EUROPEAN TELECOMMUNICATION STANDARD

ETS 300 303

July 1994

Source: ETSI TC-SPS

Reference: DE/SPS-01008

ICS: 33.080

Key words: ISDN, SS7, ISUP, GSM, mobile, radio, PLMN, interworking

Integrated Services Digital Network (ISDN); ISDN - Global System for Mobile communications (GSM) Public Land Mobile Network (PLMN) signalling interface

ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE
Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE
X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

Tel.: +33 92 94 42 00 - Fax: +33 93 65 47 16

Contents

Foreword

This European Telecommunication Standard (ETS) has been produced by the Signalling Protocols and Switching (SPS) Technical Committee of the European Telecommunications Standards Institute (ETSI).

This ETS specifies the first version of the Integrated Services Digital Network (ISDN) - Global System for Mobile communications (GSM) Public Land Mobile Network (PLMN) signalling interface.

ETS 300 121 (1992) containing the specification of ISDN User Part (ISUP) version 1 is used as a basis for this interface. The appropriate modifications to ETS 300 121 are described in this ETS.

Blank page

1 Scope

This European Telecommunication Standard (ETS) specifies a first version of the Integrated Services Digital Network (ISDN) - Global System for Mobile communications (GSM) Public Land Mobile Network (PLMN) signalling interface. This ETS is applicable to the first interconnection of PLMN and ISDN.

NOTE: A future ETS may cover the application of the ISDN User Part (ISUP) version 2 on the signalling interface.

The ISUP interface defined is the trunk signalling interface between the PLMN and the ISDN. It is assumed that the interface between PLMN and ISDN can occur in any point in a national network.

This signalling interface is based on ISUP version 1 (as given in ETS 300 121 [2]) which supports the following services:

Bearer services:

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

Teleservices:

- Telephony;
- Teletex;
- Telefax Group 4;
- Mixed mode;
- Videotex;
- Telefax Group 2/3.

Supplementary services:

- Calling Line Identification Presentation (CLIP)/Calling Line Identification Restriction (CLIR) supplementary services;
- Connected Line Identification Presentation (COLP)/Connected Line Identification Restriction (COLR) supplementary services;
- Closed User Group (CUG) supplementary service;
- User-to-User Signalling service 1 implicit (UUS1i) supplementary service.

The Direct Dialling In (DDI) supplementary service and Multiple Subscriber Number (MSN) supplementary service have no impact on this interface. The Subaddressing (SUB) supplementary service and Terminal Portability (TP) supplementary service are implicitly supported, as part of the basic ETS 300 121 [2] procedures.

An additional parameter is added to prevent looping of forwarded calls across this interface.

The support of the above mentioned services on this interface does not necessarily imply that the services are supported in one or the other of the networks interconnected.

As this interface is used within national networks, ETS 300 121 [2] is modified to be suitable for ISDN/PLMN applications. The application of the echo control procedures is described.

2 Normative references

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] ETS 300 008 (1991): "Integrated Services Digital Network (ISDN); CCITT Signalling System No.7; Message Transfer Part (MTP) to support international interconnection".

[2] ETS 300 121 (1992): "Integrated Services Digital Network (ISDN); Application of the ISDN User Part (ISUP) of CCITT Signalling System No.7 for international ISDN interconnections (ISUP version 1)".

[3] ETS 300 540: "European digital cellular telecommunications system (Phase 2); Transmission planning aspects of the speech service in the GSM Public Land Mobile Network (PLMN) system (GSM 03.50)".

[4] CCITT Recommendation Q.767 (1991): "Application of the ISDN user part of CCITT signalling system No.7 for international ISDN interconnections".

3 Symbols and abbreviations

For the purposes of this ETS, the following abbreviations apply:

ACM	Address Complete Message
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
COLP	Connected Line Identification Presentation
COLR	Connected Line Identification Restriction
CUG	Closed User Group
DDI	Direct Dialling In
GMSC	Gateway MSC (the exchange where the interrogation of the home location register is performed)
GSM	Global System for Mobile communications
IAM	Initial Address Message
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
MS	Mobile Station
MSC	Mobile-service Switching Centre
MSISDN	Mobile Station ISDN number
MSN	Multiple Subscriber Number
MSRN	Mobile Station Roaming Number
MTP	Message Transfer Part
NI	Network Indicator
PLMN	Public Land Mobile Network
SUB	Subaddressing
TP	Terminal Portability
UUS	User-to-User Signalling
UUS1	UUS service 1
VMSC	Visited MSC

4 Deviations from the provisions of ETS 300 121

4.1 Formats and codes

The formats and codes specified in CCITT Recommendation Q.767 [4] with the exceptions and clarifications described in tables B.1 and B.2 shall be applicable.

4.2 Basic call

The gateway exchanges in both networks behave like international incoming or outgoing gateway or international transit exchanges in the relevant cases as described in CCITT Recommendation Q.767 [4], with the exceptions indicated in this ETS. The basic call procedures of CCITT Recommendation Q.767 [4] are applicable with the following amendments and clarifications.

4.2.1 Calls from the PLMN to the fixed network

4.2.1.1 Gateway in the PLMN

The Initial Address Message (IAM) sent by the gateway in the PLMN is coded taking into account the following exceptions and clarifications.

4.2.1.1.1 Initial address message

Called party number

The called party number parameter may contain a Mobile Station Roaming Number (MSRN).

- internal network number indicator:

  0 if the MSRN is included;
  1 otherwise.

Calling party number

If the calling party number parameter contains the Mobile Station ISDN number (MSISDN), it is coded as follows:

- nature of address indicator:

  000 0100 (international number) in case of a foreign Mobile Station (MS);
  000 0011 (national significant number) in case of a national MS.

User service information

The IAM shall always include a user service information parameter for calls to the fixed network when the ISDN access indicator is set to ISDN.

4.2.2 Calls from the fixed network to the PLMN

4.2.2.1 Gateway in the fixed network

4.2.2.1.1 Initial address message

Called party number

The called party number parameter contains the MSISDN or MSRN.

- nature of address indicator:

  000 0011 (national number) the called subscriber's number is a national number.

- internal network number indicator:

  1 if MSISDN is included;
  0 if MSRN is included.

  NOTE: The value of the internal network number indicator is set in the exchange having the relevant knowledge, and is passed transparently through the fixed network. Due to interworking with old signalling systems, a MSRN may be received with the internal network number indicator set to "0" or "1".

4.2.2.2 Gateway in the PLMN

4.2.2.2.1 Answer message, connect message

If the connected party number is included, the connected number parameter is coded as follows:

- nature of address indicator:

  000 0100 (international number) in case of a foreign MS;
  000 0011 (national significant number) in case of a national MS.

4.2.2.2.2 Address complete message

Due to the possible delays involved in setting up mobile calls, the PLMN needs to take special action to ensure that timer T7 (awaiting address complete timer) does not expire.

Significant delays are incurred while interrogating location registers and while paging the terminating MS.

For this purpose, whenever a call enters the PLMN, the PLMN should run a timer, the PLMN/ISDN early Address Complete Message (ACM) timer (value 5 to 20 seconds). The timer is started after receiving the complete number. If the timer expires, an address complete message is sent. The PLMN should stop the timer on sending a first backward message (address complete message or connect message).

The ACM shall contain the backward call indicators set to "0" except for:

- charge indicator:

  10 (charge).

- ISDN access indicator:

  1 (ISDN) (preferred value, see table B.2).

- echo control device indicator:

  set according to echo control procedure.

- ISDN user part indicator:

  1 (ISDN user part used all the way).

4.2.3 Echo control procedure

The echo control procedure described in ETS 300 121 [2] is applicable.

According to ETS 300 540 [3], for speech and 3,1 kHz audio connection types an acoustic echo control shall be provided in the MS. The PLMN may provide electric echo control devices.

Echo control procedure is not applicable for 64 kbit/s connection type.

Examples of echo control procedures are shown in Annex C.

5 Message Transfer Part (MTP) protocol requirements

The Message Transfer Part (MTP) protocol shall conform to the requirements in ETS 300 008 [1] with the appropriate value for the Network Indicator (NI).

It is preferred that NI value 10 (national network) is used within GSM networks as in the fixed national network. Based on national agreement, any NI value may be applied on the interface between GSM networks and the fixed networks.

Annex A (normative): Considerations on supplementary services

Supplementary services are used according to ETS 300 121 [2]. When considering supplementary services, there exists a symmetry about this interface although the ISDN services may not be the same as the PLMN services. For each service supported by ETS 300 121 [2], the operation of the service in each direction needs to be considered. Other supplementary services are not considered. Supplementary services supported by the interface but not by one of the connected networks shall be handled according to table 12/Q.767 in CCITT Recommendation Q.767 [4], i.e. the gateway concerned acts like an international gateway.

If the call forwarding occurs in the PLMN or in the fixed network, then the redirection information parameter should be included in the IAM. This information should be used to prevent looping of forwarded calls across this interface.

A.1 Calling Line Identification Presentation/Restriction (CLIP/CLIR) supplementary services

The calling party number parameter may be sent by both networks.

A.2 Connected Line Identification Presentation/Restriction (COLP/COLR) supplementary services

The optional forward call indicator including the connected line identification request indicator and the connected number parameter may be sent by both networks.

A.3 Closed User Group (CUG) supplementary service

The CUG call indicator in the optional forward call indicators and the CUG interlock code parameter may be sent by both networks.

A.4 User-to-User Signalling service 1 implicit (UUS1i) supplementary service

The user-to-user information parameter and the user-to-user indicator parameter may be sent by both networks.

A.5 Terminal Portability (TP) supplementary service

The user-initiated suspend and resume messages may be sent by both networks.

A.6 Subaddressing (SUB) supplementary service

Subaddress may be sent in the access transport parameter by both networks.

Annex B (normative): Formats and codes

B.1 General functions of messages and signals

B.1.1 Exceptions and clarifications to CCITT Recommendation Q.767

Table B.1: Exceptions and clarifications to table 2/Q.767 in CCITT Recommendation Q.767 [4]

Q.762 section	Title	Remarks
1.26	Forward transfer message	not used
2.18	Cause value	cause 20 is added
2.58	Original redirection reasons	used
2.64	Redirecting indicator	used
2.66	Redirecting reason	used
2.67	Redirection counter	used

B.1.2 Additional definitions

Cause 20 "Absent subscriber": this cause value shall be used when the MS has logged off, or when the radio contact is not obtained with the called MS, or in case a personal telecommunication user is temporarily not addressable at any user-network interface.

The appropriate support of cause 20 within the originating network (e.g. provision of an announcement) is a matter of the network provider.

B.2 Formats and codes

B.2.1 Exceptions and clarifications to CCITT Recommendation Q.767

Table B.2: Exceptions and clarifications to table 4/Q.767 in CCITT Recommendation Q.767 [4]

Q.763 section	Title	Remarks
3.2	Access transport	The access transport parameter will be transported transparently. It is the responsibility of the end points to ensure compatibility.
3.4	Backward call indicators	Bit M: terminating PLMN subscribers should be considered as ISDN terminations (this is the preferred situation, but other coding may be agreed between the PLMN and ISDN operators).
3.8 b)	Calling party number Nature of address indicator	 Values used: 000 0011, 000 0100 (i.e. national and international numbers allowed).
3.10	Cause indicator	Cause 20 "Absent subscriber" is used in addition. For the coding of the location field, the exchanges at the interface between the mobile and fixed ISDN networks need not to be considered as an international interface.

(continued)

Table B.2 (concluded): Exceptions and clarifications to table 4/Q.767 in CCITT Recommendation Q.767 [4]

Q.763 section	Title	Remarks
3.14	Connected number Nature of address indicator	 Values used: 000 0011, 000 0100 (i.e. national and international numbers allowed).
3.20	Forward call indicators	Bit I: originating PLMN subscribers should be considered as ISDN terminations (this is the preferred situation, but other codings may be agreed between the PLMN and ISDN operators).
3.29	Redirection information	This parameter is used. The parameter name code is 0001 0011. The format of the redirection information parameter is: 8 7 6 5 4 3 2 1 1 H G F E D C B A 2 P O N M L K J I bits CBA: redirecting indicator 011 call diverted (default) 100 call diverted, all redirection information presentation restricted bit D: spare 0 default bits HGFE: original redirection reasons 0000 unknown bits KJI: redirection counter number of redirections the call has undergone expressed as a binary number (NOTE) bit L: reserved for national use 0 (default) bits PONM: redirecting reason 0000 unknown/not available (default) 0001 user busy 0010 no reply 0011 unconditional 0100 deflection during alerting 0101 deflection immediate response 0110 MS not reachable
Table 16	Message type: Initial address	The following optional parameter is included (in addition to CCITT Recommendation Q.767 [4]): redirection information (length = 4)
Table 21	Message type: Forward transfer	Not used
NOTE: The redirection counter is incremented when the call is forwarded, however the mechanism for the allocation of a Mobile Station Roaming Number (MSRN) shall not be considered as an instance of call forwarding.		

Annex C (informative): Examples of echo control procedures

C.1 Outgoing call in a Mobile-service Switching Centre (MSC)

The echo control device indicator is always set to "1" (outgoing included) in the IAM sent by the MSC.

An incoming half echo control device is "reserved" on the outgoing circuit of the MSC.

If the backward call indicators parameter received in the ACM indicates that an incoming half echo control device is included, the "reserved" incoming half echo control device of the outgoing circuit of the MSC is disabled.

If the backward call indicators parameter received in the ACM indicates that an incoming half echo control device is not included, the "reserved" incoming half echo control device of the outgoing circuit of the MSC is enabled.

C.2 Incoming call in the MSC

If the nature of the connection indicators parameter indicates that an outgoing half echo control device is included, any outgoing half echo control device on the incoming circuit of the MSC is disabled.

If the MSC is a Visited Mobile-service Switching Centre (VMSC), the backward call indicators parameter sent in the ACM indicates that an incoming half echo control device is enabled.

If the MSC is a Gateway Mobile-service Switching Centre (GMSC) or in case of call forwarding, the incoming half echo control device of the outgoing circuit is "reserved" and the echo control device indicator sent in the IAM is passed on:

- if the backward call indicators parameter received in the ACM indicates that an incoming half echo control device is included the incoming half echo control device of the outgoing circuit of the MSC is disabled;

- if the backward call indicators parameter received in the ACM indicates that an incoming half echo control device is not included the incoming half echo control device of the MSC is enabled.

If the nature of the connection indicators parameter indicates that an outgoing half echo control device is not included, the outgoing half echo control device on the incoming circuit of the MSC is reserved.

If the MSC is a VMSC, the outgoing half echo control device is enabled and the backward call indicators parameter sent in the ACM indicates that an incoming half echo control device is included.

If the MSC is a GMSC or if the call is to be forwarded and the MSC knows that an outgoing half echo control device is necessary (e.g. called MS, forwarding to an international destination):

- the outgoing half echo control device on the incoming circuit is enabled and the echo control parameter sent in the IAM indicates "outgoing half echo control device included";

- the incoming half echo control device of the outgoing circuit is "reserved";

- if the backward call indicators parameter received in the ACM indicates that an incoming half echo control device is included the incoming half echo control device of the outgoing circuit of the MSC is disabled;

- if the backward call indicators parameter received in the ACM indicates that an incoming half echo control device is not included the incoming half echo control device of the MSC is enabled.

If the MSC is a GMSC or if the call is to be forwarded and the MSC knows that an outgoing half echo control device is not necessary:

- the outgoing half echo control device on the incoming circuit is disabled and the echo control parameter in the IAM is passed on;

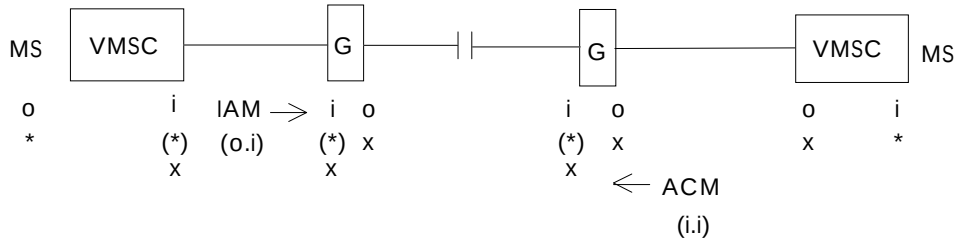
- the incoming half echo control device on the outgoing circuit is disabled.

C.3 Examples of echo control procedure

The following additional notations are used in figures C.1 to C.11:

G	Gateway in the fixed network
(o.i)	outgoing half echo control device included
(o.ni)	outgoing half echo control device not included
(i.i)	incoming half echo control device included
(i.ni)	incoming half echo control device not included
(*)	echo control device "reserved"
*	echo control device enabled
x	echo control device disabled
i	incoming half echo control device
o	outgoing half echo control device

C.3.1 Call from a mobile station to a mobile station via the fixed network



NOTE: There are no echo control devices implemented in the Gateways (G).

Figure C.1

C.3.2 Call from a mobile station to fixed network with no echo control device

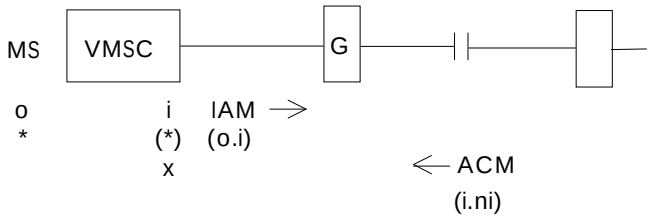


Figure C.2

C.3.3 Call from a mobile station to fixed network with echo control device

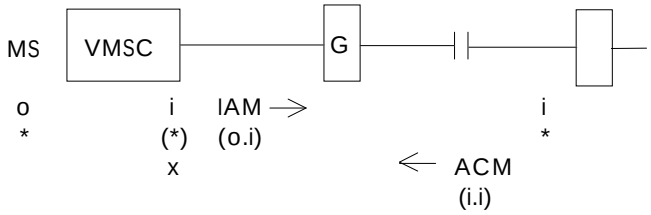


Figure C.3

C.3.4 Call from fixed network with no echo control device to a mobile station roaming in a PLMN of another country

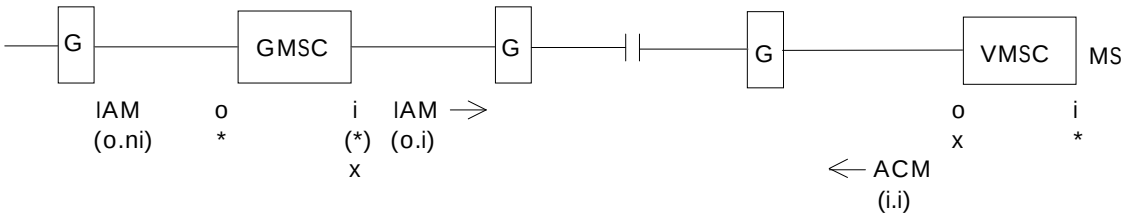


Figure C.4

C.3.5 Call from fixed network with echo control device to a mobile station roaming in a PLMN of another country

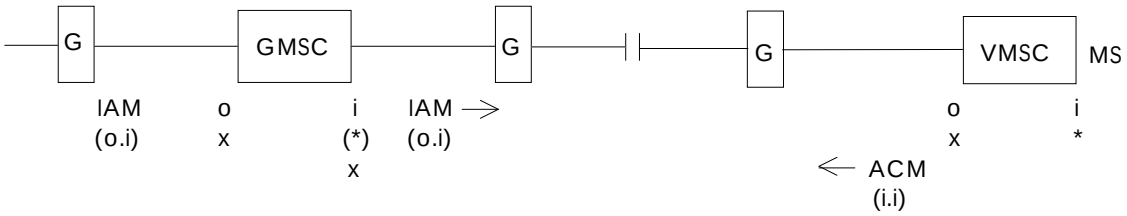


Figure C.5

C.3.6 Call from fixed network with no echo control device to a mobile station

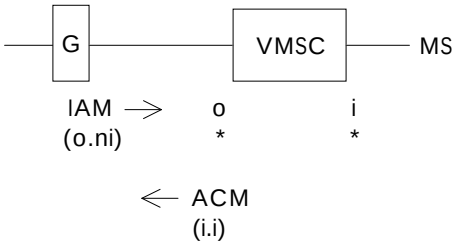


Figure C.6

C.3.7 Call from fixed network with echo control device to a mobile station

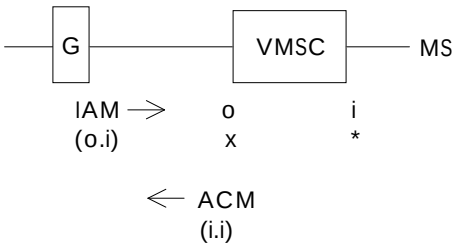


Figure C.7

C.3.8 Call forwarded by the VMSC

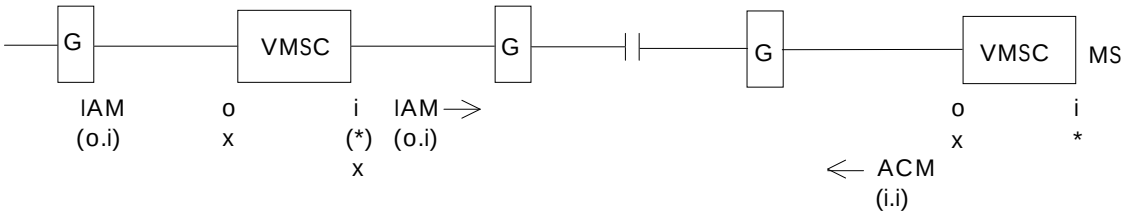


Figure C.8

C.3.9 Call forwarded by the VMSC to the fixed network with no echo control device

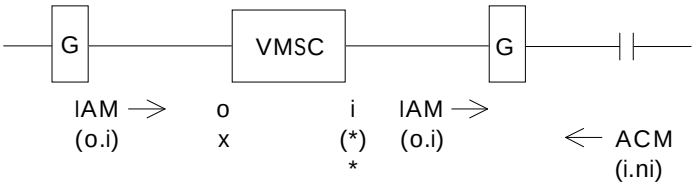


Figure C.9

C.3.10 Call with no outgoing echo control device included in a preceding exchange forwarded by the VMSC to the fixed network with no echo control device in the terminating network

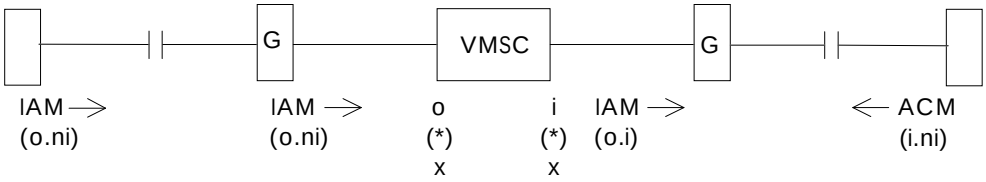


Figure C.10

C.3.11 Call with no outgoing echo control device included in a preceding exchange forwarded by the VMSC to the fixed network with echo control device in the terminating network

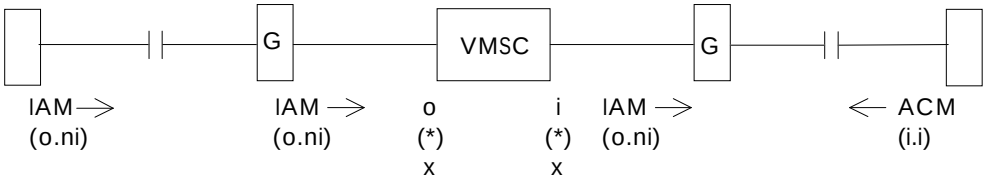


Figure C.11

Annex D (informative): Bibliography

1) ETS 300 100 (1992): "Integrated Services Digital Network (ISDN); Routing in support of ISUP version 1 services".

2) ETS 300 356: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 2 for the international interface".

History

Document history	
July 1994	First Edition
December 1995	Converted into Adobe Acrobat Portable Document Format (PDF)