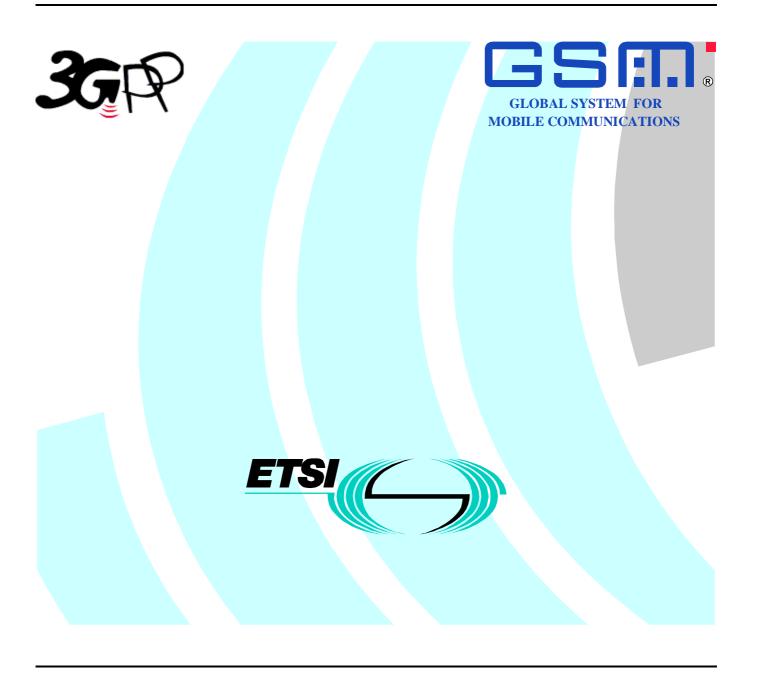# ETSI TS 129 078 V4.1.0 (2001-06)

Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); Customised Applications for Mobile network Enhanced Logic (CAMEL) Phase 3; CAMEL Application Part (CAP) specification (3GPP TS 29.078 version 4.1.0 Release 4)

GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS

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Foreword

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The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

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Contents

Foreword

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

The present document identifies the 3G system specifications for Release 1999.

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x   the first digit:

1   presented to TSG for information;

2   presented to TSG for approval;

3   or greater indicates TSG approved document under change control.

y   the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z   the third digit is incremented when editorial only changes have been incorporated in the document.

1   Scope

The present document specifies the CAMEL Application Part (CAP) supporting the third phase of the network feature Customized Applications for Mobile network Enhanced Logic. CAP is based on a sub-set of the ETSI Core INAP CS-2 as specified by EN 301 140-1 [39]. Descriptions and definitions provided by EN 301 140-1 [39] are directly referenced by this standard in case no additions or clarifications are needed for the use in the CAP.

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 ETR 186-2: "Intelligent Network (IN); Interaction between IN Application Protocol (INAP) and Integrated Services Digital Network (ISDN) signalling protocols; Part 2: Switching signalling requirements for IN Capability Set 2 (CS2) service support in a Narrowband ISDN (N-ISDN) environment".

[2]   3GPP TS 29.202: "SS7 Signalling Transport in Core Network; Stage 3.

[3]   ETSI ETS 300 009-1: "Integrated Services Digital Network (ISDN); Signalling System No.7; Signalling Connection Control Part (SCCP) (connectionless and connection-oriented class 2) to support international interconnection; Part 1: Protocol specification [ITU-T Recommendations Q.711 to Q.714 and Q.716 (1993), modified]".

[4]   ETSI ETS 300 121: "Integrated Services Digital Network (ISDN); Application of the ISDN User Part (ISUP) of CCITT Signalling System No.7 for international ISDN interconnections (ISUP version 1)".

[5]   ETSI EN 300 196-1: "Integrated Services Digital Network (ISDN); Generic functional protocol for the support of supplementary services; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[6]   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]".

[7]   ETSI ETS 300 348: "Intelligent Network (IN); Physical plane for intelligent network Capability Set 1 (CS1) [ITU-T Recommendation Q.1215 (1993)]".

[8]   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]".

[9]   ETSI ETS 300 374-1:"Intelligent Network (IN); Intelligent Network Capability Set 1 (CS1); Core Intelligent Network Application Protocol (INAP); Part 1: Protocol specification".

[10]   ETSI EN 300 403-1: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 1: Protocol specification [ITU-T Recommendation Q.931 (1993), modified]".

[11] ETSI EN 301 070-1: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 3 interactions with the Intelligent Network Application Part (INAP); Part 1: Protocol specification [ITU-T Recommendation Q.1600 (1997), modified]".

[12] 3GPP TS 24.008: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification (3GPP TS 24.008)".

[13] 3GPP TS 29.002: "Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) specification (3GPP TS 29.002)".

[14] ISO 639 (1988): "Code for the representation of names of languages".

[15] ISO 9545 (1989): "Information technology - Open Systems Interconnection - Application Layer structure".

[16] ITU-T Recommendation Q.71: "ISDN circuit mode switched bearer services".

[17] ITU-T Recommendation Q.700: "Introduction to CCITT Signalling System No.7".

[18] ITU-T Recommendation Q.710: "Signalling System No.7 - Simplified MPT version of small systems".

[19] ITU-T Recommendation Q.762: "General function of messages and signals of the ISDN user part of signalling system no.7".

[20] ITU-T Recommendation Q.763: "Formats and codes of the ISDN user part of Signalling System No.7".

[21] ITU-T Recommendation Q.767: "Application of the ISDN user part of CCITT Signalling System No.7 for international ISDN interconnections".

[22] ITU-T Recommendation Q.850: "Usage of cause and location in the digital subscriber signalling system no.1 and the signalling system no.7 ISDN user part".

[23] ITU-T Recommendation Q.932: "Digital subscriber Signalling System No.1 (DSS 1) - Generic procedures for the control of ISDN supplementary services".

[24] ITU-T Recommendation Q.1224: "Distributed functional plane for intelligent network CS2".

[25] ITU-T Recommendation Q.1225: "Physical plane for intelligent network CS2".

[26] ITU-T Recommendation Q.1228: "Interface ITU-T Recommendation for intelligent network CS2".

[27] ITU-T Recommendation Q.1290: "Glossary of terms used in the definition of intelligent networks".

[28] ITU-T Recommendation Q.1400: "Architecture framework for the development of signalling and organization, administration and maintenance protocols using OSI principles".

[29] CCITT Recommendation X.208: "Specification of Abstract Syntax Notation One (ASN.1)".

[30] CCITT Recommendation X.209: "Specification of basic encoding rules for Abstract Syntax Notation One (ASN.1)".

[31] CCITT Recommendation X.219: "Remote operations: Model, notation and service definition".

[32] CCITT Recommendation X.229: "Remote operations: Protocol specification".

[33] ITU-T Recommendation X.680 ASN.1: "Information technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation".

[34] ITU-T Recommendation X.690: "ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)".

[35] ITU-T Recommendation X.831: "Information technology - Open Systems Interconnection - Generic upper layers security: Security Exchange Service Element (SESE) service definition".

[36]   ITU-T Recommendation X.832: "Information technology - Open Systems Interconnection - Generic upper layers security: Security Exchange Service Element (SESE) protocol specification".

[37]   ITU-T Recommendation X.880 | ISO/IEC 9072-1: "Information technology - Remote Operations: Concepts, model and notation".

[38]   ETSI ES 201 296: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP); Signalling aspects of charging".

[39]   ETSI EN 301 140-5: "Intelligent Network (IN); Intelligent Network Application Protocol (INAP); Capability Set 2 (CS2); Part 1: Protocol Specification".

[40]   ANSI T1.112-1996: " American National Standards for Telecommunications- Signalling System Number 7 (SS7) - Signalling Connection Control Part (SCCP)".

[41]   CCITT Recommendation Q.713: "Specifications of Signalling System No.7; SCCP formats and codes".

[42]   3GPP TS 23.078: " Customised Applications for Mobile network Enhanced Logic (CAMEL) Phase 3 - Stage 2".

[43]   3GPP TS 29.060: "General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP) across the Gn and Gp Interface".

[44]   3GPP TS 23.032: "Universal Geographical Area Description (GAD)".

[45]   3GPP TS 24.011: "Point-toPoint (PP) Short Message Service (SMS); support on mobile radio interface".

[46]   3GPP TS 23.040: "Technical realization of the Short Message Service (SMS); Point-to-Point (PP)".

[47]   3GPP TS 22.024: "Description of Charge Advice Information (CAI)".

[48]   ITU-T Recommendation Q.773: "Specifications of Signalling System No.7; Transaction capabilities formats and encoding".

[49]   3GPP TS 23.003: "Numbering, addressing and identification".

[50]   ITU-T Recommendation Q.714: "Specifications of Signalling System No.7; Signalling Connection Control Part procedures".

[51]   3GPP TS 09.12: "Application of ISDN User Part (ISUP) version 2 for the ISDN-Public Land Mobile Network (PLMN) signalling interface; Part 1: Protocol specification".

[52]   3GPP TS 22.115: "Service Aspects Charging and Billing".

[53]   ANSI T1.113-1995: "American National Standards for Telecommunications- Signalling System Number 7 (SS7) - ISDN User Part".

2.1   Specifications used for IMPORTs for CAP

The following table lists the modules from which CAP V3 imports. For each module, the table indicates in which formal specification this module can be found.

Table 2-1: Module IMPORT specifications

Module Name	Specification	Ref
CS1-DataTypes {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3) cs1-datatypes(2) version1(0)}	ETS 300 374-1	[9]
CS2-datatypes {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3) in-cs2-datatypes (0) version1(0)}	EN 301 140-1	[39]
MAP-CommonDataTypes {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1) modules(3) map-CommonDataTypes(18) version6(6)}	3GPP TS 29.002	[13]
MAP-MS-DataTypes {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1) modules(3) map-MS-DataTypes(11) version6(6)}	3GPP TS 29.002	[13]
MAP-CH-DataTypes {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1) modules(3) map-CH-DataTypes(13) version6(6)}	3GPP TS 29.002	[13]
MAP-ExtensionDataTypes {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1) modules(3) map-ExtensionDataTypes(21) version6(6)}	3GPP TS 29.002	[13]
TCAPMessages {ccitt recommendation q 773 modules(2) messages(1) version3(3)}	ITU-T Q.773	[48]
Remote-Operations-Information-Objects {joint-iso-ccitt remote-operations(4) informationObjects(5) version1(0)}	ITU-T X.880	[37]
TC-Notation-Extensions {ccitt recommendation q 775 modules(2) notation-extension (4) version1(1)}	ETS 300 287-1	[6]

3 Abbreviations

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

AC	Application Context
ACI	Access Control Information
AE	Application Entity
AEI	Application Entity Invocation
APDU	Application Protocol Data Unit
ASE	Application Service Element
ASN.1	Abstract Syntax Notation One
BCSM	Basic Call State Model
BCUSM	Basic Call Unrelated State Model
BPIM	Basic Primitive Interface Model
C-ALG	Data confidentiality algorithm
CBC	Connectionless Bearer Control
CCF	Call Control Function
CS1	Capability Set 1
CS2	Capability Set 2
CSI	CAMEL Subscription Information
DP	Detection Point
DSS1	Digital Subscriber Signalling System No. One
EDP	Event Detection Point
EDP-N	Event Detection Point - Notification
EDP-R	Event Detection Point - Request
FE	Functional Entity
FEAM	Functional Entity Access Manager
ffs	for further study
FSM	Finite State Model
GprsSSF	GPRS SSF
gsmSCF	GSM SCF
gsmSSF	GSM SSF
gsmSRF	GSM SRF
GT	Global Title
GULS	Generic Upper Layers Security

I-ALG	data Integrity ALGorithm
ID	IDentifier
IE	Information Element
IN	Intelligent Network
CAP	Intelligent Network Application Protocol
IP	Intelligent Peripheral
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
K-ALG	Key management ALGorithm
LE	Local Exchange
M3UA	MTP3-User Adaptation
MAC	Message Authentication Code
MACF	Multiple Association Control Function
MSC	Mobile services Switching Centre
MTP	Message Transfer Part
MTP3	MTP Level 3
NA	North American
O-ALG	One-way function ALGorithm
O-BCSM	Originating BCSM
PCO	Point of Control and Observation
PDU	Protocol Data Unit
PE	Physical Entity
PIA	Point In Association
PIC	Point In Call
PLMN	Public Land Mobile Network
PSTN	Public Switched Telecommunication Network
QOP	Quality of Protection
RCO	Resource Control Object
ROS	Remote Operations Service
ROSE	ROS Element
RRB	Request Report BCSM Event
SACF	Single Association Control Function
SAO	Single Association Object
SCCP	Signalling Connection Control Part
gsmSCF	Service Control Function
SCP	Service Control Point
SDL	System Description Language
SESE	Security Exchange Service Element
SL	Service Logic
SLP	Service Logic Program
SLPI	Service Logic Program Instance
SMSC	Short Message Service Centre
SMF	Service Management Function
SPKM	Simple Public Key GSS-API Mechanism
gsmSRF	Specialized Resource Function
SRME	gsmSRF Management Entity
SRSM	gsmSRF Call State Model
SS7	Signalling System no. 7
gsmSSF	Service Switching Function
SSME	gsmSSF Management Entity
SSN	Sub-System Number
SSP	Service Switching Point
STUI	Service To User Information
T-BCSM	Terminating BCSM
tbd	to be determined
TC	Transaction Capabilities
TCAP	Transaction Capabilities Application Part
TDP	Trigger Detection Point
TDP-R	Trigger Detection Point - Request

4 Interface specification for telecommunication services

4.1 General

4.1.1 Definition methodology

The definition of the protocol can be split into three sections:

- the definition of the Single Association Control Function (SACF)/Multiple Association Control Function (MACF) rules for the protocol;

- the definition of the operations transferred between entities;

- the definition of the actions taken at each entity.
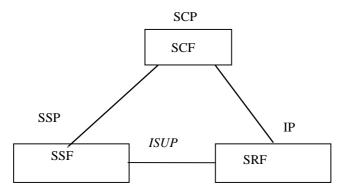
The SACF/MACF rules are defined in prose. The operation definitions are in Abstract Syntax Notation One (ASN.1), see CCITT Recommendations X.208 [29], ITU-T Recommendation X.680 [33], and the actions are defined in terms of state transition diagrams. Further guidance on the actions to be performed on receipt of an operation can be gained from the description of the relevant information flow in ITU-T Recommendation Q.1224 [24].

The CAMEL Application Protocol (CAP) is a ROS Element (ROSE) user protocol (see CCITT Recommendation X.219 [31] and CCITT Recommendation X.229 [32]). The ROSE protocol is contained within the component sublayer of Transaction Capabilities Application Part (TCAP) (see ETS 300 287-1) and Digital Subscriber Signalling System No One (DSS1) (ITU-T Recommendation Q.932). At present the ROSE Application Protocol Data Units (APDUs) are conveyed in transaction sublayer messages in Signalling System no. 7 (SS7) and in the EN 300 403-1 REGISTER, FACILITY and call control messages in DSS1. Other supporting protocols may be added at a later date.

The CAP (as a ROSE user) and the ROSE protocol have been specified using ASN.1 (see ITU-T Recommendation X.680). The encoding of the resulting Protocol Data Units (PDUs) should use the Basic Encoding Rules (see ITU-T Recommendation X.690).
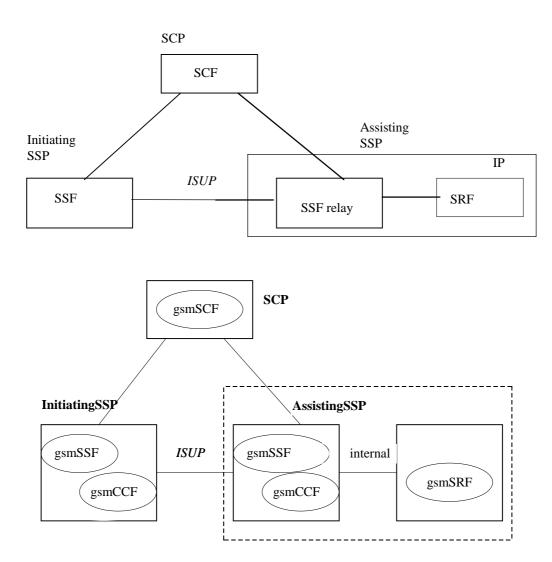
4.1.2 Example physical scenarios

The reader is referred to Intelligent Network Capability Set 1 (CS1) Core INAP [9] for details of the example physical scenarios.
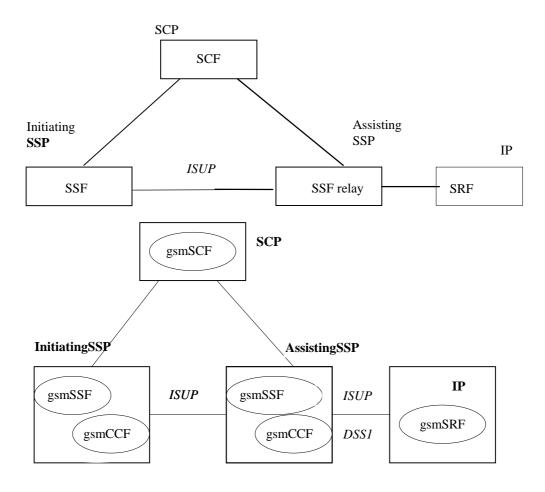
Scenario 1, Direct Path To IP (Ref. CS1 cases b) & d)).

Figure 4-1: Scenarios
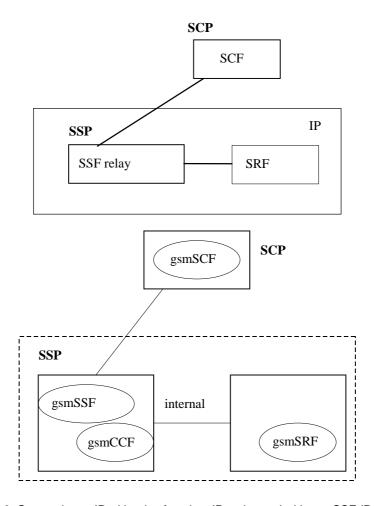
Scenario 2a, Connection to IP via an Assisting SSF with relay function; IP co-located with Assisting gsmSSF (Ref. CS1 case c)).

Figure 4-1 (continued): Scenarios
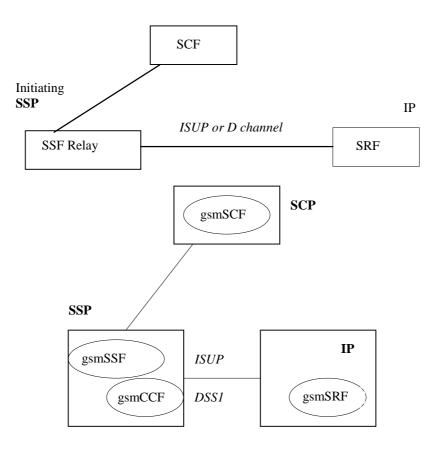
Scenario 2b; Connection to IP via an Assisting SSF with relay function; IP not co-located with Assisting gsmSSF (Ref CS1 case c)).

Figure 4-1 (continued): Scenarios
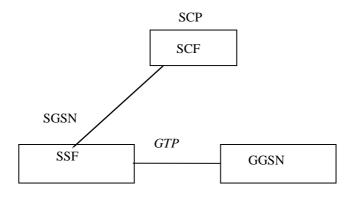
Scenario 3, Connection to IP with relay function; IP co-located with gsmSSF (Ref CS1 case a)).
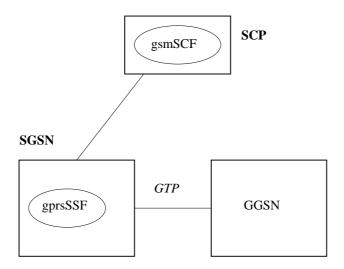
Figure 4-1 (continued): Scenarios

Scenario 4, Connection to IP with relay function; IP not co-located with gsmSSF (Ref CS1 case a)).

Figure 4-1 (continued): Scenarios

Scenario 5, GPRS interworking. No connection to IP.

Figure 4-1 (concluded): Scenarios

The following table summarises the scenarios and corresponding interface connections that shall be supported by the CAP protocol. The following terms used in the table are defined as follows:

Basic: Fully defined in CAP and may be used between any two network operators supporting CAP

Bilateral: Additional clarifications of CAP capabilities between network operators and/or equipment vendors are necessary in order for CAP to be used between any two network operators supporting CAP.

Direct: This refers to the case where CAP operations are exchanged between the gsmSRF and the gsmSCF via a transaction-level relationship established directly between the gsmSRF and the gsmSCF.

Relay: This refers to the case where CAP operations are exchanged between the gsmSRF and the gsmSCF via two transaction-layer relationships. These relationships are:

- gsmSCF to/from gsmSSF;

- gsmSSF to/from gsmSRF.

The gsmSSF sends operations it receives from the gsmSCF to the gsmSRF, and operations it receives from the gsmSRF to the gsmSCF. This is done without unpacking (and thus processing) of the relayed operations.

The gsmSSF function referred to in the table is always located in an MSC or GMSC.

The gprsSSF function is always located in a SGSN node.

Table 4-1

Scenario	Interface Support				
	GsmSSF to/from gsmSCF	GsmSSF to/from gsmSRF	gsmSSF to/from assisting SSF	gsmSRF to/from gsmSCP	assisting SSF to/from gsmSCF
Scenario 1 gsmSRF in IP connected to gsmSSF in MSC/GMSC via ISUP and accessed by gsmSCF through direct Signalling System No.7 Connection	See Note 1	See Note 2	-	See Notes 3 and 6. For gsmSRF in VPLMN see Note 4; For gsmSRF in HPLMN see note 5	-
Scenario 2a assisting gsmSSF in MSC/GMSC connected to gsmSSF in MSC/GMSC via ISUP. Assisting gsmSSF is accessed by gsmSCF through direct Signalling System No.7 Connection. gsmSRF is co-located with assisting gsmSSF and accessed (by gsmSCF) by relay via assisting gsmSSF over an internal nodal interface	See Note 1 For gsmSRF in VPLMN see Notes 4 and 6; For gsmSRF in HPLMN see note 5 and 6	-	See Note 2	-	See Note 3
Scenario 2b assisting gsmSSF in MSC/GMSC connected to gsmSSF in MSC/GMSC via ISUP. Assisting gsmSSF is accessed by gsmSCF through direct Signalling System No.7 Connection gsmSRF is in IP connected to assisting gsmSSF and accessed (by gsmSCF) by relay through ISUP or DSS1 via assisting SSF	See Note 1 See Notes 4 and 6	See Notes 4 and 6	See Note 2	-	See Note 3
Scenario 3 gsmSRF is co-located with a gsmSSF in an MSC/GMSC and accessed by relay via gsmSSF over an internal nodal interface	For gsmSRF in VPLMN see Notes 4; For gsmSRF in HPLMN see notes 5 and 6	-	-	-	-
Scenario 4 gsmSRF in IP connected to gsmSSF and accessed by gsmSCF by relay through ISUP or DSS1 via gsmSSF	See Notes 4 and 6	See Notes 4 and 6	-	-	-

NOTE 1: Basic for establishment of interface when CorrelationID and SCFiD are transferred in the AssistingSSPIPRoutingAddress. Bilateral when CorrelationID and SCFiD are transferred by other means than in the AssistingSSPIPRoutingAddress.

NOTE 2: Basic for establishment of interface when CorrelationID and SCFiD are transferred in the Called Party Number. Bilateral when CorrelationID and SCFiD are transferred by other means than in the Called Party Number.

NOTE 3: Basic when the full Called Party Number received in VPLMN or HPLMN is transferred on its own in the AssistRequestInstructions operation CorrelationID parameter to a gsmSCF in HPLMN.

Bilateral when CorrelationID is extracted from Called Party Number in HPLMN/VPLMN and transferred on its own in AssistRequestInstructions CorrelationID field to a gsmSCF in   HPLMN.

NOTE 4: Bilateral for the playing of announcements via elementaryMessageIDs and variableMessages, playing of tones and the collection of DTMF digits.

NOTE 5: Basic for the playing of announcements via elementaryMessageIDs and variableMessages, playing of tones and the collection of DTMF digits.

NOTE 6: Bilateral for the playing of announcements via text to speech translation, translation of DTMF digits via speech to caller and the translation of voice to digits.

4.1.3   CAP protocol architecture

Many of the terms used in this subclause are based on the OSI application layer structure as defined in ISO 9545.
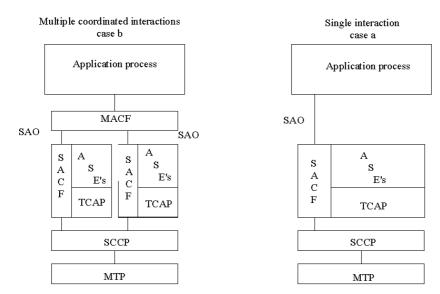
The CAP protocol architecture is illustrated in figure 4-2.

A PE has either single interactions (case a) or multiple co-ordinated interactions (case b) with other PE.

In case a, SACF provides a co-ordination function in using ASE's, which includes the ordering of operations supported by ASE(s), (based on the order of received primitives). The Single Association Object (SAO) represents the SACF plus a set of ASE's to be used over a single interaction between a pair of PE's.

In case b, MACF provides a co-ordinating function among several SAO's, each of which interacts with an SAO in a remote PE.

Each ASE supports one or more operations. Description of each operation is tied with the action of corresponding FE modelling (see ITU-T Recommendation Q.1224 and clause 11 of the present document). Each operation is specified using the OPERATION macro described in figure 4-3.

NOTE: CAP is the collection of all specifications in ASEs.

Figure 4-2: CAP protocol architecture

INAP User ASE's

```
xyz OPERATION
ARGUMENT {Parameter1, Parameter2,...}
RESULT {Parameter1, Parameter2,...}
LINKED {operation3, operation4,...}
ERRORS {error1, error2....}

error1 ERROR
PARAMETER {Parameter6, Parameter7,...}
                    etc
```

to peer → Operations
Results
Errors

TCAP ASE

COMPONENT SUB-LAYER

to peer → INVOKE
RETURN RESULT
RETURN ERROR
REJECT

TRANSACTION SUB-LAYER

to peer → BEGIN
CONTINUE
END
ABORT
UNIDIRECTIONAL

CONNECTIONLESS SCCP

Figure 4-3: Operation description

4.1.4   Compatibility mechanisms used for CAP

4.1.4.1   Introduction

This subclause specifies the compatibility mechanisms that shall be used for CAP.

Two major categories of compatibility are handled by these mechanisms:

- compatibility with the ITU-T Recommendation Q.1228 [26] version of CS2 INAP and the specification EN 301 140 -1 version of CS2 INAP [39];

- compatibility with future versions of CAP.

The second category has three subcategories of compatibility dealt within this subclause:

- Minor changes to CAP in future standardized versions:
  A minor change can be defined as a change of a functionality which is not essential for the requested IN service. Where it is a modification of an existing function, it is acceptable that the addressed function is executed in either the older or the modified variant. If the change is purely additional, it is acceptable that it is not executed at all and that the peer Application Entity (AE) need not know about the effects of the change. For minor changes, a new AC is not required.

- Major changes to CAP in future standardized versions:
  A major change can be defined as a change of a functionality which is essential for the requested IN service. Where it is a modification of an existing function, both application entities shall have a shared knowledge about the addressed functional variant. If the change is purely additional, the requested IN service will not be provided if one of the application entities does not support the additional functionality. For major changes, a new AC is required.

- Network-specific changes to CAP:
  These additions may be of either the major or minor type for a service. No new AC is expected to be defined for this type of change. At the time of definition, the additions would not be expected to be included in identical form in future versions of the 3GPP TS.

4.1.4.2 Definition of CAP compatibility mechanisms

4.1.4.2.1 Compatibility mechanism for interworking of CAP with ETSI CS2 Core INAP and ITU-T Q.1228 INAP

On receipt of an operation according to ITU-T Recommendation Q.1228 [26] or an operation according to EN 301 140-1 [39], which is not part of the CAP or is part of the CAP but which contains parameters which are not part of the CAP:

- the gsmSSF, gsmSCF, assistingSSF and gsmSRF shall apply the normal error handling for unknown operations or parameters, i.e. the normal error handling procedures as specified in clause 10 shall be followed.

Tagging of CAP additions to ITU-T Recommendation Q.1228 [26] and EN 301 140-1 [39] are specified from 50 to 59.

4.1.4.2.2 Procedures for major additions to CAP

In order to support the introduction of major functional changes, the protocol allows a synchronization between the two applications with regard to which functionality is to be performed. This synchronization takes place before the new function is invoked in either application entity, in order to avoid complicated fall-back procedures. The solution chosen to achieve such a synchronization is use of the AC negotiation provided in ETS 300 287 [6].

4.1.4.2.3 Procedures for minor additions to CAP

The extension mechanism marker shall be used for future standardized minor additions to CAP. This mechanism implements extensions by including an "extensions marker" in the type definition. The extensions are expressed by optional fields that are placed after the marker. When an entity receives unrecognized parameters that occur after the marker, they are ignored (see ITU-T Recommendation X.680 [33]).

4.1.4.2.4 Procedures for inclusion of network specific additions to CAP

This mechanism is based on the ability to explicitly declare fields of any type via the Macro facility in ASN.1 at the outermost level of a type definition. It works by defining an "ExtensionField" that is placed at the end of the type definition. This extension field is defined as a set of extensions, where an extension can contain any type. Each extension is associated with an identification that unambiguously identifies the extension. Refer to ITU-T Recommendation Q.1400 [28] for a definition of this mechanism.

4.1.5 Definition And Usage Of LegID

4.1.5.1 Definition Of LegID

In CAP V.3, two types of LegID may be exchanged between the gsmSCF and the gsmSSF. These are:

- Sending Side LegID; and

- Receiving Side LegID.

Sending Side LegID is always used in operations sent from the gsmSCF to the gsmSSF, and Receiving Side LegID is always used in operations sent from the gsmSSF to the gsmSCF.

4.1.5.2 Allocation Of LegID

For all operations containing a LegID:

- LegID = 1 shall always refer to the Calling Party, more specifically that party in the call present when InitialDP is sent to the gsmSCF;

- LegID = 2 shall always refer to the Called Party, more specifically that party in the call created as a result of the Connect, Continue or ContinueWithArgument operations.

4.2 SACF/MACF rules

4.2.1 Reflection of TC AC

TC AC negotiation rules require that the proposed AC, if acceptable, is reflected in the first backwards message.

If the AC is not acceptable, and the TC-User does not wish to continue the dialogue, it may provide an alternate AC to the initiator which can be used to start a new dialogue.

> NOTE: If the gsmSSF provides an AC which is not acceptable to the gsmSCF, then an alternate AC shall not be returned. If the AC presented to the gsmSCF is not acceptable then this is most probably due to an error in subscriber data provisioning or an error at the gsmSSF.

Refer to EN 300 287 [6] for a description of the TC AC negotiation mechanism.

4.2.2 Sequential/parallel execution of operations

In some cases it may be necessary to distinguish whether operations should be performed sequentially or in parallel (synchronized). Operations which may be synchronized are:

- charging operations; may be synchronized with any other operation.

The method of indicating that operations are to be synchronized is to include them in the same message. Where one of the operations identified above is not to be executed until some other operation has progressed to some extent or finished, the sending PE (usually SCP) shall control this by sending the operations in two separate messages.

This method does not imply that all operations sent in the same message have to be executed simultaneously, but simply that where it could make sense to do so (in the situations identified above) the operations should be synchronized.

In case of inconsistency between the above-mentioned generic rules and the FE-specific rules, as specified in clause 9, the FE-specific rules take precedence over the generic rules.

5 Common CAP Types

5.1 Data types

```
-- The Definition of Common Data Types follows

CAP-datatypes {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1)
modules(3) cap-datatypes(52) version3(2)}
-- This module contains the type definitions for the CAP v.3 data types.

DEFINITIONS IMPLICIT TAGS ::= BEGIN


IMPORTS

    CallingPartysCategory,
    Duration,
    HighLayerCompatibility,
    Integer4,
    Interval,
    LegID,
    RedirectionInformation,
    ServiceKey
FROM CS1-DataTypes {ccitt(0) identified-organization(4) etsi(0) inDomain(1) in-network(1)
modules(0) cs1-datatypes(2) version1(0)}

    BothwayThroughConnectionInd,
    CriticalityType,
    MiscCallInfo
FROM CS2-datatypes {ccitt(0) identified-organization(4) etsi(0) inDomain(1) in-network(1)
cS2(20) modules(0) in-cs2-datatypes(0) version1(0)}
```

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

    Ext-QoS-Subscribed,
    GeographicalInformation,
    GSN-Address,
    LocationInformation,
    LSAIdentity,
    QoS-Subscribed,
    SubscriberState
FROM MAP-MS-DataTypes {ccitt(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 {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
gsm-Network(1) modules(3) map-CH-DataTypes(13) version6(6)}

    tc-Messages,
    classes
FROM CAP-object-identifiers {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-object-identifiers(100) version3(2)}

    TCInvokeIdSet
FROM TCAPMessages tc-Messages

    EXTENSION,
    PARAMETERS-BOUND,
    SupportedExtensions {}
FROM CAP-classes classes

    ExtensionContainer
FROM MAP-ExtensionDataTypes {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
gsm-Network(1) modules(3) map-ExtensionDataTypes(21) version6(6)}

;

AccessPointName {PARAMETERS-BOUND: bound}::= OCTET STRING (SIZE(
    bound.&minAccessPointNameLength .. bound.&maxAccessPointNameLength))
-- Indicates the AccessPointName, refer to 3GPP TS 24.008 [12] for the encoding.

AChBillingChargingCharacteristics {PARAMETERS-BOUND : bound} ::= OCTET STRING (SIZE
    (bound.&minAChBillingChargingLength .. bound.&maxAChBillingChargingLength))
    (CONSTRAINED BY {-- shall be the result of the BER-encoded value of the type --
    CAMEL-AChBillingChargingCharacteristics {bound}})
-- The AChBillingChargingCharacteristics parameter specifies the charging related information
-- to be provided by the gsmSSF and the conditions on which this information has to be reported
-- back to the gsmSCF with the ApplyChargingReport operation. The value of the
-- AChBillingChargingCharacteristics of type OCTET STRING carries a value of the ASN.1 data type:
-- CAMEL-AChBillingChargingCharacteristics. The normal encoding rules are used to encode this
-- value.
-- The violation of the UserDefinedConstraint shall be handled as an ASN.1 syntax error.

AdditionalCallingPartyNumber {PARAMETERS-BOUND : bound}      ::= Digits {bound}
-- Indicates the Additional Calling Party Number.

AlertingPattern                                   ::= OCTET STRING (SIZE(3))
-- Indicates a specific pattern that is used to alert a subscriber
-- (e.g. distinctive ringing, tones, etc.).
-- The encoding of the last octet of this parameter is as defined in 3GPP TS 29.002 [13].
-- Only the trailing OCTET is used, the remaining OCTETS shall be sent as NULL (zero)
-- The receiving side shall ignore the leading two OCTETS.

AOCBeforeAnswer                     ::= SEQUENCE {
    aOCInitial                      [0] CAI-GSM0224,
    aOCSubsequent                   [1] AOCSubsequent                      OPTIONAL
    }

AOCGPRS                             ::= SEQUENCE {
    aOCInitial                      [0] CAI-GSM0224,
    aOCSubsequent                   [1] AOCSubsequent                      OPTIONAL
    }

AOCSubsequent                       ::= SEQUENCE {
    cAI-GSM0224                     [0] CAI-GSM0224 ,
    tariffSwitchInterval            [1] INTEGER (1..86400)                 OPTIONAL
    }
-- tariffSwitchInterval is measured in 1 second units

AppendFreeFormatData    ::= ENUMERATED {
    overwrite       (0),
    append          (1)
    }
```

```
ApplicationTimer                                        ::=INTEGER (0..2047)
-- Used by the gsmSCF to set a timer in the gsmSSF. The timer is in seconds.

AssistingSSPIPRoutingAddress {PARAMETERS-BOUND : bound}      ::= Digits {bound}
-- Indicates the destination address of the gsmSRF for the assist procedure.

BackwardServiceInteractionInd       ::= SEQUENCE {
    conferenceTreatmentIndicator        [1] OCTET STRING (SIZE(1))  OPTIONAL,
    -- acceptConferenceRequest  'xxxx xx01'B
    -- rejectConferenceRequest  'xxxx xx10'B
    -- network default is accept conference request
    callCompletionTreatmentIndicator    [2] OCTET STRING (SIZE(1))  OPTIONAL,
    -- acceptCallCompletionServiceRequest   'xxxx xx01'B,
    -- rejectCallCompletionServiceRequest   'xxxx xx10'B
    -- network default is accept call completion service request
    ...
    }

BasicGapCriteria {PARAMETERS-BOUND : bound}                 ::= CHOICE {
    calledAddressValue          [0] Digits {bound},
    gapOnService                [2] GapOnService,
    calledAddressAndService     [29] SEQUENCE {
        calledAddressValue          [0] Digits {bound},
        serviceKey                  [1] ServiceKey,
        ...
        },
    callingAddressAndService    [30] SEQUENCE {
        callingAddressValue         [0] Digits {bound},
        serviceKey                  [1] ServiceKey,
        ...
        }
    }
-- Both calledAddressValue and callingAddressValue can be
-- incomplete numbers, in the sense that a limited amount of digits can be given.
-- For the handling of numbers starting with the same digit string refer to the detailed
-- procedure of the CallGap operation

BCSMEvent {PARAMETERS-BOUND : bound} ::= SEQUENCE {
    eventTypeBCSM       [0] EventTypeBCSM,
    monitorMode         [1] MonitorMode,
    legID               [2] LegID                                OPTIONAL,
    dpSpecificCriteria  [30] DpSpecificCriteria {bound}          OPTIONAL
    }
-- Indicates the BCSM Event information for monitoring.

BearerCapability {PARAMETERS-BOUND : bound} ::= CHOICE {
    bearerCap           [0] OCTET STRING (SIZE(2..bound.&maxBearerCapabilityLength))
    }
-- Indicates the type of bearer capability connection to the user. For bearerCap, the ISUP User
-- Service Information, ETS 300 356-1 [8]
-- encoding shall be used.

CAI-GSM0224                     ::= SEQUENCE {
    e1                              [0] INTEGER (0..8191)            OPTIONAL,
    e2                              [1] INTEGER (0..8191)            OPTIONAL,
    e3                              [2] INTEGER (0..8191)            OPTIONAL,
    e4                              [3] INTEGER (0..8191)            OPTIONAL,
    e5                              [4] INTEGER (0..8191)            OPTIONAL,
    e6                              [5] INTEGER (0..8191)            OPTIONAL,
    e7                              [6] INTEGER (0..8191)            OPTIONAL
    }
-- Indicates Charge Advice Information to the Mobile Station. For information regarding
-- parameter usage, refer to 3GPP TS 22.040 [26].

CalledPartyBCDNumber {PARAMETERS-BOUND : bound}     ::= OCTET STRING (SIZE(
    bound.&minCalledPartyBCDNumberLength .. bound.&maxCalledPartyBCDNumberLength))
-- Indicates the Called Party Number, including service selection information.
-- Refer to 3GPP TS 24.008 [12]
-- for encoding. This data type carries only the "type of number", "numbering plan
-- identification" and "number digit" fields defined in 3GPP TS 24.008 [12];
-- it does not carry the "called party
-- BCD number IEI" or "length of called party BCD number contents".

CalledPartyNumber {PARAMETERS-BOUND : bound}    ::= OCTET STRING (SIZE(
    bound.&minCalledPartyNumberLength .. bound.&maxCalledPartyNumberLength))
-- Indicates the Called Party Number. Refer to ITU-T Q.763 [20] for encoding.

CallingPartyNumber {PARAMETERS-BOUND : bound}   ::= OCTET STRING (SIZE(
    bound.&minCallingPartyNumberLength .. bound.&maxCallingPartyNumberLength))
-- Indicates the Calling Party Number. Refer to ETS 300 356-1 [8] for encoding.

CallResult {PARAMETERS-BOUND : bound} ::= OCTET STRING (SIZE(
    bound.&minCallResultLength .. bound.&maxCallResultLength))
    (CONSTRAINED BY {-- shall be the result of the BER-encoded value of type -
    CAMEL-CallResult {bound}})

-- The violation of the UserDefinedConstraint shall be handled as an ASN.1 syntax error.

-- This parameter provides the gsmSCF with the charging related information previously requested
```

```
-- using the ApplyCharging operation. This shall include the partyToCharge parameter as
-- received in the related ApplyCharging operation to correlate the result to the request

CAMEL-AChBillingChargingCharacteristics {PARAMETERS-BOUND : bound} ::= CHOICE {
    timeDurationCharging               [0] SEQUENCE {
            maxCallPeriodDuration          [0] INTEGER (1..864000),
            releaseIfdurationExceeded      [1] BOOLEAN DEFAULT FALSE,
            tariffSwitchInterval           [2] INTEGER (1..86400)          OPTIONAL,
            tone                           [3] BOOLEAN DEFAULT FALSE,
            extensions                     [4] SEQUENCE SIZE(1..bound.&numOfExtensions) OF
                                               ExtensionField  {bound} OPTIONAL,
            ...
        }
    }
-- tariffSwitchInterval is measured in 1 second units.
-- maxCallPeriodDuration is measured in100 millisecond units

CAMEL-CallResult {PARAMETERS-BOUND : bound}     ::= CHOICE {
    timeDurationChargingResult         [0] SEQUENCE {
        partyToCharge                      [0] ReceivingSideID,
        timeInformation                    [1] TimeInformation,
        callActive                         [2] BOOLEAN                DEFAULT TRUE,
        callReleasedAtTcpExpiry            [3] NULL                   OPTIONAL,
        extensions                         [4] SEQUENCE SIZE(1..bound.&numOfExtensions)    OF
                                               ExtensionField  {bound}     OPTIONAL,
        ...
        }
    }

CAMEL-FCIBillingChargingCharacteristics {PARAMETERS-BOUND : bound} ::= CHOICE{
    fCIBCCCAMELsequence1       [0] SEQUENCE {
        freeFormatData             [0] OCTET STRING (SIZE(
            bound.&minFCIBillingChargingDataLength .. bound.&maxFCIBillingChargingDataLength)),
        partyToCharge              [1] SendingSideID        DEFAULT sendingSideID : leg1,
        appendFreeFormatData       [2] AppendFreeFormatData    DEFAULT overwrite
        }
    }

CAMEL-FCIGPRSBillingChargingCharacteristics {PARAMETERS-BOUND : bound} ::= SEQUENCE{
    fCIBCCCAMELsequence1       [0] SEQUENCE {
        freeFormatData             [0] OCTET STRING (SIZE(
            bound.&minFCIBillingChargingDataLength .. bound.&maxFCIBillingChargingDataLength)),
        pDPID                      [1] PDPID OPTIONAL,
        appendFreeFormatData       [2] AppendFreeFormatData    DEFAULT overwrite,
        ...
        }
    }

CAMEL-FCISMSBillingChargingCharacteristics {PARAMETERS-BOUND : bound} ::= CHOICE{
    fCIBCCCAMELsequence1       [0] SEQUENCE {
        freeFormatData             [0] OCTET STRING (SIZE(
            bound.&minFCIBillingChargingDataLength .. bound.&maxFCIBillingChargingDataLength)),
        appendFreeFormatData       [1] AppendFreeFormatData    DEFAULT overwrite
        }
    }

CAMEL-SCIBillingChargingCharacteristics ::= CHOICE {
    aOCBeforeAnswer                         [0] AOCBeforeAnswer,
    aOCAfterAnswer                          [1] AOCSubsequent
    }

CAMEL-SCIGPRSBillingChargingCharacteristics ::= SEQUENCE {
    aOCGPRS                                 [0] AOCGPRS,
    pDPID                                   [1] PDPID        OPTIONAL,
    ...
    }

Carrier {PARAMETERS-BOUND : bound} ::= OCTET STRING (SIZE(
    bound.&minCarrierLength .. bound.&maxCarrierLength))
-- This parameter is only used for North America (na)
-- It contains the carrier selection field (first octet) followed by Carrier ID
-- information (North America (na)).

-- The Carrier selection is one octet and is encoded as:
-- 00000000     No indication
-- 00000001     Selected carrier identification code (CIC) pre subscribed and not
--              input by calling party
-- 00000010     Selected carrier identification code (CIC) pre subscribed and input by
--              calling party
-- 00000011     Selected carrier identification code (CIC) pre subscribed, no
--              indication of whether input by calling party (undetermined)
-- 00000100     Selected carrier identification code (CIC) not pre subscribed and
--              input by calling party
-- 00000101
-- to           Spare
-- 11111110
-- 11111111     Reserved

-- Refer to ANSI ISUP T1.113 [53] for encoding of na carrier ID information (3 octets).
```

```
Cause {PARAMETERS-BOUND : bound}              ::= OCTET STRING (SIZE(
    bound.&minCauseLength .. bound.&maxCauseLength))
-- Indicates the cause for interface related information.
-- Refer to ETS 300 356-1 [8] Cause parameter for encoding.
-- For the use of cause and location values refer to ITU-T Recommendation Q.850 [22]
-- Shall always include the cause value and shall also include the diagnostics field,
-- if available.

CGEncountered                                 ::= ENUMERATED {
    noCGencountered         (0),
    manualCGencountered     (1),
    scpOverload             (2)
    }
-- Indicates the type of automatic call gapping encountered, if any.

ChargeNumber {PARAMETERS-BOUND : bound} ::= LocationNumber {bound}
-- Information sent in either direction indicating the chargeable number for the call and
-- consisting of the odd/even indicator, nature of address indicator, numbering plan indicator,
-- and address signals.
-- Uses the LocationNumber format which is based on the Q.763 Location Number format
-- For example, the ChargeNumber may be a third party number to which a call is billed for
-- the 3rd party billing service. In this case, the calling party may request operator assistance
-- to charge the call to, for example, their home number.

-- For NA, this parameter uniquely identifies the chargeable number for a call sent into a North
-- American long distance carrier. It transports the ChargeNumber Parameter Field
--  as defined in ANSI ISUP T1.113 [53]. This provides
--  - 1 octet for the nature of address indicator field, plus
--  - 1 octet for a numbering plan field, plus
--  - up to 5 octets for the address signal (up to 10 digits)

-- The Charge Number in ANSI T1.113 [53] normally contains a 10 digit national number within
-- the North American Numbering Plan (NANP); longer (e.g. international) charge numbers are not
-- supported in T1.113 [53].

ChargingCharacteristics              ::= CHOICE {
    maxTransferredVolume             [0] INTEGER (1..4294967295),
    maxElapsedTime                   [1] INTEGER (1..86400)
    }
--  maxTransferredVolume is measured in number of bytes
--  maxElapsedTime is measured in seconds

ChargingResult                       ::= CHOICE {
    transferredVolume                [0] TransferredVolume,
    elapsedTime                      [1] ElapsedTime
    }

ChargingRollOver                     ::= CHOICE {
    transferredVolumeRollOver        [0] TransferredVolumeRollOver,
    elapsedTimeRollOver              [1] ElapsedTimeRollOver
    }
-- transferredVolumeRollOver shall be reported if ApplyChargingReportGPRS reports volume and
-- a roll-over has occurred in one or more volume counters. Otherwise, it shall be absent.
-- elapsedTimeRollOver shall be reported if ApplyChargingReportGPRS reports duration and
-- a roll-over has occurred in one or more duration counters. Otherwise, it shall be absent.

CollectedDigits                          ::= SEQUENCE {
    minimumNbOfDigits       [0] INTEGER (1..30) DEFAULT 1,
    maximumNbOfDigits       [1] INTEGER (1..30),
    endOfReplyDigit         [2] OCTET STRING (SIZE (1..2))  OPTIONAL,
    cancelDigit             [3] OCTET STRING (SIZE (1..2))  OPTIONAL,
    startDigit              [4] OCTET STRING (SIZE (1..2))  OPTIONAL,
    firstDigitTimeOut       [5] INTEGER (1..127)            OPTIONAL,
    interDigitTimeOut       [6] INTEGER (1..127)            OPTIONAL,
    errorTreatment          [7] ErrorTreatment             DEFAULT stdErrorAndInfo,
    interruptableAnnInd     [8] BOOLEAN                     DEFAULT TRUE,
    voiceInformation        [9] BOOLEAN                     DEFAULT FALSE,
    voiceBack               [10] BOOLEAN                    DEFAULT FALSE
    }
-- The use of voiceBack and the support of voice recognition via voiceInformation
-- is network operator specific.
-- The endOfReplyDigit, cancelDigit, and startDigit parameters have been
-- designated as OCTET STRING, and are to be encoded as BCD, one digit per octet
-- only, contained in the four least significant bits of each OCTET. The following encoding shall
-- be applied for the non-decimal characters:
-- 1011 (*), 1100 (#).
-- The usage is service dependent.
-- firstDigitTimeOut and interDigitTimeOut are measured in seconds.

CollectedInfo                            ::= CHOICE {
    collectedDigits         [0] CollectedDigits
    }

ConnectedNumberTreatmentInd              ::= ENUMERATED {
    noINImpact                      (0),
    presentationRestricted          (1),
    presentCalledINNumber           (2),
    presentCallINNumberRestricted   (3)
```

```
}
-- This parameter is used to suppress or to display the connected number.

ControlType                             ::= ENUMERATED {
    sCPOverloaded               (0),
    manuallyInitiated           (1)
    }

CompoundCriteria {PARAMETERS-BOUND : bound} ::= SEQUENCE {
    basicGapCriteria            [0] BasicGapCriteria {bound},
    scfID                       [1] ScfID {bound}                OPTIONAL
    }

CorrelationID {PARAMETERS-BOUND : bound}    ::= Digits {bound}
-- used by gsmSCF for correlation with a previous operation.

DateAndTime                             ::= OCTET STRING (SIZE(7))
--  DateAndTime is BCD encoded. The year digit indicating millenium occupies bits
--  0-3 of the first octet, and the year digit indicating century occupies bits
--  4-7 of the first octet.
--  The year digit indicating decade occupies bits 0-3 of the second octet,
--  whilst the digit indicating the year within the decade occupies bits 4-7 of
--  the second octet.
--  The most significant month digit occupies bits 0-3 of the third octet,
--  and the least significant month digit occupies bits 4-7 of the third octet.
--  The most significant day digit occupies bits 0-3 of the fourth octet,
--  and the least significant day digit occupies bits 4-7 of the fourth octet.
--  The most significant hours digit occupies bits 0-3 of the fifth octet,
--  and the least significant digit occupies bits 4-7 of the fifth octet.
--  The most significant minutes digit occupies bits 0-3 of the sixth octet,
--  and the least significant digit occupies bits 4-7 of the sixth octet.
--  The most significant seconds digit occupies bits 0-3 of the seventh octet,
--  and the least seconds significant digit occupies bits 4-7 of the seventh octet.
--  For the encoding of digits in an octet, refer to the timeAndtimezone parameter.

DestinationRoutingAddress {PARAMETERS-BOUND : bound} ::= SEQUENCE SIZE(1) OF
                                                CalledPartyNumber {bound}
-- Indicates the Called Party Number.

Digits {PARAMETERS-BOUND : bound}                ::= OCTET STRING (SIZE(
    bound.&minDigitsLength .. bound.&maxDigitsLength))
-- Indicates the address signalling digits.
-- Refer to ETS 300 356-1 [8] Generic Number & Generic Digits parameters for encoding.
-- The coding of the subfields 'NumberQualifier' in Generic Number and 'TypeOfDigits' in
-- Generic Digits are irrelevant to the CAP;
-- the ASN.1 tags are sufficient to identify the parameter.
-- The ISUP format does not allow to exclude these subfields,
-- therefore the value is network operator specific.
-- The following parameters should use Generic Number:
-- AdditionalCallingPartyNumber for InitialDP
-- AssistingSSPIPRoutingAddress for EstablishTemporaryConnection
-- CorrelationID for AssistRequestInstructions
-- CalledAddressValue for all occurrences, CallingAddressValue for all occurrences.
--
-- The following parameters should use Generic Digits:
-- CorrelationID in EstablishTemporaryConnection
-- number in VariablePart
-- digitsResponse in ReceivedInformationArg
-- In the digitsResponse the digits may also include the '*', '#', a, b , c and d digits
-- by using the IA5 character encoding scheme. If the BCD even or BCD odd encoding
-- scheme is used, the following encoding shall be applied for the non-decimal characters:
-- 1011 (*), 1100 (#).

-- Note that when CorrelationID is transported in Generic Digits, then the digits shall
-- always be BCD encoded.

DpSpecificCriteria {PARAMETERS-BOUND : bound}        ::= CHOICE {
    applicationTimer        [1] ApplicationTimer
    }
--  The gsmSCF may set a timer in the gsmSSF for the No Answer event.
--  If the user does not answer the call within the allotted time,
--  the gsmSSF reports the event to the gsmSCF

ElapsedTime                         ::= CHOICE {
    timeGPRSIfNoTariffSwitch    [0] INTEGER (0..86400),
    timeGPRSIfTariffSwitch      [1] SEQUENCE {
        timeGPRSSinceLastTariffSwitch   [0] INTEGER (0..86400),
        timeGPRSTariffSwitchInterval    [1] INTEGER (0..86400)  OPTIONAL
        }
    }
-- timeGPRSIfNoTariffSwitch is measured in seconds
-- timeGPRSSinceLastTariffSwitch and timeGPRSTariffSwitchInterval are measured in seconds

ElapsedTimeRollOver             ::= CHOICE {
    rO-TimeGPRSIfNoTariffSwitch     [0] INTEGER (0..255),
    rO-TimeGPRSIfTariffSwitch       [1] SEQUENCE {
        rO-TimeGPRSSinceLastTariffSwitch    [0] INTEGER (0..255)     OPTIONAL,
        rO-TimeGPRSTariffSwitchInterval     [1] INTEGER (0..255)     OPTIONAL
        }
```

```
    }
-- rO-TimeGPRSIfNoTariffSwitch, rO-TimeGPRSSinceLastTariffSwitch and
-- rO-TimeGPRSTariffSwitchInterval
-- present counters indicating the number of parameter range rollovers.

EndUserAddress  {PARAMETERS-BOUND: bound}              ::= SEQUENCE {
    pDPTypeOrganization                    [0] OCTET STRING (SIZE(1)),
    pDPTypeNumber                          [1] OCTET STRING (SIZE(1)),
    pDPAddress                             [2] OCTET STRING (SIZE(
        bound.&minPDPAddressLength .. bound.&maxPDPAddressLength))  OPTIONAL
    }
-- Indicates the EndUserAddress, refer to 3GPP TS 29.060 for the encoding.
-- The pDPTypeOrganization shall use the least significant 4 bits of the octet encoded.
-- The sender of this parameter shall set the most significant 4 bits of the octet to 1.
-- The receiver of this parameter shall ignore the most significant 4 bits of this octet.

ErrorTreatment                                         ::= ENUMERATED {
    stdErrorAndInfo       (0),
    help                  (1),
    repeatPrompt          (2)
    }
-- stdErrorAndInfomeans returning the "ImproperCallerResponse" error in the event of an error
-- condition during collection of user info.

EventSpecificInformationBCSM {PARAMETERS-BOUND : bound} ::= CHOICE {
    routeSelectFailureSpecificInfo [2] SEQUENCE {
            failureCause              [0] Cause {bound}         OPTIONAL,
            ...
            },
    oCalledPartyBusySpecificInfo  [3] SEQUENCE {
            busyCause                 [0] Cause {bound}         OPTIONAL,
            ...
            },
    oNoAnswerSpecificInfo         [4] SEQUENCE {
            -- no specific info defined --
            ...
            },
    oAnswerSpecificInfo           [5] SEQUENCE {
            destinationAddress        [50] CalledPartyNumber {bound}  OPTIONAL,
            or-Call                   [51] NULL                OPTIONAL,
            forwardedCall             [52] NULL                OPTIONAL,
            ...
            },
    oDisconnectSpecificInfo       [7] SEQUENCE {
            releaseCause              [0] Cause {bound}         OPTIONAL,
            ...
            },
    tBusySpecificInfo             [8] SEQUENCE {
            busyCause                 [0] Cause {bound}         OPTIONAL,
            callForwarded             [50] NULL                OPTIONAL,
            routeNotPermitted         [51] NULL                OPTIONAL,
            ...
            },
    tNoAnswerSpecificInfo         [9] SEQUENCE {
            callForwarded             [50] NULL                OPTIONAL,
            ...
            },
    tAnswerSpecificInfo           [10] SEQUENCE {
            destinationAddress        [50] CalledPartyNumber {bound}  OPTIONAL,
            or-Call                   [51] NULL                OPTIONAL,
            forwardedCall             [52] NULL                OPTIONAL,
            ...
            },
    tDisconnectSpecificInfo       [12] SEQUENCE {
            releaseCause              [0] Cause {bound}         OPTIONAL,
            ...
            }
    }
-- Indicates the call related information specific to the event.

EventSpecificInformationSMS    ::= CHOICE {
    o-smsFailureSpecificInfo       [0] SEQUENCE {
        failureCause               [0] SMSCause                          OPTIONAL,
        ...
        },
    o-smsSubmittedSpecificInfo     [1] SEQUENCE {
        -- no specific info defined—
        ...
        }
    }

EventTypeBCSM                              ::= ENUMERATED {
    collectedInfo               (2),
    analyzedInformation         (3),
    routeSelectFailure          (4),
    oCalledPartyBusy            (5),
    oNoAnswer                   (6),
    oAnswer                     (7),
    oDisconnect                 (9),
```

```
    oAbandon                     (10),
    termAttemptAuthorized        (12),
    tBusy                        (13),
    tNoAnswer                    (14),
    tAnswer                      (15),
    tDisconnect                  (17),
    tAbandon                     (18)
    }
-- Indicates the BCSM detection point event.
-- Values collectedInfo, analyzedInformation and termAttemptAuthorized can only be used for TDPs

EventTypeSMS                     ::= ENUMERATED {
    sms-CollectedInfo            (1),
    o-smsFailure                 (2),
    o-smsSubmitted               (3)
    }
-- Value sms-CollectedInfo can only be used for TDPs.

ExtensionField {PARAMETERS-BOUND : bound}   ::= SEQUENCE {
    type              EXTENSION.&id              ({SupportedExtensions {bound}}),
                      -- shall identify the value of an EXTENSION type
    criticality       CriticalityType           DEFAULT ignore,
    value        [1] EXTENSION.&ExtensionType   ({SupportedExtensions {bound}}{@type}),
    ...
    }
-- This parameter indicates an extension of an argument data type.
-- Its content is network operator specific

FCIBillingChargingCharacteristics {PARAMETERS-BOUND : bound} ::= OCTET STRING (SIZE(
    bound.&minFCIBillingChargingLength .. bound.&maxFCIBillingChargingLength))
    (CONSTRAINED BY {-- shall be the result of the BER-encoded value of type --
    CAMEL-FCIBillingChargingCharacteristics {bound}})
-- This parameter indicates the billing and/or charging characteristics.
-- The violation of the UserDefinedConstraint shall be handled as an ASN.1 syntax error.

FCIGPRSBillingChargingCharacteristics {PARAMETERS-BOUND : bound} ::= OCTET STRING (SIZE(
    bound.&minFCIBillingChargingLength .. bound.&maxFCIBillingChargingLength))
    (CONSTRAINED BY {-- shall be the result of the BER-encoded value of type -
    CAMEL-FCIGPRSBillingChargingCharacteristics {bound}})
-- This parameter indicates the GPRS billing and/or charging characteristics.
-- The violation of the UserDefinedConstraint shall be handled as an ASN.1 syntax error.

FCISMSBillingChargingCharacteristics {PARAMETERS-BOUND : bound} ::= OCTET STRING (SIZE(
    bound.&minFCIBillingChargingLength .. bound.&maxFCIBillingChargingLength))
    (CONSTRAINED BY {-- shall be the result of the BER-encoded value of type -
    CAMEL-FCISMSBillingChargingCharacteristics {bound}})
-- This parameter indicates the SMS billing and/or charging characteristics.
-- The violation of the UserDefinedConstraint shall be handled as an ASN.1 syntax error.

ForwardServiceInteractionInd                     ::= SEQUENCE {
    conferenceTreatmentIndicator   [1] OCTET STRING (SIZE(1))        OPTIONAL,
    -- acceptConferenceRequest  'xxxx xx01'B
    -- rejectConferenceRequest  'xxxx xx10'B
    -- network default is accept conference request
    callDiversionTreatmentIndicator [2] OCTET STRING (SIZE(1))       OPTIONAL,
    -- callDiversionAllowed      'xxxx xx01'B
    -- callDiversionNotAllowed  'xxxx xx10'B
    -- network default is Call Diversion allowed
    callingPartyRestrictionIndicator [4] OCTET STRING (SIZE(1))      OPTIONAL,
    -- noINImpact                'xxxx xx01'B
    -- presentationRestricted   'xxxx xx10'B
    -- network default is noINImpact
    ...
    }

GapCriteria {PARAMETERS-BOUND : bound}::= CHOICE {
    basicGapCriteria             BasicGapCriteria {bound},
    compoundGapCriteria          CompoundCriteria {bound}
    }

GapIndicators                                    ::= SEQUENCE {
    duration               [0] Duration,
    gapInterval            [1] Interval,
    ...
    }
-- Indicates the gapping characteristics.
-- No gapping when gapInterval equals 0.

GapOnService                                     ::= SEQUENCE {
    serviceKey             [0] ServiceKey,
    ...
    }

GapTreatment {PARAMETERS-BOUND : bound}                  ::= CHOICE {
    informationToSend        [0] InformationToSend {bound},
    releaseCause             [1] Cause {bound}
    }
-- The default value for Cause is the same as in ISUP.
```

```
GenericNumber {PARAMETERS-BOUND : bound}              ::= OCTET STRING (SIZE(
    bound.&minGenericNumberLength .. bound.&maxGenericNumberLength))
--  Indicates a generic number. Refer to ETS 300 356-1 [8] Generic number for encoding.

GenericNumbers {PARAMETERS-BOUND : bound}             ::= SET SIZE(1..bound.&numOfGenericNumbers) OF
GenericNumber {bound}

GPRS-QoS                                 ::= CHOICE {
    short-QoS-format                         [0] QoS-Subscribed,
    long-QoS-format                          [1] Ext-QoS-Subscribed
    }
--  Short-QoS-format shall be sent for QoS in pre GSM release 99 format.
--  Long-QoS-format shall be sent for QoS in GSM release 99 (and beyond) format.
--  Which of the two QoS formats shall be sent is determined by which QoS
--  format is available in the SGSN at the time of sending.
--  Refer to 3GPP TS 29.002 [13] for encoding details of QoS-Subscribed and
--  Ext-QoS-Subscribed.

GPRSCause {PARAMETERS-BOUND : bound}               ::= OCTET STRING (SIZE
            (bound.&minGPRSCauseLength .. bound.&maxGPRSCauseLength))
--  Shall only include the cause value.

--  00000000   Unspecified
--  All other values shall be interpreted as "Unspecified".
--
--  This parameter indicates the cause for CAP interface related information.
--  The GPRSCause mapping to/from GTP cause values specified in the 3GPP TS 29.060 and
--  to/from 3GPP TS 24.008 GMM cause and SM cause values are outside scope of this document.


GPRSChargingID                           ::= OCTET STRING (SIZE (4))
--  The Charging ID is a unique four octet value generated by the GGSN when
--  a PDP Context is activated. A Charging ID is generated for each activated context.

GPRSEvent                          ::= SEQUENCE {
    gPRSEventType                          [0] GPRSEventType,
    monitorMode                            [1] MonitorMode
    }
--  Indicates the GPRS event information for monitoring.

GPRSEventSpecificInformation {PARAMETERS-BOUND : bound}               ::= CHOICE {

    attachChangeOfPositionSpecificInformation
                                    [0] SEQUENCE {
        locationInformationGPRS      [0] LocationInformationGPRS OPTIONAL,
        ...
        },

    pdp-ContextchangeOfPositionSpecificInformation
                                    [1] SEQUENCE {
        accessPointName              [0] AccessPointName {bound} OPTIONAL,
        chargingID                   [1] GPRSChargingID        OPTIONAL,
        locationInformationGPRS      [2] LocationInformationGPRS OPTIONAL,
        endUserAddress               [3] EndUserAddress        OPTIONAL,
        qualityOfService             [4] QualityOfService      OPTIONAL,
        timeAndTimeZone              [5] TimeAndTimezone       OPTIONAL,
        ...,
        gGSNAddress                  [6] GSN-Address           OPTIONAL
        },

    detachSpecificInformation     [2] SEQUENCE {
        initiatingEntity             [0] InitiatingEntity      OPTIONAL,
        ...,
        routeingAreaUpdate           [1] NULL                  OPTIONAL
        },

    disconnectSpecificInformation [3] SEQUENCE {
        initiatingEntity             [0] InitiatingEntity      OPTIONAL,
        ...,
        routeingAreaUpdate           [1] NULL                  OPTIONAL
        },

    pDPContextEstablishmentSpecificInformation
                                    [4] SEQUENCE {
        accessPointName              [0] AccessPointName {bound} OPTIONAL,
        endUserAddress               [1] EndUserAddress        OPTIONAL,
        qualityOfService             [2] QualityOfService      OPTIONAL,
        locationInformationGPRS      [3] LocationInformationGPRS OPTIONAL,
        timeAndTimeZone              [4] TimeAndTimezone       OPTIONAL,
        pDPInitiationType            [5] PDPInitiationType     OPTIONAL,
        ...,
        secondaryPDP-context         [6] NULL                  OPTIONAL
        },

    pDPContextEstablishmentAcknowledgementSpecificInformation
                                    [5] SEQUENCE {
        accessPointName              [0] AccessPointName {bound} OPTIONAL,
```

```
            chargingID                      [1] GPRSChargingID        OPTIONAL,
            endUserAddress                  [2] EndUserAddress        OPTIONAL,
            qualityOfService                [3] QualityOfService      OPTIONAL,
            locationInformationGPRS         [4] LocationInformationGPRS OPTIONAL,
            timeAndTimeZone                 [5] TimeAndTimezone        OPTIONAL,
            ...,
            gGSNAddress                     [6] GSN-Address            OPTIONAL
            }
        }

GPRSEventType                               ::= ENUMERATED {
    attach                                  (1),
    attachChangeOfPosition                  (2),
    detached                                (3),
    pdp-ContextEstablishment                (11),
    pdp-ContextEstablishmentAcknowledgement (12),
    disonnect                               (13),
    pdp-ContextChangeOfPosition             (14)
    }

GPRSMSClass                                 ::= SEQUENCE {
    mSNetworkCapability                     [0] MSNetworkCapability,
    mSRadioAccessCapability                 [1] MSRadioAccessCapability
    }
-- GPRS MS class mark describes the terminal capabilites.
-- For encoding refer to 3GPP TS 24.008 [12].

InbandInfo {PARAMETERS-BOUND : bound}                   ::= SEQUENCE {
    messageID               [0] MessageID {bound},
    numberOfRepetitions     [1] INTEGER (1..127)                        OPTIONAL,
    duration                [2] INTEGER (0..32767)                      OPTIONAL,
    interval                [3] INTEGER (0..32767)                      OPTIONAL,
    ..
    }
-- Interval is the time in seconds between each repeated announcement. Duration is the total
-- amount of time in seconds, including repetitions and intervals.
-- The end of announcement is either the end of duration or numberOfRepetitions,
-- whatever comes first.
-- duration with value 0 indicates infinite duration

InformationToSend {PARAMETERS-BOUND : bound}        ::= CHOICE {
    inbandInfo              [0] InbandInfo {bound},
    tone                    [1] Tone
    }

InitiatingEntity                            ::= ENUMERATED {
    mobileStation                           (0),
    sgsn                                    (1),
    hlr                                     (2),
    ggsn                                    (3)
    }

InvokeID        ::= TCInvokeIdSet

IPRoutingAddress {PARAMETERS-BOUND : bound}             ::= CalledPartyNumber {bound}
-- Indicates the routing address for the IP.

IPSSPCapabilities {PARAMETERS-BOUND : bound}        ::= OCTET STRING (SIZE(
    bound.&minIPSSPCapabilitiesLength .. bound.&maxIPSSPCapabilitiesLength))
-- Indicates the gsmSRF resources available. The parameter has two parts, a standard and a
-- bilateral part. The standard part indicates capabilities defined as optional in CAP V.2
-- that shall be recognised (but not necessarily supported) by a CAP V.2 gsmSCF. The bilateral
-- part contains further information that is not specified in this standard, but which is set
-- according to bilateral agreements between network operators and/or equipment vendors.
-- The last octet of the standard part is indicated by bit 7 being set to 0, otherwise Bit 7 of
-- a standard part octet is set to 1 indicating that the standard part continues in the following
-- octet. Coding is as follows:

-- Octet 1              Standard Part for CAP V.3
-- Bit Value            Meaning
-- 0   0                IPRoutingAddress not supported
--     1                IPRoutingAddress supported
-- 1   0                VoiceBack not supported
--     1                VoiceBack supported
-- 2   0                VoiceInformation not supported, via speech recognition
--     1                VoiceInformation supported, via speech recognition
-- 3   0                VoiceInformation not supported, via voice recognition
--     1                VoiceInformation supported, via voice recognition
-- 4   0                Generation of voice announcements from Text not supported
--     1                Generation of voice announcements from Text supported
-- 5   -                Reserved
-- 6   -                Reserved
-- 7   0                End of standard part
--     1                This value is reserved in CAP V.3
--
-- Octets 2 to 4        Bilateral Part: Network operator / equipment vendor specific


LegType                                     ::= OCTET STRING (SIZE(1))
```

```
leg1 LegType                                                 ::= '01'H
leg2 LegType                                                 ::= '02'H

LocationInformationGPRS     ::= SEQUENCE {
    cellGlobalIdOrServiceAreaIdOrLAI    [0] OCTET STRING (SIZE(5..7))   OPTIONAL,
    routeingAreaIdentity                [1] RAIdentity                  OPTIONAL,
    geographicalInformation             [2] GeographicalInformation     OPTIONAL,
    sgsn-Number                         [3] ISDN-AddressString          OPTIONAL,
    selectedLSAIdentity                 [4] LSAIdentity                 OPTIONAL,
    extensionContainer                  [5] ExtensionContainer          OPTIONAL,
    ...,
    sai-Present                         [6] NULL                        OPTIONAL
}
-- CellGlobalIdOrServiceAreaIdOrLAI and LSAIdentity are coded in accordance with
-- 3GPP TS 29.002 [13].
-- sai-Present indicates that the cellGlobalIdOrServiceAreaIdOrLAI parameter contains
-- a Service Area Identity.

LocationNumber {PARAMETERS-BOUND : bound}           ::= OCTET STRING (SIZE (
    bound.&minLocationNumberLength .. bound.&maxLocationNumberLength))
-- Indicates the Location Number for the calling party.
-- Refer to ETS 300 356-1 [8] for encoding.

MessageID {PARAMETERS-BOUND : bound}                ::= CHOICE {
    elementaryMessageID     [0] Integer4,
    text                    [1] SEQUENCE {
        messageContent          [0] IA5String (SIZE(
            bound.&minMessageContentLength .. bound.&maxMessageContentLength)),
        attributes              [1] OCTET STRING (SIZE(
            bound.&minAttributesLength .. bound.&maxAttributesLength)) OPTIONAL
    },
    elementaryMessageIDs    [29] SEQUENCE SIZE (1.. bound.&numOfMessageIDs) OF Integer4,
    variableMessage         [30] SEQUENCE {
        elementaryMessageID     [0] Integer4,
        variableParts           [1] SEQUENCE SIZE (1..5) OF VariablePart {bound}
    }
}
-- Use of the text parameter is network operator/equipment vendor specific.

MonitorMode                                 ::= ENUMERATED {
    interrupted                 (0),
    notifyAndContinue           (1),
    transparent                 (2)
}
-- Indicates the event is relayed and/or processed by the SSP.
-- Transparent means that the gsmSSF or gprsSSF does not notify the gsmSCF of the event.
-- For the use of this parameter refer to the procedure descriptions in clause 11.

MSNetworkCapability                         ::= OCTET STRING (SIZE (8))
-- MS Network Capability describes the GPRS terminal capabilites related to the network, i.e. SMS
-- point to point service over packet data channels. For encoding refer to 3GPP TS 24.008 [12].

MSRadioAccessCapability                     ::= OCTET STRING (SIZE (3..32))
-- MS Radio Access Capability describes the terminal capabilites relevant for the radio network,
-- which may affect the way the network handles the mobile.
-- For encoding refer to 3GPP TS 24.008 [12].

NAOliInfo                       ::= OCTET STRING (SIZE (1))
-- NA Oli information takes the same value as defined in ANSI ISUP T1.113 [53]
-- e.g.    '3D'H - Decimal value 61 - Cellular Service (Type 1)
--         '3E'H - Decimal value 62 - Cellular Service (Type 2)
--         '3F'H - Decimal value 63 - Cellular Service (roaming)

OriginalCalledPartyID {PARAMETERS-BOUND : bound}            ::= OCTET STRING (SIZE(
    bound.&minOriginalCalledPartyIDLength .. bound.&maxOriginalCalledPartyIDLength))

-- Indicates the original called number. Refer to ETS 300 356-1 [8] Original Called Number
-- for encoding.

OCSIApplicable                              ::= NULL
-- Indicates that the Originating CAMEL Subscription Information, if present, shall be
-- applied on the outgoing call leg created with a Connect operation. For the use of this
-- parameter see 3GPP TS 23.078 [42].

PDPID                               ::= OCTET STRING (SIZE (1))
-- PDP Identifier is a counter used to identify a specific PDP Context within a control
-- relationship between gprsSSF and gsmSCF.

PDPInitiationType                           ::= ENUMERATED {
    mSInitiated                 (0),
    networkInitiated            (1)
}

QualityOfService                            ::= SEQUENCE {
    requested-QoS               [0] GPRS-QoS   OPTIONAL,
    subscribed-QoS              [1] GPRS-QoS   OPTIONAL,
    negotiated-QoS              [2] GPRS-QoS   OPTIONAL,
    ...
```

```
    }
-- The procedure descriptions in chapter 11 indicate which one(s) of the
-- QoS variables shall be transported.

RAIdentity                             ::= OCTET STRING (SIZE (7))
--  Routing Area Identity coded according to 3GPP TS 29.060 [43].

ReceivingSideID                        ::= CHOICE {receivingSideID [1] LegType}

-- used to identify LegID in operations sent from gsmSSF to gsmSCF

RedirectingPartyID {PARAMETERS-BOUND : bound}       ::= OCTET STRING (SIZE (
    bound.&minRedirectingPartyIDLength .. bound.&maxRedirectingPartyIDLength))
-- Indicates redirecting number.
-- Refer to ETS 300 356-1 [8] Redirecting number for encoding.

RequestedInformationList {PARAMETERS-BOUND : bound}     ::= SEQUENCE SIZE (1.. numOfInfoItems) OF
RequestedInformation {bound}

RequestedInformationTypeList {PARAMETERS-BOUND : bound} ::= SEQUENCE SIZE (1.. numOfInfoItems) OF
RequestedInformationType

RequestedInformation {PARAMETERS-BOUND : bound}         ::= SEQUENCE {
    requestedInformationType    [0] RequestedInformationType,
    requestedInformationValue   [1] RequestedInformationValue {bound},
    ...
    }

RequestedInformationType                               ::= ENUMERATED {
    callAttemptElapsedTime    (0),
    callStopTime              (1),
    callConnectedElapsedTime  (2),
    releaseCause              (30)
    }

RequestedInformationValue {PARAMETERS-BOUND : bound} ::= CHOICE {
    callAttemptElapsedTimeValue    [0] INTEGER (0..255),
    callStopTimeValue              [1] DateAndTime,
    callConnectedElapsedTimeValue  [2] Integer4,
    releaseCauseValue              [30] Cause {bound}
    }
-- The callAttemptElapsedTimeValue is specified in seconds. The unit for the
-- callConnectedElapsedTimeValue is 100 milliseconds

RPCause         ::= OCTET STRING (SIZE (1))
-- RP cause according to 3GPP TS 24.011 [45].
-- GsmSCF shall send this cause in the ReleaseSMS operation.
-- The received cause is sent to the originating MS by the VMSC/SGSN.

ScfID {PARAMETERS-BOUND : bound}                       ::= OCTET STRING (SIZE(
    bound.&minScfIDLength .. bound.&maxScfIDLength))
-- defined by network operator.
-- Indicates the gsmSCF identity.

SCIBillingChargingCharacteristics {PARAMETERS-BOUND : bound} ::= OCTET STRING (SIZE (
    bound.&minSCIBillingChargingLength .. bound.&maxSCIBillingChargingLength))
    (CONSTRAINED BY {-- shall be the result of the BER-encoded value of type --
    CAMEL-SCIBillingChargingCharacteristics})
-- Indicates AOC information to be sent to a Mobile Station
-- The violation of the UserDefinedConstraint shall be handled as an ASN.1 syntax error.

SCIGPRSBillingChargingCharacteristics {PARAMETERS-BOUND : bound} ::= OCTET STRING (SIZE (
    bound.&minSCIBillingChargingLength .. bound.&maxSCIBillingChargingLength))
    (CONSTRAINED BY {-- shall be the result of the BER-encoded value of type –
    CAMEL-SCIGPRSBillingChargingCharacteristics})
-- Indicates AOC information to be sent to a Mobile Station
-- The violation of the UserDefinedConstraint shall be handled as an ASN.1 syntax error.

SendingSideID                          ::= CHOICE {sendingSideID [0] LegType}
-- used to identify LegID in operations sent from gsmSCF to gsmSSF

ServiceInteractionIndicatorsTwo                            ::= SEQUENCE {
    forwardServiceInteractionInd       [0] ForwardServiceInteractionInd      OPTIONAL,
    -- applicable to operations InitialDP, Connect and ContinueWithArgument.
    backwardServiceInteractionInd      [1] BackwardServiceInteractionInd      OPTIONAL,
    -- applicable to operations Connect and ContinueWithArgument.
    bothwayThroughConnectionInd        [2] BothwayThroughConnectionInd        OPTIONAL,
    -- applicable to ConnectToResource and EstablishTemporaryConnection
    connectedNumberTreatmentInd        [4] ConnectedNumberTreatmentInd        OPTIONAL,
    -- applicable to Connect and ContinueWithArgument
    nonCUGCall                         [13] NULL                              OPTIONAL,
    -- applicable to Connect and ContinueWithArgument
    -- indicates that no parameters for CUG shall be used for the call (i.e. the call shall
    -- be a non-CUG call).
    -- If not present, it indicates one of three things:
    --  a) continue with modified CUG information (when one or more of either CUG Interlock Code
    --     and Outgoing Access Indicator are present), or
    --  b) continue with original CUG information (when neither CUG Interlock Code or Outgoing
    --     Access Indicator are present), i.e. no IN impact.
```

```
     -- c) continue with the original non-CUG call.
     holdTreatmentIndicator          [50] OCTET STRING (SIZE(1))              OPTIONAL,
     -- applicable to InitialDP, Connect and ContinueWithArgument
     -- acceptHoldRequest    'xxxx xx01'B
     -- rejectHoldRequest    'xxxx xx10'B
     -- network default is accept hold request
     cwTreatmentIndicator            [51] OCTET STRING (SIZE(1))              OPTIONAL,
     -- applicable to InitialDP, Connect and ContinueWithArgument
     -- acceptCw 'xxxx xx01'B
     -- rejectCw 'xxxx xx10'B
     -- network default is accept cw
     ectTreatmentIndicator           [52] OCTET STRING (SIZE(1))              OPTIONAL,
     -- applicable to InitialDP, Connect and ContinueWithArgument
     -- acceptEctRequest 'xxxx xx01'B
     -- rejectEctRequest 'xxxx xx10'B
     -- network default is accept ect request
     ...
     }

SGSNCapabilities                            ::= OCTET STRING (SIZE (1))

-- Indicates the SGSN capabilities. The coding of the parameter is as follows:
-- Bit Value             Meaning
-- 0   0                 AoC not supported by SGSN
--     1                 AoC supported by SGSN
-- 1   -                 This bit is reserved in CAP V.3
-- 2   -                 This bit is reserved in CAP V.3
-- 3   -                 This bit is reserved in CAP V.3
-- 4   -                 This bit is reserved in CAP V.3
-- 5   -                 This bit is reserved in CAP V.3
-- 6   -                 This bit is reserved in CAP V.3
-- 7   -                 This bit is reserved in CAP V.3

SMSCause    ::= ENUMERATED {
    systemFailure            (0),
    unexpectedDataValue      (1),
    facilityNotSupported     (2),
    sM-DeliveryFailure       (3),
    releaseFromRadioInterface (4)
    }
-- MO SMS error values which are reported to gsmSCF.
-- Most of these values are received from the SMSC as a response to
-- MO-ForwardSM operation.

SMSEvent                      ::= SEQUENCE {
    eventTypeSMS                   [0] EventTypeSMS,
    monitorMode                    [1] MonitorMode
    }

TimeInformation               ::= CHOICE {
    timeIfNoTariffSwitch           [0] TimeIfNoTariffSwitch,
    timeIfTariffSwitch             [1] TimeIfTariffSwitch
    }
-- Indicates call duration information

TimeIfNoTariffSwitch          ::= INTEGER(0..864000)
-- TimeIfNoTariffSwitch is measured in 100 millisecond intervals

TimeIfTariffSwitch            ::= SEQUENCE {
    timeSinceTariffSwitch          [0] INTEGER(0..864000),
    tariffSwitchInterval           [1] INTEGER(1..864000)                     OPTIONAL
    }
-- timeSinceTariffSwitch and tariffSwitchInterval are measured in 100 millisecond intervals

TimerID                       ::= ENUMERATED {
    tssf                           (0)
    }
-- Indicates the timer to be reset.

TimerValue                    ::= Integer4
-- Indicates the timer value (in seconds).

TimeAndTimezone {PARAMETERS-BOUND : bound}::= OCTET STRING (SIZE(
    bound.&minTimeAndTimezoneLength .. bound.&maxTimeAndTimezoneLength))
-- Indicates the time and timezone, relative to GMT. This parameter BCD encoded.
-- The year digit indicating millenium occupies bits 0-3 of the first octet, and the year
-- digit indicating century occupies bits 4-7 of the first octet.
-- The year digit indicating decade occupies bits 0-3 of the second octet, whilst the digit
-- indicating the year within the decade occupies bits 4-7 of the second octet.
-- The most significant month digit occupies bits 0-3 of the third octet, and the least
-- significant month digit occupies bits 4-7 of the third octet.
-- The most significant day digit occupies bits 0-3 of the fourth octet, and the least
-- significant day digit occupies bits 4-7 of the fourth octet.
-- The most significant hours digit occupies bits 0-3 of the fifth octet, and the least
-- significant hours digit occupies bits 4-7 of the fifth octet.
-- The most significant minutes digit occupies bits 0-3 of the sixth octet, and the least
-- significant minutes digit occupies bits 4-7 of the sixth octet.
-- The most significant seconds digit occupies bits 0-3 of the seventh octet, and the least
-- significant seconds digit occupies bits 4-7 of the seventh octet.
```

```
--
-- The timezone information occupies the eigth octet. For the encoding of Timezone refer to
-- Reference [29], 3GPP TS 23.040 [46].
--
-- The BCD digits are packed and encoded as follows:
--
-- Bit  7 6 5  4 | 3 2 1 0
--       2nd digit | 1st digit            Octet 1
--       3rd digit | 4th digit            Octet 2
--           ..          ..
--       nth digit | n-1th digit          Octet m
--
--       0000      digit 0
--       0001      digit 1
--       0010      digit 2
--       0011      digit 3
--       0100      digit 4
--       0101      digit 5
--       0110      digit 6
--       0111      digit 7
--       1000      digit 8
--       1001      digit 9
--       1010      spare
--       1011      spare
--       1100      spare
--       1101      spare
--       1110      spare
--       1101      spare
--
-- where the leftmost bit of the digit is either bit 7 or bit 3 of the octet.

Tone                                    ::= SEQUENCE {
    toneID          [0] Integer4,
    duration        [1] Integer4            OPTIONAL,
    ...
    }
-- The duration specifies the length of the tone in seconds, value 0 indicates infinite duration.

TPDataCodingScheme              ::= OCTET STRING (SIZE (1))
-- TP Data Coding Scheme according to 3GPP TS 23.040 [46]

TPProtocolIdentifier            ::= OCTET STRING (SIZE (1))
-- indicates the protocol used above SM-Transfer Layer as specified in 3GPP TS 23.040 [46].

TPShortMessageSubmissionInfo    ::= OCTET STRING (SIZE (1))
-- contains the 1ˢᵗ octect of the SMS-SUBMIT TPDU or the SMS-COMMAND TPDU as specified in 3GPP TS
23.040 [46].

TPValidityPeriod                ::= OCTET STRING (SIZE (1..7))
-- indicates the length of the validity period or the absolute time of the validity
-- period termination as specified in 3GPP TS 23.040 [46].
-- the length of ValidityPeriod is either 1 octet or 7 octets

TransferredVolume               ::= CHOICE {
    volumeIfNoTariffSwitch     [0] INTEGER (0..4294967295),
    volumeIfTariffSwitch [1] SEQUENCE {
        volumeSinceLastTariffSwitch    [0] INTEGER (0..4294967295),
        volumeTariffSwitchInterval     [1] INTEGER (0..4294967295) OPTIONAL
        }
    }
-- volumeIfNoTariffSwitch, volumeSinceLastTariffSwitch and volumeTariffSwitchInterval
-- are measured in bytes.

TransferredVolumeRollOver        ::= CHOICE {
    rO-VolumeIfNoTariffSwitch     [0] INTEGER (0.. 255),
    rO-VolumeIfTariffSwitch       [1] SEQUENCE {
        rO-VolumeSinceLastTariffSwitch    [0] INTEGER (0.. 255)  OPTIONAL,
        rO-VolumeTariffSwitchInterval     [1] INTEGER (0.. 255)  OPTIONAL
        }
    }
-- rO-VolumeIfNoTariffSwitch, rO-VolumeSinceLastTariffSwitch and rO-VolumeTariffSwitchInterval
-- present counters indicating the number of parameter range rollovers.

UnavailableNetworkResource ::= ENUMERATED {
    unavailableResources           (0),
    componentFailure               (1),
    basicCallProcessingException   (2),
    resourceStatusFailure          (3),
    endUserFailure                 (4)
    }
-- Indicates the network resource that failed.

VariablePart {PARAMETERS-BOUND : bound}                 ::= CHOICE {
    integer         [0] Integer4,
    number          [1] Digits {bound}, -- Generic digits
    time            [2] OCTET STRING (SIZE(2)), -- HH: MM, BCD coded
    date            [3] OCTET STRING (SIZE(4)), -- YYYYMMDD, BCD coded
    price           [4] OCTET STRING (SIZE(4))
    }
```

```
--  Indicates the variable part of the message. Time is BCD encoded.
--  The most significant hours digit occupies bits 0-3 of the first octet, and the least
--  significant digit occupies bits 4-7 of the first octet. The most significant minutes digit
--  occupies bits 0-3 of the second octet, and the least significant digit occupies bits 4-7
--  of the second octet.
--
--  Date is BCD encoded. The year digit indicating millenium occupies bits 0-3 of the first octet,
--  and the year digit indicating century occupies bits 4-7 of the first octet. The year digit
--  indicating decade occupies bits 0-3 of the second octet, whilst the digit indicating the year
--  within the decade occupies bits 4-7 of the second octet.
--  The most significant month digit occupies bits 0-3 of the third octet, and the least
--  significant month digit occupies bits 4-7 of the third octet. The most significant day digit
--  occupies bits 0-3 of the fourth octet, and the least significant day digit occupies bits 4-7
--  of the fourth octet.
--  Price is BCD encoded. The digit indicating hundreds of thousands occupies bits 0-3 of the
--  first octet, and the digit indicating tens of thousands occupies bits 4-7 of the first octet.
--  The digit indicating thousands occupies bits 0-3 of the second octet, whilst the digit
--  indicating hundreds occupies bits 4-7 of the second octet. The digit indicating tens occupies
--  bits 0-3 of the third octet, and the digit indicating 0 to 9 occupies bits 4-7 of the third
--  octet. The tenths digit occupies bits 0-3 of the fourth octet, and the hundredths digit
--  occupies bits 4-7 of the fourth octet.
--
--  For the encoding of digits in an octet, refer to the timeAndtimezone parameter


-- The Definition of range of constants follows
numOfInfoItems INTEGER ::= 4

END
```

5.2 Error types

```
CAP-errortypes {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1)
modules(3) cap-errortypes(51) version3(2)}
-- This module contains the type definitions for the CAP Error Types.
-- Where a parameter of type CHOICE is tagged with a specific tag value, the tag is automatically
-- replaced with an EXPLICIT tag of the same value.

DEFINITIONS IMPLICIT TAGS ::= BEGIN


IMPORTS

    ros-InformationObjects,
    datatypes,
    errorcodes
FROM CAP-object-identifiers {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-object-identifiers(100) version3(2)}

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

    InvokeID,
    UnavailableNetworkResource
FROM CAP-datatypes datatypes

    errcode-canceled,
    errcode-cancelFailed,
    errcode-eTCFailed,
    errcode-improperCallerResponse,
    errcode-missingCustomerRecord,
    errcode-missingParameter,
    errcode-parameterOutOfRange,
    errcode-requestedInfoError,
    errcode-systemFailure,
    errcode-taskRefused,
    errcode-unavailableResource,
    errcode-unexpectedComponentSequence,
    errcode-unexpectedDataValue,
    errcode-unexpectedParameter,
    errcode-unknownLegID,
    errcode-unknownPDPID
FROM CAP-errorcodes errorcodes

;

-- TYPE DEFINITION FOR CAP ERROR TYPES FOLLOWS

canceled ERROR              ::= {
    CODE    errcode-canceled
    }
-- The operation has been canceled.

cancelFailed ERROR          ::= {
    PARAMETER   SEQUENCE {
        problem              [0] ENUMERATED {
            unknownOperation     (0),
```

```
                    tooLate                    (1),
                    operationNotCancellable (2)
                    },
         operation                 [1] InvokeID,
            ...
         }
      CODE    errcode-cancelFailed
      }
-- The operation failed to be canceled.

eTCFailed ERROR            ::= {
      CODE    errcode-eTCFailed
      }
-- The establish temporary connection failed.

improperCallerResponse ERROR ::= {
      CODE    errcode-improperCallerResponse
      }
-- The caller response was not as expected.

missingCustomerRecord ERROR ::= {
      CODE    errcode-missingCustomerRecord
      }
-- The Service Logic Program could not be found in the gsmSCF.

missingParameter ERROR       ::= {
      CODE    errcode-missingParameter
      }
-- An expected optional parameter was not received.

parameterOutOfRange ERROR    ::= {
      CODE    errcode-parameterOutOfRange
      }
-- The parameter was not as expected (e.g. missing or out of range).

requestedInfoError ERROR     ::= {
      PARAMETER    ENUMERATED {
            unknownRequestedInfo        (1),
            requestedInfoNotAvailable   (2)
            }
      CODE    errcode-requestedInfoError
      }
-- The requested information cannot be found.

systemFailure ERROR          ::= {
      PARAMETER   UnavailableNetworkResource
      CODE    errcode-systemFailure
      }
-- The operation could not be completed due to a system failure at the serving physical entity.

taskRefused ERROR            ::= {
      PARAMETER    ENUMERATED {
            generic                     (0),
            unobtainable                (1),
            congestion                  (2)
            }
      CODE    errcode-taskRefused
      }
-- An entity normally capable of the task requested cannot or chooses not to perform the task at
-- this time. This includes error situations like congestion and unobtainable address as used in
-- e.g. the connect operation.)

unavailableResource ERROR    ::= {
      CODE    errcode-unavailableResource
      }
-- A requested resource is not available at the serving entity.

unexpectedComponentSequence ERROR ::= {
      CODE    errcode-unexpectedComponentSequence
      }
-- An incorrect sequence of Components was received (e.g."DisconnectForwardConnection"
-- followed by "PlayAnnouncement").

unexpectedDataValue ERROR ::= {
      CODE    errcode-unexpectedDataValue
      }
-- The data value was not as expected (e.g. routing number expected but billing number received)

unexpectedParameter ERROR ::= {
      CODE    errcode-unexpectedParameter
      }
-- A parameter received was not expected.

unknownLegID ERROR        ::= {
      CODE    errcode-unknownLegID
      }
-- Leg not known to the gsmSSF.

unknownPDPID ERROR        ::= {
```

```
    CODE      errcode-unknownPDPID
    }
-- PDPID not known by the receiving entity.

END
```

5.3   Operation codes

```
CAP-operationcodes {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1)
modules(3) cap-operationcodes(53) version3(2)}


DEFINITIONS ::= BEGIN

IMPORTS

    ros-InformationObjects
FROM CAP-object-identifiers {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-object-identifiers(100) version3(2)}

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

;

-- the operations are grouped by the identified operation packages.

-- gsmSCF activation Package
    opcode-initialDP                      Code ::= local: 0
-- gsmSCF/gsmSRF activation of assist Package
    opcode-assistRequestInstructions      Code ::= local: 16
-- Assist connection establishment Package
    opcode-establishTemporaryConnection   Code ::= local: 17
-- Generic disconnect resource Package
    opcode-disconnectForwardConnection    Code ::= local: 18
-- Non-assisted connection establishment Package
    opcode-connectToResource              Code ::= local: 19
-- Connect Package (elementary gsmSSF function)
    opcode-connect                        Code ::= local: 20
-- Call handling Package (elementary gsmSSF function)
    opcode-releaseCall                    Code ::= local: 22
-- BCSM Event handling Package
    opcode-requestReportBCSMEvent         Code ::= local: 23
    opcode-eventReportBCSM                Code ::= local: 24
-- gsmSSF call processing Package
    opcode-continue                       Code ::= local: 31
    opcode-continueWithArgument           Code ::= local: 56
-- Timer Package
    opcode-resetTimer                     Code ::= local: 33
-- Billing Package
    opcode-furnishChargingInformation     Code ::= local: 34
-- Charging Package
    opcode-applyCharging                  Code ::= local: 35
    opcode-applyChargingReport            Code ::= local: 36
-- Traffic management Package
    opcode-callGap                        Code ::= local: 41
-- Call report Package
    opcode-callInformationReport          Code ::= local: 44
    opcode-callInformationRequest         Code ::= local: 45
-- Signalling control Package
    opcode-sendChargingInformation        Code ::= local: 46
-- Specialized resource control Package
    opcode-playAnnouncement               Code ::= local: 47
    opcode-promptAndCollectUserInformation Code ::= local: 48
    opcode-specializedResourceReport      Code ::= local: 49
-- Cancel Package
    opcode-cancel                         Code ::= local: 53
-- Activity Test Package
    opcode-activityTest                   Code ::= local: 55

-- Sms Activation Package
    opcode-initialDPSMS                   Code ::= local: 60
-- Sms Billing Package
    opcode-furnishChargingInformationSMS  Code ::= local: 61
-- Sms Connect Package
    opcode-connectSMS                     Code ::= local: 62
-- Sms Event Handling Package
    opcode-requestReportSMSEvent          Code ::= local: 63
    opcode-eventReportSMS                 Code ::= local: 64
-- Sms Processing Package
    opcode-continueSMS                    Code ::= local: 65
-- Sms Release Package
    opcode-releaseSMS                     Code ::= local: 66
-- Sms Timer Package
    opcode-resetTimerSMS                  Code ::= local: 67
```

```
-- Gprs Activity Test Package
   opcode-activityTestGPRS                        Code ::= local: 70
-- Gprs Charging Package
   opcode-applyChargingGPRS                       Code ::= local: 71
   opcode-applyChargingReportGPRS                 Code ::= local: 72
-- Gprs Cancel Package
   opcode-cancelGPRS                              Code ::= local: 73
-- Gprs Connect Package
   opcode-connectGPRS                             Code ::= local: 74
-- Gprs Processing Package
   opcode-continueGPRS                            Code ::= local: 75
-- Gprs Exception Information Package
   opcode-entityReleasedGPRS                      Code ::= local: 76
-- Gprs Billing Package
   opcode-furnishChargingInformationGPRS          Code ::= local: 77
-- Gprs Scf Activation Package
   opcode-initialDPGPRS                           Code ::= local: 78
-- Gprs Release Package
   opcode-releaseGPRS                             Code ::= local: 79
-- Gprs Event Handling Package
   opcode-eventReportGPRS                         Code ::= local: 80
   opcode-requestReportGPRSEvent                  Code ::= local: 81
-- Gprs Timer Package
   opcode-resetTimerGPRS                          Code ::= local: 82
-- Gprs Charge Advice Package
   opcode-sendChargingInformationGPRS             Code ::= local: 83

END
```

5.4   Error codes

```
CAP-errorcodes {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1)
modules(3) cap-errorcodes(57) version3(2)}


DEFINITIONS ::= BEGIN

IMPORTS

    ros-InformationObjects
FROM CAP-object-identifiers {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-object-identifiers(100) version3(2)}

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

;

errcode-canceled                     Code ::= local: 0
errcode-cancelFailed                 Code ::= local: 1
errcode-eTCFailed                    Code ::= local: 3
errcode-improperCallerResponse       Code ::= local: 4
errcode-missingCustomerRecord        Code ::= local: 6
errcode-missingParameter             Code ::= local: 7
errcode-parameterOutOfRange          Code ::= local: 8
errcode-requestedInfoError           Code ::= local: 10
errcode-systemFailure                Code ::= local: 11
errcode-taskRefused                  Code ::= local: 12
errcode-unavailableResource          Code ::= local: 13
errcode-unexpectedComponentSequence  Code ::= local: 14
errcode-unexpectedDataValue          Code ::= local: 15
errcode-unexpectedParameter          Code ::= local: 16
errcode-unknownLegID                 Code ::= local: 17
errcode-unknownPDPID                 Code ::= local: 50

END
```

5.5   Classes

```
CAP-classes {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1)
modules(3) cap-classes(54) version3(2)}

DEFINITIONS ::= BEGIN

IMPORTS

    ROS-OBJECT-CLASS,
    Code
FROM Remote-Operations-Information-Objects ros-InformationObjects


    id-rosObject-gsmSRF,
    id-rosObject-gsmSSF,
    ros-InformationObjects,
```

```
    gsmSSF-gsmSCF-Protocol,
    gsmSCF-gsmSRF-Protocol
FROM CAP-object-identifiers {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-object-identifiers(100) version3(2)}

    capSsfToScfGeneric,
    capAssistHandoffssfToScf
FROM CAP-gsmSSF-gsmSCF-pkgs-contracts-acs gsmSSF-gsmSCF-Protocol

    gsmSRF-gsmSCF-contract
FROM CAP-gsmSCF-gsmSRF-pkgs-contracts-acs gsmSCF-gsmSRF-Protocol

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

;

gsmSSF ROS-OBJECT-CLASS ::= {
    INITIATES    {capSsfToScfGeneric|
                 capAssistHandoffssfToScf}
    RESPONDS     {capSsfToScfGeneric}
    ID           id-rosObject-gsmSSF
    }

gsmSRF ROS-OBJECT-CLASS ::= {
    INITIATES    {gsmSRF-gsmSCF-contract}
    ID           id-rosObject-gsmSRF
    }

EXTENSION ::= CLASS {
    &ExtensionType,
    &criticality    CriticalityType DEFAULT ignore,
    &id Code
    }

WITH SYNTAX {
    EXTENSION-SYNTAX      &ExtensionType
    CRITICALITY           &criticality
    IDENTIFIED BY         &id
    }
-- Example of addition of an extension named 'Some Network Specific Indicator' of type
-- BOOLEAN, with criticality 'abort' and to be identified as extension number 1
-- Example of definition using the above information object class:
--
-- SomeNetworkSpecificIndicator EXTENSION ::= {
--   EXTENSION-SYNTAX    BOOLEAN
--   CRITICALITY         abort
--   IDENTIFIED BY       local: 1
--   }

-- Example of transfer syntax, using the ExtensionField datatype as specified in subclause 5.
-- Assuming the value of the extension is set to TRUE, the extensions parameter
-- becomes a Sequence of type INTEGER ::= 1, criticality ENUMERATED ::= 1 and value [1]
-- EXPLICIT BOOLEAN ::= TRUE.
--
-- Use of Q.1400 [28] defined Extension is for further study.
-- In addition the extension mechanism marker is used to identify the future minor additions
-- to CAP.

firstExtension EXTENSION ::= {
    EXTENSION-SYNTAX    NULL
    CRITICALITY         ignore
    IDENTIFIED BY       local: 1
    }
-- firstExtension is just an example.

SupportedExtensions {PARAMETERS-BOUND : bound} EXTENSION ::= {firstExtension, ...
-- full set of network operator extensions --
}
-- SupportedExtension is the full set of the network operator extensions.

PARAMETERS-BOUND ::= CLASS
{
    &minAccessPointNameLength                    INTEGER,
    &maxAccessPointNameLength                    INTEGER,
    &minAChBillingChargingLength                 INTEGER,
    &maxAChBillingChargingLength                 INTEGER,
    &minAttributesLength                         INTEGER,
    &maxAttributesLength                         INTEGER,
    &maxBearerCapabilityLength                   INTEGER,
    &minCalledPartyBCDNumberLength               INTEGER,
    &maxCalledPartyBCDNumberLength               INTEGER,
    &minCalledPartyNumberLength                  INTEGER,
    &maxCalledPartyNumberLength                  INTEGER,
    &minCallingPartyNumberLength                 INTEGER,
    &maxCallingPartyNumberLength                 INTEGER,
    &minCallResultLength                         INTEGER,
    &maxCallResultLength                         INTEGER,
```

```
    &minCarrierLength                               INTEGER,
    &maxCarrierLength                               INTEGER,
    &minCauseLength                                 INTEGER,
    &maxCauseLength                                 INTEGER,
    &minDigitsLength                                INTEGER,
    &maxDigitsLength                                INTEGER,
    &minFCIBillingChargingDataLength                INTEGER,
    &maxFCIBillingChargingDataLength                INTEGER,
    &minFCIBillingChargingLength                    INTEGER,
    &maxFCIBillingChargingLength                    INTEGER,
    &minGenericNumberLength                         INTEGER,
    &maxGenericNumberLength                         INTEGER,
    &minGPRSCauseLength                             INTEGER,
    &maxGPRSCauseLength                             INTEGER,
    &minIPSSPCapabilitiesLength                     INTEGER,
    &maxIPSSPCapabilitiesLength                     INTEGER,
    &minLocationNumberLength                        INTEGER,
    &maxLocationNumberLength                        INTEGER,
    &minMessageContentLength                        INTEGER,
    &maxMessageContentLength                        INTEGER,
    &minOriginalCalledPartyIDLength                 INTEGER,
    &maxOriginalCalledPartyIDLength                 INTEGER,
    &minPDPAddressLength                            INTEGER,
    &maxPDPAddressLength                            INTEGER,
    &minRedirectingPartyIDLength                    INTEGER,
    &maxRedirectingPartyIDLength                    INTEGER,
    &minScfIDLength                                 INTEGER,
    &maxScfIDLength                                 INTEGER,
    &minSCIBillingChargingLength                    INTEGER,
    &maxSCIBillingChargingLength                    INTEGER,
    &minTimeAndTimezoneLength                       INTEGER,
    &maxTimeAndTimezoneLength                       INTEGER,
    &numOfBCSMEvents                                INTEGER,
    &numOfSMSEvents                                 INTEGER,
    &numOfGPRSEvents                                INTEGER,
    &numOfExtensions                                INTEGER,
    &numOfGenericNumbers                            INTEGER,
    &numOfMessageIDs                                INTEGER
}

WITH SYNTAX
{
    MINIMUM-FOR-ACCESS-POINT-NAME                   &minAccessPointNameLength
    MAXIMUM-FOR-ACCESS-POINT-NAME                   &maxAccessPointNameLength
    MINIMUM-FOR-ACH-BILLING-CHARGING                &minAChBillingChargingLength
    MAXIMUM-FOR-ACH-BILLING-CHARGING                &maxAChBillingChargingLength
    MINIMUM-FOR-ATTRIBUTES                          &minAttributesLength
    MAXIMUM-FOR-ATTRIBUTES                          &maxAttributesLength
    MAXIMUM-FOR-BEARER-CAPABILITY                   &maxBearerCapabilityLength
    MINIMUM-FOR-CALLED-PARTY-BCD-NUMBER             &minCalledPartyBCDNumberLength
    MAXIMUM-FOR-CALLED-PARTY-BCD-NUMBER             &maxCalledPartyBCDNumberLength
    MINIMUM-FOR-CALLED-PARTY-NUMBER                 &minCalledPartyNumberLength
    MAXIMUM-FOR-CALLED-PARTY-NUMBER                 &maxCalledPartyNumberLength
    MINIMUM-FOR-CALLING-PARTY-NUMBER                &minCallingPartyNumberLength
    MAXIMUM-FOR-CALLING-PARTY-NUMBER                &maxCallingPartyNumberLength
    MINIMUM-FOR-CALL-RESULT                         &minCallResultLength
    MAXIMUM-FOR-CALL-RESULT                         &maxCallResultLength
    MINIMUM-FOR-CARRIER                             &minCarrierLength
    MAXIMUM-FOR-CARRIER                             &maxCarrierLength
    MINIMUM-FOR-CAUSE                               &minCauseLength
    MAXIMUM-FOR-CAUSE                               &maxCauseLength
    MINIMUM-FOR-DIGITS                              &minDigitsLength
    MAXIMUM-FOR-DIGITS                              &maxDigitsLength
    MINIMUM-FOR-FCI-BILLING-CHARGING-DATA           &minFCIBillingChargingDataLength
    MAXIMUM-FOR-FCI-BILLING-CHARGING-DATA           &maxFCIBillingChargingDataLength
    MINIMUM-FOR-FCI-BILLING-CHARGING                &minFCIBillingChargingLength
    MAXIMUM-FOR-FCI-BILLING-CHARGING                &maxFCIBillingChargingLength
    MINIMUM-FOR-GENERIC-NUMBER                      &minGenericNumberLength
    MAXIMUM-FOR-GENERIC-NUMBER                      &maxGenericNumberLength
    MINIMUM-FOR-GPRS-CAUSE-LENGTH                   &minGPRSCauseLength
    MAXIMUM-FOR-GPRS-CAUSE-LENGTH                   &maxGPRSCauseLength
    MINIMUM-FOR-IP-SSP-CAPABILITIES                 &minIPSSPCapabilitiesLength
    MAXIMUM-FOR-IP-SSP-CAPABILITIES                 &maxIPSSPCapabilitiesLength
    MINIMUM-FOR-LOCATION-NUMBER                     &minLocationNumberLength
    MAXIMUM-FOR-LOCATION-NUMBER                     &maxLocationNumberLength
    MINIMUM-FOR-MESSAGE-CONTENT                     &minMessageContentLength
    MAXIMUM-FOR-MESSAGE-CONTENT                     &maxMessageContentLength
    MINIMUM-FOR-ORIGINAL-CALLED-PARTY-ID            &minOriginalCalledPartyIDLength
    MAXIMUM-FOR-ORIGINAL-CALLED-PARTY-ID            &maxOriginalCalledPartyIDLength
    MINIMUM-FOR-PDP-ADDRESS-LENGTH                  &minPDPAddressLength
    MAXIMUM-FOR-PDP-ADDRESS-LENGTH                  &maxPDPAddressLength
    MINIMUM-FOR-REDIRECTING-ID                      &minRedirectingPartyIDLength
    MAXIMUM-FOR-REDIRECTING-ID                      &maxRedirectingPartyIDLength
    MINIMUM-FOR-GSMSCF-ID                           &minScfIDLength
    MAXIMUM-FOR-GSMSCF-ID                           &maxScfIDLength
    MINIMUM-FOR-SCI-BILLING-CHARGING                &minSCIBillingChargingLength
    MAXIMUM-FOR-SCI-BILLING-CHARGING                &maxSCIBillingChargingLength
    MINIMUM-FOR-TIME-AND-TIMEZONE                   &minTimeAndTimezoneLength
    MAXIMUM-FOR-TIME-AND-TIMEZONE                   &maxTimeAndTimezoneLength
```

```
    NUM-OF-BCSM-EVENT                              &numOfBCSMEvents
    NUM-OF-SMS-EVENTS                              &numOfSMSEvents
    NUM-OF-GPRS-EVENTS                             &numOfGPRSEvents
    NUM-OF-EXTENSIONS                              &numOfExtensions
    NUM-OF-GENERIC-NUMBERS                         &numOfGenericNumbers
    NUM-OF-MESSAGE-IDS                             &numOfMessageIDs
}


capSpecificBoundSet PARAMETERS-BOUND ::=
{
    MINIMUM-FOR-ACCESS-POINT-NAME                  1
    MAXIMUM-FOR-ACCESS-POINT-NAME                  100
    MINIMUM-FOR-ACH-BILLING-CHARGING               5
    MAXIMUM-FOR-ACH-BILLING-CHARGING               177
    MINIMUM-FOR-ATTRIBUTES                         2
    MAXIMUM-FOR-ATTRIBUTES                         10
    MAXIMUM-FOR-BEARER-CAPABILITY                  11
    MINIMUM-FOR-CALLED-PARTY-BCD-NUMBER            1
    MAXIMUM-FOR-CALLED-PARTY-BCD-NUMBER            41
    MINIMUM-FOR-CALLED-PARTY-NUMBER                3
    MAXIMUM-FOR-CALLED-PARTY-NUMBER                18
    MINIMUM-FOR-CALLING-PARTY-NUMBER               2
    MAXIMUM-FOR-CALLING-PARTY-NUMBER               10
    MINIMUM-FOR-CALL-RESULT                        12
    MAXIMUM-FOR-CALL-RESULT                        186
    MINIMUM-FOR-CARRIER                            4
    MAXIMUM-FOR-CARRIER                            4
    MINIMUM-FOR-CAUSE                              2
    MAXIMUM-FOR-CAUSE                              32
    MINIMUM-FOR-DIGITS                             2
    MAXIMUM-FOR-DIGITS                             16
    MINIMUM-FOR-FCI-BILLING-CHARGING-DATA          1
    MAXIMUM-FOR-FCI-BILLING-CHARGING-DATA          160
    MINIMUM-FOR-FCI-BILLING-CHARGING               5
    MAXIMUM-FOR-FCI-BILLING-CHARGING               174
    MINIMUM-FOR-GENERIC-NUMBER                     3
    MAXIMUM-FOR-GENERIC-NUMBER                     11
    MINIMUM-FOR-GPRS-CAUSE-LENGTH                  1
    MAXIMUM-FOR-GPRS-CAUSE-LENGTH                  1
    MINIMUM-FOR-IP-SSP-CAPABILITIES                1
    MAXIMUM-FOR-IP-SSP-CAPABILITIES                4
    MINIMUM-FOR-LOCATION-NUMBER                    2
    MAXIMUM-FOR-LOCATION-NUMBER                    10
    MINIMUM-FOR-MESSAGE-CONTENT                    1
    MAXIMUM-FOR-MESSAGE-CONTENT                    127
    MINIMUM-FOR-ORIGINAL-CALLED-PARTY-ID           2
    MAXIMUM-FOR-ORIGINAL-CALLED-PARTY-ID           10
    MINIMUM-FOR-PDP-ADDRESS-LENGTH                 1
    MAXIMUM-FOR-PDP-ADDRESS-LENGTH                 63
    MINIMUM-FOR-REDIRECTING-ID                     2
    MAXIMUM-FOR-REDIRECTING-ID                     10
    MINIMUM-FOR-GSMSCF-ID                          2
    MAXIMUM-FOR-GSMSCF-ID                          10
    MINIMUM-FOR-SCI-BILLING-CHARGING               4
    MAXIMUM-FOR-SCI-BILLING-CHARGING               69
    MINIMUM-FOR-TIME-AND-TIMEZONE                  8
    MAXIMUM-FOR-TIME-AND-TIMEZONE                  8
    NUM-OF-BCSM-EVENT                              10
    NUM-OF-SMS-EVENTS                              10
    NUM-OF-GPRS-EVENTS                             10
    NUM-OF-EXTENSIONS                              10
    NUM-OF-GENERIC-NUMBERS                         5
    NUM-OF-MESSAGE-IDS                             16
}
END
```

5.6   Object IDentifiers (IDs)

```
CAP-object-identifiers {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-object-identifiers(100) version3(2)}


DEFINITIONS ::= BEGIN

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

-- For Modules from TC, ROS,
tc-Messages                     OBJECT IDENTIFIER ::=
    {ccitt recommendation q 773 modules(2) messages(1) version3(3)}
tc-NotationExtensions           OBJECT IDENTIFIER ::=
    {ccitt recommendation q 775 modules(2) notation-extension (4) version1(1)}
ros-InformationObjects          OBJECT IDENTIFIER ::=
    {joint-iso-ccitt remote-operations(4) informationObjects(5) version1(0)}
```

```
-- For CAP Modules
datatypes                       OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3)
    cap-datatypes(52) version3(2)}

errortypes                      OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3)
    cap-errortypes(51) version3(2)}

operationcodes                  OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3)
    cap-operationcodes(53) version3(2)}

errorcodes                      OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3)
    cap-errorcodes(57) version3(2)}

classes                         OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3)
    cap-classes(54) version3(2)}


gsmSSF-gsmSCF-Operations        OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3)
    cap-gsmSSF-gsmSCF-ops-args(101) version3(2)}

gsmSSF-gsmSCF-Protocol          OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3)
    cap-gsmSSF-gsmSCF-pkgs-contracts-acs(102) version3(2)}

gsmSCF-gsmSRF-Operations        OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3)
    cap-gsmSCF-gsmSRF-ops-args(103) version3(2)}

gsmSCF-gsmSRF-Protocol          OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3)
    cap-gsmSCF-gsmSRF-pkgs-contracts-acs(104) version3(2)}


sms-Operations                  OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3)
    cap-SMS-ops-args(105) version3(2)}

smsSSF-gsmSCF-Protocol          OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3)
    cap-smsSSF-gsmSCF-pkgs-contracts-acs(106) version3(2)}

gprsSSF-gsmSCF-Operations       OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3)
    cap-GPRS-ops-args(107) version3(2)}

gprsSSF-gsmSCF-Protocol         OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1) modules(3)
    cap-gprsSSF-gsmSCF-pkgs-contracts-acs(108) version3(2)}


id-CAP                          OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
    umts-network(1) cap3(20)}
id-CAP0E                        OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
    umts-network(1) cap3OE(21)}
id-ac                                   OBJECT IDENTIFIER ::= {id-CAP     ac(3)}
id-acE                                  OBJECT IDENTIFIER ::= {id-CAP0E   ac(3)}
id-as                                   OBJECT IDENTIFIER ::= {id-CAP     as(5)}
id-asE                                  OBJECT IDENTIFIER ::= {id-CAP0E   as(5)}
id-rosObject                            OBJECT IDENTIFIER ::= {id-CAP     rosObject(25)}
id-contract                             OBJECT IDENTIFIER ::= {id-CAP     contract(26)}
id-contractE                            OBJECT IDENTIFIER ::= {id-CAP0E   contract(26)}
id-package                              OBJECT IDENTIFIER ::= {id-CAP     package(27)}
id-packageE                             OBJECT IDENTIFIER ::= {id-CAP0E   package(27)}

-- for ac, as, rosObject, contract and package, the values are identical to Q.1218

-- ROS Objects

id-rosObject-gsmSCF                     OBJECT IDENTIFIER ::= {id-rosObject 4}
id-rosObject-gsmSSF                     OBJECT IDENTIFIER ::= {id-rosObject 5}
id-rosObject-gsmSRF                     OBJECT IDENTIFIER ::= {id-rosObject 6}

-- gsmSSF/gsmSCF AC
id-ac-CAP-gsmSSF-scfGenericAC           OBJECT IDENTIFIER ::= {id-acE 4}
id-ac-CAP-gsmSSF-scfAssistHandoffAC     OBJECT IDENTIFIER ::= {id-acE 6}

-- gsmSRF/gsmSCF AC
id-ac-gsmSRF-gsmSCF                     OBJECT IDENTIFIER ::= {id-ac 14}

-- gprsSSF/gsmSCF AC
```

```
id-ac-CAP-gprsSSF-gsmSCF-AC              OBJECT IDENTIFIER ::= {id-acE 50}
id-ac-CAP-gsmSCF-gprsSSF-AC              OBJECT IDENTIFIER ::= {id-acE 51}


-- gprsSSF/gsmSCF or gsmSSF/gsmSCF AC
id-ac-cap3-sms-AC                        OBJECT IDENTIFIER ::= {id-acE 61}


-- gsmSSF/gsmSCF Contracts
id-CAPSsfToScfGeneric                    OBJECT IDENTIFIER ::= {id-contractE 3}
id-CAPAssistHandoffssfToScf              OBJECT IDENTIFIER ::= {id-contractE 5}


-- gsmSRF/gsmSCF Contracts
id-contract-gsmSRF-gsmSCF                OBJECT IDENTIFIER ::= {id-contract 13}


-- gprsSSF/gsmSCF Contracts
id-cap3GprsSsfTogsmScf                   OBJECT IDENTIFIER ::= {id-contract 14}
id-cap3GsmSCFTogprsSSF                   OBJECT IDENTIFIER ::= {id-contract 15}


-- gprsSSF/gsmSCF or gsmSSF/gsmSCF Contracts
id-cap3SmsSsfTogsmScf                    OBJECT IDENTIFIER ::= {id-contract 16}


-- gsmSSF/gsmSCF Operation Packages
id-package-scfActivation                 OBJECT IDENTIFIER ::= {id-package 11}
id-package-gsmSRF-scfActivationOfAssist  OBJECT IDENTIFIER ::= {id-package 15}
id-package-assistConnectionEstablishment OBJECT IDENTIFIER ::= {id-package 16}
id-package-genericDisconnectResource     OBJECT IDENTIFIER ::= {id-package 17}
id-package-nonAssistedConnectionEstablishment
                                         OBJECT IDENTIFIER ::= {id-package 18}
id-package-connect                       OBJECT IDENTIFIER ::= {id-package 19}
id-package-callHandling                  OBJECT IDENTIFIER ::= {id-packageE 20}
id-package-bcsmEventHandling             OBJECT IDENTIFIER ::= {id-package 21}
id-package-ssfCallProcessing             OBJECT IDENTIFIER ::= {id-packageE 24}
id-package-timer                         OBJECT IDENTIFIER ::= {id-package 26}
id-package-billing                       OBJECT IDENTIFIER ::= {id-package 27}
id-package-charging                      OBJECT IDENTIFIER ::= {id-package 28}
id-package-trafficManagement             OBJECT IDENTIFIER ::= {id-package 29}
id-package-callReport                    OBJECT IDENTIFIER ::= {id-package 32}
id-package-signallingControl             OBJECT IDENTIFIER ::= {id-package 33}
id-package-activityTest                  OBJECT IDENTIFIER ::= {id-package 34}
id-package-cancel                        OBJECT IDENTIFIER ::= {id-packageE 36}


-- gsmSRF/gsmSCF Operation Packages
id-package-specializedResourceControl    OBJECT IDENTIFIER ::= {id-package 42}
id-package-gsmSRF-scfCancel              OBJECT IDENTIFIER ::= {id-package 43}


-- gprsSSF/gsmSCF Operation Packages
id-package-gprsContinue                  OBJECT IDENTIFIER ::= {id-package 49}
id-package-gprsExceptionInformation      OBJECT IDENTIFIER ::= {id-package 50}
id-package-gprsSCFActivationPackage      OBJECT IDENTIFIER ::= {id-package 51}
id-package-gprsConnectPackage            OBJECT IDENTIFIER ::= {id-package 52}
id-package-gprsReleasePackage            OBJECT IDENTIFIER ::= {id-package 53}
id-package-gprsEventHandlingPackage      OBJECT IDENTIFIER ::= {id-package 54}
id-package-gprsSCFTimerPackage           OBJECT IDENTIFIER ::= {id-package 55}
id-package-gprsSCFBillingPackage         OBJECT IDENTIFIER ::= {id-package 56}
id-package-gprsSCFChargingPackage        OBJECT IDENTIFIER ::= {id-package 57}
id-package-gprsSCFActivityTestPackage    OBJECT IDENTIFIER ::= {id-package 58}
id-package-gprsSCFCancelPackage          OBJECT IDENTIFIER ::= {id-package 59}
id-package-gprsSCFChargeAdvicePackage    OBJECT IDENTIFIER ::= {id-package 60}


-- gprsSSF/gsmSCF or gsmSSF/gsmSCF Operation Packages
id-package-smsActivation                 OBJECT IDENTIFIER ::= {id-package 61}
id-package-smsConnect                    OBJECT IDENTIFIER ::= {id-package 62}
id-package-smsContinue                   OBJECT IDENTIFIER ::= {id-package 63}
id-package-smsRelease                    OBJECT IDENTIFIER ::= {id-package 64}
id-package-smsEventHandling              OBJECT IDENTIFIER ::= {id-package 65}
id-package-smsBilling                    OBJECT IDENTIFIER ::= {id-package 66}
id-package-smsTimer                      OBJECT IDENTIFIER ::= {id-package 67}


-- gsmSSF/gsmSCF Abstract Syntaxes
id-as-gsmSSF-scfGenericAS                OBJECT IDENTIFIER ::= {id-asE 4}
id-as-assistHandoff-gsmSSF-scfAS         OBJECT IDENTIFIER ::= {id-asE 6}


-- gsmSRF/gsmSCF Abstract Syntaxes
id-as-basic-gsmSRF-gsmSCF                OBJECT IDENTIFIER ::= {id-as 14}


-- gprsSSF/gsmSCF Abstract Syntaxes
id-as-gprsSSF-gsmSCF-AS                  OBJECT IDENTIFIER ::= {id-as 50}
id-as-gsmSCF-gprsSSF-AS                  OBJECT IDENTIFIER ::= {id-as 51}


-- gprsSSF/gsmSCF or gsmSSF/gsmSCF Abstract Syntaxes
id-as-sms-AS                             OBJECT IDENTIFIER ::= {id-as 61}

END
```

5.7 User Abort Data

```
CAP-U-ABORT-Data {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1)
modules(3) cap-u-abort-data(110) version3(2)}

DEFINITIONS ::= BEGIN

id-CAP-U-ABORT-Reason OBJECT IDENTIFIER ::= {ccitt(0) identified-organization(4) etsi(0)
mobileDomain(0) umts-network(1) as(1) cap-u-abort-reason(2) version3(2)}

cAP-U-ABORT-Reason-Abstract-Syntax ABSTRACT-SYNTAX ::= {CAP-U-ABORT-REASON IDENTIFIED BY
id-CAP-U-ABORT-Reason}

CAP-U-ABORT-REASON ::= ENUMERATED {
    no-reason-given(1),
    application-timer-expired(2),
    not-allowed-procedures(3),
    abnormal-processing(4),
    congestion(5),
    invalid-reference(6),
    missing-reference (7),
    overlapping-dialogue (8)
    }
-- application-timer-expired    shall be set when application timer (e.g. Tssf) is expired.
-- not-allowed-procedures       shall be set when received signal is not allowed in CAP
--                              procedures.
--                              For example, when class4 operation is received from SCF and
--                              the operation is not allowed in SSF FSM.
--                              (SSF FSM cannot continue state transition). (e.g. ReleaseCall
--                              operation received in Waiting for End of Temporary Connection
--                              state.)
-- abnormal-processing          shall be set when abnormal procedures occur at entity action.
-- congestion                   shall be set when requested resource is unavailable due to
--                              congestion at TC user (CAP) level.
-- invalid-reference            shall be set if the received destinationReference is unknown or
--                              for a known destination Reference the received originationReference
--                              does not match with the stored originationReference.
--                              This abort reason is used for CAP defined GPRS-ReferenceNumber.
-- missing-reference            shall be set when the destinationReference or the
--                              originationReference is absent in the received message but is
--                              required to be present according to the procedures in 12.1.7.
--                              This abort reason is used for CAP defined GPRS-ReferenceNumber.
-- overlapping-dialogue         shall be used by the gprsSSF to indicate to the gsmSCF that a
--                              specific instance already has a TC dialogue open. This error
--                              cause is typically obtained when both the gsmSCF and gprsSSF
--                              open a new dialogue at the same time.
-- no-reason-given              shall be set when any other reasons above do not apply
END -- of CAP-U-ABORT-Data
```

6 Circuit Switched Call Control

6.1 gsmSSF/CCF - gsmSCF Interface

6.1.1 Operations and arguments

```
CAP-gsmSSF-gsmSCF-ops-args {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-gsmSSF-gsmSCF-ops-args(101) version3(2)}

DEFINITIONS IMPLICIT TAGS ::= BEGIN

-- This module contains the operations and operation arguments used for the
-- gsmSSF - gsmSCF interface, for the control of circuit switched calls.

-- The table in section 2.1 lists the specifications that contain the modules
-- that are used by CAP.

IMPORTS

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

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

```
    ServiceKey
FROM CS1-DataTypes {ccitt(0) identified-organization(4) etsi(0) inDomain(1) in-network(1)
modules(0) cs1-datatypes(2) version1(0)}

    MiscCallInfo
FROM CS2-datatypes {ccitt(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 {ccitt(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 {ccitt(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 {ccitt(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

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

    AChBillingChargingCharacteristics {},
    AdditionalCallingPartyNumber {},
    AlertingPattern,
    AssistingSSPIPRoutingAddress {},
    BCSMEvent {},
    BearerCapability {},
    CalledPartyNumber {},
    CalledPartyBCDNumber {},
    CallingPartyNumber {},
    CallingPartysCategory,
    CallResult {},
    Carrier,
    Cause {},
    CGEncountered,
    ChargeNumber {},
    ControlType,
    CorrelationID {},
    DestinationRoutingAddress {},
    EventSpecificInformationBCSM {},
    EventTypeBCSM,
    ExtensionField {},
    FCIBillingChargingCharacteristics {},
    GapCriteria {},
    GapIndicators,
    GapTreatment,
    GenericNumbers {},
    HighLayerCompatibility,
    InvokeID,
    IPRoutingAddress {},
    IPSSPCapabilities {},
    leg1,
    LocationNumber {},
    MonitorMode,
    NAOliInfo,
    OCSIApplicable,
```

```
        OriginalCalledPartyID {},
        ReceivingSideID,
        RedirectingPartyID {},
        RedirectionInformation,
        RequestedInformationList {},
        RequestedInformationTypeList {},
        ScfID {},
        SCIBillingChargingCharacteristics {},
        SendingSideID,
        ServiceInteractionIndicatorsTwo,
        TimeAndTimezone {},
        TimerID,
        TimerValue
FROM CAP-datatypes datatypes

        cancelFailed,
        eTCFailed,
        missingCustomerRecord,
        missingParameter,
        parameterOutOfRange,
        requestedInfoError,
        systemFailure,
        taskRefused,
        unexpectedComponentSequence,
        unexpectedDataValue,
        unexpectedParameter,
        unknownLegID
FROM CAP-errortypes errortypes

;

activityTest OPERATION ::= {
        RETURN RESULT TRUE
        CODE    opcode-activityTest
        }
-- Direction: gsmSCF -> gsmSSF, Timer: T_at
-- This operation is used to check for the continued existence of a relationship
-- between the gsmSCF and gsmSSF, assistSSF or gsmSRF. If the relationship is
-- still in existence, then the gsmSSF will respond. If no reply is received,
-- then the gsmSCF will assume that the gsmSSF, assistSSF or grmSRF 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 -> gsmSSF, Timer: T_ac
-- This operation is used for interacting from the gsmSCF with the gsmSSF charging mechanisms.
-- The ApplyChargingReport operation provides the feedback from the gsmSSF to the gsmSCF.

ApplyChargingArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
        aChBillingChargingCharacteristics   [0] AChBillingChargingCharacteristics {bound},
        partyToCharge                       [2] SendingSideID   DEFAULT sendingSideID : leg1,
        extensions                          [3] SEQUENCE SIZE (1..bound.&numOfExtensions) OF
                                                                ExtensionField {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: gsmSSF -> gsmSCF, Timer: T_acr
-- This operation is used by the gsmSSF 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}
```

```
assistRequestInstructions {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT        AssistRequestInstructionsArg {bound}
    RETURN RESULT   FALSE
    ERRORS          {missingCustomerRecord |
                    missingParameter |
                    systemFailure |
                    taskRefused |
                    unexpectedComponentSequence |
                    unexpectedDataValue |
                    unexpectedParameter}
    CODE            opcode-assistRequestInstructions
    }
-- Direction: gsmSSF -> gsmSCF or gsmSRF -> gsmSCF, Timer: T_ari
-- This operation is used when there is an assist procedure and may be
-- sent by the gsmSSF or gsmSRF to the gsmSCF. This operation is sent by the
-- assisting gsmSSF to gsmSCF, when the initiating gsmSSF has set up a connection to
-- the gsmSRF or to the assisting gsmSSF as a result of receiving an
-- EstablishTemporaryConnection from
-- the gsmSCF.
-- Refer to clause 11 for a description of the procedures associated with this operation.

AssistRequestInstructionsArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
    correlationID      [0] CorrelationID {bound},
    iPSSPCapabilities  [2] IPSSPCapabilities {bound},
    extensions         [3] SEQUENCE SIZE(1..bound.&numOfExtensions) OF ExtensionField {bound}
                                                                    OPTIONAL,
    ...
    }
-- OPTIONAL denotes network operator specific use. The value of the correlationID may be the
-- Called Party Number supplied by the initiating gsmSSF.

callGap {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT        CallGapArg {bound}
    RETURN RESULT   FALSE
    ALWAYS RESPONDS FALSE
    CODE            opcode-callGap
    }
-- Direction: gsmSCF -> gsmSSF, Timer: T_cg
-- This operation is used to request the gsmSSF to reduce the rate at which specific service
-- requests are sent to the gsmSCF.

CallGapArg {PARAMETERS-BOUND : bound}::= SEQUENCE {
    gapCriteria    [0] GapCriteria {bound},
    gapIndicators  [1] GapIndicators,
    controlType    [2] ControlType                                           OPTIONAL,
    gapTreatment   [3] GapTreatment {bound}                                  OPTIONAL,
    extensions     [4] SEQUENCE SIZE(1..bound.&numOfExtensions) OF
                                          ExtensionField {bound}             OPTIONAL,
    ...
    }
-- OPTIONAL denotes network operator optional. If gapTreatment is not present, the gsmSSF will
-- use a default treatment depending on network operator implementation.

callInformationReport {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT        CallInformationReportArg {bound}
    RETURN RESULT   FALSE
    ALWAYS RESPONDS FALSE
    CODE            opcode-callInformationReport
    }
-- Direction: gsmSSF -> gsmSCF, Timer: T_cirp
-- 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] SEQUENCE SIZE(1..bound.&numOfExtensions)    OF
                                      ExtensionField {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 -> gsmSSF, Timer: T_cirq
-- This operation is used to request the gsmSSF 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 {bound},
    extensions                      [2] SEQUENCE SIZE(1..bound.&numOfExtensions) OF
                                                        ExtensionField {bound}  OPTIONAL,
    legID                           [3] SendingSideID                   OPTIONAL,
    ...
    }
-- OPTIONAL denotes network operator optional.

cancel {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT        CancelArg {bound}
    RETURN RESULT   FALSE
    ERRORS          {cancelFailed |
                    missingParameter |
                    taskRefused}
    CODE            opcode-cancel
    }
-- Direction: gsmSCF -> gsmSSF, or gsmSCF -> gsmSRF, Timer: T_can
-- This operation cancels the correlated previous operation or all previous requests. The following
-- operations can be canceled: PlayAnnouncement, PromptAndCollectUserInformation.

CancelArg {PARAMETERS-BOUND : bound}::= 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}
    RETURN RESULT   FALSE
    ERRORS          {missingParameter |
                    parameterOutOfRange |
                    systemFailure |
                    taskRefused |
                    unexpectedComponentSequence |
                    unexpectedDataValue |
                    unexpectedParameter}
    CODE            opcode-connect
    }
-- Direction: gsmSCF-> gsmSSF, Timer: T_con
-- This operation is used to request the gsmSSF to perform the call processing actions
-- to route or forward a call to a specified destination.

ConnectArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
    destinationRoutingAddress       [0] DestinationRoutingAddress {bound},
    alertingPattern                 [1] AlertingPattern                      OPTIONAL,
    originalCalledPartyID           [6] OriginalCalledPartyID {bound}        OPTIONAL,
    extensions                      [10] SEQUENCE SIZE(1..bound.&numOfExtensions) OF
                                    ExtensionField {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,
    ...
    }
-- na-Info is included at the discretion of the gsmSCF operator.

connectToResource {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT        ConnectToResourceArg {bound}
    RETURN RESULT   FALSE
    ERRORS          {missingParameter |
                    systemFailure |
                    taskRefused |
                    unexpectedComponentSequence |
                    unexpectedDataValue |
                    unexpectedParameter}
    CODE            opcode-connectToResource
    }
-- Direction: gsmSCF -> gsmSSF, Timer: T_ctr
-- This operation is used to connect a call from the gsmSSF to the
-- gsmSRF.
-- Refer to clause 11 for a description of the procedures associated with this operation.

ConnectToResourceArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
    resourceAddress CHOICE {
        ipRoutingAddress            [0] IPRoutingAddress {bound},
        none                        [3] NULL
        },
```

```
    extensions                        [4] SEQUENCE SIZE(1..bound.&numOfExtensions) OF
                                                    ExtensionField {bound}         OPTIONAL,
    serviceInteractionIndicatorsTwo [7] ServiceInteractionIndicatorsTwo           OPTIONAL,
    ...
    }

continue OPERATION ::= {
    RETURN RESULT    FALSE
    ALWAYS RESPONDS FALSE
    CODE             opcode-continue
    }
-- Direction: gsmSCF -> gsmSSF, Timer: T_cue
-- This operation is used to request the gsmSSF 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 gsmSSF 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 -> gsmSSF, Timer: T_cwa
-- This operation is used to request the gsmSSF 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 gsmSSF 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] SEQUENCE SIZE(1..bound.&numOfExtensions) OF
                                              ExtensionField {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,
    ...
    }

disconnectForwardConnection OPERATION ::= {
    RETURN RESULT    FALSE
    ERRORS           {systemFailure |
                     taskRefused |
                     unexpectedComponentSequence}
    CODE             opcode-disconnectForwardConnection
    }
-- Direction: gsmSCF -> gsmSSF, Timer: T_dfc
-- This operation is used to disconnect a forward temporary connection or a connection to a
-- resource. Refer to clause 11 for a description of the procedures associated with this operation.

establishTemporaryConnection {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT         EstablishTemporaryConnectionArg {bound}
    RETURN RESULT    FALSE
    ERRORS           {eTCFailed |
                     missingParameter |
                     systemFailure |
                     taskRefused |
                     unexpectedComponentSequence |
                     unexpectedDataValue |
                     unexpectedParameter}
    CODE             opcode-establishTemporaryConnection
    }
-- Direction: gsmSCF -> gsmSSF, Timer: T_etc
-- This operation is used to create a connection to a resource for a limited period
-- of time (e.g. to play an announcement, to collect user information); it implies
-- the use of the assist procedure. Refer to clause 11 for a description of the
-- procedures associated with this operation.

EstablishTemporaryConnectionArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
    assistingSSPIPRoutingAddress    [0] AssistingSSPIPRoutingAddress {bound},
    correlationID                     [1] CorrelationID {bound}   OPTIONAL,
    scfID                             [3] ScfID {bound}                        OPTIONAL,
    extensions                        [4] SEQUENCE SIZE(1..bound.&numOfExtensions) OF
                                                    ExtensionField {bound} OPTIONAL,
    carrier                           [5] Carrier {bound}                      OPTIONAL,
    serviceInteractionIndicatorsTwo [6] ServiceInteractionIndicatorsTwo       OPTIONAL,
    naOliInfo                         [50] NAOliInfo                           OPTIONAL,
```

```
    chargeNumber                      [51] ChargeNumber {bound}                      OPTIONAL,
    ...
    }

eventReportBCSM {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT         EventReportBCSMArg {bound}
    RETURN RESULT    FALSE
    ALWAYS RESPONDS  FALSE
    CODE             opcode-eventReportBCSM
    }
-- Direction: gsmSSF -> gsmSCF, Timer: T_erb
-- 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] SEQUENCE SIZE(1..bound.&numOfExtensions) OF
                                                   ExtensionField {bound}  OPTIONAL,
    ...
    }

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

InitialDPArg {PARAMETERS-BOUND : bound} ::= 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] SEQUENCE SIZE(1..bound.&numOfExtensions) OF
                                                   ExtensionField {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,
    mscAddress                        [55] ISDN-AddressString                       OPTIONAL,
```

```
    calledPartyBCDNumber              [56] CalledPartyBCDNumber {bound}              OPTIONAL,
    timeAndTimezone                   [57] TimeAndTimezone {bound}                   OPTIONAL,
    gsm-ForwardingPending             [58] NULL                                      OPTIONAL,
    initialDPArgExtension             [59] InitialDPArgExtension                     OPTIONAL,
    ...
    }

InitialDPArgExtension                 ::= SEQUENCE {
    gmscAddress                       [0] ISDN-AddressString                         OPTIONAL,
    ...
}
-- If iPSSPCapabilities is not present then this denotes that a colocated gsmSRF is not
-- supported by the gsmSSF. If present, then the gsmSSF supports a colocated gsmSRF capable
-- of playing announcements via elementaryMessageIDs and variableMessages, the playing of
-- tones and the collection of DTMF digits. Other supported capabilities are explicitly
-- detailed in the IPSSPCapabilities parameter itself.
-- Carrier is included at the discretion of the gsmSSF operator.

releaseCall {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT        ReleaseCallArg {bound}
    RETURN RESULT   FALSE
    ALWAYS RESPONDS FALSE
    CODE            opcode-releaseCall
    }
-- Direction: gsmSCF -> gsmSSF, Timer: T_rc
-- 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 -> gsmSSF, Timer: T_rrb
-- This operation is used to request the gsmSSF 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 gsmSSF 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 {bound},
    extensions [2] SEQUENCE SIZE(1..bound.&numOfExtensions) OF ExtensionField {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            opcode-resetTimer
    }
-- Direction: gsmSCF -> gsmSSF, Timer: T_rt
-- This operation is used to request the gsmSSF to refresh an application timer in the gsmSSF.

ResetTimerArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
    timerID         [0] TimerID DEFAULT tssf,
    timervalue      [1] TimerValue,
    extensions      [2] SEQUENCE SIZE(1..bound.&numOfExtensions) OF
                                                    ExtensionField {bound}  OPTIONAL,
    ...
    }

sendChargingInformation {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT        SendChargingInformationArg {bound}
    RETURN RESULT   FALSE
    ERRORS          {missingParameter |
                    unexpectedComponentSequence |
                    unexpectedParameter |
```

```
                        parameterOutOfRange |
                        systemFailure |
                        taskRefused |
                        unexpectedDataValue |
                        unknownLegID}
    CODE                opcode-sendChargingInformation
    }
-- Direction: gsmSCF -> gsmSSF, Timer: T_sci
-- This operation is used to instruct the gsmSSF on the charging information to send by the gsmSSF.
-- The charging information can either be sent back by means of signalling or internal
-- if the gsmSSF is located in the local exchange. In the local exchange
-- this information may be used to update the charge meter or to create a standard call record.

SendChargingInformationArg {PARAMETERS-BOUND : bound}::= SEQUENCE {
    sCIBillingChargingCharacteristics  [0] SCIBillingChargingCharacteristics {bound},
    partyToCharge                      [1] SendingSideID,
    extensions                         [2] SEQUENCE SIZE(1..bound.&numOfExtensions) OF
                                           ExtensionField {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 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: Timer value ranges

Operation Name	Timer	Value range
ActivityTest	T_{at}	short
ApplyCharging	T_{ac}	short
ApplyChargingReport	T_{acr}	short
AssistRequestInstructions	T_{ari}	short
CallInformationReport	T_{cirp}	short
CallInformationRequest	T_{cirq}	short
Cancel	T_{can}	short
CallGap	T_{cg}	short
Connect	T_{con}	short
ConnectToResource	T_{ctr}	short
Continue	T_{cue}	short
ContinueWithArgument	T_{cwa}	short
DisconnectForwardConnection	T_{dfc}	short
EstablishTemporaryConnection	T_{etc}	medium
EventReportBCSM	T_{erb}	short
FurnishChargingInformation	T_{fci}	short
InitialDP	T_{idp}	short
ReleaseCall	T_{rc}	short
RequestReportBCSMEvent	T_{rrb}	short
ResetTimer	T_{rt}	short
SendChargingInformation	T_{sci}	short

6.1.2 gsmSSF/gsmSCF packages, contracts and ACs

6.1.2.1 gsmSSF/gsmSCF ASN.1 module

```
CAP-gsmSSF-gsmSCF-pkgs-contracts-acs {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-gsmSSF-gsmSCF-pkgs-contracts-acs(102) version3(2)}
```

```
DEFINITIONS ::= BEGIN

-- This module specifies the Operation Packages, Contracts, Application Contexts
-- and Abstract Syntaxes used for the gsmSSF – gsmSCF interface, for the control of
-- circuit switched calls.

-- The table in section 2.1 lists the specifications that contain the modules
-- that are used by CAP.

IMPORTS

    PARAMETERS-BOUND,
    cAPSpecificBoundSet
FROM CAP-classes classes

    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 {},
    assistRequestInstructions {},
    callGap {},
    callInformationReport {},
    callInformationRequest {},
    cancel {},
    connect {},
    connectToResource {},
    continue,
    continueWithArgument {},
    disconnectForwardConnection,
    establishTemporaryConnection {},
    eventReportBCSM {},
    furnishChargingInformation {},
    initialDP {},
    releaseCall {},
    requestReportBCSMEvent {},
    resetTimer {},
    sendChargingInformation {}
FROM CAP-gsmSSF-gsmSCF-ops-args gsmSSF-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-ac-CAP-gsmSSF-scfGenericAC,
    id-ac-CAP-gsmSSF-scfAssistHandoffAC,
    id-CAPSsfToScfGeneric,
    id-CAPAssistHandoffssfToScf,
    id-as-gsmSSF-scfGenericAS,
    id-as-assistHandoff-gsmSSF-scfAS,
    id-package-scfActivation,
    id-package-gsmSRF-scfActivationOfAssist,
    id-package-assistConnectionEstablishment,
    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,
    gsmSSF-gsmSCF-Operations,
    gsmSCF-gsmSRF-Operations,
    gsmSCF-gsmSRF-Protocol
FROM CAP-object-identifiers {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
```

```
umts-network(1) modules(3) cap-object-identifiers(100) version3(2)}

;

-- Application Contexts

capssf-scfGenericAC APPLICATION-CONTEXT ::= {
    CONTRACT                     capSsfToScfGeneric
    DIALOGUE MODE                structured
    ABSTRACT SYNTAXES            {dialogue-abstract-syntax |
                                 gsmSSF-scfGenericAbstractSyntax}
    APPLICATION CONTEXT NAME     id-ac-CAP-gsmSSF-scfGenericAC}

capssf-scfAssistHandoffAC APPLICATION-CONTEXT ::=   {
    CONTRACT                     capAssistHandoffssfToScf
    DIALOGUE MODE                structured
    ABSTRACT SYNTAXES            {dialogue-abstract-syntax |
                                 assistHandoff-gsmSSF-scfAbstractSyntax}
    APPLICATION CONTEXT NAME     id-ac-CAP-gsmSSF-scfAssistHandoffAC}


-- Contracts

capSsfToScfGeneric CONTRACT ::= {
-- dialogue initiated by gsmSSF with InitialDP Operation
    INITIATOR CONSUMER OF
            {scfActivationPackage {cAPSpecificBoundSet}}
    RESPONDER CONSUMER OF
            {activityTestPackage|
            assistConnectionEstablishmentPackage {cAPSpecificBoundSet} |
            bcsmEventHandlingPackage {cAPSpecificBoundSet} |
            billingPackage {cAPSpecificBoundSet} |
            callHandlingPackage {cAPSpecificBoundSet} |
            callReportPackage {cAPSpecificBoundSet} |
            cancelPackage {cAPSpecificBoundSet} |
            chargingPackage {cAPSpecificBoundSet} |
            connectPackage {cAPSpecificBoundSet} |
            genericDisconnectResourcePackage {cAPSpecificBoundSet} |
            nonAssistedConnectionEstablishmentPackage {cAPSpecificBoundSet} |
            signallingControlPackage {cAPSpecificBoundSet} |
            specializedResourceControlPackage {cAPSpecificBoundSet} |
            ssfCallProcessingPackage {cAPSpecificBoundSet} |
            timerPackage {cAPSpecificBoundSet} |
            trafficManagementPackage {cAPSpecificBoundSet}}
    ID      id-CAPSsfToScfGeneric
    }

capAssistHandoffssfToScf CONTRACT ::= {
-- dialogue initiated by gsmSSF with AssistRequestInstructions
    INITIATOR CONSUMER OF
            {gsmSRF-scfActivationOfAssistPackage {cAPSpecificBoundSet}}
    RESPONDER CONSUMER OF
            {activityTestPackage|
            callHandlingPackage {cAPSpecificBoundSet} |
            cancelPackage {cAPSpecificBoundSet} |
            genericDisconnectResourcePackage {cAPSpecificBoundSet} |
            nonAssistedConnectionEstablishmentPackage {cAPSpecificBoundSet} |
            specializedResourceControlPackage {cAPSpecificBoundSet} |
            timerPackage {cAPSpecificBoundSet}}
    ID      id-CAPAssistHandoffssfToScf
    }


-- Operation Packages

scfActivationPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {initialDP {bound}}
    ID      id-package-scfActivation}
gsmSRF-scfActivationOfAssistPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {assistRequestInstructions {bound}}
    ID      id-package-gsmSRF-scfActivationOfAssist}
assistConnectionEstablishmentPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {establishTemporaryConnection {bound}}
    ID      id-package-assistConnectionEstablishment}
genericDisconnectResourcePackage {PARAMETERS-BOUND : bound} 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}
ssfCallProcessingPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {continueWithArgument {bound} | continue}
    ID      id-package-ssfCallProcessing}
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}
signallingControlPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {sendChargingInformation {bound}}
    ID      id-package-signallingControl}
activityTestPackage OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {activityTest}
    ID      id-package-activityTest}
        cancelPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {cancel {bound}}
    ID      id-package-cancel}



-- Abstract Syntaxes

gsmSSF-scfGenericAbstractSyntax ABSTRACT-SYNTAX ::= {
    GenericSSF-gsmSCF-PDUs
    IDENTIFIED BY   id-as-gsmSSF-scfGenericAS}
GenericSSF-gsmSCF-PDUs ::= TCMessage {{SsfToScfGenericInvokable},
        {SsfToScfGenericReturnable}}
SsfScfGenericInvokable OPERATION ::= {
        activityTest |
        applyCharging {cAPSpecificBoundSet} |
        applyChargingReport {cAPSpecificBoundSet} |
        callInformationReport {cAPSpecificBoundSet} |
        callInformationRequest {cAPSpecificBoundSet} |
        cancel {cAPSpecificBoundSet} |
        connect {cAPSpecificBoundSet} |
        continueWithArgument {cAPSpecificBoundSet} |
        connectToResource {cAPSpecificBoundSet} |
        disconnectForwardConnection |
        establishTemporaryConnection {cAPSpecificBoundSet} |
        eventReportBCSM {cAPSpecificBoundSet} |
        furnishChargingInformation {cAPSpecificBoundSet} |
        initialDP {cAPSpecificBoundSet} |
        releaseCall {cAPSpecificBoundSet} |
        requestReportBCSMEvent {cAPSpecificBoundSet} |
        resetTimer {cAPSpecificBoundSet} |
        sendChargingInformation {cAPSpecificBoundSet} |
        playAnnouncement {cAPSpecificBoundSet} |
        promptAndCollectUserInformation {cAPSpecificBoundSet} |
        specializedResourceReport
        }
SsfScfGenericReturnable OPERATION ::= {
        activityTest |
        applyCharging {cAPSpecificBoundSet} |
        applyChargingReport {cAPSpecificBoundSet} |
        callGap {cAPSpecificBoundSet} |
        callInformationRequest {cAPSpecificBoundSet} |
        cancel {cAPSpecificBoundSet} |
        connect {cAPSpecificBoundSet} |
        connectToResource {cAPSpecificBoundSet} |
        continue |
        continueWithArgument {cAPSpecificBoundSet} |
        disconnectForwardConnection |
        establishTemporaryConnection {cAPSpecificBoundSet}|
        furnishChargingInformation {cAPSpecificBoundSet}|
        initialDP {cAPSpecificBoundSet}|
        releaseCall {cAPSpecificBoundSet}|
        requestReportBCSMEvent {cAPSpecificBoundSet}|
        resetTimer {cAPSpecificBoundSet}|
        sendChargingInformation {cAPSpecificBoundSet}|
        playAnnouncement {cAPSpecificBoundSet}|
        promptAndCollectUserInformation {cAPSpecificBoundSet}
        }

assistHandoff-gsmSSF-scfAbstractSyntax ABSTRACT-SYNTAX ::= {
    AssistHandoffsSF-gsmSCF-PDUs
```

```
        IDENTIFIED BY   id-as-assistHandoff-gsmSSF-scfAS}
AssistHandoffsSF-gsmSCF-PDUs ::= TCMessage {{AssistHandoffssfToScfInvokable},
            {AssistHandoffssfToScfReturnable}}
AssistHandoffssfToScfInvokable OPERATION ::= {
            activityTest |
            assistRequestInstructions {cAPSpecificBoundSet}|
            cancel {cAPSpecificBoundSet}|
            connectToResource {cAPSpecificBoundSet}|
            disconnectForwardConnection |
            playAnnouncement {cAPSpecificBoundSet}|
            promptAndCollectUserInformation {cAPSpecificBoundSet}|
            resetTimer {cAPSpecificBoundSet}|
            specializedResourceReport
            }
AssistHandoffssfToScfReturnable OPERATION ::= {
            activityTest |
            assistRequestInstructions {cAPSpecificBoundSet}|
            cancel {cAPSpecificBoundSet}|
            connectToResource {cAPSpecificBoundSet}|
            disconnectForwardConnection |
            playAnnouncement {cAPSpecificBoundSet}|
            promptAndCollectUserInformation {cAPSpecificBoundSet}|
            resetTimer {cAPSpecificBoundSet}
            }

END
```

6.2 gsmSCF/gsmSRF interface

6.2.1 gsmSCF/gsmSRF operations and arguments

```
CAP-gsmSCF-gsmSRF-ops-args {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-gsmSCF-gsmSRF-ops-args(103) version3(2)}

DEFINITIONS IMPLICIT TAGS ::= BEGIN

-- This module contains the operations and operation arguments used for the
-- gsmSRF - gsmSCF interface, for the control of circuit switched calls.

-- The table in section 2.1 lists the specifications that contain the modules
-- that are used by CAP.

IMPORTS

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

    opcode-playAnnouncement,
    opcode-promptAndCollectUserInformation,
    opcode-specializedResourceReport
FROM CAP-operationcodes operationcodes

    CollectedInfo,
    Digits {},
    ExtensionField {},
    InformationToSend {}
FROM CAP-datatypes datatypes

    canceled,
    improperCallerResponse,
    missingParameter,
    parameterOutOfRange,
    systemFailure,
    taskRefused,
    unavailableResource,
    unexpectedComponentSequence,
    unexpectedDataValue,
    unexpectedParameter
FROM CAP-errortypes errortypes

    PARAMETERS-BOUND
FROM CAP-classes classes

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

;

playAnnouncement {PARAMETERS-BOUND : bound} OPERATION ::= {
```

```
    ARGUMENT          PlayAnnouncementArg {bound}
    RETURN RESULT     FALSE
    ERRORS            {canceled |
                      missingParameter |
                      parameterOutOfRange |
                      systemFailure |
                      taskRefused |
                      unexpectedComponentSequence |
                      unexpectedDataValue |
                      unexpectedParameter |
                      unavailableResource}
    LINKED            {specializedResourceReport}
    CODE              opcode-playAnnouncement
    }
-- Direction: gsmSCF -> gsmSRF, Timer: T_pa
-- This operation is to be used after Establish Temporary Connection (assist procedure
-- with a second gsmSSF) or a Connect to Resource (no assist) operation. It may be used
-- for inband interaction with a mobile station, or for interaction with an ISDN user.
-- In the former case, the gsmSRF is usually collocated with the gsmSSF for standard
-- tones (congestion tone...) or standard announcements.
-- In the latter case, the gsmSRF is always collocated with the gsmSSF in the switch.
-- Any error is returned to the gsmSCF. The timer associated with this operation must
-- be of a sufficient duration to allow its linked operation to be correctly correlated.

PlayAnnouncementArg {PARAMETERS-BOUND : bound}::= SEQUENCE {
    informationToSend         [0] InformationToSend {bound},
    disconnectFromIPForbidden [1] BOOLEAN DEFAULT TRUE,
    requestAnnouncementComplete [2] BOOLEAN DEFAULT TRUE,
    extensions                [3] SEQUENCE SIZE(1..bound.&numOfExtensions)    OF
                                    ExtensionField {bound}  OPTIONAL,
    ...
    }

promptAndCollectUserInformation {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT          PromptAndCollectUserInformationArg {bound}
    RESULT            ReceivedInformationArg {bound}
    ERRORS            {canceled |
                      improperCallerResponse |
                      missingParameter |
                      parameterOutOfRange |
                      systemFailure |
                      taskRefused |
                      unexpectedComponentSequence |
                      unavailableResource |
                      unexpectedDataValue |
                      unexpectedParameter
                      }
    CODE              opcode-promptAndCollectUserInformation
    }
-- Direction: gsmSCF -> gsmSRF, Timer: T_pc
-- This operation is used to interact with a user to collect information.

PromptAndCollectUserInformationArg {PARAMETERS-BOUND : bound}::= SEQUENCE {
    collectedInfo             [0] CollectedInfo,
    disconnectFromIPForbidden [1] BOOLEAN DEFAULT TRUE,
    informationToSend         [2] InformationToSend {bound}        OPTIONAL,
    extensions                [3] SEQUENCE SIZE(1..bound.&numOfExtensions) OF
                                    ExtensionField {bound}        OPTIONAL,
    ...
    }

ReceivedInformationArg {PARAMETERS-BOUND : bound}::= CHOICE {
    digitsResponse            [0] Digits {bound}
    }

specializedResourceReport OPERATION ::= {
    ARGUMENT          SpecializedResourceReportArg
    RETURN RESULT     FALSE
    ALWAYS RESPONDS FALSE
    CODE              opcode-specializedResourceReport
    }
-- Direction: gsmSRF -> gsmSCF, Timer: T_srr
-- This operation is used as the response to a PlayAnnouncement operation when the announcement
-- completed report indication is set.

SpecializedResourceReportArg ::= NULL

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 6-2 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 6-2: Operation timers and their value range

Operation Name	Timer	Value range
PlayAnnouncement	T_{pa}	long
PromptAndCollectUserInformation	T_{pc}	long
SpecializedResourceReport	T_{srr}	short

6.2.2 gsmSRF/gsmSCF contracts, packages and ACs

6.2.2.1 gsmSRF/gsmSCF ASN.1 modules

```
CAP-gsmSCF-gsmSRF-pkgs-contracts-acs {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-gsmSCF-gsmSRF-pkgs-contracts-acs(104) version3(2)}

DEFINITIONS ::= BEGIN

-- This module specifies the Operation Packages, Contracts, Application Contexts
-- and Abstract Syntaxes used for the gsmSRF - gsmSCF interface, for the control of
-- circuit switched calls.

-- The table in section 2.1 lists the specifications that contain the modules
-- that are used by CAP.

IMPORTS

    PARAMETERS-BOUND,
    cAPSpecificBoundSet
FROM CAP-classes classes

    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

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

    activityTest,
    cancel {},
    assistRequestInstructions {}
FROM CAP-gsmSSF-gsmSCF-ops-args gsmSSF-gsmSCF-Operations

    gsmSRF-scfActivationOfAssistPackage {}
FROM CAP-gsmSSF-gsmSCF-pkgs-contracts-acs gsmSSF-gsmSCF-Protocol

    id-package-specializedResourceControl,
    id-ac-gsmSRF-gsmSCF,
    id-contract-gsmSRF-gsmSCF,
    id-package-gsmSRF-scfCancel,
    id-as-basic-gsmSRF-gsmSCF,
    classes,
    ros-InformationObjects,
    tc-Messages,
    tc-NotationExtensions,
    gsmSCF-gsmSRF-Operations,
    gsmSSF-gsmSCF-Operations,
    gsmSSF-gsmSCF-Protocol
FROM CAP-object-identifiers {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-object-identifiers(100) version3(2)}

;

-- Application Contexts

gsmSRF-gsmSCF-ac APPLICATION-CONTEXT ::= {
    CONTRACT                    gsmSRF-gsmSCF-contract
    DIALOGUE MODE               structured
```

```
    TERMINATION                basic
    ABSTRACT SYNTAXES          {dialogue-abstract-syntax |
                               gsmSRF-gsmSCF-abstract-syntax}
    APPLICATION CONTEXT NAME   id-ac-gsmSRF-gsmSCF}

-- Contracts

gsmSRF-gsmSCF-contract CONTRACT ::= {
    INITIATOR CONSUMER OF
          {gsmSRF-scfActivationOfAssistPackage {cAPSpecificBoundSet}}
    RESPONDER CONSUMER OF
          {specializedResourceControlPackage {cAPSpecificBoundSet}|
          activityTestPackage {cAPSpecificBoundSet}|
          gsmSRF-scfCancelPackage {cAPSpecificBoundSet}}
    ID    id-contract-gsmSRF-gsmSCF}

-- Operation Packages

specializedResourceControlPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES   {playAnnouncement {bound} |
                       promptAndCollectUserInformation {bound}
    }
    SUPPLIER INVOKES   {specializedResourceReport}
    ID                 id-package-specializedResourceControl}

gsmSRF-scfActivationOfAssistPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES   {assistRequestInstructions {bound}}
    ID     id-package-gsmSRF-scfActivationOfAssist}


gsmSRF-scfCancelPackage {PARAMETERS-BOUND : bound}  OPERATION-PACKAGE ::= {
    CONSUMER INVOKES   {cancel {bound}}
    ID                 id-package-gsmSRF-scfCancel}

activityTestPackage {PARAMETERS-BOUND : bound}  OPERATION-PACKAGE ::= {
    CONSUMER INVOKES   {activityTest}
    ID                 id-package-activityTest}

-- Abstract Syntaxes

gsmSRF-gsmSCF-abstract-syntax ABSTRACT-SYNTAX ::= {
    BASIC-gsmSRF-gsmSCF-PDUs
    IDENTIFIED BY   id-as-basic-gsmSRF-gsmSCF}

BASIC-gsmSRF-gsmSCF-PDUs ::= TCMessage {{GsmSRFgsmSCFInvokable},{GsmSRFgsmSCFReturnable}}

GsmSRFgsmSCFInvokable OPERATION ::= {
        activityTest |
        assistRequestInstructions {cAPSpecificBoundSet}|
        cancel {cAPSpecificBoundSet}|
        playAnnouncement {cAPSpecificBoundSet}|
        promptAndCollectUserInformation {cAPSpecificBoundSet}|
        specializedResourceReport
        }

GsmSRFgsmSCFReturnable OPERATION ::= {
        activityTest |
        assistRequestInstructions {cAPSpecificBoundSet}|
        cancel {cAPSpecificBoundSet}|
        playAnnouncement {cAPSpecificBoundSet}|
        promptAndCollectUserInformation {cAPSpecificBoundSet}
        }

END
```

7 MO SMS Control

This clause defines the operations, arguments, packages and appliaction contexts used for CSE control of MO SMS over the gsmSCF – gprsSSF and gsmSCF – gsmSSF interfaces.

7.1 SMS operations and arguments

```
CAP-SMS-ops-args {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1)
modules(3) cap-SMS-ops-args(105) version3(2)}

DEFINITIONS IMPLICIT TAGS::= BEGIN

-- This module contains the operations and operation arguments used for the
-- gsmSSF/gprsSSF - gsmSCF interface, for the control of MO-SMS.

-- The table in section 2.1 lists the specifications that contain the modules
```

```
-- that are used by CAP.

IMPORTS

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

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

    ServiceKey
FROM CS1-DataTypes {ccitt(0) identified-organization(4) etsi(0) inDomain(1) in-network(1)
modules(0) cs1-datatypes(2) version1(0)}

    MiscCallInfo
FROM CS2-datatypes {ccitt(0) identified-organization(4) etsi(0) inDomain(1) in-network(1)
cS2(20) modules(0) in-cs2-datatypes (0) version1(0)}

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

    LocationInformation
FROM MAP-MS-DataTypes {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
gsm-Network(1) modules(3) map-MS-DataTypes(11) version6(6)}

    PARAMETERS-BOUND
FROM CAP-classes classes

    opcode-connectSMS,
    opcode-continueSMS,
    opcode-eventReportSMS,
    opcode-furnishChargingInformationSMS,
    opcode-initialDPSMS,
    opcode-releaseSMS,
    opcode-requestReportSMSEvent,
    opcode-resetTimerSMS
FROM CAP-operationcodes operationcodes

    CalledPartyBCDNumber {},
    EventSpecificInformationSMS,
    EventTypeSMS,
    ExtensionField {},
    FCISMSBillingChargingCharacteristics,
    LocationInformationGPRS,
    RPCause,
    SMSEvent,
    TimeAndTimezone {},
    TimerID,
    TimerValue,
    TPDataCodingScheme,
    TPProtocolIdentifier,
    TPShortMessageSubmissionInfo,
    TPValidityPeriod
FROM CAP-datatypes datatypes

    missingCustomerRecord,
    missingParameter,
    parameterOutOfRange,
    systemFailure,
    taskRefused,
    unexpectedComponentSequence,
    unexpectedDataValue,
    unexpectedParameter
FROM CAP-errortypes errortypes

;

connectSMS {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT        ConnectSMSArg {bound}
    RETURN RESULT   FALSE
    ERRORS          {missingParameter |
                    parameterOutOfRange |
                    systemFailure |
                    taskRefused |
                    unexpectedComponentSequence |
                    unexpectedDataValue |
                    unexpectedParameter}
    CODE            opcode-connectSMS
    }
-- Direction: gsmSCF -> gsmSSF or gprsSSF, Timer: T_consms
```

```
-- This operation is used to request the gsmSSF/gprsSSF to perform the SMS processing
-- actions to route
-- or forward a short message to a specified destination.

ConnectSMSArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
    callingPartysNumber              [0] ISDN-AddressString                    OPTIONAL,
    destinationSubscriberNumber      [1] CalledPartyBCDNumber {bound}          OPTIONAL,
    sMSCAddress                      [2] ISDN-AddressString                    OPTIONAL,
    extensions                       [10] SEQUENCE SIZE(1..bound.&numOfExtensions)   OF
                                                        ExtensionField {bound}     OPTIONAL,
    ...
    }

continueSMS OPERATION ::= {
    RETURN RESULT   FALSE
    ALWAYS RESPONDS FALSE
    CODE            opcode-continueSMS
    }
```
-- Direction: gsmSCF -> gsmSSF/gprsSMS, Timer: T_{cuesms}
```
-- This operation is used to request the gsmSSF/gprsSSF to proceed with
-- Short Message processing at the DP at which it previously suspended
-- Short Message processing to await gsmSCF instructions (i.e. proceed
-- to the next Point in Association in the SMS FSM). The gsmSSF/gprsSSF
-- continues SMS processing without substituting new data from gsmSCF.

eventReportSMS {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT        EventReportSMSArg {bound}
    RETURN RESULT   FALSE
    ALWAYS RESPONDS FALSE
    CODE            opcode-eventReportSMS
    }
```
-- Direction: gsmSSF or gprsSSF -> gsmSCF, Timer: T_{erbsms}
```
-- This operation is used to notify the gsmSCF of a SM related event (e.g., FSM events such
-- as submission or failure) previously requested by the gsmSCF in a RequestReportSMSEvent
-- operation.

EventReportSMSArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
    eventTypeSMS                     [0] EventTypeSMS,
    eventSpecificInformationSMS      [1] EventSpecificInformationSMS       OPTIONAL,
    miscCallInfo                     [2] MiscCallInfo   DEFAULT {messageType request },
    extensions                       [10] SEQUENCE SIZE(1..bound.&numOfExtensions)   OF
                                                        ExtensionField {bound}     OPTIONAL,
    ...
    }

furnishChargingInformationSMS {PARAMETERS-BOUND : bound}          OPERATION ::= {
    ARGUMENT        FurnishChargingInformationSMSArg {bound}
    RETURN RESULT   FALSE
    ERRORS          {missingParameter |
                    taskRefused |
                    unexpectedComponentSequence |
                    unexpectedDataValue |
                    unexpectedParameter}
    CODE            opcode-furnishChargingInformationSMS
    }
```
-- Direction: gsmSCF -> gsmSSF or gprsSSF, Timer: T_{fcisms}
```
-- This operation is used to request the gsmSSF/gprsSSF to generate, register a charging record
-- or to include some information in the default SM record. The registered charging record is
-- intended for off line charging of the SM.

FurnishChargingInformationSMSArg {PARAMETERS-BOUND : bound}           ::=
    FCISMSBillingChargingCharacteristics {bound}

initialDPSMS {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT        InitialDPSMSArg {bound}
    RETURN RESULT   FALSE
    ERRORS          {missingCustomerRecord |
                    missingParameter |
                    parameterOutOfRange |
                    systemFailure |
                    taskRefused |
                    unexpectedComponentSequence |
                    unexpectedDataValue |
                    unexpectedParameter}
    CODE            opcode-initialDPSMS
    }
```
-- Direction: gsmSSF or gprsSSF -> gsmSCF, Timer: T_{idpsms}
```
-- This operation is used after a TDP to indicate request for service.

InitialDPSMSArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
    serviceKey                       [0] ServiceKey,
    destinationSubscriberNumber      [1] CalledPartyBCDNumber {bound}          OPTIONAL,
    callingPartyNumber               [2] ISDN-AddressString                    OPTIONAL,
    eventTypeSMS                     [3] EventTypeSMS                          OPTIONAL,
    iMSI                             [4] IMSI                                  OPTIONAL,
    locationInformationMSC           [5] LocationInformation                  OPTIONAL,
    locationInformationGPRS          [6] LocationInformationGPRS              OPTIONAL,
```

```
    sMSCAddress                              [7] ISDN-AddressString                OPTIONAL,
    timeAndTimezone                          [8] TimeAndTimezone {bound}           OPTIONAL,
    tPShortMessageSubmissionInfo             [9] TPShortMessageSubmissionInfo      OPTIONAL,
    tPProtocolIdentifier                     [10] TPProtocolIdentifier             OPTIONAL,
    tPDataCodingScheme                       [11] TPDataCodingScheme               OPTIONAL,
    tPValidityPeriod                         [12] TPValidityPeriod                 OPTIONAL,
    extensions                               [13] SEQUENCE SIZE(1..bound.&numOfExtensions) OF
                                                  ExtensionField {bound}           OPTIONAL,
    ...
    }
releaseSMS                       OPERATION ::= {
    ARGUMENT        ReleaseSMSArg
    RETURN RESULT   FALSE
    ALWAYS RESPONDS FALSE
    CODE            opcode-releaseSMS
    }
-- Direction: gsmSCF -> gsmSSF or gprsSSF, Timer: T_relsms
-- This operation is used to prevent an attempt to submit a short message.

ReleaseSMSArg                        ::= RPCause

requestReportSMSEvent {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT        RequestReportSMSEventArg {bound}
    RETURN RESULT   FALSE
    ERRORS          {missingParameter |
                    parameterOutOfRange |
                    systemFailure |
                    taskRefused |
                    unexpectedComponentSequence |
                    unexpectedDataValue |
                    unexpectedParameter}
    CODE            opcode-requestReportSMSEvent
    }
-- Direction: gsmSCF -> gsmSSF or gprsSSF, Timer: T_rrbsms
-- This operation is used to request the gsmSSF or gprsSSF to monitor for a
-- SM related event (e.g., FSM events such as submission or failure), then
-- send a notification back to the gsmSCF when the event is detected.

RequestReportSMSEventArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
    sMSEvents                        [0] SEQUENCE SIZE (1..bound.&numOfSMSEvents)  OF SMSEvent,
    extensions                       [10] SEQUENCE SIZE (1..bound.&numOfExtensions) OF
                                              ExtensionField {bound}           OPTIONAL,
    ...
    }
-- Indicates the SM related events for notification.

resetTimerSMS {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT        ResetTimerSMSArg {bound}
    RETURN RESULT   FALSE
    ERRORS          {missingParameter |
                    parameterOutOfRange |
                    taskRefused |
                    unexpectedComponentSequence |
                    unexpectedDataValue |
                    unexpectedParameter}
    CODE            opcode-resetTimerSMS
    }
-- Direction: gsmSCF -> gsmSSF/gprsSSF, Timer: T_rtsms
-- This operation is used to request the gsmSSF/gprsSSF to refresh an application
-- timer in the gsmSSF/gprsSSF.

ResetTimerSMSArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
    timerID       [0] TimerID DEFAULT tssf,
    timervalue    [1] TimerValue,
    extensions    [2] SEQUENCE SIZE(1..bound.&numOfExtensions) OF
                                                  ExtensionField {bound}  OPTIONAL,
    ...
    }

END
```

7.1.1 Operation timers

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

    short: 1 to 20 seconds;
    medium: 1 to 60 seconds;
    long: 1 second to 30 minutes

Table 7-1 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 7-1: Operation timers and their value range

Operation Name	Timer	Value range
ConnectSMS	T_{consms}	short
ContinueSMS	T_{cuesms}	short
EventReportSMS	T_{erbsms}	short
FurnishChargingInformationSMS	Tfcisms	short
InitialDPSMS	T_{idpsms}	short
ReleaseSMS	T_{relsms}	short
RequestReportSMSEvent	T_{rrbsms}	short
ResetTimerSMS	T_{rtsms}	short

7.2 SMS contracts, packages and ACs

7.2.1 SMS ASN.1 module

```
CAP-smsSSF-gsmSCF-pkgs-contracts-acs {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-smsSSF-gsmSCF-pkgs-contracts-acs(106) version3(2)}

DEFINITIONS ::= BEGIN

-- This module specifies the Operation Packages, Contracts, Application Contexts
-- and Abstract Syntaxes used for the gsmSSF/gprsSSF – gsmSCF interface, for the
-- control of MO-SMS.

-- The table in section 2.1 lists the specifications that contain the modules
-- that are used by CAP.

IMPORTS

    PARAMETERS-BOUND,
    cAPSpecificBoundSet
FROM CAP-classes classes

    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

    connectSMS{},
    continueSMS,
    eventReportSMS{},
    furnishChargingInformationSMS{},
    initialDPSMS{},
    releaseSMS,
    requestReportSMSEvent{},
    resetTimerSMS{}
FROM CAP-SMS-ops-args sms-Operations

    id-ac-cap3-sms-AC,
    id-cap3SmsSsfTogsmScf,
    sms-Operations,
    tc-NotationExtensions,
    tc-Messages,
    ros-InformationObjects,
    classes,
    id-as-sms-AS
FROM CAP-object-identifiers {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-object-identifiers(100) version3(2)}

;

-- Application Contexts

cap3-sms-AC APPLICATION-CONTEXT ::= {
    CONTRACT                      cap3SMS
    DIALOGUE MODE                 structured
```

```
        ABSTRACT SYNTAXES          {dialogue-abstract-syntax |
                                   sms-AbstractSyntax}
        APPLICATION CONTEXT NAME   id-ac-cap3-sms-AC}


-- Contracts

cap3SMS CONTRACT ::= {
-- dialogue initiated by gprsSSF or gsmSSF with InitialDPSMS Operation
        INITIATOR CONSUMER OF
                {smsActivationPackage {cAPSpecificBoundSet}}
        RESPONDER CONSUMER OF
                {smsConnectPackage {cAPSpecificBoundSet} |
                smsReleasePackage {cAPSpecificBoundSet} |
                smsEventHandlingPackage {cAPSpecificBoundSet} |
                smsTimerPackage {cAPSpecificBoundSet} |
                smsBillingPackage {cAPSpecificBoundSet} |
                smsProcessingPackage {cAPSpecificBoundSet}}
        ID      id-cap3SmsSsfTogsmScf
        }


-- Operation Packages

smsActivationPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {initialDPSMS {bound}}
    ID      id-package-smsActivation}
smsConnectPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {connectSMS {bound}}
    ID      id-package-smsConnect}
smsProcessingPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {continueSMS}
    ID      id-package-smsContinue}
smsReleasePackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {releaseSMS}
    ID      id-package-smsRelease}
smsEventHandlingPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {requestReportSMSEvent {bound}}
    SUPPLIER INVOKES    {eventReportSMS {bound}}
    ID      id-package-smsEventHandling}
smsBillingPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {furnishChargingInformationSMS {bound}}
    ID      id-package-smsBilling}
smsTimerPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {resetTimerSMS {bound}}
    ID      id-package-smsTimer}


-- Abstract Syntaxes

sms-AbstractSyntax ABSTRACT-SYNTAX ::= {
    Generic-sms-PDUs
    IDENTIFIED BY   id-as-sms-AS}

Generic-sms-PDUs ::= TCMessage {{SmsInvokable}, {SmsReturnable}}

SmsInvokable OPERATION ::= {
    connectSMS {cAPSpecificBoundSet} |
    eventReportSMS {cAPSpecificBoundSet} |
    furnishChargingInformationSMS {cAPSpecificBoundSet} |
    initialDPSMS {cAPSpecificBoundSet} |
    requestReportSMSEvent {cAPSpecificBoundSet} |
    resetTimerSMS {cAPSpecificBoundSet}
    }

SmsReturnable OPERATION ::= {
    connectSMS {cAPSpecificBoundSet} |
    continueSMS |
    furnishChargingInformationSMS {cAPSpecificBoundSet}|
    initialDPSMS {cAPSpecificBoundSet}|
    releaseSMS { }|
    requestReportSMSEvent {cAPSpecificBoundSet}|
    resetTimerSMS {cAPSpecificBoundSet}
    }

END
```

8 GPRS Control

8.1 gsmSCF/gprsSSF operations and arguments

```
CAP-gprsSSF-gsmSCF-ops-args {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-GPRS-ops-args(107) version3(2)}
```

```
DEFINITIONS IMPLICIT TAGS ::= BEGIN

-- This module contains the operations and operation arguments used for the
-- gprsSSF - gsmSCF interface, for the control of GPRS.

-- The table in section 2.1 lists the specifications that contain the modules
-- that are used by CAP.

IMPORTS

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

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

    ServiceKey
FROM CS1-DataTypes {ccitt(0) identified-organization(4) etsi(0) inDomain(1) in-network(1)
modules(0) cs1-datatypes(2) version1(0)}

    MiscCallInfo
FROM CS2-datatypes {ccitt(0) identified-organization(4) etsi(0) inDomain(1) in-network(1)
cS2(20) modules(0) in-cs2-datatypes (0) version1(0)}

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

    GSN-Address
FROM MAP-MS-DataTypes {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
gsm-Network(1) modules(3) map-MS-DataTypes(11) version6(6)}

    PARAMETERS-BOUND
FROM CAP-classes classes

    opcode-activityTestGPRS,
    opcode-applyChargingGPRS,
    opcode-applyChargingReportGPRS,
    opcode-cancelGPRS,
    opcode-connectGPRS,
    opcode-continueGPRS,
    opcode-entityReleasedGPRS,
    opcode-eventReportGPRS,
    opcode-furnishChargingInformationGPRS,
    opcode-initialDPGPRS,
    opcode-releaseGPRS,
    opcode-requestReportGPRSEvent,
    opcode-resetTimerGPRS,
    opcode-sendChargingInformationGPRS
FROM CAP-operationcodes operationcodes

    AccessPointName {},
    GPRSCause {},
    ChargingCharacteristics,
    ChargingResult,
    EndUserAddress,
    ExtensionField {},
    FCIGPRSBillingChargingCharacteristics,
    GPRSChargingID,
    GPRSEventSpecificInformation {},
    GPRSEvent,
    GPRSEventType,
    GPRSMSClass,
    LocationInformationGPRS,
    PDPID,
    PDPInitiationType,
    QualityOfService,
    RAIdentity,
    SCIGPRSBillingChargingCharacteristics,
    SGSNCapabilities,
    TimeAndTimezone {},
    TimerID,
    TimerValue
FROM CAP-datatypes datatypes

    missingCustomerRecord,
    missingParameter,
    parameterOutOfRange,
    systemFailure,
    taskRefused,
    unexpectedComponentSequence,
    unexpectedDataValue,
```

```
        unexpectedParameter,
        unknownPDPID
FROM CAP-errortypes errortypes

;


activityTestGPRS OPERATION ::= {
        RETURN RESULT    TRUE
        CODE             opcode-activityTestGPRS }
-- Direction: gsmSCF -> gprsSSF, Timer: T_atg
-- This operation is used to check for the continued existence of a relationship between the gsmSCF
-- and gprsSSF. If the relationship is still in existence, then the gprsSSF will respond. If no
-- reply is received, then the gsmSCF will assume that the gprsSSF has failed in some way
-- and will take the appropriate action.

applyChargingGPRS                    OPERATION ::= {
        ARGUMENT        ApplyChargingGPRSArg
        RETURN RESULT   FALSE
        ERRORS          {missingParameter |
                        unexpectedComponentSequence |
                        unexpectedParameter |
                        unexpectedDataValue |
                        parameterOutOfRange |
                        systemFailure |
                        taskRefused |
                        unknownPDPID}
        CODE            opcode-applyChargingGPRS
        }
-- Direction gsmSCF -> gprsSSF, Timer T_acg
-- This operation is used for interacting from the gsmSCF with the gprsSSF CSE-controlled
-- GPRS session or PDP Context charging mechanism.

ApplyChargingGPRSArg                 ::= SEQUENCE {
        chargingCharacteristics      [0] ChargingCharacteristics,
        tariffSwitchInterval         [1] INTEGER (1..86400)            OPTIONAL,
        pDPID                        [2] PDPID                         OPTIONAL,
        ...
        }
-- tariffSwitchInterval is measured in 1 second units.

applyChargingReportGPRS         OPERATION ::= {
        ARGUMENT        ApplyChargingReportGPRSArg
        RETURN RESULT   TRUE
        ERRORS          {missingParameter |
                        unexpectedComponentSequence |
                        unexpectedParameter |
                        unexpectedDataValue |
                        parameterOutOfRange |
                        systemFailure |
                        taskRefused |
                        unknownPDPID}
        CODE            opcode-applyChargingReportGPRS
        }
-- Direction gprsSSF -> gsmSCF,Timer T_acrg
-- The ApplyChargingReportGPRS operation provides the feedback from the gprsSCF to the gsmSCF
-- CSE-controlled GPRS session charging mechanism.

ApplyChargingReportGPRSArg           ::= SEQUENCE {
        chargingResult               [0] ChargingResult,
        qualityOfService             [1] QualityOfService             OPTIONAL,
        active                       [2] BOOLEAN             DEFAULT TRUE,
        pDPID                        [3] PDPID                         OPTIONAL,
        ...,
        chargingRollOver             [4] ChargingRollOver      OPTIONAL
        }

cancelGPRS                           OPERATION ::= {
        ARGUMENT        CancelGPRSArg
        RETURN RESULT   FALSE
        ERRORS          {missingParameter |
                        taskRefused |
                        unknownPDPID}
        CODE            opcode-cancelGPRS
        }
-- Direction: gsmSCF -> gprsSSF, Timer: T_cag
-- This generic operation cancels all previous requests,
-- i.e. all EDPs and reports can be cancelled by the gsmSCF.

CancelGPRSArg                        ::= SEQUENCE {
        pDPID                        [0] PDPID OPTIONAL,
        ...
        }

connectGPRS {PARAMETERS-BOUND: bound} OPERATION::= {
        ARGUMENT        ConnectGPRSArg {bound}
        RETURN RESULT   FALSE
```

```
    ERRORS              {missingParameter |
                        parameterOutOfRange |
                        unknownPDPID |
                        systemFailure |
                        taskRefused |
                        unexpectedComponentSequence |
                        unexpectedDataValue |
                        unexpectedParameter}
    CODE                opcode-connectGPRS
    }
-- Direction: gsmSCF -> gprsSSF, Timer: T_cong
-- This operation is used to modify the Access Point Name used when establishing a PDP Context.

ConnectGPRSArg {PARAMETERS-BOUND: bound}::= SEQUENCE {
    accessPointName             [0] AccessPointName {bound},
    pdpID                       [1] PDPID                          OPTIONAL,
    ...
    }

continueGPRS                        OPERATION ::= {
    ARGUMENT        ContinueGPRSArg
    RETURN RESULT   FALSE
    ERRORS          {missingParameter |
                    unknownPDPID |
                    unexpectedDataValue}
    CODE            opcode-continueGPRS
    }
-- Direction: gsmSCF -> gprsSSF, Timer: T_cueg
-- This operation is used to request the gprsSSF to proceed with processing at the DP at
-- which it previously suspended processing to await gsmSCF instructions (i.e., proceed to
-- the next point in processing in the Attach/Detach state model or PDP Context
-- state model) substituting new data from the gsmSCF.

ContinueGPRSArg                     ::= SEQUENCE {
    pDPID                       [0] PDPID                          OPTIONAL,
    ...
    }

entityReleasedGPRS  {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT        EntityReleasedGPRSArg {bound}
    RETURN RESULT   TRUE
    ERRORS          {missingParameter |
                    taskRefused |
                    unknownPDPID}
    CODE            opcode-entityReleasedGPRS
    }
-- Direction: gprsSSF -> gsmSCF, Timer: T_erg
-- This operation is used when the GPRS Session is detached or a PDP Context is diconnected and
-- the associated event is not armed for reporting.
-- The usage of this operation is independent of the functional entity that initiates the Detach
-- or PDP Context Disconnection and is independent of the cause of the Detach or PDP Context
-- Disconnect.

EntityReleasedGPRSArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
    gPRSCause                   [0] GPRSCause {bound},
    pDPID                       [1] PDPID                  OPTIONAL,
    ...
    }

eventReportGPRS {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT        EventReportGPRSArg {bound}
    RETURN RESULT   TRUE
    ERRORS          {unknownPDPID}
    CODE            opcode-eventReportGPRS
    }
-- Direction gprsSSF -> gsmSCF,Timer T_ereg
-- This operation is used to notify the gsmSCF of a GPRS session or PDP context related
-- events (e.g. PDP context activation) previously requested by the gsmSCF in a
-- RequestReportGPRSEvent operation.

EventReportGPRSArg {PARAMETERS-BOUND : bound}::= SEQUENCE {
    gPRSEventType               [0] GPRSEventType,
    miscGPRSInfo                [1] MiscCallInfo DEFAULT {messageType request},
    gPRSEventSpecificInformation [2] GPRSEventSpecificInformation {bound}   OPTIONAL,
    pDPID                       [3] PDPID OPTIONAL,
    ...
    }

furnishChargingInformationGPRS {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT        FurnishChargingInformationGPRSArg {bound}
    RETURN RESULT   FALSE
    ERRORS          {missingParameter |
                    taskRefused |
                    unexpectedComponentSequence |
                    unexpectedDataValue |
                    unexpectedParameter |
                    unknownPDPID}
```

```
    CODE            opcode-furnishChargingInformationGPRS
    }
-- Direction: gsmSCF -> gprsSSF, Timer: Tfcig
-- This operation is used to request the gprsSSF to generate, register a logical record or to
-- include some information in the default logical GPRS record.
-- The registered logical record is intended for off line charging of the GPRS session
-- or PDP Context.

FurnishChargingInformationGPRSArg {PARAMETERS-BOUND : bound} ::=
    FCIGPRSBillingChargingCharacteristics{bound}


initialDPGPRS {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT        InitialDPGPRSArg {bound}
    RETURN RESULT   FALSE
    ERRORS          {missingCustomerRecord |
                    missingParameter |
                    parameterOutOfRange |
                    systemFailure |
                    taskRefused |
                    unexpectedComponentSequence |
                    unexpectedDataValue |
                    unexpectedParameter}
    CODE            opcode-initialDPGPRS
    }
-- Direction gprsSSF -> gsmSCF,Timer T_idpg
-- This operation is used by the gprsSSF when a trigger is detected at a DP in the GPRS state
-- machines to request instructions from the gsmSCF

InitialDPGPRSArg {PARAMETERS-BOUND : bound}::= SEQUENCE {
    serviceKey                      [0] ServiceKey,
    gPRSEventType                   [1] GPRSEventType,
    mSISDN                          [2] ISDN-AddressString,
    iMSI                            [3] IMSI,
    timeAndTimeZone                 [4] TimeAndTimezone {bound},
    gPRSMSClass                     [5] GPRSMSClass            OPTIONAL,
    endUserAddress                  [6] EndUserAddress         OPTIONAL,
    qualityOfService                [7] QualityOfService       OPTIONAL,
    accessPointName                 [8] AccessPointName{bound} OPTIONAL,
    routeingAreaIdentity            [9] RAIdentity             OPTIONAL,
    chargingID                      [10] GPRSChargingID        OPTIONAL,
    sGSNCapabilities                [11] SGSNCapabilities      OPTIONAL,
    locationInformationGPRS         [12] LocationInformationGPRS OPTIONAL,
    pDPInitiationType               [13] PDPInitiationType     OPTIONAL,
    extensions                      [14] SEQUENCE SIZE(1..bound.&numOfExtensions)  OF
                                         ExtensionField {bound}    OPTIONAL,
    ...,
    gGSNAddress                     [15] GSN-Address           OPTIONAL,
    secondaryPDP-context            [16] NULL                  OPTIONAL
    }
-- The RouteingAreaIdentity parameter is not used.
-- The receiving entity shall ignore RouteingAreaIdentity if received.
-- The RouteingAreaIdentity is conveyed in the LocationInformationGPRS parameter.


releaseGPRS {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT        ReleaseGPRSArg {bound}
    RETURN RESULT   FALSE
    ERRORS          {missingParameter |
                    taskRefused |
                    unknownPDPID}
    CODE            opcode-releaseGPRS
    }
-- Direction: gsmSCF -> gprsSSF, Timer: T_rg
-- This operation is used to tear down an existing GPRS session or PDP Context at any phase.

ReleaseGPRSArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
    gprsCause                       [0] GPRSCause {bound},
    pDPID                           [1] PDPID OPTIONAL,
    ...
    }


requestReportGPRSEvent {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT        RequestReportGPRSEventArg {bound}
    RETURN RESULT   FALSE
    ERRORS          {missingParameter |
                    parameterOutOfRange |
                    systemFailure |
                    taskRefused |
                    unexpectedComponentSequence |
                    unexpectedDataValue |
                    unexpectedParameter |
                    unknownPDPID}
    CODE            opcode-requestReportGPRSEvent
    }
-- Direction: gsmSCF -> gprsSSF, Timer: T_rrqe
-- This operation is used to request the gprsSSF to monitor for an event (e.g., GPRS events
-- such as attach or PDP Context activiation), then send a notification back to the
-- gsmSCF when the event is detected.
```

```
RequestReportGPRSEventArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
    gPRSEvent                   [0] SEQUENCE SIZE (1..bound.&numOfGPRSEvents)  OF GPRSEvent,
    pDPID                       [1] PDPID           OPTIONAL,
    ...
    }
-- Indicates the GPRS related events for notification.

resetTimerGPRS                      OPERATION ::= {
    ARGUMENT        ResetTimerGPRSArg
    RETURN RESULT   FALSE
    ERRORS          {missingParameter |
                    parameterOutOfRange |
                    taskRefused |
                    unexpectedComponentSequence |
                    unexpectedDataValue |
                    unexpectedParameter |
                    unknownPDPID}
    CODE            opcode-resetTimerGPRS
    }
-- Direction: gsmSCF -> gprsSSF, Timer: T_rtg
-- This operation is used to request the gprsSSF to refresh an application timer in the gprsSSF.

ResetTimerGPRSArg           ::= SEQUENCE {
    timerID                 [0] TimerID                 DEFAULT tssf,
    timervalue              [1] TimerValue,
    ...
    }

sendChargingInformationGPRS {PARAMETERS-BOUND: bound} OPERATION ::= {
    ARGUMENT        SendChargingInformationGPRSArg { bound}
    RETURN RESULT   FALSE
    ERRORS          {missingParameter |
                    unexpectedComponentSequence |
                    unexpectedParameter |
                    parameterOutOfRange |
                    systemFailure |
                    taskRefused |
                    unexpectedDataValue |
                    unknownPDPID
                    }
    CODE            opcode-sendChargingInformationGPRS
    }
-- Direction: gsmSCF -> gprsSSF, Timer: T_scig
-- This operation is used to instruct the gprsSSF on the charging information which the
-- gprsSSF shall send to the Mobile Station by means of GSM access signalling.

SendChargingInformationGPRSArg {PARAMETERS-BOUND: bound}::= SEQUENCE {
    sCIGPRSBillingChargingCharacteristics   [0] SCIGPRSBillingChargingCharacteristics { bound},
    ...
    }

END



CAP-GPRS-ReferenceNumber {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-dialogueInformation(111) version3(2)}
DEFINITIONS ::= BEGIN

EXPORTS
    id-CAP-GPRS-ReferenceNumber ,
    CAP-GPRS-ReferenceNumber-Abstract-Syntax;

IMPORTS
    Integer4
FROM CS1-DataTypes {ccitt(0) identified-organization(4) etsi(0) inDomain(1) in-network(1)
modules(0) cs1-datatypes(2) version1(0)}
;

id-CAP-GPRS-ReferenceNumber OBJECT IDENTIFIER ::= {ccitt(0) identified-organization(4) etsi(0)
mobileDomain(0) umts-network(1) as(1) cap-GPRS-ReferenceNumber(5) version3(2)}

CAP-GPRS-ReferenceNumber-Abstract-Syntax ABSTRACT-SYNTAX ::= {CAP-GPRS-ReferenceNumber IDENTIFIED BY
id-CAP-GPRS-ReferenceNumber}

CAP-GPRS-ReferenceNumber ::= SEQUENCE {
    destinationReference    [0] Integer4          OPTIONAL,
    originationReference    [1] Integer4          OPTIONAL
    }
-- This IE is used to identify the relationship between SGSN and the SCP.

END -- of CAP-GPRS-ReferenceNumber
```

8.1.1   Operation timers

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

short:	1 to 20 seconds;
medium:	1 to 60 seconds;
long:	1 second to 30 minutes

Table 8-1 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 8-1: Operation timers and their value range

Operation Name	Timer	Value range
ActivityTestGPRST	T_{atg}	short
ApplyChargingGPRS	T_{acg}	short
ApplyChargingReportGPRS	T_{acrg}	short
CancelGPRS	T_{cag}	short
ConnectGPRS	T_{cong}	short
ContinueGPRS	T_{cueg}	short
EntityReleasedGPRS	T_{erg}	short
EventReportGPRS	T_{ereg}	short
FurnishChargingInformationGPRS	T_{fcig}	short
InitialDPGPRS	T_{idpg}	short
ReleaseGPRS	T_{rg}	short
RequestReportGPRSEvent	T_{rrqe}	short
ResetTimerGPRS	T_{rtg}	short
SendChargingInformationGPRS	T_{scig}	short

8.2   gsmSCF/gprsSSF contracts, packages and ACs

8.2.1   gprsSSF/gsmSCF ASN.1 module

```
CAP-gprsSSF-gsmSCF-pkgs-contracts-acs {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-gprsSSF-gsmSCF-pkgs-contracts-acs(108) version3(2)}

DEFINITIONS ::= BEGIN

-- This module specifies the Operation Packages, Contracts, Application Contexts
-- and Abstract Syntaxes used for the gprsSSF – gsmSCF interface, for the
-- control of GPRS.

-- The table in section 2.1 lists the specifications that contain the modules
-- that are used by CAP.

IMPORTS

    PARAMETERS-BOUND,
    cAPSpecificBoundSet
FROM CAP-classes classes

    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

    activityTestGPRS {},
    applyChargingGPRS {},
```

```
        applyChargingReportGPRS {},
        cancelGPRS {},
        connectGPRS {},
        continueGPRS {},
        entityReleasedGPRS {},
        furnishChargingInformationGPRS {},
        initialDPGPRS {},
        releaseGPRS {},
        eventReportGPRS {},
        requestReportGPRSEvent {},
        resetTimerGPRS {},
        sendChargingInformationGPRS {}
FROM CAP-gprsSSF-gsmSCF-ops-args gprsSSF-gsmSCF-Operations

        id-ac-CAP-gprsSSF-gsmSCF-AC,
        id-cap3GprsSsfTogsmScf,
        id-cap3GsmScfToGprsSsf,
        id-as-gprsSSF-gsmSCF-AS,
        id-as-gsmSCF-gprsSSF-AS,
        classes,
        ros-InformationObjects,
        tc-Messages,
        tc-NotationExtensions,
        gprsSSF-gsmSCF-Operations
FROM CAP-object-identifiers {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cap-object-identifiers(100) version3(2)}

;


-- Application Contexts

cap3-gprssf-scfAC APPLICATION-CONTEXT ::= {
    CONTRACT                    cap3GprsSsfToScf
    DIALOGUE MODE               structured
    ABSTRACT SYNTAXES           {dialogue-abstract-syntax |
                                gprsSSF-fgsmSCFAbstractSyntax}
    APPLICATION CONTEXT NAME    id-ac-CAP-gprsSSF-gsmSCF-AC}

cap3-gsmscf-gprsssfAC APPLICATION-CONTEXT ::= {
    CONTRACT                    cap3GsmScfToGprsSsf
    DIALOGUE MODE               structured
    ABSTRACT SYNTAXES           {dialogue-abstract-syntax |
                                gsmSCF-gprsSSFAbstractSyntax}
    APPLICATION CONTEXT NAME    id-ac-CAP-gsmSCF-gprsSSF-AC}


-- Contracts

cap3GprsSsfToScf CONTRACT ::= {
-- dialogue initiated by gprsSSF with InitialDPGPRS, ApplyChargingReportGPRS,
-- EntityReleaseGPRS and EventReportGPRS Operations
    INITIATOR CONSUMER OF
            {gprSscfActivationPackage {cAPSpecificBoundSet} |
            gprsEventHandlingPackage {cAPSpecificBoundSet} |
            gprsChargingPackage {cAPSpecificBoundSet} |
            gprsExceptionInformationPackage}
    RESPONDER CONSUMER OF
            {gprsConnectPackage {cAPSpecificBoundSet} |
            gprsProcessingPackage {cAPSpecificBoundSet} |
            gprsReleasePackage {cAPSpecificBoundSet} |
            gprsEventHandlingPackage {cAPSpecificBoundSet} |
            gprsTimerPackage {cAPSpecificBoundSet} |
            gprsBillingPackage {cAPSpecificBoundSet} |
            gprsChargingPackage {cAPSpecificBoundSet} |
            gprsCancelPackage {cAPSpecificBoundSet} |
            gprsChargeAdvicePackage {cAPSpecificBoundSet}}
    ID      id-cap3GprsSsfTogsmScf
    }

cap3GsmScfToGprsSsf CONTRACT ::= {
-- dialogue initiated by gsmSCF with ApplyCharginGPRS, ActivityTestGPRS,
-- CancelGPRS, FurnishChargingInformationGPRS, ReleaseGPRS,
-- RequestReportGPRSEvent and SendChargingInformationGPRS Operations
    INITIATOR CONSUMER OF
            {gprsReleasePackage {cAPSpecificBoundSet} |
            gprsEventHandlingPackage {cAPSpecificBoundSet} |
            gprsBillingPackage {cAPSpecificBoundSet} |
            gprsChargingPackage {cAPSpecificBoundSet} |
            gprsActivityTestPackage {cAPSpecificBoundSet} |
            gprsCancelPackage {cAPSpecificBoundSet} |
            gprsChargeAdvicePackage {cAPSpecificBoundSet}}
    RESPONDER CONSUMER OF
            {}
    ID      id-cap3GsmScfToGprsSsf
    }


-- Operation Packages
```

```
gprsScfActivationPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    { initialDPGPRS {bound}}
    ID      id-package-gprsScfActivation}
gprsConnectPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {connectGPRS {bound}}
    ID      id-package-gprsConnect}
gprsProcessingPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {continueGPRS {bound}}
    ID      id-package-gprsContinue}
GprsReleasePackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {releaseGPRS {bound}}
    ID      id-package-gprsRelease}
gprsEventHandlingPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {requestReportGPRSEvent {bound}}
    SUPPLIER INVOKES    {eventReportGPRS {bound}}
    ID      id-package-gprsEventHandling}
gprsExceptionInformationPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {entityReleasedGPRS {bound}}
    ID      id-package-gprsExceptionInformation}
gprsTimerPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {resetTimerGPRS {bound}}
    ID      id-package-gprsTimer}
gprsBillingPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {furnishChargingInformationGPRS {bound}}
    ID      id-package-gprsBilling}
gprsChargingPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {applyChargingGPRS {bound}}
    SUPPLIER INVOKES    {applyChargingReportGPRS {bound}}
    ID      id-package-gprsCharging}
gprsChargeAdvicePackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {sendChargingInformationGPRS {bound}}
    ID      id-package-gprsChargeAdvice}
gprsActivityTestPackage OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {activityTestGPRS {bound}}
    ID      id-package-gprsActivityTest}
gprsCancelPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE ::= {
    CONSUMER INVOKES    {cancelGPRS {bound}}
    ID      id-package-gprsCancel}


-- Abstract Syntaxes

gprsSSF-gsmSCFAbstractSyntax ABSTRACT-SYNTAX ::= {
    GenericGprsSSF-gsmSCF-PDUs
    IDENTIFIED BY   id-as-gprsSSF-gsmSCF-AS}

GenericGprsSSF-gsmSCF-PDUs ::= TCMessage {{GprsSsfToGsmScfInvokable},
            {GprsSsfToGsmScfReturnable}}

GprsSsfToGsmScfGenericInvokable OPERATION ::= {
            activityTestGPRS {cAPSpecificBoundSet} |
            applyChargingGPRS {cAPSpecificBoundSet} |
            applyChargingReportGPRS {cAPSpecificBoundSet} |
            cancelGPRS {cAPSpecificBoundSet} |
            connectGPRS {cAPSpecificBoundSet} |
            entityReleasedGPRS {cAPSpecificBoundSet} |
            eventReportGPRS {cAPSpecificBoundSet} |
            furnishChargingInformationGPRS {cAPSpecificBoundSet} |
            initialDPGPRS {cAPSpecificBoundSet} |
            releaseGPRS {cAPSpecificBoundSet} |
            requestReportGPRSEvent {cAPSpecificBoundSet} |
            resetTimerGPRS {cAPSpecificBoundSet} |
            sendChargingInformationGPRS {cAPSpecificBoundSet}
            }

GprsSsfToGsmScfReturnable OPERATION ::= {
            activityTestGPRS {cAPSpecificBoundSet} |
            applyChargingGPRS {cAPSpecificBoundSet} |
            applyChargingReportGPRS {cAPSpecificBoundSet} |
            cancelGPRS {cAPSpecificBoundSet} |
            connectGPRS {cAPSpecificBoundSet} |
            continueGPRS {cAPSpecificBoundSet} |
            entityReleasedGPRS {cAPSpecificBoundSet} |
            furnishChargingInformationGPRS {cAPSpecificBoundSet}|
            initialDPGPRS {cAPSpecificBoundSet}|
            releaseGPRS {cAPSpecificBoundSet}|
            requestReportGPRSEvent {cAPSpecificBoundSet}|
            resetTimerGPRS {cAPSpecificBoundSet}|
            sendChargingInformationGPRS {cAPSpecificBoundSet}
            }

gsmSCF-gprsSSFGenericAbstractSyntax ABSTRACT-SYNTAX ::= {
    GenericGsmSCF-gprsSSF-PDUs
    IDENTIFIED BY   id-as-gsmSCF-gprsSSF-AS}

GenericGsmSCF-gprsSSF-PDUs ::= TCMessage {{GsmScfToGprsSsfInvokable}, {GsmScfToGprsSsfReturnable}}
```

```
GsmScfToGprsSsfInvokable OPERATION ::= {
        activityTestGPRS {cAPSpecificBoundSet} |
        applyChargingGPRS {cAPSpecificBoundSet}|
        cancelGPRS {cAPSpecificBoundSet}|
        furnishChargingInformationGPRS {cAPSpecificBoundSet}|
        releaseGPRS {cAPSpecificBoundSet}|
        requestReportGPRSEvent {cAPSpecificBoundSet}|
        sendChargingInformationGPRS {cAPSpecificBoundSet}
        }

GsmScfToGprsSsfReturnable OPERATION ::= {
        activityTestGPRS {cAPSpecificBoundSet} |
        applyChargingGPRS {cAPSpecificBoundSet}|
        cancelGPRS {cAPSpecificBoundSet}|
        furnishChargingInformationGPRS {cAPSpecificBoundSet}|
        releaseGPRS {cAPSpecificBoundSet}|
        requestReportGPRSEvent {cAPSpecificBoundSet}|
        sendChargingInformationGPRS {cAPSpecificBoundSet}
        }

END
```

9 Application Entity procedures

The description of the application entity procedures for CAMEL Phase 3 can be found in 3GPP TS 23.078 [42].

10 Error procedures

This clause defines the generic error procedures for the CAP. The error procedure descriptions have been divided in two subclauses, subclause 10.1 listing the errors related to CAP operations and subclause 10.2 listing the errors related to error conditions in the different FEs which are not directly related to the CAP operations.

The gsmSSF states which are referred to in this clause are described in 3GPP TS 23.078 [42]. The operations PlayAnnouncement, PromptAndCollectUserInformation and SpecialisedResourceReport refer to states in the gsmSRF SRSM which are described in ETS 300 374-1 [9] as well as to states in 3GPP TS 23.078 [42].

10.1 Operation related error procedures

The following subclauses define the generic error handling for the operation related errors. The errors are defined as operation errors in subclauses 6, 7 and 8. Errors which have a specific procedure for an operation are described in subclause 11 with the detailed procedure of the related operation.

The TC services which are used for reporting operation errors are described in subclause 12.1. All errors, which can be detected by the ASN.1 decoder, already may have been detected during the decoding of the TC message and indicated by the TC error indication "MistypedParameter" in the TC-U-Reject.

10.1.1 Canceled

10.1.1.1 General Description

10.1.1.1.1 Error description

The Error "Canceled" gives an indication to the gsmSCF that the cancellation, as it was requested by the gsmSCF, of a specific Operation, has been successful. The gsmSCF is only able to cancel certain predefined gsmSCF → gsmSRF Operations.

10.1.1.2 Operations gsmSCF→gsmSRF

PlayAnnouncement

PromptAndCollectUserInformation

Procedures at responding entity (gsmSRF)

A) Receiving Cancel

    Precondition: SRSM state 3 User Interaction.

    Postcondition: SRSM state 3 User Interaction.

The indicated PlayAnnouncement or PromptAndCollectUserInformation is terminated if it is presently executing or deleted from the buffer. If the indicated PlayAnnouncement or PromptAndCollectUserInformation is already executed this causes a failure ("CancelFailed").

B) Sending Cancel Error

    Precondition: SRSM state 3 User Interaction.

    Postcondition: SRSM state 3 User Interaction.

After returning the "Canceled" Error the gsmSRF stays in the same state. The execution of the indicated PlayAnnouncement or PromptAndCollectUserInformation is aborted, i.e., the gsmSRF remains connected and the next PlayAnnouncement or PromptAndCollectUserInformation is executed if available.

10.1.2 CancelFailed

10.1.2.1 General description

10.1.2.1.1 Error description

This Error is returned by Cancel if the canceling of an Operation, as requested by the gsmSCF, was not successful. Possible failure reasons are:

    0   unknownOperation, when the InvokeID of the operation to cancel is not known to gsmSRF (this may also happen in case the operation has already been completed);

    1   tooLate, when the invokeID is known but the execution of the operation is in a state that it cannot be canceled anymore. For instance the announcement is finished but the SpecializedResourceReport has not been sent to the gsmSCF yet. The conditions for the occurrence of failure reason "tooLate" may be implementation dependent;

    2   operationNotCancellable, when the invokeID points to an Operation that the gsmSCF is not allowed to cancel.

10.1.2.1.2 Argument description

```
PARAMETER SEQUENCE {
    problem     [0] ENUMERATED {
                    unknownOperation (0),
                    tooLate (1),
                    operationNotCancellable (2)},
    operation   [1] InvokeID
    }
-- The operation failed to be canceled.
```

10.1.2.2 Operations gsmSCF→gsmSRF

Cancel

Procedures at responding entity (gsmSRF)

A) Receiving Cancel. However, the indicated PlayAnnouncement or PromptAndCollectUserInformation is not known, or already executed. This causes a failure, CancelFailed.

    Precondition: SRSM state User Interaction.

    Postcondition: SRSM state User Interaction or
                               SRSM state Idle.

B) Sending CancelFailed Error

Precondition: SRSM state User Interaction or
SRSM state Idle.

Postcondition: SRSM state User Interaction or
SRSM state Idle.

After returning the CancelFailed the gsmSRF stays in the same state.

10.1.3 ETCFailed

10.1.3.1 General description

10.1.3.1.1 Error description

ETCFailed is an error from gsmSSF to gsmSCF, indicating the fact that the establishment of a temporary connection to an assisting gsmSSF or gsmSRF was not successful (e.g., receiving a "Backwards Release" after sending an IAM).

10.1.3.2 Operations gsmSCF→gsmSSF

EstablishTemporaryConnection

Procedures at responding entity (gsmSSF)

A gsmSSF receives EstablishTemporaryConnection from a gsmSCF but the establishment of the connection fails, results in returning an ETCFailed Error to the gsmSCF.

Precondition: gsmSSF FSM state c Waiting for Instructions.

Postcondition: gsmSSF FSM state c Waiting for Instructions.

No further error treatment.

10.1.4 ImproperCallerResponse

10.1.4.1 General description

10.1.4.1.1 Error description

The format of the user input has been checked by the gsmSRF and does not correspond to the required format as it was defined in the initiating Operation.

10.1.4.2 Operations gsmSCF→gsmSRF

PromptAndCollectUserInformation

Procedures at responding entity (gsmSRF)

A) gsmSRF receives PromptAndCollectUserInformation

Precondition: SRSM state 2 Connected or
SRSM state 3 User Interaction.

Postcondition: SRSM state 3 User Interaction.

B) response from caller is not correct, gsmSRF returns ImproperCallerResponse to gsmSCF

Precondition: SRSM state 3 User Interaction.

Postcondition: SRSM state 3 User Interaction.

gsmSRF waits for a new Operation from gsmSCF. This may be a new PromptAndCollectUserInformation or PlayAnnouncement.

10.1.5   MissingCustomerRecord

10.1.5.1   General description

10.1.5.1.1 Error description

This error is sent by the gsmSCF to the gsmSSF, gprsSSF or the gsmSRF, if the SLP could not be found in the gsmSCF, because the required customer record does not exist, or the requested SLPI, indicated by the correlationID in "AssistRequestInstructions" does not exist anymore.

10.1.5.2   Operations gsmSSF→gsmSCF

AssistRequestInstructions

InitialDP

Procedures at invoking entity (gsmSSF)

A) Sending Operation

    Precondition: gsmSSF FSM state   Trigger processing or
                           gsmSSF FSM state   Waiting for Instructions; in the assistingSSP case.

    Postcondition: gsmSSF FSM state   Waiting for Instructions.
                           gsmSSF FSM state Waiting for Instructions; in the assistingSSP case.

B) gsmSSF receives Error "MissingCustomerRecord"

    Precondition: gsmSSF FSM state   Waiting for Instructions or
                           gsmSSF FSM state   Waiting for Instructions; in the assistingSSP case.

    Postcondition: gsmSSF FSM state   Idle or
                           gsmSSF FSM state Idle; in the assistingSSP case.

The GMSC/VMSC handles the call according to the Default Call Handling parameter of the valid CSI.

10.1.5.3   Operations gsmSRF→gsmSCF

AssistRequestInstructions

Procedures at invoking entity (gsmSRF)

A) Sending Operation

    Precondition: SRSM state   Connected.

    Postcondition: SRSM state   Connected.

B) gsmSRF receives Error "MissingCustomerRecord"

    Precondition: SRSM state   Connected.

    Postcondition: SRSM state   Idle.

gsmSRF initiated Disconnect.

10.1.5.4   Operations gprsSSF/gsmSSF→gsmSCF

SMS Related

InitialDPSMS

Procedures at invoking entity (gprsSSF/gsmSSF)

A) Sending Operation

   Precondition: gprsSSF/gsmSSF state Waiting for Instructions.

   Postcondition: gprsSSF/gsmSSF state Waiting for Instructions.

B) gprsSSF/gsmSSF receives Error "MissingCustomerRecord"

   Precondition: gprsSSF/gsmSSF state Waiting for Instructions.

   Postcondition: gprsSSF/gsmSSF state Idle.

10.1.5.5   Operations gprsSSF→gsmSCF

GPRS Related

InitialDPGPRS

Procedures at invoking entity (gprsSSF)

A) Sending Operation

   Precondition: gprsSSF state Waiting for Instructions.

   Postcondition: gprsSSF state Waiting for Instructions.

B) gprsSSF receives Error "MissingCustomerRecord"

   Precondition: gprsSSF state Waiting for Instructions.

   Postcondition: gprsSSF state Idle.

10.1.6   MissingParameter

10.1.6.1   General description

10.1.6.1.1 Error description

There is an Error in the received Operation argument. The responding entity cannot start to process the requested Operation because the argument is incorrect: an expected optional parameter which is essential for the application is not included in the Operation argument.

10.1.6.2   Operations gsmSCF→gsmSSF

Call Associated/Non Call Processing

ApplyCharging

CallInformationRequest

FurnishChargingInformation

RequestReportBCSMEvent

ResetTimer

SendChargingInformation

Call Associated/Call Processing

Connect

ConnectToResource

ContinueWithArgument

EstablishTemporaryConnection

Procedures at responding entity (gsmSSF)

> Precondition: (1) gsmSSF FSM appropriate state
> (2) gsmSSF FSM Call associated operation received, appropriate event occurred
> (3) SSME appropriate state
> (4) SSME Non call associated operation received, appropriate event

> Postcondition: (1) gsmSSF FSM transition to the same state
> (2) SSME transition to the initial state (i.e., before receiving the erroneous operation)

The gsmSSF FSM detects the error in the received operation. The Error parameter is returned to inform the gsmSCF of this situation.

10.1.6.3   Operations gsmSSF→gsmSCF

ApplyChargingReport

AssistRequestInstructions

InitialDP

Procedures at invoking entity (gsmSSF)

A) Sending Operation

> Precondition: gsmSSF FSM any state in which the above operations can be transferred

> Postcondition: gsmSSF FSM any state as result of the transfer of any of the above operations

B) gsmSSF receives Error "MissingParameter"

> Precondition: gsmSSF FSM any state as result of the transfer of any of the above operations

> Postcondition: gsmSSF FSM state a Idle

After receiving this Error, the gsmSSF FSM returns to the state Idle, the GMSC/VMSC handles the call according to the Default Call Handling parameter of the valid CSI. In case of an assisting SSF, the temporary connection is released by the assisting SSF.

10.1.6.4   Operations gsmSCF→gsmSRF

PlayAnnouncement

PromptAndCollectUserInformation

Procedures at responding entity (gsmSRF)

> Precondition: SRSM state   Connected or
> SRSM state   User Interaction

> Postcondition: SRSM state   User Interaction

The SRSM detects that a required parameter is not present in the Operation argument. The Error parameter MissingParameter is used to inform the gsmSCF of this situation. The gsmSCF should take the appropriate actions to treat this error.

10.1.6.5   Operations gsmSRF→gsmSCF

AssistRequestInstructions

Procedures at invoking entity (gsmSRF)

A) Sending Operation

Precondition: SRSM state Connected.

Postcondition: SRSM state Connected.

B) Receiving Error

Precondition: SRSM state Connected.

Postcondition: SRSM state Idle.

The gsmSCF detects the error in the received operation. The Error parameter is used to inform the gsmSRF of this situation. The SL and maintenance functions are informed. The gsmSCF might try another gsmSRF, route the call or release the call (SL dependent).

10.1.6.6 Operations gprsSSF/gsmSSF→gsmSCF

SMS Related

InitialDPSMS

Procedures at invoking entity (gprsSSF/gsmSSF)

A) Sending Operation

Precondition: gprsSSF/gsmSSF state WaitringForInstructions.

Postcondition: gprsSSF/gsmSSF state WaitringForInstructions.

B) Receiving Error

Precondition: gprsSSF/gsmSSF state WaitringForInstructions.

Postcondition: gprsSSF/gsmSSF state Idle.

After receiving this error, the gprsSSF/gsmSSF returns to the state Idle, the SGSN/VMSC handles the SM according to the Default Handling parameter of the valid CSI.

10.1.6.7 Operations gsmSCF→gprsSSF/gsmSSF

SMS Related

ConnectSMS

FurnishChargingInformationSMS

RequestReportSMSEvent

ResetTimerSMS

Procedures at responding entity (gprsSSF/gsmSSF)
precondition:

(1) gprsSSF/gsmSSF appropriate state.

(2) gprsSSF/gsmSSF SMS associated operation received, appropriate event occurred.

postcondition:

(1) gprsSSF/gsmSSF transition to the same state.

The gprsSSF/gsmSSF detects the error in the received operation. The error parameter is returned to inform the gsmSCF of this situation.

10.1.6.8 Operations gprsSSF→gsmSCF

GPRS Related

ApplyChargingReportGPRS

EntityReleasedGPRS

InitialDPGPRS

Procedures at invoking entity (gprsSSF)

A) Sending Operation

    Precondition: gprsSSF state   WaitringForInstructions.

    Postcondition: gprsSSF state   WaitringForInstructions.

B) Receiving Error

    Precondition: gprsSSF state   WaitringForInstructions.

    Postcondition: gprsSSF state   Idle.

After receiving this error, the gprsSSF returns to the state Idle, the SGSN handles the PDP Context according to the Default Handling parameter of the valid CSI.

10.1.6.9   Operations gsmSCF→gprsSSF

GPRS Related

ApplyChargingGPRS

CancelGPRSConnectGPRS

ContinueGPRS

FurnishChargingInformationGPRS

ReleaseGPRS

RequestReportGPRSEvent

ResetTimerGPRS

SendChargingInformationGPRS

Procedures at responding entity (gprsSSF)

precondition:

    (1) gprsSSF   appropriate state.

    (2) gprsSSF   operation received, appropriate event occurred.

postcondition:

    (1) gprsSSF   transition to the same state.

The gprsSSF detects the error in the received operation. The error parameter is returned to inform the gsmSCF of this situation.

10.1.7   ParameterOutOfRange

10.1.7.1   General description

10.1.7.1.1 Error description

The responding entity cannot start the processing of the requested Operation because an Error in a parameter of the Operation argument is detected: a parameter value is out of range.

10.1.7.2   Operations gsmSCF→gsmSSF

Call Associated/Non Call Processing

ApplyCharging

CallInformationRequest

RequestReportBCSMEvent

ResetTimer

SendChargingInformation

Call Associated/Call Processing

Connect

ContinueWithArgument

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.7.3   Operations gsmSSF→gsmSCF

ApplyChargingReport

InitialDP

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.7.4   Operations gsmSCF→gsmSRF

PlayAnnouncement

PromptAndCollectUserInformation

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.7.5   Operations gprsSSF/gsmSSF→gsmSCF

SMS Related

InitialDPSMS

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.7.6   Operations gsmSCF→gprsSSF/gsmSSF

SMS Related

ConnectSMS

RequestReportSMSEvent

ResetTimerSMS

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.7.7 Operations gprsSSF →gsmSCF

GPRS Related

ApplyChargingReportGPRS

InitialDPGPRS

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.7.8 Operations gsmSCF→gprsSSF

GPRS Related

ApplyChargingGPRS

ConnectGPRS

RequestReportGPRSEvent

ResetTimerGPRS

SendChargingInformationGPRS

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.8 RequestedInfoError

10.1.8.1 General description

10.1.8.1.1 Error description

The RequestedInfoError is an immediate response to the CallInformationRequest operation, indicating that the requested information is not known to the gsmSSF or is not available.

10.1.8.1.2 Argument description

```
PARAMETER ENUMERATED {
    unknownRequestedInfo(1),
    requestedInfoNotAvailable(2)
    -- other values not specified
    }
```

10.1.8.2 Operations gsmSCF→gsmSSF

CallInformationRequest

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.9 SystemFailure

10.1.9.1 General description

10.1.9.1.1 Error description

This error is returned by a PE if it was not able to fulfill a specific task as requested by an operation, and recovery is not expected to be completed within the current call instance.

10.1.9.2   Argument description

```
PARAMETER
    UnavailableNetworkResource

UnavailableNetworkResource ::= ENUMERATED {
    UnavailableResources          (0),
    ComponentFailure              (1),
    BasicCallProcessingException  (2),
    ResourceStatusFailure         (3),
    EndUserFailure                (4)
    }
```

10.1.9.3   Operations gsmSCF→gsmSSF

Call Associated/Non Call Processing

ApplyCharging

CallInformationRequest

RequestReportBCSMEvent

SendChargingInformation

Call Associated/Call Processing

Connect

ConnectToResource

DisconnectForwardConnection

EstablishTemporaryConnection

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.9.4   Operations gsmSSF→gsmSCF

ApplyChargingReport

AssistRequestInstructions

InitialDP

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.9.5   Operations gsmSCF→gsmSRF

PlayAnnouncement

PromptAndCollectUserInformation

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.9.6   Operations gsmSRF→gsmSCF

AssistRequestInstructions

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.9.7   Operations gprsSSF/gsmSSF→gsmSCF

SMS Related

InitialDPSMS

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.9.8   Operations gsmSCF→gprsSSF/gsmSSF

SMS Related

ConnectSMS

RequestReportSMSEvent

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.9.9   Operations gprsSSF →gsmSCF

GPRS Related

ApplyChargingReportGPRS

InitialDPGPRS

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.9.10 Operations gsmSCF→gprsSSF

GPRS Related

ApplyChargingGPRS

ConnectGPRS

RequestReportGPRSEvent

SendChargingInformationGPRS

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.10 TaskRefused

10.1.10.1 General description

10.1.10.1.1 Error description

This Error is returned by a PE if it was not able to fulfill a specific task as requested by an operation, and recovery is expected to be completed within the current call instance.

10.1.10.1.2 Argument description

```
PARAMETER ENUMERATED {
    Generic        (0),
    Unobtainable   (1),
    Congestion     (2)
    }
```

10.1.10.2 Operations gsmSCF→gsmSSF

Call Associated/Non Call Processing

ApplyCharging

CallInformationRequest

Cancel

FurnishChargingInformation

RequestReportBCSMEvent

ResetTimer

SendChargingInformation

Call Associated/Call Processing

Connect

ConnectToResource

DisconnectForwardConnection

EstablishTemporaryConnection

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.10.3 Operations gsmSSF→gsmSCF

ApplyChargingReport

AssistRequestInstructions

InitialDP

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.10.4 Operations gsmSCF→gsmSRF

Cancel

PlayAnnouncement

PromptAndCollectUserInformation

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.10.5 Operations gsmSRF→gsmSCF

AssistRequestInstructions

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.10.6 Operations gprsSSF/gsmSSF→gsmSCF

SMS Related

InitialDPSMS

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.10.7 Operations gsmSCF→gprsSSF/gsmSSF

SMS Related

ConnectSMS

FurnishChargingInformationSMS

RequestReportSMSEvent

ResetTimerSMS

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.10.8 Operations gprsSSF →gsmSCF

GPRS Related

ApplyChargingReportGPRS

EntityReleasedGPRS

InitialDPGPRS

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.10.9 Operations gsmSCF→gprsSSF

GPRS Related

ApplyChargingGPRS

CancelGPRS

ConnectGPRS

FurnishChatgingInformationGPRS

ReleaseGPRS

RequestReportGPRSEvent

ResetTimerGPRS

SendChargingInformationGPRS

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.11 UnavailableResource

10.1.11.1 General description

10.1.11.1.1 Error description

The gsmSRF is not able to perform its function (i.e., play a certain announcement and/or collect specific user information), and cannot be replaced. A reattempt is not possible.

10.1.11.2 Operations gsmSCF→gsmSRF

PlayAnnouncement

PromptAndCollectUserInformation

Procedures at responding entity (gsmSRF)

A) gsmSRF receiving PlayAnnouncement or PromptAndCollectUserInformation

   Precondition: SRSM state 2 Connected; if initial PlayAnnouncement or PromptAndCollectUserInformation. Or
                    SRSM state 3 User Interaction; if not initial PlayAnnouncement or
                    PromptAndCollectUserInformation.

B) gsmSRF is not able to perform its function (and cannot be replaced). gsmSRF sends UnavailableResource.

   Precondition: SRSM state 3 User Interaction.

   Postcondition: SRSM state 3 User Interaction.

10.1.12 UnexpectedComponentSequence

10.1.12.1 General description

10.1.12.1.1 Error description

The responding entity cannot start the processing of the requested operation because a SACF or MACF rule is violated, or the operation could not be processed in the current state of the FSM.

10.1.12.2 Operations gsmSCF→gsmSSF

Call Associated/Non Call Processing

ApplyCharging

CallInformationRequest

FurnishChargingInformation

RequestReportBCSMEvent

ResetTimer

SendChargingInformation

Call Associated/Call Processing

Connect

ConnectToResource

ContinueWithArgument

DisconnectForwardConnection

EstablishTemporaryConnection

In this case the gsmSSF detects the erroneous situation, sends the UnexpectedComponentSequence error and remains in the same state.

10.1.12.3 Operations gsmSSF→gsmSCF

ApplyChargingReport

AssistRequestInstructions

InitialDP

In case the operation is sent by an "initiating" gsmSSF in the context of an existing relationship, the gsmSCF returns the error parameter. On receiving the error the gsmSSF moves to Idle.

10.1.12.4 Operations gsmSCF→gsmSRF (only applicable for direct gsmSCF-gsmSRF case)

PlayAnnouncement

PromptAndCollectUserInformation

In this case the gsmSRF detects the erroneous situation, sends the UnexpectedComponentSequence error and remains in the same state.

10.1.12.5 Operations gsmSRF→gsmSCF

AssistRequestInstructions

In this case, an error occurs if the gsmSRF has already an established relationship with the gsmSCF and sends an AssistRequestInstructions. The gsmSCF detects the erroneous situation, informs SL and maintenance functions and returns the error parameter. On receiving the parameter the gsmSRF moves to idle and releases the temporary connection.

10.1.12.6 Operations gprsSSF/gsmSSF→gsmSCF

SMS Related

InitialDPSMS

In case the operation is sent by gprsSSF/ gsmSSF in the context of an existing relationship, the gsmSCF returns the error parameter. On receiving the error the gprsSSF/gsmSSF moves to Idle.

10.1.12.7 Operations gsmSCF→gprsSSF/gsmSSF

SMS Related

ConnectSMS

FurnishChargingInformationSMS

RequestReportSMSEvent

ResetTimerSMS

In this case the gprsSSF/gsmSSF detects the erroneous situation, sends the UnexpectedComponentSequence error and remains in the same state.

10.1.12.8 Operations gprsSSF →gsmSCF

GPRS Related

ApplyChargingReportGPRS

InitialDPGPRS

In case the operation is sent by gprsSSF in the context of an existing relationship, the gsmSCF returns the error parameter. On receiving the error the gprsSSF moves to Idle.

10.1.12.9 Operations gsmSCF→gprsSSF

GPRS Related

ApplyChargingGPRS

ConnectGPRS

FurnishChatgingInformationGPRS

RequestReportGPRSEvent

ResetTimerGPRS

SendChargingInformationGPRS

In this case the gprsSSF detects the erroneous situation, sends the UnexpectedComponentSequence error and remains in the same state.

10.1.13 UnexpectedDataValue

10.1.13.1 General description

10.1.13.1.1 Error description

The responding entity cannot complete the processing of the requested Operation because a parameter has an unexpected data value.

Note that this error does not overlap with "ParameterOutOfRange"

> EXAMPLE: startTime DateAndTime ::= -- value indicating January 32 1993, 12: 15: 01

> The responding entity does not expect this value and responds with "UnexpectedDataValue".

10.1.13.2 Operations gsmSCF→gsmSSF

Call Associated/Non Call Processing

ApplyCharging

CallInformationRequest

FurnishChargingInformation

RequestReportBCSMEvent

ResetTimer

SendChargingInformation

Call Associated/Call Processing

Connect

ConnectToResource

ContinueWithArgument

EstablishTemporaryConnection

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.13.3 Operations gsmSSF→gsmSCF

ApplyChargingReport

AssistRequestInstructions

InitialDP

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.13.4 Operations gsmSCF→gsmSRF

PlayAnnouncement

PromptAndCollectUserInformation

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.13.5 Operations gsmSRF→gsmSCF

AssistRequestInstructions

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.13.6 Operations gprsSSF/gsmSSF→gsmSCF

SMS Related

InitialDPSMS

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.13.7 Operations gsmSCF→gprsSSF/gsmSSF

SMS Related

ConnectSMS

FurnishChargingInformationSMS

RequestReportSMSEvent

ResetTimerSMS

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.13.8 Operations gprsSSF →gsmSCF

GPRS Related

ApplyChargingReportGPRS

InitialDPGPRS

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.13.9 Operations gsmSCF→gprsSSF

GPRS Related

ApplyChargingGPRS

ConnectGPRS

ContinueGPRS

FurnishChatgingInformationGPRS

RequestReportGPRSEvent

ResetTimerGPRS

SendChargingInformationGPRS

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.14 UnexpectedParameter

10.1.14.1 General description

10.1.14.1.1 Error description

There is an error in the received Operation argument. A valid but unexpected parameter was present in the Operation argument. The presence of this parameter is not consistent with the presence of the other parameters. The responding entity cannot start to process the Operation.

10.1.14.2 Operations gsmSCF→gsmSSF

Call Associated/Non Call Processing

ApplyCharging

CallInformationRequest

FurnishChargingInformation

RequestReportBCSMEvent

ResetTimer

SendChargingInformation

Call Associated/Call Processing

Connect

ConnectToResource

ContinueWithArgument

EstablishTemporaryConnection

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.14.3 Operations gsmSSF→gsmSCF

ApplyChargingReport

AssistRequestInstructions

InitialDP

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.14.4 Operations gsmSCF→gsmSRF

PlayAnnouncement

PromptAndCollectUserInformation

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.14.5 Operations gsmSRF→gsmSCF

AssistRequestInstructions

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.14.6 Operations gprsSSF/gsmSSF→gsmSCF

SMS Related

InitialDPSMS

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.14.7 Operations gsmSCF→gprsSSF/gsmSSF

SMS Related

ConnectSMS

FurnishChargingInformationSMS

RequestReportSMSEvent

ResetTimerSMS

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.14.8 Operations gprsSSF →gsmSCF

GPRS Related

ApplyChargingReportGPRS

InitialDPGPRS

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.14.9 Operations gsmSCF→gprsSSF

GPRS Related

ApplyChargingGPRS

ConnectGPRS

FurnishChatgingInformationGPRS

RequestReportGPRSEvent

ResetTimerGPRS

SendChargingInformationGPRS

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.15 UnknownLegID

10.1.15.1 General description

10.1.15.1.1 Error description

This error is used to indicate to the gsmSCF that a specific leg, indicated by the LegID parameter value in the operation, is unknown to the gsmSSF.

10.1.15.2 Operations gsmSCF→gsmSSF

Call Associated/Non Call Processing

ApplyCharging

CallInformationRequest

RequestReportBCSMEvent

SendChargingInformation

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.16 UnknownPDPID

10.1.16.1 General description

10.1.16.1.1 Error description

This error is used to indicate to the invoking entity that a specific PDP, indicated by the PDPId parameter value in the operation, is unknown to the receiving entity.

10.1.16.2 Operations gprsSSF→gsmSCF

GPRS Related

ApplyChargingReportGPRS

EntityReleasedGPRS

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.1.16.3 Operations gsmSCF→gprsSSF

GPRS Related

ApplyChargingGPRS

CancelGPRS

ConnectGPRS

ContinueGPRS

ReleaseGPRS

RequestReportGPRSEvent

ResetTimerGPRS

SendChargingInformationGPRS

Refer to subclause 10.1.6 MissingParameter for the appropriate error procedures.

10.2 Entity related error procedures

The following subclauses define the error handling for the entity related errors. Since the error situations are not originated by the reception of an operation, the invoking entity is denoted here as the entity at which the error situation is detected. The responding entity is the entity which receives the error report.

The TC services used for reporting errors are described in clause 12.

10.2.1 Expiration of T$_{SSF}$

10.2.1.1 General description

10.2.1.1.1 Error description

A timeout occurred in the gsmSSF on the response from the gsmSCF.

10.2.1.2 Procedures gsmSSF→gsmSCF

Procedure at the invoking entity (gsmSSF)

Timeout occurs in gsmSSF on T$_{SSF}$

    Precondition: gsmSSF FSM state Waiting for instructions or
                       gsmSSF FSM state Waiting for end of User Interaction or
                       gsmSSF FSM state Waiting for end of Temporary connection.
    Postcondition: gsmSSF FSM state a Idle.

The gsmSSF aborts the dialogue and moves to the Idle state, the GMSC/VMSC handles the call according to the Default Call Handling parameter of the valid CSI.

10.2.2 Expiration of T$_{SRF}$

10.2.2.1 General Description

10.2.2.1.1 Error description

A timeout occurred in the gsmSRF on the response from the gsmSCF. The procedures for handling this error are described in ETS 300 374-1 [9].

10.2.2.2 Procedures description

The procedures for handling this error are described in ETS 300 374-1 [9].

11 Detailed operation procedures

NOTE: The detailed operation procedures in this clause which cross reference the gsmSCF FSMs for the pre- and post-conditions are for information only; refer to the note at the beginning of clause x.

11.1 ActivityTest procedure

11.1.1 General description

This operation is used to check for the continued existence of a relationship between the gsmSCF and gsmSSF, gsmSCF and gsmSRF or gsmSCF and assistSSF. 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.

11.1.1.1 Parameters

None.

11.1.2   Responding entity (gsmSSF, gsmSRF or assistSSF)

11.1.2.1   Normal procedure

gsmSSF/gsmSRF/assistSSF precondition:

(1) A relationship exists between the gsmSCF and the gsmSSF/gsmSRF/assistSSF

(2) The SSME FSM is is the state "Idle Management"

gsmSSF/assistSSF postcondition:

(1) The SSME-FSM stays in, or moves to the state "Non-call Associated Treatment".

(2) If the Dialogue ID is active and if there is a gsmSSF/assistSSF using the dialogue, the SSME sends a Return Result "ActivityTest" to the gsmSCF. The SSME-FSM returns to the state "Idle Management".

    If the Dialogue ID is not active, the TC in the gsmSSF/assistSSF will issue a P-Abort, the SSME will in that case never receive the "ActivityTest" req.ind and thus will not be able to reply.

gsmSRF postconditions

(1) If the dialogue ID is active and if there is a gsmSRF using the dialogue, the SSME sends a return result "ActivityTest" to the gsmSCF.

    If the dialogue ID is not active, the TC in the gsmSRF will issue a P-Abort, the SSME will in that case never receive the ActivityTest operation and thus will not be able to reply.

11.1.2.2   Error handling

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

11.2   ActivityTestGPRS procedure

11.2.1   General description

This operation is used to check for the continued existence of a relationship between the gsmSCF and gprsSSF. If the relationship is still in existence, then the identified instance of gprsSSF 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. This operation opens a new SS7 dialogue between gsmSCF and gprsSSF.

11.2.1.1   Parameters

None

11.2.2   Responding entity (gprsSSF)

11.2.2.1   Normal procedure

gprsSSF precondition:

(1) A relationship exists between the gsmSCF and the gprsSSF

gprsSSF postcondition:

(1) The SSME-FSM stays in the state "Idle Management"

(2) If the relationship exists and if there is a gprsSSF using the GPRS-Reference Number, the SSME sends a Return Result "ActivityTestGPRS" to the gsmSCF. The SSME-FSM returns to the state "Idle Management".

If the GPRS-ReferenceNumber is not active, the TC User in the gprsSSF will instruct to issue a U-Abort.

(3) The temporary TC dialogue is closed.

11.2.2.2 Error handling

Generic error handling for the operation related errors is described in clause 10 and the TC services used for reporting operation errors are described in clause 12.

11.3 ApplyCharging procedure

11.3.1 General description

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

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

11.3.1.1 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 gsmSSF 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 gsmSSF 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.

11.3.2 Responding entity (gsmSSF)

11.3.2.1 Normal procedure

gsmSSF precondition:

(1) The gsmSSF is in one of the following states:

"Waiting for Instructions"
"Waiting for End of User Interaction",
"Waiting for End of Temporary Connection",
"Monitoring"

gsmSSF postcondition:

(1) No FSM state transition

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

The gsmSSF 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, a Temporary Connection or a connection to a 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, the Temporary Connection or the gsmSRF connection any indication of Answer event receipt on the outgoing connection is cleared i.e. set to Answer event not received.

11.3.2.2   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 10 and the TC services used for reporting operation errors are described in clause 12.

11.4   ApplyChargingGPRS procedure

11.4.1   General description

This operation is used for interacting from the gsmSCF with the gprsSSF function: CSE control of GPRS session or PDP Context duration and volume. The ApplyChargingGPRSReport operation provides the feedback from the gprsSSF to the gsmSCF. The charging scenarios supported by this operation are those given in 3GPP TS 22.078 for CSE control of GPRS session and PDP Context duration and volume.

This procedure may only be used if there is a control relationship between the gsmSCF and the GPRS Session or PDP Context, for which the charging instruction is intended.

If this procedure is used within a PDP Context dialogue, then the charging instruction shall pertain to the PDP Context only. Data volume threshold and duration threshold may be defined separately.

If this procedure is used within a Session dialogue, then the charging instruction may pertain to the Session or to a PDP Context. Charging for a PDP Context may be on duration and/or volume. Charging for a Session may be on duration only.

NOTE: Charging for a PDP Context on duration and volume requires two ApplyChargingGPRS operations.

11.4.1.1   Parameters

-    chargingCharacteristics:
     This parameter specifies a choice between parameters required for CSE control of a GPRS session or a PDP Context:

     - maxTransferredVolume:
          This parameter specifies the maximum volume to be transferred in number of bytes before a ApplyChargingReportGPRS shall be sent to the gsmSCF.

     - maxElapsedTime:
          This parameter specifies the maximum period of time before a ApplyChargingReportGPRS shall be sent to the gsmSCF.

- tariffSwitchInterval:
    This parameter indicates to the gprsSSF the time duration until the next tariff switch. The measurement of the elapsed tariff switch period commences immediately upon successful execution of this operation.

- pDPID:
    This parameter, if present, identifies the PDP Context, within the Session dialogue , to which the charging instruction applies.

11.4.2 Responding entity (gprsSSF)

11.4.2.1 Normal procedure

gprsSSF preconditions:

(1)
    A control relationship exists between the gsmSCF and the GPRS Session or PDP Context to which the operation applies.

(2) The gprsSSF is in one of the following states: "Waiting for Instructions" or "Monitoring".

SSF postcondition:

(1) No gprsSSF state transition

On receipt of this operation, the gprsSSF sets the charging data using the information elements included in the operation.

11.4.2.2 Error handling

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

- a previously received GPRS session or PDP context period or volume 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 10 and the TC services used for reporting operation errors are described in clause 12.

11.5 ApplyChargingReport procedure

11.5.1 General description

This operation is used by the gsmSSF 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 gsmSSF. It shall be started independently for a connection to a Called Party, a Temporary Connection and a gsmSRF connection.

A report is generated as specified in the 3GPP TS 23.078 [42].

11.5.1.1 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, Temporary Connection or gsmSRF connection, otherwise it will be absent.
  If Answer was detected for the connection to the Called Party, the Temporary Connection 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, Temporary Connection 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, the Temporary Connection 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, the temporary connection 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 gsmSSF has released the call and terminated the dialogue.
  It shall be present when ACR is sent due to Tcp expiry and the gsmSSF has released the call (because ReleaseIfExceeded was present in ACH) and terminated the dialogue.
  In all other instances, this parameter shall be absent.

11.5.2   Invoking entity (gsmSSF)

11.5.2.1   Normal procedure

gsmSSF preconditions:

(1) A relationship exists between the gsmSSF and the gsmSCF.

(2) A charging event has been detected that was requested by the gsmSCF via an ApplyCharging operation or a Called Party, Temporary Connection or gsmSRF disconnection event has occurred.

gsmSSF 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 gsmSSF 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 gsmSSF shall remain in the same state, else;

- The gsmSSF shall transit to the 'Idle' state.

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

11.5.2.2 Error handling

Generic error handling for the operation related errors are described in clause 10 and the TC services used for reporting operation errors are described in clause 12.

11.6 ApplyChargingReportGPRS procedure

11.6.1 General description

This operation is used by the gprsSSF to report charging related information to the gsmSCF as requested by the gsmSCF using the ApplyChargingGPRS operation.

Timing of duration and measuring of transferred data (if applicable) shall be started when either an Attach event, PDP context activation acknowledgement or an Inter SGSN routeing area update acceptance is detected by the gprsSSF.

A report shall be made either when a PDP context deactivation, Detach event or Change in QoS is detected by the gprsSSF or when the gprsSSF detects that the transferred volume or elapsed time duration indicated in parameter transferredVolume or elapsedTime (received in ApplyChargingGPRS operation) has been reached.
That sending of ApplyChargingReportGPRS shall only be made on chargeable QoS changes.

11.6.1.1 Parameters

- chargingResult:
  This parameter provides the SCF with the charging related information previously requested using the ApplyChargingGPRS operation. The "ChargingResult" is a choice, and can contain either of the following parameters:

  - transferredVolume:
    This is a choice of the following parameters:

    - volumeIfNoTariffSwitch:
      This parameter will be present if no tariff switch has occurred for the PDP context, otherwise it will be absent. If present, then the volume transferred since the detection of the event that triggered volume count will be reported.

    - volumeIfTariffSwitch:
      This parameter will be present if a tariff switch has occurred for the PDP context, otherwise it will be absent. If present then the parameter may contain the following information:

      - volumeSinceLastTariffSwitch:
        The volume since the detection of the event that triggered volume count or the last tariffSwitch (whichever of these events was last detected) is reported.

      - VolumeTariffSwitchInterval:
        This parameter is present only if a tariff switch was detected after the event that triggered volume count for the PDP context in the current volume count period. If present, the volume between either the detection the event that triggered volume count or the previous tariff switch (whichever of these events was last detected) and the last tariff switch is reported.

  - elapsedTime:
    This is a choice of the following parameters:

- timeGPRSIfNoTariffSwitch:
  This parameter will be present if no tariff switch has occurred for the session or the PDP context, otherwise it will be absent. If present then the elapsed time since the detection of the event that triggered time count will be reported.

- timeGPRSIfTariffSwitch:
  This parameter will be present if a tariff switch has occurred for the session or the PDP context, otherwise it will be absent. If present then the parameter may contain the following information:

  - timeGPRSSinceLastTariffSwitch:
    The time since the event that triggered time count or the last tariffSwitch is reported.

  - timeGPRSTariffSwitchInterval:
    This parameter is present only if a tariff switch was detected after the event that triggered time count for the session or PDP context in the current time count period. If present, the time between either the detection the event that triggered time count or the previous tariff switch (whichever of these events was last detected) and the last tariff switch is reported.

- qualityOfService:
  This IE identifies the QoS which was negotiated between the user, the SGSN and the GGSN.
  This parameter is only present when the sending of Apply Charging Report GPRS operation was triggered by a change in Quality of Service.

- active:
  This parameter indicates whether the GPRS session or PDP context is still active

- pDPID:
  This parameter, if present, identifies the PDP Context, within the Session dialogue, for which the charging report is valid.

- chargingRollOver:
  This parameter indicates possible rollovers of the "ChargingResult" parameter due to the limited value ranges of the parameters. The "chargingRollOver" parameter is a choice, and can contain either of the following parameters:

  - transferredVolumeRollOver:
    This is a choice of the following parameters:

    - rO-VolumeIfNoTariffSwitch:
      This parameter indicates how many times the volumeIfNoTariffSwitch parameter of the chargingResult has rolled over. If no rollover has happened, the pararameter may be absent.

    - rO-VolumeIfTariffSwitch:
      The parameter is present if at least one of the subparameters below is present. If present then the parameter may contain the following information:

      - rO-VolumeSinceLastTariffSwitch:
        This parameter indicates how many times the volumeSinceLastTariffSwitch parameter of the chargingResult has rolled over. If no rollover has happened, the pararameter may be absent.

      - rO-VolumeTariffSwitchInterval:
        This parameter indicates how many times the VolumeTariffSwitchInterval parameter of the chargingResult has rolled over. If no rollover has happened, the pararameter may be absent.

  - elapsedTimeRollOver:
    This is a choice of the following parameters:

    - rO-TimeGPRSIfNoTariffSwitch:
      This parameter indicates how many times the timeGPRSIfNoTariffSwitch parameter of the chargingResult has rolled over. If no rollover has happened, the pararameter may be absent.

    - rO-TimeGPRSIfTariffSwitch:
      The parameter is present if at least one of the subparameters below is present. If present then the parameter may contain the following information:

- rO-TimeGPRSSinceLastTariffSwitch:
  This parameter indicates how many times the timeGPRSSinceLastTariffSwitch parameter of the chargingResult has rolled over. If no rollover has happened, the pararameter may be absent.

- rO-TimeGPRSTariffSwitchInterval:
  This parameter indicates how many times the timeGPRSTariffSwitchInterval parameter of the chargingResult has rolled over. If no rollover has happened, the pararameter may be absent.

11.6.2 Invoking entity (gprsSSF)

11.6.2.1 Normal procedure

gprsSSF preconditions:

(1) A relationship exists between the gsmSCF and the GPRS Session or PDP Context.

(2) A charging event has been detected that was requested by the gsmSCF via an ApplyChargingGPRS operation

gprsSSF postconditions:

(1) If termination of the GPRS session or a PDP context has occurred:

- If the sending of ApplyChargingReportGPRS is directly followed by the reporting of an EDP-R, then the gprsSSF shall transit to state "Waiting for Instructions", else

- If there are any outstanding EDPs or pending reports then the gprsSSF shall remain in the same state, else

- If there are no outstanding EDPs or pending reports, then the gprsSSF shall transit to state 'Idle'.

(2) If the sending of ApplyChargingReportGPRS is due to a timer or counter expiry:

- If there are any outstanding EDPs or pending reports then the gprsSSF shall remain in the same state, else

- If there are no outstanding EDPs or pending reports, then the gprsSSF shall transit to state 'Idle'.

(3) If the sending of ApplyChargingReportGPRS is due to a change in QoS of a PDP Context:

- The gprsSSF shall remain in the same state.

11.6.2.2 Error handling

Generic error handling for the operation related errors is described in clause 10 and the TC services used for reporting operation errors are described in clause 12.

11.7   AssistRequestInstructions procedure

11.7.1 General description

This operation is sent to the gsmSCF by an gsmSSF, which is acting as the assisting gsmSSF in an assist procedure, or by a gsmSRF. The operation is sent when the assisting gsmSSF or gsmSRF receives an indication from an initiating gsmSSF indicating an assist procedure.

11.7.1.1 Parameters

- correlationID:
  This parameter is used by the gsmSCF to associate the "AssistRequestInstructions" from the assisting gsmSSF or by a gsmSRF with the request from the initiating gsmSSF. The value of the "correlationID" may be extracted from the digits received from the initiating gsmSSF.

- iPSSPCapabilities:
  Indicates which gsmSRF resources are attached, available and supported within:

- the VMSC/GMSC where the gsmSSF resides; or

- the IP where the gsmSRF resides.

11.7.2 Invoking entity (gsmSSF/gsmSRF)

11.7.2.1 Normal procedure

gsmSSF precondition:

    (1) An assist indication is detected by the assisting gsmSSF

gsmSSF postcondition:

    (1) The assisting gsmSSF waits for instructions

On receipt of an assist indication from the initiating gsmSSF, the gsmSSF or gsmSRF shall assure that the required resources are available to invoke an "AssistRequestInstructions" operation in the gsmSSF/gsmSRF and indicate to the initiating gsmSSF that the call is accepted. The "AssistRequestInstructions" operation is invoked by the gsmSSF or gsmSRF after the call, which initiated the assist indication, is accepted.

11.7.2.2 Error handling

Generic error handling for the operation related errors are described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.8 CallGap procedure

11.8.1 General description

This operation is used to request the gsmSSF 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 gsmSSF by an InitialDP operation.

11.8.1.1 Parameters

- gapCriteria:
  This parameter identifies the criteria for a call to be subject to call gapping. It consists of the following alternatives: basicGapCriteria or compoundGapCrteria:

  - 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 folllowing 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 gsmSSF. 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 [8]

11.8.2 Responding entity (gsmSSF)

11.8.2.1 Normal procedure

gsmSSF precondition:

   (1) Call gapping for gapCriteria is not active, or
        Call gapping for gapCriteria is active.

   (2) The gsmSSF is in any state except "Idle" and except "Wait_For_Request".

gsmSSF 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 gsmSSF 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 gsmSSF 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 'CalledAdressValue=123' and another with 'gapOnService=NP'. Then the call is subject to the control of the service request CallGap with 'CalledAdressValue=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".

11.8.2.2   Error handling

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

11.9 CallInformationReport procedure

11.9.1 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.

11.9.1.1 Parameters

- requestedInformationList:
  According to the requested information the gsmSSF 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.

11.9.2 Invoking entity (gsmSSF)

11.9.2.1 Normal procedure

gsmSSF 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 gsmSSF.

gsmSSF postcondition:

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

If the gsmSSF 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;

- gsmSSF 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.

11.9.2.2   Error handling

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

11.10   CallInformationRequest procedure

11.10.1   General description

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

11.10.1.1 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.

11.10.2   Responding entity (gsmSSF)

11.10.2.1 Normal procedure

gsmSSF precondition:

   (1) A control relationship exists between gsmSSF and gsmSCF.

gsmSSF postcondition:

   (1) Requested call information is retained by the gsmSSF.

   (2) The gsmSSF is waiting for further instructions.

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

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

The gsmSSF 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).

11.10.2.2 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 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.11 Cancel procedure

11.11.1 General description

The gsmSCF uses this class 2 operation to request the gsmSRF/gsmSSF 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 (gsmSSF) to go to idle. In this case the "Cancel operation does not specify any specific operation to be cancelled.

11.11.1.1 Parameters

- invokeID:
  This parameter specifies which operation invokation 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.

11.11.2 Responding entity (gsmSRF)

In case of Cancel(invokeID) the gsmSRF is the responding entity.

11.11.2.1 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.

11.11.2.2 Error handling

Generic error handling for the operation related errors are described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.11.3 Responding entity (gsmSSF)

In case of Cancel(allRequests) the gsmSSF is the responding entity.

11.11.3.1 Normal procedure

gsmSSF precondition:

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

gsmSSF postcondition:

(1) All active requests for reports and notifications have been cancelled.

(2) In case the gsmSSF-FSM was in state "Monitoring" it shall return to idle, or
In case the gsmSSF-FSM was in state "Waiting for Instructions" it will remain in that state.
A subsequent call-processing operation will move the gsmSSF-FSM state to "Idle". The call, if in active state, is
further treated by gsmSSF autonomously as a normal (non-IN-) call.

11.11.3.2 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 10 and the TC services which are used for reporting operation errors are
described in clause 12.

11.12 CancelGPRS procedure

11.12.1 General description

The gsmSCF uses this operation to request the gprsSSF to cancel all outstanding requests for a GPRS session or a
specific PDP context and enable the state machine in the gprsSSF to go to "Idle" if there are no further outstanding
EDPs or pending reports.
This procedure can not be used to cancel a previous operation.

11.12.1.1 Parameters

- pDPID:
  This parameter, if present, identifies the PDP Context for which the active requests for EventReportGPRS and
  ApplyGPRSChargingReport shall be cancelled.

11.12.2 Responding entity (gprsSSF)

11.12.2.1 Normal procedure

gprsSSF precondition:

(1) The gprsSSF is in the states "Waiting for Instructions" or "Monitoring".

gprsSSF postcondition:

(1) All active requests for ApplyChargingReportGPRS and outstanding EDPs have been cancelled. In the case a
PDPID was included only the ApplyChargingReportsGPRS and outstanding EDPs for the corresponding PDP
context are cancelled.

(2) In the case the gprsSSF was in state "Monitoring" it shall return to idle if there are no other PDP contexts
pending; or

In the case the gprsSSF was in state "Waiting for Instructions" it shall remain in that state. A subsequent GPRS
session or PDP context processing operation will move the gprsSSF to state "Idle" if there are no other PDP
contexts pending.

The GPRS session or PDP context, if in active state, is further treated by gprsSSF autonomously as a normal (non-CSE controlled) GPRS session or PDP context.

11.12.2.2 Error handling

Generic error handling for the operation related errors is described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.13 Connect procedure

11.13.1 General description

This operation is used to request the gsmSSF 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 gsmSSF shall replace the corresponding signalling parameter in the CCF in O-BCSM, in accordance with ES 201 296 [38] and shall be used for subsequent call processing. The CCF of the T-BCSM shall send corresponding signalling parameters to new call leg without using them in subsequent call processing. Parameters which are not provided by the Connect operation shall retain their value (if already assigned) in the CCF for subsequent call processing.

11.13.1.1 Parameters

- destinationRoutingAddress:
  This parameter contains the called party numbers towards which the call is to be routed.

- alertingPattern:
  This parameter indicates the type of alerting to be applied. It is defined in 3GPP TS 29.002 [13].

- serviceInteractionIndicatorsTwo:
  This parameter contains indicators which are exchanged between the gsmSSF and the gsmSCF to resolve interactions between IN based services and network based services.

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

- originalCalledPartyID:
  This parameter carries the dialled digits if the call is forwarded by the gsmSCF.

- redirectingPartyID:
  This parameter, if present, indicates the last directory number the call was redirected from.

- redirectionInformation:
  This parameter contains forwarding related information, such as redirecting counter.

- genericNumbers:
  This parameter allows the gsmSCF to set the Generic Number parameter used in the network. It is used for transfer of Additional Calling Party Number.

- suppressionOfAnnouncement:
  This parameter indicates that announcements and tones which are played in the exchange at non-successful call set-up attempts shall be suppressed.

- oCSIApplicable:
  This parameter indicates to the GMSC/gsmSSF or VMSC/gsmSSF that the Originating CAMEL Subscription Information, if present, shall be applied on the outgoing call leg created with the Connect operation. For the use of this parameter see 3GPP TS 23.078 [42].

- Carrier:
  This parameter indicates carrier information. It consists of the carrier selection field followed by the Carrier ID information to be used by gsmSSF for routing a call to a carrier.

It comprises the following embedded sub-parameter:

- carrierSelectionField
  This parameter indicates how the selected carrier is provided (e.g. pre-subscribed).

- carrierID
  This alternative indicates the carrier to use for the call. It contains the digits of the carrier identification code.

- naOliInfo:
  This parameter contains originating line information which identifies the charged party number type to the carrier.

- ChargeNumber:
  This parameter contains the number that identifies the entity to be charged for the call. It identifies the chargeable number for the usage of a carrier (applicable on a call sent into a North American long distance carrier). For a definition of this parameter refer to ANSI ISUP T1.113 [53].

- cug-Interlock:
  This parameter uniquely identifies a CUG within a network.

- cug-OutgoingAccess:
  This parameter indicates if the calling user has subscribed to the outgoing access inter-CUG accessibility subscription option.

11.13.2 Responding entity (gsmSSF)

11.13.2.1 Normal procedure

gsmSSF precondition:

(1) A control relationship exists between the gsmSSF and the gsmSCF

(2) BCSM: Basic call processing has been suspended at a DP.

(3) The gsmSSF is in state "Waiting for Instructions".

gsmSSF postcondition:

(1) The gsmSSF 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 gsmSSF state "Waiting for Instructions", the gsmSSF performs the following actions:

- The gsmSSF cancels T_{SSF}.

- If no EDPs have been armed and neither a CallInformationReport nor an ApplyChargingReport has been requested, the gsmSSF goes to state "Idle". Otherwise, the gsmSSF goes to state "Monitoring".

No implicit activation or deactivation of DPs occurs.

Statistic counter(s) are not affected.

11.13.2.2 Error handling

Generic error handling for the operation related errors are described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.14 ConnectGPRS procedure

11.14.1 General description

This operation is used to request the gprsSSF to modify the APN used when establishing a PDP context.

11.14.1.1 Parameters

- accessPointName:
  This parameter contains the Access Point Name (see 3GPP TS 29.060 [43]) towards which the PDP context shall be established. The encoding of this parameter is defined in 3GPP TS 24.008 [12].

- pDPID:
  This parameter identifies the PDP context for which the modified Access Point Name shall be used.

11.14.2 Responding entity (gprsSSF)

11.14.2.1 Normal procedure

gprsSSF preconditions:

(1) A control relationship exists between the gprsSSF and the gsmSCF.

(2) The GPRS PDP context FSM idenntified by the PDPID is supsended at DP PDP_Context_Establishment.

(3) The gprsSSF is in state "Waiting for Instructions".

gprsSSF postcondition:

(1) The gprsSSF performs the actions to establish the PDP context identified by PDPID using the given Access Point Name.

(2) the gprsSSF cancels T_{SSF};

(3) if no EDPs are armed, the gprsSSF transits to state "Idle". Otherwise the gprsSSF transits to state "Monitoring".

No implicit activation or deactivation of DPs occurs.

11.14.2.2 Error handling

Generic error handling for the operation related errors is described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.15 ConnectSMS procedure

11.15.1 General description

This operation is used to request the gsmSSF/gprsSSF to perform the Short Message processing actions to route a SM to a specific destination or to influence other SM set-up information, e.g. the Calling Party Number.

11.15.1.1 Parameters

- callingPartysNumber:
  This parameter allows the gsmSCF to set the Calling Party Number parameter used in the network. It is used for showing the sending party's id to the receiving party.

- destinationSubscriberNumber:
  This parameter contains the receiving party number towards which the SM is to be routed by the SMSC.

- smscAddress:
  This parameter contains the Short Message Service Centre address towards which the SM is to be routed. The SMSC forwards the SM to the indicated destinationSubscriberNumber.

11.15.2 Responding entity (gsmSSF or gprsSSF)

11.15.2.1 Normal procedure

gsmSSF or gprsSSF preconditions:

(1) Mobile originating SM submission attempt has been initiated.

(2) SM processing has been suspended at the DP SMS_Collected_Info.

(3) The gsmSSF/gprsSSF waits for instructions.

gsmSSF/gprsSSF postcondition:

(1) The gsmSSF/gprsSSF performs the SM processing actions to route the SM to the specified destination.

On receipt of this operation in the gsmSSF/gprsSSF state "Waiting for Instructions", the gsmSSF/gprsSSF performs the following actions:

- the gsmSSF/gprsSSF cancels T_{SSF};

- if the "callingPartysNumber", destinationSubscriberNumber or smscAddress are supplied, these values may be used for all subsequent gsmSSF/gprsSSF processing;

- if no EDPs have been armed the gsmSSF/gprsSSF goes to state "Idle". Otherwise, the gsmSSF/gprsSSF goes to state "Monitoring".

No implicit activation or deactivation of DPs occurs.

Statistic counter(s) are not affected.

11.15.2.2 Error handling

Generic error handling for the operation related errors is described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.16 ConnectToResource procedure

11.16.1 General description

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

11.16.1.1 Parameters

- resourceAddress:
  This parameter identifies the physical location of the gsmSRF.

- iPRoutingAddress:
  This parameter indicates the routeing address to set up a connection towards the gsmSRF.

- none:
  This parameter indicates that the call party is to be connected to a predefined gsmSRF.

- serviceInteractionIndicatorsTwo:
  This parameter contains an indicator sent from the gsmSCF to the gsmSSF, for control of the through connection to the Calling Party from the gsmSRF. Note that the Assisting gsmSSF shall always assume that Bothway Throughconnection is required, and hence will ignore this parameter if received.

11.16.2 Responding entity (gsmSSF)

11.16.2.1 Normal procedure

gsmSSF precondition:

    (1) A control relationship has been established.

    (2) The gsmSSF is in the state "Waiting for Instructions".

gsmSSF postcondition:

    (1) The call is switched to the gsmSRF.

    (2) A control relationship to the gsmSRF is established.

    (3) The gsmSSF moves to the state "Waiting for End of User Interaction (WFI)". T_{SSF} is set.

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

11.16.2.2 Error handling

Generic error handling for the operation related errors are described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.17 Continue procedure

11.17.1 General description

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

11.17.1.1 Parameters

None

11.17.2 Responding entity (gsmSSF)

11.17.2.1 Normal procedure

gsmSSF precondition:

    (1) A control relationship exists between the gsmSSF and the gsmSCF

    (2) BCSM: Basic call processing has been suspended at any DP.

    (3) gsmSSF is in state "Waiting for Instructions".

gsmSSF 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 23.078 [42].)

    (2) The gsmSSF remains in the same state if all resumptions have not been received; or

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

11.17.2.2 Error handling

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

11.18 ContinueGPRS procedure

11.18.1 General description

This operation is used to request the gprsSSF to proceed with GPRS session or PDP context processing at the DP at which it previously suspended processing to await gsmSCF instructions. The gprsSSF continues processing without substituting new data from the gsmSCF.

11.18.1.1 Parameters

- pDPID:
  This parameter if present identifies the PDP context within the control relationship for which the processing shall continue.

11.18.2 Responding entity (gprsSSF)

11.18.2.1 Normal procedure

gprsSSF precondition:

   (1) GPRS session or PDP context processing has been suspended at any DP.

   (2) gprsSSF is in state "Waiting for Instructions".

gsmSSF postcondition:

   (1) GPRS session or PDP context processing continues.

   (2) gprsSSF is in one of the following states:

   - State "Monitoring" because at least one EDP was armed or an ApplyChargingReportGPRS was requested; or

   - State "Idle" because no EDPs were armed and no ApplyChargingReportGPRS was requested.

The gprsSSF is in state "Waiting for instructions". The gprsSSF transits to state "Idle" in case no EDPs are armed and no outstanding report requests are present. The gprsSSF transits to state "Monitoring" if at least one EDP is armed, or if there is at least one outstanding ApplyChargingReportGPRS request. GPRS session or PDP context processing is resumed.

11.18.2.2 Error handling

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

11.19 ContinueSMS procedure

11.19.1 General description

This operation is used to request the gprsSSF or gsmSSF for SMS to proceed with processing at the DP at which it previously suspended processing to await gsmSCF instructions. The gprsSSF or gsmSSF continues processing without substituting new data from the gsmSCF.

11.19.1.1 Parameters

None.

11.19.2 Responding entity (gprsSSF or gsmSSF)

11.19.2.1 Normal procedure

SSF precondition:

 (1) processing has been suspended at any DP.

 (2) SSF is in state "Waiting for Instructions".

SSF postcondition:

 (1) processing continues.

 (2) SSF is in one of the following states:

  - State "Monitoring" because at least one EDP was armed; or

  - State "Idle" because no EDPs were armed.

11.19.2.2 Error handling

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

11.20 ContinueWithArgument Procedure

11.20.1 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 gsmSSF shall replace the corresponding signalling parameter in the CCF, in accordance with ES 201 296 [38] and shall be used for subsequent call processing. Parameters which are not provided by the ContinueWithArgument operation shall retain their value (if already assigned) in the CCF for subsequent call processing.

11.20.1.1 Parameters

 - alertingPattern:
  This parameter indicates the type of alerting to be applied. It is defined in 3GPP TS 29.002 [13].

 - serviceInteractionIndicatorsTwo:
  This parameter contains indicators which are exchanged between the gsmSSF and the gsmSCF to resolve interactions between IN based services and network based services.

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

 - genericNumbers:
  This parameter allows the gsmSCF to set the Generic Number parameter used in the network. It is used for transfer of Additional Calling Party Number.

 - suppressionOfAnnouncement:
  This parameter indicates that announcements and tones which are played in the exchange at non-successful call set-up attempts shall be suppressed.

- Carrier:
  This parameter indicates carrier information. It consists of the carrier selection field followed by the Carrier ID information to be used by gsmSSF for routing a call to a carrier.

  It comprises the following embedded sub-parameter:

  - carrierSelectionField
    This parameter indicates how the selected carrier is provided (e.g. pre-subscribed).

  - carrierID
    This alternative indicates the carrier to use for the call. It contains the digits of the carrier identification code.

- naOliInfo:
  This parameter contains originating line information which identifies the charged party number type to the carrier.

- ChargeNumber:
  This parameter contains the number that identifies the entity to be charged for the call. It identifies the chargeable number for the usage of a carrier (applicable on a call sent into a North American long distance carrier). For a definition of this parameter refer to ANSI ISUP T1.113 [53].

- cug-Interlock:
  This parameter uniquely identifies a CUG within a network.

- cug-OutgoingAccess:
  This parameter indicates if the calling user has subscribed to the outgoing access inter-CUG accessibility subscription option.

11.20.2 Responding entity (gsmSSF)

11.20.2.1 Normal procedure

gsmSSF precondition:

(1) A control relationship exists between the gsmSSF and the gsmSCF

(2) BCSM: Basic call processing has been suspended at DP Collected_Info, DP Analysed_Info or DP Terminating_Attempt_Authorised.

(3) gsmSSF is in the state "Waiting for Instructions"

gsmSSF postcondition:

(1) BCSM: Basic call processing continues with modified information.

(2) The gsmSSF moves to the state "Monitoring" if there exist armed EDPs or outstanding reports, otherwise the gsmSSF transits to "Idle".

11.20.2.2 Error handling

Generic error handling for the operation related errors are described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.21 DisconnectForwardConnection procedure

11.21.1 General Description

This operation is used in the following two cases:

To clear a connection to a gsmSRF

This operation is used to explicitly disconnect a connection to a resource (gsmSRF) established previously with a "ConnectToResource" or an "EstablishTemporaryConnection" operation. It is used for a forward disconnection from the gsmSSF. An alternative solution is the backward disconnect from the gsmSRF, controlled by the "DisconnectFromIPForbidden" parameter in the "PlayAnnouncement" and "PromptAndCollectUserInformation" operations.

To clear a connection to an assisting gsmSSF

This operation is sent to the non-assisting gsmSSF of a pair of SSFs involved in an assist procedure. It is used to disconnect the temporary connection between the initiating gsmSSF and the assisting gsmSSF, and the assisting gsmSSF and its associated gsmSRF.

11.21.1.1 Parameters

None.

11.21.2 Responding entity (gsmSSF)

11.21.2.1 Normal procedure

gsmSSF precondition:

(1) The basic call processing has been suspended at a DP.The gsmSSF in the initiating gsmSSF is in the state "Waiting for End of User Interaction" or "Waiting for End of Temporary Connection".

gsmSSF postcondition:

(1) The connection to the gsmSRF or assisting gsmSSF is released.

(2) The gsmSSF is in state "Waiting for Instructions".

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

This operation is accepted in the gsmSSF states "Waiting for End of Temporary Connection" or "Waiting for End of User Interaction". On receipt of this operation in these states, the gsmSSF must perform the following actions:

- The initiating gsmSSF releases the connection to the assisting gsmSSF or the relay gsmSRF.

- The gsmSSF resets T_{SSF}.

- The gsmSSF FSM goes to state "Waiting for Instructions".

NOTE: The successful disconnection to the gsmSRF causes a state transition in the gsmSRF FSM to "Idle". A current order (e.g. "PlayAnnouncement" or "PromptAndCollectUserInformation") is cancelled and any queued order (e.g. "PlayAnnouncement" or "PromptAndCollectUserInformation") is discarded.

11.21.2.2 Error handling

Generic error handling for the operation related errors are described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.22 EntityReleasedGPRS procedure

11.22.1 General description

This operation is used by the gprsSSF to inform the gsmSCF that the GPRS Session is detached or a PDP Context is disconnected. It shall be used only when the associated event detection point (ie. for GPRS Session Detach: DP 'detached' and for PDP Context Disconnect: DP 'disconnect') is at that moment not armed for reporting.

This operation shall be used irrespectively of the functional entity that initiated the Detach or PDP Context Disconnect and irrespectively of the cause for the Detach or PDP Context Disconnect.

When a PDP Context is terminated, all outstanding reports of that PDP Context shall be sent to the SCP.
When a GPRS Session is terminated, all outstanding reports of the Session shall be sent to the SCP.

11.22.1.1 Parameters

- gPRSCause:
  A number giving an indication to the gprsSCF about the reason for discontinuing the PDP Context or GPRS Session. This may be used by gsmSCF if FurnishChargingInformationGPRS is to be sent to the gprsSSF.

- pDPID:
  This parameter, if present, identifies the PDP Context within the Session dialogue, which has terminated.

11.22.2 Invoking entity (gprsSSF)

11.22.2.1 Normal procedure

gprsSSF preconditions:

   (1) State "Waiting for Instructions" or State "Monitoring".

gprsSSF postcondition:

   (1) Possible armed EDPs are ignored for the indicated PDP Context or GPRS Session. All connections and resources related to the specific PDP Context or GPRS Session are released.
   If there are no more armed EDPs or pending reports, then the gprsSSF transits to state 'Idle'; otherwise the gprsSSF remains in the same state.

11.22.2.2 Error handling

Generic error handling for the operation related errors is described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.23 EstablishTemporaryConnection procedure

11.23.1 General Description

This operation is used to create a connection between an initiating gsmSSF and an assisting gsmSSF as part of a service assist procedure. It can also be used to create a connection between a gsmSSF and a gsmSRF, for the case where the gsmSRF exists in a separately addressable PE.

The assistingSSPIPRoutingAddress shall contain routing digits, a correlationID and an scfID when a temporary connection is to be established between PLMNs and no bilateral agreement exists between the involved network operators to transfer correlationID and SCFiD as separate parameters.

11.23.1.1 Parameters

- assistingSSPIPRoutingAddress:
  This parameter indicates the destination address of the gsmSRF for assist procedure. The "assistingSSPIPRoutingAddress" may contain embedded within it, a "correlationID" and "scfID", but only if "correlationID" and "scfID" are not specified separately.

- correlationID:
  This parameter is used by the gsmSCF to associate the "AssistRequestInstructions" from the assisting gsmSSF (or the gsmSRF) with the Request from the initiating gsmSSF. The "correlationID" is used only if the correlation id is not embedded in the "assistingSSPIPRoutingAddress". The network operator has to decide about the actual mapping of this parameter on the used signalling system.

- scfID:
  This parameter indicates the gsmSCF identifier and enables the assisting SSF to identify which gsmSCF the AssistRequestInstructions shall be sent to.
  The "scfID" is used only if the gsmSCF id is not embedded in the "assistingSSPIPRoutingAddress". The network operator has to decide about the actual mapping of this parameter on the used signalling system. 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.

- serviceInteractionIndicatorsTwo:
  This parameter contains an indicator sent from the gsmSCF to the gsmSSF for control of the through connection to the Calling Party.

- Carrier:
  This parameter indicates carrier information. It consists of the carrier selection field followed by the Carrier ID information to be used by gsmSSF for routing a call to a carrier.

  It comprises the following embedded sub-parameter:

  - carrierSelectionField
    This parameter indicates how the selected carrier is provided (e.g. pre-subscribed).

  - carrierID
    This alternative indicates the carrier to use for the call. It contains the digits of the carrier identification code.

- naOliInfo:
  This parameter contains originating line information which identifies the charged party number type to the carrier.

- ChargeNumber:
  This parameter contains the number that identifies the entity to be charged for the call. It identifies the chargeable number for the usage of a carrier (applicable on a call sent into a North American long distance carrier). For a definition of this parameter refer to ANSI ISUP T1.113 [53].

11.23.2 Responding entity (gsmSSF)

11.23.2.1 Normal procedure

gsmSSF precondition:

(1) The gsmSSF is in state "Waiting for Instructions".

(2) The gsmSSF is not an assisting gsmSSF.

gsmSSF postcondition:

(1) The gsmSSF performs the call processing actions to route the call to the assisting gsmSSF or gsmSRF according to the "assistingSSPIPRoutingAddress" requested by the gsmSCF.

(2) The gsmSSF waits for end of temporary connection.

(3) The gsmSSF moves to the state "Waiting for End of Temporary Connection". T_{SSF} is set.

On receipt of this operation in the gsmSSF state "Waiting for Instructions", the SSP has to perform the following actions:

- Reset the T_{SSF}

- Route the call to assisting gsmSSF or gsmSRF using "assistingSSPIPRoutingAddress".

- The gsmSSF goes to state "Waiting for End of Temporary Connection.

11.23.2.2 Error handling

Until the connection setup has been accepted (refer to ITU-T Recommendation Q.71 [16]) by the assisting gsmSSF/gsmSRF, all received failure indications from the network on the ETC establishment shall be reported to the gsmSCF as ETC error ETCFailed (e.g., busy, congestion). Note that the operation timer for ETC shall be longer then the maximum allowed time for the signalling procedures to accept the connection.

Generic error handling for the operation related errors are described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.24 EventReportBCSM procedure

11.24.1 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.

11.24.1.1 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.

  If the busy event is triggered by an ISUP release message, the BusyCause is a copy of the ISUP release cause, for example: Subscriber absent, 20 or User busy, 17.
  If the Busy event is trigerred by a MAP error, for example: Absent subscriber, received from the HLR, the MAP cause is mapped to the corresponding ISUP release cause.

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

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

  - CallForwarded
    This parameter indicates that the T-busy event is triggered by call forwarding at the GMSC/VMSC.

  - RouteNotPermitted
    This parameter indicates that the T-busy event is triggered because call forwarding was not invoked in this GMSC due to the rules of basic optimal routeing.

  - BusyCause
    - If the T-busy event is triggered by an ISUP release message, the BusyCause is a copy of the ISUP release cause, for example: Subscriber absent, 20 or User busy, 17.
    - If the T-busy event is triggered by a MAP error, for example: Absent subscriber, received from the HLR, the MAP cause is mapped to the corresponding ISUP release cause.
    - If the T-busy event is triggered by call forwarding invocation in the GMSC/VMSC the BusyCause will refer to the type of the call forwarding service according to the mapping table in 3GPP TS 23.078.

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

  If the busy event is triggered by call forwarding at the GMSC, the BusyCause reflects the forwarding reason (Subscriber Absent, 20 or User busy, 17). The eventSpecificInformationBCSM will also contain the CallForwarded indication.

  For O-NoAnswer it will be empty.

For T-NoAnswer it may contain the CallForwarded indication.

> If the no answer event is triggered by an ISUP release message or expiry of the CAMEL timer TNRy, the eventSpecificInformationBCSM will be empty.
> If the no answer event is triggered by call forwarding at the GMSC/VMSC, the eventSpecificInformationBCSM will contain the CallForwarded indication.

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

- The destination address for the call;

- The OR indicator if the call was subject to basic optimal routeing as specified in 3GPP TS 23.079;

- The forwarding indicator if the Call Forwarding Supplementary Service was invoked.

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. gsmSSF 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".

11.24.2 Invoking entity (gsmSSF)

11.24.2.1 Normal procedure

gsmSSF precondition:

> (1) A control or a monitoring relationship exists between the gsmSSF and the gsmSCF.

> (2) The gsmSSF 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 gsmSSF 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.

gsmSSF postcondition:

> (1) The gsmSSF 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 gsmSSF 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 gsmSSF moves to the state "Waiting for Instructions" if the message type was request. Call processing is interrupted.

11.24.2.2 Error handling

In case the message type is request, on expiration of T_{ssf} before receiving any operation, the gsmSSF 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.

11.25 EventReportGPRS procedure

11.25.1 General description

This operation is used to notify the gsmSCF of a GPRS session or PDP context event previously requested by the gsmSCF in a RequestReportGPRSEvent operation. The monitoring of more than one event can be requested with a RequestReportGPRSEvent operation, but each of these requested events is reported in a separate EventReportGPRS operation.

11.25.1.1 Parameters

- gPRSEventType:
  This parameter specifies the type of event that is reported.

- gPRSEventSpecificInformation:
  This parameter indicates the GPRS session or PDP context related information specific to the event.

    For Change of Position GPRS Session it shall contain the "locationInformationGPRS", if available.

    For Change of Position PDP context it shall contain the "accessPointName", "chargingID", "locationInformationGPRS", "endUserAddress", Quality of Service, "timeAndTimeZone" and "gGSNAddress" and "secondaryPDP-context", if available.

  For Detach and Disconnect it shall contain the "initiatingEntity" and, conditionally, "routeingAreaUpdate". The "initiatingEntity" indicates the entity that initiated the Detach or PDP Context Disconnect. The "routeingAreaUpdate" indicates that the Detach or PDP Context Disconnect is due to inter-SGSN routeing area update.
  In the case of inter-SGSN routeing area update, the gsmSCF may ignore the " initiatingEntity".

    For PDP context establishment it shall contain the "accessPointName", "endUserAddress", the "pDPInitiationType", the Quality of Service, "locationInformationGPRS" and "timeAndTimeZone" and "secondaryPDP-context", if available.
    The Quality of Service shall contain the Requested QoS and the Subscribed QoS.

    For PDP context establishment acknowledge it shall contain the "accessPointName", "chargingID" "endUserAddress", the Quality of Service, "locationInformationGPRS", "timeAndTimeZone' and "gGSNAddress", if available.
    The Quality of Service shall contain the Requested QoS, the Subscribed QoS and the Negotiated QoS.

    All optional gPRSEventSpecificInformation parameters shall be sent according to 3GPP TS 23.078 subclause 6.6.1.4 and 3GPP TS 22.078 annex "GPRS Information provided to the CSE".

- miscGPRSInfo:
  This parameter contains DP related information.

-   messageType:
  This parameter indicates whether the message is a request, i.e. resulting from a RequestReportGPRSEvent with "monitorMode" = "interrupted", or a notification, i.e. resulting from a RequestReportGPRSEvent with "monitorMode" = "notifyAndContinue".

- pDPID:
  This parameter, if present, identifies the PDP Context, within the Session dialogue, for which the event is reported.

11.25.2 Invoking entity (gprsSSF)

11.25.2.1 Normal procedure

gprsSSF preconditions:

(1) The gprsSSF shall be in state "Monitoring" or "WaitingForInstructions".

(2) The GPRS session or PDP context FSM proceeds to an EDP that is armed.

gprsSSF postconditions:

(1) The gprsSSF stays in the state "Monitoring" if the message type was notification and there are still EDPs armed that can be met or an ApplyChargingReportGPRS is requested.

(2) The gprsSSF moves to the state "Idle" if the message type was notification and there are no more EDPs armed that can be met, or no more ApplyChargingReportGPRS is requested or no more PDP contexts pending.

(3) The gprsSSF moves to the state "Waiting for Instructions" if the message type was request. GPRS session or PDP context processing is interrupted.

If an EDP-R is met that causes the release of a GPRS session or PDP context, all EDPs related to the GPRS session or PDP Context shall be disarmed.

11.25.2.2 Error handling

In case the message type is request, on expiration of T_{SSF} before receiving any operation, the gprsSSF aborts the interaction with the gsmSCF and instructs the SGSN to handle the GPRS session or PDP context according to the default GPRS handling parameters of the valid CSI.

Generic error handling for the operation related errors is described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.26 EventReportSMS procedure

11.26.1 General description

This operation is used to notify the gsmSCF of a short message related event previously requested by the gsmSCF in an RequestReporSMSEvent operation. The monitoring of more than one event can be requested with a RequestReportSMSEvent operation, but each of these requested events is reported in a separate EventReportSMS operation.

11.26.1.1 Parameters

- eventTypeSMS:
  This parameter specifies the type of event that is reported.

- eventSpecificInformationSMS:
  This parameter indicates the SM related information specific to the event.

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

  For OSMSSubmission it will be empty.

- miscCallInfo:
  This parameter indicates DP related information.

  - messageType:
    This parameter indicates whether the message is a request, i.e. resulting from a RequestReportSMSEvent with "monitorMode" = "interrupted", or a notification, i.e. resulting from a RequestReportSMSEvent with "monitorMode" = "notifyAndContinue".

11.26.2 Invoking entity (gsmSSF or gprsSSF)

11.26.2.1 Normal procedure

gsmSSF/gprsSSF preconditions:

> (1) The gsmSSF or gprsSSF shall be in the state "Monitoring";

> (2) The FSM proceeds to an EDP that is armed.

gsmSSF/gprsSSF postconditions:

> (1) The gsmSSF or gprsSSF has applied implicit disarming of EDP's.

> (2) The gsmSSF or gprsSSF moves to the state "Idle" if the message type was notification and there are no more EDPs armed which could be met.

11.26.2.2 Error handling

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

11.27 FurnishChargingInformation procedure

11.27.1 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 23.078 [42].

If an FCI operation is received for the called party when the gsmSSF 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 gsmSSF 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.

11.27.1.1 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 23.078 [42].

11.27.2 Responding entity (gsmSSF)

11.27.2.1 Normal procedure

gsmSSF preconditions:

(1) gsmSSF State "Waiting for Instructions" or
gsmSSF State "Waiting for End of User Interaction" or
gsmSSF State "Waiting for End of Temporary Connection" or
gsmSSF state "Monitoring"

gsmSSF postcondition:

(1) No FSM state transition.

On receipt of this operation the gsmSSF 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. Refer to sect. 11.26.1 for the handling in the case of successive FCI's for a call 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.

11.27.2.2 Error handling

Generic error handling for the operation related errors are described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.28 FurnishChargingInformationGPRS procedure

11.28.1 General description

This operation is used to send charging related information to a logical GPRS record. This logical GPRS record is CAMEL specific. The first GPRS FCI leads to the generation of a logical GPRS record. Receipt of subsequent FCIs shall overwrite or append the contents of the logical record.

11.28.1.1 Parameters

- fCIGPRSBillingChargingCharacteristics:
  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.

    - appendFreeFormatData:
      This parameter indicates whether previous FCI free format data is appended or overwritten. See 3GPP TS 23.078 [42].

- pDPID:
  This parameter if present, indicates the PDP context's logical call record to which the free format data belongs to.

11.28.2   Responding entity (gprsSSF)

11.28.2.1 Normal procedure

gprsSSF preconditions:

  (1) gprsSSF State "Waiting for Instructions" or "Monitoring".

gprsSSF postcondition:

  (1) No FSM state transition.

On receipt of this operation the SSF performs actions to create the GPRS charging record if necessary, and writes the free-format information carried in the operation into the GPRS record. An FCI operation will create a Logical GPRS Data Record (CDR) if such a record does not already exist. Subsequent FCI operations received, will either overwrite or append the data previously written in the free-format CDR field depending on the presence and value of the IE Append Free Format Data

The Logical CDRs will be associated for a given GPRS session or PDP context into one or more physical CDRs, as specified in 3GPP TS 22.115 [52].

11.28.2.2 Error handling

Generic error handling for the operation related errors is described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.29   FurnishChargingInformationSMS procedure

11.29.1 General description

This operation is used to send charging related information to a logical SM record. This logical SM record is CAMEL specific. The first SMS FCI leads to the generation of a logical SM record. Receipt of subsequent FCIs shall overwrite or append the contents of the logical SM record.

11.29.1.1 Parameters

- fCISMSBillingChargingCharacteristics:
  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;

    - appendFreeFormatData
      This parameter indicates whether previous FCI free format data is appended or overwritten. See 3GPP TS 23.078 [42].

11.29.2 Responding entity (gsmSSF or gprsSSF)

11.29.2.1 Normal procedure

gsmSSF or gprsSSF preconditions:

(1) gsmSSF/gprsSSF State "Waiting for Instructions"

gsmSSF or gprsSSF postcondition:

(1) No FSM state transition.

On receipt of this operation the SSF performs actions to create the SM charging record if necessary, and writes the free-format information carried in the operation into the SM record. An FCI operation will create a Logical SM Data Record (CDR) if such a record does not already exist. Subsequent FCI operations received, by default, will overwrite the data previously written in the free-format CDR field, as specified in 3GPP TS 23.078 [42]. It is also possible to append free format data with consequent FCI operations.

The Logical CDRs will be associated for a given SMS submission into one or more physical CDRs, as specified in 3GPP TS 22.005 and 22.115 [52].

11.29.2.2 Error handling

Generic error handling for the operation related errors is described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.30 InitialDP procedure

11.30.1 General description

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

11.30.1.1 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 number used to identify the called party in the forward direction, i.e. see EN 300 356-1 [8]. This parameter shall be sent only in the Mobile Terminating, Mobile Forwarding and Mobile Originating on unsuccessful TDP cases.

-	callingPartyNumber:
	This parameter carries the calling party number to identify the calling party or the origin of the call. See EN 300 356-1 [8] Calling Party Number signalling information.

-	callingPartysCategory:
	Indicates the type of calling party (e.g. operator, pay phone, ordinary subscriber). See EN 300 356-1 [8] Calling Party Category signalling information.

-	locationNumber:
	This parameter is used to convey the geographical area address for mobility services, see ITU-T Recommendation Q.762. It is used when "callingPartyNumber" does not contain any information about the geographical location of the calling party (e.g., origin dependent routeing when the calling party is a mobile subscriber).

-	originalCalledPartyID:
	This parameter carries the dialled digits if the call has met call forwarding on the route to the gsmSSF. See EN 300 356-1[8] Original Called Number signalling information.

-	highlayerCompatibility:
	This parameter indicates the type of the high layer compatibility, which will be used to determine the ISDN - teleservice of a connected ISDN terminal. For encoding DSS1 (EN 300 403-1 [10]) is used. The highlayerCompatibility can also be transported by ISUP (e.g. within the ATP (see ITU-T Recommendation Q.763 [20]) parameter).

- additionalCallingPartyNumber:
  The calling party number provided by the access signalling system of the calling user, e.g. provided by a PBX.

- bearerCapability:
  This parameter indicates the type of the bearer capability connection or the transmission medium requirements to the user. It is a network option to select which of the two parameters to be used:

  - bearerCap:
    This parameter contains the value of the ISUP User Service Information parameter.

    The parameter "bearerCapability" shall only be included in the "InitialDP" operation in case the ISUP User Service Information parameter is available at the SSP.

    If User Service Information and User Service Information Prime are available at the gsmSSF the "bearerCap" shall contain the value of the User Service Information Prime parameter.

- eventTypeBCSM:
  This parameter indicates the armed BCSM DP event, resulting in the "InitialDP" operation.

- redirectingPartyID:
  This parameter indicates the last directory number the call was redirected from.

- redirectionInformation:
  It contains forwarding related information, such as redirecting counter.
  See ITU-T Recommendation Q.763 [20] Redirection Information signalling information.

- iPSSPCapabilities:
  Indicates which gsmSRF resources supported within the VMSC/GMSC the gsmSSF resides in are attached and available.

- serviceInteractionIndicatorsTwo:
  This parameter contains indicators which are exchanged between the gsmSSF and the gsmSCF to resolve interactions between IN based services and network based services.

- iMSI:
  IMSI of the mobile subscriber for which the service is invoked. For encoding see 3GPP TS 29.002 [13].

- 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 [13].

- locationInformation:
  This parameter indicates the whereabouts of the MS, and the age of the information defining the whereabouts. For encoding see 3GPP TS 29.002 [13].

- ext-BasicServiceCode:
  Indicates the Basic Service Code. For encoding see 3GPP TS 29.002 [13].

- callReferenceNumber:
  This parameter gives the call reference number assigned to the call by the CCF. For encoding see 3GPP TS 29.002 [13].

- mscAddress:
  This parameter gives the mscId assigned to the MSC. For encoding see 3GPP TS 29.002 [13].

- gmscAddress:
  This parameter gives the gmscId assigned to the GMSC. For encoding see 3GPP TS 29.002 [13].

- calledPartyBCDNumber:
  This parameter contains the number used to identify the called party in the forward direction. It may also include service selection information, including * and # characters.

- time&Timezone:
  This parameter contains the time that the gsmSSF was triggered, and the time zone that the invoking gsmSSF resides in.

- gsm-ForwardingPending:
  This parameter indicates that a forwarded-to-number was received and the call will be forwarded due to GSM supplementary service call forwarding in the GMSC or in the VMSC.

- Carrier:
  This parameter indicates carrier information. It consists of the carrier selection field followed by the Carrier ID information associated with the calling subscriber of a mobile originating call, the called subscriber of a mobile terminating call or the forwarding subscriber of a mobile fowarded call.

  It comprises the following embedded sub-parameter:

  - carrierSelectionField
    This parameter indicates how the selected carrier is provided (e.g. pre-subscribed).

  - carrierID
    This alternative indicates the carrier to use for the call. It contains the digits of the carrier identification code.

- cug-Index:
  This parameter is used to select a CUG for an outgoing call at the user, or to indicate an incoming CUG call to the user.

- cug-Interlock:
  This parameter uniquely identifies a CUG within a network.

- cug-OutgoingAccess:
  This parameter indicates if the calling user has subscribed to the outgoing access inter-CUG accessibility subscription option.

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

  If the busy event is triggered by an ISUP release message, the BusyCause is a copy of the ISUP release cause, for example: Subscriber absent, 20 or User busy, 17.
  If the Busy event is trigerred by a MAP error, for example: Absent subscriber, received from the HLR, the MAP cause is mapped to the corresponding ISUP release cause.

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

  If the T-busy event is triggered by an ISUP release message, the BusyCause is a copy of the ISUP release cause, for example: Subscriber absent, 20 or User busy, 17.
  If the T-busy event is triggered by a MAP error, for example: Absent subscriber, received from the HLR, the MAP cause is mapped to the corresponding ISUP release cause.
  If the T-busy event is triggered by call forwarding invocation in the GMSC/VMSC the BusyCause will refer to the type of the call forwarding service according to the mapping table in 3GPP TS 23.078.

11.30.2 Invoking entity (gsmSSF)

11.30.2.1 Normal procedure

gsmSSF 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.

gsmSSF postcondition:

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

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

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

11.30.2.2 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 gsmSSF 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 gsmSSF 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).

Generic error handling for the operation related errors are described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.31 InitialDPGPRS procedure

11.31.1 General description

This operation is used by the gprsSSF after detection of a TDP-R in the GPRS session or PDP context state machine, to request the gsmSCF for instructions to complete the GPRS session or PDP context.

For a GPRS Session, the 'Attach' and 'Change of Position Session' TDP's may result in the InitialDPGPRS Procedure.

For a PDP Context, the 'PDP Context Establishment', the 'PDP Context Establishment Acknowledgement' and the 'Change of Position Context' TDP's may result in the InitialDPGPRS Procedure.

If a PDP Context related TDP is met, and there is at that moment a GPRS dialogue for the GPRS Session, then the gprsSSF shall not initiate the InitialDPGPRS Procedure for that PDP Context.

If the 'PDP Context Establishment Acknowledgement' event occurs and this event is armed as a TDP, and there is at that moment a GPRS dialogue for the PDP Context, then the gprsSSF shall not initiate a new InitialDPGPRS Procedure for that PDP Context.

11.31.1.1 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).

- gPRSEventType:
  This parameter indicates the armed GPRS Attach/Detach SM or PDP Context SM DP event, resulting in the InitialDPGPRS operation.

- mSISDN:
  MSISDN of the mobile subscriber for which the CAMEL service is invoked. For encoding see 3GPP TS 29.002 [13].

- iMSI:
  IMSI of the mobile subscriber for which the CAMEL service is invoked. For encoding see 3GPP TS 29.002 [13].

- timeAndTimezone:
  This parameter contains the time that the gprsSSF was triggered, and the time zone that the invoking gprsSSF resides in.

- gPRSMSClass:
  This parameter contains the MS Station capabilites of the mobile subscriber for which the CAMEL service is invoked.

  - MSNetworkCapabilities:
    This parameter contains the Network Capabilities of the GPRS session.

  - MSRadioAccessCapabilities:
    This parameter contains the Radio Access Capabilities of the MS.

- endUserAddress:
  This parameter identifies the PDP type, PDP type organisation and the actual PDP address. For encoding see 3GPP TS 29.060 [43].

- qualityOfService:
  This parameter contains the Quality of Service.
  If the InitialDPGPRS operation is sent as a result of the 'PDP Context Establishment' TDP, then the Quality of Service parameter shall contain the Requested QoS and the Subscribed QoS.
  If the InitialDPGPRS operation is sent as a result of the 'PDP Context Establishment Ackonwledgement' TDP, then the Quality of Service parameter shall contain the Requested QoS, the Subscribed QoS and the Negotiated QoS.

- accessPointName:
  This parameter contains the requested address that the MS for which the CAMEL service is invoked for wants to connect to. For encoding see 3GPP TS 29.060 [43].

- routeingAreaIdentity:
  This parameter contains the location information of the MS for which the CAMEL service is invoked from. For encoding see 3GPP TS 29.060 [43].

- chargingID:
  This parameter contains the charging ID that uniquely identifies together with the gGSNAddress the PDP context for the MS for which the CAMEL service is invoked from. For encoding see 3GPP TS 32.015.

- sGSNcapabilities:
  This parameter specifies the capabilities which the SGSN node can provide for the CAMEL service control.

- locationInformationInSGSN:
  This parameter indicates the location of the sending MS.

- pDPInitiationType:
  This parameter indicates whether a PDP context was established as a result of a network-initiated request or as a result of a subscriber request.

- gGSNAddress:
  This parameter refers to the IP address of the GGSN where the PDP context terminates. It is used together with the chargingID for uniquely identification of the PDP context for which the CAMEL service is invoked from. For encoding see 3GPP TS 23.003.

- secondaryPDP-context
  This parameter indicates that the PDP context is requested as a secondary PDP context.

11.31.2 Invoking entity (gprsSSF)

11.31.2.1 Normal procedure

gprsSSF preconditions:

(1) An event has been met that is armed as TDP.

(2) There is no GPRS dialogue active for that PDP Context or for the GPRS Session.

gprsSSF postcondition:

(1) A control relationship has been established and the gprsSSF is in state "waiting for instructions".

The address of the gsmSCF that the InitialDPGPRS operation shall be sent to is fetched from the valid CSI. The gprsSSF provides all available parameters.

The gprsSSF shall memorise the address of the response message and use it in the future TC dialogues.

A control relationship is established with the gsmSCF. The gprsSSF application timer T_{SSF} is set when the gprsSSF sends InitialDPGPRS for requesting instructions from the gsmSCF. It is used to prevent from excessive GPRS session or PDP context duration or volume usage.

11.31.2.2 Error handling

If the destination gsmSCF is not accessible then the gprsSSF instructs the SGSN to handle the GPRS session or PDP context according to the Default GPRS handling parameter of the valid CSI.

On expiration of T_{SSF} before receiving any operation, the gprsSSF aborts the interaction with the gsmSCF and instructs the SGSN to handle the call according to the Default GPRS handling parameter of the valid CSI.

If the MS abandons the establishment of a GPRS session or PDP context after the sending of InitialGPRSEvent, then the gprsSSF aborts the control relationship after the first response from the gsmSCF has been received.

Generic error handling for the operation related errors is described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.32 InitialDPSMS procedure

11.32.1 General description

This operation is sent by the gsmSSF or gprsSSF after detection of a TDP-R in the FSM, to request the gsmSCF for instructions to complete the MO SMS submission.

11.32.1.1 Parameters

- destinationSubscriberNumber:
  This IE contains a number to identify the Destination short message entity.

- callingPartyNumber:
  This parameter carries the MSISDN of the sending MS.

- eventType:
  This parameter indicates the armed FSM DP event, resulting in the InitialDPSMS operation.

- iMSI:
  IMSI of the mobile subscriber for which the CAMEL service is invoked. For encoding see 3GPP TS 29.002 [13].

- locationInformationInMSC:
  This parameter indicates the location of the sending MS when the SM is sent via MSC.

- locationInformationInSGSN:
  This parameter indicates the location of the sending MS when the SM is sent via GPRS SGSN.

- 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 gsmSCF addressing).

- timeAndTimeZone:
  This parameter contains the time that the gsmSSF/gprsSSF was triggered, and the time zone that the invoking gsmSSF/gprsSSF resides in.

- tPDataCodingScheme:
  This IE indicates the data coding scheme of the TP-User Data element within the TPDU. It may indicate a message class. The message class may indicate e.g. the originator of Short Message.

- tPShortMessageSubmissionInfo:
  This IE contains the 1st octet of the TPDU. Refer to 3G TS 23.040 [46] for a description of the various TPDUs.

- tPProtocolIdentifier:
  This IE indicates the protocol used above SM-Transfer Layer.

- tPValidityPeriod:
  This IE indicates the length of the validity period or the absolute time of the validity period termination.

- sMSCAddress:
  This I.E defines the address of the SMSC to which the MO short message is intended to be submitted.

11.32.2 Invoking entity (gsmSSF or gprsSSF)

11.32.2.1 Normal procedure

gsmSSF/gprsSSF preconditions:

(1) A MO SMS submission attempt has been initiated.

(2) An event has been detected at a DP.

gsmSSF/gprsSSF postcondition:

(1) A control relationship has been established and the gsmSSF/gprsSSF waits for instructions from the gsmSCF.

The address of the gsmSCF the InitialDPSMS operation shall be sent to is fetched from the SMS-CSI. The gsmSSF or gprsSSF provides all available parameters.

A control relationship is established to the gsmSCF. The gsmSSF/gprsSSF application timer T_{SSF} is set when the gsmSSF/gprsSSF sends InitialDPSMS for requesting instructions from the gsmSCF. It is used to prevent from excessive SMS delivery suspension time.

11.32.2.2 Error handling

If the destination gsmSCF is not accessible then the gsmSSF/gprsSSF instructs the MSC/SGSN to handle the SM according to the Default SMS Handling parameter of the SMS-CSI.

On expiration of T_{SSF} before receiving any operation, the gsmSSF/gprsSSF aborts the interaction with the gsmSCF and instructs the VMSC/SGSN to handle the SM according to the Default SMS Handling parameter of the SMS-CSI.

If the sending mobile party abandons after the sending of InitialDPSMS, then the gsmSSF/gprsSSF closes the control relationship after the first answer message from the gsmSCF has been received, and after the SMSC has responded or a timer has expired.

Generic error handling for the operation related errors is described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.33 PlayAnnouncement procedure

11.33.1 General description

This operation is used for inband interaction with a GSM user.

11.33.1.1 Parameters

- informationToSend:
  This parameter indicates an announcement, a tone or display information to be sent to the end user by the gsmSRF.

  - inbandInfo:
    This parameter specifies the inband information to be sent.

    - messageID:
      This parameter indicates the message(s) to be sent, this can be one of the following:

      - elementaryMessageID:
        This parameter indicates a single announcement.

      - text:
        This parameter indicates a text to be sent. The text shall be transformed to inband information (speech) by the gsmSRF. This parameter consist of two subparameters, messageContent and attributes. The attributes of text may consist of items such as language.

      - elementaryMessageIDs:
        This parameter specifies a sequence of announcements.

      - variableMessage:
        This specifies an announcement with one or more variable parts.

    - numberOfRepetitions:
      This parameter indicates the maximum number of times the message shall be sent to the end-user.

  - duration:
    This parameter indicates the maximum time duration in seconds that the message shall be played/repeated. ZERO indicates endless repetition.

  - interval:
    This parameter indicates the time interval in seconds between repetitions, i.e. the time between the end of the announcement and the start of the next repetition. This parameter can only be used when the number of repetitions is > 1.

- 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.

- disconnectFromIPForbidden:
  This parameter indicates whether or not the gsmSRF should be disconnected from the user when all information has been sent.

- requestAnnouncementComplete:
  This parameter indicates whether or not a "SpecializedResourceReport" shall be sent to the gsmSCF when all information has been sent.

11.33.2 Responding entity (gsmSRF)

11.33.2.1 Normal procedure

gsmSRF precondition:

(1) The SRSM-FSM is in the state "Connected", or in the state "User Interaction" if the gsmSRF received previously an operation from the gsmSCF.

gsmSRF postcondition:

(1) The gsmSRF sends the information to the user as indicated by "informationToSend".

(2) The SRSM-FSM moves to the state "User Interaction", or remains in the same state.

(3) If all information has been sent and "RequestAnnouncementComplete" was set TRUE, the SRSM sends a "SpecializedResourceReport" operation to the gsmSCF.

(4) If all information has been sent and "disconnectFromIPForbidden" was set FALSE, the SRSM disconnects the gsmSRF from the user.

The announcement sent to the end-user is ended in the following conditions:

- if neither "duration" or "numberOfRepetitions" is specified, then the network specific announcement ending conditions shall apply; or

- if "numberOfRepetitions" is specified, when all repetitions have been sent, or

- if duration is specified, when the duration has expired. The announcement is repeated until this condition is met, or

- if "duration" and "numberOfRepetitions" is specified, when one of both conditions is satisfied (whatever comes first).

11.33.2.2 Error handling

If a Cancel operation is received before or during the processing of the operation then the operation is immediately cancelled and the error "Canceled" is reported to the invoking entity.

Generic error handling for the operation related errors are described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.34   PromptAndCollectUserInformation procedure

11.34.1 General description

This operation is used to interact with a call party in order to collect information.

11.34.1.1 Parameters

- collectedInfo:

  - collectedDigits:

    - minimumNbOfDigits:
      If this parameter is missing, the default value is defined to be 1. The "minimumNbOfDigits" specifies the minimum number of valid digits to be collected.

    - maximumNbOfDigits:
      This parameter shall always be present and specifies the maximum number of valid digits to be collected. The following applies:
      "maximumNbOfDigits" ≥ "minimumNbOfDigits".

    - endOfReplyDigit:
      This parameter indicates the digit(s) used to signal the end of input, and can be one or two digits.

      In case the "maximumNbOfDigits" > "minimumNbOfDigits" the following applies:

      If "endOfReplyDigit" is not present, the end of input is indicated:

      - when the inter-digit timer expires; or

      - when the number of valid digits received equals the "maximumNbOfDigits".

If "endOfReplyDigit" is present, the end of input is indicated:

- when the inter-digit timer expires; or

- when the end of reply digit is received; or

- when the number of valid digits received equals the "maximumNbOfDigits".

When the end of input is attained, the collected digits are sent from gsmSRF to the gsmSCF, including the 'endOfReplyDigit' if received by the gsmSRF. In the case the number of valid digits received is less than the "minimumNbOfDigits" when the inter-digit timer expires or when the end of reply digit is received, the input is specified as being erroneous.

- cancelDigit:

    If this parameter is present, the cancel digit(s) can be entered by the user to request a possible retry. This parameter can be one or two digits. All digits already received by the gsmSRF are discarded and the same PromptAndCollectUserInformation procedure is performed again, thus e.g. the same announcement to request user information is given to the user and information is collected. If this parameter is not present, the user is not able to request a possible retry.

- startDigit:

    If this parameter is present, the start digit indicates the start of the valid digits to be collected. The digits that are received by the gsmSRF before this start digit is received, are discarded and are not considered to be valid. The startDigit itself is considered to be valid digits. This parameter can be one or two digits.

    If this parameter is not present, all received digits are considered to be valid.

    When the end of input is attained, the collected digits are sent from gsmSRF to the gsmSCF, including the 'startDigit' if received by the gsmSRF.

- firstDigitTimeOut:

    If this parameter is present, the first digit should be received by the gsmSRF before the first-digit timer expiration. If the first digit is not received before first-digit timer expiration, the input is regarded to be erroneous. After receipt of the first valid or invalid input digit, the corresponding first-digit timer is stopped.

    If this parameter is not present, then the gsmSRF uses a default value for the first-digit timer.

    If "startDigit" is present, the first-digit timer is stopped after the start digit is received.

- interDigitTimeOut:

    If this parameter is present any subsequent valid or invalid digit, should be received by the gsmSRF before the inter-digit timer expires. As a result the inter-digit timer is reset and restarted.

    If a subsequent valid or invalid digit is not received before the inter-digit timer expires and the number of received valid digits is less than the "minimumNbOfDigits", the input is regarded to be unsuccessful.

    If a subsequent valid or invalid digit is not received before the inter-digit timer expires and the number of received valid digits is greater than the "minimumNbOfDigits", and less than or equal to the "maximumNbOfDigits", the input is regarded to be successful.

    If the "interDigitTimeOut" is not present, then the gsmSRF uses a default value for the inter-digit timer.

- errorTreatment:

    This optional parameter defines what specific action should be taken by the gsmSRF in the event of error conditions occurring. The default value is stdErrorAndInfo.

- interruptableAnnInd:

    This parameter is optional, where the default value is TRUE.

If this parameter is TRUE, the announcement is interrupted after the first valid or invalid digit is received by the gsmSRF. If the announcement is interrupted, a possible start-digit timer will not apply anymore. However, if the announcement has not been interrupted, a possible start-digit timer is started after the announcement has been finished.

If this parameter is present and explicitly set to FALSE, the announcement will not be interrupted after the first digit is received by the gsmSRF. The received digits during the announcement are discarded and considered to be invalid. All other specified parameters ("minimumNbOfDigits", "maximumNbOfDigits", "endOfReplyDigit", etc.) do not apply before the announcement has been finished. The possible start-digit timer is started after the announcement has been finished.

- voiceInformation:

    This parameter is optional, where the default value is FALSE. If the "voiceInformation" parameter is FALSE, all valid or invalid digits are entered by DTMF.

    If this parameter is present and explicitly set to TRUE, the calling user is required to provide all valid or invalid information by speech. The gsmSRF will perform voice recognition and translation of the provided information into digits. A possible end of reply digit will also have to be provided by speech.

- voiceBack:

    This parameter is optional, where the default value is FALSE. If the "voiceBack" parameter is FALSE, no voice back information is given by the gsmSRF.

    If this parameter is present and explicitly set to TRUE, the valid input digits received by the gsmSRF will be announced back to the calling user immediately after the end of input is received. The invalid input digits will not be announced back to the calling user. A possible end of reply digit is not voiced back.

- disconnectFromIPForbidden:

    This parameter indicates whether the gsmSRF should initiate disconnection to the gsmSSF after the interaction has been completed. If the parameter is not present or set to TRUE, the gsmSRF shall not initiate disconnection.

- informationToSend:

    This parameter indicates an announcement or tone to be sent to the end user by the gsmSRF.

- inbandInfo:

    This parameter specifies the inband information to be sent.

    - messageID:

        This parameter indicates the message(s) to be sent, this can be one of the following:

        - elementaryMessageID:

            This parameter indicates a single announcement.

        - text:

            This parameter indicates a text to be sent. The text shall be transformed to inband information (speech) by the gsmSRF. The attributes of text may consist of items such as language.

        - elementaryMessageIDs:

            This parameter specifies a sequence of announcements.

        - variableMessage:

            This parameter specifies an announcement with one or more variable parts.

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- numberOfRepetitions:

    This parameter indicates the maximum number of times the message shall be sent to the end-user.

- duration:

    This parameter indicates the maximum time duration in seconds that the message shall be played/repeated. ZERO indicates endless repetition.

- interval:

    This parameter indicates the time interval in seconds between repetitions, i.e. the time between the end of the announcement and the start of the next repetition. This parameter can only be used when the number of repetitions is greater than one.

-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.

Result Parameter:

- digitsResponse:

    This parameter contains the information collected from the end-user.

11.34.2 Responding entity (gsmSRF)

11.34.2.1 Normal procedure

gsmSRF precondition:

   (1) The SRSM-FSM is in the state "Connected", or in state "User Interaction" if the gsmSRF received previously an operation from the gsmSCF.

gsmSRF postcondition:

   (1) The gsmSRF has sent the information to the end-user as indicated by "informationToSend".

   (2) The collected information from the end-user is sent to the gsmSCF as RETURN RESULT of the "PromptAndCollectUserInformation".

   (3) If the "disconnectFromIPForbidden" was set to FALSE, the gsmSRF initiates a bearer channel disconnect to the gsmSSF and the SRSM FSM moves to the state "Idle".

   (4) Otherwise the SRSM FSM moves to the state "User Interaction", or
       remains in the same state.

The announcement send to the end-user is ended in the following conditions:

- if neither "duration" or "numberOfRepetitions" is specified, then the network specific announcement ending conditions shall apply; or

- if "numberOfRepetitions" is specified, when all repetitions have been sent, or

- if duration is specified, when the duration has expired. The announcement is repeated until this condition is met, or

- if "duration" and "numberOfRepetitions" is specified, when one of both conditions is satisfied (whatever comes first).

The above conditions are overruled if the parameter "interruptableAnnInd" is not set to FALSE and the end-user has responded with a digit during the sending of the announcement. In this case the announcement is ended immediately. The above procedures apply only to inband information and tones send to the end-user, for "displayInformation" the end conditions are met upon sending, i.e. no interruption can occur.

The parameter "errorTreatment" specifies how the gsmSRF shall treat the error. The default value "reportErrorToSCF" means that the error shall be reported to gsmSCF by means of Return Error with "ImproperCallerResponse". The value "help" indicates that no error shall be reported to gsmSCF but assistance shall be given to the end-user in form of a network dependent default announcement (which may dependent on the context, i.e. the send message). The value "repeatPrompt" indicates that no error shall be reported to the gsmSCF but the prompt shall be repeated to the end-user. The last two procedures shall only be done once per "PromptAndCollectUserInformation" operation.

Note on processing "endOfInput":

The receipt of any "endOfInput" condition (e.g endOfReplyDigit, cancelDigit, firstDigitTimeout, interDigitTimeout) terminates immediately the ongoing input. In other words when e.g an endOfReplyDigit is received, the receipt of a subsequent cancelDigit will not be processed anymore.

11.34.2.2 Error handling

If a Cancel operation is received before or during the processing of the operation then the operation is immediately cancelled and the error "Canceled" is reported to the invoking entity.

Generic error handling for the operation related errors are described in clause 10, the TC services which are used for reporting operation errors are described in clause 12.

If any of the parameter restrictions are violated (e.g. minimumNbOfDigits > maximumNbOfDigits) then an operation error has occured.

11.35   ReleaseCall procedure

11.35.1 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 gsmSSF.

11.35.1.1 Parameters

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

11.35.2 Responding entity (gsmSSF)

11.35.2.1 Normal procedure

gsmSSF precondition:

  (1) A control relationship exists between gsmSCF and gsmSSF.

  (2) The gsmSSF is in state "Waiting for Instructions" or state "Monitoring"

gsmSSF postcondition:

(1) The gsmSSF 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.

11.35.2.2 Error handling

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

11.36 ReleaseGPRS procedure

11.36.1 General description

This operation is used to tear down by the gsmSCF an existing GPRS session or PDP context at any phase. The operation can only be sent within a control relationship with the Session or PDP Context and is not allowed in a monitor relationship.

11.36.1.1 Parameters

- gPRSCause
  A number giving an indication to the gprsSSF about the reason of releasing the GPRS session or a specific PDP context. This may be used by gprsSSF for generating specific indications to the MS or to fill in the "cause" in the release message.

- pDPID:
  This parameter, if present, identifies the PDP Context, within the Session dialogue, which shall be released.

11.36.2 Responding entity (gprsSSF)

11.36.2.1 Normal procedure

gprsSSF preconditions:

(1) A control relationship exists between gsmSCF and the gsmSCF and the GPRS Session or PDP Context. More specifically, in order to tear down an individual PDP context, an EDP-R must be armed for that PDP context. In order to make a SCP controlled detach an EDP-R must be armed for the GPRS session.

(2) The gprsSSF is in state "Waiting for Instructions" or State "Monitoring".

gprsSSF postcondition:

(1) "Idle", after sending any outstanding ApplyGPRSChargingReport and no more PDP contexts are pending. Possible armed EDPs are ignored. All connections and resources related to the GPRS session or PDP context for the corresponding PDPID are released.
  All outstanding reports for the GPRS Session or the PDP Context shall be reported to the SCP. All connections and resources related to the GPRS Session or the PDP Context shall be released. All armed EDPs for the GPRS Session or the PDP Context shall be disarmed.

  If there are any armed events or pending reports, then the gprsSSF shall remain in the same state; otherwise the gprsSSF shall transit to state 'Idle'.

11.36.2.2 Error handling

Generic error handling for the operation related errors is described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.37 ReleaseSMS procedure

11.37.1 General description

This operation is used to tear down by the gsmSCF an MO SMS submission attempt. The operation can only be sent within a control relationship and is not allowed in a monitor relationship.

11.37.1.1 Parameters

- rPCause
  A number giving an indication to the gsmSSF or gprsSSF about the reason of releasing this specific SM. This may be used by gsmSSF/gprsSSF; it may forward the cause to the originating MS.

11.37.2 Responding entity (gsmSSF or gprsSSF)

11.37.2.1 Normal procedure

gsmSSF/gprsSSF preconditions:

    (1) State "Waiting for Instructions".

    (2) FSM is in the DP SMS_Collected_Info.

gsmSSF/gprsSSF postcondition:

    (1) "Idle". Possible armed EDPs are ignored. All resources related to the SM are released.

11.37.2.2 Error handling

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

11.38 RequestReportBCSMEvent procedure

11.38.1 General description

This operation is used to request the gsmSSF 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: If the RequestReportBCSMEvent requests arming of the current DP from which the call processing was suspended, the next occurrence of the DP encountered during BCSM processing will be detected (i.e. not the current one from which the call was suspended).

The DP arming principle is as follows:

- The DPs O_Disconnect and T_Disconnect can be armed as well as for leg1 as leg2 depending on what direction (either from the A-party which is connected to leg1 or from the B-party connected to leg2) events have to be captured. As an example the Disconnect DP can be armed as well as for leg1 and leg2, in that case if a release request is received from the A-party it will be detected by the Disconnect DP armed for leg1, while a release request from the B-party shall be detected by arming the leg2 Disconnect DP.

- The O_Abandon DP can only be armed for leg1 in the O_BCSM and the T_Abandon can only be armed for leg1 in the T_BCSM.

Table 11-1: DP Arming Table for O-BCSM:

O_BCSM	leg1	leg2	Default_leg_ID
Route_Select_Failure DP	-	X	2
O_Called_Party_Busy DP	-	X	2
O_No_Answer DP	-	X	2
O_Answer DP	-	X	2
O_Disconnect DP	X	X	- o1
O_Abandon DP	X	-	1
o1) The "legID" parameter shall be included Nomenclature: X = Arming Applicable - = Not Applicable			

Table 11-2: DP Arming Table for T-BCSM:

T_BCSM	leg2	leg1	Default Leg ID
T_Busy DP	X	-	2
T_No_Answer DP	X	-	2
T_Answer DP	X	-	2
T_Disconnect DP	X	X	- t1
T_Abandon DP	-	X t2	1
t1) The "legID" parameter shall be included t2) T_Abandon can only be armed for leg1. Nomenclature: X = Arming Applicable - = Not Applicable			

11.38.1.1 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 gsmSSF reports the event to the gsmSCF. This timer shall be shorter than the network no-answer timer.

11.38.2 Responding entity (gsmSSF)

11.38.2.1 Normal procedure

gsmSSF precondition:

(1) A control relationship exists between the gsmSSF and the gsmSRF.

(2) The gsmSSF 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.

gsmSSF postcondition:

(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 gsmSSF remains in the same state, unless all EDPs have been disarmed and no CallInformationReport or ApplyChargingReport has been requested; in the latter case the gsmSSF moves to the state "Idle".

11.38.2.2 Error handling

Generic error handling for the operation related errors are described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.39   RequestReportGPRSEvent procedure

11.39.1 General description

This operation is used to request the gprsSSF to monitor for a GPRS session or PDP context related event (e.g., events such as PDP context establishment or detach), then send a notification back to the gsmSCF when the event is detected.

11.39.1.1 Parameters

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

    - gPRSEventType:
      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.

- pDPID:
  This parameter, if present, identifies the PDP Context, within the Session dialogue, for which the event reporting is requested

11.39.2 Responding entity (gprsSSF)

11.39.2.1 Normal procedure

gprsSSF precondition:

(1) A control relationship exists between the gsmSCF and the GPRS Session or PDP Context.

(2) The gprsSSF is in the state "Waiting for Instructions" or the state "Monitoring".

gprsSSF postconditions:

(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 GPRS session or PDP context or until the EDPs are detected.

(3) If there sare no armed events or pending reports, then the gsmSSF shall transit to state 'Idle'. Otherwise it shall remain in the same state.

11.39.2.2 Error handling

Generic error handling for the operation related errors is described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.40 RequestReportSMSEvent procedure

11.40.1 General description

This operation is used to request the gsmSSF or gprsSSF to monitor for a SM related event (e.g., FSM events such as failure or successful delivery), then send a notification back to the gsmSCF when the event is detected.

11.40.1.1 Parameters

- smsEvents:

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

    - eventTypeSMS:

        This parameter specifies the type of event of which a report is requested. Value SMSCollectedInfo is not valid for the RequestReportSMSEvent operation.

    - 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.

11.40.2 Responding entity (gsmSSF or gprsSSF)

11.40.2.1 Normal procedure

gsmSSF/gprsSSF precondition:

(1) A control relationship exists between the gsmSSF/gprsSSF and the gsmSCF.

(2) The gsmSSF/gprsSSF is in the state "Waiting for Instructions".

gsmSSF/gprsSSF postconditions:

(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 SM submission, until the EDPs are detected or until the SM submission fails.

(3) The gsmSSF/gprsSSF remains in the same state.

11.40.2.2 Error handling

Generic error handling for the operation related errors is described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.41 ResetTimer procedure

11.41.1 General description

This class 2 operation is used by the gsmSCF to refresh the T_{ssf} application timer, in order to avoid the T_{ssf} time-out at the gsmSSF.

11.41.1.1 Parameters

- timerID:
  This parameter has a default value identifying the T_{ssf} timer.

- timerValue:
  This parameter specifies the value to which the T_{ssf} is to be set.

11.41.2 Responding entity (gsmSSF)

11.41.2.1 Normal procedure

gsmSSF precondition:

(1) Basic call processing has been suspended at a DP.

(2) The gsmSSF 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.

gsmSSF postcondition:

(1) The T_{ssf} timer has been reset.

(2) The gsmSSF remains in the same state.

11.41.2.2 Error handling

Generic error handling for the operation related errors are described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.42 ResetTimerGPRS procedure

11.42.1 General description

This operation is used by the gsmSCF to refresh the T_{SSF} application timer, in order to avoid the T_{SSF} time-out at the gprsSSF.

11.42.1.1 Parameters

- timerValue:
  This parameter specifies the value to which the T_{SSF} timer is to be set.

- timerID:
  This parameter indicates which timer shall be reset. The only permissable value for this parameter is 'Tssf'.

11.42.2 Responding entity (gprsSSF)

11.42.2.1 Normal procedure

gprsSSF preconditions:

(1) GPRS Session Attach or PDP Context establishment attempt has been initiated.

(2) GPRS Session or PDP context processing has been suspended at a DP.

(3) The gprsSSF is in the "Waiting for Instruction" state.

gprsSSF postconditions:

(1) The T_{SSF} timer has been reset.

(2) The gprsSSF remains in the same state.

11.42.2.2 Error handling

Generic error handling for the operation related errors is described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.43 ResetTimerSMS procedure

11.43.1 General description

This class 2 operation is used by the gsmSCF to refresh the T_{ssf} application timer, in order to avoid the T_{ssf} time-out at the gsmSSF or gprsSSF.

11.43.1.1 Parameters

- timerID:
  This parameter has a default value identifying the T_{ssf} timer.

- timerValue:
  This parameter specifies the value to which the T_{ssf} is to be set.

11.43.2 Responding entity (gsmSSF or gprsSSF)

11.43.2.1 Normal procedure

SSF precondition:

(1) Basic SM processing has been suspended at a DP.

(2) The SMS FSM is in the "Waiting for Instruction" state.

SSF postcondition:

(1) The T_{ssf} timer has been reset.

(2) The SSF remains in the same state.

11.43.2.2 Error handling

Generic error handling for the operation related errors are described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.44 SendChargingInformation procedure

11.44.1 General description

This operation is used to instruct the gsmSSF on the advice of charge information to be sent by the gsmSSF. The SCI operation may be invoked on multiple occasions.

The SCI operation can be used for MO and MT calls in the VMSC. In the case of a MT call the CSE provided e-parameters are not used by mobile if a call forwarding or follow-on call occurs.

11.44.1.1 Parameters

- sCIBillingChargingCharacteristics:

  This parameter is a choice between two lists of information.

  The first list shall only be sent before an answer event has been detected from the current Called Party, Temporary Connection or connection to an gsmSRF. It contains the following parameters:

  - aOCBeforeAnswer:
    This is a list of the following information:

    - aOCInitial:
      This is a set of GSM Charge Advice Information elements, as defined in 3GPP TS 22.024 [47], and these CAI elements are sent by the gsmSSF to the MS when an ANSWER is received and a tariff switch has not yet occurred.

    - aOCSubsequent:
      This list may indicate the following information:

      - cAIElements:
        This is a set of GSM Charge Advice Information elements, as defined in 3GPP TS 22.024 [47], and these CAI elements are sent to the MS when Answer is detected and a tariff switch has occurred previously, or when Answer has previously been detected and a tariff switch occurs.

      - tariffSwitchInterval:
        This parameter indicates to the gsmSSF the time duration until the next tariff switch. The measurement of the elapsed tariff switch period commences immediately upon successful execution of this operation.

  The second list in the Choice shall only be sent after an answer event has been detected from the current Called Party, Temporary Connection or connection to an gsmSRF. It contains the following parameters:

- aOCAfterAnswer:
    This list may indicate the following information:

    - cAIElements:
      This is a set of GSM Charge Advice Information elements, as defined in 3GPP TS 22.024 [47], and these CAI elements are sent to the MS by the gsmSSF when Answer is detected and a tariff switch has occurred previously, or when Answer has previously been detected and a tariff switch occurs in the call.

    - tariffSwitchInterval:
      This parameter indicates to the gsmSSF the time duration until the next tariff switch. The measurement of the elapsed tariff switch period commences immediately upon successful execution of this operation.

- legID:
    This parameter indicates where the charging information shall be sent. For Mobile Originated calls, only leg 1 shall
    be used. For Mobile Terminated calls in the VMSC, only leg 2 shall be used.

11.44.2 Responding entity (gsmSSF)

11.44.2.1 Normal procedure

gsmSSF precondition:

    (1) gsmSSF State "Waiting for Instructions", or
        gsmSSF State "Waiting for End of User Interaction", or
        gsmSSF State "Waiting for End of Temporary Connection", or
        gsmSSF State "Monitoring".

gsmSSF postcondition:

    (1) No FSM state transition

On receipt of this operation the gsmSSF performs actions to send the advice of charge information to the indicated Call
Partys MS.

If advice of charge is to be provided to a GSM MS in conjunction with CSE control of call duration then the following
sequence of operations shall be sent from the gsmSCF to the gsmSSF in the following order, in the same TC TC-
CONTINUE component;

ApplyCharging; SendChargingInformation

These operations will be processed sequentially by the gsmSSF, in the order that they are sent by the gsmSCF. Note
also that in this case parameter TariffSwitchInterval may be present in either in the ApplyCharging operation or the
SendChargingInformation operation, but not in both operations. It is recommended that it shall be transported in the
ApplyCharging operation.

The TariffSwitchInterval information received with either of these operations shall set the same tariff switch timer in
the gsmSSF, and this duration timer shall run from the time of successful operation execution.

11.44.2.2 Error handling

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

- a tariffSwitchInterval is indicated when a previously received tariffSwitchInterval is pending.

Generic error handling for the operation related errors are described in clause 10 and the TC services which are used for
reporting operation errors are described in clause 12.

11.45 SendChargingInformationGPRS Procedure

11.45.1 General description

This operation is used to instruct the gprsSSF on the advice of charge information to be sent to the MS, provided the
SGSN supports Advice Of Charge. The operation may be invoked on multiple occasions.

11.45.1.1 Parameters

- sCIGPRSBillingChargingCharacteristics:
    This parameter contains the Advice of Charge information:

    - aOCGPRS:
        This parameter specifies the Advice of Charge information that shall be forwarded to the MS. It may contain
        one or more of the following parameters:

- aOCInitial:
  This is a set of GSM Charge Advice Information elements, as defined in 3GPP TS 22.024.These CAI elements are sent by the gprsSSF to the MS when an Activate PDP Context Accept or Attach Accept is sent to MS and a tariff switch has not yet occurred. It may also be sent at any other time e.g. upon change of QoS or RAI.

- aOCSubsequent:
  This parameter may indicate the following information:

  - CAIElements
    This is a set of GSM Charge Advice Information elements, as defined in 3GPP TS 22.024. These CAI elements are sent to the MS when an Activate PDP Context Accept or Attach Accept is detected and a tariff switch has occurred previously, or when Activate PDP Context Accept or Attach Accept has previously been detected and a tariff switch occurs.

  - tariffSwitchInterval:
    This parameter indicates to the gprsSSF the time duration until the next tariff switch. The measurement of the elapsed tariff switch period commences immediately upon successful execution of this operation.

- pDPID:
  This parameter, if present, identifies the PDP Context, within the Session dialogue, for which the Advice-of-Charge instruction applies.

11.45.2 Responding Entity (gprsSSF)

11.45.2.1 Normal Procedure

gprsSSF preconditions:

(1) A control relationship exist between the gsmSCF and the GPRS Session or PDP Context.

The gprsSSF FSM is in state "Waiting for Instructions" or in state "Monitoring".

gprsSSF postconditions:

(1) No state transition.

On receipt of this operation the gprsSSF performs actions to send the advice of charge information to the MS, provided Advice Of Charge is supported by the SGSN.

If advice of charge is to be provided to a GSM MS in conjunction with CSE control of GPRS session or PDP context duration or volume, then the following sequence of operations shall be sent from the gsmSCF to the gprsSSF in the following order and in the same TC TC-CONTINUE or TC-BEGIN component:

ApplyChargingGPRS; SendChargingInformationGPRS.

These operations will be processed sequentially by the gprsSSF, in the order that they are sent by the gsmSCF. Note also that in this case parameter TariffSwitchInterval may be present in either in the ApplyChargingGPRS operation or the SendChargingInformationGPRS operation, but not in both operations. It is recommended that it shall be transported in the ApplyGPRSCharging operation.

The TariffSwitchInterval information received with either of these operations shall set the same tariff switch timer in the gprsSSF, and this duration timer shall run from the time of successful operation execution.

11.45.2.2 Error handling

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

- a tariffSwitchInterval is indicated when a previously received tariffSwitchInterval is pending.

Generic error handling for the operation related errors is described in clause 10 and the TC services which are used for reporting operation errors are described in clause 12.

11.46 SpecializedResourceReport procedure

11.46.1 General description

This operation is used as the response to a "PlayAnnouncement" operation when the announcement completed indication is set.

11.46.1.1 Parameters

None.

11.46.2 Invoking entity (gsmSRF)

11.46.2.1 Normal procedure

gsmSRF precondition:

> (1) The gsmSRF is in the state "User Interaction".
>
> (2) A "PlayAnnouncement" operation is being executed for which the parameter "RequestAnnouncementComplete" was set TRUE.
>
> (3) All information has been sent to the user.

gsmSRF postcondition:

> (1) The gsmSRF remains in the same state.
>
> (2) If the "DisconnectFromIPForbidden" parameter was set FALSE, the gsmSRF initiates a bearer channel disconnect sequence to the gsmSSF using the applicable bearer channel signalling system after sending the "SpecializedResourceReport" operation to the gsmSCF. The gsmSRF moves to the state "Idle".

11.46.2.2 Error handling

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

12 Services assumed from lower layers

12.1 Services assumed from TC

The SS7 application layer protocol defined in this 3GPP TS, is a protocol to provide communication between a pair of application processes. In the SS7 environment this is represented as communication between a pair of application-entities (AEs) using the TC. The function of an AE is provided by a set of application-service-elements (ASEs). The interaction between AEs is described in terms of their use of the services provided by the ASEs.

If AC are to be used for FE differentiation within a physical node then the version of TC used must support the dialogue portion of TC (ie ETS 300 287-1 [6]).

This requirement applies to all interfaces, not just those used for internetworking.

Table 12-1 defines which versions of TC are the minimum versions required to support the defined CAP interfaces:

Table 12-1: Minimum TC requirements for CAP interfaces

Interface	IN CS2
gsmSSF - gsmSCF	Blue Book (note)
gsmSCF - gsmSRF	Blue Book (note)
Note: If the AC name needs to be indicated, then ETS 300 287-1 [6] is the minimum version required.	

12.1.1   Common procedures

This subclause defines the procedures and mapping which apply between CAP and TC to be used in the absence of specific procedures and mapping instructions for the specific CAP interfaces as defined in subsequent subclauses.

12.1.1.1   Normal procedures

This subclause describes the procedures and TC primitives that shall be used for transmitting messages between AEs under normal operation.

The CAP, as TC-user, uses only the structured dialogue facility provided by TC. The following situations can occur when a message is sent between two PE:

- a dialogue shall be established: the TC-user issues a TC-BEGIN request primitive.

- a dialogue shall be maintained: the TC-user issues a TC-CONTINUE request primitive.

- a dialogue shall no longer be maintained: the TC-user issues a TC-END request primitive with either basic end or with pre-arranged end depending on the following conditions:

- Basic End

    - In the case the dialogue is established, operations, leading to a termination of the relationship, can be transmitted by the FE with a TC-END request primitive (basic) in case the FE is not interested in the reception of any ERROR or REJECT components for these sent operations. Once the FE dialogue resources have been released, any ERROR or REJECT components received for these operations will be discarded by TC as described in ETS 300 287-1 [6].

    - In case the dialogue is established and the FE has received an operation, leading to the termination of the relationship, does not wish to continue dialogue and there is no operation to be sent, a TC-END request primitive (basic) with zero components can be sent from the FE.

- Pre-arranged End

    - Where an entity is interested in possible ERROR or REJECT messages on response to sent operations leading to a termination of the relationship, the dialogue is ended with a TC-END request primitive (pre-arranged end) after the last associated operation timer expires. The receiving entity can end the dialogue with a TC-END request primitive (pre-arranged end) after successful processing of these operations (i.e. the relationship is terminated).

- in general, the use of prearranged end shall be limited to the case for both communicating entities clearly recognizable that peer entity applies prearranged end. In all other cases, basic end shall be used.

12.1.1.2   Abnormal procedures

This subclause describes the procedures and TC primitives that shall be used for reporting abnormal situations between AEs. The error cases are defined in clause 10.

The following primitives shall be used to report abnormal situations:

- operation errors, as defined in the CAP, are reported with TC-U-ERROR request primitive.

- rejection of a TC component by the TC-user shall be reported with TC-U-REJECT request primitive.

- when the FE detecting error or rejecting operation decides the termination of TC dialogue, TC-END request primitive (basic) with error or reject can be used for the termination of TC dialogue.

- when the gsmSSF or the gsmSRF detecting error or rejecting operation recognizes the possibility to continue dialogue, TC-CONTINUE request primitive with error or reject can be used for the continuation of TC dialogue.

- a dialogue shall be aborted by the TC-user with a TC-U-ABORT request primitive.

- on expiration of application timer TSSF or TSRF, dialogue shall be terminated by means of by TC-U-ABORT primitive with an Abort reason, regardless of TC dialogue is established or not.

For abnormal situations detected by TC the same rules shall apply for reception of TC-R-REJECT indication as for transmission of TC-U-REJECT request and for transmission of TC-P-ABORT indication as for transmission of TC-U-ABORT request primitive.

The following rules shall be applied to terminate the TC dialogue under abnormal situations:

- in the case that abort condition is detected and TC dialogue is established, TC dialogue is terminated by TC-U-ABORT primitive with an Abort reason.

- in the case that abort condition is detected and TC dialogue is not established, TC dialogue is locally terminated by TC-U-ABORT primitive. (in the case such as application time out).

In error situations prearranged end shall not be used to terminate the TC dialogue. In case any AE encounters an error situation the peer entity shall be explicitly notified of the error, if possible. If from any entity's point of view the error encountered requires the relationship to be ended, it shall close the dialogue via a TC-END request primitive with basic end or via a TC-U-ABORT request primitive, depending on whether any pending ERROR or REJECT component is to be sent or not.

In case an entity receives a TC-END indication primitive and after all components have been considered, the FSM is not in a state to terminate the relationship, an appropriate internal error should be provided.

In cases when a dialogue needs to be closed by the initiating entity before its establishment has been completed (before the first TC indication primitive to the TC-BEGIN request primitive has been received from the responding entity), the TC-user shall issue a TC-END request primitive with prearranged end or a TC-U-ABORT request primitive. The result of these primitives will be only local, any subsequent TC indication received for this dialogue will be handled according to the abnormal procedures as specified in ETS 300 287-1 [6]).

12.1.1.3   Dialogue handling

12.1.1.3.1 Dialogue establishment

The establishment of a CAP dialogue involves two application processes as described in clause 1, one that is the dialogue-initiator and one that is the dialogue-responder.

AC negotiation may not be supported in all PE and/or all networks.

This procedure is driven by the following signals:

- A TC-BEGIN request primitive from the dialogue-initiator.

- A TC-BEGIN indication primitive occurring at the responding side

- The first TC-CONTINUE indication primitive occurring at the initiating side or under specific conditions:

   - A TC-END indication primitive occurring at the initiating side

   - A TC-U-ABORT indication primitive occurring at the initiating side

   - A TC-P-ABORT indication primitive occurring at the initiating side

Sending of a TC-BEGIN request

Before issuing a TC-BEGIN request primitive, TC-USER shall store the AC-name and if present the user-information parameter.

TC-USER shall request the invocation of the associated operations using the TC-INVOKE service. See subclause 12.1.1.4.1 for a description of the invocation procedure.

After processing of the last invocation request, TC-USER shall issue a TC-BEGIN request primitive.

The initiator TC-USER then waits for a TC indication primitive and will not issue any other requests, except a TC-U-ABORT request or a TC-END request with the release method parameter set to "pre-arranged release".

Receipt of a TC-BEGIN indication

On receipt of a TC-BEGIN indication primitive, responder TC-USER shall:

- Analyse the application-context-name if included in the primitive. If it is supported, process any other indication primitives received from TC as described in subclause 12.1.1.4.1.

- If the application-context-name included in the primitive is not supported, issue a TC-U-ABORT request primitive.

Receipt of the first TC-CONTINUE indication

On receipt of the first TC-CONTINUE indication primitive for a dialogue, TC-USER shall check the value of the application-context-name parameter. If this value matches the one used in the TC-BEGIN request primitive, TC-USER shall process the following TC component handling indication primitives as described in subclause 12.1.1.4.1, otherwise it shall issue a TC-U-ABORT request primitive.

Receipt of a TC-END indication

On receipt of a TC-END indication primitive in the dialogue initiated state, TC-USER shall check the value of the application-context-name parameter. If this value match the one used in the TC-BEGIN request primitive, then the TC-USER shall process the following TC component handling indication primitives as described in subclause 12.1.1.4.1.

Receipt of a TC-U-ABORT indication

Receipt of a TC-U-ABORT indication primitive is described as part of user abort procedure (see 12.1.1.3.4.)

Receipt of a TC-P-ABORT indication

Receipt of a TC-P-ABORT indication primitive is described as part of provider abort procedure (see 12.1.1.3.5.)

12.1.1.3.2 Dialogue continuation

Once established the dialogue is said to be in a continuation phase.

Both application processes can request the transfer of CAP APDUs until one of them requests the termination of the dialogue.

Sending entity

TC-USER shall process any component handling request primitives as described in subclause 12.1.1.4.1.

After processing the last component handling request primitive, TC-USER shall issue a TC-CONTINUE request primitive.

Receiving entity

On receipt of a TC-CONTINUE indication primitive TC-USER shall accept zero, one or several TC component handling indication primitives and process them as described in subclause 12.1.1.4.1.

12.1.1.3.3 Dialogue termination

Both the dialogue-initiator and the dialogue-responder have the ability to request the termination of a dialogue after it has been established when no dialogue is to be established or when a dialogue is no longer to be maintained according to the rules as stated in subclauses 12.1.2.1.1 and 12.1.2.1.2.

The dialogue termination procedure is driven by the following events:

- A TC-END request primitive

- A TC-END indication primitive

Sending of TC-END request

When the dialogue shall no longer be maintained, TC-USER shall process any component handling request primitives as described in subclause 12.1.1.4.1

After processing the last component handling request primitive (if any), TC-USER shall issue a TC-END request primitive with the release method parameter set to "basic end" or "prearranged release", according to the rules as stated in subclauses 12.1.2.1.1 and 12.1.2.1.2.

When no dialogue is to be established, refer to subclauses 12.1.1.3.1.

Receipt of a TC-END indication

On receipt of a TC-END indication primitive, the TC-USER shall accept any component handling indication primitives and process them as described in subclause 12.1.1.4.1.

After processing the last component handling primitive all dialogue related resources are released.

12.1.1.3.4 User abort

Both the dialogue-initiator and the dialogue-responder have the ability to abort a dialogue at any time.

The user abort procedure is driven by one of the following events:

- A TC-U-ABORT request primitive

- A TC-U-ABORT indication primitive

Sending of TC-U-ABORT request

After issuing a TC-U-ABORT request primitive, all dialogue related resources are released.

Receipt of a TC-U-ABORT indication

On receipt of a TC-U-ABORT indication all dialogue related resources are released.

12.1.1.3.5 Provider abort

TC has the ability to abort a dialogue at both the dialogue-initiator side and the dialogue-responder side.

The provider abort procedure is driven by the following event:

- A TC-P-ABORT indication primitive

Receipt of a TC-P-ABORT indication

On receipt of a TC-P-ABORT indication, all dialogue related resources are released.

12.1.1.3.6 Mapping to TC dialogue primitives

The TC-UNI service is not used by CAP.

The mapping of parameters onto the TC Dialogue services is as follows:

The use of parameters of the TC-BEGIN service is as defined in subclause 12.1.1.3.7 with the following qualifications:

- The Destination Address parameter of the TC-BEGIN service shall be set to the CAP address of the AE which is to respond to the TC-BEGIN service.

  NOTE 1: The address used in this parameter may be mapped by SCCP address translation to one of a number of alternative AEs.

- The AC Name parameter of the TC-BEGIN service shall be set according to the specific interface being used between the initiating AE and the responding AE.

- The Originating Address parameter of the TC-BEGIN service shall be set to the unambiguous CAP address of the AE initiating the TC-BEGIN service.

The use of parameters of the TC-CONTINUE service is as defined in subclause 12.1.1.3.7 with the following qualifications:

- The AC Name parameter of the TC-CONTINUE service shall be set to the value of the AC Name parameter of the TC-BEGIN service for the same Dialogue ID parameter value.

- If present, the Originating Address parameter of the TC-CONTINUE service shall be set to the unambiguous CAP address of the AE initiating the TC-CONTINUE service. This parameter is only present in the first TC-CONTINUE service after a TC-BEGIN service with the same Dialogue ID parameter value.

The use of parameters of the TC-END service is as defined in subclause 12.1.1.3.7 with the following qualifications:

- The AC Name parameter of the TC-END service shall be set to the value of the AC Name parameter of the TC-BEGIN service for the same Dialogue ID parameter value. This parameter is only present if the TC-END service is used immediately after the TC-BEGIN service.

The use of parameters of the TC-U-ABORT service is as defined in subclause 12.1.1.3.7 with the following qualifications:

- The Abort Reason parameter of the TC-U-ABORT service shall be used as specified in ETS 300 287-1 [6].

- The AC Name parameter of the TC-U-ABORT service shall be set to the value used in the TC-BEGIN service.

  NOTE 2: This parameter is only present if the TC-U-ABORT is the immediate response to a TC-BEGIN indication.

The use of parameters of the TC-P-ABORT service is as defined in subclause 12.1.1.3.7 with the following qualifications:

- The P-Abort parameter of the TC-P-ABORT service is set by TC to indicate the reason why TC aborted the dialogue. It shall take the values as defined in ETS 300 287-1 [6].

12.1.1.3.7 Default mapping to TC dialogue parameters

Dialogue Id

The value of this parameter is associated with the CAP invocation in an implementation dependent manner. This parameter uniquely identifies a specific TC dialogue to a remote CAP AE for an CAP AE.

Application-context-name

The application-context-name parameter is set according to the set of operations which need to be supported by the TC dialogue. The defined AC Names can be found in clauses 6 to 8.

User information

This parameter may be used by both initiating and responding application processes. This parameter shall be used for the CAP-GPRS-ReferenceNumber as defined in 12.1.7. For interfaces other than the gprsSSF-gsmSCF interface and for SMS related messages (as in subclauses 12.1.3, 12.1.4 and 12.1.5) the receiving side may ignore this parameter if received. The User Information parameter shall be encoded in accordance with the definition provided in Q.773 (subclause 3.2) [48] and the definition of EXTERNAL type provided in X.690 [34], with the restriction that:

- a size (1..10) constraint of SEQUENCE OF EXTERNAL;

- an Object Identifier shall always be present to identify the user information and the entity which sent it;

- a single-ASN-1-type is used for encoding.

For the use of CAP defined TC-U-Abort reason, see the ASN.1 notation in the subclause 5.7.

For the use of CAP defined CAP-GPRS-ReferenceNumber, see subclause 12.1.7. For the abstract syntax of CAP defined CAP-GPRS-ReferenceNumber, see the ASN.1 notation in the subclause 8.1.

Component present

This parameter is used by TC-USER as described in ETS 300 287-1 [6].

Termination

The value of the release method parameter of the TC-END request primitive is set by TC-USER according to the rules as stated in subclauses 12.1.2.1.1 and 12.1.2.1.2.

Quality of service

The quality of service of TC request primitives is set by the TC-USER to the following value:

- Sequencing requested;

- return option, this parameter is set by TC-USER in an implementation dependent manner.

12.1.1.4   Component handling

12.1.1.4.1   Procedures for CAP operations

This subclause describes the procedures for CAP operations.

Operation invocation

TC-USER shall build an operation argument from the parameters received and request the invocation of the associated operation using the TC-INVOKE procedure. If a linked ID parameter is inserted in the primitive this indicates a child operation and implies that the operation is linked to a parent operation.

Operation invocation receipt

On receipt of a TC-INVOKE indication primitive, TC-USER shall

- If the operation code does not correspond to an operation supported by the application-context, request the transfer of a reject component using the TC-U-REJECT request primitive, with the appropriate problem code (unrecognized operation);

- If a linked ID is included, perform the following checks: If the operation referred to by the linked ID does not allow linked operations or if the operation code does not correspond to a permitted linked operation, or if the parent operation invocation is not active, issue a TC-U-REJECT request primitive with the appropriate problem code (linked response unexpected or unexpected linked operation);

- If the type of the argument is not the one defined for the operation, request the transfer of a reject component using the TC-U-REJECT request primitive, with the appropriate problem code (mistyped parameter);

- if the operation cannot be invoked because the CAP related dialogue is about to be released, requests the transfer of the reject component using the TC-U-REJECT request primitive with the problem code (Initiating Release);

- if sufficient CAP related resources are not available to perform the requested operation, request the transfer of a reject component using the TC-U-REJECT request primitive with the problem code (Resource Limitation);

- Otherwise, accept the TC-INVOKE indication primitive. If the operation is to be user confirmed, TC-USER waits for the corresponding response.

Operation Response

For user confirmed operations, TC-USER shall:

- If no error indication is included in the response to a class 1 or 3 operation, construct a result information element from the parameters received and request its transfer using the TC-RESULT-L service.

- If an error indication is included in the response to a class 1 or 2 operation, construct an error parameter from the parameters received and request its transfer using the TC-U-ERROR request primitive.

Receipt of a response

On receipt of a TC-RESULT-NL indication, TC-USER shall:

- Request the transfer of a reject component using the TC-U-REJECT request primitive, with the appropriate problem code (mistyped parameter).

On receipt of a TC-RESULT-L indication, TC-USER shall:

- if the type of the result parameter is not the one defined for the result of this operation, request the transfer of a reject component using the TC-U-REJECT request primitive, with the appropriate problem code (mistyped parameter);

- otherwise, accept the TC-RESULT-L indication primitive.

On receipt of a TC-U-ERROR indication, TC-USER shall:

- if the error code is not defined for the TC-USER or is not one associated with the operation referred to by the invoke ID, request the transfer of a reject component using the TC-U-REJECT request primitive, with the appropriate problem code (unrecognized error or unexpected error);

- if the type of the error parameter is not the one defined for this error, request the transfer of a reject component using the TC-U-REJECT request primitive, with the appropriate problem code (mistyped parameter);

- Otherwise, accept the TC-U-ERROR indication primitive.

On receipt of a TC-U-REJECT indication primitive which affects a pending operation, TC-USER shall:

- accept the TC-U-REJECT indication primitive.

On receipt of a TC-L-REJECT indicating "return result problem, return error unexpected", TC-USER shall inform the application process.

On receipt of a TC-L-REJECT indicating "return error problem, return error unexpected", TC-USER shall inform the application process.

This event occurs when the local TC detects a protocol error in an incoming component which affects an operation.

When the problem code indicates a general problem, it is considered that the event cannot be related to an active operation even if the invoke Id is provided by TC. This is because it is unclear whether the invoke Id refers to a local or remote invocation. The behaviour of TC-USER in such a case is described in the subclause headed "other events".

On receipt of a TC-L-CANCEL indication, the TC-USER shall:

- if the associated operation is a class 1 operation, inform the application process;

- if the associated operation is a class 2 operation and no linked operations are defined for this operation, ignore the primitive;

- if the associated operation is a class 2 operation and has linked operations but none of them has been invoked, inform the application process;

- if the associated operation is a class 2 operation and a linked operation invocation has already been received in response to this operation, ignore the primitive;

- if the associated operation is a class 3 operation, inform the application process;

- if the associated operation is a class 4 operation, ignore the primitive;

Other events

This subclause describes the behaviour of TC-USER on receipt of a component handling indication primitive which cannot be related to any operation or which does not affect a pending one.

On receipt of a TC-U-REJECT indication primitive which does not affect an active operation (i.e. indicating a return result or return error problem), it is up to the application process to abort, continue or terminate the dialogue, if not already terminated by the sending application process according to the rules as stated in subclause 12.1.2.1.2. This is also applicable for invoke problems related to a class 4 linked operation.

On receipt of a TC-R-REJECT indication (i.e. when a protocol error has been detected by the peer TC entity) which does not affect an active operation, it is up to the application process to abort, continue or terminate the dialogue, if not already terminated by the sending application process according to the rules as stated in subclause 12.1.2.1.2.

On receipt of a TC-L-REJECT indication primitive (i.e. when a protocol error has been detected by the local TC entity) which cannot be related to an active operation, it is up to the application process to continue, or to terminate the dialogue and implicitly trigger the transmission of the reject component or to abort the dialogue.

On receipt of a TC-NOTICE indication primitive, which informs the TC-USER that a message cannot be delivered by the Network Layer, it is for the application process to decide whether to terminate the dialogue or retry.

This primitive can only occur if the Return Option has been set (see subclause 12.1.1.3.6).

12.1.1.4.2 Mapping to TC component primitives

The mapping of parameters onto the TC Component services is as follows:

The TC-U-CANCEL service is not used.

The TC-RESULT-NL service is not used.

The use of parameters of the TC-INVOKE service is as defined in subclause 12.1.1.4.3 with the following qualifications:

- The Operation parameter of the TC-INVOKE service shall contain the *operation.&operationCode* value of the CAP operation to be invoked. The operation must be one of the valid operations supported by the negotiated AC for the TC dialogue and must be invokable by the local AE.

- The Parameters parameter of the TC-INVOKE service shall contain a value of the *operation.&ArgumentType* value for the operation being invoked, as specified by the Operation parameter.

The use of parameters of the TC-RESULT-L service is as defined in subclause 12.1.1.4.3 with the following qualifications:

- The Invoke Id parameter of the TC-RESULT-L service shall be set to the value of the Invoke Id parameter of the TC-INVOKE service from the remote AE to which a result is being sent.

- The Operation parameter of the TC-RESULT-L service be set to the value of the Operation parameter of the TC-INVOKE service from the remote AE which contains the same Invoke Id Parameter value.

- The Parameters parameter of the TC-RESULT-L service shall contain the *operation.&ResultType* value for the operation result, as specified by the Operation parameter.

The use of parameters of the TC-U-ERROR service is as defined in subclause 12.1.1.4.3 with the following qualifications:

- The Invoke Id parameter of the TC-U-ERROR service shall be set to the value of the Invoke Id parameter of the TC-INVOKE service from the remote AE to which an error is being sent.

- The Error parameter of the TC-U-ERROR service shall be set to the value of the *error.&errorCode* of the error to be sent. It must be one of the errors which is expected for the invoked operation as defined in the *operation.&Errors* specification.

- The Parameters parameter of the TC-U-ERROR service shall be set to the value of the *error.&ParameterType* of the error to be sent, as identified by the Error parameter.

The use of parameters of the TC-U-REJECT service is as defined in subclause 12.1.1.4.3 with the following qualifications:

- The Invoke Id parameter of the TC-U-REJECT service shall be set to the Invoke Id Parameter of the TC component service from the remote AE which is being rejected.

The use of parameters of the TC-L-CANCEL service is as defined in subclause 12.1.1.4.3.

12.1.1.4.3 Default mapping to TC component parameters

Invoke Id

This parameter is set by the sending application process. It represents the unique identity of an instance of an operation which is invoked by a AE within a specific TC dialogue. The TC dialogue is identified by the Dialogue Id parameter.

Linked Id

This parameter is set by the sending application process. It represents the Invoke Id of an operation which was received from the remote AE for a specific TC dialogue to which the operation being invoked by the local AE is to be linked. This parameter is only present if the original operation invoked by the remote AE is defined as having linked operations. The type of local operation invoked must be the same type as one of the operations defined as being linked.

Dialogue Id

The value of this parameter is associated with the CAP invocation in an implementation dependent manner. It represents the identity of the established TC dialogue which will carry the component services between the local AE and the remote AE.

Class

The value of this parameter is set according to the type of the operation to be invoked according to the operation definitions in clauses 6 through 8.

Time out

The value of this parameter is set according to the type of operation invoked.

Last component

This parameter is used as described in ETS 300 287-1 [6].

Problem code

This parameter is used as described in subclause 12.1.1.4.1.

Abort reason

This parameter is used by TC-USER, and attributes and coding are specified by network operator.

12.1.2 gsmSSF-gsmSCF interfaces

12.1.2.1 Normal procedures

12.1.2.1.1 gsmSSF-to-gsmSCF messages

This subclause defines the normal procedures for TC messages from the gsmSSF to the gsmSCF.

gsmSSF-FSM related messages

A dialogue shall be established when the gsmSSF-FSM moves from the state Idle to the state Waiting for Instructions. The InitialDP operation shall be transmitted in the same message.

The CAP operation InitialDP shall be sent with a TC-BEGIN request primitive.

For all other operations sent from the gsmSSF-FSM, the dialogue shall be maintained except for the following cases.

When the gsmSSF-FSM makes a non-error case state transition to the state Idle and there is one or more pending operation and TC dialogue is established, TC dialogue can be terminated by TC-END primitive with component(s). When the gsmSSF sends the last EventReportBCSM, ApplyChargingReport or CallInformationReport the dialogue may be ended from the gsmSSF by a TC-END request primitive with basic end.

In the case that there is no pending operation and TC dialogue is established, TC dialogue can be terminated by TC-END primitive with zero component or prearranged end. When the gsmSSF-FSM makes a non-error case state transition to the state Idle and there is no operation to be sent, the dialogue is ended by means of a TC-END request primitive (basic) with zero components, or the dialogue is locally ended by means of a TC-END request primitive with prearranged end.

In the case where a call release is initiated by any other entity than an gsmSCF, the gsmSSF can end a dialogue with a TC-END request primitive with zero component or prearranged end if a TC dialogue is established and the gsmSSF has no pending call information requests (or pending requests which should be treated in the same way, see subclause 12.1.1.1) nor any armed EDP.

When the gsmSSF has sent the last EventReportBCSM, ApplyChargingReport or CallInformationReport the dialogue may be ended from the gsmSCF by a TC-END request primitive with basic end.

Assisting gsmSSF FSM related messages

A dialogue shall be established when the Assisting gsmSSF-FSM moves from the state Idle to the state Waiting for Instructions. The AssistRequestInstructions operation shall be transmitted with a TC-BEGIN request primitive.

For all other operations sent from the Assisting gsmSSF-FSM, the dialogue shall be maintained except for the following cases.

When the Assisting gsmSSF-FSM makes a non-error case state transition to the state Idle and there is one or more pending operation and TC dialogue is established, TC dialogue can be terminated by TC-END primitive with component(s).

In the case that there is no pending operation and TC dialogue is established, TC dialogue can be terminated by TC-END primitive with zero component or prearranged end. When the Assisting gsmSSF-FSM makes a non-error case state transition to the state Idle and there is no operation to be sent, the dialogue is ended by means of a TC-END request primitive (basic) with zero components, or the dialogue is locally ended by means of a TC-END request primitive with prearranged end.

SSME-FSM related messages

The following procedures shall be followed:

- The dialogue shall be maintained when the ActivityTest Return Result is sent.

12.1.2.1.2 gsmSCF-to-gsmSSF messages

This subclause defines the normal procedures for TC messages from the gsmSCF to the gsmSSF.

SCSM-FSM related messages

A dialogue shall be established when the SCSM-FSM receives of InitialDP operation for TDP-R or AssistRequestInstructions operation.

For subsequent operations sent from the SCSM-FSM, the dialogue shall be maintained except for the following cases, i.e. all other operations are sent after a dialogue was established from the gsmSSF (the gsmSCF has previously received a TC-BEGIN indication primitive with an InitialDP operation or an AssistRequestInstructions operation).

The dialogue shall no longer be maintained when the prearranged end condition is met in the gsmSCF. When the gsmSCF does not expect any messages other than possibly REJECT or ERROR messages for the operations sent and when the last associated operation timer expires, the dialogue is locally ended by means of a TC-END request primitive with prearranged end.
Alternatively, the sending of operations, leading to the termination of the relationship, by means of a TC-END request primitive (basic end) is possible.

SCME-FSM related messages

The operations sent from the SCME-FSM shall be issued according to the following procedures:

- The dialogue shall be maintained when the ActivityTest operation is sent.

- For sending one or more CallGap operations, the SCME FSM shall use an existing SCSM FSM associated dialogue which was initiated by a gsmSSF-FSM (i.e. established for the transmission of the InitialDP operation). The dialogue shall be maintained.

12.1.2.1.3 gsmSSF/gprsSSF-to-gsmSCF SMS related messages

A dialogue shall be established when the gsmSSF/gprsSSF has finalised trigger processing and moves to the state Waiting for Instructions. The relevant CAP operation, which can only be the InitialDPSMS operation, shall be transmitted in the same message.

For all other operations sent from the gsmSSF/gprsSSF, the dialogue shall be maintained.

The dialogue shall no longer be maintained when the prearranged end condition is met in the gsmSSF/gprsSSF. When the gsmSSF/gprsSSF makes a state transition to the state Idle, the dialogue is locally ended by means of a TC-END request primitive with prearranged end.

When the gsmSSF/gprsSSF has sent the last EventReportSMS operation the dialogue may be ended from the gsmSCF by a TC-END request primitive with basic end. If the gsmSSF/gprsSSF decides to apply basic end, it shall send TC-END with zero components.

12.1.3 gsmSCF-to-gsmSSF/gprsSSF SMS related messages

All operations are sent after a dialogue was established from the gsmSSF/gprsSSF (the gsmSCF has previously received a TC-BEGIN indication primitive with an InitialSMSEvent operation).

The dialogue shall no longer be maintained when the prearranged end condition is met in the gsmSCF. When the gsmSCF does not expect any messages other than possibly REJECT or ERROR messages for the operations sent and when the last associated operation timer expires, the dialogue is locally ended by means of a TC-END request primitive with prearranged end.

Alternatively, the sending of operations, leading to the termination of the control relationship, by means of a TC-END request primitive (basic end) is possible.

12.1.3.1 Use of dialogue handling services

Dialogue handling services are used to trigger the sending of the APDUs associated with the operations involved in the CAP packages.

Component grouping is performed under the control of the application-process through an appropriate usage of the TC-BEGIN, TC-CONTINUE and TC-END service.

12.1.3.2 Abnormal procedures

The following procedures also apply to the gsmSCF-gsmSRF interfaces.

12.1.3.2.1 gsmSCF-to-gsmSSF/gsmSRF messages

Considering that gsmSSF and gsmSRF do not have the logic to recover from error cases detected on the gsmSCF-gsmSSF/gsmSRF interface, the following shall apply:

- Operation errors and rejection of TC components shall be transmitted to the gsmSSF and, respectively, the gsmSRF with a TC-END request primitive, basic end.

If, in violation of the above procedure, an ERROR or REJECT component is received with a TC-CONTINUE indication primitive, the gsmSSF and, respectively, the gsmSRF shall abort the dialogue with a TC-U-ABORT request primitive.

12.1.3.2.2 gsmSSF/gsmSRF/ -to-gsmSCF messages

Operation errors and rejection of TC components shall be transmitted to the gsmSCF according to the following rules:

- The dialogue shall be maintained when the preceding message, which contained the erroneous component, indicated that the dialogue shall be maintained. I.e. the error or reject shall be transmitted with a TC-CONTINUE request primitive if the erroneous component was received with a TC-CONTINUE indication primitive.
  On receipt of an ERROR or REJECT component the gsmSCF decides on further processing. It may either continue, explicitly end or abort the dialogue.

- In all other situations the dialogue shall no longer be maintained. I.e. the error or reject shall be transmitted with a TC-END request primitive, basic end, if the erroneous component was received with a TC-BEGIN indication primitive.

- on expiration of application timer TSSF or TSRF, dialogue shall be terminated by means of by TC-U-ABORT primitive with an Abort reason, regardless of TC dialogue is established or not.

If the error processing in the gsmSSF/gsmSRF leads to the case where the gsmSSF/gsmSRF is not able to process further gsmSCF operations while the dialogue is to be maintained, the gsmSSF/gsmSRF aborts the dialogue with a TC-END request primitive with basic end or a TC-U-ABORT request primitive, depending on whether any pending ERROR or REJECT component is to be sent or not.

The gsmSSF can end a dialogue with a TC-U-ABORT request primitive in case call release is initiated by any other entity then the gsmSCF and the gsmSSF has no pending call information requests (or pending requests which should be treated in the same way, i.e., ApplyCharging nor any armed EDP to notify the gsmSCF of the call release (for alternative way, see subclause 12.1.2.1.1).

12.1.4   gsmSCF-to-gsmSSF/gprsSSF SMS related messages

Considering that the gsmSSF/gprsSSF does not have the logic to recover from error cases detected on the gsmSCF-gsmSSF/gprsSSF interface, the following shall apply:

- operation errors and rejection of TC components shall be transmitted to the gsmSSF/gprsSSF with a TC-END request primitive, basic end.

If, in violation of the above procedure, an ERROR or REJECT component is received with a TC-CONTINUE indication primitive, the gsmSSF/gprsSSF shall abort the dialogue with a TC-U-ABORT request primitive.

12.1.5   gsmSSF/gprsSSF-to-gsmSCF SMS related messages

Operation errors and rejection of TC components shall be transmitted to the gsmSCF according to the following rules:

- the dialogue shall be maintained when the preceding message, which contained the erroneous component, indicated that the dialogue shall be maintained. I.e. the error or reject shall be transmitted with a TC-CONTINUE request primitive if the erroneous component was received with a TC-CONTINUE indication primitive;

- on receipt of an ERROR or REJECT component the gsmSCF decides on further processing. It may either continue, explicitly end or abort the dialogue;

If the error processing in the gsmSSF/gprsSSF leads to the case where the gsmSSF/gprsSSF is not able to process further gsmSCF operations while the dialogue is to be maintained, the gsmSSF/gprsSSF aborts the dialogue with a TC-U-ABORT request primitive.

The gsmSSF/gprsSSF aborts a dialogue with a TC-U-ABORT request primitive if release is initiated by any other entity than the gsmSCF and the gsmSSF/gprsSSF has no armed EDPs to notify the gsmSCF.

12.1.5.1   Use of dialogue handling services

On receipt of a TC-U-REJECT.ind in the FE, this primitive should be ignored. It is up to the application process to abort, continue or terminate the dialogue, if not already terminated by the sending application process according to the rules as stated in subclause 12.1.1.2. This is also applicable for invoke problems related to a class 4 linked operation.

A TC-U-REJECT.req should be sent followed by a TC-CONTINUE.req.

On receipt of a TC-R-REJECT.ind in the FE, this primitive should be ignored. It is up to the application process to abort, continue or terminate the dialogue, if not already terminated by the sending application process according to the rules as stated in subclause 12.1.1.2. This is also applicable for invoke problems related to a class 4 linked operation.

On receipt of a TC-L-REJECT indication primitive (i.e. when a protocol error has been detected by the local TC entity) which cannot be related to an active operation, it is up to the application process to continue or to terminate the dialogue and implicitly trigger the transmission of the reject component or to abort the dialogue.

On receipt of a TC-NOTICE indication the TC-USER is informed that a message cannot be delivered by the Network Layer. It occurs if the Return Option has been set (see subclause 12.1.1.3.7). It is for the application process to decide whether to terminate the dialogue or retry.

The application-process is the sole user of the TC-P-ABORT service and TC-NOTICE service.

The receipt of a TC-U-ABORT-Ind or TC-P-ABORT-Ind on a dialogue terminates all request processing.

12.1.5.2   Dialogue handling

12.1.5.2.1   Dialogue establishment

12.1.5.2.2   Dialogue continuation

12.1.5.2.3   Dialogue termination

12.1.5.2.4   User abort

12.1.5.2.5   Provider abort

12.1.5.2.6   Mapping to TC dialogue primitives

The gsmSSF-gsmSCF IN services can be mapped onto TC services. This subclause defines the mapping of the gsmSSF-gsmSCF IN services onto the services of the TC dialogue handling services defined in ETS 300 287-1 [6].

a)   The TC-BEGIN service is used to invoke the operations of the gsmSCF-gsmSSF connection packages as defined in clause 6.

b)   The TC-CONTINUE service is used to report the success of the operations invoked in a TC-BEGIN service and to invoke or respond to any other operations.

c)   The TC-U-ABORT service is used to report the failure of operations of the connection packages as defined in clause 6.

The mapping of the parameters onto the TC-BEGIN primitive is defined in subclause 12.1.1.3.6 with the following qualifications:

-   The AC Name parameter shall take the value of the application-context-name field of the cap3-sms-AC object if the initiating AE is a gsmSSF.

The mapping of the parameters onto the TC-CONTINUE primitive is defined in subclause 12.1.1.3.6.

The mapping of the parameters onto the TC-U-ABORT primitive is defined in subclause 12.1.1.3.6 with the following qualifications:

-   The Application-Context-Name parameter shall be used as specified in ETS 300 287-1 [6]. When the responding AE refuses a dialogue because the application-context-name it receives is not supported, this parameter shall have the value of the application-context-name field of the cap3-sms-AC object if the responding AE is a gsmSCF.

The use of the parameters of the TC-END service is defined in subclause 12.1.1.3.6.

12.1.5.3 Component Handling

12.1.5.3.1 Procedures for CAP operations

The CAP ASEs are users of the TC component handling services except for the TC-L-REJECT and TC-L-CANCEL services which are used by the application-process. Receipt of a TC-L-REJECT-Ind leads the application-process to abandon the dialogue (i.e. it issues a TC-U-ABORT-Request primitive).

The TC-U-CANCEL service is never used.

12.1.5.3.2 Mapping to TC component parameters

The gsmSSF-gsmSCF IN ASE services are mapped onto the TC component handling services. The mapping of operations and errors onto TC services is defined in subclause 12.1.1.4.2 with the following qualifications:

The timeout parameter of the TC-INVOKE-Req primitives is set according to clause 6.

12.1.6 gsmSCF-gsmSRF interface

12.1.6.1 Normal procedures

12.1.6.1.1 SCF-to/from-gsmSRF messages

A dialogue is established when the gsmSRF sends an AssistRequestInstructions operation to the gsmSCF. For all other operations sent to/from the gsmSRF, the dialogue shall be maintained.

In the case that there is no pending operation and TC dialogue is established, TC dialogue can be terminated by TC-END primitive with zero component. When the SCSM makes a non-error case state transition to end user interaction and there is no operation to be sent, the dialogue is ended by means of a TC-END request primitive (basic) with zero components.

The dialogue shall no longer be maintained when sending the SpecialisedResourceReport operation for PlayAnnoucement with disconnection from the gsmSRF set to true or Return Result of the PromptAndCollectUserInformation with disconnection from the gsmSRF set to true with disconnection from the gsmSRF set to true. The dialogues is ended by means of a TC-END request primitive with basic end, and the one of above operations is transmitted with the same request.

Regardless of whether pending operation exists or not, when the SRSM-FSM is informed of the disconnection of bearer connection (in the case of gsmSCF initiated disconnection or call abandon from call party) and dialogue is established, the dialogue is ended by means of a TC-END request primitive (basic) with zero components or TC-END request primitive (prearranged end).

The dialogue shall no longer be maintained when the prearranged end condition is met in the gsmSRF. When the SRSM-FSM is informed the disconnection of bearer connection and TC dialogue is not established, TC dialogue is locally terminated by TC-END primitive with prearranged end.

When the gsmSCF does not expect any messages other than possibly REJECT or ERROR messages for the operations sent and when the last associated operation timer expires, the dialogue is locally ended by means of a TC-END request primitive with prearranged end. Alternatively, the sending of operations, leading to the termination of the relationship, by means of a TC-END request primitive (basic end) is possible.

In the relay case, the gsmSRF-gsmSCF relationship uses the gsmSSF-gsmSCF TC dialogue. This is possible, because begin and end of the gsmSRF-gsmSCF relationship are embedded in the gsmSSF-gsmSCF relationship. gsmSRF-gsmSCF information shall be exchanged with TC-CONTINUE request primitives.

12.1.6.1.2 Abnormal procedures

12.1.6.1.3 Dialogue handling

12.1.6.1.4 Dialogue establishment

12.1.6.1.5 Dialogue continuation

12.1.6.1.6 Dialogue termination

12.1.6.1.7 User abort

12.1.6.1.8 Provider abort

12.1.6.1.9 Mapping to TC dialogue primitives

The gsmSCF-gsmSRF IN services can be mapped onto TC services. This subclause defines the mapping of the gsmSCF-gsmSRF IN services onto the services of the TC dialogue handling services defined in ETS 300 287-1 [6].

a) The TC-BEGIN service is used to invoke the operations of the gsmSRF-gsmSCF connection packages as defined in clause 6.

b) The TC-CONTINUE service is used to report the success of the operations invoked in a TC-BEGIN service and to invoke or respond to any other operations.

c) The TC-U-ABORT service is used to report the failure of operation of the gsmSCF-gsmSRF operations packages as defined in clause 6.

The mapping of parameters onto the TC Dialogue services is as defined in subclause 12.1.1.3.6 with the following qualifications:

The mapping of the parameters onto the TC-BEGIN primitive is defined in subclause 12.1.1.3.6 with the following qualifications:

- The AC Name parameter shall take the value of the application-context-name field of the gsmSRF-gsmSCF-ac object.

12.1.6.2 Component handling

12.1.6.2.1 Procedures for CAP operations

12.1.6.2.2 Mapping to TC component parameters

The mapping of parameters for the TC component services is defined in subclause 12.1.1.4.2 with the following qualifications.

The Timeout Parameter of the TC-INVOKE service is set according to clauses 6.

12.1.7 gprsSSF-gsmSCF interface

12.1.7.1 Normal procedures

12.1.7.1.1 TC-dialogues and relationships

The GPRS dialogue can consist of multiple consecutive TC-dialogues. A GPRS dialogue is identified by a GPRS-ReferenceNumber consisting of the originationReference and the destinationReference. One GPRS-Reference is assigned by the SGSN and shall be unique within this SGSN. The other GPRS-Reference is assigned by the gsmSCF and shall be unique within this gsmSCF.

The *TC*-dialogues are closed and (re)opened whenever necessary.

12.1.7.1.2 Use of the GPRS Reference

For the use of CAP defined GPRS-ReferenceNumber, see also the ASN.1 notation in the subclause 8.1.

When the gprsSSF sends the first operation for a new GPRS dialogue (InitialDPGPRS), the gprsSSF shall include a GPRS-ReferenceNumber in the TC message. This GPRS-ReferenceNumber shall consist of the *SGSN Process Id* as originationReference, which is internally allocated by the gprsSSF. This number is used by the gprsSSF to associate an incoming TC message with an internal GPRS Process.

When the gsmSCF has received the InitialDPGPRS operation, it shall store the SGSN Process ID and allocate an *SCF Process Id* which is used by the gsmSCF to associate an incoming TC message with an internal SCF Process.

The SCP shall include the GPRS-ReferenceNumber in the first TC-CONTINUE message, *SGSN Process Id* in destinationReference and *SCF Process Id* in originationReference, returned to the gprsSSF.

When the gprsSSF receives the first TC message from the SCP for this GPRS dialogue, the gprsSSF shall store the SCP Process Id together with the SGSN Process Id.

From here onwards all the TC messages that open a new TC dialogue shall include the GPRS-ReferenceNumber consisting of the originationReference and the destinationReference to associate the internal process in the origination entity and the destination entity, respectively, until the end of the relationship between these processes.

For any TC-CONTINUE in the existing TC dialogue, transporting the GPRS-ReferenceNumber is not needed except for the first response after the InitialDPGPRS operation.

12.1.7.1.3 gprsSSF-to-gsmSCF messages

This subclause defines the normal procedures for TC messages from the gprsSSF to the gsmSCF.

gprsSSF-FSM related messages

A GPRS dialogue and a TC dialogue shall be established when the gprsSSF moves from the state Idle to the state Waiting for Instructions. The InitialDPGPRS operation shall be transmitted in the same TC message, i.e. TC-BEGIN. It shall contain the GPRS-Reference as assigned by the SGSN in the originationReference. The gprsSSF may intiate the subsequent TC dialogues for this GPRS dialogue with the following operations:

- ApplyChargingReportGPRS

- EntityReleasedGPRS

- EventReportGPRS

The gprsSSF shall memorise the gsmSCF address used in the first response message to the InitialDPGPRS, and use it in the further TC dialogues. The gsmSCF shall memorise the gprsSSF address received along with the InitialDPGPRS, and use it in the further TC dialogues for the relationship between these processes.

The gsmSCF may open subsequent TC dialogues with the following CAP operations:

- ActivityTestGPRS;

- ApplyChargingGPRS;

- CancelGPRS;

- FurnishChargingInformationGPRS;

- ReleaseGPRS;

- RequestReportGPRSEvent;

- SendChargingInformationGPRS.

The CAP operation that opens a TC dialogue shall be sent with a TC-BEGIN request primitive. This message shall contain the GPRS-ReferenceNumber assigned by the sender of this message in the originationReference. If the

operation opens a subsequent TC dialogue this message shall contain also the previously received destinationReference. If an operation opens a GPRS dialogue then the TC message reply shall contain the originationReference as assigned by the sender, i.e. the gsmSCF.

The TC dialogue shall be closed for the idle periods, i.e. when the gprsSSF moves from the Waiting for Instructions state to the Idle state, if the gprsSSF is in the Monitoring state and has received all replies or time-outs for the operations sent, after standalone operations of the SCF in Monitoring state if gprsSSF is not going to the Idle state (ActivityTestGPRS, ApplyChargingGPRS, CancelGPRS, FurnishChargingInformationGPRS, RequestReportGPRSEvent, SendChargingInformationGPRS), or at the end of a GPRS dialogue.
Each TC dialogue shall be terminated by the gprsSSF using TC-END (basic end). The following operations can cause the end of the GPRS dialogue:

- ContinueGPRS;

- ConnectGPRS;

- ApplyChargingReportGPRS result;

- EntityReleasedGPRS rersult;

- EventReportGPRS (EDP-N) result;

- CancelGPRS;

- ReleaseGPRS;

- RequestReportGPRSEvent (disarming of DPs).

When the gprsSSF makes a non-error case state transition to the state Idle and there is one or more pending operation and TC dialogue is established, TC dialogue may be terminated by TC-END primitive with zero component(s) after all pending operations have been sent. When the gprsSSF sends the last EventReportGPRS, EntityReleasedGPRS or ApplyChargingReportGPRS, then after reception of the result or error, the GPRS dialogue may be ended from the gprsSSF by a TC-END request primitive with basic end.

In the case that there is no pending operation, result nor error, and TC dialogue is established, TC dialogue shall be terminated by a TC-END primitive with zero components.

In the case where a PDP context release or detach is initiated by any other entity than an gsmSCF, the gprsSSF shall end a GPRS dialogue with the EntityReleasedGPRS operation if the gprsSSF has no armed DP to report nor pending ApplyChargingReportGPRS which should reported.

In the case of overlapping dialogues for the same GPRS dialogue the gsmSCF opened TC dialogue is aborted by the gprsSSF with the abort reason overlapping-dialogue as specified in clause 5.7. This abort reason is used to indicate to the gsmSCF that a specific instance already has a TC dialogue open. It is typically obtained when both the gsmSCF and gprsSSF open a new dialogue at the same time. While the gprsSSF waits for a response to an operation sent in TC-BEGIN it may receive an operation from the gsmSCF in TC-BEGIN. In such cases the dialogue opened by the gprsSSF is maintained and the dialogue opened by the gsmSCF is aborted with this abort reason.

SSME-FSM related messages

The following procedures shall be followed:

- The TC dialogue shall be terminated by a TC-END primitive with zero components after the ActivityTestGPRS Return Result is sent.

12.1.7.1.4 gsmSCF-to-gprsSSF messages

This subclause defines the normal procedures for TC messages from the gsmSCF to the gprsSSF.

In the case of overlapping dialogues for the same relationship the gsmSCF opened dialogue is closed by the gprsSSF as specified in clause 5.7. The gsmSCF shall first respond normally to the operations sent by the gprsSSF, and then decide on the further actions.

SCME-FSM related messages

The operations sent from the SCME-FSM shall be issued according to the following procedures:

- A new subsequent TC dialogue is established when the ActivityTestGPRS operation is sent.

12.1.7.2   Abnormal procedures

12.1.7.2.1 gsmSCF-to-gprsSSF messages

This subclause defines the abnormal procedures for TC messages from the gsmSCF to the gprsSSF.

Considering that gprsSSF do not have the logic to recover from error cases detected on the gsmSCF-gprsSSF interface, the following shall apply:

- Operation errors and rejection of TC components shall be transmitted to the gprsSSF with a TC-END request primitive, basic end.

- The GPRS dialogue shall be closed.

If, in violation of the above procedure, an ERROR or REJECT component is received with a TC-CONTINUE indication primitive, the gprsSSF shall abort the dialogue with a TC-U-ABORT request primitive.

12.1.7.2.2 gprsSSF-to-gsmSCF messages

This subclause defines the abnormal procedures for TC messages from the gprsSSF to the gsmSCF.

Operation errors and rejection of TC components shall be transmitted to the gsmSCF according to the following rules:

- The TC dialogue shall be maintained when the preceding message, which contained the erroneous component, indicated that the dialogue shall be maintained. I.e. the error or reject shall be transmitted with a TC-CONTINUE request primitive.
  On receipt of an ERROR or REJECT component the gsmSCF decides on further processing. It may either continue, explicitly end or abort the TC dialogue. If the TC dialogue is closed due to such error, also GPRS dialogue shall be closed.

- - on expiration of application timer T_{SSF}, the TC dialogue shall be terminated by means of by TC-U-ABORT primitive with an Abort reason. The GPRS dialogue shall be closed.

If the error processing in the gprsSSF leads to the case where the gprsSSF is not able to process further gsmSCF operations while the TC dialogue is to be maintained, the gprsSSF aborts the TC dialogue with a TC-END request primitive with basic end or a TC-U-ABORT request primitive, depending on whether any pending ERROR or REJECT component is to be sent or not.

The gprsSSF can end a TC dialogue with a TC-U-ABORT request primitive in the following case:

- Any entity other than the gsmSCF initiates closure of the GPRS dialogue, and

- The gprsSSF has no pending reports, and

- The gprsSSF has no armed EDP to notify the gsmSCF that the GPRS dialogue has been closed.

For an alternative method, see subclause 12.1.7.1.1.

12.1.7.2.3   Default GPRS Handling

If a TC dialogue is closed due to unrecoverable TC/protocol error (does not apply to the overlapping TC dialogues), or aborted by the gsmSCF, or at the Tssf expiry, then the gprsSSF shall check the applicable Default GPRS Handling parameter of the GPRS-CSI. In this context the applicable Default GPRS Handling is the one that corresponds the TDP that opened the GPRS dialogue. The same default handling shall apply to all state models that are controlled by the particular GPRS dialogue.

12.2   Services assumed from SCCP

This subclause describes the services required from the SCCP that may be used by the CAMELapplications for the CAMEL Application Part (CAP) used between the gsmSSF, assisting gsmSSF, gsmSRF,gprsSSF, and gsmSCF

The following SCCP revisions are supported by CAP version 3:

- Signalling Connection Control Part, Signalling System no. 7 CCITT ('Blue Book SCCP')

- Signalling Connection Control Part, Signalling System no. 7 ITU-T Recommendation Q.711 to Q.716 ('White Book SCCP')

NOTE: Support of White Book SCCP at the receiving side shall be mandated from 00:01hrs, 1st July 2002(UTC).

- ANSI T1.112-1996 [40]: "American National Standards for Telecommunications– Signalling System Number 7 (SS7) – Signalling Connection Control Part (SCCP)".

When CAP uses White Book SCCP to send a message, and SCCP segments the message into one or more XUDT messages, then the transmission of this message may fail.

Failure will occur when the destination SCCP, or any intermediate SCCP, does not support White Book SCCP.

Support of ANSI T1.112 SCCP applies only to PLMNs in North America. Interworking between a PLMN in North America and a PLMN outside North America will involve a STP to translate between ANSI SCCP and ITU-T/CCITT SCCP.

12.2.1   Normal procedures

The SCCP is an MTP3-User, as defined within TS 29.202 [2].The SCCP forms the link between the TC and the signalling transport (e.g MTP3, M3UA) and provides (in conjunction with the signalling transport) the network services for the CAMEL applications. The network services provided allow the signalling messages sent by the application to the lower layers to be successfully delivered to the peer application.

12.2.2   Service functions from SCCP

12.2.2.1   SCCP connectionless services

The services described are those given in the SCCP ITU-T recommendations Q.711 to Q.716 should be consulted to identify possible interworking and compatibility issues between the different SCCP versions.

The following Connection-less services are expected from the SCCP:

a) Network Addressing to enable signalling connections between SCCP users;

b) Sequence Control to enable the SCCP users to invoke "sequence guaranteed" or "sequence not guaranteed" options for a given stream of messages to the same destination;

c) Segmentation/reassembly of large user messages (only for 'White Book SCCP');

d) Return Option to enable the SCCP users to invoke "discard message on error" or "return message on error" for a given message not able to be delivered by the SCCP to the destination SCCP user, due to routeing or segmentation/re-assembly failure;

e) Congestion control.

The primitives used for the above services are given below.

The N-UNITDATA request and N-UNITDATA indication primitives are used to send and receive data. The parameters of these primitives include the Called and Calling Addresses, Sequence Control, Return Option and User Data with the addressing parameters always mandatory.

The N-NOTICE indication primitive is used to return undelivered data if return option is set and a routeing/segmentation error occurs.

12.2.2.1.1 Sub-System Number (SSN)

The use of SSN is a network operator option and values for intra-PLMN usage are network specific. A CAP SSN has been reserved for inter-PLMN use, as defined in 3GPP TS 23.003 [49].

12.2.2.1.2 Addressing

The addressing elements consist of information contained within the Calling and the Called Party Addresses which are sent by the application to the lower layers.

The application expects the SCCP to route messages by either (a) the use of the Destination Point Code (DPC) plus the Subsystem Number (SSN), or (b) the use of the GT plus optionally the SSN. The application also specifies to the lower layer whether to route the message on the DPC or the GT.

Method (a) above may be used when the application is aware of the destination point code and the destination SSN located at that point code to which the message is to be delivered. Within a national network different SSNs, according to ITU-T SCCP recommendation Q.713 [41], may be allocated for the different network specific applications, e.g. a SSN may be allocated for a gsmSCF functionality.

Method (b) above may be used when a message is to be delivered to a SCCP-user which can be identified by the combination of the elements within the GT. An example of the use of this method is when messages have to be delivered between different networks. This method may be used since the originating network is unaware of the point code and SSN's allocations within the destination network. The network that determines the end-node to which the message is to be delivered has to perform a GT Translation to derive the destination Point Code and the SSN. If optionally the original address contained the SSN, then this may be used as the destination SSN, or the translation may, if required, provide an appropriate new SSN.

When GT is used for addressing, the CAMEL application expects that the SCCP supports the following elements as defined in ITU-T SCCP recommendation Q.713 [41]:

Address Indicator:

> The application will set this indicator to indicate one or any combination of the elements "signalling point code, GT, subsystem number" in the address information octets.

GT Indicator:

> This indicator specifies the method employed for the formatting of the address information. There are four values (1 to 4), for example, the value 4 indicates that the format includes the numbering plan, the nature of the address indicator and the translation type. The format with the indicator value 4 is always used for internetwork connections.

Translation Type:

> The Translation Types are defined within ITU-T SCCP recommendation Q.713 [41].

Numbering Plan:

> 1) The *proposed* "generic numbering plan" is described within the ITU-T SCCP recommendation Q.713 [41]. This numbering plan identifies the SCCP nodes or SCCP subsystems unambiguously such that messages may be efficiently routed within one or more networks, and is particularly useful when used in the Calling Address for the sending of a response message back to the originating node. This is achieved by having an international and a national part in the generic numbering plan. For response messages the responding node analyses the international part of the generic numbering plan to determine the gateway node to which the response is to be routed. Having routed to the gateway node, the national part (which was populated within the originating network) is analysed to determine the originating node within the originating network.

> 2) A numbering plan which would define particular nodes based specifically on services is *outside the scope of CAMEL.*

> 3) The SCCP caters for a number of other numbering plans (e.g. ISDN, Mobile etc. numbering plans). The whole range catered for is shown in [2]. These may be used by CAMEL applications if deemed suitable.

Encoding Scheme:

> This identifies the encoding scheme employed by the application and is generally BCD encoded with odd or even number of digits.

GT Address Information:

> These are the actual address digits supplied by the application and may be BCD digits or encoded as indicated by the encoding scheme.

The network provider must ensure that any change of GT value during translation preserves any CAP specific information contained in the initial GT value.

This requirement applies to all interfaces, not just those used for internetworking.

If *route on SSN* is to be supported from the originating node then a ITU-T non-zero internationally standardized SSN is required for international internetworking.

In the absence of a ITU-T standardized non-zero SSN for CAP services, the use of *route on GT* is mandatory from the origin node to the network containing the destination node.

When the SCCP of CCITT Signalling System No. 7 is used, the format and coding of address parameters carried by the SCCP for that purpose shall comply with ITU-T Recommendation Q.713 [41] with the following restrictions:

1) Intra-PLMN addressing

   For communication between entities within the same PLMN, the use of SCCP addressing is network specific, and method (a) and (b) are both applicable.

2) Inter-PLMN addressing

   method (b) with the mandatory SSN is only applicable with the following format:

   i) Called Party Address

      - SSN indicator = a standardised SSN shall be used. The SSN used shall be that specified for CAP in 3GPP TS 23.003 [49];

      - Point Code indicator = 0;

      - Global title indicator = 0100 (Global title includes translation type, numbering plan, encoding scheme and nature of address indicator);

      - Translation type = 0 (Not used);

      - Routing indicator = 0 (Routing on global title);

   The format is also described in the table 12-2 below (for NP=1, NAI=4):

Table 12-2: Called Party Address format

8	7	6	5	4	3	2	1	
0	RI = 0	GTI = 4 (0100)				SSNI = 1	PCI = 0	Octet 1
SSN = a value for CAP as specified in 3GPP TS 23.003 [49]								Octet 2
Translation type = 0								Octet 3
Numbering plan = 1 (E.164)				Encoding scheme = 1 or 2				Octet 4
0	Nature of address indicator = 4 (International)							Octet 5
Country code digit 2 (if present)				Country code digit 1				Octet 6
National Destination Code (NDC) Digit 1				Country code digit 3 (if present)				Octet 7
NDC digit 3 (if present)				NDC digit 2 (if present)				Octet 8
NDC digit 5 (if present)				NDC digit 4 (if present)				Octet 9
Equipment idntification digit 2				Equipment idntification digit 1				Octet 10
...				...				...
filler = 0 (if needed)				Equipment idntification digit m				Octet n

Note - Country code, National Destination Code, and SN (equipment id) are provided as example, so each digit may differ for each Inter-PLMN addressing case. (e.g., there is a case where only CC digit 1 shall be used). See ITU-T recommendation Q.713 [41] for translation rules.

   ii) Calling Party Address

      - SSN indicator = a standardised SSN shall be used. The SSN used shall be that specified for CAP in 3GPP TS 23.003[49];

      - Point code indicator = 0;

- Global title indicator = 0100 (Global title includes translation type, numbering plan, encoding scheme and nature of address indicator);

- Translation type = 0 (Not used);

- Routing indicator = 0 (Routing on Global Title).

The format is also described in the table 12-3 below (for NP=1, NAI=4):

Table 12-3: Calling Party Address format

8	7	6	5	4	3	2	1	
0	RI = 0	GTI = 4				SSNI = 1	PCI = 0	Octet 1
SSN = a value for CAP as specified in 3GPP TS 23.003 [49]								Octet 2
Translation type = 0								Octet 3
Numbering plan = 1 (E.164)				Encoding scheme = 1 or 2				Octet 4
0	Nature of address indicator = 4 (International)							Octet 5
Country code digit 2 (if present)				Country code digit 1				Octet 6
National Destination Code (NDC) Digit 1				Country code digit 3 (if present)				Octet 7
NDC digit 3 (if present)				NDC digit 2 (if present)				Octet 8
NDC digit 5 (if present)				NDC digit 4 (if present)				Octet 9
Equipment idntification digit 2				Equipment idntification digit 1				Octet 10
...				...				...
filler = 0 (if needed)				Equipment idntification digit m				Octet n

Note - Country code, National Destination Code, and SN (equipment id) are provided as example, so each digit may differ for each Inter-PLMN addressing case. (e.g., there is a case where only CC digit 1 shall be used). See ITU-T recommendation Q.713 [41] for translation rules.

When the SCCP of ANSI Signalling System No. 7 is used, the format and coding of address parameters carried by the SCCP for the purpose of signalling transfer shall comply with ANSI Recommendation T1.112 [40] with the following restrictions:

1) Intra-PLMN addressing

 For communication between entities within the same PLMN, the use of SCCP addressing is network specific.

2) Inter-PLMN addressing

 a) Called Party Address

 - SSN indicator = a standardised SSN shall be used. The SSN used shall be that specified for CAP in 3GPP TS 23.003[49];

 - Point Code indicator = 0;

 - Global title indicator = 0010 (Global title includes translation type);

 - the Translation Type (TT) field shall be coded according to the content of the address information as follows:

 TT = 9 (decimal), if IMSI is included

 TT = 14 (decimal), if MSISDN is included,

 or TT = 10 (decimal), if a Network Element address is included. (If TT=10, then Number Portability is not applicable, if TT=14, then Number Portability is applicable)

 - Routing indicator = 0 (Routing on global title);

 b) Calling Party Address

 - SSN indicator = a standardised SSN shall be used. The SSN used shall be that specified for CAP in 3GPP TS 23.003[49];

 - Point code indicator = 0;

- Global title indicator = 0010 (Global title includes translation type);

- the Translation Type (TT) field shall be coded according to the content of the address information as follows:

  TT = 9 (decimal), if IMSI is included

  TT = 14 (decimal), if MSISDN is included,

  or TT = 10 (decimal), if a Network Element address is included. (If TT=10, then Number Portability is not applicable, if TT=14, then Number Portability is applicable)

- Routing indicator = 0 (Routing on Global Title).

12.2.2.1.3 Sequence control

The application will specify whether SCCP protocol class 0 or 1 is required. Class 0 provides a basic connection-less service where the sequence of message delivery is not guaranteed. Class 1 connection-less service provides a guaranteed sequence delivery of messages (with the same called address) for a given stream of messages. Class 1 shall be requested by any application that can send more than 1 TC message to its peer (consecutive TR-CONTINUE) before receiving a response from its peer (TR-CONTINUE or TR-END).

On receipt of a TC-RESULT-NL indication, the TC-USER shall request the transfer of a reject component using TC-U-REJECT request primitive, with the appropriate problem code (mistyped parameter).

The return option may be used if requested by the application (Network Operator to determine).

12.2.2.1.4 Return on error

Return on Error mechanism may be required by the CAMEL applications such that the application is aware of messages that have not been delivered to the destination by the SCCP. The return option allows the return of the message that was not delivered due to routeing or segmentation/re-assembly failure back to the issuing user. This return option may be required in all segments of a long message or only in the first segment by the CAMEL applications.

If the return option is invoked by the application and the message is not delivered then the SCCP specifies the "return reason" as specified in ITU-T SCCP recommendation Q.713 [41]. The N-NOTICE primitive is used to return the undelivered message to the originating user.

12.2.2.1.5 Segmentation / reassembly

The application expects that since the SCCP can send up to 260 octets of user data (including the address information and TC-message) in a UDT message (248 octets in a XUDT message performing segmentation and congestion control), segmentation is available for long user messages.

Also the SCCP is expected to perform the reassembly function on received segmented messages and deliver the reassembled message to the user.

However, it should be noted that even though the theoretical maximum size of SCCP-user data and addresses that can be segmented by the SCCP is 3 968 octets, the SCCP-user would limit the length to about 2 560 octets to allow for the largest known addresses. Note that the application must also allow for the octets used for the TC-message in the 2 560 octets.

The CAMEL application does not expect the SCCP to segment the long message into more than 16 segments.

12.2.2.1.6 Congestion control

To help control of possible congestion that might occur in the lower layers the application may assign a value to indicate the importance of the message. The use of this parameter requires the use of SCCP (1997) ITU-T Recommendations.

Also there exist other congestion control mechanisms as indicated below in SCCP Management.

These congestion control methods are network operator option in case of intra-PLMN network signalling, and shall not be used in case of inter-PLMN network signalling.

12.2.2.2   SCCP connection oriented services

The use by CAMEL applications for the Connection-oriented services is outside the scope of CAMEL.

12.2.2.3   SCCP management

The subsystems used within the CAMEL application expect the SCCP to provide management procedures to maintain network performance by re-routeing in the event of failure of a subsystem, and in case of network congestion by use of the congestion handling procedure. These procedures have appropriate interactions with the SCCP user as described in ITU-T SCCP recommendations Q.713 [41] and Q.714 [50].

To achieve the above the SCCP is expected to perform the following procedures:

- Signalling point status management (which include the signalling point prohibited, signalling point allowed, signalling point congested, and local "signalling transport" availability sub procedures).

- Subsystem status management (which include the subsystem prohibited, subsystem allowed, and subsystem status test sub procedures).

- Co-ordinated state change (a procedure which allows a duplicated subsystem to be withdrawn from service without affecting the performance of the network).

These SCCP management procedures are network operator option in case of intra-PLMN network signalling, and shall not be used in case of inter-PLMN network signalling.

Annex A (normative): Mapping between CAP and ISUP

A.1 InitialDP operation

Table A.1

ISUP message IAM (Note 1)	CAP operation InitialDP
Called party number	CalledPartyNumber
Calling party number	CallingPartyNumber
Calling party's category	CallingPartysCategory
Location number	LocationNumber
Original called number	OriginalCalledPartyID
User teleservice information (1st priority) High layer compatibility IE contained in access transport (2nd priority) (Note 2)	HighLayerCompatibility
Generic number 'additional calling party number'	AdditionalCallingPartyNumber
User service information prime (1st priority) User service information (2nd priority)	BearerCapability
Redirecting number	RedirectingPartyID
Redirection information	RedirectionInformation
Call diversion treatment indicators	ServiceInteractionIndicatorsTwo.Call diversion treatment indicators
Conference treatment indicators	ServiceInteractionIndicatorsTwo.Conference treatment indicators

NOTE 1: Optional parameters may be absent, i.e. they are only mapped, if these parameters are available at the DP.

NOTE 2: If two high layer compatibility information elements are contained in the access transport parameter, then the second information element, carrying the preferred HLC, is mapped to the CAP highLayerCompatibility parameter.

A.2 ContinueWithArgument operation

Table A.2 illustrates the mapping of parameters received in the ContinueWithArgument operation to parameters sent in the IAM message to the succeeding exchange. Parameters which were received in the IAM and are not replaced by parameters of the Connect operation are treated according to the normal procedures.

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

Table A.2

CAP operation ContinueWithArgument (Note 1)	ISUP message IAM
OriginalCalledPartyID	Original called number
CallingPartysCategory	Calling party's category
RedirectingPartyID	Redirecting number
RedirectionInformation	Redirection information
GenericNumbers	Generic number (Note 2)
ServiceInteractionIndicatorTwo	See Table A.4

NOTE 1: Optional parameters may be absent, i.e. they are only mapped, if received.

NOTE 2: The set of generic numbers received in the genericNumbers parameter is mapped to the appropriate number of Generic Number parameters in the ISUP IAM. This shall be performed irrespective of the value of the screening indicator in the ISUP calling party number.

A.3 Connect operation

On receipt of a Connect operation from the gsmSCF the called party number used for routing is derived from the destinationRoutingAddress (see Table A.3). If the triggering of the CAMEL service was made for a mobile terminating or forwarded call, an ACM message shall be sent to the preceding exchange. The encoding of the backward call indicators in the ACM is specified in 3GPP TS 09.12 [51].

Table A.3 illustrates the mapping of parameters received in the Connect operation to parameters sent in the IAM message to the succeeding exchange. Parameters which were received in the IAM and are not replaced by parameters of the Connect operation are treated according to the normal procedures.

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

Table A.3

CAP operation Connect (Note 1)	ISUP message IAM
destinationRoutingAddress	Called party number
originalCalledPartyID	Original called number
CallingPartysCategory	Calling party's category
RedirectingPartyID	Redirecting number
RedirectionInformation	Redirection information
genericNumbers	Generic number (Note 2)
ServiceInteractionIndicatorTwo	See Table A.4

NOTE 1: Optional parameters may be absent, i.e. they are only mapped, if received.

NOTE 2: The set of generic numbers received in the genericNumbers parameter is mapped to the appropriate number of Generic Number parameters in the ISUP IAM. This shall be performed irrespective of the value of the screening indicator in the ISUP calling party number.

Table A.4– Mapping of the CAP Connect and ContinueWithArgument operation serviceInteractionIndicatorsTwo to ISUP

Table A.4

CAP ServiceInteractionIndicators	ISUP parameter in	
	ACM/CPG/CON/ANM/REL	**IAM**
Call to be diverted indicator – call diversion allowed (default) – call diversion not allowed	---	Call diversion treatment indicators parameter Call to be diverted indicator – no indication – call diversion allowed – call diversion not allowed
Conference at DLE accept. ind. – accept conference request (default) – reject conference request	---	Conference treatment indicators parameter Conference acceptance ind. – no indication – accept conference request – reject conference request
Calling party restriction indicator - no IN impact (default) - presentation restricted	---	**Calling party number address presentation restricted indicator** - no impact - presentation restricted
Conference at OLE accept. ind. – accept conference request (default) – reject conference request	**ACM/CPG/CON/ANM: Conference treatment indicators parameter** Conference acceptance ind. – no indication – accept conference request – reject conference request	---
Call completion treatment indicator - accept CCBS service request (default) - reject CCBS service request	**REL, busy cause** Diagnostig field – CCBS possible – CCBS not possible	---
Connected number treatment indicator – no IN impact – presentation restricted – present called IN number – present called IN number restricted	Note 3	

NOTE 3:

If 'no IN impact' was received in the CAP serviceInteractionIndicatorsTwo (connected number treatment indicator), then a connected number parameter and a generic number parameter 'additional connected number' are passed on unchanged.

If 'presentation restricted' was received in the CAP serviceInteractionIndicatorsTwo, then

a) If a connected number parameter has been received in the ANM or CON message, the address presentation restricted indicator is set to 'presentation restricted'.

b) If a generic number parameter 'additional connected number' has been received in the ANM or CON message, the address presentation restricted indicator is set to 'presentation restricted'.

c) If a redirection number parameter has been received, a redirection number restriction parameter is sent in the ANM message with bits AB set to 'presentation restricted'.

If 'present called IN number' was received in the CAP serviceInteractionIndicatorsTwo, then

a) If a connected number parameter has been received in the ANM or CON message, the connected number parameter is modified as follows:

nature of address indicator and numbering plan indicator are encoded as received in the called party number of the IAM message,

address presentation restricted indicator: 00 (presentation allowed),

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

ETSI

b) A generic number parameter 'additional connected number' is deleted from the message, if applicable,

c) A redirection number parameter is deleted from the relevant messages, if applicable.

If 'present called IN number restricted' was received in the CAP serviceInteractionIndicatorsTwo, then

a) If a connected number parameter has been received in the ANM or CON message, the connected number parameter is modified as follows:

nature of address indicator and numbering plan indicator are encoded as received in the called party number of the IAM message,

address presentation restricted indicator: 01 (presentation restricted),

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

b) A generic number parameter 'additional connected number' is deleted from the message, if applicable,

c) A redirection number parameter is deleted from the relevant messages, if applicable.

A.4 AssistRequestInstructions operation

If an IAM is received at an assisting SSP containing a gsmSSF or an IP containing a gsmSRF then an AssistRequestInstructions operation is sent to the gsmSCF. The correlationID parameter in the AssistRequestInstructions operation can contain:

a) the CorrelationID digits extracted from the IAM Called Party Number,

b) the whole Called Party Number received in the ISUP IAM (CorrelationID digits extracted at gsmSCF),

c) the contents of the ISUP IAM CorrelationID parameter

In the case where the gsmSCF and the assisting gsmSSF are both in the HPLMN and ISUP 97 is supported then any of these mechanisms may be used.

In the case where the gsmSCF and the assisting gsmSSF are both in the HPLMN and ISUP 97 is not supported then mechanisms a) and b) may be used.

In the case where the gsmSCF is in the HPLMN and the assisting gsmSSF is in the VPLMN then only mechanism b) may be used when an all-ISUP 97 signalling path cannot be guaranteed. Mechanism a) may be used if bilateral agreements on the format of the information transferred in the ISUP IAM Called Party Number are defined between the HPLMN and VPLMN.

In the case where the gsmSCF is in the HPLMN and the assisting gsmSSF is in the VPLMN then mechanism c) only may be used if an all-ISUP 97 signalling path can be guaranteed between the HPLMN and the VPLMN.

A.5 ConnectToResource operation

On receipt of a ConnectToResource operation from the gsmSCF the the IP is connected to the incoming call, to facilitate User Interactive dialogue with the user.

If the User Interactive dialogue is to be performed at a forwarding MSC or GMSC then an ACM message shall be sent to the preceding exchange. The encoding of the backward call indicators in the ACM is specified in 3GPP TS 09.12 [51], with the Optional Backward Call Indicators indicating 'in-band information or an appropriate pattern is now available'.

If the User Interactive dialogue is to be performed at a forwarding MSC or GMSC then when the IP indicates through-connection and the ConnectToResource operation indicates that a bothway throughconnection is required an ANM message shall be sent to the preceding exchange if answer has not previously been sent. As a network operator/equipment vendor option a CPG message may be sent if ANM has already been sent.

A.6 EstablishTemporaryConnection operation

On receipt of an EstablishTemporaryConnection operation from the gsmSCF then if the triggering of the CAMEL service was made for a mobile terminating or forwarded call an ACM message shall be sent to the preceding exchange. The encoding of the backward call indicators in the ACM is specified in 3GPP TS 09.12 [51]. In addition, an ISUP IAM shall be sent to the succeeding exchange.

Table A.5 illustrates the mapping of parameters received in the EstablishTemporaryConnection operation to parameters sent in the IAM message to the succeeding exchange. On sending of the IAM the awaiting address complete timer is started. If the timer expires the call is released in both directions and an appropriate indication is returned to the calling subscriber.

Table A.5

CAP operation EstablishTemporaryConnection (Note 1)	ISUP message IAM
assistingSSPIPRoutingAddress	Called party number
CorrelationID	Correlation id (note 1)
ScfId	GsmSCF id (note 1)

NOTE 1: These optional parameters may be absent, i.e. they are only mapped, if received. If they are received and cannot be mapped then an error is sent to the gsmSCF as detailed in clause 11.

NOTE 2: The AssistingSSPIPRoutingAddress parameter may also include a Hex B digit, in order to delineate the boundary between digits used for routing and digits forming part of the SCFiD and/or CorrelationID.

Except for the Called Party Number the remaining mandatory IAM parameters are set as follows:

a) Nature of connection indicators

Satellite indicator:	set as in an Originating MSC,
Continuity check indicator:	set as in Originating MSC,
Echo control device indicator:	set as in Originating MSC

b) Forward Call Indicators

National/international call indicator:	set as in Originating MSC,
End-to-end method indicator:	00 (no end-to-end method available),
Interworking indicator:	0 (no interworking encountered),
End-to-end information indicator:	0 (no end-to-end information available),
ISDN User Part indicator:	1 (ISDN User Part used all the way),
ISDN User Part preference indicator:	00 (ISDN User Part preferred all the way),
ISDN access indicator:	0 (originating access non-ISDN),
SCCP method indicator:	00 (no indication)

c) Calling Party's Category

00001010 (ordinary subscriber)

d) Transmission Medium Requirement

00000011 (3.1 kHz audio)

The ISUP IAM optional parameter Propagation Delay Counter is set as in an Originating MSC

A.7 ReleaseCall operation

Upon receipt of the ReleaseCall operation, the GMSC/gsmSSF (VMSC/gsmSSF) sends REL messages in both directions. The cause indicators parameter contains the releaseCallArg parameter of the ReleaseCall operation.

Annex B (informative):
Change history

					Change history
TSG CN#	**Version**	**CR**	**Tdoc CN**	**New Version**	**Subject/Comment**
Jun 1999	7.0.0	-			Transferred to 3GPP CN2
CN#04				3.0.0	
CN#06	3.0.0	013	NP-99471	3.2.0	Approved at TSGN#06
CN#07	3.2.0	015r5	NP-000161	3.3.0	Introduction of call gapping
CN#07	3.2.0	018r3	NP-000161	3.3.0	GPRS TCAP dialogues
CN#07	3.2.0	034r3	NP-000161	3.3.0	CCBS & CLI presentat indicators
CN#07	3.2.0	038r2	NP-000161	3.3.0	Addition of Connected number treatment indicator
CN#07	3.2.0	042r1	NP-000161	3.3.0	Editorial changes to clause 2-9
CN#07	3.2.0	043r1	NP-000161	3.3.0	Editorial changes to clause 10
CN#07	3.2.0	044r1	NP-000161	3.3.0	Editorial changes to clause 11
CN#07	3.2.0	045r1	NP-000161	3.3.0	Editorial changes to clause 12
CN#07	3.2.0	048r2	NP-000161	3.3.0	Transfer of destination address to gsmSCF
CN#07	3.2.0	052r1	NP-000161	3.3.0	Clarification on CUG handling and syntactical error correction on ASN.1
CN#07	3.2.0	053	NP-000161	3.3.0	Correction of GPRS session description
CN#07	3.2.0	056r1	NP-000161	3.3.0	Increasing the parameter constants
CN#07	3.2.0	057r1	NP-000161	3.3.0	Clarification of CUG handling
CN#08	3.3.0	062	NP-000251	3.4.0	Clarification of collectedDigits parameter
CN#08	3.3.0	064	NP-000251	3.4.0	SII2 CCBS treatment indicator default
CN#08	3.3.0	065	NP-000251	3.4.0	Remove of SII2 frw CCBS treatment ind
CN#08	3.3.0	066	NP-000251	3.4.0	Correction to Normative References
CN#08	3.3.0	067r1	NP-000251	3.4.0	Alignment of PDP address according to [29.060]
CN#08	3.3.0	068	NP-000251	3.4.0	Detailed specification of the Control Relationship for the ApplyChargingGPRS procedure.
CN#08	3.3.0	069r4	NP-000251	3.4.0	Various corrections and updates for 29.078
CN#08	3.3.0	071	NP-000251	3.4.0	Maximum length of cause parameter
CN#08	3.3.0	072	NP-000251	3.4.0	Maximum length of CAMEL call result
CN#08	3.3.0	073	NP-000249	3.4.0	removal of the SII2 Connected Number TreatmentIndicatorDefault Value
CN#08	3.3.0	076r1	NP-000249	3.4.0	Correction of CAP Object Identifiers
CN#08	3.3.0	077r1	NP-000249	3.4.0	Correction of GPRS operation Procedures
CN#08	3.3.0	078	NP-000249	3.4.0	Correction on Quality of Service (GPRS)
CN#08	3.3.0	079	NP-000249	3.4.0	Clean-up the Monitoring state User Interaction
CN#08	3.3.0	080r1	NP-000249	3.4.0	GPRS Charging ID Type Definition
CN#08	3.3.0	081r2	NP-000249	3.4.0	GPRS AC/ACR procedure description
CN#08	3.3.0	083	NP-000249	3.4.0	Removal of ActivityTestSMS operation
CN#08	3.3.0	084r1	NP-000249	3.4.0	PDPid in the EntityReleasedGPRS operation
CN#08	3.3.0	085r1	NP-000249	3.4.0	Specification of segmented GPRS Dialogues
CN#08	3.3.0	086	NP-000250	3.4.0	Reset Timer GPRS
CN#08	3.3.0	087r3	NP-000280	3.4.0	Introduction of GPRS reference in TCAP dialogue portion
CN#08	3.3.0	088	NP-000250	3.4.0	Corrections to MO-SMS
CN#08	3.3.0	089	NP-000250	3.4.0	Corrections to Common CAP types
CN#08	3.3.0	090	NP-000250	3.4.0	Corrections to CAP for circuit switched calls
CN#08	3.3.0	091r1	NP-000250	3.4.0	Corrections to CAP for GPRS
CN#08	3.3.0	092r2	NP-000251	3.4.0	Module IMPORT references
CN#08	3.3.0	094r1	NP-000250	3.4.0	General enhancements of GPRS Event Specific Information
CN#08	3.3.0	096r2	NP-000242	3.4.0	Clarification of encoding of CollectedDigits
CN#08	3.3.0	097r1	NP-000250	3.4.0	Two changes in the class
CN#08	3.3.0	098	NP-000250	3.4.0	Addition of Location Information to Initial DP GPRS
-	3.4.0	-	-	3.4.1	Headers corrected by MCC to remove "(DRAFT)" and eliminate erroneous "History" Clause
CN#09	3.4.1	099r3	NP-000459	3.5.0	Indication of Network requested PDP Context in Initial DP GPRS message
CN#09	3.4.1	101	NP-000458	3.5.0	CAP-GPRS-ReferenceNumber ASN.1 correction
CN#09	3.4.1	102	NP-000458	3.5.0	Removal of duplicate SGSN address/number from IDP-GPRS
CN#09	3.4.1	103r2	NP-000458	3.5.0	Comments on 'Introduction of GPRS reference in TCAP dialogue portion'
CN#09	3.4.1	104r1	NP-000458	3.5.0	Revised GPRS TCAP reference in TCAP dialogue portion
CN#09	3.4.1	106r3	NP-000458	3.5.0	Alignment of 29.078 for location info GPRS
CN#09	3.4.1	108	NP-000458	3.5.0	Move of processing rules for GPRS context.
CN#09	3.4.1	109	NP-000458	3.5.0	Correction to GPRS CONTRACT
CN#09	3.4.1	111r1	NP-000458	3.5.0	Replacing 'NetworkSpecificBoundSet' by CapSpecificBoundSet'

TSG CN#	Version	CR	Tdoc CN	New Version	Subject/Comment
					Change history
CN#09	3.4.1	112r1	NP-000458	3.5.0	Renumbering of GPRS specific Error codes
CN#09	3.4.1	113	NP-000458	3.5.0	Correction of CAMEL-SCIBillingChargingCharacteristics
CN#09	3.4.1	114r1	NP-000458	3.5.0	Clarification on GPRS dialogue handling in case of TC error/abort
CN#09	3.4.1	115r1	NP-000458	3.5.0	GPRS location information in GPRSEventSpecificInformation
CN#09	3.4.1	116r1	NP-000458	3.5.0	Corrections on cause definitions
CN#10	3.5.0	118r3	NP-000715	3.6.0	Correction on CAMEL CF and OR
CN#10	3.5.0	119	NP-000715	3.6.0	Correction of Cause and GPRSCause
CN#10	3.5.0	121r1	NP-000715	3.6.0	Correction to CAP3 GPRS-cause
CN#10	3.5.0	122r2	NP-000715	3.6.0	CAMEL3 removal of duplicate RAI
CN#10	3.5.0	124r2	NP-000741	3.6.0	Corrections to ASN.1 error
CN#10	3.5.0	125r1	NP-000715	3.6.0	Corrections of the stage 3 inconsistences
CN#10	3.5.0	126	NP-000715	3.6.0	"ElapsedTime" ASN.1 Type Correction (in ACR-GPRS)
CN#10	3.5.0	127r1	NP-000715	3.6.0	CAMEL3 ASN.1 reserved word "ms" replacement by "mobile"
CN#10	3.5.0	128r3	NP-000715	3.6.0	Correction of Apply Charging Report parameter definition
CN#10	3.5.0	130r1	NP-000715	3.6.0	Addition of a parameter to indicate the SAI
CN#10	3.5.0	131	NP-000715	3.6.0	Correction of Apply Charging Report GPRS definition
CN#10	3.5.0	135r1	NP-000715	3.6.0	Introduction of GGSN Address
CN#10	3.5.0	136r1	NP-000715	3.6.0	Introduction of ellipsis for GPRS CAPv3
CN#11	3.6.0	137r2	NP-010057	3.7.0	Clarification on APN usage in the ConnectGPRS operation
CN#11	3.6.0	138r1	NP-010057	3.7.0	Inconsistency between InitialDPGPRS procedure and generic GPRS procedure
CN#11	3.6.0	139r2	NP-010057	3.7.0	Hand-over indication for GPRS
CN#11	3.6.0	140r1	NP-010057	3.7.0	Description of Entity Released GPRS
CN#11	3.6.0	141r1	NP-010057	3.7.0	Correction to description of 'O-CSI Applicable' parameter
CN#11	3.6.0	142r1	NP-010057	3.7.0	Correction to LocationInformationGPRS
CN#11	3.6.0	143r2	NP-010057	3.7.0	No Volume charging on GPRS Session (clarifying text)
CN#11	3.6.0	145r1	NP-010057	3.7.0	Correction to MO-SMS
CN#11	3.6.0	147r1	NP-010057	3.7.0	Correction on GPRS related operation
CN#11	3.6.0	148r1	NP-010057	3.7.0	Correction to MSNetwork Capability parameter length
CN#11	3.6.0	149	NP-010057	3.7.0	Definition of the geographicalInformation parameter coding
CN#11	3.6.0	151	NP-010057	3.7.0	Removal of duplicate description in CWA
					TSG CN#11 plenary March 2001 decided to create Rel-4
CN#11	3.7.0	150	NP-010058	4.0.0	Introduction of CAP over IP in accordance with SIGTRAN
CN#12	4.0.0	156r2	NP-010311	4.1.0	Contradiction and inconsistency among descriptions on SMS
CN#12	4.0.0	163r3	NP-010312	4.1.0	ASN.1 syntax correction
CN#12	4.0.0	165	NP-010312	4.1.0	Correction of the MAXIMUM-FOR-FCI-BILLING-CHARGING value
CN#12	4.0.0	167	NP-010312	4.1.0	Correction of the gprsSSF error handling
CN#12	4.0.0	169r1	NP-010313	4.1.0	Clarification of the TC dialogue termination
CN#12	4.0.0	171r1	NP-010313	4.1.0	The termination of the dialogue is not clear after ActivityTestGPRS Return Result.
CN#12	4.0.0	176	NP-010312	4.1.0	Correction to IMPORT statements
CN#12	4.0.0	177	NP-010311	4.1.0	Correction to ACR-GPRS procedure description
CN#12	4.0.0	178	NP-010311	4.1.0	Correction on the usage of SII2 parameter in CAP
CN#12	4.0.0	179	NP-010313	4.1.0	Alignment the 29.078 on the 23.078
CN#12	4.0.0	180	NP-010311	4.1.0	Correction to state transition for Assisting gsmSSF
CN#12	4.0.0	181	NP-010313	4.1.0	Setting of End User Address Spare Bits
CN#12	4.0.0	188r1	NP-010354	4.1.0	Correction for the CAMEL3 ACR-GPRS parameter range problem (roll-over)

History

Document history		
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