

# ETSI TS 129 278 V5.0.0 (2002-09)

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*Technical Specification*

**Digital cellular telecommunications system (Phase 2+);  
Universal Mobile Telecommunications System (UMTS);  
Customised Applications for Mobile network  
Enhanced Logic (CAMEL);  
CAMEL Application Part (CAP) specification  
for IP Multimedia Subsystems (IMS)  
(3GPP TS 29.278 version 5.0.0 Release 5)**

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**ETSI**

650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

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## Foreword

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# Foreword

This Technical Specification (TS) has been produced by the 3<sup>rd</sup> Generation Partnership Project (3GPP).

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# 1 Scope

The present document specifies the CAMEL Application Part (CAP) supporting the fourth phase of the network feature Customized Applications for Mobile network Enhanced Logic for IP Multimedia CN subsystems. CAP is based on a sub-set of the ETSI Core INAP CS-2 as specified by EN 301 140-1 [4]. Descriptions and definitions provided by EN 301 140-1 [4] are directly referenced by this standard in case no additions or clarifications are needed for the use in the CAP.

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# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] ETSI ETS 300 287-1: "Integrated Services Digital Network (ISDN); Signalling System No.7; Transaction Capabilities (TC) version 2; Part 1: Protocol specification [ITU-T Recommendations Q.771 to Q.775 (1993), modified]".
- [2] ETSI EN 300 356-1: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 3 for the international interface; Part 1: Basic services [ITU-T Recommendations Q.761 to Q.764 (1997), modified]".
- [3] ETSI ETS 300 374-1: "Intelligent Network (IN); Intelligent Network Capability Set 1 (CS1); Core Intelligent Network Application Protocol (INAP); Part 1: Protocol specification".
- [4] ETSI EN 301 140-5: "Intelligent Network (IN); Intelligent Network Application Protocol (INAP); Capability Set 2 (CS2); Part 1: Protocol Specification".
- [5] ITU-T Recommendation Q.763: "Formats and codes of the ISDN user part of Signalling System No.7".
- [6] ITU-T Recommendation X.880 | ISO/IEC 9072-1: "Information technology - Remote Operations: Concepts, model and notation".
- [7] ITU-T Recommendation Q.713: "Specifications of Signalling System No.7; SCCP formats and codes".
- [8] ITU-T Recommendation Q.773: "Specifications of Signalling System No.7; Transaction capabilities formats and encoding".
- [9] 3GPP TS 29.002: "Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) specification (3GPP TS 29.002) Rel-99".
- [10] 3GPP TS 23.278: " Customised Applications for Mobile network Enhanced Logic (CAMEL) Phase 4 - Stage 2 IM CN Interworking".
- [11] 3GPP TS 29.078: " Customised Applications for Mobile network Enhanced Logic (CAMEL) - Phase 3; CAMEL Application Part (CAP) Specification – Release 99".



## 2.1 Specifications used for IMPORTs for CAP

Table 2.1.1 lists the modules from which CAP V4 imports for IM CN specific operations. For each module, the table indicates in which formal specification this module can be found.

**Table 2.1.1: Module IMPORTS specifications**

Module Name	Specification	Ref
CS1-DataTypes {itu-titu-t(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3) cs1-datatypes(2) version1(0)}	ETS 300 374-1	[3]
CS2-datatypes {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3) in-cs2-datatypes (0) version1(0)}	EN 301 140-1	[4]
MAP-CommonDataTypes {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1) modules(3) map-CommonDataTypes(18) version6(6)}	3GPP TS 29.002	[9]
MAP-MS-DataTypes {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1) modules(3) map-MS-DataTypes(11) version6(6)}	3GPP TS 29.002	[9]
MAP-CH-DataTypes {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1) modules(3) map-CH-DataTypes(13) version6(6)}	3GPP TS 29.002	[9]
MAP-ExtensionDataTypes {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1) modules(3) map-ExtensionDataTypes(21) version6(6)}	3GPP TS 29.002	[9]
TCAPMessages {itu-t recommendation q 773 modules(2) messages(1) version3(3)}	ITU-T Q.773	[8]
Remote-Operations-Information-Objects {joint-iso-itu-t remote-operations(4) informationObjects(5) version1(0)}	ITU-T X.880	[6]
TC-Notation-Extensions {itu-t recommendation q 775 modules(2) notation-extension (4) version1(1)}	ETS 300 287-1	[1]
CAP-operationcodes {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3) cap-operationcodes(53) version3(2)}	3GPP TS 29.078 Rel-99	[11]
CAP-datatypes {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3) cap-datatypes(52) version3(2)}	3GPP TS 29.078 Rel-99	[11]
CAP-errortypes {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3) cap-errortypes(51) version3(2)}	3GPP TS 29.078 Rel-99	[11]
CAP-errorcodes {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3) cap-errorcodes(57) version3(2)}	3GPP TS 29.078 Rel-99	[11]
CAP-classes {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3) cap-classes(54) version3(2)}	3GPP TS 29.078 Rel-99	[11]
CAP-object-identifiers {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0)umts-network(1) modules(3) cap-object-identifiers(100) version3(2)}	3GPP TS 29.078 Rel-99	[11]

## 3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AC	Application Context
ASN.1	Abstract Syntax Notation One
BCSM	Basic Call State Model
CAP	CAMEL Application Part
CS1	Capability Set 1
CS2	Capability Set 2
CSI	CAMEL Subscription Information
DP	Detection Point
EDP	Event Detection Point
EDP-N	Event Detection Point - Notification
EDP-R	Event Detection Point - Request
FE	Functional Entity
FSM	Finite State Model
gsmSCF	Service Control Function
gsmSRF	GSM Specialized Resource Function
GT	Global Title

ID	Identifier
IN	Intelligent Network
IMS	IP Multimedia Subsystems
IM-SSF	IP Multimedia Subsystem SSF
IP	Internet Protocol
IP	Intelligent Peripheral
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
MRFC	Multimedia Resource Function Controller
MSC	Mobile services Switching Centre
NA	North American
O-IM-BCSM	Originating CAMEL BCSM for IMS
PDU	Protocol Data Unit
PIC	Point In Call
PLMN	Public Land Mobile Network
ROS	Remote Operations Service
ROSE	ROS Element
RRB	Request Report BCSM Event
SSF	Service Switching Function
SCCP	Signalling Connection Control Part
SCP	Service Control Point
SDL	System Description Language
SLP	Service Logic Program
SS7	Signalling System no. 7
SSME	IM-SSF Management Entity
SSP	Service Switching Point
TC	Transaction Capabilities
TCAP	Transaction Capabilities Application Part
TDP	Trigger Detection Point
TDP-R	Trigger Detection Point - Request
T-IM-BCSM	Terminating CAMEL BCSM for IMS

---

## 4 Introduction

The CAP stage 3 specification for IMS re-uses the ASN.1 definitions of CAP version 3 as specified in 3GPP Rel-99 TS 29.078 with modifications for CAMEL/IMS interworking. A new Application Context has been created for IMS for Release 5.

For general specifications including lower layer services (i.e. TC and SCCP procedures), refer to specifications found in 3GPP TS 29.078 [11].

For IMS, the MRFC plays the role of a gsmSRF. The CAP operations sent between the gsmSCF and the gsmSRF are sent via the IM-SSF. The IM-SSF shall map the CAP operations intended for the gsmSRF into a SIP based protocol and sent to the gsmSRF via the S-CSCF. Standardization of the MRFC interface via S-CSCF is outside the scope of this specification.

---

## 5 CAP Types for CAMEL/IMS interworking

### 5.1 Data types

```
CAP-IMS-datatypes {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1)
modules(3) cap-IMS-datatypes(62) version1(0)}
```

```
-- This module contains the data type definitions used for CAMEL/IMS interworking.
```

```
DEFINITIONS IMPLICIT TAGS ::= BEGIN
```

```
CldClgPartyURL (IMS-PARAMETERS-BOUND : imsBound) ::= OCTET STRING (SIZE(
imsBound.&minCldClgPartyURLLength .. imsBound.&maxCldClgPartyURLLength))
```

-- Indicates the SIP URL identifying the called and calling party numbers. Refer to RFC2806[45] for encoding.

MediaType ::= INTEGER

-- The valid values for Media Type are for further study.

SIPCallId { IMS-PARAMETERS-BOUND : imsBound } ::= OCTET STRING (SIZE(imsBound.&minSipCallIdLength .. imsBound.&maxSipCallIdLength))

END

## 5.2 Classes

CAP-IMS-classes {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3) cap-IMS-classes(64) version1(0)}

-- This module contains the class definitions used specifically for CAMEL/IMS interworking.

DEFINITIONS ::= BEGIN

IMPORTS

    iMSSF-gsmSCF-Protocol,  
FROM CAP-IMS-object-identifiers {iut-t(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3) cap-IMS-object-identifiers(100) version1(0)}

    capImssfToScfGeneric,  
FROM CAP-IMSSF-gsmSCF-pkgs-contracts-acx iMSSF-gsmSCF-Protocol

;

IMS-PARAMETERS-BOUND ::= CLASS

```
{
    &minCldClgPartyURLLength          INTEGER,
    &maxCldClgPartyURLLength          INTEGER,
    &minSipCallIdLength               INTEGER,
    &maxSipCallIdLength               INTEGER
}
```

WITH SYNTAX

```
{
    MINIMUM-FOR-CLDCLG-PARTY-URL      &minCldClgPartyURLLength
    MAXIMUM-FOR-CLDCLG-PARTY-URL      &maxCldClgPartyURLLength
    MINIMUM-FOR-SIP-CALL-ID           &minSipCallIdLength
    MAXIMUM-FOR-SIP-CALL-ID           &maxSipCallIdLength
}
```

ims-CAPSpecificBoundSet IMS-PARAMETERS-BOUND ::=

```
{
    MINIMUM-FOR-CLDCLG-PARTY_URL      1
    MAXIMUM-FOR-CLDCLG-PARTY_URL      100
    MINIMUM-FOR-SIP-CALL-ID           1
    MAXIMUM-FOR-SIP-CALL-ID           30
}
```

END

## 5.3 Object Identifiers (IDs)

CAP-IMS-object-identifiers {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3) cap-IMS-object-identifiers(110) version1(0)}

DEFINITIONS ::= BEGIN

-- This module assigns new object identifiers for Modules, Packages, Contracts and AC's  
-- used by CAP for IMS.

iMSdatatypes OBJECT IDENTIFIER ::= {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3) cap-IMS-datatypes(52) version1(0)}

iMSclasses OBJECT IDENTIFIER ::= {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3)}

```

CAP-IMS-classes(54) version1(0)}

iMSSF-gsmSCF-Operations          OBJECT IDENTIFIER ::=
  {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3)
  cap-IMSSF-gsmSCF-ops-args(101) version1(0)}

iMSSF-gsmSCF-Protocol           OBJECT IDENTIFIER ::=
  {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3)
  cap-IMSSF-gsmSCF-pkgs-contracts-acs(102) version1(0)}
id-CAPIOE                       OBJECT IDENTIFIER ::=
  {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) capImsoE(25)}

id-acIE                          OBJECT IDENTIFIER ::= {id-CAPIOE   ac(3)}
id-contractIE                    OBJECT IDENTIFIER ::= {id-CAPIOE   contract(26)}

-- IM-SSF/gsmSCF AC
id-ac-CAP-IMSSF-scfGenericAC     OBJECT IDENTIFIER ::= {id-acIE 4}

-- IM-SSF/gsmSCF Contracts
id-CAPImssfToScfGeneric          OBJECT IDENTIFIER ::= {id-contractIE 3}

END

```

---

## 6 IP Multimedia Subsystem Call Control

### 6.1 IM-SSF - gsmSCF Interface

#### 6.1.1 Operations and arguments

```

CAP-IMSSF-gsmSCF-ops-args {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-IMSSF-gsmSCF-ops-args(111) version1(0)}

DEFINITIONS IMPLICIT TAGS ::= BEGIN

-- This module contains the operations and operation arguments used for the
-- IM-SSF - gsmSCF interface, for the control of IP Multimedia call sessions.

-- Table 2.1.1 lists the specifications that contain the modules used by CAP.

IMPORTS

  errortypes,
  datatypes,
  operationcodes,
  classes,
  tc-Messages,
  ros-InformationObjects
FROM CAP-object-identifiers {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-object-identifiers(100) version3(2)}

  iMSdatatypes,
  iMSclasses,
FROM CAP-IMS-object-identifiers {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-IMS-object-identifiers(110) version1(0)}

OPERATION
FROM Remote-Operations-Information-Objects ros-InformationObjects

  CallingPartysCategory,
  HighLayerCompatibility,
  RedirectionInformation,
  ServiceKey
FROM CS1-DataTypes {itu-t(0) identified-organization(4) etsi(0) inDomain(1) in-network(1)
modules(0) cs1-datatypes(2) version1(0)}

  MiscCallInfo
FROM CS2-datatypes {itu-t(0) identified-organization(4) etsi(0) inDomain(1) in-network(1)
cs2(20) modules(0) in-cs2-datatypes (0) version1(0)}

  Ext-BasicServiceCode,
  IMSI,
  ISDN-AddressString
FROM MAP-CommonDataTypes {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0)
gsm-Network(1) modules(3) map-CommonDataTypes(18) version6(6)}

  CUG-Index,
  CUG-Interlock,

```

```

    CUG-Info,
    LocationInformation,
    SubscriberState
FROM MAP-MS-DataTypes {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0)
gsm-Network(1) modules(3) map-MS-DataTypes(11) version6(6)}

    CallReferenceNumber,
    SuppressionOfAnnouncement
FROM MAP-CH-DataTypes {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0)
gsm-Network(1) modules(3) map-CH-DataTypes(13) version6(6)}

PARAMETERS-BOUND
FROM CAP-classes classes

IMS-PARAMETERS-BOUND
FROM CAP-IMS-classes iMSclasses

opcode-activityTest,
opcode-applyCharging,
opcode-applyChargingReport,
opcode-callGap,
opcode-callInformationReport,
opcode-callInformationRequest,
opcode-cancel,
opcode-connect,
opcode-connectToResource,
opcode-continue,
opcode-continueWithArgument,
opcode-disconnectForwardConnection,
opcode-eventReportBCSM,
opcode-furnishChargingInformation,
opcode-initialDP,
opcode-releaseCall,
opcode-requestReportBCSMEvent,
opcode-resetTimer,
FROM CAP-operationcodes operationcodes

AChBillingChargingCharacteristics {},
AdditionalCallingPartyNumber {},
AlertingPattern,
AssistingSSPIPRoutingAddress {},
BCSMEvent,
BearerCapability {},
CalledPartyNumber {},
CalledPartyBCDNumber {},
CallingPartyNumber {},
CallResult {},
Carrier,
Cause {},
CGEncountered,
ChargeNumber {},
ControlType,
CorrelationID {},
DestinationRoutingAddress {},
EventSpecificInformationBCSM {},
EventTypeBCSM,
Extensions {},
FCIBillingChargingCharacteristics {},
GapCriteria {},
GapIndicators,
GapTreatment,
GenericNumbers {},
InvokeID,
IPRoutingAddress {},
IPSSPCapabilities {},
leg1,
LocationNumber {},
MonitorMode,
NAOLIInfo,
OCSIAplicable,
OriginalCalledPartyID {},
ReceivingSideID,
RedirectingPartyID {},
RequestedInformationList {},
RequestedInformationTypeList,
ScfID {},
SCIBillingChargingCharacteristics {},
SendingSideID,
ServiceInteractionIndicatorsTwo,
TimeAndTimezone {},
TimerID,
TimerValue
FROM CAP-datatypes {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1)
modules(3) cap-datatypes(52) version3(2)}

CalledPartyURL {},
CallingPartyURL {},
MediaType {},

```

```

    SIPCallId {},
    OriginalCalledPartyURL {},
    RedirectingPartyURL {},
    DestinationRoutingAddressURL {}
FROM CAP-IMS-datatypes cap-IMS-datatypes

    cancelFailed,
    eTCFailed,
    missingCustomerRecord,
    missingParameter,
    parameterOutOfRange,
    requestedInfoError,
    systemFailure,
    taskRefused,
    unexpectedComponentSequence,
    unexpectedDataValue,
    unexpectedParameter,
    unknownLegID
FROM CAP-erroratypes {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1)
modules(3) cap-erroratypes(51) version3(2)}

;

activityTest OPERATION ::= {
    RETURN RESULT TRUE
    CODE opcode-activityTest
}
-- Direction: gsmSCF -> IM-SSF, Timer: Tat
-- This operation is used to check for the continued existence of a relationship
-- between the gsmSCF andIM-SSF. If the relationship is
-- still in existence, then the IM-SSF will respond. If no reply is received,
-- then the gsmSCF will assume that the IM-SSF has failed
-- in some way.

applyCharging {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT ApplyChargingArg {bound}
    RETURN RESULT FALSE
    ERRORS {missingParameter |
            unexpectedComponentSequence |
            unexpectedParameter |
            unexpectedDataValue |
            parameterOutOfRange |
            systemFailure |
            taskRefused |
            unknownLegID}
    CODE opcode-applyCharging
}
-- Direction: gsmSCF -> IM-SSF, Timer: Tac
-- This operation is used for interacting from the gsmSCF with the IM-SSF charging mechanisms.
-- The ApplyChargingReport operation provides the feedback from the IM-SSF to the gsmSCF.

ApplyChargingArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
    aChBillingChargingCharacteristics [0] AChBillingChargingCharacteristics {bound},
    partyToCharge [2] SendingSideID DEFAULT sendingSideID : leg1,
    extensions [3] Extensions {bound} OPTIONAL,
    ...
}
-- The partyToCharge parameter indicates the party in the call to which the ApplyCharging operation
-- shall be applied.

applyChargingReport {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT ApplyChargingReportArg {bound}
    RETURN RESULT FALSE
    ERRORS {missingParameter |
            unexpectedComponentSequence |
            unexpectedParameter |
            unexpectedDataValue |
            parameterOutOfRange |
            systemFailure |
            taskRefused}
    CODE opcode-applyChargingReport
}
-- Direction: IM-SSF -> gsmSCF, Timer: Tacr
-- This operation is used by the IM-SSF to report to the gsmSCF the occurrence of a
-- specific charging event as requested by the gsmSCF using the ApplyCharging operation.

ApplyChargingReportArg {PARAMETERS-BOUND : bound} ::= CallResult {bound}

callInformationReport {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT CallInformationReportArg {bound}
    RETURN RESULT FALSE
    ALWAYS RESPONDS FALSE
    CODE opcode-callInformationReport
}

```

```

-- Direction: IM-SSF -> gsmSCF, Timer: Tcirp
-- This operation is used to send specific call information for a single call party to the gsmSCF as
-- requested by the gsmSCF in a previous CallInformationRequest.

CallInformationReportArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
    requestedInformationList [0] RequestedInformationList {bound},
    extensions [2] Extensions {bound} OPTIONAL,
    legID [3] ReceivingSideID OPTIONAL,
    ...
}

callInformationRequest {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT CallInformationRequestArg {bound}
    RETURN RESULT FALSE
    ERRORS {missingParameter |
        parameterOutOfRange |
        requestedInfoError |
        systemFailure |
        taskRefused |
        unexpectedComponentSequence |
        unexpectedDataValue |
        unexpectedParameter |
        unknownLegID}
    CODE opcode-callInformationRequest
}

-- Direction: gsmSCF -> IM-SSF, Timer: Tcirp
-- This operation is used to request the IM-SSF to record specific information about a single
-- call party and report it to the gsmSCF (with a CallInformationReport operation).

CallInformationRequestArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
    requestedInformationTypeList [0] RequestedInformationTypeList,
    extensions [2] Extensions {bound} OPTIONAL,
    legID [3] SendingSideID OPTIONAL,
    ...
}

-- OPTIONAL denotes network operator optional.

cancel OPERATION ::= {
    ARGUMENT CancelArg
    RETURN RESULT FALSE
    ERRORS {cancelFailed |
        missingParameter |
        taskRefused}
    CODE opcode-cancel
}

-- Direction: gsmSCF -> IM-SSF, Timer: Tcan
-- This operation cancels the correlated previous operation or all previous requests. The following
-- operations can be canceled: PlayAnnouncement, PromptAndCollectUserInformation.

CancelArg ::= CHOICE {
    invokeID [0] InvokeID,
    allRequests [1] NULL
}

-- The InvokeID has the same value as that which was used for the operation to be cancelled.

connect {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT ConnectArg {bound, imsBound}
    RETURN RESULT FALSE
    ERRORS {missingParameter |
        parameterOutOfRange |
        systemFailure |
        taskRefused |
        unexpectedComponentSequence |
        unexpectedDataValue |
        unexpectedParameter}
    CODE opcode-connect
}

-- Direction: gsmSCF-> IM-SSF, Timer: Tcon
-- This operation is used to request the IM-SSF to perform the call processing actions
-- to route or forward a call to a specified destination.

ConnectArg {PARAMETERS-BOUND : bound, IMS-PARAMETERS-BOUND : imsBound} ::= SEQUENCE {
    destinationRoutingAddress [0] DestinationRoutingAddress {bound} OPTIONAL,
    alertingPattern [1] AlertingPattern OPTIONAL,
    originalCalledPartyID [6] OriginalCalledPartyID {bound} OPTIONAL,
    extensions [10] Extensions {bound} OPTIONAL,
    carrier [11] Carrier {bound} OPTIONAL,
    callingPartysCategory [28] CallingPartysCategory OPTIONAL,
    redirectingPartyID [29] RedirectingPartyID {bound} OPTIONAL,
    redirectionInformation [30] RedirectionInformation OPTIONAL,
    genericNumbers [14] GenericNumbers {bound} OPTIONAL,
    serviceInteractionIndicatorsTwo [15] ServiceInteractionIndicatorsTwo OPTIONAL,
    chargeNumber [19] ChargeNumber {bound} OPTIONAL,
    cug-Interlock [31] CUG-Interlock OPTIONAL,
    cug-OutgoingAccess [32] NULL OPTIONAL,
    suppressionOfAnnouncement [55] SuppressionOfAnnouncement OPTIONAL,
    oCSIApplicable [56] OCSIApplicable OPTIONAL,
    naOliInfo [57] NAOliInfo OPTIONAL,
}

```

```

    ....
    connectArgExtension          [58] ConnectArgExtension {imsBound}          OPTIONAL
  }
-- The following parameters in ConnectArg are not use for IMS:
--   carrier
--   alertingPattern
--   genericNumbers
--   serviceInteractionIndicatorsTwo
--   chargeNumber
--   cug-Interlock
--   cug-OutgoingAccess
--   suppressionOfAnnouncement
--   OCSIApplicable
--   naOliInfo

ConnectArgExtension {IMS-PARAMETERS-BOUND : imsBound} ::= SEQUENCE {
  destinationRoutingAddressURL [0] CldClgPartyURL {imsBound}          OPTIONAL,
  originalCalledPartyURL       [1] CldClgPartyURL {imsBound}          OPTIONAL,
  redirectingPartyURL          [2] CldClgPartyURL {imsBound}          OPTIONAL,
  ...
}

connectToResource {PARAMETERS-BOUND : bound} OPERATION ::= {
  RETURN RESULT FALSE
  ALWAYS RESPONDS FALSE
}
CODE          opcode-connectToResource
-- Direction: gsmSCF ->IM-SSF, Timer: Tctr
-- This operation is used to connect a call from the IM-SSF to the MRFC via S-CSCF.
-- Refer to clause 9 for a description of the procedures associated with this operation.

continue OPERATION ::= {
  RETURN RESULT FALSE
  ALWAYS RESPONDS FALSE
  CODE          opcode-continue
}
-- Direction: gsmSCF -> IM-SSF, Timer: Tcuc
-- This operation is used to request the IM-SSF to proceed with call processing at the
-- DP at which it previously suspended call processing to await gsmSCF instructions
-- (i.e. proceed to the next point in call in the BCSM). The IM-SSF continues call
-- processing without substituting new data from gsmSCF.

continueWithArgument {PARAMETERS-BOUND : bound} OPERATION ::= {
  ARGUMENT          ContinueWithArgumentArg {bound}
  RETURN RESULT    FALSE
  ERRORS            {missingParameter |
                    parameterOutOfRange |
                    unexpectedComponentSequence |
                    unexpectedDataValue |
                    unexpectedParameter}
  CODE              opcode-continueWithArgument
}
-- Direction: gsmSCF -> IM-SSF, Timer: Tcwa
-- This operation is used to request the IM-SSF to proceed with call processing at the
-- DP at which it previously suspended call processing to await gsmSCF instructions
-- (i.e. proceed to the next point in call in the BCSM). The IM-SSF continues call
-- processing with the modified call setup information as received from the gsmSCF.

ContinueWithArgumentArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
  alertingPattern      [1] AlertingPattern          OPTIONAL,
  extensions           [6] Extensions {bound}      OPTIONAL,
  serviceInteractionIndicatorsTwo [7] ServiceInteractionIndicatorsTwo OPTIONAL,
  callingPartysCategory [12] CallingPartysCategory OPTIONAL,
  genericNumbers       [16] GenericNumbers {bound} OPTIONAL,
  cug-Interlock        [17] CUG-Interlock          OPTIONAL,
  cug-OutgoingAccess   [18] NULL                   OPTIONAL,
  chargeNumber         [50] ChargeNumber {bound}   OPTIONAL,
  carrier              [52] Carrier {bound}        OPTIONAL,
  suppressionOfAnnouncement [55] SuppressionOfAnnouncement OPTIONAL,
  naOliInfo           [56] NAOliInfo,              OPTIONAL,
  ...
}
-- The following parameters in ConnectArg are not use for IMS:
--   carrier
--   alertingPattern
--   genericNumbers
--   serviceInteractionIndicatorsTwo
--   chargeNumber
--   cug-Interlock
--   cug-OutgoingAccess
--   suppressionOfAnnouncement
--   naOliInfo

```



```

disconnectForwardConnection OPERATION ::= {
  RETURN RESULT  FALSE
  ERRORS        {systemFailure |
                 taskRefused |
                 unexpectedComponentSequence}
  CODE          opcode-disconnectForwardConnection
}
-- Direction: gsmSCF -> IM-SSF, Timer: Tdfc
-- This operation is used to disconnect a connection to a
-- resource. Refer to clause 9 for a description of the procedures associated with this operation.

eventReportBCSM {PARAMETERS-BOUND : bound} OPERATION ::= {
  ARGUMENT      EventReportBCSMArg {bound}
  RETURN RESULT  FALSE
  ALWAYS RESPONDS FALSE
  CODE          opcode-eventReportBCSM
}
-- Direction: IM-SSF -> gsmSCF, Timer: Terb
-- This operation is used to notify the gsmSCF of a call-related event (e.g. BCSM)
-- events such as busy or no answer) previously requested by the gsmSCF in a
-- RequestReportBCSMEvent operation.

EventReportBCSMArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
  eventTypeBCSM           [0] EventTypeBCSM,
  eventSpecificInformationBCSM [2] EventSpecificInformationBCSM {bound} OPTIONAL,
  legID                   [3] ReceivingSideID OPTIONAL,
  miscCallInfo            [4] MiscCallInfo DEFAULT {messageType request},
  extensions              [5] Extensions {bound} OPTIONAL,
  ...
}

furnishChargingInformation {PARAMETERS-BOUND : bound} OPERATION ::= {
  ARGUMENT      FurnishChargingInformationArg {bound}
  RETURN RESULT  FALSE
  ERRORS        {missingParameter |
                 taskRefused |
                 unexpectedComponentSequence |
                 unexpectedDataValue |
                 unexpectedParameter}
  CODE          opcode-furnishChargingInformation
}
-- Direction: gsmSCF -> IM-SSF, Timer: Tfc
-- This operation is used to request the IM-SSF to generate, register a call record
-- or to include some information in the default call record.
-- The registered call record is intended for off line charging of the call.

FurnishChargingInformationArg {PARAMETERS-BOUND : bound} ::=
FCIBillingChargingCharacteristics{bound}

initialDP {PARAMETERS-BOUND : bound, IMS-PARAMETERS-BOUND : imsBound} OPERATION ::= {
  ARGUMENT      InitialDPArg {bound, imsBound}
  RETURN RESULT  FALSE
  ERRORS        {missingCustomerRecord |
                 missingParameter |
                 parameterOutOfRange |
                 systemFailure |
                 taskRefused |
                 unexpectedComponentSequence |
                 unexpectedDataValue |
                 unexpectedParameter}
  CODE          opcode-initialDP
}
-- Direction: gsmSSF -> gsmSCF, Timer: Tidp
-- This operation is used after a TDP to indicate request for service.

InitialDPArg {PARAMETERS-BOUND : bound, IMS-PARAMETERS-BOUND : imsBound} ::= SEQUENCE {
  serviceKey           [0] ServiceKey ,
  calledPartyNumber    [2] CalledPartyNumber {bound} OPTIONAL,
  callingPartyNumber   [3] CallingPartyNumber {bound} OPTIONAL,
  callingPartysCategory [5] CallingPartysCategory OPTIONAL,
  cGEncountered        [7] CGEncountered OPTIONAL,
  iPSSPCapabilities    [8] IPSSPCapabilities {bound} OPTIONAL,
  locationNumber       [10] LocationNumber {bound} OPTIONAL,
  originalCalledPartyID [12] OriginalCalledPartyID {bound} OPTIONAL,
  extensions           [15] Extensions {bound} OPTIONAL,
  highLayerCompatibility [23] HighLayerCompatibility OPTIONAL,
  additionalCallingPartyNumber [25] AdditionalCallingPartyNumber {bound} OPTIONAL,
  bearerCapability      [27] BearerCapability {bound} OPTIONAL,
  eventTypeBCSM         [28] EventTypeBCSM OPTIONAL,
  redirectingPartyID    [29] RedirectingPartyID {bound} OPTIONAL,
  redirectionInformation [30] RedirectionInformation OPTIONAL,
  cause                 [17] Cause {bound} OPTIONAL,
  serviceInteractionIndicatorsTwo [32] ServiceInteractionIndicatorsTwo OPTIONAL,
  carrier               [37] Carrier {bound} OPTIONAL,
  cug-Index             [45] CUG-Index OPTIONAL,
  cug-Interlock         [46] CUG-Interlock OPTIONAL,

```

```

cug-OutgoingAccess      [47] NULL                                OPTIONAL,
iMSI                    [50] IMSI                                OPTIONAL,
subscriberState         [51] SubscriberState                OPTIONAL,
locationInformation     [52] LocationInformation            OPTIONAL,
ext-basicServiceCode    [53] Ext-BasicServiceCode                OPTIONAL,
callReferenceNumber     [54] CallReferenceNumber                OPTIONAL,
iMSISFAddress          [55] ISDN-AddressString                OPTIONAL,
calledPartyBCDNumber    [56] CalledPartyBCDNumber {bound}          OPTIONAL,
timeAndTimezone        [57] TimeAndTimezone {bound}          OPTIONAL,
gsm-ForwardingPending  [58] NULL                                OPTIONAL,
initialDPArgExtension   [59] InitialDPArgExtension {imsBound}  OPTIONAL,
...
}

-- The following parameters in InitialDPArg are not used for IMS:
-- locationNumber
-- highLayerCompatibility
-- additionalCallingPartyNumber
-- bearerCapability
-- serviceInteractionIndicatorsTwo
-- carrier
-- cug-Index
-- cug-Interlock
-- cug-OutgoingAccess
-- locationInformation
-- ext-basicServiceCode
-- callReferenceNumber,
-- calledPartyBCDNumber
-- gsm-ForwardingPending

InitialDPArgExtension {IMS-PARAMETERS-BOUND : imsBound} ::= SEQUENCE {
  gsmcAddress          [0] ISDN-AddressString                OPTIONAL,
  mediaType            [1] MediaType                        OPTIONAL,
  sipCallId            [2] SIPCallId {imsBound}              OPTIONAL,
  calledPartyURL       [3] CldClgPartryURL {imsBound}        OPTIONAL,
  callingPartyURL      [4] CldClgPartryURL {imsBound}        OPTIONAL,
  originalCalledPartyURL [5] CldClgPartryURL {imsBound}      OPTIONAL,
  redirectingPartyURL  [6] CldClgPartryURL {imsBound}        OPTIONAL,
  ...
}
-- The gsmcAddress parameter in InitialDPArgExtension is not used for IMS.

releaseCall {PARAMETERS-BOUND : bound} OPERATION ::= {
  ARGUMENT      ReleaseCallArg {bound}
  RETURN RESULT FALSE
  ALWAYS RESPONDS FALSE
  CODE          opcode-releaseCall
}
-- Direction: gsmSCF -> IM-SSF, Timer: Trc
-- This operation is used to tear down an existing call at any phase of the call for all parties
-- involved in the call.

ReleaseCallArg {PARAMETERS-BOUND : bound} ::= Cause {bound}
-- A default value of decimal 31 (normal unspecified) shall be given.

requestReportBCSMEvent {PARAMETERS-BOUND : bound} OPERATION ::= {
  ARGUMENT      RequestReportBCSMEventArg {bound}
  RETURN RESULT FALSE
  ERRORS        {missingParameter |
                 parameterOutOfRange |
                 systemFailure |
                 taskRefused |
                 unexpectedComponentSequence |
                 unexpectedDataValue |
                 unexpectedParameter |
                 unknownLegID}
  CODE          opcode-requestReportBCSMEvent
}
-- Direction: gsmSCF -> IM-SSF, Timer: Trrb
-- This operation is used to request the IM-SSF to monitor for a call-related event
-- (e.g. BCSM events such as busy or no answer), then send a notification back to the gsmSCF when
-- the event is detected.
-- NOTE:
-- Every EDP must be explicitly armed by the gsmSCF via a RequestReportBCSMEvent operation.
-- No implicit arming of EDPs at the IM-SSF after reception of any operation (different
-- from RequestReportBCSMEvent) from the gsmSCF is allowed.

RequestReportBCSMEventArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
  bcsmevents [0] SEQUENCE SIZE(1..bound.&numOfBCSMEvents) OF BCSMEvent,
  extensions [2] Extensions {bound} OPTIONAL,
  ...
}
-- Indicates the BCSM related events for notification.

resetTimer {PARAMETERS-BOUND : bound} OPERATION ::= {
  ARGUMENT      ResetTimerArg {bound}
  RETURN RESULT FALSE
  ERRORS        {missingParameter |

```

```

        parameterOutOfRange |
        taskRefused |
        unexpectedComponentSequence |
        unexpectedDataValue |
        unexpectedParameter}
CODE
}
-- Direction: gsmSCF -> IM-SSF, Timer: Trt
-- This operation is used to request the IM-SSF to refresh an application timer in the IM-SSF.

ResetTimerArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
    timerID          [0] TimerID DEFAULT tssf,
    timervalue       [1] TimerValue,
    extensions       [2] Extensions {bound} OPTIONAL,
    ...
}
END

```

The following value ranges apply for operation specific timers in CAP:

```

short:      1 s - 10 s
medium:     1 s - 60 s
long:       1 s - 30 minutes

```

Table 6.1.1.1 lists all operation timers and the value range for each timer. The definitive value for each operation timer may be network specific and has to be defined by the network operator.

**Table 6.1.1.1: Timer value ranges**

Operation Name	Timer	Value range
ActivityTest	T <sub>at</sub>	short
ApplyCharging	T <sub>ac</sub>	short
ApplyChargingReport	T <sub>acr</sub>	short
CallInformationReport	T <sub>cirp</sub>	short
CallInformationRequest	T <sub>cirq</sub>	short
Cancel	T <sub>can</sub>	short
CallGap	T <sub>cg</sub>	short
Connect	T <sub>con</sub>	short
ConnectToResource	T <sub>ctr</sub>	short
Continue	T <sub>cue</sub>	short
ContinueWithArgument	T <sub>cwa</sub>	short
DisconnectForwardConnection	T <sub>dfc</sub>	short
EventReportBCSM	T <sub>erb</sub>	short
FurnishChargingInformation	T <sub>fci</sub>	short
InitialDP	T <sub>idp</sub>	short
ReleaseCall	T <sub>rc</sub>	short
RequestReportBCSMEvent	T <sub>rrb</sub>	short
ResetTimer	T <sub>rt</sub>	short

## 6.1.2 IM-SSF/gsmSCF packages, contracts and ACs

### 6.1.2.1 IM-SSF/gsmSCF ASN.1 module

```

CAP-IMSSF-gsmSCF-pkgs-contracts-ac {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-IMSSF-gsmSCF-pkgs-contracts-ac(112) version1(0)}

```

```

DEFINITIONS ::= BEGIN

```

```

-- This module specifies the Operation Packages, Contracts, Application Contexts
-- and Abstract Syntaxes used for the IM-SSF - gsmSCF interface used for the control of
-- IP Multimedia call sessions.

```

```

-- Table 2.1.1 lists the specifications that contain the modules used by CAP.

```

```

IMPORTS

    PARAMETERS-BOUND,
    CAPSpecificBoundSet
FROM CAP-classes classes

    IMS-PARAMETERS-BOUND
FROM CAP-IMS-classes imSclasses

    CONTRACT,
    OPERATION-PACKAGE,
    OPERATION
FROM Remote-Operations-Information-Objects ros-InformationObjects

    TCMessage {}
FROM TCAPMessages tc-Messages

    APPLICATION-CONTEXT,
    dialogue-abstract-syntax
FROM TC-Notation-Extensions tc-NotationExtensions

    activityTest,
    applyCharging {},
    applyChargingReport {},
    callGap {},
    callInformationReport {},
    callInformationRequest {},
    cancel ,
    connect {},
    connectToResource {},
    continue,
    continueWithArgument {},
    disconnectForwardConnection,
    eventReportBCSM {},
    furnishChargingInformation {},
    initialDP {},
    releaseCall {},
    requestReportBCSMEvent {},
    resetTimer {}
FROM CAP-IMSSF-gsmSCF-ops-args imSSF-gsmSCF-Operations

    playAnnouncement {},
    promptAndCollectUserInformation {},
    specializedResourceReport
FROM CAP-gsmSCF-gsmSRF-ops-args gsmSCF-gsmSRF-Operations

    specializedResourceControlPackage {}
FROM CAP-gsmSCF-gsmSRF-pkgs-contracts-acs gsmSCF-gsmSRF-Protocol

    id-as-gsmSSF-scfGenericAS,
    id-package-scfActivation,
    id-package-genericDisconnectResource,
    id-package-nonAssistedConnectionEstablishment,
    id-package-connect,
    id-package-callHandling,
    id-package-bcsmEventHandling,
    id-package-ssfCallProcessing,
    id-package-timer,
    id-package-billing,
    id-package-charging,
    id-package-trafficManagement,
    id-package-callReport,
    id-package-signallingControl,
    id-package-activityTest,
    id-package-cancel,
    classes,
    ros-InformationObjects,
    tc-Messages,
    tc-NotationExtensions,
    gsmSCF-gsmSRF-Operations,
    gsmSCF-gsmSRF-Protocol
FROM CAP-object-identifiers {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-object-identifiers(100) version3(2)}

    id-ac-CAP-IMSSF-scfGenericAC,
    id-CAPImssfToScfGeneric,
    imSclasses,
    IMSSF-gsmSCF-Operations
FROM CAP-IMS-object-identifiers {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-IMS-object-identifiers(110) version4(3)}

;

-- Application Contexts

cap-IMSSF-scfGenericAC APPLICATION-CONTEXT ::= {
    CONTRACT                capImssfToScfGeneric
    DIALOGUE MODE           structured
    ABSTRACT SYNTAXES      {dialogue-abstract-syntax |

```

```

        gsmSSF-scfGenericAbstractSyntax }
APPLICATION CONTEXT NAME      id-ac-CAP-IMSSF-scfGenericAC}

-- Contracts

capImssfToScfGenericCONTRACT ::= {
-- dialogue initiated by IM-SSF with InitialDP Operation
  INITIATOR CONSUMER OF
    {scfActivationPackage {cAPSpecificBoundSet}}
  RESPONDER CONSUMER OF
    {activityTestPackage |
     bcsmEventHandlingPackage {cAPSpecificBoundSet} |
     billingPackage {cAPSpecificBoundSet} |
     callHandlingPackage {cAPSpecificBoundSet} |
     callReportPackage {cAPSpecificBoundSet} |
     cancelPackage |
     chargingPackage {cAPSpecificBoundSet} |
     connectPackage {cAPSpecificBoundSet} |
     genericDisconnectResourcePackage |
     nonAssistedConnectionEstablishmentPackage {cAPSpecificBoundSet} |
     signallingControlPackage {cAPSpecificBoundSet} |
     specializedResourceControlPackage {cAPSpecificBoundSet} |
     sscfCallProcessingPackage {cAPSpecificBoundSet} |
     timerPackage {cAPSpecificBoundSet} |
     trafficManagementPackage {cAPSpecificBoundSet}}
  ID
  }

-- Operation Packages

scfActivationPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
  CONSUMER INVOKES  {initialDP {bound}}
  ID                id-package-scfActivation}
genericDisconnectResourcePackage OPERATION-PACKAGE ::= {
  CONSUMER INVOKES  {disconnectForwardConnection}
  ID                id-package-genericDisconnectResource}
nonAssistedConnectionEstablishmentPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
  CONSUMER INVOKES  {connectToResource {bound}}
  ID                id-package-nonAssistedConnectionEstablishment}
connectPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
  CONSUMER INVOKES  {connect {bound}}
  ID                id-package-connect}
callHandlingPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
  CONSUMER INVOKES  {releaseCall {bound}}
  ID                id-package-callHandling}
bcsmEventHandlingPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
  CONSUMER INVOKES  {requestReportBCSMEvent {bound}}
  SUPPLIER INVOKES  {eventReportBCSM {bound}}
  ID                id-package-bcsmEventHandling}
sscfCallProcessingPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
  CONSUMER INVOKES  {continueWithArgument {bound} | continue}
  ID                id-package-sscfCallProcessing}
timerPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
  CONSUMER INVOKES  {resetTimer {bound}}
  ID                id-package-timer}
billingPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
  CONSUMER INVOKES  {furnishChargingInformation {bound}}
  ID                id-package-billing}
chargingPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
  CONSUMER INVOKES  {applyCharging {bound}}
  SUPPLIER INVOKES  {applyChargingReport {bound}}
  ID                id-package-charging}
trafficManagementPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
  CONSUMER INVOKES  {callGap {bound}}
  ID                id-package-trafficManagement}
callReportPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
  CONSUMER INVOKES  {callInformationRequest {bound}}
  SUPPLIER INVOKES  {callInformationReport {bound}}
  ID                id-package-callReport}
activityTestPackage OPERATION-PACKAGE ::= {
  CONSUMER INVOKES  {activityTest}
  ID                id-package-activityTest}
cancelPackage OPERATION-PACKAGE ::= {
  CONSUMER INVOKES  {cancel}
  ID                id-package-cancel}

-- Abstract Syntaxes

gsmSSF-scfGenericAbstractSyntax ABSTRACT-SYNTAX ::= {
  GenericSSF-gsmSCF-PDUs
  IDENTIFIED BY id-as-gsmSSF-scfGenericAS }
GenericSSF-gsmSCF-PDUs ::= TCMMessage {{SsfToScfGenericInvokable},
  {SsfToScfGenericReturnable}}
SsfToScfGenericInvokable OPERATION ::= {

```

```
activityTest |
applyCharging {cAPSpecificBoundSet} |
applyChargingReport {cAPSpecificBoundSet} |
callInformationReport {cAPSpecificBoundSet} |
callInformationRequest {cAPSpecificBoundSet} |
cancel |
connect {cAPSpecificBoundSet} |
continueWithArgument {cAPSpecificBoundSet} |
connectToResource {cAPSpecificBoundSet} |
disconnectForwardConnection |
eventReportBCSM {cAPSpecificBoundSet} |
furnishChargingInformation {cAPSpecificBoundSet} |
initialDP {cAPSpecificBoundSet} |
releaseCall {cAPSpecificBoundSet} |
requestReportBCSMEEvent {cAPSpecificBoundSet} |
resetTimer {cAPSpecificBoundSet} |
sendChargingInformation {cAPSpecificBoundSet} |
playAnnouncement {cAPSpecificBoundSet} |
promptAndCollectUserInformation {cAPSpecificBoundSet} |
specializedResourceReport
}
```

END

## 6.2 gsmSCF/gsmSRF interface

ASN.1 definitions used for the gsmSCF/gsmSRF interface are found in TS 29.078 [11].

---

# 7 Application Entity procedures

The description of the application entity procedures for CAMEL Phase 4 for IP Multimedia call sessions can be found in 3GPP TS 23.278 [10].

---

# 8 Error procedures

The description of the error procedures for CAMEL Phase 4 for IP Multimedia call sessions can be found in 3GPP TS 29.078 [11].

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# 9 Detailed operation procedures

## 9.1 ActivityTest procedure

### 9.1.1 General description

This operation is used to check for the continued existence of a relationship between the gsmSCF and IM-SSF. If the relationship is still in existence, then the receiving entity will respond. If no reply is received within a given time period, then the gsmSCF which sent this operation will assume that the receiving entity has failed in some way and will take the appropriate action.

#### 9.1.1.1 Parameters

None.

## 9.1.2 Responding entity (IM-SSF)

### 9.1.2.1 Normal procedure

IM-SSF preconditions:

- (1) A relationship exists between the gsmSCF and the IM-SSF.
- (2) The SSME-FSM is in the state "Idle Management" or "Non-call Associated Treatment".

IM-SSF postconditions:

- (1) The SSME-FSM stays in, or moves to the state "Non-call Associated Treatment".
- (2) If the Dialogue ID is active and there is a IM-SSF using the dialogue, then the SSME sends a Return Result "ActivityTest" to the gsmSCF. If there are no other management activities (e.g. Call Gapping), then the SSME-FSM returns to the state "Idle Management". Otherwise, the SSME-FSM remains in the state "Non-call Associated Treatment".

If the Dialogue ID is not active, then the TC in the IM-SSF will issue a P-Abort. The SSME will in that case not receive the "ActivityTest" indication and thus will not be able to reply.

### 9.1.2.2 Error handling

Operation related error handling is not applicable, due to class 3 operation.

## 9.2 ApplyCharging procedure

### 9.2.1 General description

This operation is used for interacting from the gsmSCF with the IM-SSF function: CSE control of call duration. The ApplyChargingReport operation provides the feedback from the IM-SSF to the gsmSCF.

The charging scenarios supported by this operation are those given in 3GPP TS 22.078 for CSE control of call duration.

#### 9.2.1.1 Parameters

- aChBillingChargingCharacteristics:

This parameter specifies a list of parameters required for CSE control of call duration:

The list may contain:

- timeDurationCharging:

This list contains the following parameters:

- maxCallPeriodDuration:  
This parameter specifies the period of time for which a call can progress before an ApplyChargingReport shall be sent to the gsmSCF.
- releaseIfdurationExceeded:  
This parameter specifies the action to be taken at the IM-SSF when the duration specified above has been reached. If the parameter is present, then the call is released.
- tone:  
If the parameter is present, then a warning tone is played when the warning tone timer expires.
- tariffSwitchInterval:  
This parameter indicates to the IM-SSF the time duration until the next tariff switch. The measurement of the elapsed tariff switch period commences immediately upon successful execution of this operation.

- partyToCharge:  
This parameter indicates the party in the call.

## 9.2.2 Responding entity (IM-SSF)

### 9.2.2.1 Normal procedure

IM-SSF precondition:

- (1) A control relationship exists between the gsmSCF and the IM-SSF.
- (2) The IM-SSF is in one of the following states:
  - "Waiting for Instructions";
  - "Waiting for End of User Interaction";
  
  - "Monitoring".

IM-SSF postcondition:

- (1) No FSM state transition.

On receipt of this operation, the IM-SSF sets the charging data using the information elements included in the operation and acts accordingly.

The IM-SSF will start monitoring for the Answer event upon receipt of the ApplyCharging operation if Answer has not already been received on an outgoing connection to a Called Party or a connection to the gsmSRF. Upon subsequent detection of the Answer event on the outgoing connection charging is started. If the Answer event has been received from an outgoing connection already when the ApplyCharging operation is received then charging starts immediately.

Upon release of an outgoing connection to the Called Party or the gsmSRF connection any indication of Answer event receipt on the outgoing connection is cleared i.e. set to Answer event not received.

### 9.2.2.2 Error handling

TaskRefused: In addition to the generic error handling noted below, this error shall be indicated when:

- a previously received call period duration is pending;
- a tariffSwitchInterval is indicated when a previously received tariffSwitchInterval is pending.

Generic error handling for the operation related errors is described in clause 8 and the TC services used for reporting operation errors are described in clause 12 in TS 29.078 [11].

## 9.3 ApplyChargingReport procedure

### 9.3.1 General description

This operation is used by the IM-SSF to report charging related information to the gsmSCF as requested by the gsmSCF using the "ApplyCharging" operation.

Timing of duration shall be started if answer is detected by the IM-SSF. It shall be started independently for a connection to a Called Party and an gsmSRF connection.

A report is generated as specified in the 3GPP TS 23.278 [10].

#### 9.3.1.1 Parameters

- callResult:  
This parameter provides the gsmSCF with the charging related information previously requested using the ApplyCharging operation. The "CallResult" is a list, and can contain the following parameters:



- **timeDurationChargingResult:**  
This is a list, and can contain the following parameters:
- **timeInformation:**  
This is a choice of the following parameters:
  - **timeIfNoTariffSwitch:**  
This parameter will be present if no tariff switch has occurred since the reception of the first ApplyCharging operation for the connection to the Called Party or gsmSRF connection, otherwise it will be absent.  
If Answer was detected for the connection to the Called Party or the gsmSRF connection, then the elapsed time since detection of Answer shall be reported. If answer was not detected, it shall be set to "0".
  - **timeIfTariffSwitch:**  
  
This parameter will be present if a tariff switch has occurred since the reception of the first ApplyCharging operation for the connection to the Called Party or gsmSRF connection, otherwise it will be absent.  
The parameter may contain the following information:
    - **timeSinceLastTariffSwitch:**  
  
If Answer was detected for the connection to the Called Party or the gsmSRF connection, then the elapsed time since detection of Answer or the last tariff switch (whichever of these events was last detected) shall be reported. If Answer was not detected, it shall be set to "0".
    - **TariffSwitchInterval:**  
  
This parameter is present only if a tariff switch has occurred since the detection of Answer for the connection to the Called Party or the gsmSRF connection in the reported call period.  
The time interval between either the detection of the Answer event or the previous tariff switch (whichever of these events was last detected) and the last tariff switch is reported.
- **partyToCharge:**  
The "partyToCharge" parameter as received in the related ApplyCharging operation or deduced from the default value, to correlate the result to the request.
- **callActive:**  
This parameter indicates whether the call is still active or has been released.
- **callReleasedAtTcpExpiry:**  
This parameter, if present, indicates that the IM-SSF has released the call and terminated the dialogue. It shall be present when ACR is sent due to Tcp expiry and the IM-SSF has released the call (because ReleaseIfExceeded was present in ACH) and terminated the dialogue.  
In all other instances, this parameter shall be absent.

## 9.3.2 Invoking entity (IM-SSF)

### 9.3.2.1 Normal procedure

IM-SSF preconditions:

- (1) A relationship exists between the IM-SSF and the gsmSCF.
- (2) A charging event has been detected that was requested by the gsmSCF via an ApplyCharging operation or a Called Party or gsmSRF disconnection event has occurred.

IM-SSF postconditions:

- (1) If release of the call has occurred because the allowed call duration has been reached:
  - All outstanding EDPs shall be disarmed;
  - ApplyChargingReport shall be sent to gsmSCF followed by any outstanding CallInformationReports, if applicable;
  - The IM-SSF shall transit to the 'Idle' state.
- (2) If release of the call has occurred but not because the allowed call duration has been reached:
  - If there are any outstanding EDPs or other reports then the IM-SSF shall remain in the same state, else;
  - The IM-SSF shall transit to the 'Idle' state.

This operation is invoked if a charging event has been detected that was requested by the gsmSCF.

### 9.3.2.2 Error handling

Generic error handling for the operation related errors are described in clause 8 and the TC services used for reporting operation errors are described in TS 29.078 [11].

## 9.4 CallGap procedure

### 9.4.1 General description

This operation is used to request the IM-SSF to reduce the rate at which specific service requests are sent to the gsmSCF. For CAMEL, this operation could be sent only on a dialogue that has been opened by the IM-SSF by an InitialDP operation.

#### 9.4.1.1 Parameters

- gapCriteria:  
This parameter identifies the criteria for a call to be subject to call gapping. It consists of the following alternatives: basicGapCriteria or compoundGapCriteria:
- basicGapCriteria:  
This parameter consists of:
  - calledAddressValue:  
This parameter indicates that call gapping shall be applied when the leading digits of the dialled number of a call attempt match those specified in "gapCriteria". The called address is the one received from the current call control.
  - gapOnService:  
This parameter indicates that call gapping shall be applied when the "serviceKey" of a call attempt match those specified in "gapCriteria".
  - calledAddressAndService:  
This parameter indicates that call gapping shall be applied when the "serviceKey" and the leading digits of the dialled number of a call attempt match those specified in "gapCriteria". The called address is the one received from the current call control.
  - callingAddressAndService:  
This parameter indicates that call gapping shall be applied when the "serviceKey" and the leading digits of the calling party number of a call attempt match those specified in "gapCriteria". In the case of call forwarding the calling address to be gapped is the redirecting number which would be put in the Initial DP operation.
- compoundGapCriteria:  
This parameter consists of the following subparameters:

- **basicGapCriteria:**  
This parameter is as described above.
- **scfID:**  
The means of identification of an gsmSCF. The scfID is to convey the necessary gsmSCF address information (e.g. Global Title) in the network to the requesting IM-SSF. See Q.713 "calling party address" parameter. The network operator has to decide about the actual mapping of this parameter on the used signalling system.  
This parameter indicates the address of the gsmSCF, which initiated the call gapping.  
When scfID is used in an operation, which may cross an internetwork boundary, its encoding must be understood in both networks; this requires bilateral agreement on the encoding. If this parameter is not available the call gapping is not dedicated to a specific gsmSCF.  
This subparameter is restricted to include a fixed GT address string.  
Note: In the case where the GT addresses more than one SCP (e.g. a mated pair) then if one of these physical SCPs enters overload conditions and issues CallGap, then it is applied to all of them.
- **gapIndicators:**  
This parameter indicates the gapping characteristics.
- **duration:**  
Duration specifies the total time interval during which call gapping for the specified gap criteria will be active.  
  
A duration of 0 indicates that gapping is to be removed.  
  
A duration of -2 indicates a network specific duration.  
  
Other values indicate duration in seconds. A duration of -1 shall not be used.
- **gapInterval:**  
This parameter specifies the minimum time between calls being allowed through.  
  
An interval of 0 indicates that calls meeting the gap criteria are not to be rejected.  
  
An interval of -1 indicates that all calls meeting the gap criteria are to be rejected.  
  
Other values indicate interval in milliseconds.
- **controlType:**  
This parameter indicates the reason for activating call gapping.  
  
The "controlType" value "sCPOverloaded" indicates that an automatic congestion detection and control mechanism in the SCP has detected a congestion situation.  
  
The "controlType" value "manuallyInitiated" indicates that the service and or network/service management centre has detected a congestion situation, or any other situation that requires manually initiated controls.  
  
NOTE: The controlType 'manuallyInitiated' will have priority over 'sCPOverloaded' call gap. It should be noted that also non-IN controlled traffic control mechanism can apply to an exchange with the SSF functionality. The non-IN controlled traffic control may also have some influence to the IN call. Therefore it is recommended to take measures to co-ordinate several traffic control mechanisms. The non-IN controlled traffic control and co-ordination of several traffic control mechanisms are out of the scope of CAP.
- **gapTreatment:**  
This parameter indicates how calls that were stopped by the call gapping mechanism shall be treated.
  - **informationToSend:**  
  
This parameter indicates an announcement or a tone to be sent to the calling party. At the end of information sending, the call shall be released.
  - **inbandInfo:**  
This parameter specifies the inband information to be sent.
  - **messageID:**  
This parameter indicates the message(s) to be sent, it can be one of the following:

- elementaryMessageID:  
This parameter indicates a single announcement.
- duration:  
This parameter indicates the maximum time duration in seconds that the message shall be played/repeated. ZERO indicates endless repetition.
- tone:  
This parameter specifies a tone to be sent to the end-user.
- toneID:  
This parameter indicates the tone to be sent.
- duration:  
This parameter indicates the time duration in seconds of the tone to be sent. ZERO indicates infinite duration.
- releaseCause:  
If the call is to be released, this parameter indicates a specific cause value to be sent in the release message. See EN 300 356-1 [2].

## 9.4.2 Responding entity (IM-SSF)

### 9.4.2.1 Normal procedure

IM-SSF precondition:

- (1) Call gapping for gapCriteria is not active, or  
Call gapping for gapCriteria is active.
- (2) The IM-SSF is in any state except "Idle" and except "Wait\_For\_Request".

IM-SSF postcondition:

- (1) The gsm\_SSME\_FSM process is in the state "Active".
- (2) Call gapping for gapCriteria is activated, or  
Call gapping for gapCriteria is renewed, or  
Call gapping for gapCriteria is removed.
- (3) The IM-SSF remains in the same state.

If there is not already an existing gsm\_SSME\_FSM for the gap criteria and gsmSCFAddress provided, a new gsm\_SSME\_FSM is created. If no gsmSCFAddress is provided, this refers in general to the gsm\_SSME\_FSM without a gsmSCFAddress. This gsm\_SSME\_FSM enters the state "Active" and initializes call gapping for the specified IN calls. The parameters "gapIndicators", "controlType", "gapTreatment" and "gsmSCFAddress" for the indicated gap criteria will be set as provided by the "CallGap" operation.

In the case both manually initiated and automatically initiated service request gapping are active for the same "gapCriteria", the manuallyInitiated call gapping prevails over automatically initiated ("sCPOverloaded"). More specifically, the following rules shall be applied in the SSF to manage the priority of different control Types associated with the same "gapCriteria":

- If a gsm-SSME-FSM already exists for the "gapCriteria" and the gsmSCFAddress provided, then:
  - (1) if the (new) "controlType" equals an existing "controlType", then the new parameters (i.e., "gapIndicators" and "gapTreatment") overwrites the existing parameter values.
  - (2) if the (new) "controlType" is different than the existing "controlType", then the new parameters (i.e., "controlType", "gapIndicators", and "gapTreatment") shall be appended to the appropriate gsm\_SSME\_FSM (in addition to the existing parameters). The gsm\_SSME\_FSM remains in the state "Active".

If the IM-SSF meets a TDP, it checks if call gapping was initiated for the same gsmSCF as the one currently assigned to this TDP or if call gapping exists with no provided gsmSCFAddress. If neither call gapping was initiated nor exists, an "InitialDP" operation may be sent.

It checks if call gapping was initiated either for the "serviceKey" or for the "calledAddressValue" assigned to this TDP. If not, an "InitialDP" operation may be sent. In the case call gapping was initiated for "calledAddressAndService" or "callingAddressAndService" and the "serviceKey" matches, a check on the "calledAddressValue" and "callingAddressValue" for active call gapping shall be performed. If not, an "InitialDP" operation may be sent.

If a call to a controlled number matches only one "gapCriteria", then the corresponding control is applied. If both "manuallyInitiated" and "sCPOverload" controls are active, then only the manually initiated control shall be applied.

If a call matches several active "basicGapCriteria", then the treatment as specified in the CallGap associated with the gapCriteria with the highest priority should be applied, with the priority being from high to low:

1. calledAddressAndService/calledAddressValue;
2. callingAddressAndService;
3. gapOnService.

For example, a call with called number 123456 and ServiceKey = NP matches two CallGaps, one with gapCriteria 'CalledAddressValue=123' and another with 'gapOnService=NP'. Then the call is subject to the control of the service request CallGap with 'CalledAddressValue=123'.

In case multiple call gapping procedures are active with the same gap criteria, the "manuallyInitiated" call gapping shall prevail over automatically initiated service request gapping ("sCPOverloaded").

If a call to a controlled called number or from a controlled calling number matches several active "basicGapCriteria" of the same type (in this context 'calledAddressAndService' and 'calledAddressValue' are seen as one type), then only the "gapCriteria" associated with the longest called party number shall be used, and the corresponding control shall be applied. For example, the codes 1234 and 12345 are under control. Then the call with 123456 is subject to the control on 12345.

If a call to a controlled called number matches calledAddressAndService and calledAddressValue with the same number length, than calledAddressAndService has priority. Furthermore, if both "manuallyInitiated" and "sCPOverloaded" "controlTypes" are active for this "gapCriteria", then the "manuallyInitiated" control shall be applied.

If call gapping is performed on a call for a particular service and triggering of this service is allowed no other gap criteria should be applied to the same service.

Active GapCriteria with assigned scfID will have higher priority than the others. In case an entry with scfID matching the current call exist all other criteria without scfID are not evaluated.

The matching entries with scfID are evaluated in accordance with the priority rules for the basic criteria listed above.

If call gapping shall be applied and there is no gap interval active, an "InitialDP" operation may be sent including the "cGEncountered" parameter according to the specified controlType. A new gap interval shall be initiated as indicated by "gapInterval".

If a gap interval is active, no "InitialDP" operation is sent and the call is treated as defined by Default Call Handling and "gapTreatment".

The call gap process is stopped if the indicated duration equals ZERO.

If call gapping proceeds then the gsm\_SSME\_FSM remains in the state "Active". Otherwise, the gsm\_SSME\_FSM moves to state "idle".

#### 9.4.2.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

## 9.5 CallInformationReport procedure

### 9.5.1 General description

This operation is used to send specific call information for a single call party to the gsmSCF as requested by the gsmSCF in previous "CallInformationRequest" operation. The report is sent at the end of a call party connection which is indicated by one of the events specified below.

#### 9.5.1.1 Parameters

- requestedInformationList:  
According to the requested information the IM-SSF sends the appropriate types and values to the gsmSCF.
- legID:  
This parameter indicates the party in the call for which the information has been collected. When absent, it indicates the "outgoing" leg, this can be a leg created by Connect/Continue/ContinueWithArgument.

### 9.5.2 Invoking entity (IM-SSF)

#### 9.5.2.1 Normal procedure

IM-SSF precondition:

- (1) The indicated or default party is released from the call or call setup towards the indicated or default party is not completed.
- (2) Requested call information has been collected.
- (3) "CallInformationReport" is pending due to a previously received "CallInformationRequest" operation.
- (4) A control or a monitor relationship exists between the gsmSCF and the IM-SSF.

IM-SSF postcondition:

- (1) The IM-SSF shall move to the "Idle" state in the case where no other report requests are pending and no EDPs are armed otherwise the IM-SSF FSM shall remain in the same state.

If the IM-SSF FSM executes a state transition caused by one of the following events:

- release for the indicated or default leg;
- abandon for the indicated or default leg;
- Called party busy or Not Reachable for the indicated or default leg;
- IM-SSF no answer timer expiration for the indicated or default leg;
- route select failure for the indicated or default leg;
- release of call initiated by the gsmSCF (ReleaseCall),

and "CallInformationRequest" is pending for the indicated or default legs then one "CallInformationReport" operation is sent to the gsmSCF containing all information requested for that leg.

If a "CallInformationReport" has been sent to the gsmSCF then no "CallInformationReport" is pending on that leg, i.e. a further "CallInformationReport" on that leg, for example in the case of follow-on, has to be explicitly requested by the gsmSCF.

If an event causing the "CallInformationReport" is also detected by an armed EDP-R then immediately after "CallInformationReport" the corresponding "EventReportBCSM" has to be sent.

If an event causing the "CallInformationReport" is also detected by an armed EDP-N then immediately before "CallInformationReport" the corresponding "EventReportBCSM" has to be sent.

### 9.5.2.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

## 9.6 CallInformationRequest procedure

### 9.6.1 General description

This operation is used to request the IM-SSF to record specific information about a single call party and report it to the gsmSCF using the "CallInformationReport" operation.

#### 9.6.1.1 Parameters

- requestedInformationTypeList:  
This parameter specifies a list of specific items of information which is requested.  
The list may contain:
  - callAttemptElapsedTime:  
This parameter indicates the duration between the end of CAP processing of operations initiating call setup ("Connect", "Continue" or "ContinueWithArgument") and the received answer indication from called party side. For a calling party leg this parameter has to be set to 0.  
  
In case of unsuccessful call setup the network event indicating the unsuccessful call setup stops the measurement of "callAttemptElapsedTime".
  - callStopTime:  
This parameter indicates the time stamp when the connection is released.
  - callConnectedElapsedTime:  
This parameter indicates the duration between the received answer indication from the called party side and the release of that connection. For a calling party it indicates the duration between the sending of IDP and the release of that party.
  - releaseCause:  
This parameter indicates the release cause for the call.
  - legID:  
This parameter indicates the party in the call for which the information shall be collected and at the end of connection of which the report shall be sent. When absent, it shall apply to the "outgoing" leg, this can be a leg created by Connect/Continue/ContinueWithArgument.

### 9.6.2 Responding entity (IM-SSF)

#### 9.6.2.1 Normal procedure

IM-SSF precondition:

- (1) A control relationship exists between IM-SSF and gsmSCF.

IM-SSF postcondition:

- (1) Requested call information is retained by the IM-SSF.
- (2) The IM-SSF is waiting for further instructions.

The IM-SSF may receive the "CallInformationRequest" operation within an existing call associated (CA) dialogue only.

The "CallInformationRequest" operation is accepted by the IM-SSF Finite State Machine (IM-SSF-FSM) only in the state "Waiting for Instructions". The operation does not lead to any transition to another state.

The IM-SSF allocates a record for the indicated or default party and stores the requested information if already available and prepares the recording of information items, that will become available later like for example "callStopTimeValue".

Call information may be requested for any call party (identified by a legID).

### 9.6.2.2 Error handling

In any other than the "Waiting for Instruction" state the "CallInformationRequest" operation will be handled as an error with the error code "UnexpectedComponentSequence".

Generic error handling for the operation related errors are described in clause 8 and the TC services which are used for reporting operation errors are described in clause 12 in TS 29.078 [11].

## 9.7 Cancel procedure

### 9.7.1 General description

The gsmSCF uses this class 2 operation to request IM-SSF or to the gsmSRF via the IM-SSF to cancel a correlated previous operation.

The gsmSRF operation to be deleted can be either a "PlayAnnouncement" operation or a "PromptAndCollectUserInformation" operation. The cancellation of an operation is indicated via a respective error indication, "Canceled", to the invoking entity of the cancelled "PlayAnnouncement" or "PromptAndCollectUserInformation" operation. The "Cancel" operation can also be used to cancel all outstanding requests and enable the state machine (IM-SSF) to go to idle. In this case the "Cancel" operation does not specify any specific operation to be cancelled.

#### 9.7.1.1 Parameters

- **invokeID:**  
This parameter specifies which operation invocation is to be cancelled, i.e. PromptAndCollectUserInformation or PlayAnnouncement.
- **allRequests:**  
This parameter indicates that all active requests for EDP reports, "ApplyChargingReport" and "CallInformationReport" shall be cancelled.

NOTE: This cancellation is different from the invokeID based cancel mechanism described above.

### 9.7.2 Responding entity (gsmSRF)

In case of Cancel(invokeID) the gsmSRF via the IM-SSF is the responding entity.

#### 9.7.2.1 Normal procedure

gsmSRF precondition:

- (1) A PlayAnnouncement or PromptAndCollectUserInformation operation has been received and the gsmSRF is in the "User Interaction" state.

gsmSRF postcondition:

- (1) The execution of the PlayAnnouncement or PromptAndCollectUserInformation operation has been aborted and the gsmSRF remains in the "User Interaction" state.

#### 9.7.2.2 Error handling

Generic error handling for the operation related errors are described in clause 8 and the TC services which are used for reporting operation errors are described in clause 12 in TS 29.078 [11].



## 9.7.3 Responding entity (IM-SSF)

In case of Cancel(allRequests) the IM-SSF is the responding entity.

### 9.7.3.1 Normal procedure

IM-SSF precondition:

- (1) The IM-SSF-FSM is in the state "Waiting for Instructions" or "Monitoring".

IM-SSF postcondition:

- (1) All active requests for reports and notifications have been cancelled.
- (2) In case the IM-SSF-FSM was in state "Monitoring" it shall return to idle, or  
In case the IM-SSF-FSM was in state "Waiting for Instructions" it will remain in that state.  
A subsequent call-processing operation will move the IM-SSF-FSM state to "Idle". The call, if in active state, is further treated by IM-SSF autonomously as a normal (non-IN-) call.

### 9.7.3.2 Error handling

Sending of return error on cancel is not applicable in the cancel "allRequests" case. Generic error handling for the operation related errors are described in clause 8 and the TC services which are used for reporting operation errors are described in clause 12 in TS 29.078 [11].

## 9.8 Connect procedure

### 9.8.1 General description

This operation is used to request the IM-SSF to perform the call processing actions to route a call to a specific destination.

In general all parameters which are provided in a Connect operation to the IM-SSF shall replace the corresponding signalling parameter in the IP Multimedia session control in the O-IM-BCSM and shall be used for subsequent processing of the IM session. The IP Multimedia session control in the T-IM-BCSM shall send corresponding signalling parameters to new call leg without using them in subsequent processing of the IM session. Parameters which are not provided by the Connect operation shall retain their value (if already assigned) in the IP Multimedia session control for subsequent processing of the IM session.

#### 9.8.1.1 Parameters

- destinationRoutingAddress:  
This parameter contains the ISDN called party numbers towards which the call is to be routed.
- destinationRoutingAddressURL:  
This parameter contains the SIP URL identifying the called party towards which the call is to be routed.
- callingPartysCategory:  
This parameter indicates the type of calling party (e.g., operator, pay phone, ordinary subscriber).
- originalCalledPartyID:  
This parameter carries the original destination (ISDN) number if the call is forwarded by the gsmSCF.
- originalCalledPartyURL:  
This parameter carries the SIP URL identifying the original destination party if the call has met call forwarding on the route to the IM-SSF.
- redirectingPartyID:  
This parameter, if present, indicates the last (ISDN) directory number the call was redirected from.

- redirectingPartyURL:  
This parameter indicates the SIP URL identifying the last directory number the call was redirected from.
- redirectionInformation:  
This parameter contains forwarding related information, such as redirecting reason.

## 9.8.2 Responding entity (IM-SSF)

### 9.8.2.1 Normal procedure

IM-SSF precondition:

- (1) A control relationship exists between the IM-SSF and the gsmSCF.
- (2) BCSM: Basic call processing has been suspended at a DP.
- (3) The IM-SSF is in state "Waiting for Instructions".

IM-SSF postcondition:

- (1) The IM-SSF performs the call processing actions to route the call to the specified destination.
- (2) In the O-BCSM, call processing resumes at PIC Analyze\_Information.

On receipt of this operation in the IM-SSF state "Waiting for Instructions", the IM-SSF performs the following actions:

- The IM-SSF cancels  $T_{SSF}$ ;
- If no EDPs have been armed and neither a CallInformationReport nor an ApplyChargingReport has been requested, the IM-SSF goes to state "Idle". Otherwise, the IM-SSF goes to state "Monitoring".

No implicit activation or deactivation of DPs occurs.

Statistic counter(s) are not affected.

### 9.8.2.2 Error handling

Generic error handling for the operation related errors are described in clause 8 and the TC services which are used for reporting operation errors are described in clause 12 of TS 29.078[11].

## 9.9 ConnectToResource procedure

### 9.9.1 General description

This operation is used to connect a call from the IM-SSF to a specialized resource. After successful connection to the gsmSRF, the interaction with the caller can take place. The IM-SSF relays all operations for the gsmSRF and all responses from the gsmSRF.

#### 9.9.1.1 Parameters

None.

### 9.9.2 Responding entity (IM-SSF)

#### 9.9.2.1 Normal procedure

IM-SSF precondition:

- (1) A control relationship has been established.

- (2) The IM-SSF is in the state "Waiting for Instructions".

IM-SSF postcondition:

- (1) The call is switched to the gsmSRF.
- (2) A control relationship to the gsmSRF is established.
- (3) The IM-SSF moves to the state "Waiting for End of User Interaction (WFI)". T<sub>SSF</sub> is set.

NOTE: The successful connection to the gsmSRF causes a state transition in the gsmSRF FSM from "Idle" to "Connected".

### 9.9.2.2 Error handling

Generic error handling for the operation related errors are described in clause 8 and the TC services which are used for reporting operation errors are described in clause 12 in TS 29.078 [11].

## 9.10 Continue procedure

### 9.10.1 General description

This operation is used to request the IM-SSF to proceed with call processing at the DP at which it previously suspended call processing to await gsmSCF instructions. The IM-SSF continues call processing without substituting new data from the gsmSCF.

#### 9.10.1.1 Parameters

None

### 9.10.2 Responding entity (IM-SSF)

#### 9.10.2.1 Normal procedure

IM-SSF precondition:

- (1) A control relationship exists between the IM-SSF and the gsmSCF
- (2) BCSM: Basic call processing has been suspended at any DP.
- (3) IM-SSF is in state "Waiting for Instructions".

IM-SSF postcondition:

- (1) BCSM: Basic call processing continues, if all required resumptions have been received, otherwise the only action is to decrement the resumption counter(s). (For details refer to 3GPP TS 23.278 [10].)
- (2) The IM-SSF remains in the same state if all resumptions have not been received; or

The IM-SSF transits to the state "Monitoring", because at least one EDP was armed, or a "CallInformationReport" or "ApplyChargingReport" was requested and no user interaction is ongoing; or

The IM-SSF transits to the state "Idle", because no EDPs were armed and neither the "CallInformationReport" nor the "ApplyChargingReport" was requested.

#### 9.10.2.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

## 9.11 ContinueWithArgument Procedure

### 9.11.1 General description

This operation is used to request the SSF to proceed with call processing at the DP at which it previously suspended call processing to await SCF instructions. It is also used to provide additional service related information to a user (Called Party or Calling Party) whilst the call processing proceeds.

In general all parameters which are provided in a ContinueWithArgument operation to the IM-SSF shall replace the corresponding signalling parameter in the IP Multimedia session control and shall be used for subsequent processing of the IM session. Parameters which are not provided by the ContinueWithArgument operation shall retain their value (if already assigned) in the IP Multimedia session control for subsequent processing of the IM session.

#### 9.11.1.1 Parameters

- callingPartysCategory:  
This parameter indicates the type of calling party (e.g., operator, pay phone, ordinary subscriber).

### 9.11.2 Responding entity (IM-SSF)

#### 9.11.2.1 Normal procedure

IM-SSF precondition:

- (1) A control relationship exists between the IM-SSF and the gsmSCF.
- (2) BCSM: Basic call processing has been suspended at a DP.
- (3) The IM-SSF is in state "Waiting for Instructions".

IM-SSF postcondition:

- (1) The IM-SSF performs the call processing actions to route the call to the specified destination.
- (2) In the O-BCSM, call processing resumes at PIC Analyze\_Information.

On receipt of this operation in the IM-SSF state "Waiting for Instructions", the IM-SSF performs the following actions:

- The IM-SSF cancels  $T_{SSF}$ ;
- If no EDPs have been armed and neither a CallInformationReport nor an ApplyChargingReport has been requested, the IM-SSF goes to state "Idle". Otherwise, the IM-SSF goes to state "Monitoring".

No implicit activation or deactivation of DPs occurs.

Statistic counter(s) are not affected.

#### 9.11.2.2 Error handling

Generic error handling for the operation related errors are described in clause 8 and the TC services which are used for reporting operation errors are described in clause 12 of TS 29.078[11].

## 9.12 DisconnectForwardConnection procedure

### 9.12.1 General Description

This operation is used to explicitly disconnect a connection to a resource (gsmSRF) established previously with a "ConnectToResource" operation. It is used for a forward disconnection from the IM-SSF. An alternative solution is the

backward disconnect from the gsmSRF, controlled by the "DisconnectFromIPForbidden" parameter in the "PlayAnnouncement" and "PromptAndCollectUserInformation" operations.

### 9.12.1.1 Parameters

None.

## 9.12.2 Responding entity (IM-SSF)

### 9.12.2.1 Normal procedure

IM-SSF precondition:

- (1) The basic call processing has been suspended at a DP. The IM-SSF is in the state "Waiting for End of User Interaction".

IM-SSF postcondition:

- (1) The connection to the gsmSRF is released.
- (2) The IM-SSF is in state "Waiting for Instructions".

The receipt of "DisconnectForwardConnection" results in disconnecting the PE containing the gsmSRF from the concerned call. It does not release the connection from the IM-SSF back to the end user.

This operation is accepted in the IM-SSF state "Waiting for End of User Interaction". On receipt of this operation in this state, the IM-SSF must perform the following actions:

- The initiating IM-SSF releases the connection to the gsmSRF.
- The IM-SSF resets  $T_{SSF}$ .
- The IM-SSF FSM goes to state "Waiting for Instructions".

### 9.12.2.2 Error handling

Generic error handling for the operation related errors are described in clause 8 and the TC services which are used for reporting operation errors are described in clause 12 in TS 29.078 [11].

## 9.13 EventReportBCSM procedure

### 9.13.1 General description

This operation is used to notify the gsmSCF of a call related event previously requested by the gsmSCF in a "RequestReportBCSMEvent" operation. The monitoring of more than one event could be requested with a "RequestReportBCSMEvent" operation, but each of these requested events is reported in a separate "EventReportBCSM" operation.

#### 9.13.1.1 Parameters

- eventTypeBCSM:  
This parameter specifies the type of event that is reported.
- eventSpecificInformationBCSM:  
This parameter indicates the call related information specific to the event.

For "RouteSelectFailure" it will contain the "FailureCause", if available.

For "O-Busy" it will contain the "BusyCause", if available.

NOTE 1: If no BusyCause is received, the gsmSCF shall assume busy.

For "T-Busy" it may contain the following parameters, if available.

- BusyCause

if the T-Busy event is caused by an attempt to terminate to a subscriber that is not currently registered, the cause parameter shall contain the value "Subscriber absent (20)". Otherwise, the cause shall be set to indicate "User busy (17)".

NOTE 2: If no BusyCause is received, the gsmSCF shall assume busy.

For O-NoAnswer it will be empty.

For O- or T-Answer it will contain the following information:

- The destination address for the call;

For O- or T-Disconnect it will contain the "releaseCause", if available.

- legID:  
This parameters indicates the party in the call for which the event is reported. IM-SSF will use the option "ReceivingSideID" only.
- receivingSideID:  
If not included, the following defaults are assumed:  
  
"legID" = 1 for the events O-Abandon and T-Abandon,  
  
"legID" = 2 for the events RouteSelectFailure, O-Busy, O-NoAnswer, O-Answer, T-Busy, T-NoAnswer, and T-Answer.  
  
The "legID" parameter shall always be included for the events O-Disconnect and T-Disconnect.
- miscCallInfo:  
This parameter indicates Detection Point (DP) related information.
- messageType:  
This parameter indicates whether the message is a request, i.e. resulting from a "RequestReportBCSMEvent" with monitorMode = interrupted, or a notification, i.e. resulting from a "RequestReportBCSMEvent" with "monitorMode" = "notifyAndContinue".

## 9.13.2 Invoking entity (IM-SSF)

### 9.13.2.1 Normal procedure

IM-SSF precondition:

- (1) A control or a monitoring relationship exists between the IM-SSF and the gsmSCF.
- (2) The IM-SSF is in the state "Monitoring", or in state "Waiting for Instructions" (if the O/TDisconnect DP or O/TAnswer DP is armed and encountered); or the IM-SSF is in any state, except Idle (if the O/TAbandon DP is armed and encountered).
- (3) The BCSM proceeds to an EDP that is armed.

IM-SSF postcondition:

- (1) The IM-SSF stays in the state "Monitoring" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested.
- (2) The IM-SSF moves to the state "idle" if the message type was notification and there are no more EDPs armed, no "CallInformationReport" or "ApplyChargingReport" are requested.

- (3) The IM-SSF moves to the state "Waiting for Instructions" if the message type was request. Call processing is interrupted.

### 9.13.2.2 Error handling

In case the message type is request, on expiration of  $T_{\text{ssf}}$  before receiving any operation, the IM-SSF aborts the interaction with the gsmSCF and the call is given final treatment, e.g. a final announcement.

Operation related error handling is not applicable, due to class 4 operation.

## 9.14 FurnishChargingInformation procedure

### 9.14.1 General description

This operation is used to send charging related information to a logical call record. This logical call record is CAMEL specific. The first FCI of a call leg leads to the generation of a logical call record. The handling of subsequent FCI's for a call leg depends on the presence and value of the *append free format data* parameter in the FCI operation. For details see TS 23.278 [10].

If an FCI operation is received for the called party when the IM-SSF is in state 'Monitoring', or is suspended in one of the following DPs then the charging information shall be included in the logical call record for the leg that has been or is to be established:

- Collected\_Info;
- O\_Answer;
- Terminating\_Attempt\_Authorised; or
- T\_Answer.

If an FCI operation is received for the called party when the IM-SSF is suspended in any other DP then the charging information shall be included in the logical call record created for the last failed or disconnected called party.

#### 9.14.1.1 Parameters

- fCIBillingChargingCharacteristics:  
This parameter contains the following sub-parameters;
  - fCIBCCCAMELsequence1:  
This parameter contains the following sub-parameters;
    - freeFormatData:  
This parameter contains free-format billing and/or charging characteristics;
    - partyToCharge:  
This parameter indicates the party to bill and/or charge;
    - appendFreeFormatData:  
This parameter indicates whether previous FCI free format data is appended or overwritten. See 3GPP TS 23.278 [10].

## 9.14.2 Responding entity (IM-SSF)

### 9.14.2.1 Normal procedure

IM-SSF preconditions:

- (1) IM-SSF State "Waiting for Instructions" or IM-SSF State "Waiting for End of User Interaction" or IM-SSF state "Monitoring".

IM-SSF postcondition:

- (1) No FSM state transition.

On receipt of this operation the IM-SSF performs actions to create the call record if necessary, and writes the free-format information carried in the operation into the call record. An FCI operation will create a Logical Call Data Record (CDR) if such a record does not already exist for the indicated leg.

The Logical CDRs will be associated for a given call into one or more physical CDRs, as specified in 3GPP TS 22.105.

A logical CDR is output when a disconnection event is propagated to the Leg associated with it, or when a Connect operation to create a connection to a Follow-on Called Party is received. Successive FCIs indicating the calling leg (leg1) may overwrite data from previously received FCI(s) indicating that calling leg during that entire call or call attempt. Successive FCIs indicating the called leg (leg2) may overwrite any previously received data from FCI(s) indicating that called leg until the called leg representing that particular called party number is released from or releases the call. When a new called party is created as a result of a follow-on call, and an FCI indicating the called leg is received, then a new CAMEL Logical CDR is created for that portion of the call. From then on, any subsequent FCIs for the called party may overwrite the data from any previous FCI(s) for the called leg presenting that particular called party number; however, CAMEL Logical CDR(s) that have been output already are not affected.

No CAMEL Logical CDR is output at the end of a user interaction.

### 9.14.2.2 Error handling

Generic error handling for the operation related errors are described in clause 8 and the TC services which are used for reporting operation errors are described in clause 12 in TS 29.078 [11].

## 9.15 InitialDP procedure

### 9.15.1 General description

This operation is sent by the IM-SSF after detection of a TDP-R in the BCSM, to request the gsmSCF for instructions to complete the call.

#### 9.15.1.1 Parameters

- serviceKey:  
This parameter indicates to the gsmSCF the requested IN service. It is used to address the required application/SLP within the gsmSCF (not for SCP addressing).
- calledPartyNumber:  
This parameter contains the ISDN number used to identify the called party in the forward direction, i.e. see EN 300 356-1 [2].
- calledPartyURL:  
This parameter contains the SIP URL identifying the called party in the forward direction.
- callingPartyNumber:  
This parameter carries the calling party (ISDN) number to identify the calling party or the origin of the call. See EN 300 356-1 [2] Calling Party Number signalling information.



- **callingPartyURL:**  
This parameter contains the SIP URL identifying the calling party or the origin of the call.
- **callingPartysCategory:**  
Indicates the type of calling party (e.g. operator, pay phone, ordinary subscriber). See EN 300 356-1 [2] Calling Party Category signalling information.
- **originalCalledPartyID:**  
This parameter carries the original destination (ISDN) number if the call has met call forwarding on the route to the IM-SSF. See EN 300 356-1[2] Original Called Number signalling information.
- **originalCalledPartyURL:**  
This parameter carries the SIP URL identifying the original destination party if the call has met call forwarding on the route to the IM-SSF..
- **mediaType:**  
This parameter indicates the media type associated with the SIP call (e.g. video, audio, application or data).
- **eventTypeBCSM:**  
This parameter indicates the armed BCSM DP event, resulting in the "InitialDP" operation.
- **redirectingPartyID:**  
This parameter indicates the last (ISDN) directory number the call was redirected from.
- **redirectingPartyURL:**  
This parameter indicates the SIP URL identifying the last directory number the call was redirected from.
- **redirectionInformation:**  
It contains forwarding related information, such as redirecting reason.  
See ITU-T Recommendation Q.763 [5] Redirection Information signalling information.
- **iMSI:**  
IMSI of the mobile subscriber for which the service is invoked. For encoding see 3GPP TS 29.002 [9].
- **subscriberState:**  
The state of the mobile subscriber for which the service is invoked. The possible states are busy, idle and not reachable. For encoding see 3GPP TS 29.002 [9].
- **sipCallId:**  
This parameter is a unique identifier for the SIP call assigned by the CSCF.
- **iMSSFAddress:**  
This parameter gives the address assigned to the IM-SSF. For encoding see 3GPP TS 29.002 [9].
- **time&Timezone:**  
This parameter contains the time that the IM-SSF was triggered, and the time zone that the invoking IM-SSF resides in.
- **cGEncountered:**  
This parameter indicates the type of gapping the related call has been subjected to, if any.
- **cause:**  
This parameter indicates the release cause which triggered the event:

For "RouteSelectFailure" it will contain the "FailureCause", if available.

For "T-Busy" it may contain the following parameters:

- if the T-Busy event is caused by an attempt to terminate to a subscriber that is not currently registered, the cause parameter shall contain the value "Subscriber absent (20)". Otherwise, the cause shall be set to indicate "User busy (17)".

## 9.15.2 Invoking entity (IM-SSF)

### 9.15.2.1 Normal procedure

IM-SSF precondition:

- (1) An event fulfilling the criteria for the DP being executed has been detected.
- (2) Call gapping and SS7 overload are not in effect for the call.

IM-SSF postcondition:

- (1) A control relationship has been established if the DP was armed as a TDP-R. The IM-SSF moves to the State "Waiting for Instructions".

The address of the gsmSCF is fetched from the valid CSI. The IM-SSF provides all available parameters. Otherwise the IM-SSF proceeds with call handling without CAMEL Service.

The IM-SSF application timer  $T_{SSF}$  is set when the IM-SSF sends "InitialDP" for requesting instructions from the gsmSCF. It is used to prevent excessive call suspension time.

### 9.15.2.2 Error handling

If the destination gsmSCF is not accessible then the call proceeds according to the 'default call handling' parameter in the CSI.

On expiration of  $T_{SSF}$  before receiving any operation, the IM-SSF aborts the interaction with the gsmSCF and the call continues according to the 'default call handling' parameter in the CSI.

If the calling party abandons after the sending of "InitialDP", then the IM-SSF aborts the control relationship by means of an abort to TC. Note that TC will wait until the first response message from the gsmSCF has been received before it sends an abort to the gsmSCF (see also clause 12 of TS 29.078 [11]).

Generic error handling for the operation related errors are described in clause 8 and the TC services that are used for reporting operation errors are described in clause 12 of TS 29.078 [11].

## 9.16 ReleaseCall procedure

### 9.16.1 General description

This operation is used by the gsmSCF to tear down a call at any phase. This operation may not be sent to an assisting IM-SSF.

#### 9.16.1.1 Parameters

- releaseCause:  
A number giving an indication to the IM-SSF about the reason of releasing this specific call. This may be used by IM-SSF for generating specific tones to the different parties in the call or to fill in the "cause" in the release message.

### 9.16.2 Responding entity (IM-SSF)

#### 9.16.2.1 Normal procedure

IM-SSF precondition:

- (1) A control relationship exists between gsmSCF and IM-SSF.
- (2) The IM-SSF is in state "Waiting for Instructions" or state "Monitoring".

IM-SSF postcondition:

- (1) The IM-SSF changes to state "Idle" after sending any outstanding "CallInformationReport" or "ApplyChargingReport". Possible armed EDPs are ignored. All connections and resources related to the call are released.

### 9.16.2.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

## 9.17 RequestReportBCSMEvent procedure

### 9.17.1 General description

This operation is used to request the IM-SSF to monitor for a call-related event (e.g., BCSM events such as busy or no answer), then send a notification back to the gsmSCF when the event is detected.

#### 9.17.1.1 Parameters

- bcsmEvents:

This parameter specifies the event or events of which a report is requested.

- eventTypeBCSM:

This parameter specifies the type of event of which a report is requested.

- monitorMode:

This parameter indicates how the event shall be reported. When the "monitorMode" is "interrupted", the event shall be reported as a request, if the "monitorMode" is "notifyAndContinue", the event shall be reported as a notification, if the "monitorMode" is "transparent", the event shall not be reported.

- legID:

This parameter indicates the party in the call for which the event shall be reported. gsmSCF will use the option "sendingSideID" only.

- sendingSideID:

If not included, the following defaults are assumed for LegID:

"legID" = 1 for the events O-Abandon and T-Abandon,

"legID" = 2 for the events RouteSelectFailure, O-Busy, O-NoAnswer, O-Answer, T-Busy, T-NoAnswer, and T-Answer.

The "legID" parameter shall always be included for the events O-Disconnect and T-Disconnect.

- dPSpecificCriteria:

This parameter indicates information specific to the EDP to be armed.

- applicationTimer:

This parameter indicates the NoAnswer timer value for the NoAnswer event. If the user does not answer the call within the allotted time, the IM-SSF reports the event to the gsmSCF. This timer shall be shorter than the network no-answer timer.

### 9.17.2 Responding entity (IM-SSF)

#### 9.17.2.1 Normal procedure

IM-SSF precondition:

- (1) A control relationship exists between the IM-SSF and the gsmSCF.

- (2) The IM-SSF is in either the state "Waiting for Instructions" or the state "Monitoring".

NOTE: In state "monitoring" only requests to disarm detection points (with MonitorMode set to "Transparent") or send notifications of events (with MonitorMode set to "NotifyAndContinue") shall be accepted.

IM-SSF precondition:

- (1) The requested EDPs have been armed or disarmed as indicated.
- (2) Previously requested events are monitored until ended by a transparent monitor mode, until the end of the call, until the EDPs are detected or until the corresponding leg is released.
- (3) The IM-SSF remains in the same state, unless all EDPs have been disarmed and no CallInformationReport or ApplyChargingReport has been requested; in the latter case the IM-SSF moves to the state "Idle".

### 9.17.2.2 Error handling

Generic error handling for the operation related errors are described in clause 8 and the TC services which are used for reporting operation errors are described in clause 12 in TS 29.078 [11].

## 9.18 ResetTimer procedure

### 9.18.1 General description

This class 2 operation is used by the gsmSCF to refresh the  $T_{\text{SSf}}$  application timer, in order to avoid the  $T_{\text{SSf}}$  time-out at the IM-SSF.

#### 9.18.1.1 Parameters

- timerID:  
This parameter has a default value identifying the  $T_{\text{SSf}}$  timer.
- timerValue:  
This parameter specifies the value to which the  $T_{\text{SSf}}$  is to be set.

### 9.18.2 Responding entity (IM-SSF)

#### 9.18.2.1 Normal procedure

IM-SSF precondition:

- (1) Basic call processing has been suspended at a DP.
- (2) The IM-SSF is in the "Waiting for Instruction" state or in the "Waiting for End of User Interaction" state or in the "Waiting for End of Temporary Connection" state.

IM-SSF precondition:

- (1) The  $T_{\text{SSf}}$  timer has been reset.
- (2) The IM-SSF remains in the same state.

#### 9.18.2.2 Error handling

Generic error handling for the operation related errors are described in clause 8 and the TC services which are used for reporting operation errors are described in clause 12 in TS 29.078 [11].

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## Annex A (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
09/2002	CN#17	NP-020349			Creation of version 5.0.0	2.0.0	5.0.0

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# History

<b>Document history</b>		
V5.0.0	September 2002	Publication