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Digital cellular telecommunications system (Phase 2+) (GSM);
Universal Mobile Telecommunications System (UMTS);
Customised Applications for Mobile network Enhanced Logic (CAMEL);
CAMEL Application Part (CAP) specification
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GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS

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Foreword

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Contents

Foreword

This Technical Specification has been produced by the 3GPP.

This TS specifies the Customised Applications for Mobile network Enhanced Logic (CAMEL) CAMEL Application Part (CAP) within the 3GPP system.

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 this TS, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version 3.y.z

where:

    x   the first digit:

        1   presented to TSG for information;

        2   presented to TSG for approval;

        3   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 specification;

1   Scope

This Technical Specification 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 [14]. Descriptions and definitions provided by EN 301 140-1 [14] are directly referenced by this standard in case no additions or clarifications are needed for the use in the CAP.

2   References

References may be made to:

a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or

b) all versions up to and including the identified version (identified by"up to and including" before the version identity); or

c) all versions subsequent to and including the identified version (identified by"onwards" following the version identity); or

d) publications without mention of a specific version, in which case the latest version applies.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

2.1   Normative references

[1]   ETR 186-2:"Intelligent Network (IN); Interaction between IN Application Protocol (CAP) 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]   ETS 300 008-1:"Integrated Services Digital Network (ISDN); Signalling System No.7; Message Transfer Part (MTP) to support international interconnection; Part 1: Protocol specification [ITU-T Recommendations Q.701 (1993), Q.702 (1988), Q.703 to Q.706 (1993), modified]".

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

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

[10]	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]	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 (CAP); Part 1: Protocol specification [ITU-T Recommendation Q.1600 (1997), modified]".

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

[13]	3G TS 29.002:"Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) specification (3G 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]   ES 201 296: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP); Signalling aspects of charging".

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

3   Definitions and abbreviations

3.1   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
CS	Call Segment
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
MAC	Message Authentication Code
MACF	Multiple Association Control Function
MSC	Mobile services Switching Centre
MTP	Message Transfer Part
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 , ITU-T Recommendation X.680), 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 .

The CAMEL Application Protocol (CAP) is a ROS Element (ROSE) user protocol (see CCITT Recommendation X.219 and CCITT Recommendation X.229). 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 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 [14] for details of the example physical scenarios.
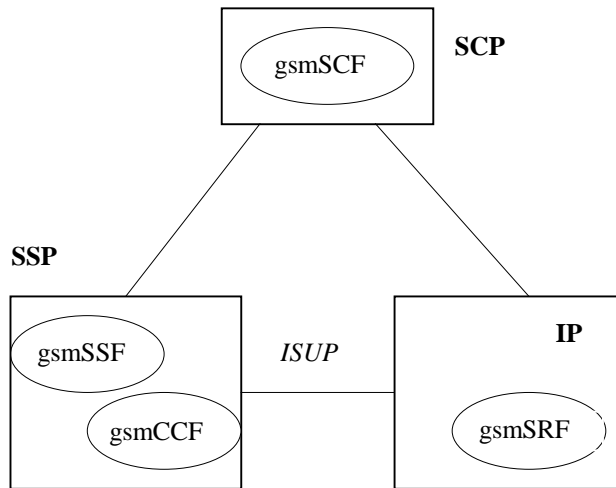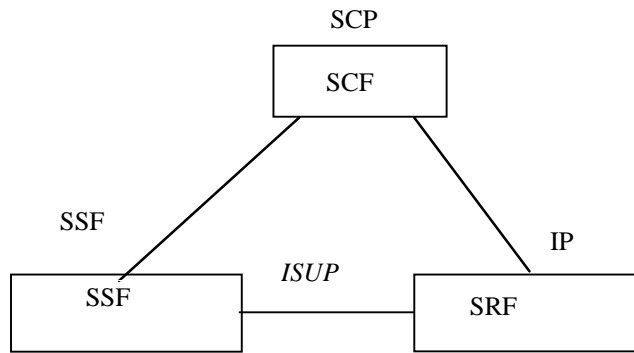
Scenario 1, Direct Path To IP (Ref. CS1 cases b) & d))

Figure 1 (continued): Scenarios

SCP

SCF

Initiating
SSP

Assisting
SSP

IP

SSF

ISUP

SSF relay

SRF

SCP

gsmSCF

InitiatingSSP

AssistingSSP

gsmSSF

ISUP

gsmSSF

internal

gsmSRF

gsmCCF

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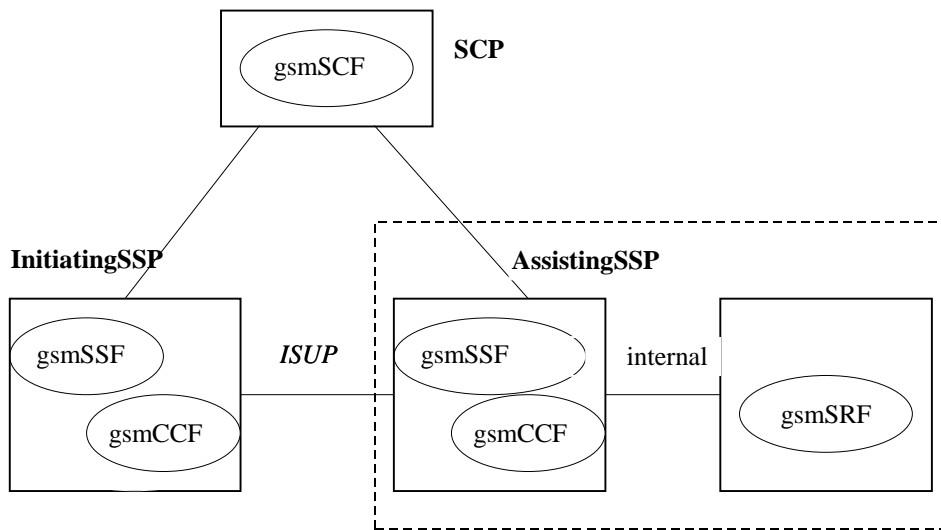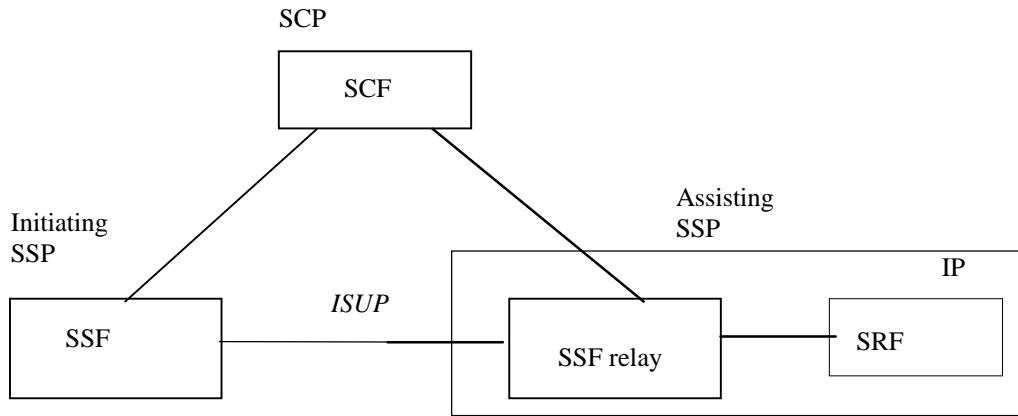
Scenario 2a, Connection to IP via an Assisting SSF with relay function; IP co-located with Assisting gsmSSF (Ref.
CS1 case c))

SCP

SCF

Initiating
SSP

Assisting
SSP

IP

SSF

ISUP

SSF relay

SRF
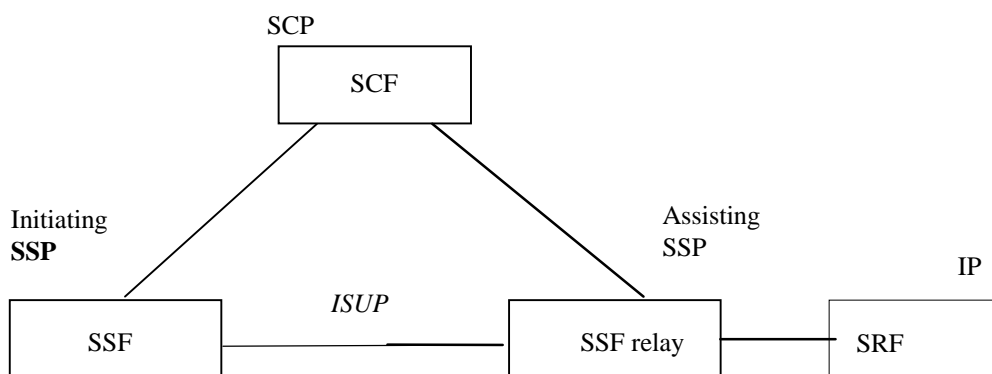
Figure 1 (continued): Scenarios
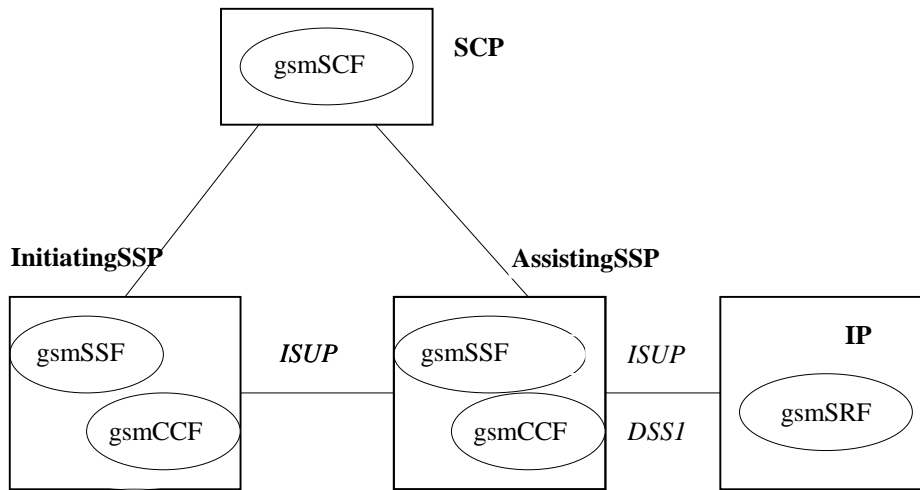
Scenario 2b : Connection to IP via an Assisting SSF with relay function; IP not co-located with Assisting gsmSSF (Ref CS1 case c))
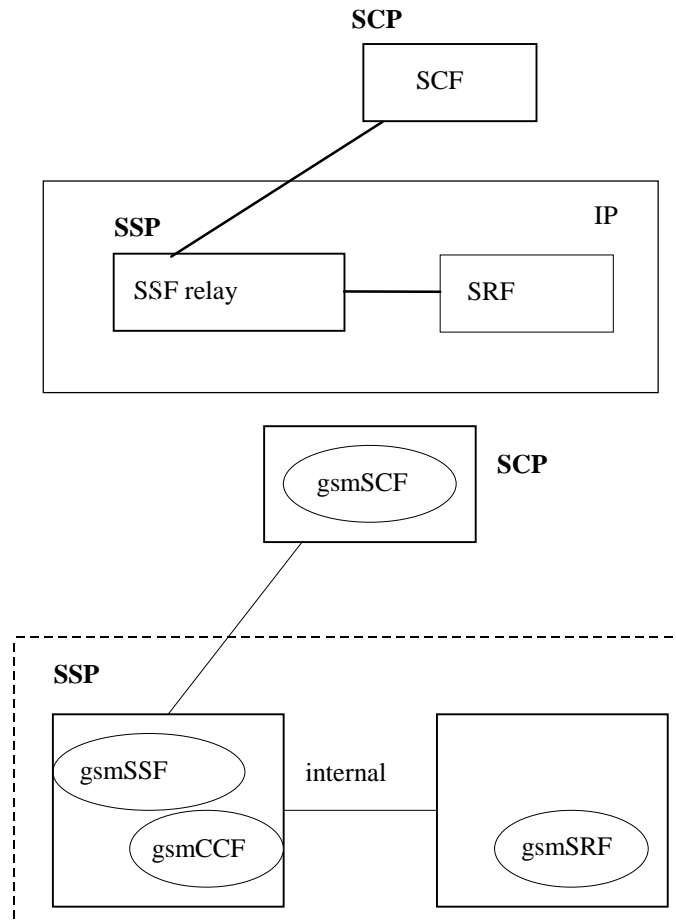
Scenario 3, Connection to IP with relay function; IP co-located with gsmSSF (Ref CS1 case a))

Figure 1 (continued): Scenarios
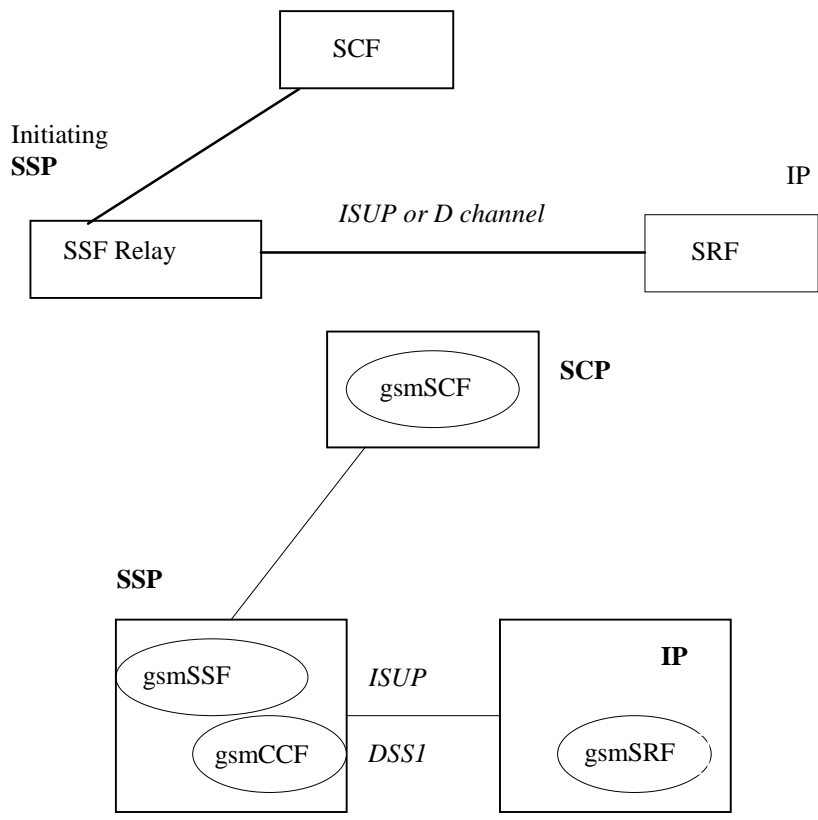
Scenario 4, Connection to IP with relay function; IP not co-located with gsmSSF (Ref CS1 case a))
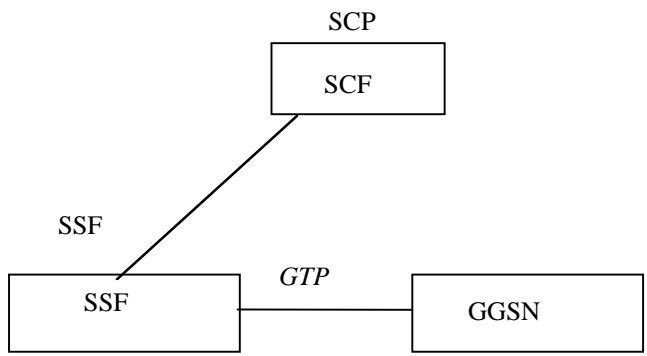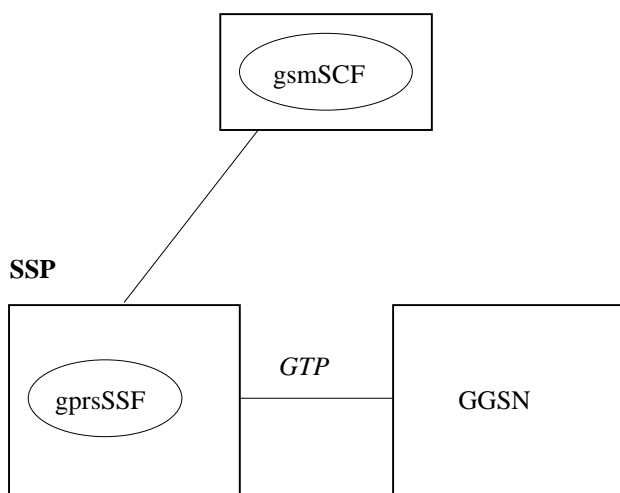
Scenario 5, GPRS interworking. No connection to IP

Figure 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.

4.1.3   CAP protocol architecture

Many of the terms used in this clause are based on the OSI application layer structure as defined in ISO 9545 .

The CAP protocol architecture is illustrated in figure 4-9.

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 12-18 of the present document). Each operation is specified using the OPERATION macro described in figure 4-10.
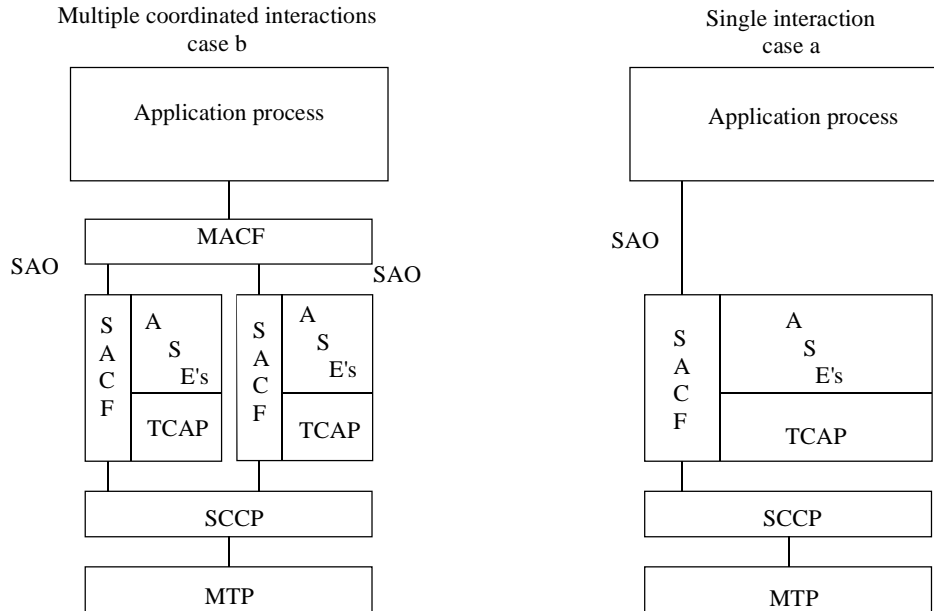
Note: CAP is the collection of all specifications in ASEs

Figure 4-9: CAP protocol architecture

The use of the Application Context (AC) negotiation mechanism as defined in X.208[**Error! Bookmark not defined.** allows the two communicating entities to identify exactly what their capabilities are and also what the capabilities required on the interface should be. This should be used to allow evolution through Intelligent Network (IN) capability sets.

If the indication of a specific AC is not supported by a pair of communicating FEs, some mechanism to pre-arrange the context needs to be supported.

4.1.4   CAP addressing

CAMEL Applications Part (CAP) makes use of the services offered by the Signalling Connection Control Part (SCCP).

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')

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.

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 3G TS 23.003.

4.1.5 Compatibility mechanisms used for CAP

4.1.5.1 Introduction

This subclause specifies the compatibility mechanisms that shall be used to ensure consistent future versions of CAP.

There are three categories of compatibility:

- 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 ITU-T Recommendations.

4.1.5.2 Definition of CAP compatibility mechanisms

4.1.5.3 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.1218 [7] or an operation according to ETS 300 374-1 [14] 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 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;

- the gsmSCF shall apply the normal error handling for unknown operations or parameters except for parameters
  in the InitialDP operation. All parameters specified in ITU-T Recommendation Q.1218 [7] and in ETS 300 374-1 [14] for InitialDP shall be known by the gsmSCF, those not included in the CAP shall be ignored.

Tagging of CAP additions to ITU-T Recommendation Q.1218[7] and ETS 300 374-1 [14] are specified from 50 to 59.

4.1.5.4 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 [3].

4.1.5.5 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 [18]).

4.1.5.6 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 [8] for a definition of this mechanism.

4.2 SACF/MACF rules

4.2.1 Reflection of TCAP AC

TCAP 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.

TCAP AC negotiation applies only to the gsmSCF interfaces.

Refer to the ITU-T Recommendations Q.77 X-Series (*Transaction capabilities application part*) for a more detailed description of the TCAP 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 3, 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) ???(0) ???Domain(1) ???-network(1) modules(3)
CAP-datatypes (50) version3(0)}


DEFINITIONS IMPLICIT TAGS ::=
BEGIN
IMPORTS
    tc-Messages, classes FROM CAP-object-identifiers
        {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1) module(0) CAP-
object-identifiers(17) version3(0)}
    InvokeIdType
FROM TCAPMessages tc-Messages
    EXTENSION,
        PARAMETERS-BOUND,
        SupportedExtensions {}
FROM CAP-classes classes



AccessPointName {PARAMETERS-BOUND: bound}::= OCTET STRING (SIZE(
        bound.&minAccessPointNameLength ..
        bound.&maxAccessPointNameLength))

-- Indicates the AccessPointName, refer to 3G TS 24.008for 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 --})

-- 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 3G TS 29.002 [Reference
    15].
-- 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
    …
    }

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)
-- 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 3G 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 3G
TS 24.008
-- for encoding. This data type carries only the"type of number","numbering plan
-- identification" and"number digit" fields defined in 3G TS 24.008;
-- 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 ETS 300 356-1 [4] for encoding.

CallingPartyNumber {PARAMETERS-BOUND : bound}   ::= OCTET STRING (SIZE (
        bound.&minCallingPartyNumberLength..
        bound.&maxCallingPartyNumberLength))
-- Indicates the Calling Party Number. Refer to ETS 300 356-1 [4] 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 --})
```

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

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

        }
    }

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


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


CAMEL-FCISMSBillingChargingCharacteristics ::= CHOICE{
    fCIBCCCAMELsequence1            [0] SEQUENCE {
        freeFormatData                  [0] OCTET STRING (SIZE (minFCIBillingChargingDataLength..
                                                    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
    }

Cause {PARAMETERS-BOUND : bound}                ::= OCTET STRING (SIZE (bound.&minCauseLength..
```

```
                  bound.&maxCauseLength))
-- Indicates the cause for interface related information.
-- Refer to ETS 300 356-1 [4] Cause parameter for encoding.
-- For the use of cause and location values refer to ITU-T Recommendation Q.850
--  Shall only include the cause value.


ChargingCharacteristics          ::= CHOICE {
        maxTransferredVolume             [0] INTEGER (0..4294967295)
        maxElapsedTime                   [1] INTEGER (0..864000)
        }

--   maxTransferredVolume is measured in number of bytes


--   maxElapsedTime is measured in 100 milliseconds

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

CliPresentationIndicator         ::= OCTET STRING (SIZE (1))
-- Indicates the Presentation Indicator to be used in the Calling Party Number.
-- Bits 8, 7, 6, 5, 2 and 1 are spare, encoded as 1 by the sender and ignored by the receiver.
-- Bits 4 and 3 encode the Address presentation restricted indicator in the Calling Party Number
-- as shown in ITU-T Recommendation Q.763

CollectedDigits                          ::= SEQUENCE {
    minimumNbOfDigits      [0] INTEGER (1..16) DEFAULT 1,
    maximumNbOfDigits      [1] INTEGER (1..16),
    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 usage is service dependent.

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

CorrelationID {PARAMETERS-BOUND : bound}    ::= Digits {bound}
-- used by gsmSCF for correlation with a previous operation.
-- Refer to clause xx for a description of the procedures associated with this parameter.

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 [4] 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
--
-- The following parameters should use Generic Digits:
-- CorrelationID in EstablishTemporaryConnection
-- number in VariablePart
-- digitsResponse in ReceivedInformationArg
-- 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    :== INTEGER (0..86400),
        timeGPRSIfTariffSwitch      :== SEQUENCE {
            timeGPRSSinceLastTariffSwitch   :== INTEGER (0..864000),
            timeGPRSTariffSwitchInterval    :== INTEGER (0..864000)
            }
        }

-- timeGPRSSinceLastTariffSwitch and timeGPRSTariffSwitchInterval are measured in seconds

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 {
        -- no specific info defined—
            ...
            },
    oDisconnectSpecificInfo [7] SEQUENCE {
            releaseCause            [0] Cause {bound}           OPTIONAL,
            ...
            },
    tBusySpecificInfo [8] SEQUENCE {
            busyCause               [0] Cause {bound}           OPTIONAL,
            callForwarded           [50] NULL                   OPTIONAL,
            ...
            },
    tNoAnswerSpecificInfo [9] SEQUENCE {
            callForwarded           [50] NULL                   OPTIONAL,
            ...
            },
    tAnswerSpecificInfo [10] SEQUENCE {
            -- no specific info defined --
```

```
            ...
            },
     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 --})
    }

-- 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 --})
    }

-- This parameter indicates the 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.&minFCIBillingChargingLengthPlusTwo        ..
    bound.&maxFCIBillingChargingLengthPlusTwo))
                                     (CONSTRAINED BY {-- shall be the result of the BER-encoded
value of type CAMEL-FCISMSBillingChargingCharacteristics --})
-- 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
    callCompletionTreatmentIndicator [53]   OCTET STRING (SIZE(1))  OPTIONAL,
    -- acceptCallCompletionServiceRequest   'xxxx xx01'B,
    -- rejectCallCompletionServiceRequest   'xxxx xx10'B
    -- network default is accept call completion service request
    …
    }

GenericNumber {PARAMETERS-BOUND : bound}            ::= OCTET STRING (SIZE(
                bound.&minGenericNumberLength..
                bound.&maxGenericNumberLength))
--  Indicates a generic number. Refer to ETS 300 356-1 [4] Generic number for encoding.

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

GPRSCause {PARAMETERS-BOUND : bound}                ::= OCTET STRING (SIZE (bound.&minCauseLength..
        bound.&maxCauseLength))
-- Indicates the cause for interface related information.
-- Refer to 3G TS 29.060 Cause parameter for encoding.
-- For the use of cause and location values refer to ITU-T Recommendation Q.850
-- Shall only include the cause value.

GPRSChargingID                          ::= INTEGER (0..4294967295)
-- The Charging ID is a counter which value is allocated by the GGSN during PDP context
-- establishment.

GPRSEvent                          ::= SEQUENCE {
    gPRSEventType                   [0] GPRSEventType,
    monitorMode                     [1] MonitorMode
    }

--  Indicates the GPRS event information for monitoring.

GPRSEventSpecificInformation {PARAMETERS-BOUND : bound}            ::= CHOICE {
        attachChangeOfPositionSpecificInformation    [0] SEQUENCE {
            newRoutingAreaIdentity          [0] RAIdentity
            },
        pdp-ContextchangeOfPositionSpecificInformation  [0] SEQUENCE {
            newRoutingAreaIdentity          [0] RAIdentity,
            chargingID                      [1] GPRSChargingID
            },
        detachSpecificInformation               [1] SEQUENCE {
            inititatingEntity               [0] InitiatingEntity
            },
        disconnectSpecificInformation           [2] SEQUENCE {
            inititatingEntity               [0] InitiatingEntity
            },
        pDPContextEstablishmentSpecificInformation [3] SEQUENCE {
            accessPointName                 [0] AccessPointName {bound}
            },
        pDPContextEstablishmentAcknowledgementSpecificInformation   [4] SEQUENCE {
            chargingID                      [0] GPRSChargingID
            }
        }


-- For the encoding of NewRoutingAreaIdentity refer to 3G TS 29.060
```

```
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 3G TS 24.008

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 {
        ms                        (0),
        sgsn                      (1),
        hlr                       (2),
        ggsn                      (3)
        }

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 {
        cellIdOrLAI             [0] OCTET STRING (SIZE(5..7)) OPTIONAL,
-- coded according to 3G TS 29.002.
        geographicalInformation  [1] OCTET STRING (SIZE (8)) OPTIONAL,
-- Refers to geographical Information defined in 3G TS 23.032.
        sgsn-Number             [2]   ISDN-AddressString  OPTIONAL,
}

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 [4] 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.


MiscCallInfo                               ::= SEQUENCE {
    messageType            [0] ENUMERATED {
        request                (0),
        notification           (1),
        …
        }
    }
-- Indicates detection point related information.

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 section 14.

MSNetworkCapability                          ::= OCTET STRING (SIZE (3))
-- 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 3G TS 24.008


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 3G TS 24.008


NACarrierInformation                ::= SEQUENCE {
        naCarrierId             [0] NAEA-CIC                          OPTIONAL,
        naCICSelectionType      [1] NACarrierSelectionInfo            OPTIONAL,
        ...}

NACarrierSelectionInfo              ::= OCTET STRING (SIZE (1))
-- NA carrier selection information octet carries the same values as ANSI
-- ISUP T1.113:        '00'H – not indicated or not explicitly provided
--                     '01'H – subscribed not dialed
--                     '02'H – subscribed and dialed
--                     '03'H – subscribed with dialing undetermined
--                     '04'H – dialed CIC not subscribed

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

```
--  NA Oli information takes the same value as defined in ANSI ISUP T1.113
--  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)


NAChargeNumber                       ::= OCTET STRING (SIZE (2..7))
--  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. 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 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


NA-Info                      ::= SEQUENCE {
    naCarrierInformation             [0] NACarrierInformation            OPTIONAL,
    naOliInfo                        [1] NAOliInfo                       OPTIONAL,
    naChargeNumber                   [2] NAChargeNumber                  OPTIONAL,
    ...}


OriginalCalledPartyID                ::= OCTET STRING (SIZE (minOriginalCalledPartyIDLength ..
                                         maxOriginalCalledPartyIDLength))

--  Indicates the original called number. Refer to ETS 300 356-1 [4] 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 3G TS 23.078 [16].

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.

PDPType                              ::= SEQUENCE {
        pDPTypeOrganization              [0] OCTET STRING (SIZE(1)),
        pDPTypeNumber                    [1] OCTET STRING (SIZE(1))
        }

QualityOfService                     ::= OCTET STRING (SIZE (5))
--  Quality of Service according to 3G TS 24.008.
--  The gprsSSF shall send the Quality of Service to the gsmSCF when a chargable change in Quality
--  of Service has been detected.

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

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 [4] Redirecting number for encoding.

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

RequestedInformationTypeList {PARAMETERS-BOUND : bound} ::= SEQUENCE SIZE (1..bound.&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 3G TS 24.011.
-- 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 IDP, CON.
    backwardServiceInteractionsInd    [1] BackwardServiceInteractionInd        OPTIONAL,
    -- applicable to operations IDP, CON.
    bothwayThroughConnectionInd       [2] BothwayThroughConnectionInd          OPTIONAL
    holdTreatmentIndicator            [50] OCTET STRING (SIZE(1))          OPTIONAL,
    -- acceptHoldRequest   'xxxx xx01'B
    -- rejectHoldRequest   'xxxx xx10'B
    -- network default is accept hold request
    cwTreatmentIndicator              [51]   OCTET STRING (SIZE(1))          OPTIONAL,
    -- acceptCw 'xxxx xx01'B
    -- rejectCw 'xxxx xx10'B
    -- network default is accept cw
    ectTreatmentIndicator             [52]   OCTET STRING (SIZE(1))          OPTIONAL,
    -- acceptEctRequest 'xxxx xx01'B
    -- rejectEctRequest 'xxxx xx10'B
    -- network default is accept ect request
    }

ServiceKey                                   ::= Integer4
-- Information that allows the gsmSCF to choose the appropriate service logic.


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
    }


TPDataCodingScheme              ::= OCTET STRING (SIZE (1))
-- TP Data Coding Scheme according to 3G TS 23.040

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], 3G TS 23.040.
--
-- 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 3G TS 23.040


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


TPShortMessageSubmissionInfo    ::= OCTET STRING (SIZE (1))
-- contains the 1st octect of the SMS-SUBMIT TPDU as specified in 3G TS 23.040


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 3G TS 23.040
-- the length of ValidityPeriod is either 1 octet or 7 octets

TransferredVolume               :== CHOICE {
      volumeIfNoTariffSwitch      :== INTEGER (0..4294967295),
      volumeTariffSwitchInterval  :== SEQUENCE {
          volumeSinceLastTariffSwitch    :== INTEGER (0..4294967295),
          volumeTariffSwitchInterval     :== INTEGER (0..4294967295)
          }
      }

-- volumeSinceLastTariffSwitch and volumeTariffSwitchInterval are measeured in bytes.

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

END
```

5.2   Error types

```
CAP-errortypes {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1) modules(3)
CAP-errortypes (1) version3(0)}
-- This module contains the type definitions for the IN CS2 errors.
-- 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) ???(0) ???Domain(1) ???-network(1) module(0) CAP-
object-identifiers(17) version3(0)}
    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 ERRORS 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)
            -- other values FOR FURTHER STUDY
            }
    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)
            --other values FOR FURTHER STUDY
            }
    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) ???(0) ???Domain(1) ???-network(1)
modules(0) CAP-operationcodes (2) version3(0)}
DEFINITIONS ::=
BEGIN

IMPORTS
ros-InformationObjects FROM CAP-object-identifiers
        {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1) modules(0) CAP-
object-identifiers(17) version3(0)}
    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: xx
-- 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
-- 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

END
```

5.4   Error codes

```
CAP-errorcodes {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1) modules(0)
CAP-errorcodes (3) version3(0)}
DEFINITIONS ::=
```

```
BEGIN
IMPORTS
ros-InformationObjects FROM CAP-object-identifiers
        {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1) modules(0) CAP-
object-identifiers(17) version3(0)}
    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: 18

END
```

5.5   Classes

```
CAP-classes {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1) modules(0) CAP-
classes (4) version3(0)}
DEFINITIONS ::=
BEGIN

IMPORTS

    ROS-OBJECT-CLASS, CONTRACT, OPERATION-PACKAGE, Code, OPERATION,
    CONNECTION-PACKAGE
FROM Remote-Operations-Information-Objects ros-InformationObjects

    emptyBind, emptyUnbind
FROM Remote-Operations-Useful-Definitions ros-UsefulDefinitions

    id-package-emptyConnection,
    id-rosObject-gsmSCF,
    id-rosObject-gsmSRF,
    id-rosObject-gsmSSF,
    ros-InformationObjects,
    ros-UsefulDefinitions,
    gsmSSF-gsmSCF-Protocol,
    gsmSCF-gsmSRF-Protocol,
    datatypes
FROM CAP-object-identifiers {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1)
modules(0) CAP-object-identifiers (17) version3(0)}

    inCs2AssistHandoffssfToScf,
    inCs2ScfToSsfGeneric,
    inCs2SsfToScfGeneric
FROM CAP-gsmSSF-gsmSCF-pkgs-contracts-acsgsmSSF-gsmSCF-Protocol

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

    CriticalityType
FROM CAP-datatypes datatypes
;

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

gsmSRF ROS-OBJECT-CLASS ::= {
    INITIATES   {gsmSRF-gsmSCF-contract}
```

```
    ID          id-rosObject-gsmSRF
    }

gsmSCF ROS-OBJECT-CLASS ::= {
    INITIATES   {capScfToSsfGeneric
                }
    RESPONDS    {capSsfToScfGeneric|
                capAssistHandoffssfToScf|
-- gsmSRF to gsmSCF contracts
                gsmSRF-gsmSCF-contract |
                }
    ID          id-rosObject-gsmSCF}

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 4.1.
-- 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 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.

inEmptyUnbind OPERATION ::= {
    RETURN RESULT   FALSE
    ALWAYS RESPONDS FALSE}
emptyConnectionPackage CONNECTION-PACKAGE ::= {
    BIND    emptyBind
    UNBIND  inEmptyUnbind
    RESPONDER UNBIND    TRUE
    ID      id-package-emptyConnection
    }
PARAMETERS-BOUND ::= CLASS
{
    &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,
        &maxCauseLength                                     INTEGER,
        &minDigitsLength                                    INTEGER,
        &maxDigitsLength                                    INTEGER,
        &minFCIBillingChargingLengthLength                            INTEGER,
        &maxFCIBillingChargingLengthLength                            INTEGER,
        &minGenericNumberLength                             INTEGER,
        &maxGenericNumberLength                             INTEGER,
        &minIPSSPCapabilitiesLength                         INTEGER,
        &maxIPSSPCapabilitiesLength                         INTEGER,
        &minLocationNumberLength                            INTEGER,
        &maxLocationNumberLength                            INTEGER,
        &minMessageContentLength                            INTEGER,
        &maxMessageContentLength                            INTEGER,
        &minOriginalCalledPartyIDLength                     INTEGER,
        &maxOriginalCalledPartyIDLength                     INTEGER,
        &minReceivedInformationLength                       INTEGER,
        &maxReceivedInformationLength                       INTEGER,
        &minRedirectingPartyIDLength                        INTEGER,
        &maxRedirectingPartyIDLength                        INTEGER,
        &minScfIDLength                                     INTEGER,
        &maxScfIDLength                                     INTEGER,
        &minSCIBillingChargingLength                        INTEGER,
        &maxSCIBillingChargingLength                        INTEGER,
        &numOfBCSMEvents                                    INTEGER,
        &numOfExtensions                                    INTEGER,
        &numOfGenericNumbers                                INTEGER,
        &numOfMessageIDs                                    INTEGER,
}
WITH SYNTAX
{
    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
    MAXIMUM-FOR-CAUSE                               &maxCauseLength
    MINIMUM-FOR-DIGITS                              &minDigitsLength
    MAXIMUM-FOR-DIGITS                              &maxDigitsLength
    MINIMUM-FOR-FCI-BILLING-CHARGING            &minFCIBillingChargingLength
    MAXIMUM-FOR-FCI-BILLING-CHARGING            &maxFCIBillingChargingLength
    MINIMUM-FOR-GENERIC-NUMBER                      &minGenericNumberLength
    MAXIMUM-FOR-GENERIC-NUMBER                      &maxGenericNumberLength
    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-RECEIVED-INFORMATION                &minReceivedInformationLength
    MAXIMUM-FOR-RECEIVED-INFORMATION                &maxReceivedInformationLength
    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
    NUM-OF-BCSM-EVENT                               &numOfBCSMEvents
    NUM-OF-EXTENSIONS                               &numOfExtensions
    NUM-OF-GENERIC-NUMBERS                          &numOfGenericNumbers
    NUM-OF-MESSAGE-IDS                              &numOfMessageIDs
}
```

```
-- The following instance of the parameter bound is just an example
networkSpecificBoundSet PARAMETERS-BOUND ::=
{
    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           12
    MINIMUM-FOR-CALLING-PARTY-NUMBER          2
    MAXIMUM-FOR-CALLING-PARTY-NUMBER          10
    MINIMUM-FOR-CALL-RESULT                   12  MAXIMUM-FOR-CALL-RESULT               24
    MINIMUM-FOR-CARRIER                       1
    MAXIMUM-FOR-CARRIER                       5
    MINIMUM -FOR-CAUSE                        2
    MAXIMUM-FOR-CAUSE                         2
    MINIMUM-FOR-DIGITS                        2
    MAXIMUM-FOR-DIGITS                        11
    MINIMUM-FOR-FCI-BILLING-CHARGING          5
    MAXIMUM-FOR-FCI-BILLING-CHARGING          49
    MINIMUM-FOR-FCI-BILLING-CHARGING          1
    MAXIMUM-FOR-FCI-BILLING-CHARGING          40
    MINIMUM-FOR-GENERIC-NUMBER                3
    MAXIMUM-FOR-GENERIC-NUMBER                11
    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-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-TIME-ZONE            8
    MAXIMUM-FOR-TIME-AND-TIME-ZONE            8
    NUM-OF-BCSM-EVENT                         10
    NUM-OF-EXTENSIONS                         10
    NUM-OF-GENERIC-NUMBERS                    5
    NUM-OF-INFO-ITEMS                         4
    NUM-OF-MESSAGE-IDS                        5
}
END
```

5.6   Object IDentifiers (IDs)

```
CAP-object-identifiers {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1)
modules(0) CAP-object-identifiers(17) version3(0)}
DEFINITIONS ::=
BEGIN
-- This module assigns object identifiers for Modules, Packages, Contracts and AC
-- for CAP

-- For Modules from TCAP, 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) version3(0)}
ros-genericPDUs                OBJECT IDENTIFIER ::=
    {joint-iso-ccitt remote-operations(4) generic-ROS-PDUs(6) version3(0)}
ros-UsefulDefinitions          OBJECT IDENTIFIER ::=
    {joint-iso-ccitt remote-operations(4) useful-definitions(7) version3(0)}
sese-APDUs                     OBJECT IDENTIFIER ::=
    {joint-iso-ccitt genericULS(20) modules(1) seseAPDUs(6)}
guls-Notation                  OBJECT IDENTIFIER ::=
    {joint-iso-ccitt genericULS (20) modules (1) notation (1)}
```

```
guls-SecurityTransformations    OBJECT IDENTIFIER ::=
    {joint-iso-ccitt genericULS (20) modules (1) gulsSecurityTransformations (3)}
ds-UsefulDefinitions            OBJECT IDENTIFIER ::=
    {joint-iso-ccitt ds(5) module(1) usefulDefinitions(0) 3}
spkmGssTokens                   OBJECT IDENTIFIER ::=
    {iso(1) identified-organization(3) dod(6) internet(1) security(5) mechanisms(5) spkm(1)
spkmGssTokens(10)}

-- For IN-CS1 Modules
contexts                        OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1) modules (0) contexts (8)
selectedContexts (1) version3(1)}

-- For CAP Modules
datatypes                       OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1) modules(0) CAP-datatypes
(0) version3(0)}
errortypes                      OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1) modules(0) CAP-
errortypes (1) version3(0)}
operationcodes                  OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1) modules(0) CAP-
operationcodes (2) version3(0)}
errorcodes                      OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1) modules(0) CAP-
errorcodes (3) version3(0)}
classes                         OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1) modules(0) CAP-classes
(4) version3(0)}
gsmSSF-gsmSCF-Operations             OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1) modules(0) CAP-gsmSSF-
gsmSCF-ops-args (5) version3(0)}
gsmSSF-gsmSCF-Protocol          OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1) modules(0) CAP-gsmSSF-
gsmSCF-pkgs-contracts-acs (6) version3(0)}
gsmSCF-gsmSRF-Operations             OBJECT IDENTIFIER ::=
    {???}
gsmSCF-gsmSRF-Protocol          OBJECT IDENTIFIER ::=
    {???}
object-identifiers        OBJECT IDENTIFIER ::=
    {???}

id-CAP          OBJECT IDENTIFIER ::= {???}
id-CAP0E        OBJECT IDENTIFIER ::=
    {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1) CS2(20)}



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 Q1218


-- 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}
id-ac-CAP-gsmSCF-ssfGenericAC             OBJECT IDENTIFIER ::= {id-acE 8}

-- 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}


-- gsmSSF/gsmSCF Contracts
id-CAPSsfToScfGeneric                           OBJECT IDENTIFIER ::= {id-contractE 3}
id-CAPAssistHandoffssfToScf                     OBJECT IDENTIFIER ::= {id-contractE 5}
id-CAPScfToSsfGeneric                           OBJECT IDENTIFIER ::= {id-contractE 6}


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

-- 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-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            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}

-- gsmSSF/gsmSCF Abstract Syntaxes

id-as-gsmSSF-scfGenericAS                           OBJECT IDENTIFIER ::= {id-asE 4}
id-as-assistHandoff-gsmSSF-scfAS                    OBJECT IDENTIFIER ::= {id-asE 6}
id-as-gsmSCF-ssfGenericAS                           OBJECT IDENTIFIER ::= {id-asE 7}


-- gsmSRF/gsmSCF Abstract Syntaxes
id-as-basic-gsmSRF-gsmSCF                           OBJECT IDENTIFIER ::= {id-as 14}
id-as-basic-gsmSCF-gsmSRF                           OBJECT IDENTIFIER ::= {id-as 15}


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


END
```

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) 3GPP(???) mobileDomain(1) ???3g-
network(1) modules(3) CAP-gsmSSF-gsmSCF-ops-args (5) version3(1)}
DEFINITIONS IMPLICIT TAGS::=
BEGIN
IMPORTS

    errortypes, datatypes, operationcodes, classes, ros-InformationObjects
FROM CAP-object-identifiers

    {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1) modules(0) CAP-object-
identifiers(17) version3(0)}
    OPERATION
FROM Remote-Operations-Information-Objects ros-InformationObjects

tc-Messages, classes FROM CAP-object-identifiers
        {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1) module(0) CAP-
object-identifiers(17) version3(0)}
    InvokeIdType
FROM TCAPMessages tc-Messages


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

    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)}

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

        PARAMETERS-BOUND
FROM CAP-classes classes

    opcode-activityTest,
    opcode-applyCharging,
    opcode-applyChargingReport,
    opcode-assistRequestInstructions,
    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 {},
    CallingPartyNumber {},
    CallingPartysCategory,
    CallResult {},
    CallSegmentID {},
    Carrier{},
    Cause {},
    CGEncountered,
    CorrelationID {},
    CountersValue,
    DateAndTime,
    DestinationRoutingAddress {},
    Digits {},
    EventSpecificInformationBCSM {},
    EventTypeBCSM,
    ExtensionField {},
    FCIBillingChargingCharacteristics {},
    GenericNumbers {},
    HighLayerCompatibility,
    initialCallSegment,
    InvokeID,
    IPRoutingAddress {},
    IPSSPCapabilities {},
    leg1,
    LocationNumber {},
    MiscCallInfo,
    MonitorMode,
    OriginalCalledPartyID {},
    ReceivingSideID,
    RedirectingPartyID {},
    RedirectionInformation,
    RequestedInformationList {},
    RequestedInformationTypeList,
    ScfID {},
    SCIBillingChargingCharacteristics {},
    SendingSideId,
    ServiceInteractionIndicatorsTwo,
    ServiceKey,
    TimerID,
    TimerValue
FROM CAP-datatypes datatypes

    cancelFailed,
    eTCFailed,
    improperCallerResponse,
    missingCustomerRecord,
    missingParameter,
    parameterOutOfRange,
    requestedInfoError,
    systemFailure,
    taskRefused,
    unavailableResource,
    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: Tari
-- This operation is used when there is an assist or a hand-off 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 or Connect operation (in the case of hand-off) from the gsmSCF.
-- Refer to clause 18 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.
```

```
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 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
and
-- report it to the gsmSCF (with a CallInformationReport operation).

CallInformationRequestArg {PARAMETERS-BOUND : bound}::= SEQUENCE {
    requestedInformationTypeList    [0] RequestedInformationTypeList,
    extensions                      [2] SEQUENCE SIZE(1..bound.&numOfExtensions) OF
                                                        ExtensionField {bound}  OPTIONAL,
    legID                           [3] ReceivingSideID
    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. To do so, the gsmSSF may or may not use destination
-- information from the calling party (e.g. dialed digits), depending on the information provided by
the gsmSCF.
-- - Call processing resumes at
--    the Analyzed_Information PIC in the O-BCSM.

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,
    serviceInteractionIndicatorsTwo   [15] ServiceInteractionIndicatorsTwo   OPTIONAL,
    callingPartysCategory          [28] CallingPartysCategory                OPTIONAL,
    redirectingPartyID             [29] RedirectingPartyID {bound}           OPTIONAL,
    redirectionInformation         [30] RedirectionInformation               OPTIONAL,
    genericNumbers                 [14] GenericNumbers {bound}               OPTIONAL,
    suppressionOfAnnouncement      [55] SuppressionOfAnnouncement            OPTIONAL,
    oCSIApplicable                 [56] OCSIApplicable                       OPTIONAL,
    na-Info                        [57] NA-Info                              OPTIONAL,
    cliPresentationIndicator       [58] CliPresentationIndicator             OPTIONAL,
    connectArgExtension            [59] ConnectArgExtension                  OPTIONAL,
    …,
    }
-- na-Info is included at the discretion of the gsmSCF operator.

ConnectArgExtension                    ::= SEQUENCE {
    cug-Interlock                  [0] Cug-Interlock                         OPTIONAL,
    cug-OutgoingAccess             [1] NULL                                  OPTIONAL,
    ...
    }

connectToResource {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT       ConnectToResourceArg {bound}
    RETURN RESULT  FALSE
    ERRORS         {missingParameter |
                   systemFailure |
                   taskRefused |
                   unexpectedComponentSequence |
                   unexpectedDataValue |
                   unexpectedParameter|
                   unknownLegID}
    CODE           opcode-connectToResource
    }
-- Direction: gsmSCF -> gsmSSF, Timer: T_ctr
-- This operation is used to connect a call from the SSP to the physical entity containing the
gsmSRF.
-- Refer to clause 18 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,
    originalCalledPartyID            [50] OriginalCalledPartyID {bound}           OPTIONAL,
    callingPartysCategory            [51] CallingPartysCategory                  OPTIONAL,
    redirectingPartyID               [52] RedirectingPartyID {bound}             OPTIONAL,
    redirectionInformation           [53] RedirectionInformation                 OPTIONAL,
    genericNumbers                   [54] GenericNumbers {bound}                 OPTIONAL,
    suppressionOfAnnouncement        [55] SuppressionOfAnnouncement              OPTIONAL,
    na-Info                          [56] NA-Info                                OPTIONAL,
    cug-Interlock                    [57] Cug-Interlock                          OPTIONAL,
    cug-OutgoingAccess               [58] NULL                                   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 18 for a description of the procedures associated with this operation.
-- This operation is not valid for a multi call segment CSA.




establishTemporaryConnection {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT        EstablishTemporaryConnectionArg {bound}
    RETURN RESULT   FALSE
    ERRORS      {eTCFailed |
                missingParameter |
                systemFailure |
                taskRefused |
                unexpectedComponentSequence |
                unexpectedDataValue |
                unexpectedParameter|
                unknownLegID}
    CODE            opcode-establishTemporaryConnection
    }
-- Direction: gsmSCF -> gsmSSF, Timer: Tetc
-- 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 18 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,
    serviceInteractionIndicatorsTwo [6] ServiceInteractionIndicatorsTwo          OPTIONAL,
    na-Info                         [50] NA-Info                                 OPTIONAL
```

```
    …,
    }
-- na-info is included at the discretion of the
-- gsmSCF operator.

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

EventReportBCSMArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
    eventTypeBCSM                   [0] EventTypeBCSM,
    eventSpecificInformationBCSM    [2] EventSpecificInformationBCSM {bound}        OPTIONAL,
    legID                           [3] ReceivingSideID
    OPTIONAL,
    miscCallInfo                    [4] MiscCallInfo              DEFAULT {messageType request},
    extensions                      [5] 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: Tfci
-- 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,
    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,
    serviceInteractionIndicatorsTwo [32] ServiceInteractionIndicatorsTwo                     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                          OPTIONAL,
    timeAndTimezone                       [57] TimeAndTimezone                              OPTIONAL,
    gsm-ForwardingPending                 [58] NULL                                          OPTIONAL,
    initialDPArgExtension                 [59] InitialDPArgExtension                         OPTIONAL,
    ...,

    }

InitialDPArgExtension                 ::= SEQUENCE {
    naCarrierInformation                  [0] NACarrierInformation                          OPTIONAL,
    gmscAddress                           [1] ISDN-AddressString                            OPTIONAL,
    cause                                 [2] Cause                                          OPTIONAL,
    cug-Info                              [5] CUG-Info                                       OPTIONAL,
    cug-Index                             [6] CUG-Index                                      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.
-- naCarrierInformation 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
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) ???(0) ???Domain(1) ???-
network(1) modules(0) CAP-gsmSSF-gsmSCF-pkgs-contracts-acs (6) version3(0)}
DEFINITIONS ::=
BEGIN

-- This module describes the operation-packages, contracts and application-contexts used
-- over the gsmSSF-gsmSCF interface.

IMPORTS

    PARAMETERS-BOUND,
    networkSpecificBoundSet
FROM CAP-classes classes


    ROS-OBJECT-CLASS, 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 {},
        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-cs2-gsmSSF-scfGenericAC,
    id-ac-cs2-gsmSSF-scfAssistHandoffAC,
    id-inCs2AssistHandoffssfToScf,
    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-scfCallInitiation,
    id-package-timer,
    id-package-billing,
    id-package-charging,
    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) ???(0) ???Domain(1) ???-network(1)
modules(0) CAP-object-identifiers (17) version3(0)}

;
-- Application Contexts

cs2ssf-scfGenericAC APPLICATION-CONTEXT ::= {
    CONTRACT                    inCs2SsfToScfGeneric
    DIALOGUE MODE               structured
    ABSTRACT SYNTAXES           {dialogue-abstract-syntax |
                                gsmSSF-scfGenericAbstractSyntax}
    APPLICATION CONTEXT NAME    id-ac-cs2-gsmSSF-scfGenericAC}

cs2ssf-scfAssistHandoffAC APPLICATION-CONTEXT ::=   {
    CONTRACT                    inCs2AssistHandoffssfToScf
    DIALOGUE MODE               structured
    ABSTRACT SYNTAXES           {dialogue-abstract-syntax |
                                assistHandoff-gsmSSF-scfAbstractSyntax}
    APPLICATION CONTEXT NAME    id-ac-cs2-gsmSSF-scfAssistHandoffAC}
```

```
-- Contracts

inCs2SsfToScfGeneric CONTRACT ::= {
-- dialogue initiated by gsmSSF with InitialDP Operation
    INITIATOR CONSUMER OF
            {                scfActivationPackage {networkSpecificBoundSet}}
    RESPONDER CONSUMER OF
            {activityTestPackage|
            assistConnectionEstablishmentPackage {networkSpecificBoundSet} |
            bcsmEventHandlingPackage {networkSpecificBoundSet} |
            billingPackage {networkSpecificBoundSet} |
            callHandlingPackage {networkSpecificBoundSet} |
            callReportPackage {networkSpecificBoundSet} |
            cancelPackage {networkSpecificBoundSet} |
            chargingPackage {networkSpecificBoundSet} |
            connectPackage {networkSpecificBoundSet} |
            genericDisconnectResourcePackage {networkSpecificBoundSet} |
            nonAssistedConnectionEstablishmentPackage {networkSpecificBoundSet} |
            signallingControlPackage {networkSpecificBoundSet} |
            specializedResourceControlPackage {networkSpecificBoundSet} |
            ssfCallProcessingPackage {networkSpecificBoundSet} |
            timerPackage {networkSpecificBoundSet} |
            }
    ID        id-inCs2SsfToScfGeneric
    }

inCs2AssistHandoffssfToScf CONTRACT :: = {
-- dialogue initiated by gsmSSF with AssistRequestInstructions
    INITIATOR CONSUMER OF
            {gsmSRF-scfActivationOfAssistPackage {networkSpecificBoundSet}}
    RESPONDER CONSUMER OF
            {activityTestPackage|
            callHandlingPackage {networkSpecificBoundSet} |
            cancelPackage {networkSpecificBoundSet} |
            genericDisconnectResourcePackage {networkSpecificBoundSet} |
            nonAssistedConnectionEstablishmentPackage {networkSpecificBoundSet} |
            specializedResourceControlPackage {networkSpecificBoundSet} |
            timerPackage {networkSpecificBoundSet}
            }
    ID        id-inCs2AssistHandoffssfToScf
    }


-- 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 |
            disconnectForwardConnectionWithArgument {bound}}
    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    {collectInformation {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}
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 {networkSpecificBoundSet} |
            applyChargingReport {networkSpecificBoundSet} |
            callInformationReport {networkSpecificBoundSet} |
            callInformationRequest {networkSpecificBoundSet} |
            cancel {networkSpecificBoundSet} |
            connect {networkSpecificBoundSet} |
            connectToResource {networkSpecificBoundSet} |
            disconnectForwardConnection |
            establishTemporaryConnection {networkSpecificBoundSet} |
            eventReportBCSM {networkSpecificBoundSet} |
            furnishChargingInformation {networkSpecificBoundSet} |
            initialDP {networkSpecificBoundSet} |
            releaseCall {networkSpecificBoundSet} |
            requestReportBCSMEvent {networkSpecificBoundSet} |
            resetTimer {networkSpecificBoundSet} |
            sendChargingInformation {networkSpecificBoundSet} |
            playAnnouncement {networkSpecificBoundSet} |
            promptAndCollectUserInformation {networkSpecificBoundSet} |
            specializedResourceReport |
            }
SsfScfGenericReturnable OPERATION :: = {
            activityTest |
            applyCharging {networkSpecificBoundSet} |
            applyChargingReport {networkSpecificBoundSet} |
            callInformationRequest {networkSpecificBoundSet} |
            cancel {networkSpecificBoundSet} |
            connect {networkSpecificBoundSet} |
            connectToResource {networkSpecificBoundSet} |
            continue |
            disconnectForwardConnection |
            establishTemporaryConnection {networkSpecificBoundSet}|
            furnishChargingInformation {networkSpecificBoundSet}|
            initialDP {networkSpecificBoundSet}|
            releaseCall {networkSpecificBoundSet}|
            requestReportBCSMEvent {networkSpecificBoundSet}|
            resetTimer {networkSpecificBoundSet}|
            sendChargingInformation {networkSpecificBoundSet}|
            playAnnouncement {networkSpecificBoundSet}|
            promptAndCollectUserInformation {networkSpecificBoundSet}|
            }

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 {networkSpecificBoundSet}|
            cancel {networkSpecificBoundSet}|
            connectToResource {networkSpecificBoundSet}|
            disconnectForwardConnection |
            playAnnouncement {networkSpecificBoundSet}|
            promptAndCollectUserInformation {networkSpecificBoundSet}|
            resetTimer {networkSpecificBoundSet}|
            specializedResourceReport |
            }
AssistHandoffssfToScfReturnable OPERATION :: = {
            activityTest |
            assistRequestInstructions {networkSpecificBoundSet}|
            cancel {networkSpecificBoundSet}|
            connectToResource {networkSpecificBoundSet}|
            disconnectForwardConnection |
            playAnnouncement {networkSpecificBoundSet}|
            promptAndCollectUserInformation {networkSpecificBoundSet}|
            resetTimer {networkSpecificBoundSet}|
            }


gsmSCF-ssfGenericAbstractSyntax ABSTRACT-SYNTAX :: = {
     GenericSCF-gsmSSF-PDUs
     IDENTIFIED BY   id-as-gsmSCF-ssfGenericAS}
GenericSCF-gsmSSF-PDUs :: = TCMessage {{ScfToSsfGenericInvokable}, {ScfToSsfGenericReturnable}}
ScfSsfGenericInvokable OPERATION :: = {
            activityTest |
            applyCharging {networkSpecificBoundSet}|
            applyChargingReport {networkSpecificBoundSet}|
            callInformationRequest {networkSpecificBoundSet}|
            cancel {networkSpecificBoundSet}|
            connect {networkSpecificBoundSet}|
            connectToResource {networkSpecificBoundSet}|
            continue |
            disconnectForwardConnection |
            establishTemporaryConnection {networkSpecificBoundSet}|
            furnishChargingInformation {networkSpecificBoundSet}|
            releaseCall {networkSpecificBoundSet}|
            requestReportBCSMEvent {networkSpecificBoundSet}|
            resetTimer {networkSpecificBoundSet}|
            sendChargingInformation {networkSpecificBoundSet}|
            playAnnouncement {networkSpecificBoundSet}|
            promptAndCollectUserInformation {networkSpecificBoundSet}|
            }
ScfSsfGenericReturnable OPERATION :: = {
            activityTest |
            applyCharging {networkSpecificBoundSet}|
            applyChargingReport {networkSpecificBoundSet}|
            callInformationReport {networkSpecificBoundSet}|
            callInformationRequest {networkSpecificBoundSet}|
            cancel {networkSpecificBoundSet}|
            connect {networkSpecificBoundSet}|
            connectToResource {networkSpecificBoundSet}|
            disconnectForwardConnection |
            establishTemporaryConnection {networkSpecificBoundSet}|
            resetTimer {networkSpecificBoundSet}|
            eventReportBCSM {networkSpecificBoundSet}|
            furnishChargingInformation {networkSpecificBoundSet}|
            requestReportBCSMEvent {networkSpecificBoundSet}|
            sendChargingInformation {networkSpecificBoundSet}|
            playAnnouncement {networkSpecificBoundSet}|
            promptAndCollectUserInformation {networkSpecificBoundSet}|
            specializedResourceReport
            }


END
```

6.2   gsmSCF/gsmSRF interface

6.2.1   gsmSCF/gsmSRF operations and arguments

```
CAP-gsmSCF-gsmSRF-ops-args {ccitt recommendation q 1228 modules(0) CAP-gsmSCF-gsmSRF-ops-args (7)
version3(0)}

DEFINITIONS IMPLICIT TAGS ::=

BEGIN

IMPORTS

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

    opcode-playAnnouncement,
    opcode-promptAndCollectUserInformation,
    opcode-specializedResourceReport,
    opcode-cancel,
    opcode-assistRequest,
    opcode-activityTest
FROM CAP-operationcodes operationcodes

    CollectedInfo,
    Digits {},
    ExtensionField {},
    InformationToSend {},
    GenericNumber {},
    ReceivedStatus,

    SendingSideID
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 recommendation q 1228 modules(0) CAP-object-identifiers(17) version3(0)}
;

playAnnouncement {PARAMETERS-BOUND : bound} OPERATION :: = {
    ARGUMENT        PlayAnnouncementArg {bound}
    RETURN RESULT   FALSE
    ERRORS          {canceled |
                    missingParameter |
                    parameterOutOfRange |
                    systemFailure |
                    taskRefused |
                    unexpectedComponentSequence |
                    unexpectedDataValue |
                    unexpectedParameter |
                    unavailableResource |
                    unknownLegId}
    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
-- SSP) or a Connect to Resource (no assist) operation. It may be used for inband interaction with
```

```
-- an analog user, 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 thisoperation 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,
                                                        connectedParty  CHOICE {
                        legID   [4]     SendingSideID,
,
                callSegmentID [5] CallSegmentID {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 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
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 recommendation q 1228 modules(0)
                                      CAP-gsmSCF-gsmSRF-pkgs-contracts-acs(8) version3(0)}


DEFINITIONS :: =

BEGIN

-- This module describes the operation-packages, contracts and application-contexts used
-- over the gsmSCF-gsmSRF interface.

IMPORTS

    PARAMETERS-BOUND,
    networkSpecificBoundSet,
    emptyConnectionPackage
FROM CAP-classes classes


    ROS-OBJECT-CLASS, 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

    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 ecommendation q 1228 modules(0)
                                      CAP-object-identifiers (17) version3(0)}
;

-- 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 :: = {
    CONNECTION                  emptyConnectionPackage
    INITIATOR CONSUMER OF       {gsmSRF-scfActivationOfAssistPackage {networkSpecificBoundSet} }
    RESPONDER CONSUMER OF       {specializedResourceControlPackage {networkSpecificBoundSet}|
                                gsmSRF-scfCancelPackage {networkSpecificBoundSet}}
    ID                          id-contract-gsmSRF-gsmSCF}

-- specializedResourceControl package

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

-- gsmSRF-scfCancel package

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

-- Abstract Syntaxes

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

BASIC-gsmSRF-gsmSCF-PDUs ::= TCMessage {{gsmSRF-gsmSCF-Invokable},{gsmSRF-gsmSCF-Returnable}}

gsmSRF-gsmSCF-Invokable OPERATION :: = {
      assistRequestInstructions  {networkSpecificBoundSet}|
      cancel  {networkSpecificBoundSet}|
      playAnnouncement  {networkSpecificBoundSet}|
      promptAndCollectUserInformation  {networkSpecificBoundSet}|
      specializedResourceReport |
      }

gsmSRF-gsmSCF-Returnable OPERATION :: = {
      assistRequestInstructions  {networkSpecificBoundSet}|
      cancel  {networkSpecificBoundSet}|
      playAnnouncement  {networkSpecificBoundSet}|
      promptAndCollectUserInformation  {networkSpecificBoundSet}|
      }

END
```

7   MO SMS Control

This section 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) 3GPP(???) mobileDomain(1) ???3g-network(1)
modules(3) CAP-SMS-ops-args (5) version3(1)}
DEFINITIONS IMPLICIT TAGS::=
BEGIN
IMPORTS

    errortypes, datatypes, operationcodes, classes, ros-InformationObjects
FROM CAP-object-identifiers

    {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1) modules(0) CAP-object-
identifiers(17) version3(0)}
```

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

tc-Messages, classes FROM CAP-object-identifiers
        {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1) module(0) CAP-
object-identifiers(17) version3(0)}
    InvokeIdType
FROM TCAPMessages tc-Messages

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

        PARAMETERS-BOUND
FROM CAP-classes classes

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

…
FROM CAP-datatypes datatypes

…
FROM CAP-errortypes errortypes
;

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


ConnectSMS                          ::= OPERATION
    ARGUMENT
        ConnectSMSArg
    ERRORS {
        MissingParameter,
        ParameterOutOfRange,
        SystemFailure,
        TaskRefused,
        UnexpectedComponentSequence,
        UnexpectedDataValue,
        UnexpectedParameter
        }

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

continueSMS OPERATION ::= {
    RETURN RESULT   FALSE
    ALWAYS RESPONDS FALSE
```

```
    CODE            opcode-continueSMS
    }
-- Direction: gsmSCF -> gsmSSF/gprsSMS, Timer: Tcuesms
-- This operation is used to request the gsmSSF/gprsSSF 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 Association in the SMS FSM). The gsmSSF/gprsSSF continues SMS processing without substituting new
data from gsmSCF.

EventReportSMS                  ::= OPERATION
    ARGUMENT
        EventReportSMSArg

-- Direction: gsmSSF or gprsSSF -> gsmSCF, Timer: Terbsms
-- 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               ::= SEQUENCE {
    eventTypeSMS                    [0] EventTypeSMS,
    eventSpecificInformationSMS     [1] EventSpecificInformationSMS       OPTIONAL,
    miscCallInfo                    [2] MiscCallInfo    DEFAULT {messageType request },
    extensions                      [10] SEQUENCE SIZE(1..numOfExtensions)  OF
                                                       ExtensionField      OPTIONAL,
    ...
    }

FurnishChargingInformationSMS   ::= OPERATION
    ARGUMENT
        FurnishChargingInformationSMSArg
    ERRORS {
        MissingParameter,
        TaskRefused,
        UnexpectedComponentSequence,
        UnexpectedDataValue,
        UnexpectedParameter
        }

-- Direction: gsmSCF -> gsmSSF or gprsSSF, Timer: Tfcisms
-- This operation is used to request the gsmSSF 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        ::= FCISMSBillingChargingCharacteristics

InitialDPSMS                    ::= OPERATION
    ARGUMENT
        InitialDPSMSArg
    ERRORS {
        MissingCustomerRecord,
        MissingParameter,
        ParameterOutOfRange,
        SystemFailure,
        TaskRefused,
        UnexpectedComponentSequence,
        UnexpectedDataValue,
        UnexpectedParameter
        }

-- Direction: gsmSSF or gprsSSF -> gsmSCF, Timer: Tidpsms
-- This operation is used after a TDP to indicate request for service.

InitialDPSMSArg                 ::= SEQUENCE {
    serviceKey                      [0] ServiceKey,
    destinationSubscriberNumber     [1] CalledPartyBCDNumber                 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                      OPTIONAL,
    tPShortMessageSubmissionSpecificInfo   [9] TPShortMessageSubmissionInfo     OPTIONAL,
    tPProtocolIdentifier            [10] TPProtocolIdentifier               OPTIONAL,
    tPDataCodingScheme              [9] TPDataCodingScheme                   OPTIONAL,
```

```
    tPValidityPeriod                              [12] TPValidityPeriod                OPTIONAL,
    extensions                                    [10] SEQUENCE SIZE(1..numOfExtensions) OF
                                                        ExtensionField    OPTIONAL
    ...
    }

ReleaseSMS                        ::= OPERATION
    ARGUMENT
        ReleaseSMSArg
```

-- *Direction: gsmSCF -> gsmSSF or gprsSSF, Timer: T$_{rcsms}$*

-- This operation is used to prevent an attempt to submit a short message.

```
ReleaseSMSArg                        ::= RPCause

RequestReportSMSEvent   ::= OPERATION
    ARGUMENT
        RequestReportSMSEventArg
    ERRORS {
        MissingParameter,
        ParameterOutOfRange,
        SystemFailure,
        TaskRefused,
        UnexpectedComponentSequence,
        UnexpectedDataValue,
        UnexpectedParameter
        }
```

-- *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             ::= SEQUENCE {
    sMSEvents                        [0] SEQUENCE SIZE (1..numOfSMSEvents)  OF SMSEvent,
    extensions                       [10] SEQUENCE SIZE (1..numOfExtensions)    OF
                                                        ExtensionField    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-resetTimer
    }
```
-- Direction: gsmSCF->gsmSSF/gprsSSF, Timer: T$_{rtsms}$
-- This operation is used to request the gsmSSF/gprsSSF to refresh an application timer in the
gsmSSF.

```
ResetTimerSMSArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
    timerID         [0] TimerID DEFAULT tssf,
    timervalue      [1] TimerValue,
    extensions      [2] SEQUENCE SIZE(1..bound.&numOfExtensions) OF
                                                        ExtensionField {bound}  OPTIONAL,
    callSegmentID   [3] CallSegmentID {bound}                                   OPTIONAL,
    ...
    }


-- END
```

Table 7-1: Operation timers and their value range

Operation Name	Timer	value range
ActivityTestSMS	T_{atsms}	short
ConnectSMS	T_{consms}	Short
ContinueSMS	T_{cuesms}	short
EventReportSMS	T_{erbsms}	Long
FurnishChargingInformationSMS	Tfcisms	Short
InitialDPSMS	T_{idpsms}	Short
ReleaseSMS	T_{rcsms}	Short
RequestReportSMSEvent	T_{rrbsms}	Short
ResetTimerSMS	T_{rtsms}	short

7.2 SMS contracts, packages and ACs

7.2.1.1 SMS ASN.1 module

```
CAP-gprsSSF-gsmSCF-pkgs-contracts-acs {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-
network(1) modules(0) CAP-SSF-gsmSCF-pkgs-contracts-acs (6) version3(0)}
DEFINITIONS ::=
BEGIN

-- This module describes the operation-packages, contracts and application-contexts used
-- over the gsmSSF/gprsSSF-gsmSCF interface.

IMPORTS

    PARAMETERS-BOUND,
    networkSpecificBoundSet
FROM CAP-classes classes


    ROS-OBJECT-CLASS, 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,
    connectSMS,
    continueSMS,
    eventReportSMS,
    furnishChargingInformationSMS,
    initialSMSEvent,
    releaseSMS,
    requestReportSMSEvent,
    resetTimerSMS
FROM CAP-gsmSSF-gsmSCF-ops-args

…
FROM CAP-object-identifiers {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1)
modules(0) CAP-object-identifiers (17) version3(0)}

;
-- Application Contexts

cap3-sms-AC APPLICATION-CONTEXT ::= {
    CONTRACT                  cap3SMS
    DIALOGUE MODE             structured
    ABSTRACT SYNTAXES         {dialogue-abstract-syntax |
                              gprsSSF-scfAbstractSyntax}
```

```
        APPLICATION CONTEXT NAME      id-ac-cap3-sms-AC}


-- Contracts

cap3SMS CONTRACT ::= {
-- dialogue initiated by gprsSSF or gsmSSF with InitialSMSEvent Operation
    INITIATOR CONSUMER OF
            {               smsActivationPackage {networkSpecificBoundSet}}
    RESPONDER CONSUMER OF
            {gprsConnectPackage {networkSpecificBoundSet} |
            gprsReleasePackage {networkSpecificBoundSet} |
            gprsEventHandlingPackage {networkSpecificBoundSet} |
            gprsTimerPackage {networkSpecificBoundSet} |
            gprsBillingPackage {networkSpecificBoundSet} |
            gprsChargingPackage {networkSpecificBoundSet} |
            gprsActivityTestPackage {networkSpecificBoundSet} |
            gprsCancelPackage {networkSpecificBoundSet} |
            gprsChargeAdvicePackage {networkSpecificBoundSet}
            }
    ID        id-cap3GprsSsfToScf
    }


-- Operation Packages

smsActivationPackage {PARAMETERS-BOUND : bound}  OPERATION-PACKAGE :: = {
    CONSUMER INVOKES    {initialSMSEvent {bound}}
    ID        id-package-smsActivation}
smsConnectPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE :: = {
    CONSUMER INVOKES    {connectSMS {bound}}
    ID        id-package-smsConnect}
smsReleasePackage  {PARAMETERS-BOUND : bound} OPERATION-PACKAGE :: = {
    CONSUMER INVOKES    {releaseSMS {bound}}
    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}
smsActivityTestPackage OPERATION-PACKAGE :: = {
    CONSUMER INVOKES    {activityTestSMS}
    ID        id-package-smsActivityTest}
    }


-- Abstract Syntaxes

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

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

SmsInvokable OPERATION :: = {
            activityTestSMS |
            connectSMS {networkSpecificBoundSet} |
            eventReportSMS {networkSpecificBoundSet} |
            furnishChargingInformationSMS {networkSpecificBoundSet} |
            initialSMSEvent {networkSpecificBoundSet} |
            releaseSMS {networkSpecificBoundSet} |
            requestReportSMSEvent {networkSpecificBoundSet} |
            resetTimerSMS {networkSpecificBoundSet} |
            }

SmsReturnable OPERATION :: = {
            activityTestSMS |
            connectSMS {networkSpecificBoundSet} |
            continueSMS |
            furnishChargingInformationSMS {networkSpecificBoundSet}|
            initialSMSEvent {networkSpecificBoundSet}|
            releaseSMS {networkSpecificBoundSet}|
            requestReportSMSEvent {networkSpecificBoundSet}|
```

```
        }

END
```

---

8 GPRS Control

8.1 gsmSCF/gprsSSF operations and arguments

```
CAP-gprsSSF-gsmSCF-ops-args {ccitt(0) identified-organization(4) 3GPP(???) mobileDomain(1) ???3g-
network(1) modules(3) CAP-GPRS-ops-args (5) version3(1)}
DEFINITIONS IMPLICIT TAGS::=
BEGIN
IMPORTS

    errortypes, datatypes, operationcodes, classes, ros-InformationObjects
FROM CAP-object-identifiers

    {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1) modules(0) CAP-object-
identifiers(17) version3(0)}
    OPERATION
FROM Remote-Operations-Information-Objects ros-InformationObjects

tc-Messages, classes FROM CAP-object-identifiers
        {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1) module(0) CAP-
object-identifiers(17) version3(0)}
    InvokeIdType
FROM TCAPMessages tc-Messages

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

        PARAMETERS-BOUND
FROM CAP-classes classes

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

    AccessPointName,
    GPRSCause,
    ChargingCharacteristics,
    ChargingResult,
    GPRSChargingID,
    GPRSEventSpecificInformation,
    GPRSEventType,
    GPRSBillingChargingCharacteristics,
    MiscGPRSInfo,
    PDPId,
    PDPType,
    QualityOfService,
    RAIdentity,
    ServiceKey,
    SGSNCapabilities,
    TimeAndTimeZone,
    TimerID,
    TimerValue,
FROM CAP-datatypes datatypes

    cancelFailed,
```

```
    missingCustomerRecord,
    missingParameter,
    parameterOutOfRange,
    systemFailure,
    taskRefused,
    unexpectedComonentSequence,
    unexpectedDataValue,
    unexpectedParameter,
    unknownPDPId
FROM CAP-errortypes errortypes
;

activityTest OPERATION ::= {
    RETURN RESULT TRUE
    CODE    opcode-activityTest
    }
```
-- 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 gsmSSF has failed in some way and will
-- take the appropriate action.

```
ApplyChargingGPRS                 ::= OPERATION
    ARGUMENT
        ApplyChargingGPRSArg
    ERRORS {
        MissingParameter |
        UnexpectedComponentSequence |
        UnexpectedParameter |
        UnexpectedDataValue |
        ParameterOutOfRange |
        SystemFailure |
        TaskRefused |
        UnknownPDPID
        }
```

-- *Direction gsmSSF -> gprsSCF,Timer T$_{acg}$*
-- This operation is used for interacting from the gsmSCF with the gprsSSF CSE-controlled
-- 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
    ERRORS {
        MissingParameter |
        UnexpectedComponentSequence |
        UnexpectedParameter |
        UnexpectedDataValue |
        ParameterOutOfRange |
        SystemFailure |
        TaskRefused |
        UnknownPDPID
        }
```

-- *Direction gprsSSF -> gsmSSF,Timer T$_{agcr}$*
-- *The ApplyChargingReportGPRS operation provides the feedback from the gprsSCF to the gsmSCF*
-- *CSE-controlled session charging mechanism.*

```
ApplyChargingReportGPRSArg       ::= SEQUENCE {
        chargingResult               [0] ChargingResult,
        qualityOfService             [1] QualityOfService      OPTIONAL,
        active                       [2] BOOLEAN               DEFAULT TRUE,
        pDPID                        [3] PDPId   OPTIONAL
        }
```

```
-- For the encoding of qualityOfService refer to 3G TS 24.008


CancelGPRS                          ::= OPERATION
    ARGUMENT
        CancelGPRSArg
    ERRORS {
        CancelFailed |
        MissingParameter |
        TaskRefused |
        UnknownPDPID
        }

-- Direction: gsmSCF -> gprsSSF, Timer: T_cag
-- This generic operation cancels the correlated previous operation or all previous requests,
-- i.e. all EDPs and reports can be cancelled by the gsmSCF.

CancelGPRSArg                        ::= CHOICE {
    allRequests                      [0] NULL,
    pDPID                            [1] PDPId OPTIONAL,
    }

connectGPRS {PARAMETERS-BOUND: bound} OPERATION:: = {
    ARGUMENT    ConnectGPRSArg {bound}
    RETURN RESULT    FALSE
    ERRORS  {missingParameter |
            parameterOutOfRange |
            unknownPDPId |
            systemFailure |
            taskRefused |
            unexpectedComponentSequence |
            unexpectedDataValue |
            unexpectedParameter}
    CODE    opcode-connect
    }
-- Direction: gsmSCF -> gprsSSF, Timer: T_con
-- 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
    ERRORS {
        MissingParameter |
        UknownPDPID |
        UnexpectedDataValue
        }

-- Direction: gsmSCF -> gprsSSF, Timer: T_cue
-- 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 FSM or PDP Context FSM) without
-- substituting new data from the gsmSCF.

ContinueGPRSArg                      ::= SEQUENCE {
        pDPID   [0] PDPId
        }

EntityReleasedGPRS                   ::= OPERATION
    ARGUMENT
        EntityReleasedGPRSArg
    ERRORS {
        CancelFailed |
        MissingParameter |
        TaskRefused |
        UnknownPDPID
        }

-- Direction: gprsSSF -> gsmSCF, Timer: T_erg
```

```
-- This operation is used to notify the gsmSCF that a PDP context has been terminated abnormally in
-- the SGSN.

EntityReleasedGPRSArg            ::= SEQUENCE {
        gPRSCause                        [0] GPRSCause,
        pDPID                            [1] PDPId
        }

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

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

InitialDPGPRS                 ::= OPERATION
    ARGUMENT
        InitialDPGPRSArg
    ERRORS {
        MissingCustomerRecord |
        MissingParameter |
        ParameterOutOfRange |
        SystemFailure |
        TaskRefused |
        UnexpectedComponentSequence |
        UnexpectedDataValue |
        UnexpectedParameter
        }
```

-- *Direction gprsSSF -> gsmSCF,Timer T$_{dpg}$*
-- *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*

```
InitialGPRSEventArg              ::= SEQUENCE {
        serviceKey                       [0] ServiceKey,
        gPRSEventType                    [1] GPRSEventType,
        mSISDN                           [2] MSISDN,
        iMSI                             [2] IMSI,
        timeAndTimeZone                  [3] TimeAndTimeZone,
        gPRSMSClass                      [4] GPRSMSClass      OPTIONAL,
        pDPType                          [5] PDPType          OPTIONAL,
        qualityOfService                 [1] QualityOfService       OPTIONAL,
        accessPointName                  [7] AccessPointName      OPTIONAL,
        routeingAreaIdentity             [8] RAIdentity          OPTIONAL,
        chargingID                       [9] GPRSChargingId        OPTIONAL,
        sGSNCapabilities                 [10]SGSNCapabilities              OPTIONAL
        }

ReleaseGPRS                   ::= OPERATION
    ARGUMENT
        ReleaseGPRSArg
    ERRORS {
        CancelFailed |
        MissingParameter |
        TaskRefused |
        UnknownPDPID
        }
```

-- *Direction: gsmSCF -> gprsSSF, Timer: T$_{rg}$*
-- This operation is used to tear down an existing GPRS session or PDP Context at any phase.

```
ReleaseGPRSArg                   ::= SEQUENCE {
        gprsCause                        [0] GPRSCause,
        pDPID                     [1] PDPId OPTIONAL
```

```
        }
EventReportGPRS                     ::= OPERATION
    ARGUMENT
        EventReportGPRSArg


--  Direction gprsSSF -> gsmSCF,Timer T_rge
--  This operation is used to notify the gsmSCF of a GPRS session or PDP context related
--  events (e.g. attach,PDP context activation) previously requested by the gsmSCF in a
--  RequestGPRSReportDataEvent operation.


EventReportGPRSArg                  ::= SEQUENCE {
        gPRSEventType               [0] GPRSEventType,
        miscGPRSInfo                [1] MiscGPRSInfo DEFAULT {messageType request},
        gPRSEventSpecificInformation [2] GPRSEventSpecificInformation   OPTIONAL,
        pDPID                       [3] PDPId OPTIONAL
        }
RequestReportGRSEvent        ::= OPERATION
    ARGUMENT
        RequestReportGPRSEvent
    ERRORS {
        MissingParameter |
        ParameterOutOfRange |
        SystemFailure |
        TaskRefused |
        UnexpectedComponentSequence |
        UnexpectedDataValue |
        UnexpectedParameter |
        UnknownPDPID
        }

--  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   ::= SEQUENCE {
        gPRSEvent                   [0] SEQUENCE SIZE (1..numOfGPRSEvents)  OF GPRSEvent,
        pDPID                       [1] PDPId          OPTIONAL
        }

--  Indicates the GPRS related events for notification.

ResetTimerGPRS                      ::= OPERATION
    ARGUMENT
        ResetTimerGPRSArg
    ERRORS {
        MissingParameter |
        ParameterOutOfRange |
        TaskRefused |
        UnexpectedComponentSequence |
        UnexpectedDataValue |
        UnexpectedParameter |
        UnknownPDPID
        }

--  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,
        pDPID                       [2] PDPId OPTIONAL
        }

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: Tscig
--  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
```

8.1.1.1.1 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 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 2

Operation Name	Timer	value
ActivityTestGPRS	Tatg	short
ApplyChargingGPRS	Tacg	short
ApplyChargingReportGPRS	Tacrg	short
CancelGPRS	Tcag	short
ConnectGPRS	T_{cong}	short
ContinueGPRS	T_{cueg}	short
EntityReleasedGPRS	T_{erg}	short
FurnishChargingInformationGPRS	T_{fcig}	short
InitialDPGPRS	T_{idpg}	short
ReleaseGPRS	T_{rg}	short
EventReportGPRS	T_{erg}	short
RequestReportGPRSEvent	T_{rrqe}	short
ResetTimerGPRS	Trtg	Short
SendChargingInformationGPRS	T_{scig}	short

8.2   gsmSCF/gprsSSF contracts, packages and ACs

8.2.1.1   gprsSSF/gsmSCF ASN.1 module

```
CAP-gprsSSF-gsmSCF-pkgs-contracts-acs {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-
network(1) modules(0) CAP-gprsSSF-gsmSCF-pkgs-contracts-acs (6) version3(0)}
DEFINITIONS ::=
BEGIN


-- This module describes the operation-packages, contracts and application-contexts used
```

```
-- over the gprsSSF-gsmSCF interface.

IMPORTS

    PARAMETERS-BOUND,
    networkSpecificBoundSet
FROM CAP-classes classes


    ROS-OBJECT-CLASS, 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,
        applyChargingGPRS {},
        applyChargingReportGPRS {},
        cancelGPRS {},
        connectGPRS {},
        continueGPRS {},
        initialDPGPRS {},
        releaseGPRS {},
        eventReportGPRS {},
        requestReportGRRSEvent,
        resetTimerGPRS,
        sendChargingInformationGPRS {}
FROM CAP-gsmSSF-gsmSCF-ops-args


…
FROM CAP-object-identifiers {ccitt(0) identified-organization(4) ???(0) ???Domain(1) ???-network(1)
modules(0) CAP-object-identifiers (17) version3(0)}

;
-- Application Contexts

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


-- Contracts

cap3GprsSsfToScf CONTRACT ::= {
-- dialogue initiated by gprsSSF with InitialDPGPRS Operation
    INITIATOR CONSUMER OF
            {           gprSscfActivationPackage {networkSpecificBoundSet}}
    RESPONDER CONSUMER OF
            {gprsConnectPackage {networkSpecificBoundSet} |
            gprsReleasePackage {networkSpecificBoundSet} |
            gprsEventHandlingPackage {networkSpecificBoundSet} |
            gprsTimerPackage {networkSpecificBoundSet} |
            gprsBillingPackage {networkSpecificBoundSet} |
            gprsChargingPackage {networkSpecificBoundSet} |
            gprsActivityTestPackage {networkSpecificBoundSet} |
            gprsCancelPackage {networkSpecificBoundSet} |
            gprsChargeAdvicePackage {networkSpecificBoundSet}
            }
    ID      id-cap3GprsSsfToScf
    }


-- 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}
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}
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}
    ID       id-package-gprsActivityTest}
gprsCancelPackage {PARAMETERS-BOUND : bound} OPERATION-PACKAGE :: = {
    CONSUMER INVOKES     {cancelGPRS {bound}}
    ID       id-package-gprsCancel}
    }


-- Abstract Syntaxes

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


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


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

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

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


GenericSCF-gprsSSF-PDUs :: = TCMessage {{GsmScfToGprsSsfInvokable}, {GsmScfToGprsSsfReturnable}}


GsmScfToGprsSsfInvokable OPERATION :: = {
          activityTestGPRS |
          applyChargingGPRS {networkSpecificBoundSet}|
```

```
                applyChargingReportGPRS {networkSpecificBoundSet}|
                cancelGPRS {networkSpecificBoundSet}|
                connectGPRS {networkSpecificBoundSet}|
                continueGPRS |
                furnishChargingInformationGPRS {networkSpecificBoundSet}|
                releaseGPRS {networkSpecificBoundSet}|
                requestReportGPRSEvent {networkSpecificBoundSet}|
                resetTimerGPRS {networkSpecificBoundSet}|
                sendChargingInformationGPRS {networkSpecificBoundSet}|
                }

GsmScfToGprsSsfReturnable OPERATION :: = {
                activityTestGPRS |
                applyChargingGPRS {networkSpecificBoundSet}|
                applyChargingReportGPRS {networkSpecificBoundSet}|
                cancelGPRS {networkSpecificBoundSet}|
                connectGPRS {networkSpecificBoundSet}|
                resetTimerGPRS {networkSpecificBoundSet}|
                eventReportGPRS {networkSpecificBoundSet}|
                furnishChargingInformationGPRS {networkSpecificBoundSet}|
                requestReportGPRSEvent {networkSpecificBoundSet}|
                sendChargingInformationGPRS {networkSpecificBoundSet}|
                }

END
```

9   Application Entity procedures

The description of the application entity procedures for CAMEL Phase 3 can be found in 3G TS 23.078 [16].

10   Error procedures

This clause defines the generic error procedures for the CAP. The error procedure descriptions have been divided in two subclauses, subclause 17.1 listing the errors related to CAP operations and subclause 17.2 listing the errors related to error conditions in the different FEs which are not directly related to the CAP operations.

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 4-10. The TCAP services which are used for reporting operation errors are described in subclause 19.1.

Errors which have a specific procedure for an operation are described in subclauses 12-16 with the detailed procedure of the related operation.

All errors, which can be detected by the ASN.1 decoder, already may be detected during the decoding of the TCAP 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   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->gsmSSF

Cancel

10.1.2.3   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 3 User Interaction.

>   Postcondition: SRSM state 3 User Interaction or
>   SRSM state 1 Idle.

B) Sending CancelFailed Error

>   Precondition: SRSM state 3 User Interaction or
>   SRSM state 1 Idle.

>   Postcondition: SRSM state 3 User Interaction or
>   SRSM state 1 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   Spare

10.1.5   ImproperCallerResponse

10.1.5.1   General description

10.1.5.1.1   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.

10.1.5.2   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.

10.1.6   MissingCustomerRecord

10.1.6.1   General description

10.1.6.1.1   Error description

This error is sent by the gsmSSF to the gsmSCF, in order to report the lack of the required user record within the SSP.

This error is also sent by the gsmSCF to the gsmSSF 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. These two cases should be distinguished as two different error situations, because the error procedure shows that the occurrence of the MissingCustomerRecord error is reported to the maintenance function, but the report to the maintenance function for the occurrence of the former case should be optional because it occurs not only in extraordinary situation but in ordinary situation. For example, the former may occur when the end user dials a missing free-phone number.

10.1.6.2   Operations gsmSSF->gsmSCF

AssistRequestInstructions

InitialDP

Procedures at invoking entity (gsmSSF)

A) Sending Operation

    Precondition: gsmSSF FSM state b Trigger processing or
                        gsmSSF FSM state b'   Waiting for Instructions; in case of assist/hand-off.

    Postcondition: gsmSSF FSM state c Waiting for Instructions.
                        gsmSSF FSM state b' Waiting for Instructions; in case of assist/hand-off.

B) gsmSSF receives Error"MissingCustomerRecord"

    Precondition: gsmSSF FSM state c Waiting for Instructions or
                        gsmSSF FSM state b'   Waiting for Instructions; in case of assist/hand-off.

    Postcondition: gsmSSF FSM state a Idle or
                        gsmSSF FSM state a' Idle; in case of assist/hand-off.

The CCF routes the call if necessary (e.g., default routing to a terminating announcement).

10.1.6.3   Operations gsmSRF->gsmSCF

AssistRequestInstructions

Procedures at invoking entity (gsmSRF)

A) Sending Operation

    Precondition: SRSM state 2 Connected.

    Postcondition: SRSM state 2 Connected.

B) gsmSRF receives Error"MissingCustomerRecord"

    Precondition: SRSM state 2 Connected.

    Postcondition: SRSM state 1 Idle.

gsmSRF initiated Disconnect.

10.1.7   MissingParameter

10.1.7.1   General description

10.1.7.1.1   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: a mandatory parameter (the application shall always return this error in case it is not detected by the ASN.1 decoder) or an expected optional parameter which is essential for the application is not included in the Operation argument.

10.1.7.2   Operations gsmSCF->gsmSSF

Call Associated/Non Call Processing

ApplyCharging

CallInformationRequest

Cancel

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.

10.1.7.3   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 CCF routes the call if necessary (default routing to a terminating announcement). If the call is already established (i.e., mid-call trigger or ApplyChargingReport), the CCF may maintain the call or disconnect it. The choice between these two options is network operator specific. In case of an assisting gsmSSF, the temporary connection is released by the assisting gsmSSF.

10.1.7.4   Operations gsmSCF->gsmSRF

Cancel

PlayAnnouncement

PromptAndCollectUserInformation

Procedures at responding entity (gsmSRF)

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

Postcondition: SRSM state 3 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.

10.1.7.5   Operations gsmSRF->gsmSCF

AssistRequestInstructions

Procedures at invoking entity (gsmSRF)

A) Sending Operation

    Precondition: SRSM state 2 Connected.

    Postcondition: SRSM state 2 Connected.

B) Receiving Error

    Precondition: SRSM state 2 Connected.

    Postcondition: SRSM state 1 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).

10.1.8   ParameterOutOfRange

10.1.8.1   General description

10.1.8.1.1   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. This error is applied for the following two cases (when the error is determined by the application):

    (1) For the parameter which type is defined with the range of its size, such as INTEGER(x..y), SEQUENCE SIZE(x..y) OF Type. This error is applied when the parameter value is z or the parameter size is z where $z < x$ or $z > y$.

    (2) For the parameter which type is defined as list of ENUMERATED value, the ParameterOutOfRange error is applied when the parameter value is not equal to any of the ENUMERATED values in the list.

10.1.8.2   Operations gsmSCF->gsmSSF

Call Associated/Non Call Processing

ApplyCharging

CallInformationRequest

Call Associated/Call Processing

Connect

ContinueWithArgument

RequestReportBCSMEvent

ResetTimer

SendChargingInformation

Refer to subclause 17.1.9 MissingParameter for the appropriate error procedures.

10.1.8.3   Operations gsmSSF->gsmSCF

ApplyChargingReport

InitialDP

Refer to subclause 17.1.9 MissingParameter for the appropriate error procedures.

10.1.8.4   Operations gsmSCF->gsmSRF

PlayAnnouncement

PromptAndCollectUserInformation

Refer to subclause 17.1.9 MissingParameter for the appropriate error procedures.

10.1.9   RequestedInfoError

10.1.9.1   General description

10.1.9.1.1   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. RequestedInfoError is used when a specific gsmSSF/CCF can not offer the information specified with RequestedInformationType but there exists other gsmSSF/CCF that can offer the information.

10.1.9.1.2   Argument description

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

10.1.9.2   Operations gsmSCF->gsmSSF

CallInformationRequest

Refer to subclause 17.1.9 MissingParameter for the appropriate error procedures.

10.1.10 SystemFailure

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 not expected to be completed within the current call instance.

10.1.10.2 Argument description

PARAMETER

    UnavailableNetworkResource

UnavailableNetworkResource:: = ENUMERATED {

    unavailableResources (0),

    componentFailure (1),

    basicCallProcessingException (2),

    resourceStatusFailure (3),

    endUserFailure (4)}

10.1.10.3 Operations gsmSCF->gsmSSF

Call Associated/Non Call Processing

ApplyCharging

CallInformationRequest

RequestReportBCSMEvent

SendChargingInformation

Call Associated/Call Processing

Connect

ConnectToResource

DisconnectForwardConnection

DisconnectForwardConnectionWithArgument

EstablishTemporaryConnection

Refer to subclause 17.1.9 MissingParameter for the appropriate error procedures.

10.1.10.4 Operations gsmSSF->gsmSCF

ApplyChargingReport

AssistRequestInstructions

InitialDP

Refer to subclause 17.1.9 MissingParameter for the appropriate error procedures.

10.1.10.5 Operations gsmSCF->gsmSRF

PlayAnnouncement

PromptAndCollectUserInformation

Refer to subclause 17.1.9 MissingParameter for the appropriate error procedures.

10.1.10.6 Operations gsmSRF->gsmSCF

AssistRequestInstructions

Refer to subclause 17.1.9 MissingParameter for the appropriate error procedures.

10.1.11 TaskRefused

10.1.11.1 General introduction

10.1.11.1.1   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.

10.1.11.1.2 Argument description

```
PARAMETER ENUMERATED {
    generic(0),
    unobtainable (1),
    congestion (2)
    }
```

10.1.11.2 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 17.1.9 MissingParameter for the appropriate error procedures.

10.1.11.3 Operations gsmSSF->gsmSCF

ApplyChargingReport

AssistRequestInstructions

InitialDP

Refer to subclause 17.1.9 MissingParameter for the appropriate error procedures.

10.1.11.4 Operations gsmSCF->gsmSRF

Cancel

PlayAnnouncement

PromptAndCollectUserInformation

Refer to subclause 17.1.9 MissingParameter for the appropriate error procedures.

10.1.11.5 Operations gsmSRF->gsmSCF

AssistRequestInstructions

Refer to subclause 17.1.9 MissingParameter for the appropriate error procedures.

10.1.12 UnavailableResource

10.1.12.1 General description

10.1.12.1.1 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.

10.1.12.2 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.

10.1.13 UnexpectedComponentSequence

10.1.13.1 General description

10.1.13.1.1 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.

10.1.13.2 Operations gsmSCF->gsmSSF

Call Associated/Non Call Processing

ApplyCharging

CallInformationRequest

FurnishChargingInformation

RequestReportBCSMEvent

ResetTimer

SendChargingInformation

Call Associated/Call Processing

Connect

ConnectToResource

ContinueWithArgument

DisconnectForwardConnection

DisconnectForwardConnectionWithArgument

EstablishTemporaryConnection

In this case the gsmSSF detects the erroneous situation, sends the UnexpectedComponentSequence error and remains in the same state. In the gsmSCF the SL and maintenance functions are informed and the SL decides about error treatment.

10.1.13.3 Operations gsmSSF->gsmSCF

ApplyChargingReport

AssistRequestInstructions

InitialDP

In case of assisting gsmSSF an error occurs in case an AssistRequestInstructions is sent while a relationship between gsmSCF and assisting gsmSSF has already been established, the gsmSCF returns the error parameter. SL and maintenance are informed. On receiving the error the assisting gsmSSF moves to Idle and the temporary connection is released.

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

10.1.13.4 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. In the gsmSCF, the SL and maintenance functions are informed and the SL decides about error treatment. Possible error treatment is to send the DisconnectForwardConnection operation to the gsmSSF.

10.1.13.5 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.

10.1.14 UnexpectedDataValue

10.1.14.1 General description

10.1.14.1.1 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".

10.1.14.2 Operations gsmSCF->gsmSSF

Call Associated/Non Call Processing

ApplyCharging

CallInformationRequest

FurnishChargingInformation

RequestReportBCSMEvent

ResetTimer

SendChargingInformation

Call Associated/Call Processing

Connect

ConnectToResource

ContinueWithArgument

DisconnectForwardConnectionWithArgument

EstablishTemporaryConnection

Refer to subclause 17.1.9 MissingParameter for the appropriate error procedures.

10.1.14.3 Operations gsmSSF->gsmSCF

ApplyChargingReport

AssistRequestInstructions

InitialDP

Refer to subclause 17.1.9 MissingParameter for the appropriate error procedures.

10.1.14.4 Operations gsmSCF->gsmSRF

PlayAnnouncement

PromptAndCollectUserInformation

Refer to subclause 17.1.9 MissingParameter for the appropriate error procedures.

10.1.14.5 Operations gsmSRF->gsmSCF

AssistRequestInstructions

Refer to subclause 17.1.9 MissingParameter for the appropriate error procedures.

10.1.15 UnexpectedParameter

10.1.15.1 General description

10.1.15.1.1 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.

10.1.15.2 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 17.1.9 MissingParameter for the appropriate error procedures.

10.1.15.3 Operations gsmSSF->gsmSCF

ApplyChargingReport

AssistRequestInstructions

InitialDP

Refer to subclause 17.1.9 MissingParameter for the appropriate error procedures.

10.1.15.4 Operations gsmSCF->gsmSRF

PlayAnnouncement

PromptAndCollectUserInformation

Refer to subclause 17.1.9 MissingParameter for the appropriate error procedures.

10.1.15.5 Operations gsmSRF->gsmSCF

AssistRequestInstructions

Refer to subclause 17.1.9 MissingParameter for the appropriate error procedures.

10.1.16   UnknownLegID

10.1.16.1 General description

10.1.16.1.1   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.

10.1.16.2 Operations gsmSCF->gsmSSF

Call Associated/Non Call Processing

ApplyCharging

CallInformationRequest

RequestReportBCSMEvent

SendChargingInformation

Call Associated/Call Processing

ConnectToResource

ContinueWithArgument

EstablishTemporaryConnection

PlayAnnouncement

Refer to subclause 17.1.9 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 TCAP services used for reporting errors are described in clause 19.

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 c Waiting for instructions or
                   gsmSSF FSM state d Waiting for end of User Interaction or
                   gsmSSF FSM state e Waiting for end of Temporary connection.

Postcondition: gsmSSF FSM state a Idle.

The gsmSSF FSM aborts the dialogue and moves to the Idle state, the CCF routes the call if necessary (e.g., defaultrouting to a terminating announcement). The abort is reported to the maintenance functions.

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. This procedure concerns only the direct gsmSCF-gsmSRF case.

10.2.2.2 Procedures gsmSRF->gsmSCF

Procedure at the invoking entity (gsmSRF)

Timeout occurs in gsmSRF on T$_{SRF}$

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

Postcondition: SRSM state 1 Idle

The gsmSRF aborts the dialogue and moves to the Idle state, all allocated resources are de-allocated. The abort is reported to the maintenance functions.

11 Detailed operation procedures

NOTE: The detailed operation procedures in this subclause 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 13.

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 or between the gsmSRF. 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)

11.1.2.1 Normal procedure

gsmSSF precondition:

(1) A relationship exists between the gsmSCF and the gsmSSF
    (2) The SSME FSM is is the state"Idle Management"

gsmSSF postcondition:

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

(2) If the Dialogue ID is active and if there is a gsmSSF-FSM 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 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.

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 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.

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 Dialogue ID is active and if there is a gprsSSF using the dialogue, the SSME sends a Return Result "ActivityTestGPRS" to the gsmSCF. The SSME-FSM returns to the state"Idle Management".

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

11.2.2.2 Error handling

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

11.3 ActivityTestSMS procedure

11.3.1 General description

This operation is used to check for the continued existence of a relationship between the gsmSCF and gprsSSF/gsmSSF for SMS. If the relationship is still in existence, then the gprsSSF/gsmSSF 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.

11.3.1.1 Parameters

None.

11.3.2 Responding entity (gprsSSF or gsmSSF)

11.3.2.1 Normal procedure

SSF precondition:

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

SSF postcondition:

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

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

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

11.3.2.2 Error handling

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

11.4 ApplyCharging procedure

11.4.1 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.

As several connection configurations may be established during a call, a possibility exists for the"ApplyCharging" to be invoked at the beginning of each connection configuration, for each party.

11.4.1.1 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 to which the"ApplyCharging" operation should be applied. If it is not present, then it is applied to the calling party (A-party).

- CallReleasedAtTcpExpiry

    This 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.

11.4.2 Responding entity (gsmSSF)

11.4.2.1 Normal procedure

gsmSSF precondition:

(1) The FSM for CS is in one of the following states:
"Waiting for Instructions"
"Waiting for End of User Interaction(WFI)" ,
"Waiting for End of User Interaction(MON)" ,
"Waiting for End of Temporary Connection(WFI)" ,
"Waiting for End of Temporary Connection(MON)" ,
"Monitoring" , or
the assisting/hand-off gsmSSF-FSM is in state:
"Waiting for Instructions"

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. In addition, the gsmSSF will start the monitoring of the end of the connection configuration and other charging events, if requested.

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.

11.4.2.2 Error handling

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

- a previously received call period duration is pending,

- a tariffSwitchInterval is indicated when a previously received tariffSwitchInterval is pending.

Generic error handling for the operation related errors is described in Clause 8 and the TCAP services used for reporting operation errors are described in Clause 10.

11.5   ApplyChargingGPRS procedure

11.5.1   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 3G TS 22.078for CSE control of GPRS session and PDP context duration and volume.

11.5.1.1   Parameters

-   chargingCharacteristics:

    This parameter specifies a choise between parameters required for CSE control of a GPRS session or aPDP

    context:

    -   maxTransferredVolume:

        This parameter specifies the maximum volume to be transferred in number of bytes.

    -   maxElapsedTime:

        This parameter specifies the period of time for which a GPRS session or a PDP context can exist 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 specifies the identifier of a PDP context within a control relationship.

11.5.2   Responding entity (gprsSSF)

11.5.2.1   Normal procedure

gprsSSF preconditions:

(1) A control relationship exists between the gprsSSFand the gsmSCF.

(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.

The gprsSSF will start monitoring for the "PDP Context Establishment Acknowledge", "PDP context deactivation" "Detach", "Change of Position session" or "Change of Position Context" event upon receipt of the ApplyChargingGPRS operation.

11.5.2.2   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 8 and the TCAP services used for reporting operation errors are described in Clause 10.

11.6   ApplyChargingReport procedure

11.6.1   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.

During a connection configuration the"ApplyChargingReport" operation may be invoked on multiple occasions. For each call party and each connection configuration, the"ApplyChargingReport" operation may be used several times. Note that at least one"ApplyChargingReport" operation is to be sent at the end of the connection configuration charging process.

The charging scenarios supported by this operation are 4.1 and 4.2 (refer to to EN 301 140-5 , annex B).

11.6.1.1   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 detection of Answer for the connection to the Called Party, Temporary Connection or gsmSRF connection, otherwise it will be absent.
        If present, then the elapsed time since detection of Answer is reported.

      - timeIfTariffSwitch
        This parameter will be present if a tariff switch has occurred since the detection of Answer for the connection to the Called Party, Temporary Connection or gsmSRF connection, otherwise it will be absent.
        If present, then the parameter may contain the following information:

        - timeSinceLastTariffSwitch
          The elapsed time since detection of the last tariff switch is reported.

        - tariffSwitchInterval
          This parameter is present only if a tariff switch was detected for the connection to the Called Party, the temporary connection or the gsmSRF connection in the reported call period.
          If present 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.

11.6.2 Invoking entity (gsmSSF)

11.6.2.1 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.

11.6.2.2 Error handling

Generic error handling for the operation related errors are described in clause 17 and the TC services used for reporting operation errors are described in clause 19.

11.7 ApplyChargingReportGPRS procedure

11.7.1 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. A report shall be made either when a PDP context deactivation, Change of Position Session, Change of Position Context, 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. Note that sending of ApplyChargingReportGPRS shall only be made on chargable QoS changes, i.e. normally upon MS initiated QoS changes.

11.7.1.1 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 since the detection of the event that triggered volume count (i.g. PDP context activation) occurred. If present, then the volume transferred since the tariff switch will be reported.

- volumeIfTariffSwitch

This parameter will be present if a tariff switch has occurred since the detection of the event that triggered volume count (e.g. PDP context activation) occurred. If present then the parameter may contain the following information:

- volumeSinceLastTariffSwitch

The volume since the last tariffSwitch is reported.

- volumeTariffSwitchInterval

This paramter is present only if a tariff switch was detected between the start of volume count for 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 is first) 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 since the detection of the event that triggered time count (e.g. attach) occurred. If present then the elapsed time since that event will be present.

- timeGPRSIfTariffSwitch

This parameter will be present if a tariff switch has occurred since the detection of the event that triggered time count (e.g. attach) occurred. If present then the parameter may contain the following information:

- timeGPRSSinceLastTariffSwitch

The time since the last tariffSwitch is reported.

- timeGPRSTariffSwitchInterval

This paramter is present only if a tariff switch was detected between the start of time count for 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 is first) and the last tariff switch is reported.

- qualityOfService:
This parameter provides the SCF with the quality of service negotiated with the subscriber.

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

- pDPID:

This parameter if present specifies the identifier of a PDP context within a control relationship for which the charging report is valid.

11.7.2 Invoking entity (gprsSSF)

11.7.2.1 Normal procedure

gprsSSF preconditions:

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

(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 PDP context has occurred because the allowed duration or volume has been reached:

- All outstanding EDPs shall be disarmed,

  - ApplyChargingReportGPRS shall be sent to gsmSCF,

  - The gprsSSF shall transit to the 'Idle' state if no more PDP contexts are pending.

(2) If termination of the GPRS session or a PDP context has occurred but not because the allowed duration or volume has been reached:

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

  - The gprsSSF shall transit to the 'Idle' state in case there are no more PDP contexts pending.

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

11.7.2.2 Error handling

Generic error handling for the operation related errors is described in Clause 8 and the TCAP services used for reporting operation errors are described in Clause 10.

11.8 AssistRequestInstructions procedure

11.8.1 General description

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

11.8.1.1 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 or be all of the digits.

- iPSSPCapabilities:
  See ITU-T Recommendation Q.1290 . This parameter is applicable to this operation only in the physical scenarios corresponding to assist with relay or hand-off. The use of this parameter is network operator dependent.

11.8.2 Invoking entity (gsmSSF/gsmSRF)

11.8.2.1 Normal procedure

gsmSSF precondition:

(1) An assist indication is detected by the assisting or Hand-off gsmSSF

gsmSSF postcondition:

(1) The assisting or Hand-off 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 (refer to ITU-T Recommendation Q.71). The"AssistRequestInstructions" operation is invoked by the gsmSSF or gsmSRF after the call, which initiated the assist indication, is accepted. The assisting gsmSSF FSM transitions to state"Waiting For Instructions".

11.8.2.2　Error handling

Generic error handling for the operation related errors are described in clause 17 and the TC services which are used for reporting operation errors are described in clause 19.

11.9　CallInformationReport procedure

11.9.1　General description

This operation is used to send specific call information for a single call/call party to the gsmSCF as requested by the gsmSCF in previous"CallInformationRequest" operation. The report is sent at the end of a call/call party connection which is indicated by one of the events specified below. This operation is not backwards-compatible with core CAP CS1 in the case where the A-party is released and the B-party is kept (e.g. A-party DP-Disconnect armed in the interrupted mode).

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 FSM for CS in 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,

- busy for the indicated or default leg.

- gsmSSF no answer timer expiration for the indicated or default leg,

- route select failure indicated by the network 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 for each such leg to the gsmSCF containing all information requested.

If a"CallInformationReport" has been sent to the gsmSCF then no"CallInformationReport" is pending, i.e. a further"CallInformationReport", 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.

11.9.3　Error handling

If requested information is not available, a"CallInformationReport" will be sent, indicating the requested information type, but with"RequestedInformationValue" filled in with an appropriate default value as specified by the network operator.

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 / 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") and the received answer indication from the indicated or default 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 to the indicated or default party is released.

- callConnectedElapsedTime:
This parameter indicates the duration between the received answer indication from the indicated or defualt called party side and the release of that connection or party. For a calling party it indicates the duration between the sending of IDP and the release of that party.

- calledAddress
This parameter indicates the incoming called party address that was received by the gsmSSF (i.e., before translation by the gsmSCF) and is as available on the UNI or NNI and interpreted as per the numbering plan.

- releaseCause:
See EN 300 356-1 . The release cause that applied to the indicated or default party.

Any set of these values can be requested.

- 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). The indicated leg may be any controlling leg or passive leg.

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 17 and the TC services which are used for reporting operation errors are described in clause 19.

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, a"PromptAndCollectUserInformation" operation or a .

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 17 and the TC services which are used for reporting operation errors are described in clause 19.

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 17 and the TC services which are used for reporting operation errors are described in clause 19.

11.12 CancelGPRS procedure

11.12.1 General description

The gsmSCF uses this class 2 operation to request the gprsSSF to cancel all outstanding requests for a session or a specific PDP context and enable the state machine in the gprsSSF to go to "Idle" if there are no futher PDP contexts pending. The CancelGPRS operation does not specify any specific operation to be cancelled.

11.12.1.1 Parameters

- allRequests:

  This parameter indicates that all active requests for EventGPRSReport and ApplyGPRSChargingReport shall be cancelled.

- pDPID:

  This parameter if present specifies for which PDP context the active requests for EventGPRSReport and ApplyGPRSChargingReport is to 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 have been cancelled. In case a pDPID was included only the ApplyChargingReportsGPRS and outstanding EDPs for the corresponding PDP context are cancelled.

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

   In case the gprsSSF was in state "Waiting for Instructions" it will 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 session or PDP context, if in active state, is further treated by gprsSSF autonomously as a normal (non-CSE controlled) session or PDP context.

All resources allocated to the dialogue are released in case there are no more PDP contexts pending.

11.12.2.2 Error handling

Sending of return error on cancel is not applicable in the cancel "allRequests" case. Otherwise generic error handling for the operation related errors is described in Clause 8 and the TCAP services which are used for reporting operation errors are described in Clause 10.

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. To do so, the gsmSSF may use destination information from the calling party (e.g. dialled digits) and existing call set-up information (e.g. route index to a list of trunk groups) depending on the information provided by the gsmSCF.

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 [**Error! Bookmark not defined.**]) 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.

Refer to subclause 12.5.

11.13.1.1 Parameters

-   destinationRoutingAddress:
    This parameter contains the called party numbers (see EN 300 356-1 [**Error! Bookmark not defined.**]) towards which the call is to be routed. The encoding of the parameter is defined in
    ITU-T Recommendation Q.763 [**Error! Bookmark not defined.**]. The"destinationRoutingAddress" may include the"correlationID" and"scfID" if used in the context of a hand-off pocedure, but only if"correlationID" and"scfID" are not specified separately.

-   alertingPattern:
    See ITU-T Recommendation Q.1290 [**Error! Bookmark not defined.**] It only applies if the network signalling support this parameter or if gsmSSF is the terminating local exchange for the subscriber.

-   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:
    See EN 300 356-1 [**Error! Bookmark not defined.**] Original Called Number signalling information. The use of this parameter in the context of the"Connect" operation is to be specified by the network operator. For CAMEL 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:
    See ITU-T Recommendation Q.763 [**Error! Bookmark not defined.**] Redirection Information signalling information.

-   genericNumbers:
    This parameter allows the gsmSCF to modify the GenericNumber information received from the gsmSSF, if any. Also, it allows the gsmSCF to precise a Generic Number information to the gsmSSF if the gsmSSF has not preciously done so.

-   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 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 3G TS 23.078 [16].

- cliPresentationIndicator
This parameter indicates the Presentation Indicator to be used in the Calling Party number.

- naCarrierInformation:
This parameter contains carrier identification code and carrier selection type to be used by gsmSSF for routing a call to a carrier.

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

- naChargeNumber:
This parameter identifies the chargeable number for the usage of a carrier.

- cug-Info
This parameter contains the CUG information, altered by the gsmSCF, for the call.

- cug-Index
This parameter contains the CUG index passed between the user and the network. This is only significant within the context of a users subscription.

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 FSM for CS 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 FSM for CS state"Waiting for Instructions", the gsmSSF performs the following actions:

- The gsmSSF cancels T_{SSF}.

- If the"callingPartyNumber" is supplied, this value may be used for all subsequent gsmSSF processing.

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

No implicit activation or deactivation of DPs occurs.

Statistic counter(s) are not affected.

Connect completes when the CAP processing of the operation is complete and before the SSP starts the processing necessary to select a circuit.

11.13.2.2 Error handling

Generic error handling for the operation related errors are described in clause 17 and the TC services which are used for reporting operation errors are described in clause 19.

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 3G TS 29.060) towards which the PDP context shall be established. The encoding of this parameter is defined in 3G TS 24.008.

- 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.

   - the gprsSSF cancels T_{SSF};

   - 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 8 and the TCAP services which are used for reporting operation errors are described in Clause 10.

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" is supplied, this value 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 8 and the TCAP services which are used for reporting operation errors are described in Clause 10.

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.
        It is only valid when used in a single call segment CSA.

- legID:
  This parameter indicates to which party in the call the subsequent interaction shall apply while maintaining the speech connection between that leg and any other legs connected to the same CS.

- callSegmentID:
  This parameter indicates to which call segment the subsequent user interaction shall apply, i.e. to all parties connected to the call segment.

- iPAddressAndLegID:
  This parameter indicates that both legID and iPRoutingAddress shall be used..

- none:
  This parameter indicates that the call party is to be connected to a predefined gsmSRF in the initial CS.
  It is only valid when used in a single call segment CSA.

- iPAddressAndCallSegment:
  This parameter indicates that both Call Segment ID and iPRoutingAddress shall be used..

- serviceInteractionIndicatorsTwo
  This parameter contains indicators which are exchanged between SSP and SCP to resolve interactions between IN based services and network based services, respectively between different IN based services.

11.16.2 Responding entity (gsmSSF)

11.16.2.1 Normal procedure

gsmSSF precondition:

(1) A control relationship has been established.

(2) The FSM for CS is in the state"Waiting for Instructions" or in the state"Monitoring".

gsmSSF postcondition:

(1) The call is switched to the gsmSRF.

(2) A control relationship to the gsmSRF is established.

(3) If in state"Waiting for Instructions" the FSM for the CS moves to the state"Waiting for End of User Interaction (WFI)". If necessary, T_{SSF} is set.

(4) If in state"Monitoring" the FSM for the CS moves to the state"Waiting for End of User Interaction (MON)". If necessary, a guard timer T_{SSF} is set.

NOTE 1: Whether the T_{SSF} is used or not in this case is network operator dependent. But it must be synchronized with $T_{SCF\text{-}gsmSSF}$ in the SCSM.

NOTE 2: 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 17 and the TC services which are used for reporting operation errors are described in clause 19.

11.17 Continue procedure

11.17.1 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

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) FSM for CS is in the state either

- "Waiting for Instructions" or

- "Waiting for End of User Interaction (WFI)" or"Waiting for End of Temporary Connection (WFI)" while being suspended at the answer DP.

NOTE: The only applicable gsmSCF-gsmSRF user interaction operation is PlayAnnouncement.

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 3G TS 23.078.)

(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.

(3) If in state"Waiting for End of User Interaction (WFI)" the FSM for the CS moves to the state"Waiting for End of User Interaction (MON)". If necessary, a guard timer T_{SSF} is set.

(4) If in state"Waiting for End of Temporary Connection (WFI)", the FSM for the CS moves to the state"Waiting for End of Temporary Connection (MON)" and T_{SSF} is set.

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 session or PDP context processin 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

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.

11.19.3 ContinueWithArgument Procedure

11.19.4 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 [**Error! Bookmark not defined.**] 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.

11.19.4.1 Parameters

- alertingPattern:
   See ITU-T Recommendation Q.1290 [**Error! Bookmark not defined.**] It only applies if the network signalling support this parameter or if gsmSSF is the terminating local exchange for the subscriber.

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

- originalCalledPartyID:
   See EN 300 356-1 [**Error! Bookmark not defined.**] Original Called Number signalling information. The use of this parameter in the context of the"Connect" operation is to be specified by the network operator. For CAMEL 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:
   See ITU-T Recommendation Q.763 [**Error! Bookmark not defined.**] Redirection Information signalling information.

- genericNumbers:
   This parameter allows the gsmSCF to modify the GenericNumber information received from the gsmSSF, if

any. Also, it allows the gsmSCF to precise a Generic Number information to the gsmSSF if the gsmSSF has not preciously done so.

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

- naCarrierInformation:
  This parameter contains carrier identification code and carrier selection type to be used by gsmSSF for routing a call to a carrier.

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

- naChargeNumber:
  This parameter identifies the chargeable number for the usage of a carrier.

- 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.

11.19.5 Responding entity (SSF)

11.19.5.1 Normal procedure

SSF precondition:

(1) A control relationship exists between the SSF and the SCF

(2) BCSM: Basic call processing has been suspended at DP Collected_Info, DP Analysed_Info or DP Terminating_Attempt_Authorised.

(3) SSF-FSM is in the state "Waiting for Instructions"

SSF postcondition:

(1) BCSM: Basic call processing continues with modified information.

(2) The SSF-FSM moves to the state "Monitoring" if there exist armed EDPs or outstanding reports, otherwise the SSF-FSM transits to "Idle".

11.19.5.2 Error handling

Generic error handling for the operation related errors are described in clause 17 and the TC services which are used for reporting operation errors are described in clause 19.

11.20 DisconnectForwardConnection procedure

11.20.1 General Description

This operation is used in the following two cases:

1) 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.

2) 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.

11.20.1.1 Parameters

11.20.2 Responding entity (gsmSSF)

11.20.2.1 Normal procedure

gsmSSF precondition:

(1) (void)

(2) If basic call processing has been suspended at a DP, then the FSM for CS in the initiating gsmSSF is in the state"Waiting for End of User Interaction (WFI)" or"Waiting for End of Temporary Connection (WFI)".

(3) If basic call processing has not been suspended at a DP, then the FSM for CS in the initiating gsmSSF is in the state"Waiting for End of User Interaction (MON)" or in the state"Waiting for End of Temporary Connection (MON)".

gsmSSF postcondition:

(1) The connection to the gsmSRF or assisting gsmSSF is released.

(2) The FSM for CS is in state"Waiting for Instructions" if basic call processing has been suspended at a DP, otherwise in state"Monitoring".

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 FSM for CS states"Waiting for End of Temporary Connection (WFI)" or"Waiting for End of Temporary Connection (MON)" or"Waiting for End of User Interaction (WFI)" or"Waiting for End of User Interaction (MON)". 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" or"Monitoring".

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.

11.20.2.2 Error handling

Generic error handling for the operation related errors are described in clause 17 and the TC services which are used for reporting operation errors are described in clause 19.

11.21   EntityReleasedGPRS procedure

11.21.1 General description

This operation is used by the gprsSSF to inform the gsmSCF that a PDP context has terminated abnormally. The operation can only be sent within a control relationship and is not allowed in a monitor relationship.

11.21.1.1 Parameters

- GPRSCause

  A number giving an indication to the gprsSCF about the reason for discontinuing the PDP context. This may be used by gsmSCF if FurnishChargingInformationGPRS is to be sent to the gprsSSF.

- pDPID:

  This parameter identifies the PDP context within the control relationship for which the processing shall be terminated.

11.21.2 Invoking entity (gprsSSF)

11.21.2.1 Normal procedure

gprsSSF preconditions:

1) State "Waiting for Instructions"; or State "Monitoring".

gprsSSF postcondition:

1) No state transition. Possible armed EDPs are ignored for the indicated PDP context. All connections and resources related to the specific PDP is released.

11.21.2.2 Error handling

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

11.22   EstablishTemporaryConnection procedure

11.22.1 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.

11.22.1.1 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 operators has to decide about the actual mapping of this parameter on the used signalling system.

- scfID:
See ITU-T Recommendation Q.1290 [**Error! Bookmark not defined.**]. The"scfID" is used only if the gsmSCF id is not embedded in the"assistingSSPIPRoutingAddress". The network operators has to decide about the actual mapping of this parameter on the used signalling system.

- serviceInteractionIndicatorsTwo
Indicators which are exchanged between SSP and SCP to resolve interactions between IN based services and network based services, respectively between different IN based services.

11.22.2 Responding entity (gsmSSF)

11.22.2.1 Normal procedure

gsmSSF precondition:

 (2)The FSM for CS is in state"Waiting for Instructions" or in state"Monitoring".

(3) 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 CS waits for end of temporary connection.

(3) If in state"Waiting for Instructions" the FSM for the CS moves to the state"Waiting for End of Temporary Connection (WFI)". If necessary, T_{SSF} is set.

(4) If in state"Monitoring" the FSM for the CS moves to the state"Waiting for End of Temporary Connection (MON)". If necessary, a guard timer T_{SSF} is set.

On receipt of this operation in the FSM for CS state"Waiting for Instructions" or"Monitoring", the SSP has to perform the following actions:

- Reset the T_{SSF} (optional)

NOTE: This"optional" means that the application timer T_{SSF} is optionally set. Whether it is used or not is network operator dependent. But it must be synchronized with $T_{SCF\text{-}gsmSSF}$ in the SCSM.

- Route the call to assisting gsmSSF or gsmSRF using"assistingSSPIPRoutingAddress".

- The gsmSSF FSM goes to state"Waiting for End of Temporary Connection (WFI)" (e7).

On receipt of this operation in the gsmSSF FSM state"Monitoring", the SSP has to perform the following actions:

- Route the call to assisting gsmSSF or gsmSRF using"assistingSSPIPRoutingAddress".

11.22.2.2 handling

Until the connection setup has been accepted (refer to ITU-T Recommendation Q.71 [**Error! Bookmark not defined.**]) 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 17 and the TC services which are used for reporting operation errors are described in clause 19.

11.23 EventReportBCSM procedure

11.23.1 General description

This operation is used to notify the gsmSCF of a call related event previously requested by the gsmSCF in an"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.

11.23.1.1 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- or T-Busy it will contain the"BusyCause" (for T-Busy also 'call forwarded'), if available.

  For O- NoAnswer it will be empty, for T-NoAnswer it will contain 'call forwarded' if applicable.

  For O-Answer it will contain the"BackwardGVNS", if available,

  For T-Answer it will be empty.

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

    The connect time, if available, indicates the duration between the received answer indication from the called party side and the release of the connection in units of 100 ms.

- legID:
  This parameters indicates the party in the call for which the event is reported. gsmSSF will use the option"ReceivingSideID" only. Refer to RequestReportBCSMEvent for the applied leg numbering.

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

11.23.2 Invoking entity (gsmSSF)

11.23.2.1 Normal procedure

gsmSSF precondition:

  (1) A control or a monitoring relationship exists between the gsmSSF and the gsmSCF.

  (2) The FSM for CS is in the state"Monitoring", or in a User Interaction monitoring state (WfEoUI(MON)/WfEoTC(MON)); or
  The FSM for CS may be in state"Waiting for Instructions" (if the O/TDisconnect DP, O/TAnswer DP or O_Term_Seized DP is armed and encountered); orThe FSM for CS is in any state, except Idle (if the O/TAbandon DP or MidCall DP immediate report is armed and encountered).

(3) The BCSM proceeds to an EDP that is armed.

gsmSSF postcondition:

(1) The FSM for CS 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 for CS 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) If the message type was request, the FSM for CS moves to the state"Waiting for Instructions" if the FSM for CS was in the state"Monitoring". If user interaction is ongoing the FSM for CS moves to a User Interaction waiting for instructions state (WfEoUI(WFI)/WfEoTC(WFI)). Call processing is interrupted.

11.23.2.2 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.

11.24 EventReportGPRS procedure

11.24.1 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 RequestGPRSReportGPRSEvent operation. The monitoring of more than one event could be requested with a RequestReportGPRSEvent operation, but each of these requested events is reported in a separate EventReportGPRS operation.

11.24.1.1 Parameters

- gPRSEventType:
  This parameter specifies the type of event that is reported.

- gPRSEventSpecificInformation:
  This parameter indicates the session or PDP context related information specific to the event.

  For Change of Position it will contain the "newRoutingAreaIdentity", if available.

  For Detach and Disconnect it will contain the "initiatingEntity".

  For PDP context establishment it will contain the "accessPointName".

  For PDP context establishment acknowledge it will contain the "chargingID".

- miscGPRSInfo:
  This parameter indicates 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 control relationship for which the event is reported.

11.24.2 Invoking entity (gprsSSF)

11.24.2.1 Normal procedure

gprsSSF preconditions:

(1) The gprsSSF shall be in the state "Monitoring"; or the gprsSSF may be in state "Waiting for Instructions" if the PDP context deactivate or Detach DP is armed and encountered.

(2) The GPRS session or PDP context SM 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 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, 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 a EDP-R is met that causes the release of a GPRS session or PDP context , all EDPs related to the session including all PDP contexts are disarmed and the event is reported via EventReportGPRS.

11.24.2.2 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 session or PDP context according to the default session and PDP context handling parameters of the valid CSI.

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

11.25 EventReportSMS procedure

11.25.1 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 could be requested with a RequestReportSMSEvent operation, but each of these requested events is reported in a separate EventReportSMS operation.

11.25.1.1 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".

11.25.2 Invoking entity (gsmSSF or gprsSSF)

11.25.2.1 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 moves to the state "Idle" if the message type was notification and there are no more EDPs armed which could be met.

11.25.2.2 Error handling

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

11.26   FurnishChargingInformation procedure

11.26.1 General description

This operation is used to send charge 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 of the *append free format data* parameter in the FCI operation.

- if this parameter is present, then the newly received free format data shall be appended to the free format data in the existing logical call record

- if thid parameter is absent, then all data in the existing logical call record shall be replaced by the newly received free format data.

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.

11.26.1.1 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 that the free format data in the FCI operation shall be appended to the data in the logical call record.

11.26.2 Responding entity (gsmSSF)

11.26.2.1 Normal procedure

11.26.2.2 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. 18.49.1 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 3G 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.

It should be noted that no CAMEL Logical CDR is output at the end of a user interaction.

11.26.2.3 Error handling

Generic error handling for the operation related errors are described in clause 17 and the TC services which are used for reporting operation errors are described in clause 19.

11.27 FurnishChargingInformationGPRS procedure

11.27.1 General description

This operation is used to send charge 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.

11.27.1.1 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 that the free-format in the FCI operation shall be appended ot the data in the logical GPRS context record.

  - PDPId
    This parameter if present, indicates the PDP context's logical call record to which the free format data belongs to.

11.27.2 Responding entity (gprsSSF)

11.27.2.1 Normal procedure

gprsSSF preconditions:

1) gprsSSF State "Waiting for Instructions"

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. Note that 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 of the IE Append Free Format Data

The Logical CDRs will be associated for a given session or PDP context into one or more physical CDRs, as specified in 3G TS 22.105.

11.27.2.2 Error handling

Generic error handling for the operation related errors is described in Clause 8 and the TCAP services which are used for reporting operation errors are described in Clause 10.

11.28 FurnishChargingInformationSMS procedure

11.28.1 General description

This operation is used to send charge 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 the contents of the logical SM record.

11.28.1.1 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 3G TS 23.078.

11.28.2 Responding entity (gsmSSF or gprsSSF)

11.28.2.1 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 3G TS 23.078. 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 3G TS 22.005 and 22.015.

11.28.2.2 Error handling

Generic error handling for the operation related errors is described in Clause 8 and the TCAP services which are used for reporting operation errors are described in Clause 10.

11.29 InitialDP procedure

11.29.1 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.

11.29.1.1 Parameters

- serviceKey:
  This parameter identifies for the gsmSCF unambiguously the requested IN service. It is used to address the correct 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.

- callingPartyNumber:
  See EN 300 356-1 Calling Party Number signalling information.

- callingPartysCategory:
  See EN 300 356-1 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:
  See EN 300 356-1 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 [**Error! Bookmark not defined.**]) is used. The highlayerCompatibility can also be transported by ISUP (e.g. within the ATP (see ITU-T Recommendation Q.763 [**Error! Bookmark not defined.**]) 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 DSS1 Bearer Capability parameter (EN 300 403-1 [**Error! Bookmark not defined.**]) in case the gsmSSF is at local exchange level or the value of the ISUP User Service Information parameter (ITU-T Recommendation Q.763 [**Error! Bookmark not defined.**]) in case the gsmSSF is at transit exchange level.

    The parameter"bearerCapability" shall only be included in the"InitialDP" operation in case the DSS1 Bearer Capability parameter or the ISUP User Service Information parameter is available at the SSP.

    If two values for bearer capability are available at the gsmSSF or if User Service Information and User Service Information Prime are available at the gsmSSF the"bearerCap" shall contain the value of the preferred bearer capability respectively 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:
  See ITU-T Recommendation Q.763 [**Error! Bookmark not defined.**] Redirection Information signalling information.

- 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 3G TS 29.002 [**Error! Bookmark not defined.**].

- 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 3G TS 29.002 [**Error! Bookmark not defined.**].

- locationInformation:
  This parameter indicates the whereabouts of the MS, and the age of the information defining the whereabouts. For encoding see 3G TS 29.002 [**Error! Bookmark not defined.**].

- ext-BasicServiceCode:
  Indicates the Basic Service Code. For encoding see 3G TS 29.002 [**Error! Bookmark not defined.**].

- callReferenceNumber:
  This parameter gives the call reference number assigned to the call by the CCF. For encoding see 3G TS 29.002 [**Error! Bookmark not defined.**].

mscAddress:
  This parameter gives the mscId assigned to the MSC. For encoding see 3G TS 29.002 [**Error! Bookmark not defined.**].

- gmscAddress:
  This parameter gives the gmscId assigned to the GMSC. For encoding see 3G TS 29.002 [**Error! Bookmark not defined.**].

  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.

naCarrierInformation:
  This parameter contains the carrier identification code and carrier selection type 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.

- 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.

11.29.2 Invoking entity (gsmSSF)

11.29.2.1 Normal procedure

gsmSSF precondition:

(1) An event fulfilling the criteria for the DP being executed has been detected.

gsmSSF postcondition:

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

Following a trigger detection (due to the DP criteria assigned being met) related to an armed TDP in the BCSM caused by a call origination attempt, the gsmSSF checks if call gapping, SS7 overload or service filtering are not in effect for the related call segment.

If these conditions are met, then the"InitialDP" operation is invoked by the gsmSSF. The address of the gsmSCF the"InitialDP" operation has to be sent to is determined on the base of trigger related data. The gsmSSF provide as many parameters as available. In some cases, some parameters must be available (such as"callingPartyNumber" or"callingPartyCategory").

Otherwise, the call control is given back to the underlying network.

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.

11.29.2.2 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 17).

Generic error handling for the operation related errors are described in clause 17 and the TC services which are used for reporting operation errors are described in clause 19.

11.30 InitialDPGPRS procedure

11.30.1 General description

This operation is sent 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 session or PDP context.

11.30.1.1 Parameters

- serviceKey:

  This parameter identifies for the gsmSCF unambiguously the requested IN service. It is used to address the correct 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 3G TS 29.002 [15].

- iMSI:

  IMSI of the mobile subscriber for which the CAMEL service is invoked. For encoding see 3G TS 29.002 [15].

- 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 for the session.

    - mSRadioAccessCapabilities

        This parameter contains the Radio Access Capabilities of the MS.

- pDPType:

    This parameter identifies the PDP type and the actual PDP address.

    - pDPTypeOrganization:

    This parameter contains the type of PDP address, e.g. ETSI or an IETF type of address. For encoding see GSM 29.060.

    - pDPTypeNumber:

        This parameter is the address that the PDP context of the MS for which the CAMEL service is invoked for, that identifies the MS from the externa packet data network. For encoding see 3G TS 29.060.

- qualityOfService:

    This parameter contains the negotiated quality of service for the PDP current PDP context. For encoding see 3G TS 24.008.

- 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 3G TS 29.060 [X].

- routeingAreaIdentity:

    This parameter contains the location information of the MS for which the CAMEL service is invoked from. For encoding see 3G TS 29.060.

- chargingID:

    This parameter contains the charging ID that uniquely identifies the PDP context for the MS for which the CAMEL service is invoked from. For encoding see 3G TS 32.015.

- sGSNcapabilities:

    This parameter specifies the capabilities which the SGSN node can provide for the CAMEL service control.

11.30.2 Invoking entity (gprsSSF)

11.30.2.1 Normal procedure

gprsSSF preconditions:

1) An attach or PDP context activation attempt has been initiated and the event was armed as a TDP

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.

A control relationship is established to 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 session or PDP context duration or volume usage.

11.30.2.2 Error handling

If the destination gsmSCF is not accessible then the gprsSSF instructs the SGSN to handle the session or PDP context according to the Default session or PDP context 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 session or PDP context handling parameter of the valid CSI.

If the MS abandons the establishment of a 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 8 and the TCAP services which are used for reporting operation errors are described in Clause 10.

11.31   InitialDPSMS procedure

11.31.1 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.

11.31.1.1 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 3G TS 29.002 [15].

− 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 identifies for the gsmSCF unambiguously the requested IN service. It is used to address the correct 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.

- SMSCAddress.

    This I.E defines the address of the SMSC to which the MO short message is intended to be submitted.

11.31.2 Invoking entity (gsmSSF or gprsSSF)

11.31.2.1 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 InitialSMSEvent 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 InitialSMSEvent for requesting instructions from the gsmSCF. It is used to prevent from excessive SMS delivery suspension time.

11.31.2.2 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 InitialSMSEvent, then the gsmSSF/gprsSSF aborts the control relationship after the first answer message from the gsmSCF has been received.

Generic error handling for the operation related errors is described in Clause 8 and the TCAP services which are used for reporting operation errors are described in Clause 10.

11.32   PlayAnnouncement procedure

11.32.1 General description

This operation is used for inband interaction with a GSMuser. When used to apply user treatment to the indicated leg, the user treatment can be audible (e.g. inband tone) or visual (e.g. text displayed).

11.32.1.1 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.

- displayInformation:
    This parameter indicates a text string to be sent to the end-user. This information can not be received by a PSTN end-user.

NOTE: As the current signalling systems (DSS1/ISUP) do not provide an indication whether or not information can be displayed by the user's terminal, in case of user interaction with an ISDN user two consecutive"PlayAnnouncement" operations are sent. The first contains the display information, the second contains the inband information to be sent to the user. Since the execution of the display information by the gsmSRF should take a limited amount of time, the inband information will be immediately sent by the gsmSRF to the user, in sequence with the display information.

- 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.

- connectedParty:
    This parameter shall be present when applied in a multi call segment CSA.
    When not present in a single call segment CSA it implies that user interaction shall apply to the call segment, i.e. to all parties connected to the call segment.

    - legID:
        This parameter indicates to which party in the call the interaction shall apply while maintaining the speech connection between that leg and any other legs connected to the same CS.

- callSegmentIdentifier:
This parameter indicates to which call segment the user interaction shall apply, i.e. to all parties connected to the call segment.

11.32.2 Responding entity (gsmSRF)

11.32.2.1 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).

11.32.2.2 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 17 and the TC services which are used for reporting operation errors are described in clause 19.

11.33 PromptAndCollectUserInformation procedure

11.33.1 General description

This operation is used to interact with a call party in order to collect information.

11.33.1.1 Parameters

- collectedInfo

    - collectedDigits

- minimumNbOfDigits:
  If this parameter is missing, the default value used is 1. The"minimumNbOfDigits" specifies the minimum number of valid digits to be collected.

- maximumNbOfDigits:
  This parameter should 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 used to signal the end of input.

  In case the"maximumNbOfDigits" ="minimumNbOfDigits", the"endOfReplyDigit" (could be present but) has no further meaning. This parameter 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 send 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 can be entered by the user to request a possible retry. All digits already received by the gsmSRF are discarded and the same"PromptAndCollectInformation" procedure is performed again, thus e.g. the same announcement to request user information is given to the user and information is collected. This parameter can be one or two digits .

  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. 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. In case 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 non-valid input digit, the corresponding first-digit timer is stopped.

  If this parameter is not present, then the gsmSRF uses a default value (network operator specific) for the first-digit timer in which the first valid or non-valid input digit is received.

  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 non-valid digit, should be received by the gsmSRF before the inter-digit timer expires. As result the inter-digit timer is reset and restarted.

  In case a subsequent valid or non-valid 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.

  In case a subsequent valid or non-valid 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 time.

- 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 reportErrorToSCF.

- interruptableAnnInd:
  This parameter is optional, where the default value is specified being TRUE.

  If this parameter is TRUE, the announcement is interrupted after the first valid or non-valid 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 non-valid. 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 specified being FALSE. If the"voiceInformation" parameter is FALSE, all valid or non-valid digits are entered by DTMF.

  If this parameter is present and explicitly set to TRUE, calling user is required to provide all valid or non-valid 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 specified being 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 non-valid input digits will not be announced back to the calling user.

  A possible end of reply digit is not voiced back.

- iA5Information
  This parameter indicates that IA5 information is expected.

- disconnectFromIPForbidden:
  This parameter indicates whether the gsmSRF should initiate disconnection to the gsmSSF/CCF 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, 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 parameter 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.

- displayInformation:
    This parameter indicates a text string to be sent to the end-user. This information can not be received by a PSTN end-user.

NOTE: As the current signalling systems (DSS1/ISUP) do not provide an indication whether or not information can be displayed by the user's terminal, in case of user interaction with an ISDN user, the"displayInformation" parameter is not used in the"PromptAndCollectUserInformation" operation. Instead a"PlayAnnouncement" operation containing the"displayInformation" parameter followed by a"PromptAndCollectUserInformation" operation containing inband information are sent to the user. Since the execution of the displayed information by the gsmSRF should take a limited amount of time, the inband information will be immediately sent after by the gsmSRF to the user, in sequence with the displayed information.

- callSegmentIdentifier:
    This parameter indicates to which call segment the user interaction shall apply.
     When not present in a single call segment CSA it implies that user interaction shall apply to the call segment.
    This parameter shall be present when applied in a multi call segment CSA.

Result Parameters:

- digitsResponse:
  This parameter contains the information collected from the end-user.

- iA5Response:
  This parameter contains the received IA5 information.

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 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.

11.33.2.2 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 17, the TC services which are used for reporting operation errors are described in clause 19.

If any of the parameter restrictions are violated (e.g. minimumNbOfDigits > maximumNbOfDigits) then an operation error has occured.

11.34 ReleaseCall procedure

11.34.1 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, except in the case of hand-off procedure.

11.34.1.1 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.

11.34.2 Responding entity (gsmSSF)

11.34.2.1 Normal procedure

gsmSSF precondition:

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

(2) The FSM for CS is in state" Waiting for Instructions" or state"Monitoring"

gsmSSF postcondition:

(1) The FSM for CS 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.

11.34.2.2 Error handling

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

11.35 ReleaseGPRS procedure

11.35.1 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 and is not allowed in a monitor relationship.

11.35.1.1 Parameters

- GPRSCause

A number giving an indication to the gprsSSF about the reason of releasing the 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 control relationship for which the processing shall be released.

11.35.2 Responding entity (gprsSSF)

11.35.2.1 Normal procedure

gprsSSF preconditions:

1) 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 session or PDP context for the corresponding pDPID are released.

11.35.2.2 Error handling

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

11.36   ReleaseSMS procedure

11.36.1 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.

11.36.1.1 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.

11.36.2 Responding entity (gsmSSF or gprsSSF)

11.36.2.1 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.

11.36.2.2 Error handling

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

11.37   RequestReportBCSMEvent procedure

11.37.1   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 the passive leg) 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 leg2 in the T_BCSM.

Table 18-9: DP Arming Table for O-BCSM:

O_BCSM	leg1	leg2	Default_leg_ID
Analysed_Information DP	X	X	1
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	- [o2]
O_Abandon DP	X	-	1

o1)   Only applicable as TDP, because first DP that can be encountered cannot be armed as EDP.
o2)   The"legID" parameter shall be included
Nomenclature: X = Arming Applicable
           - = Not Applicable

Table 18-10: DP Arming Table for T-BCSM:

T_BCSM	Controlling leg	Passive leg	Default Leg ID
T_Busy DP	X	-	2
T_No_Answer DP	X	-	2
T_Answer DP	X	-	2
T_Disconnect DP	X	X	- [t2]
T_Abandon DP	-	X [t3]	1

t1)	Only applicable as TDP, because first DP that can be encountered cannot be armed as EDP.
t2)	The"legID" parameter shall be included
t3)	T_Abandon can only be armed for the passive leg.
Nomenclature:	X = Arming Applicable
	- = Not Applicable

11.37.1.1 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. Values
    collectedInfo,analyzedInformation and termAttemptAuthorized are not valid for the eventTypeBCSM
    parameter.

  - 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.

11.37.2 Responding entity (gsmSSF)

11.37.2.1 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".

11.37.2.2 Error handling

Generic error handling for the operation related errors are described in clause 17 and the TC services which are used for reporting operation errors are described in clause 19.

11.38   RequestReportGPRSEvent procedure

11.38.1 General description

This operation is used to request the gprsSSF to monitor for a 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.

11.38.1.1 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 should 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 control relationship for which the event reporting is requested.

11.38.2 Responding entity (gprsSSF)

11.38.2.1 Normal procedure

gprsSSF precondition:

1) A control relationship exists between the gprsSSF and the gsmSCF.

2) The gprsSSF 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.

gprsSSF postconditions:

1) The requested EDPs have been armed as indicated.

2) Previously requested events are monitored until ended by a transparent monitor mode, until the end of the session or PDP context or until the EDPs are detected.

3) The gprsSSF remains in the same state, unless all EDPs have been disarmed and no more ApplyChargingReportGPRS has been requested. If no more PDP contexts are pending the gprsSSF moves to the state "Idle".

11.38.2.2 Error handling

Generic error handling for the operation related errors is described in Clause 8 and the TCAP services which are used for reporting operation errors are described in Clause 10.

11.39 RequestReportSMSEvent procedure

11.39.1 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.

11.39.1.1 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 should 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..

11.39.2 Responding entity (gsmSSF or gprsSSF)

11.39.2.1 Normal procedure

gsmSSF/gprsSSF precondition:

1) A control relationship exists between the gsmSSF/gprsSSF and the gsmSCF.

2) The gsmSSF/gprsSSF is in either the state "Waiting for Instructions".

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/gprsSSF postconditions:

1) The requested EDPs have been armed 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. If no EDPs are armed after the operation, then the gsmSSF/gprsSSF transits to state IDLE.

11.39.2.2 Error handling

Generic error handling for the operation related errors is described in Clause 8 and the TCAP services which are used for reporting operation errors are described in Clause 10.

11.40 ResetTimer procedure

11.40.1 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.

11.40.1.1 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.

11.40.2 Responding entity (gsmSSF)

11.40.2.1 Normal procedure

gsmSSF precondition:

(1) (void)

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

(3) The FSM for the CS 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.

NOTE: Whether the T_{ssf} is used or not in the state"Waiting for End of User Interaction" or in the state"Waiting for End of Temporary Connection" is network operator dependent.

gsmSSF postcondition:

(1) The T_{ssf} timer has been reset.

(2) The FSM for the CS remains in the same state.

11.40.2.2 Error handling

Generic error handling for the operation related errors are described in clause 17 and the TC services which are used for reporting operation errors are described in clause 19.

11.41 ResetTimerGPRS 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 gprsSSF.

11.41.1.1 Parameters

- timerValue:

  This parameter specifies the value to which the T_{SSF} timer is to be set.

- timerID:

  This parameter has a default value identifying the T_{SSF} timer.

- pDPID:

  This parameter if present specifies the identifier of a PDP context within a control relationship.

11.41.2 Responding entity (gprsSSF)

11.41.2.1 Normal procedure

gprsSSF preconditions:

1) Session or PDP context establishment attempt has been initiated.

2) 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.

11.41.2.2 Error handling

Generic error handling for the operation related errors is described in Clause 8 and the TCAP services which are used for reporting operation errors are described in Clause 10.

11.42 ResetTimerSMS procedure

11.42.1 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.

11.42.1.1 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.

11.42.2 Responding entity (gsmSSF or gprsSSF)

11.42.2.1 Normal procedure

SSF precondition:

1)   Basic call processing has been suspended at a DP.

2)   The FSM for the CS 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.

11.42.2.2 Error handling

Generic error handling for the operation related errors are described in clause 17 and the TC services which are used for reporting operation errors are described in clause 19.

11.43   SendChargingInformation procedure

11.43.1 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.

11.43.1.1 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 GSM 22.024 [26], 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 3G TS 22.024 [26], 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 3G TS 22.024 [26], 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, but for CAP only leg1 is allowed.

11.43.2 Responding entity (gsmSSF)

11.43.2.1 Normal procedure

gsmSSF precondition:

(1) FSM: for CS State"Waiting for Instructions", or
FSM for CS State"Waiting for End of User Interaction", or
FSM for CS State"Waiting for End of Temporary Connection", or
FSM for CS State"Monitoring", or
Assisting/hand-off gsmSSF-FSM State b:"Waiting for Instructions".

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 TCAP 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.

11.43.2.2 Error handling

Generic error handling for the operation related errors are described in clause 17 and the TC services which are used for reporting operation errors are described in clause 19.

11.44   SendChargingInformationGPRS Procedure

This operation is used to instruct the gprsSSF on the advice of charge information to be sent by the gprsSSF, provided the SGSN supports Advice Of Charge. The operation may be invoked on multiple occasions.

11.44.1 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 3G 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 3G 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.

11.44.2 Responding Entity (gprsSSF)

11.44.2.1 Normal Procedure

gprsSSF preconditions:

A control relationship exist between the gprsSSF and the gsmSCF.

The gprsSSF FSM is in state "Waiting for Instructions" or in state "Monitoring".

gprsSSF postconditions:

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 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 TCAP TC-CONTINUE 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.

11.44.2.2 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 is described in Clause xxx and the TCAP services which are used for reporting operation errors are described in Clause xxx.

11.45　SpecializedResourceReport procedure

11.45.1　General description

This operation is used as the response to a"PlayAnnouncement" operation when the announcement completed indication is set.

11.45.1.1 Parameters

11.45.2　Invoking entity (gsmSRF)

11.45.2.1 Normal procedure

gsmSRF precondition:

　　(1) The SCSM-FSM is in the state C3.2.1"User Interaction", R2,"Controlling gsmSRF", A3"User Interaction" or H3"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 SRSM FSM remains in the same state.

　　(2) If the"DisconnectFromIPForbidden" parameter was set FALSE, the SRSM 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 SRSM FSM moves to the state"Idle".

11.45.2.2 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 TCAP

The SS7 application layer protocol defined in this 3G 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 [**Error! Bookmark not defined.**]).

This requirement applies to all interfaces, not just those used for internetworking.

Table 19-1 defines which versions of TC are the minimum versions required to support the defined IN interfaces:

Table 19-1: 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 [**Error! Bookmark not defined.**] 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 TCAP 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 TCAP. 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 [**Error! Bookmark not defined.**].

        -   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.

- a dialogue shall not be established: for class 2 or 4 operations only the sending TC-user issues a TC-BEGIN request primitive and ends the dialogue locally after operation timeout by means of a prearranged end. Upon reception of the TC-BEGIN indication primitive the receiving TC-user shall end the dialogue locally.

12.1.1.2 Abnormal procedures

This subclause describes the procedures and TCAP primitives that shall be used for reporting abnormal situations between AEs. The error cases are defined in clause 17.

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 TCAP 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, the gsmSRF, or the CUSF 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 or TCUSF, dialogue shall be terminated by means of by TC-U-ABORT primitive with an Abort reason, regardless of TCAP dialogue is established or not.

For abnormal situations detected by TCAP 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 TCAP dialogue under abnormal situations:

- in the case that abort condition is detected and TCAP dialogue is established, TCAP dialogue is terminated by TC-U-ABORT primitive with an Abort reason.

- in the case that abort condition is detected and TCAP dialogue is not established, TCAP 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 TCAP 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 [**Error! Bookmark not defined.**](ETS 300 287-1 [**Error! Bookmark not defined.**]).

12.1.1.3 Dialogue handling

12.1.1.3.1 Dialogue establishment

The establishment of an 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 19.1.1.4.1 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".

If no TC indication primitive is expected because no dialogue is to be established according to the rules as stated in subclauses 19.1.2.1.1 and 19.1.2.1.2, TC-USER will wait for the last associated TCAP operation timer to expire and issue 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 clause 19.1.1.4.1.

- If no dialogue is to be established according to the rules as stated in subclauses 19.1.2.1.1 and 19.1.2.1.2, TC-USER will wait for the last indication primitive from TC and issue a TC-END request with the release method parameter set to"pre-arranged release".

- If the application-context-name included in the primitive is not supported, issue a TC-U-ABORT request primitive. If an alternative application-context can be offered its name is included in the TC-U-ABORT request primitive.

It is for further study whether or not the application-context-negotiation is limited only for using the TC-U ABORT 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 19.1.1.4.1, otherwise it shall issue a TC-U-ABORT request primitive.

It is for further study whether or not the application-context-negotiation is limited only for using the TC-U ABORT 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 19.1.1.4.1.

Receipt of a TC-U-ABORT indication

Receipt of a TC-U-ABORT indication primitive is described as part of user abort procedure (see 19.1.1.3.4.) If the abort reason is AC name not supported, the responding side may propose an alternative AC name in the TC-U-ABORT indication. If an alternative AC is proposed the receiving entity shall check this name and if it can be supported a new dialogue may be established.

Receipt of a TC-P-ABORT indication

Receipt of a TC-P-ABORT indication primitive is described as part of provider abort procedure (see 19.1.1.3.5.)

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 19.1.1.4.1.

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 19.1.1.4.1.

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 19.1.2.1.1 and 19.1.2.1.2.

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 19.1.1.4.1

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 19.1.2.1.1 and 19.1.2.1.2.

When no dialogue is to be established, refer to subclauses 19.1.1.3.1.

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 19.1.1.4.1.

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 19.1.1.3.7 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 19.1.1.3.7 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 19.1.1.3.7 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 19.1.1.3.7 with the following qualifications:

- The Abort Reason parameter of the TC-U-ABORT service shall be used as specified in ETS 300 287-1 [**Error! Bookmark not defined.**].

- The AC Name parameter of the TC-U-ABORT service shall be set to either the value used in the TC-BEGIN service or an alternative value which can be used to establish the dialogue between the initiating AE and the responding AE.

  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 19.1.1.3.7 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 [**Error! Bookmark not defined.**].

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 11.

User information

This parameter may be used by both initiating and responding application processes. 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 (section 3.2) and the definition of EXTERNAL type provided in X.690, 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, the following ASN.1 notation applies:

CAP-U-ABORT-Data {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1) modules(3) cap-u-abort-data(56) version1(0)}

DEFINITION ::=

BEGIN

id-CAP-U-ABORT-Reason OBJECT IDENTIFIER ::= {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1) AS(1) cap-u-abort-reason(2) version1(0)}

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)

}

-- application-timer-expired shall be set when application timer (e.g. Tssf) is expired.

-- not-allowed-fsm-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.

-- no-reason-given shall be set when any other reasons above do not apply

END -- of CAP-U-ABORT-Data

Component present

This parameter is used by TC-USER as described in ETS 300 287-1 [**Error! Bookmark not defined.**].

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 19.1.2.1.1 and 19.1.2.1.2.

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 19.1.2.1.2. 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 19.1.2.1.2.

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 clause 19.1.1.3.6).

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 19.1.1.4.3 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 19.1.1.4.3 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 19.1.1.4.3 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 19.1.1.4.3 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 19.1.1.4.3.

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 5 through 10.

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 [**Error! Bookmark not defined.**].

Problem code

This parameter is used as described in subclause 19.1.1.4.1.

Abort reason

This parameter is used by TC-USER, and attributes and coding are specified by network operator.

12.1.2 gsmSSF-gsmSCF and gprsSSF-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 **Active**. 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 TCAP dialogue is established, TCAP 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 TCAP dialogue is established, TCAP 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 TCAP 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 19.1.1.1) 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/Hand-off gsmSSF FSM related messages

A dialogue shall be established when the Assisting/Hand-off gsmSSF-FSM moves from the state **Idle** to the state **Active**. The AssistRequestInstructions operation shall be transmitted with a TC-BEGIN request primitive.

For all other operations sent from the Assisting/Hand-off 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 TCAP dialogue is established, TCAP dialogue can be terminated by TC-END primitive with component(s). When the gsmSSF sends the last ApplyChargingReport, 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 TCAP dialogue is established, TCAP 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.

When the gsmSSF has sent the last ApplyChargingReport, the dialogue may be ended from the gsmSCF by a TC-END request primitive with basic end.

SSME-FSM related messages

The following procedures shall be followed:

- The dialogue shall be maintained when the ActivityTest Return Result is sent.

- No dialogue shall be established when the ServiceFilteringResponse operation is sent. The operation is sent with a TC-BEGIN request primitive and the dialogue is ended by means of a TC-END request primitive with prearranged end.

- A dialogue shall no longer be maintained when the Return Result of the ActivateServiceFiltering operation is sent. The dialogue is ended by means of a TC-END request primitive with basic end, the Return Result is transmitted with the same request.

- The dialogue is locally terminated by means of a TC-END request primitive with prearranged end, upon reception of a TC-BEGIN indication primitive with a CallGap operation.

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

No dialogue shall be established when the SCSM-FSM moves from state **Idle** to state **Idle** upon receipt of InitialDP operation. The operation is received with a TC-BEGIN indication primitive and the dialogue is locally terminated by means of a TC-END request primitive with prearranged end.

A dialogue shall be established when the SCSM-FSM moves from state **Idle** to state **Preparing gsmSSF Instructions** upon the receipt 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.

- A dialogue shall not be established when a CallGap operation is sent without using a SCSM associated dialogue. The operation is sent using a TC-BEGIN request primitive and the dialogue is terminated with a prearranged end.

- For sending one or more CallGap operations, the SCME FSM may 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 and the CallGap operation(s) shall be sent with the first response of the SCSM FSM to the InitialDP operation.

- A dialogue shall be established when an ActivateServiceFiltering operation is sent. The operation shall be transmitted with a TC-BEGIN request primitive.

- The dialogue is locally terminated upon reception of a ServiceFilteringResponse operation using a TC-END request primitive with prearranged end.

12.1.3   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 InitialSMSEvent 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.

12.1.4   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.

12.1.4.1.1 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 and TC-CONTINUE service.

The TC-END service is solely used to support the dialogue closing procedure (i.e it is never used to trigger the sending of components).

On receipt of an empty TC-CONTINUE.req primitive, the FE should ignore the primitive.

On receipt of an TC-END.req with a CAP request, the FE should not perform the request and consider the requested TC-END service as a dialogue closing procedure. The dialogue is then terminated (see clause 19.1.1.1).

It is an application-process responsibility to provide in the TC-BEGIN-req primitive a destination address which can be used by the underlying SCCP to route the message to the proper FE if this FE is addressed through the SS7 network.

The pre-arranged end can be used.

12.1.4.2   Abnormal procedures

The following procedures also apply to the gsmSCF-gsmSRF and gsmSCF-CUSF interfaces.

12.1.4.2.1 gsmSCF-to-gsmSSF/gsmSRF messages

Considering that gsmSSF, gsmSRF, and CUSF do not have the logic to recover from error cases detected on the gsmSCF-gsmSSF/gsmSRF/CUSF interface, the following shall apply:

-    Operation errors and rejection of TCAP components shall be transmitted to the gsmSSF and, respectively, the gsmSRF, and the CUSF 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 and the CUSF shall abort the dialogue with a TC-U-ABORT request primitive.

In the case of the gsmSSF relay, it is for further study how to map messages to ROSE capability of bearer signalling system between the gsmSSF and the gsmSRF, and what services are assumed from ROSE.

12.1.4.2.2 gsmSSF/gsmSRF/ -to-gsmSCF messages

Operation errors and rejection of TCAP 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 TCAP dialogue is established or not.

If the error processing in the gsmSSF/gsmSRF/CUSF leads to the case where the gsmSSF/gsmSRF/CUSF is not able to process further gsmSCF operations while the dialogue is to be maintained, the gsmSSF/gsmSRF/CUSF 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 19.1.2.1.1).

In the case of the gsmSSF relay, it is for further study how to map messages to ROSE capability of bearer signalling system between the gsmSSF and the gsmSRF, and what services are assumed from ROSE.

The CUSF can end a dialogue with a TC-U-ABORT request primitive in case the association release between the user and the network is initiated by any other entity.

12.1.5 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 TCAP 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.

12.1.6 gsmSSF/gprsSSF-to-gsmSCF SMS related messages

Operation errors and rejection of TCAP 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.

12.1.6.1.1 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 clause 19.1.1.2. 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 clause 19.1.1.2. 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 19.1.1.3.7). 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.

12.1.6.2   Dialogue handling

12.1.6.2.1 Dialogue establishment

12.1.6.2.2 Dialogue continuation

12.1.6.2.3 Dialogue termination

12.1.6.2.4 User abort

12.1.6.2.5 Provider abort

12.1.6.2.6 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 [**Error! Bookmark not defined.**].

a)   The TC-BEGIN service is used to invoke the operations of the gsmSCF-gsmSSF connection packages as defined in clause 5. .

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 pactages as defined in clause 5.

The mapping of the parameters onto the TC-BEGIN primitive is defined in subclause 19.1.1.3.6 with the following qualifications:

- The AC Name parameter shall take the value of the application-context-name field of the **cs2ssf-scfGenericAC**, **cs2ssf-scfAssistHandoffAC** or **cs2ssf-scfServiceManagementAC** object if the initiating AE is a gsmSSF orthe **cs2scf-ssfGenericAC**, **cs2scf-ssfTrafficManagementAC**, **cs2scf-ssfServiceManagementAC** or **cs2scf-ssfTriggerManagementAC** object if the originating AE is a gsmSCF.

The mapping of the parameters onto the TC-CONTINUE primitive is defined in subclause 19.1.1.3.6.

The mapping of the parameters onto the TC-U-ABORT primitive is defined in subclause 19.1.1.3.6 with the following qualifications:

- The Application-Context-Name parameter shall be used as specified in ETS 300 287-1 [**Error! Bookmark not defined.**]. 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 **cs2ssf-scfGenericAC**, **cs2ssf-scfAssistHandoffAC, cs2ssf-scfServiceManagementAC** or **cs2scf-ssfGenericAC** object if the responding AE is a gsmSCF or the, **cs2scf-ssfTrafficManagementAC**, **cs2scf-ssfServiceManagementAC** or **cs2scf-ssfTriggerManagementAC** object if the responding AE is a gsmSSF.

The use of the parameters of the TC-END service is defined in subclause 19.1.1.3.6.

12.1.6.3   Component Handling

12.1.6.3.1 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.

12.1.6.3.2 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 19.1.1.4.2 with the following qualifications:

The timeout parameter of the TC-INVOKE-Req primitives is set according to clause 6.

12.1.7   gsmSCF-gsmSRF interface

12.1.7.1   Normal procedures

12.1.7.1.1 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 TCAP dialogue is established, TCAP 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 TCAP dialogue is not established, TCAP 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 TCAP 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.

In the case of the gsmSSF relay, it is for further study how to map messages to ROSE capability of bearer signalling system between the gsmSSF and the gsmSRF, and what services are assumed from ROSE.

12.1.7.2   Abnormal procedures

12.1.7.3   Dialogue handling

12.1.7.3.1 Dialogue establishment

12.1.7.3.2 Dialogue continuation

12.1.7.3.3 Dialogue termination

12.1.7.3.4 User abort

12.1.7.3.5 Provider abort

12.1.7.3.6 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 [**Error! Bookmark not defined.**].

a) The TC-BEGIN service is used to invoke the operations of the **gsmSRF-gsmSCF** connection packages as defined in clause 7.

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 7.

The mapping of parameters onto the TC Dialogue services is as defined in subclause 19.1.1.3.6 with the following qualifications:

The mapping of the parameters onto the TC-BEGIN primitive is defined in subclause 19.1.1.3.6 with the following qualifications:

-   The AC Name parameter shall take the value of the application-context-name field of the **gsmSRF-gsmSCF-ac** object.

12.1.7.4   Component handling

12.1.7.4.1 Procedures for CAP operations

12.1.7.4.2 Mapping to TC component parameters

The mapping of parameters for the TC component services is defined in subclause 19.1.1.4.2 with the following qualifications.

The Timeout Parameter of the TC-INVOKE service is set according to clause 7.

12.2   Services assumed from SCCP

This clause describes the services required from the SCCP that may be used by the IN applications for the IN Application Protocol used between the gsmSSF, gsmSCF and gsmSRF, SDF and CUSF.

12.2.1   Normal procedures

The SCCP forms the link between the TC and the MTP and provides (in conjunction with the MTP) the network services for the IN 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 cervices

The services described are those given in the SCCP [2] and ETS 300 009-1 (SCCP User Guide) [3] 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,

   (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 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 ETS 300 009-1 [3], 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. Where the destination node is in another network (and is not the gateway node) then the application populates the SSN field with either the SSN in use at the destination or zero.

When GT is used for addressing, the IN application expects that the SCCP supports the following elements as defined in ETS 300 009-1 [3]:

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 ETS 300 009-1 [3].

Numbering Plan:

(1) The *proposed*"generic numbering plan" is described within the SCCP ETS 300 009-1 [3]. 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 IN CS2.*

(3) The SCCP caters for a number of other numbering plans (e.g. ISDN, Data, Telex, Mobile etc. numbering plans). The whole range catered for is shown in [2]. These may be used by IN 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 non-zero internationally standardized SSN is required for international internetworking.

In the absence of a 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.

The version of SCCP used to support CAP operations shall be at least ITU-T White Book 1992.

12.2.2.1.2 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.

12.2.2.1.3 Return on error

Return on Error mechanism may be required by the IN 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 IN 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 [3]. The N-NOTICE primitive is used to return the undelivered message to the originating user.

12.2.2.1.4 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 IN application does not expect the SCCP to segment the long message into more than 16 segments.

12.2.2.1.5 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.

12.2.2.2 SCCP connection oriented services

The use by IN applications for the Connection-oriented services is outside the scope of IN CS2.

12.2.2.3   SCCP management

The subsystems used within the IN scenario 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 ETS 300 009-1 [3].

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 MTP 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).

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)

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 3G TS 29.012 [24].

Table A.2 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)
cliPresentationIndicator	Address presentation restricted indicator in Calling Party Number

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 operation serviceInteractionIndicatorsTwo to ISUP

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

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 3G TS 29.012 [24], 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 3G TS 29.012 [24. 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 Section 9.15

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 SA#	Spec	Version	CR	<Phase>	New Version	Subject/Comment
Jun 1999	GSM 09.78	7.0.0				Transferred to 3GPP CN2
CN#04	29.078				3.0.0	
CN#06	29.078	3.0.0	013		3.2.0	Approved at TSGN#06

History

Document history		
V3.2.0	January 2000	Publication