



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Q.1601

(12/1999)

SERIES Q: SWITCHING AND SIGNALLING
Intelligent Network

**Signalling System No. 7 – Interaction between
N-ISDN and INAP CS-2**

ITU-T Recommendation Q.1601

(Formerly 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.1699
SIGNALLING REQUIREMENTS AND PROTOCOLS FOR IMT-2000	Q.1700–Q.1799
BROADBAND ISDN	Q.2000–Q.2999

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

**Signalling System No. 7 –
Interaction between N-ISDN and INAP CS-2**

Summary

This ITU-T Recommendation specifies procedures in order to provide interaction between N-ISDN and INAP CS-2/CS-3, i.e. to support IN services in an ISDN environment. This ITU-T 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 N-ISDN in combination with the N-ISDN/INAP interaction Recommendation.

Source

ITU-T Recommendation Q.1601 was prepared by ITU-T Study Group 11 (1997-2000) and approved under the WTSC Resolution 1 procedure on 3 December 1999.

Keywords

INAP, ISUP, SS7, SSP.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. 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 turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSC Resolution 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

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. 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, 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 2001

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 ITU-T terms and definitions	2
4 Abbreviations.....	2
5 Conventions	3
6 Description.....	4
6.1 Establishment of Bearer related connections.....	4
6.2 Establishment of bearer unrelated connections.....	10
7 Operational requirements.....	10
8 Coding requirements.....	10
8.1 Messages	10
8.2 Parameters.....	10
8.2.1 Call diversion treatment indicators parameter.....	10
8.2.2 Called IN number parameter.....	10
8.2.3 Call offering treatment indicators parameter.....	10
8.2.4 Charged party identification parameter	10
8.2.5 Conference treatment indicators parameter	10
8.2.6 Correlation id parameter.....	11
8.2.7 Display information parameter	11
8.2.8 SCF id parameter	11
8.2.9 UID action indicators parameter.....	11
8.2.10 UID capability indicators parameter.....	11
8.2.11 Original called IN number parameter	11
9 State definitions	11
10 Signalling procedures.....	11
10.1 Bearer related connections.....	11
10.1.1 IN basic call	11
10.1.2 IN call with SCP request to collect further digits	17
10.1.3 Detection Point processing	18
10.1.4 Setup of an IN call to destination B.....	20
10.1.5 User interactive dialogue (in-band)	23
10.1.6 Call gapping.....	28
10.1.7 Service filtering	29
10.1.8 SCP initiated call	29
10.1.9 GVNS	31

	Page
10.1.10 Actions to be performed in local exchanges.....	32
10.1.11 Actions in an intermediate exchange.....	33
10.1.12 Actions in international gateway exchanges.....	34
10.2 Bearer unrelated connections.....	34
11 Interaction with other networks.....	34
12 Interaction between IN basic call and ISDN supplementary services.....	34
12.1 Call diversion.....	36
12.1.1 Actions in the service switching point.....	36
12.1.2 Actions in the destination local exchange.....	36
12.2 Calling line identification presentation/restriction.....	37
12.2.1 Actions in the service switching point.....	37
12.3 Completion of calls service.....	37
12.3.1 Completion of calls to busy subscriber.....	37
12.3.2 Completion of calls on no reply.....	37
12.4 Conference.....	37
12.4.1 Actions in the originating or destination local exchange.....	37
12.5 Connected line identification presentation/restriction.....	37
12.5.1 Actions in the service switching point.....	37
12.6 Explicit call transfer.....	38
12.6.1 Actions in the service switching point.....	38
12.7 Malicious call identification.....	38
12.7.1 Actions in the service switching point.....	38
12.7.2 Actions in the destination local exchange.....	38
12.8 Three party.....	39
12.8.1 Actions in the originating or destination local exchange.....	39
13 Interactions between IN services.....	39
14 Parameter values (timers).....	39
Annex A – Signalling flows.....	40
Appendix I – Coding of the compatibility information for the parameters.....	46
Appendix II – Contents of the INAP serviceInteractionIndicatorsTwo.....	47
Appendix III – Limitations for ISUP basic call procedures and supplementary services for different types of IN calls.....	49

Signalling System No. 7 – Interaction between N-ISDN and INAP CS-2

1 Scope

This ITU-T Recommendation specifies the interaction between the N-ISDN and INAP CS-2/CS-3.

For the purpose of this ITU-T Recommendation the interface INAP CS-2 between SSP and SCP is regarded as being an intranetwork interface.

The following topics being part of INAP CS-3 are considered in addition.

- "Carrier" parameter on INAP in the InitialDP and InitiateCallAttempt operation.
- Connected line identification restriction for the called IN number.
- Setting of the "charge indicator".
- Mapping of the calling geodetic location parameter.

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

This ITU-T Recommendation specifies procedures in order to provide interaction between N-ISDN and INAP, i.e. to support IN services in an ISDN environment. In addition new protocol elements for the ISUP are defined in this ITU-T 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 ITU-T 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 ITU-T Recommendation does not specify enhancements to the DSS1 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.1224 (1997), *Distributed functional plane for intelligent network Capability Set 2*.
- [5] ITU-T Recommendation Q.1228 (1997), *Interface Recommendation for intelligent network Capability Set 2*.
- [6] ITU-T Recommendation Q.1290 (1993), *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.732.2-5 (1999), *Stage 3 description for call offering supplementary services using Signalling System No. 7: Call diversion services*.
- [9] ITU-T Recommendation Q.763 (1999), *Signalling System No. 7 – ISDN User Part formats and codes*.
- [10] ITU-T Recommendation Q.764 (1999), *Signalling System No. 7 – ISDN User Part signalling procedures*.
- [11] ITU-T Recommendation Q.931 (1998), *ISDN user-network interface layer 3 specification for basic call control*.

3 ITU-T terms and definitions

This Recommendation defines the following terms:

- **Integrated Services Digital Network (ISDN)**: see ITU-T Recommendation I.112 [2].
- **Service; telecommunication service**: see ITU-T Recommendation I.112 [2].
- **Supplementary service**: see ITU-T Recommendation I.210 [3].
- **Call Control Function (CCF)**: see 3.3/Q.1224 [4].
- **Service Control Function (SCF)**: see 3.3/Q.1224 [4].
- **Service Switching Function (SSF)**: see 3.3/Q.1224 [4].
- **Specialized Resource Function (SRF)**: see 3.3/Q.1224 [4].

4 Abbreviations

This ITU-T Recommendation uses the following abbreviations:

ACM	Address Complete Message (ISUP)
ANM	Answer Message (ISUP)
ATP	Access Transport parameter (ISUP)
CCSS	Call completion Service Setup
CON	Connect Message (ISUP)
CPG	Call Progress Message (ISUP)
DLE	Destination Local Exchange
DP	Detection Point
DSS1	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)
GVNS	Global virtual network service
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
PRI	Pre-release Information message (ISUP)
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
TNS	Transit Network Selection (ISUP)

5 Conventions

The name of each element of the following class of terms is capitalized and capital letter within that term can possibly occur:

- operations.

Example: ContinueWithArgument operation.

The name of each element of the following class of terms is not capitalized and capital letter within that term can possibly occur:

- parameters within operations.

Example: calledPartyNumber.

6 Description

6.1 Establishment of Bearer related connections

ITU-T Recommendation Q.1224 [4] provides a distributed functional plane architecture for IN Capability Set 2 (CS-2). Interactions between the following functional entities (FEs) are relevant for this ITU-T 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 ITU-T 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 ITU-T Recommendation. In the configuration it is assumed that SRF support is not needed. The network signalling system used for call setup is the ITU-T ISUP [10]. The interface between SSF and SCF is the ITU-T INAP [5].

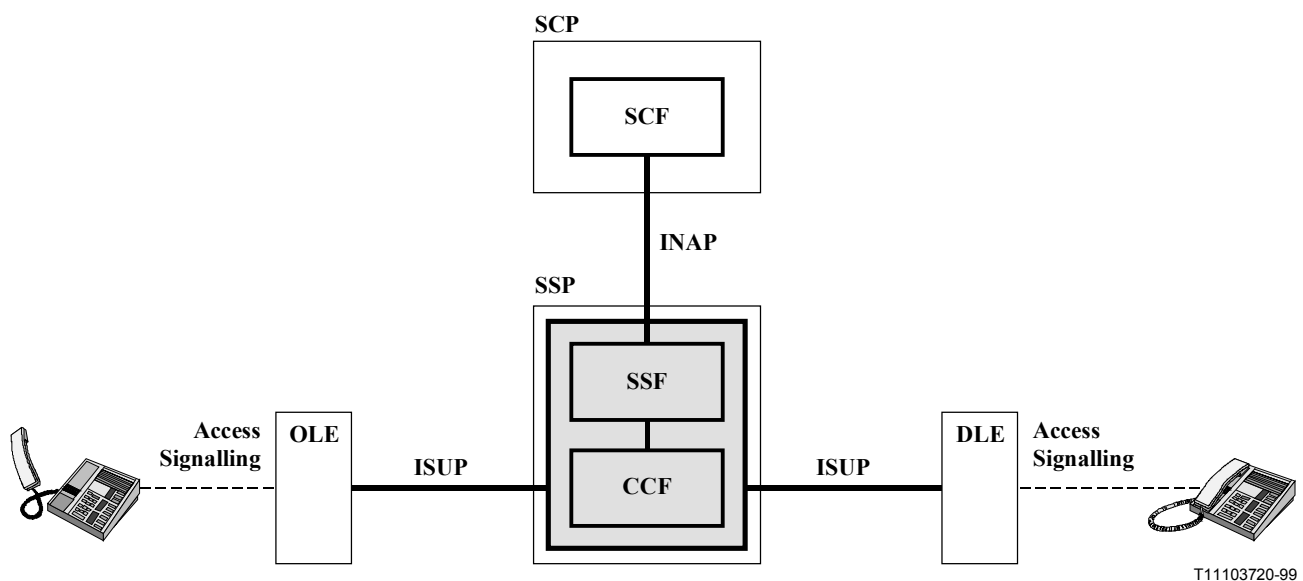


Figure 1/Q.1601 – Signalling configuration for an IN call without SRF support

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 call (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.1601 – List of Detection Points

Detection Points for the originating side	Support	Detection Points for the terminating side	Support
OA Origination_Attempt	No impact on ISUP	TA Terminating_Attempt	No impact on ISUP
OAA Origination_Attempt_Authorized	No impact on ISUP	TAA Terminating_Attempt_Authorized	No impact on ISUP
CI Collected_Information	Yes		
AI Analysed_Information	Yes		
RSF Route_Select_Failure	Yes		
OCPB O_Called_Party_Busy	Yes	TB T_Busy	Yes
		FSA Facility_Selected_and_Available	For further study
OTS O_Term_Seized	Yes	CA Call_Accepted	Yes
ONA O_No_Answer	Yes	TNA T_No_Answer	Yes
OAns O_Answer	Yes	TAns T_Answer	Yes
OMC O_Mid_Call	For further study	TMC T_Mid_Call	For further study
OS O_Suspend	Yes	TS T_Suspend	Yes
ORA O_Re_Answer	Yes	TRA T_Re_Answer	Yes
OD O_Disconnect	Yes	TD T_Disconnect	Yes
OAb O_Abandon	Yes	Tab T_Abandon	Yes

Receipt of INAP operations

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

Table 2/Q.1601 – INAP operations (direction: SCF-SSF)

Operation	Influence on ISUP call handling	Reference
ActivateServiceFiltering	Yes	Subclause 10.1.7 (Service filtering)
ActivityTest	No	
AnalyseInformattion	For further study (Note)	
ApplyCharging	No	
AuthorizeTermination	For further study (Note)	
CallGap	Yes	Subclause 10.1.6 (Call gapping)
CallInformationRequest	No	
Cancel	No	
CancelStatusReportRequest	For further study (Note)	
CollectInformation	Yes	Subclause 10.1.2 (IN call with SCP request to collect further digits)
Connect	Yes	Subclause 10.1.1.1.1.1 (Connect operation)
Continue	Yes	Subclause 10.1.1.1.1.2 (Continue operation)
ContinueWithArgument	Yes	Subclause 10.1.1.1.1.3 (ContinueWithArgument operation)
ConnectToResource	Yes	Subclause 10.1.5.1 (SSP supports requested IP capabilities)
CreateCallSegmentAssociation	No	
DisconnectForwardConnection	Yes	Subclause 10.1.5.2 (Assist method – procedure in the initiating SSP)
DisconnectForwardConnection WithArgument	Yes	Subclause 10.1.5.2 (Assist method – procedure in the initiating SSP)
DisconnectLeg	For further study (Note)	
EstablishTemporaryConnection	Yes	Subclause 10.1.5.2 (Assist method – procedure in the initiating SSP)
FurnishChargingInformation	No	
HoldCallInNetwork	For further study (Note)	
InitiateCallAttempt	Yes	Subclause 10.1.8 (SCP initiated call)
ManageTriggerData	No	
MergeCallSegments	For further study (Note)	
MoveCallSegments	For further study (Note)	
MoveLeg	For further study (Note)	

Table 2/Q.1601 – INAP operations (direction: SCF-SSF) (concluded)

Operation	Influence on ISUP call handling	Reference
Reconnect	For further study (Note)	
ReleaseCall	Yes	Subclause 10.1.1.4 (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 ITU-T Recommendation
RequestReportBCSMEEvent	Yes	Subclause 10.1.3 (Detection Point processing)
RequestReportFacilityEvent	No	
RequestReportUTSI	No	
ResetTimer	No	
SelectFacility	For further study (Note)	
SendFacilityInformation	No	
SelectRoute	For further study (Note)	
SendSTUI	For further study (Note)	
SplitLeg	For further study (Note)	
SendChargingInformation	Yes	Subclause 10.1.1.1.2 (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 1 and Figures 2 to 6 of the ITU-T INAP [5]. Table 3 below 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 ITU-T Recommendation.

Table 3/Q.1601 – 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) NOTE – Transport of additional information in ISUP would be needed.
DSS1 (Note) or implementation dependent NOTE – Extensions to the DSS1 protocol may be required, but this is outside the scope of this ITU-T Recommendation.	Supported (Note) NOTE – The scenarios can be supported from the viewpoint of this ITU-T 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 ITU-T 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 10.1.5.1 (SSP supports requested IP capabilities) and a typical arrow diagram is given in Figure A.3.

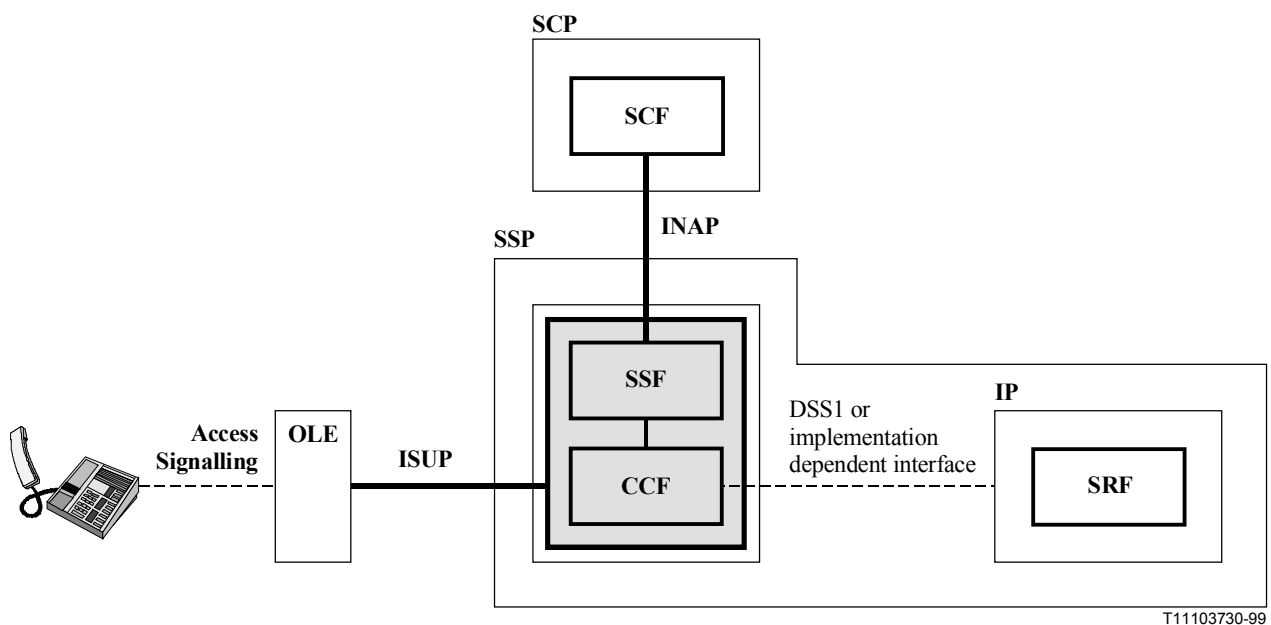


Figure 2/Q.1601 – Connection to integrated or external IP with SSP relay of IP operations

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 10.1.5.2 (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 ITU-T Recommendation. More information can be found in [5]. A typical arrow diagram is given in Figure A.5.

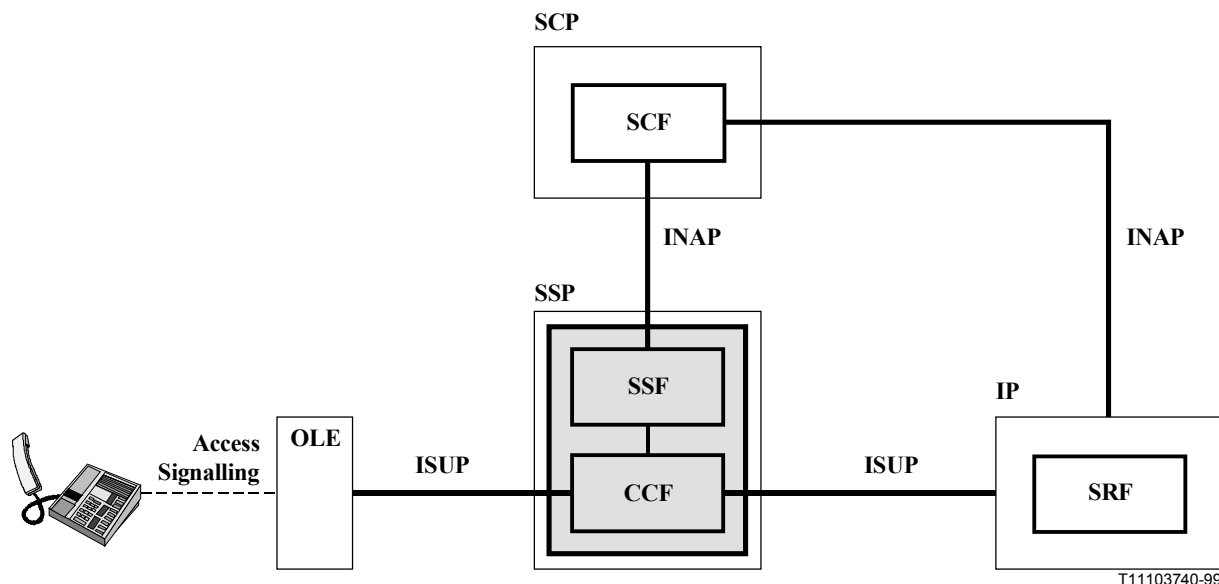


Figure 3/Q.1601 – External IP connected via ISUP; direct TCAP link between SRF and SCF ("Assist" method)

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 ITU-T 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 10.1.5.2 (Assist method – procedure in the initiating SSP) and 10.1.5.4 (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 10.1.5.3 (Hand-off method – procedure in the initiating SSP) and a typical arrow diagram is given in Figure A.7.

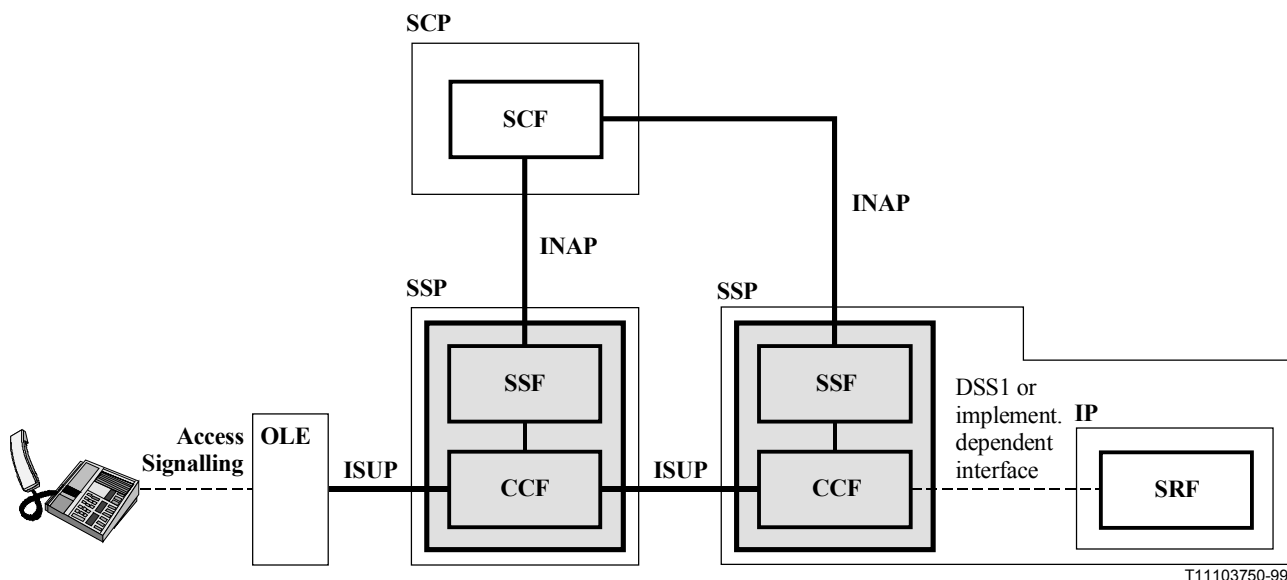


Figure 4/Q.1601 – IP attached to an assisting SSP ("Assist" method)

6.2 Establishment of bearer unrelated connections

For further study.

7 Operational requirements

Not applicable.

8 Coding requirements

8.1 Messages

None.

8.2 Parameters

8.2.1 Call diversion treatment indicators parameter

The format of the call diversion treatment indicators parameter is defined in Q.763 [9].

8.2.2 Called IN number parameter

The format of the called IN number parameter is defined in Q.763 [9].

8.2.3 Call offering treatment indicators parameter

The format of the call offering treatment indicators parameter is defined in Q.763 [9].

8.2.4 Charged party identification parameter

The format of the charged party identification parameter is defined in Q.763 [9].

8.2.5 Conference treatment indicators parameter

The format of the conference treatment indicators parameter is defined in Q.763 [9].

8.2.6 Correlation id parameter

The format of the correlation id parameter is defined in Q.763 [9].

8.2.7 Display information parameter

The format of the display information parameter is defined in Q.763 [9].

8.2.8 SCF id parameter

The format of the SCF id parameter is defined in Q.763 [9].

8.2.9 UID action indicators parameter

The format of the UID action indicators parameter is defined in Q.763 [9].

8.2.10 UID capability indicators parameter

The format of the UID capability indicators parameter is defined in Q.763 [9].

8.2.11 Original called IN number parameter

The format of the called IN number parameter is defined in Q.763 [9].

9 State definitions

No specific state definitions are required.

10 Signalling procedures

10.1 Bearer related connections

10.1.1 IN basic call

For this ITU-T 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.

10.1.1.1 Successful call setup

10.1.1.1.1 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 10.1.3 (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 setup information is awaited [see 10.1.1.1.7 (Simple segmentation)]. The mapping of parameters is shown in Table 4.

Table 4/Q.1601 – 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) or TMR (Note 3)	bearerCapability
Redirecting number	redirectingPartyID
Redirection information	redirectionInformation
CCSS with "CCSS call indicator"	cCSS
Access Transport	iSDNAccessRelatedInformation
Generic Number	genericNumbers
TNS	carrier (Note 4)
Calling geodetic location	callingGeodeticLocation
<p>NOTE 1 – Optional parameters may be absent, i.e. they are only mapped, if these parameters are available at the DP.</p> <p>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.</p> <p>NOTE 3 – The choice whether to use the user service information or the TMR is network option.</p> <p>NOTE 4 – The first octet, the carrier selection field, is coded to "no indication". The following octets are populated with the contents of the TNS parameter received.</p>	

10.1.1.1.1 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 serviceInteractionIndicatorsTwo 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 10.1.1.1.2 (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 setup.

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.1601 – 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)
serviceInteractionIndicatorsTwo	See 10.1.1.1.4 (Mapping of the INAP serviceInteractionIndicatorsTwo)
originalCalledPartyID	Original called number
callingPartysCategory	Calling party's category
redirectingPartyID	Redirecting number
redirectionInformation	Redirection information
isdnAccessRelated Information	ATP (Note 5)
forwardCallIndicators	Forward call indicators
genericNumbers	Generic Number (Note 4)
Carrier	TNS (Note 6)

Table 5/Q.1601 – Mapping of parameters from Connect to IAM (*concluded*)

NOTE 1 – Optional parameters may be absent, i.e. they are only mapped, if received.
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.
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.1228 [5].
NOTE 4 – The mapping of this parameter must not compromise the existing services supported by ISUP (MCID, CLIP, etc.).
NOTE 5 – Due to the end to end significance of the ATP DSS1 information elements only the "called party subaddress" and "calling party subaddress" contained in the "isdAccessRelatedInformation" are mapped to the "called party subaddress" and "calling party subaddress" of the ATP. Other information elements are copied from the ATP received on the incoming ISUP. The mapping of these information elements must not compromise the existing services supported by ISUP (CLIP, etc.).
NOTE 6 – The carrier selection field received in the Carrier parameter is not mapped. The octets following to the carrier selection field are as a national option mapped to the TNS parameter or not mapped.

10.1.1.1.2 Continue operation

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

10.1.1.1.3 ContinueWithArgument operation

On receipt of a ContinueWithArgument operation from the SCP, call processing is resumed and the call setup will be performed as described in 2.1.2.2/Q.764 [10].

In addition, the following parameter received from the SCP in the ContinueWithArgument operation will be sent in the IAM by the SSP as shown in Table 6.

Parameters which were received in the IAM and are not replaced by parameters of the ContinueWithArgument operation are treated according to the normal procedures.

Table 6/Q.1601 – Mapping of parameters from ContinueWithArgument to IAM

INAP operation ContinueWithArgument (Note)	ISUP message IAM
ServiceInteractionIndicatorsTwo	See 10.1.1.1.4 (Mapping of the INAP serviceInteractionIndicatorsTwo)
NOTE – Optional parameters may be absent, i.e. they are only mapped, if received.	

10.1.1.1.4 Mapping of the INAP serviceInteractionIndicatorsTwo

The INAP serviceInteractionIndicatorsTwo 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.

NOTE – In the context of IN CS-2 the serviceInteractionIndicatorsTwo is used. However the serviceInteractionIndicators may also be received, but the mapping of the serviceInteractionIndicators is network-operator specific.

Table 7 describes the mapping from the INAP to the ISUP with regard to the serviceInteractionIndicatorsTwo.

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

- a) If in the INAP serviceInteractionIndicatorsTwo parameter a value has been received indicated as default in Table 7, 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 contents is unequal zero.

Table 7/Q.1601 – Mapping of the INAP serviceInteractionIndicatorsTwo

INAP serviceInteractionIndicatorsTwo	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 serviceInteractionIndicatorsTwo 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).

10.1.1.1.4.1 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.

10.1.1.1.2 SendChargingInformation operation

The following mapping is not intended for freephone services but for supporting reverse charging on a per call basis.

The presence of the noCharge parameter in the SendChargingInformation operation indicates that no charge should be applied to the A-party.

If the partyToCharge parameter (also of the sendChargingInformation [SCI] operation) indicates the B-party then the noCharge parameter, if present, should be ignored.

If the SCI operation is received by ISUP after call setup, then the noCharge parameter, if present, should be ignored.

If the noCharge parameter is determined not be ignored, then this parameter should be mapped to the "Charge indicator" within the next backward signalling message which includes the backward call indicators parameter.

This mapping does not exclude a different mapping in a specific national network.

10.1.1.1.3 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 serviceInteractionIndicatorsTwo parameter was received in the Connect operation [see 10.1.1.1.4 (Mapping of the INAP serviceInteractionIndicatorsTwo)].

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 3n description (see [8]).

10.1.1.1.4 Information message (national option)

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

10.1.1.1.5 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.

10.1.1.1.6 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.

10.1.1.1.7 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.

10.1.1.1.8 Pre-release Information message

Upon receipt of a PRI message by a SSP, the received information is stored and processed upon receipt of the associated release message as specified in ITU-T Q.764.

When the SSP detects that additional information is to be sent at release time, this information is sent in a PRI message immediately prior to the REL message.

10.1.1.2 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.1228 [5] are applicable.

10.1.1.3 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 serviceInteractionIndicatorsTwo parameter.

10.1.1.4 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 2.3.3/Q.764 [10] are applicable.

10.1.1.5 Transfer of the called IN number and original called IN number

In all cases 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 of the Called IN number parameter is set according to the called IN number presentation restricted indicator received in the INAP serviceInteractionIndicatorsTwo parameter.

If the Called IN Number parameter had been received from the preceding exchange, but no Original Called IN Number was received, the contents of the received Called IN Number is transferred unchanged in the Original Called IN number parameter.

If an Original Called IN Number is received, it is passed on unchanged.

10.1.1.5.1 Interworking with an ISUP not supporting the called IN number or the original called IN number parameter

No specific action is required.

10.1.1.6 Abnormal conditions

10.1.1.6.1 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.

10.1.2 IN call with SCP request to collect further digits

After sending the InitialDP operation to the SCP, a RequestReportBCSMEvent operation to arm DP CI accompanied by a CollectInformation operation may be received from the SCP (see 3.3.15/Q.1228 [5]). In this case the specified number of digits will be collected in the SSP. Encountering DP CI, 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 10.1.1.5, 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 10.1.1 (IN basic call), unless a further RequestReportBCSMEvent operation to arm DP CI accompanied by a CollectInformation operation is received from the SCP. In this case the procedure described above is repeated.

10.1.3 Detection Point processing

10.1.3.1 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 10.1.1 (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. See Table 8.

Table 8/Q.1601 – Event Detection Points

DP	DP encountered on ...
CI	See 10.1.2 (IN call with SCP request to collect further digits).
OTS, CA	Receipt of an ACM or CPG message with an alerting indication.
RSF	National network specific.
OCPB, TB	Receipt of a REL message with cause value #17 (user busy) (Note).
ONA, TNA	Expiry of timer T _{NoReply} .
OAns, TAns	Receipt of an ANM or CON message.
OS, TS	Receipt of a SUS message with the indication "network initiated".
ORA, TRA	Receipt of a RES message with the indication "network initiated".
OD, TD	a) Receipt of a REL message with cause value #16 (normal call clearing) in the active phase of a call (Note). b) Expiry of timer T _{SUS} .
OAb, Tab	Receipt of a REL message with cause value #16 (normal call clearing) from a preceding exchange before the call is answered (Note).
NOTE – These are examples of correspondence between cause values and DPs. The network operator shall have the possibility to define the complete mapping between cause values and DPs. It should be noted that any operator defined mapping may contradict those defined in future IN Capability Sets.	

In the following, the differences in call processing for IN calls with dynamically armed detection points compared to the procedures described in 10.1.1 (IN basic call) and 10.1.4 (Setup of an IN call to destination B) are listed.

10.1.3.1.1 Address complete message

On receipt of a ACM message without a cause parameter, the timer T_{NoReply} is started if either DP ONA or TNA has been armed by the SCF.

10.1.3.1.2 Answer or connect message

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

10.1.3.1.3 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.1228 [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.1228 [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.1228 [5] are applicable. The call processing is suspended and the SSP waits for SCP instructions.

10.1.3.2 Actions to be performed in case of DPs armed in the request mode (except for DP Collect information)

10.1.3.2.1 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.

10.1.3.2.2 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/Q.764 [10].

10.1.3.2.3 Impact on supplementary services

10.1.3.2.3.1 User-to-user signalling

10.1.3.2.3.1.1 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.

10.1.3.2.3.1.2 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.

10.1.3.2.3.1.3 User-to-user signalling, service 3

a) *Service request during call setup*

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 setup*

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.

10.1.4 Setup of an IN call to destination B

This subclause describes the setup 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 setup differs from the normal call setup for the "IN basic call".

10.1.4.1 Successful call setup

10.1.4.1.1 Forward address signalling

10.1.4.1.1.1 Connect operation

On receipt of the Connect operation the actions described in 10.1.1.1.1.1 (Connect operation) are performed with the following exceptions:

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

10.1.4.1.2 Mapping of the INAP serviceInteractionIndicatorsTwo

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

In this case the indicators of the INAP serviceInteractionIndicatorsTwo parameter relevant for the forward direction, i.e. to be mapped into the IAM, are treated as described in 10.1.1.1.1.4 (Mapping of the INAP serviceInteractionIndicatorsTwo).

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

- The indicators contained in the received INAP serviceInteractionIndicatorsTwo 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 be sent.

10.1.4.1.3 Sending of backward messages

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

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

Table 9 describes which message is to be sent in the different cases.

Table 9/Q.1601 – Sending of backward messages

<p>Message received or message to be sent, respectively →</p> <p>↓ Messages already sent</p>	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
<p>NOTE 1 – If a serviceInteractionIndicatorsTwo parameter was provided in the INAP operation, this message carries the corresponding ISUP parameters, if applicable.</p> <p>NOTE 2 – An originating local exchange conforming to [10] will discard this CPG message since no generic notification parameter is contained in the message.</p>					

10.1.4.1.4 Address complete message

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

- The awaiting address complete timer T7 is stopped.
- 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.
- 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 10.1.4.1.3 (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.

10.1.4.1.5 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 10.1.4.1.3 (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.

10.1.4.1.6 Connect message

Upon receipt of a CON message the awaiting address complete timer T7 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 10.1.4.1.3 (Sending of backward messages).

10.1.4.1.7 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 10.1.4.1.3 (Sending of backward messages).

10.1.4.2 Timer T_{UID} expiry

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

10.1.4.3 Abnormal conditions

10.1.4.3.1 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.

10.1.4.4 Impact on supplementary services

10.1.4.4.1 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.

10.1.4.4.2 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.

10.1.5 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.

10.1.5.1 SSP supports requested IP capabilities

10.1.5.1.1 Successful call setup

10.1.5.1.1.1 Forward address signalling

10.1.5.1.1.1.1 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 10.1.3.2.2 (Signalling procedures for connection type allowing fallback). If other TMR values are received, the call is released using cause value #65.

10.1.5.1.1.2 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 10.1.1 (IN basic call).

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

- a) *Through-connection instruction*
If the bothway through-connect indicator in the serviceInteractionIndicatorsTwo 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 serviceInteractionIndicatorsTwo 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 10.1.4.1.3 (Sending of backward messages). The CPG message shall contain the UID action indicators parameter as described above for the ACM message.

10.1.5.1.1.3 Answer message

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

- a) If the bothway through-connect indicator in the serviceInteractionIndicatorsTwo 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 serviceInteractionIndicatorsTwo 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 the preceding exchange, then instead of ANM a different message may be sent. This is described in 10.1.4.1.3 (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 ITU-T Recommendation.

10.1.5.1.2 Storage and release of initial address information

Initial address information is retained in memory to allow a call setup 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.

10.1.5.1.3 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 bothway throughconnect indicator in the serviceInteractionIndicatorsTwo 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].

10.1.5.1.4 DisconnectForwardConnection operation

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

10.1.5.1.5 Impact on supplementary services

10.1.5.1.5.1 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 serviceInteractionIndicatorsTwo (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 serviceInteractionIndicatorsTwo (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 serviceInteractionIndicatorsTwo, 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.

10.1.5.1.5.2 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.

10.1.5.1.5.2.1 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.

10.1.5.1.5.2.2 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.

10.1.5.1.5.2.3 User-to-user signalling, service 3

a) *Service request during call setup*

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 setup*

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.

10.1.5.2 Assist method – procedure in the initiating SSP

10.1.5.2.1 Successful call setup

10.1.5.2.1.1 Forward address signalling

10.1.5.2.1.1.1 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 10.1.3.2.2 (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 setup 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 10 illustrates the mapping of parameters received in the EstablishTemporaryConnection operation to parameters sent in the IAM message.

Table 10/Q.1601 – Mapping of parameters from EstablishTemporaryConnection to IAM

INAP operation EstablishTemporaryConnection (Note)	ISUP message IAM
assistingSSPIPRoutingAddress	Called party number
serviceInteractionIndicatorsTwo	See 10.1.1.1.4 (Mapping of the INAP serviceInteractionIndicatorsTwo)
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 10 (Mapping of parameters from EstablishTemporaryConnection to IAM), the IAM contains the following optional parameters:

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

On sending of the IAM an ACM message is sent to the preceding exchange encoded as described in 10.1.1 (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.

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

If the parameters cannot be transferred to the assisting SSP, the setup of the connection will fail.

10.1.5.2.1.2 Address complete message

Refer to 10.1.4.1.4 (Address complete message).

10.1.5.2.1.3 Call Progress message (Basic call)

Refer to 10.1.4.1.5 (Call Progress message (Basic call)).

10.1.5.2.1.4 Connect message

Refer to 10.1.4.1.6 (Connect message).

10.1.5.2.1.5 Answer message

Refer to 10.1.4.1.7 (Answer message).

10.1.5.2.2 Storage and release of initial address information

In the initiating SSP initial address information is retained to allow a call setup 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.

10.1.5.2.3 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.

10.1.5.2.4 DisconnectForwardConnectionWithArgument operation

When the DisconnectForwardConnectionWithArgument 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.

10.1.5.2.5 Abnormal conditions

10.1.5.2.5.1 Handling of unexpected messages

Refer to 10.1.4.3.1 (Handling of unexpected messages).

10.1.5.2.6 Impact on supplementary services

The actions as described in 10.1.4.4 (Impact on supplementary services) are applicable.

10.1.5.3 Hand-off method – procedure in the initiating SSP

On receipt of a Connect operation from the SCP, the actions described in 10.1.1 (IN basic call) or in subclause 10.1.4 (Setup 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.

10.1.5.4 Assist/Hand-off method – procedure in the assisting SSP

10.1.5.4.1 Successful call setup

10.1.5.4.1.1 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 11.

Table 11/Q.1601 – Mapping of parameters from IAM to AssistRequestInstruction

ISUP message IAM	INAP operation AssistRequestInstruction
Correlation id	correlationID

10.1.5.4.1.1.1 ConnectToResource operation

The procedure to be performed after receipt of the ConnectToResource operation is identical to the procedure described in 10.1.5.1 (SSP supports requested IP capabilities).

10.1.6 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.1228 [5].

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

- 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 gapTreatment is not present in the CallGap operation, the SSF will use a default treatment depending on network-operator implementation.

10.1.7 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.1228 [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.

10.1.7.1 Impact on supplementary services

10.1.7.1.1 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.

10.1.8 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 setup 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.

10.1.8.1 Successful call setup

10.1.8.1.1 Forward address signalling

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

10.1.8.1.1.1 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 12 (Mapping of parameters from InitiateCallAttempt to IAM)].

Table 12 illustrates the mapping of parameters received in the InitiateCallAttempt operation to parameters sent in the IAM message.

Table 12/Q.1601 – Mapping of parameters from InitiateCallAttempt to IAM

INAP operation InitiateCallAttempt (Note 1)	ISUP message IAM
destinationRoutingAddress	Called party number
callingPartyNumber	Calling party number
serviceInteractionIndicatorsTwo	See 10.1.1.1.4 (Mapping of the INAP serviceInteractionIndicatorsTwo)
carrier	TNS (Note 2)
NOTE 1 – Optional parameters may be absent, i.e. they are only mapped, if received. NOTE 2 – The carrier selection field received in the Carrier parameter is not mapped. The octets following to the carrier selection field are as a national option mapped to the TNS parameter or not mapped.	

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 12, the IAM contains the following optional parameters:

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

10.1.9 GVNS

This subclause describes the setup of an GVNS call. In this situation, the call setup differs from the normal call setup for the "IN basic call".

10.1.9.1 Procedure in the SSP providing the GVNS access function

In addition to the description given in 10.1.1 (IN basic call), the following actions are to be performed.

When receiving the Connect or the ContinueWithArgument Operation with the forwardGVNS parameter, the SSP maps it to the ISUP parameter "Forward GVNS" in IAM in addition to the mapping given in 10.1.1 (IN basic call) according to Table 13.

Table 13/Q.1601 – GVNS Mapping of parameters from Connect/ContinueWithArgument to IAM

INAP operation Connect/ContinueWithArgument	ISUP message IAM
ForwardGVNS	Forward GVNS

On receipt of ANM/CON the received ISUP parameter "Backward GVNS" parameter is mapped to ERB "backwardGVNS" parameter on INAP (if armed) according to Table 14.

Table 14/Q.1601 – GVNS Mapping of parameters from ANM/CON to ERB

ISUP message ANM/CON	INAP operation EventReportBCSM
Backward GVNS	backwardGVNS

In addition the SSP discards the "backward GVNS" parameter received in ANM/CON.

On receipt of ANM/CON the Backward GVNS parameter is mapped to the backwardGVNS parameter of the EventReportBCSM operation, if applicable.

10.1.9.2 Procedure in the SSP providing the originating GVNS routing function

In addition to the description given in 10.1.1 (IN basic call), the following actions are to be performed.

When receiving the IAM, the actions described in 10.1.1 (IN basic call) are performed. In addition to the mapping given there, the following mapping is applied (see Table 15):

Table 15/Q.1601 – GVNS mapping of parameters from IAM to InitialDP

ISUP message IAM	INAP operation InitialDP
Forward GVNS	forwardGVNS

When receiving the Connect or the ContinueWithArgument Operation with the forwardGVNS parameter, the SSP maps it to the ISUP parameter "Forward GVNS" in IAM in addition to the mapping given in 10.1.1 (IN basic call) according to Table 16.

**Table 16/Q.1601 – GVNS Mapping of parameters from
Connect/ContinueWithArgument to IAM**

INAP operation Connect/ContinueWithArgument	ISUP message IAM
forwardGVNS	Forward GVNS

10.1.9.3 Procedure in the SSP providing the terminating GVNS routing function

In addition to the description given in 10.1.1 (IN basic call), the following actions are to be performed.

When receiving the IAM, the actions described in 10.1.1 (IN basic call) are performed. In addition to the mapping given there, the following mapping is applied (see Table 17):

Table 17/Q.1601 – GVNS Mapping of parameters from IAM to InitialDP

ISUP message IAM	INAP operation InitialDP
Forward GVNS	forwardGVNS

When receiving the Connect or the ContinueWithArgument Operation with the backwardGVNS parameter, the SSP maps it to the ISUP parameter "Backward GVNS" in ANM/CON according to Table 18 in addition to the actions described in 10.1.1 (IN basic call).

**Table 18/Q.1601 – GVNS mapping of parameters from Connect/
ContinueWithArgument to ANM/CON**

INAP operation Connect/ContinueWithArgument	ISUP message ANM/CON
BackwardGVNS	Backward GVNS

The Forward GVNS parameter received in IAM is discarded.

10.1.10 Actions to be performed in local exchanges

10.1.10.1 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.

10.1.10.1.1 Successful call setup

10.1.10.1.1.1 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.

10.1.10.1.2 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 10.1.4.2 (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 12 (Interaction between IN basic call and ISDN supplementary services).

10.1.10.2 Actions in the destination local exchange

10.1.10.2.1 Successful call setup

10.1.10.2.1.1 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 12 (Interaction between IN basic call and ISDN supplementary services).

10.1.10.2.1.1.1 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 setup 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.

10.1.11 Actions in an intermediate exchange

10.1.11.1 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.

10.1.11.2 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 10.1.4.2 (Timer T_{UID} expiry).

10.1.12 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.

10.2 Bearer unrelated connections

For further study.

11 Interaction with other networks

For further study.

12 Interaction between IN basic call and ISDN supplementary services

The description in this clause assumes that the SCF controls IN service(s) dependent on whether ISDN supplementary services are influenced for a call.

An overview on the interactions between IN services and ISDN supplementary services is given in Table 19.

The second 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 third column contains the reference to the subclause describing the action to be taken in case of "impact". The fourth 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 19/Q.1601 – 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 setup	No		
Advice of charge during the call	No		
Advice of charge at the end of the call	No		
Call deflection	Yes	See 12.1 (Call diversion)	SSP/DLE
Call forwarding busy	Yes	See 12.1 (Call diversion)	SSP/DLE
Call forwarding reply	Yes	See 12.1 (Call diversion)	SSP/DLE
Call forwarding unconditional	Yes	See 12.1 (Call diversion)	SSP/DLE
Calling line identification presentation Calling line identification restriction	Yes	See 12.2 (Calling line identification presentation/restriction)	SSP
Call hold	No		
Call waiting	No		
Closed user group	No		
Completion of calls to busy subscriber	Yes	See 12.3 (Completion of calls service)	SSP
Completion of calls on no reply	Yes	See 12.3 (Completion of calls service)	SSP
Add-on conference call	Yes	See 12.4 (Conference)	OLE/DLE
Connected line identification presentation Connected line identification restriction	Yes	See 12.5 (Connected line identification presentation/restriction)	SSP
Direct-dialling-in	No		
Explicit call transfer	Yes	See 12.6 (Explicit call transfer)	SSP
GVNS	No		
International telecommunication charge card	No		
Malicious call identification	Yes	See 12.7 (Malicious call identification)	SSP/DLE
Meet-me conference	No		
Multilevel precedence and pre-emption	No		
Multiple subscriber number	No		
Reverse charging	Yes	National network specific	
Subaddressing	No		
Terminal portability	No		

**Table 19/Q.1601 – 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 12.8 (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		

12.1 Call diversion

12.1.1 Actions in the service switching point

If "suppress information" was received in the INAP serviceInteractionIndicatorsTwo (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.

12.1.2 Actions in the destination local exchange

12.1.2.1 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.

12.1.2.2 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.

12.1.2.3 Call forwarding no reply

Call forwarding on 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.

12.1.2.4 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.

12.2 Calling line identification presentation/restriction

12.2.1 Actions in the service switching point

If a callingPartyNumber parameter or GenericNumbers parameter has been received in the Connect operation, then the mapping of these parameters must not compromise existing services supported by ISUP [refer to Table 5 (Mapping of parameters from Connect to IAM)].

12.3 Completion of calls service

12.3.1 Completion of calls to busy subscriber

12.3.1.1 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".

12.3.2 Completion of calls on no reply

12.3.2.1 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 ACM (subscriber free) or CPG (alerting) message a "CCNR possible" in the CCNR Possible indicator parameter is replaced with "CCNR not possible".

12.4 Conference

12.4.1 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.

12.5 Connected line identification presentation/restriction

12.5.1 Actions in the service switching point

If "no impact" was received in the INAP serviceInteractionIndicatorsTwo (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 serviceInteractionIndicatorsTwo, 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 serviceInteractionIndicatorsTwo, 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 the called party number and possible subsequent number parameters, until the 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.

If "present called IN number restricted" was received in the INAP serviceInteractionIndicatorsTwo, 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: 01 (presentation restricted);

address signals: as received in the called party number and possible subsequent number parameters, until the 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.

12.6 Explicit call transfer

12.6.1 Actions in the service switching point

If "suppress information" was received in the INAP serviceInteractionIndicatorsTwo (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.

12.7 Malicious call identification

12.7.1 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.

12.7.2 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.

12.8 Three party

12.8.1 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.

13 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 5).

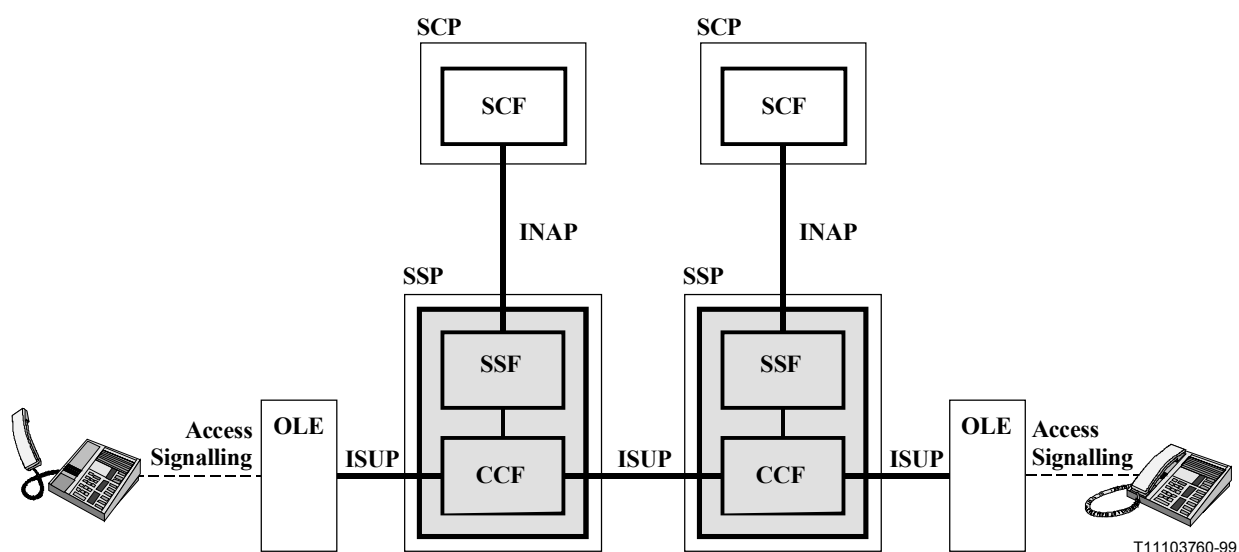


Figure 5/Q.1601 – Configuration with two SSPs involved in the call

No signalling is provided in the ITU-T INAP (CS-2) and ISUP to support interactions between IN services. This topic will be discussed in future capability sets.

14 Parameter values (timers)

See Table 20.

Table 20/Q.1601 – 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 10.1.1.3 (Suspend, resume) Subclause 10.1.3 (Detection Point processing)
T _{NoReply}	SCF controlled	At receipt of ACM when DP ONA or TNA has been armed. (Note)	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 10.1.4.2 (Timer T _{UID} expiry)
NOTE – Except for receipt of ACM with cause parameter.					

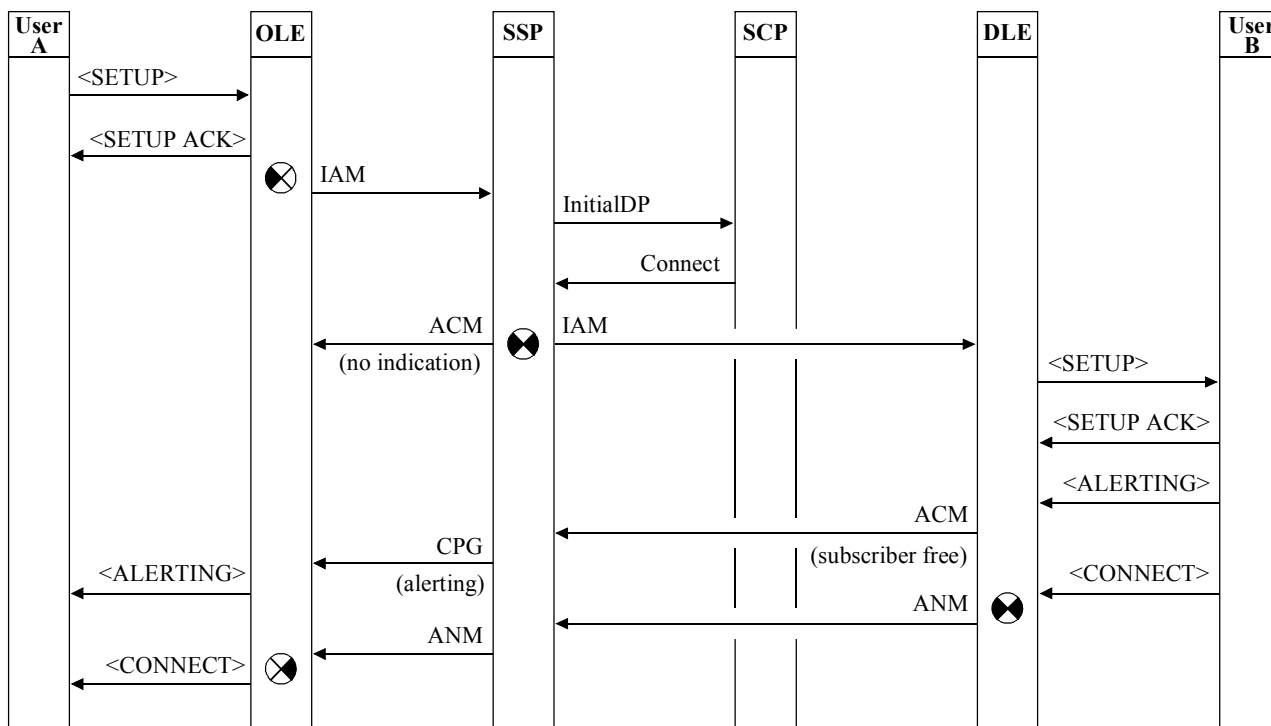
ANNEX A

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 ITU-T Recommendation, the text takes precedence. The signal flows on the access protocol are also indicated, but in a simplified manner for illustrative purposes only.

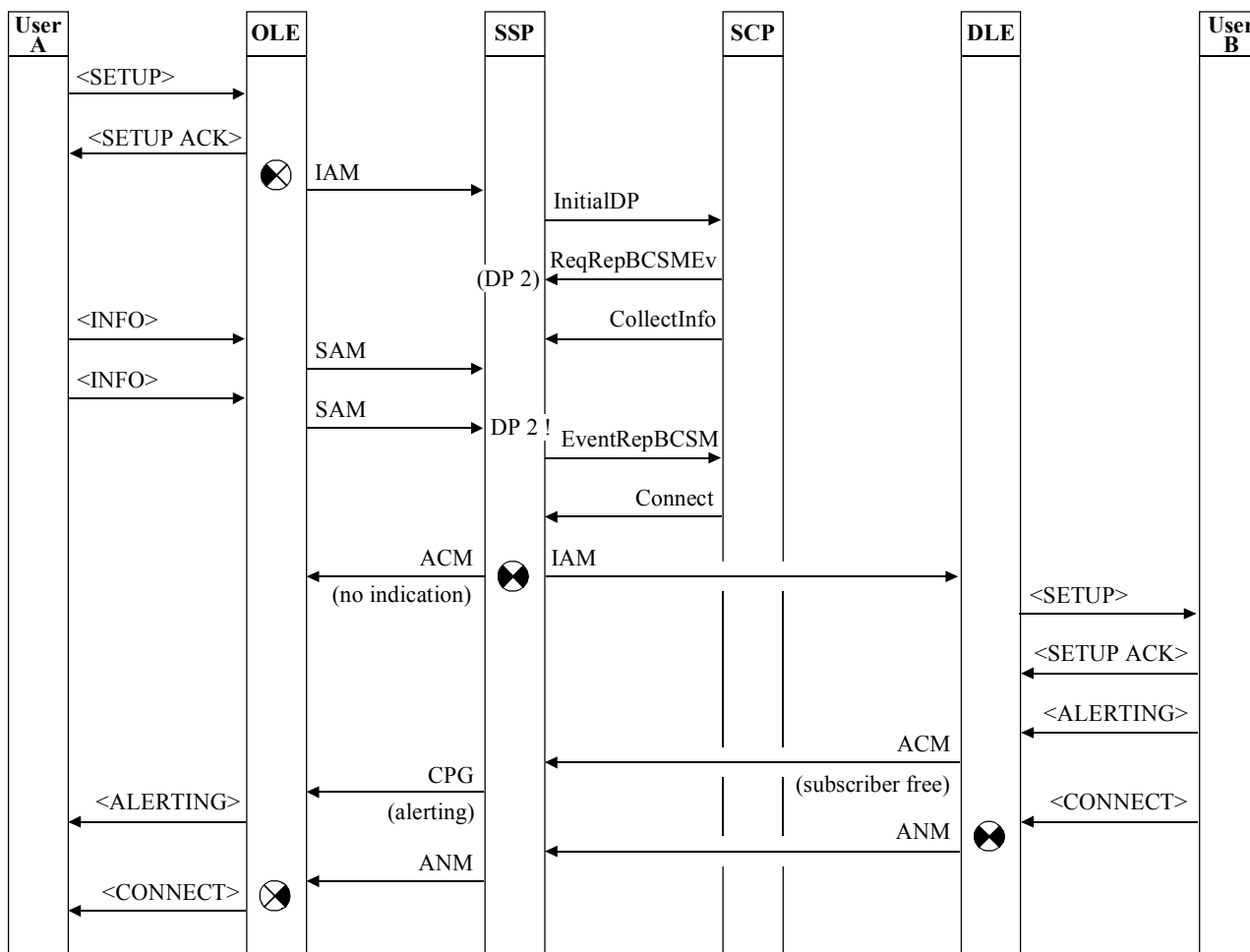
The following abbreviations and notations are used in Figures A.1 to A.7:

A-SSP	Assisting SSP
AssReqInstr	AssistRequestInstruction operation
(DP _x)	arm DP x
DP _x !	DP x encountered
DFC	DisconnectForwardConnection
CTR	ConnectToResource operation
EstTempConn	EstablishTemporaryConnection operation
I-SSP	Initiating SSP
P&C	PromptAndCollectUserInformation operation
ReqReportBCSMEv	RequestReportBCSMEv operation
⊗	Switchpath completed in backward direction
⊙	Switchpath completed in forward direction
⊗⊙	Switchpath completed in both directions
⊘	Release switchpath



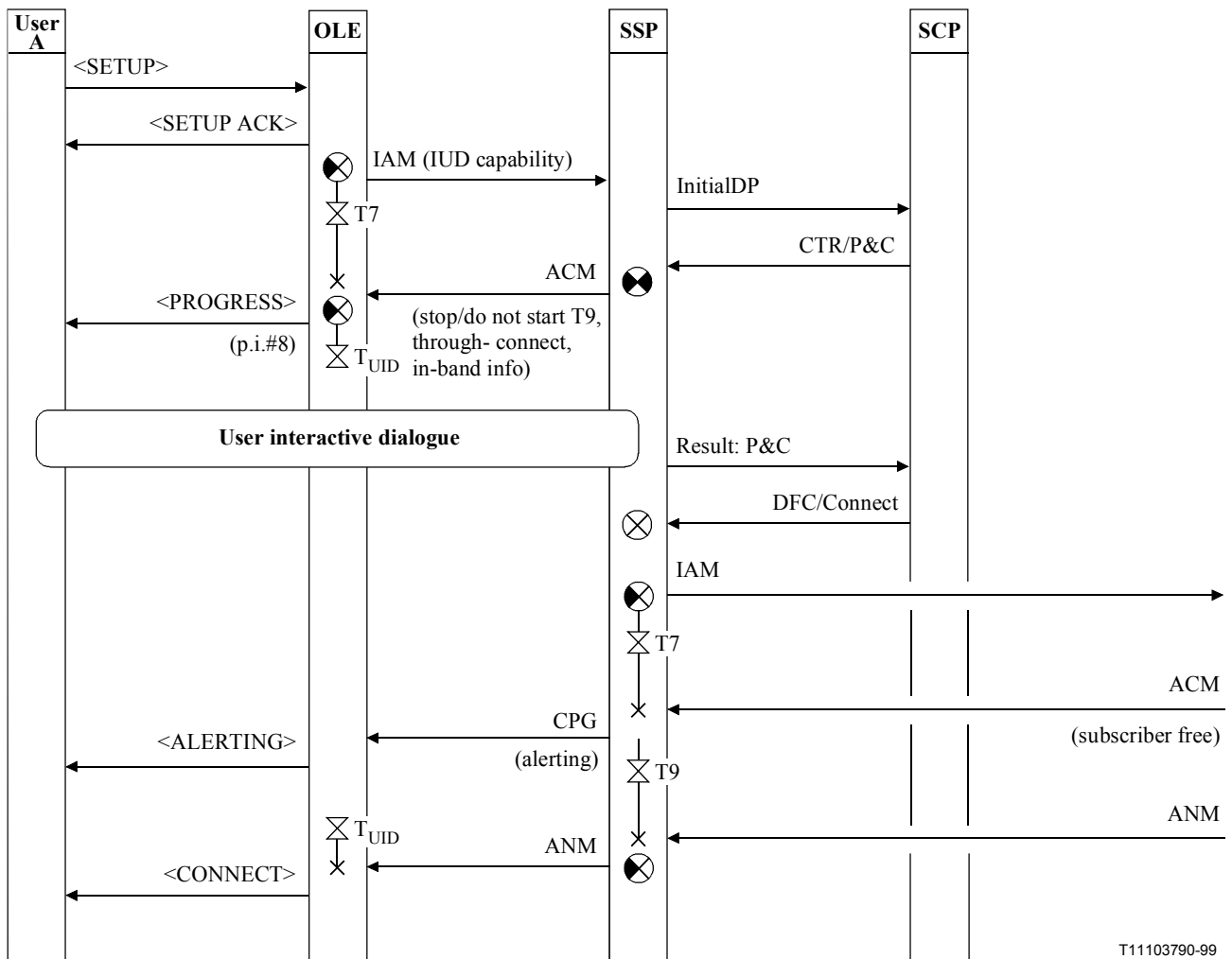
T11103770-99

Figure A.1/Q.1601 – IN basic call



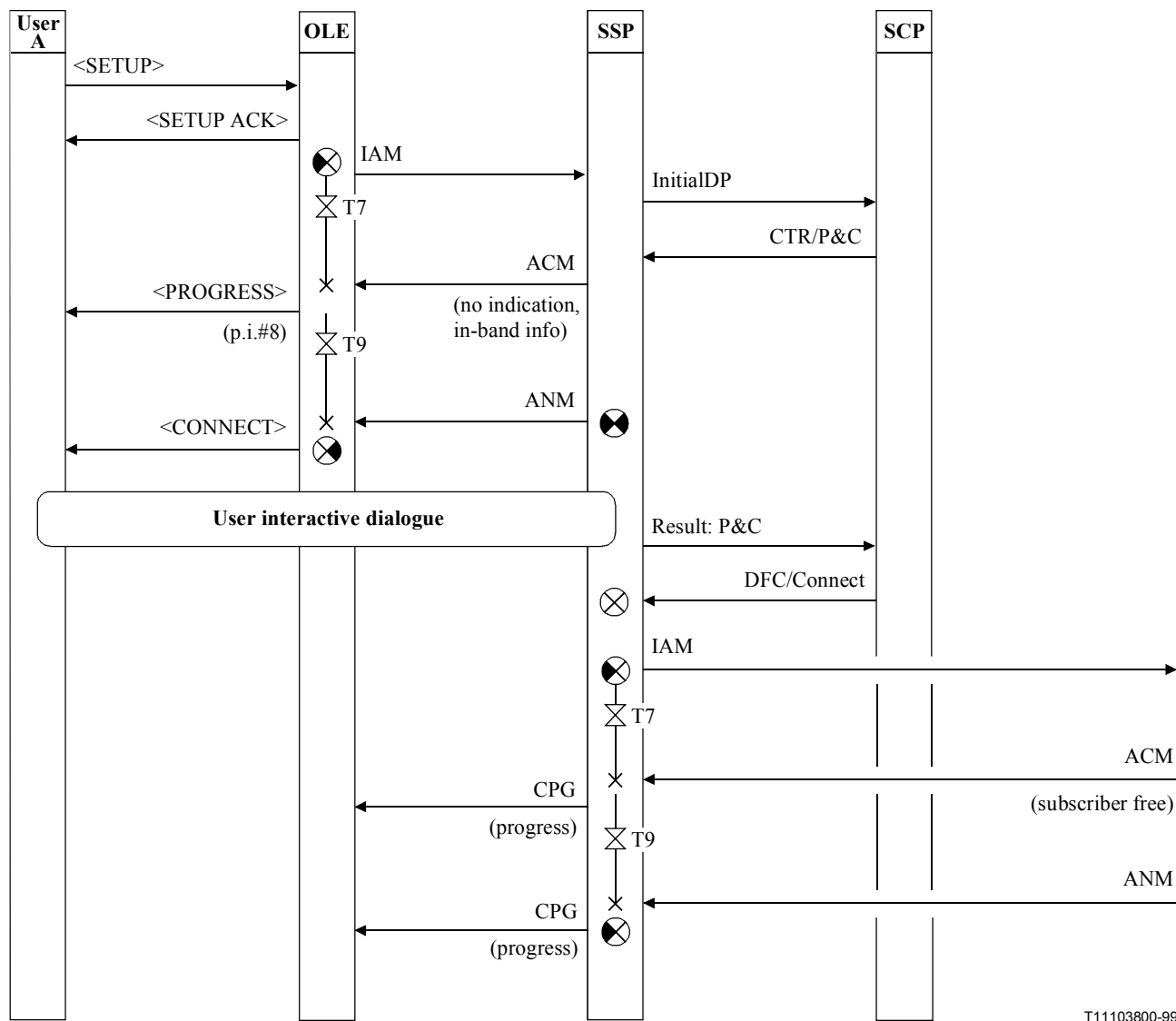
T11103780-99

Figure A.2/Q.1601 – IN call with SCP request to collect further digits



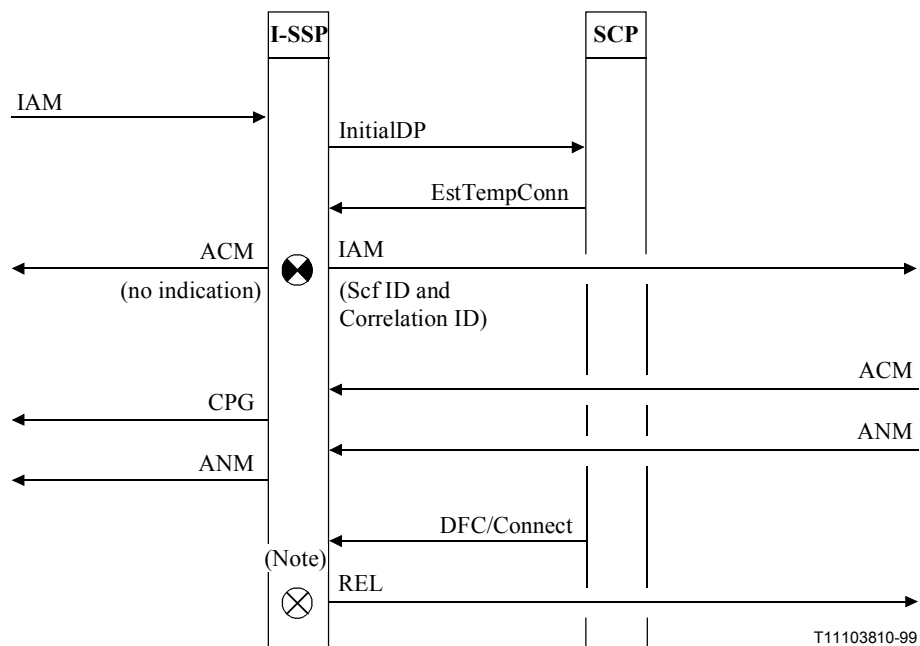
T11103790-99

Figure A.3/Q.1601 – IN call with user interactive dialogue (in-band) SSP supports requested IP capabilities OLE supports UID capabilities



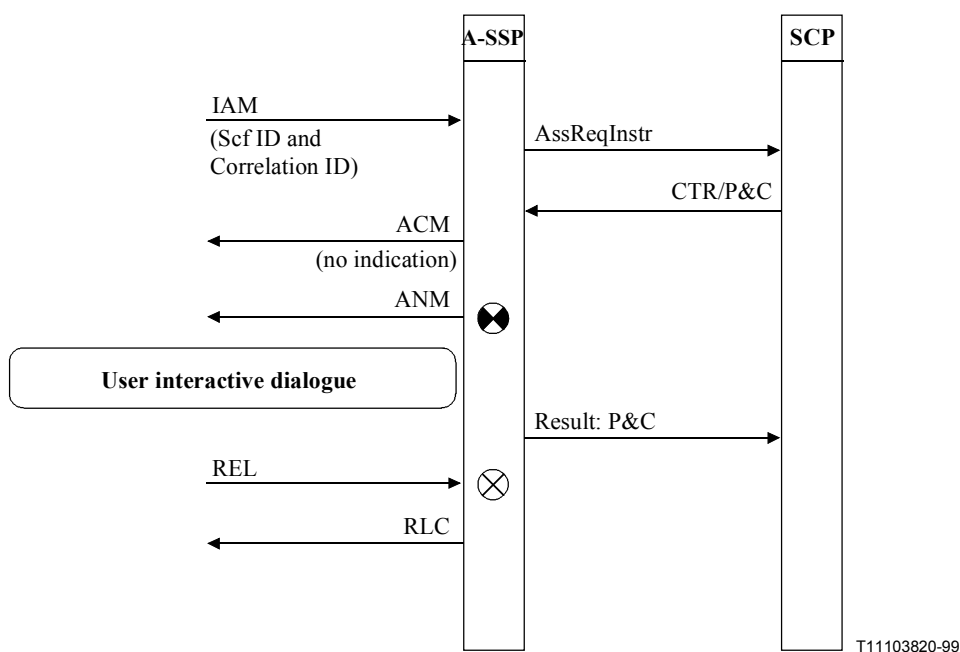
T11103800-99

Figure A.4/Q.1601 – IN call with user interactive dialogue (in-band) SSP supports requested IP capabilities OLE does not support UID capabilities

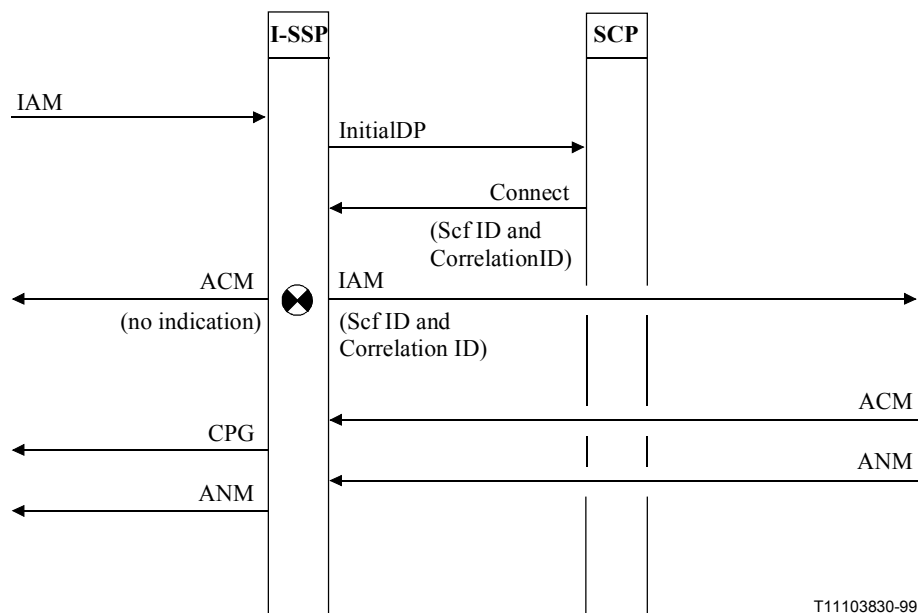


NOTE – Instead of Connect other operations may be received. If Connect is received, a normal call setup as shown in Figure A.3 will be performed.

**Figure A.5/Q.1601 – IN call with user interactive dialogue (in-band)
Assist method; procedure in initiating SSP**



**Figure A.6/Q.1601 – IN call with user interactive dialogue (in-band)
Assist method; procedure in assisting SSP**



**Figure A.7/Q.1601 – IN call with user interactive dialogue (in-band)
Hand-off method; procedure in initiating SSP**

APPENDIX I

Coding of the compatibility information for the parameters

See Table I.1.

Table I.1/Q.1601 – Coding of the instruction indicators

Default = 0 value for the subfield.

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

Table I.1/Q.1601 – Coding of the instruction indicators (*concluded*)

Default = 0 value for the subfield.

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
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
Original 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

APPENDIX II

Contents of the INAP serviceInteractionIndicatorsTwo

The appendix contains a list of indicators which are to be transferred in the serviceInteractionIndicatorsTwo 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 serviceInteractionIndicatorsTwo. See Tables II.1 and II.2.

Table II.1/Q.1601 – 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 s – 0 s (default)
Bothway 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.1601 – Supplementary service related control information

Control information	Values
Call to be diverted indicator	<ul style="list-style-type: none"> – Call diversion allowed (default) – Call diversion not allowed
Conference at DLE acceptance indicator	<ul style="list-style-type: none"> – Accept conference request (default) – Reject conference request
Conference at OLE acceptance indicator	<ul style="list-style-type: none"> – Accept conference request (default) – Reject conference request
Connected number treatment indicator	<ul style="list-style-type: none"> – No impact – Set "presentation restricted" – Present called IN number (default)
Call transfer notification treatment indicator	<ul style="list-style-type: none"> – No impact (default) – Suppress information
Call diversion notification treatment indicator	<ul style="list-style-type: none"> – No impact (default) – Suppress information
Call completion treatment indicator	<ul style="list-style-type: none"> – Reject call completion request – Accept call completion request (default)

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.1601 – 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 DP CI)	IP connection without sending of ANM	IP connection with sending of ANM	IN call setup 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.

**Table III.1/Q.1601 – Limitations for ISUP basic call procedures
and supplementary services (*concluded*)**

Type of IN call → ↓ ISUP feature	IN call with DPs armed in the request mode (except DP CI)	IP connection without sending of ANM	IP connection with sending of ANM	IN call setup after an ANM was sent for a previous connection
UUS1 implicit	Not supported		Not supported	
UUS1 explicit	Not supported		Not supported	
UUS2 explicit	Not supported		Not supported	
UUS3 explicit	Not supported		Not supported	

SERIES OF ITU-T RECOMMENDATIONS

Series A	Organization of the work of 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 communications
Series Y	Global information infrastructure and Internet protocol aspects
Series Z	Languages and general software aspects for telecommunication systems