

PNO-ISC Specification Number 008 IUP - ISUP Interworking

ICS 35.110

National foreword

This Published Document has been prepared by Technical Committee TCT/50 Public Network Operators Interconnect Standards Committee. It supersedes PD 6651:1999 which is withdrawn. It specifies the interworking function to be performed between C7 IUP, as specified in [1] and the C7 ISUP, as specified in [2].

This Published Document has been produced with place markers for some sections, not yet available, which will be issued as amendments to this Published Document when they become available.

This Published Document contains ISC references to other documents, which are planned to be published as Published Documents. The following list cross-references these against PD publications:

PD 6645	PNO-ISC/SPEC/006
PD 6623	PNO-ISC/SPEC/007
PD 6655	PNO-ISC/INFO/009

This Published Document is not to be regarded as a British Standard.

Summary of pages

This document comprises a front cover, an inside front cover, pages 0-1 to 0-15, a blank page, pages 1-1 to 1-19, a blank page, pages 2-1 to 2-33, a blank page, pages A-1 to A-36, an inside back cover and a back cover.

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C7 IUP - ISUP INTERWORKING

NETWORK INTEROPERABILITY CONSULTATIVE COMMITTEE

Office of Telecommunications

50 Ludgate Hill

London EC4M 7JJ

0.2 NORMATIVE INFORMATION

All enquiries about distribution reproduction, changes and clarifications should be addressed in the first instance to the Chairman of the NICC/PNO-IG/ISC at the address on the title page.

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0.4 HISTORY

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Issue 1	March 1999	Paul While, Marconi Comms	Approved by PNO-IG
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0.5 ISSUE CONTROL

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0.6 REFERENCES

- [1] PNO-ISC/SPEC/006 - Issue 4, Interconnect User Part (IUP)
- [2] PNO-ISC/SPEC/007 - Issue 3, ISDN User Part (ISUP)
- [3] PNO-ISC/INFO/004 - Proprietary Extensions to C7 Interconnect User Part (IUP)

Note: Where a reference does not specify a particular issue number, then the latest version applies.

0.7 GLOSSARY OF TERMS

ACI	Additional Call Information
ACM	Address Complete Message
AMC	Auto-Manual Centre
ANM	Answer Message
ANS	Answer
APM	Application Transport Message
APP	Application Transport Parameter
APRI	Address Presentation Restricted Indicator
ASUI	Additional Set-Up Information
ATII	Application Transport Instruction Indicators
ATP	Access Transport Parameter
BC	Bearer Capability
BCI	Backward Call Indicators
BI	Network Beyond Interworking Point
CBI	CLI Blocking Indicator
CCBS	Call Completion to Busy Subscriber
CCITT	International Telegraph and Telephone Consultative Committee
CCNR	Call Completion on No Reply
CCSS	Call Completion Service Set-up
CD	Call Deflection
CdLI	Called Line Identity
CdPC	Called Party Category
CdPN	Called Party Number
CFB	Call Forwarding Busy
CFNRc	Call Forward on Subscriber Not Reachable
CFNRy	Call Forwarding No Reply
CFU	Call Forwarding Unconditional
CgPC	Calling Party Category
CgPN	Calling Party Number
CLI	Calling Line Identity
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
CNA	Connection Not Admitted
COLP	Connected Line Presentation
CON	Connect
CONF	Conference
CPC	Calling Party Category
CPG	Call Progress
CPI	Call Path Indicator
CTI	Call Type Indicator
CUG	Closed User Group
CW	Call Waiting
DASS2	Digital Access Signalling System No. 2
DDI	Direct Dialling In
DPNSS	Digital Private Network Signalling System
DSS1	Digital Subscriber Signalling System No. 1
DTE	Data Terminating Equipment
ECT	Explicit Call Transfer
ETS	European Telecommunications Standard
FAM	Final Address Message
FDX	Full Duplex
FIC	Facility Information Code
GN	Generic Number
HDX	Half Duplex
HLC	High Layer Compatibility
IAM	Initial Address Message
ICC	Information Contained Code
IFAM	Initial and Final Address Message

IG	Interest Group
IND	International Number Dialling
INF	Information message
INR	Information Request message
INTL	International Network
IQ	Identity Qualifier
IRC	Information Requested Code
ISC	Interconnect Standards Committee
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
ITU	International Telecommunications Union
IUP	Interconnect User Part
IWF	Interworking Function
IWP	Interworking Point
LD	Loop Disconnect
LDLI	Last Diverting Line Identity
LLC	Low Layer Compatibility
LPN	Private Network serving the Local User
LPRI	Last Party Release Indicator
LS	Least Significant
LSB	Least Significant Bit
LSD	Least Significant Digit
MCI	Malicious Call Identification
MCID	Malicious Call Identification
MF4	Signalling System Multi-Frequency No. 4
MS	Most Significant
MSB	Most Significant Bit
MSD	Most Significant Digit
MSN	Multiple Subscriber Number
NAE	Network Address Extension
NAI	Nature of Address Indicator
NFCI	National Forward Call Indicators
NI	Network Identity
NIC	Network Independent Clock
NICC	Network Interoperability Consultative Committee
NN	Network Number
NND	National Number Dialling
NP	Network Provided
NPI	Numbering Plan Indicator
NTA	Network Translated Address
OBCI	Optional Backward Call Indicators
OSS	Operator Services System
PCLI	Partial Calling Line Identity
PI	Progress Indicator
PN	Presentation Number
PNI	Presentation Number Indicator
PNO	Public Network Operator
PNP	Presentation Number Preference indicator
PSTN	Public Switched Telephone Network
QoR	Query on Release
RA	Rate Adaptation
RBWF	Ring Back When Free
REL	Release
RES	Resume
RPI	Release Protocol Indicator
RPN	Private Network serving the Remote User
SAD	Send All Digits
SAM	Subsequent Address Message
SASUI	Send Additional Set-Up Information
SCCP	Signalling Connection Control Part
SHP	Service Handling Protocol

SIC	Service Indicator Code
SIM	Service Information Message
SND	Send N Digits
SSTV	Slow Scan Television
SUS	Suspend
TCAP	Transaction Capabilities Application Part
TLI	Terminating Line Identity
TMR	Transmission Medium Requirement
TN	Transit Network
TP	Terminal Portability
U	User
UDI	Unrestricted Digital Information
UPNV	User Provided Not Verified
UPVP	User Provided Verified and Passed
USI	User Service Information
UUS	User to User Signalling

0.8 SCOPE

This document specifies the interworking function to be performed between C7 IUP, as specified in [1] and the C7 ISUP, as specified in [2].

This specification is only applicable for networks where a transit capability is provided between points of interconnect where, for any particular call, one interconnect is via C7 IUP and the other is via C7 ISUP, i.e. where the transit network is providing the IUP↔ISUP protocol conversion explicitly between the two points of interconnect.

It is acknowledged that within networks similar interworking functions may be employed, e.g. for calls originating from a network that uses a variety of ISUP as its internodal signalling and inter-works this to IUP for interconnect to other networks. For such situations this specification is recommended by ISC as guidance to the network operators to assist in their network-specific solutions, however network-specific service requirements may cause variations to this.

This specification defines procedures which allow for the interworking of ISUP and IUP signalling protocols in support of the following basic and supplementary services:

Bearer Services:

TABLE 0.1 Bearer Services interworking

ISUP	IUP
Speech	Speech (Voice) Category 2 (Digital or Analogue Routeing)
3.1 kHz Audio	Speech (3.1 kHz) Category 2 (Digital or Analogue Routeing)
	Speech (Telephony) (Digital or Analogue Routeing)
64 kbits/s UDI	Speech/Data Category 1 (Fully Digital Path Required)

In conjunction with the bearer services interworking of certain low layer and high layer compatibility information is provided in support of terminal selection procedures. Interworking of high layer compatibility indications is limited to:

TABLE 0.2 High Layer interworking

ISUP	IUP
Facsimile Group 2/3 (Recommendation F.182)	Facsimile Group 2/3
Facsimile Group 4, Class 1 (Recommendation F.184)	Facsimile
Teletex service, basic mode of operation (Recommendation F.200)	Teletex
International interworking for Videotex services (Recommendations F.300 and T.101)	Videotex

Supplementary Services:

TABLE 0.3 Supplementary Services interworking status

ISUP	IUP (Note 1)	INTERWORKING STATUS
CLIP/CLIR	CLIP/CLIR	Full interworking
TP	TP	Full interworking
Number Portability	Number Portability	Full interworking
CUG	CUG	Full interworking
MCID	MCI	Full interworking
Diversion supplementary services (CFU, CFB, CFNRc, CFNRy and CD)	Call Diversion	Partial interworking (Note 2)
SUB	NAE	Full interworking is possible for IUP→ISUP, however only partial interworking is possible for ISUP→IUP
CCBS	CCBS	Full interworking
Targeted Transit	Targeted Transit	Full interworking
Anonymous Call Rejection	Anonymous Call Rejection	Full interworking
HOLD	n/a	Cannot be mapped across the IWF (Note 2)
CW	n/a	Cannot be mapped across the IWF (Note 2)
3PTY	n/a	Cannot be mapped across the IWF (Note 2)
CONF	n/a	Cannot be mapped across the IWF (Note 2)
ECT	n/a	Cannot be mapped across the IWF. (Note 4)
DDI	DDI	Full interworking
MSN	MSN	Full interworking
UK Basic Operator Services	UK Basic Operator Services	Full interworking
Enhanced Operator Services	Enhanced Operator Services	Partial interworking (Note 2)
COLP	n/a	Cannot be mapped across the IWF (Note 3)
UUS	n/a	Cannot be mapped across the IWF (Note 3)
CCNR	n/a	Cannot be mapped across the IWF (Note 5)
n/a	TLI	Cannot be mapped across the IWF (Note 3)
n/a	RBWF	Cannot be mapped across the IWF (Note 3)
n/a	SWAP	Cannot be mapped across the IWF (Note 3)
n/a	UUS	Cannot be mapped across the IWF (Note 3)

Note 1: Although the common procedures have been written in [1], no IUP descriptions for the above exist apart from CLIP/CLIR, Number Portability, CCBS, Targeted Transit, UK Basic Operator Services and Enhanced Operator Services.

Note 2: The associated signalling indications (i.e. notifications) will be discarded without significant impact on the operation of the supplementary services.

Note 3: ISUP and IUP supplementary services which use messages or parameters which cannot be mapped across the interworking function shall be rejected in the appropriate manner for the signalling system.

Note 4: The ECT call transfer will be rejected by the local node if a Loop Prevention (request) results in unsatisfactory responses from both directions. The IWF is required to return a Loop Prevention (response) indicating "insufficient information" if a Loop Prevention Request is received.

Note 5: The associated signalling indications (i.e. notifications) will be discarded with the result that the supplementary service cannot be invoked.

Other ISUP supplementary services which use messages or parameters that are unrecognised by the IWP shall be handled in accordance with ISUP message/parameter compatibility procedures or in accordance with the procedures specified for the supplementary service concerned for interworking with other networks.

Other IUP supplementary Services which use messages or parameters that are unrecognised by the IWP shall be handled in accordance with the IUP error handling procedures described in [1].

The interworking requirements for IUP Proprietary Extensions are described in [3].

0.9 INTERWORKING POINT (IWP)

For the purpose of this document, an element shall be defined called the InterWorking Point. This element shall provide the necessary translation functions to convert from the IUP protocol to ISUP protocol and vice versa. The element may be realised as a switch, group of switches or a network.

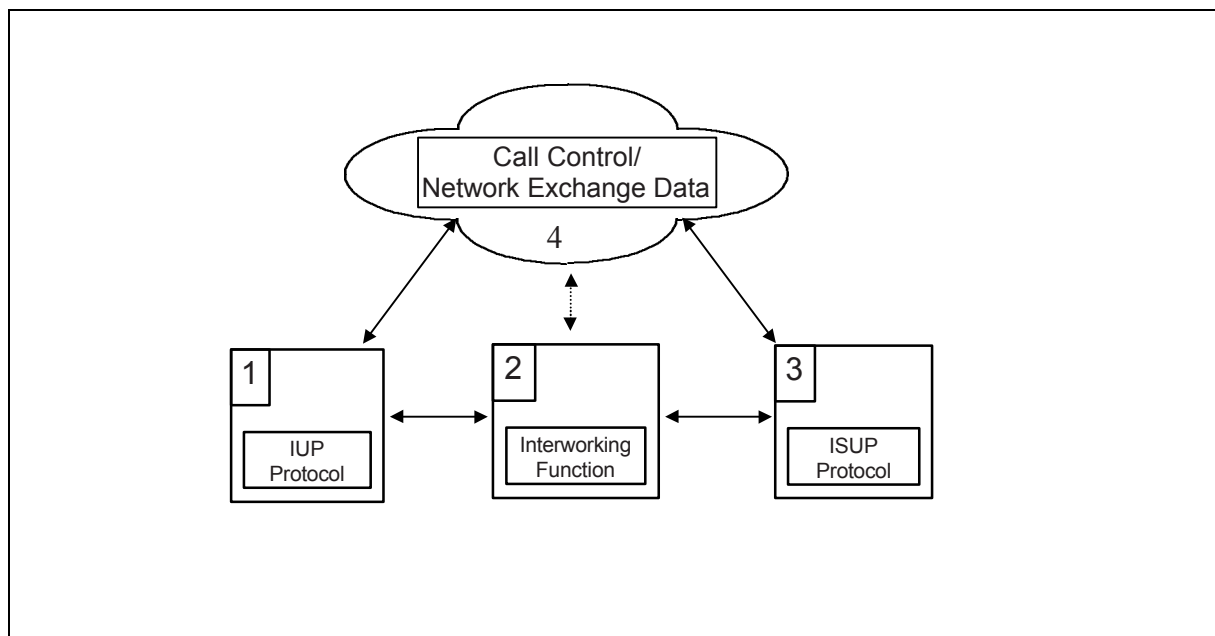


FIGURE 0.1 Internal Architectural View of IWP

In order to simplify the description of how interworking shall be performed in the interworking point, it shall be assumed that the following functional units exist.

- 1) IUP Protocol: This unit provides the IUP signalling interface procedures within the IWP, as described in [1].
- 2) InterWorking Function (IWF): This provides the necessary functions to map between the IUP and ISUP protocols.
- 3) ISUP Protocol: This unit provides the ISUP signalling interface procedures within the IWP, as described in [2].
- 4) Call Control: This unit, with the associated exchange data, manages establishment and release of calls via the appropriate signalling protocols. The Call Control functions are not covered in this document.

The IWF-IUP and IWF-ISUP interfaces are outside the scope of this document.

END OF PNO-ISC/SPEC/008§0

1 SIGNALLING PROCEDURES

This section describes the behaviour of the IWF, when call control has determined that an IWF is required between IUP and ISUP.

Sections 1.1 and 1.2 describe the procedures for call direction dependent messages.

Section 1.3 describes the procedures for call direction independent messages.

1.1 Signalling procedures for IUP to ISUP calls

The following sub-sections detail the behaviour of the IWP for an IUP to ISUP call.

1.1.1 Receipt of IUP IAM / IFAM

The Figures 1.1 to 1.4 describe the mapping of IUP IAM/IFAM and SAM and/or FAM to ISUP IAM/SAM.

Note: IUP requests for additional information (such as CLI) are omitted for clarity.



FIGURE 1.1 Mapping IUP Enbloc to ISUP Enbloc signalling

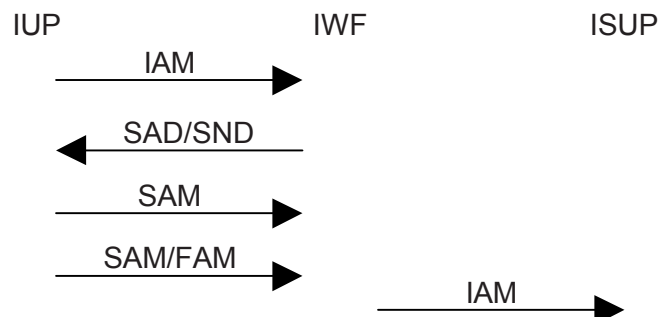


FIGURE 1.2 Mapping IUP Overlap to ISUP Enbloc signalling

Note: This illustrates that all digits are collected by appropriate IUP means before the ISUP IAM is sent.

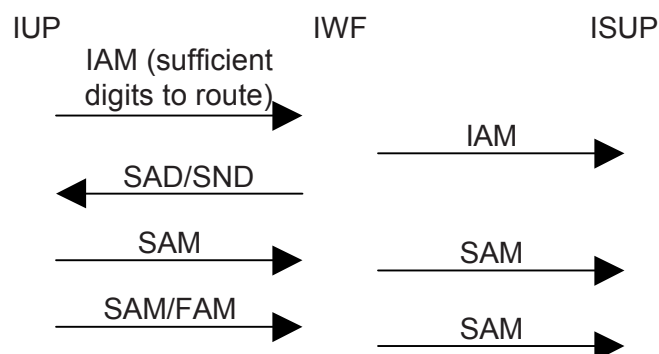


FIGURE 1.3 Mapping IUP Overlap to ISUP Overlap signalling for SHP=0

Note: This illustrates that digits are collected by appropriate IUP means.

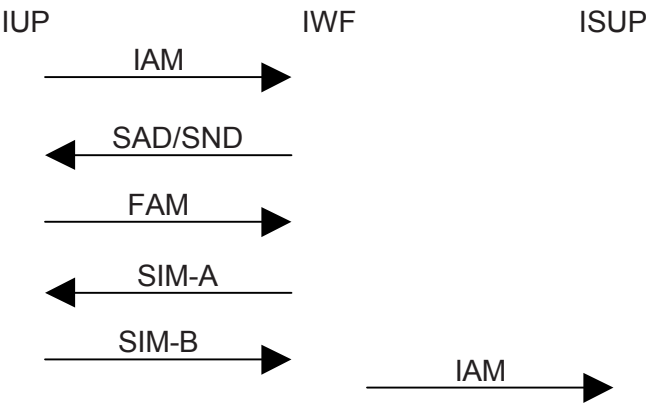


FIGURE 1.4 Mapping IUP Overlap to ISUP signalling for SHP=1

On receipt of an IUP IFAM or IAM and a number of SAMs and/or FAM, the IWF shall instruct the IUP protocol to obtain all CLI and ISDN information before instructing the ISUP protocol to send the ISUP IAM. This shall be done by using the ISDN SIM protocol, the ACI protocol and/or the SASUI protocol as defined in [1].

The information gathered shall be retained as defined in [2] in case it becomes necessary to re-route the call or perform further operations based on this information.

Note: For a call using the ISDN SIM protocol (SHP=1 call), the IWF shall first collect routing information required for the call before initiating the ISDN SIM protocol.

Tables 1.1 and 1.2 summarise the preferred actions to be taken by the IWF given the information supplied.

TABLE 1.1 CLI Request Procedures

Complete CLI received from incoming IUP I(F)AM	SIM-B received with complete CLI	Presentation Number available	Interworking encountered	Action to take at the IWF	Response	New action to take at the IWF
No	No	No	X	Request NN	Any / none	Continue Call
		Yes	No	Request PN	Confusion	Request NN
					No Response	Request NN
					Incomplete PN	Request NN
					Incomplete NN	Continue Call
					PN	Request NN
					NN	Continue Call
					Partial CLI	Continue Call
Yes (Note 2)	No	No	Yes	Request NN	Any / none	Continue Call
			No	Request NN	Any / none	Continue Call
		Yes	Yes	Not possible		
			X	Continue Call		
	Yes	No	No	Request PN	Any / none	Continue Call
			Yes	Continue Call		
		X	No	Continue Call		
			Yes	Not possible		

Note 1: It may be necessary to loop through the table a number of times until the Continue Call or Error Procedure is met.

Note 2: The CLI was received in the IUP IAM/IFAM or by request prior to invocation of the IWF.

If the CTI Indicator in the IAM/IFAM is set to indicate a diverted call then the following procedures shall be performed:

TABLE 1.2 Diverted Call Procedures

Action to be taken	Response	New Action to be taken
Request Last Diverting Line Identity(LDLI)	Confusion	Continue Call
	No Response	Continue Call
	LDLI	Continue Call
	Incomplete LDLI	Continue Call

If the SHP is set to value 2 then the IWF shall instruct the IUP protocol to initiate the Request Service Negotiation Protocol [1] after all of the routing information for the call has been received.

1.1.2 Sending ISUP IAM/SAM

On completion of the above, the IWF shall continue the call by instructing the ISUP protocol to send an IAM as defined in [2].

On receipt of any further IUP SAMs or a FAM, the IWF shall instruct the ISUP protocol to send a SAM or SAMs containing the information received from IUP - see [1] and [2].

1.1.2.1 Derivation of ISUP CLI parameters

Table 1.3 describes which IUP information shall be used to derive the various ISUP CLI parameters to be included in the ISUP IAM.

TABLE 1.3 Derivation of ISUP CLI parameters

IUP	ISUP
IFAM Line Identity, ACI ICC 1 or ASUI Type 1 content	CgPN
ACI ICC 12 content (Telephony)	PN (Note 1) & GN (Notes 2 & 3)
SIM-B content (ISDN)	PN (Note 1) & GN (Notes 2 & 3) Note 4

Note 1: The Presentation Number Preference Indicator is always set to 1 (PN preferred).

Note 2: Due to limitation on Screening Indicator in GN, all numbers are marked as UPNV (Screening Indicator = 00).

Note 3: If the number in the CgPN is marked UPVP then the GN shall be omitted.

Note 4: In the case that PNI = 'PN not available' and the SIM-B is not 'user provided, not verified', it may be assumed that the caller does not have a Presentation Number and the GN and PN parameters omitted from the IAM - the SIM-B number is discarded.

As a network option, in this case, the SIM-B may instead be assumed to carry a Presentation Number.

The following rules also apply:

- Only complete CLI information shall be included. Incomplete CLIs (i.e. Incomplete Address Indicator set to "Incomplete" or the LSD of the address signals is a HexB) from any IUP source (e.g. SIM-B) shall be discarded.
- Partial CLI from IUP shall be mapped into the ISUP PCLI parameter as described in Section 2.1.1.17.
- When incomplete or no CLI information is available for inclusion in the ISUP IAM, the relevant parameter shall be omitted.
- If neither a CLI suitable for inclusion in the CgPN parameter nor a PCLI is received from the IUP protocol, then the PCLI of the IWP node shall be included in the ISUP IAM PCLI parameter.

1.1.3 Sending of SIM-C

If the ISDN SIM protocol had been used to request information, then the IWF shall instruct the IUP protocol to send a SIM-C before sending the IUP ACM or fail the call depending on information received in the ISUP backward call indicators which are present in ISUP ACM, CPG, ANM or CON message and the service

requested by the IUP signalling. The decision to send SIM-C shall be delayed until the IUP ACM can be sent. In the case of call failure being indicated by Table 1.4, the call may be failed before the IUP ACM can be sent.

TABLE 1.4 Sending of SIM-C

Incoming IUP I(F)AM		Backward ISUP ISDN Access Indicator	Backward ISUP Interworking Indicator	Actions to be taken on IUP link
SHP	CPI			
1	0 or 2	0 (Non ISDN Access)	any	No SIM-C sent
1	0 or 2	1 (ISDN Access)	0 (no interworking encountered)	SIM-C sent
1	0 or 2	1 (ISDN Access)	1 (interworking encountered)	No SIM-C sent
1	1	0 (Non ISDN Access)	any	Fail call – reason (3) service unavailable
1	1	1 (ISDN Access)	0 (no interworking encountered)	SIM-C sent
1	1	1 (ISDN Access)	1 (interworking encountered)	Fail call – reason (3) service unavailable

1.1.4 Additional procedures to support Operator Services

1.1.4.1 Receipt of an ISUP ACM/CPG/CON/ANM containing a Called Subscriber's Basic Service Marks Parameter

1.1.4.1.1 Actions Before the Sending of an IUP ACM

If an ISUP ACM/CPG/ANM/CON message containing a Called Subscriber's Basic Service Marks parameter is received then the IWF shall store the information received in the parameter until an IUP ACM is to be sent (See 1.1.4.2 below).

If a subsequent message containing an ISUP Called Subscriber's Basic Service Marks parameter is received then the IWF shall store the information received in this parameter and discard any previously received information.

1.1.4.1.2 Actions After the Sending of an IUP ACM

If an ISUP CPG/ANM message containing a Called Subscriber's Basic Service Marks parameter is received then the IWF shall instruct the IUP protocol to send an ACI Type 4 message.

The contents of the ACI Type 4 message shall be mapped from the contents of the last received Called Subscriber's Basic Service Marks parameter.

1.1.4.2 Sending of an IUP ACI Type 4 before an IUP ACM

If the IWF has stored information received in an ISUP Called Subscriber's Basic Service Marks parameter, then the IWF shall instruct the IUP protocol to send an ACI Type 4 message before sending an ACM. The decision to send an ACI Type 4 message shall be delayed until an IUP ACM can be sent.

The contents of the ACI Type 4 message shall be mapped from the contents of the last received Called Subscriber's Basic Service Marks parameter.

1.1.4.3 Receipt of an ISUP APM containing an APP with Application Context ID = 125

If an ISUP APM is received, containing an APP with Application Context ID = 125, then the IWF shall perform the following actions depending upon the value of the OSS Information Type:

OSS Information Type	Action
----------------------	--------

4 (Action Invocation)	The IWF shall inspect the OSS Message Type.
-----------------------	---

If the OSS Message Type is set to 00000100 (Extend Call), then the IWF shall instruct the IUP Protocol to send an EXTEND CALL message.

1.1.4.4 Receipt of an IUP SERVICE Message

The IWF shall instruct the ISUP Protocol to send an IAM containing an APP.

1.1.4.5 Receipt of an IUP OPERATOR OVERRIDE Message

The IWF shall instruct the ISUP Protocol to send an APM message.

1.1.4.6 Receipt of an IUP HOWLER Message

The IWF shall instruct the ISUP Protocol to send an APM message.

1.1.5 Call Establishment

The following sub-sections state the behaviour of the IWF on receipt of the backward ISUP ACM, CPG, ANM and CON messages.

Table 1.5 summarises when an IUP ACM message is to be sent in the case when the first ISUP message received is ACM.

TABLE 1.5 When to send an IUP ACM

ISUP ACM Backward Call Indicators			ISUP ACM Optional Backward Call Indicators (if received)	When to Send IUP ACM
ISDN Access Indicator	Called Party Status Indicator	Interworking Indicator	In-band Information Indicator	
X	X	X	1	On receipt of ISUP ACM
X	X	1	X	On receipt of ISUP ACM
X	1	X	X	On receipt of ISUP ACM
0	X	X	X	On receipt of ISUP ACM
1	0,2,3	0	0	On receipt of any of the following: - ISUP ACM/CPG and the Access Transport Parameter contains DSS1 progress indicators 1 or 8, - CPG and in the Event Information parameter the Event indicator is set to 1 or 3, - CPG with BCI ISDN Access Indicator set to 0, - CPG with BCI Interworking Indicator set to 1, - CPG with OBCI In-band Information indicator set to 1, - ANM, Or on expiry of the Early ACM Timer

Note: X represents any admissible value

1.1.5.1 Receipt of an ISUP Address Complete Message (ACM)

On receipt of an ISUP ACM the IWF shall examine the contents and proceed as specified in either Section 1.1.5.1.1 or Section 1.1.5.1.2.

If the received ISUP ACM message contains a Called Subscriber's Basic Service Marks parameter the procedure described in Section 1.1.4.1 shall apply.

Note: If the IWF is required to instruct the IUP protocol to return a SIM-C message then this is described in Section 1.1.3.

1.1.5.1.1 Normal receipt of ISUP ACM

If any of the following conditions are true then the IWF shall instruct the IUP protocol to send an ACM immediately and await further backward ISUP messages.

- a) The Called Party Status Indicator in the Backward Call Indicators parameter is set to "Subscriber free".
- b) The Interworking Indicator in the Backward Call Indicators parameter is set to "Interworking".
- c) The In-band information Indicator in the Optional Backward Call Indicators parameter is set to "In-band information or an appropriate pattern is now available".
- d) The DSS1 Progress Indicator in the Access Transport parameter is set to:
"Call is not end to end ISDN; further call progress information may be available in-band" (value 1).
Or:
"In-band information or an appropriate pattern is now available" (value 8)
- e) The ISDN access Indicator in the Backward Call Indicators parameter is set to "terminating".

If the above conditions do not exist the IWF shall act as in Section 1.1.5.1.2.

1.1.5.1.2 Receipt of ISUP "early" ACM

If none of the conditions set out in Section 1.1.5.1.1 are met then the IWF shall store the information received in the ISUP ACM and proceed as specified in either Section 1.1.5.1.2.1 or Section 1.1.5.1.2.2.

1.1.5.1.2.1 Speech or 3.1kHz Audio Call

If the call is a speech or 3.1kHz Audio call then the IWF shall start a timer of 12 seconds duration and await further backward ISUP messages. The IWF shall proceed in one of the following ways:

- a) If bearer release occurs then the procedures detailed in Section 1.1.7 shall be followed.
- b) If the timer expires then the IWF shall instruct the IUP protocol to send an ACM. If an indication is now received from the ISUP protocol that the call cannot be connected then the IWF shall proceed as in Section 1.1.7.2.2.2.
- c) If an ISUP CPG or ANM message is received act as described in Section 1.1.5.2 or 1.1.5.3.

1.1.5.1.2.2 Non Speech and Non 3.1 kHz Audio Call

If the call is neither a speech nor a 3.1kHz Audio call then the IWF shall await further backward ISUP messages. The IWF shall proceed in one of the following ways.

- a) If bearer release occurs then the procedures detailed in Section 1.1.7 shall be followed.
- b) If an ISUP CPG or ANM message is received act as described in Section 1.1.5.2 or 1.1.5.3.

1.1.5.2 Receipt of an ISUP Call Progress (CPG) Message

On receipt of an ISUP CPG message the IWF shall use the values of the indicators received in the message to update/overwrite any previously received indicator values unless the value received is "no indication", with the exception of the Holding Indicator in the ISUP Backward Call Indicators parameter, which shall only be updated/overwritten if the received value is greater than the value stored.

If the received ISUP CPG message contains a Called Subscriber's Basic Service Marks parameter the procedure described in Section 1.1.4.1 shall apply.

If the IWF has not instructed the IUP protocol to send an ACM, then the IWF shall proceed as specified in either Section 1.1.5.2.1 or Section 1.1.5.2.2.

Note: If the IWF is required to instruct the IUP protocol to return a SIM-C message then this is described in Section 1.1.3.

If IWF has instructed the IUP protocol to send an ACM then the CPG shall be discarded.

1.1.5.2.1 ISUP CPG message received for Speech or 3.1kHz Audio Call

If an ISUP CPG message is received and the 12 seconds timer has not expired then the IWF shall examine its contents and proceed as follows:

If any of the following conditions exist then the IWF shall cancel the 12 seconds timer and instruct the IUP protocol to send an ACM.

- i) The Event indicator in the Event Information parameter is set to 1 (alerting) or 3 (in-band information or an appropriate pattern is now available)
- ii) The Interworking Indicator in the Backward Call Indicators parameter is set to "Interworking"
- iii) The ISDN access Indicator in the Backward Call Indicators parameter is set to "terminating access non-ISDN".
- iv) The In-band information Indicator in the Optional Backward Call Indicators parameter is set to "In-band information or an appropriate pattern is now available".
- v) The DSS1 Progress Indicator in the Access Transport parameter is set to:
"Call is not end to end ISDN; further call progress information may be available in-band" (value 1).
Or:
"In-band information or an appropriate pattern is now available" (value 8)

Otherwise the IWF shall await further backward messages.

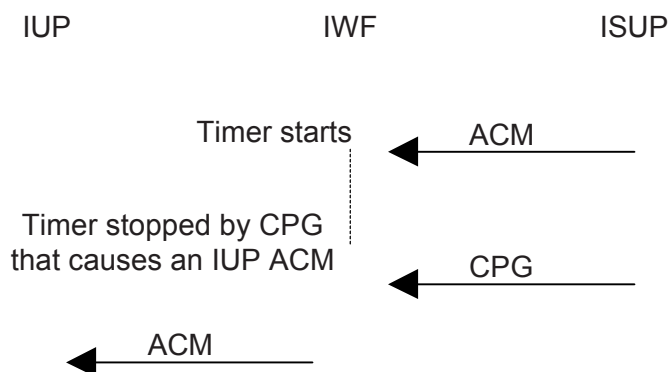


FIGURE 1.5 IUP ACM sent as a result of an ISUP CPG message

1.1.5.2.2 ISUP CPG message received for a Non Speech and Non 3.1kHz Audio Call

If an ISUP CPG message is received the IWF shall examine its contents and proceed as follows:

If any of the following conditions exist then the IWF shall instruct the IUP protocol to send an ACM :

- i) The Event indicator in the Event Information parameter is set to 1 (alerting) or 3 (in-band information or an appropriate pattern is now available).
- ii) The Interworking Indicator in the Backward Call Indicators parameter is set to "Interworking
- iii) The ISDN access Indicator in the Backward Call Indicators parameter is set to "terminating
- iv) The In-band information Indicator in the Optional Backward Call Indicators parameter is set to "In-band information or an appropriate pattern is now available".
- v) The DSS1 Progress Indicator in the Access Transport parameter is set to:
 "Call is not end to end ISDN; further call progress information may be available in-band" (value 1).
 Or:
 "In-band information or an appropriate pattern is now available" (value 8)

Otherwise the IWF shall await further backward messages.

1.1.5.3 Receipt of an ISUP Answer Message (ANM)

On receipt of an ISUP ANM the IWF shall take the following actions:

- a) Cancel the 12 seconds timer if active.
- b) Use the values of the indicators received in the ANM message to update/overwrite any previously received indicator values unless the value received is "no indication", with the exception of the Holding Indicator contained in the ISUP Backward Call Indicators parameter, which shall only be updated/overwritten if the value received is greater than the value stored.
- c) If the received ISUP ANM message contains a Called Subscriber's Basic Service Marks parameter, the procedure described in section 1.1.4.1 shall apply.

- d) Instruct the IUP protocol to send an ACM, if not already sent, followed by an ANS message.

Note: If the IWF is required to instruct the IUP protocol to return a SIM-C message then this is described in Section 1.1.3.

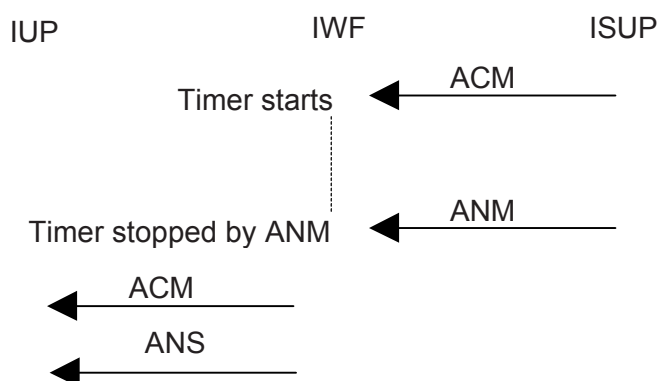


FIGURE 1.6 IUP ACM and ANS sent as a result of an ISUP ANM message

1.1.5.4 Receipt of an ISUP Connect (CON) Message

On receipt of an ISUP CON message the IWF shall instruct the IUP protocol to send an ACM followed by an Answer message.

If the received ISUP CON message contains a Called Subscriber's Basic Service Marks parameter, the procedure described in section 1.1.4.1 shall apply.

Note: If the IWF is required to instruct the IUP protocol to return a SIM-C message then this is described in Section 1.1.3.

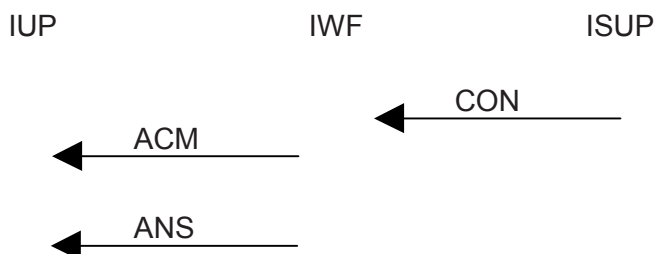


FIGURE 1.7 IUP ACM and ANS sent as a result of an ISUP CON message

1.1.6 Call Supervision

1.1.6.1 Suspend and Resume

1.1.6.1.1 ISDN case

This section describes the behaviour of the IWF when a full SIM interchange has been completed.

1.1.6.1.1.1 IUP initiated (forward) action

If the IWF receives a CLEAR or RE-ANSWER message from IUP then this shall be discarded.

If the IWF receives an IUP User Initiated SUSPEND message or RESUME message then this shall be mapped to the ISUP SUS or RES (User Initiated) message respectively.

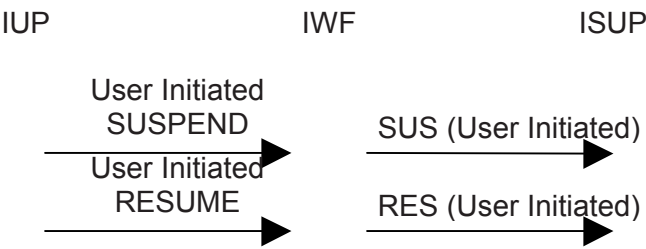


FIGURE 1.8 Mapping of IUP User Initiated SUSPEND and RESUME to ISUP

1.1.6.1.1.2 ISUP initiated (backward) action

If the IWF receives an ISUP SUS or RES (Network Initiated) message then this shall be discarded.

If the IWF receives an ISUP SUS or a RES (User Initiated) message then this shall be mapped into IUP User Initiated SUSPEND or RESUME respectively.

If the IWF receives an ISUP CPG (Generic Notification, User Suspended or Resumed) then this shall be discarded.

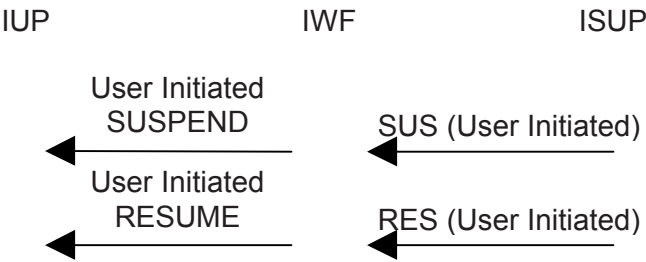


FIGURE 1.9 Mapping of ISUP SUS and RES (User Initiated) to IUP

1.1.6.1.2 Non-ISDN case

This section describes the behaviour of the IWF if no, or an incomplete SIM interchange has taken place.

1.1.6.1.2.1 IUP initiated (forward) action

If the IWF receives an IUP CLEAR message or RE-ANSWER message, then this shall be mapped to the ISUP SUS or RES (Network Initiated) message respectively.

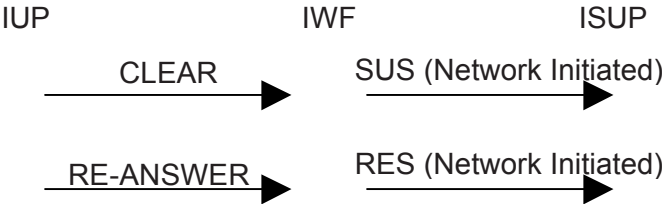


FIGURE 1.10 Mapping of IUP CLEAR and RE-ANSWER to ISUP

If the IWF receives an IUP User initiated SUSPEND or RESUME message then this shall be discarded.

1.1.6.1.2.2 ISUP initiated (backward) action

If the IWF receives an ISUP SUS or RES (Network Initiated) message then this shall be mapped to an IUP CLEAR or RE-ANSWER message respectively.

If the IWF receives an ISUP SUS or a RES (User Initiated) message or CPG (Generic Notification, User Suspended or Resumed) message then this shall be discarded.

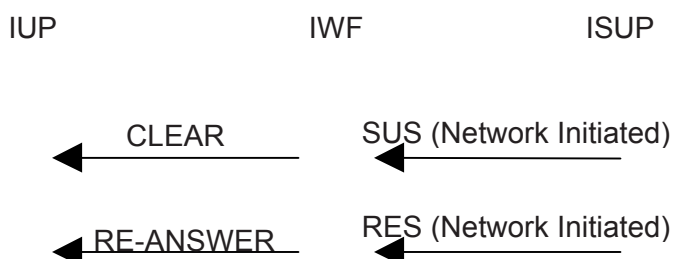


FIGURE 1.11 Mapping of ISUP SUS and RES (Network Initiated) to IUP

1.1.7 Bearer Release

On initiation of bearer release, any timer being run by the IWF shall be cancelled.

1.1.7.1 Forward IUP Release

On receipt of an IUP RELEASE message, the IWF shall instruct the ISUP protocol to initiate the ISUP Release procedure, mapping the received IUP Release Reason to an ISUP Cause value, as described in Section 2.1.7.3 (pre ACM) and Section 2.1.7.4 (post ACM).

The IUP and ISUP Release procedures will continue independently.

1.1.7.2 Backward ISUP Release

1.1.7.2.1 Backward ISUP Release pre IUP ACM

On receipt of an ISUP REL message, prior to the sending of an IUP ACM, the IWF shall instruct the IUP protocol to initiate the IUP Unsuccessful Call Establishment procedure based on the ISUP Cause value received, mapping the received Release Cause Value to an IUP CNA/Release Reason value as described in Section 2.1.7.1.

The IUP and ISUP Release procedures will continue independently.

1.1.7.2.2 Backward ISUP Release post-IUP ACM

1.1.7.2.2.1 Non Speech and non 3.1 kHz Audio call

On receipt of an ISUP REL message, subsequent to the sending of an IUP ACM, the IWF shall instruct the IUP protocol to initiate the IUP Release procedure, mapping the received ISUP Release Cause Value to an IUP Release Reason value as described in Section 2.1.7.2.

The IUP and ISUP Release procedures will continue independently.

1.1.7.2.2.2 Speech or 3.1 kHz Audio call

On receipt of an ISUP REL message, subsequent to the sending of an IUP ACM, the IWF shall instruct the IUP protocol to initiate the IUP Release procedure, mapping the received Release Cause Value to an IUP Release Reason value as described in Section 2.1.7.2. Alternatively, if the IUP ACM has been sent and the received ISUP Release cause value indicates a failure in call setup, the IWF shall return a suitable tone or announcement as determined by call control.

The IUP and ISUP Release procedures will continue independently.

1.2 Signalling procedures for ISUP to IUP calls

1.2.1 Receipt of an ISUP IAM and the sending of an IUP I(F)AM

On receipt of an ISUP IAM and possibly SAMs, the IWF shall instruct the IUP protocol to initiate the bearer establishment protocol, indicating that a complete destination address is available if an ST address signal has been received by the ISUP protocol.

As IUP ACI requests may be received at any time up to call release, any ISUP IAM information which may be required to satisfy an ACI request shall be retained at the IWF until a release message is received or sent by the IWF.

1.2.2 CLI Request Procedures

The CLI contained in the ISUP IAM CgPN shall be mapped to the IUP I(F)AM Line Identity field if supported by the IUP functionality.

The IWF shall respond to IUP requests for CLI information.

Table 1.6 specifies the order of preference that each available ISUP Line Identity takes in each of the IUP responses for each form of request mechanism. The priority shall be in descending order i.e. the CLI at the top is highest priority whilst the one at the bottom the lowest.

A Line Identity shall be deemed not usable for mapping to IUP and shall be passed over in the priority list in the following circumstances:

- a) The Line Identity information is too long to be included in the appropriate ACI, ASUI or SIM message.
- b) The ISUP Line Identity parameter is not present.
- c) The ISUP Line Identity parameter has the Address Presentation Restricted Indicator set to "not

Note: Address Presentation Restricted Indicator value "not available" is not valid in some ISUP Line Identity parameters. In these cases, the ISUP protocol will default the APRI to "restricted" before passing it to the IWF, and so this circumstance will not occur for these parameters.

- d) The ISUP Line Identity parameter has the Number Incomplete Indicator set to "incomplete".

TABLE 1.6 Possible IUP CLI request mechanisms and the ISUP parameters to be used for the response

	Possible IUP request mechanisms				
	SASUI	SIM-A	ACI 7 IRC=1, 5 (see Note 1)	ACI 7, IRC=11	ACI 7, IRC=12
ISUP parameter to be used or other content	CgPN	PN (if PNP=1)	CgPN	Last Diverting Line ID	PN (if PNP=1) (ICC=12)
	PCLI (see Note 2)	GN (see Note 3)	PCLI (see Note 2)	Confusion	GN (ICC=12) (see Note 4)
		CgPN (see Note 5)	Confusion		CgPN (ICC=1)
		SIM-B containing Line Identity with no digits			PCLI (see Note 2)
					Confusion

Note 1: Refer to Section 1.1.4 for Operator Services request procedures.

Note 2: If PCLI is not available, the IWF shall instruct the IUP procedures to generate PCLI of the IWP node if supported by the IUP functionality.

Note 3: The ISUP Generic Number shall only be used for mapping into the IUP SIM-B if the number qualifier is set to 'Additional

Note 4: The ISUP Generic Number shall only be used for mapping into the IUP ACI(ICC=12) if the number qualifier is set to 'Additional Calling Party Number' (00000110).

Note 5: The CgPN parameter shall not be used if its APRI is = 3, or the NFCI parameter is present with the CBI bit = 0.

1.2.3 Receipt of an IUP SIM-C

On receipt of an IUP SIM-C the IWF shall note that a complete SIM exchange has taken place.

1.2.4 Additional procedures to support Operator Services

1.2.4.1 Receipt of an IUP ACI Type 4 message

If a backward IUP ACI Type 4 message is received and the ACI Response Resolution Timer is not running, then the IWF shall instruct the ISUP protocol to include a Called Subscriber's Basic Service Marks parameter in either the ISUP ACM if not previously sent or an ISUP CPG message. The contents of the Called Subscriber's Basic Service Marks parameter shall be mapped from the contents of the ACI Type 4 message.

If a backward IUP ACI Type 4 message is received and the ACI Response Resolution Timer is running, then it shall be mapped in accordance with section 1.3.1.1.2.

1.2.4.2 Receipt of an ISUP APM containing an APP with Application Context ID = 125

If an ISUP APM is received, containing an APP with Application Context ID = 125, then the IWF shall perform the following actions depending upon the value of the OSS Information Type:

OSS Information Type	Action
----------------------	--------

4 (Action Invocation)	The IWF shall inspect the OSS Message Type.
-----------------------	---

If the OSS Message Type is set to 00000010 (Operator Override), then the IWF shall instruct the IUP Protocol to send an OPERATOR OVERRIDE message.

If the OSS Message Type is set to 00000011 (Howler), then the IWF shall instruct the IUP Protocol to send a HOWLER message.

1.2.4.3 Receipt of an IUP SEND SERVICE Message

The IWF shall instruct the IUP Protocol to send a Service message.

1.2.4.4 Receipt of an IUP EXTEND CALL Message

The IWF shall instruct the ISUP Protocol to send an APM message.

1.2.5 Receipt of an IUP ACM

On receipt of an IUP ACM message, the IWF shall instruct the ISUP protocol to send an ISUP ACM.

If the ACM is received without having received a SIM-C then the IWF shall note that a complete SIM exchange has not taken place.

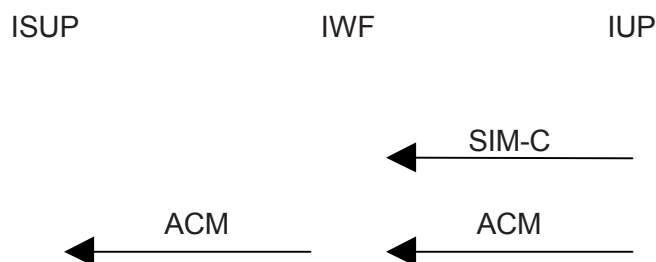


FIGURE 1.12 Mapping IUP ACM to ISUP ACM

Note: The SIM-C may be omitted under certain circumstances on category 2 calls.

1.2.6 Receipt of an IUP ANS

On receipt of an IUP ANS message, the IWF shall instruct the ISUP protocol to return an ANM message.

1.2.7 Call Supervision

1.2.7.1 Suspend and Resume

1.2.7.1.1 ISDN Case

This section describes the behaviour of the IWF when a full SIM interchange has been completed.

1.2.7.1.1.1 ISUP initiated (forward) action

If the IWF receives an ISUP SUS or RES (Network Initiated) message then this shall be discarded.

If the IWF receives an ISUP SUS or RES (User Initiated) message then this shall be mapped into IUP User Initiated SUSPEND or RESUME respectively.

If the IWF receives a ISUP CPG (Generic Notification, User Suspended or Resumed) then this shall be discarded.

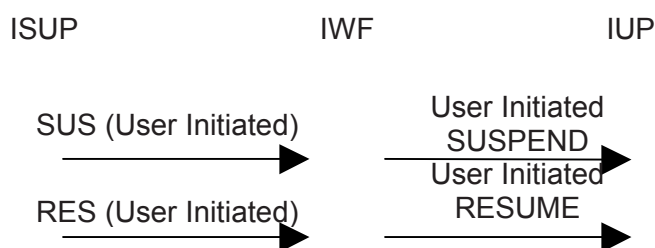


FIGURE 1.13 Mapping of ISUP SUS and RES (User Initiated) to IUP

1.2.7.1.1.2 IUP initiated (backward) action

If the IWF receives an IUP CLEAR message, then IUP and ISUP release procedures shall be initiated.

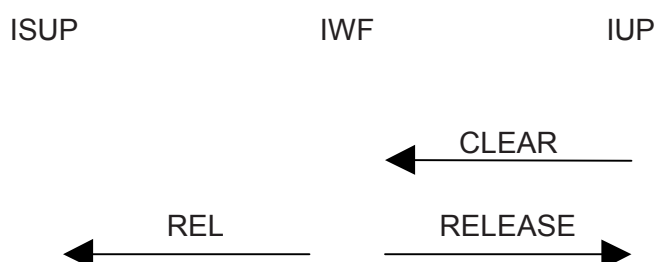


FIGURE 1.14 Mapping of IUP CLEAR message to ISUP

If the IWF receives an IUP RE-ANSWER message then it shall be discarded.

If the IWF receives an IUP User Initiated SUSPEND or RESUME message then it shall be mapped into ISUP SUS or RES (User Initiated) respectively.

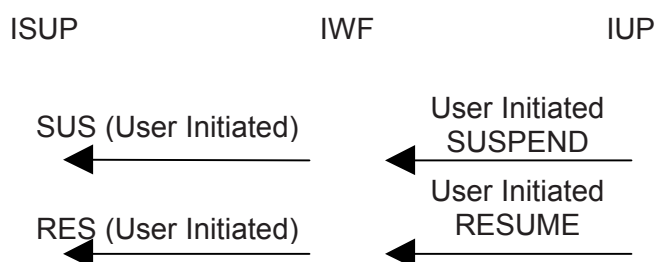


FIGURE 1.15 Mapping of IUP User Initiated SUSPEND and RESUME to ISUP

1.2.7.1.2 Non-ISDN case

This Section describes the behaviour of the IWF when a full SIM interchange has not been completed.

1.2.7.1.2.1 ISUP initiated (forward) action

If the IWF receives an ISUP SUS or RES (Network Initiated) message then it shall be mapped into IUP CLEAR or RE-ANSWER respectively.

If the IWF receives an ISUP SUS or RES (User Initiated) message or CPG (Generic Notification, User Suspended or Resumed) message then it shall be discarded.