



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Q.1600

(09/97)

SERIES Q: SWITCHING AND SIGNALLING

Intelligent Network

**Signalling system No. 7 – Interaction between
ISUP and INAP**

ITU-T Recommendation Q.1600

(Previously CCITT Recommendation)

ITU-T Q-SERIES RECOMMENDATIONS
SWITCHING AND SIGNALLING

SIGNALLING IN THE INTERNATIONAL MANUAL SERVICE	Q.1–Q.3
INTERNATIONAL AUTOMATIC AND SEMI-AUTOMATIC WORKING	Q.4–Q.59
FUNCTIONS AND INFORMATION FLOWS FOR SERVICES IN THE ISDN	Q.60–Q.99
CLAUSES APPLICABLE TO ITU-T STANDARD SYSTEMS	Q.100–Q.119
SPECIFICATIONS OF SIGNALLING SYSTEMS No. 4 AND No. 5	Q.120–Q.249
SPECIFICATIONS OF SIGNALLING SYSTEM No. 6	Q.250–Q.309
SPECIFICATIONS OF SIGNALLING SYSTEM R1	Q.310–Q.399
SPECIFICATIONS OF SIGNALLING SYSTEM R2	Q.400–Q.499
DIGITAL EXCHANGES	Q.500–Q.599
INTERWORKING OF SIGNALLING SYSTEMS	Q.600–Q.699
SPECIFICATIONS OF SIGNALLING SYSTEM No. 7	Q.700–Q.849
DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1	Q.850–Q.999
PUBLIC LAND MOBILE NETWORK	Q.1000–Q.1099
INTERWORKING WITH SATELLITE MOBILE SYSTEMS	Q.1100–Q.1199
INTELLIGENT NETWORK	Q.1200–Q.1999
BROADBAND ISDN	Q.2000–Q.2999

For further details, please refer to ITU-T List of Recommendations.

ITU-T RECOMMENDATION Q.1600

SIGNALLING SYSTEM No. 7 – INTERACTION BETWEEN ISUP AND INAP

Summary

The Recommendation specifies procedures in order to provide interaction between ISUP and INAP CS-1, i.e. to support IN services in an ISDN environment. This Recommendation only considers the case where the SSP is located at a transit level. As a consequence this could lead to limitations for ISDN supplementary services.

The interaction between other signalling systems and INAP can be found by consulting the relevant interworking Recommendation to the ISUP in combination with the ISUP/INAP interaction Recommendation.

Source

ITU-T Recommendation Q.1600 was prepared by ITU-T Study Group 11 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 12th of September 1997.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

INTELLECTUAL PROPERTY RIGHTS

The ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. The ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, the ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

© ITU 1998

All rights reserved. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the ITU.

CONTENTS

	Page
1	Scope 1
2	References 1
3	Terms and definitions 2
4	Abbreviations 2
5	Description 3
6	Operational requirements 8
7	Coding requirements 8
7.1	Messages 8
7.2	Parameters 8
7.2.1	Call diversion treatment indicators parameter 8
7.2.2	Called IN number parameter 9
7.2.3	Call offering treatment indicators parameter 9
7.2.4	Charged party identification parameter (for national use) 10
7.2.5	Conference treatment indicators parameter 10
7.2.6	Correlation id parameter 11
7.2.7	Display information parameter 12
7.2.8	SCF id parameter 12
7.2.9	UID action indicators parameter 13
7.2.10	UID capability indicators parameter 14
8	State definitions 14
9	Signalling procedures 15
9.1	IN basic call 15
9.1.1	Successful call set-up 15
9.1.2	Normal call release 19
9.1.3	Suspend, resume 19
9.1.4	ReleaseCall operation 19
9.1.5	Transfer of the called IN number 19
9.1.6	Abnormal conditions 20
9.2	IN call with SCP request to collect further digits 20
9.3	Detection Point processing 20
9.3.1	General 20
9.3.2	Actions to be performed in case of DPs armed in the request mode 21
9.4	Set-up of an IN call to destination B 22
9.4.1	Successful call set-up 23

	Page	
9.4.2	Timer T _{UID} expiry.....	25
9.4.3	Abnormal conditions.....	25
9.4.4	Impact on supplementary services	25
9.5	User interactive dialogue (in-band).....	26
9.5.1	SSP supports requested IP capabilities	26
9.5.2	Assist method – procedure in the initiating SSP.....	29
9.5.3	Hand-off method – Procedure in the initiating SSP.....	31
9.5.4	Assist/Hand-off method – Procedure in the assisting SSP.....	31
9.6	Call gapping	31
9.7	Service filtering	32
9.7.1	Impact on supplementary services	32
9.8	SCP initiated call.....	32
9.8.1	Successful call set-up.....	33
9.9	Actions to be performed in local exchanges.....	34
9.9.1	Actions in the originating local exchange.....	34
9.9.2	Actions in the destination local exchange.....	34
9.10	Actions in an intermediate exchange.....	35
9.10.1	In an intermediate exchange not starting timer T ₉	35
9.10.2	In an intermediate exchange starting timer T ₉	35
9.11	Actions in international gateway exchanges	35
10	Interaction with other networks.....	35
11	Interaction between IN basic call and ISDN supplementary services.....	35
11.1	Call diversion	37
11.1.1	Actions in the service switching point	37
11.1.2	Actions in the destination local exchange.....	37
11.2	Calling line identification presentation/restriction.....	38
11.2.1	Actions in the service switching point	38
11.3	Completion of calls to busy subscriber	38
11.3.1	Actions in the service switching point	38
11.4	Conference.....	38
11.4.1	Actions in the originating or destination local exchange.....	38
11.5	Connected line identification presentation/restriction.....	38
11.5.1	Actions in the service switching point	38
11.6	Explicit call transfer	39
11.6.1	Actions in the service switching point	39
11.7	Malicious call identification.....	39

	Page
11.7.1 Actions in the service switching point	39
11.7.2 Actions in the destination local exchange	39
11.8 Three party	39
11.8.1 Actions in the originating or destination local exchange	39
12 Interactions between IN services	39
13 Parameter values (timers)	40
Annex A – Signalling flows	41
Appendix I – Coding of the compatibility information for the new parameters	47
Appendix II – Contents of the INAP serviceInteractionIndicators	48
Appendix III – Limitations for ISUP basic call procedures and supplementary services for different types of IN calls	49

Recommendation Q.1600

SIGNALLING SYSTEM No. 7 – INTERACTION BETWEEN ISUP AND INAP

(Geneva, 1997)

1 Scope

This Recommendation specifies the interaction between the ISUP and INAP.

The interaction between other signalling systems and INAP can be found by consulting the relevant interworking Recommendation to the ISUP in combination with the ISUP/INAP interaction Recommendation.

This Recommendation specifies procedures in order to provide interaction between ISUP and INAP, i.e. to support IN services in an ISDN environment. In addition, new protocol elements for the ISUP are defined in this Recommendation in order to satisfy IN specific requirements. Based on the protocol inherent compatibility mechanism, a stepwise upgrade of the ISUP functionality is possible. However, the new function is only available for an IN call, if supported in any of the affected exchanges.

This Recommendation only considers the case where the SSP is located at a transit level. As a consequence, this could lead to limitations for ISDN supplementary services.

This Recommendation does not specify enhancements to the DSS 1 protocol, which may be needed due to additional ISUP functions or IN requirements, respectively.

The main subjects of this interaction specification are the following:

- description of specific call control functions for IN calls;
- impacts on the ISUP basic call and the ISDN supplementary services for IN calls;
- enhancement of the ISUP protocol due to IN specific requirements.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- [1] CCITT Recommendation I.130 (1988), *Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN.*
- [2] ITU-T Recommendation I.112 (1993), *Vocabulary of terms for ISDNs.*
- [3] ITU-T Recommendation I.210 (1993), *Principles of telecommunication services supported by an ISDN and the means to describe them.*
- [4] ITU-T Recommendation Q.1214 (1995), *Distributed functional plane for intelligent network CS-1.*
- [5] ITU-T Recommendation Q.1218 (1995), *Interface Recommendation for intelligent network CS-1.*

- [6] ITU-T Recommendation Q.1290 (1995), *Glossary of terms used in the definition of intelligent networks.*
- [7] ITU-T Recommendation Q.731 (1993), *Stage 3 description for number identification supplementary services using Signalling System No. 7.*
- [8] ITU-T Recommendation Q.732 (1996), *Stage 3 description for call offering supplementary services using Signalling System No. 7 – Call diversion services.*
- [9] ITU-T Recommendation Q.763 (1997), *Signalling System No. 7 ISDN User Part formats and codes.*
- [10] ITU-T Recommendation Q.764 (1997), *Signalling System No. 7 ISDN User Part signalling procedures.*
- [11] ITU-T Recommendation Q.931 (1993), *ISDN user-network interface layer 3 specification for basic call control.*

3 Terms and definitions

For the purpose of this Recommendation, the following definitions apply:

- 3.1 Integrated Services Digital Network (ISDN):** see Recommendation I.112 [2].
- 3.2 Service; telecommunication service:** see Recommendation I.112 [2].
- 3.3 Supplementary service:** see Recommendation I.210 [3].
- 3.4 Call Control Function (CCF):** see 3.3/Q.1214 [4].
- 3.5 Service Control Function (SCF):** see 3.3/Q.1214 [4].
- 3.6 Service Switching Function (SSF):** see 3.3/Q.1214 [4].
- 3.7 Specialized Resource Function (SRF):** see 3.3/Q.1214 [4].

4 Abbreviations

This Recommendation uses the following abbreviations.

ACM	Address Complete Message (ISUP)
ANM	Answer Message (ISUP)
CON	Connect Message (ISUP)
CPG	Call Progress Message (ISUP)
DLE	Destination Local Exchange
DP	Detection Point
DSS 1	Digital Subscriber Signalling System No. 1
EDP-N	Event Detection Point – Notification
EDP-R	Event Detection Point – Request
FAR	Facility Request Message (ISUP)
FOT	Forward Transfer Message (ISUP)
FRJ	Facility Reject (ISUP)
IAM	Initial Address Message (ISUP)
IDR	Identification Request Message (ISUP)

IE	Information Element
IN	Intelligent Network
INAP	Intelligent Network Application Protocol
IP	Intelligent Peripheral
IRS	Identification Response Message (ISUP)
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
OLE	Originating Local Exchange
REL	Release Message (ISUP)
RES	Resume Message (ISUP)
RLC	Release Complete Message (ISUP)
SCP	Service Control Point
SGM	Segmentation Message (ISUP)
SS	Signalling System
SSP	Service Switching Point
SUS	Suspend Message (ISUP)
TMR	Transmission Medium Requirement
UID	User Interactive Dialogue

5 Description

Recommendation Q.1214 [4] provides a distributed functional plane architecture for IN Capability Set 1 (CS-1). Interactions between the following Functional Entities (FEs) are relevant for this Recommendation:

- Call Control Function (CCF);
- Service Switching Function (SSF);
- Service Control Function (SCF);
- Specialized Resource Function (SRF).

The functional entities can be implemented in one or more network elements, called physical entities. The Service Control Point (SCP) is the physical entity in the intelligent network that implements the SCF. The CCF and SSF are realized in the Service Switching Point (SSP) and the SRF is realized in the Intelligent Peripheral (IP).

The SSF contains the capabilities beyond those that are needed for basic call control. Consequently, this Recommendation concentrates on the actions that are performed in the CCF.

Figure 1 illustrates in a simplified manner a signalling configuration which is to be considered in this Recommendation. In the configuration it is assumed that SRF support is not needed. The network signalling system used for call set-up is the ITU-T ISUP [10]. The interface between SSF and SCF is the ITU-T INAP [5].

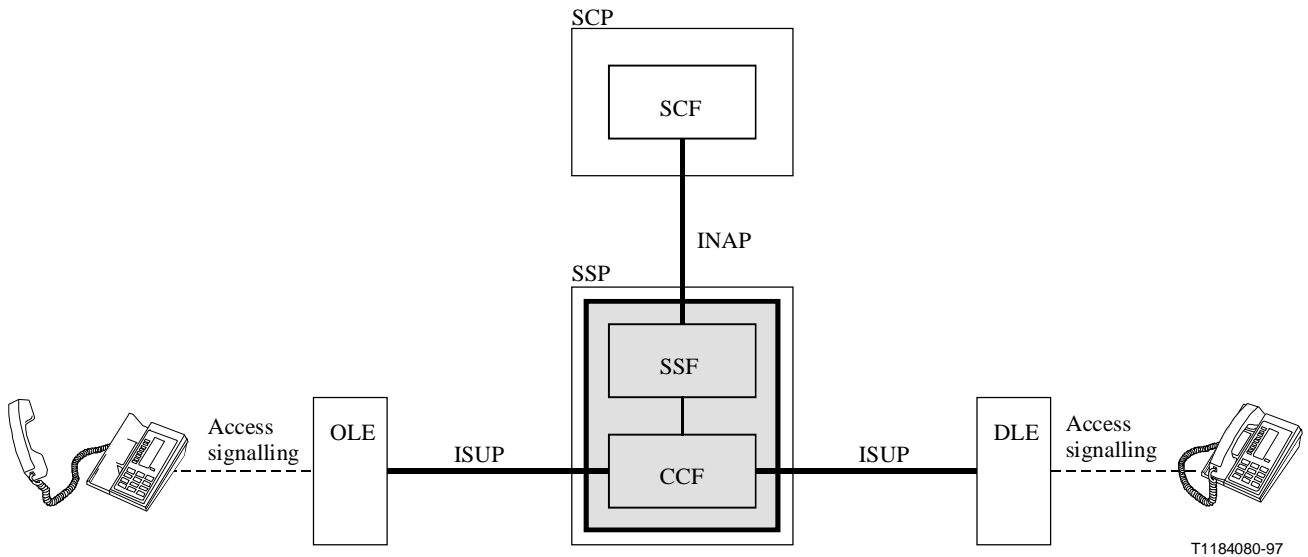


Figure 1/Q.1600 – Signalling configuration for an IN call without SRF support

The interaction between ISUP and INAP takes place in the CCF and SSF. The following main subjects have to be considered in this area:

- detection point processing in the CCF;
- receipt of INAP operations in the SSF.

Detection point processing

The provision of Detection Points (DPs) is required in the ISUP basic call handling in order to access IN functionality and to allow IN service logic influence the processing of IN calls. The Detection Points (DPs) indicate Points in Calls (PICs) at which transfer of control can occur. If a DP is recognized an operation from the SSF to the SCF will be sent. Thus the communication towards the SCP is performed. The DPs defined in [4] are listed in Table 1.

The column "Support" indicates whether the DP is supported with the ITU-T ISUP [10].

Table 1/Q.1600 – List of detection points

Detection points for the originating side		Support	Detection points for the terminating side		Support
DP1	Origination_Attempt_Authorized	No impact on ISUP	DP12	Terminating_Attempt_Authorized	No impact on ISUP
DP2	Collected_Information	Yes			
DP3	Analysed_Information	Yes			
DP4	Route_Select_Failure	Yes			
DP5	O_Called_Party_Busy	Yes	DP13	T_Called_Party_Busy	Yes
DP6	O_No_Answer	Yes	DP14	T_No_Answer	Yes
DP7	O_Answer	Yes	DP15	T_Answer	Yes
DP8	O_Mid_Call	No	DP16	T_Mid_Call	No
DP9	O_Disconnect	Yes	DP17	T_Disconnect	Yes
DP10	O_Abandon	Yes	DP18	T_Abandon	Yes

Receipt of INAP operations

Table 2 lists the INAP operations with direction SCF-SSF and indicates which operation will influence the ISUP call handling.

Table 2/Q.1600 – INAP operations (direction: SCF-SSF)

Operation	Influence on ISUP call handling	Reference
ActivateServiceFiltering	Yes	Subclause 9.7 (Service filtering)
ActivityTest	No	
AnalyseInformation	For further study (Note)	
ApplyCharging	No	
CallGap	Yes	Subclause 9.6 (Call gapping)
CallInformationRequest	No	
CancelStatusReportRequest	For further study (Note)	
CollectInformation	Yes	Subclause 9.2 (IN call with SCP request to collect further digits)
Connect	Yes	Subclause 9.1.1.1.1 (Connect operation)
Continue	Yes	Subclause 9.1.1.1.2 (Continue operation)
ConnectToResource	Yes	Subclause 9.5.1 (SSP supports requested IP capabilities)
DisconnectForwardConnection	Yes	Subclause 9.5.2 (Assist method – procedure in the initiating SSP)
EstablishTemporaryConnection	Yes	Subclause 9.5.2 (Assist method – procedure in the initiating SSP)
FurnishChargingInformation	No	
HoldCallInNetwork	For further study (Note)	
InitiateCallAttempt	Yes	Subclause 9.8 (SCP initiated call)
ReleaseCall	Yes	Subclause 9.1.4 (ReleaseCall operation)
RequestCurrentStatusReport	For further study (Note)	
RequestEveryStatusChangeReport	For further study (Note)	
RequestFirstStatusMatchReport	For further study (Note)	
RequestNotificationChargingEvent	Yes	The treatment is national-network specific and not described further within this Recommendation.
RequestReportBCSMEvent	Yes	Subclause 9.3 (Detection Point processing)
ResetTimer	No	

Table 2/Q.1600 – INAP operations (direction: SCF-SSF) (concluded)

Operation	Influence on ISUP call handling	Reference
SelectFacility	For further study (Note)	
SelectRoute	For further study (Note)	
SendChargingInformation	Yes	Subclause 9.1.1.2 (SendChargingInformation operation)
NOTE – More information can be found in references [4] and [5].		

Support of the SCF-SRF relationship

In the ITU-T INAP standard a number of scenarios for support of the SCF, SSF, and SRF functional entities as physical entities have been identified. The scenarios differ in the method to support the SCF-SRF relationship and are explained in Table 3 and Figures 2 to 6 of the ITU-T INAP [5]. Table 3 summarizes these configurations and indicates whether the scenario can be supported with the current ISDN User Part Version [10] and the extensions made in this Recommendation.

Table 3/Q.1600 – Scenarios for support of the SCF-SRF relationship

Type of signalling system between SSF/CCF and SRF	Method to support SCF-SRF relationship	
	Direct TCAP link	Relay via SSP
ISUP	Supported (see Figure 3)	Not supported (Note 1) NOTE 1 – Transport of additional information in ISUP would be needed.
DSS 1 (Note 2) or implementation dependent NOTE 2 – Extensions to the DSS 1 protocol may be required, but this is outside the scope of this Recommendation.	Supported (Note 3) NOTE 3 – The scenarios can be supported from the viewpoint of this Recommendation. No additional information and no additional procedures are required than for the ISUP as signalling system between SSF/CCF and SRF.	

The following figures provide in a simplified manner some signalling configurations for IN calls needing an IP for user interaction. The figures are only included to ease the understanding and should not be seen as an exhaustive representation of the various physical scenarios.

In Figure 2 the IP is either integrated into the SSP, or directly attached to the SSP, that is interacting with the SCP. Whether the SRF-SCF INAP operations are relayed via the SSP or are directly exchanged between IP and SCP is not relevant for this Recommendation. However, in the figure only the scenario is shown, where a relay via SSP is applied. The procedure for this scenario is described in 9.5.1 (SSP supports requested IP capabilities) and a typical arrow diagram is given in Figure A.3.

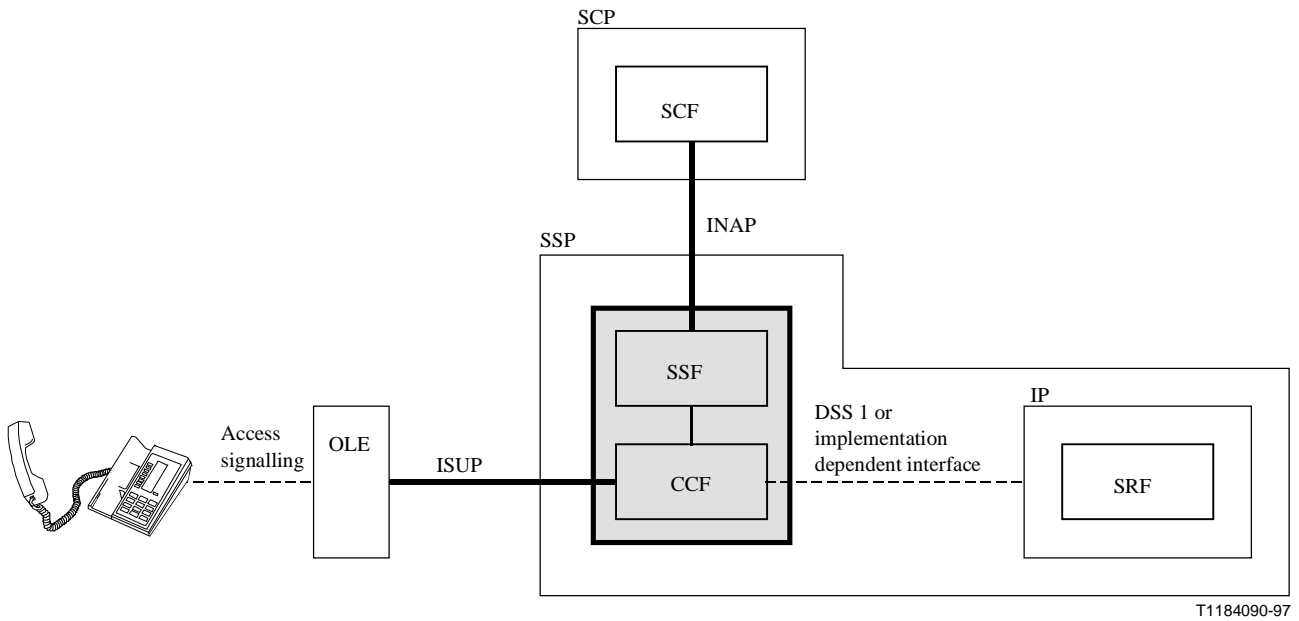


Figure 2/Q.1600 – Connection to integrated or external IP with SSP relay of IP operations

In Figure 3 the IP is connected to the SSP via ISUP. The SRF-SCF INAP operations are directly exchanged between IP and SCP.

On completion of the user interaction, control is returned to the initiating SSP. This procedure is called the "Assist" method. The procedure for this scenario is described in 9.5.2 (Assist method – procedure in the initiating SSP). The procedure between the SCP and the IP has no impact on the ISUP protocol and is outside the scope of this Recommendation. More information can be found in [5]. A typical arrow diagram is given in Figure A.5.

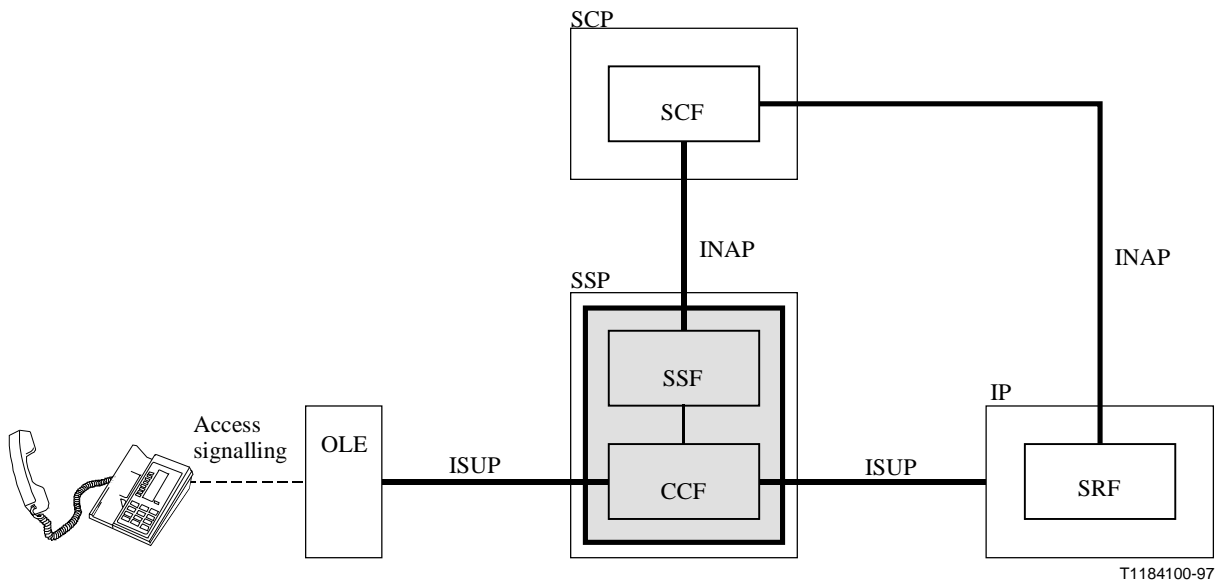


Figure 3/Q.1600 – External IP connected via ISUP; direct TCAP link between SRF and SCF ("Assist" method)

NOTE – This method may be used in some networks. However, problems are identified regarding network integrity aspects and standardized solutions of the ISUP signalling for this type of interface.

In Figure 4 the IP is integrated into another SSP (assisting SSP), than the one that is interacting with the SCP (initiating SSP). Whether the SRF-SCF INAP operations are relayed via the SSP or are directly exchanged between IP and SCP is not relevant for this Recommendation. However, in the figure only the scenario is shown, where a relay via SSP is applied.

On completion of the user interaction, control is returned to the initiating SSP. This procedure is called the "Assist" method. The procedure for this scenario is described in 9.5.2 (Assist method – procedure in the initiating SSP) and 9.5.4 (Assist/Hand-off method – procedure in the assisting SSP). Typical arrow diagrams are given in Figures A.5 and A.6.

If the control of the call is retained in the assisting SSP, the "Hand-off" method is applied. This scenario is not explicitly shown in a figure. The procedure for this scenario is described in 9.5.3 (Hand-off method – procedure in the initiating SSP) and a typical arrow diagram is given in Figure A.7.

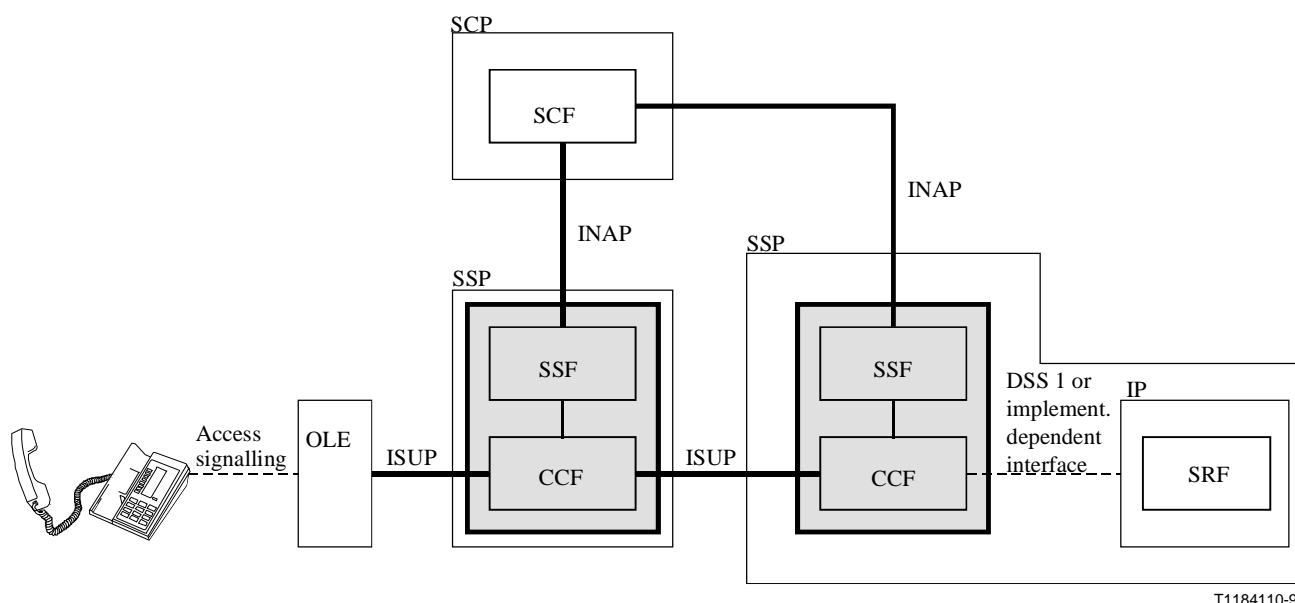


Figure 4/Q.1600 – IP attached to an assisting SSP ("Assist" method)

6 Operational requirements

Not applicable.

7 Coding requirements

7.1 Messages

None.

7.2 Parameters

7.2.1 Call diversion treatment indicators parameter

7.2.1.1 Definition

7.2.1.1.1 Call to be diverted indicator

Information sent in forward direction indicating whether diverting of the call shall be accepted.

7.2.1.2 Coding

The format of the call diversion treatment indicators parameter field is shown in Figure 5.

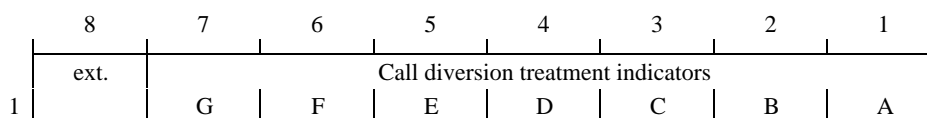


Figure 5/Q.1600 – Call diversion treatment parameter field

The following codes are used in the call diversion treatment indicators parameter field.

- a) *Extension indicator (ext.)*
 - 0 octet continues through the next octet
 - 1 last octet
- b) *Call diversion treatment indicators*
 - bit
 - B A Call to be diverted indicator
 - 0 0 no indication
 - 0 1 call diversion allowed
 - 1 0 call diversion not allowed
 - 1 1 spare
 - bits C-G: spare

The code of the call diversion treatment indicators parameter is 0110 1110.

7.2.2 Called IN number parameter

7.2.2.1 Definition

7.2.2.1.1 Called IN number

Information sent in the IAM indicating the number which was received in the SSP as called party number in IAM and SAM messages.

7.2.2.2 Coding

The format and coding the called IN number parameter corresponds to the original called number parameter defined in 3.39/Q.763 [9].

The code of the called IN number parameter is 0110 1111.

7.2.3 Call offering treatment indicators parameter

7.2.3.1 Definition

7.2.3.1.1 Call to be offered indicator

Information sent in the forward direction indicating whether the call shall be offered if the access is marked with call offering restrictions.

7.2.3.2 Coding

The format of the call offering treatment indicators parameter field is shown in Figure 6.

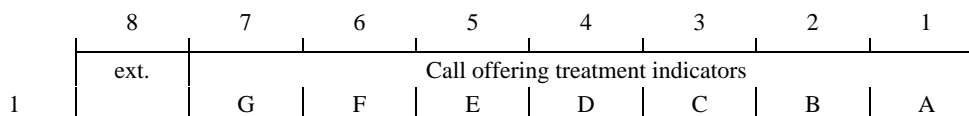


Figure 6/Q.1600 – Call offering treatment indicators parameter field

The following codes are used in the call offering treatment indicators parameter field.

- a) *Extension indicator (ext.)*
 - 0 octet continues through the next octet
 - 1 last octet
- b) *Call offering treatment indicators*
 - bit
 - B A Call to be offered indicator
 - 0 0 no indication
 - 0 1 call offering not allowed
 - 1 0 call offering allowed
 - 1 1 spare
 - bits C-G: spare

The code of the call offering treatment indicators parameter is 0111 0000.

7.2.4 Charged party identification parameter (for national use)

7.2.4.1 Definition

7.2.4.1.1 Charged party identification

Information sent in the IRS message transferring the identification of the charged party, e.g. the account number.

7.2.4.2 Coding

The format of the charged party identification parameter field is national network specific. The format is similar to the format of the corresponding INAP parameter in the FurnishChargingInformation operation (see [5]). The minimum and maximum parameter length is determined by the INAP parameter length increased by 2.

The code of the charged party identification parameter is 0111 0001.

7.2.5 Conference treatment indicators parameter

7.2.5.1 Definition

7.2.5.1.1 Conference acceptance indicator

Information sent in both directions indicating whether a request for a multi-party call, i.e. conference or three-party call, shall be accepted.

7.2.5.2 Coding

The format of the conference treatment indicators parameter field is shown in Figure 7.

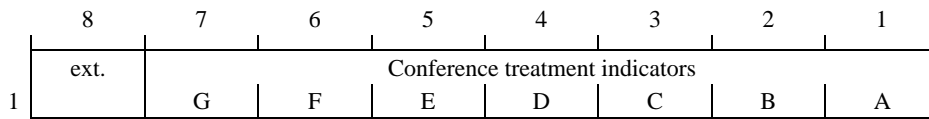


Figure 7/Q.1600 – Conference treatment indicators parameter field

The following codes are used in the conference treatment indicators parameter field.

- a) *Extension indicator (ext.)*
 - 0 octet continues through the next octet
 - 1 last octet
- b) *Conference treatment indicators*
bits
 - B A Conference acceptance indicator (Note)
 - 0 0 no indication
 - 0 1 accept conference request
 - 1 0 reject conference request
 - 1 1 spare

NOTE – Applicable to the Conference and Three-Party supplementary services.

bits C-G: spare

The code of the conference treatment indicators parameter is 0111 0010.

7.2.6 Correlation id parameter

7.2.6.1 Definition

7.2.6.1.1 Correlation id

Information sent in the IAM used by the SCF for correlation with a previous connection (see 2.1.3/Q.1218 [5] Definition of Common Data Types).

7.2.6.2 Coding

The format of the correlation id parameter field is shown in Figure 8.

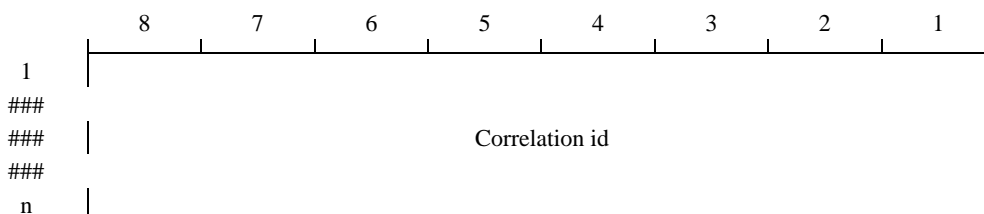


Figure 8/Q.1600 – Correlation id parameter field

The correlation id is coded as described in 2.1.3/Q.1218 [5], Definition of Common Data Types. The minimum and maximum parameter length is determined by the INAP parameter length (see 2.1.3/Q.1218 [5], Definition of range constants) increased by 2.

The code of the correlation id parameter is 0110 0101.

7.2.7 Display information parameter

7.2.7.1 Definition

7.2.7.1.1 Display information

Information sent in either direction indicating a text string to be sent to the user.

7.2.7.2 Coding

The format of the display information parameter field is shown in Figure 9.

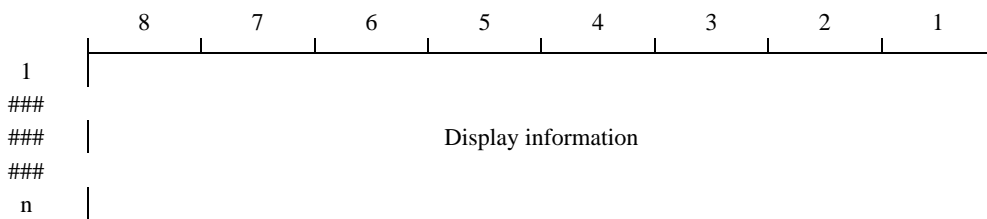


Figure 9/Q.1600 – Display information parameter field

The display information is coded as described in 4.5.16/Q.931 [11]. The minimum and maximum parameter length is determined by the DSS 1 parameter length increased by 2.

The code of the display information parameter is 0111 0011.

7.2.8 SCF id parameter

7.2.8.1 Definition

7.2.8.1.1 SCF id

Information sent in the IAM indicating the SCF identifier (see 2.1.3/Q.1218 [5], Definition of Common Data Types).

7.2.8.2 Coding

The format of the SCF id parameter field is shown in Figure 10.

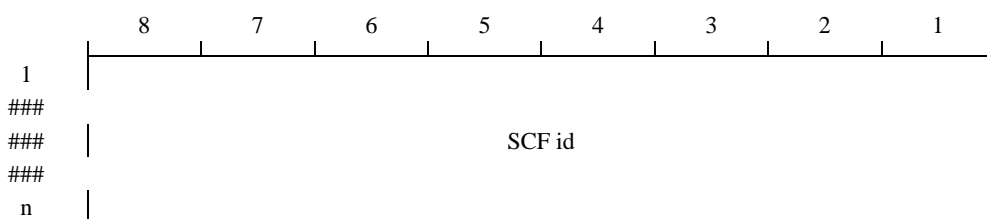


Figure 10/Q.1600 – SCF id parameter field

The SCF id is coded as described in 2.1.3/Q.1218 [5], Definition of Common Data Types. The minimum and maximum parameter length is determined by the INAP parameter length (see 2.1.3/Q.1218 [5], Definition of range constants) increased by 2.

The code of the SCF id parameter is 0110 0110.

7.2.9 UID action indicators parameter

7.2.9.1 Definition

7.2.9.1.1 Through-connection instruction indicator

Information sent in backward direction to instruct preceding exchanges to through connect the transmission path in both directions.

7.2.9.1.2 T9 timer instruction indicator

Information sent in backward direction to instruct preceding exchanges to stop or not to start, respectively, the timer T9.

7.2.9.2 Coding

The format of the UID action indicators parameter field is shown in Figure 11.

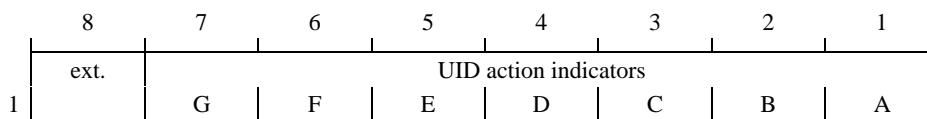


Figure 11/Q.1600 – UID action indicators parameter field

The following codes are used in the UID action indicators parameter field.

- a) *Extension indicator (ext.)*
 - 0 octet continues through the next octet
 - 1 last octet
- b) *UID action indicators*
 - bit
 - A through-connection instruction indicator
 - 0 no indication
 - 1 through connect in both directions
 - bit
 - B T9 timer instruction indicator
 - 0 no indication
 - 1 stop or do not start T9
 - bits C-G: spare

The code of the UID action indicators parameter is 0111 0100.

7.2.10 UID capability indicators parameter

7.2.10.1 Definition

7.2.10.1.1 Through-connection indicator

Information sent in forward direction to inform succeeding exchanges that on request through-connection of the transmission path in both directions is possible.

7.2.10.1.2 T9 timer indicator

Information sent in forward direction to inform succeeding exchanges that on request stopping of timer T9 is possible.

7.2.10.2 Coding

The format of the UID capability indicators parameter field is shown in Figure 12.

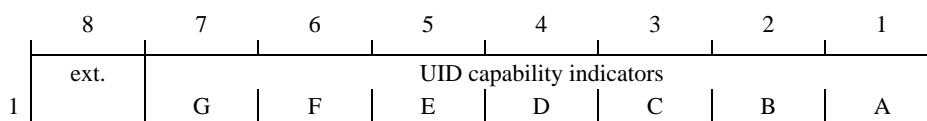


Figure 12/Q.1600 – UID capability indicators parameter field

The following codes are used in the UID capability indicators parameter field.

a) *Extension indicator (ext.)*

- 0 octet continues through the next octet
- 1 last octet

b) *UID capability indicators*

bit

- A Through-connection indicator
 - 0 no indication
 - 1 through-connection modification possible

bit

- B T9 timer indicator
 - 0 no indication
 - 1 stopping of timer possible

bits C-G: spare

The code of the UID capability indicators parameter is 0111 0101.

8 State definitions

No specific state definitions are required.

9 Signalling procedures

9.1 IN basic call

For this Recommendation an "IN basic call" is considered as:

- a normal ISUP basic call invoking IN functionality in the SSP;
- that no DPs are armed dynamically in the request mode;
- that no user interaction is needed.

For an IN basic call, the normal ISUP basic call procedures are applicable as described in [10] for national intermediate exchanges unless indicated otherwise in the subclauses below.

9.1.1 Successful call set-up

9.1.1.1 Forward address signalling

If an IAM is received in a SSP and the call is recognized as IN call, i.e. by detecting a DP as TDP-R [see 9.3 (Detection Point processing)], an InitialDP operation or a DP specific operation for a TDP-R is sent from the SSF to the SCF. If the IAM had been segmented the remainder of the call set-up information is awaited [see 9.1.1.7 (Simple segmentation)]. The mapping of parameters is shown in Table 4.

Table 4/Q.1600 – Mapping of parameters from IAM to InitialDP

ISUP message IAM (Note 1)	INAP operation InitialDP
Called party number	calledPartyNumber
Calling party number	callingPartyNumber
Calling party subaddress IE contained in access transport	callingPartySubaddress
Calling party's category	callingPartysCategory
Location number	locationNumber
Original called number	originalCalledPartyID
User teleservice information (1st priority) High layer compatibility IE contained in access transport (2nd priority) (Note 2)	highLayerCompatibility
Generic number "additional calling party number"	additionalCallingPartyNumber
Forward call indicators	forwardCallIndicators
User service information prime (1st priority) User service information (2nd priority)	bearerCapability
Redirecting number	redirectingPartyID
Redirection information	redirectionInformation
NOTE 1 – Optional parameters may be absent, i.e. they are only mapped, if these parameters are available at the DP.	
NOTE 2 – If two high layer compatibility information elements are contained in the access transport parameter, then the second information element, carrying the preferred HLC, is mapped to the INAP highLayerCompatibility parameter.	

9.1.1.1.1 Connect operation

On receipt of a Connect operation from the SCP the actions described in 2.1.1.2/Q.764 [10] will be performed. For routing of the call the called party number is derived from the destinationRoutingAddress (see Table 5: Mapping of parameters from Connect to IAM).

If no cutAndPaste parameter is received in the Connect operation an ACM message is sent to the preceding exchange. The ACM shall contain the corresponding ISUP parameters, if a serviceInteractionIndicators parameter was received in the Connect operation (see below). Other optional parameter will not be sent. The backward call indicators parameter in the ACM is encoded as follows:

Charge indicator:	see 9.1.1.2 (SendChargingInformation operation).
Called party's status indicator:	00 (no indication).
Called party's category:	00 (no indication).
End-to-end method indicator:	00 (no end-to-end method available).
Interworking indicator:	0 (no interworking encountered).
End-to-end information indicator:	0 (no end-to-end information available).
ISDN User Part indicator:	1 (ISDN User Part used all the way).
Holding indicator:	national matter.
ISDN access indicator:	1 (terminating access ISDN).
Echo Control device indicator:	see 2.7.2.1.2/Q.764 [10].
SCCP method indicator:	00 (no indication).

NOTE – As a network operator option the sending of the ACM message may be postponed to a later stage during call set-up.

Table 5 illustrates the mapping of parameters received in the Connect operation to parameters sent in the IAM message to the succeeding exchange. Parameters which were received in the IAM and are not replaced by parameters of the Connect operation are treated according to the normal procedures.

On sending of the IAM the awaiting address complete timer T7 is started. If timer T7 expires the call is released in both directions and an appropriate indication is returned to the calling subscriber.

Table 5/Q.1600 – Mapping of parameters from Connect to IAM

INAP operation Connect (Note 1)	ISUP message IAM
destinationRoutingAddress (Note 2)	Called party number (Note 3)
callingPartyNumber	(Note 4)
serviceInteractionIndicators	see 9.1.1.1.3 (Mapping of the INAP serviceInteractionIndicators)
originalCalledPartyID	Original called number
callingPartysCategory	Calling party's category
redirectingPartyID	Redirecting number
redirectionInformation	Redirection information
isdnAccessRelated Information	Not mapped (Note 5)
<p>NOTE 1 – Optional parameters may be absent, i.e. they are only mapped, if received.</p> <p>NOTE 2 – The Connect operation sent by the SCF to the SSF may contain a list of up to three destination routing addresses, following processing by the SSF only one of these addresses will be passed to ISUP.</p> <p>NOTE 3 – The treatment of the called party number in the case the cutAndPaste parameter is present in the Connect operation is described in 3.3.16/Q.1218 [5].</p> <p>NOTE 4 – The mapping of this parameter must not compromise the existing services supported by ISUP (MCID, CLIP, etc.).</p> <p>NOTE 5 – The InitialDP operation does not transfer all the information received in the IAM's access transport parameter from the originating local exchange, e.g. the low layer compatibility, called party subaddress are missing. Consequently modification of, for example, the high layer compatibility information in the SCF could cause end-to-end service incompatibility. Therefore the isdnAccessRelatedInformation parameter does neither replace the ISUP access transport nor the information elements contained in this parameter.</p>	

9.1.1.1.2 Continue operation

On receipt of a Continue operation from the SCP call processing is resumed and the call set-up will be performed as described in 2.1.2.2/Q.764 [10].

9.1.1.1.3 Mapping of the INAP serviceInteractionIndicators

The INAP serviceInteractionIndicators parameter contains information that is:

- only of local significance, i.e. to be treated in the SSP;
- relevant for the originating local exchange; or
- relevant for the destination local exchange.

Table 6 describes the mapping from the INAP to the ISUP with regard to the serviceInteractionIndicators.

Furthermore for the IN basic call the following rules shall apply:

- a) If in the INAP serviceInteractionIndicators parameter a value has been received indicated as default in Table 6, then this value is mapped to the value "no indication" in the appropriate ISUP parameter.
- b) An ISUP parameter is only included in a message, if the parameter content is unequal zero.

Table 6/Q.1600 – Mapping of the INAP serviceInteractionIndicators

INAP serviceInteractionIndicators	ISUP parameter in	
	ACM/CPG/CON/ANM	IAM
Call to be diverted indicator – call diversion allowed (default) – call diversion not allowed	---	Call diversion treatment indicators parameter Call to be diverted indicator – no indication – call diversion allowed – call diversion not allowed
Call to be offered indicator – call offering not allowed (default) – call offering allowed	---	Call offering treatment indicators parameter Call to be offered indicator – no indication – call offering not allowed – call offering allowed
Conference at DLE accept. ind. – accept conference request (default) – reject conference request	---	Conference treatment indicators parameter Conference acceptance ind. – no indication – accept conference request – reject conference request
Conference at OLE accept. ind. – accept conference request (default) – reject conference request	Conference treatment indicators parameter Conference acceptance ind. – no indication – accept conference request – reject conference request	---

If multiple IN services are invoked for a call, then the serviceInteractionIndicators received via the INAP may conflict with the received ISUP parameters transferring service interaction information. In this case the ISUP parameters to be sent in forward and backward direction shall transfer the most stringent condition, i.e. the non-default value (refer to Appendix II).

9.1.1.1.3.1 Interworking with an ISUP not supporting the parameters

No specific action is required. If the parameters cannot be transferred to the local exchanges, the behaviour in these exchanges for IN calls is the same as for normal ISDN calls, i.e. no IN controlled treatment of features is possible.

9.1.1.2 SendChargingInformation operation

The treatment is national network specific and not described further within this Recommendation.

9.1.1.3 Address complete or connect message

The procedures as described in 2.1.4.2/Q.764 [10] are applicable with the following exceptions:

Upon receipt of an ACM or CON message the awaiting address complete timer T7 is stopped. If an ACM message is received the awaiting answer timer T9 is started.

If an ACM message has not been sent, the received message is passed on. The message shall contain the corresponding ISUP parameters, if a serviceInteractionIndicators parameter was received in the Connect operation [see 9.1.1.1.3 (Mapping of the INAP serviceInteractionIndicators)].

If an ACM message has already been sent, a received ACM message is mapped to a CPG message and a received CON message to an ANM message, respectively. The mapping of parameters will be performed as described in the Call Diversion stage 3 description (see [8]).

9.1.1.4 Information message (national option)

The procedure as described in 2.1.6/Q.764 [10] is applicable. If call set-up information is missing an INR message should be sent by the SSP before the InitialDP operation is sent to the SCP.

9.1.1.5 Answer message

Upon receipt of an ANM message the awaiting answer timer T₉ is stopped and the actions described in 2.1.7/Q.764 [10] are performed.

9.1.1.6 Continuity check

If an IAM is received indicating that either a continuity check is requested or is performed on a previous circuit the normal procedures as described in 2.1.8/Q.764 [10] are applicable. The sending of the InitialDP operation is delayed until a COT message indicating "successful" is received.

If the continuity check fails, no relationship between SSF and SCF will be established.

9.1.1.7 Simple segmentation

With regard to the simple segmentation procedure the SSP behaves like a local exchange. Consequently, items d), e), f) of 2.1.12/Q.764 [10] are applicable.

9.1.2 Normal call release

The CCF part of the SSP releases the call as described in item b) of 2.3.1/Q.764 [10]. For the SSF part of the SSP the general rules described in 3.1.1.5/Q.1218 [5] are applicable.

9.1.3 Suspend, resume

Upon receipt of a SUS message with the indication "network initiated" the timer T_{SUS} is started to ensure that a RES message with the indication "network initiated" or a REL message is received. The received SUS message is not passed on. If the timer T_{SUS} expires, the procedures described in 2.4.3/Q.764 [10] apply. The value of timer T_{SUS} depends on the time limits received in serviceInteractionIndicators parameter.

9.1.4 ReleaseCall operation

Upon receipt of the ReleaseCall operation, the SSP sends REL messages in both directions. The cause indicators parameter contains the releaseCallArg parameter of the ReleaseCall operation. If no releaseCallArg was present, cause value #31 is sent. Furthermore the normal procedures as described in 2.3.3/Q.764 [10] are applicable.

9.1.5 Transfer of the called IN number

The calledPartyNumber parameter sent in the InitialDP operation is transferred in the called IN number parameter to the succeeding exchange. The address presentation restricted indicator is set according to the called IN number presentation restricted indicator received in the INAP serviceInteractionIndicators parameter. If a called IN number parameter was already contained in the IAM, then this parameter is overwritten with the new information.

9.1.5.1 Interworking with an ISUP not supporting the called IN number parameter

No specific action is required.

9.1.6 Abnormal conditions

9.1.6.1 General requirements on receipt of unrecognized signalling information messages and parameters

With regard to the handling of unrecognized signalling information, a SSP behaves like a type A exchange.

NOTE – In the future this limit may be relaxed.

9.2 IN call with SCP request to collect further digits

After sending the InitialDP operation to the SCP a RequestReportBCSMEvent operation to arm DP2 accompanied by a CollectInformation operation may be received from the SCP (see 3.3.15/Q.1218 [5]). In this case the specified number of digits will be collected in the SSP. Encountering DP2, i.e. the specified number of digits has been received, will result in sending an EventReportBCSM operation or a CollectedInformation operation, respectively, to the SCP.

In addition to 9.1.5, the digits sent to the SCP in the EventReportBCSM operation or the CollectedInformation operation shall be taken into account when constructing the called IN number parameter.

There is no further impact on the ISUP protocol and the call handling will continue as described in 9.1 (IN basic call) unless a further RequestReportBCSMEvent operation to arm DP2 accompanied by a CollectInformation operation is received from the SCP. In this case the procedure described above is repeated.

9.3 Detection Point processing

9.3.1 General

The SCF uses the RequestReportBCSMEvent operation to request the SSF to monitor for call-related events. The monitor mode is indicated in the operation as either "interrupted" or "notifyAndContinue".

In the "notifyAndContinue" mode the event is reported as EDP-N (notification mode) in the EventReportBCSM operation or a DP specific operation, respectively, to the SCF and normal call processing continues as described in 9.1 (IN basic call).

In the "interrupted" mode the event is reported as EDP-R (request mode) in the EventReportBCSM operation or a DP specific operation, respectively, and the SSF will wait for instructions from the SCF.

Table 7/Q.1600 – Event Detection Points

DP	DP encountered on ...
2	See 9.2 (IN call with SCP request to collect further digits).
4	National network specific.
5, 13	Receipt of a REL message with cause value #17 (user busy).
6, 14	Expiry of timer T _{NoReply} .
7, 15	Receipt of an ANM or CON message.
9, 17	a) Receipt of a REL message with cause value #16 (normal call clearing) in the active phase of a call. b) Expiry of timer T _{SUS} .
10, 18	Receipt of a REL message with cause value #16 (normal call clearing) from a preceding exchange before the call is answered.

In the following the differences in call processing for IN calls with dynamically armed detection points compared to the procedures described in 9.1 (IN basic call) and 9.4 (Set-up of an IN call to destination B) are listed.

9.3.1.1 Address complete message

On receipt of a ACM message the timer T_{NoReply} is started if either DP6 or 14 has been armed by the SCF.

9.3.1.2 Answer or connect message

The timer T_{NoReply} is stopped, if applicable.

9.3.1.3 Release message

If a REL is received from either the preceding or succeeding exchange and corresponds to a DP armed as EDP-N (notification mode), the CCF part of the SSP releases the call like an ordinary transit exchange. For the SSF part of the SSP the general rules described in 3.1.1.5/Q.1218 [5] are applicable.

If a REL is received from the preceding exchange and corresponds to a DP armed as EDP-R (request mode), the CCF part of the SSP releases the call like an ordinary transit exchange. For the SSF part of the SSP the general rules described in 3.1.1.5/Q.1218 [5] are applicable.

If a REL is received from the succeeding exchange and corresponds to a DP armed as EDP-R (request mode), the CCF part of the SSP releases the outgoing leg of the connection and holds the incoming leg. For the SSF part of the SSP the general rules described in 3.1.1.5/Q.1218 [5] are applicable. The call processing is suspended and the SSP waits for SCP instructions.

9.3.2 Actions to be performed in case of DPs armed in the request mode

9.3.2.1 Storage and release of initial address information

Initial address information is not released from memory on receipt of an ACM message.

NOTE – Memory capacity in the exchange may limit the use of services requiring the storage of initial address information.

9.3.2.2 Signalling procedures for connection type allowing fallback

If:

- a) an IAM was received with the TMR value set to "64 kbit/s unrestricted preferred";
- b) no fallback has already been performed,

then on receipt of the Connect operation a fallback is performed as described in 2.5.1.2.2 and 2.5.2.2.2 of Q.764 [10].

9.3.2.3 Impact on supplementary services

9.3.2.3.1 User-to-user signalling

9.3.2.3.1.1 User-to-user signalling, service 1

If user-to-user service 1 is implicitly requested, the user-to-user information parameter will be discarded from the IAM message and the user-to-user indicators parameter indicating "user-to-user information discarded by the network" is sent in the ACM message.

If the user-to-user service 1 was explicitly requested as "not essential", the user-to-user indicators parameter will be discarded from the IAM and service 1 will be indicated as "not provided" in the ACM.

If the user-to-user service 1 was explicitly requested as "essential", the call is cleared with cause value #29 and diagnostics in the REL message.

9.3.2.3.1.2 User-to-user signalling, service 2

If the user-to-user service 2 was explicitly requested as "not essential", the user-to-user indicators parameter will be discarded from the IAM and service 2 will be indicated as "not provided" in the ACM.

If the user-to-user service 2 was explicitly requested as "essential", the call is cleared with cause value #29 and diagnostics in the REL message.

9.3.2.3.1.3 User-to-user signalling, service 3

a) *Service request during call set-up*

If the user-to-user service 3 was explicitly requested as "not essential", the user-to-user indicators parameter will be discarded from the IAM and service 3 will be indicated as "not provided" in the ACM.

If the user-to-user service 3 was explicitly requested as "essential", the call is cleared with cause value #29 and diagnostics in the REL message.

b) *Service request after call set-up*

A FRQ with facility indicators set to "user-to-user service" and the user-to-user indicators parameter (containing the relevant service 3 information) will be responded by a FRJ message indicating "not provided" for service 3 in the user-to-user indicators.

9.4 Set-up of an IN call to destination B

This subclause describes the set-up of an IN call to destination B after a user interactive dialogue has been performed or after the SSF has reported an EDP-R in the EventReportBCSM operation or a DP specific operation, respectively, to the SCF. In these situations the call set-up differs from the normal call set-up for the "IN basic call".

9.4.1 Successful call set-up

9.4.1.1 Forward address signalling

9.4.1.1.1 Connect operation

On receipt of the Connect operation the actions described in 9.1.1.1.1 (Connect operation) are performed with the following exceptions:

- a) An ACM message is not sent towards the originating local exchange.
- b) Through-connection is performed as described in item d) of 2.1.1.1/Q.764 [10].

9.4.1.2 Mapping of the INAP serviceInteractionIndicators

The SCF logic may generate new service interaction information for the call.

In this case the indicators of the INAP serviceInteractionIndicators parameter relevant for the forward direction, i.e. to be mapped into the IAM, are treated as described in 9.1.1.1.3 (Mapping of the INAP serviceInteractionIndicators).

The handling of the indicators relevant for the backward direction is however different:

- The indicators contained in the received INAP serviceInteractionIndicators parameter are compared one by one against the indicators that are stored in the SSP, i.e. that have been received in an earlier INAP operation.
- If the received value of an indicator differs from the one that is stored in the SSP, then this indicator is mapped to the corresponding value in the appropriate ISUP parameter.
- If the received value of an indicator is equal to the one that is stored in the SSP, then this indicator is mapped to the value "no indication" in the appropriate ISUP parameter.

If for the call no new service interaction information was received, then the exchange will apply the information that is stored, i.e. the forward indicators sent in the IAM are the same as for the previous connection, backward indicators need not to be sent.

9.4.1.3 Sending of backward messages

If backward messages have already been sent to preceding exchanges, it may be required:

- a) to map a received message into another message; or
- b) to generate another message instead of the message, that would normally be generated.

Table 8 describes which message is to be sent in the different cases.

Table 8/Q.1600 – Sending of backward messages

Message received or message to be sent, respectively → ↓ Messages already sent	ACM	CPG "alerting" or "in-band information or an ..."	CPG "progress"	CON	ANM
ACM/CON not sent	ACM (Note 1)	Not relevant	Not relevant	CON (Note 1)	Not relevant
ACM sent, ANM not sent	CPG (Note 1)	CPG	CPG	ANM (Note 1)	ANM
ANM/CON sent for previous connection, but ANM/CON not received for actual connection	CPG "progress" (Notes 1 and 2)	CPG "progress" (Note 2)	CPG "progress"	CPG "progress" (Notes 1 and 2)	CPG "progress" (Note 2)
ANM/CON sent for previous connection and ANM/CON received for actual connection	Not relevant	Not relevant	CPG "progress"	Not relevant	Not relevant

NOTE 1 – If a serviceInteractionIndicators parameter was provided in the INAP operation, this message carries the corresponding ISUP parameters, if applicable.

NOTE 2 – An originating local exchange conforming to [10] will discard this CPG message since no generic notification parameter is contained in the message.

9.4.1.4 Address complete message

Upon receipt of an ACM message, the following actions shall be performed:

- a) The awaiting address complete timer T7 is stopped.
- b) If an UID action indicators parameter indicating "stop or do not start T9", then the SSP shall not start/shall stop timer T9 and shall start timer T_{UID}, else timer T9 is started or restarted, respectively.
- c) If an UID action indicators parameter indicating "through-connect in both directions", the SSP shall through connect the transmission path in both directions (if not already connected).

Which message is sent to preceding exchanges is described in 9.4.1.3 (Sending of backward messages). If the ACM contains an UID action indicators parameter, then the parameter shall be passed on transparently to preceding exchanges, unless an ANM has already been sent.

9.4.1.5 Call Progress message (Basic call)

Upon receipt of a CPG message, the following actions shall be performed:

- a) If an UID action indicators parameter indicating "stop or do not start T9", then SSP shall not start/shall stop timer T9 and shall start timer T_{UID}.
- b) If an UID action indicators parameter indicating "through-connect in both directions", the SSP shall through connect the transmission path in both directions (if not already connected).

Which message is sent to preceding exchanges is described in 9.4.1.3 (Sending of backward messages). If the CPG contains an UID action indicators parameter, then the parameter shall be passed on transparently to preceding exchanges, unless an ANM message has already been sent.

9.4.1.6 Connect message

Upon receipt of a CON message, the awaiting address complete timer T7 is stopped and the transmission path is through connected in forward direction, if not already connected.

Which message is sent to preceding exchanges is described in 9.4.1.3 (Sending of backward messages).

9.4.1.7 Answer message

Upon receipt of an ANM message the awaiting answer timer T9 or the timer T_{UID}, respectively, is stopped and the transmission path is throughconnected in forward direction, if not already connected.

Which message is sent to preceding exchanges is described in 9.4.1.3 (Sending of backward messages).

9.4.2 Timer T_{UID} expiry

If T_{UID} expires, the call is released using cause value #31 (normal, unspecified).

9.4.3 Abnormal conditions

9.4.3.1 Handling of unexpected messages

The procedures described in 2.9.5.1/Q.764 [10] are applicable with the following exceptions:

- a) If an ACM message has already been sent for the incoming leg of the call, but an ACM has not been received for the outgoing leg of the call, then:
 - i) a CPG received in forward direction shall be discarded, i.e. the message is not treated as an unexpected message;
 - ii) an unrecognized message received in forward direction shall not be passed on and the procedure described in item xi) of 2.9.5.2/Q.764 [10] shall be applied.
- b) If an ANM message has already been sent for the incoming leg of the call, but an ANM has not been received for the outgoing leg of the call, then the following messages received in forward direction shall be discarded, i.e. the messages are not treated as unexpected messages: SUS, RES, FAR and FOT.

9.4.4 Impact on supplementary services

9.4.4.1 Call Hold

On receipt of a CPG message with the generic notification indicator set to "remote hold" a note in memory shall be set. The note shall be reset on receipt of a CPG message with the generic notification indicator set to "remote retrieval".

If the note is set on receipt of a connect operation, then an artificial CPG message with the generic notification indicator set to "remote retrieval" shall be generated.

9.4.4.2 Malicious Call Identification

On receipt of an IDR message two cases exist:

- a) If an IDR or an ANM was already sent to the preceding exchange, then the IDR message is not passed on and is immediately responded by an IRS message.
- b) If an IDR was not sent to the preceding exchange, then the IDR message is passed on transparently towards the originating local exchange.

If bit A of the MCID request indicators was set to 1, then in addition to the normal procedure the service switching point includes the charged party identification parameter, if available, into the IRS message.

9.5 User interactive dialogue (in-band)

If in response to the InitialDP operation, the EventReportBCSM operation or a DP specific operation, a ConnectToResource or EstablishTemporaryConnection operation is received from the SCF, then the incoming call shall be connected to a physical entity containing the SRF, i.e. Intelligent Peripheral (IP). In case of ConnectToResource the SSP, that interacts with the SCP, supports the requested IP capabilities and the IP is therefore either integrated or co-located in the SSP. In case of EstablishTemporaryConnection the IP is available in another network element. Consequently, the Assist method is applied.

9.5.1 SSP supports requested IP capabilities

9.5.1.1 Successful call set-up

9.5.1.1.1 Forward address signalling

9.5.1.1.1.1 ConnectToResource operation

On receipt of the ConnectToResource operation the IP is connected to the incoming call, if the TMR value received in the IAM message is set to either "speech" or "3.1 kHz audio" or "64 kbit/s unrestricted preferred". For the latter case, see also 9.3.2.2 (Signalling procedures for connection type allowing fallback). If other TMR values are received, the call is released using cause value #65.

9.5.1.1.2 Address complete message or call progress message

An ACM message containing an optional backward call indicators parameter indicating "in-band information or an appropriate pattern is now available" is sent. The backward call indicators parameter in the ACM is encoded as described in 9.1 (IN basic call).

Depending on the contents of the INAP serviceInteractionIndicators and capabilities of the preceding exchanges, the UID action indicators parameter may be included in the ACM:

a) *Through-connection instruction*

If the both way through-connect indicator in the serviceInteractionIndicators parameter of the ConnectToResource operation was set to "required" and if an UID capability indicators parameter was received with bit A coded 1 (through-connection modification possible) in the IAM, then the UID action indicators parameter shall be included into the ACM message with bit A coded (through-connect in both directions).

b) *T9 timer instruction*

If the dialogue duration indicator in the serviceInteractionIndicators parameter of the ConnectToResource operation was set to "long duration" and if an UID capability indicators parameter was received with bit B coded 1 (stopping of timer possible) in the IAM, then an UID action indicators parameter shall be included into the ACM with bit B coded 1 (stop or do not start T9).

If backward messages have already been sent to preceding exchange, then instead of ACM a CPG message is sent. This is described in 9.4.1.3 (Sending of backward messages). The CPG message shall contain the UID action indicators parameter as described above for the ACM message.

9.5.1.1.3 Answer message

When the IP answers, the sending of an ANM message depends on the following conditions:

- a) If the both way through-connect indicator in the serviceInteractionIndicators parameter of the ConnectToResource operation was set to "required" and if a through-connection capability indicator set to "through-connection modification possible" was not received in the IAM, then an ANM message is sent.
- b) If the dialogue duration indicator in the serviceInteractionIndicators parameter of the ConnectToResource operation was set to "long duration" and if a T9 timer indicator set to "stopping of timer possible" was not received in the IAM, then an ANM message is sent.

If backward messages have already been sent to preceding exchange, then instead of ANM a different message may be sent. This is described in 9.4.1.3 (Sending of backward messages).

NOTE – The sending of an ANM message may also be required, if a chargeable announcement is to be connected. However, charging aspects are outside the scope of this Recommendation.

9.5.1.2 Storage and release of initial address information

Initial address information is retained in memory to allow a call set-up to a new destination after disconnecting the IP.

NOTE – Memory capacity in the exchange may limit the use of services requiring the storage of initial address information.

9.5.1.3 Signalling procedures for connection type allowing fallback

If:

- a) the TMR value received in the IAM is set to "64 kbit/s unrestricted preferred";
- b) no fallback has already been performed;
- c) an ANM message is to be sent, i.e. the both way throughconnect indicator in the serviceInteractionIndicators parameter of the ConnectToResource operation was set to "required",

then on receipt of the ConnectToResource operation a fallback is performed as described in 2.5.1.2.2 and 2.5.2.2.2 of Q.764 [10].

9.5.1.4 DisconnectForwardConnection operation

When the DisconnectForwardConnection operation is received the IP will be disconnected.

9.5.1.5 Impact on supplementary services

9.5.1.5.1 Connected line identification presentation

The following text is only applicable, if an ANM message is to be sent for the IP connection and if an ANM message was not sent before.

If the connected line identity was requested by the calling user, the SSP behaves as follows:

If "no impact" was received in the INAP serviceInteractionIndicators (connected number treatment indicator), then two cases exist:

- a) If a connected number is available for the IP, then the procedure as described in 5.5.2.5/Q.731 [7] will be performed.

- b) If a connected number is not available for the IP, then the SSP sends a connected number parameter in the ANM message encoded as follows:
- | | |
|--|-----------------------------|
| nature of address indicator: | 0000000. |
| numbering plan indicator: | 000. |
| address presentation restricted indicator: | 10 (address not available). |
| screening indicator: | 11 (network provided). |
| no address signals. | |

If "presentation restricted" was received in the INAP serviceInteractionIndicators (connected number treatment indicator), then two cases exist:

- a) If a connected number is available for the IP, then the procedure as described in 6.5.2.5/Q.731 [7] will be performed.
- b) If a connected number is not available for the IP, then the SSP sends a connected number parameter in the ANM message encoded as shown in item b) above.

If "present called IN number" was received in the INAP serviceInteractionIndicators, then:

- a) A connected number parameter is generated as follows:
- | | |
|---|---|
| nature of address indicator and numbering plan indicator are encoded as received in the called party number of the IAM message; | |
| address presentation restricted indicator: | 00 (presentation allowed); |
| address signals: | as received in called party number or subsequent number parameters, respectively, until ACM message was sent. |
- b) A generic number parameter "additional connected number" is not sent.

9.5.1.5.2 User-to-user signalling

The text in the following three subclauses is only applicable, if an ANM message is to be sent for the IP connection and if an ANM message was not sent before.

9.5.1.5.2.1 User-to-user signalling, service 1

If user-to-user service 1 is implicitly requested, the user-to-user information parameter will be discarded from the IAM message and the user-to-user indicators parameter indicating "user-to-user information discarded by the network" is sent in the ACM message.

If the user-to-user service 1 was explicitly requested as "not essential", the user-to-user indicators parameter will be discarded from the IAM and service 1 will be indicated as "not provided" in the ACM.

If the user-to-user service 1 was explicitly requested as "essential", the call is cleared with cause value #29 and diagnostics in the REL message.

9.5.1.5.2.2 User-to-user signalling, service 2

If the user-to-user service 2 was explicitly requested as "not essential", the user-to-user indicators parameter will be discarded from the IAM and service 2 will be indicated as "not provided" in the ACM.

If the user-to-user service 2 was explicitly requested as "essential", the call is cleared with cause value #29 and diagnostics in the REL message.

9.5.1.5.2.3 User-to-user signalling, service 3

a) *Service request during call set-up*

If the user-to-user service 3 was explicitly requested as "not essential", the user-to-user indicators parameter will be discarded from the IAM and service 3 will be indicated as "not provided" in the ACM.

If the user-to-user service 3 was explicitly requested as "essential", the call is cleared with cause value #29 and diagnostics in the REL message.

b) *Service request after call set-up*

A FRQ with facility indicators set to "user-to-user service" and the user-to-user indicators parameter (containing the relevant service 3 information) will be responded by a FRJ message indicating "not provided" for service 3 in the user-to-user indicators.

9.5.2 Assist method – procedure in the initiating SSP

9.5.2.1 Successful call set-up

9.5.2.1.1 Forward address signalling

9.5.2.1.1.1 EstablishTemporaryConnection operation

On receipt of the EstablishTemporaryConnection operation from the SCP a connection to an external IP will be established, if the TMR value received in the IAM message is set to either "speech" or "3.1 kHz audio" or "64 kbit/s unrestricted preferred". For the latter case see also 9.3.2.2 (Signalling procedures for connection type allowing fallback). If other TMR values are received, the call is released using cause value #65.

The IAM message for set-up of the temporary connection is newly generated as in an originating local exchange.

For routing of the call the called party number is derived from the assistingSSPIPRoutingAddress.

Table 9 illustrates the mapping of parameters received in the EstablishTemporaryConnection operation to parameters sent in the IAM message.

Table 9/Q.1600 – Mapping of parameters from EstablishTemporaryConnection to IAM

INAP operation EstablishTemporaryConnection (Note)	ISUP message IAM
assistingSSPIPRoutingAddress	Called party number
serviceInteractionIndicators	See 9.1.1.1.3 (Mapping of the INAP serviceInteractionIndicators)
correlationID	Correlation id
scfID	SCF id
NOTE – Optional parameters may be absent, i.e. they are only mapped, if received.	

Except the called party number parameter the remaining mandatory parameters of the IAM message are set as follows:

- a) *Nature of connection indicators*
 - Satellite indicator: set as in an OLE.
 - Continuity check indicator: set as in an OLE.
 - Echo control device indicator: set as in an OLE.
- b) *Forward call indicators*
 - National/international call indicator: set as in an OLE.
 - End-to-end method indicator: 00 (no end-to-end method available).
 - Interworking indicator: 0 (no interworking encountered).
 - End-to-end information indicator: 0 (no end-to-end information available).
 - ISDN user part indicator: 1 (ISDN user part used all the way).
 - ISDN user part preference indicator: 10 (ISDN user part required all the way).
 - ISDN access indicator: 0 (originating access non-ISDN).
 - SCCP method indicator: 00 (no indication).
- c) *Calling party's category*
 - 00001010 (ordinary subscriber)
- d) *Transmission medium requirement*
 - 00000011 (3.1 kHz audio)

Besides the parameters listed in Table 9: Mapping of parameters from EstablishTemporaryConnection to IAM, the IAM contains the following optional parameters:

- propagation delay counter (set as in an OLE).

On sending of the IAM an ACM message is sent to the preceding exchange encoded as described in subclause 9.1 (IN basic call) and the awaiting address complete timer T7 is started. If timer T7 expires the call is released in both directions and an appropriate indication is returned to the calling subscriber.

9.5.2.1.1.2 Interworking with an ISUP not supporting the Correlation Id and SCF Id parameters

If the parameters cannot be transferred to the assisting SSP, the set-up of the connection will fail.

9.5.2.1.2 Address complete message

Refer to 9.4.1.4 (Address complete message).

9.5.2.1.3 Call Progress message (Basic call)

Refer to 9.4.1.5 [Call Progress message (Basic call)].

9.5.2.1.4 Connect message

Refer to 9.4.1.6 (Connect message).

9.5.2.1.5 Answer message

Refer to 9.4.1.7 (Answer message).

9.5.2.2 Storage and release of initial address information

In the initiating SSP initial address information is retained to allow a call set-up to a new destination after disconnecting the IP.

NOTE – Memory capacity in the exchange may limit the use of services requiring the storage of initial address information.

9.5.2.3 DisconnectForwardConnection operation

When the DisconnectForwardConnection operation is received from the SCP the normal release procedures are applied for the outgoing circuit. The REL message sent in forward direction contains cause value #31.

9.5.2.4 Abnormal conditions

9.5.2.4.1 Handling of unexpected messages

Refer to 9.4.3.1 (Handling of unexpected messages).

9.5.2.5 Impact on supplementary services

The actions as described in 9.4.4 (Impact on supplementary services) are applicable.

9.5.3 Hand-off method – Procedure in the initiating SSP

On receipt of a Connect operation from the SCP, the actions described in 9.1 (IN basic call) or in 9.4 (Set-up of an IN call to destination B) will be performed. The INAP correlationID and scfID parameters are mapped to the corresponding ISUP parameters in the IAM message.

9.5.4 Assist/Hand-off method – Procedure in the assisting SSP

9.5.4.1 Successful call set-up

9.5.4.1.1 Forward address signalling

If an IAM is received in a SSP and the call is recognized as a call which is to be routed to an IP, an AssistReqInstructions operation is sent from the SSF to the SCF. The mapping of parameters is shown in Table 10.

Table 10/Q.1600 – Mapping of parameters from IAM to AssistRequestInstruction

ISUP message IAM	INAP operation AssistRequestInstruction
Correlation id	correlationID

9.5.4.1.1.1 ConnectToResource operation

The procedure to be performed after receipt of the ConnectToResource operation is identical to the procedure described in 9.5.1 (SSP supports requested IP capabilities).

9.6 Call gapping

When receiving the CallGap operation, the SSF reduces the rate at which specific service requests are sent to the SCF. The detailed procedure is described in 7.3.6/Q.1218 [5].

If the call is to be gapped and the gapTreatment parameter was present in the CallGap operation, then:

- a) If the "informationToSend" indicates announcement or tone, then the ACM message contains an optional backward call indicators parameter indicating "in-band information or an appropriate pattern is now available".

After the calling user has received the "informationToSend" the call is released and the cause indicators parameter contains the releaseCause parameter of the CallGap operation. If no releaseCause was present, cause value #31 is sent.

- b) If the "informationToSend" indicates display information, then the call is released and a display information parameter is included in the REL message. The cause indicators parameter contains the releaseCause parameter of the CallGap operation. If no releaseCause was present, cause value #31 is sent.

If the call is to be gapped and the gapTreatment parameter was not present in the CallGap operation, then the call is released using cause value #42 in the REL message.

9.7 Service filtering

When receiving the ActivateServiceFiltering operation, the SSF handles calls which are to be filtered in a specified manner without request for instructions to the SCF. The detailed procedure is described in 7.3.1/Q.1218 [5].

- a) If a call is to be filtered and the "informationToSend" indicates announcement or tone, then an ACM message is sent to the preceding exchange with an optional backward call indicators parameter indicating "in-band information or an appropriate pattern is now available". In the case of a chargeable in-band information an ANM is sent in addition.

After the calling user has received the "informationToSend" the call is released and the cause indicators parameter contains the releaseCause parameter of the ServiceFiltering operation. If no releaseCause was present, cause value #31 is sent.

- b) If a call is to be filtered and the "informationToSend" indicates display information, then:
- if the "informationToSend" is free of charge, the call is released and a display information parameter is included in the REL message. The cause indicators parameter contains the releaseCause parameter of the ServiceFiltering operation. If no releaseCause was present, cause value #31 is sent;
 - if the "informationToSend" is not free of charge, an ANM message containing the display information parameter is sent. Then the call is released and the cause indicators parameter contains the releaseCause parameter of the ServiceFiltering operation. If no releaseCause was present, cause value #31 is sent.

9.7.1 Impact on supplementary services

9.7.1.1 Closed user group

If the call is a CUG call with outgoing access not allowed, then the "informationToSend" is not provided and the call is released using cause value #29 with diagnostics. The diagnostics field contains the CUG interlock code parameter name.

9.8 SCP initiated call

For a SCP initiated call the SSP behaves like an originating local exchange with the exception that no information is received/sent from/to the access protocol. The call set-up information needed for the generation of the IAM message is partly provided with the InitiateCallAttempt operation. The remaining mandatory fields of the IAM message are supplied with default values. This is described in the subclauses below.

9.8.1 Successful call set-up

9.8.1.1 Forward address signalling

On receipt of an InitiateCallAttempt operation from the SCP the contents are stored and call processing is suspended.

9.8.1.1.1 Continue operation

The actions described in 2.1.1.1/Q.764 [10] will be performed. For routing of the call the called party number is derived from the destinationRoutingAddress (see Table 11: Mapping of the parameters from InitiateCallAttempt to IAM).

Table 11 illustrates the mapping of parameters received in the InitiateCallAttempt operation to parameters sent in the IAM message.

Table 11/Q.1600 – Mapping of parameters from InitiateCallAttempt to IAM

INAP operation InitiateCallAttempt (Note)	ISUP message IAM
destinationRoutingAddress	Called party number
callingPartyNumber	Calling party number
serviceInteractionIndicators	See 9.1.1.1.3 (Mapping of the INAP serviceInteractionIndicators)
NOTE – Optional parameters may be absent, i.e. they are only mapped, if received.	

Except the called party number parameter the remaining mandatory parameters of the IAM message are set as follows:

a) *Nature of connection indicators*

Satellite indicator: set as in an OLE.
Continuity check indicator: set as in an OLE.
Echo control device indicator: set as in an OLE.

b) *Forward call indicators*

National/international call indicator: set as in an OLE.
End-to-end method indicator: 00 (no end-to-end method available).
Interworking indicator: 0 (no interworking encountered).
End-to-end information indicator: 0 (no end-to-end information available).
ISDN user part indicator: 1 (ISDN user part used all the way).
ISDN user part preference indicator: 00 (ISDN user part preferred all the way).
ISDN access indicator: 0 (originating access non-ISDN).
SCCP method indicator: 00 (no indication).

c) *Calling party's category*

00001010 (ordinary subscriber)

d) *Transmission medium requirement*

00000011 (3.1 kHz audio)

Besides the parameters listed in Table 11 the IAM contains the following optional parameters:

- propagation delay counter (set as in an OLE).

9.9 Actions to be performed in local exchanges

9.9.1 Actions in the originating local exchange

For an IN basic call the normal ISUP basic call procedures are applicable as described in [10] for originating local exchanges, unless indicated otherwise in the subclauses below.

9.9.1.1 Successful call set-up

9.9.1.1.1 Forward address signalling

If the exchange has the capability to through connect the transmission path in both directions upon receipt of the UID action indicators parameter with bit A coded 1, then the exchange shall send the UID capability indicators parameter in the IAM message with bit A coded 1.

If the exchange has the capability to stop or not to start timer T9 upon receipt of the UID action indicators parameter with bit B coded 1, then the exchange shall send the UID capability indicators parameter in the IAM message bit B coded 1.

9.9.1.1.2 Address complete, call progress, connect or answer message

Upon receipt of an ACM or CPG message with the UID action indicators parameter indicating "through-connect in both directions" (bit A coded 1), the local exchange shall through connect the transmission path in both directions, if not already connected.

Upon receipt of an ACM or CPG message with the UID action indicators parameter indicating "stop or do not start T9 timer" (bit B coded 1), the local exchange shall not start/shall stop timer T9 and shall start timer T_{UID} to guard the connection. If T_{UID} was already running upon receipt of the UID action indicators parameter with bit B coded 1, then T_{UID} shall be restarted.

Upon receipt of an ANM or CON message, the local exchange shall stop T9 or T_{UID}, if running.

If T_{UID} expires, see 9.4.2 (Timer T_{UID} expiry).

If received in these messages, the conference treatment indicators parameter shall be stored in the exchange. If the parameter has already been stored, then the stored information will be overwritten. The application of this parameter is described in clause 11 (Interaction between IN basic call and ISDN supplementary services).

9.9.2 Actions in the destination local exchange

9.9.2.1 Successful call set-up

9.9.2.1.1 Forward address signalling

If received in the IAM message, the following parameters shall be stored: conference treatment indicators, call diversion treatment indicators, called IN number.

The application of these parameters is described in clause 11 (Interaction between IN basic call and ISDN supplementary services).

9.9.2.1.1.1 Preventing of call offering for calls not routed via IN at a destination access

Upon receipt of an IAM for an access which is marked as "prevent call offering for non-authorized calls" the following actions are performed:

- If the IAM contains the call to be offered indicator set to "call offering allowed" in the call offering treatment indicators parameter field, the call will be set up as described in 2.1.1.6/Q.764 [10].

- If the IAM contains either the call to be offered indicator set to "call offering not allowed" in the call offering treatment indicators parameter field or no call offering treatment parameter field at all, the call will be released using cause value #21 (call rejected) without diagnostics in the REL message.

NOTE – If the functionality required for this procedure is not implemented in the DLE, the call to be offered indicator will be regarded as an unknown parameter value and treated as described in 2.9.5.3.3/Q.764 [10]. The compatibility information for the call offering treatment indicators parameter field is given in Appendix I.

9.10 Actions in an intermediate exchange

9.10.1 In an intermediate exchange not starting timer T9

An intermediate exchange not starting timer T9 shall not modify the UID capability and UID action indicators parameters, these two parameters shall be passed on transparently.

9.10.2 In an intermediate exchange starting timer T9

On receipt of the UID capability parameter, the intermediate exchange shall pass it on transparently to the succeeding exchange, if it has the capability to stop or not to start T9 timer upon receipt of the UID action indicators parameter with bit B coded 1. Otherwise, the bit B of the UID capability parameter shall be set to 0.

On receipt of the UID action indicators parameter indicating "stop or do not start T9 timer" (bit B coded 1), the intermediate exchange shall not start/shall stop timer T9 and shall start timer T_{UID} to guard the connection. If T_{UID} was already running upon receipt of the UID action indicators parameter with bit B coded 1, then T_{UID} shall be restarted.

The UID action indicators parameter shall be passed on transparently to the preceding exchange.

Upon receipt of an ANM or CON message, the intermediate exchange shall stop T9 or T_{UID}, if running.

If T_{UID} expires, see 9.4.2 (Timer T_{UID} expiry).

9.11 Actions in international gateway exchanges

The UID action indicators and UID capability indicators parameters are only sent across the international interface if a bilateral agreement between both network operators exists.

10 Interaction with other networks

For further study.

11 Interaction between IN basic call and ISDN supplementary services

The description in this clause assumes that the SCF IN service(s) control ISDN supplementary services.

An overview on the interactions between IN services and ISDN supplementary services is given in Table 12.

The 2nd column of the table marked "possibly impacted by IN services" identifies the ISDN supplementary services for which SCF control is needed. As a consequence indications "impact/no impact" are required for these supplementary services which are to be sent via the INAP in an appropriate operation (see Appendix II). The 3rd column contains the reference to the subclause describing the action to be taken in case of "impact". The 4th column identifies the exchange where

the action is to be performed. In the case the affected exchange is not the SSP itself, a new instruction indicator is needed which is to be transferred in an ISUP message to the originating or destination local exchange, or both respectively.

Table 12/Q.1600 Interactions between IN basic call and ISDN supplementary services

ISDN Supplementary service	ISUP protocol possibly impacted by IN services	If impacted by IN service(s) the following action will be performed	Affected exchange
Advice of charge at call set-up	No		
Advice of charge during the call	No		
Advice of charge at the end of the call	No		
Call deflection	Yes	See 11.1 (Call diversion)	SSP/DLE
Call forwarding busy	Yes	See 11.1 (Call diversion)	SSP/DLE
Call forwarding no reply	Yes	See 11.1 (Call diversion)	SSP/DLE
Call forwarding unconditional	Yes	See 11.1 (Call diversion)	SSP/DLE
Calling line identification presentation Calling line identification restriction	Yes	See 11.2 (Calling line identification presentation/restriction)	SSP
Call hold	No		
Call waiting	No		
Closed user group	No		
Completion of calls to busy subscriber	Yes	See 11.3 (Completion of calls to busy subscriber)	SSP
Conference call, add-on	Yes	See 11.4 (Conference)	OLE/DLE
Connected line identification presentation Connected line identification restriction	Yes	See 11.5 (Connected line identification presentation/restriction)	SSP
Direct-dialling-in	No		
Explicit call transfer	Yes	See 11.6 (Explicit call transfer)	SSP
International telecommunication charge card	No		
Malicious call identification	Yes	See 11.7 (Malicious call identification)	SSP/DLE
Meet-me conference	No		
Multi-level precedence and preemption	No		
Multiple subscriber number	No		
Reverse charging	Yes	National network specific	
Sub-addressing	No		
Terminal portability	No		

Table 12/Q.1600 Interactions between IN basic call and ISDN supplementary services (concluded)

ISDN Supplementary service	ISUP protocol possibly impacted by IN services	If impacted by IN service(s) the following action will be performed	Affected exchange
Three-party	Yes	See 11.8 (Three party)	OLE/DLE
User-to-user service 1 implicit	No		
User-to-user service 1 explicit	No		
User-to-user service 2 explicit	No		
User-to-user service 3 explicit	No		

11.1 Call diversion

11.1.1 Actions in the service switching point

If "suppress information" was received in the INAP serviceInteractionIndicators (call diversion notification treatment indicator), then the following parameters shall be discarded, if received:

- a) generic notification indicator parameter with "call is diverting";
- b) call diversion information parameter;
- c) redirection number parameter;
- d) redirection number restriction parameter.

11.1.2 Actions in the destination local exchange

11.1.2.1 Call forwarding unconditional

Call forwarding unconditional activated by the ISDN subscriber is suppressed, if "call diversion not allowed" was received in the call diversion treatment indicators (call to be diverted indicator). The call is offered to the subscriber.

11.1.2.2 Call forwarding busy

Call forwarding busy activated by the ISDN subscriber is not performed, if "call diversion not allowed" was received in the call diversion treatment indicators (call to be diverted indicator). The call is released using the appropriate cause in the REL message.

11.1.2.3 Call forwarding no reply

Call forwarding no reply activated by the ISDN subscriber is not performed, if "call diversion not allowed" was received in the call diversion treatment indicators (call to be diverted indicator). Call offering to the subscriber continues.

11.1.2.4 Call deflection

Call deflection requested by the ISDN subscriber is rejected, if "call diversion not allowed" was received in the call diversion treatment indicators (call to be diverted indicator). Call offering to the subscriber continues.

11.2 Calling line identification presentation/restriction

11.2.1 Actions in the service switching point

If a callingPartyNumber parameter has been received in the Connect operation, then this parameter is not mapped to an ISUP parameter (refer to Table 5: Mapping of parameters from Connect to IAM.)

11.3 Completion of calls to busy subscriber

11.3.1 Actions in the service switching point

If "reject call completion request" was received in the INAP serviceInteractionIndicator parameter (call completion treatment indicator), then in a received REL message a "CCBS possible" in the diagnostics field of the cause indicators is replaced with "CCBS not possible".

11.4 Conference

11.4.1 Actions in the originating or destination local exchange

A request from an ISDN subscriber to add a call to a conference is rejected, if "reject conference request" was received in the conference treatment indicators (conference acceptance indicator).

If "reject conference request" is received in the conference treatment indicators (conference acceptance indicator) for a call which is part of a conference call, then this IN call is cleared.

11.5 Connected line identification presentation/restriction

11.5.1 Actions in the service switching point

If "no impact" was received in the INAP serviceInteractionIndicators (connected number treatment indicator), then a connected number parameter and a generic number parameter "additional connected number" are passed on unchanged.

If "presentation restricted" was received in the INAP serviceInteractionIndicators, then:

- a) If a connected number parameter has been received in the ANM or CON message, the address presentation restricted indicator is set to "presentation restricted".
- b) If a generic number parameter "additional connected number" has been received in the ANM or CON message, the address presentation restricted indicator is set to "presentation restricted".
- c) If a redirection number parameter has been received, a redirection number restriction parameter is sent in the ANM message with bits AB set to "presentation restricted".

If "present called IN number" was received in the INAP serviceInteractionIndicators, then:

- a) If a connected number parameter has been received in the ANM or CON message, the connected number parameter is modified as follows:
 - nature of address indicator and numbering plan indicator are encoded as received in the called party number of the IAM message;
 - address presentation restricted indicator: 00 (presentation allowed);
 - address signals: as received in called party number or subsequent number parameters, respectively, until ACM message was sent.

- b) A generic number parameter "additional connected number" is deleted from the message, if applicable.
- c) A redirection number parameter is deleted from the relevant messages, if applicable.

11.6 Explicit call transfer

11.6.1 Actions in the service switching point

If "suppress information" was received in the INAP serviceInteractionIndicators (call transfer notification treatment indicator), then the following parameter shall be discarded, if received:

- a) generic notification indicator parameter with either "call transfer, alerting" or "call transfer, active";
- b) call transfer number parameter.

11.7 Malicious call identification

11.7.1 Actions in the service switching point

The service switching point shall pass a received IDR message transparently to the preceding exchange. The subsequent IRS message is passed transparently to the succeeding exchange. If bit A of the MCID request indicators was set to 1, then in addition to the normal procedure the service switching point shall include the charged party identification parameter, if available, into the IRS message.

11.7.2 Actions in the destination local exchange

If the MCID supplementary service is invoked by the called user, the registration of call information is extended by the registration of the called IN number and the charged party identification, if these parameters were received in the IAM or IRS message, respectively.

11.8 Three party

11.8.1 Actions in the originating or destination local exchange

A request from an ISDN subscriber to establish a three-way conference is rejected, if for one call or both, respectively, "reject conference request" was received in the conference treatment indicators (conference acceptance indicator).

If "reject conference request" is received in the conference treatment indicators (conference acceptance indicator) for a call which is part of a three-party call, then this IN call is cleared.

12 Interactions between IN services

Although the INAP [5] only supports a single point of control, i.e. one CCF/SSF combination interacts with only one SCF, it may happen that multiple IN services are invoked for a call, if IN triggering occurs in different SSPs (see Figure 13).

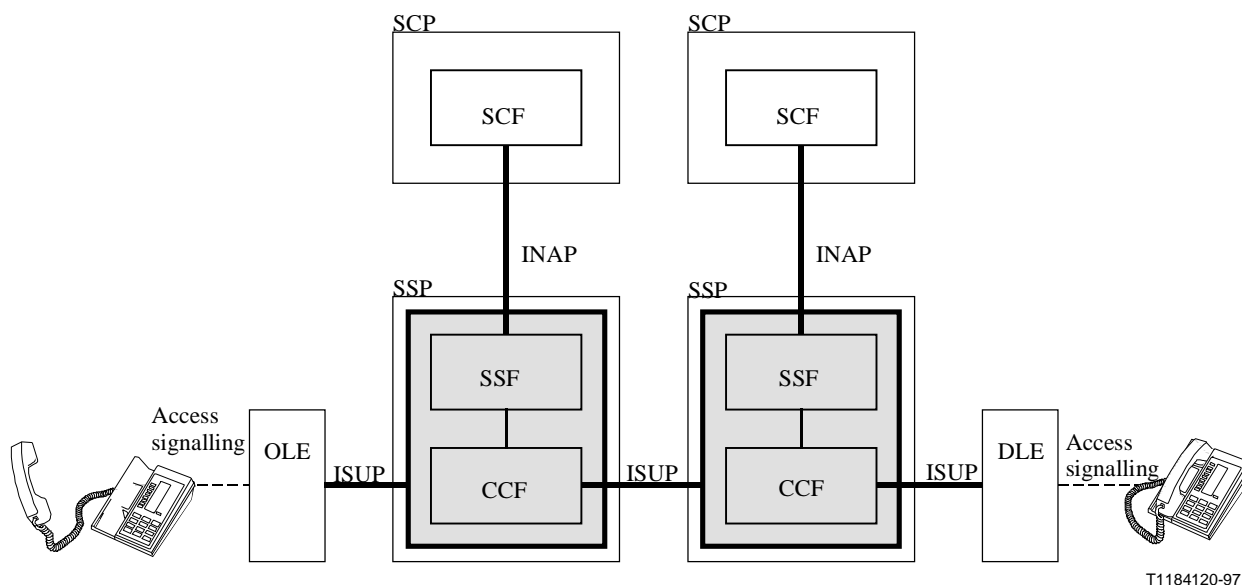


Figure 13/Q.1600 – Configuration with two SSPs involved in the call

No signalling is provided in the ITU-T INAP (CS-1) and ISUP to support interactions between IN services. This topic will be discussed in future capability sets.

13 Parameter values (timers)

See Table 13.

Table 13/Q.1600 – ISUP timers for the SSP

Symbol	Time-out value	Cause for initiation	Normal termination	At expiry	Reference
T _{SUS}	SCF controlled	When SUS "network initiated" message is received	At receipt of RES "network initiated" or REL message	Initiate release procedure or inform SCF	Subclause 9.1.3 (Suspend, resume) Subclause 9.3 (Detection Point processing)
T _{NoReply}	SCF controlled	At receipt of ACM when DP6 or 14 has been armed	At receipt of ANM or REL message	Inform SCF	
T _{UID}	30 minutes	At receipt of UID action indicators parameter with bit B set to 1	At receipt of ANM message	Initiate release procedure	Subclause 9.4.2 (Timer T _{UID} expiry)





ANNEX A

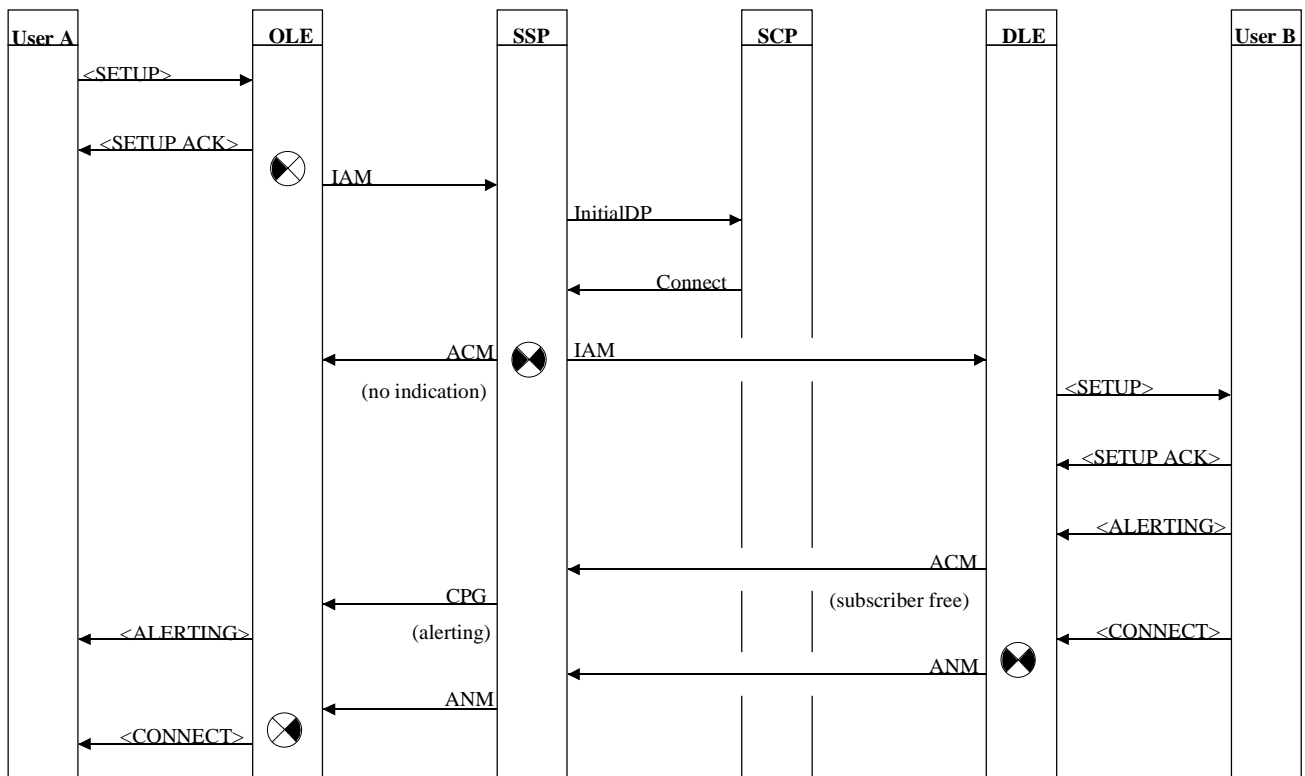
Signalling flows

This Annex contains arrow diagrams showing different types of IN calls. In case of discrepancies between the flows contained in this Annex and the text in the main part of this Recommendation, the text takes precedence. The signal flows on the access protocol are also indicated, but in a simplified manner for illustrative purposes only.

The following abbreviations and notations are used in Figures A.1 to A.7:

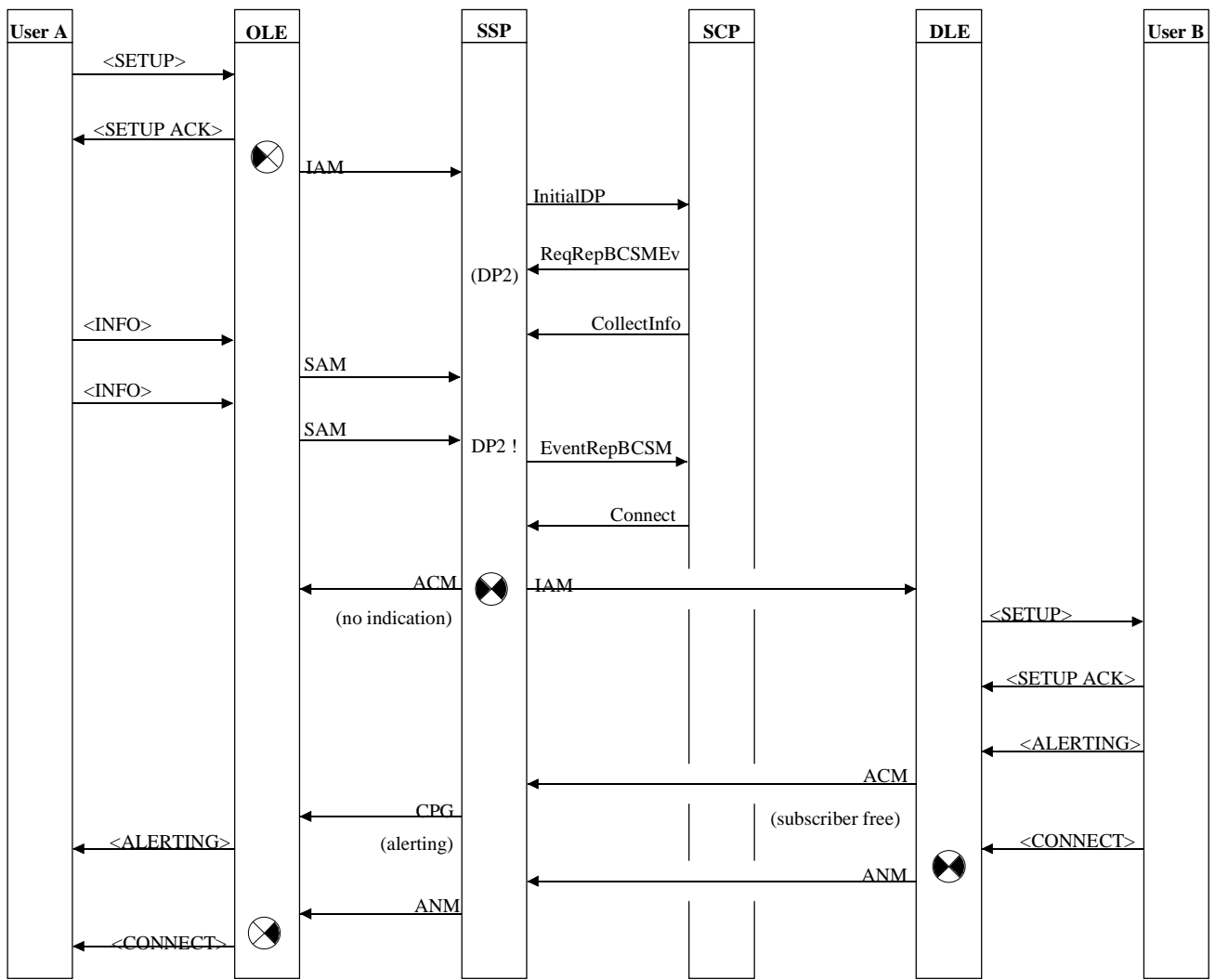
A-SSP	Assisting SSP
AssReqInstr (DPx)	AssistRequestInstruction operation arm DP x
DPx !	DP x encountered
DFC	DisconnectForwardConnection
CTR	ConnectToResource operation
EstTempConn	EstablishTemporaryConnection operation
I-SSP	Initiating SSP
P&C	PromptAndCollectUserInfo operation
ReqReportBCSMEv	RequestReportBCSMEv operation

-  Switchpath completed in backward direction
-  Switchpath completed in forward direction
-  Switchpath completed in both directions
-  Release switchpath



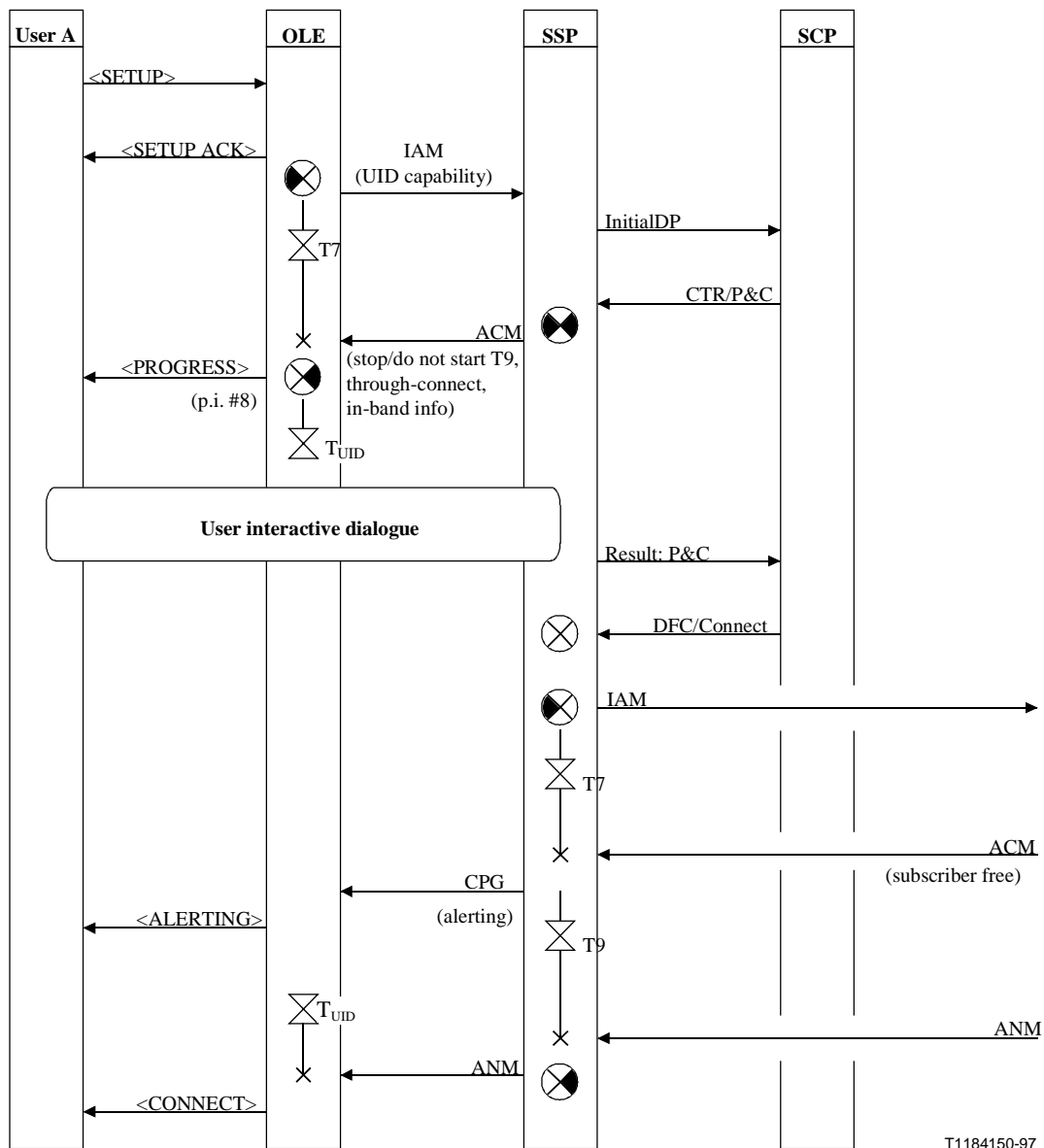
T1184130-97

Figure A.1/Q.1600 – IN basic call

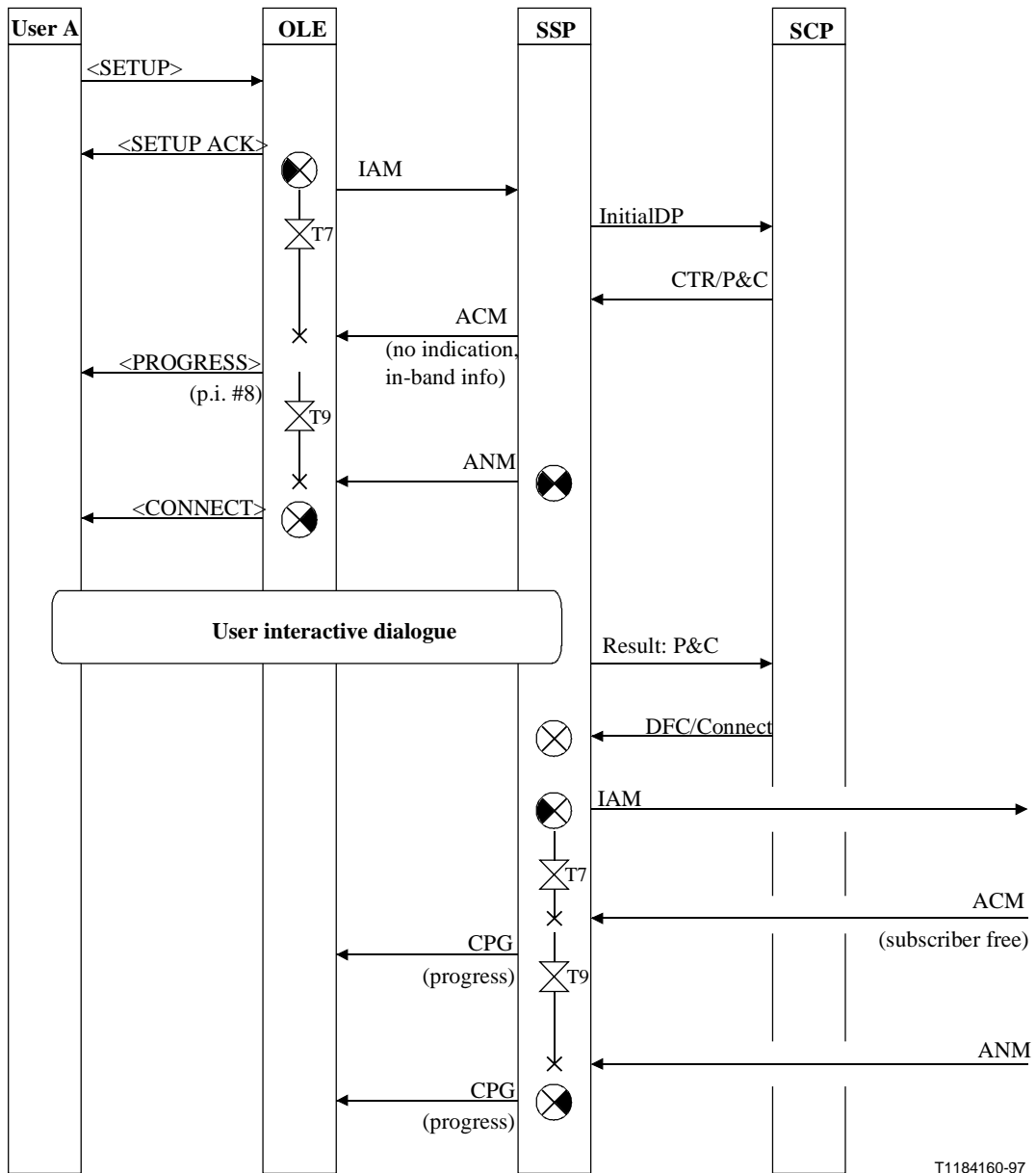


T1184140-97

Figure A.2/Q.1600 – IN call with SCP request to collect further digits

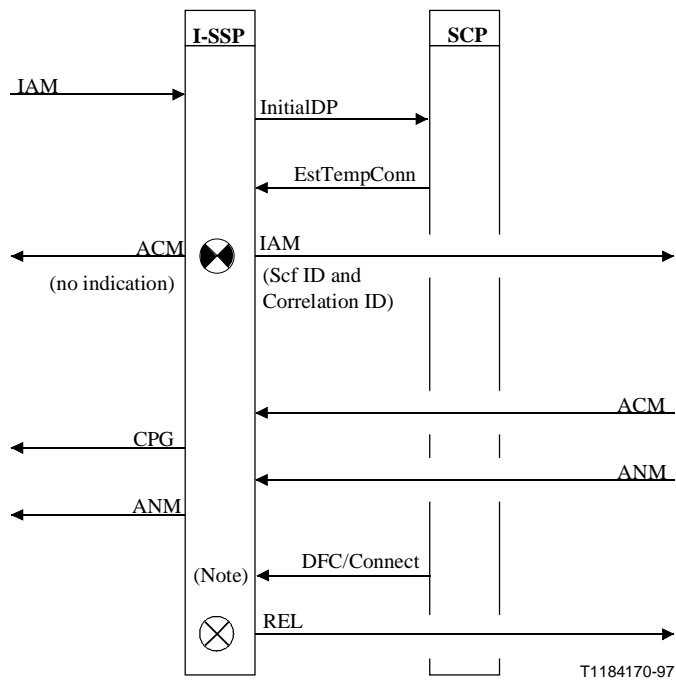


**Figure A.3/Q.1600 – IN call with user interactive dialogue (in-band)
SSP supports requested IP capabilities
OLE supports UID capabilities**



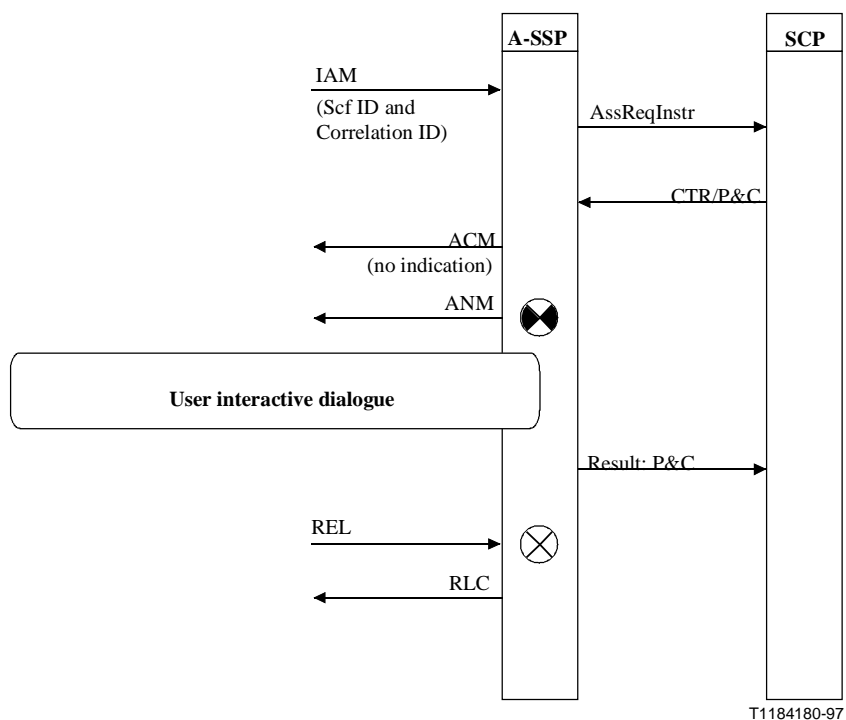
T1184160-97

**Figure A.4/Q.1600 – IN call with user interactive dialogue (in-band)
 SSP supports requested IP capabilities
 OLE does not support UID capabilities**



NOTE – Instead of Connect other operations may be received. If Connect is received, a normal call set-up as shown in Figure A.3 will be performed.

**Figure A.5/Q.1600 – IN call with user interactive dialogue (in-band)
Assist method; procedure in initiating SSP**



**Figure A.6/Q.1600 – IN call with user interactive dialogue (in-band)
Assist method; procedure in assisting SSP**

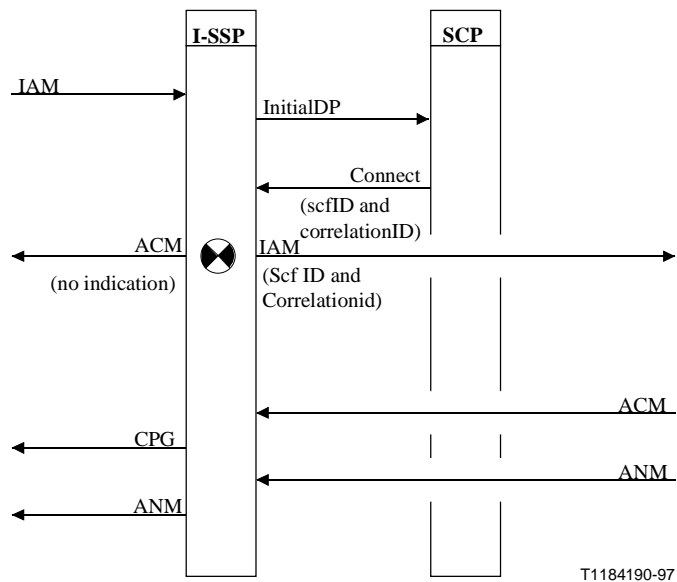


Figure A.7/Q.1600 – IN call with user interactive dialogue (in-band) Hand-off method; procedure in initiating SSP

APPENDIX I

Coding of the compatibility information for the new parameters

See Table I.1.

Table I.1/Q.1600 – Coding of the instruction indicators

Parameter	Pass on not possible indicator	Discard parameter indicator	Discard message indicator	Send notification indicator	Release call indicator	Transit at intermediate exchange indicator	Broadband/narrow-band interworking indicator
Call diversion treatment indicators	Discard parameter	Do not discard parameter	Do not discard message	Do not send notification	Do not release call	Transit interpretation	Pass on
Called IN number	Discard parameter	Do not discard parameter	Do not discard message	Do not send notification	Do not release call	Transit interpretation	Pass on
Call offering treatment indicators	Discard parameter	Do not discard parameter	Do not discard message	Do not send notification	Do not release call	Transit interpretation	Pass on
Charged party identification	Discard parameter	Do not discard parameter	Do not discard message	Do not send notification	Do not release call	Transit interpretation	Pass on
Conference treatment indicators	Discard parameter	Do not discard parameter	Do not discard message	Do not send notification	Do not release call	Transit interpretation	Pass on
Correlation id	Release call	Default	Default	Default	Release call	Transit interpretation	Pass on
Display information	Discard parameter	Do not discard parameter	Do not discard message	Do not send notification	Do not release call	Transit interpretation	Pass on
SCF id	Release call	Default	Default	Default	Release call	Transit interpretation	Pass on
UID action indicators	Discard parameter	Discard parameter	Do not discard message	Do not send notification	Do not release call	Transit interpretation	Pass on
UID capability indicators	Discard parameter	Discard parameter	Do not discard message	Do not send notification	Do not release call	Transit interpretation	Pass on
Default = 0 value for the subfield.							

APPENDIX II

Contents of the INAP serviceInteractionIndicators

The Appendix contains a list of indicators which are to be transferred in the serviceInteractionIndicators via the INAP in order to allow the SCF to control the network behaviour for IN calls. This Appendix should be considered as a proposal for the INAP to transfer this type of information and not as a requirement for the detailed encoding of the serviceInteractionIndicators. See Tables II.1 and II.2.

Table II.1/Q.1600 – Basic call related control information

Control information	Values
Call to be offered indicator	<ul style="list-style-type: none"> – call offering allowed – call offering not allowed (default)
Time limits for timer T _{SUS}	<ul style="list-style-type: none"> – as in Q.764 for timer T6 – 4-10 seconds. – 0 seconds (default)
Both way throughconnect indicator NOTE 1 – The indicator should be set to "required" in the ConnectToResource or EstablishTemporaryConnection operation, if user interaction has to be performed. If an announcement is to be connected or in other operations the indicator should be set to "not required".	<ul style="list-style-type: none"> – required (default) – not required
Called IN number presentation restricted indicator	<ul style="list-style-type: none"> – presentation allowed – presentation not allowed (default)
User interactive dialogue duration indicator NOTE 2 – The indicator should be set to "long duration" in the ConnectToResource or EstablishTemporaryConnection operation, if the user interaction may last longer than 90 seconds. Otherwise the indicator should be set to "short duration".	<ul style="list-style-type: none"> – long duration (default) – short duration

Table II.2/Q.1600 – Supplementary service related control information

Control information	Values
Call to be diverted indicator	– call diversion allowed (default) – call diversion not allowed
Conference at DLE acceptance indicator	– accept conference request (default) – reject conference request
Conference at OLE acceptance indicator	– accept conference request (default) – reject conference request
Connected number treatment indicator	– no impact – set "presentation restricted" – present called IN number (default)
Call transfer notification treatment indicator	– no impact (default) – suppress information
Call diversion notification treatment indicator	– no impact (default) – suppress information
Call completion treatment indicator	– reject call completion request (default) – accept call completion request

APPENDIX III

Limitations for ISUP basic call procedures and supplementary services for different types of IN calls

The Appendix provides an overview on the limitations for ISUP basic call procedures and supplementary services for different types of IN calls.

The CCBS supplementary service is in general not available for IN calls that require translation of the called party number. Additional limitations are listed in Table III.1.

Table III.1/Q.1600 – Limitations for ISUP basic call procedures and supplementary services

Type of IN call → ↓ ISUP feature	IN call with DPs armed in the request mode (except DP2)	IP connection without sending of ANM	IP connection with sending of ANM	IN call set-up after an ANM was sent for a previous connection
Basic call				
Access delivery information				Not supported
Connection types allowing fallback capability	Not supported	Not supported	Not supported	Not supported
Propagation delay determination				In the OLE only the accumulated delay from the OLE to the first answered destination is available.
Supplementary services				
Call diversion				The OLE does not receive the following parameters: call diversion information, generic notification indicator, redirection number and redirection number restriction indicator.
Call waiting				The generic notification indicator cannot be delivered to the calling user.
COLP				The connected number and generic number received from the destination local exchange cannot be delivered to the calling user.
UUS1 implicit	Not supported		Not supported	
UUS1 explicit	Not supported		Not supported	
UUS2 explicit	Not supported		Not supported	
UUS3 explicit	Not supported		Not supported	

ITU-T RECOMMENDATIONS SERIES

- Series A Organization of the work of the ITU-T
- Series B Means of expression: definitions, symbols, classification
- Series C General telecommunication statistics
- Series D General tariff principles
- Series E Overall network operation, telephone service, service operation and human factors
- Series F Non-telephone telecommunication services
- Series G Transmission systems and media, digital systems and networks
- Series H Audiovisual and multimedia systems
- Series I Integrated services digital network
- Series J Transmission of television, sound programme and other multimedia signals
- Series K Protection against interference
- Series L Construction, installation and protection of cables and other elements of outside plant
- Series M TMN and network maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits
- Series N Maintenance: international sound programme and television transmission circuits
- Series O Specifications of measuring equipment
- Series P Telephone transmission quality, telephone installations, local line networks
- Series Q Switching and signalling**
- Series R Telegraph transmission
- Series S Telegraph services terminal equipment
- Series T Terminals for telematic services
- Series U Telegraph switching
- Series V Data communication over the telephone network
- Series X Data networks and open system communication
- Series Z Programming languages