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SPECIFICATION OF THE NETWORK SIDE OF THE USER-NETWORK INTERFACE FOR ISDN-BA- AND ISDN-PRA NETWORK LAYER 3

Handling of the number information

ISDN - DSS1 - NETWORK LAYER 3
Handling of the number information

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0. Document history

Every update of this document results in a complete new version with new version number and release date.

Version	Date	Main or important changes since previous version
1.0	31 OCT 2002	• First version
1.1	10 APR 2003	• Rectification of some small editorial errors

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1. Scope

This document is applicable to the Siemens 'EWSD V16B' - and 'Alcatel S12 Pack 8' - switching systems.

It gives an overview of how the network handles number information related to reception and sending of calling and called party numbers in the ISDN-network. The specification is valid for both ISDN Basic Acces (BA) and ISDN Primary Rate Access (PRA).

Some parts of the technical implementation may be different in the two used switching systems. In this case, specific switch-dependent comments are added or tables are used explaining the technical implementation for both systems.

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2. References

EN 300 403-1	ETSI-specification: Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 1: Protocol specification
ITU-T E.164	ITU-Recommendation : Overall network operation, telephone service, service operation and human factors; Operation, numbering, routing and mobile services - International operation - Numbering plan of the international telephone service
ITU-T I.330	ITU-Recommendation : Integrated Services Digital Network (ISDN); Overall network aspects and functions; ISDN Numbering and addressing principles
ITU-T I.333	ITU-Recommendation : Integrated Services Digital Network (ISDN); Overall network aspects and functions; Terminal selection in ISDN
EN 300 092-1	ETSI-specification: Integrated Services Digital Network (ISDN); Calling Line Identification Presentation (CLIP) supplementary Service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification
ETS 300 356-3	ISDN User Part (ISUP) version 2 for international interface - Calling Line Identification Presentation (CLIP)
EN 300 052-1	ETSI-specification: Integrated Services Digital Network (ISDN); Multiple Subscriber Number (MSN) supplementary Service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification
ETS 300 064-1	ETSI-specification: Integrated Services Digital Network (ISDN); Direct Dialling In (DDI) supplementary Service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification
ETS 301 484-1	ETSI-specification: Integrated Services Digital Network (ISDN); Line Hunting (LH) supplementary Service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification

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3. Symbols, definitions and abbreviations

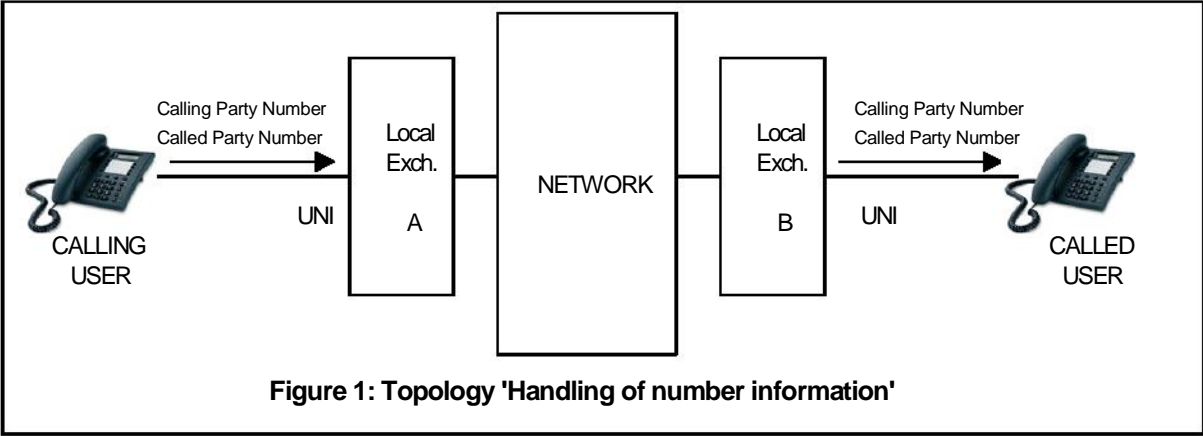For the purpose of the present document, the following symbols, abbreviations and definitions applies:

3.1. Abbreviations

BA	Basic Access Country
CC	Code
CL	Calling Line Identity
I	Calling Line Identification Presentation
CLIP	Direct Dialling In
DDI	Digital Subscriber Signalling System No. one
DSS1	European Telecommunication Standard
ETS	
EWSD	Proximus Switching System of Siemens
GDN	General Directory Number
IAC	Indirect Access Code
IDN	Individual Directory Number
ISDN	Integrated Services Digital Network
ISUP	ISDN user part of signalling system No.7
ITU	International Telecommunication Union
NA	Nature of Address
NDC	National Destination Code
NPI	Number Plan Indication
NSN	National Significant Number
PI	Presentation Indicator Primary
PRA	Rate Access
S12	Proximus Switching System of Alcatel
SI	Screening Indicator
SN	Subscriber Number
SPS	Special Service Number
T	Type Of Number
ON	Virtual Private Number
VPN	

3.2. Definitions

Bearer service	A type of telecommunication service that provides the capability for the transmission of signals between user-network interfaces.
Teleservice	A type of telecommunication service that provides the complete capability, including terminal equipment functions, for communication between users according to protocols established by agreement between Administrations.
Basic service	A bearer service or teleservice. See also section "D.5 Formal definition of basic services" of ETS 300 196-1
Network	In this description, network refers to all the ISDN telecommunications equipment that has any part in processing a call or a supplementary service for the user referred to. It does not include the ISDN terminal.
Default number	An ISDN number registered within the public ISDN following prior agreement between the calling party and the public ISDN.
Screening	A process whereby the network checks that a user provided information is acceptable to the network.
Special Arrangement	An agreement between a customer and a public network operator whereby customer supplied calling party ISDN numbers are not screened by the public ISDN.

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4. Topology

Figure 1: Topology 'Handling of number information'

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5. Handling of CLG & CLD Party Number at the originating network side

Handling of the received Called an Calling Party Number at the originating network side wil be done based on three elements which are part of the ISDN DSS1 "Calling- or Called Party Number" I.E.:
- Numbering Plan Identification (NPI)
- Type Of Number (TON)
- Number digits

Numbering Plan Identification (NPI)

The 'Numbering Plan Identification' (NPI) identifies the kind of numbering plan which is associated with a number. The following kinds of 'Numbering Plan Identification' shall be accepted by the network:
- ISDN/Telephony numbering plan, i.e. E.164
- Unknown

Type of Number (TON)

The 'Type Of Number' (TON) indicates the format of the included 'number digits'. The following kinds of 'Type Of Number' shall be accepted:
- Unknown
- National number
- International number

Number digits

ITU-T Recommendation E.164 provides the basic structure of (Directory) Numbers. This recommendation decomposes an international E.164 Number into specific code fields / parts:
- National or international prefix
- Country Code (CC)
- National Destination Code (NDC)
- Subscriber Number (SN)

The structure of the numbering plan within the Proximus network can be described as follows:

Prefixes, codes and numbers	Abbr.	Decomposition	# digits
National prefix	-	0	1
International prefix	-	00	2
Country codes	CC	<CC>	1-3
National geographical number	NSN_{geo}	<NDC> <SN> - NDC = "P" or "PQ" - SN = "XYZ KHDU" (X=2..9) or "YZ KHDU" (Y=2..9)	8
National Non-geographical number	$NSN_{non-geo}$	<NDC> <SN>	8 or 9
Special Service number	SPS	1AB, 1ABC	3 or 4
Indirect access code	IAC	1ABC	4
Mobile number	NSN_{mob}	<NDC> <SN>	9
VPN numbers	NSN_{vpn}	<NDC> [P] XXXXXXX	9 or 10
Abbr.:			
NSN	National Significant Number		
NDC	National Destination Code		
SN	Subscriber Number		
VPN	Virtual Private Network		

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5.1. Handling of the Calling party number at the originating network side

A calling ISDN user can insert the calling line identity at call request. The network shall screen the provided number.

Where the public ISDN screening is successful, the public ISDN shall complete this number to form a national ISDN number and the number shall be marked as "user provided, verified and passed".

If the user does not provide any number or the screening performed by the public ISDN is not successful, the public ISDN shall enter a default number marked as "network provided".

Screening will be done as follows:

The originating exchange shall verify whether the user provided number, received via the user access, is acceptable to the network. The acceptability is expressed in terms of two criteria. Both criteria have to be met to consider a user provided number acceptable. The two criteria are:
   acceptable kind of number, based on the subscriber configuration
   acceptable number format, based on the 'type of number' information

If any of these checks fail, the exchange shall ignore the received CALLING PARTY number information element and replace it with the default number.

Acceptable Kind of Numbers

This verification checks the correlation between the received number digits and the registered numbers for the given user access, taking into account the subscriber configuration. The table below indicates, per subscriber configuration, which kind of numbers shall be considered as being a valid user provided number:

Subscriber configuration	Acceptable numbers by S12 pack 8	Acceptable numbers by EWSD V16B	
Single ISDN BA	DN	DN	
ISDN-BA Huntgroup	MSN GDN [1] IDN [2]	MSN None [3] None [3]	GDN [4] IDN [4]
ISDN Indialing	GDN DDI number	GDN DDI number	

Notes:

Note 1   The GDN will only be accepted as valid user provided number if it is received on line IDN_1 (IDN_GDN)

Note 2   A certain IDN will only be accepted as valid user provided number if it is received on its corresponding line.

Note 3   Engineering-method 1 (pure huntgroup without DDI); In this case no screening is done. Always the default number will be entered as CLI towards the Called Party

Note 4   Engineering-method 2 (huntgroup with DDI); In this case screening is done. Both the GDN or one of the IDN's are accepted as valid user provided number, irrespective of the line on which they are received.

Abbr.:

DN   Directory Number

MSN   Multiple Subscriber Number

GDN   General Directory Number

IDN   Individual Directory Number

DDI   Direct Dialling In

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Acceptable Number Formats

Related to the number format, first of all a verification is done on the received 'Numbering Plan Identification'. Only following values for 'NPI' are accepted.

ISDN/Telephony numbering plan (E.164)

Unknown

All other received values will lead immediately to unsuccessful screening.

If the received NPI is one of the above mentioned values, a second verification will be done. This will be a correlation between the received number digits and the received 'type of number' information. The following combinations for 'Type Of Number' and 'Number digits' will be accepted:

Type of number (TON)	User provided number
	Number digits
National	<NSN>
International	<CC> <NSN>
Unknown	0 <NSN>
Unknown	00 <CC> <NSN>
Unknown	<NSN>
Notes:	
Abbr.:	
CC	Country Code
NSN	National Significant Number

If the screening is successful, the network shall create a CALLING PARTY NUMBER information element, with the following values for the different fields:

Parameter	Abbr.	Value
Type Of Number	T ON	'National'
Numbering Plan Identification	NPI	'ISDN/Telephony numbering plan (E.164)'
Screening Indicator	SI	'User provided, verified and passed'
Presentation Indicator	PI	As determined by the CLIR supplementary service
Number digits	-	The number as provided by the user converted to the national number format

If the screening fails or if no Calling Party Number information element is received, the network shall create a Calling Party Number information element, with the following values for the different fields:

Parameter	Abbr.	Value
Type Of Number	T ON	'National'
Numbering Plan Identification	NPI	'ISDN/Telephony numbering plan (E.164)'
Screening Indicator	SI	'Network provided'
Presentation Indicator	PI	As determined by the CLIR supplementary service
Number digits	-	The default number associated with the access of the calling user in national format

In both cases, the Calling Party Number information element shall be forwarded to the destination network in association with the basic call setup procedure.

In case of an international call, the international switching center will add the country code to the calling number .

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5.2.   Handling of the Called Party Number at the originating network side

If a calling ISDN user wants to set up a call to a certain destination, he has to insert a CALLED PARTY NUMBER at call request. Before starting with the establishment of the call, the network shall perform some checks on this CALLED PARTY NUMBER.

Following checks will be done :

The originating exchange shall verify whether the Called Party Number provided by the calling user, is correctly formatted or not. Depending on the type of call, specific combinations of 'Type of Number' and 'Number digits' will be correct or not.

First of all a verification is done on the received 'Numbering Plan Identification'. Only following values are accepted. All other received values will lead to unsuccessful call establishment.

   ISDN/Telephony numbering plan (E.164)

   Unknown

If the received NPI is one of the above mentioned values, a second verification will be done. This will be a correlation between the received 'number digits' and the received 'type of number' information. This correlation will depend on the type of call that has to be established. The following combinations will lead to a correct call establishment:

Type of call	Type Of Number	Number digits
Call to geographical number	Unknown	$0 <NSN_{geo}>$
	National	$<NSN_{geo}>$
Call to non-geographical number	Unknown	$0 <NSN_{non-geo}>$
	National	$<NSN_{non-geo}>$
Call to Special Service Number	Unknown	$<SPS>$
Call to Indirect Access Code	Unknown	<IAC> <subsequent string>
Call to mobile number	Unknown	$0 <NSN_{mob}>$
	National	$<NSN_{mob}>$
Call to VPN number	Unknown	$0 <NSN_{vpn}>$
	National	$<NSN_{vpn}>$
International Call	Unknown	00 <CC> <NSN>
	International	<CC> <NSN>
Abbr.:		
NSN	National significant number	
SPS	Special service number	
IAC	Indirect access code	
CC	Country code	
GEO	Geographical number	
NON-GEO	Non geographical number	
MOB	Mobile number	
VPN	Virtual private number	

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6. Handling of CLG & CLD Party Number at the destination network side

6.1. Handling of the Calling party number at the destination network side

If the B-user has subscribed for the CLIP suppl. service, than he shall receive information about the Calling Line Identiy (CLI) for each incoming call. In some networks a special arrangement may exist whereby calling party provided numbers are not fully screened by the originating network. In this case the called network side access will receive two CLI's, both numbers shall be presented in a separate Calling Party Number I.E. - the user provided number shall be presented first. The following table gives a detailed description on how the CALLING PARTY NUMBER I.E.(s), sent to the called user, shall be coded, depending on the received info from the originating network. In case of the 2-number delivery option, the table containes both the user provided unscreened and the network provided number.

No special arrangement at the originating network (screening is performed)

Succesful screening at the originating network

Type of call	Incoming National ISUP					CLD	DSS1 on terminating user				
	PI	SI	NP	NOA	Address digits	CLIR over ride	PI	SI	NPI	TON	Number digits
National	Allowed	User prov., verified and passed	ISDN/Tel.	Nat.	<NSN>_user	-	Allowed	User provided, verified and passed	ISDN/Tel.	National	<NSN>_user
National	Restricted	User prov., verified and passed	ISDN/Tel.	Nat.	<NSN>_user	No	Restricted	Network provided	Unknown	Unknown	None
National	Restricted	User prov., verified and passed	ISDN/Tel.	Nat.	<NSN>_user	Yes	Restricted	User provided, verified and passed	ISDN/Tel.	National	<NSN>_user
Internat.	Allowed	User prov., verified and passed	ISDN/Tel.	Int.nat.	<CC><NSN>_user	-	Allowed	User provided, verified and passed	ISDN/Tel.	Internat.	<CC><NSN>_user
Internat.	Restricted	User prov., verified and passed	ISDN/Tel.	Int.nat.	<CC><NSN>_user	No	Restricted	Network provided	Unknown	Unknown	None
Internat.	Restricted	User prov., verified and passed	ISDN/Tel.	Int.nat.	<CC><NSN>_user	Yes	Restricted	User provided, verified and passed	ISDN/Tel.	Internat.	<CC><NSN>_user

Abbr.:
<NSN>_user   The number as provided by the user converted to the national number format
<CC><NSN>_user   The number as provided by the user converted to the international number format

Unsuccesful screening at the originating network

Type of call	Incoming National ISUP					CLD	DSS1 on terminating user				
	PI	SI	NP	NOA	Address digits	CLIR over ride	PI	SI	NPI	TON	Number digits
National	Allowed	Network provided	ISDN/Tel.	Nat.	<NSN>_default	-	Allowed	Network provided	ISDN/Tel.	National	<NSN>_default
National	Restricted	Network provided	ISDN/Tel.	Nat.	<NSN>_default	No	Restricted	Network provided	Unknown	Unknown	None
National	Restricted	Network provided	ISDN/Tel.	Nat.	<NSN>_default	Yes	Restricted	Network provided	ISDN/Tel.	National	<NSN>_default
Internat.	Allowed	Network provided	ISDN/Tel.	Int.nat.	<CC><NSN>_default	-	Allowed	Network provided	ISDN/Tel.	Internat.	<CC><NSN>_default
Internat.	Restricted	Network provided	ISDN/Tel.	Int.nat.	<CC><NSN>_default	No	Restricted	Network provided	Unknown	Unknown	None
Internat.	Restricted	Network provided	ISDN/Tel.	Int.nat.	<CC><NSN>_default	Yes	Restricted	Network provided	ISDN/Tel.	Internat.	<CC><NSN>_default

Abbr.:
<NSN>_default   The default number associated with the access of the calling user in national format
<CC><NSN>_default   The default number associated with the access of the calling user in international format

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Special arrangement at the originating network (no screening is performed)

The "Special arrangement"-option is currently not commercialized by Proximus, but it can be offered by other national licensed operators or other international operators. If the Proximus network receives Calling Line Identity information due to the "Special arrangement"-option at the originating network, it will pass this info on the terminating subscriber line. Two separate Calling Party Number information elements will be included in the DSS1 SETUP-message. The number received in the Generic Number ISUP parameter is included as the first DSS1 Calling party number information element and the Calling Party number ISUP parameter is included as the second DSS1 Calling Party Number information element.

CLI (correctly) delivered by originating user

Type of call	Incoming National ISUP					CLD CLIR over ride	DSS1 on terminating user				
	PI	SI	NP	NOA	Address digits		PI	SI	NPI	TON	Number digits
National	Allowed	Network provided	ISDN/Tel.	Nat.	<NSN>_default	-	Allowed	Network provided	ISDN/Tel.	National	<NSN>_default
		(received in 'Calling party number' ISUP parameter)						(second 'Calling Party Number' DSS1 I.E.)			
	Allowed	User provided, not screened	ISDN/Tel.	Nat. or Int.nat.	<digits_user>		Allowed	User provided, not screened	ISDN/Tel.	Nat. or Internat.	<digits_user>
		(received in 'Generic number' ISUP parameter)						(first 'Calling Party Number' DSS1 I.E.)			
National	Restricted	Network provided	ISDN/Tel.	Nat.	<NSN>_default	No	Restricted	Network provided	Unknown	Unknown	None
		(received in 'Calling party number' ISUP parameter)						(only one 'Calling Party Number' DSS1 I.E.)			
	Restricted	User provided, not screened	ISDN/Tel.	Nat. or Int.nat.	<digits_user>						
		(received in 'Generic number' ISUP parameter)									
National	Restricted	Network provided	ISDN/Tel.	Nat.	<NSN>_default	Yes	Restricted	Network provided	ISDN/Tel.	National	<NSN>_default
		(received in 'Calling party number' ISUP parameter)						(second 'Calling Party Number' DSS1 I.E.)			
	Restricted	User provided, not screened	ISDN/Tel.	Nat. or Int.nat.	<digits_user>		Restricted	User provided, not screened	ISDN/Tel.	Nat. or Internat.	<digits_user>
		(received in 'Generic number' ISUP parameter)						(first 'Calling Party Number' DSS1 I.E.)			
Internat.	Allowed	Network provided	ISDN/Tel.	Int.nat.	<CC><NSN>_default	-	Allowed	Network provided	ISDN/Tel.	Internat.	<CC><NSN>_default
		(received in 'Calling party number' ISUP parameter)						(second 'Calling Party Number' DSS1 I.E.)			
	Allowed	User provided, not screened	ISDN/Tel.	Int.nat.	<digits_user>		Allowed	User provided, not screened	ISDN/Tel.	Internat.	<digits_user>
		(received in 'Generic number' ISUP parameter)						(first 'Calling Party Number' DSS1 I.E.)			
Internat.	Restricted	Network provided	ISDN/Tel.	Int.nat.	<CC><NSN>_default	No	Restricted	Network provided	Unknown	Unknown	None
		(received in 'Calling party number' ISUP parameter)						(only one 'Calling Party Number' DSS1 I.E.)			
	Restricted	User provided, not screened	ISDN/Tel.	Int.nat.	<digits_user>						
		(received in 'Generic number' ISUP parameter)									
Internat.	Restricted	Network provided	ISDN/Tel.	Int.nat.	<CC><NSN>_default	Yes	Restricted	Network provided	ISDN/Tel.	Internat.	<CC><NSN>_default
		(received in 'Calling party number' ISUP parameter)						(second 'Calling Party Number' DSS1 I.E.)			
	Restricted	User provided, not screened	ISDN/Tel.	Nat. or Int.nat.	<digits_user>		Restricted	User provided, not screened	ISDN/Tel.	Internat.	<digits_user>
		(received in 'Generic number' ISUP parameter)						(first 'Calling Party Number' DSS1 I.E.)			

Abbr.:

<NSN>_default	The default number associated with the access of the calling user in national format
<CC><NSN>_default	The default number associated with the access of the calling user in international format
<digits_user>	The number digits as provided by the user

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CLI not (correctly) delivered by originating user

Type of call	Incoming National ISUP					CLD	DSS1 on terminating user				
	PI	SI	NP	NOA	Address digits	CLIR over ride	PI	SI	NPI	TON	Number digits
National	Allowed	Network provided	ISDN/Tel.	Nat.	<NSN>_default	-	Allowed	Network provided	ISDN/Tel.	National	<NSN>_default
National	Restricted	Network provided	ISDN/Tel.	Nat.	<NSN>_default	No	Restricted	Network provided	Unknown	Unknown	None
National	Restricted	Network provided	ISDN/Tel.	Nat.	<NSN>_default	Yes	Restricted	Network provided	ISDN/Tel.	National	<NSN>_default
Int.nat.	Allowed	Network provided	ISDN/Tel.	Int.nat.	<CC><NSN>_default	-	Allowed	Network provided	ISDN/Tel.	Internat.	<CC><NSN>_default
Int.nat.	Restricted	Network provided	ISDN/Tel.	Int.nat.	<CC><NSN>_default	No	Restricted	Network provided	Unknown	Unknown	None
Int.nat.	Restricted	Network provided	ISDN/Tel.	Nat.	<CC><NSN>_default	Yes	Restricted	Network provided	ISDN/Tel.	Internat.	<CC><NSN>_default

Abbr.:

<NSN>_default   The default number associated with the access of the calling user in national format

<CC><NSN>_default   The default number associated with the access of the calling user in international format

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6.2.   Handling of the Called party number at the destination network side

Depending on the type of subscriber configuration, the Called Party Number sent by the network can be different.

Three types of subscriber-configurations can be defined :

     Single ISDN-BA
     ISDN-BA Huntgroup
     ISDN Indialling

Type of subscriber configuration	NPI	TON	Number digits
Single ISDN-BA	ISDN/Telephony	National	$NSN_{DN\ or\ MSN}$
ISDN-BA Huntgroup S12 Pack 8	ISDN/Telephony	National	$NSN_{GDN\ or\ IDN}$
ISDN-BA Huntgroup EWSD V16B [1]	No Called Party Number delivered		
ISDN-BA Huntgroup EWSD V16B [2]	ISDN/Telephony	National	$NSN_{GDN\ or\ IDN}$
ISDN Indialling	ISDN/Telephony	National	$NSN_{GDN\ or\ DDInumber}$
Notes:			
Note 1 Engineering-method 1 (Pure huntgroup without DDI)			
Note 2 Engineering-method 2 (Huntgroup with DDI)			
Abbr.:			
NPI Numbering Plan Identification			
TON Type Of Number			
NSN National Significant Number			
DN Directory Number			
MSN Multiple Subscriber Number			
GDN General Directory Number			
IDN Individual Directory Number			
DDI Direct Dialling In			

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