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Europeiskt digitalt mobiltelesystem, GSM — Signaleringskrav enligt CCITT signaleringssystem nr 7 (ITUP) för anslutning till ett allmänt tillgängligt telenät

I detta dokument återges den svenska standarden SS 63 63 61 vilken finns enbart på engelska.

European digital cellular telecommunications system, GSM — Signalling requirements according to CCITT Signalling System No. 7 (ITUP) for connection to a public switched telephone network

This document contains the Swedish Standard SS 63 63 61 which is available in English only.

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European digital cellular telecommunications system, GSM — Signalling requirements according to CCITT Signalling System No. 7 (ITUP) for connection to a public switched telephone network

Contents

0 Introduction

Editorial changes have been incorporated in edition 2.

1 Scope

This standard covers requirements concerning signalling for public land mobile networks (PLMNs) according to the paneuropean digital system, GSM, connected to the public switched telephone network (PSTN).

Note — This standard is provided in English only.

2 References

The following standards contain requirements, which through reference constitute requirements of this standard. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below.

CCITT Recommendations, Red Book, 1984:

G.732 Characteristics of primary PCM multiplex equipment operating at 2048 kbit/s

G.734 Characteristics of synchronous digital multiplex equipment operating at 1544 kbit/s

Q.12 Overflow – alternative routing – rerouting – automatic repeat attempt

Q.118 Special release arrangements

Q.703 Signalling link

Q.704 Signalling network functions and messages

Q.706 Message transfer part signalling performance

Q.722 General function of telephone messages and signals

Q.723 Specifications of Signalling System No. 7, Formats and codes

Q.724 Specifications of Signalling System No. 7, Signalling procedures

3 General

Formats and codes for signalling messages used for the set-up, release and supervision of switched circuits, shall be in accordance with CCITT Recommendation Q.723 as defined in clause 4.1 below.

Signalling procedures for the set-up, release and supervision of switched circuits, shall be in accordance with CCITT Recommendation Q.724 as defined in clause 4.2 below.

4 CCITT signalling system No.7 International telephone user part (ITUP)

Each section is given the same number as the concerned section to which the text refers in the relevant recommendations (CCITT Q.723, Q.724, Red Book).

4.1 Q.723, Formats and codes

1 Basic format characteristics

1.1 General

The telephone user messages are carried on the signalling data link by means of signal units, the format of which is described in Recommendation Q.703, 2.2.

The signalling information of each message constitutes the signalling information field of the corresponding signal unit and consists of an integral number of octets. It basically contains the label, the heading code and one or more signals and/or indications. Structure and function of the label are described in section 2, the heading codes and detailed message formats are described in section 3.

1.2 The service information octet

The service information octet comprises the service indicator and the subservice field.

The service indicator is used to associate signalling information with a particular User Part and is only used with message signal units (see Recommendation Q.704, 12.2).

The information in the subservice field permits a distinction to be made between national and international signalling messages.

The format of the service information octet is shown in figure 1.

D C B A	0100
Subservice field	Service indicator
4	4

Figure 1 — Service information octet

The following codes are used in the fields of the service information octet:

a) The service indicator is coded 0100.

b) Subservice field.

bits B A: Spare.
0 0

bits D C: Network indicator.
0 0 reserved
0 1 reserved
1 0 reserved
1 1 national network

1.3 Format principles

The user generated information in the signalling information field is, in general, divided into a number of subfields which may be either of fixed or variable length. For a given message type identified by a unique message heading, the presence of a given subfield may be either mandatory or optional. The various types of subfields are further defined below.

1.3.1 Mandatory subfields

Subfields which have been declared mandatory for a given message type appear in all messages of that type.

1.3.2 Optional subfields

Subfields which have been declared optional for a given message type only appear when required in messages of that type. The presence or absence of each optional field is indicated by the state of a field indicator located in an indicator field, which in this case is a mandatory subfield.

1.3.3 Fixed length subfields

Subfields which have been declared fixed length for a given message type, contain the same number of bits in all messages of that type.

1.3.4 Variable length subfields

For subfields which have been declared variable length for a given message type, the number of bits may vary between messages of that type. The size of a variable length subfield is indicated in an immediately preceding fixed length subfield in terms of a predefined unit such as bits, octets or half-octets.

1.3.5 Order of subfield transmission

For a given type of message the various types of subfields are transmitted in the following order:

a) mandatory subfields,

b) optional subfields.

Within each of these two classes, the order of subfield transmission is, in general, as follows:

1) fixed length subfields (with the exception of the indicator field and subfields indicating the size of a variable length subfield).

2) variable length subfields.

1.3.6 Order of bit transmission

Within each defined subfield the information is transmitted least significant bit first.

1.3.7 Coding of spare bits

Spare bits are coded 0 unless indicated otherwise.

2 Label

2.1 General

The label is an item of information which forms part of every signalling message and is used by the message routing function at Message Transfer Part level 3 to select the appropriate signalling route and by the User Part function to identify the particular transaction (e.g. the call) to which the message pertains.

In general, label information encompasses an explicit or implicit indication of the message source and destination and, depending on the application, various forms of transaction identification.

For messages which are related to circuits or calls, the transaction is identified by including the corresponding circuit identity in the label.

2.2 Standard telephone label

2.2.1 Label format

The standard label has a length of 40 bits and is placed at the beginning of the signalling information field. The label structure is shown in figure 2.

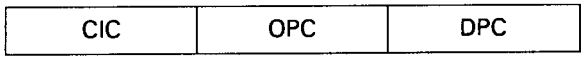

Figure 2 – Standard telephone label structure

The Destination Point Code (DPC) indicates the signalling point for which the message is intended, while the Originating Point Code (OPC) indicates the signalling point which is the source of the message. The Circuit Identification Code (CIC) indicates one speech circuit among those directly interconnecting the destination and the originating points.

The portion of the label that consists of the destination point code and originating point code fields and of the four least significant bits of the circuit identification code field corresponds to the standard routing label specified in Recommendation Q.704, 13.2.

2.2.2 Destination and originating point codes

The standard label structure requires that each telephone exchange in its role as signalling point is allocated a code from code plans established for the purpose of unambiguous identification of signalling points.

Separate code plans will be used for the international signalling network and for different national signalling networks.

An exchange may be a signalling point both in national and international networks. The exchange will then have two different OPC/DPC.

The destination point code will be the code applicable to the telephone exchange to which the message is sent. The originating point code will be the code applicable to the telephone exchange from which the message is sent.

2.2.3 Circuit identification code

The allocation of circuit identification codes to individual telephone circuits is determined by bilateral agreement and/or in accordance with applicable predetermined rules.

2048 kbit/s digital path

For circuits which are derived from a 2048 kbit/s digital path (Recommendations G.732 and G.734) the circuit identification code contains in the 5 least significant bits a binary representation of the actual number of the time slot which is assigned to the speech circuit. The remaining bits in the circuit identification code are used where necessary, to identify one among several systems interconnecting an originating and destination point.

3 Telephone signal message formats and codes

3.1 General

All telephone signal messages contain a heading consisting of two parts, heading code H0 and heading code H1. Code H0 identifies a specific message group (see Recommendation Q.722, 3.2.1) while H1 either contains a signal code or in case of more complex messages, identifies the format of these messages. The allocation of the H0 and H1 code is summarized in Table 1 at the end of this part of the specification.

3.2 Heading code H0

The heading code H0 occupies the 4-bit field following the label and is coded as follows:

0000 spare, reserved for national use
0001 forward address messages
0010 forward set-up messages
0011 backward set-up request messages
0100 successful backward set-up information messages
0101 unsuccessful backward set-up information messages
0110 call supervision messages
0111 circuit supervision messages
1000 circuit group supervision messages
1001 reserved
1010 to 1011 reserved for international and basic national use
1100 to 1111 reserved for national use

3.3 Forward address messages

3.3.1 Initial address message

The basic format of the initial address message is shown in figure 3.

	F E D C B A	0001	0001	
Spare	Calling party category	Heading code H1	Heading code H0	Label
2	6	4	4	40

		L K J I H G F E D C B A
Address signals	Number of address signals	Message indicators
n x 8	4	12

Figure 3 — Initial address message

The following codes are used in the fields of the initial address message:

a) Label: see section 2

b) Heading code H0 is coded 0001

c) Heading code H1 is coded 0001

d) Calling party category indicator

bits F E D C B A	
0 0 0 0 0 0	reserved
to	
0 0 1 0 0 0	
0 0 1 0 1 0	ordinary calling subscriber
0 0 1 0 1 1	reserved
0 0 1 1 0 0	reserved
0 0 1 1 0 1	test call
0 0 1 1 1 0	spare
to	
1 1 1 1 1 1	

e) Spare

The bits in this field are spare for international allocation.

f) Message indicators

bits B A: Nature of address indicator.
- 0 0 reserved
- 0 1 reserved
- 1 0 national (significant) number
- 1 1 international number

bits D C: Nature-of-circuit indicator.
- 0 0 no satellite circuit in the connection
- 0 1 one satellite circuit in the connection
- 1 0 spare
- 1 1 spare

bits F E: Continuity-check indicator. Always set to:
- 0 0 continuity-check not required

bit G: Echo-suppressor indicator.
- 0 outgoing half echo supressor not included
- 1 outgoing half echo supressor included

bit H: Incoming international call indicator. Always set to:
- 1 incoming international call

bit I: Redirected call indicator.
- 0 not a redirected call
- 1 redirected call

bit J: All-digital-path-required indicator. Note 2
- 0 ordinary call
- 1 digital path required

bit K: Signalling path indicator.
- 0 any path.
- 1 all signalling No.7 path

bit L: Spare.
- 0

Note 2 — A PSTN does not have to react on this indicator.

g) Number of address signals

A code expressing in pure binary representation the number of address signals contained in the initial address message, except for the code 0000 to which the meaning 16 digits including ST is assigned.

h) Address signals

0000	digit 0
0001	digit 1
0010	digit 2
0011	digit 3
0100	digit 4
0101	digit 5
0110	digit 6
0111	digit 7
1000	digit 8
1001	digit 9
1010	spare
1011	code 11
1100	code 12
1101	spare
1110	spare
1111	ST

The most significant address signal is sent first. Subsequent address signals are sent in successive 4-bit fields.

i) Filler

In case of an odd number of address signals, the filler code 0000 is inserted after the last address signal. This ensures that the variable length field which contains the address signals consists of an integral number of octets.

3.3.2 Initial address message with additional information

The basic format of the initial address message with additional information is shown in figure 4.

	F E D C B A	0010	0001	
Spare	Calling party category	Heading code H1	Heading code H0	Label
2	6	4	4	40

		L K J I H G F E D C B A
Address signals	Number of address signals	Message indicators
n x 8	4	12

	H G F E D C B A
Calling line identity	First indicator octet
n x 8	8

Figure 4 — Initial address message with additional information

The following codes are used in the fields of the initial address message with additional information:

a) Label: see section 2

b) Heading code H0 is coded 0001

c) Heading code H1 is coded 0010

d) Calling party category: see section 3.3.1 d)

e) Message indicators: see section 3.3.1 f)

f) Number of address signals: see section 3.3.1 g)

g) Address signals: see section 3.3.1 h)

h) First indicator octet

bit A: Network capability or user facility information indicator. Always set to:
0 network capability or user facility information not included

bit B: Closed user group information indicator. Always set to:
0 closed user group information not included

bit C: Additional calling party information indicator. Always set to:
0 additional calling party information not included

bit D: Additional routing information indicator. Always set to:
0 additional routing information not included

bit E: Calling line identity indicator.
0 calling line identity not included
1 calling line identity included

bit F: Original called address indicator. Always set to:
0 original called address not included

bit G: Charging information indicator. Always set to:
0 charging information not included

bit H: Spare, reserved for indicting the presence or absence of a second indicator octet.

i) Calling line identity

The basic format of the calling line identity field is shown in figure 5.

	D C B A	D C B A
Calling line identity	Number of address signals	Address indicator
n x 8	4	4

Figure 5 — Calling line identity field

The following codes are used in the subfields of the calling line identity field:

– Address indicators:

bits B A: Nature of address indicator.
0 0 reserved
0 1 reserved
1 0 national significant number
1 1 international number

Note — In the case of international number the number could be incomplete.

bit C: Calling line identity presentation indicator. Note
0 calling line identity presentation not restricted
1 calling line identity presentation restricted

Note — During a period of time, this bit shall be interpreted as calling line presentation restricted, independent of the coding of the bit in the direction to PLMN.

bit D: Incomplete calling line identity indicator. Note
0 no indication
1 incomplete calling line identity

Note — This bit will always be set to 0 for the present service definition for calls from Tvt network.

– Number of address signals:

bits D C B A

0 0 0 0 calling line identity not available indicator

0 0 0 1 to 1 1 1 1 — a code expressing in pure binary representation the number of address signals.

– Calling line address signals:

Each signal is coded as indicated in section 3.3.1.h) as applicable.

3.3.3 Subsequent address message

Not applicable.

3.3.4 Subsequent address message with one signal

Not applicable.

3.4 Forward set-up message

3.4.1 General forward set-up information message

The basic format of the general forward set-up information message is shown in figure 6.

H G F E D C B A	0001	0010	
Response type indicator	Heading code H1	Heading code H0	Label
8	4	4	40

			F E D C B A
Incoming trunk and transit exchange id.	Calling line identity	Spare	Calling party category
n x 8	n x 8	2	6

Figure 6 — General forward set-up information message

The following codes are used in the fields of the general forward set-up information message:

a) Label: see section 2

b) Heading code H0 is coded 0010

c) Heading code H1 is coded 0001

d) Response type indicator

bit A: Calling party category indicator. Always set to:
0 calling party category not included

bit B: Calling line identity indicator.
0 calling line identity not included
1 calling line identity included

bit C: Incoming trunk and transit exchange: identity indicator.
0 incoming trunk and transit exchange identity not included
1 incoming trunk and transit exchange identity included

bit D: Original called address indicator. Always set to:
0 original called address not included

bit E: Outgoing echo-suppressor indicator. Always set to:
0 outgoing half echo supressor not included

bit F: Malicious call identification indicator. Always set to:
0 malicious call identification not provided

bit G: Hold indicator. Always set to:
0 hold not provided

bit H: Index indicator. Always set to:
0 index not provided

e) Calling party category indicator

bits F E D C B A: Always set to:
0 0 0 0 0 0 unknown source

f) Calling line identity

Formats and codes are the same as used in the calling line identity contained in the initial address message with additional information (see section 3.3.2).

g) Incoming trunk and transit exchange identity

The basic format of the incoming trunk and transit exchange identity field is shown in figure 7.

D C B A			D C B A	D C B A
Field length indicator	Spare	Transit exchange identity	Exchange identity ind.	Identity type indicator
4	4	n x 8	4	4

Figure 7 — Incoming trunk and transit exchange identity field

The following codes are used in the subfields of the incoming trunk and transit exchange identity field:

- Identity type indicator

bits B A
0 0 spare
0 1 reserved
1 0 available part of calling line identity
1 1 spare

bits D C
0 0 spare

- Exchange identity length indicator

A code expressing in pure binary representation the number of address signals included in the transit exchange identity subfield for the case when the part of the calling line identity is used for this purpose.

- Transit exchange identity

A code consisting of:

a part of the calling line identity, in which case each address digit cointained in this identity is coded as indicated in 3.3.1 h) where applicable.

- Field length indicator

Always coded 0000

3.4.2 Continuity-check message

Not applicable.

3.5 Backward set-up request message

3.5.1 General request message

The basic format of the general request message is shown in figure 8.

H G F E D C B A	0001	0011	
Request type indicators	Heading code H1	Heading code H0	Label
8	4	4	40

Figure 8 — General request message

The following codes are used in the fields of the general request message:

a) Label: see section 2

b) Heading code H0 is coded 0011

c) Heading code H1 is coded 0001

d) Request type indicator

bit A:
0 no calling party request

bit B:
0 no calling line identity request
1 calling line identity request

bit C:
0 no original called address request

bit D:
0 no malicious call identification encountered

bit E:
0 hold not request

bit F:
0 no outgoing half echo suppressor requested

bit G:
0 index not provided

bit H: Spare.
0

3.6 Successful backward set-up information message

3.6.1 Address-complete message

The basic format of the address-complete message is shown in figure 9.

H G F E D C B A	0001	0100	
Message indicators	Heading code H1	Heading code H0	Label
8	4	4	40

Figure 9 — Address-complete message

The following codes are used in the fields of the address-complete message:

a) Label: see section 2

b) Heading code H0 is coded 0100

c) Heading code H1 is coded 0001

d) Message indicators

bits B A: Type of address-complete signal indicators.
0 0 reserved
0 1 address-complete signal, charge
1 0 reserved
1 1 reserved

bit C: Subscriber-free indicator.
0 no indication
1 subscriber-free

bit D: Incoming echo suppressor indicator.
0 no incoming half echo suppressor included
1 incoming half echo suppressor included

bit E: Call forwarding indicator. Always set to:
0 call not forwarded

bit F: Signalling path indicator.
0 any path
1 all signalling system No.7 path

bit H G: Spare, for national use.
0 0

3.7 Unsuccessful backward set-up information message

3.7.1 Simple unsuccessful backward set-up information message

The basic format of the simple unsuccessful backward set-up information message is shown in figure 10.

	0101	
Heading code H1	Heading code H0	Label
4	4	40

Figure 10 – Simple unsuccessful backward set-up information message

The following codes are used in the fields of the simple unsuccessful backward set-up information message:

a) Label: see section 2

b) Heading code H0 is coded 0101

c) Heading code H1 contains signal codes as follows:

0000 spare
0001 switching-equipment-congestion signal
0010 circuit-group-congestion signal
0011 national-network-congestion signal
0100 address-incomplete signal
0101 call-failure signal
0110 subscriber-busy signal (electrical)
0111 unallocated-number signal
1000 line-out-of-service signal
1001 send-special-information-tone signal
1010 access barred signal
1011 digital path not provided signal
1100 spare, for national use
1101 spare
1110 spare
1111 reserved

3.8 Call supervision message

The basic format of the call supervision message is shown in figure 11.

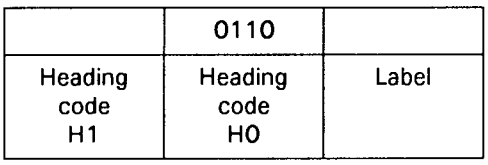

Figure 11 — Call supervision message

The following codes are used in the fields of the call supervision message:

a) Label: see section 2

b) Heading code H0 is coded 0110

c) Heding code H1 contains signal codes as follows:

0000 reserved
0001 answer signal, charge
0010 reserved
0011 clear-back signal
0100 clear-forward signal
0101 re-answer signal
0110 reserved
0111 reserved
1000 to 1110 spare
1111 reserved

3.9 Circuit supervision message

The basic format of the circuit supervision message is shown figure 12.

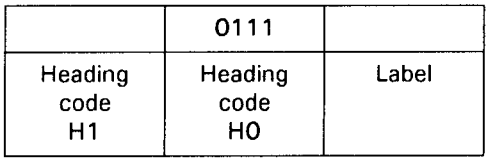

Figure 12 — Circuit supervision message

The following codes are used in the fields of the circuit supervision message:

a) Label: see section 2

b) Heading code H0 is coded 0111

c) Heading code H1 contains signal codes as follows:

0000 spare
0001 release-guard signal
0010 blocking signal
0011 blocking-acknowledgement signal
0100 unblocking signal
0101 unblocking-acknowledgement signal
0110 continuity-check-request signal
0111 reset-circuit signal
1000 to 1111 spare

3.10 Circuit group supervision message

The basic format of the circuit group supervision message is shown in figure 13.

			1000	
Status	Range	Heading code H1	Heading code H0	Label
n x 8 0 < n < 32	8	4	4	40

Figure 13 — Circuit group supervision message

The following codes are used in the fields of the circuit supervision message:

a) Label: see section 2

b) Heading code H0 is coded 1000

c) Heading code H1 contains message codes as follows:

0000 spare
0001 maintenance oriented group blocking message
0010 maintenance oriented group blocking-acknowledgement message
0011 maintenance oriented group unblocking message
0100 maintenance oriented group unblocking-acknowledgement message
0101 hardware failure oriented group blocking message
0110 hardware failure oriented group blocking-acknowledgement message
0111 hardware failure oriented group unblocking message
1000 hardware failure oriented group unblocking-acknowledgement message
1001 circuit group reset message
1010 circuit group reset-acknowledgement message
1011 to 1110 reserved
1111 spare

d) Range

Not all zero: The message is related to a whole circuit group or a part thereof, and includes a status field unless the message is the circuit group reset message. The number of consecutive circuits to be handled is in-dicated by the value contained in the range field in-creased by 1. The CIC of the first circuit to be handled is given in the label. The number of circuit to be indicated is 2 (range value 1) to 256 (range value 255).

e) Status field

All circuit group supervision messages except the circuit group reset message include a status field containing status indicator bits when the range field is not coded all zero. The number of status indicator bits is indicated by the value given in the range field increased by one.

The status field contains up to 256 one bit status indicators. The first status indicator bit is related to the circuit indicated by the CIC contained within the label, the second one is related to the circuit address by the CIC contained in the label increased by 1.

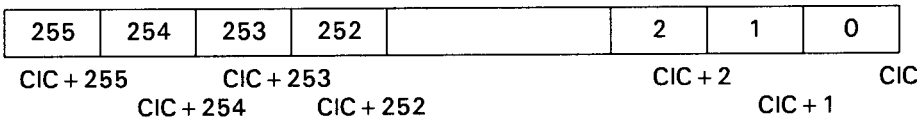

Figure 14 — Status indicator field

The CIC of the last circuit concerned is obtained by adding the value given in the range field to the CIC in the label. The status field consists of an integral number of octets. Bits within the last octet that are not used as status indicators are filled with zeros.

The status bits are coded as follows:

– in all group blocking messages
0 no blocking
1 blocking

– in all group blocking-acknowledgement message
0 no blocking acknowledgement
1 blocking acknowledgement

– in all unblocking messages
0 no unblocking
1 unblocking

– in all group unblocking-acknowledgement message
0 no unblocking-acknowledgement
1 unblocking acknowledgement

– in circuit group reset-acknowledgement messages
0 no blocking for maintenance reasons
1 blocking for maintenance reasons

The number of circuits affected by a group supervision message is limeted to 32 or less. For the group reset message this requires that the range value is 31 or less. For the group blocking and unblocking messages the range value may be up to 255, but the number of status bits set to 1 must be 32 or less.

3.11 Node-to-node messages

Not applicable.

3.12 Abbreviations

ACB Access barred signal
ACM Address complete message
ADI Address incomplete signal
ANC Answer signal, charge
BLA Blocking-acknowledgement signal
BLO Blocking signal
BSM Backward set-up message
CBK Clear-back signal
CCM Circuit supervision message
CCR Continuity-check-request signal
CFL Call-failure signal
CGC Circuit-group-congestion signal
CIC Circuit Identification Code
CLF Clear-forward signal
CSM Call supervision message
DPC Destination Point Code
DPN Digital path not provided signal
FAM Forward address message
FSM Forward set-up message
GRA Circuit group reset-acknowledgement message
GRM Circuit group supervision message
GRQ General request message
GRS Circuit group reset message
GSM General forward set-up information message
HBA Hardware failure oriented group blocking-acknowledgement message
HGB Hardware failure oriented group blocking message
HGU Hardware failure oriented group unblocking message
HUA Hardware failure oriented group unblocking-acknowledgement message
IAI Initial address message with additional information
IAM Initial address message
LOS Line-out-of-service signal
MBA Maintenance oriented group blocking-acknowledgement message
MGB Maintenance oriented group blocking message

MGU	Maintenance oriented group unblocking message
MUA	Maintenance oriented group unblocking-acknowledgement message
NNC	National-network-congestion signal
OPC	Originating Point Code
RAN	Re-answer signal
RLG	Release-guard signal
RSC	Reset-circuit signal
SBM	Successful backward set-up information message
SEC	Switching-equipment-congestion signal
SSB	Subscriber-busy signal (electrical)
SST	Send-special-information tone signal
UBA	Unblocking-acknowledgement signal
UBL	Unblocking signal
UBM	Unsuccessful backward set-up information message
UNN	Unallocated-number signal

4.2 Q.724, Signalling procedures

1 Normal call set-up

In this specification the signalling procedures are described for the normal call set-up of a call between the PLMN and a PSTN. The messages and signals are defined in part 1.

1.1 Initial address message

Only one initial address messages is applicable for the traffic between the PLMN and a PSTN and that is the Initial Address Message (IAM). The use of Initial Address message with additional Information (IAI) is for further study and will be determined on bilateral agreements.

1.2 Subsequent address message

Not applicable.

1.3 End-of-pulsing (ST) signal

The determination whether the full number has been received is made by the receipt of sending complete indication from the MS. When the end of pulsing condition is determined, a ST signal will be sent. It will be included in the IAM/(IAI).

1.4 Continuity-check of the telephone circuits

Not applicable.

1.5 Cross-office check

Not applicable.

1.6 Address-complete signals

An electrical called-party's-line-condition signal shall always be provided, when possible. Address complete charge signal with subscriber free indication is used for a normal successful call terminating in a MSC in PLMN. This corresponds to the alerting condition at BS-MS interface.

After an address-complete signal, only the following signals relating to the call set-up may be sent in the backward direction:

a) in normal operation, one of the answer or release guard signals;

b) call-failure signal; or

c) congestion signals.

Note — Case b) can occur up to the receipt of answer signal.
Case c) can only occur after an address complete signal without subscriber free.

Any further information about the called-party's-line-condition will be transmitted to the calling subscriber or operator as audible tones or announcements.

1.7 Address-incomplete signal

The determination that the proper number of digits has not been received can be made when the IAM/(IAI) is received. If the address is not complete an address-incomplete signal is sent.

Each Signalling System No.7 exchange on receipt of the address-incomplete signal will send the signal to the preceding Signalling System No.7 exchange, if any, and clear forward the connetion. The first Signalling System No.7 exchange will send a suitable signal on the preceding circuit if the related signalling system permits to do so; otherwise the appropriate tone or announcement for the national network concerned will be sent to the calling party.

1.8 Congestion signals

As soon as the congestion condition is detected one of the congestion signals (see Recommendation Q.722, 3.4) is sent.

Reception of a congestion signal at any Signalling System No.7 exchange will cause the clear-forward signal to be sent and cause an appropriate signal to be sent to the preceding exchange if the signalling system allows this or an appropriate tone or announce-ment to be sent to the originating subscriber or operator.

1.9 Called-party's-line-condition signals

The called-party's-line-condition signal (see Recommendation Q.722, 3.4) will be sent when the appropriate signals are received at the BS-MS interface.

On receipt of one of these signals, the first Signalling System No.7 exchange will clear forward the connection and cause an appropriate signal to be sent to the preceding exchange if the signalling system allows this or an appropriate tone or announcement to be sent to the originating subscriber or operator.

Each Signalling System No.7 exchange on receipt of one of these signal has to clear forward the connection.

The called-party's-line-condition signals are:

- subscriber busy,
- line-out-of service, and
- unallocated number.

1.10 Answer signals

Answer signal, unqualified and Answer signal, charge can be received. All Answer signals will be treated as Answer signal, charge.

1.11 Clear-back signal

A clear-back signal must not disconnect the speech path at a Signalling System No.7 exchange. The requirements for the release of a connection in the event that a clear-forward signal is not received are given in Recommendation Q.118.

1.12 Reanswer and clear-back sequence

Subsequent off-hook, on-hook signals from the called party, such as will result from switch-hook flashing will cause the following sequence of signals to be sent:

- clear-back,
- reanswer,
- clear-back,
- reanswer,
- etc.

It is necessary that a flashing sequence be retransmitted to the the operator (or the preceding link) and that the final condition of the circuit represents the final position of the called party's switch hook.

1.13 Forward-transfer signal

Not applicable.

1.14 Clear-forward and release-guard sequence

The clear-forward signal is overriding and all exchanges must be in a position to respond by releasing the circuit and sending a release-guard signal at any time during the progress of a call and even if the circuit is in the idle condition. If sent while a circuit is blocked it will not result in unblocking the circuit concerned (see section 5). The fact that the circuit is blocked will not delay the transmission of the release-guard signal.

1.15 Reset of circuits and circuit groups

If the memory becomes mutilated the circuits must be reset to the idle condition in both exchanges to make them available for new traffic. Since the exchange with the mutilated memory does not know whether the circuits are idle, busy, blocked, etc, reset-circuit signals or a circuit group reset message are sent as appropriate for the affected circuits. The reset-circuit signal may also be sent, in certain cases, when a signalling fault occurs.

1.15.1 Reset-circuit signal

If only a few circuits are concerned a reset-circuit signal will be sent for each affected circuit.

On receipt of a reset-circuit signal the unaffected exchange will:

a) accept the signal as a clear-forward signal and respond by sending a release-guard signal, after the circuit has been made idle, if it is the incoming exchange on a connection in any state of call set-up or during a call;

b) accept the signal as a clear-back or call-failure signal, whichever is appropriate, and respond by sending a clear-forward signal immediately if it is the outgoing exchange on a connection;

c) accept the signal as a clear-forward signal and respond by sending a release-guard signal if the circuit is in the idle condition;

d) if it has previously sent a blocking signal, or if it is unable to release the circuit as described above, respond by the blocking signal. If an incoming or outgoing call is in progress, this call is disconnected and the circuit returned to the idle (blocked) state. A clear-forward or release-guard signal may be sent. The blocking signal must be acknowledged by the affected exchange. If the acknowledgement is not received, the repetition procedure specified in section 6.4.4 is followed;

e) if it has previously received the blocking signal, respond by disconnecting any connected call, remove the blocking condition and restore the circuit to the idle state. If an outgoing call has been in progress, respond with a clear-forward or, in all other cases, a release-guard signal;

f) if a reset-circuit signal is received after the sending of an initial address message but before receipt of a backward signal relating to that call, clear the circuit and make an automatic repeat attempt on another circuit if appropriate;

g) if a reset-circuit signal is received after having sent a reset-circuit signal, respond by a release-guard signal. The circuit is restored to traffic;

h) send an appropriate clearing signal on an interconnected circuit (e.g., clear-forward, or a suitable backward signal).

The affected exchange will then reconstruct its memory according to the received acknowledgement to the reset-circuit signal, and respond to the signals received in the normal way, i.e. release-guard in response to a clear-forward, blocking-acknowledgement in response to a blocking signal.

In addition, an interconnected circuit is cleared by the use of an appropriate signal. If no acknowledgement to the reset-circuit signal is received before 4-15 seconds the reset-circuit signal is repeated. If an acknowledgement for the signal is not received within 1 minute after the sending of the initial reset-circuit signal, maintenance personnel are notified to permit manual restoration procedures. However, the sending of the reset-circuit signal continue at 1 minute intervals until maintenance intervention occurs.

1.15.2 Circuit group reset message

If a considerable number of circuits are affected by the memory mutilation, circuit group reset messages are used to make these circuits available for new traffic.

Since the effect of erroneous circuit group reset messages generated by undetected errors may seriously affect the quality of service, each circuit group reset message has to be sent twice.

On receipt of two circuit group reset messages within 5 seconds for the same group or parts thereof the unaffected exchange will:

i) If the range field is not coded all zero:

a) restore the circuits involved to the idle state;

b) send the appropriate group blocking message(s) if it had previously sent a hardware failure oriented group blocking message;

c) respond by a circuit group reset-acknowledgement message in which the status indicator bits of the circuits available for service or blocked for reasons of hardware failure alarm are coded 0 and the status indicator bit of all circuits blocked for maintenance reasons are set to 1.

ii) If the range field is coded all zero:

Not used.

iii) The following actions should take place in the unaffected exchange after receipt of two circuit group reset signals within 5 seconds:

a) if it had previously received (a) blocking signal(s) or (a) blocking message(s) for one or more of the circuit(s) involved the blocked condition will be removed and the circuits will be made available for service;

b) if a circuit group reset message is received after having sent a circuit group reset message or (a) reset circuit signal(s) the circuits involved in both the sent and the received message/signal(s) are made available for service;

c) appropriate signals will be sent on interconnected circuits to release them.

The affected exchange will then reconstruct its memory according to the possibly received blocking messages and the received circuit group reset-acknowledgement message. It will respond to the possible received group blocking messages in the normal way.

If no acknowledgement to a circuit group reset message is received before 4-15 seconds the circuit group reset message is repeated (twice). If acknowledgement for the message is not received within 1 minute after sending the initial circuit group reset message maintenance personnel will be notified to permit manual restoration procedures.

However, the sending of the circuit group reset message continue at 1 minute intervals until maintenance intervention occurs.

2 Dual seizure with both-way operation

2.1 Dual seizure

Since Signalling System No.7 circuits have the capability of both-way operation, it is possible that the two exchanges will attempt to seize the same circuit at approximately the same time.

The use of both-way operation or one-way operation is based on bilateral agreements.

2.2 Unguarded interval

Considering that with Signalling System No.7:

a) signalling data link propagation time may be relatively long;

b) there may be significant delay due to retransmissions;

c) quassi-associated operation may add extra message transfer time(s) at signalling transfer points;

the unguarded interval during which dual seizure can occure may be relatively long in some instances. The exchanges must therefore detect dual seizure and take action as defined in section 2.5.

2.3 Detection of dual seizure

A dual seizure is detected by an exchange from the fact that it receives an Initial Address Message for a circuit for which it has sent an Initial Address Message.

2.4 Preventive action

Different methods for circuit selection can be envisaged to minimize the occurrence of dual seizure. In the following, two methods are described. Further study is required to determine the field of application of each method and to ensure that the two methods do interwork satisfactorily.

Other methods for circuit selection may also be used provided that they give the same degree of protection against dual seizure also when one of the methods specified is used at the other end.

Method 1:

An opposite order of selection is used at each terminal exchange of a both-way circuit group.

Method 2:

Each terminal exchange of a both-way circuit group has priority access to the group of circuits which it is controlling (see section 2.5). Of this group the circuit which has been released the longest is selected (first-in, first-out). In addition each terminal exchange of a both-way circuit group has nonpriority access to the group of circuits which it is noncontrolling. Of this group the latest released circuit is selected (last-in, first-out).

For call control purposes a both-way circuit group can be subdiveded into subgroups in an exchange.

It is necessary to take preventive action in cases where Signalling System No.7 uses a signalling data link with long propagation time.

2.5 Action to be taken on detection of dual seizure

Each exchange will control one half of the circuits in a both-way circuit group. On detection of a dual seizure, the call being processed by the control exchange for that circuit will be completed and the received Initial Address Message will be disregarded.

Under these conditions, the call being processed by the control exchange will be allowed to complete although, when continuity-check has to be preformed, the continuity of the circuit may have been checked in the direction from noncontrol to control only. The call being processed by the noncontrol exchange will be backed off, switches released, the continuity-check transceiver removed, and the check-loop connected unless or until a continuity signal has been received from the control exchange. A clear-forward signal will not be sent. The noncontrol exchange will make an automatic repeat attempt on the same or on an alternate route.

For the purpose of resolution of dual seizure on both-way circuits, the exchange with the higher signalling point code will control all even-numbered circuits (circuit identification code) and the other exchange the odd-numbered circuits.

3 Automatic repeat attempt

Automatic repeat attempt, as defined in Recommendation Q.12, is provided in Signalling System No.7.

An automatic repeat attempt will be made:

- on detection of dual seizure (at the noncontrol exchange)(see section 2.5);
- on receipt of the blocking signal after sending an initial address message and before a backward signal has been received;
- on receipt of a reset-circuit signal after sending an initial address message and before a backward signal has been received;
- on receipt of unreasonable signalling information after sending an initial address message and before one of the backward signals required for call set-up has been received.

4 Speed of switching and signal transfer in GMSC

4.1 Outgoing GMSC

At the outgoing GMSC:

- the initial address message is sent as soon as all the digits of the address are received and the outgoing circuit has been chosen.

4.2 Transit exchange

Not applicable.

4.3 Incoming GMSC

At the incoming GMSC:

- the setting-up of the PLMN part of the connection start as soon as all the digits of the address have been received.

5 Blocking and unblocking of circuits and circuits groups

The circuit blocking (unblocking) signal and the group blocking (unblocking) message are provided to permit the switching equipment or maintenance personnel to remove from (and return to) traffic, the distant terminal(s) at a circuit or circuit group because of a fault or to permit testing.

Since circuits served by the Signalling System No.7 have both-way capability, the blocking signal or a group blocking message can be originated by either exchange.

The receipt of the blocking signal or a group blocking message will have the effect of prohibiting calls on the relevant circuit(s) outgoing from that exchange until an unblocking signal or the appropriate group unblocking message is received, but will not in itself prohibit calls incoming to that exchange.

Acknowledgement sequences are always required for the blocking and unblocking signals as well as for the group blocking and group unblocking messages, using the blocking-acknowledgement signal, the unblocking-acknowledgement signal, the appropriate group blocking-acknowledgment message and the appropriate group unblocking-acknowledgement message, respectively.

The acknowledgement is not sent until the appropriate action, either blocking or unblocking, has been taken.

The clear forward signal will not override a blocking condition and return circuits to service which might be faulty.

(A) blocked circuit(s) will be returned to service on transmission of the unblocking-acknowledgement signal or the appropriate group unblocking-acknowledgment message at one exchange and on receipt of the unblocking-acknowledgment signal or the appropriate group unblocking-acknowledgement message at the other exchange.

The message Maintenance oriented group blocking message, MGB is never sent, but it is possible to receive the message.

The circuit group reset message is never related to a predeterminad circuit group. Every blocking and unblocking message is individual. This means that if a circuit is blocked because of several blocking conditions it is necessary to receive an unblocking message for every type of blocking before the circuit can be taken into service.

5.1 Other actions on receipt of a blocking signal

In the event of the receipt of a blocking signal:

- after an initial address message has been sent, and
- before a backward signal relating to that call has been received,

an automatic repeat attempt will be made on another circuit. The exchange receiving the blocking signal will clear forward the original attempt in the normal manner after sending the blocking-acknowledgement signal.

If the blocking signal for a circuit is received:

- in the outgoing exchange after at least one backward signal relating to a call has been received, or
- in the incoming exchange after at least one backward signal relating to a call has been sent,

the exchange will not seize that circuit for subsequent calls.

The fact that the circuit is engaged on a call will not delay transmission of the blocking (unblocking)-acknowledgement signal.

If a blocking signal is sent and subsequently an initial address message is received in the opposite direction, the following action is taken:

- for test calls, the call is accepted, if possible. In the case where the test call cannot be accepted, the blocking signal must be returned;
- for calls other than test calls, the blocking signal must be returned.

Blocking of a circuit that has not been withdrawn from service by use of the blocking signal must not exceed five minutes, after which an alarm will be given at each terminal of the circuit. Should a call be in progress on the circuit involved, the five minutes time will commence when that call is cleared. If the work on the circuit must exceed five minutes, the circuit should be withdrawn from service.

5.2 Group blocking and unblocking messages

The following group blocking (unblocking) messages and the appropriate acknowledgement messages are provided:

- maintenance oriented group blocking (unblocking) message, MGB (MGU). (These messages are never sent. It is possible to receive these messages);
- hardware failure oriented group blocking (unblocking) message, HGB (HGU);

The range of circuits to be blocked (unblocked) is dependent on the coding of the range field:

- If the range field is not coded all zero, the circuit indicated in the status field have to be blocked (unblocked).

The same rule applies to the acknowledgements.

Since the effect of erroneous group blocking (unblocking) messages generated by undetected errors may seriously affect the quality of service, each group blocking (unblocking) message has to be sent twice. Therefore, at the receiving exchange actions only take place after a blocking (unblocking) message was received twice within 5 seconds.

For the circuits blocked for maintenance reasons the same conditions apply and the same actions have to be taken as described in section 5.1.

For the circuits blocked for reasons of hardware failure, the following actions will be taken:

- the maintenance personnel has to be alerted;
- all interconnected circuits have to be released by the appropriate signals;
- the affected circuits are set to the condition idle/hardware blocked without any exchange of release signals.

6 Release of connections and associated equipment

6.1 Normal release conditions

Connections are normally released in the forward direction as a result of the receipt of a clear-forward signal from the preceding exchange.

In addition, the normal release of connections (or circuits) occurs as follows:

- on receipt of an address-incomplete signal (see section 1.7);

- on receipt of one of the congestion signals (see section 1.8);
- on receipt of one of the called-party's-line-condition signals (see section 1.9);
- on receipt of the blocking signal or the maintenance oriented group blocking message after sending an initial address message and before a backward signal relating to that call has been received (see section 5);
- on receipt of unreasonable signalling information after sending an initial address message and before one of the backward signals required for call set-up has been received (see section 6.5);

If the conditions for the normal release of connections as described above are not fulfilled, release is provided as follows:

- in the release under abnormal conditions (see section 6.4);
- on receipt of a call-failure signal (see section 6.3);
- on failure to receive a clear-forward signal after sending a clear-back signal (see section 6.4);
- on failure to receive an answer signal (see section 6.4);
- on receipt of a reset-circuit signal or circuit group reset message (see section 1.15).

Address and routing information are released from memory in each of the exchanges of a connection as described in the following subsections.

6.1.1 Outgoing GMSC

Address and routing information stored at the outgoing GMSC can be erased on receipt of one of the following backward signals:

a) one of the address-complete signals,

b) the address-incomplete signal,

c) one of the congestion signals,

d) one of the called-party's-line-condition signals,

e) the call-failure signal,

or when the connection is cleared earlier and no automatic repeat attempt has to be made.

6.1.2 Incoming GMSC

Address and routing information stored at the incoming GMSC will be erased on receipt of one of the backward signals indicated in section 6.1.1 (or equivalent) from the PLMN signalling system, or when one of the following signals has been originated and sent to a PSTN:

a) one of the address-complete signals,

b) the address-incomplete signal,

c) one of the congestion signals,

d) the call-failure signal,

e) the reset-circuit signal, or circuit group reset message,

or on receipt of a clear-forward signal.

6.1.3 Transit exchange

Not applicable.

6.2 Abnormal release conditions — clear-forward, release-guard sequences

6.2.1 Inability to release in response to a clear-forward signal

Not applicable.

6.2.2 Inability to release in response to a backward signal

Not applicable.

6.2.3 Failure to receive a release-guard signal in response to a clear-forward signal

If a release-guard signal is not received in response to a clear-forward signal before 4-15 seconds, the clear-forward signal is repeated.

If, after sending a clear-forward signal, a release-guard signal is not received within a period of one minute after the first clear-forward signal, the maintenance personnel must be alerted. The repetition of the clear-forward signal is ceased, and circuit reset is initiated.

6.3 Call-failure signal

The call-failure signal is sent as the result of time-out situations, described in section 6.4 and whenever a call attempt fails and other specific signals do not apply, viz:

- the address-incomplete signal,
- the congestion signals, or
- the called-party's-line-condition signal.

Reception of the call-failure at any Signalling System No.7 exchange will cause the clear-forward signal to be sent and, if the signalling system permits to do so, the appropriate signal to be sent to the preceding exchange or the appropriate tone or announcement to be sent to the national network.

Failure to receive a clear-forward signal within 4-15 seconds of sending a call-failure signal causes the latter to be repeated. If no clear-forward signal is received within 1 minute of sending the call-failure signal, repetition of the call-failure signal is ceased, maintenance personnel is alerted and circuit reset is initiated.

6.4 Abnormal release condition — Other sequences

If the conditions for normal release as covered in section 6.1 are not fulfilled, release will take place under the following conditions.

6.4.1 Outgoing GMSC

An outgoing exchange will:

a) release all equipment and clear forward the connection on failure to meet the conditions for normal release of address and routing information before 20-30 seconds after sending the latest address message;

b) release all equipment and clear forward the connection on failure to receive an answer signal within the interval specified in Recommendation Q.118;

c) release all equipment and clear forward the connection on failure to receive a clear-forward signal from the national network after having received a clear-back signal within the interval specified in Recommendation Q.118.

6.4.2 Incoming GMSC

An incoming GMSC will:

a) release all equipment, clear forward the connection into the national network and send back a call-failure signal in the follow cases:

- on failure to receive one of the backward signals from a national network before 20-30 seconds after receipt of the latest address message, unless the timing for sending the address-incomplete signal is provided; or
- on receipt of an address-incomplete signal after an address-complete signal has been generated.

b) send the call-failure signal on failure to receive a clear-forward signal for the incoming circuit before 4-15 seconds after sending an address-incomplete, congestion, call failure or a called-party's-line-condition signal indicating inability to complete the call.

If a clear-forward signal is not received within a period of one minute after sending the call-failure signal, the repetition of the call-failure signal will be ceased, maintenance personnel will be alerted, and a reset-circuit signal is sent for the concerned circuit.

c) release all equipment and clear forward the connection into the national network on failure to receive a clear-forward signal after sending a clear-back signal within the interval specified in Recommendation Q.118.

6.4.3 Transit exchange Not applicable.

6.4.4 Failure in the blocking/unblocking sequence

An exchange will repeate the blocking (unblocking) signal or the group blocking (unblocking) messages on failure to receive the appropriate acknowledgement in response to one of the signals/messages before 4-15 seconds (see section 5).

If an acknowledgement is not received within a period of one minute after sending the initial blocking (unblocking) signal or the group blocking (unblocking) messages, maintenance personnel are alerted, the repetition of the blocking (unblocking) signal or group blocking (unblocking) messages are continued at one minute intervals.

6.5 Receipt of unreasonable signalling information

The Message Transfer Part of the signalling system will avoid mis-sequencing, or double delivery, of messages with a high realibility (Recommendation Q.706 2). However, undetected errors at the signalling link level and exchange malfunctions may produce signalling information in messages that is either ambiguous or inappropiate.

In order to resolve some possible ambiguites in the state of a circuit when unreasonable signals are received the following will apply:

a) if a clear-forward signal is received relating to an idle circuit it will be acknowledged with a release-guard signal;

b) if a realese-guard signal is received relating to a circuit for which a clear-forward signal has not been sent, the following actions will be undertaken:

- if the circuit is idle, the realese-guard signal is dicscarded;
- if the circuit is seized by a call, the realese-guard signal is considered as an ordinary unreasonable information (see item g);

c) if a blocking signal is received for a blocked circuit, a blocking-acknowledgement signal will be sent;

d) if a unblocking signal is received for an unblocked circuit, an unblocking-acknowledgement signal will be sent;

e) if a blocking-acknowledgement signal for which no blocking signal has been sent is received:

- relating to a circuit blocked by sending a blocking signal, the blocking-acknowledgement will be discarded;
- relating to a circuit which is not blocked by sending a blocking signal, an unblocking signal will be sent;

f) if an unblocking-acknowledgement signal for which no unblocking signal has been sent, is received:

- relating to a circuit blocked by sending a blocking signal, the blocking signal will be sent;
- relating to a circuit which is not blocked by sending a blocking signal, the unblocking-acknowledgement signal will be discarded;

g) if other unreasonable signalling information is received, the following actions will be undertaken:

- if the circuit is idle, the reset-circuit signal is sent;
- if the circuit is seized by a call, after receipt of a backward signal required for the call set-up, the unreasonable signalling information is discarded;
- if the circuit is seized by a call, before receipt of a backward signal required for the call set-up, the reset-circuit signal is sent. If the circuit is seized by an incoming call, the call will be released. If the circuit is seized by an outgoing call, an automatic repeat attempt is provided on another circuit.

7 Continuity circuit for 4-wire speech circuits

Not applicable.

8 Continuity check on 2-wire circuits

Not applicable.

9 Interruption control for multiplex systems

Not applicable.

10 Supplementary services

In this part the signalling procedures relating to a number of supplementary services are described.

10.1 Closed user group

Not applicable.

10.2 Users access to the calling line identification

Not applicable.

10.3 Users access to the called line identification

Not applicable.

10.4 Redirection of calls

10.4.1 General

The redirection of calls facility enables a user to have calls to a telephone number, for which the facility is subscribed, redirected to another predetermined number during periods when the facility is activated.

Depending on the possibilities offered by the administation facility, activation and deactivation may be made:

a) by the user by means of user controlled activation and deactivation procedures;

b) by the network at predetermined times;

c) by the administration on request of the user.

User controlled procedures for inquiry of status of the facility may also be provided.

A call may only be redirected once.

10.4.2 Call set-up procedure not involving other facilities affecting the procedure

Information that a subscriber has the redirection of calls facility activated is stored together with the redirection address, at the exchange to which the user is connected. When such a user is called, the call is set up to the redirection address in accordance with the following.

10.4.2.1 The redirection address is at the same exchange

In this case the destination exchange connects the call to the redirection address and returns an address complete message.

10.4.2.2 The redirection address is at another exchange

The call forwarding procedure is based on the principle that the connection is extended forward from the destination exchange to the new destination exchange.

i) The first destination exchange sets up the forward connection to the redirection address. The initial address message forwarded includes a call forwarding indicator.

ii) Upon receipt of the redirected call the new destination exchange connects or rejects the call. The call forwarding indicator received may be used to prevent a further redirection. In the case when the redirection address does not belong to the own network the call is rejected.

iii) In the case where the call is connected to the redirection address the destination exchange will send an address complete message.

10.4.3 Calls involving other facilities affecting the procedure

Not applicable.

10.5 Completion of calls to a busy subscriber

Not applicable.

10.6 Network access to the calling line identification

General

In normal operation the calling line identity is not transferred across the networks. However, during certain circumstances e.g. malicious calls it may be needed to transfer the calling line identity across the network boundaries. Therefore, after operational and administrative agreements it should be possible to request the calling line identity.

The malicious call identification gives the possibility by an appropriate request from the called subscriber the identification of the calling line. In the case of a redirected call the calling line identity is the redirecting number. The identification request from the called party provokes an out-print at the destination exchange.

Procedures

The procedure is only invoked for an incoming call to a subscriber that has the special marking for this capability. For each call to that subscriber a request for the identity is made. As a respons to the request the calling line is returned.

If the call crosses the network interface between the PSTN and the PLMN and the called party is marked for the malicious call identification service the following procedure take place.

- The request for calling line identity is transferred in a General Request message. In the message the calling line identity request (bit B) is set to 1.
- The response is transported in a General Forward set-up information message.
  - In the case the complete CLI is available the Response type indicator (bit BC) are set to 10 and the Address indicator (bit C) is set to 0.
  - In the case where the calling line identity is not complete the Response type ind. (bit BC) are set to 01 and the available part of the CLI is sent in the Transit exchange identity field.
  - In the case where no agreements exists for providing the calling line identity, the Response type indicator (bit BC) are set to 00 and Address indicator (bit C) is set to 1.

10.7 Digital connectivity Not applicable.

11 Echo suppressor procedure

I General

The echo control procedure is used on a per call basis to convey information between exchange nodes about the demand and ability to insert echo control devices.The echo control procedure is applicable only for speech.

The procedure is invoked when a an exchange knows that echo contol device is necessary for the call. It could be initiated at the originating exchange or at an intermediate exchange.

A Calls from the PLMN

1. Forward direction

a. Actions in the originating PLMN

If the originating PLMN has sufficient information to determine that echo control is necessary for the outgoing circuit then:

- an outgoing half echo control device is enabled; and
- the echo supressor indicator of the message indicators parameter field in the IAM is set.
- an incoming half echo control device is reserved

b. Actions at an intermediate exchange outside the PLMN

If an intermediate exchange has sufficient information to determine that echo control is required for the outgoing circuit then one of the following actions can occur:

a) When the echo supressor indicator of the message indicators parameter field in the IAM indicates that an echo control device is already included:

- no change to the echo supressor indicator of the message indicators parameter field in the IAM is made;
- an incoming half echo control device is reserved; and
- any outgoing half echo control device is disabled.

b) When the the echo supressor indicator of the message indicators parameter field in the IAM does not indicate that an echo control device is already included:

Not applicable

If the intermediate exchange has sufficient information to determine that echo control is not required for the outgoing circuit then one of the following actions can occur:

a) When the echo supressor indicator of the message indicators parameter field in the IAMthe s parameter field in the IAM indicates that an echo control device is already included:

- no change to the echo supressor indicator of the message indicators parameter field in the IAMthe s parameter field in the IAM is made; and
- an incoming half echo control device is reserved.

b) When the the echo supressor indicator of the message indicators parameter field in the IAM does not indicate that an echo control device is already included:

- no additional action is required.

c. Actions at the destination exchange

See Section 11.1.2.1 below.

2. Backward direction

a. Actions at the destination exchange otside the PLMN

Upon the receipt of an IAM with the echo supressor indicator of the message indicators parameter field set the following actions is taken:

- an incoming half echo control device is enabled; and
- the incoming echo suppressor indicator of the message indicators parameter field in the ACM is set.

If the destination exchange is unable to include an incoming half echo control device, the information is conveyed to the preceding exchange by an echo control device indicator in the message indicator field in the address complete message.

b. Actions at an intermediate exchange

Upon receipt of the ACM in response to an IAM with echo control indication, then one of the following actions can occur:

a) When the backward call indicators parameter field indicates that an incoming half echo control device is not already included:

- the reserved incoming half echo control device is included; and

- the echo control device indicator in the message indicators parameter field is set.

b) When the backward call indicators parameter field indicates that an incoming half echo control device is already included:

- the reserved incoming half echo control is released; and
- no change to the backward call indicators parameter field in the backward message is made.

2.8.3.3 Actions at the originating exchange

No additional action is required.

2.8.4 Abnormal situations

If an exchange has enabled an outgoing half echo control device and receives an echo control device indicator in the first backward message indicating that an incoming half echo control device is not included in a succeeding exchange then the following actions are taken:

- the call is not cleared,
- the outgoing half echo control device is not disabled,
- the outing half echo control indicator is sent as received.

If an exchange receives the information that an incoming half echo control device is included in the connection although an outgoing half echo control device is not enabled in this exchange or any preceding exchange, the call is not cleared, and the echo control device indicator is transferred transparently.