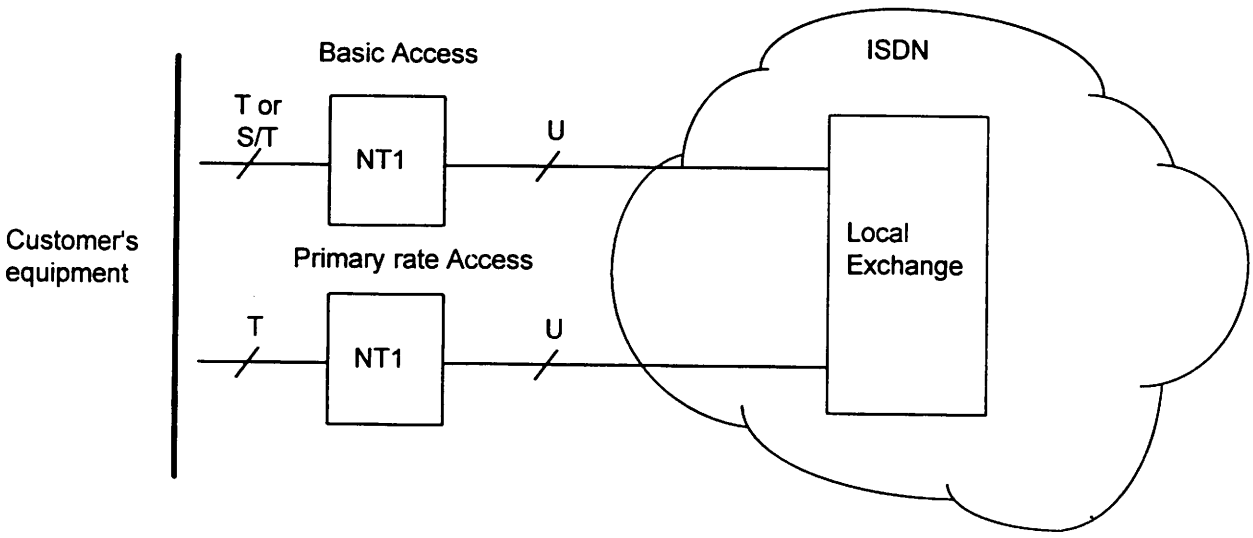


Figure 2: Interface configuration

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 network will provide the following subscription options (see table 2) to a user subscribing to ISDN.

	User type		
	Non-private network (S/T reference point)		Private network (T reference point)
	Configuration		Configuration
	point-to-multipoint	point-to-point	point-to-point
Basic access	A	B	D
Primary rate access	Not applicable	C	E

Table 2: Subscripton options

A) Subscription option A implies access to a basic access at the coincident S/T reference point with DSS1 procedures according to the point-to-multipoint procedures described in ETS 300 403-1 [18] for basic call and in Clause 9 for the relevant supplementary service ETSs;

B) Subscription option B implies access to a basic access at the coincident S/T reference point with DSS1 procedures according to the point-to-point procedures described in ETS 300 403-1 [18] for basic call and in Clause 9 for the relevant supplementary service ETSs;

C) Subscription option C implies access to a primary rate access at the coincident S/T reference point with DSS1 procedures according to the point-to-point procedures described in ETS 300 403-1 [18] for basic call and in Clause 9 for the relevant supplementary service ETSs;

D) Subscription option D implies access to a basic access at the T reference point with DSS1 procedures according to the point-to-point procedures described in ETS 300 403-1 [18] for basic call and in Clause 10 for the relevant supplementary service ETSs;

E) Subscription option E implies access to a primary rate access at the T reference point with DSS1 procedures according to the point-to-point procedures described in ETS 300 403-1 [18] for basic call and in Clause 10 for the relevant supplementary service ETSs.

In addition, for each individual primary rate access a subscription parameter "m" will be available to indicate the number of accessible B-channels for that interface. When the number of B-channels in use reaches the value "m", the network will consider "no channels available" at that interface.

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 will be able to connect terminals on a short passive bus, an extended bus or a point-to-point wiring configuration.

The standard ETS 300 012 [34] applies.

The complete layer 1 specification is given in Appendix D1 which is an application specification to ETS 300 012 [34].

Concerning the pratical details for installation of the S-bus, it is recommended to follow EN 50098-1 [110].

8.2.1.2 DSS1 Link layer (layer 2)

The standard ETS 300 125 [35] will apply.

The complete layer 2 specification is given in Appendix E 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 F2 which is an application specification to ETS 300 007.

8.2.1.3 DSS1 Network layer (layer 3)

The layer 3 protocol will be able to handle point-to-multipoint procedures applicable to terminals connected to a passive (the coincident S/T reference point).

Furthermore, the layer 3 protocol will 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 Basic call for circuit mode services

The standards ETS 300 403-1 [18] and ETS 300 403-2 [36] shall apply concerning basic call handling for the defined bearer and teleservices. The complete layer 3 specification is given in Appendix F1, which is an application specification to ETS 300 403-1 [18].

8.2.1.3.2 ETSI supplementary services applicable to circuit mode services

The protocols used for handling of supplementary services are based on two different principles:

a) the functional ASN.1 based signalling procedures which are fully specified by ETSI. The generic specification for these procedures can be found in ETS 300 196-1 [74] which is clarified in Appendix H. The protocol requirements for the individual supplementary services are given in the individual ETSI stage 3 descriptions to which the list of supplementary services below is referring. Appendix I is an application specification to these ETSI stage 3 descriptions;

b) the Keypad facility protocol which is a stimulus based protocol. Some basic procedures are defined by ETSI in ETS 300 122 [75] and these procedures are clarified from a network perspective in Appendix K. However, from a terminal manufacturer's perspective attention should be paid to Appendix M which gives guidance on how an ISDN terminal should handle the Keypad facility protocol (and the sending of DTMF) to match present and future Keypad facility protocol based supplementary services. The Keypad facility protocol for the individual supplementary services is defined on a Tele Danmark basis as no ETSI standards apply. These Tele Danmark specifications can be found in Appendix L.

Some supplementary services are implemented using functional procedures, some are implemented using the Keypad facility protocol and some are provided by means of both procedures simultaneously. This is explicitly indicated in the list of supplementary services below.

The supplementary services and the associated specifications for the stage 3 protocol are as follows:

- Calling Line Identification Presentation (CLIP).

  ETSI functional stage 3 protocol: ETS 300 092-1 [37]

- Calling Line Identification Restriction (CLIR).

  ETSI functional stage 3 protocol: ETS 300 093-1 [38]

- Subaddressing (SUB).

  ETSI functional stage 3 protocol: ETS 300 061-1 [39]

- Terminal Portability (TP).

  ETSI functional stage 3 protocol: ETS 300 055-1 [40].

- Call Waiting (CW).

  ETSI functional stage 3 protocol: ETS 300 058-1 [41]

- Direct Dialling In (DDI).

  ETSI functional stage 3 protocol: ETS 300 064-1 [42]

- Multiple Subscriber Number (MSN).

  ETSI functional stage 3 protocol: ETS 300 052-1 [43].

- User to User Signalling (UUS).

  ETSI functional stage 3 protocol: ETS 300 286-1 [109].

- Connected Line Identification Presentation (COLP).

  ETSI functional stage 3 protocol: ETS 300 097-1 [76].

- Connected Line Identification Restriction (COLR).

  ETSI functional stage 3 protocol: ETS 300 098-1 [77].

- Call Hold (HOLD).

  ETSI functional stage 3 protocol: ETS 300 141-1 [78].

- Closed User Group (CUG).

  ETSI functional stage 3 protocol: ETS 300 138-1 [103]
  Tele Danmark specified Keypad facility protocol: Appendix L1

- Diversion (DIV)

  ETSI functional stage 3 protocol: ETS 300 207-1 [104]
  Tele Danmark specified Keypad facility protocol: Appendix L2

- Completion of Calls to Busy Subscriber (CCBS)

  ETSI functional stage 3 protocol: ETS 300 359-1 [105]

- Three Party Service (3-PTY)

  ETSI functional stage 3 protocol: ETS 300 188-1 [106]

- Advice Of Charge (AOC)

  ETSI functional stage 3 protocol: ETS 300 182-1 [107]
  Tele Danmark specified Keypad facility protocol: Appendix L4

- Malicious Call IDentification (MCID)

  ETSI functional stage 3 protocol: ETS 300 130-1 [108]
  Tele Danmark specified Keypad facility protocol: Appendix L3

- Outgoing Call Barring - Fixed (OCB-F)

  ETSI functional stage 3 protocol: As the OCB-F supplementary service is not user controlled, stage 3 does not exist for this supplementary service.

- Outgoing Call Barring - User Controlled (OCB-UC)

  Tele Danmark specified Keypad facility protocol: Appendix L6

- Line Hunting (LH)

  Tele Danmark specified Keypad facility protocol: Appendix L5

- Trunk Hunting (TH)

  Stage 3: As the TH supplementary service is not user controlled, stage 3 does not exist for this supplementary service.

- Interaction between supplementary services.

  Stage 3: ETS 300 195-1 [44].

8.2.1.3.3 Tele Danmark supplementary services applicable to circuit mode services

- Interception Service

  No impact on the DSS1 protocol.

- Priority

  No impact on the DSS1 protocol.

8.2.1.3.4 Basic call for packet mode services

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 F2 which is an application specification to ETS 300 007, Case B.

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:

   The following characteristics apply for the VC service 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 (X121) 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 functionality.

The following characteristics apply for the PVC service on the B-channel:

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-channels 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 calls, i.e. all incoming VC calls will be offered on the already established B-channel.

ii) Packet switched calls on the D-channel:

The following characteristics apply for the VC service 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 recognised 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 functionality.

The following characteristics apply for the PVC service on the D-channel:

A logical D-channel link shall always be established between the user and the network before a PVC can be used for data transfer. 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 support VCs together with PVCs. In this case, the "no notification class" will apply for incoming VC calls.

8.2.1.3.5 Supplementary services applicable to packet mode services

The protocol requirements for supplementary services (user facilities are given in ITU-T 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.

The complete layer 1 specification is given in Appendix D2 which is an application specification to ETS 300 011 [45].

8.2.2.2 DSS1 Link layer (layer 2)

The same specifications as for section 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 section 8.2.1.3 apply.

Basic call:

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

ETSI Supplementary services:

The same specifications as for section 8.2.1.3.2 apply.

Tele Danmark supplementary services:

The same specifications as for section 8.2.1.3.3 apply.

8.3 Approval requirements

According to the Executive Order No. 737 on Telecommunications Terminal Equipment issued 13. August 1994 amended by Executive Order No. 664 of 3. August 1995 - which implements the European Council Directive 91/263/EEC in Denmark, all Telecommunications terminal equipment for connection to the public telecommunications network have to be approved by a Notified Body following one of three approval procedures:

- Type-Examination followed by Conformity to Type.
- Type-Examination followed by Production Quality Assurance.
- Full Quality Assurance.

The Administrative Approval is granted on the condition that the equipment is marked with information on manufacturer and/or supplier responsible for placing it on the market, type designation, batch and/or serial number and the CE marking in accordance with section 10, in the Executive Order No. 737.

ISDN terminal equipment covered by this Executive Order shall comply with the common technical regulations (CTRs) CTR3 (Basic Access), CTR4 (Primary Rate Access) and CTR8 (Telephony 3,1 kHz teleservice). The CTR has a reference to the harmonised standard applicable.

8.3.1 Approval requirements for ISDN basic access

For ISDN basic access, the Danish Technical Regulations TR 92 021 rev. A, January 1995 [111] refer directly to the CTR3 issued by the Commission. The harmonised standard referred to is TBR3, November 1995 [79].

8.3.2 Approval requirements for ISDN primary rate access

For ISDN primary rate access, the Danish Technical Regulations TR 92 022 rev. A, January 1995 [112] refer directly to the CTR4 issued by the Commission. The harmonised standard referred to is TBR4, November 1995 [80].

8.3.3 Approval requirements for ISDN telephony handset

For ISDN telephony handset terminals (3,1 kHz telephony), the Danish Technical Regulations TR 92 023 rev. B, January 1995 [113] refer directly to the CTR8 issued by the Commission. The harmonised standard referred to is TBR8, November 1995 [81].

8.3.4 An updated Common Technical Regulation (CTR) status report

INTERNET location http://www.etsi.fr/ecs/current.htm contains information concerning the status of CTRs and the Technical Basis for Regulation (TBR) - which holds the technical content of the CTR.

In practice, a CTR consists of

- A Commission Decision, published in the form of an announcement in the Official Journal of the European Communities, containing the regulatory requirements.
- A TBR, identifying the specifications and tests necessary to ensure conformance with the CTR.

8.3.5 ITAAB (TRAC ISDN Type Approval Advisory Board).

This Board considers urgent problems derived from the TBRs, encountered during type approval or conformity assessment. Advisory Notes are issued in order to specify a common approach to the type-examination of Terminal Equipment according to these Type Approval specifications.

These Notes are advisory in nature, but compliance with the referenced Advisory Notes by type approval authorities should ensure an agreed common platform for the type examination of ISDN Terminal Equipment.

INTERNET location http://www.etsi.fr/adm/publications/publica.htm contains a listing of the titles of these Advisory Notes.

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. For further clarification, se Appendix L.

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, a 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 expect 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 the following impact on the use of supplementary services:

NOTE: The following clarifies the interworking conditions from a technical view point. Some restrictions may be placed on these conditions due to commercial reasons.

- Calling Line Identification Presentation (CLIP).

  Calling line identification (calling party number) can be exchanged between ISDN and PSTN users.

- Calling Line Identification Restriction (CLIR).

  The calling line identification restriction mechanism applies between ISDN and PSTN.

- Subaddressing (SUB)

  Subaddressing cannot be used for calls interworking with PSTN.

- Terminal Portability (TP)

  An ISDN user can invoke terminal portability an a call toward PSTN.

- Call Waiting (CW)

  An incoming call from PSTN can "wait" at a called ISDN user, but the calling PSTN user will not be notified that the call is waiting.

  An outgoing ISDN call can "wait" at a called PSTN user, but the calling ISDN user will not be notified that the call is waiting.

- Direct Dialling In (DDI)

  ISDN users receiving calls from PSTN can make use of the DDI supplementary service as usual.

- Multiple Subscriber Number (MSN)

  ISDN users receiving calls from PSTN can make use of the MSN supplementary service as usual.

- User to User Signalling (UUS)

  The UUS supplementary service cannot be used for calls interworking with PSTN.

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

  The COLP/R supplementary service cannot be used for calls interworking with PSTN.

- Call Hold (HOLD)

  Both the ISDN user and the PSTN user can put a call on hold, but no notification is given to either users that the call is held.

- Closed User Group (CUG)

  CUG is not supported by PSTN. CUG calls towards PSTN will be rejected and calls from PSTN will not be accepted as a CUG call.

- Diversion (DIV)

  An ISDN user can divert incoming calls to a PSTN user, and an incoming PSTN call to an ISDN user can be diverted. Some of the number indications (forwarding number, original called number may be lost due to the interworking.

- Completion of Calls to Busy Subscriber (CCBS)

  ISDN users will be able to activate CCBS towards PSTN users and visa versa. However, some of the CCBS procedures such as deactivation is not implemented in PSTN, and therefore an ISDN user may experience a decrease in service handling.

- Three Party Service (3PTY)

  A three party conference can consist of any combination of ISDN and PSTN calls. However, the notifications generated from ISDN will not be presented for the PSTN user.

- Advice Of Charge (AOC)

  AOC is not affected by interworking to PSTN.

- Malicious Call IDentification (MCID)

  Calls incoming from PSTN can be registered in the network on request from an ISDN user.

- Outgoing Call Barring (OCB)

  OCB is not affected by interworking to PSTN.

- Line/Trunk Hunting (LH/TH)

  LH/TH is not affected by interworking to PSTN.

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 F2.

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

There is no provision of interworking directly to network applications such as "Alarmnet", Datapost 400 (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 ITU-T 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 ITU-T 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 ("00") and the country code shall precede the called user's national number. In addition, an extended prefix may be used to select alternative ISDN operators.

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 ("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 ITU-T 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. 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 analyse a call request from the user according to the flow given in figure 3.

The following is assumed:

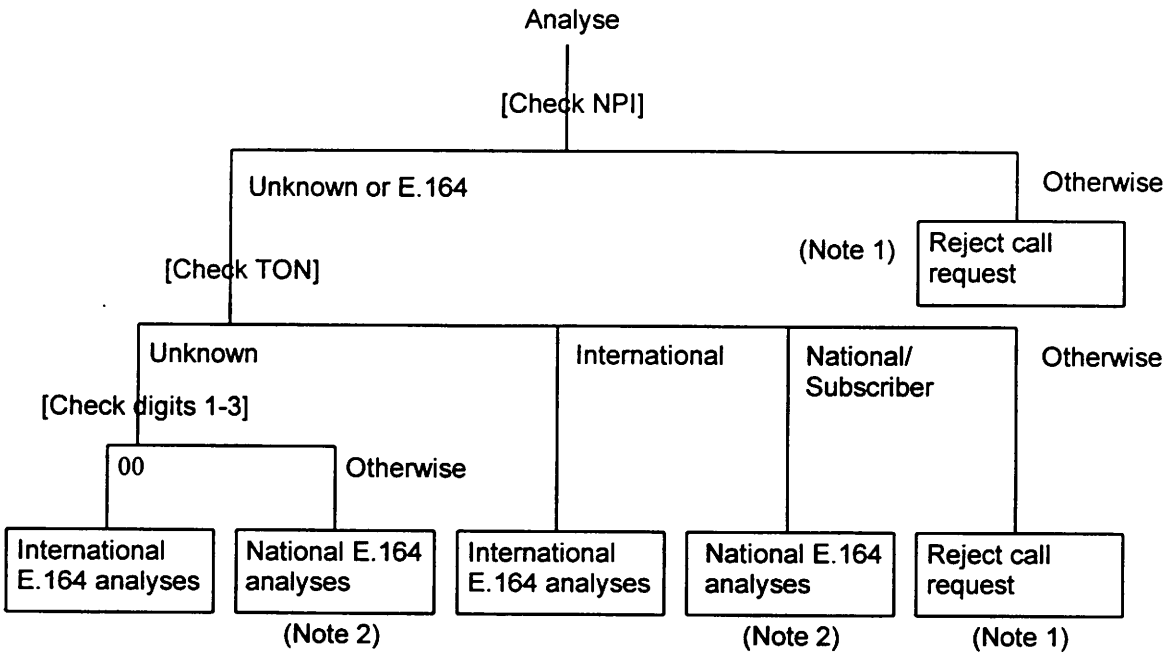
- The user may indicate "Number type" (e.g. international number) either by using the "Type of number" (TON) field in the Called party number information element according to ETS 300 403-1 [18] subclause 4.5.8, or by using prefix digits (e.g. "00" for international).

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

  Note: Generally, it is recommended to encode TON to "unknown" as prefixes will be used for other purposes than selection of international calls.

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

- If NPI indicates "unknown" the network will interpret 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 analyse does also include network specific administration/service numbers

Figure 3: TON/NPI selection

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 300 403-1 [18]).

The O&M-procedures used by the network for supervision of the user-network interface have no impact on the terminal equipment.

History

Document history		
Date	**Status**	**Comment**
1/1/97	Issue 1	Final version

PolyPropylen

A

B

C

D

E

F

G

H

IJ

K

L

M

N

O

PQ

R

S

TU

VW

XYZ

ÆØÅ

TELE DANMARK

INAD-3 APPENDIX A

Title:

Application specifications to ETSI Bearer Services - Service description (Stage 1)

Subappendices:

Appendix A1: ISDN Packet Mode Bearer Service (B-channel)

Appendix A2: ISDN Packet Mode Bearer Service (D-channel)

Appendix A3: ISDN Circuit Mode Bearer Services

TELE DANMARK

INAD-3 APPENDIX A1

Title:

ISDN Packet Mode Bearer Service (B-channel)

Contents:

This appendix is an application specification to the packet mode bearer service (B-channel) service description ETS 300 048.

TELE DANMARK

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

TELE DANMARK

INAD-3 APPENDIX A2

Title:

ISDN Packet Mode Bearer Service (D-channel)

Contents:

This appendix is an application specification to the packet mode bearer service (D-channel) service description ETS 300 049.

TELE DANMARK

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 D channel of the user access.

Application specification document to ETS 300-049
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 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.

TELE DANMARK

INAD-3 APPENDIX A3

Title:

ISDN Circuit mode bearer services

Contents:

This appendix is an application specification to the following circuit mode bearer services:

- speech;
- 3,1 kHz Audio;
- 64 kbit/s unrestricted;
- multiple-rate.

Note: The multiple-rate bearer service is not implemented.

TELE DANMARK

ISDN Circuit Mode Bearer Services

Service Description

Application specification document to ETSI ETSs:

Integrated Services Digital Network (ISDN), Circuit Mode Bearer Services, Service description.

July 1994

Table of contens:

INTRODUCTION

This document gives the service descriptions (stage 1) for the circuit mode bearer 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.

All ETSs referred to are the final pulished versions.

Structure of the document

The document contains a section for each teleservice.

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".

64 kbit/s unrestricted bearer service

Application to ETSI ETS 300 108

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

Applicable.

6 Procedures

The subscription options are not applicable.

Note: A subcription parameter "m" indicating the number of available channels is applicable to each individual primary rate access. This is specified in the INFR-92 overview document subsection 8.2.

7 Intercommunication and interworking considerations

Applicable.

8 Interaction with other supplementary sercices

Applicable.

9 Static description of the service using attributes

Applicable.

10 Dynamic description

Applicable.

Speech bearer service

Application to ETSI ETS 300 109

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

Applicable.

6 Procedures

The subscription options are not applicable.

Note: A subcription parameter "m" indicating the number of available channels is applicable to each individual primary rate access. This is specified in the INFR-92 overview document subsection 8.2.

7 Intercommunication and interworking considerations

Applicable.

8 Interaction with other supplementary sercices

Applicable.

9 Static description of the service using attributes

Applicable.

10 Dynamic description

Applicable.

3,1 kHz audio bearer service

Application to ETSI ETS 300 110

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

Applicable.

6 Procedures

The subscription options are not applicable.

Note: A subcription parameter "m" indicating the number of available channels is applicable to each individual primary rate access. This is specified in the INFR-92 overview document subsection 8.2.

7 Intercommunication and interworking considerations

Applicable.

8 Interaction with other supplementary sercices

Applicable.

9 Static description of the service using attributes

Applicable.

10 Dynamic description

Applicable.

Multiple-rate bearer service

Application to ETSI ETS 300 389

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

For Primary Rate Access, the values of N are restricted to 2, 6, 24 and 30.

6 Procedures

6.1 Provision and withdrawal

The subscription option concerning "maximum number of B-channels available for this bearer service category" is not applicable.

Note: A subscription parameter "m" indicating the number of available channels is applicable to each individual primary rate access. This is specified in the INFR-92 overview document subsection 8.2.

~~The subscription option concerning "assignment of B-channels" is applicable, i.e. the network shall support contiguous as well as non-contiguous assignment.~~

7 Intercommunication and interworking considerations

Applicable.

8 Interaction with other supplementary sercices

Applicable.

9 Static description of the service using attributes

Applicable.

10 Dynamic description

Applicable.

Annex A (informative): Time slot sequence integrity

Applicable.

Annex B (informative): Applicability of supplementary services to the multiple-rate bearer service category

Applicable.

TELE DANMARK

INAD-3 APPENDIX B

Title:

Application specifications to ETSI Teleservices - Service description (Stage 1)

Contents:

This appendix is an application specification to the service description of the following teleservices:

- telephony 7 kHz;
- videotelephony.

TELE DANMARK

ISDN Teleservices

Service Description

Application specification document to ETSI ETSs:

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

February 1994

Table of contens:

INTRODUCTION

This document gives the service descriptions (stage 1) for the teleservices 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.

All ETSs referred to are the final pulished versions.

Note: Only application text to the telephony 7 kHz and the videotelephony teleservices are included at this point in time.

Structure of the document

The document contains a section for each teleservice.

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".

Telephony 7 kHz

Application to ETSI ETS 300 263

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

The use of the Retention Timer is specified in connection with the relevant supplementary services (e.g. CCBS).

4 Symbols and abbreviations

Applicable.

5 Description

The provision of communication in a multipoint configuration is not applicable, i.e. the telephony 7 kHz teleservice cannot make use of e.g. the three party supplementary service.

6 Procedures

6.1 Provision and withdrawal

The telephony 7 kHz teleservice shall be provided after prior arrangement with the service provider.

The subscription options are not applicable.

Note: A subcription parameter "m" indicating the number of available channels is applicable to each individual primary rate access. This is specified elsewhere.

6.3 Exceptional procedures

6.3.4 Retention of information

The retention of information is specified in connection with the relevant supplementary services (e.g. CCBS).

7 Intercommunication and interworking considerations

Applicable.

8 Interaction with other supplementary sercices

Applicable.

9 Static description of the service using attributes

9.1 Low layer attributes

9.1.1 Information transfer attributes

Table 2, Note 2:
The provision of communication in a multipoint configuration is not applicable, i.e. the telephony 7 kHz teleservice cannot make use of e.g. the three party supplementary service.

10 Dynamic description

Applicable.

Videotelephony

Application to ETSI ETS 300 264

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

The use of the Retention Timer is specified in connection with the relevant supplementary services (e.g. CCBS).

4 Symbols and abbreviations

Applicable.

5 Description

The provision of communication in a multipoint configuration is not applicable, i.e. the telephony 7 kHz teleservice cannot make use of e.g. the three party supplementary service.

6 Procedures

6.1 Provision and withdrawal

The videotelephony teleservice shall be provided after prior arrangement with the service provider.

The subscription options are not applicable.

Note: A subcription parameter "m" indicating the number of available channels is applicable to each individual primary rate access. This is specified elsewhere.

6.3 Exceptional procedures

6.3.4 Retention of information

The retention of information is specified in connection with the relevant supplementary services (e.g. CCBS).

7 Intercommunication and interworking considerations

Applicable.

8 Interaction with other supplementary sercices

Applicable.

9 Static description of the service using attributes

9.1 Low layer attributes

9.1.1 Information transfer attributes

Table 2, Note 2:
The provision of communication in a multipoint configuration is not applicable, i.e. the telephony 7 kHz teleservice cannot make use of e.g. the three party supplementary service.

10 Dynamic description

Applicable.

Annex A

Applicable.

Annex B

Applicable.

TELE DANMARK

INAD-3 APPENDIX C

Title:

Application specifications to ETSI Supplementary Services - Service description (Stage 1)

Contents:

This appendix is an application specification to the following supplementary services:

- Direct Dialling In, ETS 300 062
- Multiple Subscriber Number, ETS 300 050
- SUBaddressing, ETS 300 059
- Calling Line Identification Presentation, ETS 300 089
- Calling Line Identification Restriction, ETS 300 090
- Terminal Portability, ETS 300 053
- Call Waiting, ETS 300 056
- User-to-User Signalling, ETS 300 284
- Connected Line Identification Presentation, ETS 300 094
- Connected Line Identification Restriction, ETS 300 095
- Call HOLD, ETS 300 139
- Closed User Group, ETS 300 136
- Malicious Call Identification, ETS 300 128
- Call Forwarding busy; ETS 300 199
- Call Forwarding Unconditional, ETS 300 200
- Call Forwarding No Reply, ETS 300 201
- Call Deflection, ETS 300 202
- Advice Of Charge - at call set-up time, ETS 300 178
- Advice Of Charge - at the end of the call, ETS 300 180
- Three Party Service, ETS 300 186
- Completion of Calls to Busy Subscriber, ETS 300 357
- Line Hunting, DE/NA-10003
- Trunk Hunting, DE/NA-10028
- User Controlled Outgoing Call Barring, DE/NA-10022.
- Fixed Outgoing Call Barring, DE/NA-10006

TELE DANMARK

ISDN Supplementary Services

Service Description

Application specification document to ETSI ETSs:

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

December 1995

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.~~

~~Note: The interaction with the following supplementary services are not considered while not implemented:~~

~~the Freephone supplementary service~~
~~the Conference call, add on supplementary service~~
~~the Call transfer supplementary service~~
~~the Meet-me conference supplementary service~~

~~All ETSs referred to are the final published versions exept for the Line and Trunk Hunting and the User Controlled Outgoing Call Barring supplementary services.~~

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 ~~prETS~~ 300 062 ~~Revision 4~~

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

~~**8.12 Malicious call identification**~~

~~If the MCID supplementary service is provided to a served user of the DDI supplementary service, it shall be possible to provide MCID either for the whole access or for a specific DDI number.~~

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 ~~prETS~~ 300 050 ~~Revison 5~~

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

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 Normal procedure

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 ~~prETS~~ 300 059 ~~Revision 4~~

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 Provision and withdrawal

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 ~~prETS~~ 300 090 ~~March 1991~~

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.~~

~~Special arrangement shall be provided.~~

6.2 Normal procedure

6.2.3 Invocation and operation

~~Special arrangement shall not be provided.~~

~~Special arrangement shall be provided.~~

6.2.3.1 Calling user side

~~Special arrangement shall not be provided.~~

~~Special arrangement shall 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.~~

Special arrangement shall be provided.

8.13 Multiple subscriber number

~~Special arrangement shall not be provided.~~

Special arrangement shall be provided.

* ~~Annex A~~

~~Applicable~~

* ~~Annex B~~

~~Applicable~~

CLIR - Calling Line Identification Restriction

Application to ETSI ~~prETS 300 090 March 1991~~

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 Normal procedures

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 ~~pr~~ETS 300 053 ~~Revision 5~~

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 Normal procedure

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.~~

~~8.1.3 Charging information at the end of the call~~

~~Advice of charge information shall be given if the calling user attempts to resume a suspended call which has been cleared.~~

CW - Call Waiting

Application to ETSI ~~prETS~~ 300 056 ~~Revision 5~~

1 Scope

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

Note: It is an open issue whether the CW supplementary service is applicable to the multiple-rate bearer service.

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.

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~~ ETS 300 284

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

~~"Note ISDN923" indicates temporary notes. The content of such notes applies for the first phase of commercial ISDN (19923), and will be reviewed afterwards.~~

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

~~Applicable.~~

~~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

~~5.1 Service 1~~

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

~~- Service 2:~~

~~The network option alowing the terminating exchange to deliver received UUI to the user during the active phase shall be supported.~~

~~5.2 Service 2~~

~~Note ISDN923: Service 2 is not applicable.~~

~~5.3 Service 3~~

~~Note ISDN923: Service 3 is not applicable.~~

The network shall support 128 octets per message.

6 Procedures

6.1 Provision/Withdrawal

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

~~Note ISDN923: Only Service 1 is applicable.~~

6.2 Normal procedures

6.2.1 Activation/Deactivation/Registration

~~Note ISDN923: Only Service 1 implicitly requested is applicable.~~

~~6.2.3.2 Service 2~~

~~Note ISDN923: Not applicable.~~

6.2.1.3 Service 3

~~Note ISDN923: Not applicable.~~

The network shall support possibilities of prevention as well as no prevention for the called user to request the UUS service 3 supplementary service after the connection has been established.

6.3 Exceptional procedures

~~6.3.1 Activation/Deactivation/Registration~~

~~For Service 1 implicitly requested rejection cannot always be given.~~

6.3.3 Invocation and operation

In case of excessive UUI length, the sending user shall be informed if UUI has been discarded.

7 Intercommunication conciderations

~~Note ISDN923: 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).~~

The specified interworking shall not be supported by the served users network. I.e. if the served user's network does not receive an explicit acceptance or rejection as a response to an explicit service 1 request, the service 1 request shall be rejected toward the served user.

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.~~

8.10 Diversion services

8.10.1 Call forwarding unconditional

The network shall support the possibilities of restrictions as well as no restrictions of forwarding of the user-

to-user information and/or the user-to-user requests.

8.10.2 Call forwarding busy

The network shall support the possibilities of restrictions as well as no restrictions of forwarding of the user-to-user information and/or the user-to-user requests.

8.10.3 Call forwarding no reply

The network shall support the possibilities of restrictions as well as no restrictions of forwarding of the user-to-user information and/or the user-to-user requests.

If service 1 is requested explicitly "not required" and the forwarding user accepts the service 1 request, the call forwarding no reply shall be cancelled.

8.10.4 Call deflection

The network shall support the possibilities of restrictions as well as no restrictions of deflecting of the user-to-user information and/or the user-to-user requests.

If service 1 is requested explicitly "not required" and the deflecting user accepts the service 1 request, the call deflection request shall be rejected.

Annex A(informative): Interaction between UUS supplementary service and the call forwarding no reply supplementary service

If service 1 is requested explicitly "not required" and the forwarding user accepts the service 1 request, the call forwarding no reply shall be cancelled.

Annex B(informative): Interaction between UUS supplementary service and the call deflection supplementary service

If service 1 is requested explicitly "not required" and the deflecting user accepts the service 1 request, the call deflection request shall be rejected.

COLP - COnnected Line identification Presentation

Application to ETSI ~~prETS~~ 300 094 ~~March 1991~~

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.~~

~~Special arrangement~~ shall 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.~~

~~Special arrangement~~ shall be provided.

8.13 Multiple subscriber number

~~Special arrangement shall not be provided.~~

Special arrangement shall be provided

COLR - COnnected Line identification Restriction

Application to ETSI ~~prETS~~ 300 095 ~~March 1991~~

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 Normal procedure

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 ~~pr~~ETS 300 139 ~~1991~~

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

~~Applicable.~~

~~The served user can put as a maximum 10 calls on hold.~~

~~The NOTE is not applicable, i.e. HOLD shall be suppported on a primary rate access.~~

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 Normal procedure

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~~

~~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.~~

6.3 Exceptional procedure

6.3.3 Invocation and operation

6.3.3.1 Hold request

If the number of calls on hold has reached the maximum limit (10), subsequent hold requests shall be rejected.

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 ~~prETS~~ 300 136 ~~1991~~

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.

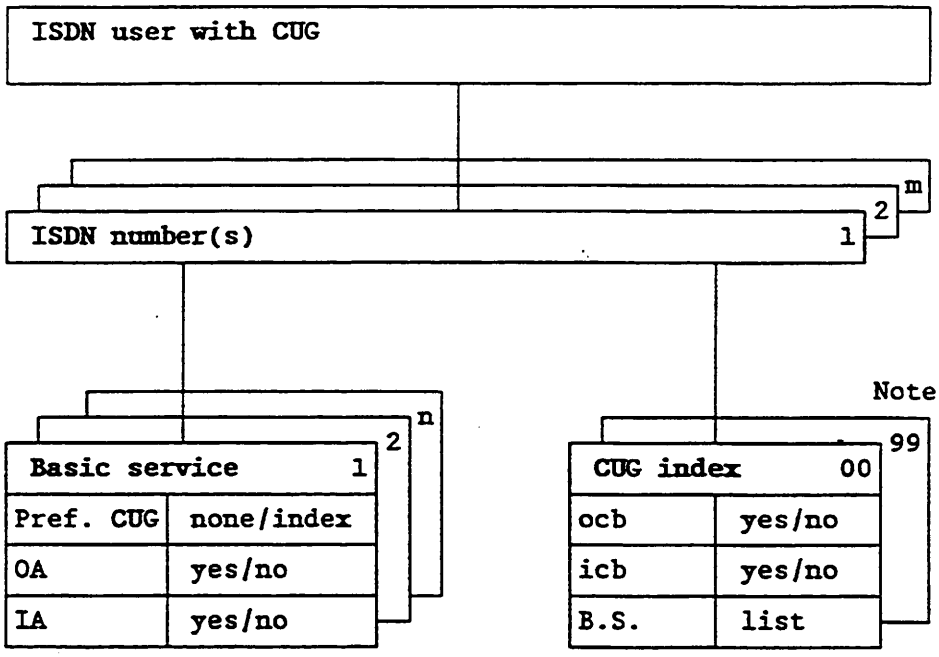


Figure 1: Relationship between ISDN subscriber, ISDN number, basic service and CUG.

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 and Trunk Hunting (LTH) supplementary service, the CUG membership shall be provided on the basis of the entire group of accesses.

MCID - Malicious Call IDentification

Application to ETSI ETS 300 128 March 92.

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

The calling party subaddress (if provided by the calling user) shall be registered.

6 Procedures

6.1 Provision and withdrawal

Enabling of automatic invocation of the MCID supplementary service on calls to the served user that are not answered, shall be provided on a subscription basis.

6.2 Normal procedure

6.2.3 Invocation and operation

If the automatic invocation of the MCID supplementary service is subscribed to by the served user, all incoming ~~unanswered~~ calls to the served user shall be registered. without any restrictions.

The NOTE is not applicable.

7 Intercommunication considerations

Applicable.

8 Interaction with other supplementary services

~~Applicable.~~

~~8.9 Direct dialling in~~

~~If the DDI supplementary service is provided to a served user of the MCID supplementary service, it shall be possible to provide MCID either for the whole access or for a specific DDI number.~~

CFB - Call Forwarding Busy

Application to ETSI ETS 300 199

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

The subscription option for notifying the served user shall be supported.

The maximum number of diversions of a single call shall be 5.

6 Procedures

6.1 Provision and withdrawal

The network shall provide the CFB supplementary service on a per ISDN number basis.

The network shall provide the CFB supplementary service to all basic services subscribed to by the user.

All four subscription options shall be supported and shall apply seperately to each combination of basic service and ISDN number.

It shall be possible for the served user to activate, deactivate and interrogate the CFB supplementary service for all ISDN numbers on the same access.

The applicability of subscription options is by example summarized in figure 1.

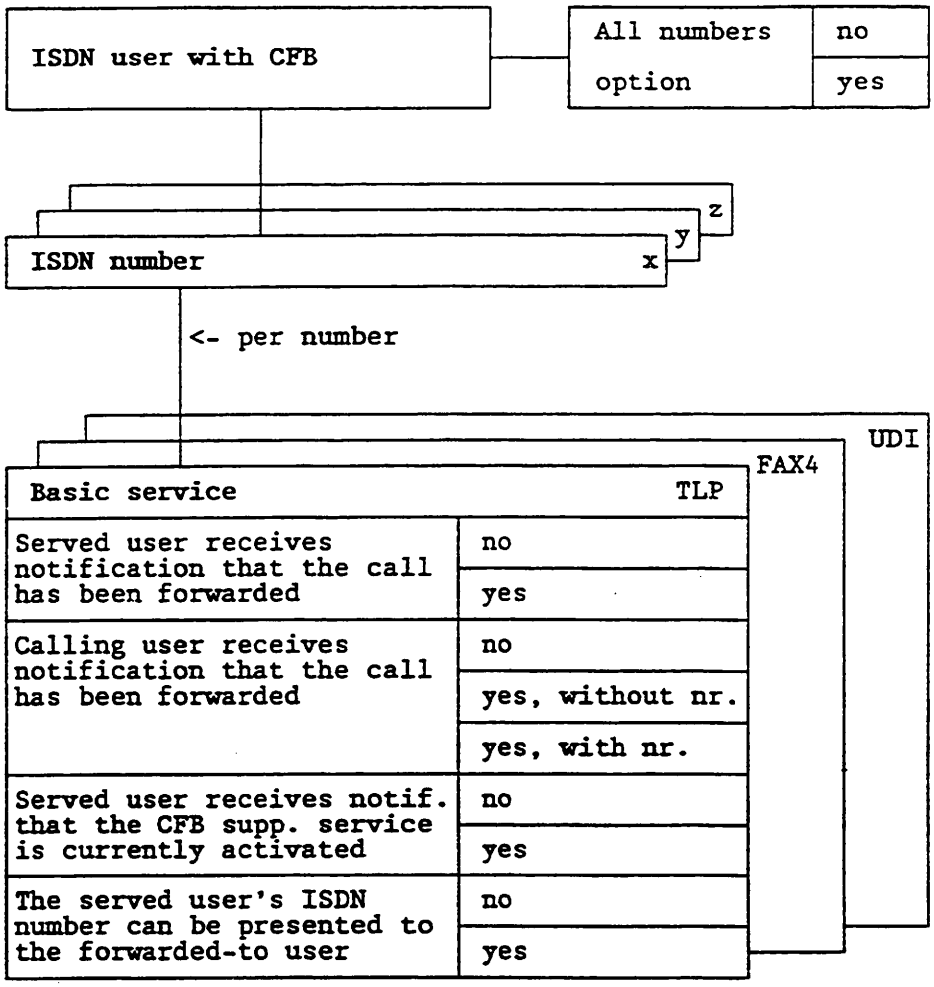


Figure 1: Applicability of subscription options.

6.2 Normal procedures

Note: In this subclause, procedures related to the subscription option "The whole access" do not apply.

6.2.1 Activation, deactivation and registration

6.2.1.1 Activation

The service provider option concerning "all ISDN numbers" shall apply.

The network shall verify the forwarded-to number before accepting the activation request.
This verification shall check the length of the indicated forwarded-to number. If the forwarded-to number consists of eight or more digits, the network shall accept the activation request. Otherwise the request shall be rejected.

6.2.1.2 Deactivation

The service provider option concerning "all ISDN numbers" shall apply.

6.2.3 Invocation

The maximum number of diversions of a single call shall be 5.

7 Intercommunication considerations

7.2 Interworking with private ISDN

NOTE 1 is not applicable.

The network shall support partial rerouting.

8 Interaction with other supplementary services

8.1 Advice of charge services

Refer to the specification of the AOC supplementary service.

8.9 Direct dialling in

* If the served user subscribes to the DDI supplementary service, the CFB supplementary service shall be provided for the default General Directory Number (GDN) ~~and for the group of DDI numbers individually~~.

Note: If line hunting applies, the CFB supplementary service shall be provided for all accesses included in the hunt group.

8.17 User-to-user signalling

The network shall support the possibilities of restrictions as well as no restrictions of forwarding of the user-to-user information and/or the user-to-user request.

CFU - Call Forwarding Unconditional

Application to ETSI ETS 300 200

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

The subscription option for notifying the served user shall be supported.

The maximum number of diversions of a single call shall be 5.

6 Procedures

6.1 Provision and withdrawal

The network shall provide the CFU supplementary service on a per ISDN number basis.

The network shall provide the CFU supplementary service to all basic services subscribed to by the user.

All four subscription options shall be supported and shall apply seperately to each combination of basic service and ISDN number.

It shall be possible for the served user to activate, deactivate and interrogate the CFU supplementary service for all ISDN numbers on the same access.

The applicability of subscription options is by example summarized in figure 1.

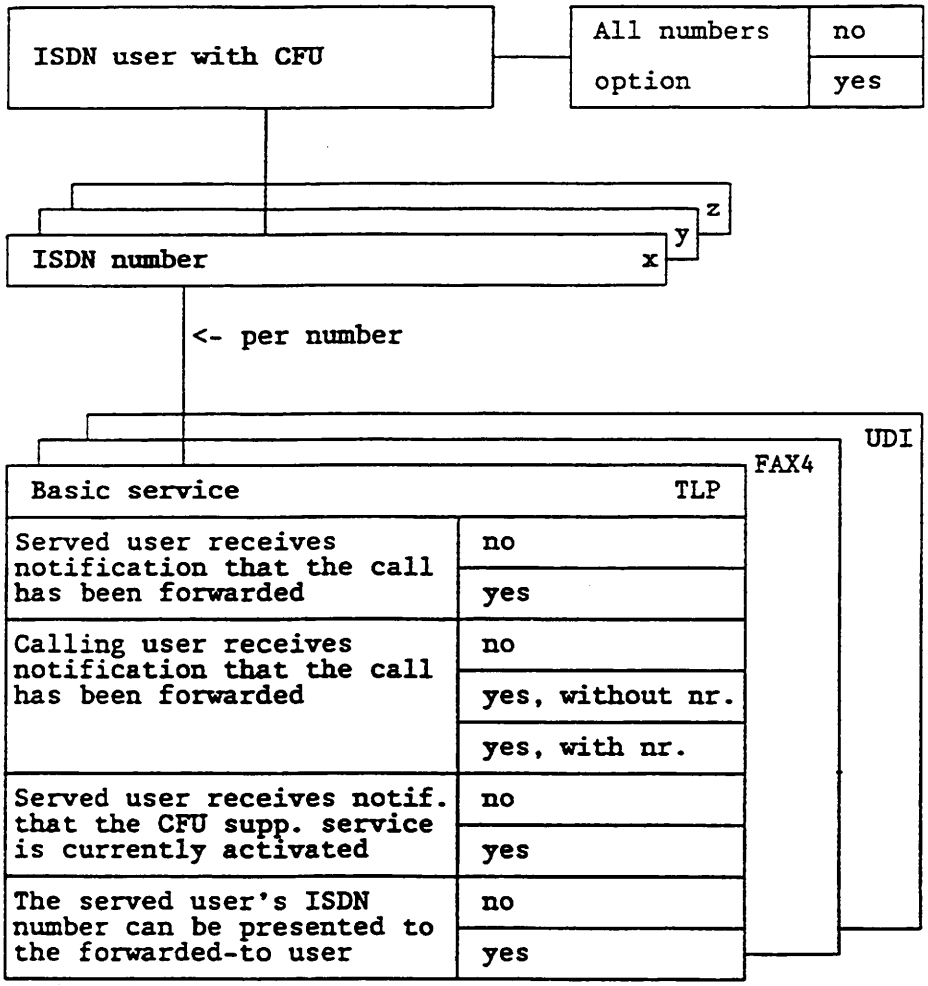


Figure 1: Applicability of subscription options.

6.2 Normal procedures

Note: In this subclause, procedures related to the subscription option "The whole access" do not apply.

6.2.1 Activation, deactivation and registration

6.2.1.1 Activation

The service provider option concerning "all ISDN numbers" shall apply.

The network shall verify the forwarded-to number before accepting the activation request.
This verification shall check the length of the indicated forwarded-to number. If the forwarded-to number consists of eight or more digits, the network shall accept the activation request. Otherwise the request shall be rejected.

6.2.1.2 Deactivation

The service provider option concerning "all ISDN numbers" shall apply.

6.2.3 Invocation

The maximum number of diversions of a single call shall be 5.

7 Intercommunication considerations

7.2 Interworking with private ISDN

NOTE 1 is not applicable.

The network shall support partial rerouting.

8 Interaction with other supplementary services

8.1 Advice of charge services

Refer to the specification of the AOC supplementary service.

8.9 Direct dialling in

* If the served user subscribes to the DDI supplementary service, the CFU supplementary service shall be provided for the default General Directory Number (GDN) ~~and for the group of DDI numbers individually~~.

Note: If line hunting applies, the CFU supplementary service shall be provided for all accesses included in the hunt group.

8.17 User-to-user signalling

The network shall support the possibilities of restrictions as well as no restrictions of forwarding of the user-to-user information and/or the user-to-user request.

CFNR - Call Forwarding No Reply

Application to ETSI ETS 300 201

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

The subscription option for notifying the served user shall be supported.

The maximum number of diversions of a single call shall be 5.

6 Procedures

6.1 Provision and withdrawal

The network shall provide the CFNR supplementary service on a per ISDN number basis.

The network shall provide the CFNR supplementary service to all basic services subscribed to by the user.

All four subscription options shall be supported and shall apply seperately to each combination of basic service and ISDN number.

It shall be possible for the served user to activate, deactivate and interrogate the CFNR supplementary service for all ISDN numbers on the same access.

The applicability of subscription options is by example summarized in figure 1.

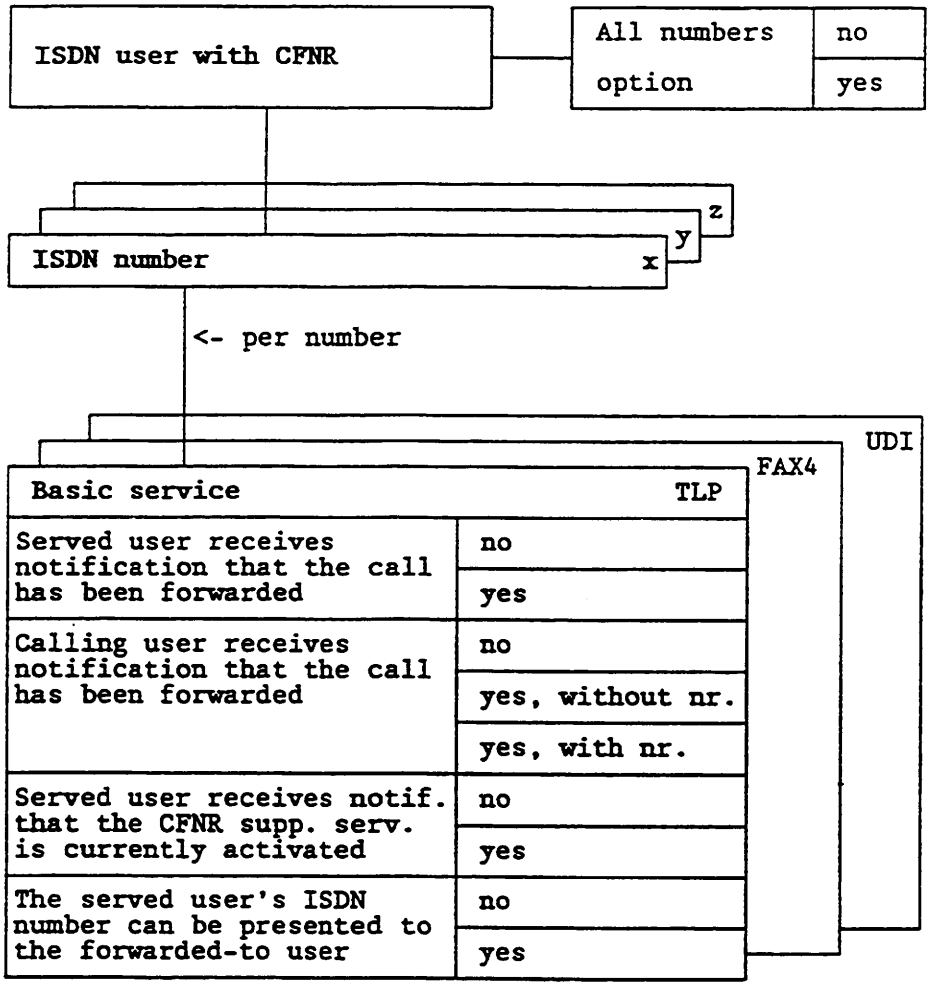


Figure 1: Applicability of subscription options.

6.2 Normal procedures

Note: In this subclause, procedures related to the subscription option "The whole access" do not apply.

6.2.1 Activation, deactivation and registration

6.2.1.1 Activation

The service provider option concerning "all ISDN numbers" shall apply.

The network shall verify the forwarded-to number before accepting the activation request.
This verification shall check the length of the indicated forwarded-to number. If the forwarded-to number consists of eight or more digits, the network shall accept the activation request. Otherwise the request shall be rejected.

6.2.1.2 Deactivation

The service provider option concerning "all ISDN numbers" shall apply.

6.2.3 Invocation

The maximum number of diversions of a single call shall be 5.

* ~~6.2.3.1 Served user's view~~

~~The network shall support item b), i.e. the call to the served user shall be removed on invocation of CFNR.~~

7 Intercommunication considerations

7.2 Interworking with private ISDN

NOTE 1 is not applicable.

The network shall support partial rerouting.

8 Interaction with other supplementary services

8.1 Advice of charge services

Refer to the specification of the AOC supplementary service.

8.9 Direct dialling in

* If the served user subscribes to the DDI supplementary service, the CFNR supplementary service shall be provided for the default General Directory Number (GDN) ~~and for the group of DDI numbers individually~~.

Note: If line hunting applies, the CFNR supplementary service shall be provided for all accesses included in the hunt group.

8.17 User-to-user signalling

The network shall support the possibilities of restrictions as well as no restrictions of forwarding of the user-to-user information and/or the user-to-user request.

Annex A(informative): Interaction between UUS supplementary service and the call forwarding no reply supplementary service

If service 1 is requested explicitly "not required" and the forwarding user accepts the service 1 request, the call forwarding no reply shall be cancelled.

CD - Call Deflection

Application to ETSI ETS 300 202

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

The maximum number of diversions of a single call shall be 5.

6 Procedures

6.1 Provision and withdrawal

The network shall provide the CD supplementary service on a per ISDN number basis.

* ~~All four~~ Both subscription options shall be supported and shall apply seperately each ISDN number.

The applicability of subscription options is by example summarized in figure 1.

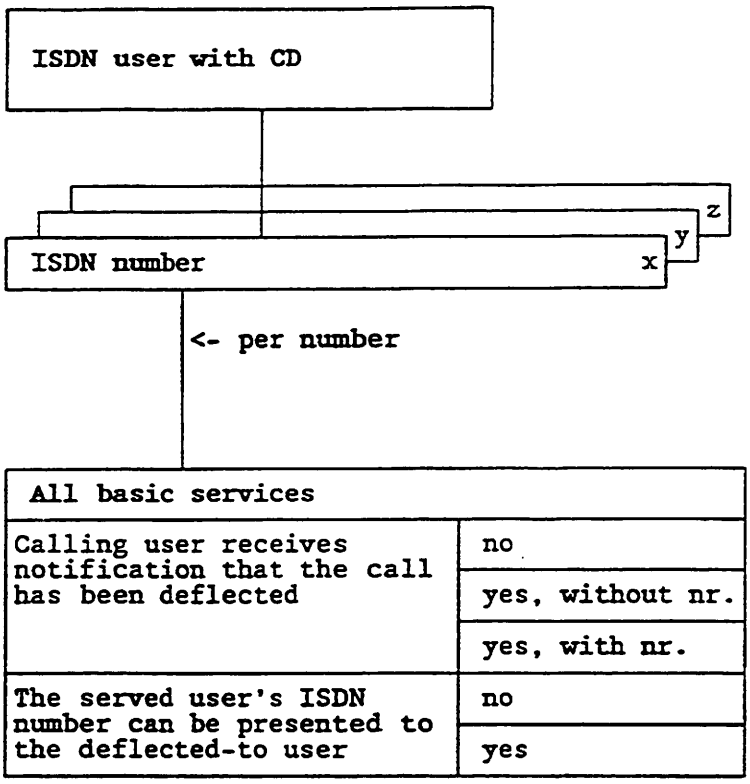


Figure 1: Applicability of subscription options.

6.2 Normal procedures

Note: In this subclause, procedures related to the subscription option "The whole access" do not apply.

~~6.2.1 Activation, deactivation and registration~~

~~* 6.2.1.1 Activation~~

~~The service provider option concerning "all ISDN numbers" shall apply.~~

~~The network shall verify the forwarded-to number before accepting the activation request. This verification shall check the length of the indicated forwarded-to number. If the forwarded-to number consists of eight or more digits, the network shall accept the activation request. Otherwise the request shall be rejected.~~

~~* 6.2.1.2 Deactivation~~

~~The service provider option concerning "all ISDN numbers" shall apply.~~

6.2.3 Invocation

The maximum number of diversions of a single call shall be 5.

* 6.2.3.1 Served user's view

The network shall support the possibility for the served user to override the value of the subscription option "the served user's ISDN number can be presented to the deflected-to user".

The network shall support item b), i.e. the call to the served user shall be removed on invocation of CD.

* 6.3 Exceptional procedures

6.3.3 Invocation and operation

The network shall verify the deflected-to number before accepting the activation request.
This verification shall check the length of the indicated deflected-to number. If the deflected-to number consists of eight or more digits, the network shall accept the invocation request. Otherwise the request shall be rejected.

7 Intercommunication considerations

7.2 Interworking with private ISDN

NOTE 1 is not applicable.

The network shall support partial rerouting.

8 Interaction with other supplementary services

8.1 Advice of charge services

Refer to the specification of the AOC supplementary service.

8.9 Direct dialling in

* If the served user subscribes to the DDI supplementary service, the CD supplementary service shall be provided for the default General Directory Number (GDN) ~~and for the group of DDI numbers individually~~.

Note: If line hunting applies, the CD supplementary service shall be provided for all accesses included in the hunt group.

8.17 User-to-user signalling

The network shall support the possibilities of restrictions as well as no restrictions of forwarding of the user-to-user information and/or the user-to-user request.

Annex A(informative): Interaction between UUS supplementary service and the call deflection supplementary service

If service 1 is requested explicitly "not required" and the deflecting user accepts the service 1 request, the call deflection request shall be rejected.

AOC-S - Advice Of Charge - at call set-up time

Application to ETSI ETS 300 178

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

The specific structure, contents and application of charging information are specified in Appendix A to this document.

6 Procedures

6.1 Provision and withdrawal

The subscription option shall be supported.

7 Intercommunication considerations

Applicable.

8 Interaction with other supplementary services

8.16 Three party

The charging information for the use of the three party service shall be sent to the served user provided the served user is the calling user.

Annex A (Normative): Structure, contents and application of charging information

See Appendix A to this subsection.

Appendix A: Application specification for charging information

Ap.1 General

To support the AOC-S supplementary service, each local exchange shall provide a data base containing charging information. The charging information shall be configurable by the network operator and be used to inform the served user about charging rates. In addition, the infomation is used by the AOC-E supplementary service.

The purpose of this appendix is:

- to specify the functional stucture of the data base; and
- to specify the conditions for delivery of this information to the served user.

Ap.1.1 Requirements to the structure of charging information used for basic communication

This subsection specifies the structure of charging information used to informe the served user about the rate for the basic connection to the destination user.

To ease the description of the requirements the following terms are introduced:

1) "Basic communication charging class", which shall be considered as a set of data identified by the network at call request based on the origin of the call, the called party number and the basic service requested by the user.
The network shall be able to identify at least 256 "basic communication charging classes".

   The purpose of the "basic communication charging class" is to identify charging information for the basic communication part of a call.

2) "Basic communication charging class record". Each "basic communication charging class" shall consist of at least 8 "basic communication charging class records" each containing the same structure of charging information. A specific "basic communication charging class record" shall be selected based on the time and date.

   Note: The charging class and the charging class record need not be considered as an implementation requirement, but the specified functionality shall be supported.

The structure of the "basic communication charging class" and basic communication charging class record" is illustrated by example in figure Ap.1 below.

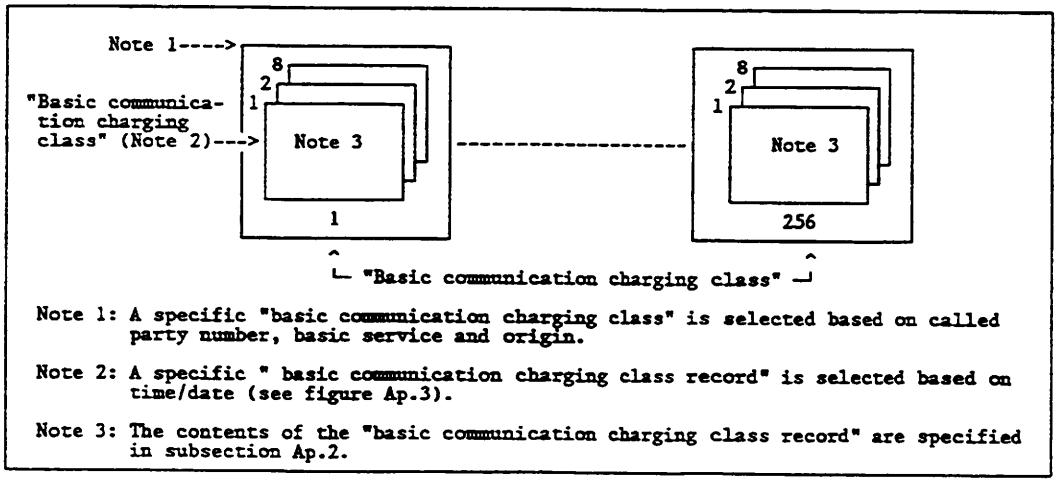


Figure Ap.1: Structure of "Basic communication charging class"

Ap.1.2 Requirements to the structure of charging information used for call attempt and supplementary services

This subsection specifies the structure of charging information used to informe the served user about the rate for the call attempt and the use of requested supplementary services.

To ease the description of the requirements the following terms are introduced:

1) "General charging class", which shall be considered as a set of data identified by the network at call request based on the origin of the call, the called party number and the basic service requested by the user.
The network shall be able to identify at least 64 "general charging classes".

The purpose of the "general charging class" is to identify charging information for the call attempt charge, the charge for user-to-user information transfer and the charge for the use of supplementary services.

2) "General charging class record". Each "general communication charging class" shall consist of at least 4 "general charging class records" each containing the same structure of charging information. A specific "general charging class record" shall be selected based on the time and date.

Note: The charging class and the charging class record need not be considered as an implementation requirement, but the specified functionality shall be supported.

The general structure of the "general charging class" and "general charging class record" is illustrated by example in figure Ap.2 below.

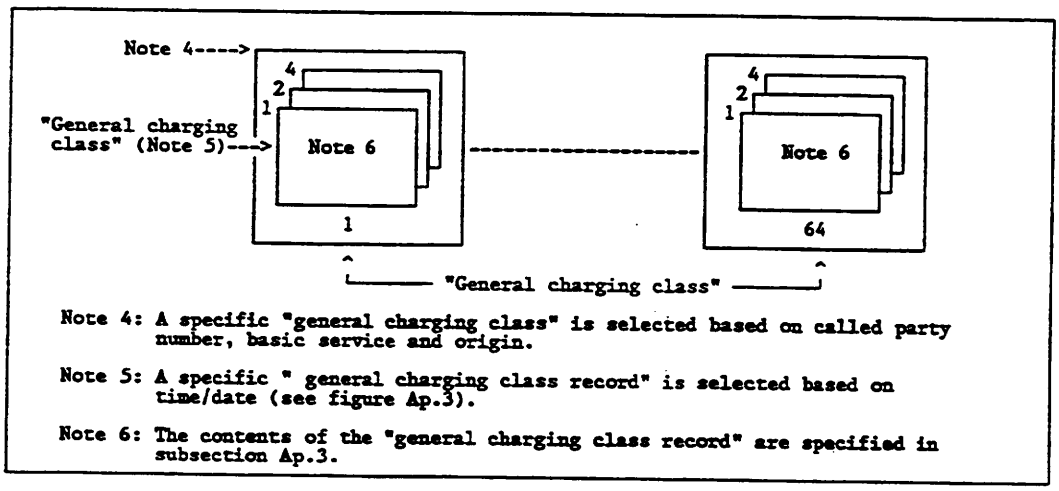


Figure Ap.2: Structure of "General charging class"

Ap.1.3 Requirements for the selection of a charging class and a associated charging class record

In order to select a charging class, the following shall apply:

a) The network shall consider the basic services:

- speech;
- 64 kbit/s unrestricted; and
- 3,1 kHz audio.

b) To cater for the origin of a call, e.g. a user connected to a remote subscriber stage or a payphone, it shall be possible to assign an "origin type" to each calling user. The "origin type" shall be a value in the range 1 - 16 in steps of 1.

In order to select the correct charging class record within the chosen charging class dependent of the time and date, the network shall provide at least 16 configurable "time/date patterns".

In each "time/date pattern" it shall be possible to indicate at least 16 "time stamps" based on time of day, day of week and date. The "time stamps" shall be configurable in steps of one quarter of an hour. On each "time stamp" it shall be possible to select one of 8 "basic communication charging class record" and one of 4 "general charging class record".

In each "basic communication charging class" and in each "general communication charging class" it shall be possible to indicate an association to one of the 16 "time/date patterns".

The principles for the time/date management are illustrated by example in figure Ap.3.

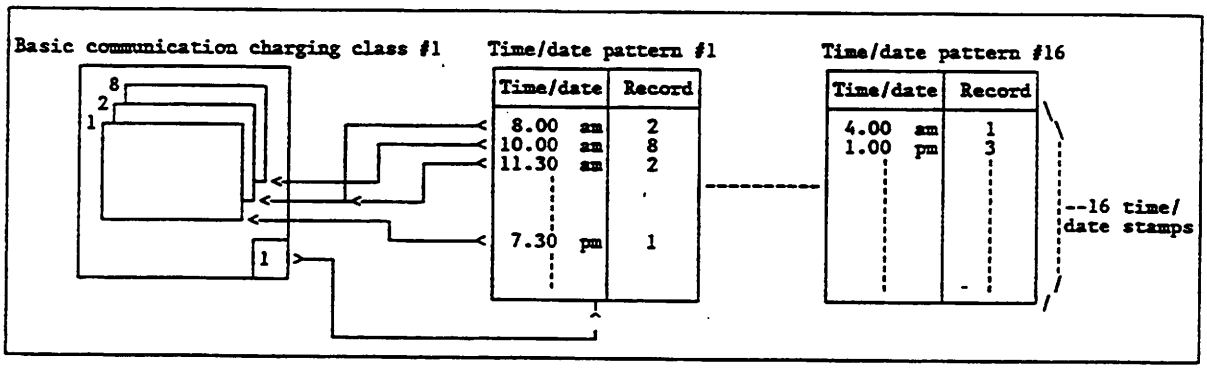


Figure Ap.3: Principle for time/date management

Ap.2 Requirements to the structure of basic communication charging class record

The charging information contained in a "basic communication charging class record" is specified in the following and summarized in figure Ap.4.

It shall be possible to configure the contents of each individual "basic communication charging class record" by means of O&M commands.

Each "basic communication charging class record" shall contain the following information about the Basic communication charged items as defined in subclause A.2.2:

- duration rate, i.e. price per time unit as defined in subclause A.2.3.1 (the type of charging shall indicate "continuous"); and/or
- flat rate, i.e. fixed price as defined in subclause A.2.3.1;
- free of charge, as defined in subclause A.2.3.1; or
- not available, as defined in subclause A.2.3.1.

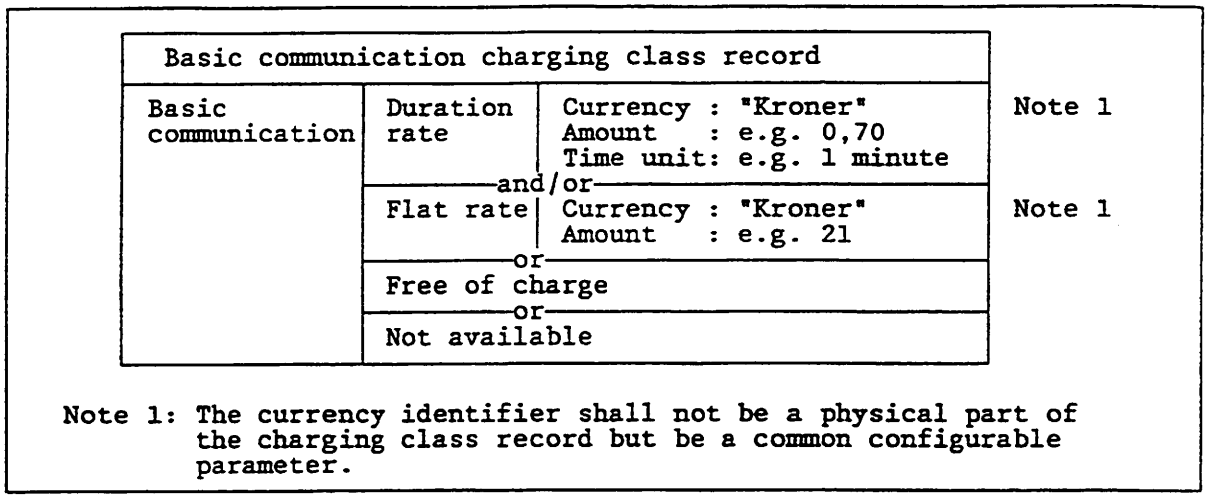


Figure Ap.4: Structure of the basic communication charging class record

The information in the charged items shall be structured as follows:

- the currency identifier shall be a configurable IA5 string of 10 characters including the characters "æ", "ø", "å", "Æ", "Ø", and "Å";
- the currency amount shall be in the range specified in subclause A.2.3;
- the time unit shall be in the range specified in subclause A.2.3.1.

Ap.3 Requirements to the structure of general charging class record

The charging information contained in a "general charging class record" is specified in the following and summarized in figure Ap.5.

It shall possible to configure the contents of each individual "general charging class record" by means of O&M commands.

Each "general charging class record" shall contain about the following charged items as defined in subclause A.2.2:

a) Call attempt

For call attempt charging, the following information shall be available:

- flat rate, i.e. fixed price as defined in subclause A.2.3.1; or
- free of charge, as defined in subclause A.2.3.1; or
- not available, as defined in subclause A.2.3.1.

b) User-to-user information transfer

For charging of user-to-user information transfer, the following information shall be available:

- volume rate, i.e. a price pr. user-to-user information unit; or
- free of charge, as defined in subclause A.2.3.1; or
- not available, as defined in subclause A.2.3.1.

Note: The charge for user-to-user information apply for all types of user-to-user signalling supplementay services.

c) Operation of supplementary services

For charging of supplementary services, the following information shall be available in the selected "general charging class record" for each of the supplementary service listed in figure Ap.5:

- duration rate, i.e. price per time unit as defined in subclause A.2.3.1; (the type of charging shall indicate "continuous"); and/or
- flat rate, i.e. fixed price as defined in subclause A.2.3.1; or
- free of charge, as defined in subclause A.2.3.1; or
- not available, as defined in subclause A.2.3.1.

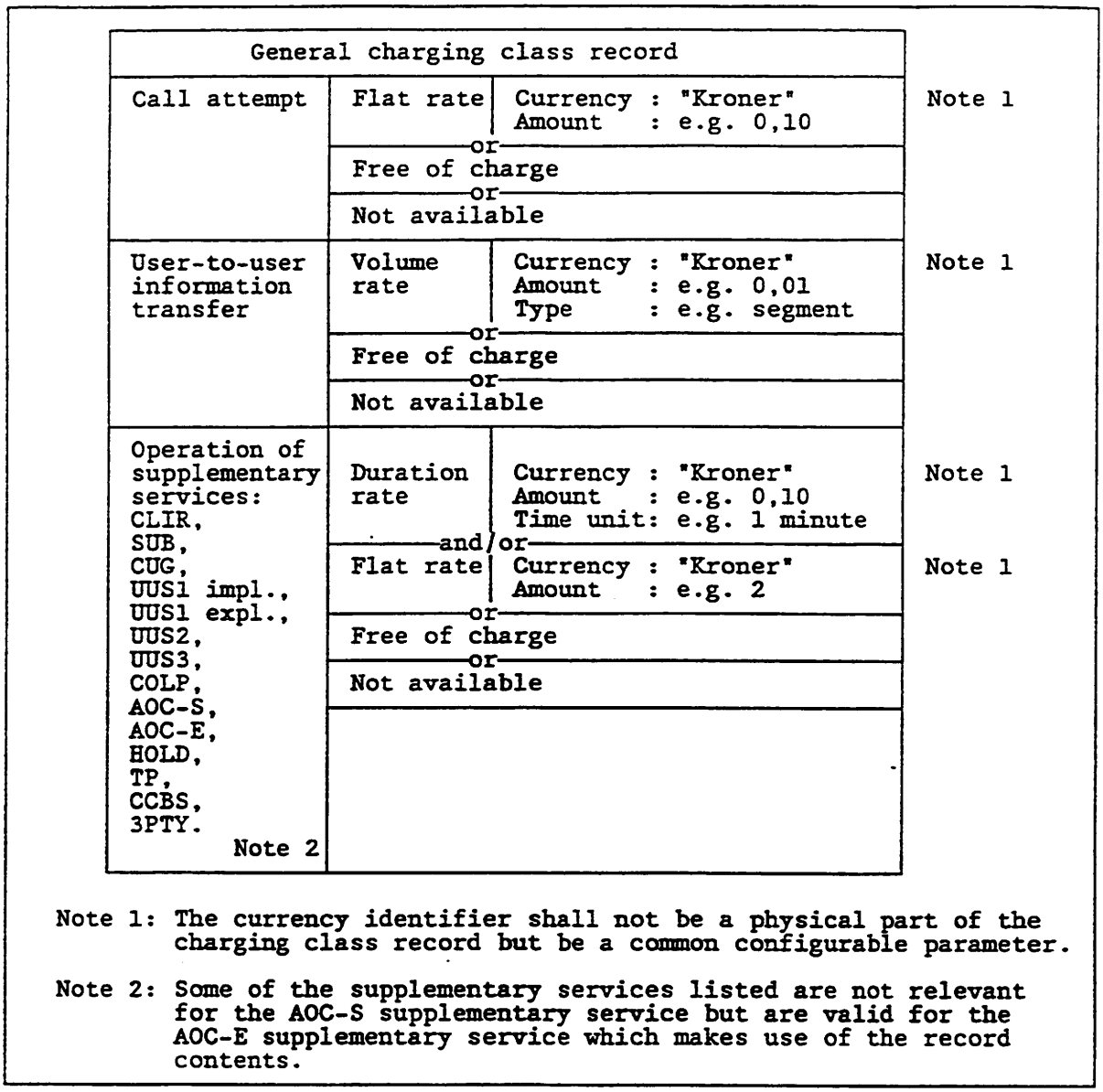


Figure Ap.5: Structure of charging information

The information in the charged items shall be structured as follows:

- the currency identifier shall be a configurable IA5 string of 10 characters including the characters "æ", "ø", "å", "Æ", "Ø", and "Å";
- the currency amount shall be in the range specified in subclause A.2.3;
- the time unit shall be in the range specified in subclause A.2.3.1;
- the type of volume unit shall be selectable as octet, segment or message.

Ap.4 Additional charging record for multiple-rate (N*64 kbit/s) connections

If the calling user requests a multiple-rate call, the selection of a "basic communication charging class record" and "general charging class record" shall follow the same principles as for the 64 kbit/s unrestricted bearer service.

When the records are selected, the resulting basic communication and call attempt charge information by multiplying the selected values with the multipliers found in the "multiple-rate charging record" specified in

figure Ap.6. The value of N corresponds to the number of channels requested by the calling user.

Multiple-rate charging record			
Value of N	Basic communication		Call attempt
	Duration rate multiplier	Flat rate multiplier	Multiplier
2	Note 1	Note 1	Note 1
3	Note 1	Note 1	Note 1
4	Note 1	Note 1	Note 1
/	/	/	/
30	Note 1	Note 1	Note 1

Note 1: The multiplier shall be configurable in the range 0,1 to 100 in steps of 0,1.

Figure Ap.6: Multiple-rate charging record

Only one "multiple-rate charging record" shall exist in each exchange, i.e. only one set of multipliers exists for a specific value of N.

Ap.5 Delivery of charging information to the served user at call setup time

When the served user originates a call, a specific "basic communication charging class record" and "general charging class record" shall be selected based on analysis of the origin of the call, the called party number and the requested basic service.

The selected charging class records shall be associated to the call in such a way that the information can be used if the charge change e.g. due to change in date/time or due to the requst of a supplementary service during a call.

Ap.5.1 Delivery of charge information in the case of a successful call establishment

For a successful call establishment, the following charge information shall be sent to the served user:

a) the basic communication charged item;

b) the call attempt charged item;

c) the user-to-user information charged item, if one of the user-to-user signalling supplementary services is requested in the call request;

d) the operation of supplementary services charged item if one or more supplementary services are requested.

Since it is not possible to explicitly indicate the type of supplementary service to the served user, the following rules shall apply for this charged item:

- the charge for all requested supplementary service for which the charge information is of the type "duration rate" shall be collected in one operation of supplementary service

charged item delivered to the served user;

- the charge for all requested supplementary service for which the charge information is of the type "flat rate" shall be collected in one operation of supplementary service charged item delivered to the served user;

- if the charge information for all requested supplementary services is of the type "free of charge", this shall be indicated to the served user.

The charge information for the individual supplementary services shall be according to the following conditions:

- for the calling line identification restriction supplementary service if this service is invoked either permanently or on a per call basis;

- for the connected line identification presentation supplementary service if the connected party number is delivered to the served user;

- for the subaddress supplementary service if the served user includes subaddress information in the call request;

- for the closed user group supplementary service if invoked either by default (preferential CUG) or explicitly in the call request;

- for all the user-to-user signalling supplementary services if activated in the call request;

- for the advice of charge at call set-up time supplementary service if activated in the call request or permanently activated;

- for the advice of charge at the end of a call supplementary service if activated in the call request or permanently activated;

- for the completion of calls to busy subscriber supplementary service if activated in connection with the clearing of a call encountering a busy destination.

Ap.5.2 Delivery of charging information in the case of an unsuccessful call request

If the call request is unsuccessful either due to network reasons or due to called user reaction, the served user shall receive the same set of charging information as if the call was successful.

Note: This implies that in some cases, the served user will receive charging information for services for which the served user will not be charged finally.

Ap.6 Delivery of charging information to the served user during the call

During an active call the charge may change due to either change in date/time or due to a request of a supplementary service.

The requirements in this subsection apply to the calling user only.
If the called user requests a supplementary service during the call no charging information shall be given.

Ap.6.1 Change in charging information due to change in time/date

If change in time/date requires a change in the charging, the network shall select the appropriate charging class record within the selected charging record.

The network shall then deliver to the served user the charging information for those charged items relevant

for that user and having a different value related to the current charge. This applies only to charged items of the types duration rate and volume rate, i.e. a change in a flat rate type shall not be indicated to the served user.

Furthermore, if the charge is changed for more than one suplementary service, the network shall collect the charging information in one operation of supplementary service charged item.

Ap.6.2 Change in charging information due to the request of a supplementary service

If the served user requests a supplementary service during the call, the network shall deliver the charging information for this supplementary service. This applies for the following supplementary services:

- the user-to-user signalling service 3 supplementary service. In this case both the user-to-user information transfer charged item and the operation of supplementary services charged item shall be given;

- the three party supplementary service;

- the hold supplementary service.

AOC-E - Advice Of Charge - at the end of the call

Application to ETSI ETS 300 180

1 Scope

Applicable.

Note: This application specification for AOC-E stage 1 applies also to the specified stage 3 keypad protocol for AOC-E.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

The specific structure, contents and application of charging information are specified in the application text to Annex A.

6 Procedures

6.1 Provision and withdrawal

The subscription option shall be supported.

7 Intercommunication considerations

Applicable.

8 Interaction with other supplementary services

8.1.2 Charging information during the call

Not applicable.

8.10 Diversion services

The network shall support the transferring of AOC-E charging information to the diverting user when the diverted call is terminated.

8.15 Terminal portability

The network shall support the transferring of AOC-E charging information for a call terminated during suspension.

8.16 Three party

The charging information for the use of the three party service shall be sent to the served user provided the served user is the calling user.

Annex A (Normative): Structure, contents and application of charging information

A.1 Introduction

Applicable.

A.2 Structure and contents of charging information

A.2.1 Type of charging information

The requirements to charging information in connection with supplementary services are summarised in subclause A.3.

A.2.2 Record charges

Recorded number of charging units are not applicable.

In the currency unit, the currency identifier parameter shall be a configurable IA5 string of 10 characters including the characters "æ", "ø", "å", "Æ", "Ø", and "Å".

A.2.3 Billing identification

The following billing identifications are not applicable:

- reverse charging,
- credit card charging,
- call transfer.

A.3 Application of charging information

The charging information shall be given in currency units.

The charging information shall be calculated based on information stored in the selected "basic communication charging record" and the "general charging class record" specified in the application specification to AOC-S stage 1 subsection Ap.2 and Ap.3 respectively. The selection of the relevant charging class records shall be as specified in AOC-S subsection Ap.1.

For AOC-E given to a calling user in connection with a circuit swiched call, the following rules shall apply:

a) in general, if the call request is rejected before the first digit of the called party number is received by the network, the indication "not available" shall be given;

b) the charge for the "basic communication" (see AOC-S, figure Ap.4) shall be calculated from the time when the called user answers the call until the call is disconnected;

c) the charge for the "call attempt" (see AOC-S, figure Ap.5) shall be included in all cases except if a call request is rejected due to network reasons. Rejection due to network reasons shall be considered if a call request is rejected with one the following cause values:

   - no route to destination (cause #3);
   - destination out of order (cause #27);
   - no circuit/channel available (cause #34);

- network out of order (cause #38);
- temporary failure (cause #41);
- switch equipment congestion (cause #42);or
- resources unavailable (cause #47);

and the location of the initiator of the cause value is not the user or the private network.

d) the charge for the "user-to-user information transfer" (see AOC-S, figure Ap.4) shall be included regardless of the result of the call request, except if the call request is rejected due to network reason as defined in item c);

e) the charge for the "operation of supplementary services" (see AOC-S, figure Ap.4) shall be included regardless of the result of the call request, except if the call request is rejected due to network reason as defined in item c). This applies for the following supplementary services:

- the calling line identification restriction supplementary service if this service is invoked either permanently or on a per call basis;
- the connected line identification presentation supplementary service if the connected party number is delivered to the served user;
- the subaddress supplementary service if the served user includes subaddress information in the call request;
- the closed user group supplementary service if invoked either by default (preferential CUG) or explicitly in the call request;
- all the user-to-user signalling supplementary services if activated in the call request or, for service 3, during the call;
- the advice of charge at call set-up time supplementary service if activated in the call request or permanently activated;
- the advice of charge at the end of a call supplementary service if activated in the call request or permanently activated;
- the completion of calls to busy subscriber supplementary service if activated in connection with the clearing of a call encountering a busy destination.
- the three party supplementary service;
- the terminal portability supplementary service;
- the hold supplementary service.

For AOC-E given to a diverting user when a diverted call is released, the following rules shall apply:

a) the charge for the "basic communication" (see AOC-S, figure Ap.4) shall be calculated from the time when the diverted-to user answers the call until the call is disconnected;

b) the charge for the "call attempt" (see AOC-S, figure Ap.5) shall be included in all cases except if a call request is rejected due to network reasons. Rejection due to network reasons shall be considered if a call request is rejected with one the following cause values:

- no route to destination (cause #3);
- destination out of order (cause #27);
- no circuit/channel available (cause #34);

- network out of order (cause #38);
- temporary failure (cause #41);
- switch equipment congestion (cause #42);or
- resources unavailable (cause #47);

and the location of the initiator of the cause value is not the user or the private network.

c) the charge for the "user-to-user information transfer" (see AOC-S, figure Ap.4) shall be included regardless of the result of the call request, except if the call request is rejected due to network reason as defined in item b);

e) the charge for the "operation of supplementary services" (see AOC-S, figure Ap.4) shall be included regardless of the result of the call request, except if the call request is rejected due to network reason as defined in item b). This applies for the following supplementary services:

- the calling line identification restriction supplementary service if this service is invoked either permanently or on a per call basis;
- the subaddress supplementary service if the called party subaddress is included in the call request towards the diverted-to user;
- the closed user group supplementary service if invoked;
- all the user-to-user signalling supplementary services if activated in the call request or, for service 3, during the call;
- the advice of charge at the end of a call supplementary service if permanently activated.

3PTY - Three Party Service

Application to ETSI ETS 300 186

1 Scope

For an interim period of time the Telephony 7 kHz Teleservice cannot make use of the Three-Party supplementary service.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

For an interim period of time the Telephony 7 kHz Teleservice cannot make use of the Three-Party supplementary service.

6 Procedures

6.2 Normal procedure

6.2.3.1 Beginning the 3PTY supplementary service

The network shall not check whether the two calls are used for speech communication; i.e. it is the served user's responsibility to ensure that the two calls are compatible and applicable to the 3PTY supplementary service.

6.2.3.4 Information provided to participants

The network shall send notifications to the remote users.

7 Intercommunication considerations

7.1 Interworking with non-ISDNs

Remote parties belonging to non-ISDN shall not be notified.

8 Interaction with other supplementary services

8.1.1 Charge informatin at call set-up time

The charging information for the use of the three party service shall be sent to the served user provided the served user is the calling user.

8.1.2 Charge informatin during call

AOC-D is not applicable.

8.1.3 Charge information at the end of the call

The charging information for the use of the three party service shall be sent to the served user provided the served user is the calling user.

8.16 Three-party

As the remote user's network is not aware of the invocation of the 3PTY supplementary service, the remote user shall not be prevented from making their connection to the three-way conversation a part of another three-way conversation controlled by that remote user.

Annex A

Applicable.

CCBS - Completion of Call to Busy Subscriber

Application to ETSI ETS 300 357

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 CCBS supplementary service shall be provided on a subscription basis.

The network shall provide the subscription option for the Recall mode.

6.2 Normal procedures

6.2.1 Activation, deactivation and registration

6.2.1.1 Activation

The retention timer shall have the value 15 seconds.

The service duration timer shall have the value 45 minutes.

The maximum number of outstanding CCBS requests at user A shall be 5.

When the network receives a CCBS activation request, the network shall check whether an identical CCBS request is already in user A's queue. ~~In this case the CCBS request shall be rejected.~~

The maximum number of outstanding CCBS requests at user B shall be 5.

At the destination, the network shall provide the possibility to select the queue size per individual user.

6.2.3 Invocation and operation

The idle guard timer shall have the value 10 seconds.

The recall timer shall have the value 20 seconds.

6.3 Exceptional procedures

6.3.3.1 Exceptional situation at destination B's side

Item b): destination B is busy upon arrival of the CCBS call

The network option specified in the second hyphen shall apply. This implies that the CCBS request shall be retained if user B is busy again when user A makes a CCBS call. (This option is called the "CCBS request retention" option in stage 3).

6.3.3.2 Exceptional situation at user A's side

Item c): user A reinitiates the CCBS supplementary service

The network option specified in the first hyphen shall apply. The network shall check if an identical CCBS request already exists and if so restart the CCBS service duration timer.

6.3.3.3 Network congestion

The network shall not take any specific action to reduce the probability of network congestion on the CCBS call.

7 Intercommunication considerations

Applicable.

8 Interaction with other supplementary services

8.10 Diversion services

8.10.2 Call forwarding busy

Arrival of the CCBS call after the call forwarding busy supplementary service has been activated

The network option specified in the first hyphen shall apply.

Annex A (Normative): Determination of the existance of compatible terminals

Applicable.

Annex B (Informative): Bibliography

Applicable.

LH - Line Hunting

Application to ETSI DE/NA-10003, version ~~78~~

1 Scope

~~Applicable.~~

When a basic access is selected, the network shall select the less significant free B-channel (i.e. B1 shall be selected before B2).

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbriviations

Applicable.

The following has to be added:

LHG Line Hunting Group

5 Description

The maximum number of hunt groups, of which one basic access can be member, shall be 5.

A basic access in a hunt group can activate "hunt group withdrawal" to be temporarily prevented from receiving calls to the hunt group. This option shall be applicable.

6 Procedures

6.1 Provision and withdrawal

The subscription options applying to the whole hunt group shown in table 1 shall be applicable.

The subscription options applying to each basic access in a hunt group shown in table 2 shall be applicable.

6.2 Normal procedures

6.2.4 **Interrogation**

* ~~Interrogation shall be possible from all accesses in a hunt group.~~

~~Note: This functionality is pending decision in ETSI.~~

* ~~Applicable.~~

7 Intercommunication conciderations

Applicable.

8 Interaction with other supplementary services

Applicable.

9 Interaction with other NA1 services

Applicable.

TH - Trunk Hunting

Application to ETSI DE/NA-10028, version ~~01~~ 02

1 Scope

* ~~Applicable.~~

* ~~When a access is selected, the network shall select the less significant free B-channel (i.e. B1 shall be selected before B2 etc).~~

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbriviations

Applicable.

5 Description

The maximum number of hunt groups, of which one access can be member, shall be 5.

An access in a hunt group can activate "hunt group withdrawal" to be temporarily prevented from receiving calls to the hunt group. This option shall be applicable.

6 Procedures

6.1 Provision and withdrawal

The subscription options applying to the whole hunt group shown in table 1 shall be applicable.

The service provider option to support withdrawal for each access of the hunt group shall be supported.

7 Intercommunication conciderations

Applicable.

8 Interaction with other supplementary services

Applicable.

9 Interaction with other NA1 services

Applicable.

OCB-UC - User Controlled Outgoing Call Barring

Application to ETSI DE/NA-10022, version ~~42 rev 1, 10 march 1994~~

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbriviations

The following addition shall apply in this document:

BP Barring program.

5 Description

It shall be possible to have 30 different call barring programs.

6 Procedures

6.1 Provision and withdrawal

* The size of the PIN shall be 4 digits. ~~The PIN shall be associated with the whole access, i. e. a PIN cannot be assigned per ISDN number.~~

It shall be possible to provide the OCB-UC supplementary service for:

1. the whole ISDN access,
2. one or more basic services or
3. one or more MSN-numbers.

It shall be possible to have different barring programs for each basic service and each MSN-number.

* ~~The network shall support the possibly for the served user to indicate an individual ISDN number or all ISDN numbers.~~

6.2 Normal procedures

* ~~6.2.1 Registration and erasure~~

~~Note: If the keypad procedures is used for the control of OCB-UC, registration and erasure are applicable.~~

6.2.2 Activation and deactivation

* 6.2.2.1 Activation

A PIN shall not be assigned on a per ISDN number basis, i.e. the PIN belongs to the whole access.

The network shall support the possibility for the served user to indicate all ISDN numbers.

* 6.2.2.2 Deactivation

A PIN shall not be assigned on a per ISDN number basis, i.e. the PIN belongs to the whole access.

The network shall support the possibility for the served user to indicate all ISDN numbers.

7 Intercommunication conciderations

Applicable

8 Interaction with other supplementary services

It shall be possible to store abbreviated address numbers in the network. It shall be possible to call abbreviated address numbers, which have been registered prior to activation of OCB-UC, by using the abbreviated address, even if the number cannot be called by dialling the full number due to OCB-UC.

Note: The abbreviated number supplementary service is not part of INFR-92. However, if this supplementary service is implemented in an exchange system, the interaction specified above shall apply.

9 Interaction with other NA1 services

Applicable.

* Annex A (normative)

The PIN shall not be assigned on a per ISDN number basis, i.e. the PIN belongs to the whole access.

The served user shall have the possibility to make requests two times indicating a wrong PIN. If the third request contains a wrong PIN, the network shall disable the PIN and restrict further access the OCB-UC supplementary service. The PIN shall be enabled either automatically after 24 hours or before 24 hours by administrative procedures.

No further procedure specified in this annex shall apply.

OCB-F - Fixed Outgoing Call Barring

Application to ETSI DE/NA-10006, version ~~64 rev 1, 10 march 1994~~

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbriviations

Applicable.

5 Description

It shall be possible to have 30 different call barring programs.

The time controlled option shall be available.

6 Procedures

6.1 Provision and withdrawal

It shall be possible to provide the OCB-F supplementary service for:

1. the whole ISDN access,
2. one or more basic services or
3. one or more MSN-numbers.

It shall be possible to have different barring programs for each basic service and each MSN-number.

6.2 Normal procudures

6.2.4 Interrogation

Interrogation shall be possible.

Note: This functionality is pending decision in ETSI.

7 Intercommunication conciderations

Applicable.

8 Interaction with other supplementary services

It shall be possible to store abbreviated address numbers in the network. It shall be possible to call abbreviated address numbers, which have been registered prior to activation of OCB-F, by using the abbreviated address, even if the number cannot be called by dialling the full number due to OCB-F.

Note: The abbreviated number supplementary service is not part of INFR-92. However, if this supplementary service is implemented in an exchange system, the interaction specified above shall apply.

9 Interaction with other NA1 services

Applicable.

TELE DANMARK

INAD-3 APPENDIX D

Title:

Application specifications to DSS1 - Physical layer

Subappendices:

Appendix D1: Basic Access - S/T-reference point

Appendix D2: Primary Rate Access - T-reference point

TELE DANMARK

INAD-3 APPENDIX D1

Title:

Basic Access - S/T-reference point

Contents:

This appendix is an application specification to the basic access layer 1 standard ETS 300 012.

March 26. 1993

Specification of:

ETS 300 012
Integrated Services Digital Network (ISDN);
Basic user-network interface
Layer 1 specification and test principles
April 1992

This specification refers to page 15 in the standard.

Clause/ subclause	Option	Specifica-tion
7.1.4.2	Power source characteristic a) or b)	a
7.1.4.4.2	Maximum number of terminals to be fed from power source 1	4
7.3.1	Maximum number of terminals to be fed from APS	4
7.4	NT1 designed to be compatible with an APS: yes, no	yes
7.4.1	NT1 normal mode voltage detector: yes, no	yes
A.4.4	Connection of NT to user premises wiring	prEN 28 877
A.4.5	– Connection of the connecting cord to equipment – Location of the terminating resistor at the NT side – Connected cord is part of TE, or TE is designed for use with "standard ISDN basic access TE cord"	prEN 28 877 Strap: none, 50 or 100Ω Standard cord
A.5.3.2	Connected/disconnected indication: a) or b)	Optional
A.6.1.4	Priority class: fixed or under control of layer 2	Optional
A.6.2.2	TE not able to initiate activation: yes, no	Optional
A.6.2.3.2	Activation/deactivation procedure according to table 5, table C–1 or table C–2/I.430 [2]: – 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	Optional
A.6.2.4.1 (table 6)	Timer T2 in NT = 25 ms to 100 ms or T2 = 0	25 ms to 100 ms
A.6.3.3	TE supporting multiframing: yes, no NT2 providing multiframing: yes, no	No No
A.8.6.2	NT designed for configurations according 8.6.2.2, 8.6.2.3, 8.6.2.4 or 8.6.2.5	*
A.8.6.3	NT designed for round trip delay according 8.6.3.1 8.6.3.2, 8.6.3.3 or 8.6.3.4	**
A.8.9	Standard cord length: a) < 7m or b) 7m to 10m	< 7m
A.9.1.2	– 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	Optional No Optional Optional
A.9.2.1	Power available from power source 1	40V 4W in normal mode 40V 420mW in restricted mode
A.9.5.2.1	TE designed for restricted power operation: yes, no	Optional
Annex C	TE designed to minimise power disturbance: yes, no	Optional

* = Noise and distortion: 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 bus configurations with jumpers

•• = Round trip delay: 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 bus configurations with jumpers

TELE DANMARK

INAD-3 APPENDIX D2

Title:

Primary Rate Access - T-reference point

Contents:

This appendix is an application specification to the primary rate access layer 1 specification ETS 300 011.

Application specification for T–interface

Foreword

This application specification is an addition to ETS 300 011, April 1992: "Integrated Services Digital Network (ISDN); Primary rate user–network interface; Layer 1 specification and test principles", showing modifications and statements to the requirements of this ETS where necessary for the application in the network of Tele Danmark.

While approval requirements to the user equipment will appear in CTR 4, this application specification describes all requirements to the user equipment necessary for its cooperation on layer 1 with the ISDN network of Tele Danmark. It describes also the functions at layer 1 provided by this network to the user equipment.

The functions provided by the network and described in the parallel application specification to ETS 300 233 may be provided by various logical functions in the network. Where these functions are provided by the Network Termination 1 (NT1), which as a part of the digital section provides the user–network interface itself, it is explicitly stated such that this application specification can be used as a part of the purchase specification for NT1's.

Modifications and statements

Clause	Comment/title	Statement
5	**Conformance**	I
5, CRC	<CRC shall be processed in the NT1>	N
5, channels	<H–channel services are not supported by the ISDN>	N
5, TS0B2 (timeslot 0, bit 2)	<use of B2 = 0 in odd TS0's to detect loss of frame alignment is optional>	N
6	**Requirements**	I
Table 1 items	**Table 1 re ETS 300 011**	I
3.4.4	<In the G5 state sending of continuous CRC error information is mandatory>	N

Clause	Comment/title	Statement
5.2.3	<Add NOTE> At the T–interface the NT1 sends $S_{a5} = S_{a6} = 0$ and ignores the received S_{a5} and S_{a6} bits. <The use of these bits in the network is regulated in ETS 300 233>	N
5.3	<Add the following text> If no network timing is available, but timing from the T–interface is available, the NT1 shall derive its timing from the T–interface.	N
5.4.2	<This input jitter tolerance shall also apply to the NT1>	N
5.4.3	<This output jitter shall also apply to the NT1> <Add NOTE> The input providing timing shall be the network input, the T–interface or the internal clock in the NT1, re clause 5.3.	N
5.8.1	<The NT1 shall transmit user channels as received from the network>	N
5.8.2	<The NT1 shall transmit the D–channel as received from the network>	N
5.9.2.1	<Add NOTE> Only the option with CRC processing in the transmission link (in the NT1) shall be applied.	N
5.9.2.2.1	<No CRC processing>	N/R
5.9.2.2.2	<CRC processing in the NT1>	N
5.9.3.3.1	<Add to NOTE 1> The NT1 shall send AIS to the T–interface if it is not frame–aligned to the received network signal. <Add to NOTE 2> The NT1 shall detect all of these defect conditions.	N

Clause	Comment/title	Statement
5.9.3.3.3	<Read table 8/I.431 as follows, when it shall relate to defect conditions and defect indication signals detected in the NT1: Line "loss of power...": AIS mandatory. Line "loss of frame alignment": only option 2 applicable. Line "excessive CRC error ratio": there shall be no generation of RAI>	N
6	Interface connector <Add NOTE> The NT1 shall allow for both options.	N
Table 2 items	**Table 2 re ETS 300 011**	I
6.3	Specification at the input ports	I
Table 3 items	**Table 3 re ETS 300 011**	I
1	General	I
Annex A	A.1, A.2	N/R
Table 4 items	**Table 4 re ETS 300 011**	I
1	General	I
4.1.1	<NOTE 2 is mandatory>	N
Annex A	**Application for PTNX interconnections** <This annex has no implications for the NT1>	N
Annex B	**Application to the S-interface** <This annex has no implications for the NT1>	N
Annex C	**Conformance test** <Some tests of NT1 require a simulator with suitable levels and bit patterns at the network side>	N

Clause	Comment/title	Statement
Annex D	**Loopbacks**	I
D.2	Loopback at the network side <loopback 2 is mandatory>	N
D.3	Loopback at the user side <The network will not implement the control of these loops in the near future>	N/R

TELE DANMARK

INAD-3 APPENDIX E

Title:

Application specifications to DSS1 - Data link layer

Subappendices:

None.

Contents:

This appendix is an application specification to the DSS1 layer 2 standard ETS 300 125 1993 version.

TELE DANMARK

ISDN Digital Subscriber Signalling No. 1

DSS1

Data link layer

Application specification document to ETSI ETS ~~T/S 46-20~~ 300 402 part 1 and 2:

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

November 1994

Table of contens:

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~~ 300 402 part 1 and 2, ~~which has been revised in March 1990 according to public comments~~.
This document is an application specification to this ETS.

Application to ETS 300 402 part 1, application of CCITT 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 ETS 300 402 part 2, application of CCITT 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.~~

~~Applicable~~

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.~~

~~SAPI 12 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 ~~Parameter data~~

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 Acknowleged 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 fault conditions 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.~~

TELE DANMARK

INAD-3 APPENDIX F

Title:

Application specifications to DSS1 - network layer - ETSI Bearer Services

Subappendices:

Appendix F1: Basic call control.

Appendix F2: Support of packet mode terminal equipment by an ISDN, Case B.

TELE DANMARK

INAD-3 APPENDIX F1

Title:

Basic call control

Contents:

This appendix is an application specification to the basic call control standard for circuit switched bearer services, ETS 300 403-1.

Note: Although specified in this appendix, the multiple rate bearer service is not implemented in the network.

NORDTEL

NT/SIG-SPEC-1

NORDIC SPECIFICATION

APPLICATION DOCUMENT TO ETS 300 ~~102~~403-1 (1993)
DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1 (DSS1)
NETWORK LAYER - BASIC CALL CONTROL

Issue 2
Rev: B

ISSUE DATE: 96-07-11

TABLE OF CONTENTS

NORDTEL Foreword

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)~~ ETS 300 403-1. This document selects which options in the ~~ETS T/S 46-30 (ETS 300 102 Part 1)~~ ETS 300 403-1 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. Consequently, this document does not in all cases specify which message contents and information element codings are implemented as this depends on the services supported.

Where text is provided in this application document, the relevant clause in ETS 300 403-1 shall be considered as "applicable" taking into consideration the additional text provided in that clause.

In relation to Issue 1 of NT/SIG-SPEC-1, the following notation is used:

- changes in the contents in relation to Issue 1 are explicitly indicated by use of strike-out (deleted text) and shadow (new text). However, this applies only to substantial changes and not to editoral changes without technical impact,

- the appendices A and B to this document have been rewritten and changes are therefore not explicitly indicated,

- application text to new ETSI clauses and subclauses are not explicitly marked,

- in many cases, a paragraph has been deleted due to the fact that the content of the paragraph is included as part of the updated ETS.

A number of NORDTEL D-channel related specifications exist.

These are:

- NT/SIG-SPEC-2-1, which is an application specification to ETS 300 122, specifying the requirements for the generic signalling keypad procedures to be used for stimulus control of supplementary services.

- NT/SIG-SPEC-2-2, which is an application specification to ETS 300 196, specifying the generic functional procedures for the support of supplementary services.

- NT/SIG-SPEC-3A/B/C/D which are individual specifications for the stage 3 keypad signalling procedures for the diversion, advice of charge, closed user group and malicious call identification supplementary services respectively.

Foreword

Applicable.

1 General

1.1 Scope

Applicable.

1.2 Normative references

Applicable.

1.3 Definitions

Applicable.

1.4 Symbols and abbreviations

Applicable.

1.5 Typographic conventions

Applicable.

1.6 Application to interface structures

Applicable.

2 Overview of call control

Applicable.

3 Messages functional definitions and content

Applicable.

3.1 Messages for circuit mode connection control

SEGMENT

See the application to Annex H.

3.1.1 Alerting

Applicable.

3.1.2 Call proceeding

Applicable.

3.1.3 Connect

NOTE 7: The Date/time information element shall be included for all calls in the CONNECT message.

NOTE 9: 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.~~

3.1.4 Connect acknowledge

Applicable.

3.1.5 Disconnect

Applicable.

3.1.6 Information

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

ETSI NOTE: The use of the Keypad facility information element in the network-to-user direction is not applicable.

NOTE - Norway: The use of the Keypad facility information element in the network-to-user direction is applicable.

3.1.7 Notify

Applicable.

3.1.8 Progress

Applicable.

3.1.9 Release

Applicable.

3.1.10 Release complete

Applicable.

3.1.11 Resume

Applicable.

3.1.12 Resume acknowledge

Applicable.

3.1.13 Resume reject

Applicable.

3.1.14 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 in the network-to-user direction.

NOTE 6: Network specific facilities information is not applicable.

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

NOTE 15: Transit network selection is not applicable.

ETSI NOTE 1: The use of the Keypad facility information element in the network-to-user direction is not applicable.

NOTE - Norway: The use of the Keypad facility information element in the network-to-user direction is applicable.

3.1.15 Setup acknowledge

Applicable.

3.1.16 Status

Applicable.

3.1.17 Status enquiry

Applicable.

3.1.18 Suspend

Applicable.

3.1.19 Suspend acknowledge

Applicable.

3.1.20 Suspend reject

Applicable.

3.2 Messages for packet mode connection control

Applicable.

3.3 Messages for user signalling bearer service control

Applicable.

3.4 Messages used with the global call reference

The SEGMENT message is not applicable.

3.4.1 Restart

Applicable.

3.4.2 Restart acknowledge

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 H.

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.~~

Information elements belonging to codeset 5 are not applicable.

4.5.2 Extensions of codeset

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 subclause 4.5.3).

Information elements belonging to codeset 4, 5, 6 and 7 are not applicable.
The network shall handle information elements belonging to ~~other~~ these codesets ~~than 0 or 5~~ according to the procedures for unrecognized information elements (see subclause 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~~ considered as having a content error and handled according to subclause 5.8.6.2 or 5.8.7.2.

4.5.6 Call identity

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~~ considered as having a content error and handled according to subclause 5.8.6.2 or 5.8.7.2.

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

The following text is an application to CCITT Recommendation Q.850.

1. General

Applicable.

2. Cause

2.1 Format

Applicable.

2.2 Codes used in the sub-field of the "Cause"

2.2.1 Extension indicator (ext)

Applicable.

2.2.2 Coding standard

~~The network shall be able to handle both CCITT-standardized and national-standard coding.~~ Only CCITT-standardized coding shall be used. If a Cause information element is received containing a different coding than CCITT coding ~~or national-standard~~, the information element shall be ~~discarded~~ considered as having a content error and handled according to subclause 5.8.6.2 or 5.8.7.2.

2.2.3 Location

Applicable.

2.2.4 Recommendation

Applicable.

2.2.5 Cause value

The cause values shall be used as specified in the procedural text.

2.2.6 Diagnostics

If the network receives a Cause information element containing a Diagnostic field, and the cause information is transported transparently ~~the network shall transport this information transparently~~ through the network to the remote user, the diagnostic field shall be included.

NOTE - Finland: The diagnostic field is not required.

The diagnostic field shall be provided for cause values listed in table 1.

Table 1: Cause values for which diagnostics are required

CAUSE	
43	Access information discarded
~~57~~	~~Bearer capability not authorized~~
~~58~~	~~Bearer capability not presently available~~
~~65~~	~~Bearer capability not implemented~~
86	Call having the requested call identity has been cleared
88	Incompatible destination
96	Mandatory information element is missing
97	Message type non-existent or not implemented
98	Message not compatible with call state or message type non-existent or not implemented
99	Information element non-existent or not implemented
100	Invalid information element contents
101	Message not compatible with call state
102	Recovery on timer expiry

2.2.7 Cause Definitions

Applicable.

3 General rules for the handling of the location field

If the network has the knowledge that the user is not a private network, the location field in the Cause information element received from the user shall be checked. If the location field indicates a value different from "user", the network shall change it to "user".

If the network has the knowledge that the user is a private network, no check of the location field shall be performed.

4.5.13 Channel identification

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~~ considered as having a content error and handled according to subclause 5.8.6.2 or 5.8.7.2.

4.5.14 Congestion level

Applicable.

4.5.15 Date/time

Applicable.

4.5.16 Display

Applicable.

4.5.17 High layer compatibility

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

To identify a basic service (e.g. in connection with supplementary service handling), 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.~~

All HLC values shall be transported transparently through the network.

The network shall only use CCITT-standardized HLC values to identify basic services.

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 and Sweden: Support of national HLC values is not required.

4.5.18 Keypad facility

Applicable.

4.5.19 Low layer compatibility

Applicable.

4.5.20 More data

Applicable.

4.5.21 Network-specific facilities

Not applicable.

4.5.22 Notification indicator

Applicable.

4.5.23 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~~ considered as having a content error and handled according to subclause 5.8.6.2 or 5.8.7.2.

4.5.24 Repeat indicator

Applicable, i.e. not used.

4.5.25 Restart indicator

Applicable.

4.5.26 Segmented message

Not applicable.

NOTE - Norway: Applicable.

4.5.27 Sending complete

Applicable.

4.5.28 Signal

Applicable, i.e. not used.

4.5.29 Transit network selection

Not applicable.

4.5.30 User-user

Applicable.

4.6 Information elements for packet communications

Applicable.

5 Circuit switched call control procedures

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

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 Appendix B to this application document.

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", "speech" or "unrestricted digital information with tones/announcements" and additionally return inband dial tone.

5.1.4 Invalid call information

In case bearer capability is "3.1 kHz audio", "speech" or "unrestricted digital information with tones/announcements", the network shall return progress indicator #8 "in-band information or appropriate pattern now available" in accordance with Appendix A to this application document.

Cause #3 shall not be generated by the network.

5.1.5 Call proceeding

Applicable.

5.1.6 Notification of interworking at the originating interface

Applicable.

5.1.7 Call confirmation indication

Applicable.

5.1.8 Call connect

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 the TA, TE or NT2 and to retain it indefinitely, shall be applicable.

Conditions for releasing the data link

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.

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.

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 subaddress, if provided, and
- always include a Sending complete information element.

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

The alternative procedure specified in the ETSI NOTE is not applicable.

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

Item 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.~~

In connection with basic call it shall be possible for users to subscribe to:

- Option 1; or
- Option 2;

Note: Option 3 is covered by the functionality in 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 to this application document.

5.2.3.2 SETUP message delivered by broadcast data link

Applicable.

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

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 non-existent or not implemented message type.

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 en-bloc SETUP or completion of overlap receiving

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

5.2.5.2 Receipt of CALL PROCEEDING and ALERTING

Applicable.

5.2.5.3 Called user clearing during incoming call establishment

Applicable.

5.2.5.4 Call failure

Applicable.

5.2.6 Notification of interworking at the terminating interface

The NOTE related to the first item 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

Applicable.

5.3.4 Clearing initiated by the network

Applicable.

5.3.4.1 Clearing when tones/announcements provided

In case the bearer capability is "3.1 kHz audio", "speech" or "unrestricted digital information with tones/announcements", the network shall return progress indicator #8 "in-band information or appropriate pattern now available" and the in-band information shall be according to Appendix A to this application document.

If, in the case of én-bloc sending, the network clears the call, and 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 according to Appendix A to this application document.

5.3.4.2 Clearing when tones/announcements not provided

Applicable.

5.3.5 Absence of response during call clearing

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

5.3.6 Clear collision

Applicable.

5.4 In-band tones and announcements

For all calls where bearer capability is "speech", "3.1 kHz audio" or "unrestricted digital information with tones/announcements", 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.

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).

Table 2:
Actions on the coding of the received Restart indicator and Channel identification information elements.

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 1)	Restart channel	RESTART ACK (Bi) (Note 1)
			Bsp	Invalid	STATUS (#82)
		The D-channel	No channel	Invalid	STATUS (#82)
			Any channel	Invalid	STATUS (#82)
			Bi (Note 1)	Restart channel	RESTART ACK (Bi) (Note 1)
			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 (Note 2)	Restart channel(s)	RESTART ACK (Bi) (Note 2)
			Bsp	Invalid	STATUS (#82)
			"B16"	Invalid	STATUS (#82)
			Bi, Bsp, "B16" (Note 2)	Restart channel(s) excluding Bsp and "B16"	RESTART ACK (Bi) (Note 2)
		The D-channel	No channel	Invalid	STATUS (#82)
			Any channel	Invalid	STATUS (#82)
			Bi (Note 2)	Restart channel(s)	RESTART ACK (Bi) (Note 2)
			Bsp	Invalid	STATUS (#82)
			"B16"	Invalid	STATUS (#82)
			Bi, Bsp, "B16" (Note 2)	Restart channel(s) excluding Bsp and "B16"	RESTART ACK (Bi) (Note 2)
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)

Cause #82 "Identified channel does not exist"

Bi: one or more B-channels on the interface
Bsp: semipermanent B-channel
B16: time-slot 16 on PRA used for D-channel signalling

Note 1: If more than one B-channel is to be indicated, the Channel identification information element shall be repeated within the message.
Note 2: A single Channel identification information element shall be used if more than one B-channel is to be indicated.

5.5.1 Sending RESTART

Applicable.

5.5.2 Receipt of RESTART

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.

5.5.3 Restart error handling procedures

Applicable.

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

Applicable.

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"~~ #29 "facility rejected" and the call shall remain in the Active state.

5.6.4 Call re-establishment

Applicable.

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 an 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 a Cause information element with the diagnostic field.

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.

5.8.7.3 Unexpected recognised information element

Applicable.

5.8.8 Data link reset

Applicable.

5.8.9 Data link failure

Item b): the second hyphenated item applies, i.e. the network shall perform the status enquiry procedure to verify the call state of the peer entity.

~~NOTE - Finland and Sweden: The status enquiry procedure 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 subclause 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 46-30300 403-1~~ 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

	User's 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	B
1 Call initiated	D	E	C	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	C
3 Outgoing call proceeding	D	K	K	E	C	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	C
6 Call present	I	H	H	H	H	E	H	H	H	H	H	H	H	H	H	H	H
7 Call received	I	H	H	H	H	EH	H	H	H	H	H	H	H	H	H	H	H
8 Connect request	I	H	H	H	H	EH	H	H	H	H	H	H	H	H	H	H	H
9 Incoming call proceeding	I	H	H	H	H	EH	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	C
10 Active (Dest.)	D	C	C	C	C	C	C	K	C	E	C	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	F
12 Disc ind	G	F	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	C
17 Resume request	D	C	C	C	C	C	C	C	C	C	C	C	C	E	C	C	C
19 Release request	G	F	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	H
25 Overlap receiving	I	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H

*) Any other call state value.

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

	User's 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	M
8 Connect request	L	M	M	M	M	M	M	N	M	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	M
19 Release request	L	F	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	M

*) Any other call state value.

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

	User's 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	C
7 Call received	D	C	C	C	C	C	E	C	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	C
9 Incoming call proceeding	D	C	C	C	C	C	C	C	E	C	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	C

*) Any other call state value.

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 6: State machine associated with a global call reference

	User's call state received in a STATUS message			
Network call state	0	1	2	*)
0 Rest 0	R	R	R	T
1 Rest 1	S	R	S	T
2 Rest 2	T	R	R	T

*) Any other call state value.

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. If

- cause #30 "Response to status enquiry",
  cause #31 "Normal, unspecified", or
  cause #96 "Mandatory information element is missing"
  ~~cause #97 "Message type non-existent or not implemented",~~
  ~~cause #98 "Message not compatible with call state or message type non-existent or not implemented" or~~
  ~~cause #101 "Message type not compatible with call state"~~ is received, 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 is received, the network shall take no action.

~~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 call state ~~which existed at the moment the incorrect message was received~~ of the receiver after taking action on the message. ~~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 300 403-2).

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

5.9 User notification procedure

Applicable.

5.10 Basic telecommunication service identification and selection

Note: The application specification to this subclause will be considered when ETS 300 403-1 has passed the public enquiry phase and alignment with Clause 5 of ETS 300 267 has taken place. In the meantime, application specification can be found in national application specification to Clause 5 of ETS 300 267, if available.

5.11 Signalling procedures for bearer capability selection

Note: The application specification to this subclause will be considered when ETS 300 403-1 has passed the public enquiry phase and alignment with Clause 5 of ETS 300 267 has taken place. In the meantime, application specification can be found in national application specification to Clause 5 of ETS 300 267, if available.

5.12 Signalling procedures for high layer compatibility selection

Note: The application specification to this subclause will be considered when ETS 300 403-1 has passed the public enquiry phase and alignment with Clause 5 of ETS 300 267 has taken place. In the meantime, application specification can be found in national application specification to Clause 5 of ETS 300 267, if available.

5.13 Control of status request procedures

Applicable.

6 Packet communication procedures

Applicable.

7 User signalling bearer service call control procedures

Applicable.

8 Circuit-mode multirate (64 kbit/s base rate) procedures

8.1 Call establishment at the originating interface

8.1.1 Compatibility information

Applicable.

8.1.2 Channel selection

The network shall support the contiguous channel assignment mechanism.

The network shall support free allocation of the set of channels for a specific call provided a contiguous number of channels are available.

Note: For example, if a 6*64 kbit/s call is requested, the assigned channels may be [26, 27, 28, 29, 30 and 31] or [24, 25, 26, 27, 28 and 29] etc.

The entity (user or network) selecting the channels as part of the channel negotiation procedure shall assign the channels contiguously.

When both single 64 kbit/s and multirate connections are supported at the same interface, it may be appropriate to assign single 64 kbit/s connection from one end of the interface (e.g. starting with channel 1) and multirate connections from the other end (e.g. starting with channel 31) to avoid call rejection due to lack of contiguous channels.

To provide this in a flexible manner the originating network shall support the subscription option specified in table 7. The subscription option applies only to primary rate access.

Table 7: Subscription option for originating channel assignment

Subscription option	Value	Meaning
Assignment of single 64 kbit/s connections	Low end	The network shall assign channels to 64 kbit/s connections from the low end channel number for an outgoing call
	High end	The network shall assign channels to 64 kbit/s connections from the high end channel number for an outgoing call
Assignment of multi-rate connections	Low end	The network shall assign channels to multirate connections from the low end channel number for an outgoing call
	High end	The network shall assign channels to multirate connections from the high end channel number for an outgoing call

8.2 Call establishment at the destination interface

8.2.1 Compatibility information

Applicable.

8.2.2 Channel selection

The network shall support the contiguous channel assignment mechanism.

The network shall support free allocation of the set of channels for a specific call provided a contiguous number of channels are available.

Note: For example, if a 6*64 kbit/s call is requested, the assigned channels may be [26, 27, 28, 29, 30 and 31] or [24, 25, 26, 27, 28 and 29] etc.

The entity (user or network) selecting the channels as part of the channel negotiation procedure shall assign the channels contiguously.

As for the originating side, the destination network shall provide a subscription option, specified in table 8, for the handling of channel assignment.

Table 8: Subscription option for destination channel assignment

Subscription option	Value	Meaning
Assignment of single 64 kbit/s connections	Low end	The network shall assign channels to 64 kbit/s connections from the low end channel number for an incoming call
	High end	The network shall assign channels to 64 kbit/s connections from the high end channel number for an incoming call
Assignment of multi-rate connections	Low end	The network shall assign channels to multirate connections from the low end channel number for an incoming call
	High end	The network shall assign channels to multirate connections from the high end channel number for an incoming call

8.2.2.1 Point-to-point configuration

Applicable.

8.2.2.2 Point-to-multipoint configuration

Applicable.

9 List of system parameters

The network timer values given in table 9 below shall be used.

9.1 Timers in the Network Side

Table 9. Network timer values

Timer	TIMER VALUE APPLICABLE IN EACH COUNTRY				
	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~~ N.a.	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	~~90s~~ 6/12s	~~90s~~ 6/12s	~~90s~~ 6/12s	~~90s~~ 6/12s	~~90s~~ 6/12s
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	Note 1	Note 1	Note 1	Note 1	Note 1
T322	4 s	N. a.	4 s	~~N.a.~~ 4 s	~~N.a.~~ 4 s
T3xx(Note2)	15 s	10-15 s	15 s	10-15 s	10-15 s

N. a. = Not applicable

Note 1: Outside the scope of this standard.

Note 2: See § 5.2.

9.2 Timers in the User Side

Applicable.

Annex A (Informative): User side and network side SDL diagrams

Applicable.

Annex B (Normative): Compatibility and address checking

Applicable.

Annex C (Normative): Transit network selection

Not applicable.

Annex D (Informative): Extensions for symmetric call operation

Applicable, i.e. not used.

Annex E (Normative): Network specific facility selection

Not applicable.

Annex F (Informative): D-channel backup procedures

Applicable, i.e. not used.

Annex G (Normative): Use of progress indicators

Applicable.

Annex H (Normative): 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 ~~Clause 7~~ ETS 300 286.

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

NOTE - Norway: Applicable.

~~NOTE - Denmark: Segmentation is applicable as follows:~~

~~a) The network shall accept a segmented message from the user.~~

~~b) The network shall provide a subscription option on a per access basic. If the subscription option is set to "segmentation not provided", the network shall not send segmented messages to the user but act as specified above (i.e. discard the User-user information element). If the subscription option is set to "segmentation provided", the network shall send segmented messages to the user where appropriate.~~

Annex I (Normative): 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 46-39018~~ for further examples.

Annex J (Normative): Low layer compatibility negotiation

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

See ETR ~~T/S 46-39018~~ for further examples.

Annex K (Normative): 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 L (Informative): Optional procedures for bearer service change

Applicable, i.e. not used.

Annex M (Informative): Usage of cause values

Applicable.

Annex N (Informative): Identification of changes from edition 1 of this ETS (ETS 300 102-1 December 1990)

Applicable.

NORDTEL

NT/SIG-SPEC-1

NORDIC SPECIFICATION

APPLICATION DOCUMENT TO ETS 300 ~~102~~403-1 (1993)
DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1 (DSS1)
NETWORK LAYER - BASIC CALL CONTROL

APPENDIX A

CAUSE MAPPING AND ASSOCIATION BETWEEN CAUSE VALUES
AND TONES AND/OR ANNOUNCEMENTS

Issue 2
Rev: B

ISSUE DATE: 96-07-11

APPENDIX A: Cause mapping and association between cause values and tones and/or announcements

This appendix specifies the requirements to mapping of cause values between ISUP and DSS1 and, in addition, the tones and/or annoucements associated to the individual cause values.

A.1 Association between cause values and tones/announcements

Table A.1 lists all cause values applicable to DSS1 and the associated tones/announcement which shall be sent to the user.

In general, tones/announcements are sent only if the cause value is sent to the user in connection with a call clearing or call rejection and if a B-channel is established to the user.

Keys:

No indication in the "country columns" implies that no tone or announcement is sent.
Rec. = Recorded announcement
Busy = Busy tone
Cong. = Congestion tone
SIT = Special information tone

Table A.1: Association between cause values and tones/announcements

Cause no.	Cause Name	Sweden	Norway	Denmark	Finland
1	Unallocated (unassigned) number	SIT/Rec.	Rec.	SIT	Rec.
2	No route to specified transit network	SIT/Rec.	Cong.	SIT	
3	No route to destination	SIT/Rec.	Cong.	SIT	
6	Channel unacceptable		Cong.		Cong.
7	Call awarded and being delivered in an established channel				
8	Preemption			Busy	
16	Normal clearing		Cong.	Busy	Busy
17	User busy	Busy	Busy	Busy	Busy
18	No user responding		Cong.	Busy	Rec.
19	No answer from user (user alerting)		Cong.	Busy	Busy
20	Subscriber absent			Busy	Rec.
21	Call rejected		Cong.	Busy	Busy
22	Number changed	SIT/Rec.	Rec.	SIT	Rec.
26	Non-selected user clearing				
27	Destination out of order		Rec.	Busy	Rec.
28	Invalid number format (address incompl.)	SIT/Rec.	Cong.	SIT	Rec.
29	Facility rejected	Cong/Rec	Cong/Rec	SIT	Cong.
30	Response to STATUS ENQUIRY				
31	Normal, unspecified		Cong.2)	Busy 2)	
34	No circuit/channel available	Cong./ Busy	Cong.	Busy	Cong.
38	Network out of order	SIT/Rec.	Rec.	Busy	Rec.
39	Permanent frame mode conn. out of service				
40	Permanent frame mode conn. operational				
41	Temporary failure	Cong.	Cong.	Busy	Cong.
42	Switching equipment congestion	Cong.	Cong.	Busy	Cong.
43	Access information discarded				
44	Requested circuit/channel not available		Cong.	Busy	
46	Precedence call blocked				
47	Resource unavailable, unspecified	Cong.	Cong.	Busy	Cong.
49	Quality of service unavailable				
50	Requested facility not subscribed	SIT	Rec.	SIT	Rec.
57	Bearer capabily not authorized				Rec.
58	Bearer capability not presently available				Cong.
62	Inconsistency in designated outgoing access information and subscriber class				
63	Service or option not available, unspec.	SIT/Rec.	Rec.	SIT	Rec.
65	Bearer capability not implementet				Rec.
66	Channel type not implemented				
69	Requested facility not implemented	SIT/Rec.		SIT	Rec.
70	Only restricted digital information bearer capability is available				
79	Service or option not implemented, unsp.	SIT/Rec.		SIT	Rec.
81	Invalid call reference value				
82	Identified channel does not exist				
83	A suspended call exists, but this call identity does not				
84	Call identity in use				
85	No call suspended				
86	Call having the requested call identity has been cleared				
87	User not member of CUG	?	Rec.	1)	Rec.
88	Incompatible destination	SIT/Rec.	Cong.	SIT	Rec.
91	Invalid transit network selection	SIT		SIT	Cong.
95	Invalid message,unspecified				Cong.
96	Mandatory information element is missing				Rec.
97	Message type non-existent or not impl.				Rec.
98	Message not compatible with call state or message type non-existent or not impl.				Rec.
99	Information element/parameter non-existent or not implemented				Rec.
100	Invalid information element contents				Rec.
101	Message not compatible with call state				Rec.
102	Recovery on timer expiry		Cong.	Busy	Rec.
111	Protocol error, unspecified				Rec.

Note 1: To be considered together with the individual supplementray services.

Note 2: If cause #31 is sent as a result of an received cause #4 from ISUP, SIT shall be sent to the user.

A.2 Cause mapping

When a call clearing at ISUP results in call clearing at DSS1, or visa versa, mapping of cause values may be necessary in the cause value received from one signalling system cannot be used unchanged through the other signalling system.

Two cases of cause mapping exist.

1) A cause value received by the network from ISUP mapped into a cause value sent via DSS1.

2) A cause value received by the network from DSS1 mapped into a cause value sent via ISUP.

Tables A.2 and A.3 show the two cases of mapping. The tables include only the mapping requirements for cases where the mapping is not performed one-to-one.

Table A.2: Mapping of cause values received from ISUP and sent via DSS1

Cause value received from ISUP		Cause values sent via DSS1			
		Sweden	Norway	Denmark	Finland
4	Send special information tone	31	31	31	31
5	Misdialled trunk prefix	28	28	28	1
9	Preemption - circuit reserved for reuse	31	31	31	Note 1
53	Outgoing calls barred within CUG	29	29	29	29
55	Incoming calls barred within CUG	29	29	29	29
90	Non-existent CUG	29	29	29	29
95	Invalid message,unspecified	95	95	95	95
97	Message type non-existent or not impl.	97	97	97	97
99	Information element/parameter non-existent or not implemented	99	99	99	99
103	Parameter non-existent or not implemented, passed on Note 2				
110	Message with unrecognized parameter, discarded	99	31	99	?
111	Protocol error, unspecified	111	111	111	111

Note 1: This cause value is of local significance at ISUP and mapping is therefore not relevant.

Note 2: Not used in national ISUP. Will be mapped in international gateway.

Table A.3: Mapping of cause values received from DSS1 and sent via ISUP

Cause value received from DSS1 Note 1		Cause values sent via ISUP			
		Sweden	Norway	Denmark	Finland
6	Channel unacceptable Note 1	34	34	34	
7	Call awarded and being delivered in an established channel Note 2				
26	Non-selected user clearing Note 2				
30	Response to STATUS ENQUIRY Note 1	111	111	111	111
39	Permanent frame mode connection out of sevice	31	31	31	Note 3
40	Permanent frame mode connection operational	31	31	31	Note 3
49	Quality of service unavailable	31	31	31	Note 3
66	Channel type not implemented	88	79?	88	?
81	Invalid call reference value	111	111?	111	95
82	Identified channel does not exist	44	44?	44	
95	Invalid message,unspecified	95	95	95	95
96	Mandatory information element is missing	96	96	96	111
97	Message type non-existent or not impl.	97	31	97	97
98	Message not compatible with call state or message type non-existent or not impl.	98	31	98	111
100	Invalid information element contents	100	31	100	111
101	Message not compatible with call state	101	31	101	111
111	Protocol error, unspecified	111	111	111	111

Note 1: In some cases, call clearing is a result of an internal network action. In these cases the clearing message and the cause value is sent on both DSS1 and ISUP. This applies e.g. to cause #6.
Note 2: This cause value is of local significance at DSS1 and mapping is therefore not relevant.
Note 3: Not used in national ISUP.

NORDTEL

NT/SIG-SPEC-1

NORDIC SPECIFICATION

APPLICATION DOCUMENT TO ETS 300 ~~102~~403-1 (1993)
DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1 (DSS1)
NETWORK LAYER - BASIC CALL CONTROL

APPENDIX B

GRAPHICAL REPRESENTATION OF B-CHANNEL SELECTION PROCEDURES

Issue 2
Rev: B

ISSUE DATE: 96-07-11

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 side (ref. sec. 5.1.2)

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

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

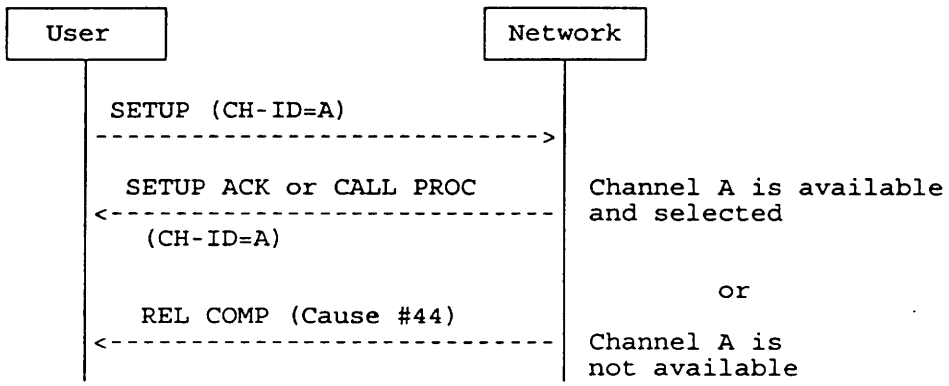
Case c) Content of the channel identification information element:
- any channel is acceptable => CH-ID=X.

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

Keys:

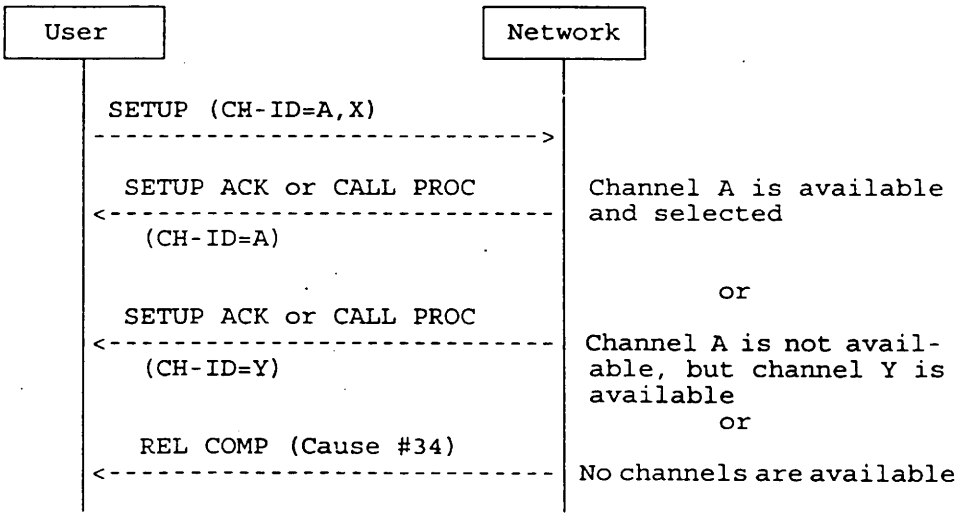
- A channel which is selected out of one or more available channels => CH-ID=Y.

Case a



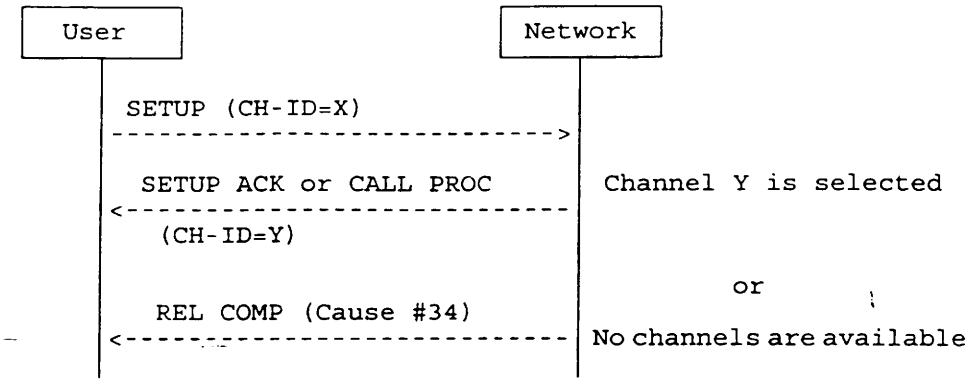
Cause #44 "requested circuit/channel not available

Case b



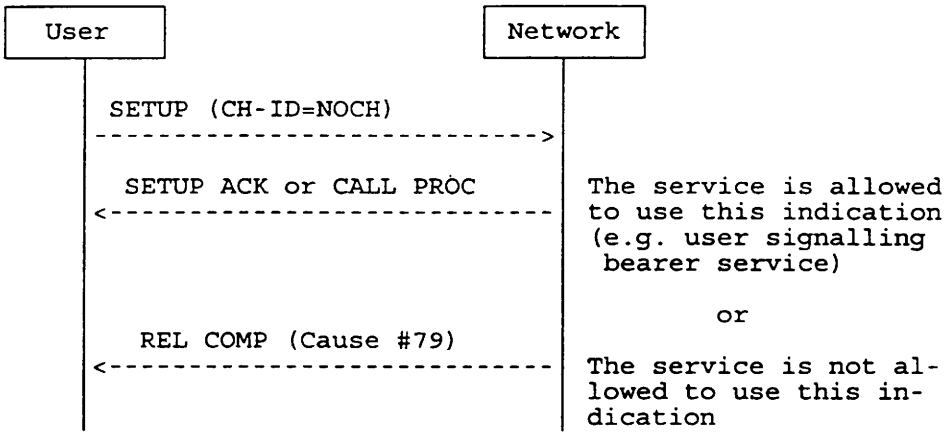
Cause #34 "No circuit/channel available

Case c



Cause #34 "No circuit/channel available

Case d



Cause #79 "service or option not implemented"

B.2 B-channel selection - destination side

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

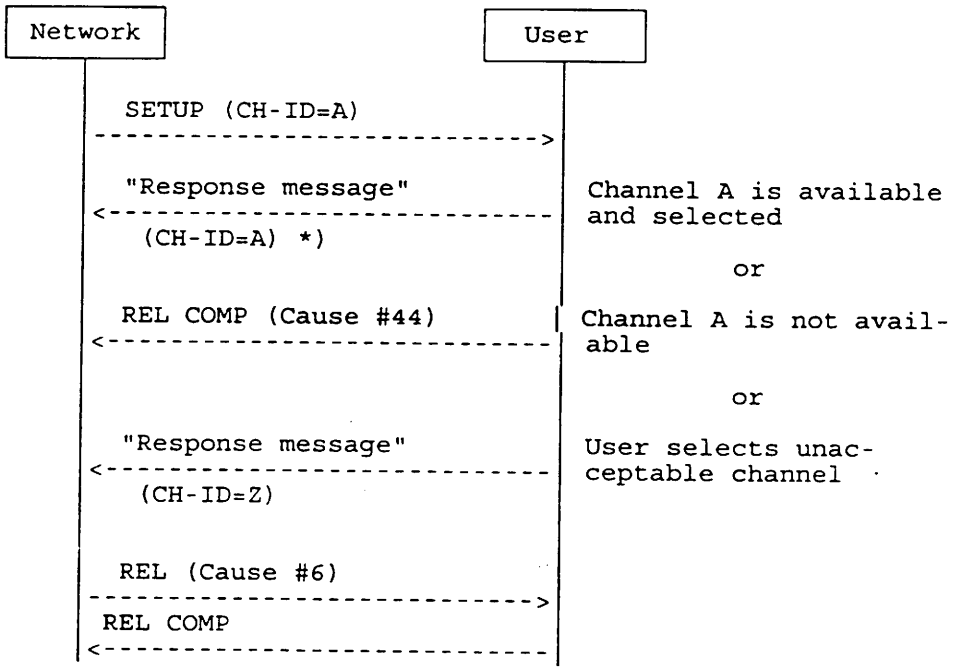
Case 1) Content of the channel identification information element:
- channel is indicated, no acceptable alternative => CH-ID=A.

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

Keys:

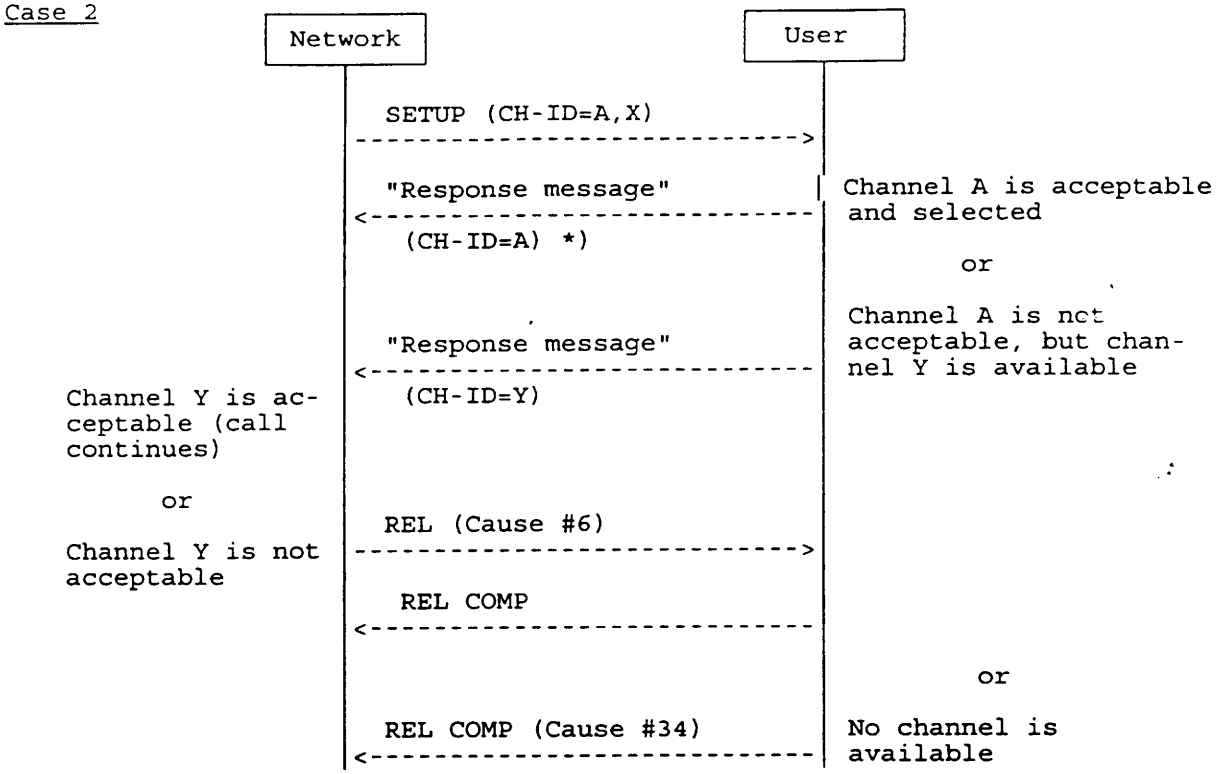
- A channel which is selected out of one or more available channels => CH-ID=Y.
- A channel which is not allowed to be selected => CH-ID=Z.

Case 1



"Response message": SETUP ACK, CALL PROC, ALERT or CONN
*) optional to include CH-ID
Cause #44 "requested circuit/channel not available"
Cause #6 "channel unacceptable"

Case 2



"Response message": SETUP ACK, CALL PROC, ALERT or CONN
*) optional to include CH-ID
Cause #34 "no circuit/channel available"
Cause #6 "channel unacceptable"

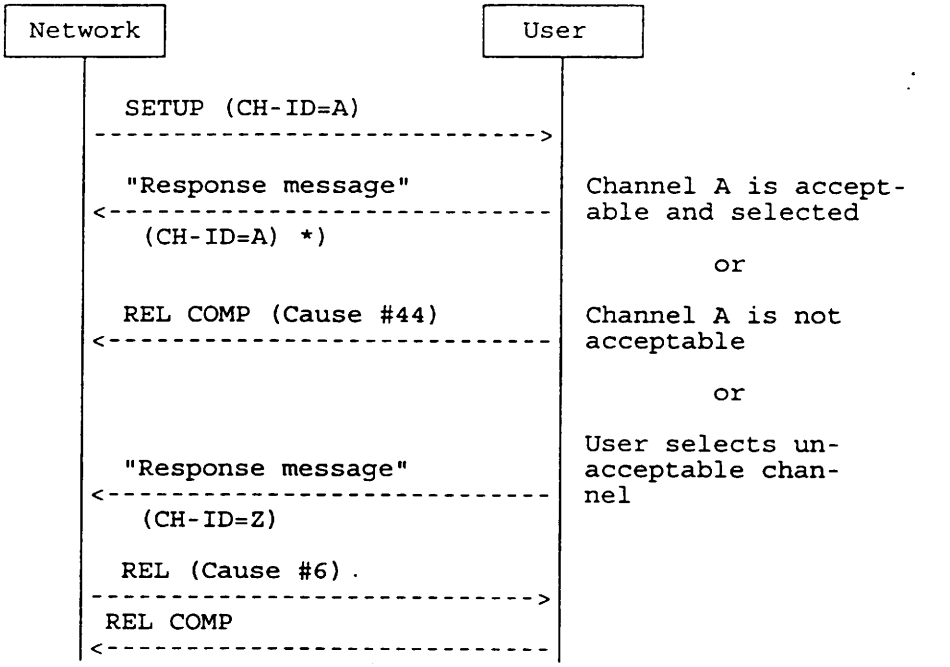
B.2.2 SETUP message delivered on a point-to-multipoint data link (ref. sec. 5.2.3.2)

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

Keys:

- A channel which is seleted out of one or more available channels => CH-ID=Y.
- A channel which is not allowed to be selected => CH-ID=Z.

Case a



"Response message": SETUP ACK, CALL PROC, ALERT or CONN
*) optional to include CH-ID
Cause #44 "requested circuit/channel not available"
Cause #6 "channel unacceptable"

TELE DANMARK

INFR-92 APPENDIX F2

Title:

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

Contents:

This appendix is an application specification to the standard for the support of packet mode terminal by an ISDN, ETS 300 007.

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
Information Channel selection (Note 3)	Preferred or Exclusive	D-channel indicator (Note 4)	network-user
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.

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.			
Access connection types (primarily ETS 300 007 related data).			
Supported access connection types:	On de-mand B-channel access:	Supported:	*Yes.*
		X.25 service type:	*VC only.*
X.25 related data.			
X.25 service pro-file.	B-channel access:	*The standard service profile defined in ETS 300 048, Annex A (normative): Standard service profile.*	

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 AI.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.

TELE DANMARK

INFR-92 APPENDIX F3

Title:

Packet Handler Access Point Interface (PHI)

Contents:

This appendix is an application specification to the PHI standard, ETS 300 099.

Changes related to INFR-91:

This appendix replaces Appendix O of INFR-91.

All tecnical changes are explicitly indicated.

Open issues:

None.

Tele Danmark

INTEGRATED SERVICES DIGITAL NETWORK (ISDN):

Specification of the
Packet Handler Access Point Interface (PHI)

Application specification document to ETSI ETS 300 099:

INTEGRATED SERVICES DIGITAL NETWORK (ISDN):
SPECIFICATION OF THE PACKET HANDLER ACCESS POINT INTERFACE (PHI)

0. Foreword

Applicable.

1. Scope

1.1 Implementation Alternatives for ISDN Packet Mode Services and Applicability of this Specification

Case A is not supported. Specification for case A is outside the scope of this document. In general throughout this specification for the PH, the case A service is not applicable. CRF and PH functions should be located in different physical environments.

1.2 ISDN Packet Mode Services Supported

Applicable.

1.3 Local and Remote Access to the PHI

Applicable.

2. Normative References

Applicable.

3. Definitions and Abbreviations

Applicable.

4. Reference Configuration and Functional Model

4.1 Reference Configuration
Applicable.

4.2 Basic Functional Model
Applicable.

4.3 Functional Model for Remote Access to the PHI
Fig. 3: note 2 - not applicable.

5. Services Supported by the PHI Specification

Applicable.

5.1 Basic Services
Semi-permanent B-channel access is not supported. For D-channel access only the PLL service is supported.

5.1.1 Services Provided on the B-channel
Semipermanent B-channels are not supported.

5.1.1.1 Semipermanent Access
Not applicable. The use of semipermanent B-channels is for further study when standards become available.

5.1.1.2 Switched Access
Applicable. The service shall provide the possibility of a default, standard or customized service profile. Standard and customized service profile are provided on individual basis at subscription time. Annex C.2.4 applies.

5.1.2 Services Provided on the D-channel (Case B)
Only the PLL service is supported.

5.1.2.1 Semipermanent Access
Not applicable.

5.1.2.2 PLL Access
Applicable. For PVC's the packet handler is responsible for keeping the layer 2 activated. (Layer 1 is maintained by the network on BRA). Both customized and standard service profiles shall be supported.

5.1.2.3 Switched Access
Not applicable.

5.2 Detailed Service Aspects

5.2.1 **Notification of Incoming Calls**
Applicable.

5.2.1.1 **No Notification Class**
Applicable for D-channel PLL and on demand B-channels used for PVC's.

5.2.1.2 **Conditional Notification Class**
Applicable for on demand B-channels used for SVC only.

5.2.2 **Mapping of Information Elements**
Only called address and called address extension shall be mapped.

5.2.3 **Access Connection Clearing**
Applicable.

5.2.4 **Access Collision**
Applicable.

5.2.5 **Cause Mappings**
Applicable.

5.3 **Numbering, Addressing and Terminal Selection**

5.3.1 **Numbering and Addressing**
Interworking according to E.166 and X.122 applies. Use of ~~either~~ DNIC ~~or escape code~~ is for further study. ~~Use of Escape code is mandatory.~~

Use of X.121 numbering plan for D-channel subscribers shall not be supported. The E.164 number shall be used for charging purposes and profile selection. Only one profile shall exist per E.164 number (i.e. no selection of profiles based on calling party subaddresses). Only one service profile per PLL-link (DLCI-value) shall exist (i.e. note 1 is not applicable).

In case of incoming calls only the following address information shall be contained in the setup message across the PHI:

called party number
called party subaddress

The PH algorithm, for allocation of incoming calls in the case of multiple switched B-channels being established towards the same E.164 number, is for further study.

5.3.2 **Terminal Selection and Compatibility Checking**
~~By use of one of~~. The ISDN supplementary services, Multiple Subscriber Number(MSN) or Direct Dialling In (DDI) shall be used for selection and identification.

Only one permanent logical link shall exist per E.164 number (there must be a one-to-one relation between a specific E.164 number and permanent logical link).

5.3.3 **Directory Number on Services Association**
Applicable for switched B-channels and PLL service.

The PH must be able to support both the PLL service and the B-channel service for the same E.164 number.

5.4 **Services Cross Reference and Conformance Statement for the PHI**
Applicable for the services indicated earlier.

6. Basic Interface Structure

6.1 **General**
Semipermanent/switched D-Channel access and dynamic provisioning of semipermanent links and PLLs are not supported. Multiple PRA's are supported.

6.2 **Interface Architecture for Single-PRA PHI**
Applicable.

6.2.1 **Local PHI Access**
Applicable.

6.2.2 **Remote PHI Access**
Applicable.

6.3 **PHI Channel Types**

6.3.1 **D64-Channel**
D64 signalling related to Dynamic provisioning of semipermanent Bd-Channels is ~~not~~ supported ~~(only static provisioning is required).~~

~~Switched Bd-Channels is not supported.~~

6.3.2 **Bb-Channels (Case A and Case B)**
Switched Bb-channels are supported.

6.3.3 **Bd-Channels**
~~Only static provisioning is supported, and therfore~~ No signalling connection is required on any Bd-channel. Use of intermediate FH-function is not applicable. ~~Bd-channels are not established on demand. Dynamic provisioning of semipermanent Bd-channels is supported.~~

6.3.3.1 **Data Transfer**
Applicable.

6.3.3.2 **Link Layer Management**
Link Layer Management is maintained by static procedures only.

7. Interface Configuration

7.1 Frame Handler Function at the CRF-S

Applicable.

7.2 Multi-PRA PHI Configuration

Multiple PRA support is based on a Line Hunting algorithm. Annex D is not applicable.

8. Operations, Administration and Maintenance (OA&M)

8.1 General

8.1.1 Scope

8.1.2 Definitions

~~Dynamic Provisioning using Dynamic Procedures is not supported.~~

~~Applicable~~

8.1.3 Principles

Accounting information on both sides of the PHI must be available. The PH is responsible for the billing of the packet switched portion.

8.2 Layer 1 OA&M Requirements

8.2.1 Administration

8.2.1.1 Provisioning of Semipermanent Bb-Channels

Not applicable.

8.2.1.2 Provisioning of Semipermanent Bd-Channels

~~Only~~ Static ~~and dynamic~~ provisioning of semipermanent Bd-channels is supported.

8.2.2 Operations and Maintenance

8.2.2.1 Primary Rate Access

Applicable.

8.2.2.2 Establishment and Release of Switched Bd-Channels due to Operational Requirements

~~Not~~ Applicable ~~as used with the Dynamic provisioning procedures of semipermanent Bd-channels as initiated by operational actions from the PH.~~

8.2.2.3 Re-establishment of Dynamically provisioned Semipermanent Bd-channels in case of Failure.

~~Not applicable.~~ ~~Reestablishment is provided by the PH.~~

8.3 Layer 2 OA&M Requirements

8.3.1 Bb-Channels
Applicable.

8.3.2 Bd-Channels
Applicable.

8.3.2.1 Administration
Only static provisioning is used and therefore only static service data is required at either side of the PHI.

8.3.2.2 Operations

8.3.2.2.1 General Status and Performance Monitoring
Applicable.

8.3.2.2.2 Load Sharing
Applicable.

8.3.2.3 Maintenance
Signalling Links are not supported.

8.3.3 D64-Channel
Applicable.

8.4 Layer 3 OA&M Requirements

8.4.1 Service Support

8.4.1.1 CCITT Recommendation X.25 Packet Layer Procedures (PLP)
Applicable.

8.4.1.2 PVCs on the D-channel
Applicable.

8.4.2 Signalling (D64 and Bd-Inband)

8.4.2.1 Administration
~~Dynamic Bd-Channels are not supported.~~

~~Applicable. One address per GRF S and one address per PH is assigned at both sides of the PHI by administrative procedures.~~

8.4.2.2 Operations

8.4.2.2.1 D64 Signalling
Applicable.

8.4.2.2.2 Bd-Inband Signalling

Not applicable.

8.4.2.3 **Maintenance**

8.4.2.3.1 **D64 Signalling**
Applicable.

8.4.2.3.2 **Bd-Inband Signalling**
Not applicable.

9. Frame Multiplexing on the Bd-Channels

9.1 **Principle**
Individual Data link layer characteristics per bundle are not supported.

9.2 **Address Field Layout**
Applicable.

9.3 **Subscriber Data Links**
Applicable.

9.4 **Signalling Data Links**
Not applicable.

9.4.1 **The DLCI Value of the Signalling Data Link**
Not applicable.

9.4.2 **Establishment of the Signalling Data Link**
Not applicable.

9.4.3 **Signalling Data Link Failure**
Not applicable.

9.4.4 **Recovery of the Signalling Data Link**
Not applicable.

9.5 **Switchover and Concentration**
Not applicable.

9.6 **Reset Procedures**
Not applicable.

9.7 **Bd-Channel Continuity Check**
Applicable.

9.7.1 **HDLC Flag Continuity Check Procedure**
Not applicable

9.7.2 **Management Frame Continuity Check Procedure**
Applicable.

9.7.2.1 Both-way Procedure Description
Applicable.

9.7.2.2 One-way Procedure Description
Applicable.

9.7.2.3 Management from Layouts
Applicable.

9.7.2.4 Parameter Set
Applicable.
Formel should read : TCC' = TCC + (N200 + 2) * T200

9.8 Connection Verification Procedures
Applicable.

9.9 Peer Busy Procedures
Applicable.

9.10 Default Timer Values
Applicable.

10. PHI Signalling

Throughout chapter 10:

- Switched Bd-Channels are not used, although dynamic provisioning for Bd-channels is used in the PEL to CRF-S direction.
- No Bd-Signalling links are used.
- No dynamic provisioning of semipermanent links and PLLs is used.

10.1 General Introduction
Applicable.

10.1.1 Signalling Procedures
Applicable.

10.1.2 Signalling Messages
Applicable.

10.1.3 Information Elements
Applicable. For PMBS, only messages and information elements specified in subclause 10.3 or 10.6 shall be used on the D64 channel. Optional information elements specified in ETS 300 102-1 or ETS 300 007 but not specified in subclause 10.3 or 10.6 shall be ignored.

10.2 B-Channel Services, Switched, Case A
Not applicable.

10.2.1 Signalling Messages
Not applicable.

10.2.1.1 CALL PROCEEDING
Not applicable.

10.2.1.2 CONNECT
Not applicable.

10.2.1.3 CONNECT ACKNOWLEDGE
Not applicable.

10.2.1.4 DISCONNECT
Not applicable.

10.2.1.5 RELEASE
Not applicable.

10.2.1.6 RELEASE COMPLETE
Not applicable.

10.2.1.7 SETUP
Not applicable.

10.2.1.8 STATUS
Not applicable.

10.2.1.9 STATUS ENQUIRY
Not applicable.

10.2.2 Case A, Procedures for an Outgoing Call (CRF-P to PH)
Not applicable.

10.2.3 Case A, Procedures for Incoming Call (PH to CRF-P)
Not applicable.

10.2.4 Case A, Procedures for Call Clearing
Not applicable.

10.3 B-Channel Services, Switched, Case B

10.3.1 Signalling Messages
Applicable.

10.3.1.1 CALL PROCEEDING
Applicable.

10.3.1.2 CONNECT
Applicable.

10.3.1.3 CONNECT ACKNOWLEDGE
Applicable.

10.3.1.4 DISCONNECT
Applicable.

10.3.1.5 RELEASE
Applicable.

10.3.1.6 RELEASE COMPLETE
Applicable.

10.3.1.7 SETUP
Applicable.

10.3.1.8 STATUS
Applicable.

10.3.1.9 STATUS ENQUIRY
Applicable.

10.3.2 Case B, Procedures for an Outgoing Call (CRF-P to PH)
If calling party subaddress is present in the setup message, the PH shall ignore this information.

10.3.3 Case B, Procedures for an Incoming Call (PH to CRF-P)
Applicable.

According to subclause 5.2.2 mapping of calling party number is not applicable. The CRF-P shall always perform screening of the calling party number according to the procedures specified in ETS 300 092.
Note: To avoid presentation of the calling party number of the PH to the called user, the CLIR supplementary service shall be set to "permanent restricted" at subscription time.

10.3.4 Case B, Procedures for Call Clearing
Applicable.

10.4 Switched Bd-Channels
Applicable to satisfy requirement for Dynamic provisioning of Semipermanent Bd-Channels in the PH to CRF-S direction as invoked by OA&M functions in the PH.

10.4.1 Signalling Messages for Circuit Mode Procedures
Not applicable.

10.4.1.1 CONNECT
Not applicable.

10.4.1.2 SETUP
Not applicable.

10.4.2 Signalling Messages for Packet Mode Procedures
Applicable. Only the PH can initiate the call establishment.

10.4.2.1 CONNECT
Applicable in the CRF-S to PH direction.

10.4.2.2 SETUP
Applicable in the PH to CRF-S direction.

10.4.3 Procedures for Bd-Channels Established by the CRF-S (CRF-P to PH)
Not applicable.

10.4.4 Procedures for Bd-Channels Established by the PH (PH to CRF-P)
Applicable as invoked by OA&M procedures. In case of failing continuity check the FH shall automatically reestablish the failed Bd-Channel.

10.4.5 Procedures for Bd-Channel Access Connection Clearing
Applicable.

10.5 D-Channel Services, Switched, Case B
Not applicable.

10.5.1 Signalling Messages
Not applicable.

10.5.1.1 CONNECT
Not applicable.

10.5.1.2 RELEASE
Not applicable.

10.5.1.3 RELEASE COMPLETE
Not applicable.

10.5.1.4 SETUP
Not applicable.

10.5.1.5 STATUS
Not applicable.

10.5.2 Procedures for Data Link Establishment by the CRF-S (CRF-S to PH)
Not applicable.

10.5.3 Procedures for Data Link Establishment by the PH (PH to CRF-S)
Not applicable.

10.5.4 Procedures for Data Link Disconnection
Not applicable.

10.5.5 Procedures after Receipt of a STATUS Message
Not applicable.

10.6 Restart on the D64-Channel
Applicable.

10.6.1 Signalling Messages
Applicable.

10.6.1.1 RESTART
Applicable.

10.6.1.2 RESTART ACKNOWLEDGE
Applicable.

10.6.1.3 STATUS
Applicable.

10.6.2 Restart Procedure
Applicable.

10.7 The Timers T320, TPHI, TPH, and TCRF
Only T320 is applicable.

11. Static and Dynamic Provisioning for PLL and Semipermanent Services

11.1 General Introduction
Applicable.

11.1.1 Signalling Procedures
Not applicable.

11.1.2 Signalling Messages
Not applicable.

11.1.3 Information Elements
Not applicable.

11.2 B-Channel Services, Case A and Case B, Semipermanent

11.2.1 Static Provisioning
Not applicable.

11.2.2 Dynamic Provisioning
Not applicable.

11.3 Semipermanent Bd-Channels

11.3.1 Static Provisioning
Applicable.

11.3.2 Dynamic Provisioning
Applicable in the PH to CRF-S direction when invoked by OA&M procedures.

11.3.3 De-registration of Dynamically Provisioned Bd-Channels
Applicable.

11.4 D-Channel Services, PLL
Dynamic provisioning is not applicable.

11.4.1 **PLL Data Link Provisioning, Static**
Applicable.

11.4.2 **Messages for Dynamic Provisioning of PLL Data Links**
Not applicable.

11.4.2.1 **REGISTER**
Not applicable.

11.4.2.2 **RELEASE COMPLETE**
Not applicable.

11.4.2.3 **The Linked Identifier of the Invoke Component**
Not applicable.

11.4.2.4 **The Argument of the Invoke Component**
Not applicable.

11.4.2.5 **The Result of the Return Result Component**
Not applicable.

11.4.2.6 **The Error Value of the Return Error Component**
Not applicable.

11.4.2.7 **The Parameter of the Return Error Component**
Not applicable.

11.4.3 **Procedures for PLL Data Link Registration by the CRF-S (CRF-S to PH)**
Not applicable.

11.4.4 **Procedures for PLL Data Link Registration by the PH (PH to CRF-S)**
Not applicable.

11.4.5 **Procedures for PLL Data Link De-registration**
Not applicable.

11.5 **D-Channel Service, Semipermanent**

11.5.1 **Semipermanent Data Link Provisioning, Static**
Not applicable.

11.5.2 **Messages for Dynamic Provisioning of Semipermanent Data Links**
Not applicable.

11.5.3 **Procedures for Semipermanent Data Link Registration**
Not applicable.

11.5.4 **Procedures for Semipermanent Data Link De-registration**
Not applicable.

12. Exception Handling

Applicable.

12.1 B-Channels Service (Case A and Case B)
Applicable.

12.1.1 Outgoing Call
Applicable.

12.1.2 Incoming Call
Applicable.

12.1.2.1 Unsuccessfull Call
Applicable.

12.1.2.2 Premature Clearing by Remote Terminal
Applicable.

12.1.2.3 No Bd-Channel Available
Applicable.

12.1.2.4 Data Link Disconnect
Applicable.

12.1.2.5 Acceptance of Call on Existing B-Channel
Applicable.

12.1.3 Call Collision
Applicable.

12.1.4 Data Transfer Phase
Applicable.

12.1.4.1 Subscriber Disconnects Data Link
Applicable.

12.1.4.2 Bb-Channel is Cleared
Applicable.

12.1.4.3 Restart on PHI
Applicable.

12.2 Bd-Channel Establishment
Applicable

12.2.1 Bd-Channel Establishment by the CRF-S
Not applicable.

12.2.1.1 Corrupted "User-User" Information Element
Not applicable.

12.2.2 Bd-Channel Establishment by the PH
Applicable.

12.2.2.1 Corrupted "User-User" Information Element
Applicable.

12.3 Switched D-Channel Service
Not applicable.

12.3.1 Exception Resolution Using Layer 2 Procedures
Not applicable.

12.3.1.1 DM-Frame on the User-Network Interface
Not applicable.

12.3.1.2 No Exception Reporting
Not applicable.

12.3.1.3 DM-Frame in the Bd-Channel
Not applicable.

12.3.2 Outgoing Call
Not applicable.

12.3.2.1 No Bd-Channel Available
Not applicable.

12.3.2.2 Signalling Data Link Disconnection
Not applicable.

12.3.2.3 Data Link Establishment Rejection
Not applicable.

12.3.2.4 Repeated DLCI
Not applicable.

12.3.3 Incoming Call
Not applicable.

12.3.3.1 Unsuccessfull Call
Not applicable.

12.3.3.2 Premature Clearing by Remote Terminal
Not applicable.

12.3.3.3 No Bd-Channel Available
Not applicable.

12.3.3.4 Signalling Data Link Disconnection
Not applicable.

12.3.3.5 **Acceptance of Call on Existing Data Link**
Not applicable.

12.3.3.6 **Repeated "Called Party Number"**
Not applicable.

12.3.3.7 **Repeated DLCI**
Not applicable.

12.3.3.8 **Data Links Disconnect**
Not applicable.

12.3.4 **Call Collision**
Not applicable.

12.3.5 **Data Transfer Phase**
Not applicable.

12.3.5.1 **Subscriber Disconnect Data Link**
Not applicable.

12.3.5.2 **Bd-Channel is Cleared**
Not applicable.

12.3.5.3 **Restart on PHI**
Not applicable.

12.4 **PLL or Semipermanent D-Channel Service**

12.4.1 **Outgoing Call**
Applicable.

12.4.1.1 **No Bd-Channel Available**
Applicable. Automatic establishment of Bd-Channels on receipt of incoming call is not supported.

12.4.1.2 **SETUP with PLL (Semipermanent) DLCI Value**
Not applicable.

12.4.1.3 **SABME with Unknown DLCI**
Applicable.

12.4.2 **Incoming Call**
Applicable.

12.4.2.1 **No Bd-Channel Available**
Applicable.

12.4.2.2 **SABME with Unknown DLCI**
Applicable.

12.4.3 Call Collision
Applicable.

12.4.3.1 Call Collision on Network-User Interface
Applicable.

12.4.3.2 Call Collision on the Bd-Channel
Applicable.

12.4.3.3 Exceeding the Maximum Number of Data Links
Applicable.

12.4.4 Data Transfer Phase
Applicable.

12.5 PLL or Semipermanent Registration or De-registration

12.5.1 Registration or De-registration by the CRF-S

12.5.1.1 Data Link Disconnection
Not applicable.

12.5.1.2 Repeated DLCI
Not applicable.

12.5.1.3 Unknown De-registration Parameter
Not applicable.

12.5.2 Registration or De-registration by the PH
Not applicable.

12.5.2.1 Data Link Disconnection
Not applicable.

12.5.2.2 Repeated "Called Party Number"
Not applicable.

12.5.2.3 Repeated DLCI
Not applicable.

12.5.2.4 Unknown De-registration Parameter
Not applicable.

13. Additional Information Elements for PHI Signalling

13.1 Coding Rules
~~Not~~ applicable.

13.2 Coding of the Additional Information Elements
~~Not applicable.~~

13.2.1 **DLCI Value**
Not applicable.

13.2.2 **Bd-Channel Reference Number**
Applicable.

13.2.3 **FH-Reference Number**
Applicable. The FH-reference number is used to identify the distributed FH's in one CRF-S.

13.2.4 **Additional Subscriber Identification**
Not applicable.

13.2.5 **Type of Service**
Not applicable.

13.2.6 **Called Party Number**
Not applicable.

13.2.7 **Cause**
Not applicable.

13.3 **Coding of the Facility Information Element**
Not applicable.

13.3.1 **Embedded Information Elements**
Not applicable.

13.3.2 **Operation Value**
Not applicable.

13.3.3 **Error Value**
Not applicable.

(Informative)
Anneks A Requirements on the Common Channel Signalling System
~~Not~~ applicable.

(Informative)
Anneks B PHI Signalling Diagrams

B.1 **Introduction**
Applicable.

B.1.1 **Conventions for the diagrams**
Applicable.

B.2 **B-Channel Services - Case A**
Not applicable.

B.2.1 **B-Channel Establishment**
Not applicable.

B.2.2 **B-Channel Disconnection**
Not Applicable.

B.3 **B-Channel Services Case B**
Applicable.

B.3.1 **B-Channel Establishment**
Applicable.

B.4 **Dynamic Bd-Channels**
Not applicable.

B.4.1 **Bd-Channel Establishment**
Not applicable.

B.4.2 **Bd-Channel Clearing**
Not applicable.

B.5 **Data Link Establishment and Release**

B.5.1 **D-Channel Data Link Establishment**
Applicable for PLL, without the Dynamic Bd-Channel establishment. If the FH implements frame relay, other scenarioes are relevant.

B.5.2 **D-Channel Data Link Disconnection**
Applicable for PLL. ~~Channels, except for the Dynamic Bd-Channel establishment.~~ If the FH implements frame relay, other scenarioes are relevant.

B.6 **Bd-Channel Establishment, Semipermanent**
~~Not applicable.~~ Only Fig. B.23 is applicable. In figure B.23 type of Service = Semi is not applicable.

B.7 **Dynamic Provisioning for D-Channel PLL Service**
Not applicable.

B.7.1 **PLL Data Link Registration**
Not applicable.

B.7.2 **PLL Data Link De-registration**
Not applicable.

B.8 **Dynamic Provisioning for D-Channel Semipermanent Service**
Not applicable.

B.8.1 **Semipermanent Data Link Registration**
Not applicable.

B.8.2 **Semipermanent Data Link De-registration**
Not applicable.

(Informative)

Annex C: Additional Information for PVCs on Switched B-Channel Access Case B

Applicable.

(Informative)

Annex D: Multi-PRA Configurations

Not applicable.

(Informative)

Annex E: Switchover and concentration procedures

Not applicable.

(Informative)

Annex F: Reset Procedures

Not applicable.

(Informative)

Annex G: Layer 2 SDL Diagrams and State Tables

Applicable.

(Normative)

Annex H: Coding of the BC and LLC Information Elements

H.1 BC Information Element for circuit Switched Bearer Capability

Not applicable.

H.2 LLC Information Element for Case A Services

Not applicable.

H.3 BC Information Element for Packet Mode Bearer Capability

Applicable. For Bd-channel establishment octet 6 is in alignment with the proposal at ETSI/NA2 for conection. (i.e. coded as ETSI PH Bd-channel link layer, Value=01110).

H.4 BC Information Element in the Bd-Channel Signalling Link

Not applicable.

(Informative)

Annex J SDL for Management Frame Continuity Check

Applicable.

(Normative)

Annex K Selection Mechanism for Incoming Calls

Applicable.

TELE DANMARK

INAD-3 APPENDIX G

Title:

Application specifications to DSS1 - Network layer - ETSI Teleservices

Contents:

This appendix is an application specification to the stage 3 description of the following teleservices:

- telephony 7 kHz;
- videotelephony.

TELE DANMARK

ISDN Digital Subscriber Signalling System No. 1

DSS1

Network layer
Teleservices

Application specification document to ETSI ETSs for supplementary services:

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

February 1994

Table of contens:

INTRODUCTION

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

The D-channel layer 3 specification for teleservices 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 Teleservices, Service description".

All ETSs referred to are the final pulished versions.

Note: ETSI has only introduced specific network layer standards for teleservices regarding the telephony 7 kHz and the videotelephony teleservices.

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".

Telephony 7 kHz and videotelephony teleservices

Application to stage 3 ETSI ETS 300 264

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Additional generic requirements for basic telecommunications services not covered in ETS 300 102 -1

5.5 Signalling procedures at the coincident S and T reference point

5.5.3 Procedures for the originating user to indicate high layer compatibility selection is allowed

5.5.3.1 Normal operation

The network shall support high layer compatibility selection.

5.5.5 Identification of the basic telecommunications service

5.5.5.1 Normal operation

The network shall perform subscription checks as described.

6 Telephony 7 kHz teleservice

6.2 Operational requirements

6.2.1 Provision and withdrawal

The telephony 7 kHz teleservice shall be provided after prior arrangement with the service provider.

6.5 Signalling procedures at the coincident S and T reference point

6.5.1 Call establishment at the originating interface

b): The network shall perform subscription checks as described.

6.5.4 In-band tones and announcements

Note: This subclause contains an technical flaw as it indicates that tones and annoumecements only apply during connection establishment. However, tones and annoucements can also be applied during call clearing. This technical flaw is assumed to be corrected during a publish Corrigendum.

7 Videotelephony teleservice

7.2 Operational requirements

7.2.1 Provision and withdrawal

The videotelephony teleservice shall be provided after prior arrangement with the service provider.

7.5 Signalling procedures at the coincident S and T reference point

7.5.1 Call establishment at the originating interface

b): The network shall perform subscription checks as described.

7.5.4 In-band tones and announcements

Note: This subclause contains an technical flaw as it indicates that tones and annoumecements only apply during connection establishment. However, tones and annoucements can also be applied during call clearing. This technical flaw is assumed to be corrected during a publish Corrigendum.

Annex A (Informative) Signalling flows for telephony 7 kHz

Applicable (For additional information se Appendix A).

Annex B (Informative) Signalling flows for videotelephony

Applicable (For additional information se Appendix B).

Appendix A

This appendix contains additional signalling flows for the telephony 7 kHz teleservice. In case of contradiction between the text in the standard and the attached signalling flows the text shall be followed.

Additional signalling flows for telephony 7 kHz teleservice

Abbreviation:	UDI-TA:	Unrestricted Digital Information with Tones/Announcements.
	BC:	Bearer Capability
	HLC:	High Layer Compatibility
	PI:	Progress Indicator

A.1 From 7kHz terminal to 7 kHz terminal

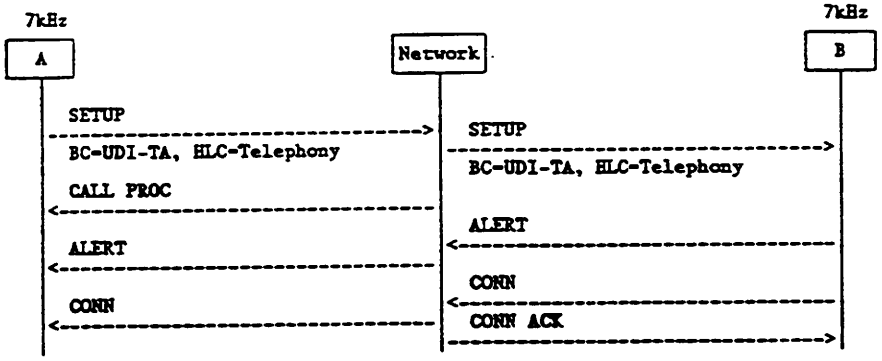


Figure A.1.1: Fallback not allowed

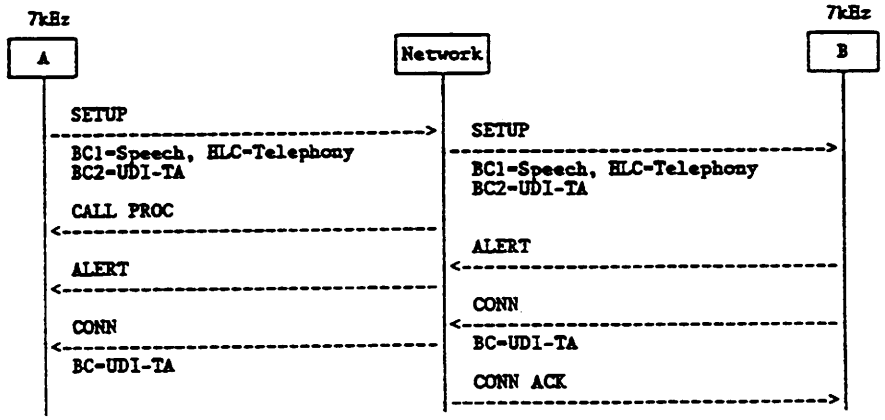


Figure A.1.2: Fallback allowed, but does not occur

A.2 From 7 kHz terminal to 3.1 kHz terminal

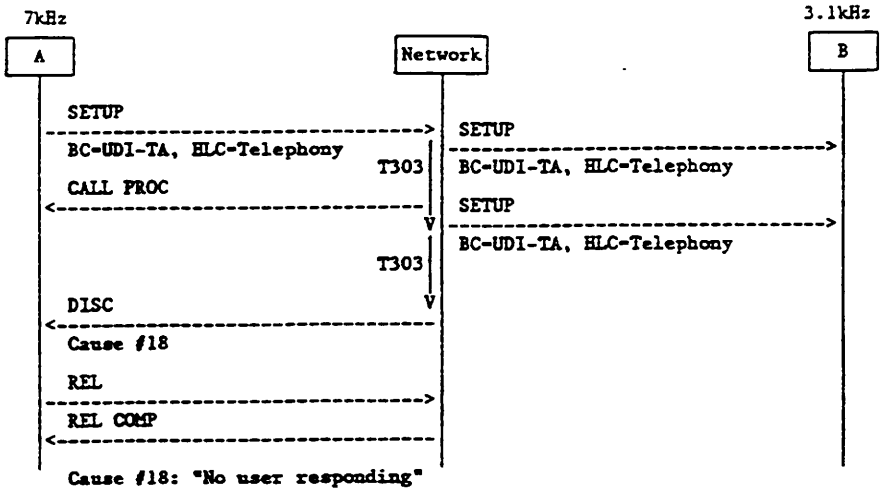


Figure A.2.1: Fallback not allowed

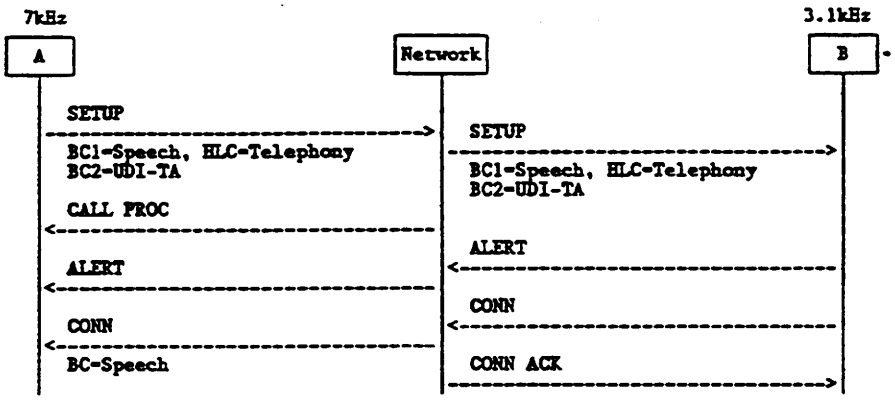


Figure A.2.2: Fallback allowed, and occurs

A.3 From 7 kHz terminal via PSTN to the B-terminal

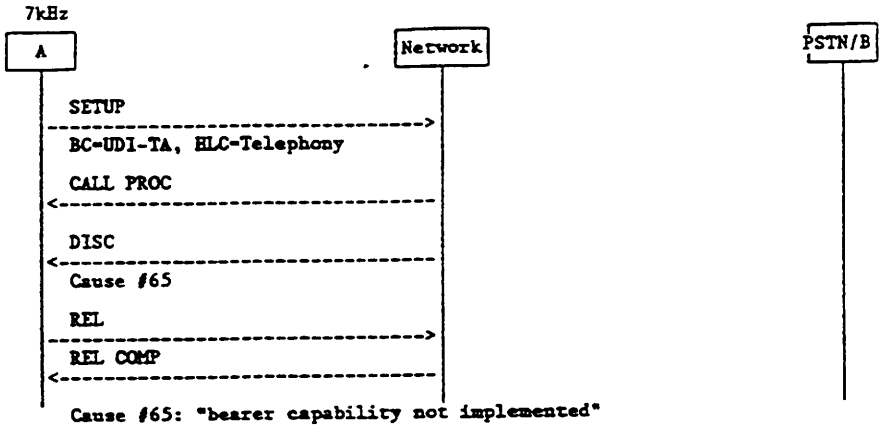


Figure A.3.1: Fallback not allowed

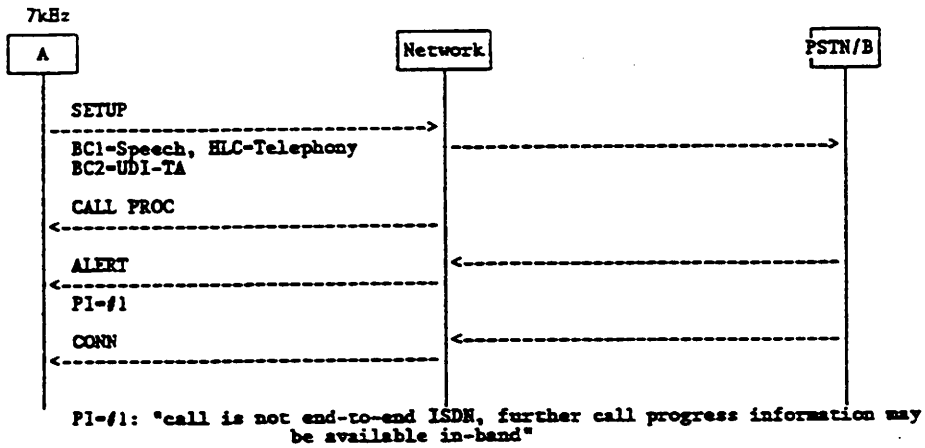


Figure A.3.2: Fallback allowed, and occurs

A.4 From 7kHz terminal with fallback in the public network

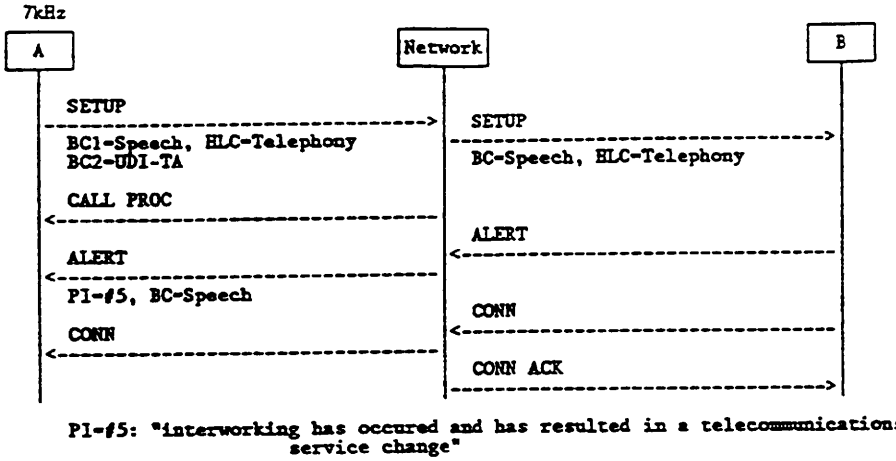


Figure A.4.1: Fallback allowed, and occurs

A.5 From 7kHz terminal to private ISDN supporting 7 kHz telephony and fallback, destination user is a 3.1 kHz terminal

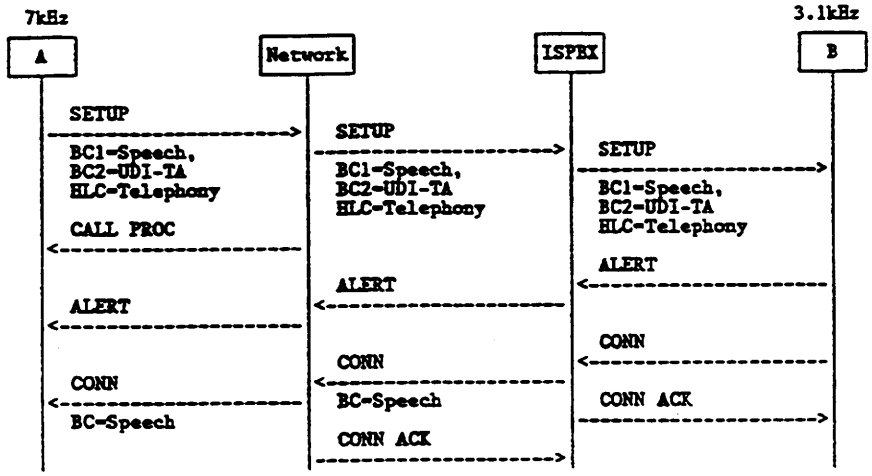


Figure A.5.1: Fallback allowed, and occurs

A.6 From 7kHz terminal to private ISDN not supporting 7 kHz telephony

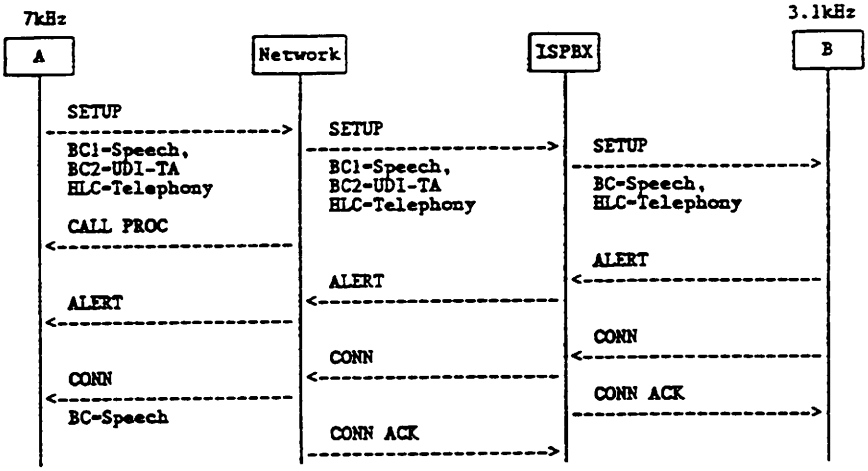
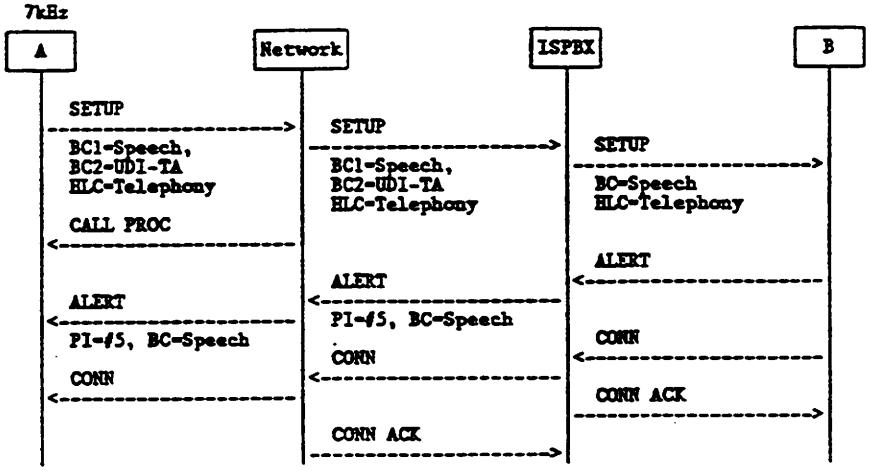


Figure A.6.1: Fallback allowed, and occurs

A.7 From 7kHz terminal to private ISDN with fallback in private ISDN



PI=#5: "interworking has occured and has resulted in a telecommunications service change"

Figure A.7.1: Fallback allowed, and occurs

Appendix B

This appendix contains additional signalling flows for the videotelephony teleservice. In case of contradiction between the text in the standard and the attached signalling flows the text shall be followed.

Additional signalling flows for videotelephony teleservice

Abbreviation:	UDI-TA:	Unrestricted Digital Information with Tones/Announcements.
	BC:	Bearer Capability
	HLC:	High Layer Compatibility
	PI:	Progress Indicator

B.1 From Video terminal to Video terminal

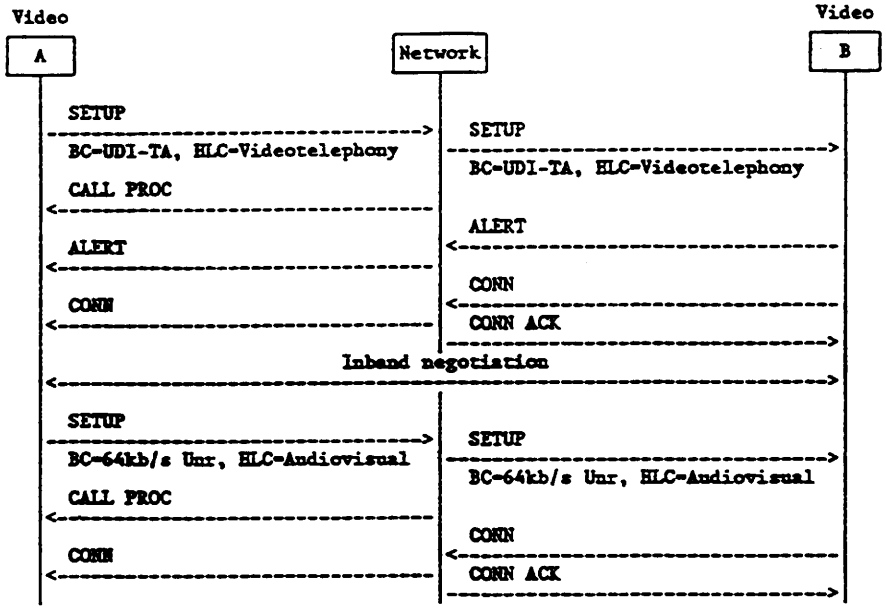


Figure B.1.1: Fallback not allowed

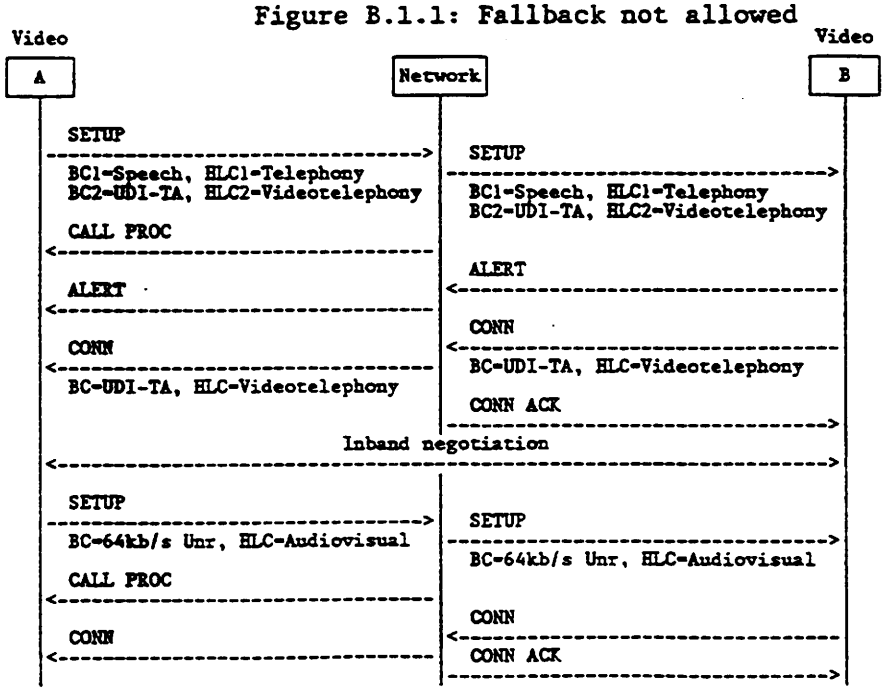


Figure B.1.2: Fallback allowed, but does not occur

B.2 From Video terminal to 7 kHz terminal

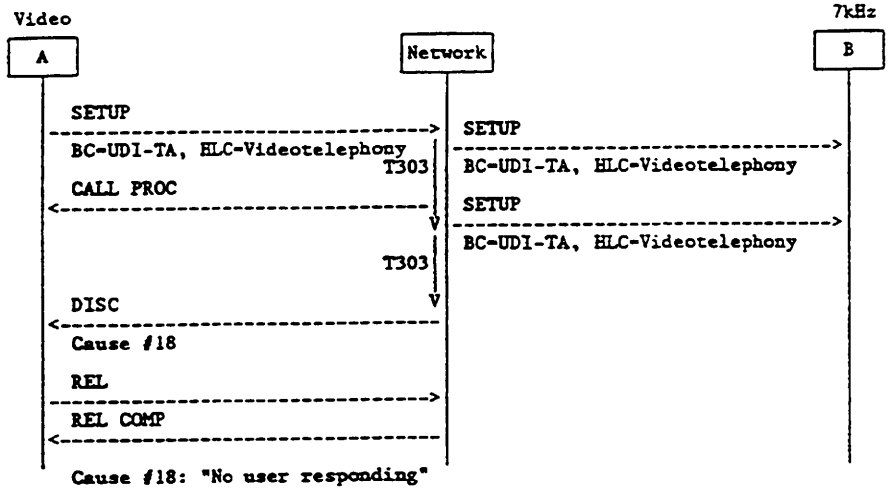


Figure B.2.1: Fallback not allowed

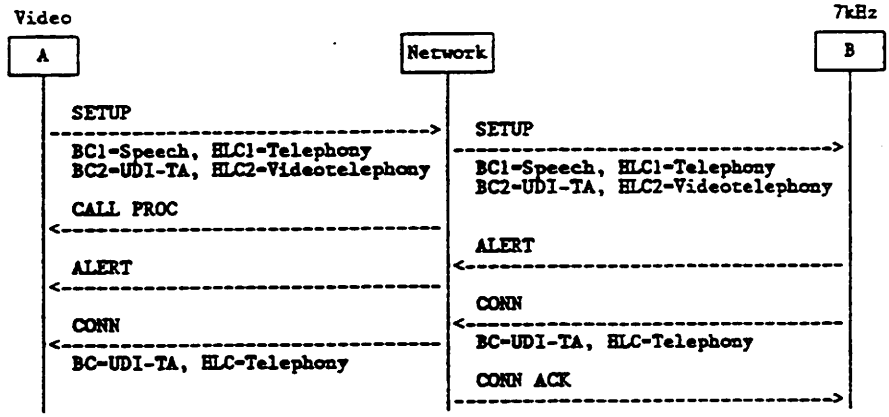


Figure B.2.2: Fallback allowed, and occurs

B.3 From Video terminal via PSTN to the B-terminal

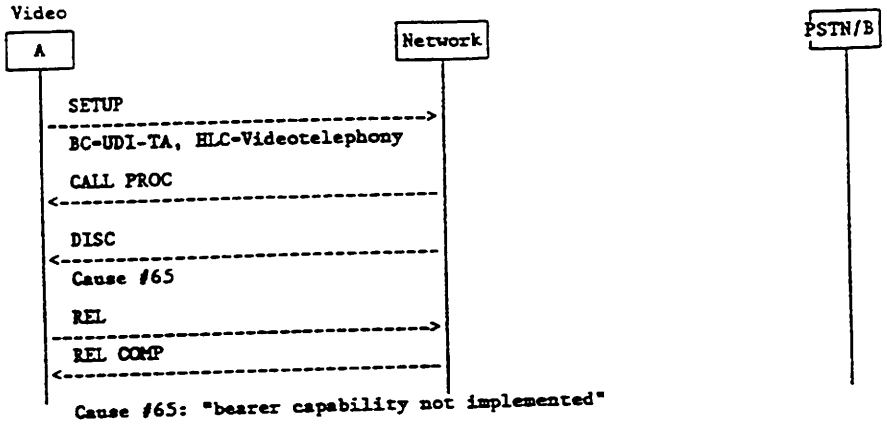


Figure B.3.1: Fallback not allowed

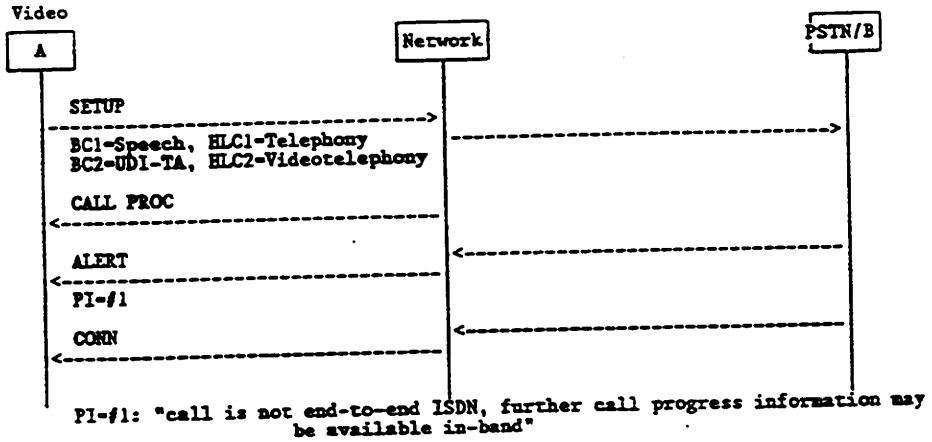


Figure B.3.2: Fallback allowed, and occurs

B.4 From Video terminal with fallback in the public network

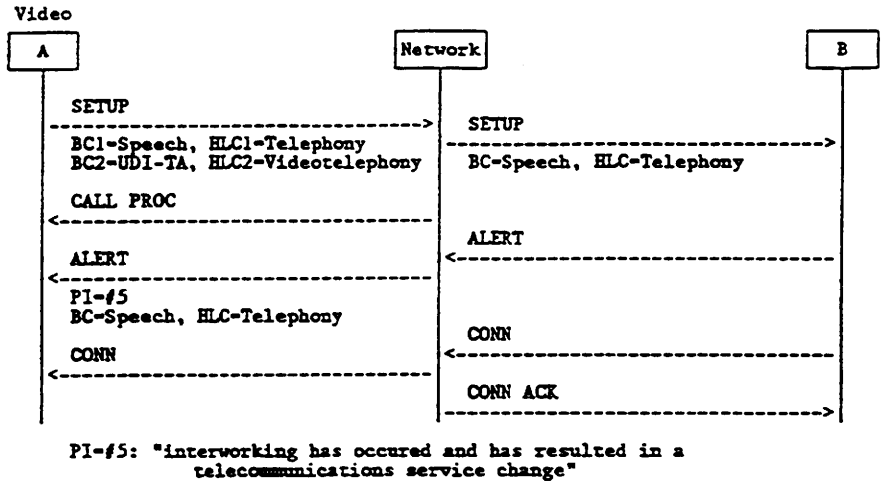


Figure B.4.1: Fallback allowed, and occurs

B.5 From video terminal to private ISDN supporting video telephony and fallback, destination user is a 3.1 kHz terminal

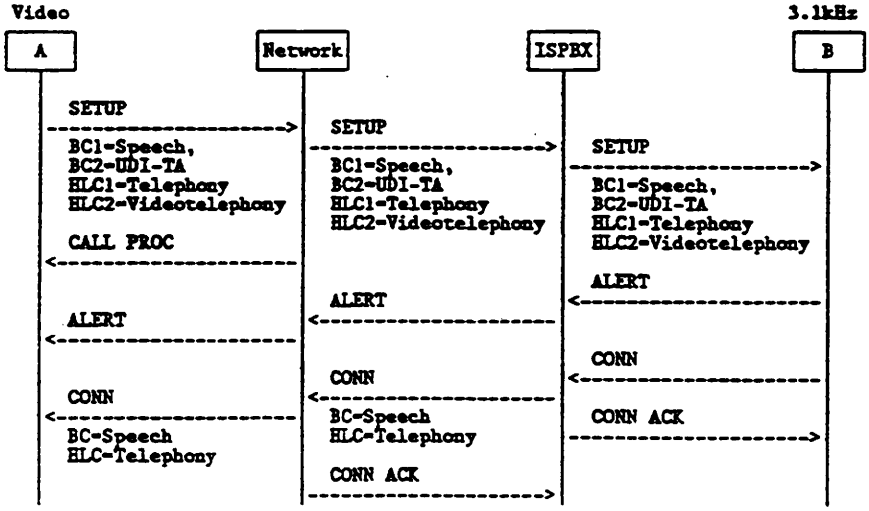


Figure B.5.1: Fallback allowed, and occurs

B.6 From video terminal to private ISDN not supporting video telephony and 7kHz telephony

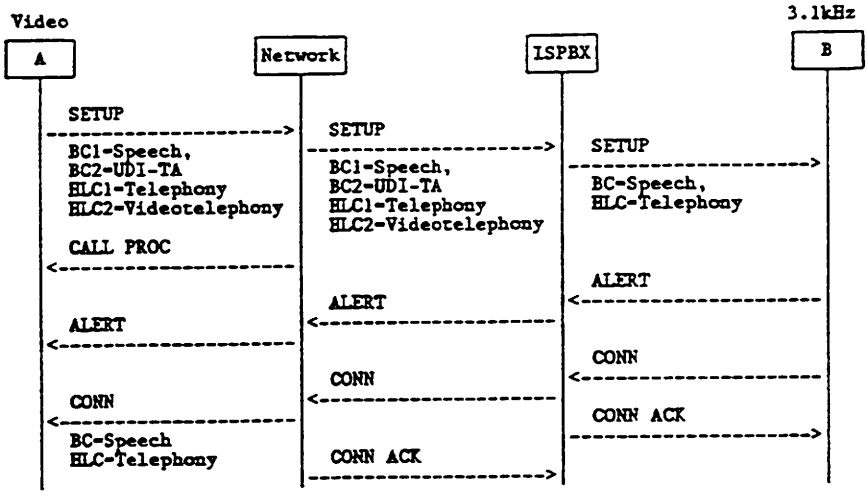
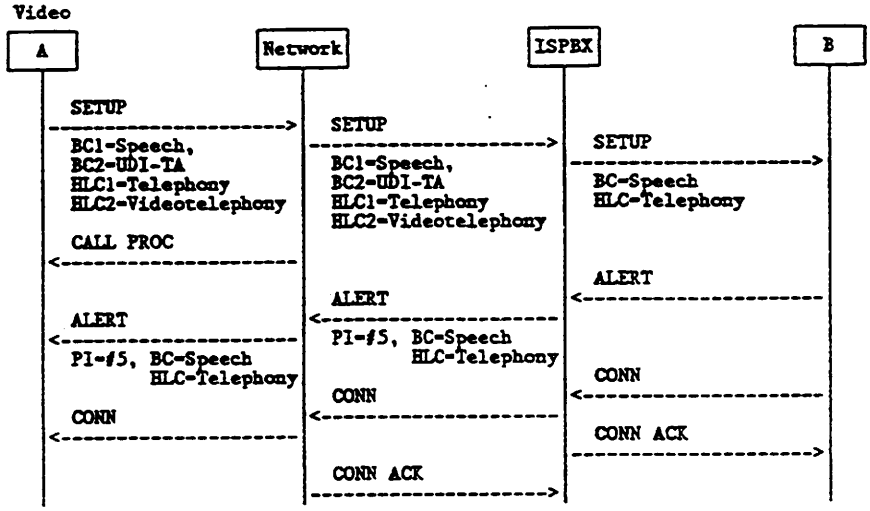


Figure B.6.1: Fallback allowed, and occurs

B.7 From video terminal to private ISDN with fallback in private ISDN



PI=#5: "interworking has occured and has resulted in a telecommunications service change"

Figure B.7.1: Fallback allowed, and occurs

TELE DANMARK

INAD-3 APPENDIX H

Title:

Application specifications to DSS1 - Network layer - Generic functional protocol for the support of supplementary services.

Contents:

This appendix is an application specification to the generic functional protocol standard, ETS 300 196. This appendix is a common Nordic application specification.

NORDTEL

NT/SIG-SPEC-2-2

NORDIC SPECIFICATION

APPLICATION DOCUMENT TO
ETSI ETS 300 196

GENERIC FUNCTIONAL PROTOCOL FOR THE SUPPORT OF SUPPLEMENTARY SERVICES

ISSUE DATE: 93-09-01

FOREWORD

The following sections give the requirements to the generic functional 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 ETS 300 196 (May 1993) and selects which options in ETS 300 196 are applicable in the Nordic networks.

The clauses not mentioned here 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

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Coexistence of generic protocols for the control of supplementary services

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 interface. 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. This is specified in relation to the relevant supplementary services for which it applies.

5.3 Arrangements by which coexistence of protocols may be supported by a network

The support of both the keypad protocol and the functional protocol is independent of the type of 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. This is specified in relation to the relevant supplementary services for which it applies.

6 General principles applied for the functional control of supplementary services

Applicable.

7 Control of supplementary services using the separate message approach

Applicable.

8 Control of supplementary services using the common information element approach

8.3.2.1 Point-to-point transport mechanism (connection-oriented)

If the network receives a RESTART message with the Restart indicator information element indicating "single interface" or "all interfaces", all protocol entities containing connection-oriented signalling connections shall release the used call reference and enter the Null call (N0) state and continue according to the procedures in subclause 5.5 of ETS 300 102-1 [4].

8.3.2.1.2.3 Exceptional procedures

If a STATUS message indicating user call state "Bearer Independent Transport" (U31) is received in the network call state "Bearer Independent Transport" (N31) 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 #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 - Finland: The network actions to be taken on the received cause value are implementation dependent

If a STATUS message indicating user call state Null (U0) is received in the network call state "Bearer Independent Transport" (N31) 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.

If a STATUS message indicating any other user call state is received in the network call state "Bearer Independent Transport" (N31) the network 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.

If a STATUS message indicating user call state "Bearer Independent Transport" (U31) is received in the network call state Null (N0) the network shall send a RELEASE COMPLETE message with cause #101 "Message not compatible with call state" to the local user and remain in then Null state.

If a STATUS message indicating user call state U31 is received in any other network call state the network 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.

8.3.2.1.3.2 Exceptional procedures

The NOTE is not applicable i.e. the restart procedure shall not be initiated by the network.

9 Generic notification procedures

Applicable.

10 Other generic procedures

Explicit reservation defined in clause 10.1.2 is currently not applicable.

NOTE: The procedures related to explicit channel reservation may be used in conjunction with the videotelephony teleservice using 2 B-channels and the call hold supplementary service. This is under consideration in ETSI.

11 Coding requirements

Extended facility information element defined in clause 11.2.2.4 is not applicable.

Annex A (normative) Dynamic descriptions

Applicable.

Annex B (informative) Guidelines for the application of the generic procedures for the design of individual supplementary services

Applicable.

Annex C (informative) ASN.1 subtypes and proposed mechanism for enhancements of the future protocol

Applicable.

Annex D (normative) Formal definition of data types

D.5 Formal definition of basic services

NOTE 1: If the bearer capability "multirate" is indicated, i.e. octet 4 of the Bearer capability information element is encoded with "circuit mode" and "multirate", this encoding shall be interpreted as the basic service "unrestricted digital information" irrespective of the content of the High layer compatibility information element.

NOTE 7: If the bearer capability "unrestricted digital information with tones and announcements" is indicated in combination with an inappropriate high layer compatibility, the basic service "unrestricted digital information with tones and announcements" shall be considered.

According to NOTE 1 to table D.5, if the BasicService parameter indicate "unrestricted digital information", the bearer capability "multirate" shall be considered as included in this indication.

D.6 Operations and errors for explicit channel reservation

Operation and errors for explicit channel reservation control defined in table D.6 are currently not applicable.

NOTE: The procedures related to explicit channel reservation

may be used in conjunction with the videotelephony teleservice using 2 B-channels and the call hold supplementary service. This is under consideration in ETSI.

Annex E (informative) Formal definition of remote operations notation

Applicable.

Annex F (informative) Coding examples

Applicable.

Annex G (informative) Assignment of object identifier values

Applicable.

TELE DANMARK

INAD-3 APPENDIX I

Title:

Application specifications to DSS1 - Network layer - ETSI Supplementary Services

Subappendices:

None.

Contents:

This appendix is an application specification to the following supplementary services:

- Direct Dialling In, ETS 300 064-1
- Multiple Subscriber Number, ETS 300 052-1
- SUBaddressing, ETS 300 061-1
- Calling Line Identification Presentation, ETS 300 092-1
- Calling Line Identification Restriction, ETS 300 093-1
- Terminal Portability, ETS 300 055-1
- Call Waiting, ETS 300 058-1
- User-to-USer Signalling, ETS 300 286-1
- Connected Line Identification Presentation, ETS 300 097-1
- Connected Line Identification Restriction, ETS 300 098-1
- Call HOLD, ETS 300 141-1
- Closed User Group, ETS 300 138-1
- Malicious Call Identification, ETS 300 130-1
- Call Diversion, ETS 300 207-1
- Advice Of Charge, ETS 300 182-1
- Three Party Service, ETS 300 188-1
- Completion of Calls to Busy Subscriber, ETS 300 359-1

Furthermore, the application specification to ETS 300 195-1 is part of this appendix.

TELE DANMARK

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.

December 1995

Table of contens:

INTRODUCTION

This document gives the specification for the layer 3 procedures for Primary Rate Access and Basic Access to be implemeted 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.~~

~~Note: The interaction with the following supplementary services are not considered while not implemented:~~

~~the Freephone supplementary service~~
~~the Conference call, add on supplementary service~~
~~the Call transfer supplementary service~~
~~the Meet-me conference supplementary service~~

Comments to interactions ~~between supplementary services~~ 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 300 195~~.

~~All ETSs referred to are the final published versions.~~

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 ~~prETS~~ 300 064 ~~Revision 5~~

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 ~~prETS 300 052 Revision 4~~

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).

9.3 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 ~~prETS~~ 300 061 ~~Revision 4~~

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 international 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 ~~prETS~~ 300 092 ~~Revision 1~~

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.~~

Special arrangement shall 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.~~

~~Applicable~~

~~NOTE 2 – 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.~~

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.~~

~~Applicable~~

CLIR - Calling Line Identification Restriction

Application to stage 3 ETSI ~~prETS~~ 300 093 ~~Revision 1~~

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 ~~prETS~~ 300 055 ~~Revision 4~~

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 ~~prETS~~ 300 058 ~~Revision 4~~

1 Scope

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

~~Note: It is an operator issue whether the CW supplementary service is applicable to the multiple rate bearer service.~~

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~~ 300 286

~~Note: In INR-91, the application to the User-to-user signalling supplementary service was based on ETS 300 102-1, subclause 7.1. Furthermore, only service 1 implicit was included.~~
~~Since UUS has now been specified in ETS 300 286, the application text from INR-91 has been deleted and application text to ETS 300 286 has been included instead, and the requirements include all UUS service types.~~
~~The application text to service 1 implicit stated in INER-91 has now been part of the normative text in ETS 300 286 and is therefore no longer essential.~~
~~The following application text shall therefore be considered as new text and revision marks are not included.~~

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

The "NOTE" is not applicable, i.e. the network shall as a maximum allow the transmission of 128 octets per message.

The network shall support possibilities of prevention as well as no prevention for the called user to request the UUS service 3 supplementary service after the connection has been established.

5.2 Service 2

The network option allowing the terminating exchange to deliver received UUI to the user during the active state of the call shall be supported.

6 Operational requirements

6.1 Provision and withdrawal

The individual UUS supplementary services shall be provided or witdrawn as separate supplementary services.

7 Coding requirements

Applicable.

7.3 Definition of information elements

7.3.3 User-user

NOTE 1 is not applicable, i.e. the network shall support the maximum size of 131 octets in the User-user information element.

8 State definitions

Applicable.

9 Signalling procedures at the coincident S and T reference point

9.1 Service 1

9.1.2 Invocation

9.1.2.1 Service 2 invocation during call establishment

9.1.2.1.2 Exceptional procedures

* In the case of excessive UUI, the network shall send a STATUS message with cause #~~31~~43 "access information discarded" to the calling user.

9.1.2.2 Service 1 invocation during call clearing

9.1.2.2.1 Normal operation

* In the case of excessive UUI, the network shall send a STATUS message with cause #~~31~~43 "access information discarded" to the calling user.

9.2 Service 2

9.2.2 Invocation

9.2.2.1 Normal operation

The calling network shall accept the USER INFORMATION messages from the calling user and the called network shall deliver them to the called user after the calling and the called network have entered the Active (N10) call state.

9.2.2.2 Exceptional procedures

* The calling or called network shall send a STATUS message with cause #~~31~~43 "access information discarded" to the calling or called user in the specified error situations.

9.3 Service 3

9.3.1 Activation, deactivation and registration

9.3.1.2 Service 3 request during the Active (N10, U10) call state

9.3.1.2.1 Normal operation

The network shall support possibilities of prevention as well as no prevention for the called user to request the UUS service 3 supplementary service during the Active state of a call.

9.3.2 Invocation

9.3.2.2 Exceptional procedures

The calling or called network shall send a STATUS message with cause #3143 "access information discarded" to the calling or called user in the specified error situations.

10 Procedures for interworking with private ISDNs

Applicable.

11 Interactions with other networks

11.1 Service 1 interaction with an ISDN network not supporting explicit request

The network option shall not apply.

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) Diagrammatic description of coding requirements

Applicable.

COLP - COnnected Line identification Presentation

Application to stage 3 ETSI ~~pr~~ETS 300 097 ~~Revision 2~~

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.~~

~~Special arrangement shall 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 ~~pr~~ETS 300 098 ~~Revision 2~~

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 ~~pr~~ETS 300 141 ~~-1990~~

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.~~

The explicit channel reservation function is applicable.

9.1.2 Exceptional procedures

If the number of calls on hold has reached the maximum limit of 10, the network shall reject subsequent hold requests by sending a HOLD REJECT message with cause #29 "facility rejected".

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.~~

The network shall support the sending of notifications to the remote user.

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.~~

The network shall support the sending of notifications to the remote 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.

CUG - Closed User Group

Application to stage 3 ETSI ETS 300 138

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

A user can be member of maximum 100 closed user groups.

6 Operational requirements

6.1 Provision and withdrawal

The CUG supplementary service shall be offered with the subscription options shown in tables 1 and 2.
The relationship between the ISDN user, ISDN number, basic services and CUG with subscription options is summerized in figure 1 below.

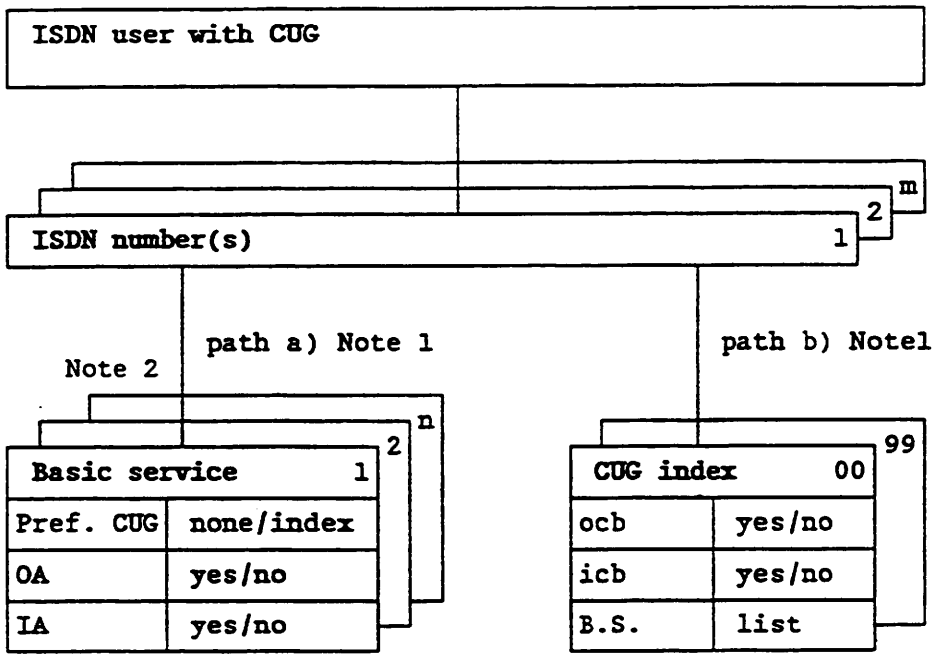


Figure 1: Relationship between ISDN subscriber, ISDN number, basic service and CUG.

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 1: The CUG procedures depend on wheteher a CUG index is provided by the user or not. If provided, the procedures are in alignment with those of path b), if not, those of path a).

Note 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.

7 Coding requirements

Applicable.

8 State definitions

Applicable.

9 Signalling procedures at the coincident S and T reference point

9.2 Invocation and operation

9.2.1 Call originating from a user with the CUG supplementary service (explicit request)

9.2.1.1 Normal operation

Applicable.

9.2.1.2 Exceptional procedures

Note 1: This subclause specifies that at the CUG check fails at the destination network side, the calling user shall be informed by means of a return error component containing specific information about the reason for rejection. However, the current ISUP standard (ETS 300 356-9) can only support transfer of reject reasons from the destination side to the originating side by means of cause values. Consequently, the following shall apply:

If the call is cleared at the destination due to "incoming calls barred within CUG", the destination network shall indicate cause #55 "incoming calls barred within CUG" to the originating network. The originating network shall indicate the error value "incomingCallsBarredWithinCUG" to the calling user.

If the call is cleared at the destination due to any other CUG supplementary service related reason (including destination user initiated clearing), the destination network shall indicate cause #87 "user not member of CUG" to the originating network. The originating network shall indicate the error value "userNotMemberOfCUG" to the calling user.

The same procedures shall apply for calls not involving ISUP.

9.2.4 Call terminating at a user with the CUG supplementary service

Item b): In case of a SETUP message sent via a broadcast datalink, the network shall retain the return error component along with the cause retained according to basic call.

~~Editor's note: The mistakes in the remaining part of item b) is still pending the ETSI secretariat.~~

Note 1: In subclause 9.2.4.1, item b) of ETS 300 138, the text in the third paragraph is misleading and will result in a Corrigendum from ETSI. The new third paragraph is expected to read:

"In case of a SETUP message sent via the broadcast datalink, the network may, as a network option retain the return error component along with the ETS 300 102-1 cause retained according to subclause 5.2.5.3 of ETS 300 102-1 [10]. If there are multiple clearing messages containing return error component, the indication in the return error component contained in the first received clearing message with the highest priority cause will be sent back to the calling user. If none of the clearing messages with the highest priority cause contains return

error components and other clearing messages with lower priority causes do contain return error component, no indication in these return error components shall be sent back to the calling user.

In addition to the basic call procedures defined in ETS 300 102-1 [10], when a user receives a SETUP message with a Facility information element containing a CUGCall invoke component and the user can recognise CUG call invocation procedures, the user may:

1) initiate appropriate user domain closed user group procedures and, if the call fails for CUG supplementary service reasons, may include in the first clearing message returned to the network (before the alerting phase) a Facility information element containing a CUGCall return error component; or

2) include in the first clearing message returned to the network (before the alerting phase) a Facility information element containing a CUGCall return error component with a value 'Inconsistency In Designated Outgoing Access Category' or 'Subscriber Class' if the call fails for a reason unrelated to the CUG supplementary service.

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) Diagrammatic description of coding requirements

Applicable.

MCID - Malicious Call IDentification

Application to stage 3 ETSI ETS 300 130

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

Applicable.

12 Interactions with other supplementary services

Applicable.

13 Parameter values (timers)

Applicable.

14 Dynamic description (SDLs)

Applicable.

Annex A (Informative) Signalling flows

Applicable.

DIV - DIVersion services

Application to stage 3 ETSI ETS 300 207

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 subscription options are specified in relevant stage 1 ETSs.

The following network provider options shall apply:

Network option	Chosen value	Applicabil.
Served user call retention on invocation of diversion	clear call on invocation of diversion	CFNR,CD
The maximum number of call diversions for a single call	5	CFU, CFB CFNR, CD
Call forwarding on no reply timer	T(CFNR) 10-60 secs in steps of max. 10 secs	CFNR
Partial rerouting provided at the T reference point	Yes	CFU, CFB CFNR, CD
* The call-by-call indication overrides the value of the subscription option "diverting number is released to the diverted-to-user"	Yes	CD

7 Coding requirements

Applicable.

8 State definitions

Applicable.

9 Signalling procedures at the coincident S and T reference point

Note: In this Clause, procedures related to the subscription option "The whole access" do not apply.

9.1.1 Activation

9.1.1.1 Normal operation

The network shall verify the forwarded-to number before accepting the activation request. This verification shall check the length of the indicated fowarded-to number.
If the forwarded-to number consists of eight or more digits, the network shall accept the activation request. Otherwise the request shall be rejected.

9.1.3 Interrogation of the served user numbers

9.1.3.1 Normal operation

The network shall send an InterrogateServedUserNumbers return result component as an answer to an InterrogateServedUserNumber invoke component.

9.2.3 Identification of the diverted-to user to the calling user

9.2.3.1 Normal operation

If the diverted-to user has subscribed to the COLR supplementary service, the presentation indicator shall always be send through the network to the calling user's network.

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.

9.2.4 Operations at the served user

9.2.4.4 Procedures for the CFNR supplementary service

9.2.4.4.1 Normal operation

The timer T(cnfr) shall be selectable in the range of 10-60 seconds with steps of maximum 10 seconds.

9.2.5 Operation at the diverted-to user

9.2.5.1 Normal operation

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.

10 Procedures for interworking with private ISDNs

10.5 Procedures where a call from the public ISDN is diverted within or beyond the private ISDN and partial rerouting takes place in the public ISDN

10.5.1 Normal operation

For case g) item iv), 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.

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.

Additional signalling flows are shown in Appendix A to this subsection.

Appendix A (Informative)

Additional signalling flows for the Call Diversion supplementary services

This appendix contains additional signalling flows showing interworking between DSS1 and ISUP signalling. In case of contradiction between the text in the standard and the attached signalling flows the text shall be followed.

The following signalling flows show different scenarios in relation to the subscription option chosen by the served user.
Furthermore, the signalling flows also show some cases of interaction with the CLIP/CLIR and COLP/COLR supplementary services.
The signalling flows are based on the "early ACM" principle in the ISUP signalling.

Figure A.1 and A.2 together with table 1 and 2 show the signalling flows for the supplementary service Call Forwarding Unconditional.

Figure A.3 and A.4 together with table 1 and 2 show the signalling flows for the supplementary service Call Forwarding No Reply.

Figure A.5 together with table 3 show the signalling flows for the supplementary service Call Deflection before alerting.

Figure A.6 together with table 5 show the signalling flows for the supplementary service Call Deflection after alerting.

Figure A.7 shows the signalling flows in case of partial rerouting.

Tables 1-3 show the served user's choice of subscription option values for the individual Call Diversion supplementary services and in addition other supplementary services subscribed to by user A and user C.
The subscription options are chosen in such a way that the signalling diagrams show a signalling flow with either no subscription options or all subscription options according to the tables 1 - 3. The other supplementary services subscribed to are identical for all signalling diagrams except figure A.7.

The following abbreviations are used in the signalling flows:

BC: Bearer capability

BCI: Backward call indicator

BS: Basic service

CAD: Called address (Diverted-to number)

CAP: Calling address parameter

CDI: Call diversion information

CDMO: Call diversion may occur

CLPN: Calling party number

CON: Connected number

CPN: Called party number

CPSI: Called party's status indicator

DA: Deflection address

DR: Diversion reason

EI: Event information

FIE: Facility information element

GNI: Generic notification indicator

LRN: Last rerouting number

NI: Notification indicator

NSO: Notification subscription option

OBC: Optional backward call indicator

OCN: Original called number

PAC: Presentation allowed to calling user

PAD: Presentation allowed to diverted-to user

PI: Presentation indicator

PRI: Presentation restriction indicator

RC: Redirection counter

RDI: Redirecting indicator

RDN: Redirecting number

REC: Rerouting counter

RER: Rerouting reason

RFD: Reason for diversion

RI: Redirection information

RN: Redirection number

RNRI: Redirection number restriction Indicator

RR: Redirection reason

SN: Subscriber number

SO: Subscription option

TMR: Transmission medium requirement

Table 1 - 3 show the served users choice of values for the subscription options related to the Call Diversion services. Furthermore, the tables are showing the other supplementary services the served user has subscribed to.

Call Diversion suppl. service		Additional suppl. services	
Subscription option, according to the definition on subclause 6.1	Served users choice of value	User A (calling user)	User C (forwarded-to user)
Served user receives notification that a call has been forwarded	No	CLIR per call	CLIP
Calling user is notified of diversion (forwarded or deflected)	No	COLP	COLR permanent mode
Served user receives reminder notification on outgoing calls that forwarding is currently activated	No		
Diverting number is released to the diverted-to user	No		
Activation, deactivation and interrogation for all ISDN-numbers on the same access	No		

Table 1: Call Forwarding Unconditional (CFU) and Call Forwarding No Reply (CFNR). Served users choice of value and additional supplementary services subscribed to by user A and user C (related to figure A.1 and A.3).

Call Diversion suppl. service		Additional suppl. services	
Subscription option, according to the definition on page 6	Served users choice of value	User A (calling user)	User C (forwarded-to user)
Served user receives notification that a call has been forwarded	Yes	CLIR per call	CLIP
Calling user is notified of diversion (forwarded or deflected)	Yes, with C-no.	COLP	
Served user receives reminder notification on outgoing calls that forwarding is currently activated	No		
Diverting number is released to the diverted-to user	Yes		
Activation, deactivation and interrogation for all ISDN-numbers on the same access	No		

Table 2. Call Forwarding Unconditional (CFU) and Call Forwarding No Reply (CFNR). Served users choice of value and additional supplementary services subscribed to by user A and user C (related to figure A.2 and A.4).

Call Diversion suppl. service		Additional suppl. services	
Subscription option, according to the definition on page 6	Served users choice of value	User A (calling user)	User C (forwarded-to user)
Calling user is notified of diversion (forwarded or deflected)	Yes, with C-no.	CLIR per call	CLIP
Diverting number is released to the diverted-to user	No	COLP	

Table 3. Call Deflection (CD) before and after alerting. Served users choice of value and additional supplementary services subscribed to by user A and user C (related to figure A.5 and A.6).

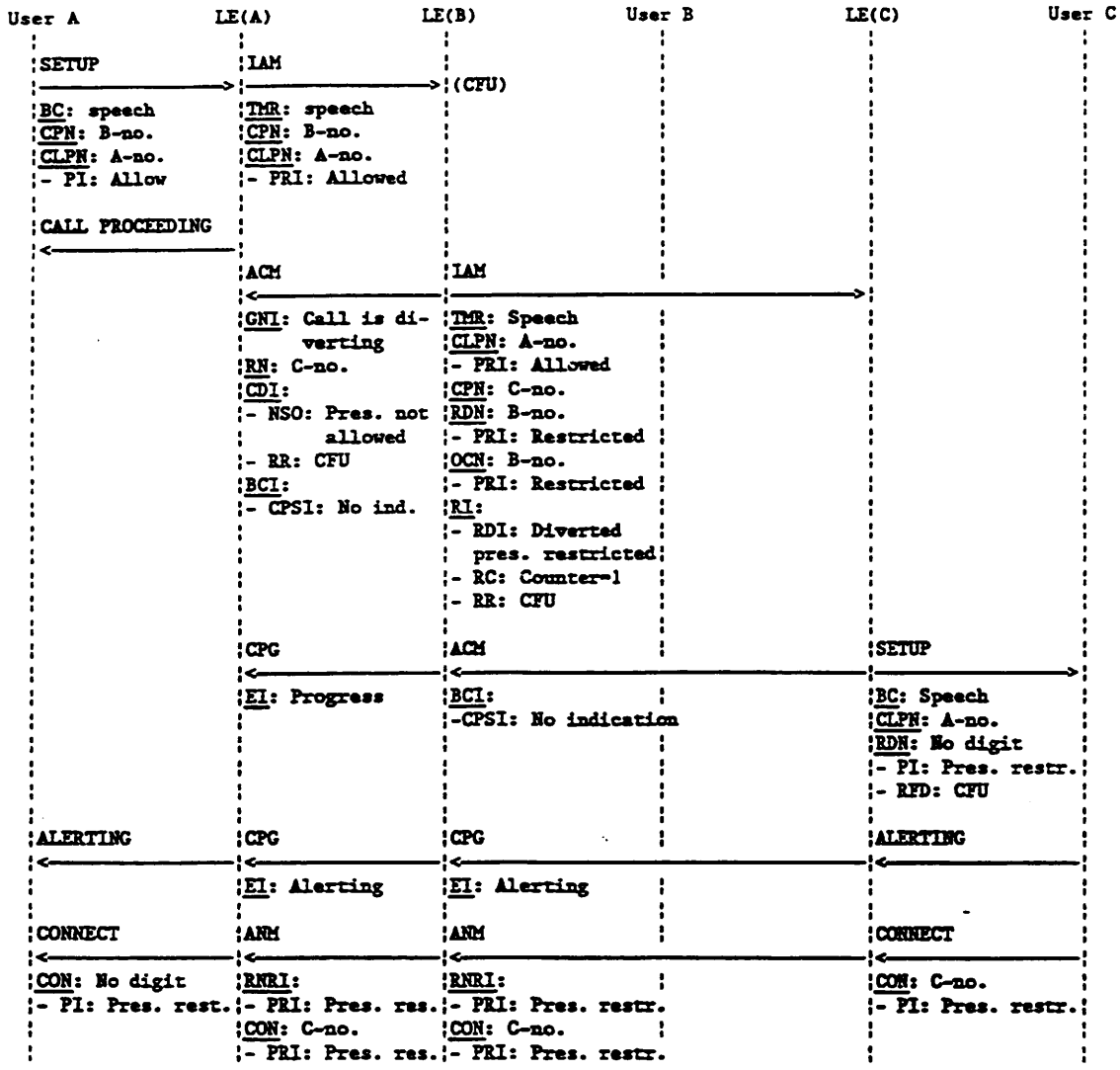


Figure A.1: Call Forwarding Unconditional (CFU) - with all subscription options restricted according to table 1

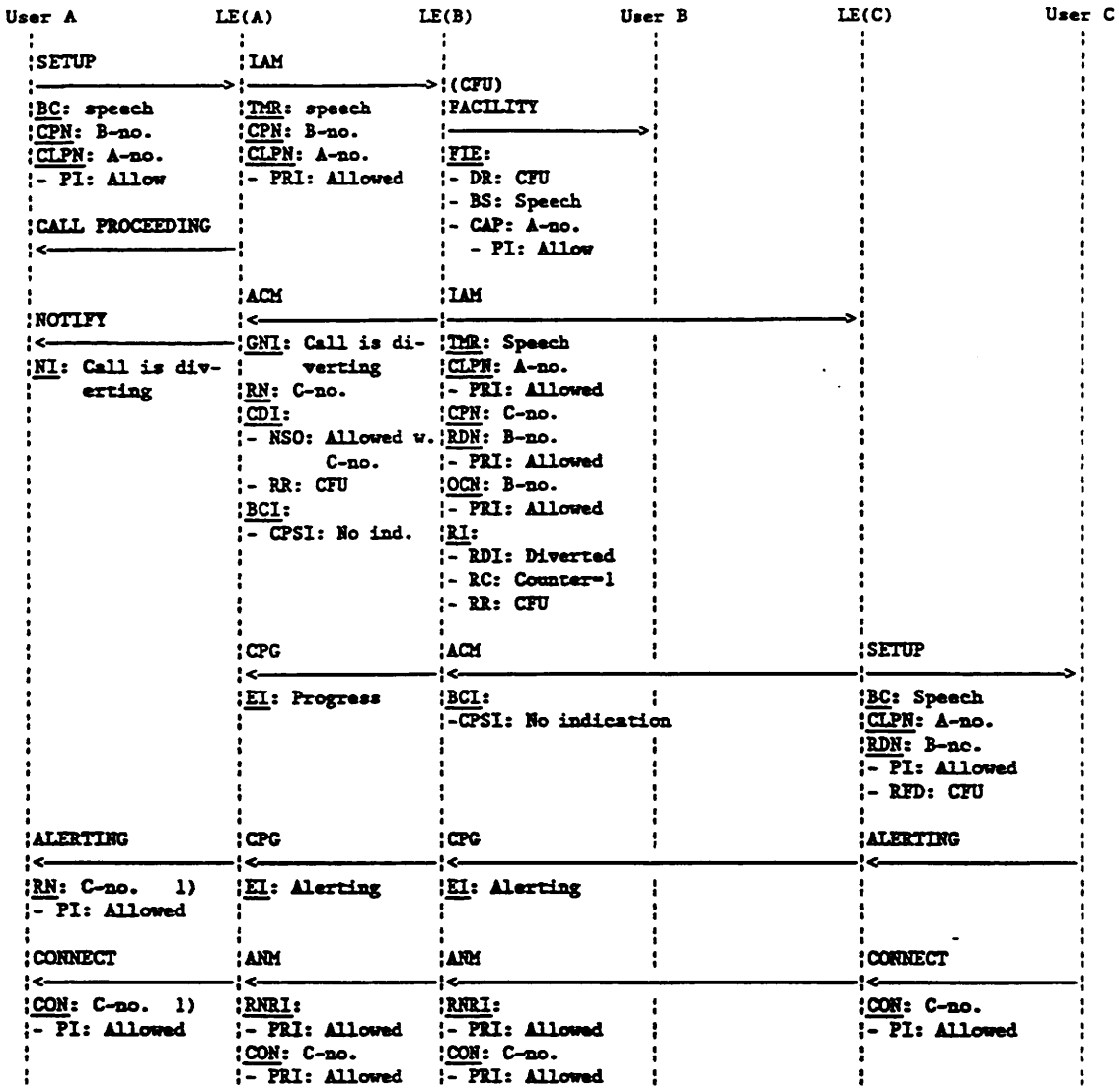


Figure A.2: Call Forwarding Unconditional (CFU) - with all subscription options activated according to table 2

1): If multiple call forwarding occurs the RN-number and the CON-number will be different.

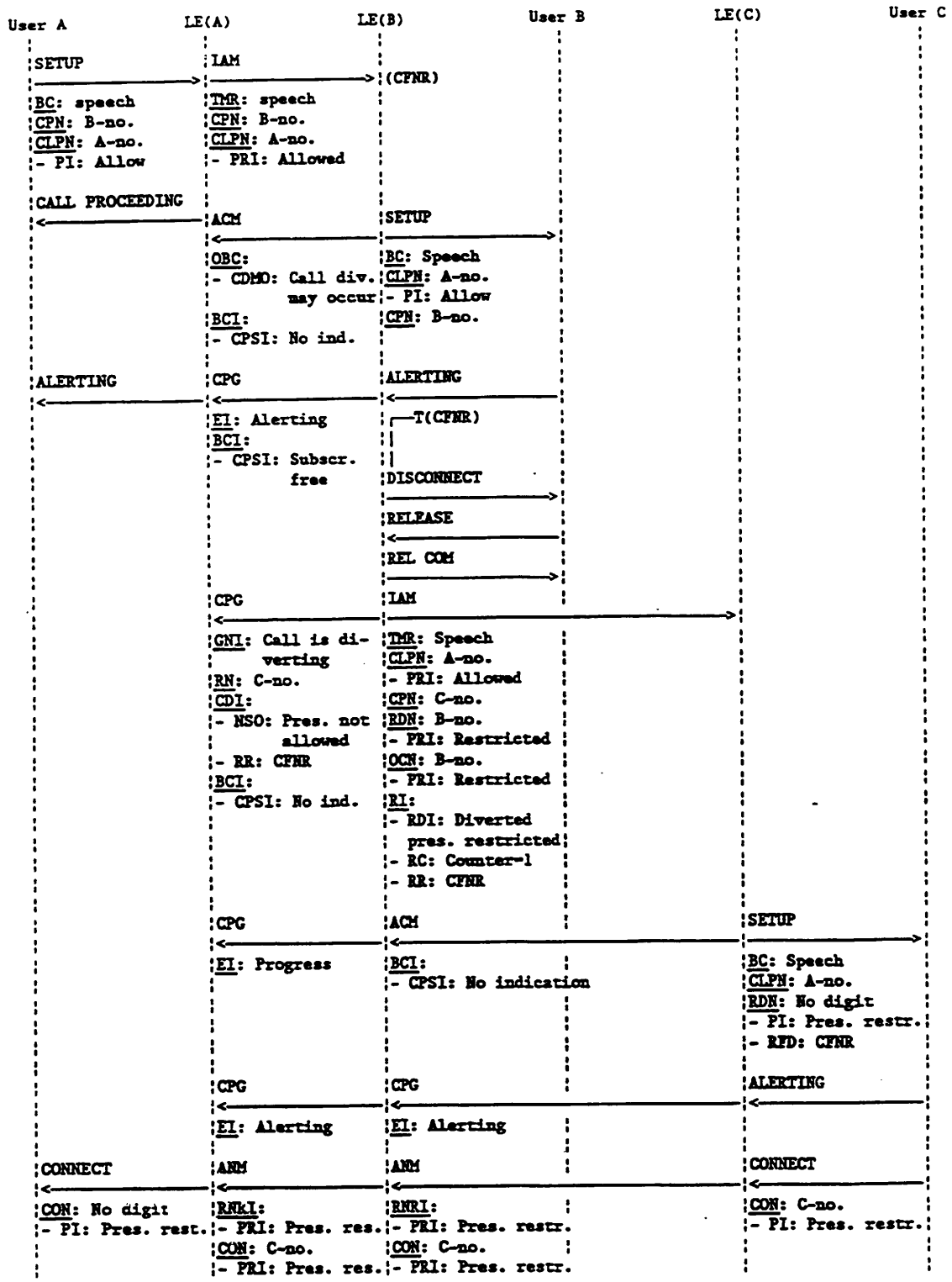


Figure A.3: Call Forwarding No Reply (CFNR) - Option B, immediate release - with all subscription options restricted according to table 1

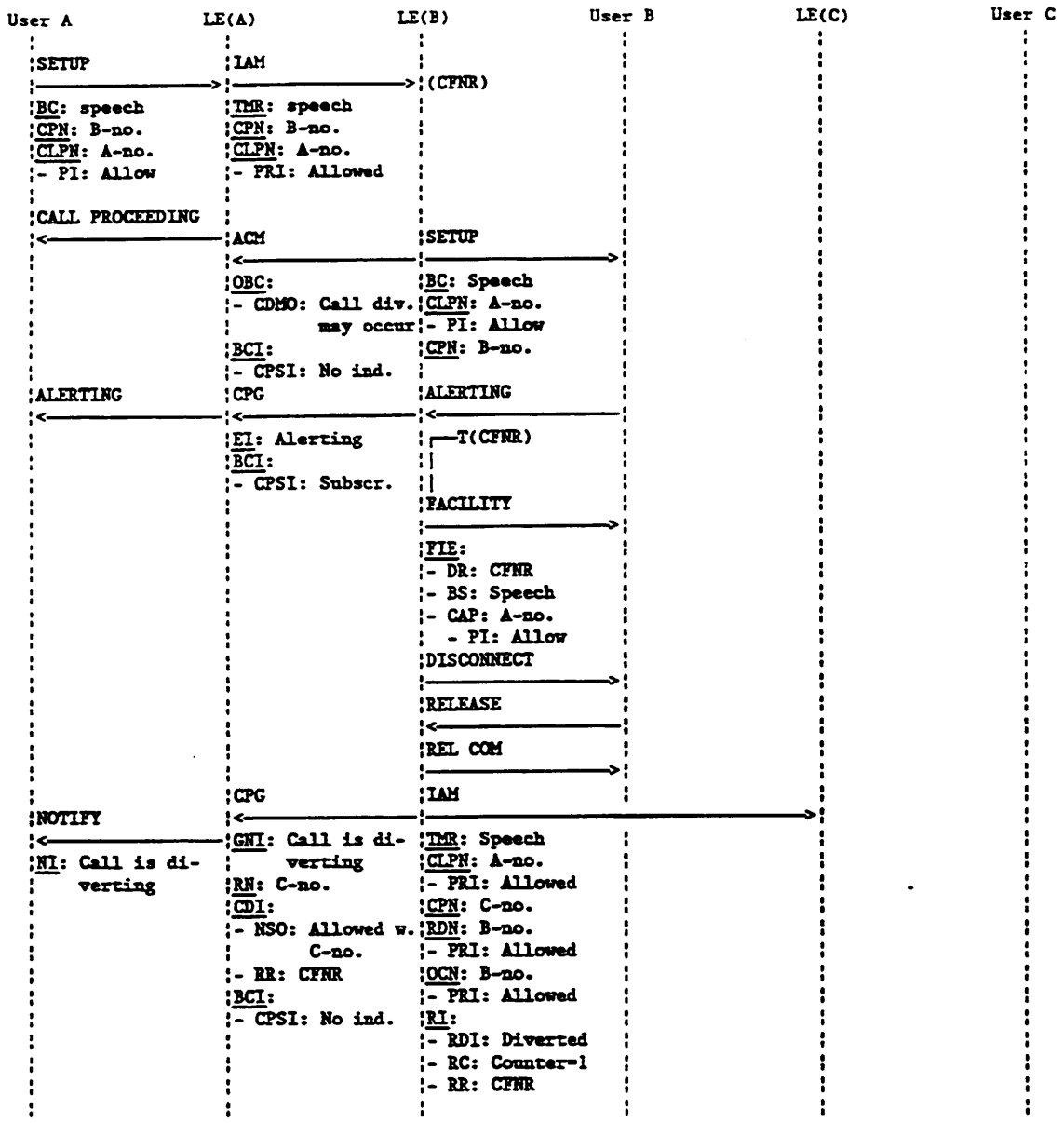


Figure A.4/1: Call Forwarding No Reply (CFNR) - Option B, immediate release - with all subscription options allowed according to table 2

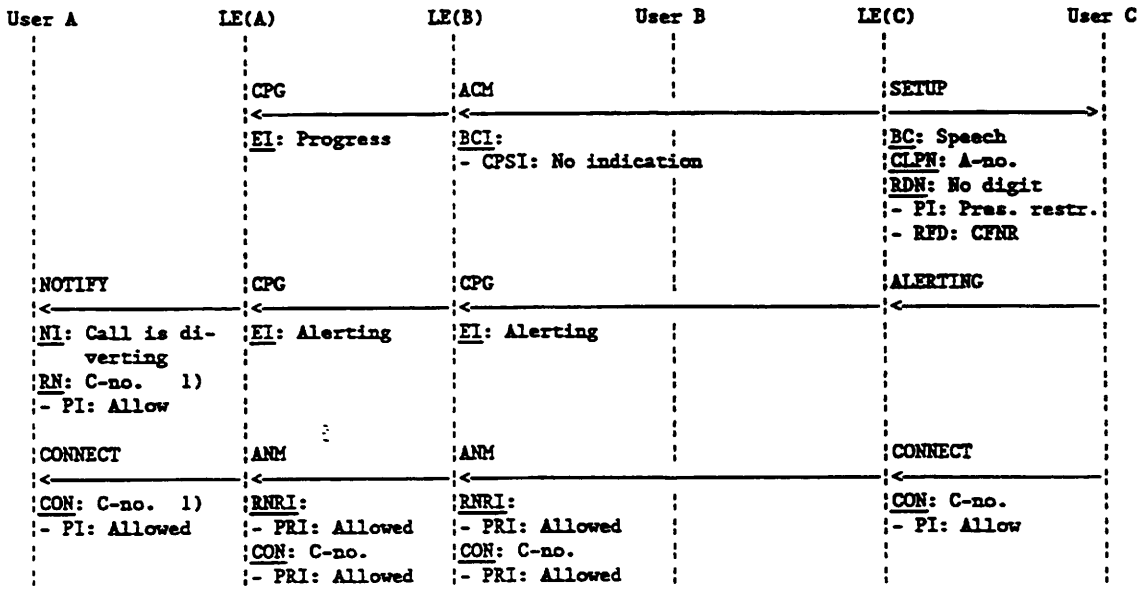


Figure A.4/2: Call Forwarding No Reply (CFNR) - Option B, immediate release - with all subscription options allowed according to table 2

1): If multiple call forwarding occurs the RN-number and the CON-number will be different.

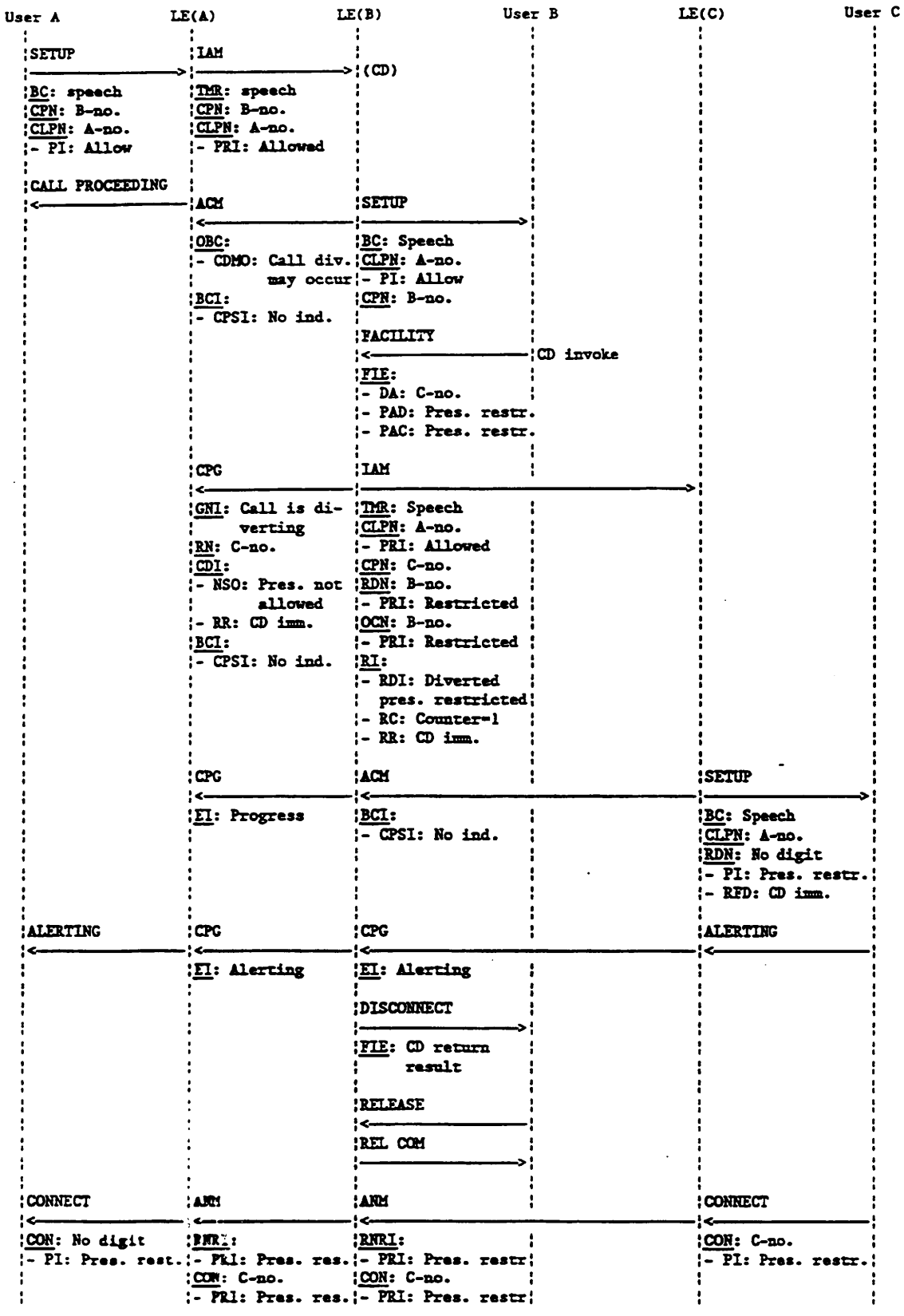


Figure A.5: Call deflection before alerting (CD immidiate) - Option B, immediate release - with all subscription options restricted according to table 3

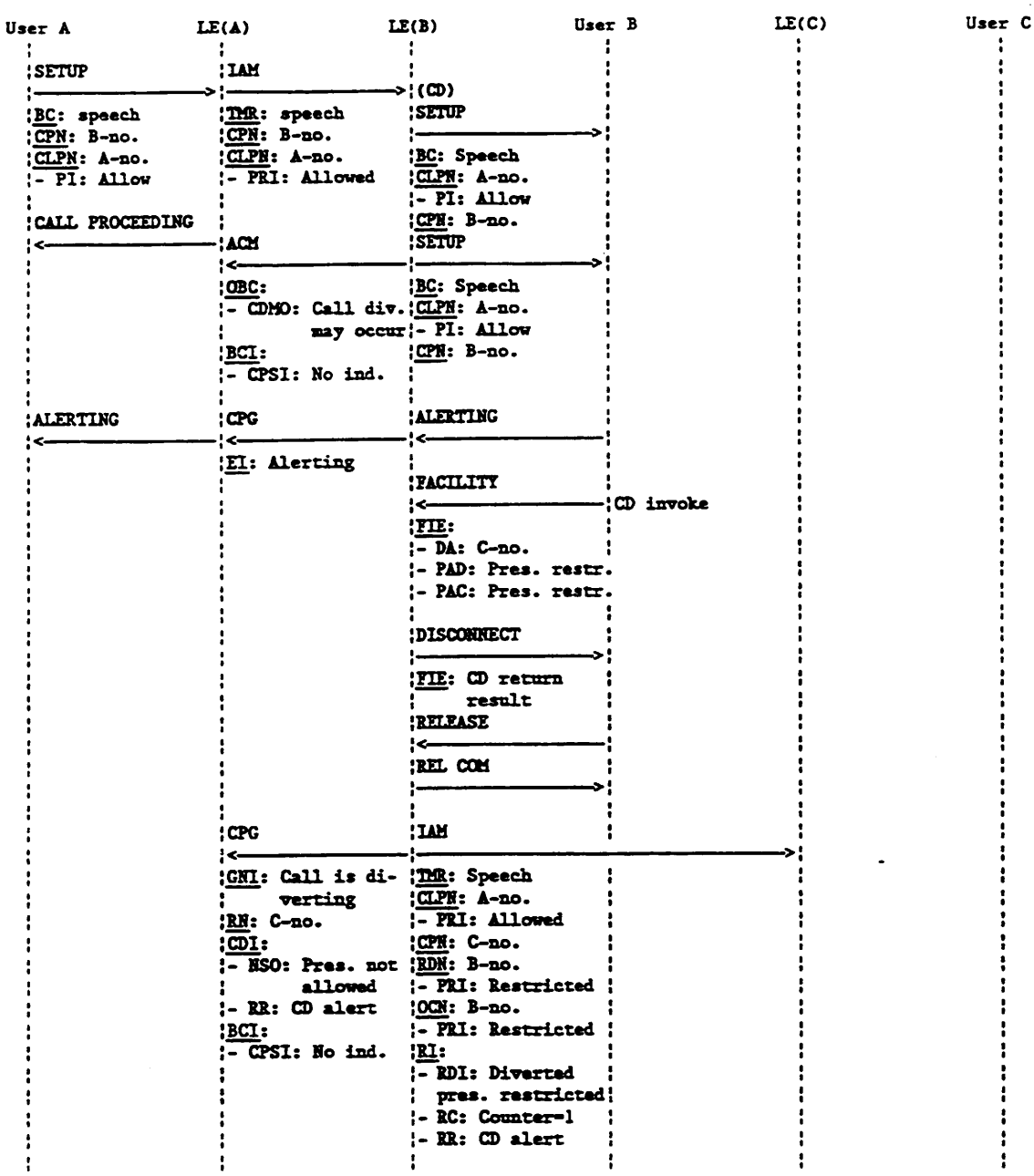


Figure A.6/1: Call deflection after alerting (CD alerting) - Option B, immediate release - with all subscription options restricted according to table 3

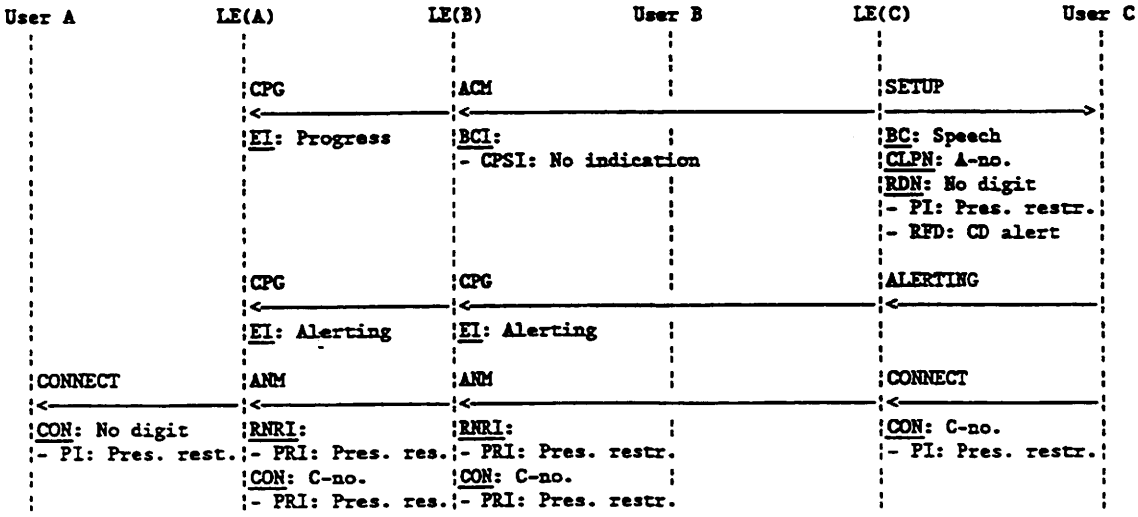


Figure A.6/2: Call deflection after alerting (CD alerting) - Option B, immediate release - with all subscription options restricted according to table 3

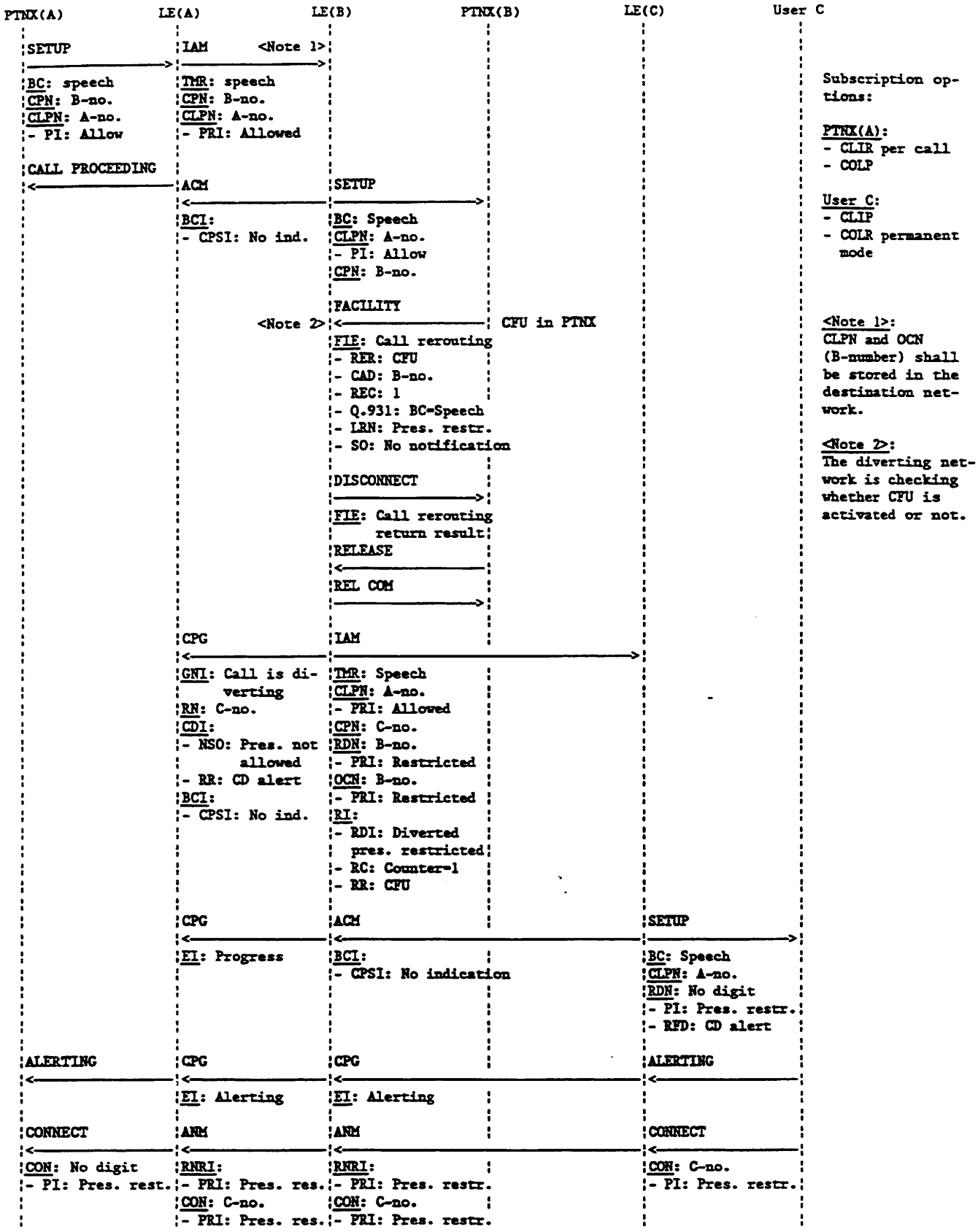


Figure A.7 Partiel rerouting

AOC - Advice Of Charge

Application to stage 3 ETSI ETS 300 182

1 Scope

AOC-D is not applicable.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

5.3 Charging information during the call (AOC-D)

Not applicable.

6 Operational requirements

6.1 Provision and withdrawal

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

6.2 Requirements on the originating network side

The network shall retain the charging information for a suspended call.

7 Coding requirements

Coding requirements related to AOC-D are not applicable.

8 State definitions

States related to AOC-D are not applicable.

9 Signalling procedures at the coincident S and T reference point

9.1 Activation, deactivation and registration

Procedures related to AOC-D are not applicable.

9.2 Invocation

Procedures related to AOC-D are not applicable.

9.2.1 Transfer of charging information in the call establishment phase

9.2.1.1 Normal operation

The special charging arrangement (AOCSpecialArr invoke component) in connection with AOC-S is not applicable.

9.2.2 Transfer of charging information in the Active state

9.2.2.1 Normal operation

The special charging arrangement in connection with AOC-S is not applicable.

9.2.3 Transfer of charging information in the call clearing phase

9.2.3.1 Normal operation

The special charging arrangement (AOCSpecialArr invoke component) in connection with AOC-S is not applicable.

AOC-E charging information shall be given in currency units.

9.2.3.2 Exceptional procedures

AOC-E charging information shall be given in currency units.

9.2.4 Transfer of charging information independent of a bearer at the user-network interface

9.2.4.1 Normal operation

AOC-E charging information shall be given in currency units.

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.

3PTY - Three Party Service

Application to stage 3 ETSI ETS 300 188

1 Scope

For an interim period of time the Telephony 7 kHz Teleservice cannot make use of the Three-Party supplementary service.

2 Normative references

Applicable.

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

The network shall send notifications to the remote users.

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

Remote users in PSTN shall not be notified.

12 Interactions with other supplementary services

Applicable.

13 Parameter values (timers)

Applicable.

14 Dynamic description (SDLs)

Applicable.

Annex A (Informative) Signalling flows

Applicable.

CCBS - Completion of Calls to Busy Subscriber

Application to stage 3 ETSI ETS 300 359-1

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 CCBS supplementary service shall be provided on a subscription basis.

The network shall provide the subscription option for the Recall mode.

The network shall support the value "yes" for the network option "check for identical call".

The network shall support the value "yes" for the network option "CCBS request retention".

7 Coding requirements

Applicable.

8 State definitions

Applicable.

9 Signalling procedures at the coincident S and T reference point

Applicable taking into account the values of the network options as specified in subclause 6.1.

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)

The T-RETENTION timer shall have the value 15 seconds.

Timer T-CCBS2 (service duration timer) shall have the value 45 minutes.

Timer T-CCBS3 (recall timer) shall have the value 20 seconds.

Timer T-CCBS4 (idle guard timer) shall have the value 10 seconds.

14 Dynamic description (SDLs)

Applicable.

Annex A (Informative) Signalling flows

Applicable. (See also Appendix A)

Interaction between supplementary services

Application to stage 3 ETSI ETS 300 195-1

1 Scope

Applicable.

2 Normative references

Applicable.

3 Definitions

Applicable

4 Symbols and abbreviations

5 Description of supplementary service interactions

5.4 The AOC and CD supplementary services

5.4.2 Signalling procedures at the coincident S and T reference point

The sending of charging information to the deflecting (served) user when a deflected call is released, provided that AOC-E is activated for all calls, shall be supported.

5.4.3 Procedures for interworking with private ISDNs

Applicable.

5.4.3.1 Delivery of charging information to the private network when the CD supplementary service is provided to the private ISDN

The sending of charging information to the deflecting (served) user when a deflected call is released, provided that AOC-E is activated for all calls, shall be supported.

5.4.3.2 Delivery of charging information to the private network when partial rerouting applies

The sending of charging information to the deflecting (served) user when a deflected call is released, provided that AOC-E is activated for all calls, shall be supported.

5.5 The AOC and CFB supplementary services

5.5.2 Signalling procedures at the coincident S and T reference point

The sending of charging information to the forwarding (served) user when a forwarded call is released shall be supported.

5.5.3 Procedures for interworking with private ISDNs

Applicable.

5.5.3.1 Delivery of charging information to the private network when the CFB supplementary service is provided to the private ISDN

The sending of charging information to the forwarding (served) user when a forwarded call is released, provided that AOC-E is activated for all calls, shall be supported.

5.8 The AOC and 3PTY supplementary services

5.8.2 Signalling procedures at the coincident S and T reference point

5.8.2.1 Normal operation

The network option to indicate charges for the use of the conference bridge shall apply.

5.10 The AOC and TP supplementary services

5.10.2 Signalling procedures at the coincident S and T refrence point

5.10.2.2 In the call resume phase

5.10.2.2.1 Normal operation

The network shall support the transfer of charging information to the served user even though the network cannot resume a suspended call (within the time the network retains the call identity of the suspended call).

5.20 The CD and UUS supplementary services

5.20.2 Signalling procedures at the coincident S and T reference point

5.20.2.1 Procedures at the served user when deflection takes place before alerting

5.20.2.1.1 Normal operation

The network provider option regarding the deflection of UUI and/or UUS supplementary service request shall apply.

5.20.2.2 Procedures at the served user when deflection takes place after alerting

5.20.2.2.1 Service 1 implicitly requested

5.20.2.2.1.1 Normal operation

The network provider option regarding the deflection of the UUI shall apply.

5.20.2.2.2 Service 1 explicitly requested

5.20.2.2.2.1 Normal operation

In the first hyphenated item, the network option a) shall apply.

5.20.2.2.4 Service 3

5.20.2.2.4.1 Normal operation

The network provider option regarding the deflection of the UUS supplementary service

request shall apply.

5.23 The CFB and UUS supplementary services

5.23.2 Signalling procedures at the coincident S and T reference point

5.23.2.1 Normal operation

The network provider option regarding the forwarding of UUI and/or UUS supplementary service request shall apply.

5.23.3 Procedures for interworking with private ISDNs

5.23.3.2 Procedures where partial rerouting takes place

5.23.3.2.1 Normal operation

The network provider option regarding rerouting of UUI and/or UUS supplementary service request shall apply.

5.26 The CFNR and UUS supplementary services

5.26.2 Signalling procedures at the coincident S and T reference point

5.26.2.1 Service 1 implicitly requested

5.26.2.1.1 Normal operation

The network provider option regarding the forwarding of the UUI shall apply.

5.26.2.2 Service 1 explicitly requested

5.26.2.2.1 Normal operation

In the first hyphenated item, the network option a) shall apply.

5.26.2.4 Service 3

5.26.2.4.1 Normal operation

The network provider option regarding the deflection of the UUS supplementary service request shall apply.

5.29 The CFU and UUS supplementary services

5.29.2 Signalling procedures at the coincident S and T reference point

5.29.2.1 Normal operation

The network provider option regarding the forwarding of the UUI and/or UUS supplementary service request shall apply.

6 General procedures

Applicable.

Annex A (informative): Signalling flows

Applicable except that the AOC-D supplementary service is not applicable.

Annex B (informative): Example of the interaction between the AOC-E and the CONF supplementary service

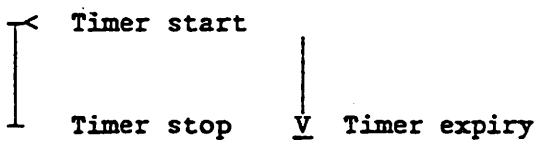
The CONF supplementary service is not supported.

Appendix A (Informativ): Additional signalling flows for the CCBS supplementary service

This Appendix shows two signalling flows:

- Figure 1: Overview
- Figure 2: Successful CCBS

Keys to the figures:

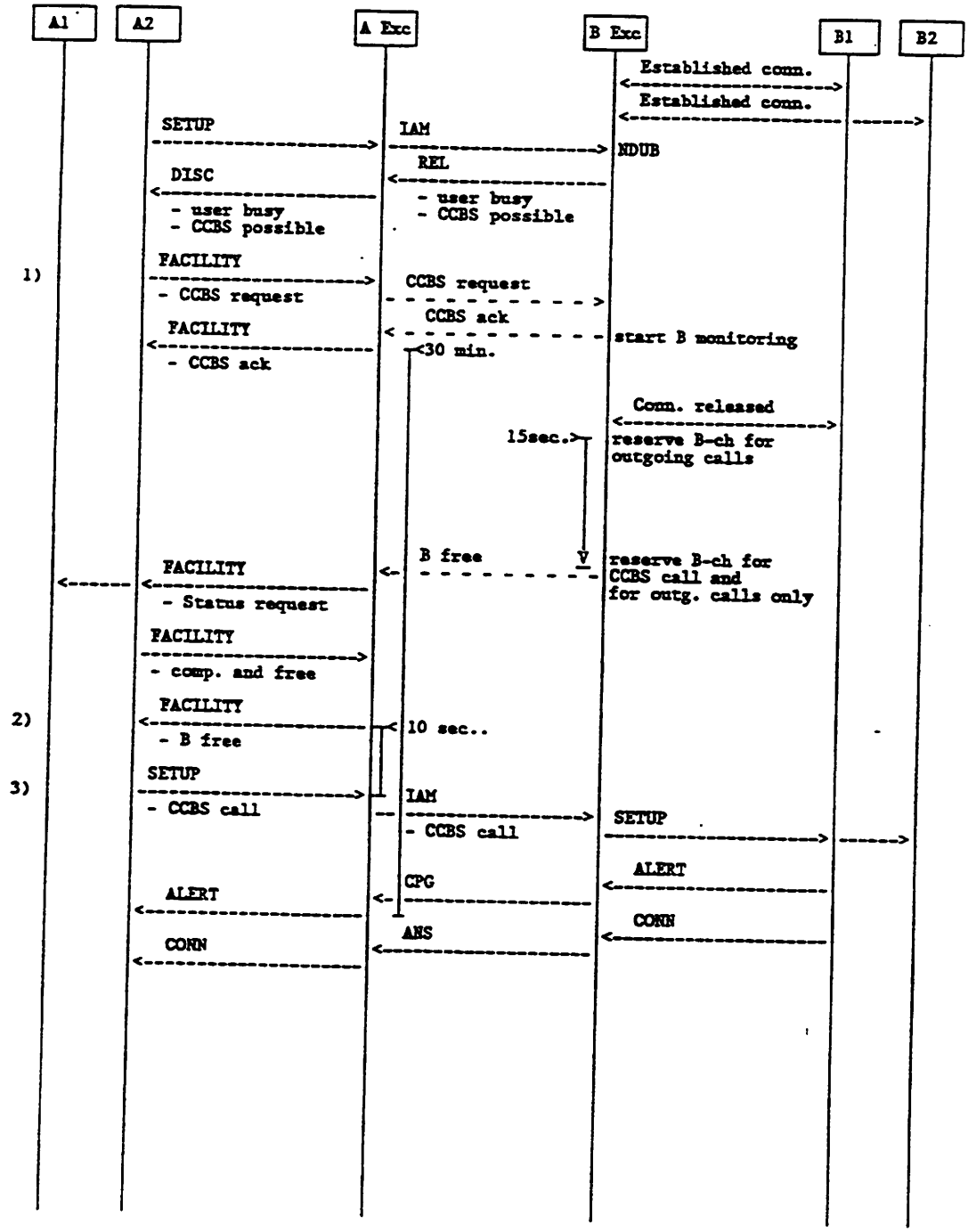


On SS7:

`----------> means ISUP message`
`- - - - - -> means TCAP message`

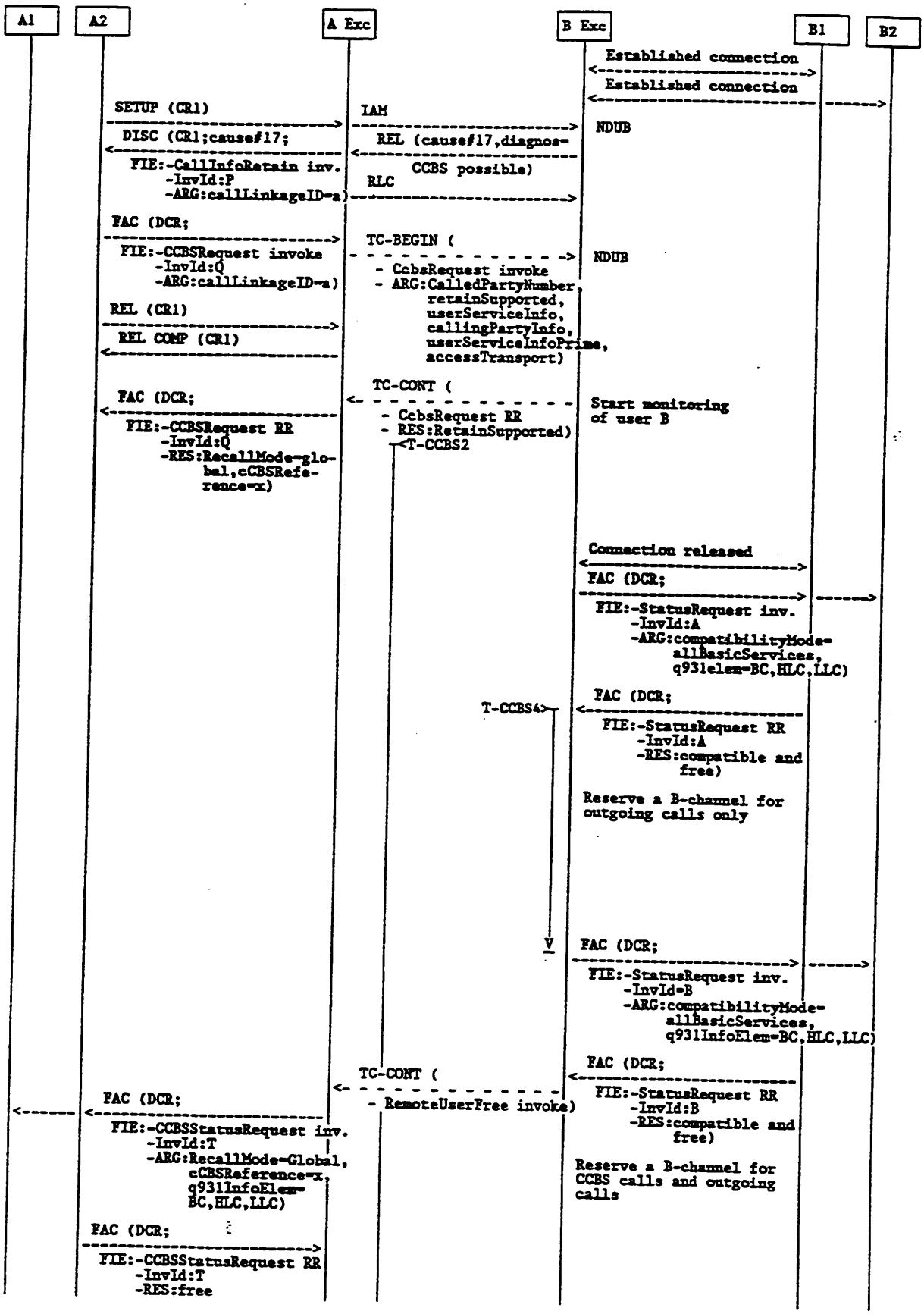
Abbreviations:

ARG:	Argument
BC:	Bearer capability
CR:	Call Reference
DCR:	Dummy call reference
FIE:	Facility information element
HLC:	High layer compatibility
LLC:	Low layer compatibility
RES:	Result
RR:	Return result component



1) CCBS request
2) CCBS recall
3) CCBS call

Figure A.1: Overview


A1
A2
A Exc
B Exc
B1
B2
Established connection
Established connection
SETUP (CR1)
IAM
NDUB
DISC (CR1;cause#17;
REL (cause#17,diagnos=
FIE:-CallInfoRetain inv.
-InvId:P
-ARG:callLinkageID-a)
CCBS possible)
RLC
FAC (DCR;
TC-BEGIN (
FIE:-CCBSRequest invoke
-InvId:Q
-ARG:callLinkageID-a)
- CcbsRequest invoke
- ARG:CalledPartyNumber,
retainSupported,
userServiceInfo,
callingPartyInfo,
userServiceInfoPrime,
accessTransport)
REL (CR1)
REL COMP (CR1)
TC-CONT (
FAC (DCR;
- CcbsRequest RR
- RES:RetainSupported)
FIE:-CCBSRequest RR
-InvId:Q
-RES:RecallMode-glo-
bal,cCBSRefe-
rence-x)
T-CCBS2
Start monitoring
of user B
Connection released
FAC (DCR;
FIE:-StatusRequest inv.
-InvId:A
-ARG:compatibilityMode-
allBasicServices,
q931elem-BC,HLC,LLC)
FAC (DCR;
T-CCBS4
FIE:-StatusRequest RR
-InvId:A
-RES:compatible and
free)
Reserve a B-channel for
outgoing calls only
FAC (DCR;
FIE:-StatusRequest inv.
-InvId=B
-ARG:compatibilityMode-
allBasicServices,
q931InfoElem-BC,HLC,LLC)
TC-CONT (
FAC (DCR;
- RemoteUserFree invoke)
FIE:-StatusRequest RR
-InvId:B
-RES:compatible and
free)
FAC (DCR;
FIE:-CCBSStatusRequest inv.
-InvId:T
-ARG:RecallMode-Global,
cCBSReference-x,
q931InfoElem-
BC,HLC,LLC)
Reserve a B-channel for
CCBS calls and outgoing
calls
FAC (DCR;
FIE:-CCBSStatusRequest RR
-InvId:T
-RES:free

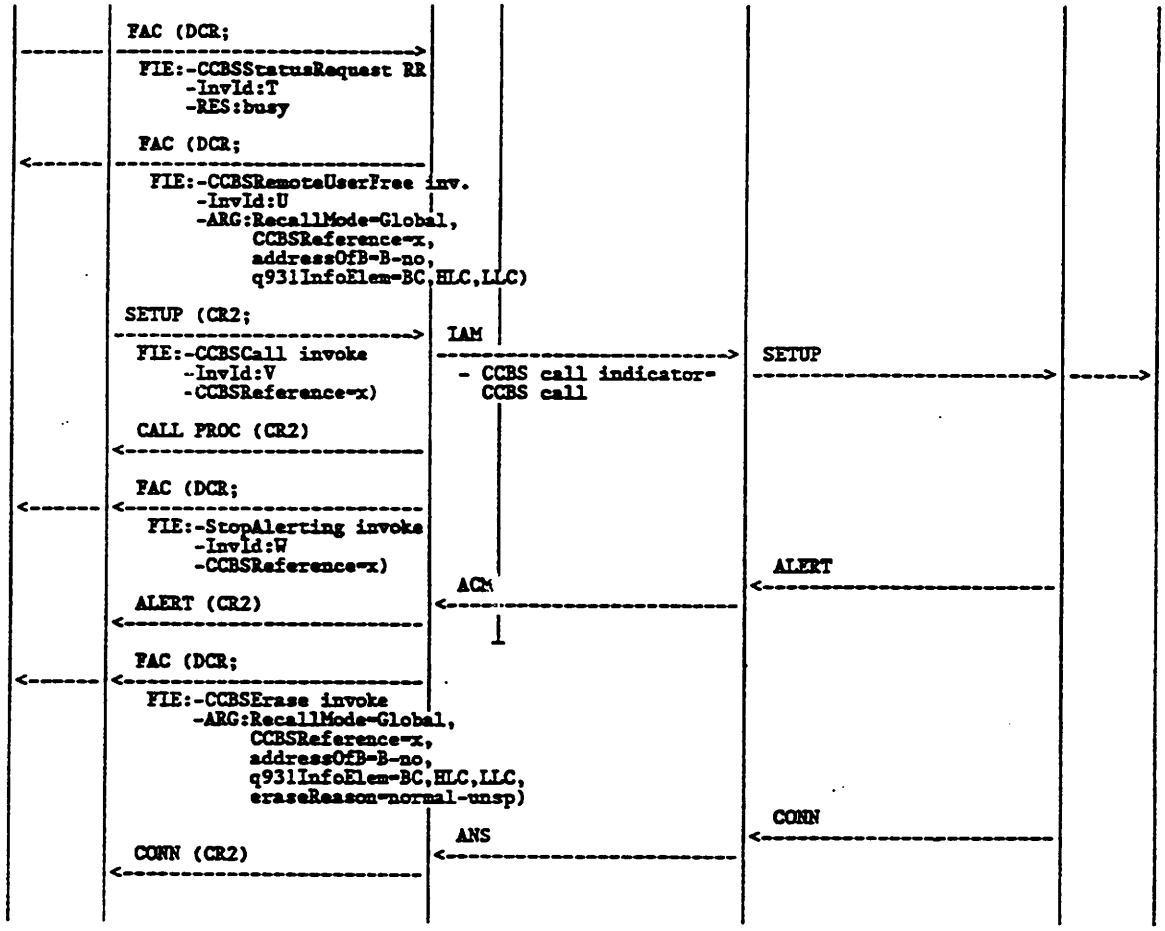


Figure A.2: Successful CCBS

TELE DANMARK

INAD-3 APPENDIX K

Title:

Application specifications to DSS1 - Network layer - Generic keypad protocol for the support of supplementary services.

Contents:

This appendix is an application specification to the generic keypad protocol standard, ETS 300 122. This appendix is a common Nordic application specification.

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).

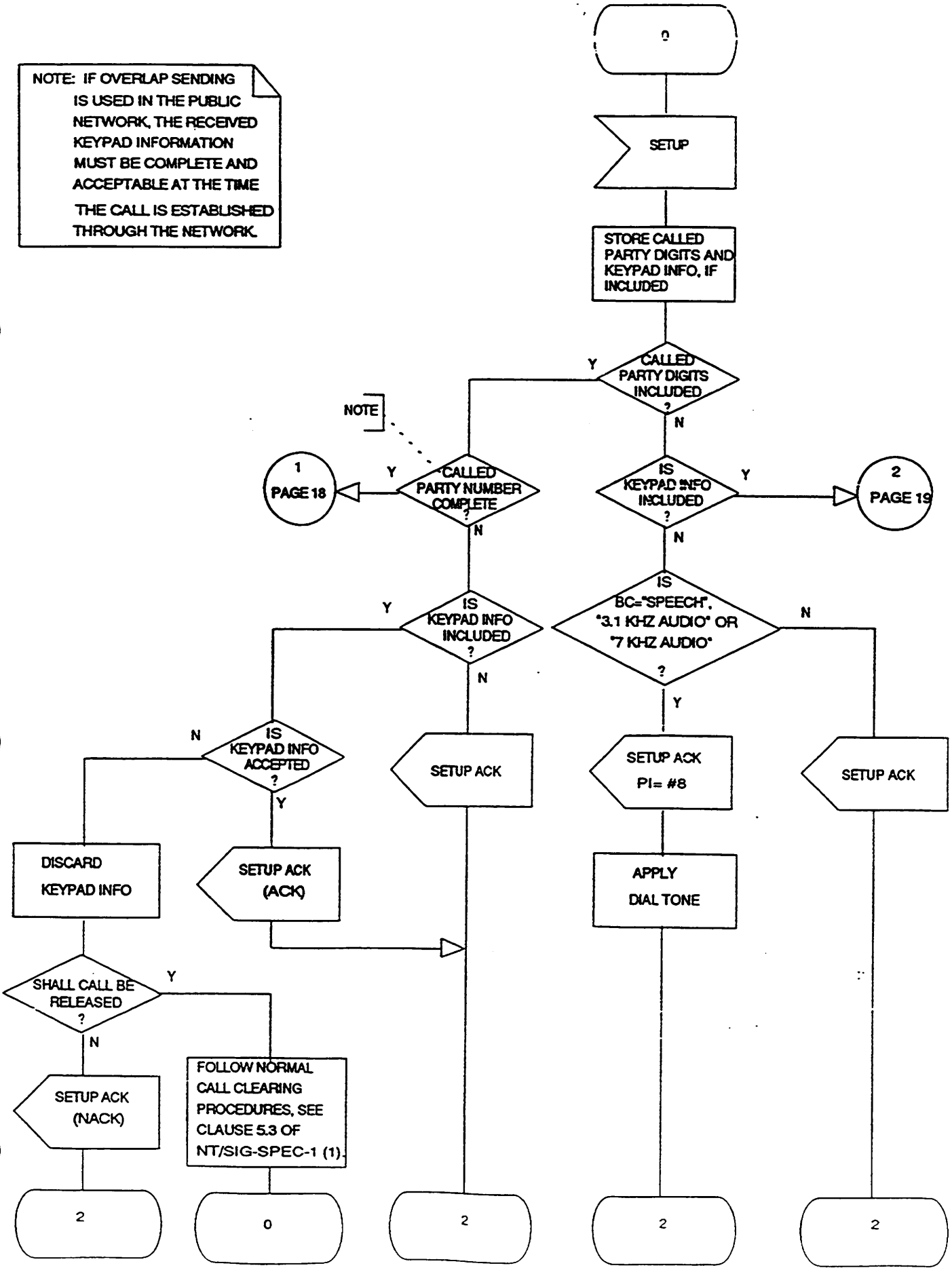
Advice of Charge (AOC), At the end of the call	464
Abbreviated Dialling, Registration	51
Last Number Repetition	52
Fixed Destination Call	53
Alarm Call, Casual	55
Alarm Call, Regular, Number of Days	56
Diversion on "No Reply", Operator or any Number	61
Diversion on "Busy", To any number (CFB)	67
Page Pick Up	82

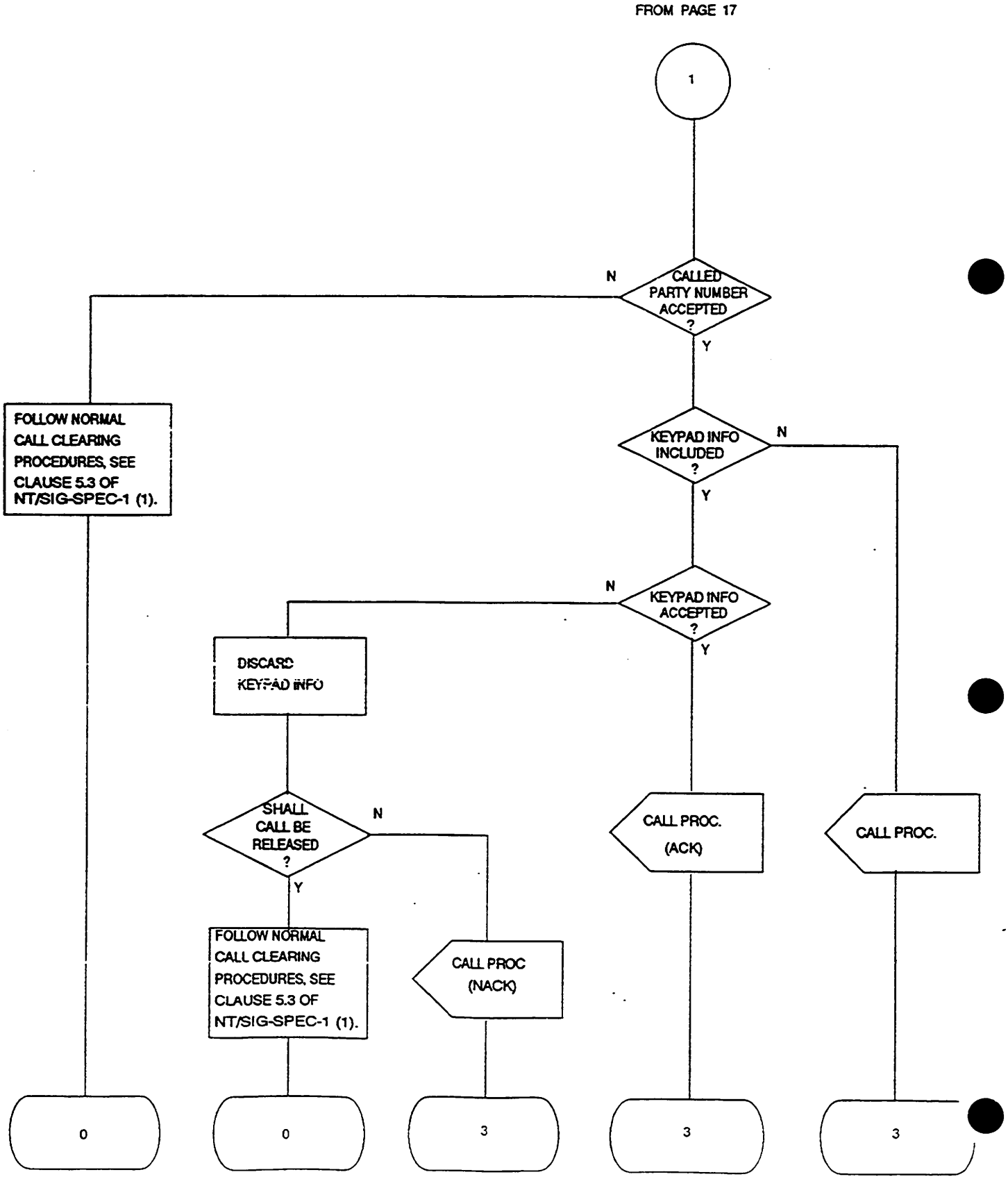
Table A.2: Switching orders

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

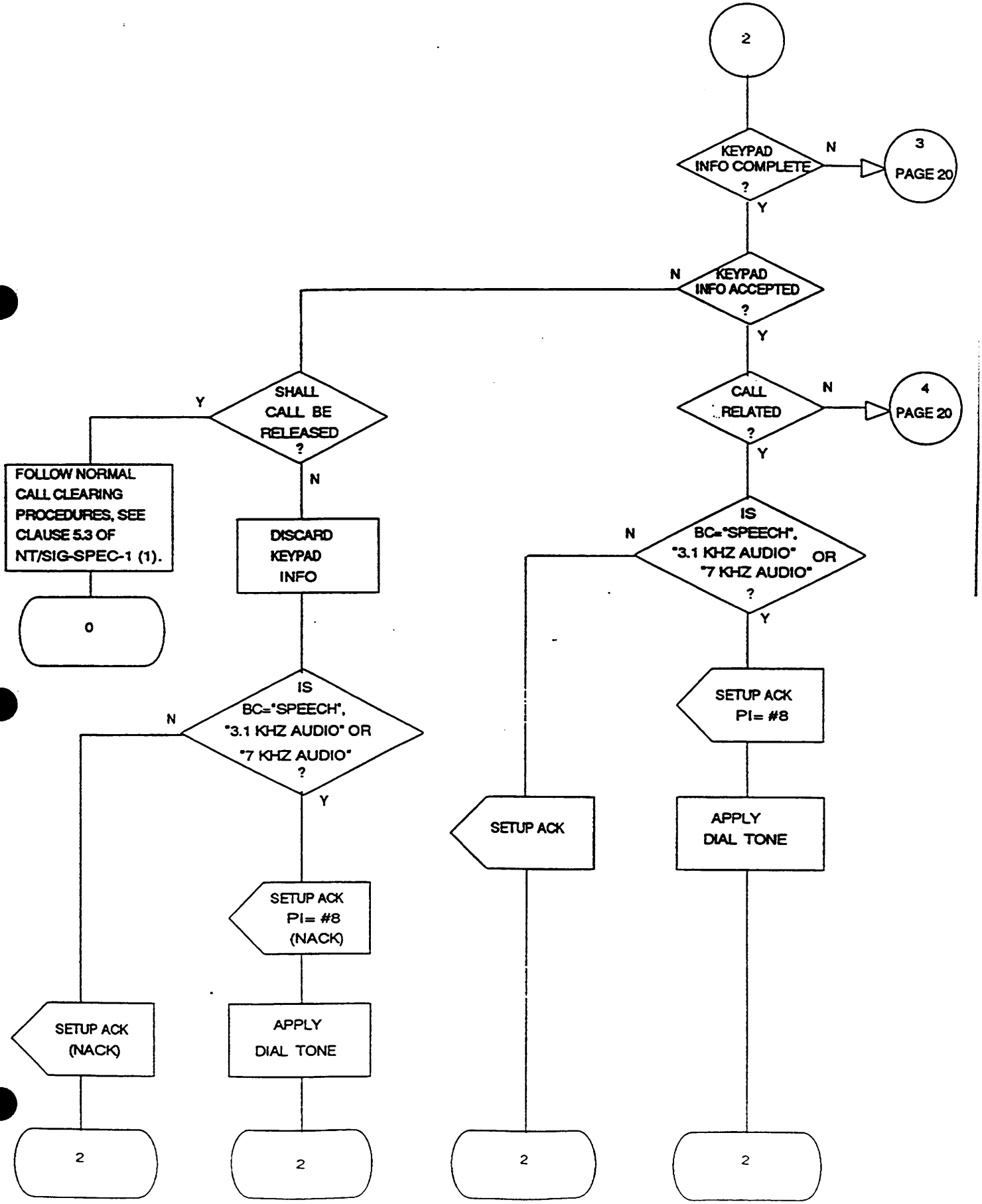
Note: The switching order shall be sent in the Keypad facility information element.

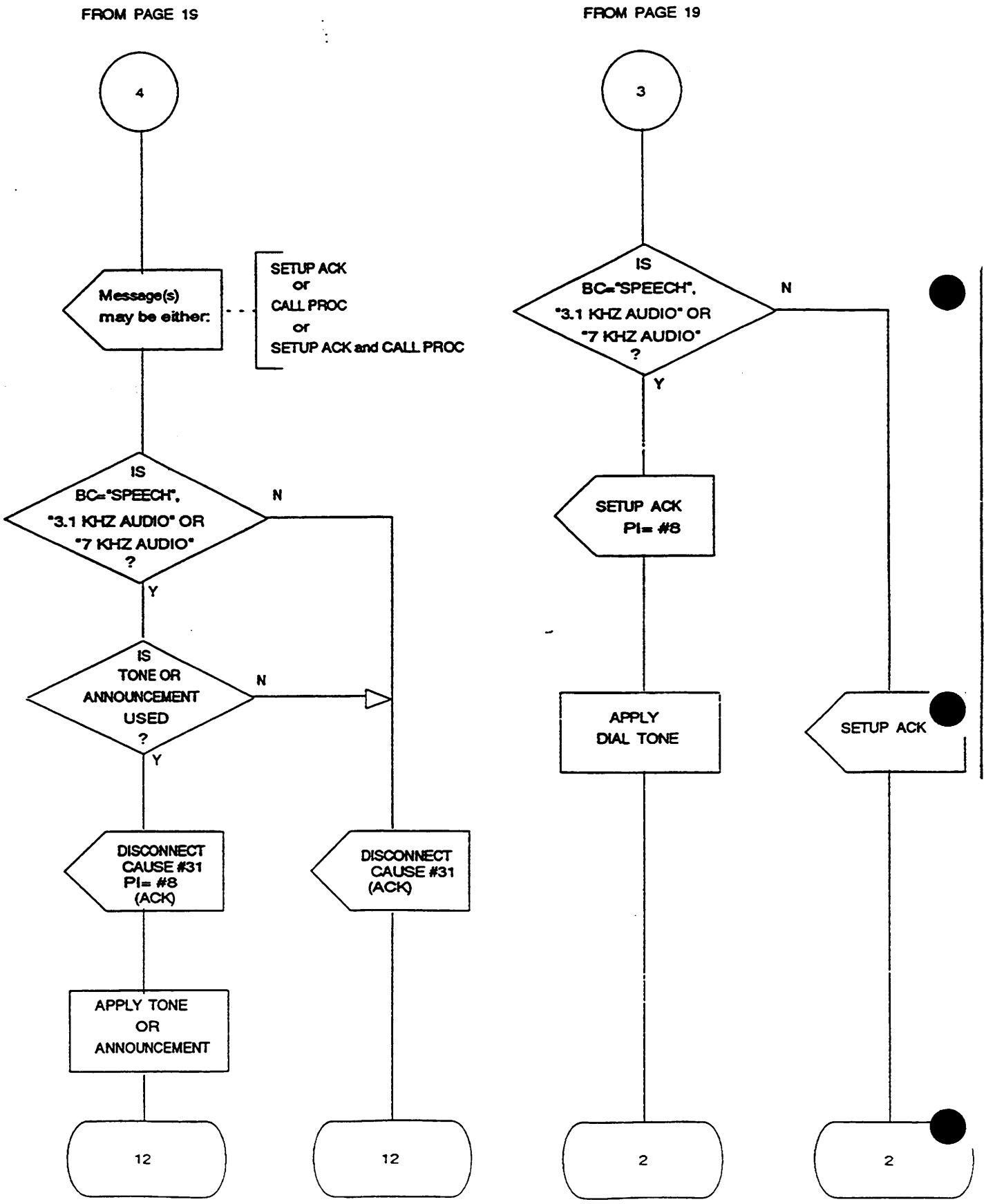
APPENDIX B: Network side SDL diagrams for en-bloc/overlap sending

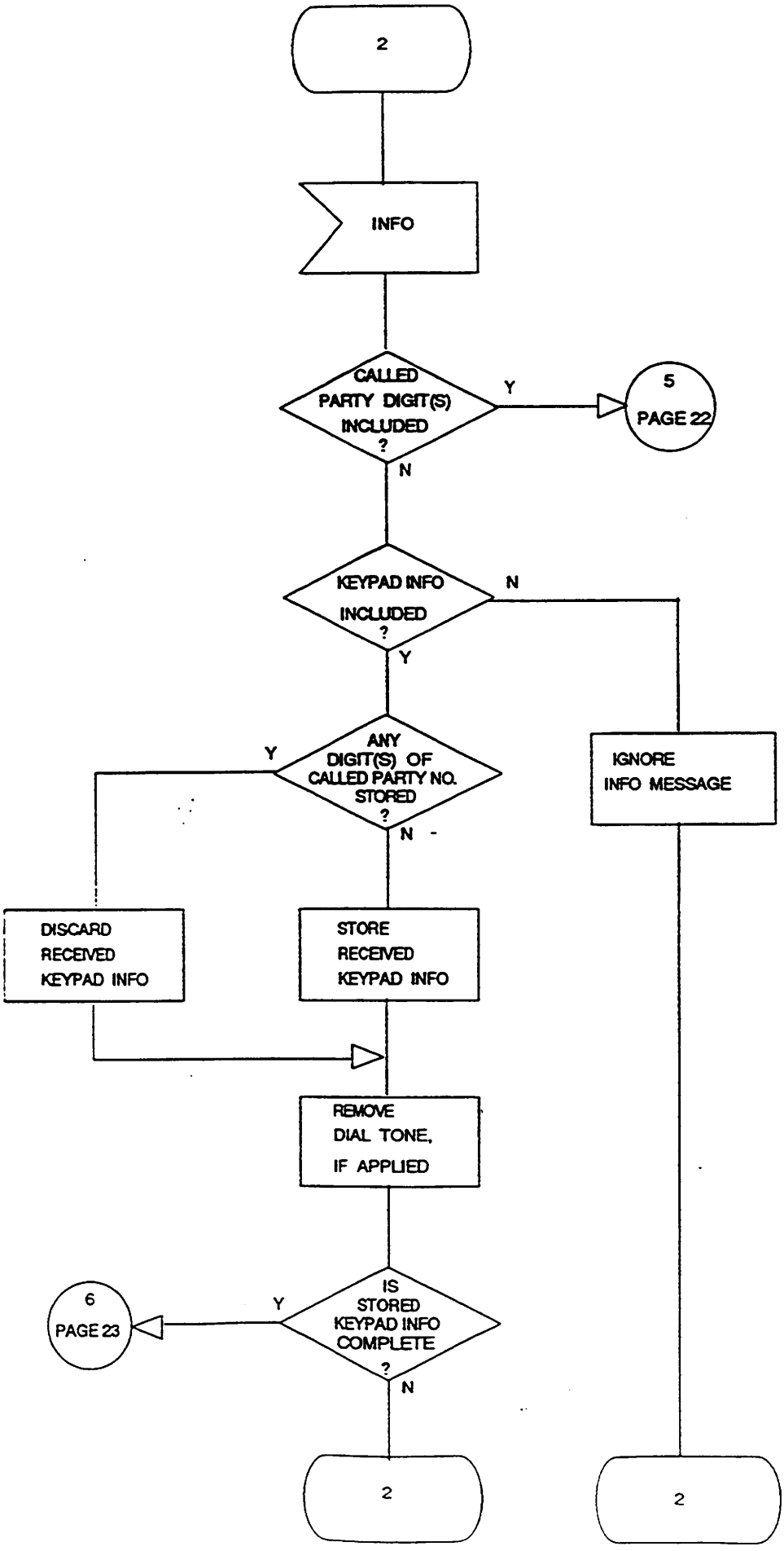



FROM PAGE 17
1
CALLED PARTY NUMBER ACCEPTED ?
N
Y
FOLLOW NORMAL CALL CLEARING PROCEDURES, SEE CLAUSE 5.3 OF NT/SIG-SPEC-1 (1).
KEYPAD INFO INCLUDED ?
N
Y
KEYPAD INFO ACCEPTED ?
N
Y
DISCARD KEYPAD INFO
SHALL CALL BE RELEASED ?
N
Y
FOLLOW NORMAL CALL CLEARING PROCEDURES, SEE CLAUSE 5.3 OF NT/SIG-SPEC-1 (1).
CALL PROC (NACK)
CALL PROC. (ACK)
CALL PROC.
0
0
3
3
3

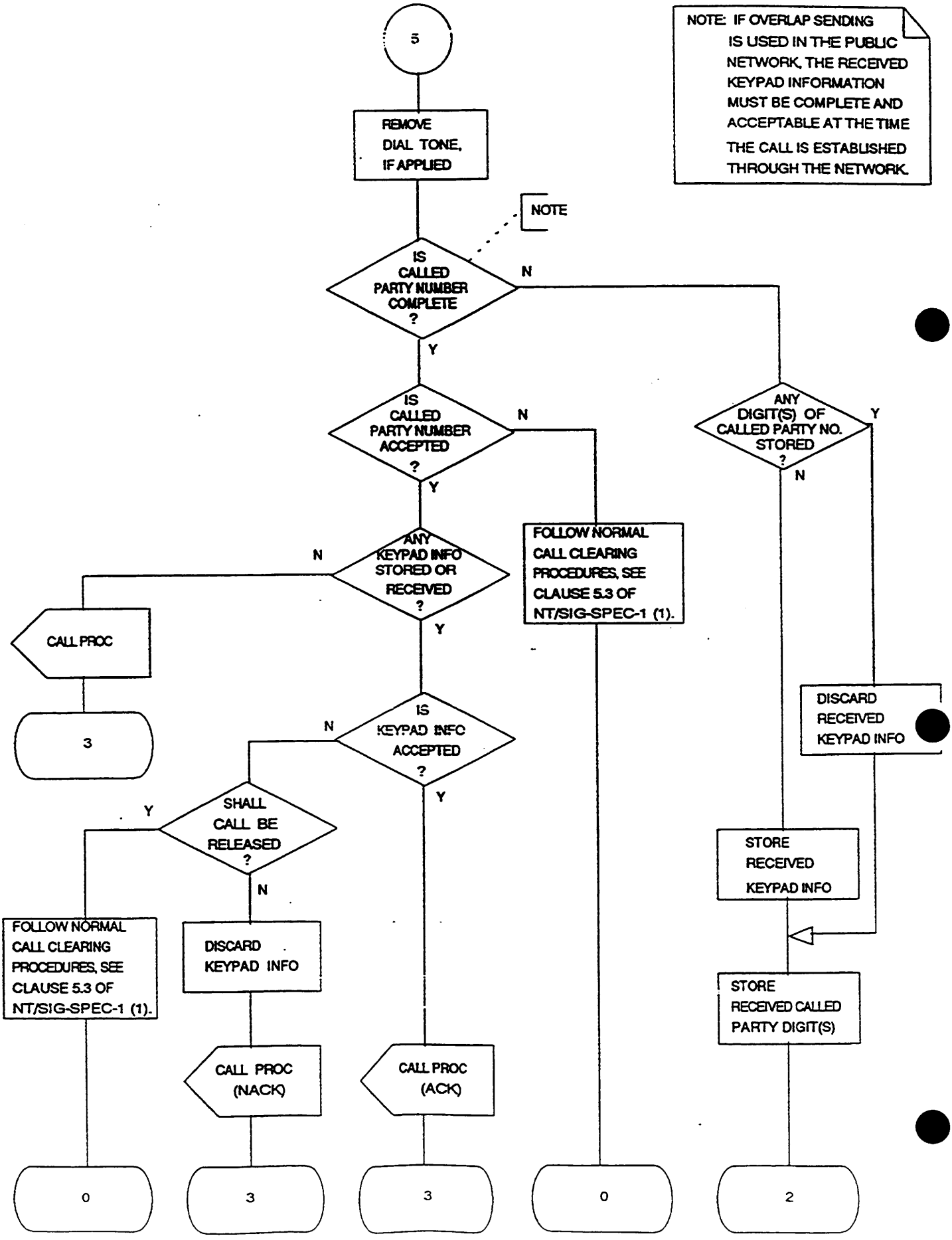
FROM PAGE 17


2
KEYPAD INFO COMPLETE ?
N
3
PAGE 20
Y
KEYPAD INFO ACCEPTED ?
N
Y
SHALL CALL BE RELEASED ?
Y
N
CALL RELATED ?
N
4
PAGE 20
Y
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
IS BC="SPEECH", "3.1 KHZ AUDIO" OR "7 KHZ AUDIO" ?
N
Y
SETUP ACK (NACK)
SETUP ACK PI= #8 (NACK)
SETUP ACK
APPLY DIAL TONE
APPLY DIAL TONE
2
2
2
2

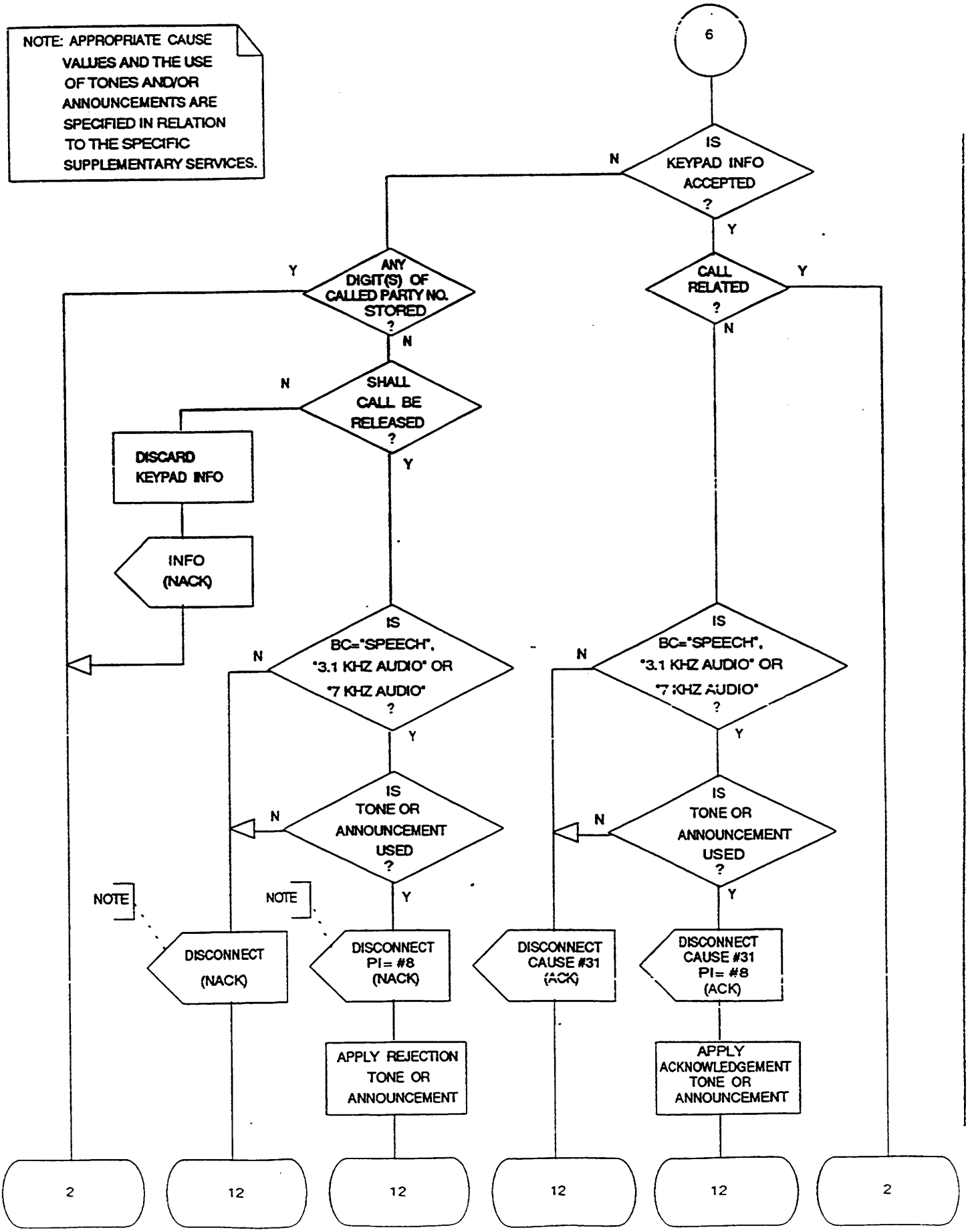

FROM PAGE 18
4
Message(s) may be either:
SETUP ACK or CALL PROC or SETUP ACK and CALL PROC
IS BC="SPEECH", "3.1 KHZ AUDIO" OR "7 KHZ AUDIO" ?
N
Y
IS TONE OR ANNOUNCEMENT USED ?
N
Y
DISCONNECT CAUSE #31 PI= #8 (ACK)
APPLY TONE OR ANNOUNCEMENT
12
DISCONNECT CAUSE #31 (ACK)
12
FROM PAGE 19
3
IS BC="SPEECH", "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 TONE OR ANNOUNCEMENT USED ?
N
Y
NOTE
NOTE
DISCONNECT (NACK)
DISCONNECT PI= #8 (NACK)
APPLY REJECTION TONE OR ANNOUNCEMENT
DISCONNECT CAUSE #31 (ACK)
DISCONNECT CAUSE #31 PI= #8 (ACK)
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.

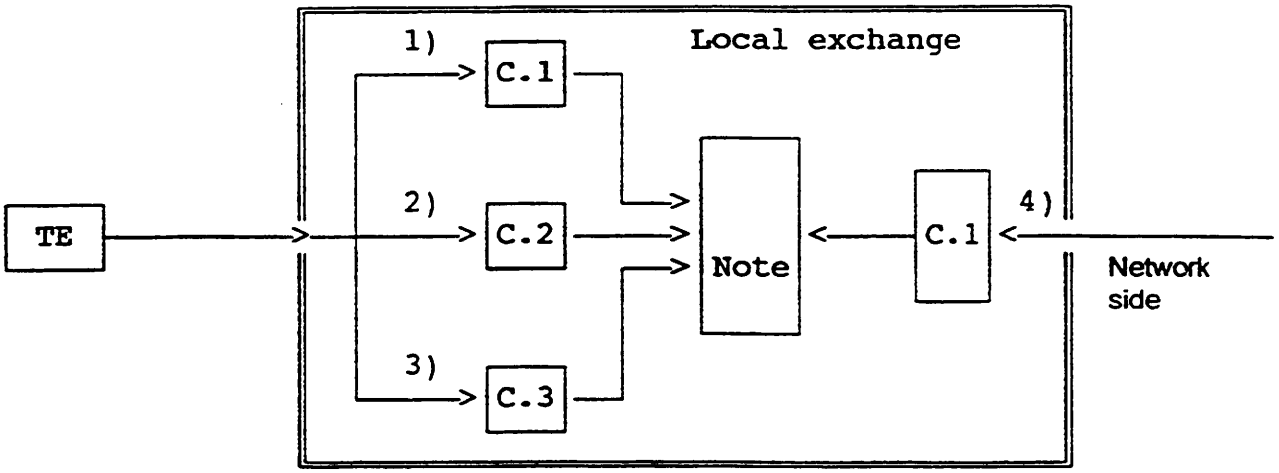
Table C.3: Relationship between a basic service and the received BC/HLC values

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.

TELE DANMARK

INAD-3 APPENDIX L

Title:

Specification of DSS1 - ETSI supplementary services using the keypad protocol.

Subappendices:

Appendix L1:	The Closed User Group supplementary service
Appendix L2:	The Diversion supplementary service
Appendix L3:	The Malicious Call IDentification supplementary service
Appendix L4:	The Advice of Charge at the end of a call supplementary service
Appendix L5:	The Line and Trunk Hunting supplementary service
Appendix L6:	The User Controlled Outgoing Call Barring supplementary service

TELE DANMARK

INAD-3 APPENDIX L1

Title:

The Closed User Group supplementary service.

Contents:

This appendix is a specification of the stage 3 of the Closed User Group supplementary service using keypad procedures. The appendix is a common Nordic specification.

The stage 1 requirements are given in ETS 300 136 completed by the application specification in Appendix C.

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

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 en-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.

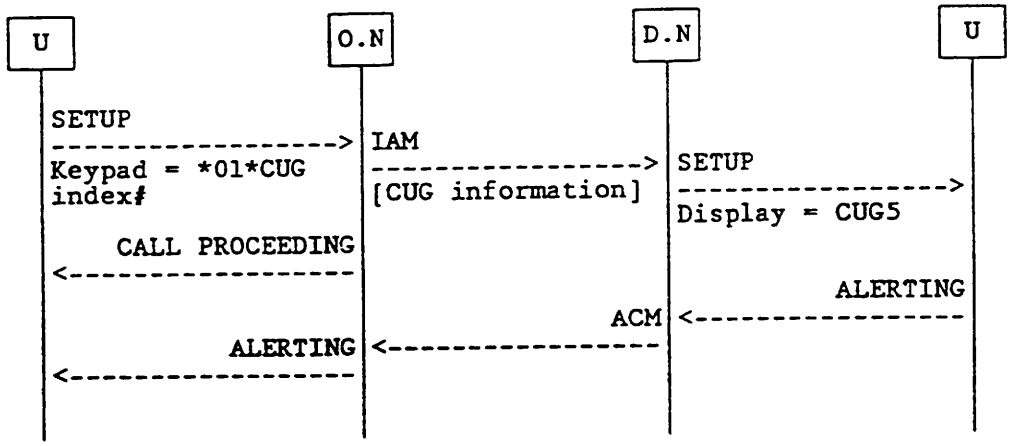
14 Dynamic description (SDL)

SDL diagrams for the keypad procedures for the CUG supplementary service will not be provided.

Annex A (Informative)

Signalling flows

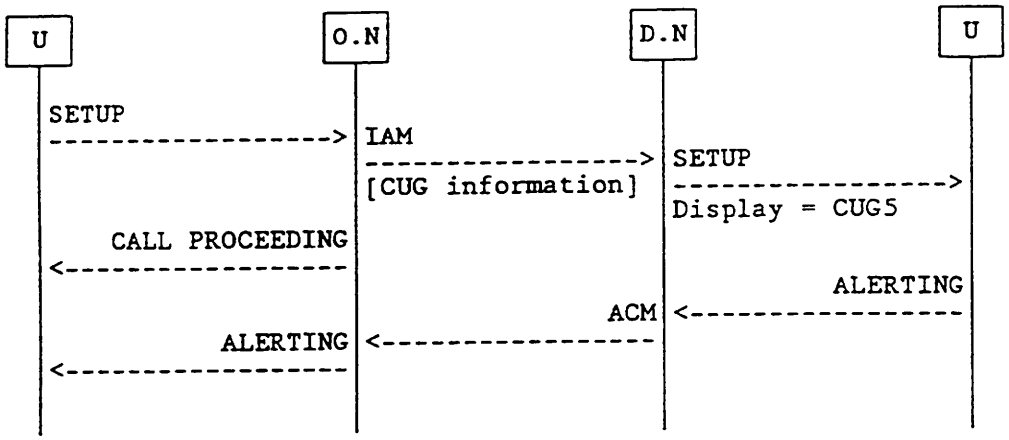
The examples in figures A.1 - A.7 show the messages related to the keypad procedures only and the example in figure A.8 shows the messages related to both the keypad procedures and functional procedures.



O.N: Originating network

D.N: Destination network

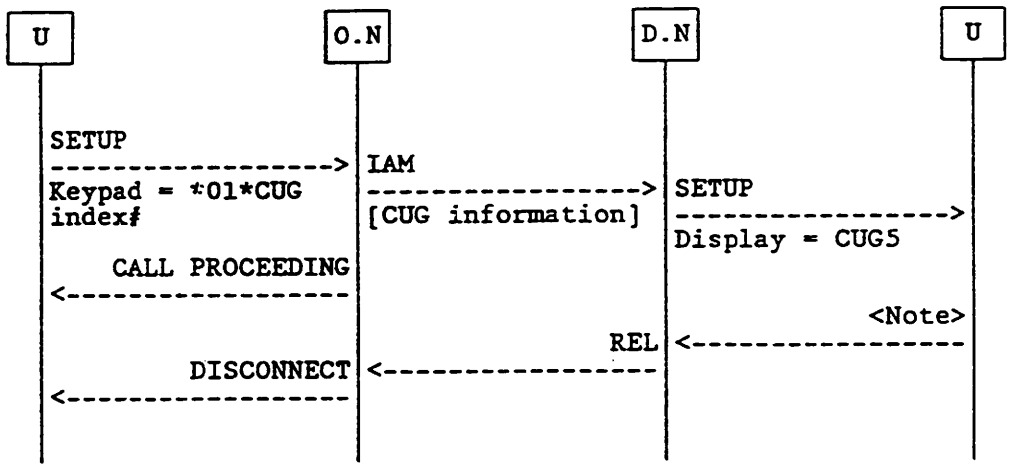
Figure A.1: Call passes both the originating and the destination network side checks successfully (explicit request).



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).

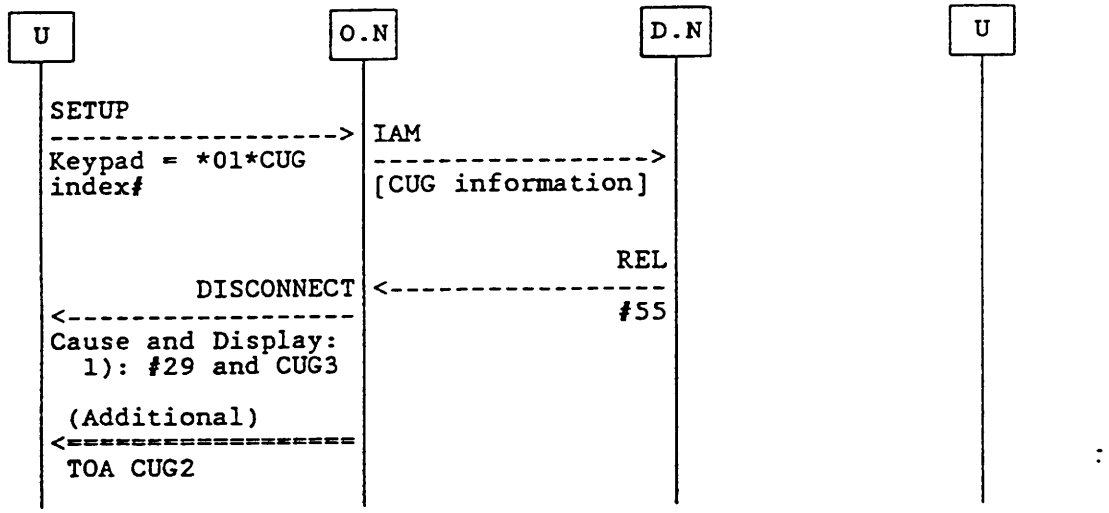


O.N: Originating network

D.N: Destination network

<Note>: DISCONNECT or RELEASE COMPLETE

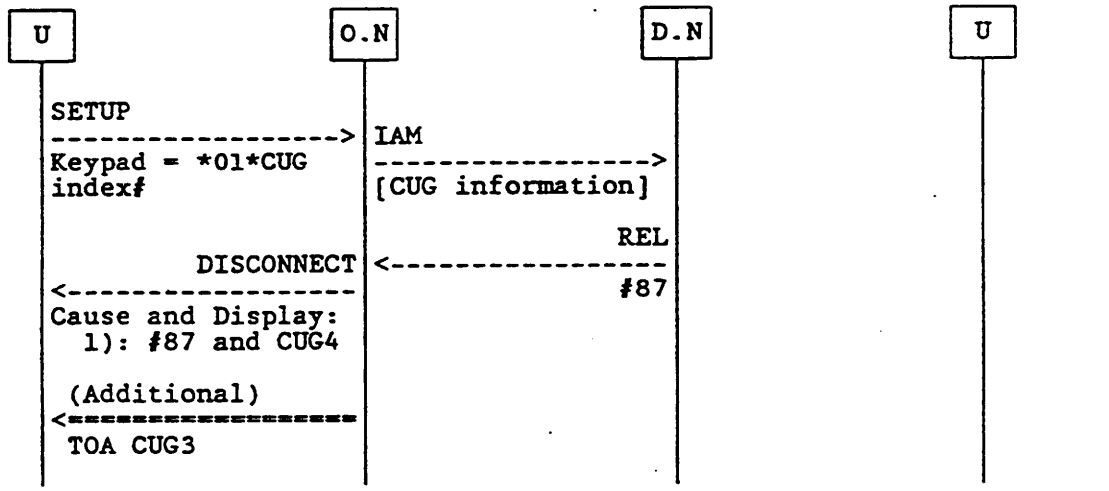
Figure A.3: Call passes both the originating and the destination network side checks but fails on the destination user's side.



O.N: Originating network

D.N: Destination network

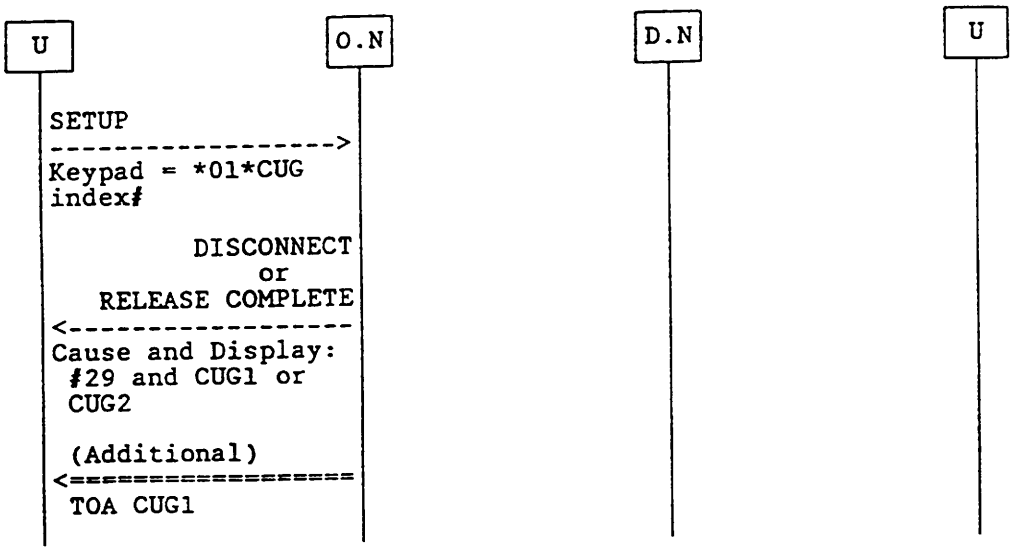
Figure A.4.1: Call fails destination network side checks (explicit request).



O.N: Originating network

D.N: Destination network

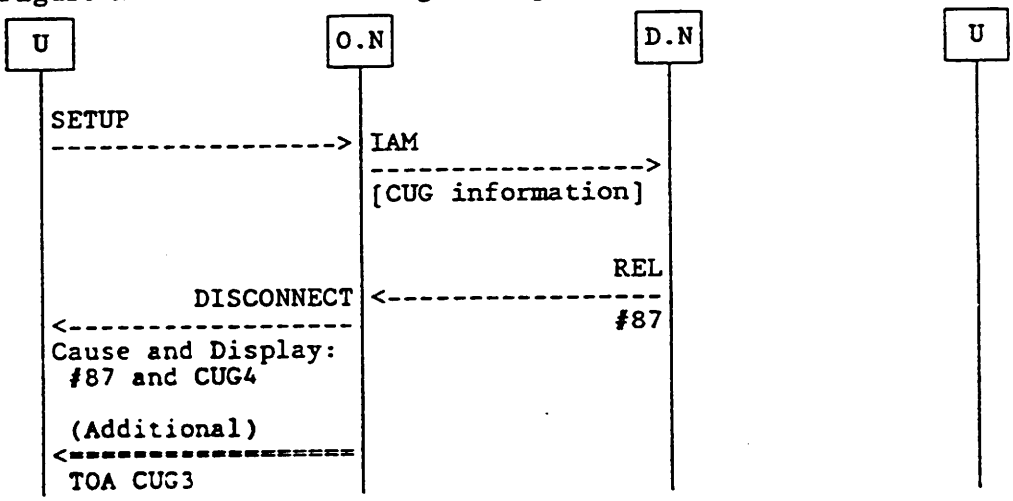
Figure A.4.2: Call fails destination network side checks (explicit request).



O.N: Originating network

D.N: Destination network

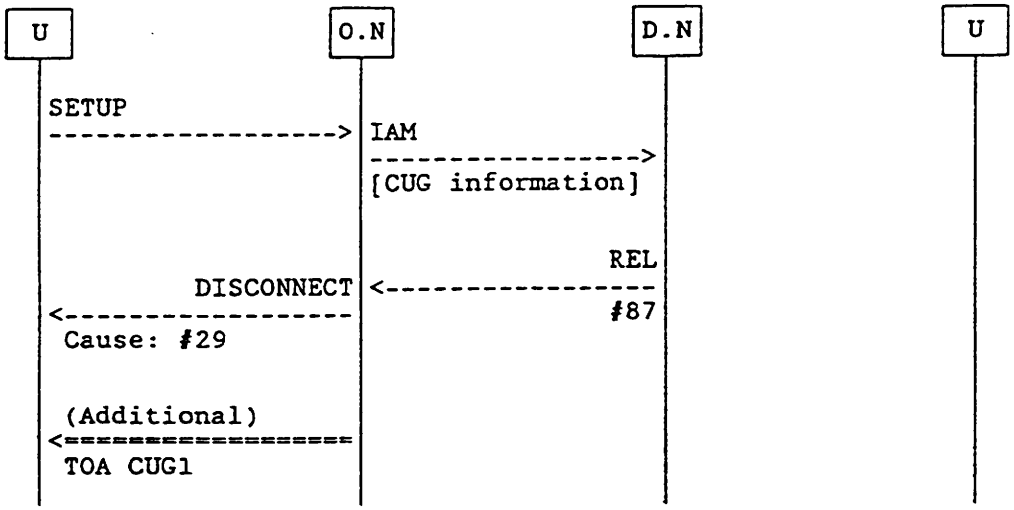
Figure A.5: Call fails originating network side checks (explicit request).



O.N: Originating network

D.N: Destination network

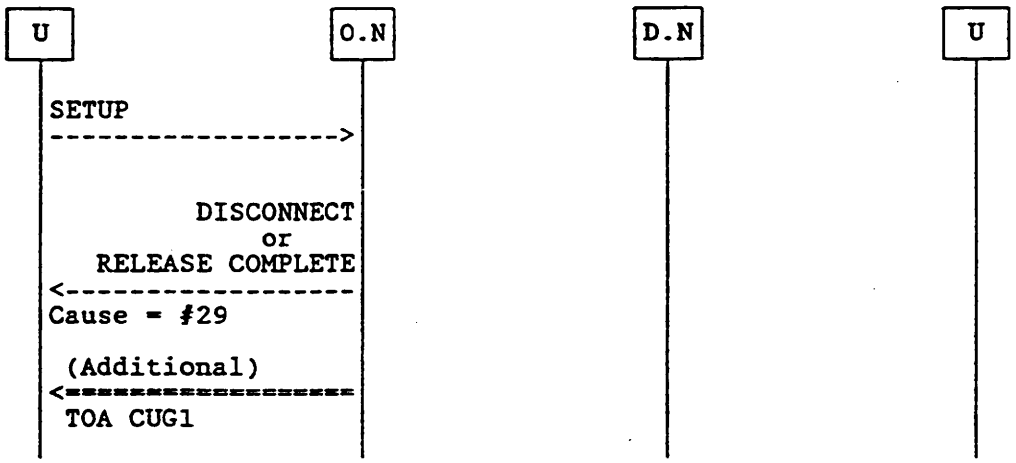
Figure A.6.1: Call fails destination network side checks (default request).



O.N: Originating network

D.N: Destination network

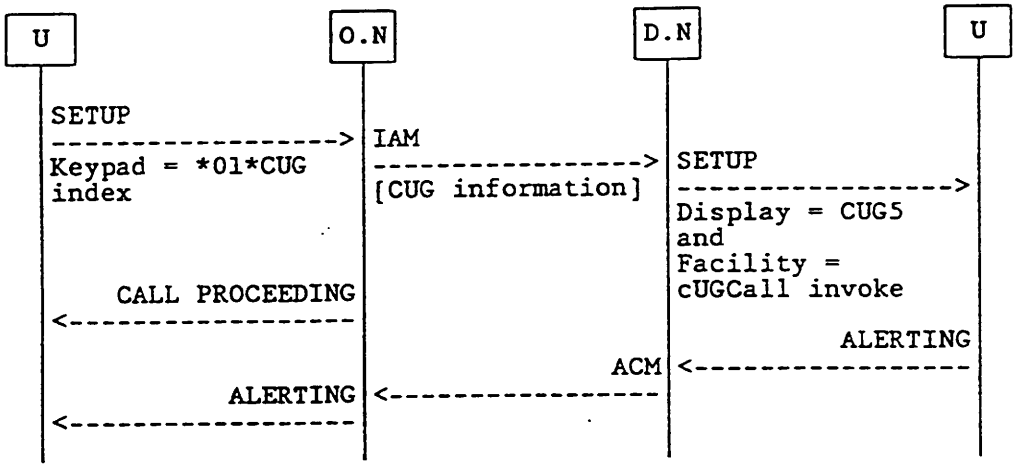
Figure A.6.2: Call fails destination network side checks (default request).



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.

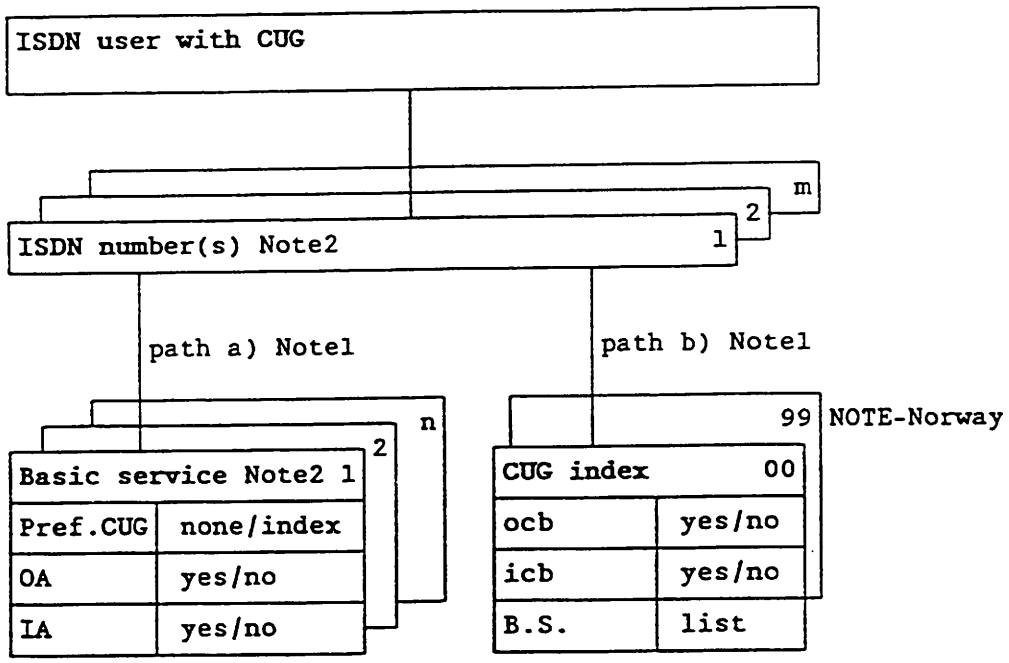


Figure 1. Relationship between the ISDN subscriber, the ISDN number, the basic service and the CUGs.

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.

Note 1: 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).

Note 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.

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: B

ISSUE DATE: 94-07-01

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	Gruppen findes ikke
Display CUG2	Du kan ikke kalde gruppen
Display CUG3	Nr. kan ikke kaldes af gruppen
Display CUG4	Nr. er ikke i gruppen
Display CUG5	Opkald i gruppe xx <Note1>

~~<Note1>: "LBG" is an abbreviation for the danish word "Lukket Bruger Gruppe".~~
<Note~~2~~1>: "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.

TELE DANMARK

INAD-3 APPENDIX L2

Title:

The Diversion supplementary service.

Contents:

This appendix is a specification of the stage 3 of the Diversion supplementary service using keypad procedures. The appendix is a common Nordic specification.

The stage 1 requirements are given in ETSs 300 199-201 completed by the application specification in Appendix C. Note that CD does not apply for the keypad procedures.

NORDTEL

NT/SIG-SPEC-3-A

NORDIC SPECIFICATION

APPLICATION DOCUMENT TO
ETSI ETS 300 207

DIVERSION SUPPLEMENTARY SERVICE USING KEYPAD PROTOCOL

ISSUE DATE: 94-09-01, Rev. B

Contents

FOREWORD

The following sections give the requirements for the implementation of the diversion supplementary services using the 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 300 207 (1) where the keypad protocol is applied instead of the functional protocol, and selects which options in ETS 300 207 (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 subclauses 6.2, 6.3, 6.4, 9.1, 9.3 and 12 replace entirely the text contained in the same clauses in ETS 300 207 (1). In addition, this specification contains some clarifications and/or additions to certain other clauses of ETS 300 207 (1), where this is felt to be necessary. Where clarifying text is provided, the relevant clause in ETS 300 207 (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 diversion supplementary service, using the keypad protocol, in each Nordic country is a national matter.

Appendix B contains additional requirements associated with the diversion supplementary service, although outside the scope of the ETSI stage 1 description, which is applicable to Sweden.

The provision of tones and/or announcements and display information in connection with the diversion supplementary service is a national matter, and is specified in Appendix C.

1 Scope

This specification describes the operation of the diversion supplementary services using the keypad protocol. It is an application document to ETS 300 207 (1) and makes use of the generic keypad protocol defined in NT/SIG-SPEC-2-1 (2).

The diversion supplementary services defined in this specification consist of the following:

a) Call forwarding unconditional supplementary service (CFU);

b) Call forwarding busy supplementary service (CFB); and,

c) Call forwarding no reply supplementary service (CFNR).

For the call deflection supplementary service (CD), no procedures using the keypad protocol will be defined (i.e. only the functional procedures defined in ETS 300 207 (1) are applicable).

This stage 3 description is based on the service requirements specified in ETS 300 199 [7], ETS 300 200 [8] and ETS 300 201 [9]. 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 300 207 "Integrated Services Digital Network (ISDN); Diversion supplementary services; 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".

(3) Nordic Specification NT/SIG-SPEC-3-B, dated 92-12-01: "Advice Of Charge supplementary service using keypad protocol".

NOTE: References enclosed in square brackets ("[ ]") refer to the references defined by ETS 300 207 (1).

3 Definitions

Basic service indicator (BS): This indicator consists of 1 or 2 digit(s), in order to indicate a basic service. The semantics of the indicated values are defined in Appendix C of NT/SIG-SPEC-2-1 (2).

Speech type connection: A connection type where the Bearer capability information element indicates "speech", "3.1 kHz Audio" or "unrestricted digital information with tones/announcements".

4 Symbols and abbreviations

TOA Tones and/or announcements

DIV Diversion supplementary services (i.e. CFU, CFB and CFNR)

5 Description

Applicable.

6 Operational requirements

6.1 Provision and withdrawal

Tables 1 and 2 contain the subscription options and the network options respectively, that are applicable to the diversion supplementary services in ETS 300 207 (1). The tables indicate explicitly the options that are not applicable when using the keypad procedures.

Table 1: Subscription options for diversion supplementary services

Subscription option	Value	Applicability
Served user receives notification that a call has been forwarded <Note 1>	No	CFU, CFB, CFNR
	Yes, with call offering information	
Calling user is notified of diversion (forwarded or deflected) <Note 2>	No	CFU, CFB, CFNR, CD <Note 2>
	Yes, with diverted-to number	
	Yes, without diverted-to number	
Served user receives reminder notification on outgoing calls that forwarding is currently activated	No	CFU, CFB, CFNR
	Yes	
Diverting number is released to the diverted-to user	No	CFU, CFB, CFNR, CD <Note 2>
	Yes	
Activation, deactivation and interrogation for all ISDN-numbers on the same access. (In case of subscription on a per ISDN number basis) <Note 3>, <Note 4>	No	CFU, CFB, CFNR
	Yes	

Note 1: This option is not supported by the keypad protocol, i.e. the served user does not receive a notification that a call has been forwarded.

Note 2: The call deflection supplementary service is not supported by the keypad protocol.

Note 3: This option applies to all the instances subscribed to on the access of the served user for the related supplementary services.

Note 4: Denmark and Finland: This subscription option is not applicable.

Table 2: Network options for diversion supplementary services

Network provider option	Value	Applicability
Served user call retention on invocation of diversion (forwarding or deflection) <Note 2>	Retain call until alerting begins at the diverted-to user	CFNR, CD <Note 2>
	Clear call on invocation of diversion	
The maximum number of diversions for a single call	Maximum number of diverted connections (with an upper limit of 5)	CFU, CFB, CFNR, CD <Note 2>
Call forwarding on no reply timer	Timer duration shall be a network provider option	CFNR
Partial rerouting provided at the T reference point <Note 1>	Yes	CFU, CFB, CFNR, CD <Note 2>
	No	
The call-by-call indication overrides the value of the subscription option "Diverting number is released to the diverted-to user" <Note 2>	Yes	CD <Note 2>
	No	

Note 1: This option is not supported by the keypad protocol.

Note 2: The call deflection supplementary service is not supported by the keypad protocol.

The network options supported in the Nordic countries are defined in Appendix A.

6.2 Requirements on the calling user's network side

The procedures at the coincident S and T reference point of subclause 5.1 of ETS 300 102-1 [3] and the procedures of subclauses 9.2.1, 9.2.2 and 9.2.3 of this specification shall apply.

6.3 Requirements on the served user's network side

The procedures at the coincident S and T reference point of subclause 5.2 of ETS 300 102-1 [3] and the procedures of subclauses 9.1, 9.2.4 and 9.3 of this specification shall apply.

6.4 Requirements on the diverted-to user's network side

The procedures at the coincident S and T reference point of subclause 5.2 of ETS 300 102-1 [3] and the procedures of subclause 9.2.5 of this specification shall apply.

7 Coding requirements

7.1 Coding of the Facility information element components

Not applicable.

7.2 Coding of the information elements

7.2.1 Coding of the Notification indicator information element

Applicable.

7.2.2 Coding of the Redirecting number information element

Applicable.

7.2.3 Coding of the Redirection number information element

Applicable.

7.3 Coding of Keypad facility information element

Table 3, 4 and 5 provide the coding of the keypad information to support the diversion supplemen services, in accordance with NT/SIG-SPEC-2-1 (2).

In the tables, square brackets ("[" and "]") are used to indicate that the parameter(s) enclosed by the brackets are optional.

NOTE: Sweden: Additional requirements particular to Sweden are given in Appendix B.

7.3.1 Activation procedure

Table 3 contains the coding requirement for the activation procedure.

Table 3: Diversion activation procedure

Diversion activation request ::=

* Diversion service code * FTN [* [SUB] [* [SUN] [* BS]]]#

Diversion service code: CFU = 21

CFB = 67

CFNR = 61

BS= Basic service indicator (0 - 63). BS= 0 indicates "All services". See also subclause 7.2 of NT/SIG-SPEC-2-1 (2).

FTN= Forwarded-to number

SUN= Served user number (i.e. in case of multiple subscriber number supplementary service), SUN= 0 indicates "All numbers" (see also clause 7.1 of NT/SIG-SPEC-2-1 (2))

SUB= Forwarded-to subaddress

Note: Denmark: The "SUB", "SUN" and "BS" parameters are not applicable.

Note: Finland:The "SUB" and "BS" parameters are not applicable.

The "SUB", "BS" and "SUN" are optional parameters and may not be present in a specific activation request.

7.3.2 Deactivation procedure

Table 4 contains the coding requirement for the deactivation procedure.

Table 4: Diversion deactivation procedure

Diversion deactivation request ::=

Diversion service code [* [SUN] [* BS]]#

Diversion service code: CFU = 21

CFB = 67

CFNR = 61

BS= Basic service indicator (0 - 63). BS= 0 indicates "All services". See also subclause 7.2 of NT/SIG-SPEC-2-1 (2).

SUN= Served user number (i.e. in case of multiple subscriber number supplementary service), SUN= 0 indicates "All numbers" (see also clause 7.1 of NT/SIG-SPEC-2-1 (2))

Note: Denmark: The "SUN" and "BS" parameters are not applicable.

Note: Finland:The "BS" parameter is not applicable.

The "BS" and "SUN" are optional parameters and may not be present in a specific deactivation request.

7.3.3 Interrogation procedure

Table 5 contains the coding requirement for the interrogation procedure.

Table 5: Diversion interrogation procedure

Diversion interrogation request ::=

* # Diversion service code [* [SUN] [* BS]]#

Diversion service code: CFU = 21

CFB = 67

CFNR = 61

BS= Basic service indicator (0 - 63). BS= 0 indicates "All services". See also subclause 7.2 of NT/SIG-SPEC-2-1 (2).

SUN= Served user number (i.e. in case of multiple subscriber number supplementary service), SUN= 0 indicates "All numbers" (see also clause 7.1 of NT/SIG-SPEC-2-1 (2))

Note: Denmark: The "SUN" and "BS" parameters are not applicable.

Note: Finland:The "BS" parameter is not applicable.

The "BS" and "SUN" are optional parameters and may not be present in a specific interrogation request.

7.4 Coding of the Display information element

The semantics of the display information in relation to the diversion supplementary service is specified in table 6.

The Display information element will contain information related to the diversion supplementary services, coded in IA5 characters constituting a national text according to Appendix C.

NOTE: Sweden: Additional requirements particular to Sweden are given in Appendix B.

Table 6: The semantics of the display information for the diversion supplementary services

Display DIV1 "diversion activated to cccccccc" <Note 1>
Display DIV2 "deactivation successful"
Display DIV3 "bbbbbbbb$_1$ bbbbbbbb$_2$ " <Note 2>
Display DIV4 "diversion activated to cccccccc for BS ..." <Note 1>
Display DIV5 "interrogation complete"
Display DIV6 "service not activated"
Display DIV7 "diversion is activated"

Note 1: "cccccccc" indicates the diverted-to address
Note 2: "bbbbbbbb$_1$ bbbbbbbb$_2$ indicates the served user number (SUN)

Note: Denmark: The Display DIV3 and DIV5 are not applicable.
Note: Finland:The Display DIV3 is not applicable.

8 State definitions

Applicable.

9 Signalling procedures at the coincident S and T reference point

9.1 Activation, deactivation and interrogation

If the user requests activation, deactivation or interrogation by using the Keypad facility information element, then the network shall give the result of the request in a Display information element.

NOTE: Denmark: The indication of the subaddress (SUB), the served user number (SUN) and the basic service (BS) in the keypad string as specified in subclause 4.4.1 (items 7.1, 7.2 and 7.3) of NT/SIG-SPEC-2-1 (2) is not applicable. Consequently, the network shall derive the served user number from the Calling party number information element, the basic service from the Bearer capability and the High layer compatibility information elements as specified in table C.3 of NT/SIG-SPEC-2-1 (2). In addition, the forwarded-to subaddress cannot be indicated by the served user.

NOTE: Finland: The indication of the subaddress (SUB) and the basic service (BS) in the keypad string as specified in subclause 4.4.1 (items 7.2 and 7.3) of NT/SIG-SPEC-2-1 (2) is not applicable. The diversion supplementary service is activated for all basic services. In addition, the forwarded-to subaddress cannot be indicated by the served user.

9.1.1 Activation

9.1.1.1 Normal operation

To activate a diversion supplementary service, the user shall include in the SETUP or INFORMATION message an activation request in one or more Keypad facility information element(s) using en-bloc or overlap procedures according to NT/SIG-SPEC-2-1 (2). The Keypad facility information element shall contain the CFU, CFB or CFNR activation request, using the coding shown in table 3.

After the network has returned either a SETUP ACKNOWLEDGE message or a CALL PROCEEDING message (possibly preceded by a SETUP ACKNOWLEDGE message), the network shall send a DISCONNECT message with cause #31 "normal, unspecified" and a Display information element containing

Display DIV1 "diversion activated to cccccccc" which indicates that the activation has been accepted. If the Bearer capability information element in the SETUP message indicates a speech type connection, in-band information TOA1 shall be sent to the served user.

If the display information Display DIV1 exceeds the maximum length supported by the network, the network shall send the first part in a Display information element included in an INFORMATION message, preceding the DISCONNECT message.

No keypad procedure is defined for providing the activation status notification to all users identified by the served user number. If the activation was performed by using the keypad protocol, activation status notification shall also in this case be sent by the network to all users identified by the served user's number as defined in ETS 300 207 (1) if the functional protocol is implemented.

9.1.1.2 Exceptional procedures

If a user attempts to activate a diversion supplementary service without having subscribed to the specific supplementary service, the network shall respond with a DISCONNECT message indicating cause #50 "requested facility not subscribed".

If the user attempts to activate a diversion supplementary service and the network cannot provide the supplementary service due to a temporary fault or lack of resources, the network shall respond with a DISCONNECT message indicating cause #47 "resources unavailable, unspecified" or cause #63 "service or option not available, unspecified".

In other error situations, a DISCONNECT message indicating cause #29 "facility rejected" shall be sent to the user.

For the cases above, if the Bearer capability information element in the SETUP message indicates a speech type connection, an appropriate in-band information TOA2 shall be sent to the served user.

9.1.2 Deactivation

9.1.2.1 Normal operation

The diversion supplementary services can be deactivated in one of three ways. The user can deactivate explicitly by using the deactivation procedure, the user can activate the same diversion service with the same parameters (i.e. same basic service and served user number) but to another diverted-to-user (thus causing the previous invocation to be overridden), or the user can invoke the general deactivation supplementary service (if available).

In order to explicitly deactivate a diversion supplementary service, the user shall include in the SETUP or INFORMATION message a deactivation request in one or more Keypad facility information element(s) using èn-bloc or overlap procedures according to NT/SIG-SPEC-2-1 (2). The Keypad facility information element shall contain the CFU, CFB or CFNR deactivation request, using the coding shown in table 4.

After the network has returned either a SETUP ACKNOWLEDGE message or a CALL PROCEEDING message (possibly preceded by a SETUP ACKNOWLEDGE message), the network shall send a DISCONNECT message with cause #31 "normal, unspecified" and a Display information element containing Display DIV2 "deactivation successful" which indicates that the deactivation has been accepted. If the Bearer capability information element in the SETUP message indicates a speech type connection, in-band information TOA3 shall be sent to the served user.

If the display information Display DIV2 exceeds the maximum length supported by the network, the network shall send the first part in a Display information element included in an INFORMATION message, preceding the DISCONNECT message.

No keypad procedure is defined for providing the deactivation status notification to all users identified by the served user number. If the deactivation was performed by using the keypad protocol, deactivation status notification shall also in this case be sent by the network to all users identified by the served user's number as defined in ETS 300 207 (1) if the functional protocol is implemented.

9.1.2.2 Exceptional procedures

If a user attempts to deactivate a diversion supplementary service without having subscribed to that specific supplementary service or the indicated basic service, the network shall respond with a DISCONNECT message indicating cause #50 "requested facility not subscribed".

If the user attempts to deactivate a diversion supplementary service and the network cannot perform the requested deactivation due to a temporary fault or lack of resources, the network shall respond with a DISCONNECT message indicating cause #47 "resources unavailable, unspecified" or cause #63 "service or option not available, unspecified".

In the following error situations, the network shall send a DISCONNECT message indicating cause #. "facility rejected" to the user:

1) The deactivation request contains invalid parameter(s); or,

2) The diversion supplementary service is not activated.

For the cases above, if the Bearer capability information element in the SETUP message indicates a speech type connection, an appropriate in-band information TOA4 shall be sent to the served user.

9.1.3 Interrogation

This subclause covers the procedures specified in subclauses 9.1.3 and 9.1.4 of ETS 300 207 (1).

9.1.3.1 Normal operation

In order to interrogate a diversion supplementary service, the user shall include in the SETUP or INFORMATION message an interrogation request in one or more Keypad facility information eleme using en-bloc or overlap procedures according to NT/SIG-SPEC-2-1 (2). The Keypad facility informa element shall contain the CFU, CFB or CFNR interrogation request, using the coding shown in table 5.

After the network has returned a SETUP ACKNOWLEDGE message or a CALL PROCEEDING message (possibly preceded by a SETUP ACKNOWLEDGE message), two cases exist:

a) If the display information containing the result of the interrogation can be included in one Display information element, the network shall clear the call by sending a DISCONNECT message containing the Display information element with cause #31 "normal, unspecified". The display information to be included in the Display information element is shown in table 7.

b) If the display information exceeds the maximum number of characters to be included in one Display information element, the network shall send one or more INFORMATION message(s) each containing a Display information element. The display information to be included in the Display information element is shown in table 7.

   After the network has sent the last INFORMATION message, the network shall clear the call by sending a DISCONNECT message with cause #31 "normal, unspecified". This message shall contain a Display information element with Display DIV5 "interrogation completed", in order to inform served user that the interrogation was successfully completed.

NOTE: If several INFORMATION messages are to be sent to the user in connection with diversion interrogation, it is advisable to send a CALL PROCEEDING message in order to avoid call clearance as a result of the expiry of supervisory timers.

NOTE: Denmark: Item b) is not applicable.

Table 7: Network response to an interrogation request

Served user number indicated by the user	Basic service indicated by the user	
	BS= 0 ("All services")	BS indicated or BC/HLC used (i.e. BS not indicated)
SUN included <Note 1>	Respond with Display DIV4 related to the indicated SUN, once for each BS.	Respond with Display DIV4 related to the indicated SUN and BS or BC/HLC
Only calling party number is indicated <Note 2>	Respond with Display DIV4 related to the indicated calling party number, once for each BS.	Respond with Display DIV4 related to the indicated calling party number and BS or BC/HLC. <Note 3>, <Note 4>
SUN= 0 ("All numbers") is indicated	Respond with Display DIV3 listing all numbers on that access for which diversion is activated.	Respond with Display DIV3 listing all numbers on that access for which diversion is activated for the indicated BS or BC/HLC.
No SUN or calling party number is indicated	Respond with Display DIV4 for the "default" number assigned to that access, once for each BS.	Respond with Display DIV4 for the "default" number assigned to that access, for the indicated BS or BC/HLC. <Note 3>, <Note 4>

Display DIV3: "bbbbbbbb$_1$ bbbbbbbb$_2$"
Display DIV4: "Diversion activated to cccccccc for BS..."

Note 1: The number indicated in the SUN will be screened by the network. If the indicated SUN is not a valid number associated with that access, the network shall interpret the SUN as an invalid parameter and shall reject the interrogation request as described in clause 9.1.3.2.

Note 2: If no SUN is indicated in the interrogation request, the network shall use the calling party number included in the Calling party number information element. If screening fails, the network shall use the "default" number assigned to that access.

Note 3: Denmark: Only this option is applicable.

Note 4: Finland: Only this option is applicable. The "BS" parameter is not applicable. The diversion supplementary service can only be interrogated for all basic services.

For the cases above, if the Bearer capability information element in the SETUP message indicates a speech type connection, in-band information TOA5 shall be sent to the served user, when the DISCONNECT message is sent.

If no diversion supplementary service is activated, the network shall send a DISCONNECT message (after it has returned either a SETUP ACKNOWLEDGE message or a CALL PROCEEDING message (possibly

preceded by a SETUP ACKNOWLEDGE message)), with cause #31 "normal, unspecified" and a Displa information element containing Display DIV6 "service not activated". If the Bearer capability informatio element in the SETUP message indicates a speech type connection, in-band information TOA8 shall be ser to the served user, when the DISCONNECT message is sent.

~~For the cases above, if the Bearer capability information element in the SETUP message indicates a speec type connection, in-band information TOA5 shall be sent to the served user, when the DISCONNEC message is sent.~~

9.1.3.2 Exceptional procedures

If a user attempts to interrogate a diversion supplementary service without having subscribed to the give supplementary service or the indicated basic service, the network shall respond with a DISCONNEC message indicating cause #50 "requested facility not subscribed".

If the user attempts to interrogate a diversion supplementary service and the network cannot perfor requested interrogation due to a temporary fault or lack of resources, the network shall respond wi DISCONNECT message indicating cause #47 "resources unavailable, unspecified" or cause #63 "service o option not available, unspecified".

If the interrogation request contains invalid parameter(s), the network shall send a DISCONNECT messag indicating cause #29 "facility rejected" to the served user.

For the cases above, if the Bearer capability information element in the SETUP message indicates a speec type connection, an appropriate in-band information TOA6 shall be sent to the served user.

9.2 Invocation and operation

9.2.1 Collection and analysis of diversion information at the calling network

Applicable.

9.2.2 Notification of diversion to the calling user

Applicable.

9.2.3 Identification of the diverted-to user to the calling user

Applicable.

9.2.4 Operation at the served user

When a diversion supplementary service is invoked, no keypad procedures are defined for notification at the served user's interface.

9.2.5 Operation at the diverted-to user

Applicable.

9.3 Reminder notification to the served user

9.3.1 Normal operation

If the served user has activated a call forwarding supplementary service, and an outgoing call with the same served user's number and with the same basic service is initiated at that served user's interface, the network

shall, as a subscription option, send a Display information element containing the Display DIV7 "diversion is activated" in the first call control message for that call, to the served user.

If the call forwarding unconditional supplementary service is activated and the served user has subscribed to "reminder notification" and:

- the Bearer capability information element in the SETUP message indicates a speech type connection;
- no called party number digits was included;

the network shall, in addition to sending a SETUP ACKNOWLEDGE message, also provide TOA7 and DIV7 to the served user.

If the display information Display DIV7 exceeds the maximum length supported by the network, the network shall send the first part in a Display information element included in the first call control message for that call which is sent to the served user. Subsequently, the network shall send the remaining Display DIV7 information in an INFORMATION message to the user.

10 Procedures for interworking with private ISDNs

No keypad procedures are defined.

11 Interactions with other networks

Applicable.

12 Interactions with other supplementary services

12.1 Advice of charge

If the AOC supplementary service is implemented using the keypad procedures, then the procedures specified in clause 12 of NT/SIG-SPEC-3-B (3) shall apply.

If the AOC supplementary service is implemented using the functional procedures, then the procedures specified in subclauses 5.5, 5.6 and 5.7 of ETS 300 195 [5] shall apply. In this case, only the signalling procedures at the coincident S and T reference point are applicable.

12.2 Call hold

No impact.

12.3 Explicit call transfer

No impact.

12.4 Diversion services

a) If the network receives an activation request:

- for another call forwarding supplementary service than one that is already activated by the network,
- indicating the same basic service and the same served user number, and

- if the network otherwise can accept the activation request,

then the network shall give a proper response to the user, as specified in clause 9.1.1.1. The following shall apply:

- For the interaction CFU - CFB and CFU - CFNR: The invocation of the CFU supplementary service shall take precedence over the CFB and CFNR supplementary services.

- For the interaction CFB - CFNR: No impact.

b) If the network receives an activation request indicating a different basic service and/or served user number to an already accepted activation: No impact.

12.5 Three-party

No impact.

12.6 Conference call, add-on

No impact.

12.7 Terminal portability

No impact.

12.8 User-to-user signalling

See subclauses 5.23, 5.26 and 5.29 of ETS 300 195 [5].

12.9 Calling line identification presentation

No impact.

12.10 Calling line identification restriction

No impact.

12.11 Connected line identification presentation

See subclause 9.2.3 of this specification.

12.12 Connected line identification restriction

See subclause 9.2.3 of this specification.

12.13 Closed user group

No impact.

12.14 Call waiting

No impact.

12.15 Direct dialling in

No impact.

12.16 Freephone

No impact.

12.17 Malicious call identification

No impact.

12.18 Multiple subscriber number

See subclause 12.4 of this specification.

12.19 Subaddressing

No impact.

12.20 Completion of calls to busy subscriber

No impact.

13 Parameter values (timers)

The timer T(cfnr) is applicable.

Timer T(activate), T(deactivate) and T(interrogate) are not applicable for keypad procedures.

14 Dynamic description (SDLs)

SDL diagrams for the keypad procedures for the diversion supplementary services will not be provided.

ANNEX A (informative) Signalling flows

The following diagrams show some examples where the keypad protocol is used in connection with the diversion supplementary services.

Table A.1 contains the key to the figures in this Annex.

Table A.1: Key to figures

bbbbbbbb :	Served user number
cccccccc :	Forwarded-to number

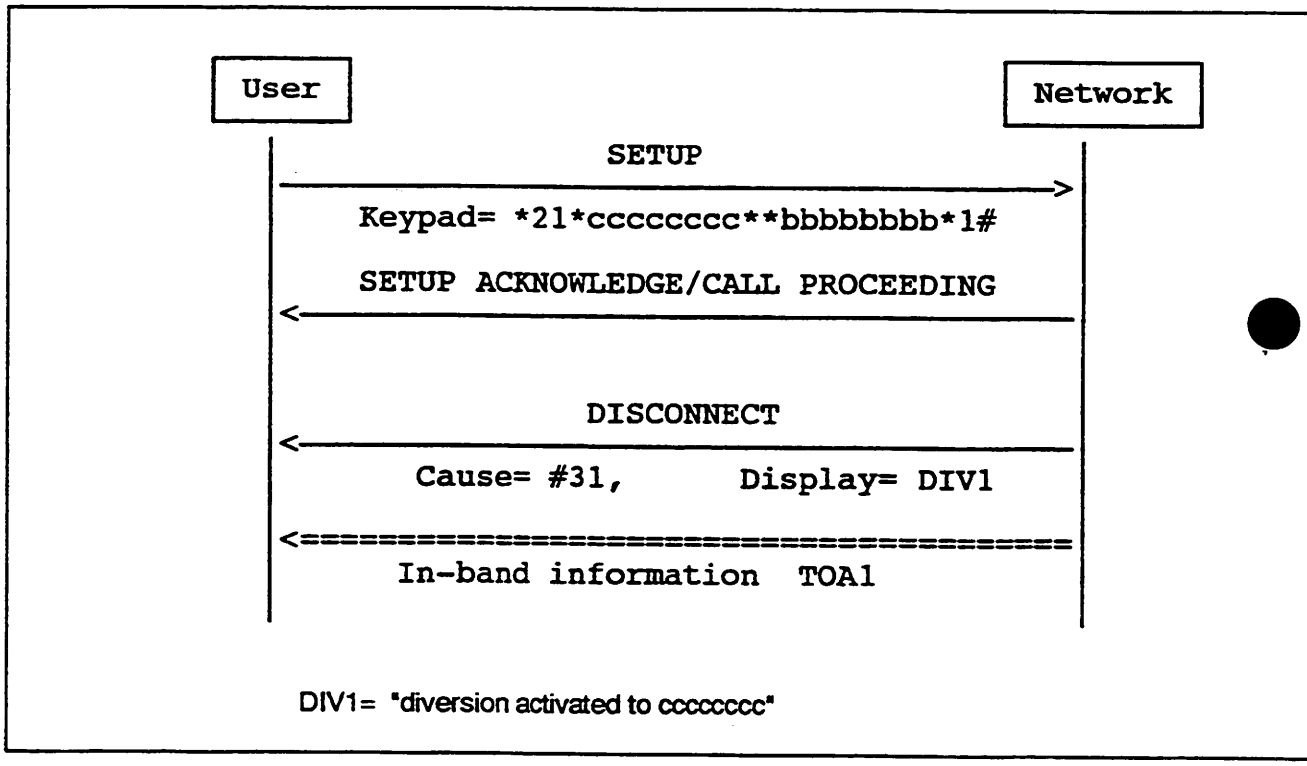


Figure A.1: CFU activation procedure, BS= 1

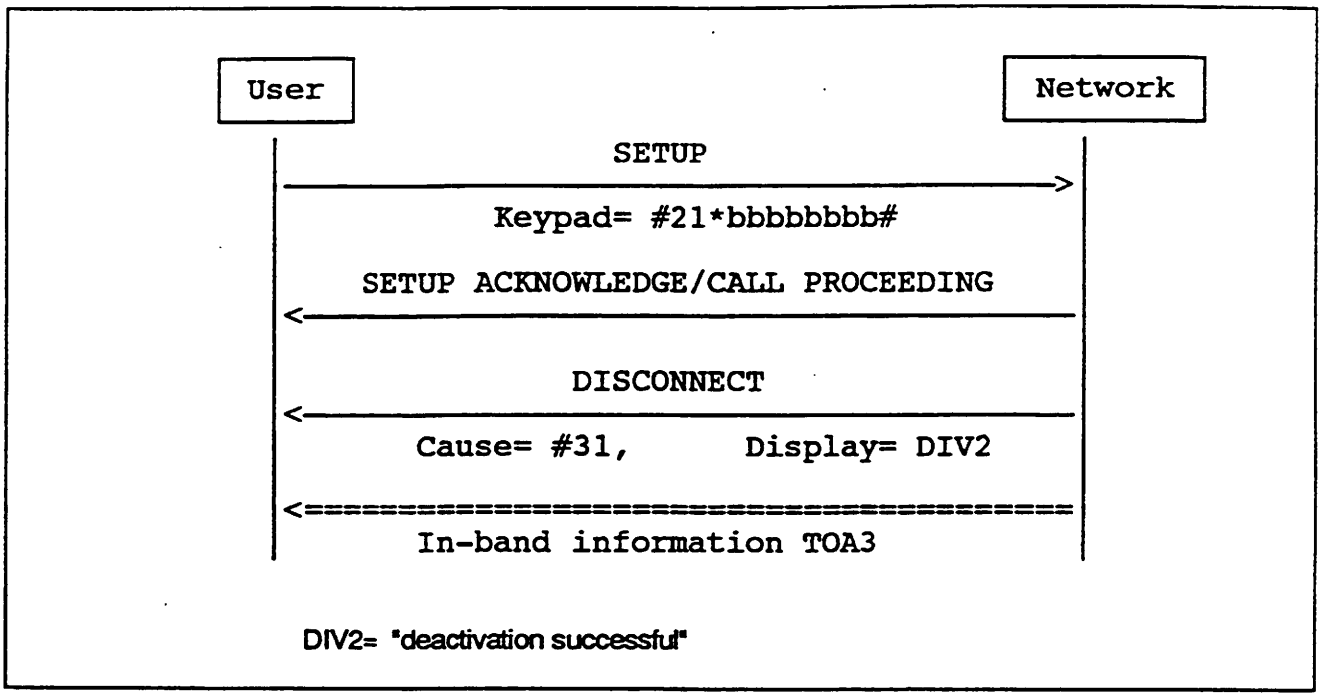


Figure A.2: CFU deactivation procedure

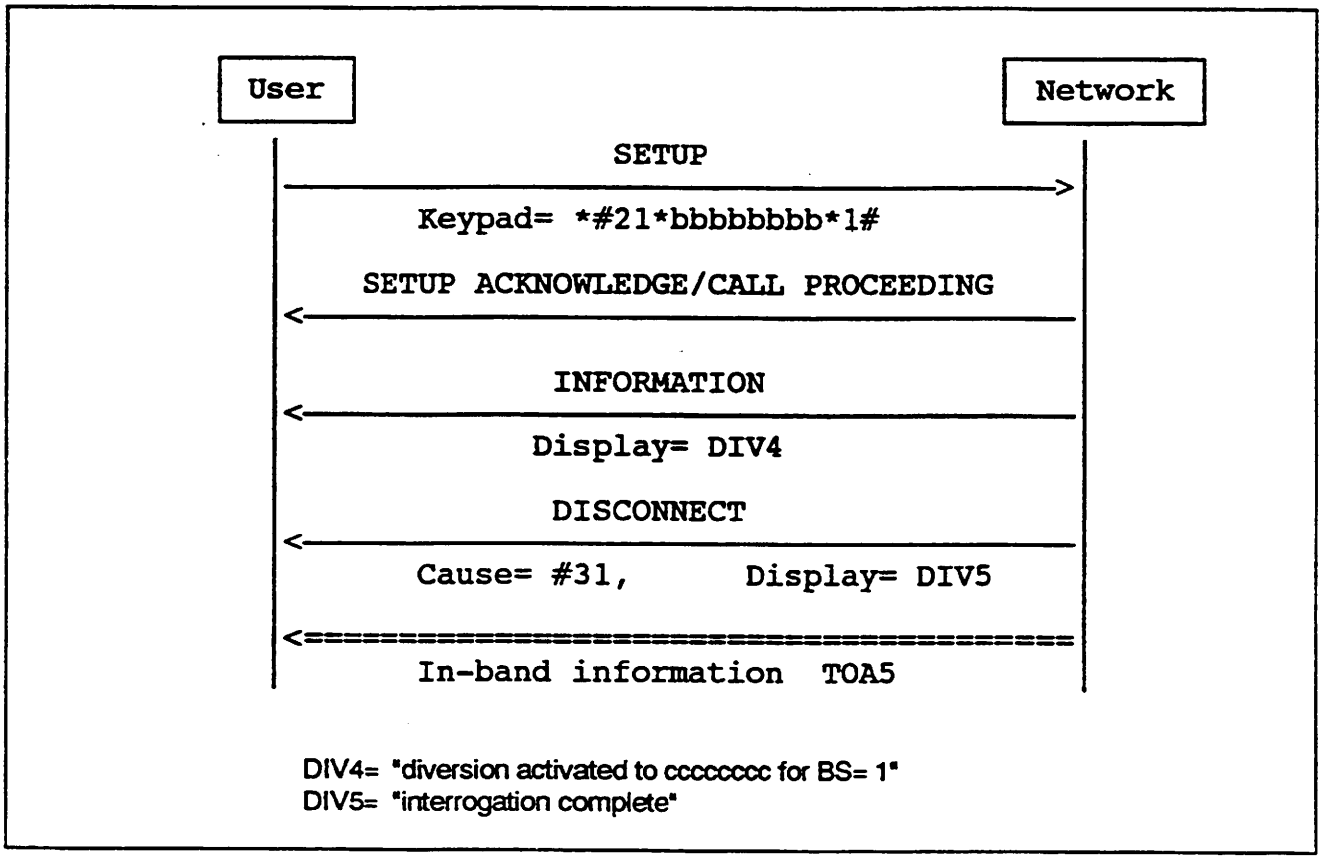


Figure A.3: CFU interrogation procedure, SUN= bbbbbbbb and BS= 1 is indicated

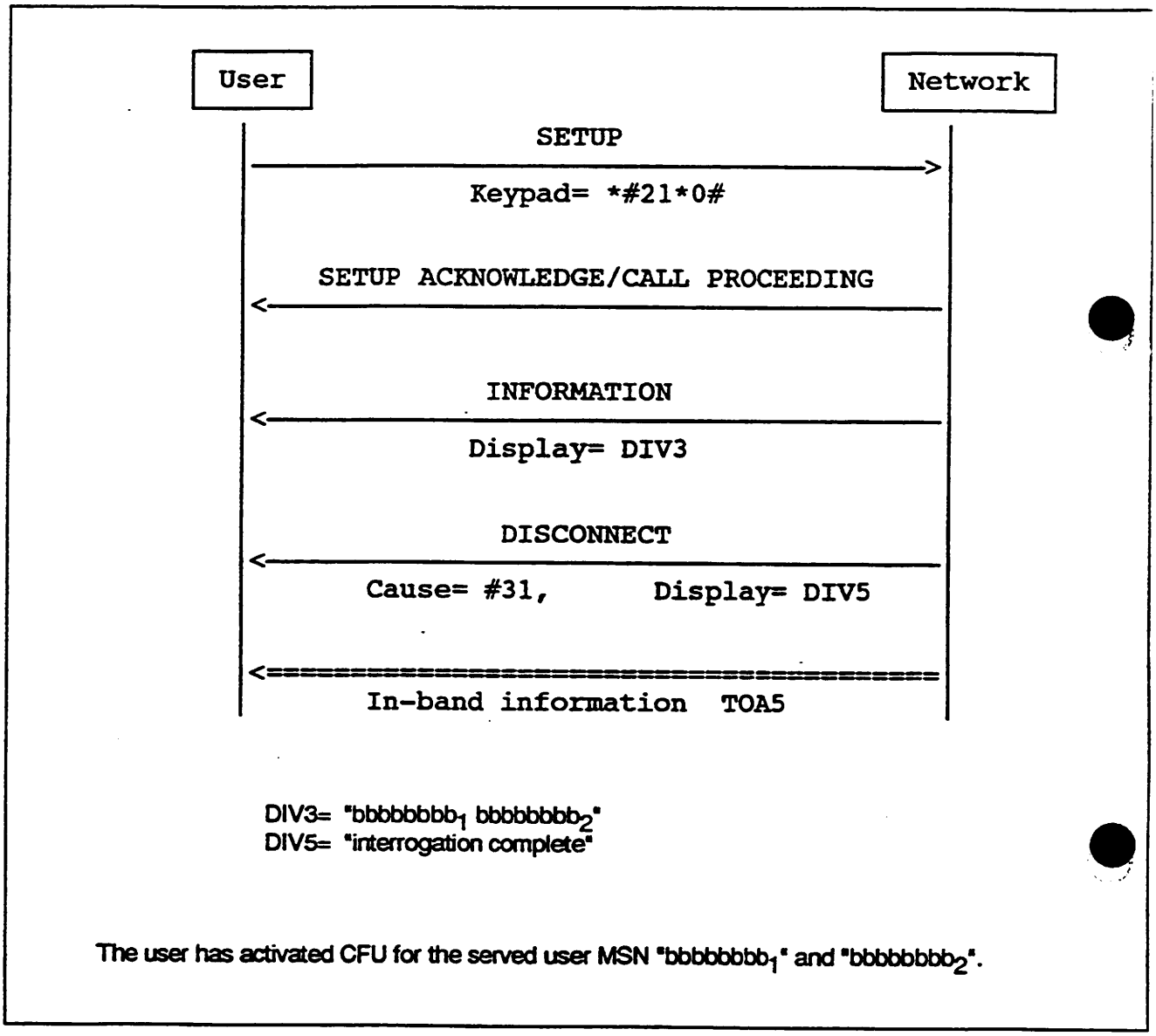


Figure A.4: CFU interrogation procedure, SUN= 0 ("All numbers")

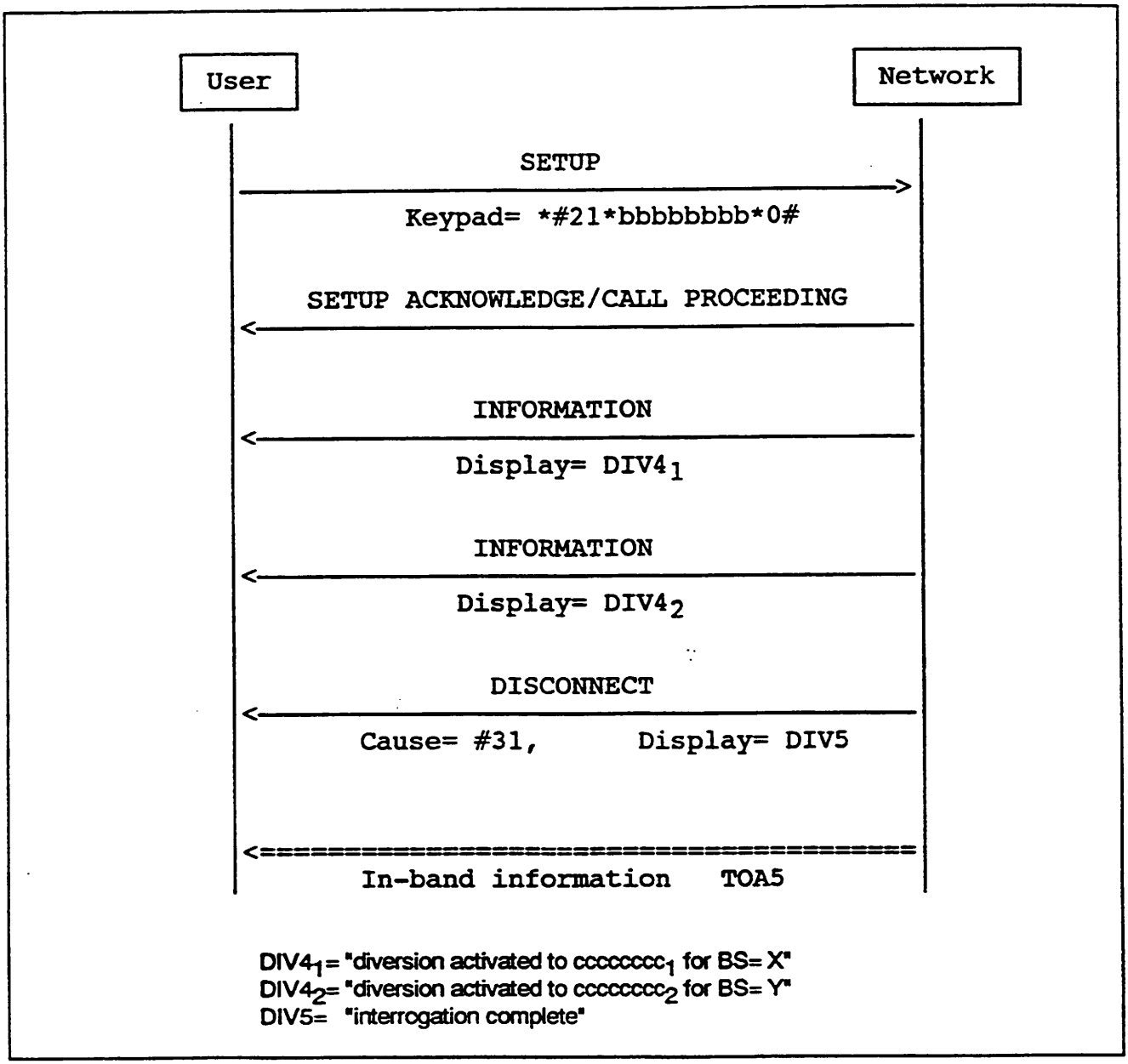


Figure A.5: CFU interrogation procedure, BS= 0 ("All services")

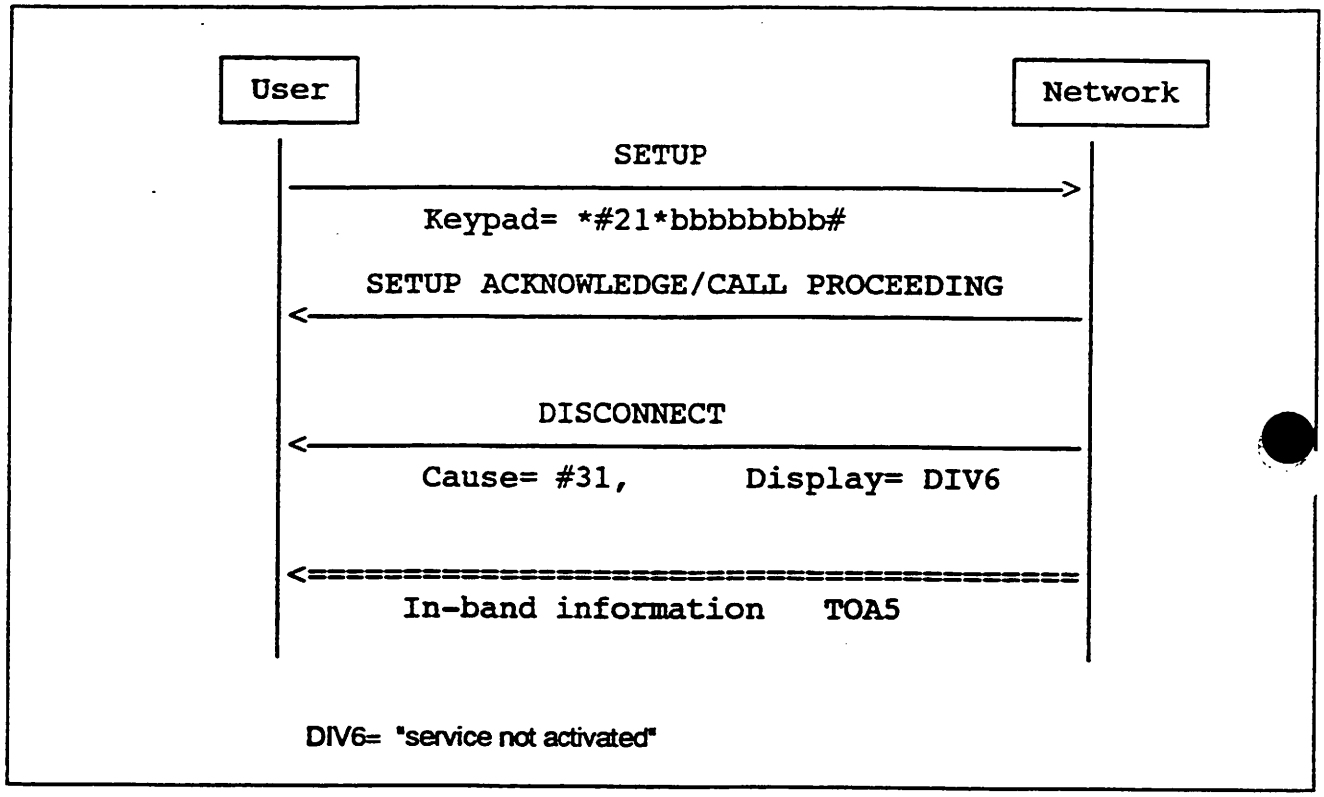


Figure A.6: CFU interrogation procedure, no diversion service active

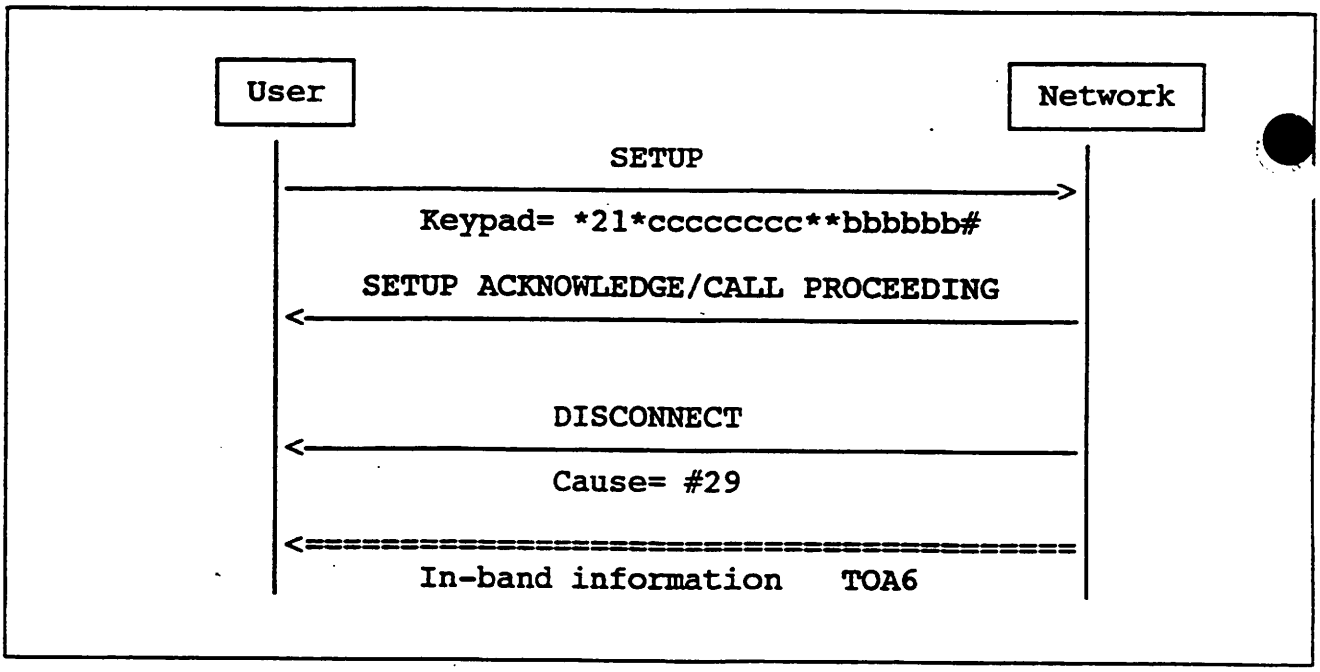


Figure A.7: Unsuccessful CFU activation, invalid SUN indicated

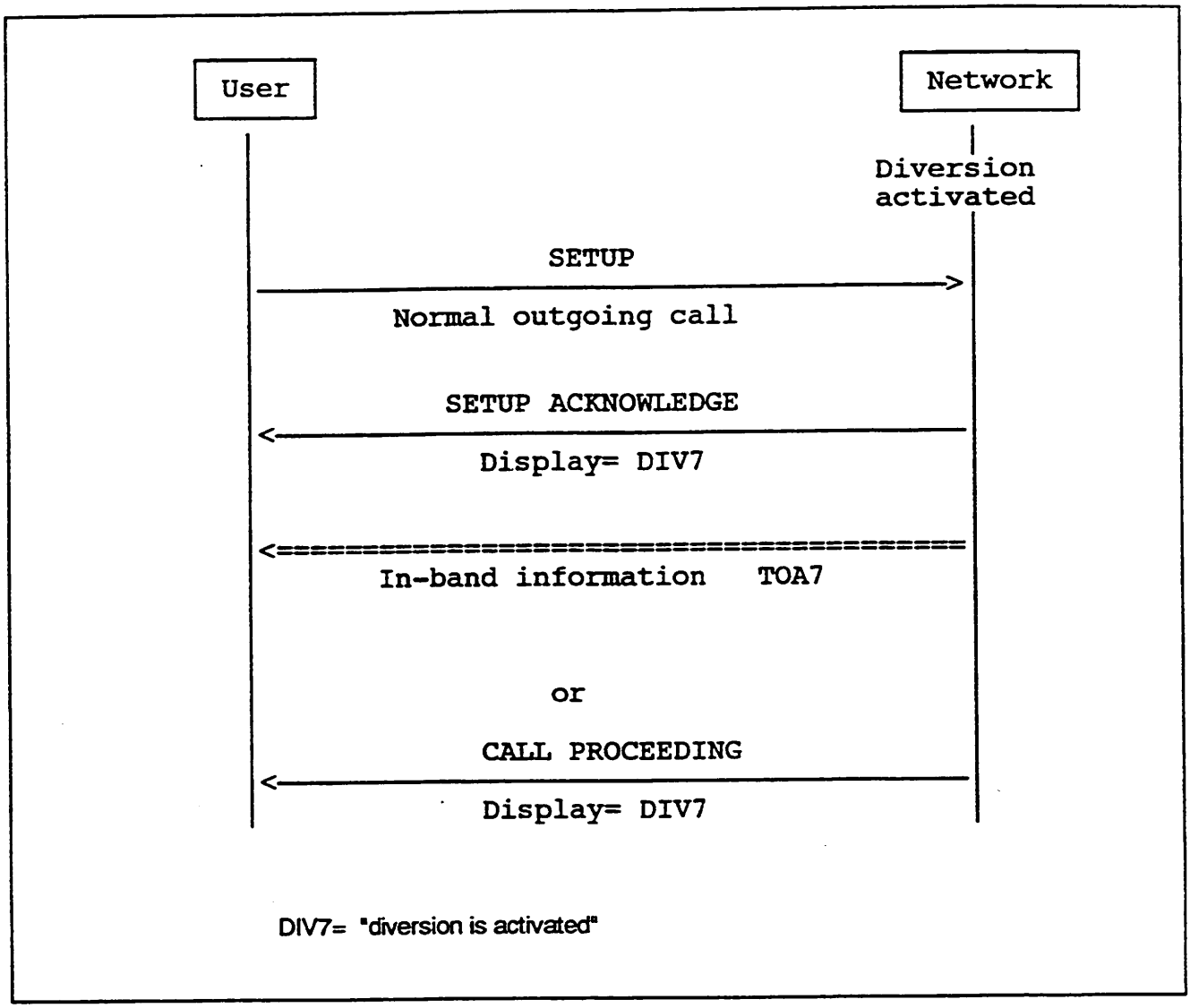


Figure A.8: Reminder notification

Appendix A: Supported network options

The following table shows only the network provider options defined for the diversion supplementary services using the keypad procedures, and which value for each option that is chosen in the Nordic countries.

Table A.1: Network provider options in the Nordic countries

Network provider options	Value	Country
Served user call retention on invocation of diversion (forwarding) (CFNR)	Retain call until alerting begins at the diverted-to user	Norway, Sweden
	Clear call on invocation of diversion	Denmark, Finland
The maximum number of diversions for a single call	Maximum number of diverted connections: 5	Denmark, Finland, Norway, Sweden
Call forwarding on no reply timer	Denmark: 10 - 60 seconds, in steps of 10 second intervals. Finland: 15 - 30 seconds, in steps of 1 second intervals. Norway: 5 - 60 seconds, in steps of 1 second intervals. Sweden: 5 - 60 seconds, in steps of 1 second intervals, subscriber controlled, default value= 30 seconds.	

Appendix B: Additional requirements to the diversion supplementary service applicable in Sweden

Clause 7.3, 7.4 and 9.1.3 are applicable for use in Sweden with the enhancements specified in this Appendix.

B.1 Activation procedure

Table B.1: Diversion activation procedure

a) Diversion activation request ::=

* Diversion service code * FTN [* [SUB] [* [SUN] [* BS]]]#

Diversion service code: CFU = 21

CFB = 67

b) Diversion activation request ::=

* Diversion service code [* [SUB] [* [SUN] [* BS]]]#

Diversion service code: CFU, fixed FTN = 22

c) Diversion activation request ::=

* Diversion service code * FTN [* [SUB] [* [SUN] [* [BS][* Interval]]]]#

Diversion service code: CFNR = 61

d) Diversion activation request ::=

* Diversion service code [* [SUB] [* [SUN] [* [BS] [* Interval]]]]#

Diversion service code: CFB, list of FTN = 68

CFNR, list of FTN = 62

BS= Basic service indicator (0 - 63). BS= 0 indicates "All services". See also clause 7.2 of NT/SIG-SPEC-2-1 (2).

FTN= Forwarded-to number

SUN= Served user number (i.e. in case of multiple mubscriber number supplementary service), SUN= 0 indicates "All numbers" (see also clause 7.1 of NT/SIG-SPEC-2-1 (2))

SUB= Forwarded-to subaddress

Interval= Subscriber controlled CFNR timer. Interval is only applicable to CFB= 68, CFNR= 61 and CFNR=62.

The "SUB", "BS", "SUN" and "Interval" are optional parameters and may not be present in a specific activation request.

B.2 Deactivation procedure

Table B.2: Diversion deactivation procedure

Diversion deactivation request ::=

#Diversion service code [* [SUN] [* BS]]#

Diversion service code:		
	CFU	= 21
	CFU, fixed FTN	= 22
	CFB	= 67
	CFB, list of FTN	= 68
	CFNR	= 61
	CFNR, list of FTN	= 62

BS= Basic service indicator (0 - 63). BS= 0 indicates "All services". See also clause 7.2 of NT/SIG-SPEC-2-1 (2).

SUN= Served user number (i.e. in case of multiple subscriber number supplementary service), SUN= 0 indicates "All numbers" (see also clause 7.1 of NT/SIG-SPEC-2-1 (2))

The "BS" and "SUN" are optional parameters and may not be present in a specific deactivation request.

B.3 Interrogation procedure

Table B.3: Diversion interrogation procedure

Diversion interrogation request ::=

* # Diversion service code [* [SUN] [* BS]]#

Diversion service code:		
	CFU	= 21
	CFU, fixed FTN	= 22
	CFB	= 67
	CFB, list of FTN	= 68
	CFNR	= 61
	CFNR, list of FTN	= 62

BS= Basic service indicator (0 - 63). BS= 0 indicates "All services". See also clause 7.2 of NT/SIG-SPEC-2-1 (2).

SUN= Served user number (i.e. in case of multiple subscriber number supplementary service), SUN= 0 indicates "All numbers" (see also clause 7.1 of NT/SIG-SPEC-2-1 (2))

The "BS" and "SUN" are optional parameters and may not be present in a specific interrogation request.

B.4 Coding of the Display information element

Table B.4: The semantics of the display information for the diversion supplementary services

Display DIV1 "diversion activated to cccccccc" <Note 1>
Display DIV2 "deactivation successful"
Display DIV3 "$b_1b_1b_1b_1b_1b_1b_1b_1$ $b_2b_2b_2b_2b_2b_2b_2b_2$ " <Note 2>
Display DIV4 "diversion activated to cccccccc for BS ..." <Note 1>
Display DIV5 "interrogation complete"
Display DIV6 "service not activated"
Display DIV7 "diversion is activated"
Display DIV8 "diversion activated to a list for BS..."

Note 1: "cccccccc" indicates the diverted-to address
Note 2: "$b_1b_1b_1b_1b_1b_1b_1b_1$ $b_2b_2b_2b_2b_2b_2b_2b_2$ indicates the served user number (SUN)

B.5 Interrogation

Table 7: Network response to an interrogation request

Served user number indicated by the user	Basic service indicated by the user	
	BS= 0 ("All services")	BS indicated or BC/HLC used (i.e. BS not included)
SUN included <Note 1>	Respond with Display DIV4 or DIV8 (if activated to a list) related to the indicated SUN, once for each BS.	Respond with Display DIV4 or DIV8 (if activated to a list) related to the indicated SUN and BS or BC/HLC
Only calling party number is indicated <Note 2>	Respond with Display DIV4 or DIV8 (if activated to a list) related to the indicated calling party number, once for each BS.	Respond with Display DIV4 or DIV8 (if activated to a list) related to the indicated calling party number and BS or BC/HLC.
SUN= 0 ("All numbers") is indicated	Respond with Display DIV3 listing all numbers on that access for which diversion is activated.	Respond with Display DIV3 listing all numbers on that access for which diversion is activated for the indicated BS or BC/HLC.
No SUN or calling party number is indicated	Respond with Display DIV4 or DIV8 (if activated to a list) for the "default" number assigned to that access, once for each BS.	Respond with Display DIV4 or DIV8 (if activated to a list) for the "default" number assigned to that access, for the indicated BS or BC/HLC.

Display DIV3: "bbbbbbbb$_1$ bbbbbbbb$_2$"
Display DIV4: "Diversion activated to cccccccc for BS..."
Display DIV8: "diversion activated to a list for BS..."

Note 1: The number indicated in the SUN will be screened by the network. If the indicated SUN is not a valid number associated with that access, the network shall interpret the SUN as an invalid parameter and shall reject the interrogation request as described in clause 9.1.3.2.

Note 2: If no SUN is indicated in the interrogation request, the network shall use the calling party number included in the Calling party number information element. If screening fails, the network shall use the "default" number assigned to that access.

NORDTEL

NT/SIG-SPEC-3-A

NORDIC SPECIFICATION

APPLICATION DOCUMENT TO ETSI ETS 300 207
DIVERSION
SUPPLEMENTARY SERVICE
USING KEYPAD PROTOCOL

APPENDIX C

DISPLAY INFORMATION
AND TONES AND/OR ANNOUNCEMENTS

ISSUE DATE: 94-11-08

APPENDIX C: DISPLAY INFORMATION AND TONES AND/OR ANNOUNCEMENTS

The specification of the display information in Danish wording is given in table C.1.

Furthermore, the specification of the tones and/or announcements is given in table C.2

Display type	Content in the Display information element
Display DIV1	Viderestillet til xx NOTE 1
Display DIV2	Viderestilling deaktiveret
Display DIV3	<Not applicable in Denmark>
Display DIV4	Viderestillet til xx NOTE 1
Display DIV5	<Not applicable in Denmark>
Display DIV6	Viderestilling ikke aktiv
Display DIV7	Viderestilling aktiv
NOTE 1: xx shall be the diverted-to number	

Table C.1: Content of the Display information element

TOA type	Tone to be sent
TOA1	Dial tone
TOA2	Special information tone
TOA3	Dial tone
TOA4	Special information tone
TOA5	Dial tone
TOA6	Special information tone
TOA7	Special dial tone
TOA8	Busy tone

Table C.2: Tones

TELE DANMARK

INAD-3 APPENDIX L3

Title:

The Malicious Call IDentification supplementary service.

Contents:

This appendix is a specification of the stage 3 of the Mailicious Call IDentification supplementary service using keypad procedures. The appendix is a common Nordic specification.

The stage 1 requirements are given in ETSs 300 128 completed by the application specification in Appendix C.

NORDTEL

NT/SIG-SPEC-3-D

NORDIC SPECIFICATION

APPLICATION DOCUMENT TO ETSI ETS 300 130
MALICIOUS CALL IDENTIFICATION
SUPPLEMENTARY SERVICE
USING KEYPAD PROTOCOL

APPENDIX A

DISPLAY INFORMATION

ISSUE DATE: 94-07-01

APPENDIX A: DISPLAY INFORMATION

The specification of the display information in danish wording is given in figure A-1.

Display type	Content in display information element
Display MCID1	Nummeret registreret

Figure A-1: Content of the display information in Danish.

Foreword

The following sections give the requirements for the implementation of the MCID supplementary service using the 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 300 130 (1) where the keypad protocol is applied instead of functional protocol. The generic keypad protocol which is applied in this specification is defined in NT/SIG-SPEC-2-1 (2).

The text in clauses 7 and 9 of this specification replaces entirely the text of the same clauses of ETS 300 130 (1). In addition, this specification contains some clarifications and/or additions to certain other clauses of ETS 300 130 (1), where this is felt to be necessary. Where clarifying text is provided, the relevant clause in ETS 300 130 (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 MCID supplementary service using the keypad protocol in each Nordic country is a national matter.

1 Scope

This specification describes the operation of the Malicious call identification supplementary service using the keypad protocol.

This stage 3 description is based on the service requirements specified in ETS 300 128 (3). 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 300 130: Integrated Services Digital Network (ISDN); Malicious Call Identification (MCID) 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"

(3) ETS 300 128: Integrated Services Digital Network (ISDN); Malicious Call Identification (MCID) supplementary service; Service description

3 Definitions

Applicable.

4 Symbols and abbreviations

Applicable.

5 Description

Applicable.

6 Operational requirements

Applicable.

7 Coding requirements

ASN.1 coding defined in ETS 300 130 (1) is not applicable for keypad protocol.

Table 1: MCID invocation procedure

MCID invoke request::=
*MCID service code#
MCID service code = 39

7.2 Coding of the Display information element

The semantics of the display information in relation to the MCID supplementary service are specified in table 2.

The Display information element will contain MCID related information coded in IA5 characters constituting a national text according to Appendix A.

Table 2: Semantics of the display information for the MCID supplementary service

Display MCID1 "invocation successful"

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 procedures

9.2.1 Normal operation

To invoke the MCID supplementary service, the user shall send the MCID invoke request in the Keypad facility information element(s) within the INFORMATION message(s) to the network.

The network shall return an INFORMATION message including a Display information element containing Display MCID1 "invocation successful" to indicate that the invocation has been accepted.

9.2.2 Exceptional procedures

If the MCID request is received from the called party in any other state than the Active state (N10) or the Disconnect Indication state (N12), the network shall not invoke the MCID supplementary service, and shall return an INFORMATION message containing a cause #29 "facility rejected" indicating that the invocation has not been accepted.

If the MCID supplementary service is requested when not subscribed, the network shall return an INFORMATION message with the cause #50 "requested facility not subscribed" to indicate that the invocation has been rejected.

If the MCID supplementary service is requested for an outgoing call, the network shall return an INFORMATION message with the cause #29 "facility rejected" to indicate that the invocation has been rejected.

If the network receives from the user a RELEASE message before sending response to the previous MCID invocation, the network shall process the MCID request as appropriate, and continue normal call clearing procedure.

If it is not possible to register any call information, the network shall send an INFORMATION message with the cause #47 "resource unavailable, unspecified" or #63 "service or option not available, unspecified" to indicate that the invocation was unsuccessful.

If the MCID supplementary service is requested when another supplementary service is already activated or has already been invoked, and the network does not allow this MCID supplementary service invocation in combination with the other supplementary service, the network shall return an INFORMATION message with the cause #29 "facility rejected" to indicate that the invocation has been rejected.

If the user requests the MCID supplementary service after a successful invocation, the network shall acknowledge this request according to clause 9.2.1. However, the network shall only record the call information once.

10 Procedures for interworking with private ISDNs

The procedures as specified in clause 9 shall apply.

11 Interactions with other networks

No protocol impact.

12 Interactions with other supplementary services

Applicable.

13 Parameter values (timers)

Applicable.

14 Dynamic description (SDLs)

SDL diagrams for the keypad procedure for the MCID supplementary service will not be provided.

ANNEX A (informative) Signalling flows

Example signalling flows for the MCID supplementary service are shown in Figures A.1 and A.2.

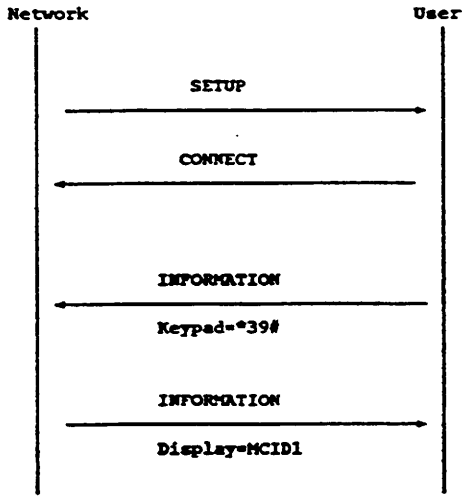


Figure A.1: MCID invocation in Active state

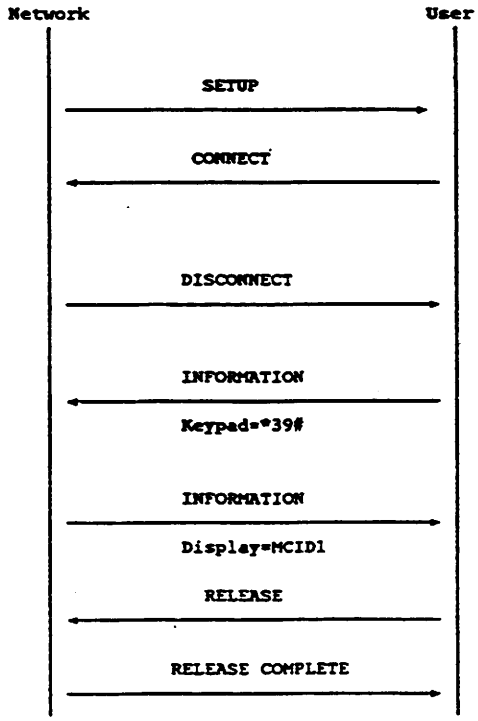


Figure A.2: MCID invocation in Disconnect Indication state

ANNEX B (informative) mCIDRequest components

Not applicable.

NORDTEL

NT/SIG-SPEC-3-D

NORDIC SPECIFICATION

APPLICATION DOCUMENT TO
ETSI ETS 300 130
MALICIOUS CALL IDENTIFICATION
SUPPLEMENTARY SERVICE
USING KEYPAD PROTOCOL

APPENDIX A

**DISPLAY INFORMATION AND
TONES AND/OR ANNOUNCEMENTS**

ISSUE DATE: 92-06-01

TELE DANMARK

INAD-3 APPENDIX L4

Title:

The Advice of Charge at the End of a call supplementary service.

Contents:

This appendix is a specification of the stage 3 of the Advice of Charge at the End of a call supplementary service using keypad procedures. The appendix is a common Nordic specification.

The stage 1 requirements are given in ETS 300 180 completed by the application specification in Apendix C. Note that only AOC-E applies for the keypad procedures.

NORDTEL

NT/SIG-SPEC-3-B

NORDIC SPECIFICATION

APPLICATION DOCUMENT TO
ETSI ETS 300 182

ADVICE OF CHARGE SUPPLEMENTARY SERVICE USING KEYPAD PROTOCOL

ISSUE DATE: 92-12-01

CONTENTS

FOREWORD

The following sections give the requirements for the implementation of the Advice of Charge supplementary service using the 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 300 182 (1) where the keypad protocol is applied instead of the functional protocol, and selects which options in ETS 300 182 (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 7, 9 and 12 replace entirely the text contained in the same clauses in ETS 300 182 (1). In addition, this specification contains some clarifications and/or additions to certain other clauses of ETS 300 182 (1), where this is felt to be necessary. Where clarifying text is provided, the relevant clause in ETS 300 182 (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 Advice of Charge supplementary service, using the keypad protocol, in each Nordic country, is a national matter.

The provision of display information in connection with the Advice of Charge supplementary service is a national matter, and is specified in Appendix A.

1 Scope

This specification describes the operation of the Advice of Charge (AOC) supplementary service using the keypad protocol. It is an application document to ETS 300 182 (1) and makes use of the generic keypad protocol defined in NT/SIG-SPEC-2-1 (2).

Three AOC supplementary services exist:

a) Charging information at call set-up time (AOC-S)

b) Charging information during the call (AOC-D)

c) Charging information at the end of the call (AOC-E)

For the AOC-S supplementary service no procedures using the keypad protocol will be defined (i.e. only the functional procedures defined in ETS 300 182 (1) are applicable).

This stage 3 specification is based on the service requirements specified in ETS 300 179 [7] and ETS 300 180 [8]. 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 300 182 "Integrated Services Digital Network (ISDN), Advice of Charge 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".

(3) ETS 300 055 "Integrated Services Digital Network (ISDN), Terminal Portability (TP) supplementary service, Digital Subscriber Signalling System No. one (DSS1) protocol".

Note: References enclosed in square brackets ("[]") refer to the references defined by ETS 300 182 (1).

3 Definitions

Applicable, except for the charging information.

Charging information: information sent to a user in a Display information element showing charging related information (i.e. the recorded charges for the call).

4 Symbols and abbreviations

Applicable.

5 Description

5.1 General description

Applicable, except for the supplementary service AOC-S.

5.2 Charging information at call set-up time

Not applicable.

5.3 Charging information during the call

Applicable.

5.4 Charging information at the end of the call

Applicable.

6 Operational requirements

6.1 Provision and withdrawal

Applicable, except for the supplementary service AOC-S.

6.2 Requirements on the originating network side

Applicable.

6.3 Requirements on the destination network side

Applicable.

7 Coding requirements

7.1 General

The only types of charging information supported, using keypad procedures, are "currency", one type of "charging units" and the "free of charge" indication.

7.2 Coding of the Facility information element components

Not applicable.

7.3 Coding of the Keypad facility information element

The coding requirements for the activation procedure of AOC-D and AOC-E on a per call basis are:

Table 1: AOC activation procedure

AOC request ::= *AOC service code#
AOC-D service code = 462 AOC-E service code = 464

7.4 Coding of the Display information element

The semantics of the display information in relation to the AOC supplementary service are specified in table 2.

The Display information element will contain AOC related information coded in IA5 characters constituting a national text according to Appendix A.

Table 2: The semantics of the display information for the AOC supplementary service.

Display AOC1	"activation successful"
Display AOC2	"charging information in currency/charging units"
Display AOC3	"free of charge"
Display AOC4	"no charging information available"

8 State definitions

Applicable, except for the AOC-S states.

9 Signalling procedures at the coincident S and T reference point

9.1 Activation, deactivation and registration

9.1.1 Normal operation

These supplementary services may be activated on a per call basis or they may be active for all calls. The activation on a per-call basis is only active for the lifetime of that call.

If an AOC supplementary service is subscribed to for all calls, no signalling procedure is defined for the activation of the service. The network shall automatically activate the subscribed AOC supplementary service at each call setup.

To activate an AOC supplementary service, the user shall include in the SETUP or INFORMATION message, using en-bloc or overlap procedure according to NT/SIG-SPEC-2-1 (2), one or more Keypad facility information element(s) containing the keypad string for AOC supplementary service activation, as specified in table 1.

If the network activates the requested AOC supplementary service (e.g. the served user is allowed to request the information), the network shall acknowledge the request by returning a Display information element containing Display AOC1 "activation successful" in a call control message (i.e. SETUP ACKNOWLEDGE, CALL PROCEEDING, PROGRESS, ALERTING or CONNECT message - whichever is appropriate). Alternatively, the network can use an INFORMATION message to convey the information, if a call control message is not available when the information is to be sent.

No signalling procedure is defined for the registration of an AOC supplementary service.

9.1.2 Exceptional procedures

The following exceptional procedures shall apply:

a) if the AOC supplementary service is activated for all calls and the network cannot provide the charging information, the network shall, at the time it determines that the information is not available, send an INFORMATION message to the served user, and continue normal call handling. The INFORMATION message shall contain a Display information element indicating Display AOC4 "no charging information available".

   The Display AOC4 "no charging information available" indicates that the served user would normally receive charging information but that in this case the information cannot be sent to the served user.

b) if the AOC supplementary service is requested on a per-call basis and the network cannot provide the charging information, the network shall, send an INFORMATION message to the served user, and continue normal call handling. The INFORMATION message shall contain a Cause information element, indicating:

- cause #47 "resource unavailable, unspecified";
- cause #50 "requested facility not subscribed"; or,
- cause #63 "service or option not available, unspecified";

or if non of the above Cause information elements are available:

- a Display information element indicating Display AOC4 "no charging information available".

c) if the network receives a request for any of the AOC supplementary services in any other message than a SETUP or an INFORMATION message during call request, the network shall send an INFORMATION message containing cause #29 "facility rejected" or cause #50 "requested facility not subscribed" to the user.

d) if a user requests on a per-call basis an AOC supplementary service which is activated for all calls, the network shall acknowledge the request as specified in subclause 9.1.1. However the network shall only send charging information as a result of one activation of each AOC supplementary service activated.

9.2 Invocation and operation

In the following subclauses the procedures for the transfer of charging information are given.

The transfer of charging information may occur:

- in the Active state of a call (AOC-D supplementary service);
- during the call clearing phase (AOC-D and AOC-E supplementary services).

9.2.1 Transfer of charging information in the call establishment phase

Not applicable.

9.2.2 Transfer of charging information in the Active state

9.2.2.1 Normal operation

If the AOC-D supplementary service is offered, the originating network shall send charging information during a call. The rate of sending messages may vary from call to call and during a call.

When the network transfer charging information to the served user during the Active state, the network shall include Display AOC2 "charging information in currency/charging units" or Display AOC3 "free of charge" in the Display information element sent in an INFORMATION message to the served user.

If the AOC-D supplementary service is provided, the network shall give charging information, based, as a network option, on currency units or on charging units. Only the charged items that affects the charging applied to that call shall be covered.

9.2.2.2 Exceptional procedures

In the case that charging information is temporarily not available in the network, the network shall continue normal call handling and no indication shall be sent to the user. This applies to the case where the AOC-D supplementary service is activated.

9.2.3 Transfer of charging information in the call clearing phase

9.2.3.1 Normal operation

When the network transfers charging information to the served user in the call clearing phase, the network shall include the Display information element either in the DISCONNECT or the RELEASE message, depending on who initiates the call clearing. If the served user initiates call clearing by sending a DISCONNECT message to the network, the network shall include the charging information in the RELEASE message sent from the network to the served user. If the remote user or the network initiates call clearing, the network shall include the charging information in the DISCONNECT message sent from the network to the served user.

In both these cases, if the AOC-D or the AOC-E supplementary services are activated, the network shall include Display AOC2 "charging information in currency/charging units" or Display AOC3 "free of charge" in the Display information element sent to the served user.

The network shall give charging information, based, as a network option, on currency units or on charging units. Only the charged items that affect the charging applied to that call shall be covered.

In the case that the served user does not respond to a DISCONNECT message sent from the network, the network shall include the charging information, previously sent in the DISCONNECT message, in the subsequent RELEASE message(s) sent to the served user.

In the case that the served user does not respond to a RELEASE message sent from the network, the network shall include the charging information contained in the first RELEASE message in the retransmitted RELEASE message.

In the case that the network receives a RELEASE message as the first clearing message from the served user, the network shall send Display AOC2 "charging information in currency/charging units", Display AOC3 "free of charge" or Display AOC4 "no charging information available" to the served user in the Display information element within the RELEASE COMPLETE message.

9.2.3.2 Exceptional procedures

In the case that charging information is not available in the network, the network shall inform the served user and continue normal call handling procedures.

If the complete charging information is not available, the network shall include Display AOC4 "no charging information available" in the Display information element in a clearing message sent from the network to the served user.

If the call fails and the network knows that charges have been applied to the call, the recorded charges shall be transferred to the user. Display AOC2 "charging information in currency/charging units" shall then be included in the Display information element and sent to the served user in an appropriate message.

9.2.4 Transfer of charging information independent of a bearer at the user-network interface

Not applicable.

10 Procedures for interworking with private ISDNs

The procedures as specified in clause 9 shall apply.

11 Interactions with other networks

Applicable.

12 Interactions with other supplementary services

12.1 Advice of Charge

12.1.1 AOC-S with AOC-D and AOC-E

No impact.

12.1.2 AOC-D with AOC-E

If the AOC-D and AOC-E supplementary services are activated for the same call, the network shall only send AOC-E type of charging information when the call is released. The charging information shall be one of the following types:

- Display AOC2 "charging information in currency/charging units"; or,
- Display AOC3 "free of charge".

12.2 Call Hold

No impact.

12.3 Explicit Call Transfer

If the served user has activated the AOC-D and/or AOC-E supplementary service, the network shall not send any charging information to the served user after the call has been transferred. When the call transfer is completed and the network releases the served user, the network shall send AOC-D and/or AOC-E display information, in one of the call control messages clearing the call, indicating Display AOC4 "no charging information available".

12.4 Diversion Services

The diverting user can not receive any charging information.

12.5 Three-Party

If the served user has activated any of the AOC-D or AOC-E supplementary services, the network shall send charging information to the user as for normal calls for those calls originated by the served user.

12.6 Conference Call add-on

The network shall use the call reference of the conference call when it sends charging information to a conference-controlling user. In this case, the network shall send charging information related to the whole conference.

If a conferee is split from the conference, the network shall use the call reference established for the private communication when sending charging information for that connection if an AOC supplementary service is activated. When the private communication is terminated, the network shall send the relevant charging information as for a call in the clearing phase (see clause 9.2.3). If the AOC-D supplementary service is activated for the private communication, the network shall include Display AOC2 "charging information in currency/charging units" or Display AOC3 "free of charge" in the Display information element sent in a call control message terminating the private communication.

12.7 Terminal Portability

a) In the call suspension phase:

If a served user suspends a call, the network shall send charging information to the served user in the SUSPEND ACKNOWLEDGE message. In that case, the Display information element shall be included in the SUSPEND ACKNOWLEDGE message containing the cumulative charge (i.e. the sub-total charge incurred up to the moment when the call is suspended).

The network shall send one of the following AOC-D types of charging information to the served user:

- Display AOC2 "charging information in currency/charging units"; or,
- Display AOC3 "free of charge".

Note: Charging continues during the time the call is suspended (while timer T307 is running). If the served user does not resume the call before timer T307 expires, the charging information recorded for this call may be different from the charging information sent to the served user either prior to or during the sending of the SUSPEND ACKNOWLEDGE message. This also applies if the remote user clears the call during the period of suspension.

In some cases the charging information may not be available in time for it to be included in the SUSPEND ACKNOWLEDGE message sent to the served user. This may happen when the charging information resides in a functional entity different from the functional entity generating the SUSPEND ACKNOWLEDGE message. In this case the network shall send the Display information element in the SUSPEND ACKNOWLEDGE message to indicate to the served user that the charging information is not available (i.e. Display AOC4 "no charging information available") and the call suspension shall continue as defined in ETS 300 055 (3).

b) In the call resume phase:

When a served user resumes a call, the network shall also resume sending of charging information to the user if the AOC-D supplementary service is activated for the call. In addition, charging information may be sent to the served user in the RESUME ACKNOWLEDGE message. In that case , the network shall include the Display information element in the RESUME ACKNOWLEDGE message, containing one of the following types of charging information:

- Display AOC2 "charging information in currency/charging units"; or,
- Display AOC3 "free of charge".

In some cases the charging information may not be available in time for it to be included in the RESUME ACKNOWLEDGE message sent to the served user. This may happen when the charging information resides in a functional entity different from the functional entity generating the RESUME ACKNOWLEDGE message. In this case the network shall send the Display information element in the RESUME ACKNOWLEDGE message to indicate to the served user that the charging information is not available (i.e. Display AOC4 "no charging information available") and normal call handling shall continue. When the charging information has become available after a call has been resumed, the network shall send an INFORMATION message to the served user containing the charging information shown above.

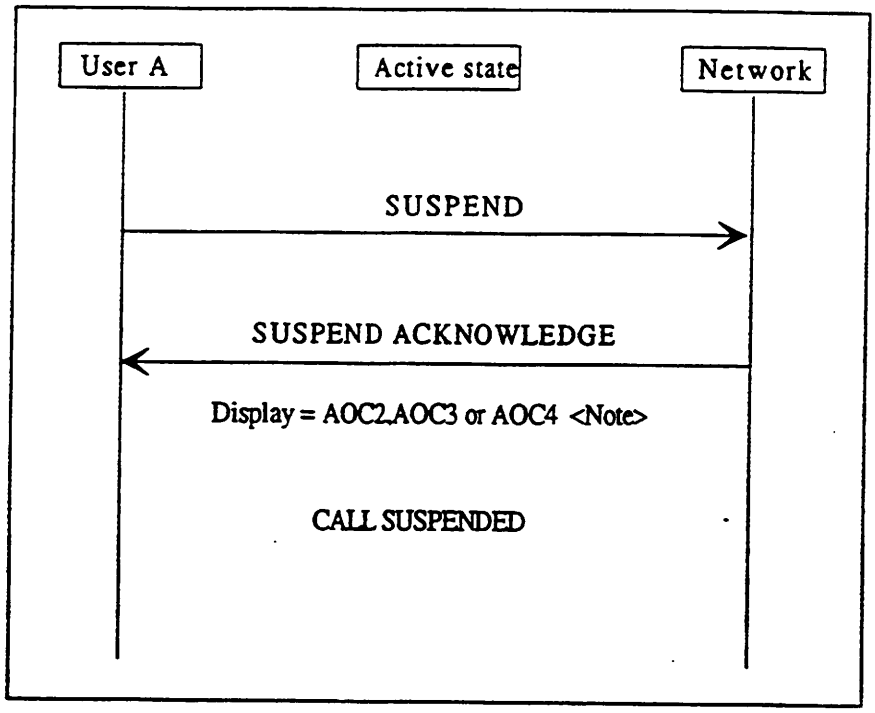
The network shall transfer charging information to the served user even though the network cannot resume a suspended call (within the time the network retains the call identity of the suspended call). The network shall include the Display information element in the RESUME REJECT message if the served user attempts to resume the call before the retention time expires. The network shall retain the charging information for the suspended call as long as it retains the call identity of the suspended call. The following cases are applicable:

1) If the remote user disconnects while the call is suspended:

   Either the AOC-D or the AOC-E type charging information can be provided, if the supplementary service is activated for the call. If the AOC-D or AOC-E supplementary service is activated, the network shall include Display AOC2 "charging information in currency/charging units" or Display AOC3 "free of charge" in the Display information element, when charging information is sent to the served user.

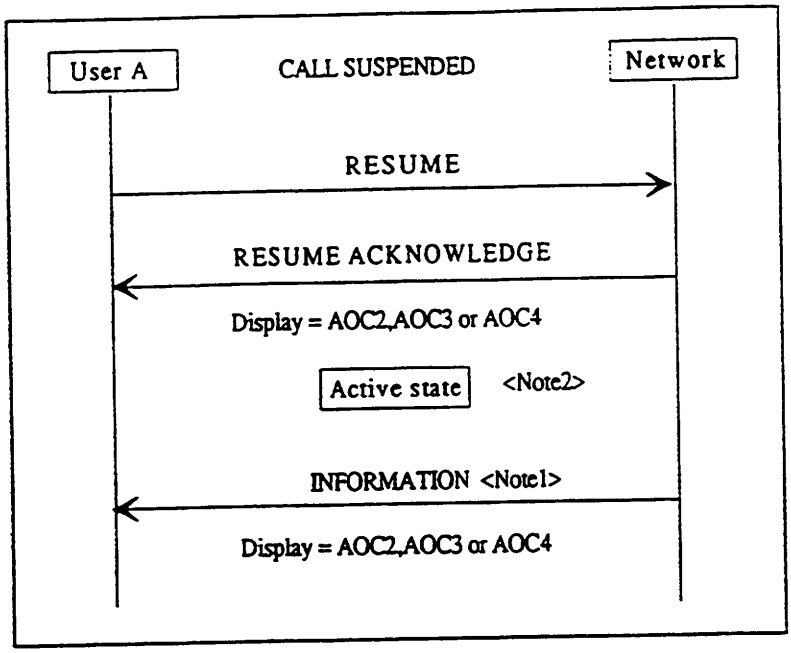
2) If resumption is rejected for any other reason:

   Only cumulative charging during a call can be provided, if the supplementary service is activated for the call (i.e. the served user attempts to resume the call a number of times before the call retention timer expires). If the AOC-D supplementary service is activated, the network shall include Display AOC2 "charging information in currency/charging units" or Display AOC3 "free of charge" in the Display information element, when charging information is sent to the served user.



Note: Only applicable to the AOC-D supplementary service.

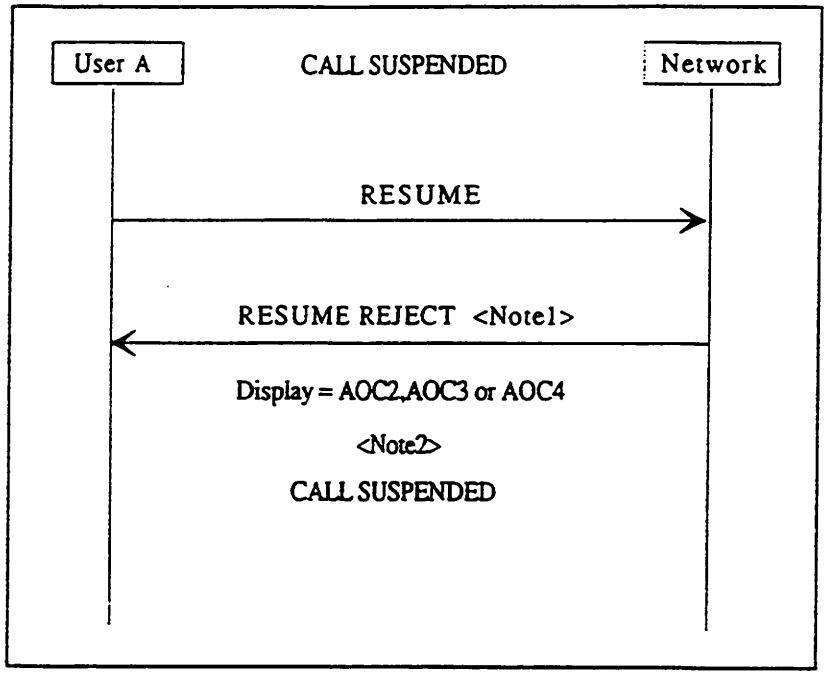
Figure 1: Transfer of charging information in the call suspension phase



Note1: The first INFORMATION message following the RESUME ACKNOWLEDGE message is only used if the charging information has not already been sent in the RESUME ACKNOWLEDGE message.

Note2: Only applicable to the AOC-D supplementary service.

Figure 2: Transfer of charging information in the call resumption phase



Note1: The network has retained the call identity of the suspended call. If the network shall send charging information, the charging information must be available for the duration of the call retension timer.

Note2: Only applicable to the AOC-D supplementary service.

Figure 3: Transfer of charging information in the case of a call resume reject

12.8 User-to-User Signalling

No impact.

12.9 Calling Line Identification Presentation

No impact.

12.10 Calling Line Identification Restriction

No impact.

12.11 Connected Line Identification Presentation

No impact.

12.12 Connected Line Identification Restriction

No impact.

12.13 Closed User Group

No impact.

12.14 Call Waiting

No impact.

12.15 Direct Dialling In

No impact.

12.16 Freephone

No impact.

12.17 Malicious Call Identification

No impact.

12.18 Multiple Subscriber Number

No impact.

12.19 Subaddressing

No impact.

12.20 Completion of Calls to Busy Subscriber

No impact.

13 Parameter values (timers)

Applicable.

14 Dynamic description (SDLs)

SDL diagrams for the keypad procedures for the AOC supplementary service will not be provided.

Annex A (Informative)

Signalling flows

In the following signalling flows it is assumed that the network has knowledge about the charging rate or the charges applied to a particular call. This does not exclude the possibility for the network to collect this information from another point in the network. The signalling flows across the user-network interface will be the same for both cases.

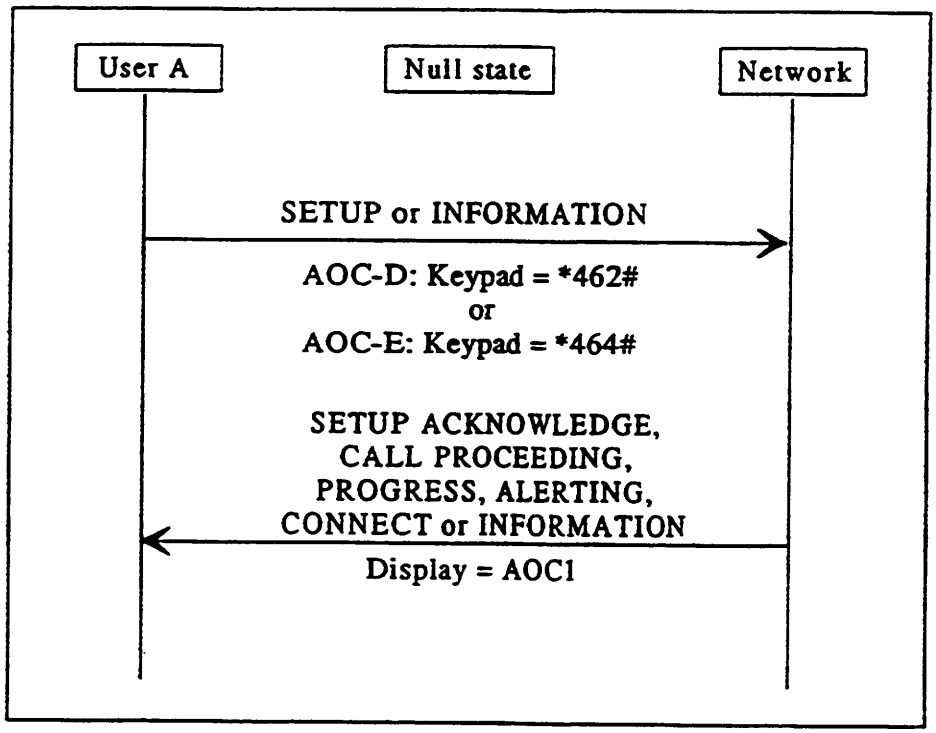


Figure A.1: Successful request procedure during call establishment

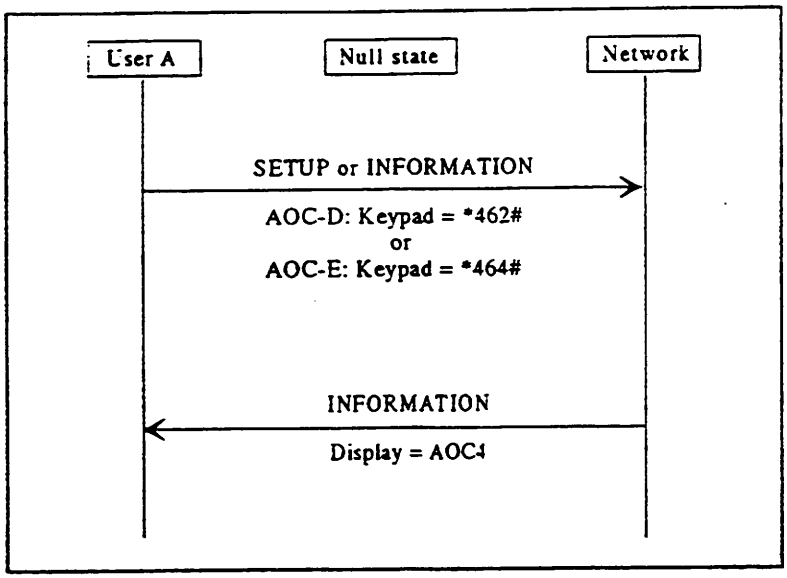


Figure A.2: Unsuccessful request procedure during call establishment according to subclause 9.1.2 a)

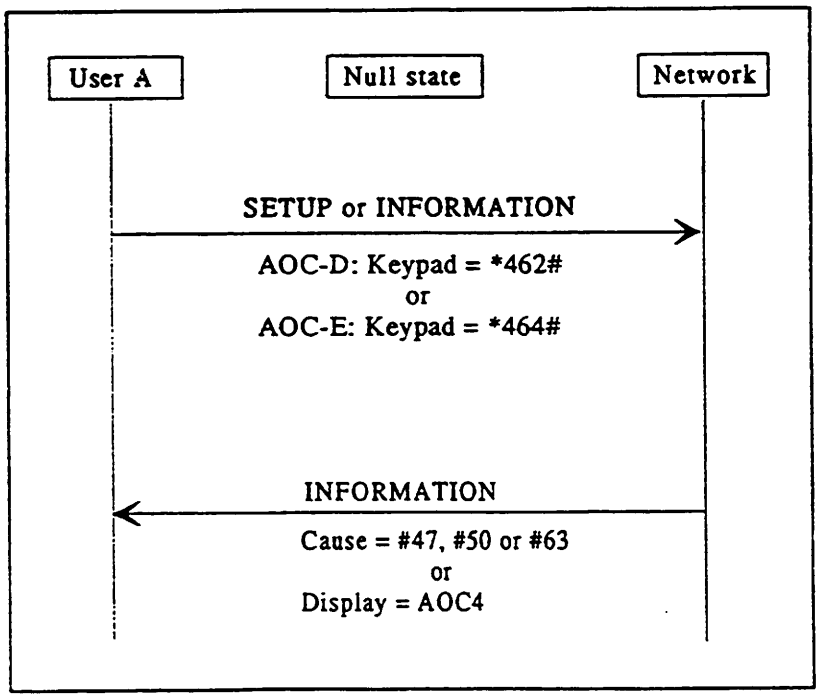


Figure A.3: Unsuccessful request procedure during call establishment according to subclause 9.1.2 b)

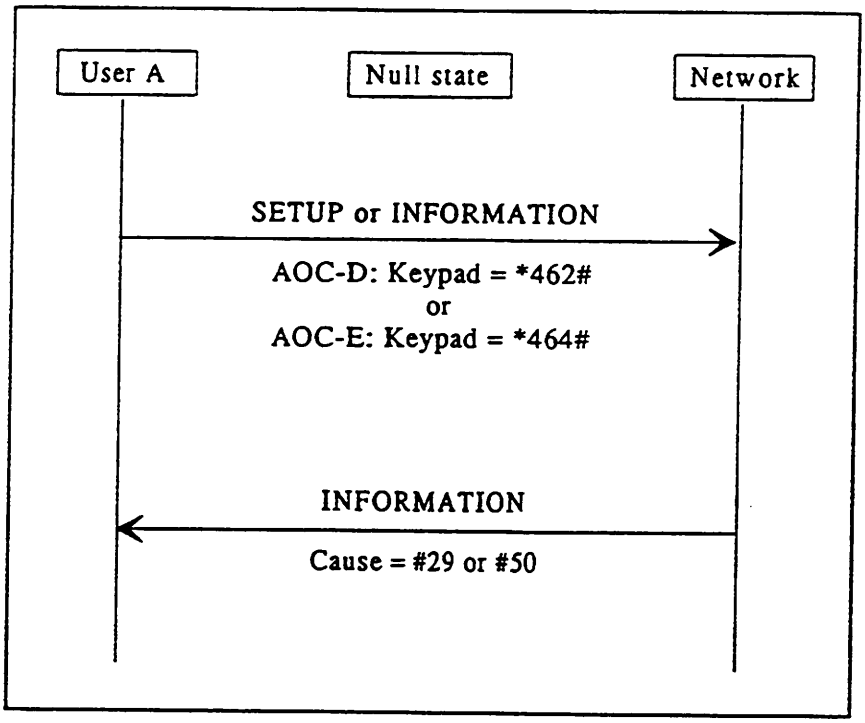


Figure A.4: Unsuccessful request procedure during call establishment according to subclause 9.1.2 c)

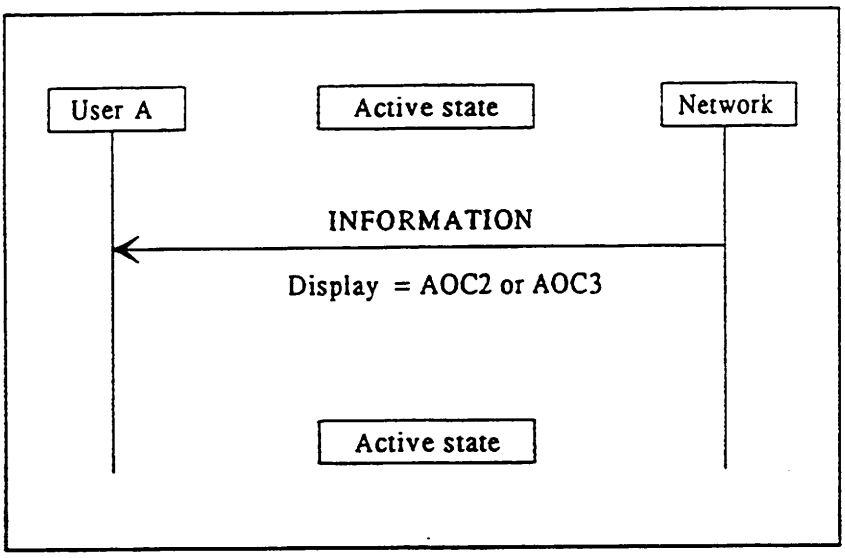


Figure A.5: Transfer of charging information during the Active state of a call

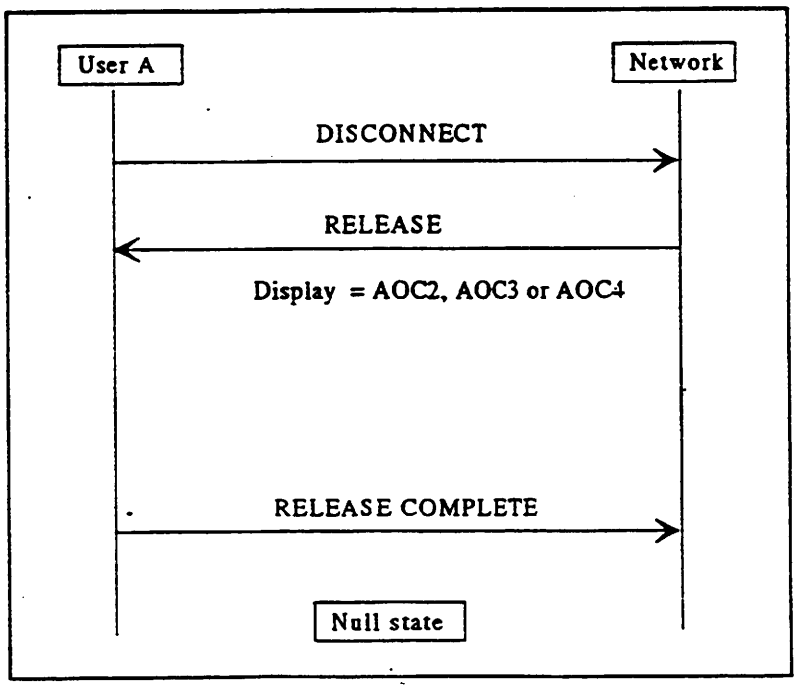


Figure A.6: Transfer of charging information during the call clearing phase, clearing initiated by the calling user

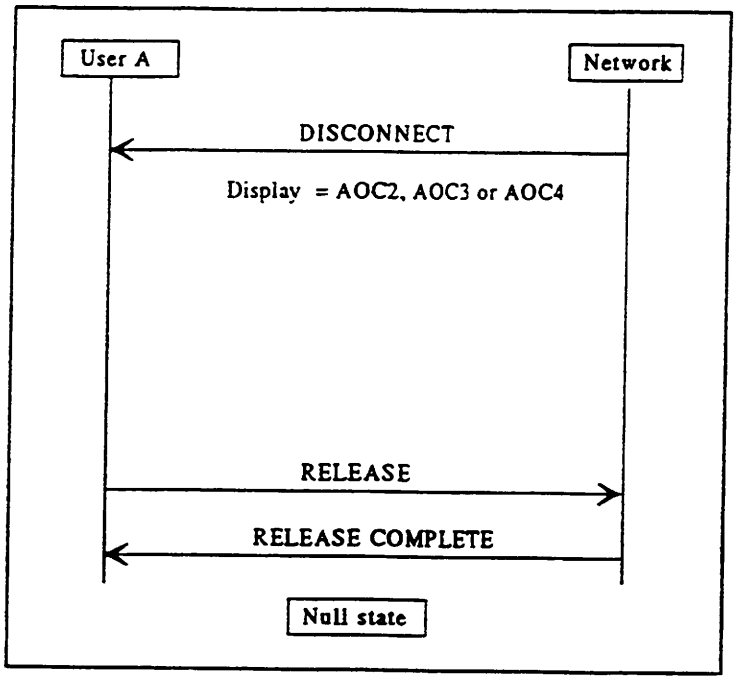


Figure A.7: Transfer of charging information during the call clearing phase, clearing initiated by the called user

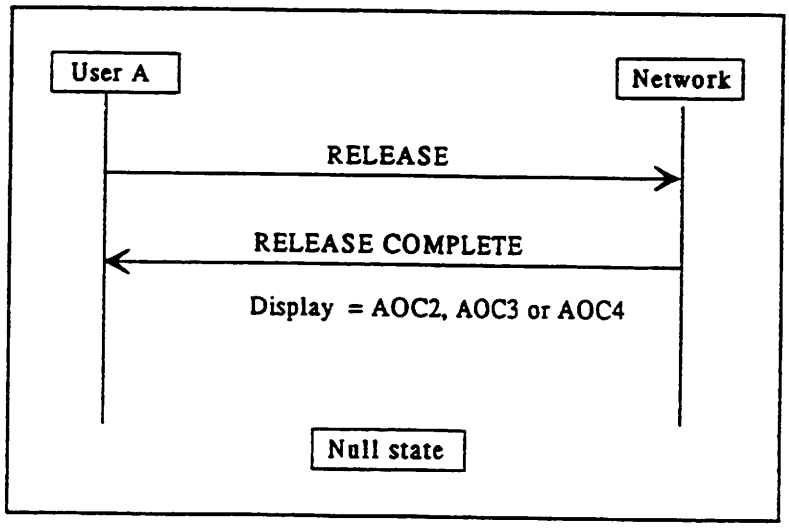


Figure A.8: Transfer of charging information in the case the network receives a RELEASE message as the first message in the release procedure

NORDTEL

NT/SIG-SPEC-3-B

NORDIC SPECIFICATION

APPLICATION DOCUMENT TO ETSI ETS 300 182 ADVICE OF CHARGE SUPPLEMENTARY SERVICE USING KEYPAD PROTOCOL

APPENDIX A

DISPLAY INFORMATION

ISSUE DATE: 94-07-01

APPENDIX A: DISPLAY INFORMATION

The specification of the display information in danish wording is given in figure A-1.

Display type	Content in display information element
Display AOC1	Samtalepris bestilt
Display AOC2	Pris: xx,yy kr.
Display AOC3	Gratis opkald
Display AOC4	Pris kan ikke oplyses

Figure A-1: Content of the display information in Danish.

TELE DANMARK

INAD-3 APPENDIX L5

Title:

The Line Hunting supplementary service.

Contents:

This appendix is a specification of the stage 3 of the Line Hunting supplementary service using keypad procedures.

The stage 1 requirements are given in DE/NA-10003 completed by the application specification in Appendix C.

TELE DANMARK

COMMITTEE FOR SPECIFICATION AND STANDARDISATION (SSU)

TECHNICAL SPECIFICATION

TDK-TS 900 223

October 1996

Source:

Reference: None

UDC: 621.395

Key word:

Integrated Services Digital Network (ISDN)
Line Hunting (LH) supplementary service
User-network interface, keypad facility protocol specification

SSU

Committee for specification and standardisation

Tele Danmark A/S

Blank page

Contents

Tele Danmark foreword

The following sections give the requirements for the implementation of the line hunting supplementary service using the keypad protocol for ISDN services in the Danish network. The requirements stated here are the requirements to the network side of the user-network interface.

This specification is a document where the keypad protocol is applied instead of the functional protocol, and specify the keypad protocol used in the Danish network. The generic keypad protocol which is applied in this specification is defined in NT/SIG-SPEC-2-1 (1).

Tones and/or announcements in connection with the line hunting supplementary service are provided according to appendix A.

Blank page

1 Scope

This specification describes the stage three of the Line Hunting (LH) supplementary service using the keypad protocol as provided by Tele Danmark at the T reference point or the coincident S and T reference point (as defined in CCITT Recommendation I.411 (3)) by means of the Digital Subscriber Signalling System No. one (DSS1). Stage three identifies the protocol procedures and switching functions needed to support a telecommunications service (see CCITT Recommendation I.130 (4)).

This stage three makes use of the generic keypad protocol defined in NT/SIG-SPEC-2-1 (1) which is an application specification to ETS 300 122.

This stage three is based on the service requirements specified in ETSI DE/NA-10003 (2). If any service requirement cannot be fulfilled due to the reduced functionality of the keypad protocol, it is explicitly indicated in the text.

This specifications does not specify the additional protocol requirements where the service is provided to the user via a telecommunications network that is not an ISDN.

The LH supplementary service enables calls to a single ISDN number to be offered to a free basic access in a group of basic accesses to which terminals are connected.

The LH supplementary service is applicable to all circuit-mode basic telecommunications services.

2 (Normative) references

(1) Nordic Specification NT/SIG-SPEC-2-1, dated 92-06-01 "Generic keypad protocol for the support of supplementary services".

(2) draftETS DE/NA - 10003 Version 8, dated 1995 "Line Hunting (LH) supplementary service, Service Description"

(3) CCITT Recommendation I.411 (1988): "ISDN user-network interfaces - Reference configurations".

(4) CCITT Recommendation I.130 (1988): "Method for characterisation of telecommunication services supported by an ISDN and network capabilities of an ISDN".

(5) ETS 300 403-1 (1994): "Integrated Services Digital Network (ISDN); User-network interface layer 3; Specifications for basic call control; Part 1: Protocol specification".

(6) ETS 300 403-2 (1994): "Integrated Services Digital Network (ISDN); User-network interface layer 3; Specifications for basic call control; Part 1: Protocol specification".

(7) CCITT Recommendation I.221 (1988): "Common specific characteristics of services".

(8) CCITT Recommendation E.164 (1991): "Numbering plan for the ISDN era".

(9) CCITT Recommendation I.210 (1988): "Principles of telecommunication services supported by an ISDN and the means to describe them".

(10) CCITT Recommendation I.112 (1988): "Vocabulary of terms for ISDNs".

(11) CCITT Recommendation Q.9 (1988): "Vocabulary of switching and signalling terms".

(12) ETSI ETS 300 092 (1992): "Integrated Services Digital Network (ISDN); Calling Line Identification Presentation (CLIP) supplementary service. Digital Subscriber Signalling System No. one (DSS1) protocol."

(13) ETSI ETS 300 207-1 (1994): "Integrated Services Digital Network (ISDN); Diversion supplementary service. Digital Subscriber Signalling System No. one (DSS1) protocol."

(14) Nordic Specification NT/SIG-SPEC-3-A, dated 94-09-01: "Diversion supplementary service using keypad protocol".

(15) Tele Denmark specification TDK-TS 900 222 (1995): "Integrated Services Digital Network (ISDN); Outgoing Call Barring User Controlled (OCB-UC) supplementary service. User-network interface, keypad facility protocol specification".

3 Definitions

For the purposes of this specification, the following definitions apply:

Busy: see CCITT Recommendation I.221 (7), § 3.

Call: see CCITT Recommendation Q.9 (11), § 2.2, definition 2201.

Cyclic hunting: the selection of a free basic access always starts at the next basic access after the one used last, and follows a fixed order. When the last basic access in the hunt group is reached, the searching continues from the beginning of the group until all basic accesses in the hunt group have been searched or a free access is found.

Default number: one of the hunt group numbers or an individual number associated with a basic access. The default number is used to identify the user in the case of an outgoing call when the calling party number is not provided by the calling user.

Destination network: the network at the served user.

Free basic access: a basic access to which the call can be offered without exceeding the number of used B-channels specified for this basic access and this hunt group.

Hunt group number: the ISDN number to which the LH supplementary services is allocated.

Hunt group withdrawal: a request by a basic access of the hunt group in order to temporarily prevent this access from receiving calls to the hunt group (existing call are not affected).

Hunt group: a number of basic accesses over which the LH supplementary service applies for the assigned ISDN number.

Integrated Services Digital Network (ISDN): see CCITT Recommendation I.112 (10), par. 2.3, definition 308.

ISDN number: a number conforming to the numbering plan and structure specified in CCITT Recommendation E.164 (8).

Network determined user busy: see ITU-T Recommendation I.221 (7), § 2.1.4.

Network; Public network: the DSS1 protocol entity at the network side of the user-network interface.

Private network: the DSS1 protocol entity at the user side of the user-network interface at the T reference point.

Sequential hunting: the selection of a free basic access always starts with the same basic access and then follows a fixed order until all basic accesses in the hunt group have been searched or a free access is found.

Served user: the user to whom the LH supplementary service is provided.

Service; Telecommunication service: see CCITT Recommendation I.112 (10), par. 2.2, definition 201.

Speech type connection: A connection type where the bearer capability indicates "speech", "3.1 kHz Audio" or "UDI-TA".

Supplementary service: see CCITT Recommendation I.210 (9), par. 2.4.

Uniform hunting: the basic access that has not been used for the longest time for an incoming call via the hunt group number is selected.

User: the DSS1 protocol entity at the user side of the user-network interface.

4 Symbols and abbreviations

DSS1	Digital Subscriber Signalling System No. one
ISDN	Integrated Services Digital Network
LH	Line Hunting
TOA	Tones and/or announcement
UDI-TA	Unrestricted digital information with tones and announcement

5 Description

The LH supplementary service shall be available to users who are connected to the network via a basic access.

The LH supplementary service enables calls to an ISDN number (i.e. the hunt group number) to be offered to a free basic access in a hunt group. All basic accesses within one hunt group must be connected to the same exchange.

NOTE: The individual accesses that are members of the hunt group can also have individual numbers (e.g. multiple subscriber numbers) allocated.

The LH supplementary service is intended for use on basic accesses to which terminals are connected at the coincident S and T reference point.

It is the user's responsibility to ensure compatibility of the equipment connected to accesses in a hunt group.

A basic access can be member of more than one hunt group. The maximum number of hunt groups of which one basic access can be member, shall be 5.

If more than one ISDN number is associated with a basic access (i.e. the basic access is member of more than one hunt group or has an individual number) then one of the numbers shall be assigned as the default number. The default number shall be used as calling party number in connection with an outgoing call as specified in ETS 300 092 (12), subclauses 9.3.1 and 9.4.1, and in connection with interaction with other supplementary services as specified in Clause 8.

The method of selecting a free basic access shall be either sequential hunting, uniform hunting or cyclic hunting, based on a subscription option which applies for the whole hunt group. When a basic access is selected, the network shall select the less significant free B-channel (i.e. B1 shall be selected before B2).

The served user can determine, at subscription for each basic access, how many B-channels shall be available for the hunt group. A call to the hunt group shall only be presented to the basic access, if the number of B-channels used for this basic access does not exceed the specified value.

As a subscription option, the served user can receive an indication that the served user's access is currently withdrawn from one or more hunt groups. This indication shall be provided when the served user originates a call on the access which is withdrawn from a hunt group.

Services can be subscribed to on the hunt group identified by the hunt group number. Some supplementary services on the hunt group number which need special authorisation can only be activated and deactivated from a basic access which is a member of the hunt group and on which "activation allowance" is subscribed to. These supplementary services are listed in Clause 12.

A basic access in a hunt group can activate "hunt group withdrawal" to be temporarily prevented from receiving calls to the hunt group, if this option is subscribed to.

6 Operational requirements

6.1 Provision and withdrawal

The LH supplementary service shall be provided after prior arrangement with the service provider. To establish the hunt group, a list of the accesses has to be provided to identify the members of the hunt group.

The LH supplementary service shall be offered with a number of subscription options. The subscription options applying to the whole hunt group is shown in table 1. The subscription options applying to each access in a hunt group are summarised in table 2.

Table 1: Subscription option applying for the whole hunt group

Subscription option	Values
Selection method	- sequential hunting - uniform hunting - cyclic hunting

Table 2: Subscription option applying for each access in a hunt group

Subscription option	Values
Number of channel available for the hunt group	value (0, 1, 2)
Activation allowance (for supplementary services related to the hunt group)	- yes - no
Hunt group withdrawal	- available - not available
User receives notification that the basic access is currently withdrawn from one or more hunt groups	- yes - no

The LH supplementary service shall be withdrawn by the service provider upon request of the subscriber or for service provider reasons after prior arrangement with the served user.

6.2 Requirements on the originating network side

No specific requirement related to the LH supplementary service.

6.3 Requirements on the destination network side

The destination network shall be able to select a free access at the user's group of accesses.

7 Coding requirements

7.1 Coding of the Keypad facility information element

Tables 3 and 4 provide the coding of the keypad information to support the LH supplementary service, in accordance with NT/SIG-SPEC-2-1 (1).

In the tables, square brackets ("[" and "]") are used to indicate that the parameter(s) enclosed by the brackets are optional.

7.1.1 Coding requirement for activation of "hunt group withdrawal"

Table 3: Coding requirements for LH activate withdrawal procedure

LH activation withdrawal request ::=
*LH service code[*hunt group number]#
LH service code = 47
Hunt group number = the ISDN number of the hunt group (the value "0" means "all hunt groups")
NOTE: The hunt group number shall be included if the user is member of more than one line hunt group, otherwise it is optional.

7.1.2 Coding requirement for deactivation of "hunt group withdrawal"

Table 4: Coding requirements for LH deactivate withdrawal procedure

LH deactivation withdrawal request ::=
#LH service code[*hunt group number]#
LH service code = 47
Hunt group number = the ISDN number of the hunt group (the value "0" means "all hunt groups")
NOTE: The hunt group number shall be included if the user is member of more than one line hunt group, otherwise it is optional.

7.1.3 Coding requirement for interrogation

Table 5: Coding requirements for LH interrogation procedure

LH interrogate request ::=
*#LH service code[*hunt group number]#
LH service code = 47
Hunt group number = the ISDN number of the hunt group
NOTE: The hunt group number shall be included if the user is member of more than one line hunt group, otherwise it is optional.

7.2 Coding of the Display information element

The semantics of the display information in relation to the LH supplementary service are specified in table 6.

The Display information element will contain LH supplementary service related information coded in IA5 characters constituting a national text according to appendix A.

Table 6: The semantics of the display information for the LH supplementary service.

Display LH1:	"access withdrawal accepted"
Display LH2:	"cancel of access withdrawal accepted"
Display LH3:	"access withdrawn"
Display LH4:	"access in operation"
Display LH5:	"access withdrawn notification"

8 State definition

No additional states are defined.

9 Signalling procedures at the coincident S and T reference point

9.1 Registration, erasure, activation, deactivation and interrogation

Registration and erasure are not applicable.

The LH supplementary service shall be activated on provision and deactivated on withdrawal. However, if the subscription option "hunt group withdrawal" is set to "available", the served user may activate/deactivate "hunt group withdrawal".

9.1.1 Activation of "hunt group withdrawal"

9.1.1.1 Normal operation

In order to withdraw a basic access from a hunt group, the served user shall send a SETUP message and possibly one or more INFORMATION messages containing one or more Keypad facility information element(s) using en-bloc or overlap procedures according to NT/SIG-SPEC-2-1 (1). The Keypad facility

information element(s) shall contain the LH withdrawal activation request, using the coding shown in table 3. The LH withdrawal activation request shall be sent on the access to be withdrawn from the hunt group.

Provided the subscription option "hunt group withdrawal" is set to "available" for this access then, after the network has returned either a SETUP ACKNOWLEDGE or a CALL PROCEEDING message, the network shall send a DISCONNECT message with a cause #31 "normal, unspecified" and a Display information element containing Display LH1 "access withdrawal accepted" indicating that the access has been withdrawn from the hunt group. If the Bearer capability information element in the SETUP message indicates a speech type connection, in-band information TOA1 shall be sent.

If the served user sends an LH withdrawal activation request and the access is already withdrawn, the network shall give a positive response as specified above.

After acceptance of the LH withdrawal activation request for a basic access, the network shall not present incoming calls to that access. Call already existing at the access on activation time shall not be affected.

9.1.1.2 Exceptional procedures

If the served user attempts to withdraw a basic access from a hunt group and the subscription option "hunt group withdrawal" is set to "not available" for this access, the network shall respond with a DISCONNECT message indicating cause #50 "requested facility not subscribed".

If the served user attempts to withdraw a basic access from a hunt group and the provided hunt group number does not exist for that access, the network shall respond with a DISCONNECT message indicating cause #29 "facility rejected ".

If the served user attempts to withdraw a basic access from a hunt group without providing a hunt group number although the user is a member of more than one hunt group, the network shall respond with a DISCONNECT message indicating cause #29 "facility rejected ".

For the cases above, if the Bearer capability information element in the SETUP message indicates a speech type connection, an in-band information TOA3 shall be sent to the served user.

9.1.2 Deactivation of "hunt group withdrawal"

9.1.2.1 Normal operation

In order to cancel the withdrawal of a basic access from a hunt group (i.e. include the access in a hunt group again), the served user shall send a SETUP message and possibly one or more INFORMATION messages containing one or more Keypad facility information element(s) using en-bloc or overlap procedures according to NT/SIG-SPEC-2-1 (1). The Keypad facility information element(s) shall contain the LH withdrawal deactivation request, using the coding shown in table 4. The LH withdrawal deactivation request shall be sent on the access to be put in operation.

Provided the subscription option "hunt group withdrawal" is set to "available" for this access then, after the network has returned either a SETUP ACKNOWLEDGE or a CALL PROCEEDING message, the network shall send a DISCONNECT message with a cause #31 "normal, unspecified" and a Display information element containing Display LH2 "cancel of access withdrawal accepted" indicating that the access is included in the hunt group. If the Bearer capability information element in the SETUP message indicates a speech type connection, in-band information TOA1 shall be sent.

If the served user sends an LH withdrawal deactivation request and the access is already in operation, the network shall give a positive response as specified above. After acceptance of the LH withdrawal deactivation request for a basic access, the network shall present incoming calls to that access, if appropriate.

9.1.2.2 Exceptional procedures

If the served user attempts to include a basic access in a hunt group and the subscription option "hunt group withdrawal" is set to "not available" for this access, the network shall respond with a DISCONNECT message indicating cause #50 "requested facility not subscribed".

If the served user attempts to include a basic access in a hunt group and the provided hunt group number does not exist for that access, the network shall respond with a DISCONNECT message indicating cause #29 "facility rejected ".

If the served user attempts to include a basic access in a hunt group without providing a hunt group number although the user is a member of more than one hunt group, the network shall respond with a DISCONNECT message indicating cause #29 "facility rejected ".

For the cases above, if the Bearer capability information element in the SETUP message indicates a speech type connection, an in-band information TOA3 shall be sent to the served user.

9.1.3 Interrogation

9.1.3.1 Normal operation

NOTE: The general interrogation procedure specified in stage 1 is not supported by the keypad protocol specified in this document.

In order to interrogate the status of an basic access, the served user shall send a SETUP message and possibly one or more INFORMATION messages containing one or more Keypad facility information element(s) using en-bloc or overlap procedures according to NT/SIG-SPEC-2-1 (1). The Keypad facility information element(s) shall contain the LH interrogate request, using the coding shown in table 5. The LH interrogation request shall be sent on the access to be interrogated.

After the network has returned either a SETUP ACKNOWLEDGE or a CALL PROCEEDING message, the network shall send a DISCONNECT message with a cause #31 "normal, unspecified" and a Display information element. The content of the Display information element depends on the interrogation result as follows:

- if the basic access is withdrawn from the hunt group, the Display information element shall contain Display LH3 "access withdrawn". If the Bearer capability information element in the SETUP message indicates a speech type connection, in-band information TOA1 shall be sent; or

- if the basic access is in operation for the hunt group, the Display information element shall contain Display LH4 "access in operation". If the Bearer capability information element in the SETUP message indicates a speech type connection, in-band information TOA2 shall be sent.

9.1.3.2 Exceptional procedures

If the served user attempts to interrogate a basic access in a hunt group and the provided hunt group number does not exist for that access, the network shall respond with a DISCONNECT message indicating cause #29 "facility rejected ".

If the served user attempts to interrogate a basic access in a hunt group without providing a hunt group number although the user is a member of more than one hunt group, the network shall respond with a DISCONNECT message indicating cause #29 "facility rejected ".

For the cases above, if the Bearer capability information element in the SETUP message indicates a speech type connection, an in-band information TOA3 shall be sent to the served user.

9.2 Invocation and operation

9.2.1 Normal operation

The LH supplementary service shall be invoked automatically by the network on incoming calls to a hunt group number. A free access in the hunt group shall be selected according to the selection method subscribed to according to table 1, and taking into acount the value of the subscription option "number of channel available for the hunt group".

Once a basic access is selected, the network shall offer the incoming call according to subclause 5.2 of ETS 300 403-1 (5). The network shall include the called party number in a Called party number information element contained in the SETUP message sent to the called user.

The served user's ability to originate calls shall be unaffected by the LH supplementary service.

9.2.2 Exceptional procedures

If no free access is available or if all accesses have been withdrawn from the hunt group, the network shall consider this as network determined user busy and clear the call towards the calling user according to the procedures of ETS 300 403-1 (5).

9.3 Access status notification procedure

9.3.1 Normal operation

If the subscription option "user receives notification that the basic access is currently withdrawn from one or more hunt groups" is set to "yes", and a basic access is withdrawn then the user shall be informed that the access is withdrawn when making an outgoing call using that basic access. In this case, the network shall include in the first response to the SETUP message a Display information element containing Display LH5 "access withdrawn notification".

If the subscription option "user receives notification that the basic access is currently withdrawn from one or more hunt groups" is set to "no", no indication shall be given to the user.

9.3.2 Exceptional procedures

Not applicable.

10 Procedures for interworking with private ISDNs

The LH supplementary service is not applicable to private networks.

11 Interworking with other networks

The LH supplementary service can be invoked on calls which originate in non-ISDNs.

12 Interaction with other supplementary services

Supplementary services can be subscribed to on the hunt group identified by the hunt group number.

The following supplementary services on the hunt group number which need special authorisation can only be activated and deactivated from a basic access which is member of the hunt group and on which the subscription option "activation allowance" is set to "yes":

- Call forwarding unconditional supplementary service
- Call forwarding busy supplementary service
- Call forwarding on no reply supplementary service
- Outgoing call barring - user controlled supplementary service

If the user tries to activate or deactivate one of these services from a basic access and the subscription option "activation allowance" is set to "no" for that basic access, then the activation/deactivation request shall be rejected as described in the subclauses below.

For incoming calls to the hunt group number, any supplementary services provided to a basic access related individual ISDN number shall not be considered.

When the user on an basic access of the hunt group originates a call, then only the supplementary services provided to the calling party number given by that user shall apply. If no calling party number is given by that user or if he gives an invalid calling party number then the supplementary services provided to the default number of that access shall apply (see Clause 5 regarding assignment of default number).

In order to activate, deactivate or interrogate supplementary services allocated to a hunt group number, this number shall be indicated as the served user's number. If the served user's number is invalid or missing, the request shall be rejected as specified in the following subclauses.

NOTE: For interaction with supplementary services not listed below, no protocol impact is identified.

12.10 Diversion services

12.10.1 Call forwarding unconditional

If the served user requests activation, deactivation or interrogation of the CFU supplementary service and the subscription option activation allowance" is set to "no", the request shall be rejected as follows:

a) if the functional procedures of ETS 300 207-1 (13) is used, the rejection shall be according to subclause 9.1 of ETS 300 207 (13) indicating the error value "notAvailable"; or

b) if the keypad procedures of NT/SIG-SPEC-3-A (14) is used, the rejection shall be according to subclause 9.1 of NT/SIG-SPEC-3-A (14) indicating cause #29 "facility rejected".

12.10.2 Call forwarding busy

If the served user requests activation, deactivation or interrogation of the CFB supplementary service and the subscription option activation allowance" is set to "no", the request shall be rejected as follows:

a) if the functional procedures of ETS 300 207 (13) is used, the rejection shall be according to subclause 9.1 of ETS 300 207 (13) indicating the error value "notAvailable"; or

b) if the keypad procedures of NT/SIG-SPEC-3-A (14) is used, the rejection shall be according to subclause 9.1 of NT/SIG-SPEC-3-A (14) indicating cause #29 "facility rejected".

No indication shall be given to the served user in connection with the CFB supplementary service as part of the LH supplementary service keypad protocol.

12.10.3 Call forwarding on no reply

If the served user requests activation, deactivation or interrogation of the CFNR supplementary service and the subscription option activation allowance" is set to "no", the request shall be rejected as follows:

a) if the functional procedures of ETS 300 207 (13) is used, the rejection shall be according to subclause 9.1 of ETS 300 207 (13) indicating the error value "notAvailable"; or

b) if the keypad procedures of NT/SIG-SPEC-3-A (14) is used, the rejection shall be according to subclause 9.1 of NT/SIG-SPEC-3-A (14) indicating cause #29 "facility rejected".

No indication shall be given to the served user in connection with the CFNR supplementary service as part of the LH supplementary service keypad protocol.

12.21 Outgoing call barring

12.21.2 Outgoing call barring - user controlled

If the served user requests activation, deactivation or interrogation of the OCB-UC supplementary service and the subscription option activation allowance" is set to "no", the request shall be rejected according to subclause 9.1 of TDK-TS 900 222 (15) indicating cause #29 "facility rejected".

Annex A (Informative) Signalling flows

Not applicable.

Appendix A: Display information and tones and/or announcements

The specification of the display information in Danish wording is given in table A.1.

Furthermore, the specification of the tones and/or announcements is given in table A.2

Table A.1: Content of the Display information element

Display type	Content in the Display information element
Display LH1	Linie frakoblet
Display LH2	Linie tilkoblet
Display LH3	Linien er frakoblet
Display LH4	Linien er tilkoblet
Display LH5	Bemærk, linien er frakoblet

Table A.2: Tones

TOA type	Tone to be sent
TOA1	Dial tone
TOA2	Busy tone
TOA3	Special information tone

TELE DANMARK

INAD-3 APPENDIX L6

Title:

The User Controlled Outgoing Call Barring supplementary service.

Contents:

This appendix is a specification of the stage 3 of the User Controlled Outgoing Call Barring supplementary service using keypad procedures.

The stage 1 requirements are given in DE/NA-10022 completed by the application specification in Appendix C.

TELE DANMARK

COMMITTEE FOR SPECIFICATION AND STANDARDISATION (SSU)

TECHNICAL SPECIFICATION

TDK-TS 900 222

July 1996

Source:

Reference: None

UDC: 621.395

Key word:

Integrated Services Digital Network (ISDN)
Outgoing Call Barring User Controlled (OCB-UC) supplementary service
User-network interface, keypad facility protocol specification

SSU

Committee for specification and standardisation

Tele Danmark A/S

Blank page

Contents

Tele Danmark foreword

The following sections give the requirements for the implementation of the Outgoing Call Barring-User Controlled supplementary service using the keypad protocol for ISDN services in the Danish network. The requirements stated here are the requirements to the network side of the user-network interface.

This specification is a document where the keypad protocol is applied instead of the functional protocol, and specify the keypad protocol used in the Danish network. The generic keypad protocol which is applied in this specification is defined in NT/SIG-SPEC-2-1 (1).

Tones and/or announcements in connection with the Outgoing Call Barring-User Controlled supplementary service are provided according to appendix A.

Blank page

1 Scope

This specification describes the stage three of the Outgoing Call Barring-User Controlled (OCB-UC) supplementary service using the keypad protocol as provided by Tele Danmark at the T reference point or the coincident S and T reference point (as defined in CCITT Recommendation I.411 (3)) by means of the Digital Subscriber Signalling System No. one (DSS1). Stage three identifies the protocol procedures and switching functions needed to support a telecommunications service (see CCITT Recommendation I.130 (4)).

This stage three makes use of the generic keypad protocol defined in NT/SIG-SPEC-2-1 (1) which is an application specification to ETS 300 122.

This stage three is based on the service requirements specified in draftETS DE/NA-10022 (2). If any service requirement cannot be fulfilled due to the reduced functionality of the keypad protocol, it is explicitly indicated in the text.

This specifications does not specify the additional protocol requirements where the service is provided to the user via a telecommunications network that is not an ISDN.

The OCB-UC supplementary service enables calls belonging to certain types and/or categories to be rejected when they are originated by the served user. The served user's ability to receive incoming calls is unaffected by the OCB-UC supplementary service. The served user can select the barring program, activate and later deactivate it.

The OCB-UC supplementary service is applicable to all circuit-mode basic telecommunications services.

2 (Normative) references

(1) Nordic Specification NT/SIG-SPEC-2-1, dated 92-06-01 "Generic keypad protocol for the support of supplementary services".

(2) draftETS DE/NA - 10022 Version 2 rev 1, dated 10 march 1994 "Outgoing Call Barring-user controlled (OCB-UC), Service Description"

(3) CCITT Recommendation I.411 (1988): "ISDN user-network interfaces - Reference configurations".

(4) CCITT Recommendation I.130 (1988): "Method for characterisation of telecommunication services supported by an ISDN and network capabilities of an ISDN".

(5) ETS 300 403-1 (1994): "Integrated Services Digital Network (ISDN); User-network interface layer 3; Specifications for basic call control; Part 1: Protocol specification".

(6) CCITT Recommendation I.221 (1988): "Common specific characteristics of services".

(7) CCITT Recommendation E.164 (1991): "Numbering plan for the ISDN era".

(8) CCITT Recommendation I.210 (1988): "Principles of telecommunication services supported by an ISDN and the means to describe them".

(9) CCITT Recommendation I.112 (1988): "Vocabulary of terms for ISDNs".

(10) CCITT Recommendation Q.9 (1988): "Vocabulary of switching and signalling terms".

3 Definitions

For the purposes of this specification, the following definitions apply:

Activation (ACT): a parameter in the registration request indicating whether to activate the OCB-UC supplementary service or not.

Barring program (BP): a selection of type of calls or prefixes to which the calls can be barred.

Basic service: a bearer service or teleservice.

Busy: see CCITT Recommendation I.221 (6), par. 3.

Call: see CCITT Recommendation Q.9 (10), par. 2.2, definition 2201.

Integrated Services Digital Network (ISDN): see CCITT Recommendation I.112 (9), par. 2.3, definition 308.

ISDN number: a number conforming to the numbering plan and structure specified in CCITT Recommendation E.164 (7).

Network; Public network: the DSS1 protocol entity at the network side of the user-network interface.

Originating network: the network at the served user.

Personal Identification Number (PIN): combination of minimum 4 digits used when controlling the OCB-UC supplementary service.

Private network: the DSS1 protocol entity at the user side of the user-network interface at the T reference point.

Served user: the user to whom the OCB-UC supplementary service is provided.

Service; Telecommunication service: see CCITT Recommendation I.112 (9), par. 2.2, definition 201.

Speech type connection: A connection type where the bearer capability indicates "speech", "3.1 kHz Audio" or "UDI-TA".

Supplementary service: see CCITT Recommendation I.210 (8), par. 2.4.

User: the DSS1 protocol entity at the user side of the user-network interface.

4 Symbols and abbreviations

ACT	ACTivation
BP	Barring Program
DSS1	Digital Subscriber Signalling System No. one
ISDN	Integrated Services Digital Network
OCB-UC	Outgoing Call Barring: user controlled
PIN	Personal Identification Number
TOA	Tones and/or announcement
UDI-TA	Unrestricted digital information with tones and announcement

5 Description

The OCB-UC service shall be available to users who are connected to the network via a basic access or a primary rate access.

The OCB-UC supplementary service enables calls belonging to certain types and/or categories to be rejected when they are originated by the served user. The user's ability to receive incoming calls is unaffected by the OCB-UC supplementary service.

Outgoing calls from the served user's termination shall be barred according to the call barring program which is active at the served user's access or ISDN number.

The network shall support 30 different barring programs. The definition of each barring program will be according to the policy of call barring specified by Tele Danmark.

6 Operational requirements

6.1 Provision and withdrawal

The OCB-UC supplementary service shall be provided to subscribers by the service provider on a subscription basis, along with a PIN of 4 digits. The PIN is associated with the whole access, i.e. a PIN cannot be assigned per ISDN number.

The OCB-UC supplementary service can be withdrawn by the network provider at the subscriber's request or for administrative reasons.

The OCB-UC supplementary service shall be offered with the subscription options summarised in table 1. For each subscription option, only one value can be selected.

NOTE: The possibility to indicate "all ISDN numbers" in connection with activation and deactivation (as specified in DE/NA-10022, subclause 6.1) is not supported by the keypad protocol.

Table 1: Subscription options for OCB-UC supplementary service

Subscription options	Value
Applicability to served user number	The whole access
	Per ISDN number (MSN number)
Applicability to basic service	For all basic services
	For a list of basic services

6.2 Requirements on the originating network side

The procedures specified in ETS 300 403-1 (5) shall apply.

6.3 Requirements on the destination network side

The served user's ability to receive incoming calls shall be unaffected by the activation of the OCB-UC supplementary service.

7 Coding requirements

7.1 Coding of the Keypad facility information element

Tables 2 to 6 provide the coding of the keypad information to support the OCB-UC supplementary service, in accordance with NT/SIG-SPEC-2-1 (1).

In the tables, square brackets ("[" and "]") are used to indicate that the parameter(s) enclosed by the brackets are optional.

7.1.1 Registration and erasure procedure

In addition to the requirements in the stage 1 description the requirements mentioned below shall be fulfilled:

- the served user shall have the possibility to register for later activation a barring program of the OCB-UC supplementary service.

- The served user shall have the possibility to erase a registered barring program of the OCB-UC supplementary service.

Table 2 and 3 contain the coding requirements for the registration and procedure.

Table 2: OCB-UC registration procedure

OCB-UC registration request ::=
*OCB-UC service code*PIN*BP[* ACT]#
OCB-UC service code = 34
BP = 1 - 30
PIN = 4 digit
ACT = 0 (zero) or 1 NOTE
NOTE: ACT = 0 means registration without activation. ACT = 1 or the parameter ACT is omitted means registration with activation.

Table 3: OCB-UC erasure procedure

OCB-UC erasure request ::=
#OCB-UC service code*PIN*0#
OCB-UC service code = 34
PIN = 4 digits
0 (zero) = erasure

7.1.2 Activation procedure

Table 4 contains the coding requirements for the activation procedure.

Table 4: OCB-UC activation procedure

OCB-UC activation request ::=
*OCB-UC service code*PIN#
OCB-UC service code = 34
PIN = 4 digits

7.1.3 Deactivation procedure

Table 5 contains the coding requirements for the deactivation procedure.

Table 5: OCB-UC deactivation procedure

OCB-UC deactivation request ::=
#OCB-UC service code*PIN#
OCB-UC service code = 34
PIN = 4 digits

7.1.4 Interrogation procedure

Table 6 contains the coding requirements for the interrogation procedure.

Table 6: OCB-UC interrogation procedure

OCB-UC interrogation request ::=
*#OCB-UC service code#
OCB-UC service code = 34

7.2 Coding of the Display information element

The semantics of the display information in relation to the OCB-UC supplementary service are specified in table 7.

The Display information element will contain OCB-UC supplementary service related information coded in IA5 characters constituting a national text according to appendix A.

Table 7: The semantics of the display information for the OCB-UC supplementary service.

Display OCB-UC1:	"activation successful"
Display OCB-UC2:	"deactivation successful"
Display OCB-UC3:	"call is rejected due to OCB-UC"
Display OCB-UC4:	"OCB-UC activated for BP xx"
	(xx is the number of the barring program in question)
Display OCB-UC5:	"invalid BP or identified BP not subscribed to"
Display OCB-UC6:	"invalid PIN"
Display OCB-UC7:	"no BP active"
Display OCB-UC8:	"registration succesful"
Display OCB-UC9:	"registration with activation succesful"
Display OCB-UC10:	"erasure succesful"

8 State definitions

No additional states are defined.

9 Signalling procedures at the coincident S and T reference point

9.1 Registration, erasure, activation, deactivation and interrogation

In addition to the requirements in the stage 1 description the requirements mentioned below shall be fulfilled:

- the served user shall have the possibility to register for later activation a barring program of the OCB-UC supplementary service, and
- the served user shall have the possibility to erase a registered barring program of the OCB-UC supplementary service.

If a user requests registration, erasure, activation, deactivation or interrogation by using the keypad facility information element, then the network shall give the result of the request in a display information element and tones and/or announcement.

The basic service shall be derived from the Bearer capability information element and the High layer Compatibility information element, if present, in the SETUP message containing the OCB-UC activation request.

NOTE 1: This restriction implies that the stage 1 requirement on indication of "all basic services" in connection with activation/deactivation does not apply for the keypad protocol.

The ISDN number to which the registration, erasure, activation, deactivation or interrogation applies shall be derived from either the Calling party number information element, if present, or the default number of the access.

NOTE 2: This restriction implies that the stage 1 requirement on indication of "all ISDN numbers" in connection with activation/deactivation does not apply for the keypad protocol.

9.1.1 Registration

9.1.1.1 Normal operation

To register a barring program of the OCB-UC supplementary service, the user shall include in the SETUP or INFORMATION message a registration request in one or more Keypad facility information element(s) using èn bloc or overlap procedures according to NT/SIG-SPEC-2-1 (1). The Keypad facility information element shall contain the registration request, using the coding shown in table 2.

According to table 2 the user can request registration with or without activation.

In case, the served user does not want to activate the OCB-UC supplementary service an indication shall be send in the registration request.

If the user only has one barring program, the activation request need not to contain the identification of the barring program otherwise the barring program shall be identified.

If a user sends an registration request containing a barring program already registered, then the network shall react as specified below.

After the network has returned either a SETUP ACKNOWLEDGE or a CALL PROCEEDING message, the network shall react as follows:

a) If the registration request is without activation the network shall send a DISCONNECT message with a cause #31 "normal, unspecified" and a Display information element containing Display OCB-UC8 "registration successful" indicating that the registration has been accepted.

b) If the registration request is with activation the network shall send a DISCONNECT message with a cause #31 "normal, unspecified" and a Display information element containing Display OCB-UC9 "registration with activation successful" indicating that the registration and activation has been accepted.

If the Bearer capability information element in the SETUP message indicates a speech type connection, in-band information TOA1 shall be sent.

9.1.1.2 Exceptional procedures

If a user attempts to register the OCB-UC supplementary service without having subscribed to the service, the network shall respond with a DISCONNECT message indicating cause #50 "requested facility not subscribed".

If a user attempts to register the OCB-UC supplementary service indicating a wrong PIN, the network shall respond with a DISCONNECT message indicating cause #29 "facility rejected" and a Display information element containing Display OCB-UC6 "invalid PIN".

If a user attempts to register the OCB-UC supplementary indicating either a none-existent barring program or without having subscribed to the identified barring program, the network shall respond with a DISCONNECT message indicating cause #50 "requested facility not subscribed" and a Display information element containing Display OCB-UC5 "invalid BP or identified BP not subscribed to".

For the cases above, if the Bearer capability information element in the SETUP message indicates a speech type connection, an in-band information TOA2 shall be sent to the served user.

9.1.2 Activation

9.1.2.1 Normal operation

To activate the OCB-UC supplementary service, the user shall include in the SETUP or INFORMATION message an activation request in one or more Keypad facility information element(s) using èn bloc or

overlap procedures according to NT/SIG-SPEC-2-1 (1). The Keypad facility information element shall contain the activation request, using the coding shown in table 4.

After the network has returned either a SETUP ACKNOWLEDGE or a CALL PROCEEDING message, the network shall send a DISCONNECT message with a cause #31 "normal, unspecified" and a Display information element containing Display OCB-UC1 "activation successful" indicating that the activation has been accepted. If the Bearer capability information element in the SETUP message indicates a speech type connection, in-band information TOA1 shall be sent.

NOTE: The stage 1 requirement to inform all affected users on the served user's access shall not be supported by the keypad protocol.

If a user sends an activation request and the OCB-UC supplementary service is already activated, then the network shall send a positive response as specified above.

9.1.2.2 Exceptional procedures

If a user attempts to activate the OCB-UC supplementary service without having subscribed to the service, the network shall respond with a DISCONNECT message indicating cause #50 "requested facility not subscribed".

If a user attempts to activate the OCB-UC supplementary service indicating a wrong PIN, the network shall respond with a DISCONNECT message indicating cause #29 "facility rejected" and a Display information element containing Display OCB-UC6 "invalid PIN".

For the cases above, if the Bearer capability information element in the SETUP message indicates a speech type connection, an in-band information TOA2 shall be sent to the served user.

9.1.3 Deactivation

9.1.3.1 Normal operation

To deactivate the OCB-UC supplementary service, the user shall include in the SETUP or INFORMATION message a deactivation request in one or more Keypad facility information element(s) using èn bloc or overlap procedures according to NT/SIG-SPEC-2-1 (1). The Keypad facility information element shall contain the deactivation request, using the coding shown in table 5.

After the network has returned either a SETUP ACKNOWLEDGE or a CALL PROCEEDING message, the network shall send a DISCONNECT message with a cause #31 "normal, unspecified" and a Display information element containing Display OCB-UC2 "deactivation successful" indicating that the deactivation has been accepted. If the Bearer capability information element in the SETUP message indicates a speech type connection, in-band information TOA1 shall be sent to the served user.

NOTE: The stage 1 requirement to inform all affected users on the served user's access shall not be supported by the keypad protocol.

9.1.3.2 Exceptional procedures

If a user attempts to deactivate the OCB-UC supplementary service without having subscribed to the service, the network shall respond with a DISCONNECT message indicating cause #50 "requested facility not subscribed".

If a user attempts to deactivate the OCB-UC supplementary service indicating a wrong PIN, the network shall respond with a DISCONNECT message indicating cause #29 "facility rejected" and a Display information element containing Display OCB-UC6 "invalid PIN".

If a user attempts to deactivate the OCB-UC supplementary service without a barring program activated, the network shall respond with a DISCONNECT message indicating cause #29 "facility rejected".

For the cases above, if the Bearer capability information element in the SETUP message indicates a speech type connection, an in-band information TOA2 shall be sent to the served user.

9.1.4 Interrogation

9.1.4.1 Normal operation

To interrogate the OCB-UC supplementary service, the user shall include in the SETUP or INFORMATION message an interrogation request in one or more Keypad facility information element(s) using èn bloc or overlap procedures according to NT/SIG-SPEC-2-1 (1). The Keypad facility information element shall contain the interrogation request, using the coding shown in table 6.

After the network has returned a SETUP ACKNOWLEDGE message or a CALL PROCEEDING message, the network shall clear the call by sending a DISCONNECT message with cause #31 "normal, unspecified" and a Display information element. The content of the Display information element depends on the interrogation result as follows:

- if a BP of the OCB-UC is activated, the Display information element shall contain Display OCB-UC4 "OCB-UC activated for BP xx". If the Bearer capability information element in the SETUP message indicates a speech type connection, an in-band information TOA1 shall be sent to the served user; or

- if no BP of the OCB-UC is activated, the Display information element shall contain Display OCB-UC7 "no BP active". If the Bearer capability information element in the SETUP message indicates a speech type connection, an in-band information TOA3 shall be sent to the served user.

In case, the served user in the interrogation request has sent the calling party number in the Calling party number information element, the network shall respond as above to the indicated calling party number and the basic service as derived from the Bearer capability information element and, if indicated, the High layer compatibility information element.

In case, the served user in the interrogation request does not send the calling party number in the Calling party number information element, the network shall respond as above for the default number assigned to the access and the basic service as derived from the Bearer capability information element and, if indicated, the High layer compatibility information element.

9.1.4.2 Exceptional procedures

If a user attempts to interrogate the OCB-UC supplementary service without having subscribed to the service, the network shall respond with a DISCONNECT message indicating cause #50 "requested facility not subscribed".

If a user attempts to interrogate the OCB-UC supplementary service indicating a wrong PIN, the network shall respond with a DISCONNECT message indicating cause #29 "facility rejected" and a Display information element containing Display OCB-UC6 "invalid PIN".

If a user attempts to interrogate the OCB-UC supplementary service without a barring program registered, the network shall respond with a DISCONNECT message indicating cause #29 "facility rejected".

For the cases above, if the Bearer capability information element in the SETUP message indicates a speech type connection, an in-band information TOA2 shall be sent to the served user.

9.1.5 Erasure

9.1.5.1 Normal operation

To erase a registered BP of the OCB-UC supplementary service, the user shall include in the SETUP or INFORMATION message an erasure request in one or more Keypad facility information element(s) using èn bloc or overlap procedures according to NT/SIG-SPEC-2-1 (1). The Keypad facility information element shall contain the erasure request, using the coding shown in table 3.

After the network has returned a SETUP ACKNOWLEDGE message or a CALL PROCEEDING message, the network shall clear the call by sending a DISCONNECT message with cause #31 "normal, unspecified" and the Display information element containing Display OCB-UC10 "erasure successful".

For the cases above, if the Bearer capability information element in the SETUP message indicates a speech type connection, an in-band information TOA1 shall be sent to the served user.

9.1.5.2 Exceptional procedures

If a user attempts to erase a registered BP of the OCB-UC supplementary service without having subscribed to the service, the network shall respond with a DISCONNECT message indicating cause #50 "requested facility not subscribed".

If a user attempts to erase a registered BP of the OCB-UC supplementary service indicating a wrong PIN, the network shall respond with a DISCONNECT message indicating cause #29 "facility rejected" and a Display information element containing Display OCB-UC6 "invalid PIN".

If a user attempts to erase the OCB-UC supplementary service without a barring program registered, the network shall respond with a DISCONNECT message indicating cause #29 "facility rejected".

For the cases above, if the Bearer capability information element en the SETUP message indicates a speech type connection, an in-band information TOA2 shall be sent to the served user.

9.2 Invocation and operation

9.2.1 Normal operation

If the network receives a SETUP message from a user with OCB-UC supplementary service activated, the network shall check the content of the Called party number information element with respect to the applicable barring program.

If calls from the user to the requested destination are barred, then the network shall reject the call request by sending either a CALL PROCEEDING message followed by a DISCONNECT message with cause #21 "call rejected" and a display information OCB-UC3 "call is rejected due to OCB-UC" or a RELEASE COMPLETE message with cause #21 "call rejected" and a Display information OCB-UC3 "call is rejected due to OCB-UC".

If the Bearer capability information element in the SETUP message indicates a speech type connection, an in-band information TOA2 shall be sent to the served user.

If calls from the user to the requested destination are not barred, then the network shall proceed with call establishment according to basic call as specified in ETS 300 403-1 (5).

9.2.2 Exceptional procedures

Not applicable

9.3 Use of PIN

If the served user indicates a non-valid PIN, the network shall respond with a DISCONNECT message with cause #29 "facility rejected" and a Display information element containing Display OCB-UC6 "invalid PIN".

The served user shall have the possibility to make requests two times indicating a wrong PIN. If the third request contains a wrong PIN, the network shall disable the PIN, leave the OCB-UC supplementary service in the same state as before the request and restrict further access the OCB-UC supplementary service. The PIN shall be enabled either automatically after 24 hours or before 24 hours by administrative procedures.

NOTE: Further procedures regarding maintenance of the PIN (DE/NA-10022 (2), Annex A) is not supported by the keypad protocol specified in this document.

10 Procedures for interworking with private ISDNs

The procedures specified in clause 9 are applicable for interworking with private networks.

11 Interactions with other networks

The OCB-UC supplementary service restricts the user's ability to originate certain types of calls. If a call is not barred, then the procedures for basic call according to ETS 300 403-1 (5) shall apply.

12 Interactions with other supplementary services

No protocol interaction identified.

13 Parameter values (timers)

No additional timers are defined.

14 Dynamic description (SDL)

SDL diagrams for the keypad procedures for the OCB-UC supplementary service will not be provided.

Annex A (Informative) Signalling flows

Not applicable.

Appendix A: Display information and tones and/or announcements

The specification of the display information in Danish wording is given in table A.1.

Furthermore, the specification of the tones and/or announcements is given in table A.2

Table A.1: Content of the Display information element

Display type	Content in the Display information element
Display OCB-UC1	Spærring nr. xx aktiv NOTE
Display OCB-UC2	Spærring nr. xx fjernet NOTE
Display OCB-UC3	Opkald spærret
Display OCB-UC4	Spærring nr. xx aktiv NOTE
Display OCB-UC5	Spærring nr. xx ugyldig NOTE
Display OCB-UC6	Ugyldig personlig kode
Display OCB-UC7	Ingen spærring aktiv
Display OCB-UC8	Spærring nr. xx indlagt NOTE
Display OCB-UC9	Spærring nr. xx indlagt og aktiv NOTE
Display OCB-UC10	Spærring nr. xx slettet NOTE
NOTE: xx shall be the number of the BP in question	

Table A.2: Tones

TOA type	Tone to be sent
TOA1	Dial tone
TOA2	Special information tone
TOA3	Busy tone

TELE DANMARK

INAD-3 APPENDIX M

Title:

Guidance requirements to ISDN terminal manufacturers on the implementation of the Keypad facility protocol and the sending of DTMF for an ISDN terminal

Contents:

This appendix gives guidance on the implementation of the Keypad facility protocol and the sending of DTMF for an ISDN terminal

TELE DANMARK

COMMITTEE FOR SPECIFICATION AND STANDARDISATION (SSU)

TECHNICAL REPORT

TDK-TR 100 205

December 1996

Source: TDK, NUS

Reference: None

UDC: 621.395

Key word: ISDN, Keypad signalling

Guidance requirements to ISDN terminal manufacturers on the implementation of the Keypad facility protocol and the sending of DTMF for an ISDN terminal

SSU

Committee for specification and standardisation

Tele Danmark A/S

Blank page

Contents

Foreword

As a public operator, Tele Danmark (TDK) cannot put requirements on terminal equipment except those requirements that all terminals have to comply with for approval.

It is however strongly recommended that terminal manufacturers who provide ISDN terminals to TDK's market comply with the requirements stated in this Technical Report (TDK-TR). In other words, ISDN terminals not complying with the requirements in this report will not in all cases be able to operate services in TDK's public ISDN.

1 Scope

This TDK technical report (TDK-TR) addresses ISDN terminal manufacturers in order to give guidance on the requirements to the implementation of the keypad facility protocol and the handling of DTMF transmission in ISDN terminal equipment. The purpose is to ensure that ISDN terminals to be connected to TDK's ISDN are able to support nationally specified supplementary services and IN-based services using a stimulus mode of operation.

The ISDN concept is based on intelligent terminals that are able to support the ETSI specified functional protocol in order to control ISDN supplementary services. There is however an increasing need for ISDN terminals and especially telephone terminals to support the keypad facility protocol and, in addition, be able to transmit DTMF in-band information.

The support of the keypad facility protocol makes an ISDN terminal able to control supplementary services in a stimulus way, i.e. without having explicit knowledge of the individual supplementary services. TDK's ISDN already includes such supplementary services and more services are planned. In addition, the keypad facility protocol is foreseen to be a stimulus based communication means between ISDN terminals and the IN platform in order to support IN-based services when they appear, i. e. it is not necessary to wait for the updating of terminals with service specific functionality. It should be noted that ETSI is currently studying this approach.

Regarding the transmission of in-band DTMF this is basically needed for end-to-end communication with different types of service providers. But in the short term, DTMF will also be necessary in order to communicate with a number of IN services. The use of in-band DTMF is only applicable in connection with speech oriented services.

2 Normative references

[1] ETSI ETS 300 122 (1992): "Integrated Services Digital Network (ISDN); Generic keypad facility protocol for the support of supplementary services; Digital Subscriber Signalling No. one (DSS1) protocol".

[2] INAD version 2: "ISDN Network Access Description".

NOTE: Regarding the requirements on the generic keypad facility protocol, the forthcoming INAD version 3 will remain unchanged.

[3] ETSI ETS 300 403-1 (1995): "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 1: Protocol specification".

[4] ETSI ETS 300 001 (1992): "Attachments to Public Switched Telephone Network (PSTN); General technical requirements for equipment connected to an analougue subscriber interface in the PSTN (candidate NET4)".

3 Definitions

For the purpose of the specification the following definitions apply:

Announcement: a verbal announcement sent to a user.

Human user: human-user operating a terminal or a synonym for an application in a terminal.

Keypad facility protocol: a protocol for the control of supplementary services in a stimulus way i.e. by making use of the digits 0..9 and the characters * and #.

Keypad facility information: keypad information used for the control of network services e.g. supplementary services by means of the keypad facility protocol.

Keypad information: in the context of this document, keypad information is digits (0..9) and the characters * and # sent to the network by means of the keypad facility protocol, as called party number information or as in-band DTMF.

Network: the DSS1 protocol entity at the network side of the user-network interface.

Terminal: in the context of this document, a terminal may be a TE1, TA or an ISPBX connected to the public ISDN.

User: the DSS1 protocol entity at the user side of the user-network interface when a coincident S and T reference point applies.

User A: the user originating a call.

User B: the user receiving a call.

4 Symbols and abbreviations

DTMF	Dual Tone Multi-Frequency
ETSI	European Telecommunication Standardisation Institute
IN	Intelligent Network
ISDN	Integrated Services Digital Network
ISPBX	ISdn Private Branch eXchange
PSTN	Public Switched Telephone Network
TE1	Terminal Equipment type 1
TA	Terminal Adapter

5 Description

5.1 The keypad facility protocol

The keypad facility protocol is a so-called stimulus protocol with the basic characteristics as described in the following.

The keypad facility protocol supports a user's control of network services in a manner equal to or very similar to the mechanism used by users connected to the PSTN. By means of the keypad facility protocol, ISDN supplementary services and IN-based services can be controlled by the human user from an ISDN terminal which has no knowledge what so ever of the specific service.

In the user-network direction, the ISDN terminal simply reflects the human user's operation of the keypad in the sense that the digits 0..9 and the characters * and # can be sent to the network. Alternatively, the keypad information may be sent by an application not involving any human user. The keypad facility information is always sent in the Keypad facility information element contained in a SETUP message and/or one or more INFORMATION messages. The keypad facility information can be sent by the calling user or the called user.

In the network-user direction, two alternatives exist to inform the user. The network can include display information in the Display information element contained in a call control message (including INFORMATION messages) or, in connection with a speech oriented call, the network can send in-band tones and/or announcements.

The generic keypad facility protocol is specified by ETSI in ETS 300 122 [1] and this standard is further clarified on a national basis in appendix I of INAD [2].

NOTE: It should be noted that ETSI only specifies the overall procedures i.e. no specification is given for the individual supplementary services. These are specified in additional national specifications.

5.2 DTMF

The use of in-band DTMF is basically not an ISDN-like signalling mechanism. It is, however, foreseen that DTMF will be a valid requirement for telephony terminals, mainly to communicate end-to-end with different services such as bank-services, but also in the short term as a communication mechanism with IN based services.

6 Requirements on the keypad facility protocol

6.1 Sending of keypad information

This subsection deals with the requirements to the user on sending of keypad information to the network in the different call states at the user side. Both procedures for the control of supplementary services not related to the establishment of an end-to-end connection and for the control of supplementary services related to the establishment of an end-to-end connection are specified.

6.1.1 Procedures at the originating side

6.1.1.1 Sending of keypad information in the call request phase

In this context, the call request phase includes up to the receiving of the CALL PROCEEDING message, i. e. the Null call state (U0), the Call initiate call state (U1) and the Overlap sending call state (U2), see figures A.1, A.2 and A.3.

In the call request phase user A may provide keypad facility information to the network to control a supplementary service without requesting call at the same time (e.g. activation of call forwarding) or to control a supplementary service along with the request of an end-to-end call (e.g. a closed user group call).

In the first example, the human user will typically provide the sequence:

*21*C-no#

and in the second example the sequence:

*01*CUG-index#B-no

According to ETS 300 122, user A shall always include the keypad facility information in the Keypad facility information element and the called party number information in the Called party number information element. This implies that in the first example above, all the keypad information shall be provided in the Keypad facility information element, while in the second example, the keypad information up to and include the # shall be provided in the Keypad facility information element and B-no in the Called party number information element.

As it is not relevant to let the human user decide which type of information to go into which information element, user A (terminal) shall implement a simple algorithm which automatically places the keypad facility information in the Keypad facility information element and the called party number information in the Called party number information element. This algorithm is based on the fact that keypad facility information is a string of characters (digit, *, #) starting with a * or # and terminated by a # and that this keypad facility information is always preceding a possibly called party number. Consequently, keypad information in the call request phase shall be sent according to the following rules (see figure A.1 for clarification):

1) if the first character received from the human user is digit (0..9), this digit and subsequent characters (digit, *, #) shall be included in the Called party number information element sent to the network;

2) if the first character received from the human user is a * or a #, this character shall be included in the Keypad facility information element sent to the network, and the subsequent characters (digit, *, #) received from the human user shall be handle as follows:

   a) the second character (digit, *, #) shall be included in the Keypad facility information element;

   b) the third and subsequent characters (digit, *, #) shall be included in the Keypad facility information element;

   c) a # character received as the third or subsequent character shall be included in the Keypad facility information element. In addition, the sending of keypad facility information shall be terminated implying that any character (digit, *, #) received after this # shall be included in the Called party number information element.

The above procedure can be performed as overlap sending or as en-bloc sending. Figures A.1 and A.2 give examples of overlap sending while figure A.3 shows en-bloc sending.

NOTE 1: The above procedure implies that further validation of the keypad facility information is performed by the network.

NOTE 2: The procedures defined in subsection 6.1.1.1 apply to terminal equipment connected to the public ISDN. Terminals connected to ISPBX extension lines may require other algorithms. An example of such an algorithm is given in annex B.

The user shall terminate the algorithm when a CALL PROCEEDING message is received from the network.

6.1.1.2 Sending of keypad information in the call set-up phase

In this context, the call set-up phase includes the Outgoing call proceeding call state (U3) and the Call delivered call state (U4). See figure A.4.

In the call set-up phase, any keypad information (digits, *, #) received from the human user shall be sent to the network included in the Keypad facility information element contained in one or more INFORMATION messages. (Concerning the sending of DTMF, see subsection 7.1.2)

In order to ensure that the human user has sufficient time to submit keypad information to the network in the Outgoing call proceeding call state (U3), the optional user side timer T310 should not be implemented.

6.1.1.3 Sending of keypad information in the Active call state (U10)

See subsection 7.1.3.

6.1.1.4 Sending of keypad information in the call clearing phase

In this context, the call clearing phase includes the Disconnect request call state (U11), the Disconnect indication call state (U12) and the Release request call state (U19).

If call clearing is initiated by user A, the sending of keypad information during call clearing is not relevant (U11).

If call clearing is initiated by the network (see figure A.5), i.e. a DISCONNECT message is received by user A (U12), the human user shall have the possibility to provide keypad information to the network before the final release of the call. This implies that user A shall not send the RELEASE message to the network as a response on the DISCONNECT message, but remain in the Disconnect indication call state (U12) until a specific human user action such as on-hook takes place.

NOTE: As an implementation option, the delay of the RELEASE message may be dependent of having received a Progress indicator information element coded as #8 "In-band

information or an appropriate pattern is now available" or a Display information element in the DISCONNECT message.

In the Disconnect indication call state (U12), any keypad information (digits, *, #) received from the human user shall be sent to the network included in the Keypad facility information element contained in one or more INFORMATION messages.

In the Release request call state (U19) the sending of keypad information is not relevant.

6.1.2 Procedures at the destination side

The requirements to a user acting as a called user, user B, is based on the fact that it might be a valid scenario to request a network service before B-answer.

6.1.2.1 Sending of keypad information in the call delivered phase

In this context, the call delivered phase includes the Incoming call proceeding call state (U9), the Overlap receiving call state (U25), the Call received call state (U7), the Connect request call state (U8) and the Active call state (U10). See figure A.6.

In the call delivered phase, any keypad information (digits, *, #) received from the human user shall be sent to the network included in the Keypad facility information element contained in one or more INFORMATION messages.

6.1.2.2 Sending of keypad information in the call clearing phase

The same procedures as in subsection 6.1.1.4 shall apply.

6.2 Receiving of display information

The network may send display information to user A or user B for two main purposes:

1) as a response to a supplementary service request from the user, or

2) as prompting information from IN services.

The user shall be able to receive display information in the Display information element contained in call control messages (including INFORMATION messages) according to the basic call control specification ETS 300 403-1 [3], i.e. up to 82 IA5-characters in one message.

The user A shall accept display information in the following call states:

- Call initiated call state (U1),
- Overlap sending call state (U2),
- Outgoing call proceeding call state (U3),
- Call delivered call state (U4),
- Active call state (U10),
- Disconnect indication call state (U12).

User B shall accept display information in the following call states:

- Null call state (U0),
- Incoming call proceeding call state (U9),
- Overlap receiving call state (U25),
- Call received call state (U7),
- Connect request call state (U8),
- Active call state (U10),
- Disconnect indication call state (U12).

It is foreseen that especially IN services will require a certain amount of information implying that the terminal should be able to show up to 246 IA5-characters (three Display information elements with maximum length sent in individual messages) on a display or by means of a scrolling mechanism.

The following set of IA5-characters are valid:

- All graphic characters;
- The Danish characters: æ(7/11); Æ(5/11); ø(7/12); Ø(5/12); å(7/13); Å(5/13);
- The control characters: CR (0/13); LF(0/11); SP(2/0).

NOTE: The requirements above supersede the requirements stated in INAD [2], appendix D of appendix I.

6.3 Receiving of in-band tones and/or announcements

The network may send in-band tones and/or announcements to user A or user B for two main purposes:

1) as a response to a supplementary service request from the user, or

2) as prompting information from IN services.

The user shall be able to receive in-band tones and/or announcements, i. e. connect to the B-channel according to the requirements in ETS 300 403-1 [3].

7 Requirements on the transmission of in-band DTMF

As most telephony terminals have only one keypad, there is in fact a conflict as to whether the keypad shall be used to support the sending of keypad information as specified in section 6 or the sending of in-band DTMF. This conflict exists because in some states of a call both the sending of keypad information and sending of DTMF might be valid depending on the service to be controlled.

Although the keypad facility protocol is an ISDN specific protocol while DTMF is considered as "a necessary evil", it is foreseen that IN based services as well as end-user applications will make use of DTMF for some time. The following procedures are based on the principles that the choice between keypad facility and DTMF should if possible happen without the human user's intervention. The use of in-band DTMF is only applicable in connection with speech oriented services.

NOTE: The basic requirements to DTMF (signal level, frequencies, timing, etc.) is outside the scope of this document. In that respect, the Danish statements in ETS 300 001 [4] are referred to.

7.1 Procedures on the originating side

7.1.1 Sending of DTMF in the call request phase

In the call request phase (the Null call state (U0), the Call initiate call state (U1) and the Overlap sending call state (U2)), keypad information received from the human user shall not result in sending of in-band DTMF.

7.1.2 Sending of DTMF in the call set-up phase

In the call set-up phase (the Outgoing call proceeding call state (U3) and the Call delivered call state (U4)), keypad information received from the human user shall be sent as in-band DTMF to the network provided the B-channel is through-connected in the forward direction by the terminal (as specified in ETS 300 403-1 [3]). This procedure implies that in the call set-up phase, keypad information from the human user will be sent in the Keypad facility information element and as in-band DTMF simultaneously, see figure A.4. By this procedure, the human user needs not be aware of the signalling mechanism required as this is handled by the network.

NOTE: Regarding through-connect of the B-channel, when stated in ETS 300 403-1[3] that "the user shall connect/attach to the B-channels", this shall be interpreted as connection to the B-channel in both directions.

7.1.3 Sending of DTMF in the Active call state (U10)

In the Active call state (U10) it is, however, not acceptable to send keypad facility information and DTMF simultaneously as this will lead to conflict between keypad facility based network services and DTMF based end-user services. The only solution seen is to implement a switch in the terminal giving the human user the possibility to select the appropriate signalling mechanism (keypad facility or DTMF).

NOTE: Implementation of the principle that the terminal can only send DTMF in the Active call state of a call is not recommended as this will restrict the use of keypad facility based network services. However, DTMF is currently the mechanism used in most cases.

7.1.4 Sending of DTMF in the call clearing phase

Sending of in-band DTMF is not relevant during call clearing.

7.2 Procedures at the destination side

At the destination side, the sending of in-band DTMF to the network is only relevant in the Active call state (U10) as defined in subsection 7.1.3.

Annex A (Normative) Signalling flows

Figure A.1 shows user A's handling of keypad information in different call states during the call request phase at the originating side, example 1 of overlap sending

Figure A.2 shows user A's handling of keypad information in different call states during the call request phase at the originating side, example 2 of overlap sending.

Figure A.3 shows user A's handling of keypad information in different call states during the call request phase at the originating side, en-bloc sending.

Figure A.4 shows user A's handling of keypad information in different call states during the call set-up phase at the originating side.

Figure A.5 shows user A's handling of keypad information during network initiated clearing at the originating side.

Figure A.6 shows user B's handling of keypad information in different call states at the destination side

Keys to the figures:

Kfie: Keypad facility information element

Cpnie: Called party number information element

Piie: Progress indicator information element

——→ D-channel

·····→ B-channel

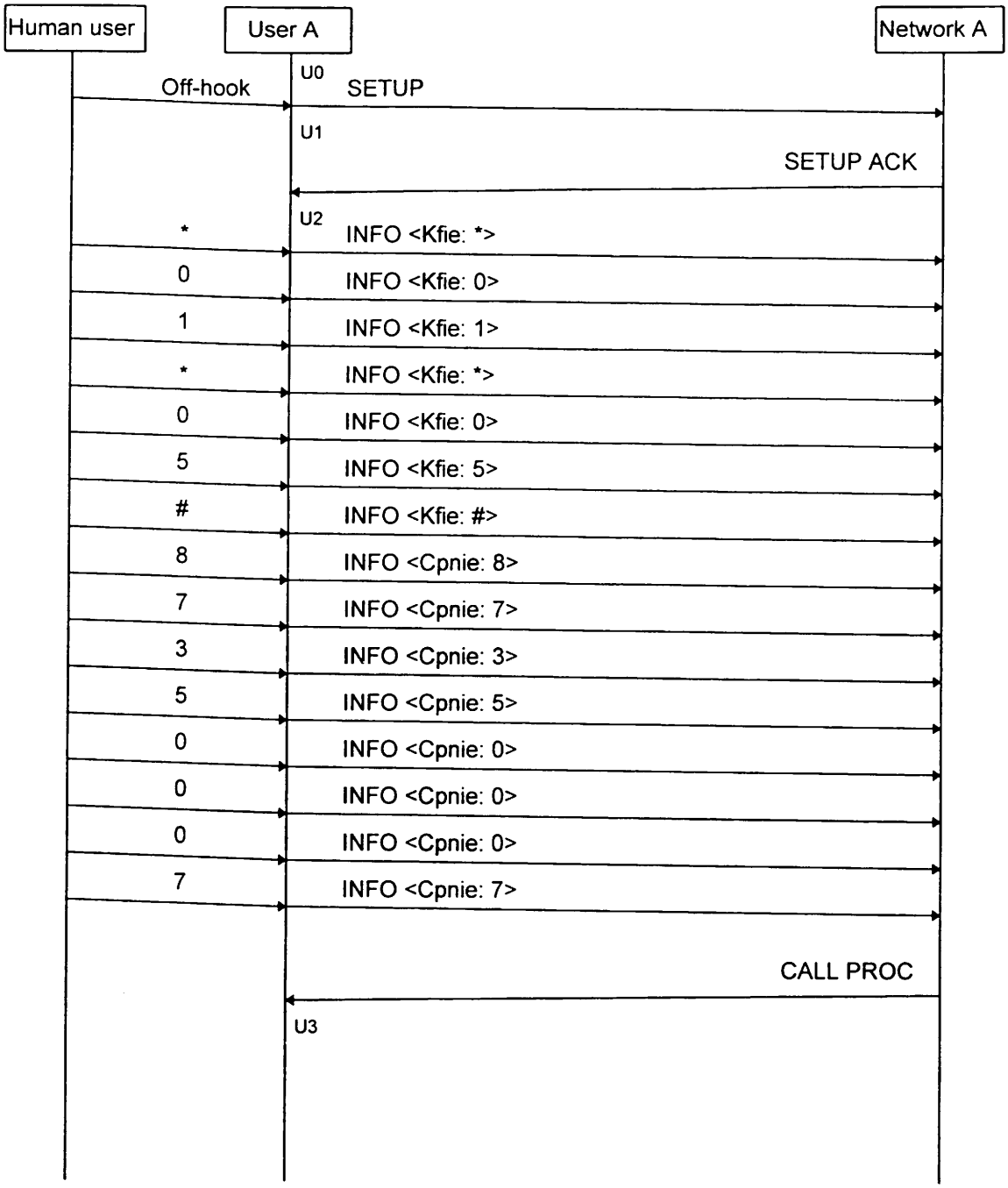


Figure A.1: Terminal handling of keypad information in the call request phase at the originating side, example 1 of overlap sending

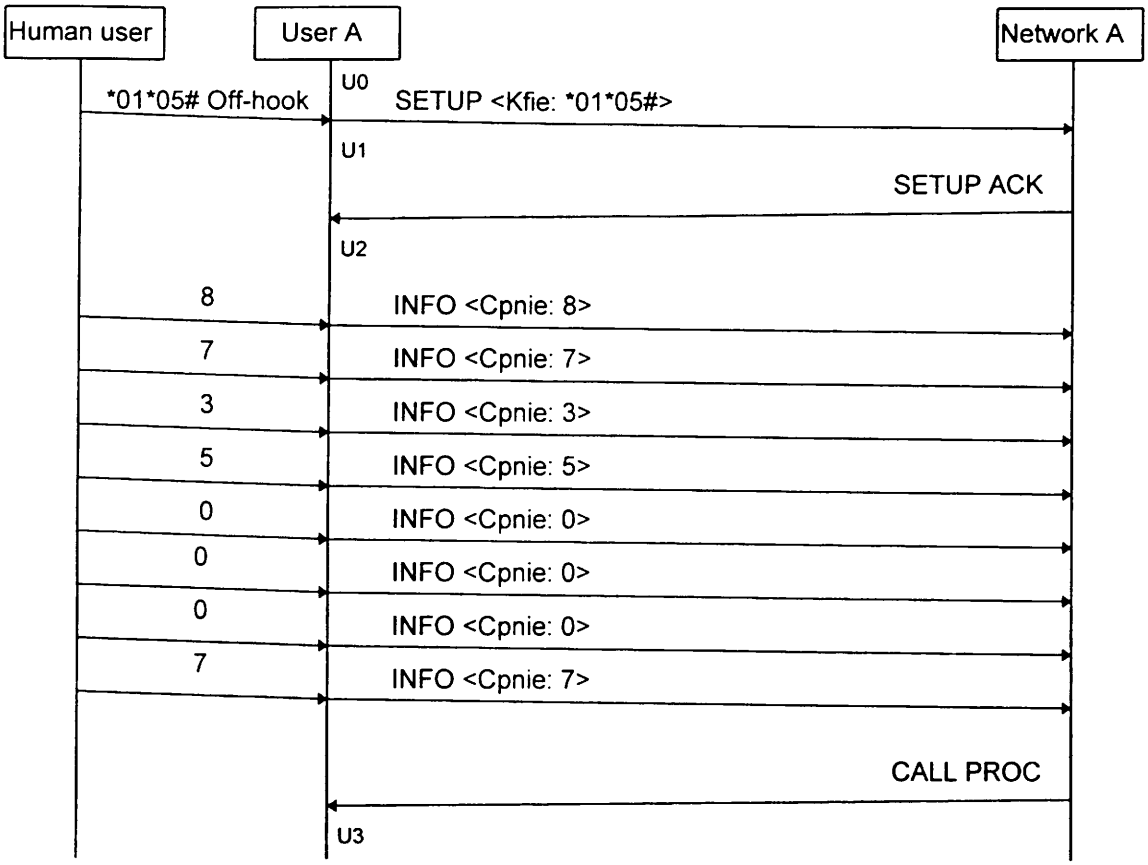


Figure A.2: Terminal handling of keypad information in the call request phase at the originating side, example 2 of overlap sending

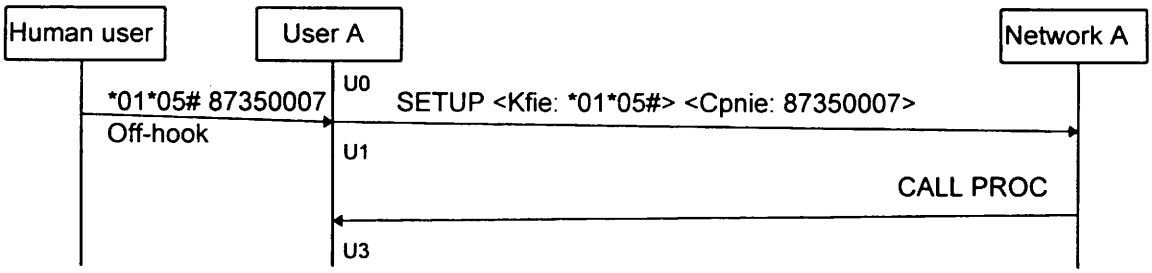
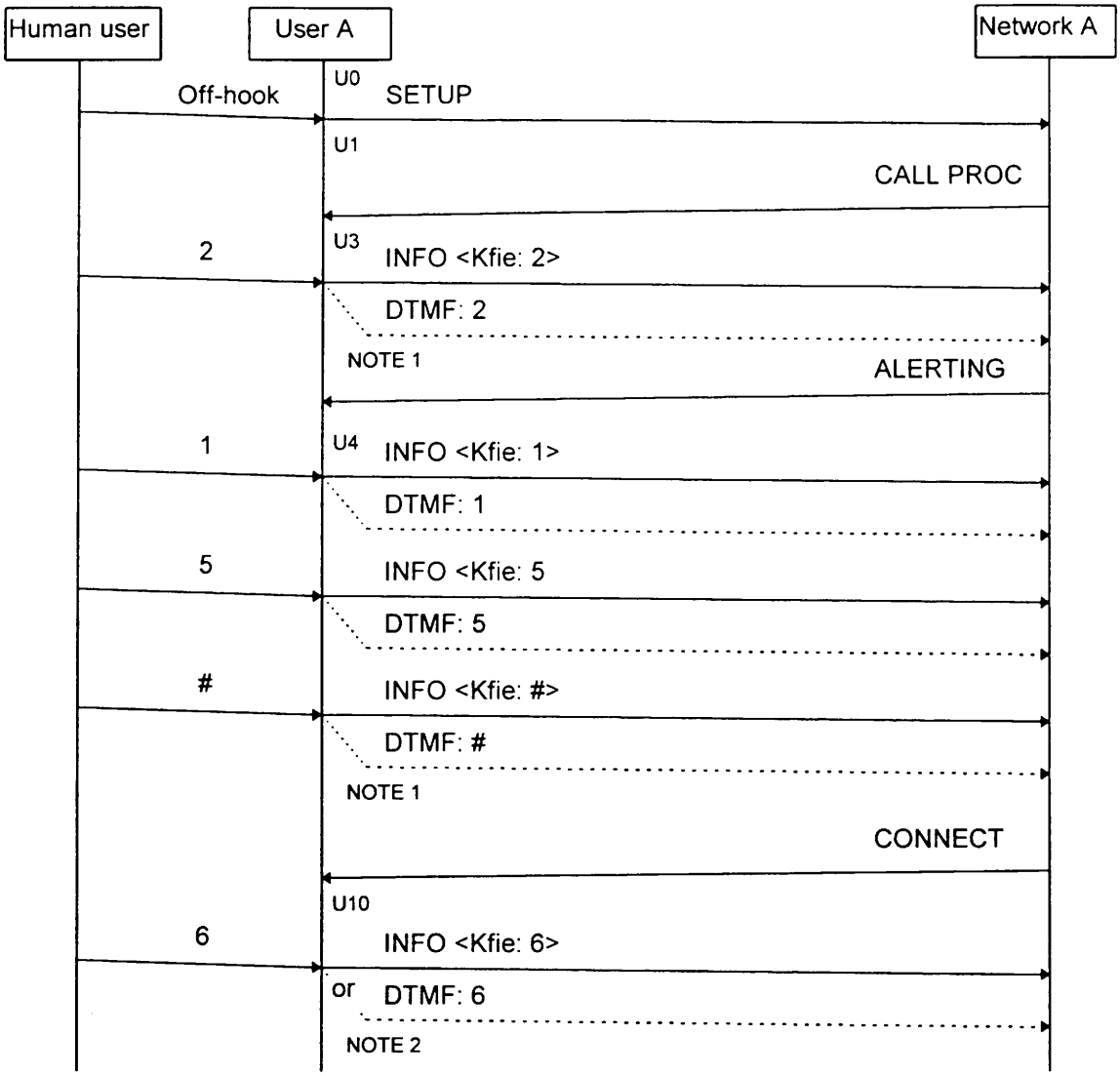


Figure A.3: Terminal handling of keypad information in the call request phase at the originating side, en-bloc sending



NOTE 1 In the call states U3 and U4 any keypad information (digits, *, #) shall be sent in the Keypad information element and as DTMF simultaneously.

NOTE 2: In the Active call state, the decision on whether to send the keypad information in the Keypad information element or as DTMF is taken by the human user

Figure A.4: Terminal handling of keypad information in the call set-up phase at the originating side

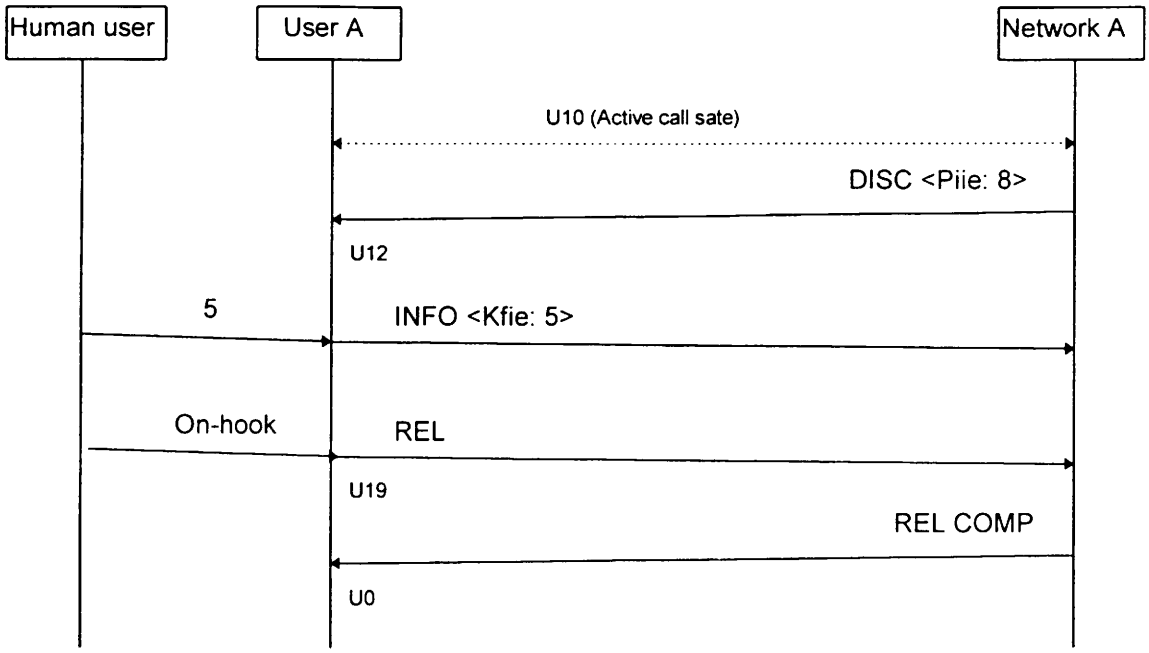
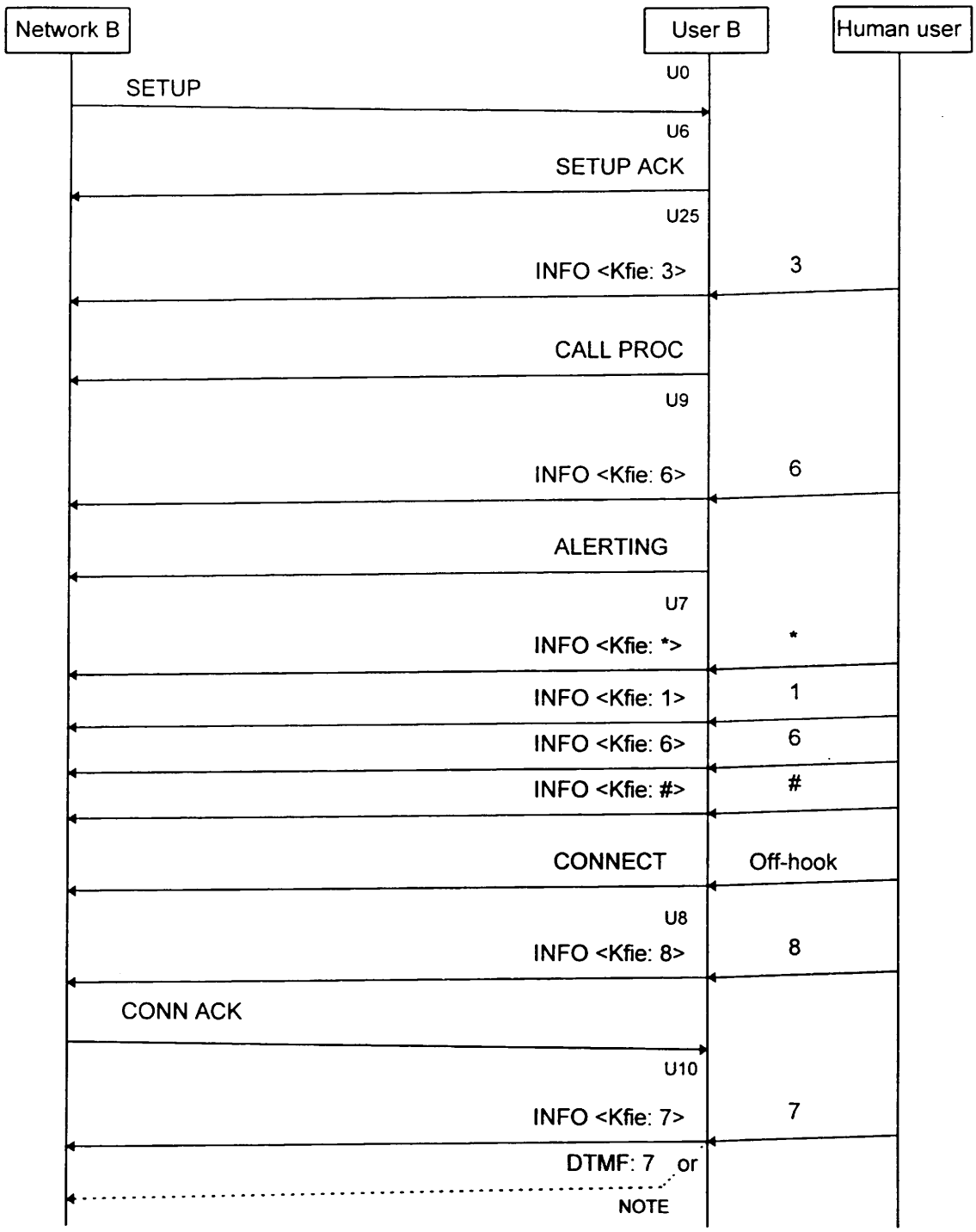


Figure A.5: Terminal handling of keypad information during network initiated clearing at the originating side



NOTE: In the Active call state, the decision on whether to send the keypad information in the Keypad information element or as DTMF is taken by the human user

Figure A.6: Terminal handling of keypad information in different call states at the destination side

Annex B (informative) Additional procedures for terminals connected to an ISPBX

Annex B gives an example of the algorithm to be used in the call request phase by a user connected to an ISPBX extension line.

NOTE 1: The procedures defined in this annex are an alternative to the procedure in subsection 6.1.1.1. It should be noted that terminals implementing the procedures below will not in all cases be able to operate properly if connected to the public ISDN (as an example the terminal will not be able to submit a # as a sending complete indication in the Called party number information element). Therefore, a general purpose terminal should implement both the procedures in subsection 6.1.1.1 and annex B managed by mode selection or another appropriate mechanism.

NOTE 2: Since terminals connected to an ISPBX is outside the scope of this technical report, the following information shall only be taken as information.

In this context, the call request phase includes up to the receiving of the CALL PROCEEDING message, i.e. the Null call state (U0), the Call initiate call state (U1) and the Overlap sending call state (U2), see figures B.1 and B.2. In addition, "user A" is the user connected to the ISPBX extension line and "network" shall be considered as the ISPBX.

In the call request phase, user A may provide keypad facility information to the network to control a supplementary service without requesting a call (e.g. activation of call forwarding) or to control a supplementary service along with the request of an end-to-end call (e.g. a closed user group call).

The procedures below allows the human user to alternate between keypad information that applies for the Keypad facility information element and keypad information that applies for the Called party number information element. By that, it is possible for a terminal to support sequences such as

0*SI#B-number, i.e. the human user requests access to the public ISDN and then requests a service in the public network along with a call request (SI = service information).

***SI#0*SI#B-number**, i.e. the human user requests a service in the ISPBX, enters the prefix to get access to the public network and then requests a service in the public network along with a call request (SI = service information).

The algorithm is defined below. It is split into two parts depending on whether the first character received by user A is a digit or a * or #.

1) If the first character received is a * or a # (see figure A.1),

   a) this character shall be included in the Keypad facility information element sent to the network;

   b) the second character (digit, *, #) shall be included in the Keypad facility information element;

   c) the third and subsequent characters (digit, *, #) (after the * or # received in item a)),shall be included in the Keypad facility information element. If, however, a # character is received as this third or subsequent character, it shall be included in the Keypad facility information element and the sending of keypad facility information shall be terminated implying that digits received after this # shall be included in the Called party number information element;

   d) if a new * or # is received after the terminating # (as received in c)), this character shall be considered as the first character in a new keypad facility string, i.e. the algorithm shall be continued at item a).

2) If the first character received is a digit (0..9) (see figure B.1),

   a) this digit shall be included in the Called party number information element sent to the network;

b) subsequent digits (i.e. not * or #) received from the human user shall be included in the Called party number information element;

c) if a * or a # is received from the human user, the algorithm shall continue at item 1) above.

The above procedure can be performed as overlap sending or as en-bloc sending. Figure B.1 gives example of overlap sending while figure B.2 shows en-bloc sending.

NOTE: It should be noted that in the case of en-bloc sending, the ISPBX is not able to distinguish between the sequence 0*SI#B-number and the sequence *SI#0B-number which might cause problems.

The user shall terminate the algorithm when a CALL PROCEEDING message is received from the network.

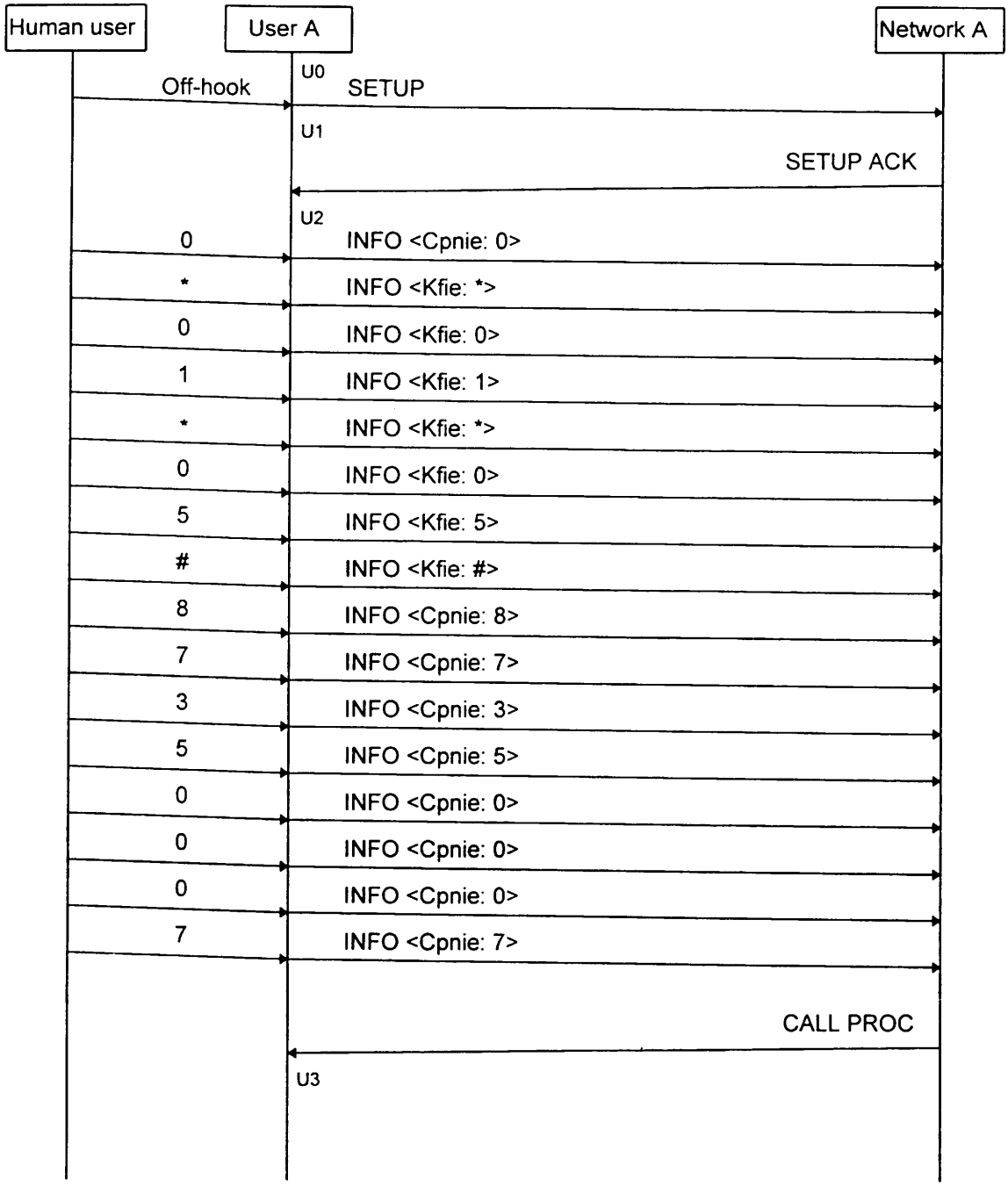


Figure B.1: Terminal handling of keypad information in the call request phase at the originating side, overlap sending for possible ISPBX extension line service handling

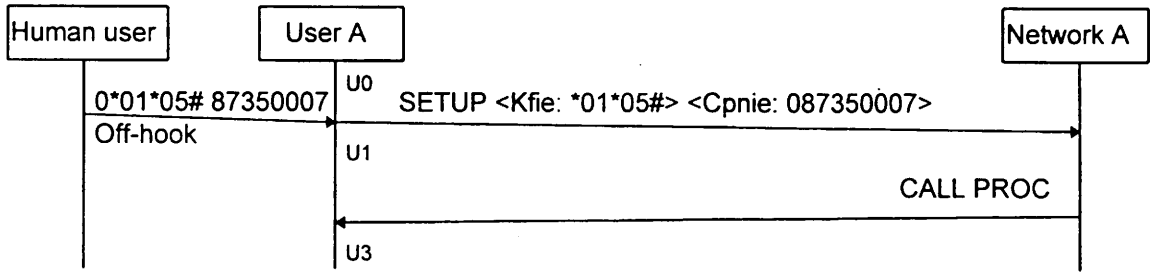


Figure B.2: Terminal handling of keypad information in the call request phase at the originating side, en-bloc sending for possible ISPBX extension line service handling

History

Document history		
Date	**Status**	**Comment**
December 1996	Final version	

TELE DANMARK

INAD-3 Notes Version 1 961202

The following notes to INFR-92 are published:

None.

TELE DANMARK

INAD-3 Revision history Version 1 961202

Date	Subject	Version	Changes in contents
970101	Full document	First edition	