Handläggande organ / Standardising body
Svenska informations- och Telekommunikationsstandardiseringen

Fastställd / Approved
2024-09-13

Utgåva / Edition
Utgåva 10

Transfer of number information in national interconnections based on ISUP

An Application Guide for handling number information between public communications networks

Reference

ITS WG NI

Keywords

ISUP, national interconnections, number information transfer, Relay Services

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Foreword

This Application Guide has been produced by ITS Working Group Network Interworking (WG NI).

Introduction

This Application guide is released in edition 10 to remove SIP and SIP-I information that has been documented in ITS ApG 32 [19].

This Application Guide describes information elements to be used in the transfer of subscriber number information across the interfaces between public communications networks for national interconnection via ISUP in Sweden. It also describes the functional contents of the information elements. It does not deal with the corresponding internal information in each operator's network.

The document is concerned with technical issues. It is assumed that the public communications operators concerned sign mutual commercial agreements on interconnection, traffic cases, routing, services, traffic volumes, accounting procedures, prices, etc. The extent to which this guide shall be applied will be settled in those agreements. The public communications operators can agree on deviations from the present document.

Public communications networks are interconnected to enable the subscribers in the different networks to call each other (see Figure 1).

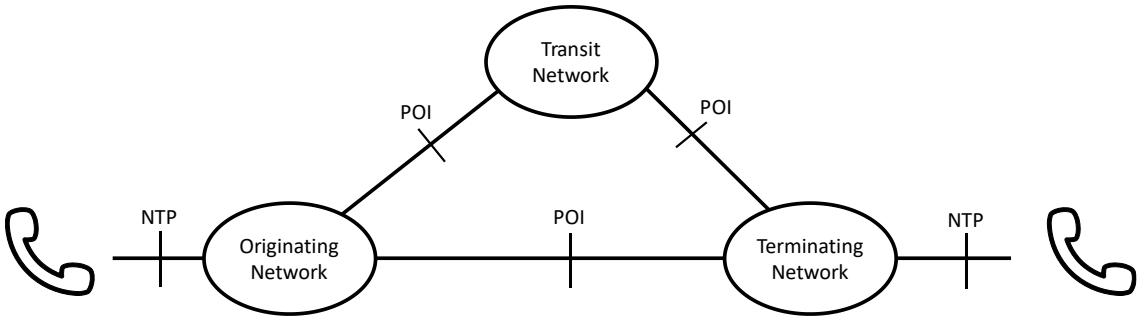

Figure 1: Interconnected public communication networks

A subscriber connected to one public communications network shall be able to use services in other public communications networks (see Figure 2).

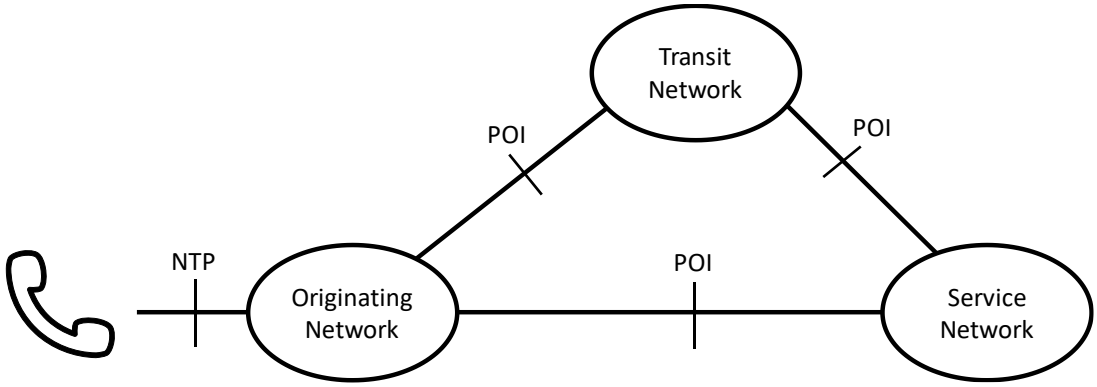

Figure 2: Use of services over networks

Services offered by public communications networks shall be capable of terminating in other public communications networks (see Figure 3).

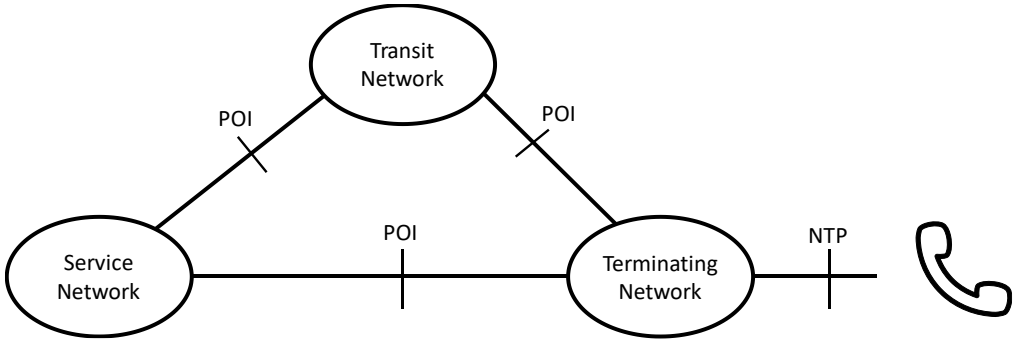

Figure 3: Termination of services

1 Scope

In order to ensure that:

- Calls can be set up between subscribers connected to different public communications networks,
- Calls can pass through a public communications network,
- Calls can reach the relay service provider for Automatic Invocation of Relay Services [17], and
- Confidential information is not disclosed, information on numbers must be transferred in a uniform manner.

This Application Guide provides format control of number information and any possible restrictions in the

presentation of subscriber numbers transferred across the interfaces between public communications networks and is applicable for national interconnection using ISUP [6]-[9] and [14] between public communications networks.

Furthermore, this Application Guide:

- Supports basic call by specifying the information transferred within the information element Called Party Number;
- Supports the Supplementary Services Calling Line Identification Presentation and Calling Line Identification Restriction by specifying the information transferred within the information element Calling Party Number. Transfer of the information element Calling Party Number is mandatory for some public communication services offered by the operator of the service networks;
- Supports the Supplementary Services Connected Line Identification Presentation and Connected Line Identification Restriction with the information element Connected Number;
- Supports Call Diversion Supplementary Services by specifying the information transferred within the information elements Original Called Number, Redirecting Number, Redirection Number and Redirection Number Restriction;
- Describes routing cases related to calls to short code services beginning with 11, including emergency services;
- Is based on ISUP between the public communications networks in accordance with Telia Company specifications 8211-A335 [8], 8211-A325 [6] and SIS SS 63 63 93 [14].

Supported interconnections shall be determined through separate agreements between the operators (together with the parameters that must be sent across the POI).

Subaddresses are outside the scope of the present document.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ITS cannot guarantee their long-term validity.

[1] ETSI EN 300 356-15 v 4.2.1 (07/2001): "Integrated Services Digital Network (ISDN); Signalling System No. 7: ISDN User Part (ISUP) version 2 for the international interface. Part 15: Diversion supplementary services.

[2] ITU-T Rec. Q.732.2-5 (12/1999): "Stages 3 description for call offering supplementary services using signalling system No. 7". Clause 2 – Call diversion services

[3] ITU-T Rec. Q.763 (12/1999): "Signalling System No. 7 – ISDN user part formats and codes".

[4] ITU-T Rec. Q.767 (1991): "Application of the ISDN user part of CCITT signalling system No. 7 for international ISDN interconnection."

[5] ITU-T Rec. E.164 (11/2010): "The international public telecommunication numbering plan".

[6] Telia Company 8211-A325: "ISDN-PLMN (GSM) signalling interface for Sweden."

[7] Telia Company 1/8211-A325: "Annex 1 (8211-A325)."

[8] Telia Company 8211-A335: "ISDN-ISDN signalling interface for Sweden."

[9] Telia Company 1/8211-A335: "Annex 1 (8211-A335)."

[10] Post- och telestyrelsen: "Sammanställning av svensk nummerplan för telefoni" (in Swedish only)

[11] ITS ApG 21: "Guidelines for calls to emergency numbers 112 and 90 000 in Sweden."

[12] SIS SS 63 63 90: "Number portability in Sweden – Network solutions for Service Provider Portability for fixed public telecommunications services."

[13] SIS SS 63 63 92: "Mobile Number Portability in Sweden – Network solutions for Service Provider Portability for public digital mobile telephony services."

[14] SIS SS 63 63 93: "PSTN/ISDN- PLMN (GSM) ISDN signalling interface for Sweden."

[15] ITU-T Rec. E.101 (11/2009): "Definitions of terms used for identifiers (names, numbers, addresses and other identifiers) for public telecommunication services and networks in the E-series Recommendations".

[16] ITS ApG 28: "Transfer of inter-operator Premium rate services and Mass call services termination numbers"

[17] ITS ApG30: "Automatic network invocation of Relay services".

[18] ETSI ES 202 975: "Human Factors (HF); Requirements for relay services".

[19] ITS ApG 32: "Transfer of number information in national interconnections based on SIP and SIP-I"

3 Terms and definitions

All call query (ACQ) operator: an operator that have access to the reference database for ported numbers and does a lookup for every call. The resulting RN is prepended to the called number. A non-ACQ operator does not have the ability to prepend the RN.

Carrier call-by-call selection: the calling party has an opportunity to select carrier network for each call. The calling party dials a Carrier Selection Code prior to the normal dialling information to be connected with the desired party or terminal using the selected carrier.

Carrier preselection: a fixed set-up procedure to reach a carrier network without any additional action by the calling party for each call. The normal dialling procedure is sufficient for the calling party to be connected with the desired party or terminal using a preselected carrier.

Directory number (DN): the number, derived from the E.164 numbering plan, used by the calling party to establish a call to an end user or a service. The number may also be used for presentation services like Calling Line Identification Presentation (CLIP) and Connected Line Identification Presentation (COLP) and may also be published in different directories and/or directory enquiry services [15].

eCall: manually or automatically initiated emergency call, from a vehicle, supplemented with a minimum set of emergency related data (MSD).

Emergency call taker: the term "emergency call taker" or "call taker" refers to a person at any PSAP that accepts the emergency session.

Public Safety Answering Point (PSAP): a physical location where emergency calls are handled by emergency call takers.[1]

Fictitious Calling party number: a number agreed by the network operator and the PSAP provider used to inform the emergency call taker that the calling party number isn't complete.

Originating network: The network where the calling party is located.

Ported number: a directory number subject to number portability

Ported prefix: digits indicating following digits constitute a Routing number (RN)

Relay service: Electronic Communications Service that enables users of different modes of

[1] SOS Alarm is acting as the PSAP provider according to an agreement with the Swedish government.

communication (e.g. text, sign and speech), to interact by providing conversion between the modes of communication, normally through an interpreter or a communication assistant (e.g. human operator). [17].

routing number (RN): an address/number, only used for routing purposes and not known by end users, that is derived and used by the public telecommunications networks to route the call/session towards the network termination point. This address/number can also be used to route calls towards a ported number [15].

service network: a network of an operator offering public communication services to subscribers

short code: string of digits in the national numbering plan (NNP), as defined by the national Numbering Plan Administrator, which can be used as a complete dialling sequence on public networks to access a specific type of service/network. The length of a short code is normally shorter than a subscriber number. In some countries, or in countries in an integrated numbering plan, the short code could be a national-only number [15].

terminating network: A network of an operator responsible for incoming calls being terminated by the operator's services or subscribers connected to the operator's network

transit network: a network of an operator switching calls between two other operators' networks

4 Symbols and abbreviations

ACQ	All Call Query
CC	Country Code, as defined by ITU-T (E.101)
CAC	Carrier Access Code is a digit sequence indicating that the following digits constitute a Carrier Identification Code
CIC	Carrier Identification Code is a digit sequence containing the carrier network identity
CSC	Carrier Selection Code is a digit sequence which indicates selection and provides information about the required carrier network provider. CAC + CIC = CSC.
ISUP	ISDN User Part
N(S)N	National (Significant) Number, as defined by ITU-T (E.101). A number transferred as a N(S)N across an interface must belong to the Swedish numbering plan for telephony.
NDC	National Destination Code, as defined by ITU-T (E.101)
NPA	Numbering Plan Administrator
NTP	Network Termination Point
POI	Point of Interconnection
PSAP	Public Safety Answering Point
SIP	Session Initiation Protocol
SIP-I	Session Initiation Protocol with encapsulated ISUP
SN	Subscriber number, as defined by ITU-T (E.101)

5 Called party number

To set up a call between two networks, a Called party number must be transferred across the POI. The Called party number is a mandatory parameter field and is the information used to identify the called party. It shall be applied according to Table 1. Depending on the type of number and additional information to transfer, the subfields Nature of address and Address signals shall be applied according to different additional tables.

Subfield name	Subfield value
Odd/ even indicator	odd/ even
Nature of address indicator	see tables 3 and 4
Internal network number indicator	allowed/not allowed
Numbering plan indicator	1 (E.164)
Address signals	see tables 5 and 6

Table 1: Subfields of Called Party Number

6 Transfer of called party address signals

6.1 Transfer of Geographic, Non-Geographic and International E.164 numbers

This type of number information is sent across an interface with a subscriber dialing e.g.:

- SN;
- 0 N(S)N;
- 00 CC N(S)N.

The subfields Nature of address indicator and Address signals shall be applied as shown in Table 2.

The number information may be transferred across the POI in two different formats:

- Case 1: the information is transferred as a National (significant) number (belonging to the Swedish numbering plan for telephony);
- Case 2: the information is transferred as an International E.164 number.

Subfield name	Subfield value	
	Case 1	Case 2
Nature of address indicator	3 (National (significant) number)	4 (International E.164 number)
Address signals	N(S)N	CC N(S)N

Table 2: Subfields NoA and Address signals

6.2 Transfer of short code information in 11- and 90-series

6.2.1 Transfer of emergency number 112/ 90 000

This type of number information is sent across an interface with a subscriber dialing:

- The emergency number is mainly 112 but 90 000 is also available.

The subfields Nature of address and Address signals shall be applied as shown in Table 3. It does not matter if a subscriber has dialed 112 or 90 000 for the public emergency service (SOS-service). If the subscriber dialed 90 000 the originating operator shall replace 90 000 with 112.

Subfield name	Subfield value
Nature of address indicator	3 (National (significant) number)
Address signals	379 112 XYZ Note 1, 2, 3

Table 3: Subfields NoA and Address signals

Note 1 - 379 routing number for short codes 11X and 90X

Note 2 - 112 short code for emergency number

Note 3 - XYZ origin of call according to ITS ApG 21 [11]

6.2.2 Transfer of emergency number 112 for eCall

This type of number information is sent across an interface when an eCall is generated:

The subfields Nature of address and Address signals shall be applied as shown in Table 4.

Subfield name	Subfield value
Nature of address indicator	3 (National (significant) number)
Address signals	379 112 AB XYZ Note 1, 2, 3, 4

Table 4: Subfields NoA and Address signals

Note 1 - 379 routing number for short codes 11X and 90X

Note 2 - 112 short code for emergency number

Note 3 - AB eCall discriminator;

Values

AB = 00: Automatic eCall

AB = 01: Manual eCall

Note 4 - XYZ origin of call according to ITS ApG 21[11]

6.2.3 Transfer of national information number for non-emergent events 11313

This type of number information is sent across the interface with a subscriber dialling:

- The national information number for non-emergent events 11313.

The subfields Nature of address indicator and Address signals shall be applied as shown in Table 5.

Subfield name	Subfield value
Nature of address indicator	3 (National (significant) number)
Address signals	379 11313 XYZ Note 1, 2, 3

Table 5: Subfields NoA and Address signals

Note 1 -	379	routing number for short codes 11X and 90X
Note 2 -	11313	short code for national information for non-emergent events
Note 3 -	XYZ	origin of call according to information provided by assignee of 11313

6.2.4 Transfer of police number 11414

This type of number information is sent across the interface with a subscriber dialing:

- The police number 11414 (non-emergency).

The subfields Nature of address indicator and Address signals shall be applied as shown in Table 6.

Subfield name	Subfield value
Nature of address indicator	3 (National (significant) number)
Address signals	379 11414 XYZ Note 1, 2, 3

Table 6: Subfields NoA and Address signals

Note 1 - 379 routing number for short codes 11X and 90X

Note 2 - 11414 short code for police number

Note 3 - XYZ origin of call according to information provided by assignee of 11414

6.2.5 Transfer of medical help-line number 1177

This type of number information is sent across the interface with a subscriber dialing:

- The medical help-line number 1177.

The subfields Nature of address indicator and Address signals shall be applied as shown in Table 7.

Subfield name	Subfield value
Nature of address indicator	3 (National (significant) number)
Address signals	379 1177 XYZ Note 1, 2, 3

Table 7: Subfields NoA and Address signals

Note 1 - 379 routing number for short codes 11X and 90X

Note 2 - 1177 short code for medical help-line number

Note 3 - XYZ origin of call according to information provided by assignee of 1177

6.2.6 Transfer of harmonised numbers for harmonised services of social value 116XXX

This type of number information is sent across an interface with a subscriber dialing:

- A harmonised number for harmonised services of social value 116XXX.

The subfields Nature of address indicator and Address signals shall be applied as shown in Table 8 or Table 9.

Subfield name	Subfield value
Nature of address indicator	3
Address signals	379 116 XXX

Table 8: For non-ACQ operators

Subfield name	Subfield value	
	Case 1 (preferred)	Case 2 (alternate)
Nature of address indicator	8	3
Address signals	ZXY 379 116 XXX Note 2, 3, 4, 5	394 ZXY 379 116 XXX Note 1, 2, 3, 4 ,5

Table 9: For ACQ operators

Note 1 - 394 ported prefix

Note 2 - ZXY routing number (PTS plan for Routing numbers for number portability according to Swedish standard SS 63 63 90/SS 63 63 92)

Note 3 - 379 routing number for short codes 11X and 90X

Note 4 - 116 short code for harmonised number for harmonised services of social value

Note 5 - XXX 3 digit string (only 100-199 is used today, no decision is yet made by PTS about the number length for other parts of the 116 series)

6.2.7 Transfer of directory enquiry service numbers 118XXX

This type of number information is sent across an interface with a subscriber dialing:

- A directory enquiry service 118XXX.

The subfields Nature of address indicator and Address signals shall be applied as shown in Table 10.

Subfield name	Subfield value
Nature of address indicator	3 (National (significant) number)
Address signals	379 118 XXX Note 1, 2, 3

Table 10: Subfields NoA and Address signals

Note 1 - 379 routing number for short codes 11X and 90X

Note 2 - 118 short code for directory enquiry service number

Note 3 - XXX 3-digit string

6.2.8 Transfer of national corporate numbers 90XXX

This type of number information is sent across an interface with a subscriber dialing:

- A national corporate number 90X1X2X3 where X1≠0 and X1 X2 X3≠112.

The subfields Nature of address indicator and Address signals shall be applied as shown in Table 11 or Table 12.

Subfield name	Subfield value
Nature of address indicator	3
Address signals	379 90 XXX

Table 11: For non-ACQ operators

Subfield name	Subfield value	
	Case 1 (preferred)	Case 2 (alternate)
Nature of address indicator	8	3
Address signals	ZXY 379 90 XXX Note 2, 3, 4, 5	394 ZXY 379 90 XXX Note 1, 2, 3, 4 ,5

Table 12: For ACQ operators

Note 1 -	394	ported prefix
Note 2 -	ZXY	routing number (PTS plan for Routing numbers for number portability according to Swedish standard SS 63 63 90/SS 63 63 92)
Note 3 -	379	routing number for short codes 11X and 90X
Note 4 -	90	short code for national corporate number
Note 5 -	XXX	3-digit string (100-111 and 113-999)

6.2.9 Transfer of inter-operator Premium rate services and Mass call services termination numbers

This type of number information is sent across an interface from a service network (where the charging platform is hosted) to the terminating network (where the content platform is hosted), if not the same operator for:

- Subscribers dialling to Premium rate services numbers in NDC 900, 939 and 944
- Subscribers dialling to Mass call services numbers in NDC 99

The subfields Nature of address indicator and Address signals shall be applied as shown in Table 13.

Subfield name	Subfield value	
	Case 1 (preferred)	Case 2 (alternate)
Nature of address indicator	8	3
Address signals	ZXY 389 XXX Note 2, 3, 4	394 ZXY 389 XXX Note 1, 2, 3, 4

Table 13: Subfields NoA and Address signals

Note 1 - 394 ported prefix

Note 2 - ZXY 3 digits routing number (PTS plan for Routing numbers for number portability according to Swedish standard SS 63 63 90/SS 63 63 92)

Note 3 - 389 routing number (NDC) for Correlation numbers (for Premium rate services and Mass call services [16]) allocated by PTS

Note 4 - XXX Correlation number (for Premium rate services and Mass call services [16]) as decided by the terminating operator. 3 to 13 digits.

6.2.10 Transfer of information for Automatic Invocation of Relay Services

This type of number information is sent across an interface from a network where the Primary User of Relay Services is subscribed to the terminating network (where the Relay Service Serving platform is hosted) for:

- Incoming call to a User of Relay Services which has Call Forwarding Unconditional activated for forwarding to Relay Service Serving platform [17]

The subfields Nature of address indicator and Address signals shall be applied as shown in Table 14.

Subfield name	Subfield value
Nature of address indicator	3 (National)
Address signals	BBB N(S)N Note 1, 2

Table 14: Subfields NoA and Address signals

Note 1 - BBB routing number (NDC) allocated by PTS for Automatic Invocation of Relay Services [17]

Note 2 - N(S)N National Significant Number for a Primary User of Relay Services

6.3 Transfer of Carrier Selection Code information

This type of number information is transferred between two networks, when a subscriber with a physical access to one network has decided to have calls switched by another network. A subscriber may have dialed:

- abc... (in case of Carrier preselection);
- 95XY abc... (in case of Carrier call-by-call selection).

Whether it is Carrier preselection or Carrier call-by-call selection, the subfields Nature of address indicator and Address signals shall be applied as shown in Table 14.

Subfield name	Subfield value
Nature of address indicator	2 (Unknown)
Address signals	95 XY abc... Note 1, 2, 3

Table 14: Subfields NoA and Address signals

Note 1 -	95	Carrier Access Code (CAC)
Note 2 -	XY	Carrier Identification Code (CIC)
Note 3 -	abc...	digit string (requirements according to utilised service)

6.4 Transfer of Ported number information

Information about a ported number is transferred between two networks, when a called subscriber number is found to be ported to another network. All information about Ported Number information in this document is an extract from Swedish Standards SS 63 63 90 and SS 63 63 92.

The subfields Nature of address indicator and Address signals shall be applied as shown in Table 15.

The ported number information and number information may be transferred across the interface in two different formats:

- Case 1: preferred method. The information is transferred as Routing Number concatenated with Called Directory Number;
- Case 2: alternative method. The information is transferred as National (significant) number.

Subfield name	Subfield value	
	Case 1 (preferred)	Case 2
Nature of address indicator	8 (Routing Number concatenated with Called Directory Number (for national use))	3 (National (significant) number)
Address signals	ZXY N(S)N Note 2	394 ZXY N(S)N Note 1, 2

Table 15: Subfields of Ported number

Note 1 - 394 Ported prefix

Note 2 - ZXY Routing number (according to PTS plan for Routing numbers for number portability according to Swedish standard SS 63 63 90/SS 63 63 92)

7 Calling party number

The Calling party number is an optional parameter field sent in the forward direction to identify the calling party. If a network shall transfer a Calling party number across the interface to another network, it shall be done as shown in Table 16.

As required by the PSAP[2], an emergency call taker shall have access to the Calling party number:

- to be able to call back to the person in distress;
- to geographically locate the person in distress with the assistance of a directory enquiry service database.

Calling party number may be sent in four different formats:

- Case 1: the number is transferred as a national (significant) number;
- Case 2: the number is transferred as an international E.164 number;
- Case 3: an incomplete national (significant) number is transferred;
- Case 4: an incomplete international E.164 number is transferred.

[2] SOS Alarm is acting as the PSAP according to an agreement with the Swedish government.

Subfield name	Subfield value			
	Case 1	Case 2	Case 3	Case 4
Odd/ even indicator	odd/ even			
Nature of address indicator	3 (National (significant) number)	4 (International E.164 number)	3 (National (significant) number)	4 (International E.164 number)
Calling party number incomplete indicator	complete		incomplete	
Numbering plan indicator	1 (E.164)			
Address presentation restricted indicator	presentation allowed/ restricted			
Screening indicator	user provided/ network provided			
Address signals	N(S)N	CC N(S)N	abc... (Note 1, 2 and 3)	abc... (Note 1)

Table 16: Subfields of Calling Party Number

Note 1 - abc... Digit string. At least 1 digit.

Note 2 - For identification of an originating network, operator id for network operators may be transferred as address signals. (Operator id according to agreement between the operators.)

Note 3 - Use of fictitious Calling party numbers may be noted in an appropriate way in accordance with agreement between originating network operator and the PSAP.

8 Original called number

The Original called number is an optional parameter field sent in the forward direction when a call is redirected and identifies the original called party utilised by Call diversion services. If a network shall transfer an Original called number across the interface it shall be done as shown in Table 18.

The Original called number may be transferred across the POI in two different formats:

- Case 1: the number is transferred as a National (significant) number;
- Case 2: the number is transferred as an International E.164 number.

Subfield name	Subfield value	
	Case 1	Case 2
Odd/ even indicator	odd/ even	
Nature of address indicator	3 (National (significant) number)	4 (International E.164 number)
Numbering plan indicator	1 (E.164)	
Address presentation restricted indicator	presentation allowed/ restricted	
Address signals	N(S)N	CC N(S)N

Table 18: Subfields of Original Called Number

9 Redirecting number

The Redirecting number is an optional parameter field sent in the forward direction when a call is diverted, indicating the number from which the call was diverted utilised by Call diversion services. If a network shall transfer a Redirecting number across the interface it shall be done as shown in Table 19.

The Redirecting number may be transferred across the POI in two different formats:

- Case 1: the number is transferred as a National (significant) number;
- Case 2: the number is transferred as an International E.164 number.

Subfield name	Subfield value	
	Case 1	Case 2
Odd/ even indicator	odd/ even	
Nature of address indicator	3 (National (significant) number)	4 (International E.164 number)
Numbering plan indicator	1 (E.164)	
Address presentation restricted indicator	presentation allowed/ restricted	
Address signals	N(S)N	CC N(S)N

Table 19: Subfields of Redirecting Number

10 Redirection number restriction

The Redirection number restriction is an optional parameter field utilised by Call diversion services. If a network shall transfer a Redirection number restriction across the interface it shall be done as shown in Table 20.

Subfield name	Subfield value
Redirection number restriction indicator (A and B bits)	presentation allowed/ restricted

Table 20: Subfields of Redirecting Number Restriction

Document history

Edition	Date of publication	Changes
2	December 1999	
4	June 2009	Latest available, published version.
5.1.1	October 2012	Update including a new clause (5.2.2, after the allocation of a national information number for non-emergent events), transfer to new ITS ApG format and editorials.
5.2.1	June 2013	Updated version.
6.1.1	August 2016	Update concerning routing of e-Call.
6.1.2	October 2016	Minor corrections of editorial type.
7	July 2019	New version adding new clause 5.2.9: Transfer of inter-operator Premium rate services and Mass call services termination numbers. Minor corrections of editorial type. Removing one of double clause 10/11 ("Redirection number").
8	September 2021	Add reference to Telia Company specification 8211-A356 to include transfer of number information in national interconnections based on SIP/SIP-I.
9	May 2022	New clause 6.2.10 regarding Transfer of information for Automatic Invocation of Relay Services. References [17] and [18] are added.
10	Xxx 2024	Removal of SIP and SIP-I references.