ND1104:2004/11

PNO-ISC/INFO/004

PROPRIETARY EXTENSIONS TO

C7 INTERCONNECT USER PART (IUP)

Network Interoperability Consultative Committee,
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PNO-ISC INFORMATION DOCUMENT NUMBER 004
PROPRIETARY EXTENSIONS TO
C7 INTERCONNECT USER PART (IUP)

NETWORK INTEROPERABILITY CONSULTATIVE COMMITTEE

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0.2 Normative Information

All enquiries about distribution, reproduction and clarifications should be addressed in the first instance to the Technical Secretary of the NICC at the address on the title page.

0.3 Contents

0.4 History

Revision	Date of Issue	Updated by	Description
Issue 2	October 1999	PNO-ISC Editors	First Published Version
Issue 3	February 2003	PNO-ISC Editors	Second Published Version. Section 6 Revised to describe handling of INF & INR messages. Minor editorials.
Issue 4	October 2004	PNO-ISC Editors	Sections 1, 2 and 3 minor editorials.

0.5 Issue Control

Section	Page	Issue	Date
0	All	4	November 2004
1	All	2	November 2004
2	All	3	November 2004
3	All	3	November 2004
4	-	0	-
5	All	1	October 1999
6	All	3	February 2003
7	All	1	October 1999
8	-	0	-

0.6 References

/1/ NICC ND 1006:2004/11 - PNO-ISC/SPEC/006 - Interconnect User Part (IUP)

/2/ NICC ND 1007:2004/11 - PNO-ISC/SPEC/007 - ISDN User Part (ISUP)

/3/ NICC ND 1008:2004/11 - PNO-ISC/SPEC/008 - C7 IUP - ISUP Interworking

/4/ NICC ND 1301:2001/03 – DPNSS188 - Digital Private Network Signalling System No.1 (DPNSS1)

/5/ NICC ND1016:2004/09 (PNO-ISC/SPEC/016 Issue 1), Requirements on Communications Providers in Relation to Customer Line Identification Display Services and Other Related Services

/6/ NICC ND 1201:2000/05 – PNO-ISC/SER/001 – Completion of Calls to Busy Subscriber (CCBS) Supplementary Service

0.7 Glossary of Terms

0.7.1 Abbreviations

ACI	Additional Call Information (message)
ACK	Acknowledge
ACM	Address Complete Message
AMC	Auto Manual Centre
ANM	Answer Message (ISUP protocol)
ANS	Answer message (IUP protocol)
ASUI	Additional Set Up Information (message)
BT	British Telecom
BY	Busy
C7	CCITT Signalling System Number 7
CBC	Call Back Complete
CBWF	Call Back When Free
- C	- Cancel Request
- CB	- Call Back Request
- CLB	- Call Back Call
- CSUD	- Call Set Up Delayed
- CSUI	- Call Set Up Immediate
- FN	- Free Notification
- R	- Request
CC	Clearing Cause
CCBS	Completion of Calls to Busy Subscriber
CCF	Circuit Free message
CCITT	Committée Consultatif International Télégraphique et Téléphonique
CCM	Call Connected Message
CDB	Call Drop back
CdPC	Called Party Category
CFC	Coin and Fee Checking (message)
CIC	Circuit Identification Code
CLC	Calling Line Category
CLI	Calling Line Identity
CLR	Clear message
CNA	Connection Not Admitted (message)
CON	Congestion (DPNSS protocol)
CON	Connect message
CPC	Calling Party Category
CPG	Call Progress Message
CPI	Call Path Indicator
CQ	Content Qualifier
CRM	Clear Request Message
CT	Call Termination
CTI	Call Type Indicator
DA	Destination Address
DPNSS	Digital Private Network Signalling System No.1
DPNSS-CLI	Called Line Identity
DSS1	Digital Subscriber Signalling System No.1

ECD	Echo Control Device
ECM	Extend Call Message
EEM	End to End Message
EIM	Enveloped ISUP Message
EISM	Enveloped ISUP Segmented Message
E-ISUP	Enveloped-ISUP (A technique for conveying Signalling System C7 ISUP signalling messages across an IUP signalling network.)
Euro-ISDN	A general term used to describe an ISDN which has been implemented according to European Telecommunication Standards
ENG	Engaged
ETL	Ericsson Telecommunications Ltd
FAM	Final Address Message
FNR	Facility Not Registered
HLR	Howler (message)
IAM	Initial Address Message
ICC	Information Contained Code
IFAM	Initial and Final Address Message
IND	International Number Dialling
INF	ISUP Information message
INR	ISUP Information Request message
IRC	Information Requested Code
ISDN	Integrated Services Digital Network
ISI	Interconnect Specific Information
ISRM(C)	Initial Service Request Message (Complete)
ISUP	ISDN User Part
ISUP-RES	ISUP-Resume message
ISUP-SUS	ISUP-Suspend message
IUP	Interconnect User Part
IUP+	IUP enhanced to support Enveloped-ISUP
IUP-CLI	Calling Line Identity
IW	Interworking (with non C7 Signalling network/ route)
LDLI	Last Diverting Line Identity
LPD	Long Propagation Delay
LSB	Least Significant Bit
MSB	Most Significant Bit
MTP	Message Transfer Part
NAM	Number Acknowledge Message
NEED	Nodal End to End Data (message)
NET	Network
NICC	Network Interoperability Consultative Committee
NND	National Number Dialling
NSI	Non-Specified Information
NT	Network Termination
NU	Number Unobtainable

OCM	Operator Condition Message
OLI	Originating Line Identity
OOR	Operator Override (message)
ORD	Ordinary
OSS	Operator Services System
PNM	Protocol Negotiation Message
PNO-IG	Public Network Operators - Interest Group
PNO-ISC	Public Network Operators - Interconnect Standards Committee
PRI	Protocol Request Indicator
PSTN	Public Switched Telephone Network
RAN	Re-Answer message
RBWF	Ring Back When Free
REJ	Reject
REL	Release message
RES	Resume
RLC	Release Complete message
RO	Ring Out
SAD	Send All Digits (message)
SAM	Subsequent Address Message
SASUI	Send Additional Set Up Information (message)
SCP	Service Control Point
SCT	Subscriber Call Termination
SHP	Service Handling Protocol
SIC	Service Indicator Code
SIF	Signalling Information Field
SIM	ISDN Composite Service Information Message
SND	Send N Digits (message)
SOD	State of Destination
B	Busy
F	Free
SSP	Service Switching Point
STU	Service Temporarily Unavailable
SU	Service Unavailable
SUB	Subscriber
SUS	Suspend
TELE	Telephony
TMR	Transmission Medium Requirement
UK	The United Kingdom of Great Britain and Northern Ireland
UUD	User-to-User Data (message)
VMS	Voice Messaging Service
VPS	Virtual Private Service

0.7.2 Terminology

The following definitions are contained in PNO-ISC Specification 016 /5/:

calling line identity (CLI)
calling line identity presentation (CLIP) service
calling line identity restriction (CLIR) service
CLI available
CLI restricted/withheld
CLI unavailable
COL available
COL restricted/withheld
COL unavailable
connected line identity (COL)
network number (NN)
network provided (NP) number
presentation number (PN)
user provided, not verified (UPNV) number
user provided, verified and passed (UPVP) number

A-User
The User who activates RBWF service i.e. the calling User.

B-User
The User who is busy i.e. the called User.

Bearer Call
The IUP call carrying the Enveloped DPNSS protocol. Bearer call set-up occurs before any Enveloped DPNSS messages can be sent.

Called Customer
The customer in the Terminating Network to whom the call is directed.

Calling Customer
The customer in the Originating Network initiating the call.

Incoming Network
The network to which a call is passed from a point of interconnection between two networks.

NOTE - The incoming network may be the terminating network or a transit network.

Originating Network
The network to which the customer who originates a call is directly connected.

Outgoing Network
The network from which a call is passed to a point of interconnection between two networks.

NOTE - The outgoing network may be the originating network or a transit network.

RBWF

Ring Back When Free. An IUP implementation of CCBS using the IUP Enveloped DPNSS Protocol. RBWF enables queuing to a busy User line so that the caller receives a backward call when the called User ends the existing call. A new call is then set up between the two Users.

Terminating Network

The network to which the customer who receives a call is directly connected.

Transit Network

A network through which a call passes, but which is neither the originating network nor the terminating network for that call.

NOTE: A transit network acts as an outgoing network and as an incoming network.

END OF PNO-ISC/INFO/004 SECTION 0

1. INTRODUCTION

1.0 Scope

This section provides an introduction, context and supporting definitions to all of the sections of Information Document PNO-ISC/INFO/004 that together specify the proprietary extensions to the C7 Interconnect User Part (IUP) protocol.

Information Document PNO-ISC/INFO/004 should be read in conjunction with Specification PNO-ISC/SPEC/006 in order to obtain a complete description of the proprietary extensions to the Interconnect User Part.

1.1 Definitions of Terms Used in PNO-ISC/INFO/004

Service
The term service refers to both network features and customer services.

Informative service
A service for which a description has been produced by a particular supplier or operator. However, PNO-IG agreement of the description has been neither sought nor received for application of that service between networks in the UK. These services are described in the relevant sections of Document PNO-ISC/INFO/004 for information only, there being no obligation on any Operator to support the service either internally or via interconnect routes with other Operators. PNO-ISC/INFO/004 may be used as the basis of bilateral agreements between Operators.

1.2 Scope of PNO-ISC/INFO/004

PNO-ISC/INFO/004 specifies the signalling procedures, formats and codes that shall be used to support Informative services and network features at the point of interconnect between public networks in the UK using the C7 IUP protocol.

The inclusion in this document of any service shall not imply that the service is supported on any particular interconnect, or by any particular network. The services supported on a particular interconnect shall be determined by bilateral agreement between the operators of the interconnected networks.

Each service is described at both a service and protocol level. The service overviews are provided for information only. Full service descriptions, where available, can be found within the PNO-ISC/SER series of documents.

1.3 Contents of PNO-ISC/INFO/004

Section 1 provides general information, defines the scope and describes the structure of the C7 IUP proprietary extensions information document.

Section 2, “Message Types and Contents”, provides a "library" of messages and parameters, and specifies their formats and codes. These are drawn upon as necessary by the services and procedures described in Sections 3 onwards. Thus, messages, parameters or codes are only required to be supported if a service which employs them is supported. The messages and parameters specified here are in addition to those specified in section 2 of /1/.

Section 3, “Common Procedures”, provides a "library" of common call control procedures, which are drawn upon as necessary to realise the services described in Sections 4 onwards. A common call control procedure need only be supported if a service which employs it is supported. These procedures are in addition to those specified in Section 3 of /1/.

Section 4 is withdrawn.

Section 5, “Ring Back When Free”, specifies the signalling protocol to support the Ring Back When Free service.

Section 6, “Enhancements to IUP to Provide Enveloped ISUP”, specifies the signalling procedures for the Enveloped ISUP protocol.

Section 7, “Voice Messaging”, specifies the signalling procedures for the Voice Messaging Service.

END OF PNO-ISC/INFO/004 SECTION 1

2 MESSAGE TYPES AND CONTENTS

2.0 Scope

The purpose of this section is to provide a 'library' of message formats and contents in addition to those described in Section 2 of /1/. These additions are provided primarily for information only as they are used to support services in certain operators networks. Other sections describe services which utilise some of the additional messages to enable the extension of these services between networks, subject to agreement between the operators concerned. Use of the additions to support other than the services described is not recommended.

2.1 General

This document specifies message formats and contents additional to those specified in Section 2 of /1/. As such, this document is written as a 'delta' document to Section 2 of /1/. The sub-section numbers used in 2.2 onwards fit into the sequence of sub-sections in Section 2 of /1/. However, the Tables and Figures in this document are numbered independently of Section 2 of /1/.

In order to determine the totality of the IUP message formats and codes specified, it is necessary to consider both this document and Section 2 of /1/.

2.2 Message Groups and Types

2.2.1 Message Groups

2.2.1.4 Backward Set-Up Information Messages (H0=3)

Add:

Call Drop Back (CDB) Message

2.2.1.8 Service Information Messages (H0=7)

Add:

Additional Call Information (ACI) Message Type 8

Nodal End-to-End Data (NEED) Message

Operator Condition Message (OCM)

OSS Node to Node Message

User to User Data (UUD) Message

2.2.1.9 Enveloped ISUP Messages (H0=8)

Add:

Enveloped ISUP Message (EIM)

Enveloped ISUP Segmented Message (EISM)

Protocol Negotiation Message (PNM)

TABLE 2.1
Allocation of additional H0 and H1 codes

H0 H1	0	1	2	3	4	5	6	7	8
0									
1									PROTOCOL NEGOTIATION
2									ENVELOPED ISUP
3									
4									
5								OPERATOR CONDITION	
6								USER-TO-USER DATA	
7									
8									
9									
10				CALL DROP BACK					
11								NODAL END-TO-END DATA	
12									
13									
14								OSS NODE TO NODE MESSAGE	
15									
16									
130									ENVELOPED ISUP SEGMENTED

2.3 Message Contents

Replace sub-sections referencing this document with the following:

2.3.1.8 Additional Call Information (ACI) Message - Type 8

This message is used to indicate that Nodal End-to-End Data transfer may commence.

The message format is:

TABLE 2.2

Parameter	Reference (sub-section)	Type	Length (octets)
Label	2.1.2	FM	5
Header - (H0 and H1 Codes)	2.2.2	FM	2
ACI Message - Information Contained and Information Requested	2.4.2	FM	2
reserved	-	FM	1
ACI Type 8 Message Indicators	2.4.6	FM	2
Line Identity	2.4.19	VM	1-9

2.3.7 Call Drop Back (CDB) Message

This message indicates that release of the path in the forward direction is required and carries information to enable call set up to be completed.

The message format is:

TABLE 2.3

Parameter	Reference (sub-section)	Type	Length (octets)
Label	2.1.2	FM	5
Header - (H0 and H1 Codes)	2.2.2	FM	2
Call Drop Back Message - Call Log Indicators	2.4.33	FM	1
Call Drop Back Message - SCP Information	2.4.34	VM	2-11
Call Drop Back Message - Calling Line Information Indicator	2.4.32	FM	1
Line Identity	2.4.19	VO	1-9
Partial Calling Line Identity	2.4.23	FO	9
Translated Address	2.4.35	VM	1-11

2.3.20 Nodal End-to-End Data (NEED) Message

This message is used to pass information as identified by the content qualifier transparently between networks.

The message format is:

TABLE 2.4

Parameter	Reference (sub-section)	Type	Length (octets)
Label	2.1.2	FM	5
Header - (H0 and H1 Codes)	2.2.2	FM	2
Content Qualifier	2.4.20	FM	1
reserved	-	FM	1
Nodal End-to-End Data	2.4.21	VM	2-46

2.3.21 Operator Condition Message (OCM)

This message is used on calls between Operator Services in one network and Operator Services in another, to indicate changes in Operator Service conditions.

The message format is:

TABLE 2.5

Parameter	Reference (sub-section)	Type	Length (octets)
Label	2.1.2	FM	5
Header - (H0 and H1 Codes)	2.2.2	FM	2
Operator Condition Indicators	2.4.22	FM	2

2.3.41 User-to-User Data (UUD) Message

This message is used to transfer data between users.

The message format is:

TABLE 2.6

Parameter	Reference (sub-section)	Type	Length (octets)
Label	2.1.2	FM	5
Header - (H0 and H1 Codes)	2.2.2	FM	2
reserved	-	FM	1
User-to-User Data	2.4.31	VM	2-46

2.3.42 Enveloped-ISUP Message (EIM)

This message is used to transport ISUP message contents, thus allowing ISUP signalling flows within an IUP signalling environment.

The message format is:

TABLE 2.7

Parameter	Reference (sub-section)	Type	Length (octets)
Label	2.1.2	FM	5
Header - (H0 and H1 Codes)	2.2.2	FM	2
ISUP Message	2.4.37	VM	3-265

2.3.43 Enveloped-ISUP Segmented Message (EISM)

This message is used to transport segments of an ISUP Message when IUP segmentation procedures for IUP-EIMs apply (see Section 6).

The message format is:

TABLE 2.8

Parameter	Reference (sub-section)	Type	Length (octets)
Label	2.1.2	FM	5
Header - (H0 and H1 Codes)	2.2.2	FM	2
EISM Segmentation Information	2.4.38	FM	1
ISUP Message Segment (Note)	2.4.39	VM	2-53

NOTE - Except for the final message of an EISM sequence, this parameter is always 53 octets in length

2.3.44 Protocol Negotiation Message (PNM)

This message is used in the backwards direction to support the invocation of enveloped protocols when requested in the IAM/IFAM.

The message format is:

TABLE 2.9

Parameter	Reference (sub-section)	Type	Length (octets)
Label	2.1.2	FM	5
Header - (H0 and H1 Codes)	2.2.2	FM	2
Protocol Negotiation Message Indicators	2.4.40	FM	2

2.3.45 OSS Node to Node Message (ONN)

Reserved for intra-network use by BT

2.4 Parameter Formats and Code Allocations

2.4.1.3 Reserved Values within Parameter Fields

Add:

Within this document certain parameter fields are marked as reserved for use by a particular Operator or Manufacturer. This indicates that the Operator/Manufacturer concerned has declared their use of the value to the PNO-ISC. The PNO-ISC will try to avoid re-allocating such values.

2.4.2 Additional Call Information Message Information Contained and Information Requested

Add the following codings:

00001010 [10]	Called Line Identity, Called Party Category and Interconnect Specific Information.

Add the following ACI type to Table 2.37:

TABLE 2.10

Additional Call Information Message Type	Permitted Information Contained Codes	Permitted Information Requested Codes
ACI Type 8	00001010 [10]	00000000 [0] 00000001 [1] 00001100 [12]

2.4.6 Additional Call Information Message, Type 8 - Message Indicators

The format of the ACI, Type 8 Message Indicators parameter field is shown in Figure 2.4.1 below.

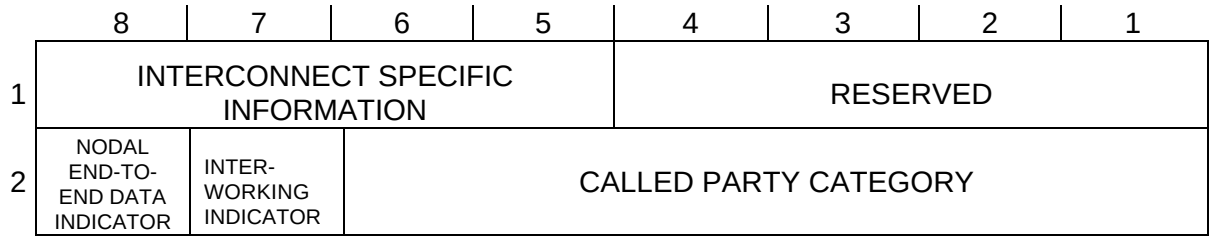

FIGURE 2.4.1

ACI Message, Type 8 - Message Indicators parameter field

The following codes are defined for use in the sub-fields of the ACI Message, Type 8 - Message Indicators parameter field.

a) Interconnect Specific Information (ISI)

This field may be used to convey information between networks interconnected by C7 IUP. Under these circumstances, the use, codings, and meaning of the field, must be mutually agreed between the PNOs concerned. This document will not specify the codings.

b) Called Party Category (CdPC)

000000 [0]	Unknown
000001 [1]	Ordinary (Residential)
000010 [2]	Ordinary (Business)
000011 [3]	Pay-on-answer coin box (Public or Private)
000100 [4]	Administration Diverted - Ordinary
000101 [5]	Administration Diverted - Payphone
000110 [6]	ISDN (Residential)
000111 [7]	ISDN (Business)
001000 [8]	Pre-payment Payphone (Public)
001001 [9]	Pre-payment Payphone (Renter's Residential)
001010 [10]	Pre-payment Payphone (Renter's, Business)
001011 [11]	Service Line
001100 [12]	Centrex
001101 [13]	Operator Services Operator
001110 [14]	AMC Operator (NND/IND)
001111 [15]	AMC Operator (NND)
010000 [16]	DPNSS
010001 [17]	)
to	) reserved
111111 [63]	)

c) IW Indicator

0	No IW involved
1	IW involved

d) Nodal End-to-End Data Indicator

0	Nodal End-to-End Data transfer not available
1	Nodal End-to-End Data transfer available

2.4.9 Called Address

Add the following coding for the protocol request indicator:

Protocol Request Indicator (PRI)

000[0]	Enveloped-ISUP not requested
001[1]	Enveloped-ISUP protocol preferred
010[2]	Reserved (BT)
011[3]	Reserved (BT)
100[4]	reserved (BT)
101[5]	reserved (BT)
110[6]	reserved (BT)
111[7]	reserved (BT)

2.4.16 IAM/IFAM Message Indicators

d) Service Handling Protocol (SHP)

Add:

0011 [3]	Invoke Nodal End-to-End Data Protocol
0100 [4]	In use by ETL
1000 [8]	Enveloped-ISUP Essential

e) Message Indicators I to P

iv) NML - Call Type Indicator (CTI)

Add:

010 [2]	Call Forward No Reply (In use by Orange)
011 [3]	Call Forward Busy or Not Reachable (In use by Orange)
100 [4]	VPS Virtual Call
101 [5]	Reserved VPS Real Call
110 [6]	Public Network DPNSS Call

2.4.20 Nodal End-to-End Data Message - Content Qualifier

The format of the Nodal End-to-End Data Message - Content Qualifier parameter field is shown in Figure 2.4.2 below.

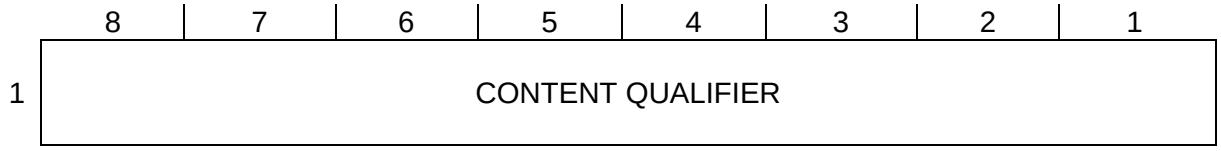

FIGURE 2.4.2

Nodal End-to-End Data Message - Content Qualifier parameter field

The following codes are defined for use in the Nodal End-to-End Data Message - Content Qualifier parameter field.

00000000 [0]	No information on content
00000001 [1]	DPNSS Real Call Message
00000010 [2]	DPNSS Virtual Call Message
00000011 [3] to 11111111 [255]	reserved

2.4.21 Nodal End-to-End Data

The format of the Nodal-End-to-End Data parameter field is shown in Figure 2.4.3 below.

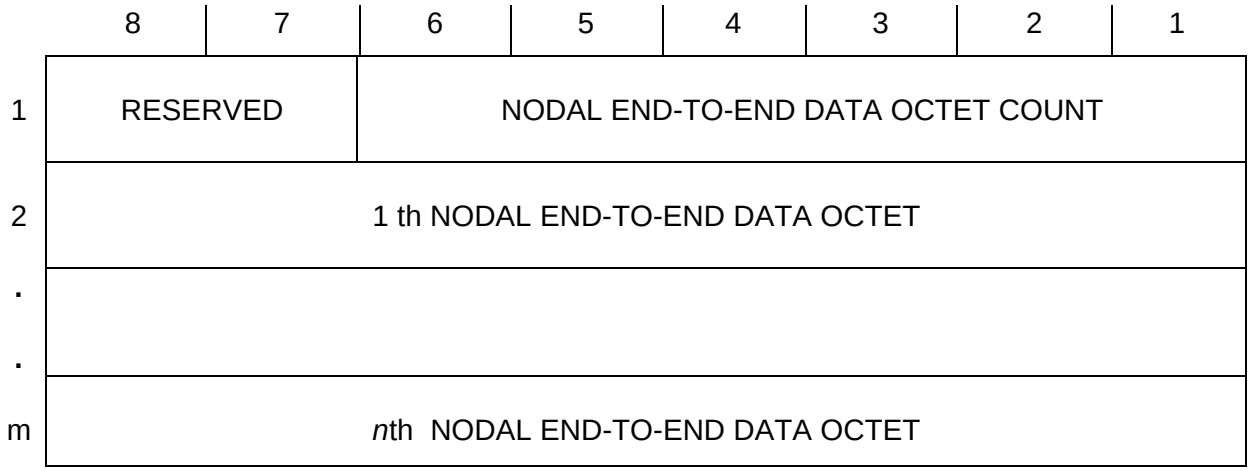

FIGURE 2.4.3

Nodal End-to-End Data parameter field

The following codes are defined for use in the sub-fields of the Nodal End-to-End Data parameter field.

a) Nodal End-to-End Data Octet Count

Set to provide, in binary form, an indication of the number of octets contained within the Nodal End-to-End Data sub-field.

000000 [0]	No information on content
000001 [1]	)
to	) Number of octets in the Nodal End-to-End Data sub-field
101101 [45]	)
101110 [46]	)
to	) reserved
111111 [63]	)

b) Nodal End-to-End Data

The information contained within this sub-field shall be encoded/decoded as necessary by the originating/terminating VPS/DPNSS node concerned.

2.4.22 Operator Condition Indicators

The format of the Operator Condition Indicators parameter field is shown in Figure 2.4.4 below.

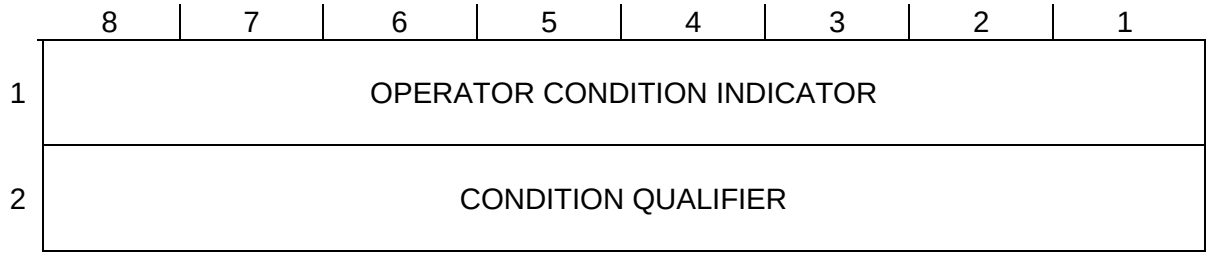

FIGURE 2.4.4

Operator Condition Indicators parameter field

The following codes are defined for use in the sub-fields of the Operator Condition Indicators parameter field.

a) Operator Condition Indicator

00000000 [0]	Operator Answer
00000001 [1]	Operator in circuit
00000010 [2]	Operator out of circuit
00000011 [3]	Operator recall
00000100 [4]	Operator relinquish
00000101 [5]	Subscriber Clear
00000110 [6]	)
to	) reserved
11111111 [255]	)

b) Condition Qualifier

00000000 [0]	No information on content
00000001 [1]	Path split
00000010 [2]	Path not split
00000011 [3]	)
to	) reserved
11111111 [255]	)

2.4.31 User-to-User Data

The format of the User-to-User Data parameter field is shown in Figure 2.4.5 below.

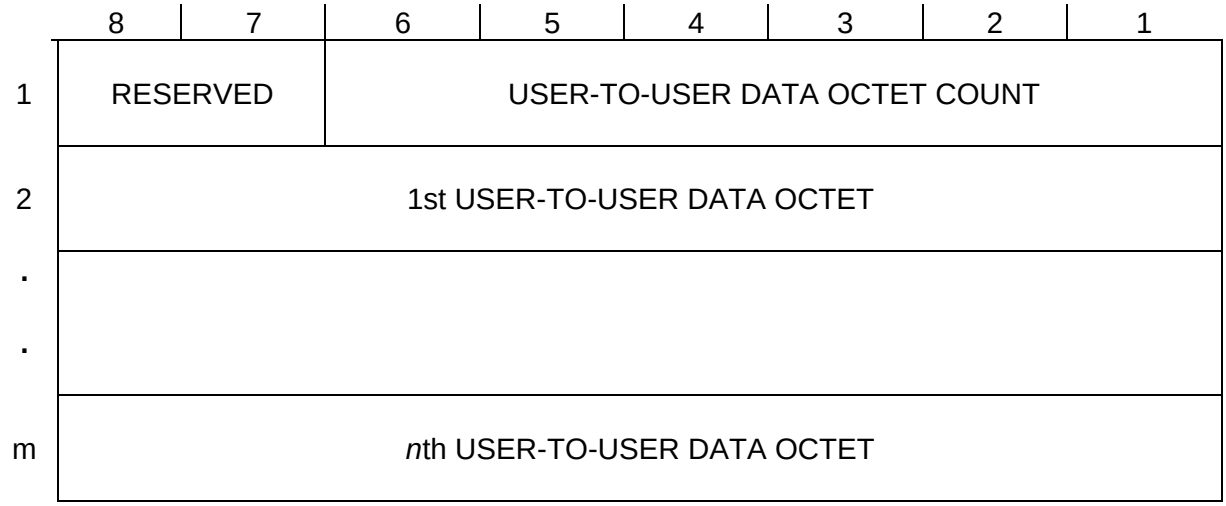

FIGURE 2.4.5

User-to-User Data parameter field

The following codes are defined for use in the sub-fields of the User-to-User Data parameter field.

a) User-to-User Data Octet Count

Set to provide a binary indication of the number of octets contained within the User-to-User Data sub-field.

000000 [0]	reserved
000001 [1]	)
to	) Number of User-to-User Data octets included
101101 [45]	)
101110 [46]	)
to	) reserved
111111 [63]	)

b) User-to-User Data

This information shall be conveyed in the order received from the calling/called terminal and shall not be examined by the network.

2.4.32 Call Drop Back Message - Calling Line Information Indicator

An indication of whether full or partial CLI is included in the message.

The format of the Call Drop Back Message Calling Line Information Indicator parameter field is shown in Figure 2.4.6 below.

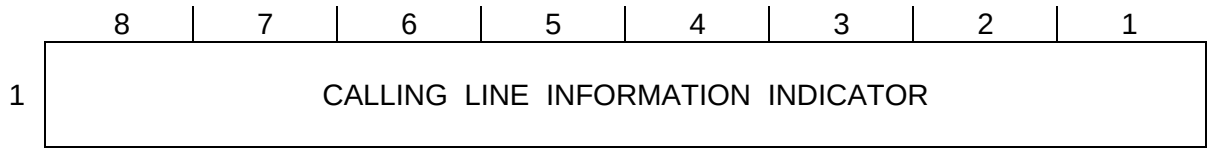

FIGURE 2.4.6

Call Drop Back Message Calling Line Information Indicator parameter field

The following codes are defined for use in the Call Drop Back Calling Line Information Indicator parameter field.

00000000 [0]	No Full or Partial Calling Line Identity parameter included
00000001 [1]	Full Calling Line Identity included
00000010 [2]	Partial Calling Line Identity included
00000011 [3]	)
to	) reserved
11111111 [255]	)

2.4.33 Call Drop Back Message - Call Log Indicators

The format of the Call Drop Back Message Call Log Indicators parameter field is shown in Figure 2.4.7 below.

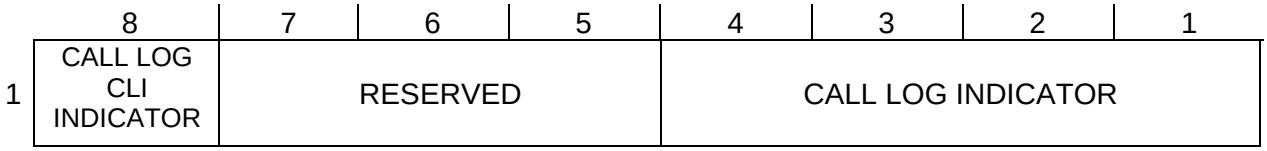

FIGURE 2.4.7

Call Drop Back Message Call Log Indicators parameter field

The following codes are defined for use in the sub-fields of the Call Drop Back Call Log Indicators parameter field.

a) Call Log Indicator

Indicating whether or not a call log record is required. This indicator shall be set by the node that initiates the Call Drop Back message.

0000 [0]	Call Log not required
0001 [1]	Generate Call Log if call is answered
0010 [2]	Generate Call Log unconditionally
0011 [3]	)
to	) reserved
1111 [15]	)

b) Call Log CLI Indicator

Indicating whether or not the SSP is required to request CLI for insertion into the call logging record at the SSP.

0	CLI request not required for Call Logging
1	Request CLI for Call Logging record

2.4.34 Call Drop Back Message - Service Control Point (SCP) Information

The format of the Call Drop Back Message SCP Information parameter field is shown in Figure 2.4.8 below.

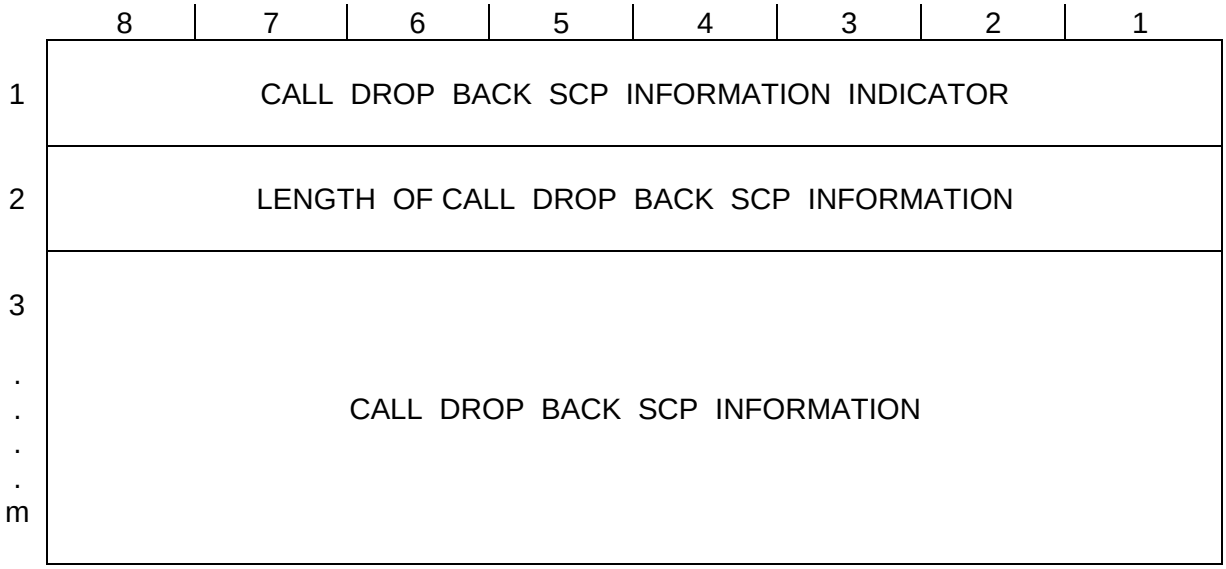

FIGURE 2.4.8

Call Drop Back Message SCP Information parameter field

The following codes are defined for use in the sub-fields of the Call Drop Back message SCP Information parameter field.

a) Call Drop Back SCP Information Indicator

Set to indicate the type of information contained within the Call Drop Back SCP Information sub-field.

00000000 [0]	No information (Octet 2 shall be set to '00000000' and Octets 3 to n shall be omitted)
00000001 [1]	Reason for Termination
00000010 [2] to 01111111 [127]	reserved
10000000 [128]	In use by BT for Number Portability
10000001 [129] to 11111111 [255]	reserved

b) Length of Call Drop Back SCP Information

Set to provide a binary indication of the number of octets contained within the Call Drop Back SCP Information sub-field,

00000000 [0] to 00001001 [9]	) Length of Call Drop Back SCP Information
00001010 [10] to 11111111 [255]	) Invalid length indication

NOTE - This sub-field shall not be coded greater than '00000001' since the only defined information that may be included is "Reason for Termination" which is a single octet fixed length sub-field.

c) Call Drop Back SCP Information

As defined by the CDB SCP Information Indicator, (restricted to "Reason for Termination"). The type of information contained within this sub-field is qualified by the Call Drop Back Information Indicator code.

i) Reason for Termination

"Reason for Termination" is a single octet with the same meanings as defined for the Reason parameter of the Connection Not Admitted (CNA)and Release messages, (Sub-sections 2.4.15 and 2.4.24 of /1/).

Only the following values shall be generated but all nodes with the ability to receive and act upon the Call Drop Back Message shall be capable of receiving any of the defined CNA/Release reasons and either passing them on unchanged or connecting the appropriate tone or announcement.

00110101 [53]	Flow Controlled
00110110 [54]	Out of Catchment Area
00110111 [55]	Translation Out of Service

2.4.35 Call Drop Back Message - Translated Address

This parameter shall contain up to a maximum of 20 address signal digits pertaining to a new called number with an indication of the number of address signals included in the message. If the Call Drop Back message contains a failure reason the Translated Address may not be present, in which case the length of the translated address will be indicated as zero address signals.

The format of the Call Drop Back Message Translated Address parameter field is shown in Figure 2.4.9 below.

	8	7	6	5	4	3	2	1
1	RESERVED			NUMBER OF TRANSLATED ADDRESS SIGNALS				
2	2nd ADDRESS SIGNAL				1st ADDRESS SIGNAL			
. . . .								
m	FILLER (IF NECESSARY)				nth ADDRESS SIGNAL			

FIGURE 2.4.9

Call Drop Back Message Translated Address parameter field

The following codes are defined for use in the sub-fields of the Call Drop Back Translated Address parameter field.

a) Number of Translated Address Signals

Set to provide a binary indication of the number of Address Signals contained within the Translated Address, i.e. from 0 to 20 digits.

00000 [0] No Address Signals included
00001 [1])
to) Number of Address signals
10100 [20])

10101 [21])
to) Invalid length indication
11111 [31])

b) Address Signals

0000 [0] Digit 0
0001 [1] Digit 1
0010 [2] Digit 2
0011 [3] Digit 3
0100 [4] Digit 4
0101 [5] Digit 5
0110 [6] Digit 6
0111 [7] Digit 7
1000 [8] Digit 8
1001 [9] Digit 9
1010 [10])
to) reserved
1111 [15])

The most significant Address Signal shall be sent first. Subsequent Address Signals shall be sent in successive four bit sub-fields. The order of bit transmission for each digit shall be least significant bit first.

c) Filler

In the case of an odd number of Address Signals, the Filler code '0000' shall be inserted after the last Address Signal, thus ensuring that the variable length parameter containing the Translated Address always contains an integral number of octets.

2.4.37 ISUP Message

The format of the ISUP Message parameter field is shown in Figure 2.4.10 below.

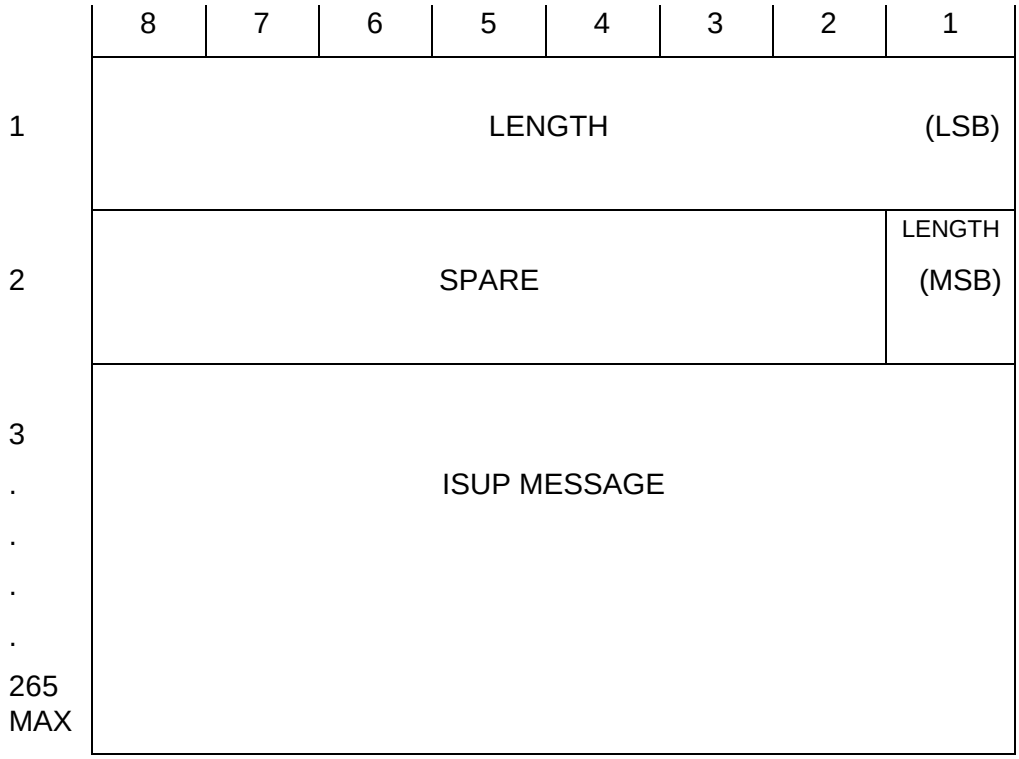

FIGURE 2.4.10

ISUP Message parameter field

The following codes are defined for use in the sub-fields of the ISUP Message parameter field:

a) Length (excluding “Length” octets 1& 2)

0 00000000[0] Invalid
0 00000001[1])
to) ISUP Message length (Note)
1 00000111[263])

1 00001000[264])
to) Invalid
1 11111111[511])

NOTE - If 62 octet MTP applies this will be between 1 and 52 octets. If 272 octet MTP applies this will be between 1 and 263 octets.

b) ISUP Message

The formatting and coding of this parameter field will be in accordance with the formatting and coding of ISUP messages, see /2/, beginning with the ISUP message type code.

2.4.38 EISM Segmentation Information

The format of the EISM Segmentation information parameter field is shown in Figure 2.4.11below.

	8	7	6	5	4	3	2	1
1	1st SI	SPARE			NUMBER OF SEGMENTS REMAINING			

FIGURE 2.4.11

EISM Segmentation Information parameter field

The following codes are defined for use in the sub-fields of the EISM Segmentation Information parameter field

a) Number of Segments Remaining

0000 [0] No further segments to be sent (last segment indication).
0001 [1])
to) Number of segments still to be sent.
0101 [5])

0110 [6])
to) Invalid
1111 [15])

b) First Segment Indicator (1st SI)

0 Subsequent message segment
1 First segment of a segmented message sequence

2.4.39 ISUP Message Segment

The format of the ISUP Message Segment parameter field is shown in Figure 2.4.12 below

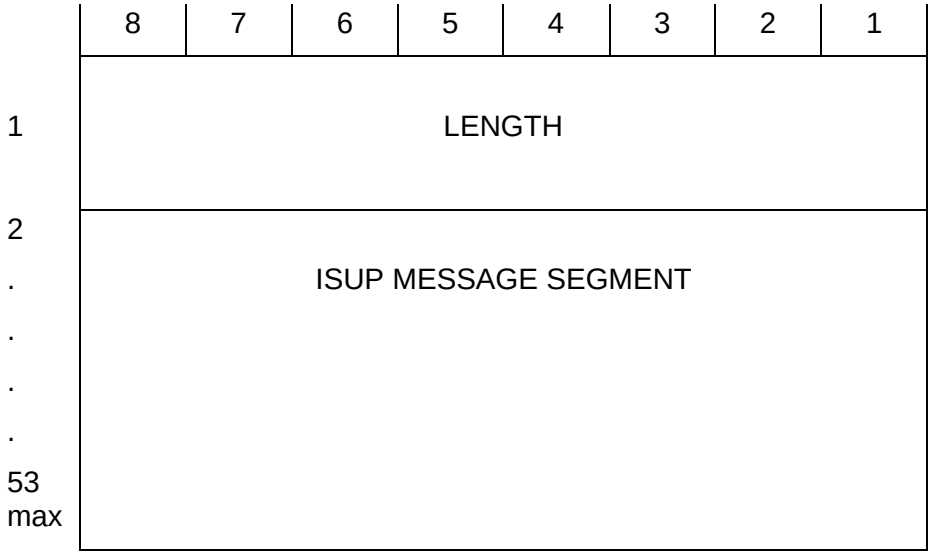

FIGURE 2.4.12

ISUP Message Segment parameter field

a) Length (excluding “Length” octet 1)

00000000[0])		Invalid
00000001[1]	)	
to	)	ISUP Message length
00110100[52]	)	
00110101[53]	)	
to	)	Invalid
11111111[255]	)	

b) ISUP Message Segment

This shall contain a segment of the ISUP message derived as described in Section 6.

2.4.40 Protocol Negotiation Message Indicators

The format of the Protocol Negotiation Message Indicators parameter field is shown in Figure 2.4.13 below

	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

FIGURE 2.4.13

Protocol Negotiation Message Indicators parameter field

The following codes are defined for use in the sub-fields of the Protocol Negotiation Message Indicators parameter field.

A Send ISUP-IAM Indicator

0 No information

1 Preceding node requested to send EIM[ISUP-IAM]

B to P - reserved

END OF PNO-ISC/INFO/004 SECTION 2

3. COMMON PROCEDURES

3.0 Scope

The purpose of this section of PNO-ISC/INFO/004 is to provide a “library” of common call procedures in addition to those described in section 3 of /1/ ,which may be employed across a national interconnect between two Public Network Operators. The common call control procedures (given in 3.2) are drawn upon as necessary to realise the services described in later sections of this document. Thus, compliance to a common call control procedure is only necessary for compliance to a service which employs that common call control procedure given in sub-section 3.2. This document does not include any procedures for transit network operation.

3.1 General

This section of PNO-ISC/INFO/004 gives specific information for the additional call control procedures, information flows, error handling procedures and timer requirements for the support of information services established between Public Network Operator networks. Where details already exist in Section 3 of /1/ a reference is made to that document.

The messages, procedures and message parameter codes, specific to an information service are listed in the specification relevant to the service concerned.

The following Message Sequence Diagrams (MSDs) and accompanying numbered text give the message flows across the interface between two interconnected Networks using C7 IUP.

Details relating to the control of the transmission path are not given in this section, these requirements are given in the individual service sections of this document.

3.2 Common Call Control Procedures

C7 IUP comprises a number of call set up, release and supervision protocols which provide additional Call Control Procedures necessary to support Information services described in later sections of this document.

The set up protocols can be considered as comprising the Bearer Establishment Protocol, necessary for bearer establishment between Incoming and Outgoing Networks, and other protocols used for end-end service provision. The supervision protocols are used to exchange call status information between networks. Timer procedures are also included.

The C7 IUP signalling between the Incoming and Outgoing Networks is described in detail. Message flows within the networks are not relevant to this document.

The additional set up protocols are defined in 3.2.1 and 3.2.2, the supervision protocols in 3.2.3 and the release protocols in 3.2.4.

The protocols to be used for the establishment of any individual call or Supplementary Service is determined by protocol negotiation initiated by the contents of the C7 IUP SHP parameter field of the Initial Address Message (IAM) or Initial and Final Address Message (IFAM) sent by the Outgoing Network.

The following overview gives the general relationship between C7 IUP Call Set Up Protocols.

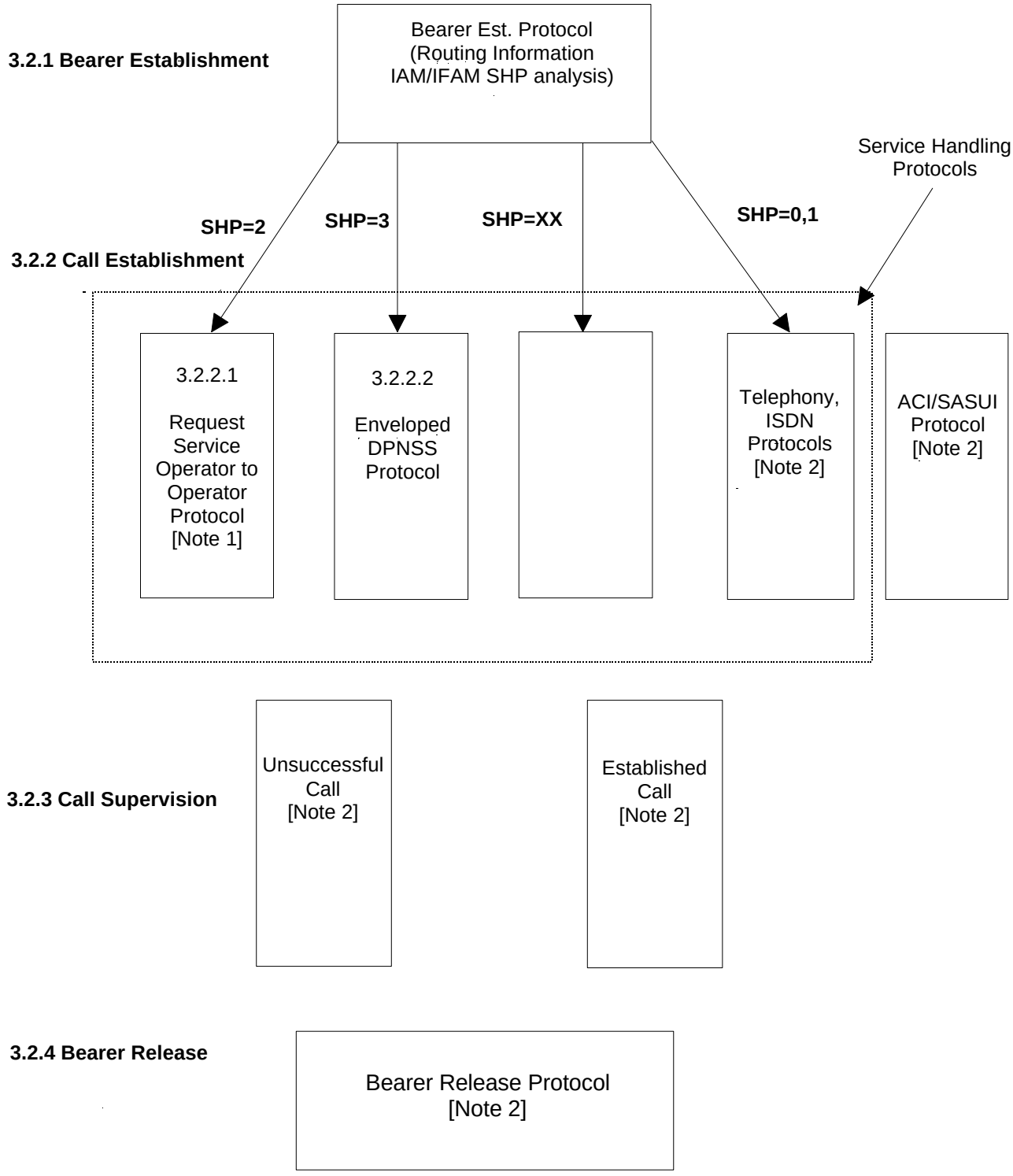

FIGURE 3.1
C7 IUP Call Set Up Protocols

NOTE 1 - Initiation of the Request Service protocol (i.e. SHP=2) is described in Section 3 of /1/. This document describes the Operator to Operator Protocol variant.

NOTE 2 - Section 3 of /1/ applies.

NOTE 3 - Further Call Establishment protocol allocations may be specified by PNO-ISC in the future. The protocols relevant to any particular service or call is determined from the specification of the service concerned. Only those protocols relevant to services supported between Networks are obligatory.

3.2.1 Bearer Establishment Protocol

The IUP Bearer Establishment Protocol provides the messages necessary to;

i) set up a bearer connection between Incoming and Outgoing Networks.

ii) enable the Incoming Network to identify the required destination.

iii) enable the Incoming Network to determine the Service Handling Protocol being requested by the Outgoing Network.

Specific SHP values are used to invoke the protocols necessary to support the services described in this document. In addition to those described in /1/, SHP value 3, the Enveloped DPNSS Protocol is detailed in this document.

There are three variants of the Bearer Establishment protocol, these are described Section 3 of /1/.

During bearer establishment, the Incoming Network may request supplementary information from the Outgoing Network, e.g. Calling Line Identity, using either the SASUI or ACI Protocol (refer to /1/).

3.2.2 Call Establishment

3.2.2.1 Request Service Protocol - OP (Operator - Operator) Protocol

The Request Service Protocol is used when an IUP call requires to utilise one or more of the facilities (over and above “normal” call facilities) provided by an Operator Services function.

There are three variants of OP, each variant is characterised according to the initiation of the Operator Services function and the outcome of an initiation protocol - called the OP negotiation protocol (as specified Section 3 of /1/). Two of these three variants are described in Section 3 of /1/ and the third, OP (Operator to Operator), is described in this document.

The OP (Operator - Operator) Protocol allows the establishment and maintenance of a IUP call between Operators in different Networks.

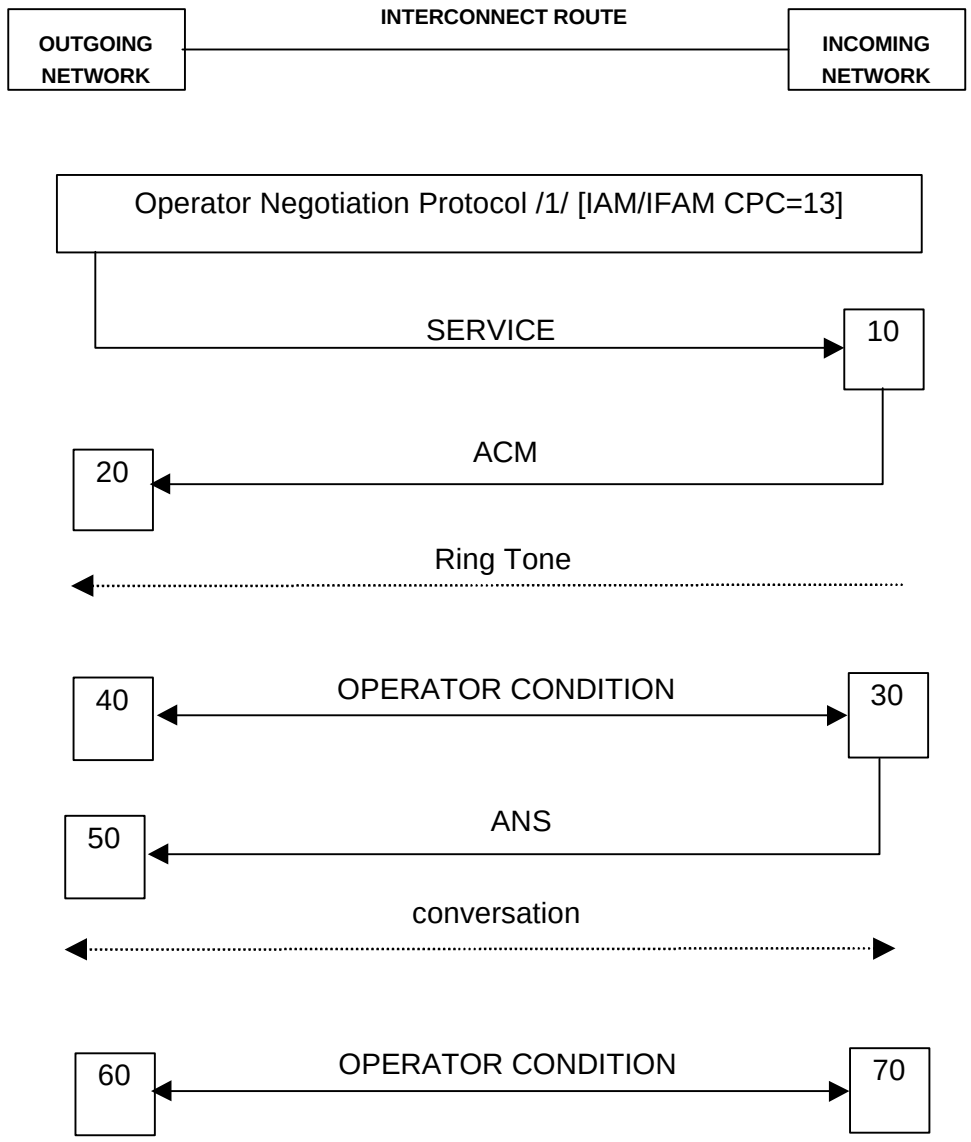

FIGURE 3.2
OP (Operator to Operator) PROTOCOL

When the OP negotiation protocol has been completed the call shall continue in accordance with 3.2.2.1.10.

3.2.2.1.10

When the Incoming Network is in a position to indicate an established call condition to the Outgoing Network it shall;

a) send an ACM to the Outgoing Network,

b) start Timer TO-05,

If the Incoming Network is unable to indicate an established call condition to the Outgoing Network then the Incoming Network shall fail the call by using the procedures described in /1/.

3.2.2.1.20

On receipt of ACM, the Outgoing Network shall progress the call in accordance with the service concerned.

3.2.2.1.30-40

OPERATOR CONDITION messages may be passed in either direction as required by the service concerned, to enable call supervision and service information to be passed between Operators.

If, subsequent to completion of the exchange of information, the call can proceed, the Incoming Network shall send ANS message to the Outgoing Network.

3.2.2.1.50

On receipt of ANS, the Outgoing Network shall progress the call in accordance with the service concerned.

3.2.2.1.60-70

OPERATOR CONDITION messages may be passed in either direction as required by the service concerned, to enable call supervision and service information to be passed between Operators.

3.2.2.1.80

The call now continues in accordance with the service concerned, using the procedures described in /1/.

3.2.2.2 Enveloped DPNSS Protocol

This protocol is used to transparently carry DPNSS signalling over a C7-IUP "Bearer Call" between interconnected public networks. The DPNSS signalling can be used to support a number of different services, e.g. Ring Back When Free (RBWF).

Individual services are described in the Service Sections within this document.

DPNSS is specified in /4/.

As the Enveloped DPNSS protocol utilises Group 7 messages (i.e. ACI and NEED), it should be noted that the CONFUSION procedures of /1/ are applicable.

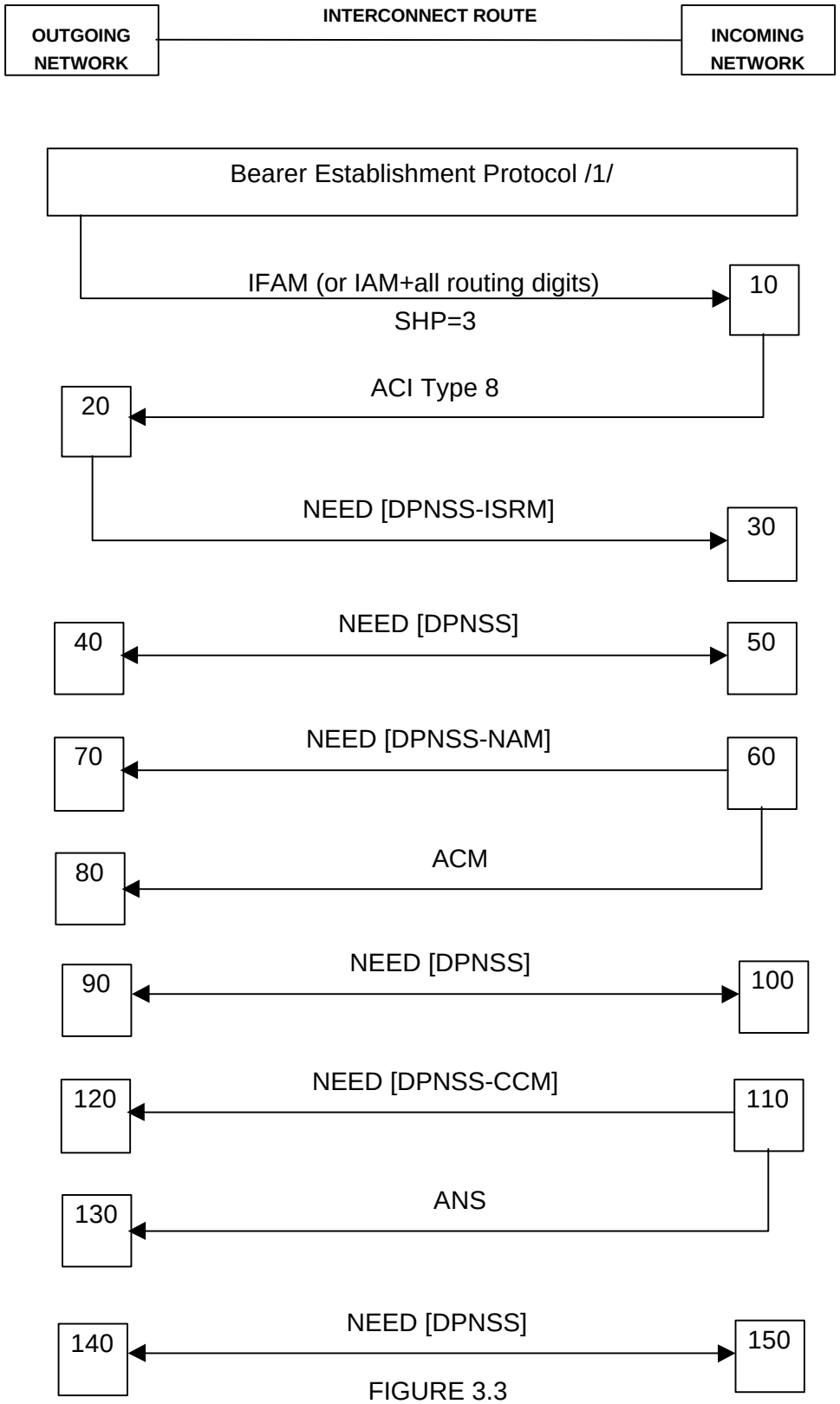

FIGURE 3.3

Enveloped DPNSS [NEED] Protocol

3.2.2.2.10

On completion of the Bearer Establishment Protocol. i.e. when all of the required digits have been received using IFAM or IAM procedures as described in 3.2.1 and SHP=3, the Incoming Network shall determine whether Enveloped DPNSS Protocol can be used on the call. Currently Enveloped DPNSS Protocol can only be used if CPI is set to a value of 1.

3.2.2.2.10.1

If the Incoming Network requires additional information from the Outgoing Network at this point in the call then it may use the ACI Protocol described in Section 3 of /1/. If, subsequent to completion of the ACI protocol, the call can proceed, the Incoming Network shall proceed in accordance with 3.2.2.2.10.2.

3.2.2.2.10.2

If the Enveloped DPNSS Protocol can be used on the call then the Incoming Network shall:

a) send an ACI-Type 8 message, to the Outgoing Network.

b) the contents of the ACI-Type 8 message shall be in accordance with the service concerned and are given in the appropriate service section of this document.

3.2.2.2.10.3

If the Enveloped DPNSS Protocol cannot be used then the Incoming Network shall reject the call by using the procedures described in Section 3 of /1/.

3.2.2.2.20

On receipt of an ACI-Type 8 message, the Outgoing Network shall:

a) send a NEED message, constructed in accordance with Section 2, containing a DPNSS ISRM to the Incoming Network.

b) the contents of the ISRM are dependent on the service concerned and are described in the appropriate service section of this document.

c) stop and restart TO-09.

NOTE - timer TO-09 is started during the bearer establishment protocol

3.2.2.2.20.1

If, instead of receiving an ACI-Type 8, an ACM or ANS message is received from the Incoming Network then the Outgoing Network shall initiate the Bearer Release procedure by sending a Release message to the Incoming Network.

3.2.2.2.30

On receipt of the NEED message, the Incoming Network shall process the call based on the contained DPNSS message. The action will be dependent on the service concerned and is described in the appropriate service section of this document.

3.2.2.2.40 and 3.2.2.2.50

NEED messages containing DPNSS messages may be passed in either direction as required by the service concerned, the state of the underlying IUP Bearer Call is unaffected until a NEED message containing a DPNSS NAM is sent when the procedures of 3.2.2.2.60 apply.

a) each time a NEED message is sent by the Outgoing Network TO-09 shall be stopped and restarted, awaiting an ACM.

b) if the Incoming Network requires additional information from the Outgoing Network at this point in the call then it may use the ACI Protocol described in Section 3 of /1/. If, subsequent to completion of the ACI protocol, the call can proceed, the Incoming Network shall proceed in accordance with 3.2.2.2.40.

c) if a NEED message containing a DPNSS CRM is sent by the Incoming Network then the release sequence described in Section 3 of /1/ shall be initiated using a CNA message. The CNA reason shall be derived from the CRM (clearing cause) which is dependent on the service concerned.

d) if a NEED message containing a DPNSS CRM is sent by the Outgoing Network then the release sequence described in Section 3 of /1/ shall be initiated using a RELEASE message.

3.2.2.2.60

When the Incoming Network sends a NEED message containing a DPNSS NAM it shall:

a) send an ACM in accordance with the service concerned, to the Outgoing Network.

b) start Timer TO-05.

3.2.2.2.70

On receipt of the NEED message containing a DPNSS NAM, the Outgoing Network shall act in accordance with the service concerned and then proceed in accordance with 3.2.2.2.80.

3.2.2.2.80

On receipt of an ACM the Outgoing Network shall;

a) process the ACM in accordance with its contents and parameter values.

b) stop Timer TO-09,

c) stop Timer TO-16, (Note)

d) start Timer TO-02.

NOTE - Timer TO-16 is started during the bearer establishment protocol

3.2.2.2.90 and 3.2.2.2.100

Enveloped DPNSS messages may be passed in either direction as required by the service concerned. The state of the underlying IUP Bearer Call is unaffected until, dependent on the service concerned the following apply:

i) If a NEED message containing a DPNSS CCM is sent then the procedures of 3.2.2.2.110 apply and further Enveloped DPNSS messages may be sent in accordance with 3.2.2.2.140.

ii) If an ANS message is sent without a DPNSS CCM then the call shall continue in accordance with 3.2.2.2.130. Further Enveloped DPNSS messages shall not be sent.

iii) If either network requires additional information from the other network at this point in the call then the ACI Protocol described in Section 3 of /1/ may be used. If, subsequent to completion of the ACI protocol, the call can proceed, the procedures of 3.2.2.2.90, and 3.2.2.2.100 again apply.

iv) If a NEED message containing a DPNSS CRM is sent by either the Incoming or Outgoing Network then the release sequence described in Section 3 of /1/ shall be initiated using a RELEASE message.

3.2.2.2.110

When the Incoming Network sends a NEED containing a DPNSS CCM it shall:

a) send an Answer message (ANS), constructed in accordance with the IUP service concerned, to the Outgoing Network,

b) stop timer TO-05.

3.2.2.2.120

On receipt of the NEED message containing a DPNSS CCM, the Outgoing Network shall act in accordance with the service concerned and then proceed in accordance with 3.2.2.2.130.

3.2.2.2.130

On receipt of an ANS, the Outgoing Network shall:

a) process the ANS in accordance with its contents and parameter values,

b) stop Timer TO-02.

3.2.2.2.140 and 3.2.2.2.150

NEED messages containing DPNSS messages may be passed in either direction as required by the service concerned, the state of the underlying IUP Bearer Call is unaffected.

a) if either Network requires additional information from the other network at this point in the call then the ACI Protocol described in Section 3 of /1/ may be used. If, subsequent to completion of the ACI protocol, the call can proceed, the procedures of 3.2.2.2.140 and 3.2.2.2.150 again apply.

b) when a NEED message containing a DPNSS CRM is sent by either the Incoming or Outgoing Network then the release sequence described in Section 3 of /1/ shall be initiated using a RELEASE message.

3.2.3 Call Supervision

The call supervision procedures enable the notification of a change in call status between networks. The call supervision procedures described in Section 3 of /1/ apply.

3.2.4 Bearer Release Protocols

The Bearer Release Protocol described in Section 3 of /1/ apply.

3.2.5 Transit Network Procedures

Not defined.

3.2.6 Treatment of Reserved Fields and Values

3.2.6.1 Reserved Parameter Fields

Irrespective of the coded value and unless indicated otherwise in this document, reserved parameter fields shall be ignored.

3.2.6.2 Reserved Parameter Field Values

Reserved parameter field values shall be interpreted as value 0 unless otherwise specified in this section.

3.2.6.2.1 Additional Call Information (ACI) Message, Type 8 - Message Indicators (see 2.4.6)

a) Interconnect Specific Information (ISI)

The rules for handling this field shall be as specified for reserved fields.

3.2.6.2.2 Called Address (see 2.4.9)

Protocol Request Indicator PRI

The reserved PRI values shall be handled as following:

At intermediate nodes not terminating Enveloped-ISUP in the Incoming Network:

010[2]	fail call by returning an IUP CNA with Reason “service unavailable” and continue clearing in accordance with /1/.
011[3]	treat as PRI=0. The PRI value 3 shall be passed on unchanged.
100[4]	fail call by returning an IUP-CNA with Reason “service unavailable” and continue clearing in accordance with /1/.

Other reserved values treat as PRI=0

At nodes where Enveloped-ISUP is terminated in the Incoming Network

010[2]	Treat as PRI=1

Other reserved values treat as PRI=0

3.2.6.2.3 Nodal End-to-End Data (see 2.4.21)

a) Nodal End-to-End Data Octet Count

000000[0] (No information on content) - Confusion Message shall be returned on receipt.

101110[46])
to) reserved - Confusion Message shall be returned on receipt.
111111[63])

3.2.6.2.4 Operation Condition Indicators (see 2.4.22)

a) Operation Condition Indicator

00000110[6])
to) reserved - Confusion Message shall be returned on receipt.
11111111[255])

b) Condition Qualifier

00000011[3])
to) reserved - Confusion Message shall be returned on receipt.
11111111[255])

3.2.6.2.5 'Service' Message - Service Code (see 2.4.28)

Confusion Message shall be returned on receipt of a reserved Service code.

3.2.6.2.6 User-to-User Data (see 2.4.31)

a) User-to-User Data Octet Count

Confusion Message shall be returned on receipt of a reserved User-to-User Data Octet Count value.

3.2.6.2.7 Call Drop Back Message - Calling Line Information Indicator (see 2.4.32)

The receipt of any reserved value shall initiate call failure and a fault report.

3.2.6.2.8 Call Drop Back Message- Service Control Point (SCP) information (see 2.4.34)

a) Call Drop Back SCP Information indicator.

The receipt of any reserved value shall initiate call failure and a fault report.

b) Length of Call Drop Back SCP Information

The receipt of any invalid length indication shall initiate call failure and a fault report.

3.2.6.2.9 Call Drop Back Message - Translated Address (see 2.4.35)

a) Number of Translated Address Signals

The receipt of any invalid length indication shall initiate call failure and a fault report.

b) Address Signals

The receipt of any reserved Address Signal value shall initiate call failure and a fault report.

3.2.6.2.10 ISUP Message (see 2.4.37)

a) Length (excluding “Length” octets 1 & 2)

On receipt of an invalid length value the IUP message shall be discarded and the call shall continue.

3.2.6.2.11 ISUP Segmentation Information (see 2.4.38)

a) Number of segments remaining

On receipt of an invalid number of segments remaining value the complete EISM sequence shall be discarded and the call continue.

3.2.6.2.12 ISUP Message Segment (see 2.4.39)

a) Length (excluding “Length” octet 1)

On receipt of an invalid length value the IUP message shall be discarded and the call shall continue.

3.2.6.2.13 Protocol Negotiation Message Indicators (see 2.4.40)

On receipt of a reserved value, Ignore value, call set-up shall continue.

3.3. Call Control Error Handling Procedures

The call control error handling procedures described in Section 3 of /1/ apply

3.4 Circuit Blocking / Unblocking Procedures

The circuit blocking and unblocking procedures described in Section 3 of /1/ apply.

3.5 Timer Table

The C7 IUP Timer requirements are described in Section 3 of /1/. In addition, the following timer applies:

TIMER	PURPOSE	SETTING		VALUE	STARTED	CANCELLED	NETWORK WHERE RUN
		MIN	MAX				
TO-20	EISM re-assembly procedure	1s	2s	1.5s	*On receipt of EISM with non-zero segmentation information parameter value*	On receipt of last segment in EISM sequence (Note)	Both

NOTE 1- TO-20 is also cancelled under various message out of sequence conditions- refer to 6.3.6.3

New Timers for RBWF are detailed in Section 5 Annex 5.A.

END OF PNO-ISC/INFO/004 SECTION 3

4 DELETED

END OF PNO-ISC/INF0/004 SECTION 4

5 RING BACK WHEN FREE

5.0 Scope

This section provides information necessary to enable the operation of an Enveloped DPNSS implementation of PNO-IG CCBS, called Ring Back When Free, between Public Networks via an IUP interconnection.

5.1 Service Overview

5.1.1 General

This document specifies an implementation of the PNO-ISC CCBS service using an Enveloped DPNSS signalling protocol via an IUP Interconnection. This implementation which is known as Ring Back When Free [RBWF] complies with the PNO-ISC Service Description for the CCBS Supplementary Service.

The full service description appears in PNO-ISC/ /6/. A brief outline description is given below in order to give context to the RBWF specification that appears in the remainder of this document.

5.1.2 Activation

When User A encounters a busy User B, the Outgoing Network shall retain the call information for a period defined by a retention time. During this time User A can request RBWF.

If User A requests RBWF the Outgoing Network shall start a RBWF service duration timer. The Incoming Network shall be notified of the request and start monitoring User B. The Incoming Network may store a queue of RBWF requests against User B.

Having activated RBWF, User A can originate and receive calls as normal.

5.1.3 Deactivation

User A may at any time deactivate an active RBWF request. The Outgoing Network informs the Incoming Network and information relating to the RBWF request is deleted from any queues.

5.1.4 Invocation and Operation

The Incoming Network shall start processing active RBWF requests in User B’s queue when:

- User B becomes free and a RBWF request is stored,
- a RBWF request is received and User B is free.

The Incoming Network shall start a guard time, allowing User B the opportunity to make an outgoing call. If the guard timer expires and User B is still free, the Incoming Network shall inform the Outgoing Network.

If User A is free the Outgoing Network shall establish a RBWF call to the Incoming Network. If User B is still free the Incoming Network shall acknowledge the call and the Outgoing Network shall ring User A. When User A answers, the Outgoing Network notifies the Incoming Network which rings User B.

5.1.5 Exceptional Procedures - Invocation and Operation

If when the guard timer expires, User B is no longer free, the Incoming Network shall return to monitoring User B.

If User A is busy when the Incoming Network informs the Outgoing Network that User B is free, the Outgoing Network shall monitor User A. When User A becomes free, the Outgoing Network shall establish the RBWF call to the Incoming Network as described in 5.1.4 above.

5.2 Formats and codes

The RBWF Supplementary Service described in this Section uses the Enveloped DPNSS Protocol as specified in Section 3.

The format and coding of the IUP messages shall conform to Section 2.

The format and coding of the DPNSS messages shall comply with Section 4 of /4/.

The DPNSS Protocol and common procedures are described in Section 5 of /4/.

5.2.1 IUP IAM/IFAM

The IAM/IFAM message shall contain the following service specific information:

5.2.1.1 IAM/IFAM Message Indicators

Service Handling Protocol (SHP) = 3 indicating that the Enveloped DPNSS protocol is required,

Call Type Indicator (CTI) = 6 (Public Network DPNSS Call) indicating a PSTN Application of the Enveloped DPNSS protocol,

Call Path Indicator (CPI) = 1, and

Calling Line Identity (IUP-CLI) (optional).

NOTE - Although CPI has the value of 1, OOR and Monitor access shall not be inhibited on the Outgoing and Incoming Networks where CTI has the value of 6.

5.2.1.2 Called Address

The called party number of User B.

5.2.2 IUP ACI Type 8

The ACI Type 8 message shall contain the following information:

5.2.2.1 Information Contained and Information Requested

Information Contained Code (ICC) = 10, and

Information Requested Code (IRC) = 0.

5.2.2.2 Message Indicators

NEED Indicator = 1 (NEED Transfer may be invoked),

Interworking Indicator = 0 (No interworking involved),

Interconnect Specific Information (as applicable, default value = 0), and

Called Party Category (as applicable).

5.2.2.3 Line Identity

Called Line Identity (optional).

5.2.3 IUP NEED

The NEED message shall contain the following service specific information:

5.2.3.1 Content Qualifier (CQ)

CQ=1: indicating ‘DPNSS Real Call Message’, or

CQ=2: indicating ‘DPNSS Virtual Call Message’.

5.2.3.2 Nodal End-to-End Data

DPNSS Message as applicable.

5.2.4 CNA/RELEASE message

Where a CNA/RELEASE message is sent in conjunction with a NEED[CRM] the Release Reason shall be as follows:

DPNSS:	CC	IUP CNA:	REASON
	ACK		SCT
	SU		SU
	STU		NT
	CT		SCT
	FNR		NT
	CON		CON
	BY		SUB ENG
	REJ		NT
	Other		NT

5.2.5 DPNSS ISRM

Only ISRM(C) messages shall be used.

The message shall contain the following service specific information:

SIC (Service Indicator Code) = TELE,

CLC (Calling/Called Line Category, optional) =

- ORD (Ordinary), or
- NET (Network), and

OLI (National significant number),

String

- CBWF-R for RBWF Request, or
- CBWF-FN for RBWF Free Notification, or
- CBWF-CSUI for RBWF Call Set-Up (Immediate), or
- CBWF-CSUD for RBWF Call Set-Up (Delayed), or
- CBWF-C for RBWF Cancel Request, and

DA (Destination Address, optional).

If DA is sent in the ISRM, it may be the same as that in the preceding IAM/IFAM, however this may not be the case if number translation has occurred on the call, e.g. 0800 numbers.

NOTE - Whether or not the CLC and DA are present in the ISRM shall have no impact on the processing of the request by the Incoming Network.

5.2.6 DPNSS CRM

The DPNSS CRM message shall contain the following service specific information:

Clearing Cause =

- ACK (Acknowledgement), indicating that the RBWF supplementary service has been or is being carried out), or
- SU (Service Unavailable), indicating that the called line is barred for RBWF requests, or
- STU (Service Temporarily Unavailable), indicating that the Incoming Network is temporarily unable to accept further requests (e.g. RBWF queue is full), or
- CT (Call Termination), indicating that a User has cleared the call, or
- FNR (Facility Not Registered), indicating that no corresponding RBWF queue record can be found to match the Incoming CBWF-Free Notification, or
- CON (Congestion), or
- BY (Busy), or
- REJ (Reject), indicating that the calling User rejects the offered CBWF-Free Notification, or
- Other, as defined in /4/.

DPNSS-CLI (national significant number) (if Clearing Cause = ACK), and

State Of Destination (SOD) string =

- SOD-B, if the called User is still busy, or
- SOD-F, if the called User is no longer busy.

5.2.7 DPNSS NAM

The DPNSS NAM message shall optionally contain the following information:

CLC = ORD, and

DPNSS-CLI (National significant number).

NOTE - Whether or not the CLC and/or the CLI are present in the NAM shall have no impact on the processing of the call by the Outgoing Network.

5.2.8 DPNSS EEM

The DPNSS EEM message shall contain the following service specific information:

Indication Field =

- Ring Out (RO), indicating that ringing can be applied to the called User access,

  or

- Call Back Complete (CBC), indicating that the CBWF-request has been completed and the call can be now handled as a simple call.

5.3 Signalling procedures

5.3.1 General

As the service is based on DPNSS signalling messages carried through PSTN enveloped in IUP NEED messages, the basic signalling requirements are:

i) Enveloped DPNSS protocol support. Service Handling Protocol (SHP) subfield value 3 in IUP IAM/IFAM message causes the activation of the Enveloped DPNSS protocol.

ii) DPNSS message support. The service uses the following separate but related DPNSS signalling sequences /4/:

NOTE - The full DPNSS clearing sequence is not used in the Enveloped DPNSS Protocol. The CIM response to a CRM is omitted.

- RBWF Request

This sequence is used when the Outgoing Network requests the Incoming Network to register the RBWF request.

- RBWF Free Notification

This sequence is used by the Incoming Network to notify the Outgoing Network that the wanted line has become free.

- RBWF Call Set-Up

This sequence is used to establish the RBWF call.

- RBWF Cancel Request

This sequence is used when the Outgoing Network wishes to cancel the RBWF request as a result of User action or a time-out.

Each sequence requires an IUP Bearer Call to be set-up. From the DPNSS point of view only the RBWF call set-up is a Real Call, RBWF Request, Free Notification and Cancel Request being Virtual Calls. However, as IUP does not support virtual calls a speech circuit is reserved each time an IUP Bearer Call is set-up. In these cases the speech circuit is not used.

The bearer call set-up is not described separately for each DPNSS sequence; instead it is described once in 5.3.2. and assumed to be initiated automatically each time a DPNSS sequence is required over the IUP interconnect.

5.3.2 Bearer Call

5.3.2.1 Bearer Call Set-Up

When a DPNSS sequence is required an IUP Bearer Call is set up as follows.

5.3.2.1.1 Initial Action of the Outgoing Network

The Outgoing Network initiates the establishment of a Bearer Call in accordance with Section 3. The contents of the IAM/IFAM shall be as specified in 5.2.1.

5.3.2.1.2 Action of Incoming Network on Receipt of IAM/IFAM

On receipt of an IAM/IFAM containing SHP=3, the incoming network shall:

- Establish a Bearer Connection in accordance with Section 3,

- Invoke the Enveloped DPNSS Protocol in accordance with Section 3, [i.e. send an ACI Type 8]

The contents of the ACI Type 8 shall be as specified in 5.2.2.

NOTE - For the RBWF call the Incoming Network may also send an ACI Type 7 message to obtain the CLI of the caller.

5.3.2.1.3 Action of Outgoing Network on Receipt of ACI Type 8

On receipt of an ACI Type 8 the outgoing network shall invoke the Enveloped DPNSS Protocol in accordance with Section 3, [i.e. send a NEED message containing a DPNSS-ISRM]

The contents of the IUP NEED message shall be as specified in 5.2.3.

The contents of the DPNSS-ISRM shall be as specified for the RBWF sequence concerned in 5.2.5.

5.3.2.1.4 Enveloped DPNSS Protocol Invoked

The incoming and outgoing networks now continue in accordance with the Enveloped DPNSS Protocol in accordance with Section 3.

Sub-sections 5.3.4 to 5.3.9 describe the action taken by each network in terms of DPNSS messages only.

5.3.2.2 Bearer Call Release

5.3.2.2.1 DPNSS Virtual Call

When each of the DPNSS virtual call sequences is complete the Bearer Call is released by sending a NEED[CRM] followed by a CNA to initiate the Bearer Connection Release procedure as described in Section 3 of /1/.

5.3.2.2.2 Release of RBWF Call

The IUP Bearer Connection release procedure shall be initiated if a NEED[CRM] is sent by either network. If the NEED[CRM] is sent in the backward direction before an ACM then a CNA message shall initiate the release. In all other cases a RELEASE message shall initiate the release.

5.3.2.2.3 Release after Call Back Complete

Following Call Back Complete the Bearer Connection shall be released by a RELEASE message without a preceding NEED[CRM]

5.3.3 Initial Call to Busy User

In normal case, User A first makes a call attempt to User B. This does not involve any RBWF specific activities and will be handled as a basic IUP call.

5.3.4 RBWF-Request

When User A determines that User B is busy and requests RBWF by giving the appropriate service activation code, an IUP bearer connection for a virtual DPNSS call shall be established as described in 5.3.2. and the following DPNSS signalling initiated:

5.3.4.1 Initial Action of Outgoing Network

The Outgoing Network shall:

a) send an ISRM containing:
   - SIC = TELE
   - CLC = ORD (Optional)
   - CBWF-R
   - OLI
   - DA (Optional)

b) await an acknowledgement.

5.3.4.2 Action of Incoming Network on Receipt of RBWF Request

The Incoming Network shall process the RBWF request depending on the situation as follows:

5.3.4.2.1 User B Still Busy

The Incoming Network shall

a) store the request in the desired B-User's RBWF queue,

b) reply with a CRM message containing
   - Clearing Cause ACK,
   - DPNSS-CLI, and
   - SOD-B (User busy),

c) start timer TO-01, and

d) start monitoring User B for becoming free.

5.3.4.2.2 User B no longer Busy

The Incoming Network shall

a) send a CRM message containing
   - Clearing Cause ACK,
   - DPNSS-CLI, and
   - SOD-F (User free),

b) store the details of the request,

c) start timer TO-04,

d) block User B from other incoming calls for the period of TO-04, and

e) wait for the Outgoing Network to make the RBWF call (ISRM with CBWF-CSU).

5.3.4.2.3 Request a Duplication of an Existing Request

The Incoming Network shall

a) continue as described in 5.3.4.2.1 and 5.3.4.2.2 above with the exception that the request details do not need to be stored,

b) restart timer TO-01.

5.3.4.2.4 Request Not Allowed

When User B does not allow RBWF service, the Incoming Network shall send a CRM message containing Clearing Cause SU.

5.3.4.2.5 RBWF Queue Full

If the maximum number of RBWF requests are already stored for User B the Incoming Network shall send a CRM message containing Clearing Cause STU.

5.3.4.2.6 Request Cannot Be Accepted (Other Reason)

If User B's line is out of service, incoming calls are barred, there is congestion, or similar situation occurs, the Incoming Network shall send a CRM message containing an appropriate DPNSS Clearing Cause.

5.3.4.3 Action of Outgoing Network on Receipt of CRM

The Outgoing Network action depends on the Clearing Cause and String in the CRM message and on the User action.

5.3.4.3.1 User B Still Busy and the Request Accepted

If the CRM message contains a Clearing Cause ACK and string SOD-B the Outgoing Network shall

a) examine the DPNSS-CLI contained in the CRM message:
   - If the request is not a duplication of RBWF request by User A for the same User B access, the Outgoing Network shall store the request and start timer TO-02.
   - If the request is duplication, the Outgoing Network shall restart timer TO-02.

b) inform User A that the request has been accepted and registered, and

c) continue to clear the call.

5.3.4.3.2 User B Free

If the CRM message contains a Clearing Cause ACK and string SOD-F the Outgoing Network shall

a) examine the DPNSS-CLI contained in the CRM message:

- If the request is not a duplication of RBWF request by User A for the same User B access, the Outgoing Network stores the request and starts timer TO-02.
- If the request is duplication, the Outgoing Network restarts timer TO-02.

b) inform User A that the request has been accepted and registered,

c) continue to clear the call,

d) block User A from incoming calls, and

e) when User A clears, continue as described in 5.3.6.

NOTE - In this case no Free Notification will be sent by the Incoming Network. The Outgoing network treats the SOD-F in the CRM as a Free Notification.

5.3.4.3.3 Service Temporarily Unavailable

If the CRM message contains a Clearing Cause STU or CON, the Outgoing Network shall

a) inform User A of “short term denial”, and

b) continue to clear the call.

5.3.4.3.4 Service Not Available

If the CRM message contains any other Clearing Cause, the Outgoing Network shall

a) inform User A that the request was not accepted, and

b) continue to clear the call.

5.3.4.3.5 User A Clears

If User A clears, the Outgoing Network shall

a) send a CRM message to the Incoming Network containing Clearing Cause CT (Call Termination),

b) delete all details of the request.

5.3.4.3.6 Other Condition

Network specific action may occur.

5.3.5 RBWF Free Notification

When User B becomes free, and a RBWF request has been stored the Incoming Network establishes an IUP Bearer connection for a virtual DPNSS call as described in 5.3.2. and the following DPNSS signalling is initiated:

NOTE - If a CBWF-FN has previously been received while the User was busy, i.e. also acting as an A-User, this may take precedence and the sequence described in 5.3.6 may be initiated.

5.3.5.1 Initial Action of Incoming Network

When User B becomes free and an incoming RBWF request(s) is stored then the Incoming Network shall

a) start timer TO-03,

b) reject all incoming calls except RBWF call set-up by sending a CNA containing Reason: Busy,

c) wait for the expiry of timer TO-03.

If User B makes an outgoing call, then timer TO-03 is cancelled and the monitoring of User B is started again.

5.3.5.2 Action of Incoming Network When TO-03 Matures

When timer TO-03 expires and if User B is still free, the Incoming Network shall [subject to the note in 5.3.5]:

a) send an ISRM message containing

- SIC = TELE,
- CBWF-FN,
- CLC = NET, (Optional)
- OLI, and
- DA (optional, if used then the same as the OLI in the original RBWF Request), and

b) wait for acknowledgement i.e. CRM message.

5.3.5.3 Action of Outgoing Network on Receipt of RBWF Free Notification

The Outgoing Network shall determine the identity of User A to which the Free Notification relates from the Called Address field in the IAM/IFAM IUP Bearer Call and process the notification as follows:

NOTE - The CLC within the DPNSS ISRM is not used and the Free Notification shall be accepted regardless of the CLC value, or if the CLC is not present.

If User A is free and has a RBWF request registered for User B, the Outgoing Network shall

a) block User A from receiving all types of incoming calls,

b) send a CRM message containing

- Clearing Cause ACK, and
- SOD-F,

c) store an indication that control of this request is now at the Outgoing Network, and

d) clear the IUP call,

e) continue in 5.3.6.

5.3.5.3.1 User A Not Free

If User A is not free, i.e. busy, but does have a RBWF request registered for the B-User, the Outgoing Network shall

a) send a CRM message containing

- Clearing Cause ACK, and
- SOD-B,

b) start monitoring User A to become free, and

c) store an indication that control of this request is now at the Outgoing Network, and

d) Clear the IUP call.

NOTE - When User A becomes free, Sub-section 5.3.6 uses CBWF-CSUD instead of CBWF-CSUI.

5.3.5.3.2 No Request Registered

If User A has no RBWF request registered against User B, the Outgoing Network shall

a) send a CRM message containing Clearing Cause FNR (Facility Not Registered), and

b) clear the IUP call.

5.3.5.3.3 User in Other State

If User A is in any other state (e.g. Out of Service), the Outgoing Network shall send a CRM message containing an appropriate Clearing Cause in accordance with /4/ and delete all details of the request from the RBWF queue. The IUP bearer call shall be cleared normally.

5.3.5.4 Action of Incoming Network on Receipt of CRM

Depending on the fields of the received CRM message and the status of User B, the Incoming Network shall continue to process the request as follows:

5.3.5.4.1 Users A and B Free

If the CRM message contains a Clearing Cause ACK and string SOD-F and User B is still free, the Incoming Network shall

a) start timer TO-04,

b) store an indication that control of this request is now at the Outgoing Network, and

c) wait for the RBWF call set-up.

NOTE - If the timer TO-04 matures, the RBWF request details shall be deleted. Remaining requests, if any, shall be processed normally as described in 5.3.5.2. Timer TO-03 shall not be (re-)run. If no further requests exist, User B shall be unblocked.

5.3.5.4.2 User B Busy

If the CRM message contains a Clearing Cause ACK and string SOD-F and User B is busy, the Incoming Network shall start monitoring User B for becoming free.

NOTE - When the RBWF Set up Call is received from the Outgoing Network, it shall be rejected by sending a CRM message containing Clearing Cause BY.

5.3.5.4.3 User A Busy

If the CRM message contains a Clearing Cause ACK and string SOD-B, the Incoming Network shall

a) store an indication that control of this request is now at the Outgoing Network, and

b) if there are other RBWF requests in the queue the processing shall continue as described in 5.3.5.2., or

c) If there are no further requests, User B shall be unblocked.

5.3.5.4.4 Congestion

If the CRM message contains a Clearing Cause CON and there are no further requests in the queue, the Incoming Network shall

a) unblock User B, and

b) start timer TO-07.

NOTE - When timer TO-07 matures, the Incoming Network shall block User B, if free, and continue to process the request as described in 5.3.5.2. If User B is busy, monitoring for free shall be restarted.

If the CRM message contains a Clearing Cause CON and if there are other requests in the queue, the Incoming Network shall process the next request.

NOTE - If the next request cannot be processed because of congestion, the process shall be repeated. If all stored requests encounter congestion timer TO-07 shall be run.

5.3.5.4.5 Other Condition

If the CRM message contains any other Clearing Cause (than ACK or CON), the Incoming Network shall delete the request from the queue and either process the next request in the queue or, if no requests are in the queue, unblock User B to incoming calls.

5.3.6 RBWF Call

This sequence is started when:

i) User A becomes free after a Free Notification has been previously received.

ii) A Free Notification has been received while User A is free.

iii) An SOD-F was received in response to a RBWF request

In each case an IUP Bearer Connection for a real DPNSS call shall be established as described in 5.3.1 and the following DPNSS signalling initiated:

5.3.6.1 Initial Action of Outgoing Network

a) send an ISRM message containing

- SIC = TELE,
- CLC = ORD (optional),
- CBWF-CSUI [for case (ii) and (iii) above] or
- CBWF-CSUD [for Case (i) above]
- CLI, and
- DA (optional), and

b) await a NAM

5.3.6.2 Action of Incoming Network on Receipt of RBWF Call Set-Up

After receiving the ISRM message containing CBWF-CSUI or CBWF-CSUD, the Incoming Network shall check whether User B is still free.

NOTE - From the Incoming Network point of view the strings are equal, i.e. they shall be processed the same way.

5.3.6.2.1 User B Free

If User B is still free, the Incoming Network shall

a) send a NAM message containing:

- CLC = ORD (Optional)
- CLI (Optional)

b) send an IUP ACM message, and

c) await an EEM containing RO.

NOTE - User B is NOT alerted at this stage.

5.3.6.2.2 User B Busy

If User B is busy, the Incoming Network shall

a) send a CRM message containing Clearing Cause BY,

b) unblock User B to incoming calls, and

c) restart monitoring User B for becoming free.

When User B becomes free, the processing shall continue as described in 5.3.5.

5.3.6.3.1 Action of Outgoing Network on Response from Incoming Network

The Outgoing Network continues to process the request depending on the reply received from the Incoming Network and on the status of User A.

5.3.6.3.1 Both Users Free

If User A is free when a NAM message is received, the Outgoing Network shall

a) apply an “Alerting” indication to User A, and

b) start timer TO-05.

NOTE - If the timer TO-05 matures, the Outgoing Network shall send a CRM message containing Clearing Cause REJ to the Incoming Network.

When User A answers, the Outgoing Network shall

a) cancel timer TO-05,

b) start timer TO-06,

c) send an EEM message containing RO (Ring Out).

5.3.6.3.2 User A Busy

If User A has become busy when the NAM is received, the Outgoing Network shall

a) clear the RBWF Call sending a CRM message containing a Clearing Cause BY, and

b) start monitoring for User A to become free.

NOTE - When User A becomes free, the Outgoing Network shall set up the RBWF call by sending an ISRM-CSUD message.

5.3.6.3.3 User B Busy

If a CRM message containing Clearing Cause BY is received, the Outgoing Networks shall unblock User A to incoming calls.

5.3.6.3.4 Congestion

If a CRM message containing Clearing Cause CON is received, the Outgoing Network shall start timer TO-07.

NOTE - When the timer TO-07 matures, the actions of 5.3.6. shall be repeated. If User A attempts an outgoing call during the repeat attempts, the repeat attempts shall be stopped and the sequence continues from 5.3.6. when User A clears.

5.3.6.3.5 Other Condition

If a CRM message containing a Clearing Cause other than BY or CON is received, the Outgoing Network shall:

a) delete all details of the RBWF request,

b) unblock User A.

5.3.6.4 Action of Incoming Network on Receipt of Response from Outgoing Network

5.3.6.4.1 Ring-Out Received and User B Still Free

If an EEM message containing RO is received and User B is free, the Incoming Network shall:

a) send ringing to User B,

b) send an EEM message containing CBC (Call Back Complete),

c) delete RBWF request details from the queue,

d) continue to process the call as simple telephony call awaiting answer (i.e. no more DPNSS messages are used).

5.3.6.4.2 User B no Longer Free

If an EEM message containing RO is received but User B is no longer free, the Incoming Network shall:

a) send a CRM message containing Clearing Cause BY,

b) start monitoring User B to become free, and

c) cancel timer TO-04.

NOTE - Timers TO-01 and TO-02 will continue to run and when User B becomes free again the process shall continue as described in 5.3.5.

5.3.6.4.3 User A Busy

If a CRM message containing Clearing Cause BY is received the Incoming Network shall process the next request in the RBWF queue (if any).

5.3.6.5 Further Action of Outgoing Network

5.3.6.5.1 Call Back Complete Received

If an EEM message containing CBC is received, the Outgoing Network shall:

a) delete the request from the queue,

b) cancel timer TO-02,

c) cancel timer TO-06, and

d) continue to process the call as simple telephony call awaiting answer (i.e. no more DPNSS messages need to be sent).

5.3.6.5.2 User B Busy

If a CRM message containing Clearing Cause BY is received, the Outgoing Network shall:

a) send a busy indication to User A, and

b) cancel timer TO-06.

NOTE - Timers TO-01 and TO-02 will continue to run and when User B becomes free again the process shall continue as described in 5.3.5.

5.3.6.5.3 No Response to EEM[RO]

If timer TO-06 matures, the Outgoing Network shall:

a) delete the RBWF request details,

b) continue as if an EEM message containing CBC had been received, and

c) cancel timer TO-02.

5.3.6.6 Action on Receipt of DPNSS Messages After Call Back Complete

If either network receives a DPNSS message after EEM Call Back Complete has been signalled, it shall be ignored.

5.3.7 RBWF Cancel Request

An existing RBWF request can be cancelled by the Outgoing Network as a result of User action or a time-out. As User A may have several RBWF requests active, they may all be cancelled at the same time by the User.

An IUP bearer connection for a DPNSS virtual call shall be established as described in 5.3.2. and the following DPNSS signalling initiated:

5.3.7.1 Initial Action of Outgoing Network

When User A cancels an existing RBWF request or when timer TO-02 matures, the Outgoing Network shall:

a) delete the request from the queue, and

b) send an ISRM containing:

- SIC = TELE
- CLC = ORD (Optional)
- OLI
- CBWF-C
- DA (Optional)

c) await an acknowledgement

In the case where all existing calling User RBWF requests are to be cancelled, the Outgoing Network shall process the queue sequentially, i.e. the Outgoing Network shall send an ISRM message for the first request in the queue and wait for the response from the Incoming Network for that, before processing the next request in the queue. The processing shall continue until all requests have been deleted from the queue and cancelled also at the Incoming Network.

NOTE - If the cancellation does not reach the Incoming Network e.g. due to congestion, the RBWF Free Notification coming from the Incoming Network shall be rejected with a CRM message containing Clearing Cause FNR.

5.3.7.2 Action of Incoming Network on Receipt of RBWF Cancellation

When an ISRM message containing CBWF-C is received, the Incoming Network shall:

a) delete the request from the RBWF queue, and

b) cancel timer TO-01,

c) send a CRM message containing Clearing Cause ACK, and

d) if there are no other requests in the queue, stop monitoring User B to become free.

If a RBWF cancel request is received but not corresponding request stored against the called User can be found, the Incoming Network shall send a CRM message containing Clearing Cause FNR.

5.3.7.3 Action of Outgoing Network on Receipt of CRM

If a CRM message containing Clearing Cause ACK or FNR is received, the Outgoing Network shall:

a) inform User A that the request has been cancelled, and

b) cancel timer TO-02 (if not matured already).

NOTE - If User A's request was to cancel all existing RBWF requests, the Outgoing Network shall inform the User only after receiving the CRM message to the last request cancellation.

5.3.8 Call Clear

Normal IUP call clear sequences as described in Section 3 of /1/ shall apply.

5.3.9 Error and Exceptional Situations

5.3.9.1 Service Not Supported

If a call is not allowed or possible (e.g. SHP=3 in IUP IAM/IFAM message is not supported), the call shall be cleared in accordance with Section 3 of /1/ using Reason code 3 (Service Unavailable).

5.4 Message sequence diagrams

5.4.1 RBWF Request

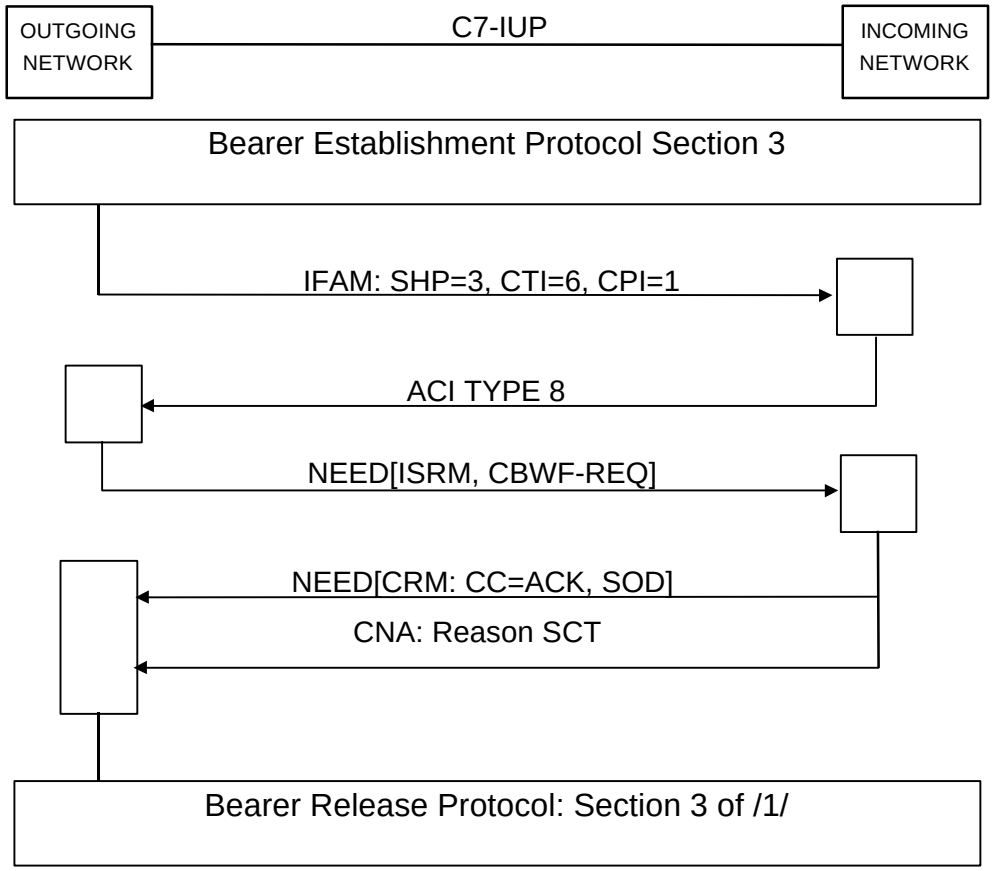

FIGURE 5.1

RBWF Request

5.4.2 RBWF Free Notification

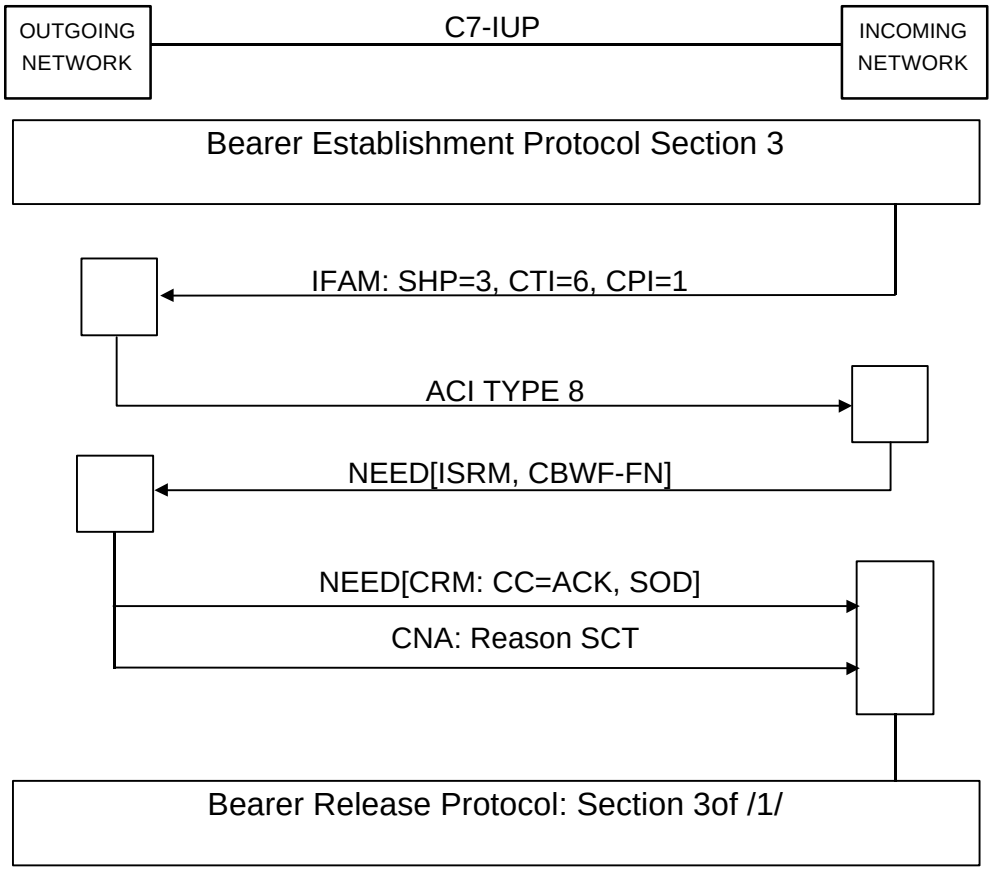

FIGURE 5.2

RBWF Free Notification

5.4.3 RBWF Call

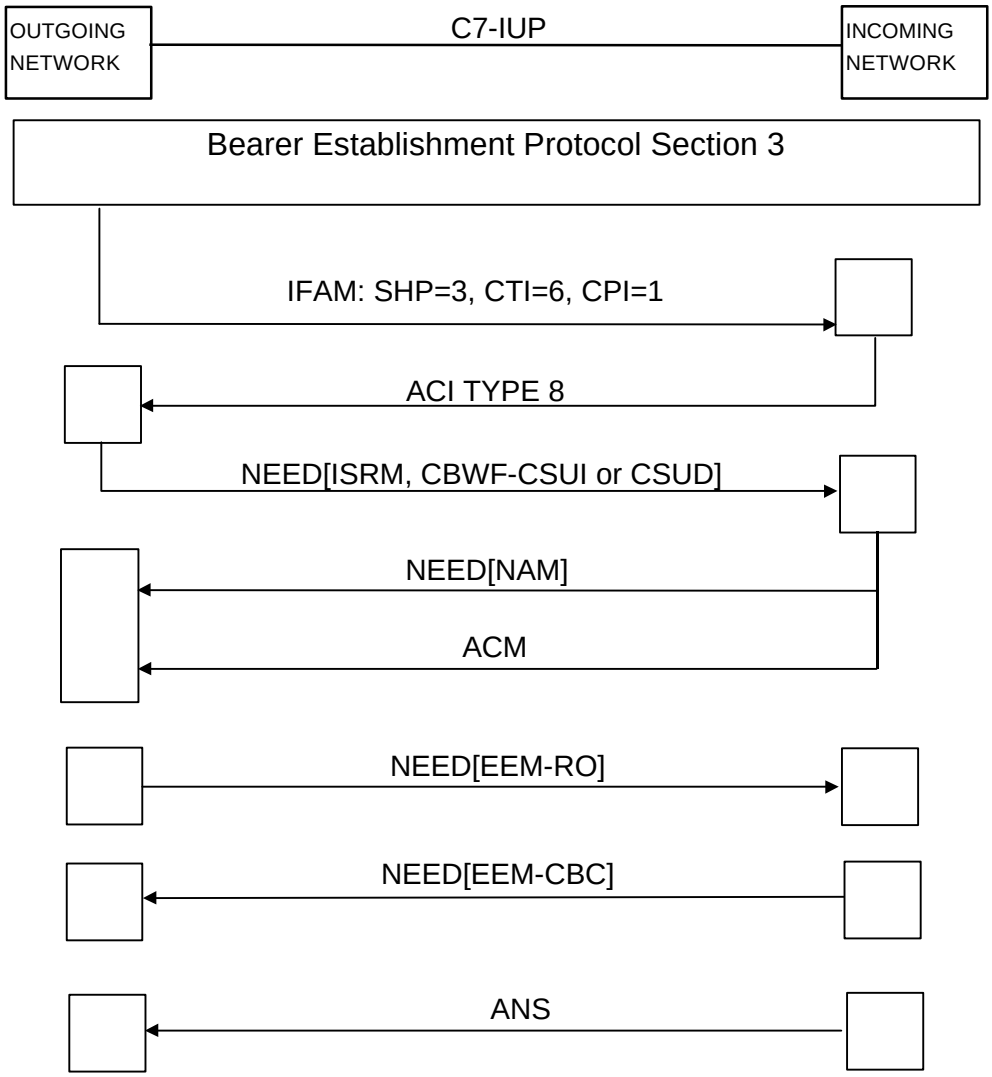

FIGURE 5.3

RBWF Call

5.4.4 RBWF Cancel Request

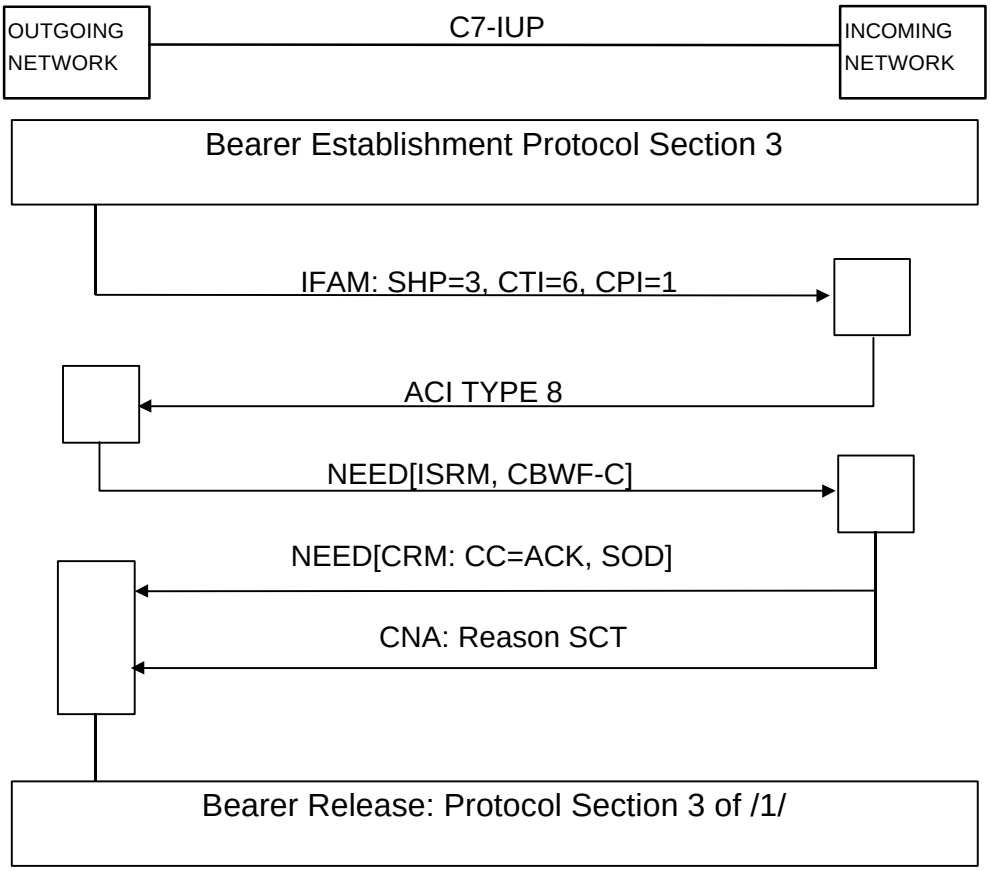

FIGURE 5.4

RBWF Cancel Request

Annex 5.A

TABLE 5.1
Time-out table

⌛	**Purpose**	**Started**	**Cancelled**	**Action on Maturing**	**N/W run**	**Value**
TO-01	Max queuing time in the Incoming Network	When RBWF request registered, after sending CRM with ACK	When EEM CBC sent or when ISRM CBWF-C received	Delete request details	I/C	185 min
TO-02	Max queuing time in the Outgoing Network	When RBWF request registered, after receiving CRM with ACK	EEM CBC received	Delete request details and send cancellation	O/G	5-180 min
TO-03	To allow User B the opportunity to make an outgoing call	When User B becomes free and a RBWF Request is stored	When User B makes an outgoing call	Send Free Notification	I/C	1-15 s
TO-04	Awaiting the Outgoing Network to acknowledge the Free Notification	When ack + SOD-F is received to Free Notification	When RBWF Call Set-Up is complete	Delete request details	I/C	40 s
TO-05	Awaiting User A to answer the B Free Notification	When Alerting due to B-Free is sent to User A	When User A answers the B Free indication	Send CRM with REJ to the Incoming Network	O/G	1-30 s
TO-06	Awaiting response to sending EEM [RO]	When EEM [RO] is sent	When EEM [CBC] or CRM CC=BY is received	Delete request details,	O/G	5 s
TO-07	To initiate a repeat RBWF CSU or FN when congestion is encountered.	When Congestion info received in CRM message	Never cancelled	Re-send ISRM CBWF-CSUD Re-send Free Notification	O/G I/C	120 s

END OF PNO-ISC/INFO/004 Section 5

6 ENHANCEMENTS TO IUP TO PROVIDE ENVELOPED ISUP

6.0 Scope

This section specifies the enhancements to the Interconnect User Part (IUP) that allows the use of UK ISUP signalling information flows within an IUP signalling environment.

6.1 SERVICE OVERVIEW

6.1.1 General

This sectionspecifies the enhancements to IUP which allow it to provide the signalling information flows of UK ISUP within an IUP signalling environment. The protocol is primarily intended to support Euro-ISDN between DSS1 accesses, but may be used on calls involving other accesses, e.g. Analogue.

Enveloped ISUP is intended to be a generic mechanism that builds on existing IUP and UK ISUP call control procedures. When IUP supports Enveloped ISUP the enhanced IUP is referred to as “IUP+”.

Enveloped ISUP assumes that the node has IUP and UK ISUP internodal signalling logic and that all signalling (access or internodal) can be mapped (at least logically) to both IUP and UK ISUP. These mappings are not part of the Enveloped ISUP procedure and are defined elsewhere

e.g. PNO-ISC/SPEC/008

Where no mapping to UK ISUP exists then Enveloped ISUP is not requested (PRI=0). Some ISUP applications (e.g. the “SHP=2” equivalent services) have a specific IUP protocol supporting the same service. For these applications, where there is no clear benifit in using Enveloped ISUP , the Outgoing Network may choose not to request Enveloped ISUP (PRI=0).

It is a pre-requisite of Enveloped ISUP operation that the associated UK ISUP signalling logic in the incoming network shall support the capability of performing fallback on incoming calls.

Although UK ISUP internodal signalling logic is assumed, it is not necessary for a node to implement UK ISUP signalling interfaces in order to take advantage of Enveloped ISUP.

An IUP network that has not implemented the Enveloped ISUP protocol cannot act as a transit network between Enveloped ISUP capable Outgoing and Incoming Networks. Reasons for this limitation are:

- the need to take Enveloped ISUP protocol action on certain reserved Protocol Request Indicator (PRI) values;
- the absence of certain IUP messages (e.g. IUP ACM) from the Enveloped ISUP protocol which compromises timer supervision at intermediate nodes.

Consequently, an Outgoing Network must not attempt to invoke Enveloped ISUP protocol procedures towards any subsequent network which has not implemented the Enveloped ISUP protocol.

This requirement results in the need to “control” the Enveloped ISUP protocol at the last node in the Enveloped ISUP capable network where it interconnects with the network that has not implemented Enveloped ISUP. This controlling action will be required to maintain the integrity of the Enveloped ISUP protocol by the following actions:

a) if in the IUP IAM/IFAM the SHP value is 8, then the call attempt shall be failed by returning an IUP CNA with Reason “service unavailable”;

b) if in the IUP IAM/IFAM the SHP value is not 8 and the PRI value is 2 or 4, then the call attempt shall be failed by returning an IUP CNA with Reason “service unavailable”;

c) if in the IUP IAM/IFAM the SHP value is not 8 and the PRI value is 1 or 3, then the PRI value shall be reset to 0 and the call shall continue.

6.1.2 Key Features

The key features of the Enveloped ISUP protocol are:

1. The protocol may be used in conjunction with an IUP Bearer Call using either IUP IFAM (en-bloc) or IUP IAM (overlap) procedures;
2. Routeing and Bearer selection are done by IUP procedures (Routeing digits are carried within IUP IAM, IFAM, SAM or FAM messages, no routeing digits are carried in EIM[ISUP-IAM] messages. Consequently, EIM[ISUP-SAM] messages are not supported.);
3. The protocol is requested by means of a Protocol Request Indicator (PRI) in the IUP IAM/IFAM;
4. Under some circumstances Enveloped ISUP is essential to the progress of the call. Use of value SHP=8 ensures that these calls are identified and rejected by the Incoming Network if it does not support Enveloped ISUP procedures;
5. If Enveloped ISUP is not essential to progress the call, the Incoming Network may cause the Enveloped ISUP call to revert to the protocol identified by the SHP in the IUP IAM/IFAM. This could happen, for example, if the Incoming Network does not support Enveloped ISUP features for the terminating access type. When reversion occurs, any IUP interworking functions are performed by the Outgoing Network;
6. The protocol employs the following three “IUP+” messages in addition to those used by the IUP Protocol;
   a) Protocol Negotiation Message [PNM]: To indicate whether Enveloped ISUP can proceed;
   b) Enveloped ISUP message [EIM]: To transport ISUP messages;
   c) Enveloped ISUP Segmented message [EISM]: To transport long ISUP messages in segments;
7. The format and coding of the ISUP messages within the IUP EIM/EISM shall be in accordance with /2/ except where indicated in sub-section 2;
8. IUP ACM and IUP ANS messages are not used if the Enveloped ISUP protocol is successfully invoked, instead EIM[ISUP-ACM], EIM[ISUP-CPG] and EIM[ISUP-ANM] (or EIM[ISUP-CON]) are used. Similarly:
   a) EIM[ISUP-SUS(network initiated)] is used in place of IUP CLR messages;
   b) EIM[ISUP-RES(network initiated)] is used in place of IUP RAN messages;
   c) EIM[ISUP-SUS(user initiated)] is used in place of IUP SUS messages;
   d) EIM[ISUP-RES(user initiated)] is used in place of IUP RES messages;

9. IUP ACI messages may be used during an Enveloped ISUP call. Their use will be as determined by network and supplementary services. Procedures (e.g. timer supervision and use of IUP CONFUSION message in response to unrecognised requests) shall be as described for the appropriate phase of the underlying IUP call in. However, where the IUP "ACI" procedure is mirrored by an equivalent "ISUP" procedure there are some particular backwards compatibility issues which are described in 6.3.5.

10. Once the Enveloped ISUP protocol is successfully invoked, clearing is normally initiated by the EIM[ISUP-REL] message. Once initiated, clearing continues according to the appropriate IUP procedures (bothway or uni-directional) using IUP REL and IUP CCF messages. Thus the enveloping phase of Enveloped ISUP ends after the initiation of clearing. Enveloped ISUP does not use EIM[ISUP-RLC]. The IUP REL message is not normally used to initiate clearing after Enveloped ISUP protocol is successfully invoked. However, it is recognised as a clearing message in order to protect against certain error conditions;

11. Circuit Management functions are not performed in ISUP but at the IUP level, e.g. BLOCKING;

12. IUP Segmentation and Reassembly is used when the required parameter content of an EIM will exceed the maximum IUP Message Transfer Part message length capability;

13 Use of Enveloped ISUP in networks which deploy echo control devices is not precluded, but the following requirements need to be observed.

   a) Any echo logic in the Enveloped ISUP initiating node (in the Outgoing Network) interacts with ISUP message contents before being "enveloped" (forward direction) and after being "un-enveloped" (backward direction).

   b) Any echo logic in the Enveloped ISUP terminating node (in the Incoming Network) interacts with ISUP message contents after being "un-enveloped" (forward direction) and before being "enveloped" (backward direction).

   c) Action at any intermediate node (in the Outgoing and Incoming Networks) with echo control logic depends on the need to provide full ISUP echo control procedures as follows:

      i) if full ISUP echo control logic is required (e.g. in support of connection types allowing fallback) then the intermediate node must have visibility of all the echo control related "enveloped" ISUP signalling (e.g. by terminating and re-initiating the Enveloped ISUP protocol) thus allowing full interaction between the echo control logic and the contents of forward and backward ISUP messages;

      ii) if it is sufficient to provide only limited ISUP echo control logic which supports simple echo control procedures but does not support connection types allowing fallback then a simplified intermediate node procedure is possible. In the forward direction the echo control logic interacts with the IUP IAM/IFAM ECD indicator. Note that the Enveloped ISUP procedure for regenerating the ISUP IAM at the Enveloped ISUP terminating node is able to resolve any conflict between the IUP IAM/IFAM ECD indicator and the subsequent (ISUP) ECD indicator in the EIM[ISUP-IAM]. In the backward direction the echo control logic interacts with the (ISUP) ECD indicator in the EIM[ISUP-ACM] or EIM[ISUP-CON] (i.e. reading and if appropriate setting the ECD indicator).

6.2 Formats And Codes

6.2.1 Enveloped ISUP

Enveloped ISUP uses the following IUP messages, parameters and fields which are described fully in Section 2.

6.2.1.1 IUP IAM/IFAM

Service Handling Protocol Indicator within the IUP IAM/IFAM Message Indicators parameter

IUP Protocol Request Indicator within the IUP Called Address parameter

6.2.1.2 IUP PNM

IUP Protocol Negotiation Message Indicators parameter

6.2.1.3 IUP EIM

IUP ISUP Message parameter

6.2.1.4 IUP EISM

IUP EISM Segmentation Information parameter

IUP ISUP Message Segment parameter

6.2.2 ISUP Message as conveyed in Enveloped ISUP

The formatting and coding principles of all ISUP messages conveyed in Enveloped ISUP shall be as indicated in /2/, beginning with the ISUP Message Type Code.

The ISUP IAM shall also be of standard format, including all mandatory parameters correctly set, except for the Called Party Number parameter which is not used. To maintain the standard Called Party Number parameter format it shall be coded as follows:

Odd-Even Indicator	0	even number of address signals
Nature of Address Indicator	3	National (significant) number
Internal Network Number Indicator	1	Routeing to internal network number not allowed
Numbering Plan Indicator	1	ISDN (Telephony) numbering plan (Recommendation E.164)
Address Signal	One octet	The octet carrying the 1st and 2nd Address Signals shall always be included and shall be coded as “00”
Filler	Not required	

6.3 Signalling Procedures

The signalling is defined by:

(a) Enveloped ISUP call set-up using en-bloc signalling (see 6.3.1);

(b) Enveloped ISUP call set-up using overlap digit-by-digit signalling (see 6.3.2).

The following description is given in terms of Message Sequence Diagrams (MSDs) and accompanying text showing typical examples of a call using en-bloc and overlap (digit by digit) signalling during the establishment phase. Call cleardown and alternative actions that occur within the protocol are described in text.

Throughout the descriptions, reference is made to sending and receiving ISUP messages within IUP EIM messages. Where the ISUP message contents exceeds the capability of a single IUP EIM**,** an EISM SEQUENCE shall be used. The IUP segmentation procedures for IUP EIMs are given in 6.3.6.

Care must be taken at any intermediate nodes within the Outgoing and Incoming Networks to process all Enveloped ISUP protocol significant messages (e.g. the Enveloped ISUP-ACM) in both EIM and EISM sequence form.

6.3.1 Establishment of Enveloped ISUP call using En-bloc signalling

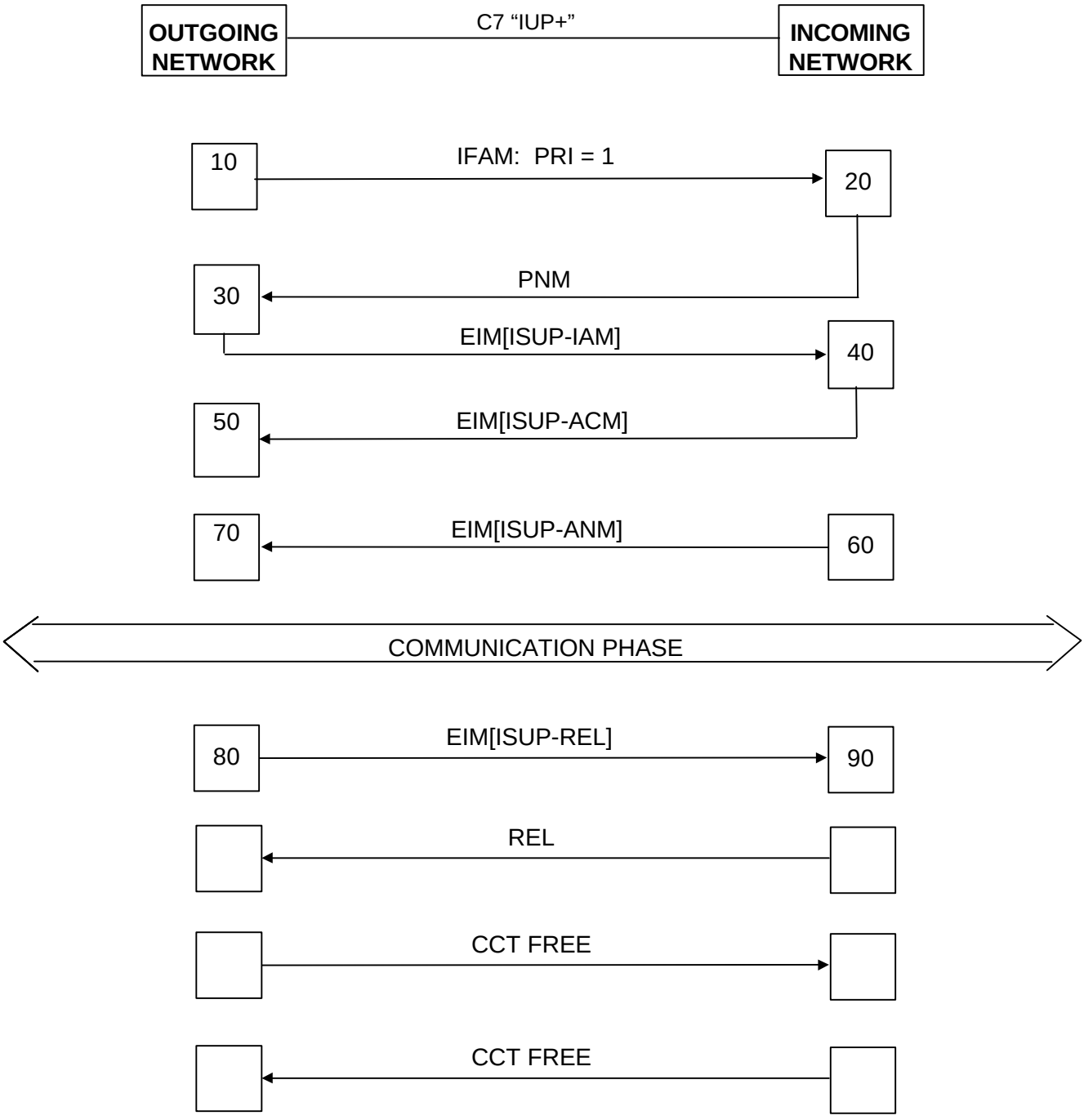

FIGURE 6.1

6.3.1.10 Sending of IUP IFAM

The Outgoing Network shall:

a) send an IUP IFAM to the Incoming Network.

The IUP IFAM shall include the following:

i) PRI=1

NOTE 1 - Current originating local exchange implementations that have the ability to use Enveloped ISUP will not use a PRI value of 1 unless the originating line has DSS1 access.

NOTE 2 - PRI values 2, 3 and 4 have been reserved for possible future use in Enveloped ISUP.

ii) The SHP value shall be derived by application of the normal mapping contained in /3/ to the ISUP IAM to be enveloped. If application of this mapping would cause a /3/ interworking point to fail the call then the value of SHP shall be set to value 8.

NOTE 3 - Current signalling systems that have the ability to use Enveloped ISUP will not use an SHP value of 8 unless Enveloped ISUP is essential to progress the call.

iii) The CPI shall be derived from the TMR the Outgoing Network requires by applying the appropriate mapping in /3/ except if the TMR value is 6 “64kbit/s preferred” when the TMR prime value shall be used in place of the TMR value to derive the IUP CPI value.

iv) All other contents of the IFAM shall be generated as though the ISUP IAM which the Outgoing Network wishes to send were being mapped to an IUP IFAM. (see /3/).

b) start timer TO-09 and timer TO-16 in accordance with /1/;

c) continue as described in 6.3.1.30

6.3.1.20 Receipt of an IUP IFAM with PRI=1

On receipt of an IUP IFAM with PRI=1, the Incoming Network shall decide whether to accept the Enveloped ISUP protocol.

6.3.1.20.1

If the Incoming Network decides to accept the Enveloped ISUP protocol it shall:

a) send an IUP PNM with Send ISUP IAM Indicator value “Preceding node requested to send EIM[ISUP-IAM]” to the Outgoing Network

b) start TO-14

c) continue as described in 6.3.1.40

6.3.1.20.2

If the Incoming Network decides not to accept the Enveloped ISUP protocol and the SHP does not equal 8, the IUP IFAM (excluding the PRI parameter) shall be processed in accordance with existing IUP requirements as described in /1/ and Section 3.

6.3.1.20.3

If the Incoming Network decides not to accept the Enveloped ISUP protocol (e.g. because it does not support Enveloped ISUP for the identified destination access type) and the SHP value is 8, the Incoming Network shall return an IUP CNA with Reason “service unavailable” and shall continue clearing in accordance with /1/.

6.3.1.30 The Outgoing Network is expecting an IUP PNM

6.3.1.30.1

On receipt of an IUP PNM, with a Send ISUP-IAM Indicator value “Preceding node requested to send EIM[ISUP-IAM]”, the Outgoing Network shall:

a) send an IUP EIM forward containing the ISUP-IAM;

b) restart timer TO-09;

c) continue as described in 6.3.1.50.

NOTE - An IUP PNM with a Send ISUP-IAM Indicator value “No information available” shall be discarded and the Outgoing Network continue as described in 6.3.1.30.

6.3.1.30.2

On receipt of an IUP SASUI, the Outgoing Network shall:

a) process the message in accordance with /1/;

b) continue as described in 6.3.1.30.

6.3.1.30.3

The receipt of an IUP ACM or IUP SIM-A indicates that the call cannot continue using Enveloped ISUP. If the IUP IFAM SHP value was not 8 the call shall proceed in accordance with /1/. Any mapping to ISUP shall be in accordance with /3/. If the IUP IFAM SHP value was 8 the Outgoing Network shall initiate (and subsequently complete) IUP clearing in accordance with /1/ by sending an IUP REL to the Incoming Network.

NOTE - For connection types with fallback the non-negotiation of E-ISUP must be treated as having encountered a succeeding network which does not have the capability of performing fallback and hence fallback will occur at this node.

6.3.1.30.4

On receipt of an IUP CONGESTION, IUP REPEAT ATTEMPT or IUP CALL DROPBACK the Outgoing Network shall:

a) initiate (and subsequently complete) IUP clearing of this call attempt in accordance with /1/ by sending an IUP REL; and

b) apply the appropriate nodal algorithm to either:

   i) modify the called party number (if necessary) and make a new call attempt to the Incoming Network using protocols appropriate to the selected route; or

   ii) generate an ISUP-REL from the IUP message by applying the appropriate mapping in /3/ and process the ISUP-REL in accordance with /2/.

6.3.1.30.5

On expiry of TO-09 the Outgoing Network shall release the call in accordance with /1/.

6.3.1.30.6

On receipt of any other message (or event occurrence) the Outgoing Network shall proceed in accordance with /1/. If the processing does not result in call clearing, the Outgoing Network shall continue as described in 6.3.1.30. Any mapping to ISUP shall be in accordance with /3/.

6.3.1.40 The Incoming Network is expecting an IUP EIM (ISUP-IAM)

6.3.1.40.1

On receipt of an IUP EIM (ISUP-IAM), the Incoming Network shall:

a) cancel timer TO-14;

b) remove the ISUP-IAM from the IUP EIM[ISUP-IAM] and modify it as follows:

i) reconstruct the Called party number parameter from the Called Address signals received in the IUP IFAM by applying the appropriate mapping in /3/;

ii) if the Satellite indicator has value 0 and the LPD indicator received in the IUP IFAM has value 1, then the Satellite indicator shall be changed to value 1 “one satellite circuit in the connection”;

iii) if the Echo control device indicator has value 0 and that received in the IUP IFAM has value 1, then the Echo control device indicator shall be changed to value 1 “outgoing half echo control device included”;

iv) if the National/International call indicator has value 0 and the International indicator in the IUP IFAM has value 1, then the National/International call indicator shall be changed to value 1 “ call to be treated as international call”;

v) if the National forward call indicator parameter is absent, then it shall be constructed with the CLI blocking indicator, the Network translated address indicator, the Priority access indicator (IUP) and the Protection indicator (IUP) being derived from the corresponding indicators in the IUP IFAM by applying the appropriate mapping in /3/;

vi) if the CLI blocking indicator has value 1 and that received in the IUP IFAM has value 0, then the CLI blocking indicator shall be changed to value 0 “Network Number may not be disclosed to the called user”.;

vii) if the Network translated address indicator has value 0 and that received in the IUP IFAM has value 1, then the Network translated address indicator shall be changed to value 1 “network translated address”.

viii) if the Priority Access indicator has a value of 0 and that received in the IUP IFAM has a value of 1 then the Priority Access indicator shall be changed to value 1 “priority access call in IUP”.

ix) if the Protection indicator has a value of 0 and that received in the IUP IFAM has a value of 1 then the Protection indicator shall be changed to value 1 “protected call in IUP”.

c) Process the resultant ISUP-IAM in accordance with /2/.

As a result of processing the ISUP-IAM one of the following may occur:

6.3.1.40.1.1

The Incoming Network sends an IUP EIM[ISUP-ACM] and shall continue as described in 6.3.1.60.

NOTE - Reversion to the IUP protocol that was indicated by the IUP SHP value is no longer possible

6.3.1.40.1.2

The Incoming Network sends an IUP EIM[ISUP-CON] and shall continue as described in 6.3.1.90.

NOTE - Reversion to the IUP protocol that was indicated by the IUP-SHP value is no longer possible

6.3.1.40.1.3

The Incoming Network sends an IUP EIM[ISUP-REL] and shall continue IUP clearing in accordance with /1/. Timer supervision and expected subsequent events shall be as if an IUP CNA had been returned pre IUP ACM.

NOTE - No IUP EIM[ISUP-RLC] will be received.

6.3.1.40.1.4

The Incoming Network sends an IUP EIM which contains an ISUP message valid for this stage of the (ISUP) call (other than an ISUP ACM, ISUP CON or ISUP REL) and shall continue as described in 6.3.1.40.

6.3.1.40.1.5

Under certain failure conditions the Incoming Network may initiate (and subsequently complete) clearing in accordance with /1/.

6.3.1.40.2

On receipt of an IUP REL the Incoming Network shall complete IUP clearing in accordance with /1/.

6.3.1.40.3

On expiry of TO-14, the Incoming Network shall initiate (and subsequently complete) IUP clearing in accordance with /1/.

6.3.1.40.4

On receipt of an IUP EIM[ISUP-REL] the Incoming Network shall complete IUP clearing in accordance with /1/ as though an IUP REL had been received.

6.3.1.50 The Outgoing Network is expecting an IUP EIM[ISUP-ACM]

6.3.1.50.1

On receipt of an IUP EIM[ISUP-ACM], the Outgoing Network shall:

a) cancel timers TO-16 and TO-09;

b) remove the ISUP-ACM from the IUP EIM[ISUP-ACM] and process in accordance with /2/;

c) continue as described in 6.3.1.70.

NOTE - Once this IUP EIM has been received the Outgoing Network will no longer be able to revert to the IUP protocol that was indicated by the SHP value.

6.3.1.50.2

On receipt of an IUP EIM[ISUP-CON], the Outgoing Network shall:

a) cancel timers TO-16 and TO-09;

b) remove the ISUP-CON from the IUP EIM[ISUP-CON] and process in accordance with /2/;

c) continue as described in 6.3.1.80.

NOTE - Once this IUP-EIM has been received the Outgoing Network will no longer be able to revert to the IUP protocol that was indicated by the SHP value.

6.3.1.50.3

On receipt of an IUP EIM[ISUP-REL], the Outgoing Network shall:

a) remove the ISUP-REL from the IUP EIM[ISUP-REL] and process in accordance with /2/;

b) continue IUP clearing in accordance with /1/ as though an IUP CNA had been received.

NOTE - Enveloping of ISUP messages is no longer possible and the ISUP-RLC resulting from the processing of the ISUP-REL cannot be passed to the Incoming Network.

6.3.1.50.4

On receipt of any other IUP EIM[ISUP message] the Outgoing Network shall:

a) remove the ISUP message from the IUP EIM[ISUP message] and process in accordance with /2/;

b) continue as described in 6.3.1.50.

6.3.1.50.5

If the Outgoing Network wishes to send an ISUP message (except ISUP-REL) it shall:

a) envelope the message and send an IUP EIM[ISUP message];

b) continue as described in 6.3.1.50.

6.3.1.50.6

If the Outgoing Network wishes to clear the call it shall either:

6.3.1.50.6.1

a) send an IUP REL;

b) continue IUP clearing in accordance with /1/.

or

6.3.1.50.6.2

a) envelope an ISUP-REL and send an IUP EIM[ISUP-REL];

b) continue clearing in accordance with /1/;

c) timer supervision and expected subsequent events shall be as if an IUP REL had been sent.

NOTE - No IUP EIM[ISUP-RLC] will be received.

6.3.1.50.7

On receipt of an IUP PNM, with a Send ISUP-IAM Indicator value “Preceding node requested to send EIM[ISUP-IAM]”, the Outgoing Network shall:

a) envelope the ISUP-IAM and send an IUP –EIM[ISUP-IAM];

b) restart timer TO-09;

c) continue as described in 6.3.1.50.

NOTE 1 -An IUP PNM with a Send ISUP-IAM Indicator value “No information available” shall be discarded and the Outgoing Network continues as described in 6.3.1.50.

NOTE 2 -As an implementation option the Outgoing Network may keep a count of the total number of IUP PNMs with Send ISUP-IAM Indicator value “preceding node requested to send EIM[ISUP-IAM]” received and responded to. If such an option is implemented, the Outgoing Network shall be capable of responding to at least five PNMs. If the count is exceeded the Outgoing Network shall clear the call as described in 6.3.1.50.6.

6.3.1.50.8

On receipt of an IUP SASUI, the Outgoing Network shall:

a) process the message in accordance with /1/;

b) continue as described in 6.3.1.50.

6.3.1.50.9

The receipt of an IUP ACM or IUP SIM-A indicates that the call cannot continue using Enveloped ISUP. If the IUP IFAM SHP value was not 8 the call shall proceed in accordance with /1/. Any mapping to ISUP shall be in accordance with /3/. If the IUP IFAM SHP value was 8 the Outgoing Network shall initiate (and subsequently complete) IUP clearing in accordance with /1/ by sending an IUP REL to the Incoming Network.

NOTE - For connection types with fallback the non-negotiation of E-ISUP must be treated as having encountered a succeeding network which does not have the capability of performing fallback and hence fallback will occur at this node.

6.3.1.50.10

On receipt of an IUP CONGESTION, IUP REPEAT ATTEMPT or IUP CALL DROPBACK the Outgoing Network shall:

a) initiate (and subsequently complete) IUP clearing of this call attempt in accordance with /1/ by sending an IUP REL; and

b) apply the appropriate nodal algorithm to either:

i) modify the called party number (if necessary) and make a new call attempt to the Incoming Network using protocols appropriate to the selected route; or

ii) generate an ISUP-REL from the IUP message by applying the appropriate mapping in /3/ and process the ISUP-REL in accordance with /2/.

6.3.1.50.11

On expiry of TO-09 the Outgoing Network shall release the call in accordance with /1/.

6.3.1.50.12

On receipt of any other message (or event occurrence) the Outgoing Network shall proceed in accordance with /1/. If the processing does not result in call clearing, the Outgoing Network shall continue as described in 6.3.1.50. Any mapping to ISUP shall be in accordance with /3/.

6.3.1.60 The Incoming Network is awaiting an indication that the called user has answered

6.3.1.60.1

If the Incoming Network wishes to send an ISUP-ANM it shall:

a) envelope the message and send it as an IUP EIM[ISUP-ANM];

b) continue as described in 6.3.1.90.

6.3.1.60.2

If the Incoming Network wishes to send any other ISUP message (except ISUP-REL) it shall:

a) envelope the message and send it as an IUP EIM[ISUP message];

b) continue as described in 6.3.1.60.

6.3.1.60.3

If the Incoming Network wishes to clear the call it shall:

a) send an IUP EIM[ISUP-REL];

b) continue clearing in accordance with /1/;

c) timer supervision and expected subsequent events shall be as if an IUP REL had been sent.

NOTE - No IUP EIM[ISUP-RLC] will be received.

6.3.1.60.4

On receipt of an IUP EIM[ISUP-REL] the Incoming Network shall:

a) remove the ISUP-REL from the EIM[ISUP-REL] and process in accordance with /2/;

b) continue IUP clearing in accordance with /1/ as though an IUP REL had been received.

NOTE - Enveloping of ISUP messages is no longer possible and the ISUP-RLC resulting from the processing of the ISUP-REL cannot be passed to the Outgoing Network.

6.3.1.60.5

On receipt of any other IUP EIM[ISUP message] the Incoming Network shall:

a) remove the ISUP-messge from the EIM[ISUP message] and process in accordance with /2/;

b) continue as described in 6.3.1.60.

6.3.1.60.6

On receipt of an IUP REL the Incoming Network shall:

a) generate an ISUP-REL from the IUP REL by applying the appropriate mapping in /3/;

b) process the ISUP-REL in accordance with /2/;

c) continue IUP clearing in accordance with /1/.

NOTE - Enveloping of ISUP messages is no longer possible and the ISUP-RLC resulting from the processing of the ISUP-REL cannot be passed to the Outgoing Network.

6.3.1.60.7

On receipt of any other IUP message (except IUP ACI messages and IUP CONFUSION messages resulting from IUP ACI messages; see 6.1.2 item 9) the Incoming Network shall discard the message and continue as described in 6.3.1.60.

6.3.1.70 The Outgoing Network is expecting an IUP EIM[ISUP-ANM]

6.3.1.70.1

On receipt of an IUP EIM[ISUP-ANM], the Outgoing Network shall:

a) remove the ISUP-ANM from the IUP EIM[ISUP-ANM] and process in accordance with /2/;

b) continue as described in 6.3.1.80.

6.3.1.70.2

On receipt of an IUP EIM[ISUP-REL] the Outgoing Network shall:

a) remove the ISUP-REL from the IUP EIM[ISUP-REL] and process in accordance with /2/;

b) continue IUP clearing in accordance with /1/ as though an IUP REL had been received.

NOTE - Enveloping of ISUP messages is no longer possible and the ISUP-RLC resulting from the processing of the ISUP-REL cannot be passed to the Incoming Network.

6.3.1.70.3

On receipt of any other IUP EIM[ISUP message] the Outgoing Network shall:

a) remove the ISUP message from the IUP EIM[ISUP message] and process in accordance with /2/;

b) continue as described in 6.3.1.70.

6.3.1.70.4

If the Outgoing Network wishes to send any ISUP message except ISUP-REL it shall:

a) envelope the message and send it as an IUP EIM[ISUP message];

b) continue as described in 6.3.1.70.

6.3.1.70.5

If the Outgoing Network wishes to clear the call it shall:

a) envelope an ISUP-REL and send an IUP EIM[ISUP-REL];

b) continue clearing in accordance with /1/;

c) timer supervision and expected subsequent events shall be as if an IUP REL had been sent.

NOTE - no IUP EIM[ISUP-RLC] will be received.

6.3.1.70.6

On receipt of an IUP REL the Outgoing Network shall:

a) generate an ISUP-REL from the IUP REL by applying the appropriate mapping in /3/;

b) process the ISUP-REL in accordance with /2/;

c) continue IUP clearing in accordance with /1/.

NOTE - Enveloping of ISUP messages is no longer possible and the ISUP-RLC resulting from the processing of the ISUP-REL cannot be passed to the Incoming Network.

6.3.1.80 The Outgoing Network is in the Active Enveloping phase

6.3.1.80.1

On receipt of an IUP EIM[ISUP-REL] the Outgoing Network shall:

a) remove the ISUP-REL from the IUP EIM[ISUP-REL]and process in accordance with /2/;

b) continue IUP clearing in accordance with /1/ as though an IUP REL had been received.

NOTE - Enveloping of ISUP messages is no longer possible and the ISUP-RLC resulting from the processing of the ISUP-REL cannot be passed to the Incoming Network.

6.3.1.80.2

On receipt of any other IUP EIM[ISUP message] the Outgoing Network shall:

a) remove the ISUP message from the IUP EIM[ISUP message] and process in accordance with /2/;

b) continue as described in 6.3.1.80.

6.3.1.80.3

If the Outgoing Network wishes to send an ISUP message except ISUP-REL it shall:

a) envelope the message and send it as an IUP EIM[ISUP message];

b) continue as described in 6.3.1.80.

6.3.1.80.4

If the Outgoing Network wishes to clear the call it shall:

a) envelope an ISUP-REL and send an IUP EIM[ISUP-REL];

b) continue clearing in accordance with /1/;

c) timer supervision and expected subsequent events shall be as if an IUP REL had been sent.

NOTE - No IUP EIM[ISUP-RLC] will be received.

6.3.1.80.5

On receipt of an IUP REL the Outgoing Network shall:

a) generate an ISUP-REL from the IUP REL by applying the appropriate mapping in /3/;

b) process the ISUP-REL in accordance with /2/;

c) continue IUP clearing in accordance with /1/.

NOTE - Enveloping of ISUP messages is no longer possible and the ISUP-RLC resulting from the processing of the ISUP-REL cannot be passed to the Incoming Network.

6.3.1.80.6

On receipt of any other IUP message (except IUP ACI messages and IUP CONFUSION messages resulting from IUP ACI messages; see 6.1.2 item 9) the Outgoing Network shall discard the message and continue as described in 6.3.1.80.

6.3.1.90 The Incoming Network is in the Active Enveloping phase

6.3.1.90.1

On receipt of an IUP EIM[ISUP-REL] the Incoming Network shall:

a) remove the ISUP-REL from the IUP EIM[ISUP-REL] and process in accordance with /2/;

b) continue IUP clearing in accordance with /1/ as though an IUP REL had been received.

NOTE - Enveloping of ISUP messages is no longer possible and the ISUP-RLC resulting from the processing of the ISUP-REL cannot be passed to the Outgoing Network.

6.3.1.90.2

On receipt of any other IUP EIM[ISUP message] the Incoming Network shall:

a) remove the ISUP message from the IUP EIM[ISUP message] and process in accordance with /2/;

b) continue as described in 6.3.1.90.

6.3.1.90.3

If the Incoming Network wishes to send any ISUP message except ISUP-REL it shall:

a) envelope the message and send it as an IUP EIM[ISUP message];

b) continue as described in 6.3.1.90.

6.3.1.90.4

If the Incoming Network wishes to clear the call it shall:

a) envelope an ISUP-REL and send an IUP EIM[ISUP-REL];

b) continue clearing in accordance with /1/;

c) timer supervision and expected subsequent events shall be as if an IUP REL had been sent.

NOTE - No IUP EIM[ISUP-RLC] will be received.

6.3.1.90.5

On receipt of an IUP REL the Incoming Network shall:

a) generate an ISUP-REL from the IUP REL by applying the appropriate mapping in /3/;

b) process the ISUP-REL in accordance with /2/;

c) continue IUP clearing in accordance with /1/.

NOTE - Enveloping of ISUP messages is no longer possible and the ISUP-RLC resulting from the processing of the ISUP-REL cannot be passed to the Outgoing Network.

6.3.1.90.6

On receipt of any other IUP message (except IUP ACI messages and IUP CONFUSION messages resulting from IUP ACI messages; see 6.1.2 item 9) the Incoming Network shall discard the message and continue as described in 6.3.1.90.

6.3.2 Establishment of Enveloped ISUP call using IAMs with digit-by-digit signalling

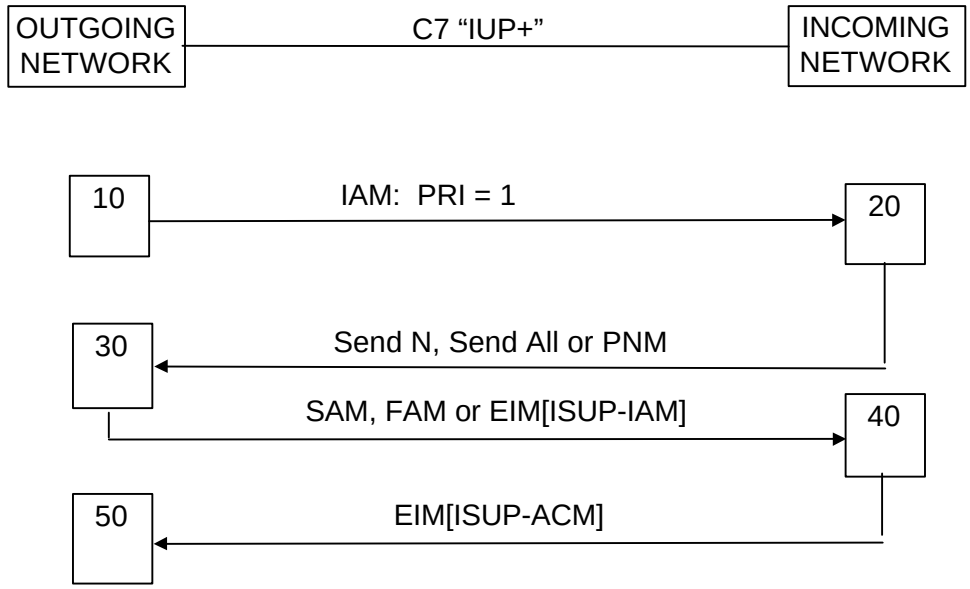

FIGURE 6.2

6.3.2.10 Sending of IUP IAM (Enveloped ISUP requested).

The Outgoing Network on deciding that digit by digit sending is to be used, in accordance with /1/, and that Enveloped ISUP is to be requested, shall send an IUP IAM with contents as defined in 6.3.1.10..

After sending the IUP IAM, the Outgoing Network shall continue as described in 6.3.2.30.

6.3.2.20 Receipt of IUP IAM with PRI=1

On receipt of an IUP IAM with PRI=1, the Incoming Network shall process the message in accordance with /1/. Additionally, the requirements described in 6.3.1.20 shall apply with the following exceptions:

6.3.2.20.1

If the Incoming Network decides to accept Enveloped ISUP, processing shall continue as described in 6.3.2.40.

6.3.2.20.2

If the Incoming Network decides to reject the call at this stage because SHP=8 value has been received, a CNA containing Reason "service unavailable" shall be sent in place of an IUP SND or IUP SAD message.

6.3.2.20.3

If the Incoming Network has insufficient information to accept or reject Enveloped ISUP then it shall continue as described in 6.3.2.40.

6.3.2.30 Receipt of IUP Send N, IUP Send All or IUP PNM

6.3.2.30.1

On receipt of an IUP Send N or IUP Send All, the Outgoing Network shall process the message in accordance with /1/ after which the Incoming Network shall continue as described in 6.3.2.30.

6.3.2.30.2

On receipt of an IUP PNM, the Outgoing Network shall process the message in accordance with 6.3.1.30.1 and continue as described in 6.3.2.50.

6.3.2.30.3

On receipt of any other message, the Outgoing Network shall process the message in accordance with 6.3.1.30. If the processing does not result in call clearing, the Outgoing Network shall continue as described in 6.3.2.30.

6.3.2.40 Receipt of IUP SAM, IUP FAM or IUP EIM[ISUP-IAM]

NOTE - IUP digit collection is in accordance with the IUP IAM (SND) protocol and/or the IUP IAM (SAD) protocol as described in /1/.

6.3.2.40.1

On Receipt of an IUP FAM, if the Incoming Network decides to accept Enveloped ISUP and an IUP PNM has not previously been sent, the Incoming Network shall send a PNM in accordance with 6.3.1.20.1 The Incoming Network shall continue as described in 6.3.2.40.

6.3.2.40.2

On receipt of an IUP SAM and

a) the Incoming Network determines that a complete number has been received,

b) the Incoming Network decides to accept Enveloped ISUP;

c) an IUP PNM has not been sent previously.

The Incoming Network shall send an IUP PNM in accordance with 6.3.1.20.1. The Incoming Network shall continue as described in 6.3.2.40.

6.3.2.40.3

On receipt of an IUP FAM and the Incoming Network has previously sent an IUP PNM but a response is still awaited, the Incoming Network shall continue as described in 6.3.2.40.

6.3.2.40.4

On receipt of an IUP SAM and

a) the Incoming Network determines that a complete number has been received;

b) the Incoming Network has previously sent a IUP PNM but a response is still awaited.

The Incoming Network shall continue as described in 6.3.2.40.

6.3.2.40.5

On receipt of an IUP EIM[ISUP-IAM], and a complete number has been received by the Incoming Network, processing shall continue as described in 6.3.1.40.1. Further processing shall continue as described in 6.3.1.40.1 (including references to other sub sections within 6.3.1).

6.3.2.40.6

On receipt of an IUP SAM and

a) the Incoming Network determines that a complete number has been received;

b) the Incoming Network has previously received a IUP EIM[ISUP-IAM].

The Incoming Network shall continue as described in 6.3.2.40.5

6.3.2.40.7

On receipt of an IUP FAM and the Incoming Network has previously received a IUP EIM[ISUP-IAM], the Incoming Network shall continue as described in 6.3.2.40.5.

6.3.2.40.8

On receipt of an IUP SAM or IUP FAM, if the Incoming Network decides not to accept the Enveloped ISUP protocol and the SHP does not equal 8, the Incoming Network shall continue to process the call in accordance with /1/ and Section 3.

6.3.2.40.9

On receipt of an IUP SAM or IUP FAM, if the Incoming Network decides not to accept the Enveloped ISUP protocol (e.g. because it does not support Enveloped ISUP for the identified destination access type) and the SHP value is 8, the Incoming Network shall initiate (and subsequently complete) IUP clearing in accordance with /1/ with Reason “service unavailable”.

6.3.2.40.10

On receipt of any other message or event, processing shall continue as described in 6.3.1.40.

6.3.2.50 Receipt of IUP EIM[ISUP-ACM]

Further processing of the call shall be as described in 6.3.1.50, including references to subsequent sub-sections of 6.3.1, with the following addition:

6.3.2.50.1

The Outgoing Network may send digits to the Incoming Network in an IUP SAM or IUP FAM (in accordance with the IUP IAM (SND)/(SAD) protocols as described in /1/) whilst awaiting an IUP EIM[ISUP-ACM].

6.3.3 Modifications to ISUP as used by Enveloped ISUP

Enveloped ISUP shares functionality between the underlying IUP protocol/procedures and the ISUP signalling flows conveyed in IUP EIMs. Clearly, when standing alone, ISUP and IUP are complete protocols, and so when combined they can offer two distinct (and possibly incompatible) means of achieving equivalent functions (e.g. circuit blocking). The following ISUP messages are not used in Enveloped ISUP:

Blocking

Blocking Acknowledgement

Circuit Group Blocking

Circuit Group Blocking Acknowledgement

Circuit Group Reset

Circuit Group Reset Acknowledgement

Circuit Group Unblocking

Circuit Group Unblocking Acknowledgement

Unblocking

Unblocking Acknowledgement

Reset Circuit

Release Complete

Subsequent Address

User Part Availability

User Part Test

Similarly the following ISUP parameters are not used in Enveloped ISUP:

Automatic Congestion Level

Circuit Group Supervision Message Type Indicator

National Forward Call Indicator (Link by Link)

Range and Status

Subsequent Number

It is therefore necessary to specify additional ISUP procedures for use in conjunction with /2/ when supporting Enveloped ISUP. This additional specification covers the treatment of received ISUP messages/parameters which are not used in Enveloped ISUP. Such treatment is not included in /2/ because these messages/parameters are not unrecognised in ISUP (indeed they are for the most part included in the ITU-T Rec. Q.761 minimum message/parameter sets). Furthermore, message/parameter compatibility information would not be expected with these messages/parameters except for National Forward Call Indicators (Link by Link). Message handling is described in 6.3.3.1 and parameter handling is described in 6.3.3.2.

In each of 6.3.3.1 and 6.3.3.2 these cases are covered:

a) the node in the Outgoing Network where the Enveloped ISUP is originated;

b) the node in the Incoming Network where the Enveloped ISUP is terminated;

c) nodes in either the Outgoing or Incoming Networks which do not intervene in the Enveloped ISUP protocol but which provide IUP Group 8 message transparency and recognition of IUP EIM[ISUP-ACM/ANM/CON/REL].

NOTE - nodes in case (c) cannot be regarded as ISUP transit nodes as they cannot recognise and act on ISUP compatibility information addressed to transit exchanges.

6.3.3.1

Default actions on receipt of ISUP messages not used by Enveloped ISUP.

6.3.3.1.1

Node where Enveloped ISUP is originated.

Following receipt of an IUP PNM, any received IUP EIM[ISUP message] listed in 6.3.3 except IUP EIM[ISUP-RLC] shall be discarded. Receipt of an IUP EIM[ISUP-RLC] shall cause forward and backward release. This shall be initiated in the forward direction by sending an IUP EIM[ISUP-REL].

6.3.3.1.2

Node where Enveloped ISUP is terminated.

After an IUP PNM has been sent, any received IUP EIM[ISUP message] listed in 6.3.3 except IUP EIM[ISUP-RLC] shall be discarded. Receipt of an IUP EIM[ISUP-RLC] shall cause forward and backward release. This shall be initiated in the backward direction by sending an IUP EIM[ISUP-REL].

NOTE - as an implementation option, if the IUP EIM[ISUP-RLC] is received before an IUP EIM[ISUP-IAM], then backward release may be initiated according to IUP procedures as described in /1/.

6.3.3.1.3

Intermediate node providing IUP Group 8 message transparency and limited recognition of IUP EIM[ISUP messages].

6.3.3.1.3.1

In any call state where no association exists between an incoming and outgoing IUP circuit, i.e. an outgoing circuit has not been selected or the call is in the clearing phase, on receipt of any Enveloped ISUP message except IUP EIM[ISUP-REL], but including any IUP EIM[ISUP message] listed in 6.3.3, it shall be discarded.

If an IUP EIM[ISUP-REL] is received it shall either:

i) be treated as though an IUP REL had been received;

or

ii) as an implementation option, be discarded as an Enveloped ISUP message.

6.3.3.1.3.2

In any call state where an association exists between an incoming and outgoing IUP circuit, on receipt of any Enveloped ISUP message including any IUP EIM[ISUP message] listed in 6.3.3, it shall be passed on.

Furthermore, if the Enveloped ISUP message is one of the following set, the intermediate node shall take the additional supervision/protocol action described.

IUP EIM[ISUP-ACM] :	action as if IUP ACM received
IUP EIM[ISUP-ANM] :	action as if IUP ANS received
IUP EIM[ISUP-CON] :	action as if IUP ACM and ANS received
IUP EIM[ISUP-REL] :	action as if IUP REL received

6.3.3.2 Default actions on receipt of ISUP parameters not used by Enveloped ISUP.

6.3.3.2.1 Node where Enveloped ISUP is originated.

PARAMETER TYPE RECEIVED	**REMARKS**
Automatic Congestion Level	Only legal in Release message - discard parameter, continue with call release
Circuit Group Supervision Message Type Indicator	Only legal in Circuit Group Supervision messages - discarded with message as indicated in 6.3.3.1.1
Range and Status	Only legal in Circuit Group Supervision messages - discarded with message as indicated in 6.3.3.1.1
Subsequent Number	Only legal in (unexpected) Subsequent Address message - discarded with message as indicated in 6.3.3.1.1
National Forward Call Indicator (Link by Link)	Discard parameter

6.3.3.2.2 Node where Enveloped ISUP is terminated.

PARAMETER TYPE RECEIVED	REMARKS
Automatic Congestion Level	Only legal in Release message - discard parameter, continue with call release
Circuit Group Supervision Message Type Indicator	Only legal in Circuit Group Supervision messages - discarded with message as indicated in 6.3.3.1.2
Range and Status	Only legal in Circuit Group Supervision messages - discarded with message as indicated in 6.3.3.1.2
Subsequent Number	Only legal in Subsequent Address message - discarded with message as indicated in 6.3.3.1.2
National Forward Call Indicator (Link by Link)	Discard parameter, continue with call establishment.

6.3.3.2.3 Intermediate node providing IUP Group 8 message transparency and limited recognition of IUP-EIM[ISUP messages].

PARAMETER TYPE RECEIVED	REMARKS
Automatic Congestion Level	Only legal in Release message - discarded or transferred transparently in accordance with 6.3.3.1.3 , continue with call release.
Circuit Group Supervision Message Type Indicator	Only legal in Circuit Group Supervision messages - discarded or transferred transparently in message in accordance with 6.3.3.1.3.
Range and Status	Only legal in Circuit Group Supervision messages - discarded or transferred transparently in message in accordance with 6.3.3.1.3
Subsequent Number	Only legal in Subsequent Address message - discarded or transferred transparently in message in accordance with 6.3.3.1.3
National Forward Call Indicator (Link by Link)	Message containing parameter discarded or transferred transparently in message in accordance with 6.3.3.1.3.

6.3.4 Modification to IUP as used by Enveloped ISUP.

It is necessary to specify additional IUP procedures for use in conjunction with /1/ to handle new errors which become possible as a result of the Enveloped ISUP enhancements. Nodes that do not implement Enveloped ISUP can handle all Enveloped ISUP enhancements under the error handling procedures described in /1/.

Error handling is described for:

a) the node in the Outgoing Network where the Enveloped ISUP is originated;

b) the node in the Incoming Network where the Enveloped ISUP is terminated.

NOTE - Treatment of Enveloped ISUP messages at nodes which provide IUP Group 8 message transparency and limited recognition of IUP EIM[ISUP messages] is described in 6.3.3.1.3.

6.3.4.1 Node in the idle state.

Any IUP Group 8 message received when the node is in the idle state shall be treated as an unexpected message as described in /1/.

As an implementation option receipt of an IUP EIM[ISUP-REL] may be handled as though an IUP REL had been received and continue as described in /1/.

6.3.4.2 Node is not in idle state: Enveloped ISUP not requested.

6.3.4.2.1 Node in Outgoing Network.

After sending an IUP IAM/IFAM which has not requested Enveloped ISUP protocol, any IUP Group 8 message received shall be treated as an unexpected message as described in /1/.

As an implementation option receipt of an IUP EIM[ISUP-REL] may be handled as though an IUP REL had been received and continue as described in /1/.

6.3.4.2.2 Node in Incoming Network

6.3.4.2.2.1

If the received IUP IAM/IFAM contains conflicting SHP and PRI values (e.g. SHP value 8, PRI value 0) the node shall initiate (and subsequently complete) IUP clearing as described in /1/ by sending an IUP CNA with Reason “service unavailable”.

6.3.4.2.2.2

After receiving an IUP IAM/IFAM which has not requested Enveloped ISUP protocol, any IUP Group 8 message received shall be treated as an unexpected message as described in /1/.

As an implementation option receipt of an IUP EIM[ISUP-REL] may be handled as though an IUP REL had been received and continue as described in /1/.

6.3.4.3 Node is not in idle state: Enveloped ISUP requested PRI=1.

6.3.4.3.1 Node in Outgoing Network.

6.3.4.3.1.1

Subsequent to the sending of the IUP IAM/IFAM any backward EIM (or EISM sequence) before receipt of an IUP PNM shall be discarded and call set-up shall continue.

6.3.4.3.1.2

Subsequent to the receipt of an IUP PNM containing a “Preceding Node requested to send EIM[ISUP-IAM]” indication the receipt of any Group 8 message other than an EIM (or EISM sequence) shall be discarded and call set-up shall continue.

6.3.4.3.1.3

Subsequent to the sending of the IUP IAM/IFAM and the receipt of the IUP PNM containing a “Preceding Node requested to send EIM[ISUP-IAM]” indication, the receipt of further IUP PNMs containing a “Preceding Node requested to send EIM[ISUP-IAM]” indication prior to the receipt of an IUP EIM[ISUP-ACM], IUP EIM[ISUP-CON], IUP SIM-A or IUP ACM shall be accepted and responded to correctly, i.e. the IUP EIM[ISUP-IAM] shall be re-transmitted and no state change shall occur.

6.3.4.3.1.4

Subsequent to the receipt of an IUP EIM[ISUP-ACM] or IUP EIM[ISUP-CON] the receipt of any further IUP PNM shall be discarded and call set-up shall continue.

6.3.4.3.1.5

Subsequent to receipt of an IUP ACM or IUP SIM-A the receipt of any backward Group 8 message shall be discarded and call set-up shall continue.

6.3.4.3.1.6

If the IUP-IAM/IFAM SHP value is set to 8, the receipt of an IUP ACM or IUP SIM-A shall be considered as an unexpected message indicating, in error, that Enveloped ISUP has not been invoked, contrary to the IUP IAM/IFAM SHP value. On receipt of the unexpected message the call attempt shall be released in the forward direction with an IUP RELEASE message with Reason “Network Termination” and an indication of “Service Unavailable” shall be provided towards the calling party. Mapping of this indication into ISUP shall be in accordance with /3/.

6.3.4.3.1.7

Subsequent to receipt of an IUP EIM[ISUP-ACM] or IUP EIM[ISUP-CON], any received IUP non Group 8 message, with the exception of IUP ACI, IUP CONFUSION and IUP RELEASE messages shall be discarded and the call shall continue.

6.3.4.3.2 Node in Incoming Network 6.3.4.3.2.1

Subsequent to the receipt of the IUP IAM/IFAM and before the IUP PNM containing a “Preceding Node requested to send EIM[ISUP-IAM]” indication is sent, any received Group 8 message shall be discarded and call set-up shall continue.

6.3.4.3.2.2

Subsequent to the sending of the IUP PNM containing a “Preceding Node requested to send EIM[ISUP-IAM]” indication any received Group 8 message other than an EIM (or EISM sequence) shall be discarded and call set-up shall continue.

6.3.4.3.2.3

Subsequent to the sending of the IUP PNM containing a “Preceding Node requested to send EIM[ISUP-IAM]” indication, but prior to the sending of an IUP EIM[ISUP-ACM] or IUP EIM[ISUP-CON], any received IUP non Group 8 message, with the exception of an IUP SAM, IUP FAM, IUP ASUI, IUP ACI, IUP CONFUSION or IUP RELEASE message, shall be discarded and call set-up shall continue.

6.3.4.3.2.4

Subsequent to sending an IUP EIM[ISUP-ACM] or IUP EIM[ISUP-CON], any received IUP non Group 8 message, with the exception of IUP ACI, IUP CONFUSION or IUP RELEASE messages, shall be discarded and the call shall continue.

6.3.4.3.2.5

Subsequent to the sending of an IUP ACM or IUP SIM-A, any received Group 8 messages shall be discarded and the call shall continue.

6.3.5 Information Messages

6.3.5.1 Introduction

Although the description below is written in terms of the Enveloped ISUP protocol acting as a link between ISUP entities provision is made for the support of existing IUP functionality by the support of a limited range of IUP ACI messages which are the equivalents of the UK ISUP INR and INF message contents. It should be noted that this functionality was only provided to enable the continued functioning of certain applications within the BT network.

The following sub sections shall apply regardless of call direction.

6.3.5.2 Actions on Receipt of ISUP Messages

6.3.5.2.1 Receipt of an ISUP INR Message

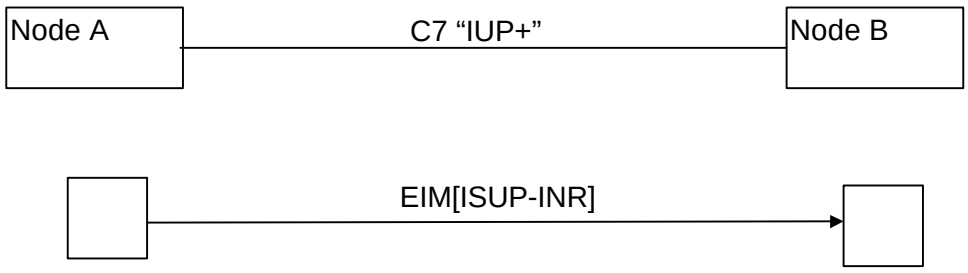

FIGURE 6.3

If an ISUP information request message is received at Node A which is performing the interface function between UK ISUP and E ISUP then the node shall send an IUP EIM containing the received ISUP Information request message to Node B.

6.3.5.2.2 Receipt of an ISUP INF Message

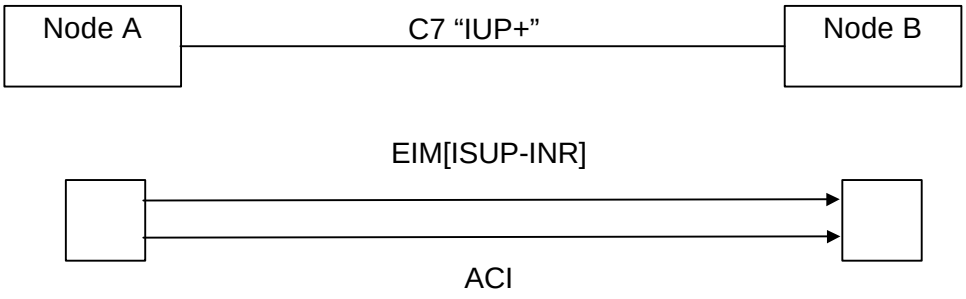

FIGURE 6.4

If an ISUP information message is received at Node A which is performing the interface function between UK ISUP and E ISUP then the node shall:

a) Send an IUP EIM containing the received ISUP Information message to Node B.

b) Apply the mapping contained in /3/ Tables 2.98, 2.99, 2.100, 2.101, 2.102 and 2.103 to produce the equivalent IUP ACI message and send to Node B.

If the ISUP INF message contains more than one parameter capable of being mapped into an IUP ACI message then Node A shall send an IUP Confusion message to Node B (instead of an IUP ACI message). However this shall not impact on the procedure described in (a) above.

6.3.5.3 Actions on Receipt of E-ISUP Messages

6.3.5.3.1 Receipt of an EIM[ISUP–INR]

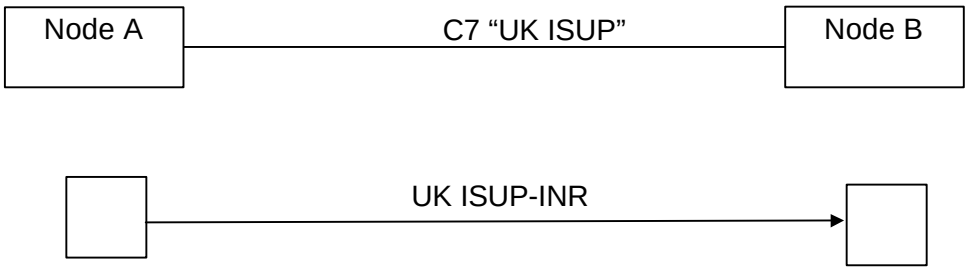

FIGURE 6.5

If an IUP EIM containing an ISUP information request message, EIM[ISUP-INR], is received at Node A which is performing the interface function between E-ISUP and UK ISUP then the node shall remove the ISUP INR message from the IUP EIM[ISUP-INR] and send it to Node B.

6.3.5.3.2 Receipt of an IUP ACI Type 7 Message

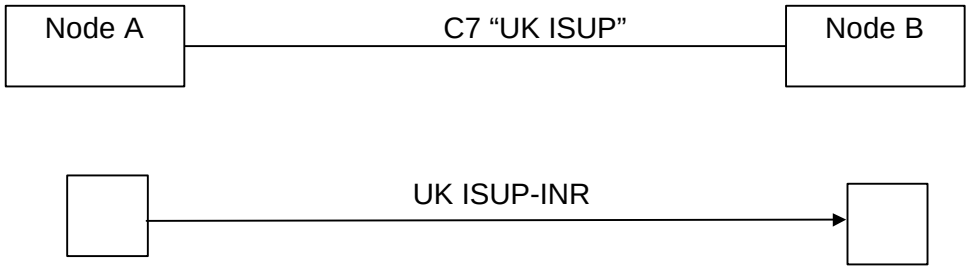

FIGURE 6.6

If an IUP ACI Type 7 message is received at Node A which is performing the interface function between E-ISUP and UK ISUP then Node A shall:

a) apply the mappings contained in /3/ Tables 2.87 & 2.88 to produce an ISUP INR message.

b) send the resultant ISUP INR message to Node B.

6.3.5.3.3 Receipt of an EIM[ISUP-INF]

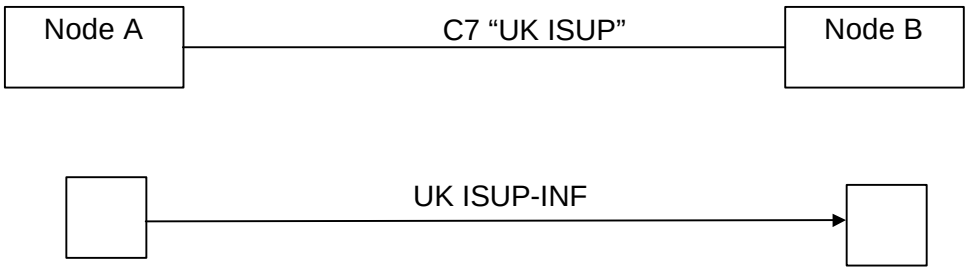

FIGURE 6.7

If an IUP EIM containing an ISUP information message EIM[ISUP-INF] is received at Node A which is performing the interface function between E-ISUP and UK ISUP then the node shall remove the ISUP INF message from the IUP EIM[ISUP-INF] and send it to Node B.

6.3.5.3.4 Receipt of an IUP ACI Non Type 7 or an IUP Confusion Message

If either an IUP ACI Non Type 7 message or an IUP Confusion message is received at Node A then it shall be discarded, unless Node A had previously initiated the IUP ACI protocol by sending an IUP ACI Type 7 message.

6.3.6 IUP Segmentation/Reassembly Procedures for EIMs

6.3.6.1 Introduction

6.3.6.1.1

Enveloped ISUP Messages (IUP EIMs) require the ability to contain the contents of ISUP messages which are defined in /2/ starting from the ISUP message type code. There will, therefore, be instances when the required parameter content of an IUP EIM will exceed the maximum capability of the MTP.

Under these circumstances the following requirements shall apply if 62 octet MTP message capability applies and an IUP EIM with a Signalling Information Field (SIF) greater than 61 octets is required to be sent.

NOTE - Because of specific operational limitations it is essential that messages sent via 62 octet MTP links do not exceed a maximum SIF length of 61 octets, (56 octets excluding the label). This limitation is reflected in the following text and the formatting of IUP EIMs and IUP EISMs.

The following shall also apply on 272 octet MTP routes when an IUP EIM with a Signalling Information Field (SIF) greater than 272 octets is required to be sent.

NOTE - ISUP messages are constructed by the ISUP signalling logic based on a maximum SIF length of 272 octets (266 octets excluding the label). Thus it is possible for the enveloping function to generate an IUP EIM with maximum SIF of 275 octets. Therefore, under rare circumstances, IUP EISM segmentation/reassembly is required on 272 octet MTP routes.

6.3.6.1.2

Any IUP EIM with a total SIF of 62 octets or more which is to be sent via a 62 octet MTP link (or with a total SIF of 273 octets or more which is to be sent via a 272 octet MTP link) shall be partitioned into "segments" of 52 octet packets, starting with the ISUP Message Type Code, and sent to line, in order, in a "sequence" of IUP Enveloped ISUP Segmented Messages (IUP EISMs). ISUP parameter boundaries shall be ignored in this operation.

6.3.6.1.3

All IUP EISMs in the message sequence shall include a mandatory EISM Segmentation Information parameter. Refer to Section 2. for message formatting details.

6.3.6.1.4

If the potential ISUP message total SIF (including label) would have been greater than 272 octets, standard ISUP "Simple Segmentation" procedures shall apply to reduce this message to standard potential ISUP messages with SIFs (including label) within the 272 octet limit, before enveloping into IUP EIMs takes place.

NOTE - ISUP “Simple” Segmentation involves the removal of specific, complete optional parameters from the ISUP message concerned and carrying these in a single ISUP-SEGMENTATION message sent immediately following the message concerned. An indication that Simple Segmentation has occurred is included in the segmented ISUP message concerned, providing an indication that further parameters are following in an ISUP-SEGMENTATION message. Refer to /2/ for further details.

6.3.6.1.5

An IUP EIM [ISUP-SEGMENTATION] message shall always be sent immediately following the IUP EIM (or IUP EISM sequence) which conveys the segmented ISUP message. If necessary, the IUP EIM [ISUP-SEGMENTATION] message itself shall be segmented into an IUP EISM sequence sent immediately following the IUP EIM (or IUP EISM sequence) which conveys the segmented ISUP message.

6.3.6.1.6

It shall be possible to send an IUP EISM sequence whilst receiving an IUP EISM sequence for the same circuit without interaction between the sending and receiving procedures.

6.3.6.2 IUP Message Segmentation

The following requirements shall apply when messages are segmented for transmission by the MTP.

6.3.6.2.1

The maximum possible number of segments into which any IUP EIM may be partitioned is sixteen. With the current ISUP maximum SIF (including label) of 272 octets, a valid IUP EISM sequence will never exceed a maximum of six messages. Any IUP EIM delivered for segmentation which is too long to be contained within six IUP EISM segments shall be discarded.

6.3.6.2.2

The format of all IUP EISMs shall be as shown in Section 2. All IUP EISMs of a sequence, apart from the final segment, shall contain a 52 octet "packet" of the original ISUP message, resulting in IUP EISMs with a SIF of 61 octets. The final segment will contain the remaining octets of the original ISUP message, (1 to 52 octets), resulting in an IUP EISM with a SIF of between 10 and 61 octets.

The relationship between an IUP EIM and the derived IUP EISM segments is shown in Figure 6.8 below.

6.3.6.2.3

The EISM Segmentation Information parameter shall contain:-

i) an indication when the message contains the first segment of a segmented message sequence, (First Segment Indicator); and

ii) an indication of the number of segments still to be sent (Number of Segments Remaining field).

The EISM Segmentation Information parameter is defined in Section 2.

6.3.6.2.4

The First Segment Indicator in the EISM Segmentation Information parameter shall be set in the first IUP EISM of an IUP EISM sequence. It shall not be set in any other IUP EISM of the sequence.

6.3.6.2.5

The Number of Segments Remaining field of the EISM Segmentation Information parameter shall be set to indicate how many more IUP EISMs of the message sequence are to follow. Consequently, the last IUP EISM of an IUP EISM sequence will be indicated by this field being set to zero.

6.3.6.2.6

Under normal conditions, once the first IUP EISM of an IUP EISM sequence has been transmitted to the MTP Level 3, then all remaining IUP EISMs of that sequence shall be sent to the MTP Level 3, in order, before any other message or segmented message sequence, pertaining to the same circuit (CIC value) is sent.

NOTE - Under nodal failure or fault conditions, when immediate release of a call is required by the network, the sending of an IUP EISM sequence may be curtailed and the IUP REL message or other appropriate IUP call failure message, (e.g. IUP CNA message), may be sent. The receiving node shall discard the incomplete IUP EISM sequence and act upon the IUP REL message or IUP call failure message in accordance with 6.3.6.3.8 below. Under these conditions the release sequence may also be initiated by an IUP EIM[ISUP-REL] message.

6.3.6.3 IUP EISM Reassembly

The following requirements shall apply when receiving and reassembling an IUP EISM sequence.

6.3.6.3.1

The reassembly function, on receiving an IUP EISM with the First Segment Indicator of the EISM Segmentation Information parameter indicating that it contains a first segment, shall enter the ”Receiving Segmented Message” state, from the “Idle” state, and accumulate message segments pertaining to the same circuit.

6.3.6.3.2

A timer TO-20 shall be started, or cancelled then started, upon receipt of a non-zero Number of Segments Remaining field value in the EISM Segmentation Information parameter. Timer TO-20 shall be cancelled upon receipt of the last segment of the IUP EISM sequence.

6.3.6.3.3

The reassembly function, on receiving and processing the last message segment of an IUP EISM sequence (indicated by the Number of Segments Remaining field value being set to zero) shall

then deliver the reassembled IUP EIM for further processing as though the IUP EIM had been transferred without the need for IUP segmentation. Timer TO-20 shall be cancelled and the reassembly function shall return to the “Idle” state. The relationship between the IUP EISM segments and the reassembled IUP EIM is shown in figure 6.8 below.

6.3.6.3.4

Upon expiry of timer TO-20, the reassembly function shall discard the partially reassembled IUP EIM so far received and enter the “Idle” state. The call shall then continue.

6.3.6.3.5

The reassembly function in the “Idle” state, on receiving an IUP EISM with the First Segment Indicator of the EISM Segmentation Information parameter not indicating that it contains a first segment or with the Number of Segments Remaining field set to zero or with an ISUP Message Segment parameter which is not 53 octets in length (see Section 2), shall discard the IUP EISM. The reassembly function shall remain in the “Idle” state and Timer TO-20 shall not be started. The call shall then continue.

6.3.6.3.6

If the reassembly function in the “Receiving Segment Message” state, receives an IUP EISM containing an EISM Segmentation Information parameter with the Number of Segments Remaining field set to a value that is not decremented by one from the value received in the immediately preceding IUP EISM, it shall:

a) discard that IUP EISM;

b) discard the partially reassembled IUP EIM constructed from previously received IUP EISM(s);

c) cancel Timer TO-20; and

d) return to the “Idle” state.

The call shall then continue.

6.3.6.3.7

If, whilst in the “Receiving Segmented Message” state, the reassembly function receives a further first segment IUP EISM with indication pertaining to the same circuit, it shall:

a) discard the partially reassembled IUP EIM constructed from previously received IUP EISM(s);

b) cancel then start Timer TO-20;

c) assume receipt of a new IUP EISM sequence which shall be reassembled for further processing if all remaining segments are received in the correct order.

The call shall then continue.

6.3.6.3.8

If, whilst in the “Receiving Segmented Message” state, the reassembly function receives an IUP message other than IUP EISM pertaining to the same circuit, it shall:

a) discard the partially reassembled IUP EIM constructed from previously received IUP EISM(s);

b) cancel Timer TO-20; and

c) return to the “Idle” state.

The non-segmented message shall be processed and the call shall continue.

6.3.6.3.9

If, whilst in the “Receiving Segmented Message” state the reassembly function receives an IUP EISM (except the last in the IUP EISM sequence) which does not include an ISUP Message Segment parameter with a length of 53 octets (see Section 2) then it shall:

a) discard that IUP EISM;

b) discard the partially reassembled IUP EIM constructed from previously received IUP EISM(s);

c) cancel Timer TO-20; and

d) return to the “Idle” state.

The call shall continue.

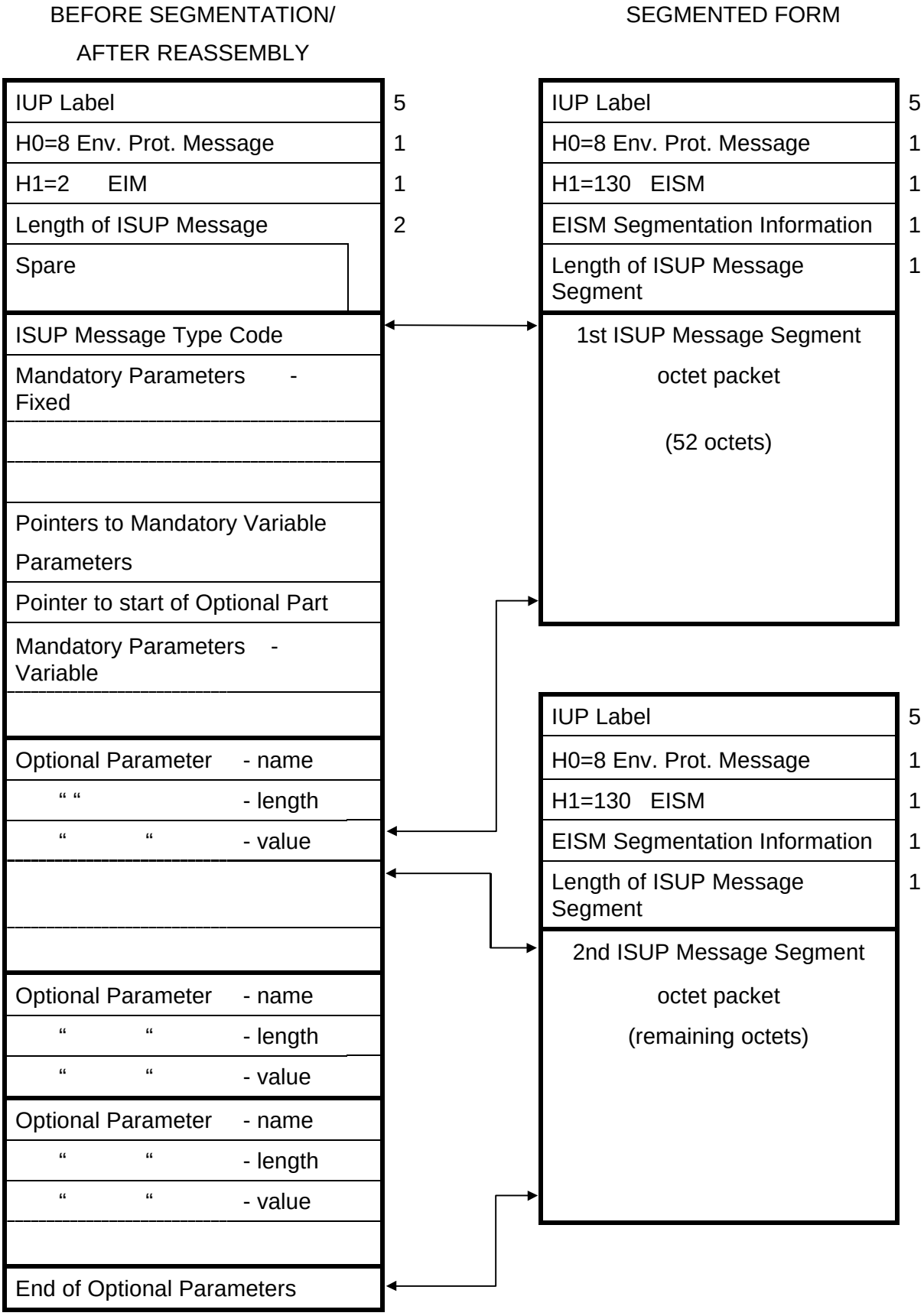

FIGURE 6.8 **Relationship between IUP EIM and IUP EISM segments**

END OF PNO-ISC/INFO/004 SECTION 6

7 VOICE MESSAGING

7.0 Scope

This section specifies Interconnect User Part (IUP) signalling procedures between a network hosting the Voice Messaging Service (VMS) customer and a network hosting the VMS platform. The following capabilities are provided:

- Message deposit;
- Message retrieval from either the VMS customer's telephone line or from other access lines;
- Customer control of VMS platform options from either the VMS customer's telephone line or from other access lines;
- VMS platform control of the VMS customer's dial tone cadence and ring-tone-no-reply time-out value.

7.1 Service Overview

This document specifies the operation of a Voice Messaging Service (VMS) between:

a) a network hosting the VMS customer; and

b) network hosting the VMS platform

via an IUP interconnect.

A VMS customer is a user who has a service such that calls to that user are diverted to a VMS platform when either the user's line is busy or the calls are not answered.

A VMS platform provides features such as message storage and message retrieval for the VMS customer.

The VMS platform can initiate a call to the VMS customer which shall change the normal dial tone given to the VMS customer, to indicate that there are one or more messages waiting to be retrieved, or, to restore the normal dial tone once messages have been retrieved.

The VMS platform can initiate a call to the VMS customer to change the value of the ring-tone-no-reply time-out. This will determine the time that the VMS customer's line is alerted during an incoming call before it is diverted to the VMS platform.

Message deposit occurs when a call to the VMS customer is diverted to the VMS platform. This may be used, for example, to allow the caller to record a voice message for the VMS customer.

Customer remote access occurs when a VMS customer calls their own number and the call is diverted to the VMS platform, allowing the VMS customer to convert their call from message deposit to customer remote access to perform message retrieval, e.g. by entering into an in-band dialogue with the VMS platform.

Local message retrieval and customer control options occur when a VMS customer enters an access code from their own telephone line to access the VMS platform, allowing the VMS customer to retrieve messages and/or change the ring-tone-no-reply timeout via an in-band dialogue.

A VMS notification call occurs when the VMS platform calls the VMS customer's number to provide an in-band indication that a voice message has been stored. If this call from the VMS platform encounters busy or ring-tone-no-reply timeout at the VMS customer, the call is diverted back to the VMS platform. The VMS notification call has no signalling features which distinguish it from a telephony call (as described in /1/) and is not described in this document.

Message exchanges in addition to those described in this document may occur e.g. other ACI/SASUI messages. Their use will be as determined by network and supplementary services and shall conform to Section 4 of /1/.

7.2 Formats And Codes

The Voice Messaging Service described in this section uses the Enveloped DPNSS Protocol as specified in Section 3.

The format and coding of the IUP messages shall conform to Section 2 of /1/ and Section 2.

The format and coding of the DPNSS messages shall comply with /4/.

The DPNSS Protocol and common procedures are described in /4/.

7.3 Signalling Procedures

The following description is given in terms of Message Sequence Diagrams (MSDs) and accompanying text showing:

a) a message-deposit and customer remote access for message retrieval / customer-control options call;

b) a local message-retrieval and customer control options call; and

c) control of dial tone or ring-tone-no-reply timeout.

Alternative actions that may occur within the protocol are described in text.

7.3.1 Message deposit and customer remote access for message retrieval / customer-control options call

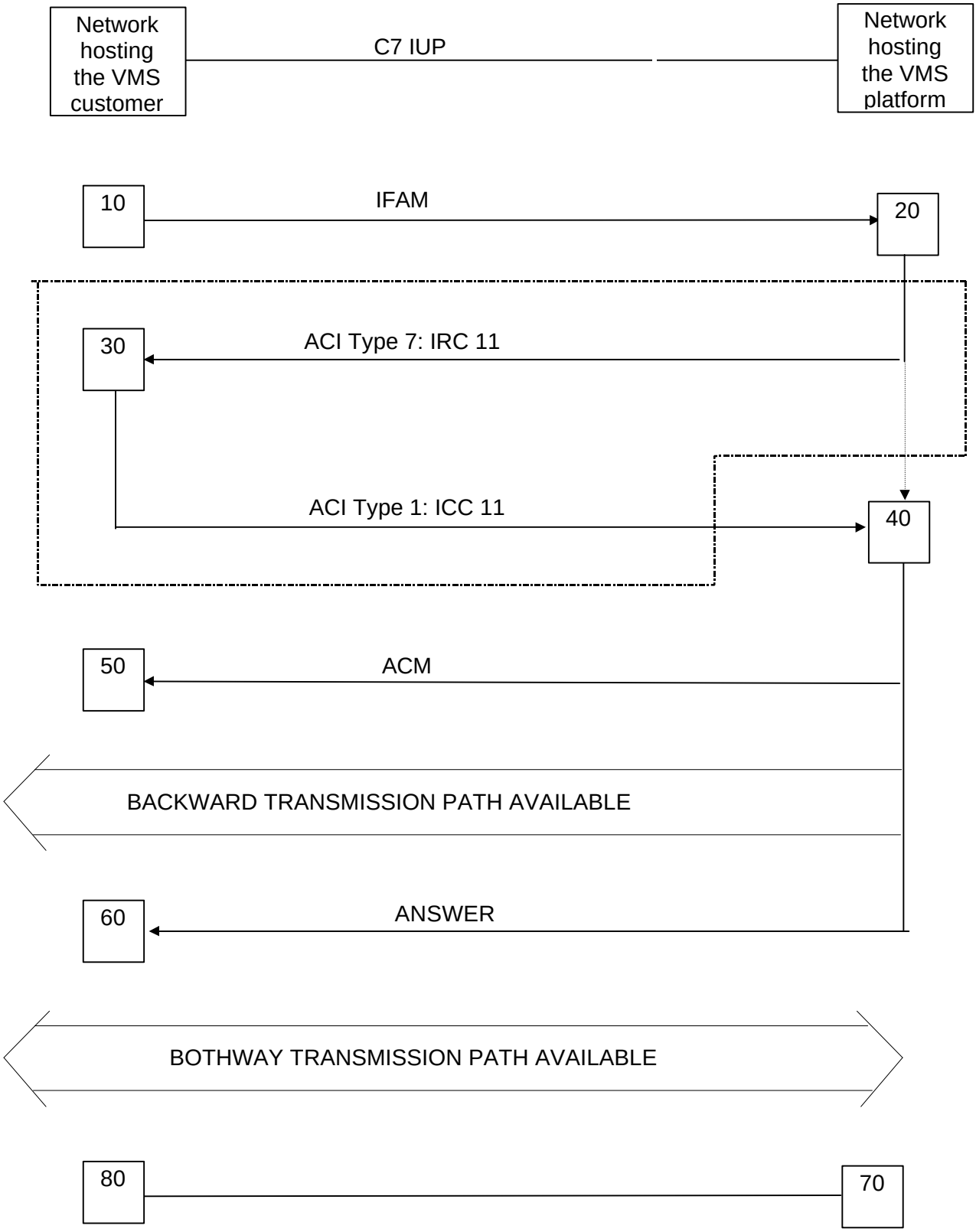

FIGURE 7.1

To enable the message deposit and customer remote access for message retrieval / customer-control options call to be connected to the VMS platform over the interconnect route, the network hosting the VMS customer shall initiate the establishment of a Bearer Connection in accordance with Section 4 of /1/, with the following specific additions:

7.3.1.10

The network hosting the VMS customer shall send an IFAM to the network hosting the VMS platform. The contents of the IFAM shall be as described in Section 4 of /1/ with the exceptions shown in 7.3.1.10.1 and 7.3.1.10.2.

Subject to bilateral agreement, a network hosting a VMS customer shall implement either:

i) both the methods shown in 7.3.1.10.1 and 7.3.1.10.2 on a customer by customer and call by call basis; or

ii) solely the method shown in 7.3.1.10.2.

7.3.1.10.1

If the network hosting the VMS customer requires the identity of the VMS customer to be determined by use of the ACI mechanism to request the LDLI, then:

a) the SHP shall be set to value 0 or value 1;

b) the CTI shall be set to value 1;

c) the 1st, 2nd and 3rd Address Signals shall be set to values 9, 4, 4 respectively;

d) the 4th, 5th and 6th Address Signals shall be set to identify the VMS platform that the call is to be routed to;

e) the 7th Address Signal shall be set to value 0;

f) the 8th Address Signal shall be set to value 1 or value 2 to indicate that the user's line was busy or that the call was not answered respectively;

g) the 9th to 18th Address Signals shall be present (Note);

h) continue as described in 7.3.1.30.

NOTE - Due to historical reasons these Address Signals shall be present and may be discarded.

7.3.1.10.2

If the network hosting the VMS customer requires the identity of the VMS customer to be determined from digits contained within the IFAM Called Address, then:

a) the SHP shall be set to value 0 or value 1;

b) the CTI shall be set to value 0 or value 1 (Note);

c) the 1st, 2nd and 3rd Address Signals shall be set to values 9, 4, 4 respectively;

d) the 4th, 5th and 6th Address Signals shall be set to identify the VMS platform that the call is to be routed to;

e) the 7th Address Signal shall be set to value 1;

f) the 8th Address Signal shall be set to value 1 or value 2 to indicate that the user's line was busy or that the call was not answered respectively;

g) Address Signals subsequent to the 8th Address Signal shall be present and shall contain the full national number of the VMS customer without the National Access Code ‘0’;

h) continue as described in 7.3.1.50.

NOTE - Due to current implementations, in the case where the CTI has been set to value 1, an ACI Type 7 IRC 11 request from the network hosting the VMS platform may receive an ACI Type 1 ICC 11 response from the network hosting the VMS customer which is not the identify of the VMS customer.

7.3.1.20

The network hosting the VMS platform is in the idle state awaiting an IFAM from the network hosting the VMS customer.

7.3.1.20.1

On receipt of an IFAM which includes the contents shown in 7.3.1.10.1, then the network hosting the VMS platform shall:

a) send an ACI Type 7 IRC 11 to the network hosting the VMS customer; and

b) continue as described in 7.3.1.40.1.

7.3.1.20.2

On receipt of an IFAM which includes the contents shown in 7.3.1.10.2, then the network hosting the VMS platform shall continue as described in 7.3.1.40.2.

7.3.1.30

On receipt of an ACI Type 7 IRC 11 from the network hosting the VMS platform, the network hosting the VMS customer shall:

a) send an ACI Type 1 ICC 11 to the network hosting the VMS platform;

b) continue as described in 7.3.1.50.

In the case where the 7th Address Signal of the Called Address in the IFAM was set to value 0, the ACI Type 7 ICC11 shall contain the identity of the VMS customer.

7.3.1.40

On receipt of an ACI Type 1 ICC 11, or an IFAM as described in 7.3.1.10.2, from the network hosting the VMS customer, the network hosting the VMS platform shall continue as described in 7.3.1.40.1 or 7.3.1.40.2 respectively.

7.3.1.40.1

On receipt of an ACI Type 1 ICC 11 the network hosting the VMS platform shall determine the identity of the VMS customer from the information contained within the ACI and decide whether the call is to proceed.

7.3.1.40.1.1

If the call is to proceed, the network hosting the VMS platform shall:

a) send an ACM to the network hosting the VMS customer, the contents of which shall be as described in Section 4 of /1/;

b) establish a backward transmission path; and

c) send an ANSWER to the network hosting the VMS customer, the contents of which shall be as described in Section 4 of /1/ and the type of answer shall be chargeable.

7.3.1.40.1.2

If the call is not to proceed, the network hosting the VMS platform shall continue as described in either 7.3.1.40.1.2.1 or 7.3.1.40.1.2.2.

7.3.1.40.1.2.1

The network hosting the VMS platform shall:

a) send a CNA containing an appropriate reason to the network hosting the VMS customer; and

b) continue to clear in accordance with Section 4 of /1/.

7.3.1.40.1.2.2

The network hosting the VMS platform shall:

a) send an ACM to the network hosting the VMS customer;

b) establish a backward transmission path;

c) send a RELEASE with reason [32] Service Termination to the network hosting the VMS customer; and

d) continue to clear in accordance with Section 4 of /1/.

7.3.1.40.2

On receipt of an IFAM as described in 3.1.10.2 the network hosting the VMS platform shall determine the identity of the VMS customer from digits contained within the IFAM Called Address and decide whether the call is to proceed.

7.3.1.40.2.1

If the call is to proceed, the network hosting the VMS platform shall:

a) send an ACM to the network hosting the VMS customer, the contents of which shall be as described in Section 4 of /1/;

b) establish a backward transmission path; and

c) send an ANSWER to the network hosting the VMS customer, the contents of which shall be as described in Section 4 of /1/ and the type of answer shall be chargeable.

7.3.1.40.2.2

If the call is not to proceed, the network hosting the VMS platform shall continue as described in either 7.3.1.40.2.2.1 or 7.3.1.40.2.2.2.

7.3.1.40.2.2.1

The network hosting the VMS platform shall:

a) send a CNA containing an appropriate reason to the network hosting the VMS customer; and

b) continue to clear in accordance with Section 4 of /1/.

7.3.1.40.2.2.2

The network hosting the VMS platform shall:

a) send an ACM to the network hosting the VMS customer;

b) establish a backward transmission path;

c) send a RELEASE with reason [32] Service Termination to the network hosting the VMS customer; and

d) continue to clear in accordance with Section 4 of /1/.

7.3.1.50

The network hosting the VMS customer is expecting an ACM from the network hosting the VMS platform.

On receipt of an ACM the network hosting the VMS customer shall:

a) process the ACM in accordance with Section 4 of /1/; and

b) continue as described in 7.3.1.60

7.3.1.60

The network hosting the VMS customer is expecting an ANSWER from the network hosting the VMS platform.

On receipt of an ANSWER the network hosting the VMS customer shall process the ANSWER in accordance with Section 4 of /1/.

The call shall continue as described in Section 4 of /1/ until call-clearing is initiated and shall proceed as described in 7.3.1.70 or 7.3.1.80 as appropriate.

7.3.1.70

Call-clearing initiated by the network hosting the VMS platform.

The network hosting the VMS platform shall send a RELEASE containing a REASON of [32] Service Termination to the network hosting the VMS customer. Cleardown shall continue in accordance with Section 4 of /1/.

7.3.1.80

Call-clearing initiated by the network hosting the VMS customer.

The network hosting the VMS customer shall send a RELEASE with REASON in accordance with Section 4 of /1/.

Call cleardown shall continue in accordance with Section 4 of /1/.

7.3.2 Local message-retrieval and customer control options call

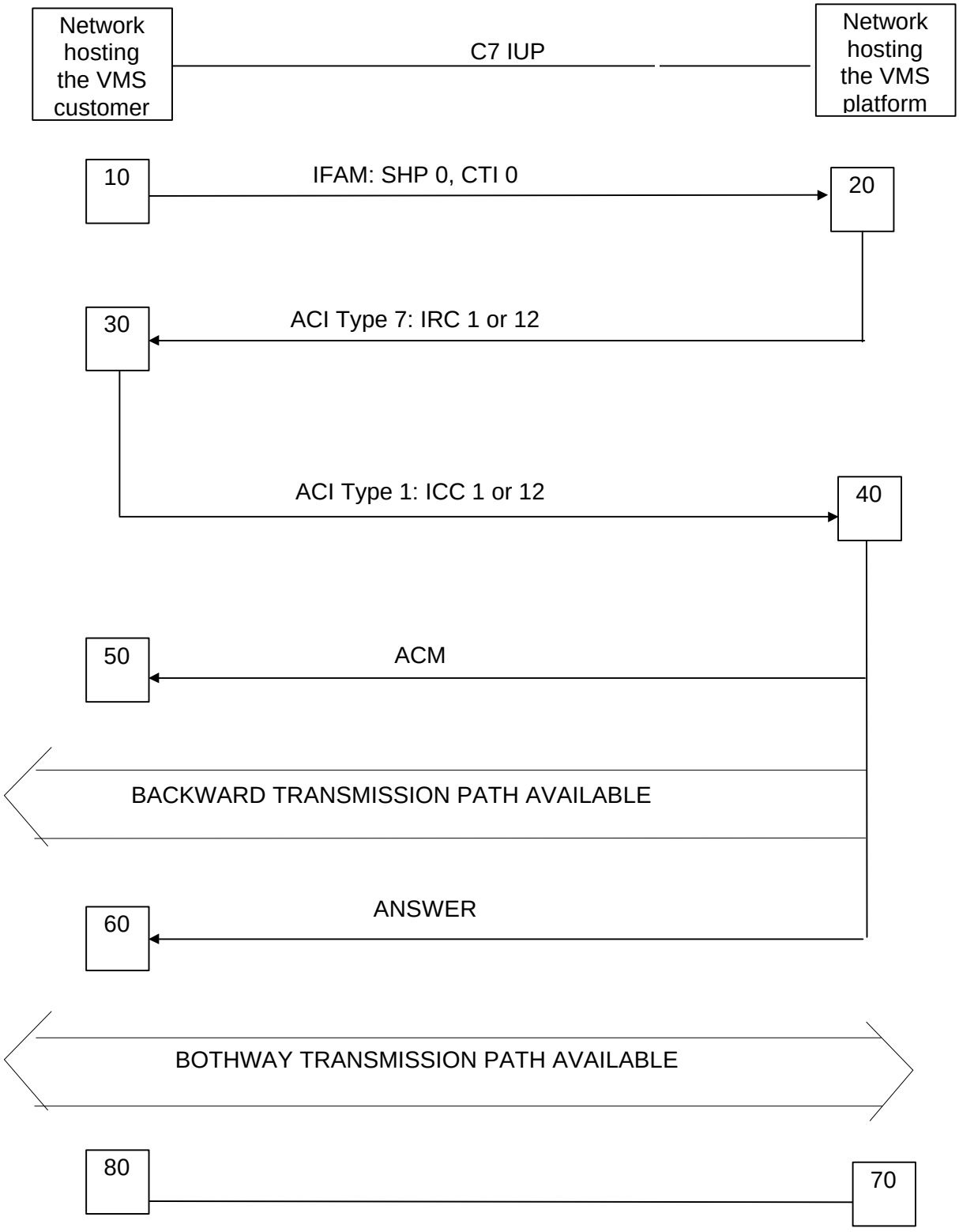

FIGURE 7.2

To enable a local message-retrieval and customer control options call from the VMS customer to be connected to the VMS platform over the interconnect route, the network hosting the VMS customer shall initiate the establishment of a Bearer Connection in accordance with Section 4 of /1/, with the following specific additions:

7.3.2.10

The network hosting the VMS customer shall send an IFAM to the network hosting the VMS platform. The contents of the IFAM shall be as described in Section 4 of /1/ with the following exceptions:

a) the 1st, 2nd and 3rd Address Signals shall be set to values 9, 4, 4 respectively;

b) the 4th, 5th and 6th Address Signals shall be set to identify the VMS platform that the call is to be routed to;

c) the 7th Address Signal shall be set to value 0;

d) the 8th Address Signal shall be set to value 3.

The network hosting the VMS customer shall then continue as described in 7.3.2.30.

7.3.2.20

The network hosting the VMS platform is in the idle state awaiting an IFAM from the network hosting the VMS customer.

On receipt of an IFAM which includes the contents shown in 7.3.2.10, the network hosting the VMS platform shall continue as described in 7.3.2.20.1 or 7.3.2.20.2 as appropriate.

7.3.2.20.1

If the Calling Line Identity Blocking indicator is set to value 0, then the network hosting the VMS platform shall:

a) send an ACI Type 7 IRC 1 to the network hosting the VMS customer; and

b) continue as described in 7.3.2.40.

7.3.2.20.2

If the Calling Line Identity Blocking indicator is set to value 1, then the network hosting the VMS platform shall:

a) send an ACI Type 7 IRC 1 or 12 - Network option - to the network hosting the VMS customer; and

b) continue as described in 7.3.2.40.

7.3.2.30

The network hosting the VMS customer is expecting an ACI Type 7 IRC 1 or 12 from the network hosting the VMS platform.

On receipt of an ACI Type 7 IRC 1 or 12 the network hosting the VMS customer shall:

a) respond to the ACI request in accordance with Section 4 of /1/; and

b) continue as described in 7.3.2.50.

7.3.2.40

The network hosting the VMS platform is expecting an ACI Type 1 ICC 1 or 12 from the network hosting the VMS customer.

On receipt of an ACI Type 1 ICC 1 or 12 the network hosting the VMS platform may determine the identity of the VMS customer from the contents of the ACI Type 1 and decide whether the call is to proceed.

7.3.2.40.1

If the call is to proceed, the network hosting the VMS platform shall:

a) send an ACM to the network hosting the VMS customer, the contents of which shall be as described in Section 4 of /1/;

b) establish a backward transmission path; and

c) send an ANSWER to the network hosting the VMS customer, the contents of which shall be as described in Section 4 of /1/ and the type of answer shall be chargeable.

7.3.2.40.2

If the call is not to proceed, the network hosting the VMS platform shall continue as described in either 7.3.2.40.2.1 or 7.3.1.40.2.2.

7.3.2.40.2.1

The network hosting the VMS platform shall:

a) send a CNA containing an appropriate reason to the network hosting the VMS customer; and

b) continue to clear in accordance with Section 4 of /1/.

7.3.2.40.2.2

The network hosting the VMS platform shall:

a) send an ACM to the network hosting the VMS customer;

b) establish a backward transmission path;

c) send a RELEASE with reason [32] Service Termination to the network hosting the VMS customer; and

d) continue to clear in accordance with Section 4 of /1/.

7.3.2.50

The network hosting the VMS customer is expecting an ACM from the network hosting the VMS platform.

On receipt of an ACM the network hosting the VMS customer shall:

a) process the ACM in accordance with Section 4 of /1/; and

b) continue as described in 7.3.2.60

7.3.2.60

The network hosting the VMS customer is expecting an ANSWER from the network hosting the VMS platform.

On receipt of an ANSWER the network hosting the VMS customer shall process the ANSWER in accordance with Section 4 of /1/.

NOTE - Communication between the VMS customer and the VMS platform can now proceed in-band.

The call shall continue as described in Section 4 of /1/ until call-clearing is initiated and shall proceed as described in 7.3.2.70 or 7.3.2.80 as appropriate.

7.3.2.70

Call-clearing initiated by the network hosting the VMS platform.

The network hosting the VMS platform shall send a RELEASE containing a REASON of [32] Service Termination to the network hosting the VMS customer. Cleardown shall continue in accordance with Section 4 of /1/.

7.3.2.80

Call-clearing initiated by the network hosting the VMS customer.

The network hosting the VMS customer shall send a RELEASE with REASON in accordance with Section 4 of /1/.

Call cleardown shall continue in accordance with Section 4 of /1/.

7.3.3 Control of dial tone or ring-tone-no-reply timeout

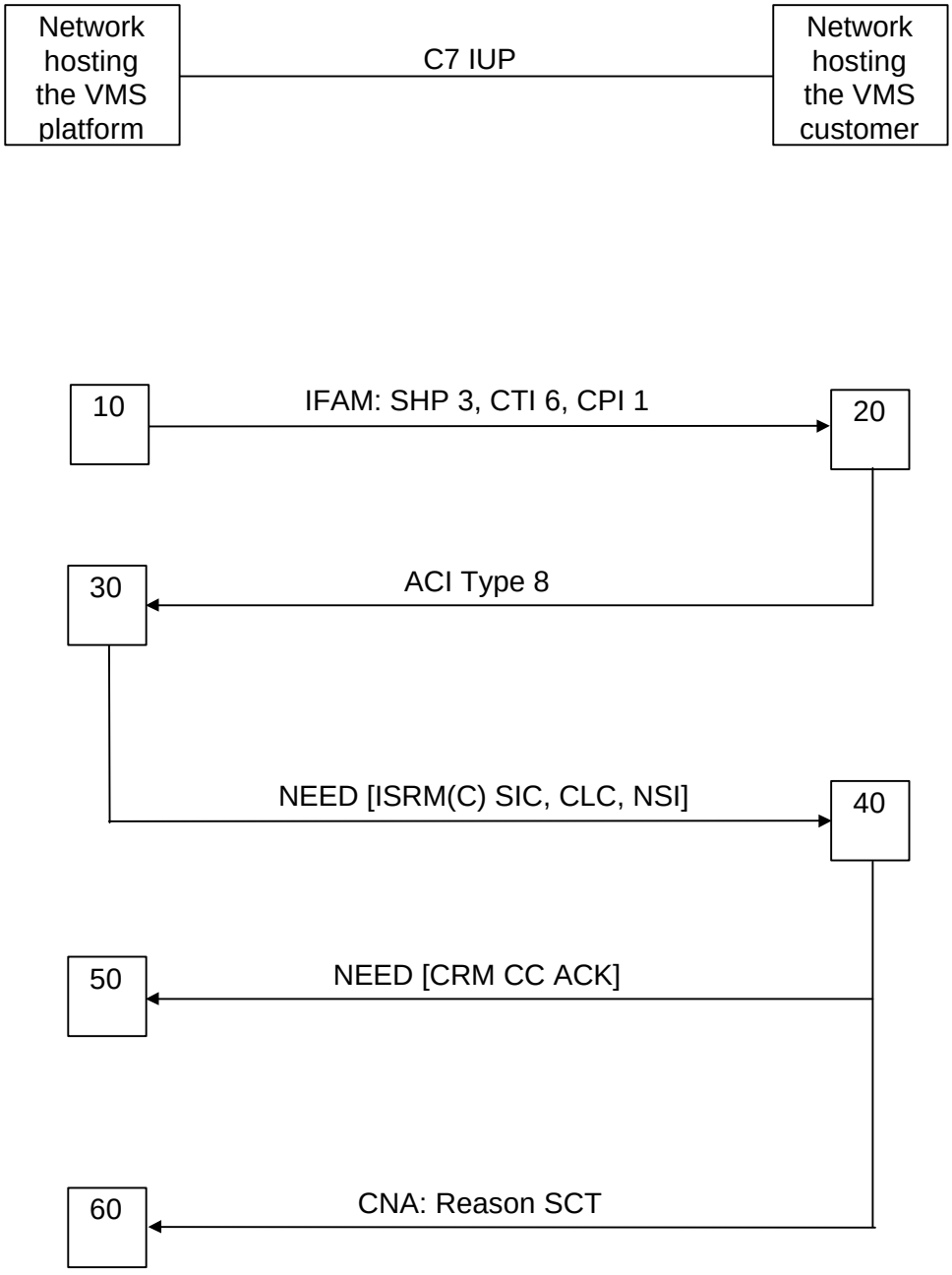

FIGURE 7.3

To enable the VMS platform to be connected over the interconnect route to the network service logic supporting the VMS customer, for the control of dial tone or ring-tone-no-reply timeout, the network hosting the VMS platform shall initiate the establishment of a Bearer Connection in accordance with Section 3, with the following specific additions.

7.3.3.10

The network hosting the VMS platform shall send an IFAM to the network hosting the VMS customer. The contents of the IFAM shall be as described in Section 4 of /1/ with the following exceptions:

a) the SHP shall be set to value 3;

b) the CTI shall be set to value 6;

c) the CPI shall be set to value 1; and

d) the Called Address shall contain the full national number of the VMS customer, which includes the National Access Code ‘0’.

The network hosting the VMS platform shall then continue as described in 7.3.3.30.

7.3.3.20

The network hosting the VMS customer is in the idle state awaiting an IFAM from the network hosting the VMS platform.

On receipt of an IFAM which includes the contents shown in 7.3.3.10, then the network hosting the VMS customer shall send an ACI Type 8 to the network hosting the VMS platform. The ACI shall contain:

a) ICC set to value 10;

b) IRC set to value 0;

c) Message Indicators as shown in Table 1; and

d) Called Line Identity (optional).

NEED Indicator set to value 1 (speech with 64kbit/s A-law)
Interworking Indicator set to value 0
Interconnect Specific Information set to a value as appropriate (default = 0)
Called Party Category (as applicable)

NOTE - No address digits are present in the ISRM(C)

Table 7.1
Message Indicators

The network hosting the VMS customer shall then continue as described in 7.3.3.40

7.3.3.30

The network hosting the VMS platform is expecting an ACI Type 8 from the network hosting the VMS customer.

On receipt of an ACI Type 8, which includes the information shown in 7.3.3.20, the network hosting the VMS platform shall send a NEED to the network hosting the VMS customer. The NEED shall contain:

a) CQ set to value 2; and

b) Nodal End-to End Data containing a DPNSS ISRM(C) shown in Table 7.2.

SIC set to TELE
CLC set to NET
NSI string constructed as *58B*LA*P1*P2# (the value of the P1 and P2 parameters shall be as shown in Table 7.3)

Table 7.2
DPNSS ISRM(C)

The setting of the NSI string P1 and P2 parameters in a call to control the dial tone shall be as follows: a) Parameter P1 shall be set to value 1; and b) Parameter P2 shall be set to either: i. value 1, to apply standard dial tone; or ii. value 2, to apply dial tone variant.
The setting of the NSI string P1 and P2 parameters in a call to control the ring-tone-no-reply timeout shall be as follows: a) Parameter P1 shall be set to value 2; and b) Parameter P2 shall be set to value 00, 12, 21 or 30 to indicate the length of the ring-tone-no-reply timeout in seconds.

Table 7.3
P1 and P2 parameters

The network hosting the VMS platform shall then continue as described in 7.3.3.50.

7.3.3.40

The network hosting the VMS customer is expecting a NEED from the network hosting the VMS platform.

On receipt of a NEED which includes the information shown in 7.3.3.30, then the network hosting the VMS customer shall determine if the customer is registered for the VMS.

7.3.3.40.1

If the customer is registered for the VMS, then the network hosting the VMS customer shall:

a) apply the control conditions specified in the P1 and P2 parameters to the VMS customer identified in the Called Address of the IFAM;

b) send a NEED which includes a CRM containing a Clearing Cause of ACK to the network hosting the VMS platform; and

c) send a CNA containing a REASON of [48] Subscriber Call Termination to the network hosting the VMS platform; and

d) continue to clear in accordance with Section 4 of /1/.

NOTE - A NEED which includes a CRM containing a Clearing Cause of ACK will also be sent to the network hosting the VMS platform if the requested conditions already exist.

7.3.3.40.2

If it is determined that the customer is not registered for the VMS, then the network hosting the VMS customer shall:

a) send a NEED which includes a CRM containing a Clearing cause of FNR or SU to the network hosting the VMS platform;

b) send a CNA containing a REASON of [0] Number Unobtainable or [3] Service Unavailable respectively to the network hosting the VMS platform; and

c) continue to clear in accordance with Section 4 of /1/.

7.3.3.40.3

If the customer number contained within the IFAM Called Address is a spare number, then the network hosting the VMS customer shall:

a) send a NEED which includes a CRM containing a Clearing Cause of NU to the network hosting the VMS platform;

b) send a CNA containing a REASON of (for example) [0] Number Unobtainable to the network hosting the VMS platform; and

c) continue to clear in accordance with Section 4 of /1/.

7.3.3.40.4

If the network hosting the VMS customer is unable to comply with the request indicated by the information in the received NEED due to short-term congestion, then the network hosting the VMS customer shall:

a) send a NEED which includes a CRM containing a Clearing Cause of STU to the network hosting the VMS platform;

b) send a CNA containing a REASON of (for example) [0] Number Unobtainable to the network hosting the VMS platform; and

c) continue to clear in accordance with Section 4 of /1/.

7.3.3.50

The network hosting the VMS platform is expecting a NEED from the network hosting the VMS customer.

7.3.3.50.1

Receipt of a NEED which includes a CRM containing a Clearing Cause of ACK by the network hosting the VMS platform shall be recognised as an indication that the change has been implemented and the network hosting the VMS platform shall continue as described in 7.3.3.60.

NOTE - Receipt of a NEED which includes a CRM containing a Clearing Cause of ACK is the only indication that the change has been implemented.

7.3.3.50.2

Receipt of a NEED which includes a CRM containing a Clearing Cause of FNR or SU by the network hosting the VMS platform shall be recognised as an indication that the change has not been implemented due to the customer not being registered for the VMS and the network hosting the VMS platform shall continue as described in 7.3.3.60.

7.3.3.50.3

Receipt of a NEED which includes a CRM containing a Clearing Cause of STU by the network hosting the VMS platform shall be recognised as an indication that implementation of the change has been prevented by short-term congestion and the network hosting the VMS platform shall continue as described in 7.3.3.60.

7.3.3.50.4

Receipt of a NEED which includes a CRM containing a Clearing Cause of NT shall be recognised as an indication that implementation of the change has been prevented due to a fault within the network hosting the VMS customer and the network hosting the VMS platform shall continue as described in 7.3.3.60.

7.3.3.50.5

Receipt of a NEED which includes a CRM containing a Clearing Cause of NU shall be recognised as an indication that implementation of the change has been prevented due to the number in the IFAM indicating a spare destination and the network hosting the VMS platform shall continue as described in 7.3.3.60.

7.3.3.50.6

Receipt of a NEED which includes a CRM containing any other Clearing Cause shall be recognised as an indication that implementation of the change has been prevented due to another reason and the network hosting the VMS platform shall continue as described in 7.3.3.60.

7.3.3.60

The network hosting the VMS platform is expecting a CNA from the network hosting the VMS customer.

On receipt of a CNA the network hosting the VMS platform shall continue to clear in accordance with Section 4 of /1/.

END OF PNO-ISC/INFO/004 SECTION 7

8. DELETED

END OF PNO-ISC/INFO/004 SECTION 8

END OF PNO-ISC/INFO/004