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Technical Specification

**Digital cellular telecommunications system (Phase 2+);
Customised Applications for Mobile network Enhanced Logic
(CAMEL);
CAMEL Application Part (CAP) specification
(GSM 09.78 version 7.0.0 Release 1998)**

GSM®

GLOBAL SYSTEM FOR
MOBILE COMMUNICATIONS



Reference

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Foreword

This Technical Specification (TS) has been produced by the Special Mobile Group (SMG).

The present document specifies the Customised Applications for Mobile network Enhanced Logic (CAMEL) CAMEL Application Part (CAP) within the digital cellular telecommunications system.

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- x the second digit is incremented for changes of substance, i.e. technical enhancements, corrections, updates, etc.
- y the third digit is incremented when editorial only changes have been incorporated in the specification.

1 Scope

The present document specifies the CAMEL Application Part (CAP) supporting the second phase of the network feature Customised Applications for Mobile network Enhanced Logic. CAP is based on a sub-set of the CS1 Core INAP as specified by ETS 300 374-1 [13]. Descriptions and definitions provided by ETS 300 374-1 [13] are directly referenced by the present document in case no additions or clarifications are needed for the use in the CAP.

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.
- For this Release 1998 document, references to GSM documents are for Release 1998 versions (version 7.x.y).

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- [34] ITU-T Recommendation Q.716: "Specifications of Signalling System No.7; Signalling System No. 7 – Signalling Connection Control Part (SCCP) Performance".
- [35] ANSI T1.113-1995 Signalling System No. 7(SS7) – Integrated Services Digital Network (ISDN) User Part.
- [36] ANSI T1.112-1996: " American National Standards for Telecommunications– Signalling System Number 7 (SS7) – Signalling Connection Control Part (SCCP)".

3 Abbreviations

AC	Application Context
ACM	Address Complete Message
AE	Application Entity
ASE	Application Service Element
ASN.1	Abstract Syntax Notation One
BCSM	Basic Call State Model
CAP	CAMEL Application Part
CIC	Carrier Identification Code
CS1	Capability Set 1
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
FSM	Finite State Model
gsmSCF	GSM SCF
gsmSSF	GSM SSF
gsmSRF	GSM SRF
IAM	Initial Address Message
ID	Identifier
IN	Intelligent Network
INAP	Intelligent Network Application Protocol
IP	Intelligent Peripheral
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
MACF	Multiple Association Control Function
MTP	Message Transfer Part
NA	North American
OCSI	Originating CSI
PE	Physical Entity
REL	Release
ROSE	Remote Operations Service Element
SACF	Single Association Control Function
SAO	Single Association Object
SCCP	Signalling Connection Control Part
SCF	Service Control Function
SCME	SCF Management Entity
SCSM	SCF Call State Model
SLP	Service Logic Program
SRF	Specialised Resource Function
SSF	Service Switching Function
SSME	SSF Management Entity
SSN	Sub-System Number
TC	Transaction Capabilities
TCAP	Transaction Capabilities Application Part
TCSI	Terminating CSI
TDP	Trigger Detection Point
TDP-R	Trigger Detection Point - Request

4 General

4.1 Definition methodology

The definition of the protocol is split into three Clauses:

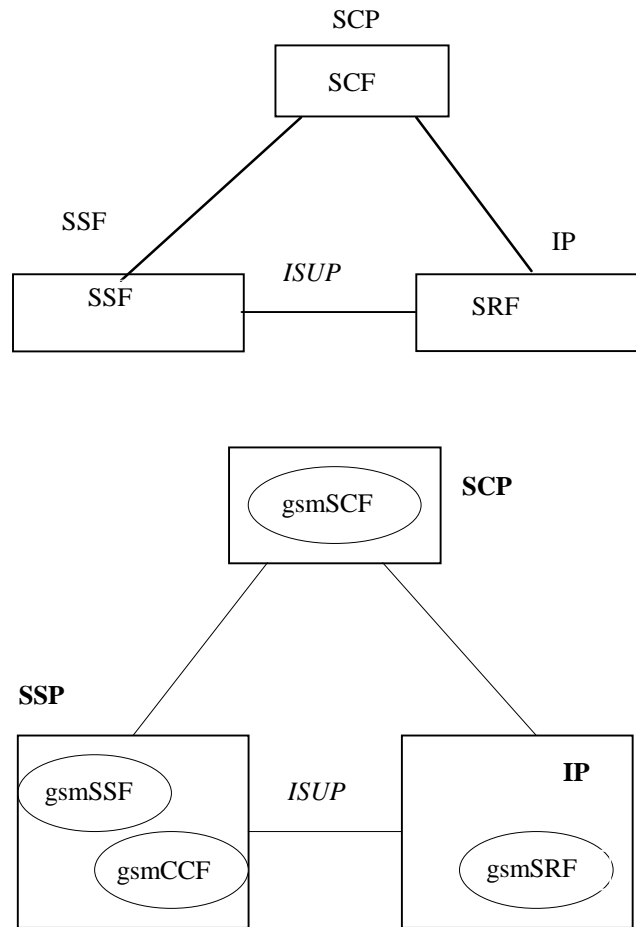
- the definition of the Single/Multiple Association Control Function (SACF/MACF) rules for the protocol (Clause 5);
- the definition of the operations transferred between entities (Clause 6);
- the definition of the actions taken at each entity (Clause 7).

The SACF/MACF rules are defined in prose. The operation definitions are in Abstract Syntax Notation 1 (ASN.1, see CCITT Recommendation X.208 [8]), 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 Clause 6 and from the relevant detailed procedures in Clause 7.

The CAP is a Remote Operations Service Element (ROSE) user protocol (see CCITT Recommendations X.219 [10] and X.229 [11] and ITU-T Recommendation X.880 [22]). CAP uses the Basic Encoding Rules (see CCITT Recommendation X.209 [9] and ITU-T recommendation X.690 [21]).

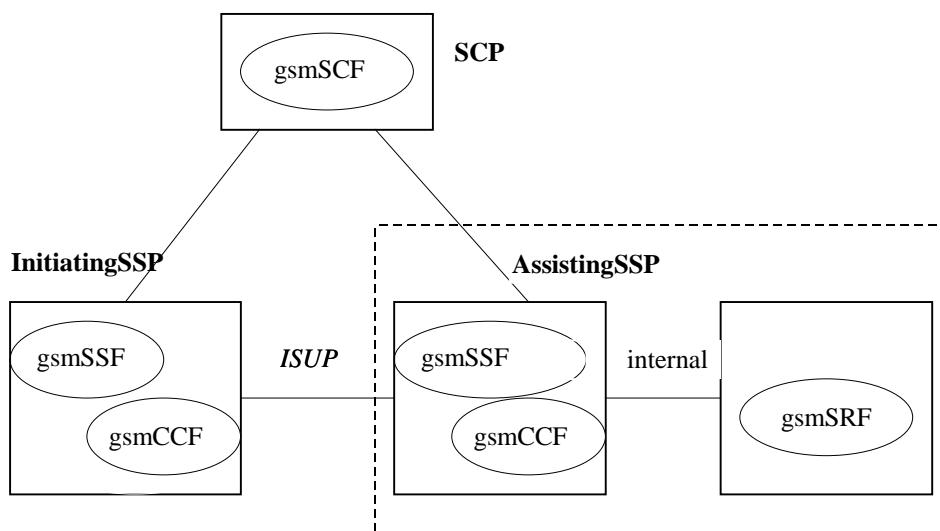
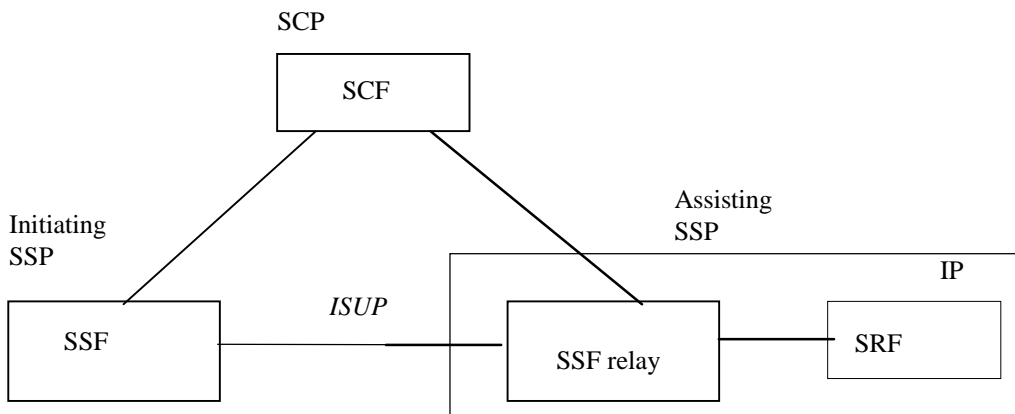
4.2 Example physical scenarios

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



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

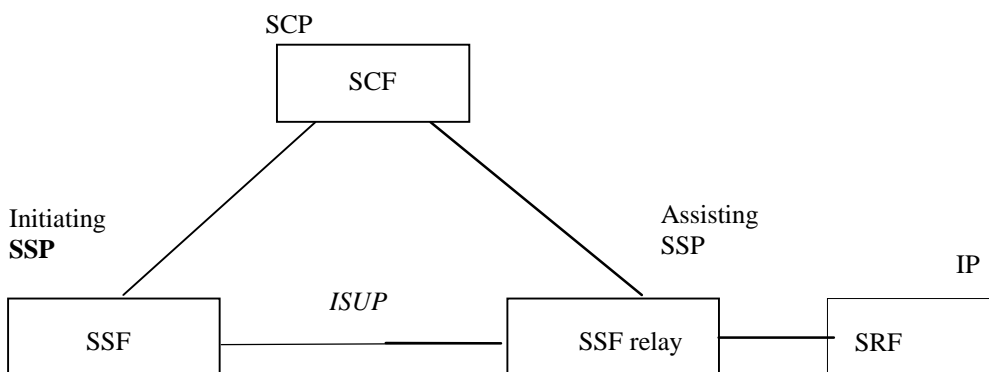
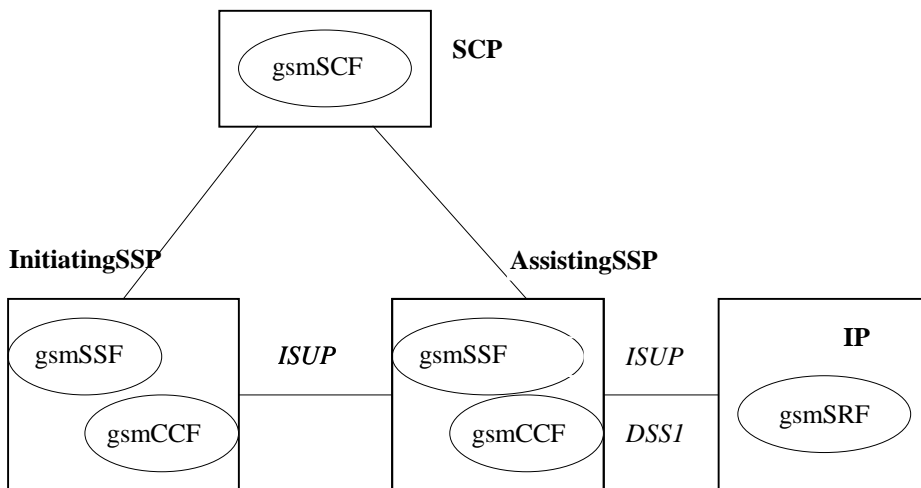
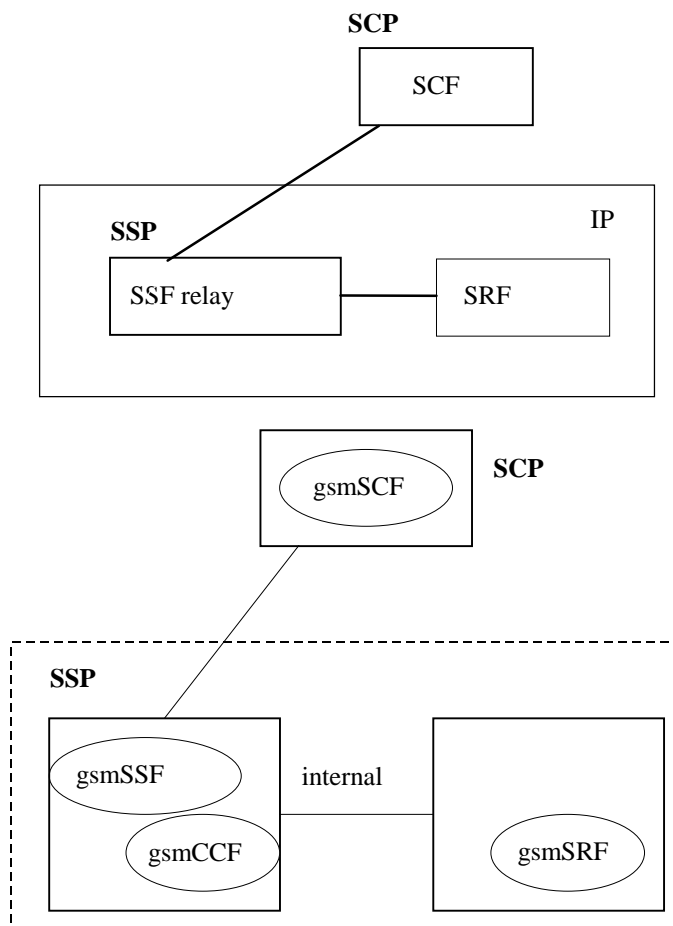


Figure 1 (continued): Scenarios

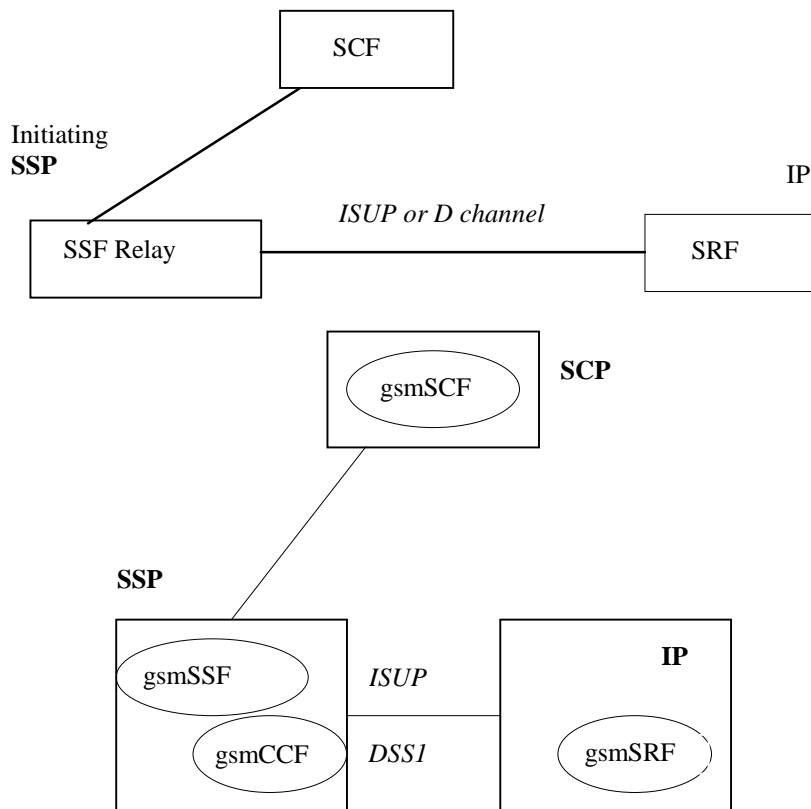


Scenario 2b; Connection to IP via an Assisting SSF with relay function; IP not co-located with Assisting gsmSSF (Ref CS1 case c))



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))

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.

Table 1

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

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

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

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

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

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

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

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

4.3 CAP protocol architecture

Many of the terms used in this subclause are based on the OSI Application Layer Structure as defined in ISO 9545 [12].

The CAP protocol architecture can be illustrated as shown in figure 2.

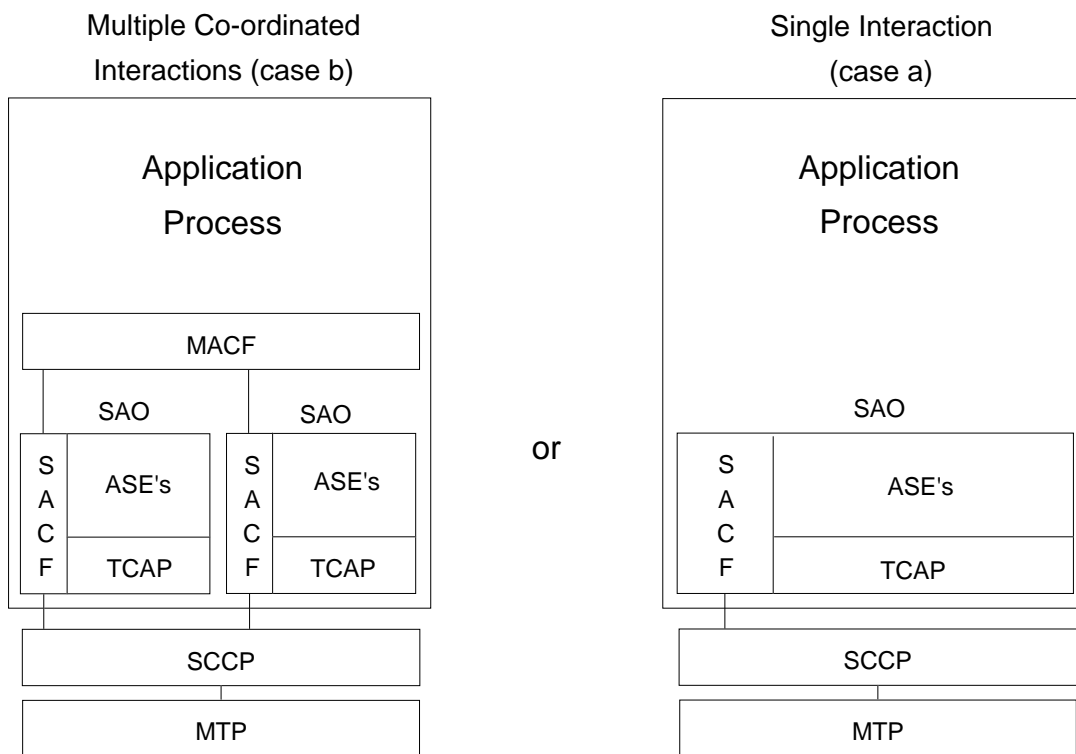


Figure 2: CAP protocol architecture

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

In case a, SACF provides a co-ordination function in using Application Service Elements (ASEs), 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 ASEs to be used over a single interaction between a pair of PEs.

In case b, MACF provides a co-ordinating function among several SAOs, 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 GSM 03.78 [15] and Clause 7 of the present document). Each operation is specified using the operation macro described in figure 3.

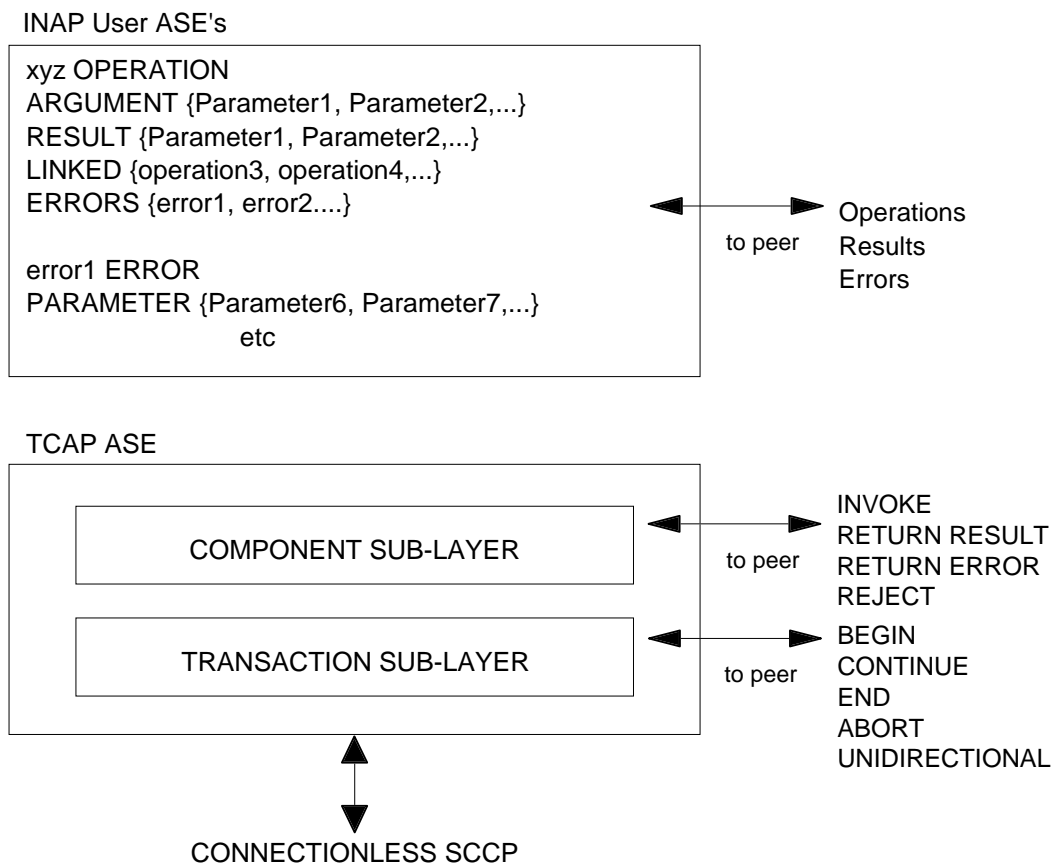


Figure 3: Operation description

The use of the Application Context (AC) negotiation mechanism (as defined in ETS 300 287 [2]) 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 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 shall be supported.

4.4 CAP addressing

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

The following SCCP versions are supported by CAP Version 2:

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

SCCP version used for CAP version 2 is a network option.

When CAP uses White Book SCCP to send a message, then:

- if CAP message can be sent in one UDT message either UDT message or XUDDT message shall be used;
- if CAP message cannot be sent in one UDT message , SCCP segments the message into two or more XUDDT messages.

The transmission of XUDT messages may fail. Failure will occur when the destination SCCP, or any intermediate SCCP, does not support White Book SCCP.

Support of ANSI T1.112 SCCP applies only to PLMNs in North America. Interworking between a PLMN in North America and a PLMN outside North America will involve an STP to translate between ANSI SCCP and ITU-T/CCITT SCCP.

4.4.1 Sub-System Number (SSN)

The use of SSN is a network operator option and values for intra-PLMN usage are network specific. A CAP SSN has been reserved for inter-PLMN use, as defined in GSM 03.03.

4.4.2 Quality of service parameters

The class (class 0 or class 1) of SCCP is set as required by the application. However class 1 shall be requested by any application that can send more than 1 TCAP message to its peer (consecutive TR-CONTINUE) before receiving a response from its peer (TR-CONTINUE or TR-END).

On receipt of a TC-RESULT-NL indication, the TC-USER shall request the transfer of a reject component using TC-U-REJECT request primitive, with the appropriate problem code (mistyped parameter).

The return option may be used if requested by the application (Network Operator to determine).

4.4.3 SCCP addressing

Within the GSM System there is a need to communicate between entities within the same PLMN and in different PLMNs. Using the CAMEL Application Part (CAP) for this function implies the use of Transaction Capabilities (TC) of CIITT Signalling System No. 7 and the Signalling Connection Control Part (SCCP) of either CCITT Signalling System No. 7 (for non-North American PLMNs) or ANSI Signalling System No. 7 (for North American PLMNs). When the SCCP of CCITT Signalling System No. 7 is used, the format and coding of address parameters carried by the SCCP for that purpose shall comply with CCITT Recommendation Q.713 [16] with the following restrictions:

1) Intra-PLMN addressing

For communication between entities within the same PLMN, the use of SCCP addressing is network specific.

2) Inter-PLMN addressing

a) Called Party Address

- SSN indicator = a standardised SSN shall be used. The code point used shall be that specified for CAP in GSM 03.03;
- Point Code indicator = 0;
- Global title indicator = 0100 (Global title includes translation type, numbering plan, encoding scheme and nature of address indicator);
- Translation type = 0 (Not used);
- Routing indicator = 0 (Routing on global title);

b) Calling Party Address

- SSN indicator = a standardised SSN shall be used. The code point used shall be that specified for CAP in GSM 03.03;
- Point code indicator = 0;
- Global title indicator = 0100 (Global title includes translation type, numbering plan, encoding scheme and nature of address indicator);

- Translation type = 0 (Not used);

Routing indicator = 0 (Routing on Global Title).

When the SCCP of ANSI Signalling System No. 7 is used, the format and coding of address parameters carried by the SCCP for the purpose of signalling transfer shall comply with ANSI Recommendation T1.112 [36] with the following restrictions:

1) Intra-PLMN addressing

For communication between entities within the same PLMN, the use of SCCP addressing is network specific.

2) Inter-PLMN addressing

a) Called Party Address

- SSN indicator = a standardised SSN shall be used. The code point used shall be that specified for CAP in GSM 03.03;
- Point Code indicator = 0;
- Global title indicator = 0010 (Global title includes translation type);
- the Translation Type (TT) field shall be coded according to the content of the address information as follows:

TT = 9 (decimal), if IMSI is included

TT = 14 (decimal), if MSISDN is included,

Or TT = 10 (decimal), if a Network Element address is included. (If TT=10, then Number Portability is not applicable, if TT=14, then Number Portability is applicable)

- Routing indicator = 0 (Routing on global title);

b) Calling Party Address

- SSN indicator = a standardised SSN shall be used. The code point used shall be that specified for CAP in GSM 03.03;
- Point code indicator = 0;
- Global title indicator = 0010 (Global title includes translation type);
- the Translation Type (TT) field shall be coded according to the content of the address information as follows:

TT = 9 (decimal), if IMSI is included

TT = 14 (decimal), if MSISDN is included,

Or TT = 10 (decimal), if a Network Element address is included. (If TT=10, then Number Portability is not applicable, if TT=14, then Number Portability is applicable)

- Routing indicator = 0 (Routing on Global Title).

4.5 Definition And Usage Of LegID

4.5.1 Definition Of LegID

In CAP V.2, two types of LegID may be exchanged between the gsmSCF and the gsmSSF. These are:

- Sending Side LegID, and
- Receiving Side LegID

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

4.5.2 Allocation Of LegID

For all operations containing a LegID;

- LegID = 1 shall always refer to the Calling Party, more specifically that party in the call present when InitialDP is sent to the gsmSCF,
- LegID = 2 shall always refer to the Called Party, more specifically that party in the call created as a result of the Connect or Continue operations.

4.6 Compatibility Mechanisms Used For CAP

4.6.1 Introduction

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

Two major categories of compatibility are handled by these mechanisms:

- compatibility with the ITU-T Recommendation Q.1218 [6] version of CS1 INAP and the specification ETS 300 374 -1 version [14] of CS1 INAP;
- compatibility with future versions of CAP.

The second category has three sub-categories of compatibility dealt with in this subclause:

- minor changes to the CAP in future standardised versions: A minor change can be defined as a change of a functionality which is not essential for the requested CAMEL service. In case 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 the CAP in future standardised versions: A major change can be defined as a change of a functionality which is essential for the requested CAP service. In case 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 CAMEL service will not be provided if one of the application entities does not support the additional functionality. For major changes, a new AC is required;
- network specific changes to CAP: These additions may be of either the major or minor type for a service. No new AC is expected to be defined for this type of change. At the time of definition, the additions would not be expected to be included in identical form in future versions of the ETS.

4.6.2 Definition of CAP compatibility mechanisms

4.6.2.1 Interworking of CAP with ETSI CS1 Core INAP and ITU-T Q.1218 INAP

On receipt of an operation according to ITU-T Recommendation Q.1218 [6] or an operation according to ETS 300 374-1 [13] which is not part of the CAP or is part of the CAP but which contains parameters which are not part of the CAP:

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

Note: Tagging of CAP additions to ITU-T Recommendation Q.1218 [6] and ETS 300 374-1 [13] are specified from 50 and upwards.

4.6.2.2 Procedures for major additions to CAP

In order to support the introduction of major functional changes, the protocol allows a synchronization between the two applications with regard to which functionality is to be performed. This synchronization takes place before the new function is invoked in either application entity, in order to avoid complicated fall-back procedures. The solution chosen to achieve such a synchronization is use of the AC negotiation provided in ETS 300 287 [2].

4.6.2.3 Procedures for minor additions to CAP

The extension mechanism marker shall be used for future standardized minor additions to CAP. This mechanism implements extensions by including an "extensions marker" in the type definition. The extensions are expressed by optional fields that are placed after the marker. When an entity receives unrecognized parameters that occur after the marker, they are ignored (see ITU-T Recommendation X.680 [17]).

4.6.2.4 Procedures for inclusion of network specific additions to CAP

This mechanism is based on the ability to explicitly declare fields of any type via the Macro facility in ASN.1 at the outermost level of a type definition. It works by defining an "ExtensionField" that is placed at the end of the type definition. This extension field is defined as a set of extensions, where an extension can contain any type. Each extension is associated with an identification that unambiguously identifies the extension. Refer to ITU-T Recommendation Q.1400 [7] for a definition of this mechanism.

5 Single/Multiple Association Control Function (SACF/MACF) rules

5.1 Reflection of TCAP Application Context (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.

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

Refer to ETS 300 287 [2] for a more detailed description of the TCAP AC negotiation mechanism.

5.2 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 it is impossible to execute one of the operations identified above until some other operation has progressed to some extent or finished, the sending PE (usually SCP) can control this by sending the operations in two separate messages.

This method does not imply that all operations sent in the same message should 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 7, the FE-specific rules take precedence over the generic rules.

6 Abstract syntax of the CAP

This Clause specifies the abstract syntax for the CAP version 1, using ASN.1 as defined in CCITT Recommendation X.208 [8] and ITU-T Recommendations X.680 [17], X.681 [18], X.682 [19] and X.683 [20].

The encoding rules which are applicable to the defined abstract syntax are the Basic Encoding Rules for ASN.1, defined in CCITT Recommendation X.209 [9] and ITU-T Recommendation X.690 [21] with the restrictions as described in ITU-T Recommendation Q.773 [5], § 4.1.1, modified by ETS 300 287 [2]. Additional encodings are cited for parameters used in existing ISUP (ETS 300 356-1 [3]) and DSS1 (ETS 300 403-1 [4]) standards.

For the ISUP and DSS1 parameters used in the CAP, only the coding of the parameter value is coded as defined in ISUP or DSS1. The DSS1/ISUP defined parameter identifiers are removed and replaced by the CAP defined parameter identifiers.

Where possible existing data types from the CS1 ETSI Core INAP (ETS 300 374-1 [13]) and MAP (ETS 300 974 [15]) standards have been used. For future compatibility where parameter mappings in CS1 ETSI Core INAP (ETS 300 374-1 [13]) are not defined for functions imported from CS1 ETSI Core INAP, but parameter mappings are defined in CS2 ETSI Core INAP [30] then the parameter mappings in CS2 ETSI Core IANP [30] shall be used.

OCTET STRING fields shall be encoded as primitives using the ASN.1 Basic Encoding Rules defined in CCITT Recommendation X.209 [9] and ITU-T Recommendation X.690 [21] with the restrictions as described in ITU-T Recommendation Q.773 [5], § 4.1.1, modified by ETS 300 287 [2].

The mapping of OPERATION and ERROR to TCAP components is defined in ITU-T Recommendation Q.773 [5] modified by ETS 300 287 [2]. The class of an operation is not stated explicitly but is specified in the ASN.1 OPERATION MACRO, as follows:

- class 1: both RESULT and ERRORS appear in the ASN.1 OPERATION MACRO definition;
- class 2: only ERRORS appears in the ASN.1 OPERATION MACRO definition;
- class 3: only RESULT appears in the ASN.1 OPERATION MACRO definition;
- class 4: neither RESULT nor ERRORS appears in the ASN.1 OPERATION MACRO definition.

The abstract syntax for CAP is composed of several ASN.1 modules describing operations, errors, and associated data types. The values (operation codes and error codes) are defined in a separate module.

The module containing all the type definitions for CAP operations is **CAP-Operations** and is described in subclause 6.1.

The module containing all the type definitions for CAP errors is **CAP-Errors** and is described in subclause 6.2.

The module containing all the type definitions for CAP data types is **CAP-DataTypes** and is described in subclause 6.3.

The module containing the operation codes and error codes for CAP is **CAP-Codes** and is described in subclause 6.4.

All the AC definitions for CAP are described in subclause 6.5.

The module containing the class definitions for CAP is **CAP-Classes** and is described in subclause 6.6.

6.1 Operation types

```

CAP-Operations {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
gsm-Network(1) modules(3) cap-operations(50) version2(1)}
-- This module contains the type definitions for the CAP v.2 operations.

DEFINITIONS ::=
BEGIN
IMPORTS
OPERATION
FROM TCAPMessages {ccitt recommendation q 773 modules(2) messages(1) version2(2)}
-- error types
Cancelled,
CancelFailed,
ETCFailed,
ImproperCallerResponse,
MissingCustomerRecord,
MissingParameter,
ParameterOutOfRange,
RequestedInfoError,
TaskRefused,
UnavailableResource,
UnexpectedComponentSequence,
UnexpectedDataValue,
UnexpectedParameter,
UnknownLegID,
SystemFailure
FROM CS1-Errors {ccitt(0) identified-organization(4) etsi(0) inDomain(1) in-network(1) modules(0)
cs1-errors(1) version1(0)}

-- CAP v.2 argument types
ApplyChargingArg,
ApplyChargingReportArg,
AssistRequestInstructionsArg,
CallInformationReportArg,
CallInformationRequestArg,
CancelArg,
ConnectArg,
ConnectToResourceArg,
EstablishTemporaryConnectionArg,
EventReportBCSMArg,
FurnishChargingInformationArg,
InitialDPArg,
PlayAnnouncementArg,
PromptAndCollectUserInformationArg,
ReceivedInformationArg,
ReleaseCallArg,
RequestReportBCSMEEventArg,
ResetTimerArg,
SendChargingInformationArg,
SpecializedResourceReportArg

FROM CAP-DataTypes {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1)
modules(3) cap-datatypes(52) version2(1)};
-- TYPE DEFINITIONS FOR CAP v.2 OPERATIONS FOLLOW
-- gsmSCF-gsmSSF operations

ActivityTest                                ::= OPERATION
RESULT

-- Direction: gsmSCF -> gsmSSF or gsmSCF -> gsmSRF or gsmSCF -> assistSSF, Timer: Tat
-- This operation is used to check for the continued existence of a relationship between the
-- gsmSCF and gsmSSF, gsmSCF and gsmSRF or gsmSCF and assistSSF. If the relationship is still in
-- existence, then the gsmSSF, gsmSRF or assistSSF will respond.
--..If no reply is received, then the gsmSCF will assume that the gsmSSF, gsmSRF or assistSSF
-- has failed in some way and will take the appropriate action.

ApplyCharging                                ::= OPERATION
ARGUMENT
    ApplyChargingArg
ERRORS {
    MissingParameter,
    UnexpectedComponentSequence,

```

```

    UnexpectedParameter,
    UnexpectedDataValue,
    ParameterOutOfRange,
    SystemFailure,
    TaskRefused,
    UnknownLegID
}

-- Direction: gsmSCF -> gsmSSF, Timer: Tac
-- This operation is used for interacting from the gsmSCF with the gsmSSF CSE-controlled call
-- duration charging mechanism.

ApplyChargingReport                ::= OPERATION
  ARGUMENT
    ApplyChargingReportArg
  ERRORS {
    MissingParameter,
    UnexpectedComponentSequence,
    UnexpectedParameter,
    UnexpectedDataValue,
    ParameterOutOfRange,
    SystemFailure,
    TaskRefused
  }

-- Direction: gsmSSF -> gsmSCF, Timer: Tacr
-- The ApplyChargingReport operation provides the feedback from the gsmSSF to the gsmSCF for the
-- CSE-controlled call duration charging mechanism.

AssistRequestInstructions           ::= OPERATION
  ARGUMENT
    AssistRequestInstructionsArg
  ERRORS {
    MissingCustomerRecord,
    MissingParameter,
    TaskRefused,
    UnexpectedComponentSequence,
    UnexpectedDataValue,
    UnexpectedParameter
  }

-- Direction: gsmSSF -> gsmSCF: gsmSRF -> gsmSCF, Timer: Tari
-- This operation is used when there is an assist or handoff procedure and may be sent by the
-- gsmSSF or gsmSRF to the gsmSCF. This operation may be sent by the gsmSSF or gsmSRF to
-- the gsmSCF, when the initiating gsmSSF has set up a connection to the gsmSRF or to the
-- assisting gsmSSF as a result of receiving an EstablishTemporaryConnection from the gsmSCF.

CallInformationReport               ::= OPERATION
  ARGUMENT
    CallInformationReportArg

-- Direction: gsmSSF -> gsmSCF, Timer: Tcirp
-- 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.

CallInformationRequest              ::= OPERATION
  ARGUMENT
    CallInformationRequestArg
  ERRORS {
    MissingParameter,
    ParameterOutOfRange,
    RequestedInfoError,
    SystemFailure,
    TaskRefused,
    UnexpectedComponentSequence,
    UnexpectedParameter,
    UnknownLegID
  }

-- Direction: gsmSCF -> gsmSSF, Timer: Tcirq
-- 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).

Cancel                              ::= OPERATION
  ARGUMENT
    CancelArg
  ERRORS {
    CancelFailed
  }

-- Direction: gsmSCF -> gsmSSF, or gsmSCF -> gsmSRF, Timer: Tcan

```

```

-- When this operation is sent from gsmSCF to gsmSSF, then all outstanding requests will be
cancelled.
-- The following outstanding requests will be cancelled: RequestReportBCSMEEvent,
ApplyChargingReport,
-- CallInformationReport.
--
-- When this operation is sent from gsmSCF to gsmSRF, then the indicated previous operation will be
cancelled.-- The following operations may be cancelled: PlayAnnouncement and
PromptAndCollectUserInformation.

Connect ::= OPERATION
  ARGUMENT
    ConnectArg
  ERRORS {
    MissingParameter,
    SystemFailure,
    TaskRefused,
    UnexpectedComponentSequence,
    UnexpectedDataValue,
    UnexpectedParameter
  }

-- Direction: gsmSCF -> gsmSSF, Timer: Tcon
-- 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., dialled digits) and existing call setup
-- information depending on the information provided by the gsmSCF.

ConnectToResource ::= OPERATION
  ARGUMENT
    ConnectToResourceArg
  ERRORS {
    MissingParameter,
    SystemFailure,
    TaskRefused,
    UnexpectedComponentSequence,
    UnexpectedDataValue,
    UnexpectedParameter
  }

-- Direction: gsmSCF -> gsmSSF, Timer: Tctr
-- This operation is used to connect a call from the physical entity containing the gsmSSF to the
-- physical entity containing the gsmSRF.

Continue ::= OPERATION

-- Direction: gsmSCF -> gsmSSF, Timer: Tcue
-- 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.

DisconnectForwardConnection ::= OPERATION
  ERRORS {
    SystemFailure,
    TaskRefused,
    UnexpectedComponentSequence
  }

-- Direction: gsmSCF -> gsmSSF, Timer: Tdfc
-- This operation is used to disconnect a forward temporary connection or a connection to a
-- resource.

EstablishTemporaryConnection ::= OPERATION
  ARGUMENT
    EstablishTemporaryConnectionArg
  ERRORS {
    ETCFailed,
    MissingParameter,
    SystemFailure,
    TaskRefused,
    UnexpectedComponentSequence,
    UnexpectedDataValue,
    UnexpectedParameter
  }

-- Direction: gsmSCF -> gsmSSF, Timer: Tetc
-- This operation is used to create a connection to a resource (e.g. to
-- play an announcement, to collect user information); it implies the use of the assist procedure.

EventReportBCSM ::= OPERATION
  ARGUMENT
    EventReportBCSMArg

```

```

-- Direction: gsmSSF -> gsmSCF, Timer: Terb
-- This operation is used to notify the gsmSCF of a call-related event (e.g., BCSM events such
-- as answer or disconnect) previously requested by the gsmSCF in a RequestReportBCSMEvent
-- operation.

FurnishChargingInformation ::= OPERATION
    ARGUMENT
        FurnishChargingInformationArg
    ERRORS {
        MissingParameter,
        TaskRefused,
        UnexpectedComponentSequence,
        UnexpectedDataValue,
        UnexpectedParameter
    }

-- 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.

InitialDP ::= OPERATION
    ARGUMENT
        InitialDPArg
    ERRORS {
        MissingCustomerRecord,
        MissingParameter,
        SystemFailure,
        TaskRefused,
        UnexpectedComponentSequence,
        UnexpectedDataValue,
        UnexpectedParameter
    }

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

ReleaseCall ::= OPERATION
    ARGUMENT
        ReleaseCallArg

-- Direction: gsmSCF -> gsmSSF, Timer: Trc
-- This operation is used to tear down an existing call at any phase of the call for all
-- parties involved in the call.

RequestReportBCSMEvent ::= OPERATION
    ARGUMENT
        RequestReportBCSMEventArg
    ERRORS {
        MissingParameter,
        SystemFailure,
        TaskRefused,
        UnexpectedComponentSequence,
        UnexpectedDataValue,
        UnexpectedParameter,
        UnknownLegID
    }

-- Direction: gsmSCF -> gsmSSF, Timer: Trrb
-- This operation is used to request the gsmSSF to monitor for a call-related event (e.g., BCSM
-- events such as answer or disconnect), then send a notification or request for instructions
-- back to the gsmSCF when the event is detected.

ResetTimer ::= OPERATION
    ARGUMENT
        ResetTimerArg
    ERRORS {
        MissingParameter,
        TaskRefused,
        UnexpectedComponentSequence,
        UnexpectedDataValue,
        UnexpectedParameter
    }

-- Direction: gsmSCF -> gsmSSF, Timer: Trt
-- This operation is used to request the gsmSSF to refresh an application timer in the gsmSSF.

SendChargingInformation ::= OPERATION
    ARGUMENT
        SendChargingInformationArg
    ERRORS {

```

```

    MissingParameter,
    UnexpectedComponentSequence,
    UnexpectedParameter,
    ParameterOutOfRange,
    SystemFailure,
    TaskRefused,
    UnknownLegID
}

-- Direction: gsmSCF -> gsmSSF, Timer: Tsci
-- This operation is used to instruct the gsmSSF on the charging information which the gsmSSF
-- shall send to the Mobile Station by means of GSM access signalling.

-- gsmSCF-gsmSRF Operations

-- AssistRequestInstructions
-- gsmSRF -> gsmSCF
-- Refer to previous description of this operation in the gsmSCF-gsmSSF operations clause.
-- Cancel
-- gsmSCF -> gsmSRF
-- Refer to previous description of this operation in the gsmSCF-gsmSSF operations clause.

PlayAnnouncement ::= OPERATION
  ARGUMENT
    PlayAnnouncementArg
  ERRORS {
    Cancelled,
    MissingParameter,
    SystemFailure,
    UnavailableResource,
    UnexpectedComponentSequence,
    UnexpectedDataValue,
    UnexpectedParameter
  }
  LINKED {
    SpecializedResourceReport
  }

-- Direction: gsmSCF -> gsmSRF, Timer: Tpa
-- This operation is to be used after Establish Temporary Connection (assist procedure with
-- a second gsmSSF) or a Connect to Resource (no assist) operation. It may be used for inband
-- interaction with a Mobile Station. In the former case, the gsmSRF is usually collocated
-- with the gsmSSF for standard tones (congestion tone etc.) or standard announcements. In
-- the latter case, the gsmSRF is always collocated with the gsmSSF in the MSC. Any error is
-- returned to the gsmSCF. When the gsmSRF is collocated with the gsmSSF, this operation is
-- relayed from the gsmSCF to the gsmSRF via the gsmSSF. The timer associated with this
-- operation must be of a sufficient duration to allow its linked operation to be correctly
-- correlated.

PromptAndCollectUserInformation ::= OPERATION
  ARGUMENT
    PromptAndCollectUserInformationArg
  RESULT
    ReceivedInformationArg
  ERRORS {
    Cancelled,
    ImproperCallerResponse,
    MissingParameter,
    SystemFailure,
    TaskRefused,
    UnavailableResource,
    UnexpectedComponentSequence,
    UnexpectedDataValue,
    UnexpectedParameter
  }

-- Direction: gsmSCF -> gsmSRF, Timer: Tpc
-- This operation is used to interact with a user to collect information. When the gsmSRF
-- is collocated with the gsmSSF, this operation is relayed from the gsmSCF to the gsmSRF
-- via the gsmSSF.

SpecializedResourceReport ::= OPERATION
  ARGUMENT
    SpecializedResourceReportArg

-- Direction: gsmSRF -> gsmSCF, Timer: Tsrr
-- This operation is used as the response to a PlayAnnouncement operation when the announcement
-- completed report indication is set. When the gsmSRF is collocated with the gsmSSF, this
-- operation is relayed from the gsmSRF to the gsmSCF via the gsmSSF.

END

```


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
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
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
PlayAnnouncement	T _{pa}	long
PromptAndCollectUserInformation	T _{pc}	long
SpecialisedResourceReport	T _{srr}	short

6.2 Error types

Spare

6.3 Data types

```

CAP-DataTypes {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1)
modules(3)cap-datatypes(52) version2(1)}

-- This module contains the type definitions for the CAP v.2 data types.

DEFINITIONS IMPLICIT TAGS ::=
BEGIN
    IMPORTS

-- CAP Classes

    EXTENSION,

    SupportedExtensions
FROM CAP-Classes {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1)
modules(3) cap-classes(54) version2(1)}

-- This module contains the class definitions for CAP v.2.

-- CS1 Parameters

    CallingPartysCategory,

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

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

    IMSI,
    ISDN-AddressString,
    Ext-BasicServiceCode,
    NAEA-CIC
FROM MAP-CommonDataTypes { ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
gsm-Network(1) modules(3) map-CommonDataTypes(18) version4(4)}

    LocationInformation,
    SubscriberState
FROM MAP-MS-DataTypes { ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
gsm-Network(1) modules(3) map-MS-DataTypes(11) version4(4)}

    CallReferenceNumber,
    SuppressionOfAnnouncement
FROM MAP-CH-DataTypes { ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
gsm-Network(1) modules(3) map-CH-DataTypes(13) version4(4)}
;

-- TYPE DEFINITIONS FOR CAP v.2 DATA TYPES FOLLOW

-- Argument Data Types

ApplyChargingArg ::= SEQUENCE {
    aChBillingChargingCharacteristics [0] AChBillingChargingCharacteristics,
    partyToCharge [2] SendingSideID
        DEFAULT sendingSideID : leg1,
    extensions [3] SEQUENCE SIZE(1..numOfExtensions) OF
        ExtensionField OPTIONAL,
    ...
}

-- The partyToCharge parameter indicates the party in the call to which the ApplyCharging
-- operation should be applied.

ApplyChargingReportArg ::= CallResult
    
```

```

AssistRequestInstructionsArg ::= SEQUENCE {
    correlationID          [0] CorrelationID,
    iPSSPCapabilities     [2] IPSSPCapabilities,
    extensions             [3] SEQUENCE SIZE(1..numOfExtensions) OF
                                ExtensionField OPTIONAL,
    ...
}

-- OPTIONAL denotes network operator specific use. The value of the correlationID may be the
-- Called Party Number supplied by the initiating gsmSSF.

CallInformationReportArg ::= SEQUENCE {
    requestedInformationList [0] RequestedInformationList,
    extensions               [2] SEQUENCE SIZE(1..numOfExtensions) OF
                                ExtensionField OPTIONAL,
    legID                   [3] ReceivingSideID OPTIONAL,
    ...
}

CallInformationRequestArg ::= SEQUENCE {
    requestedInformationTypeList [0] RequestedInformationTypeList,
    extensions                   [2] SEQUENCE SIZE(1..numOfExtensions) OF
                                ExtensionField OPTIONAL,
    legID                       [3] SendingSideID OPTIONAL,
    ...
}

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

ConnectArg ::= SEQUENCE {
    destinationRoutingAddress [0] DestinationRoutingAddress,
    alertingPattern           [1] AlertingPattern OPTIONAL,
    originalCalledPartyID     [6] OriginalCalledPartyID OPTIONAL,
    extensions                 [10] SEQUENCE SIZE(1..numOfExtensions) OF
                                ExtensionField OPTIONAL,
    callingPartysCategory     [28] CallingPartysCategory OPTIONAL,
    redirectingPartyID        [29] RedirectingPartyID OPTIONAL,
    redirectionInformation    [30] RedirectionInformation OPTIONAL,
    genericNumbers            [14] GenericNumbers OPTIONAL,
    suppressionOfAnnouncement [55] SuppressionOfAnnouncement OPTIONAL,
    oCSIApplicable            [56] OCSIApplicable OPTIONAL,
    ...,
    na-Info                   [57] NA-Info OPTIONAL
}

-- na-Info is included at the discretion of the gsmSCF operator.

ConnectToResourceArg ::= SEQUENCE {
    resourceAddress CHOICE {
        ipRoutingAddress [0] IPRoutingAddress,
        none [3] NULL
    },
    extensions [4] SEQUENCE SIZE(1..numOfExtensions) OF
                ExtensionField OPTIONAL,
    serviceInteractionIndicatorsTwo [7] ServiceInteractionIndicatorsTwo OPTIONAL,
    ...
}

EstablishTemporaryConnectionArg ::= SEQUENCE {
    assistingSSPIPRoutingAddress [0] AssistingSSPIPRoutingAddress,
    correlationID [1] CorrelationID OPTIONAL,
    scfID [3] ScfID OPTIONAL,
    extensions [4] SEQUENCE SIZE(1..numOfExtensions) OF
                ExtensionField OPTIONAL,
    serviceInteractionIndicatorsTwo [7] ServiceInteractionIndicatorsTwo OPTIONAL,
    ...
}

```

```
na-info          [50] NA-Info          OPTIONAL
}
-- na-info is included at the discretion of the
-- gsmSCF operator.

EventReportBCSMArg ::= SEQUENCE {
  eventTypeBCSM          [0] EventTypeBCSM,
  eventSpecificInformationBCSM [2] EventSpecificInformationBCSM OPTIONAL,
  legID                  [3] ReceivingSideID          OPTIONAL,
  miscCallInfo          [4] MiscCallInfo          DEFAULT {messageType request},
  extensions             [5] SEQUENCE SIZE(1..numOfExtensions) OF
                          ExtensionField          OPTIONAL,
  ...
}

FurnishChargingInformationArg ::= FCIBillingChargingCharacteristics
```

```

InitialDPArg ::= SEQUENCE {
    serviceKey [0] ServiceKey,
    calledPartyNumber [2] CalledPartyNumber OPTIONAL,
    callingPartyNumber [3] CallingPartyNumber OPTIONAL,
    callingPartysCategory [5] CallingPartysCategory OPTIONAL,
    ipSSPCapabilities [8] IPSSPCapabilities OPTIONAL,
    locationNumber [10] LocationNumber OPTIONAL,
    originalCalledPartyID [12] OriginalCalledPartyID OPTIONAL,
    extensions [15] SEQUENCE SIZE(1..numOfExtensions) OF
        ExtensionField OPTIONAL,
    highLayerCompatibility [23] HighLayerCompatibility OPTIONAL,
    additionalCallingPartyNumber [25] AdditionalCallingPartyNumber OPTIONAL,
    bearerCapability [27] BearerCapability OPTIONAL,
    eventTypeBCSM [28] EventTypeBCSM OPTIONAL,
    redirectingPartyID [29] RedirectingPartyID OPTIONAL,
    redirectionInformation [30] RedirectionInformation 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,
    ...
}

-- 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.

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

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

ReceivedInformationArg ::= CHOICE {
    digitsResponse [0] Digits
}

ReleaseCallArg ::= Cause

RequestReportBCSMEventArg ::= SEQUENCE {
    bcsmevents [0] SEQUENCE SIZE (1..numOfBCSMEvents) OF BCSMEvent,
    extensions [2] SEQUENCE SIZE (1..numOfExtensions) OF
        ExtensionField OPTIONAL,
    ...
}

-- Indicates the BCSM related events for notification.

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

```

```

    extensions                [2] SEQUENCE SIZE(1..numOfExtensions) OF
                               ExtensionField                       OPTIONAL,
    ...
}

SendChargingInformationArg ::= SEQUENCE {
    sCIBillingChargingCharacteristics [0] SCIBillingChargingCharacteristics,
    partyToCharge                     [1] SendingSideID,
    extensions                         [2] SEQUENCE SIZE(1..numOfExtensions) OF
                                       ExtensionField                       OPTIONAL,
    ...
}

SpecializedResourceReportArg ::= NULL

-- Common Data Types

AChBillingChargingCharacteristics ::=
    OCTET STRING (SIZE(minAChBillingChargingLength .. 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 ::= Digits

-- Indicates the Additional Calling Party Number.

AlertingPattern ::= OCTET STRING (SIZE (3))

-- The encoding of the last octet of this parameter is as defined in GSM 09.02 [Reference 14].
-- Only the last octet is used. The remaining octets shall be sent with all bits set to zero.
-- The receiving side shall ignore the first two octets.

AOCBeforeAnswer ::= 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

ApplicationTimer ::= INTEGER (0..2047)

-- Used by the gsmSCF to set a timer in the gsmSSF. The timer is in seconds.

AssistingSSPIPRoutingAddress ::= Digits

-- Indicates the destination address of the gsmSRF for the assist procedure.

BCSMEvent ::= SEQUENCE {
    eventTypeBCSM [0] EventTypeBCSM,
    monitorMode [1] MonitorMode,
    legID [2] LegID OPTIONAL,
    dPSpecificCriteria [30] DPSpecificCriteria OPTIONAL
}

-- Indicates the BCSM Event information for monitoring.

BearerCapability ::= CHOICE {
    bearerCap [0] OCTET STRING (SIZE (2..maxBearerCapabilityLength))
}

-- Indicates the type of bearer capability connection to the user. For bearerCap, the value as
-- described in ISUP (ETS 300 356-1 [3], User Service Information) 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 GSM 02.40 [26].

CalledPartyBCDNumber              ::= OCTET STRING (SIZE (minCalledPartyBCDNumberLength ..
                                                maxCalledPartyBCDNumberLength))

-- Indicates the Called Party Number, including service selection information. Refer to GSM
-- 04.08 [25] for encoding. This data type carries only the "type of number", "numbering plan
-- identification" and "number digit" fields defined in [25]; it does not carry the "called
-- party BCD number IEI" or "length of called party BCD number contents".

CalledPartyNumber                 ::= OCTET STRING (SIZE (minCalledPartyNumberLength ..
                                                maxCalledPartyNumberLength))

-- Indicates the Called Party Number. Refer to ETS 300 356-1 [3] for encoding.

CallingPartyNumber                ::= OCTET STRING (SIZE (minCallingPartyNumberLength ..
                                                maxCallingPartyNumberLength))

-- Indicates the Calling Party Number. Refer to ETS 300 356-1 [3] for encoding.

CallResult                        ::= OCTET STRING (SIZE (minCallResultLength ..
                                                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 OPTIONAL,
        tariffSwitchInterval            [2] INTEGER (1..86400)          OPTIONAL
    }
}
-- tariffSwitchInterval is measured in 1 second units.
-- maxCallPeriodDuration is measured in 100 millisecond units

CAMEL-CallResult                    ::= CHOICE {
    timeDurationChargingResult          [0] SEQUENCE {
        partyToCharge                   [0] ReceivingSideID,
        timeInformation                 [1] TimeInformation,
        callActive                       [2] BOOLEAN                      DEFAULT TRUE
    }
}

CAMEL-FCIBillingChargingCharacteristics ::= CHOICE {
    fCIBCCAMELsequence1                [0] SEQUENCE {
        freeFormatData                  [0] OCTET STRING (SIZE (minFCIBillingChargingDataLength..
                                                maxFCIBillingChargingDataLength)),
        partyToCharge                    [1] SendingSideID
        DEFAULT sendingSideID : leg1
    }
}

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

Cause                               ::= OCTET STRING (SIZE (minCauseLength .. maxCauseLength))

-- Indicates the cause for interface related information. Refer to the ETS 300 356-1 [3] Cause
-- parameter for encoding. For the use of Cause and Location values refer to Q.850.
-- Shall only include the cause value.

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                ::= Digits

-- used by gsmSCF for correlation with a previous operation. Refer to clauses 9.5 and 9.15
-- 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    ::= SEQUENCE SIZE (1) OF CalledPartyNumber

-- Indicates the Called Party Number.

Digits                       ::= OCTET STRING (SIZE (minDigitsLength .. maxDigitsLength))

-- Indicates the address signalling digits. Refer to the ETS 300 356-1 [3] Generic Number
-- and Generic Digits parameters for encoding. The coding of the subfields "NumberQualifier"
-- in Generic Number and "Type Of Digits" 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 they shall be sent. 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.

DPSSpecificCriteria         ::= CHOICE {
    applicationTimer         [1] ApplicationTimer
}

-- The gsmSCF may set a timer in the gsmSSF for the NoAnswer event. If the user does not
-- answer the call within the allocated time, the gsmSSF reports the event to the gsmSCF.

ErrorTreatment               ::= ENUMERATED {
    stdErrorAndInfo         (0),
    help                    (1),
    repeatPrompt            (2)
}

-- stdErrorAndInfo means returning the "ImproperCallerResponse" error in the event of an error
-- condition during collection of user info.

EventSpecificInformationBCSM ::= CHOICE {
    routeSelectFailureSpecificInfo [2] SEQUENCE {
        failureCause          [0] Cause          OPTIONAL,
        ...
    },
}

```



```

oCalledPartyBusySpecificInfo      [3] SEQUENCE {
  busyCause                        [0] Cause                        OPTIONAL,
  ...
};
oNoAnswerSpecificInfo             [4] SEQUENCE {
  -- no specific info defined-
  ...
};
oAnswerSpecificInfo              [5] SEQUENCE {
  -- no specific info defined-
  ...
};
oDisconnectSpecificInfo          [7] SEQUENCE {
  releaseCause                    [0] Cause                        OPTIONAL,
  ...
};
tBusySpecificInfo                [8] SEQUENCE {
  busyCause                       [0] Cause                        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                        OPTIONAL,
  ...
}
}

```

-- Indicates the call related information specific to the event.

```

EventTypeBCSM ::= ENUMERATED {
  collectedInfo                (2),
  routeSelectFailure           (4),
  oCalledPartyBusy             (5),
  oNoAnswer                    (6),
  oAnswer                      (7),
  oDisconnect                  (9),
  oAbandon                     (10),
  termAttemptAuthorized        (12),
  tBusy                        (13),
  tNoAnswer                    (14),
  tAnswer                      (15),
  tDisconnect                  (17),
  tAbandon                     (18)
}

```

-- Values collectedInfo and termAttemptAuthorized can only be used for TDPS.

```

ExtensionField ::= SEQUENCE {
  type                EXTENSION.&id ({SupportedExtensions}),
  -- shall identify the value of an EXTENSION type
  criticality         CriticalityType    DEFAULT ignore,
  value              [1] EXTENSION.&ExtensionType({SupportedExtensions}){@type}
}

```

-- This parameter indicates an extension of an argument data type. Its content is network operator specific

```

FCIBillingChargingCharacteristics ::= OCTET STRING (SIZE (minFCIBillingChargingLength ..
  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.

```

GenericNumber ::= OCTET STRING (SIZE(minGenericNumberLength..
  maxGenericNumberLength))

```

-- Indicates a generic number. Refer to ETS 300 356-1 [3] Generic number for encoding.

```

GenericNumbers ::= SET SIZE(1..numOfGenericNumbers) OF GenericNumber

```

```

InbandInfo ::= SEQUENCE {
    messageID [0] MessageID,
    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 ::= CHOICE {
    inbandInfo [0] InbandInfo,
    tone [1] Tone
}

IPRoutingAddress ::= CalledPartyNumber

-- Indicates the routing address for the IP.

IPSSPCapabilities ::= OCTET STRING (SIZE (minIPSSPCapabilitiesLength..
    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 the present document, 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.2
-- Bit Value Meaning
-- 0 0 IPRoutingAddress not supported
-- 0 1 IPRoutingAddress supported
-- 1 0 VoiceBack not supported
-- 1 1 VoiceBack supported
-- 2 0 VoiceInformation not supported, via speech recognition
-- 2 1 VoiceInformation supported, via speech recognition
-- 3 0 VoiceInformation not supported, via voice recognition
-- 3 1 VoiceInformation supported, via voice recognition
-- 4 0 Generation of voice announcements from Text not supported
-- 4 1 Generation of voice announcements from Text supported
-- 5 - Reserved
-- 6 - Reserved
-- 7 0 End of standard part
-- 7 1 This value is reserved in CAP V.2
--
-- Octets 2 to 4 Bilateral Part: Network operator / equipment vendor specific

LegType ::= OCTET STRING (SIZE(1))
    leg1 LegType ::= '01'H
    leg2 LegType ::= '02'H

LocationNumber ::= OCTET STRING (SIZE (minLocationNumberLength ..
    maxLocationNumberLength))

-- Indicates the Location Number for the calling party. Refer to ETS 300 356-1 [3] for encoding.

MessageID ::= CHOICE {
    elementaryMessageID [0] Integer4,
    text [1] SEQUENCE {
        messageContent [0] IA5String (SIZE(minMessageContentLength..
            maxMessageContentLength)),
        attributes [1] OCTET STRING (SIZE (minAttributesLength..
            maxAttributesLength)) OPTIONAL
    },
    elementaryMessageIDs [29] SEQUENCE SIZE (1..numOfMessageIDs) OF Integer4,
    variableMessage [30] SEQUENCE {
        elementaryMessageID [0] Integer4,
        variableParts [1] SEQUENCE SIZE (1..5) OF VariablePart
    }
}

-- Use of the text parameter is network operator/equipment vendor specific.

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 Tl.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 Tl.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 Tl.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 Tl.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
-- Tl.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 [3] 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 GSM 03.78 [15].

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

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

RedirectingPartyID           ::= OCTET STRING (SIZE (minRedirectingPartyIDLength ..
                                                maxRedirectingPartyIDLength))

-- Indicates redirecting number. Refer to ETS 300 356-1 [3] Redirecting number for encoding.

ReleaseIfDurationExceeded    ::= SEQUENCE {
    tone                       BOOLEAN DEFAULT FALSE,
    ...,
    extensions                 [10] SEQUENCE SIZE(1..numOfExtensions) OF
                                                ExtensionField          OPTIONAL
    }

-- Indicates that the call shall be released, with optional warning tone.
RequestedInformationList      ::= SEQUENCE SIZE (1..numOfInfoItems) OF RequestedInformation

RequestedInformationTypeList  ::= SEQUENCE SIZE (1..numOfInfoItems) OF RequestedInformationType

RequestedInformation          ::= SEQUENCE {
    requestedInformationType    [0] RequestedInformationType,
    requestedInformationValue   [1] RequestedInformationValue
    }

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

```

```

}

RequestedInformationValue ::= CHOICE {
    callAttemptElapsedTimeValue [0] INTEGER (0..255),
    callStopTimeValue [1] DateAndTime,
    callConnectedElapsedTimeValue [2] Integer4,
    releaseCauseValue [30] Cause
}

-- The callAttemptElapsedTimeValue is specified in seconds. The unit for the
-- callConnectedElapsedTimeValue is 100 milliseconds.

ScfID ::= OCTET STRING (SIZE (minScfIDLength..maxScfIDLength))

-- defined by network operator. Indicates the SCF identifier.

SCIBillingChargingCharacteristics ::= OCTET STRING (SIZE (minSCIBillingChargingLength ..
    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.

SendingSideID ::= CHOICE {sendingSideID [0] LegType}

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

ServiceInteractionIndicatorsTwo ::= SEQUENCE {
    bothwayThroughConnectionInd [2] BothwayThroughConnectionInd OPTIONAL
}

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 ::= OCTET STRING (SIZE(minTimeAndTimezoneLength..
    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 eighth octet. For the encoding of Timezone refer to
-- Reference [28], GSM 03.40.
--
-- 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-lth 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.

VariablePart ::= CHOICE {
    integer          [0] Integer4,
    number          [1] Digits,
                    -- 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
--
-- Definition of range constants

minAchBillingChargingLength      INTEGER ::= 5
maxAchBillingChargingLength      INTEGER ::= 177
minAttributesLength              INTEGER ::= 2
maxAttributesLength              INTEGER ::= 10
maxBearerCapabilityLength        INTEGER ::= 11
minCallResultLength              INTEGER ::= 12
maxCallResultLength              INTEGER ::= 24
minCalledPartyBCDNumberLength    INTEGER ::= 1
maxCalledPartyBCDNumberLength    INTEGER ::= 41
minCalledPartyNumberLength       INTEGER ::= 3
maxCalledPartyNumberLength       INTEGER ::= 12
minCallingPartyNumberLength      INTEGER ::= 2
maxCallingPartyNumberLength      INTEGER ::= 10

```

```
minCauseLength          INTEGER ::= 2
maxCauseLength          INTEGER ::= 2
minDigitsLength         INTEGER ::= 2
maxDigitsLength         INTEGER ::= 11
minFCIBillingChargingDataLength  INTEGER ::= 1
maxFCIBillingChargingDataLength  INTEGER ::= 40
minFCIBillingChargingLength      INTEGER ::= 5
maxFCIBillingChargingLength      INTEGER ::= 49
minGenericNumberLength  INTEGER ::= 3
maxGenericNumberLength  INTEGER ::= 11
minIPSSPCapabilitiesLength      INTEGER ::= 1
maxIPSSPCapabilitiesLength      INTEGER ::= 4
minLocationNumberLength  INTEGER ::= 2
maxLocationNumberLength  INTEGER ::= 10
minMessageContentLength  INTEGER ::= 1
maxMessageContentLength  INTEGER ::= 127
minOriginalCalledPartyIDLength  INTEGER ::= 2
maxOriginalCalledPartyIDLength  INTEGER ::= 10
minRedirectingPartyIDLength      INTEGER ::= 2
maxRedirectingPartyIDLength      INTEGER ::= 10
minScfIDLength           INTEGER ::= 2
maxScfIDLength           INTEGER ::= 10
minSCIBillingChargingLength      INTEGER ::= 4
maxSCIBillingChargingLength      INTEGER ::= 69
minTimeAndTimezoneLength  INTEGER ::= 8
maxTimeAndTimezoneLength  INTEGER ::= 8
numOfBCSMEvents           INTEGER ::= 10
numOfExtensions           INTEGER ::= 10
numOfGenericNumbers       INTEGER ::= 5
numOfInfoItems            INTEGER ::= 4
numOfMessageIDs           INTEGER ::= 5
```

END

-- The maxACHBillingChargingLength allows 160 octets for the possible inclusion of extension fields
-- of the releaseIfDurationExceeded subparameter.

6.4 Operation and error codes

```
CAP-Codes {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1) modules(3)cap-
-codes(53) version2(1)}
```

```
-- This module contains the operation and error code assignments for the CAP v.2 application
-- protocol.
```

```
DEFINITIONS ::=
BEGIN
```

```
-- OPERATION AND ERROR CODE ASSIGNMENTS FOR THE CAP v.2 PROTOCOL FOLLOWS
```

```
IMPORTS
```

```
-- operation types
```

```
ActivityTest,
ApplyCharging,
ApplyChargingReport,
AssistRequestInstructions,
CallInformationReport,
CallInformationRequest,
Cancel,
Connect,
ConnectToResource,
Continue,
DisconnectForwardConnection,
EstablishTemporaryConnection,
EventReportBCSM,
FurnishChargingInformation,
InitialDP,
PlayAnnouncement,
PromptAndCollectUserInformation,
ReleaseCall,
RequestReportBCSMEvent,
ResetTimer,
SendChargingInformation,
SpecializedResourceReport
```

```
FROM CAP-Operations { ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1)
modules(3) cap-operations(50) version2(1)}
```

```
-- CSI error types
```

```
Cancelled,
CancelFailed,
ETCFailed,
ImproperCallerResponse,
MissingCustomerRecord,
MissingParameter,
ParameterOutOfRange,
RequestedInfoError,
TaskRefused,
UnavailableResource,
UnexpectedComponentSequence,
UnexpectedDataValue,
UnexpectedParameter,
UnknownLegID,
SystemFailure
```

```
FROM CSI-Errors {ccitt(0) identified-organization(4) etsi(0) inDomain(1) in-network(1) modules(0)
csi-errors(1) version1(0)}
```

```
-- CAP error types
```

```
-- the operations are grouped by the identified ASEs.
```

```
--
```

```
-- gsmSCF activation ASE
```

```
initialDP InitialDP ::= localValue 0
```

```
-- SCF/gsmSRF activation of assist ASE
```

```
assistRequestInstructions AssistRequestInstructions ::= localValue 16
```

```
-- Assist connection establishment ASE
```

```
establishTemporaryConnection EstablishTemporaryConnection ::= localValue 17
```

```
-- Generic disconnect resource ASE
```

```

disconnectForwardConnection      DisconnectForwardConnection      ::= localValue 18
-- Non-assisted connection establishment ASE
connectToResource                 ConnectToResource                 ::= localValue 19
-- Connect ASE (elementary gsmSSF function)
connect                           Connect                           ::= localValue 20
-- Call handling ASE (elementary gsmSSF function)
releaseCall                       ReleaseCall                       ::= localValue 22
-- BCSM Event handling ASE
requestReportBCSMEvent           RequestReportBCSMEvent           ::= localValue 23
eventReportBCSM                  EventReportBCSM                  ::= localValue 24
-- gsmSSF call processing ASE
continue                          Continue                          ::= localValue 31
-- Timer ASE
resetTimer                        ResetTimer                        ::= localValue 33
-- Billing ASE
furnishChargingInformation        FurnishChargingInformation        ::= localValue 34
-- Charging ASE
applyCharging                     ApplyCharging                     ::= localValue 35
applyChargingReport              ApplyChargingReport              ::= localValue 36
-- Call report ASE
callInformationReport             CallInformationReport             ::= localValue 44
callInformationRequest            CallInformationRequest            ::= localValue 45
-- Signalling control ASE
sendChargingInformation           SendChargingInformation           ::= localValue 46
-- Specialized resource control ASE
playAnnouncement                 PlayAnnouncement                 ::= localValue 47
promptAndCollectUserInformation   PromptAndCollectUserInformation   ::= localValue 48
specializedResourceReport         SpecializedResourceReport         ::= localValue 49
-- Cancel ASE
cancel                           Cancel                           ::= localValue 53
-- Activity Test ASE
activityTest                      ActivityTest                      ::= localValue 55
-- ERROR codes
cancelled                        Cancelled                        ::= localValue 0
cancelFailed                      CancelFailed                      ::= localValue 1
eTCFailed                        ETCFailed                        ::= localValue 3
improperCallerResponse           ImproperCallerResponse           ::= localValue 4
missingCustomerRecord            MissingCustomerRecord            ::= localValue 6
missingParameter                 MissingParameter                 ::= localValue 7
parameterOutOfRange              ParameterOutOfRange              ::= localValue 8
requestedInfoError               RequestedInfoError               ::= localValue 10
systemFailure                    SystemFailure                    ::= localValue 11
taskRefused                      TaskRefused                      ::= localValue 12
unavailableResource              UnavailableResource              ::= localValue 13
unexpectedComponentSequence       UnexpectedComponentSequence       ::= localValue 14
unexpectedDataValue              UnexpectedDataValue              ::= localValue 15
unexpectedParameter              UnexpectedParameter              ::= localValue 16
unknownLegID                     UnknownLegID                     ::= localValue 17

```

END

6.5 Application Service Elements

```
CAP-ASEs {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1) modules(3) cap-ases(55) version2(1)}
```

```
-- This module contains grouping of operations by the identified ASEs for the CAP v.2 application.
--
```

```
DEFINITIONS ::=
BEGIN
```

```
-- GROUPING OF OPERATIONS BY THE IDENTIFIED ASEs FOR THE CAP v.2 PROTOCOL FOLLOWS
```

```
IMPORTS
```

```
-- macros
```

```
APPLICATION-SERVICE-ELEMENT
```

```
FROM Remote-Operations-Notation-Extension {joint-iso-ccitt remote-operations(4) notation-extension(2)}
```

```
-- operation codes
```

```
activityTest,
applyCharging,
applyChargingReport,
assistRequestInstructions,
callInformationReport,
callInformationRequest,
cancel,
connect,
connectToResource,
continue,
disconnectForwardConnection,
establishTemporaryConnection,
eventReportBCSM,
furnishChargingInformation,
initialDP,
playAnnouncement,
promptAndCollectUserInformation,
releaseCall,
requestReportBCSMEvent,
resetTimer,
sendChargingInformation,
specializedResourceReport
```

```
FROM CAP-Codes {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1) modules(3) cap-codes(53) version2(1)}
```

```
;
```

```
-- APPLICATION SERVICE ELEMENTS
```

```
GSM-SCF-activation-ASE ::= APPLICATION-SERVICE-ELEMENT
```

```
-- consumer is gsmSSF
```

```
CONSUMER INVOKES {
initialDP
}
```

```
GSM-SCF-GSM-SRF-activation-of-assist-ASE ::= APPLICATION-SERVICE-ELEMENT
```

```
-- consumer is gsmSSF/gsmSRF
```

```
CONSUMER INVOKES {
assistRequestInstructions
}
```

```
Assist-connection-establishment-ASE ::= APPLICATION-SERVICE-ELEMENT
```

```
-- supplier is gsmSCF
```

```
SUPPLIER INVOKES {
establishTemporaryConnection
}
```

```
Generic-disconnect-resource-ASE ::= APPLICATION-SERVICE-ELEMENT
```

```
-- supplier is gsmSCF
```

```
SUPPLIER INVOKES {
disconnectForwardConnection
}
```

```
Non-assisted-connection-establishment-ASE ::= APPLICATION-SERVICE-ELEMENT
```

```
-- supplier is gsmSCF
```

```
SUPPLIER INVOKES {
connectToResource
}
```

```

    }

Connect-ASE ::= APPLICATION-SERVICE-ELEMENT
    -- supplier is gsmSCF
    SUPPLIER INVOKES {
    connect
    }

Call-handling-ASE ::= APPLICATION-SERVICE-ELEMENT
    -- supplier is gsmSCF
    SUPPLIER INVOKES {
    releaseCall
    }

BCSM-event-handling-ASE ::= APPLICATION-SERVICE-ELEMENT
    -- consumer is gsmSSF
    CONSUMER INVOKES {
    eventReportBCSM
    }
    -- supplier is gsmSCF
    SUPPLIER INVOKES {
    requestReportBCSMEvent
    }

GSM-SSF-call-processing-ASE ::= APPLICATION-SERVICE-ELEMENT
    -- supplier is gsmSCF
    SUPPLIER INVOKES {
    continue
    }

Timer-ASE ::= APPLICATION-SERVICE-ELEMENT
    -- supplier is gsmSCF
    SUPPLIER INVOKES {
    resetTimer
    }

Billing-ASE ::= APPLICATION-SERVICE-ELEMENT
    -- supplier is gsmSCF
    SUPPLIER INVOKES {
    furnishChargingInformation
    }

Charging-ASE ::= APPLICATION-SERVICE-ELEMENT
    -- consumer is gsmSSF
    CONSUMER INVOKES {
    applyChargingReport
    }
    -- supplier is gsmSCF
    SUPPLIER INVOKES {
    applyCharging
    }

Call-report-ASE ::= APPLICATION-SERVICE-ELEMENT
    -- consumer is SSF
    CONSUMER INVOKES {
    callInformationReport
    }
    -- supplier is SCF
    SUPPLIER INVOKES {
    callInformationRequest
    }

Signalling-control-ASE ::= APPLICATION-SERVICE-ELEMENT
    -- supplier is SCF
    SUPPLIER INVOKES {
    sendChargingInformation
    }

Specialized-resource-control-ASE ::= APPLICATION-SERVICE-ELEMENT
    -- consumer is SSF/gsmSRF
    CONSUMER INVOKES {
    specializedResourceReport
    }
    -- supplier is SCF
    SUPPLIER INVOKES {
    playAnnouncement,
    promptAndCollectUserInformation
    }

Cancel-ASE ::= APPLICATION-SERVICE-ELEMENT
    -- supplier is SCF
    SUPPLIER INVOKES {

```

```

cancel
    }

Activity-test-ASE ::= APPLICATION-SERVICE-ELEMENT
    -- supplier is gsmSCF
    SUPPLIER INVOKES {
    activityTest
    }

END

```

6.6 Application contexts

```

APPLICATION-CONTEXT MACRO ::=
BEGIN
TYPE NOTATION ::= Symmetric | InitiatorConsumerOf ResponderConsumerOf | empty
VALUE NOTATION ::= value(VALUE OBJECT IDENTIFIER)
Symmetric ::= "OPERATIONS OF" "{" ASEList "}"
InitiatorConsumerOf ::= "INITIATOR CONSUMER OF" "{" ASEList "}" | empty
ResponderConsumerOf ::= "RESPONDER CONSUMER OF" "{" ASEList "}" | empty
ASEList ::= ASE | ASEList "," ASE
ASE ::= type -- shall reference an APPLICATION-SERVICE-ELEMENT type.

END

CAP-v2-gsmSSF-to-gsmSCF-AC APPLICATION-CONTEXT
-- dialogue initiated by gsmSSF with InitialDP
INITIATOR CONSUMER OF {
    GSM-SCF-activation-ASE,
    Assist-connection-establishment-ASE,
    Non-assisted-connection-establishment-ASE,
    Generic-disconnect-resource-ASE,
    Connect-ASE,
    Call-handling-ASE,
    BCSM-event-handling-ASE,
    Charging-ASE,
    GSM-SSF-call-processing-ASE,
    Timer-ASE,
    Billing-ASE,
    Call-report-ASE,
    Signalling-control-ASE,
    Specialized-resource-control-ASE,
    Cancel-ASE,
    Activity-test-ASE
}
::= {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1) ac(0)
cap-gsmssf-to-gsmscf(50) version2(1)};

```

```

CAP-v2-assist-gsmSSF-to-gsmSCF-AC APPLICATION-CONTEXT
-- dialogue initiated by gsmSSF with AssistRequestInstructions
INITIATOR CONSUMER OF {
    GSM-SCF-GSM-SRF-activation-of-assist-ASE,
    Generic-disconnect-resource-ASE,
    Non-assisted-connection-establishment-ASE,
    Timer-ASE,
    Specialized-resource-control-ASE,
    Cancel-ASE,
    Activity-test-ASE
}
::= {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1) ac(0)
cap-assist-handoff-gsmssf-to-gsmscf(51) version2(1)};

CAP-v2-gsmSRF-to-gsmSCF-AC APPLICATION-CONTEXT
-- dialogue initiated by gsmSRF with AssistRequestInstructions
INITIATOR CONSUMER OF {
    GSM-SCF-GSM-SRF-activation-of-assist-ASE,
    Specialized-resource-control-ASE,
    Cancel-ASE,
    Activity-test-ASE
}
::= {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1) ac(0)cap-gsmSRF-to-
gsmscf(52) version2(1)};
    
```

6.7 Classes

```

CAP-Classes {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1) modules(3)
cap--classes(54) version2(1)}
-- This module contains the class definitions for CAP v.2.
    
```

DEFINITIONS ::=

BEGIN

IMPORTS

Code

```

FROM Remote-Operations-Information-Objects {joint-iso-ccitt remote-operations(4)
informationObjects(5) version1(0)}
;
    
```

```

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

```

WITH SYNTAX {
    EXTENSION-SYNTAX &ExtensionType,
    CRITICALITY &criticality,
    IDENTIFIED BY &id
}
    
```

```

CriticalityType ::= ENUMERATED {
    ignore (0),
    abort (1)
}
    
```

```

-- Only value Global OBJECT IDENTIFIER is used for &id
-- Only the value ignore (0) is used for &criticality.
-- Example of addition of an extension named "Some Network Specific Indicator" of type
-- BOOLEAN, with criticality "ignore" and to be identified with object ID "ccitt(0)
-- identified-organization(4) organisation(x) gsm(x) capextension":
-- Example of definition using the above information object class:
--
    
```

```

-- SomeNetworkSpecificIndicator EXTENSION ::= {
-- EXTENSION-SYNTAX BOOLEAN
-- CRITICALITY ignore
-- IDENTIFIED BY global : xxxxxx
-- }
    
```

```

firstExtension EXTENSION ::= {
    EXTENSION-SYNTAX NULL,
    CRITICALITY ignore,
    IDENTIFIED BY global:{xxxxxx}
}
    
```

```

SupportedExtensions EXTENSION ::= {firstExtension--full set of network operator extensions--}
END
    
```

7 Application entity procedures

The description of the application entity procedures for CAMEL Phase 2 can be found in GSM 03.78 [15].

8 Error procedures

This subclause defines the generic error procedures for the CAP. The error procedure descriptions have been divided in two subclauses, subclause 8.1 listing the errors related to CAP operations and subclause 8.2 listing the errors related to error conditions in the different FEs which are not directly related to the CAP operations.

The gsmSSF states which are referred to in this section are described in GSM 03.78 [15]. The operations PlayAnnouncement, PromptAndCollectUserInformation and SpecialisedResourceReport refer to states in the gsmSRF SRSM which are described in ETS 300 374-1 [13] as well as to states in GSM 03.78 [15].

8.1 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 Clause 6. Errors which have a specific procedure for an operation are described in Clause 9 with the detailed procedure of the related operation.

The TCAP services which are used for reporting operation errors are described in Clause 10. All errors which can be detected by the ASN.1 decoder already may have been detected during the decoding of the TCAP message and indicated by the TC error indication "MistypedParameter".

The gsmSSF states which are referred to in this section are described in GSM 03.78 [15]. The operations PlayAnnouncement, PromptAndCollectUserInformation and SpecialisedResourceReport refer to states in the gsmSRF SRSM which are described in ETS 300 374-1 [13] as well as to states in GSM 03.78 [15].

8.1.1 Spare

8.1.2 Cancelled

8.1.2.1 General description

8.1.2.1.1 Error description

The error "Cancelled" gives an indication to the gsmSCF that the cancellation, as it was requested by the SCF, of a specific operation, has been successful. The gsmSCF is only able to cancel certain predefined gsmSCF->gsmSRF operations.

8.1.2.2 Operations gsmSCF->gsmSRF

PlayAnnouncement
 PromptAndCollectUserInformation

Procedures at responding entity (gsmSRF)

A) Receiving Cancel

precondition: SRSM state User Interaction
 postcondition: SRSM state User Interaction

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

B) Sending Cancel error

precondition: SRSM state User Interaction

postcondition: SRSM state User Interaction

After returning the "Cancelled" error the gsmSRF stays in the same state. The execution of the indicated PA or P&C is aborted, i.e. the gsmSRF remains connected and the next PA or P&C is executed if available.

8.1.3 CancelFailed

8.1.3.1 General description

8.1.3.1.1 Error description

This error is returned by Cancel if the cancelling 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 stadium that it cannot be cancelled 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.

8.1.3.1.2 Argument description

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

8.1.3.2 Operations gsmSCF->gsmSRF

Cancel

Procedures at responding entity (gsmSRF)

- A) Receiving Cancel. However, the indicated PA or P&C is not known, or already executed. This causes a failure, CancelFailed.

precondition: SRSM state User Interaction

postcondition: SRSM state User Interaction

or SRSM state Idle

B) Sending CancelFailed error

precondition: SRSM state User Interaction

or SRSM state Idle

postcondition: SRSM state User Interaction

or SRSM state Idle

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

8.1.4 ETCFailed

8.1.4.1 General description

8.1.4.1.1 Error description

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

8.1.4.2 Operations gsmSCF->gsmSSF

EstablishTemporaryConnection

Procedures at responding entity (gsmSSF)

gsmSSF receives ETC from gsmSCF but the establishment of the connection fails, resulting in the returning of the ETCFailed error to the gsmSCF

precondition: gsmSSF FSM Waiting for Instructions

postcondition: gsmSSF FSM Waiting for Instructions

No further error treatment.

8.1.5 ImproperCallerResponse

8.1.5.1 General description

8.1.5.1.1 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 P&C operation.

8.1.5.2 Operations gsmSCF->gsmSRF

PromptAndCollectUserInformation

Procedures at responding entity (gsmSRF)

A) gsmSRF receives P&C

precondition: SRSM state Connected

 or SRSM state User Interaction

postcondition: SRSM state User Interaction

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

precondition: SRSM state User Interaction

postcondition: SRSM state User Interaction

gsmSRF waits for a new operation from gsmSCF. This may be a new P&C or PA.

8.1.6 MissingCustomerRecord

8.1.6.1 General description

8.1.6.1.1 Error description

The SLP could not be found in the gsmSCF, because the required customer record does not exist or the requested SLPI, indicated by CorrelationID in the AssistRequestInstructions does not exist anymore.

8.1.6.2 Operations gsmSSF->gsmSCF

AssistRequestInstructions
InitialDP

Procedures at invoking entity (gsmSSF)

gsmSSF receives error "MissingCustomerRecord"

precondition: gsmSSF state Waiting for Instructions

postcondition: gsmSSF state Idle

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

8.1.6.3 Operations SRF->SCF

AssistRequestInstructions

Procedures at invoking entity (SRF)

A) Sending operation

precondition: SRSMS state2 Connected

postcondition: SRSMS state2 Connected

B) SRF receives error "MissingCustomerRecord"

precondition: SRSMS state2 Connected

postcondition: SRSMS state1 Idle

SRF initiated Disconnect.

8.1.7 MissingParameter

8.1.7.1 General description

8.1.7.1.1 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: an expected optional parameter which is essential for the application is not included in the operation argument.

8.1.7.2 Operations gsmSCF->gsmSSF

Call Associated/Non-call Processing

ApplyCharging	CallInformationRequest
FurnishChargingInformation	RequestReportBCSMEEvent
ResetTimer	SendChargingInformation

Call Associated/Call Processing

Connect	ConnectToResource
EstablishTemporaryConnection	

Procedures at responding entity (gsmSSF)

precondition: (1) gsmSSF appropriate state.

(2) gsmSSF operation received, appropriate event occurred.

postcondition: (1) gsmSSF transition to the same state.

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

8.1.7.3 Operations gsmSSF->gsmSCF

AssistRequestInstructions
ApplyChargingReport
InitialDP

Procedures at invoking entity (gsmSSF)

A) Sending operation

precondition: SSF FSM any state in which the above operations can be transferred

postcondition: SSF FSM any state as result of the transfer of any of the above operations

B) gsmSSF receives error "MissingParameter"

precondition: gsmSSF any state as result of the transfer of any of the above operations.

postcondition: gsmSSF state Idle

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

8.1.7.4 Operations gsmSCF->gsmSRF

PlayAnnouncement
PromptAndCollectUserInformation

Procedures at responding entity (gsmSRF)

precondition: SRSM state Connected

or SRSM state User Interaction

postcondition: SRSM state User Interaction

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

8.1.7.5 Operations SRF->SCF

AssistRequestInstructions

Procedures at invoking entity (SRF)

A) Sending operation

precondition: SRSM state2 Connected

postcondition: SRSM state2 Connected

B) Receiving error

precondition: SRSM state2 Connected

postcondition: SRSM state1 Idle

8.1.8 ParameterOutOfRange

8.1.8.1 General description

8.1.8.1.1 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.

8.1.8.2 Operations gsmSCF->gsmSSF

Call Associated/Non-call Processing

ApplyCharging
CallInformationRequest
SendChargingInformation

Refer to subclause 8.1.7 for the appropriate error procedures.

8.1.8.3 Operations gsmSSF->gsmSCF

ApplyChargingReport

Refer to subclause 8.1.7 for the appropriate error procedures.

8.1.9 RequestedInfoError

8.1.9.1 General description

8.1.9.1.1 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.

8.1.9.1.2 Argument description

```
PARAMETER ENUMERATED {
    unknownRequestedInfo(1),
    requestedInfoNotAvailable(2)
}
```

8.1.9.2 Operations gsmSCF->gsmSSF

CallInformationRequest

Refer to subclause 8.1.7 for the appropriate error procedures.

8.1.10 SystemFailure

8.1.10.1 General description

8.1.10.1.1 Error description

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

8.1.10.1.2 Argument description

```
PARAMETER
UnavailableNetworkResource ::= ENUMERATED {
    unavailableResources(0),
    componentFailure(1),
    basicCallProcessingException(2),
    resourceStatusFailure(3),
    endUserFailure(4)
}
```

8.1.10.2 Operations gsmSCF->gsmSSF

Call Associated/Non-call Processing

ApplyCharging	CallInformationRequest
RequestReportBCSMEEvent	SendChargingInformation

Call Associated/Call Processing

Connect	ConnectToResource
DisconnectForwardConnection	EstablishTemporaryConnection

Refer to subclause 8.1.7 for the appropriate error procedures.

8.1.10.3 Operations gsmSSF->gsmSCF

InitialDP
ApplyChargingReport

Refer to subclause 8.1.7 for the appropriate error procedures.

8.1.10.4 Operations gsmSCF->gsmSRF

PlayAnnouncement
PromptAndCollectUserInformation

Refer to subclause 8.1.7 for the appropriate error procedures.

8.1.11 TaskRefused

8.1.11.1 General introduction

8.1.11.1.1 Error description

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

8.1.11.1.2 Argument description

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

8.1.11.2 Operations gsmSCF->gsmSSF

Call Associated/Non-call Processing

ApplyCharging	CallInformationRequest
FurnishChargingInformation	RequestReportBCSMEEvent
ResetTimer	SendChargingInformation

Call Associated/Call Processing

Connect	ConnectToResource
DisconnectForwardConnection	EstablishTemporaryConnection

Refer to subclause 8.1.7 for the appropriate error procedures.

8.1.11.3 Operations gsmSSF->gsmSCF

AssistRequestInstructions
InitialDP
ApplyChargingReport

Refer to subclause 8.1.7 for the appropriate error procedures.

8.1.11.4 Operations gsmSCF->gsmSRF

PromptAndCollectUserInformation

Refer to subclause 8.1.7 for the appropriate error procedures.

8.1.11.5 Operations SRF->SCF

AssistRequestInstructions

Refer to subclause 8.1.7 for the appropriate error procedures.

8.1.12 UnavailableResource

8.1.12.1 General description

8.1.12.1.1 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.

8.1.12.2 Operations gsmSCF->gsmSRF

PlayAnnouncement
PromptAndCollectUserInformation

Procedures at responding entity (gsmSRF)

A) gsmSRF receiving PA or P&C

precondition:	gsmSRF state	Connected; if initial PA or P&C
	or gsmSRF state	User Interaction; if not initial PA or P&C

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

precondition:	SRSN state	User Interaction
postcondition:	SRSN state	User Interaction

8.1.13 UnexpectedComponentSequence

8.1.13.1 General description

8.1.13.1.1 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 receiving entity.

8.1.13.2 Operations gsmSCF->gsmSSF

Call Associated/Non-call Processing

ApplyCharging	CallInformationRequest
FurnishChargingInformation	RequestReportBCSMEEvent
ResetTimer	SendChargingInformation

Call Associated/Call Processing

Connect	ConnectToResource
Continue	DisconnectForwardConnection
EstablishTemporaryConnection	

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

8.1.13.3 Operations gsmSSF->gsmSCF

AssistRequestInstructions
ApplyChargingReport
InitialDP

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

8.1.13.4 Operations SCF->SRF (only applicable for direct SCF-SRF case)

PlayAnnouncement
PromptAndCollectUserInformation

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

8.1.13.5 Operations SRF->SCF

AssistRequestInstructions

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

8.1.14 UnexpectedDataValue

8.1.14.1 General description

8.1.14.1.1 Error description

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

NOTE: This error does not overlap with "ParameterOutOfRange".

8.1.14.2 Operations gsmSCF->gsmSSF

Call Associated/Non-call Processing

ApplyCharging	FurnishChargingInformation
RequestReportBCSMEEvent	ResetTimer

Call Associated/Call Processing

Connect	ConnectToResource
EstablishTemporaryConnection	

Refer to subclause 8.1.7 for the appropriate error procedures.

8.1.14.3 Operations gsmSSF->gsmSCF

AssistRequestInstructions
ApplyChargingReport
InitialDP

Refer to subclause 8.1.7 for the appropriate error procedures.

8.1.14.4 Operations gsmSCF->gsmSRF

PlayAnnouncement
PromptAndCollectUserInformation

Refer to subclause 8.1.7 for the appropriate error procedures.

8.1.14.5 Operations SRF->SCF

AssistRequestInstructions

Refer to subclause 8.1.7 for the appropriate error procedures.

8.1.15 UnexpectedParameter

8.1.15.1 General description

8.1.15.1.1 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.

8.1.15.2 Operations gsmSCF->gsmSSF

Call Associated/Non-call Processing

ApplyCharging	CallInformationRequest
FurnishChargingInformation	RequestReportBCSMEEvent
ResetTimer	SendChargingInformation

Call Associated/Call Processing

Connect	ConnectToResource
EstablishTemporaryConnection	

Refer to subclause 8.1.7 for the appropriate error procedures.

8.1.15.3 Operations gsmSSF->gsmSCF

AssistRequestInstructions
ApplyChargingReport
InitialDP

Refer to subclause 8.1.7 for the appropriate error procedures.

8.1.15.4 Operations gsmSCF->gsmSRF

PlayAnnouncement
PromptAndCollectUserInformation

Refer to subclause 8.1.7 for the appropriate error procedures.

8.1.15.5 Operations SRF->SCF

AssistRequestInstructions

Refer to subclause 8.1.7 for the appropriate error procedures.

8.1.16 UnknownLegID

8.1.16.1 General description

8.1.16.1.1 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.

8.1.16.2 Operations gsmSCF->gsmSSF

Call Associated/Non-call Processing

ApplyCharging

CallInformationRequest

RequestReportBCSMEEvent

SendChargingInformation

Refer to subclause 8.1.7 for the appropriate error procedures.

8.2 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 10.

8.2.1 Expiration of T_{SSF}

8.2.1.1 General description

8.2.1.1.1 Error description

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

8.2.1.2 Procedures gsmSSF->gsmSCF

Procedure at the invoking entity (gsmSSF)

Timeout occurs in gsmSSF on T_{SSF}

precondition:	gsmSSF state	Waiting for instructions
or	gsmSSF state	Waiting for end of User Interaction
or	gsmSSF state	Waiting for end of Temporary Connection
postcondition:	gsmSSF state	Idle

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

8.2.2 Expiration of T_{SRF}

8.2.2.1 General description

8.2.2.1.1 Error description

A timeout occurred in the SRF on the response from the SCF. The procedures for handling this error are described in ETS 300 374-1, [13].

8.2.2.2 Procedures description

The procedures for handling this error are described in ETS 300 374-1, [13].

9 Detailed operation procedures

The gsmSSF states which are referred to in this section are described in GSM 03.78 [15]. The operations PlayAnnouncement, PromptAndCollectUserInformation and SpecialisedResourceReport refer to states in the gsmSRF, which are described in ETS 300 374-1 [13], Subclause 7.3.4. The gsmSRF control procedures are defined in ETS 300 374-1 [13], Subclause 7.3.5. Note that:

- the Handoff case is not supported,
- the support for voice recognition is optional,
- the support for speech synthesis from text is optional,
- for the cases of direct IP connection to the SCF and all assist cases only the procedures at the initiating gsmSSF (together with relevant operation syntax and procedures) are specified in CAP.

9.1 Spare

9.2 ActivityTest procedure

9.2.1 General description

This operation is used to check for the continued existence of a relationship between the gsmSCF and gsmSSF, gsmSCF and gsmSRF or gsmSCF and assistSSF. If the relationship is still in existence, then the gsmSSF, gsmSRF or assistSSF will respond.

If no reply is received, then the gsmSCF will assume that the gsmSSF, gsmSRF or assistSSF has failed in some way and will take the appropriate action.

9.2.1.1 Parameters

None.

9.2.2 Spare

9.2.3 Responding entity (gsmSSF, gsmSRF or assistSSF)

9.2.3.1 Normal procedure

gsmSSF/gsmSRF/assistSSF precondition:

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

GsmSSF/assistSSF postconditions:

- (1) The SSME FSM stays in, or moves to the state "Non-call Associated Treatment".
- (2) If the dialogue ID is active and if there is a gsmSSF/assistSSF using the dialogue, the SSME sends a return result "ActivityTest" to the gsmSCF. If there are no other management activities, the SSME FSM returns to the state "Idle Management", or

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

gsmSRF postconditions

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

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

9.2.3.2 Error handling

Not applicable.

9.3 ApplyCharging procedure

9.3.1 General description

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

The charging scenarios supported by this operation are those given in GSM 02.78 for CSE control of call duration.

9.3.1.1 Parameters

- aChBillingChargingCharacteristics:

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

The list may contain:

- timeDurationCharging:

This list contains the following parameters:

- maxCallPeriodDuration:

This parameter specifies the period of time for which a call can progress before an ApplyChargingReport shall be sent to the gsmSCF.

- releaseIfdurationExceeded:

This parameter specifies the action to be taken at the gsmSSF when the duration specified above has been reached. If the parameter is present, then the call is released.

- Tone

If the parameter is present, then a warning tone is played before the call is released.

- 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 a party in the call.

9.3.2 Spare

9.3.3 Responding entity (gsmSSF)

9.3.3.1 Normal procedure

gsmSSF preconditions:

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

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

"Waiting for Instructions"; or

"Waiting for End of User Interaction"; or

"Waiting for End of Temporary Connection"; or

"Monitoring"

SSF postcondition:

(1) No gsmSSF state transition

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

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.

9.3.3.2 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.

9.4 ApplyChargingReport procedure

9.4.1 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. A report shall be made either when a call disconnection event is detected by the gsmSSF or when the gsmSSF detects that the call period duration indicated in parameter maxCallPeriodDuration (received in ApplyCharging operation) has been reached.

9.4.1.1 Parameters

- CallResult:

This parameter provides the SCF 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 SRF 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 SRF 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.

9.4.2 Invoking entity (gsmSSF)

9.4.2.1 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 SRF 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.

9.4.2.2 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.

9.5 AssistRequestInstructions procedure

9.5.1 General description

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

9.5.1.1 Parameters

- correlationID:

This parameter is used by the gsmSCF to associate the dialogue created from the assisting gsmSSF (or the gsmSRF) to the gsmSCF with the InitialDP from the gsmSSF. The value of the "correlationID" may be extracted from the digits received from the initiating gsmSSF.

- iPSSPCapabilities:

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

- the VMSC/GMSC where the gsmSSF resides, or
- the IP where the gsmSRF resides.

9.5.2 Invoking entity (gsmSSF/gsmSRF)

9.5.2.1 Normal procedure

gsmSSF preconditions:

1) An assist indication has been detected by the assisting gsmSSF.

gsmSSF postconditions:

2) The assisting gsmSSF is in state 'Waiting For Instruction'.

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

9.5.2.2 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.

9.6 Spare

9.7 CallInformationReport procedure

9.7.1 General description

This operation is used to send specific call information for a single call party to the gsmSCF as requested by the gsmSCF in a 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.

9.7.1.1 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 created with Connect or Continue.

9.7.2 Invoking entity (gsmSSF)

9.7.2.1 Normal procedure

gsmSSF preconditions:

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

gsmSSF postcondition:

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

If the gsmSSF executes a state transition caused by one of the following events:

- Release of the indicated or default leg;
- Abandon of the indicated leg;
-
- Called party Busy or Not Reachable for the indicated or default leg;

- gsmSSF no answer timer expiration for the indicated or default leg;
- route select failure for the indicated or default leg;
- release call initiated by the gsmSCF,

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

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

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

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

9.7.2.2 Error handling

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

9.7.3 Spare

9.8 CallInformationRequest procedure

9.8.1 General description

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

9.8.1.1 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" or "Continue") and the received answer indication from the called party side. In case of unsuccessful call setup the network event indicating the unsuccessful call setup stops the measurement of "callAttemptElapsedTime". For the Calling Party this parameter shall be set to 0.

- callStopTime:

This parameter indicates the time stamp when the connection is released.

- callConnectedElapsedTime:

This parameter indicates the duration between the received answer indication from the called party side and the release of the connection. For a Calling Party it indicates the duration between the sending of IDP and the release of that party

- releaseCause:

This parameter indicates the release cause for the call.

- legID:

This parameter indicates the party in the call for which information shall be collected and at the end of connection of which the report shall be sent. When absent, it indicates the 'outgoing' leg created with Connect or Continue.

Any set of these values can be requested.

9.8.2 Spare

9.8.3 Responding entity (gsmSSF)

9.8.3.1 Normal procedure

gsmSSF preconditions:

- (1) Call origination attempt has been initiated.
- (2) A control relationship exists between gsmSSF and gsmSCF.

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

The CallInformationRequest operation is accepted by the gsmSSF only in the state "Waiting for Instructions". The operation does not lead to any transition to another state.

gsmSSF postconditions:

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

The gsmSSF allocates a record and stores the requested information if already available and prepares the recording of information items that will become available later, e.g. "callStopTimeValue".

9.8.3.2 Error handling

In any other than the "Waiting for Instruction" state the CallInformationRequest operation will be handled as "out of context".

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.

9.9 Cancel procedure

9.9.1 General description

The gmSCF uses this class 2 operation to request the gsmSRF to cancel a correlated previous operation.

The operation to be deleted can be either a PlayAnnouncement operation or a PromptAndCollect UserInformation operation.

The cancellation of an operation is indicated via a respective error indication, "Cancelled", 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 machines (gsmSSF/gsmSRF) to go to "Idle". In this case the Cancel operation does not specify any specific operation to be cancelled.

9.9.1.1 Parameters

- invokeID:

This parameter specifies which operation is to be cancelled.

- allRequests:

This parameter indicates that all active requests for EventReportBCSM, ApplyChargingReport and CallInformationReport shall be cancelled.

9.9.2 Spare

9.9.3 Responding entity (gsmSRF)

9.9.3.1 Normal procedure

gsmSRF precondition:

- 1) A PA/P&C has been received and the gsmSRF is in the "User Interaction" state.

gsmSRF postcondition:

- 1) The execution of the PA/P&C has been aborted and the gsmSRF remains in the "User Interaction" state.

9.9.3.2 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.

9.9.4 Responding entity (gsmSSF)

9.9.4.1 Normal procedure

gsmSSF precondition:

- 1) The gsmSSF is in the states "Waiting for Instructions" or "Monitoring".

gsmSSF postcondition:

- 1) All active request for reports and notifications have been cancelled.
- 2) In case the gsmSSF was in state "Monitoring" it shall return to idle; or

In case the gsmSSF was in state "Waiting for Instructions" it will remain in that state. A subsequent call-processing operation will move the gsmSSF to state "Idle".

The call, if in active state, is further treated by gsmSSF autonomously as a normal (non-IN) call.

All resources allocated to the dialogue are released.

9.9.4.2 Error handling

Sending of return error on cancel is not applicable in the cancel "allRequests" case.

9.10 Spare

9.11 Connect procedure

9.11.1 General description

This operation is used to request the gsmSSF to perform the call processing actions to route a call to a specific destination or to influence other call set-up information, e.g. the Generic Number.

9.11.1.1 Parameters

- destinationRoutingAddress:

This parameter contains the called party number towards which the call is to be routed.

- alertingPattern:

This parameter indicates the type of alerting to be applied. It is defined in GSM 09.02 [14].

- callingPartysCategory:

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

- originalCalledPartyID:

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

- redirectingPartyID:

This parameter indicates the directory number the call was redirected from.

- redirectionInformation:

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

- genericNumbers:

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

- suppressionOfAnnouncement:

This parameter indicates that announcements and tones which are played in the GMSC or the VMSC 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 GSM 03.78 [15].

- 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.

9.11.2 Spare

9.11.3 Responding entity (gsmSSF)

9.11.3.1 Normal procedure

gsmSSF preconditions:

- 1) Mobile originating or terminating call attempt has been initiated.
- 2) Basic call processing has been suspended at a DP.
- 3) The gsmSSF waits for instructions.

gsmSSF postcondition:

- 1) The gsmSSF performs the call processing actions to route the call to the specified destination.

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

- the gsmSSF cancels T_{SSF} ;
- if no EDPs have been armed and no CallInformationReport or ApplyChargingReport has been requested the gsmSSF goes to state "Idle". Otherwise, the gsmSSF goes to state "Monitoring".

No implicit activation or deactivation of DPs occurs.

Statistic counter(s) are not affected.

9.11.3.2 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.

9.12 ConnectToResource procedure

9.12.1 General description

This operation is used to connect a call from the gsmSSF to a specialised 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.

9.12.1.1 Parameters

- resourceAddress:

This parameter identifies the physical location of the gsmSRF.

- iPRoutingAddress:

This parameter indicates the routing address to set up a connection towards the gsmSRF.

- none:

This parameter indicates that the call party is to be connected to a predefined gsmSRF.

- serviceInteractionIndicatorsTwo:

This parameter contains an indicator sent from the gsmSCF to the gsmSSF, for control of the through connection to the Calling Party from the gsmSRF. Note that the Assisting gsmSSF shall always assume that Bothway Throughconnection is required, and hence will ignore this parameter if received.

9.12.3 Responding entity (gsmSSF)

9.12.3.1 Normal procedure

gsmSSF preconditions:

- 1) BCSM: Call processing has been suspended at a DP and a control relationship has been established.
- 2) The gsmSSF is in state "Waiting for Instructions".

gsmSSF postconditions:

- 1) The call is switched to the gsmSRF.
- 2) A control relationship to the gsmSRF is established.
- 3) The gsmSSF moves to the state "Waiting for End of User Interaction". T_{SSF} is set.

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

9.12.3.2 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.

9.13 Continue procedure

9.13.1 General description

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

9.13.1.1 Parameters

None.

9.13.2 Spare

9.13.3 Responding entity (gsmSSF)

9.13.3.1 Normal procedure

gsmSSF preconditions

- 1) BCSM: Basic call processing has been suspended at any DP.
- 2) gsmSSF is in the state "Waiting for Instructions".

gsmSSF postconditions

- 1) BCSM: Basic call processing continues.

- 2) gsmSSF is in the state "Monitoring", because at least one EDP was armed, or a CallInformationReport or ApplyChargingReport was requested; or gsmSSF is in the state "Idle", because no EDPs were armed and neither a CallInformationReport or an ApplyChargingReport was requested.

The gsmSSF is in state "Waiting for instructions". The gsmSSF transits to state "Idle" in case no EDPs are armed and no outstanding report requests are present. The gsmSSF transits to state "Monitoring" if at least one EDP is armed, or if there is at least one outstanding report request. Basic call processing is resumed.

9.13.3.2 Error handling

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

9.14 DisconnectForwardConnection procedure

9.14.1 General description

This operation is used in the following two cases:

- a) To clear a connection to an gsmSRF:

this operation is used to explicitly disconnect a connection to a resource (gsmSRF) established previously with a ConnectToResource operation. It is used for a forward disconnection from the gsmSSF. An alternative solution is the backward disconnect from the gsmSRF, controlled by the "DisconnectFromIPForbidden" parameter in the PlayAnnouncement and PromptAndCollectUserInformation operations;

- b) To clear a connection to an assisting SSF:

this operation is sent to the non-assisting gsmSSF involved in an assist procedure. It is used to disconnect the temporary connection between the gsmSSF and the assisting SSF, and the assisting SSF and its associated gsmSRF.

9.14.1.1 Parameters

None.

9.14.2 Spare

9.14.3 Responding entity (gsmSSF)

9.14.3.1 Normal procedure

gsmSSF preconditions:

- 1) Call origination attempt has been initiated.
- 2) Basic call processing has been suspended at a DP.
- 3) The gsmSSF is in the state "Waiting for End of User Interaction" or "Waiting for End of Temporary Connection".

gsmSSF postconditions:

- 1) The connection to the gsmSRF or assisting SSF is released.
- 2) The gsmSSF is waiting for instructions.

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

This operation is accepted in the gsmSSF states "Waiting for End of Temporary Connection" or "Waiting for End of User Interaction". On receipt of this operation in these states, the gsmSSF shall perform the following actions:

- release the connection to the assisting SSF or the relay gsmSRF;
- the gsmSSF resets timer T_{SSF} ;
- the gsmSSF goes to state "Waiting for Instructions".

The DisconnectForwardConnection operation contains no parameters.

NOTE: The successful disconnection to the gsmSRF causes a state transition in the gsmSRF to "Idle". A current order (PlayAnnouncement or PromptAndCollectUserInformation) is cancelled and any queued order is discarded.

9.14.3.2 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.

9.15 EstablishTemporaryConnection procedure

9.15.1 General description

This operation is used to create a connection between a gsmSSF and an assisting SSF 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 (an IP).

Note that assistingSSIPRoutingAddress should contain routing digits, a correlationID and an scfID when a temporary connection is to be established between PLMNs and no bilateral agreement exists between the involved network operators to transfer correlationID and SCFiD as separate parameters.

9.15.1.1 Parameters

- assistingSSIPRoutingAddress:

This parameter indicates the destination address of the gsmSRF or assisting gsmSSF for assist procedure. The "assistingSSIPRoutingAddress" 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 dialogue created from the assisting SSF (or the gsmSRF) to the gsmSCF with the InitialDP from the gsmSSF. The "correlationID" is used only if the correlation ID is not embedded in the "assistingSSIPRoutingAddress". The network operators have to decide about the actual mapping of this parameter on the signalling system.

- scfID:

This parameter indicates the gsmSCF identifier and enables the assisting SSF to identify which gsmSCF the AssistRequestInstructions should be sent to. The "scfID" is used only if the SCF ID is not embedded in the "assistingSSIPRoutingAddress". The network operators have to decide about the actual mapping of this parameter on the signalling system.

- serviceInteractionIndicatorsTwo:

This parameter contains an indicator sent from the gsmSCF to the gsmSSF for control of the through connection to the Calling Party.

9.15.2 Spare

9.15.3 Responding entity (gsmSSF)

9.15.3.1 Normal procedure

gsmSSF preconditions:

- 1) Call origination attempt has been initiated.
- 2) BCSM has been suspended at a DP.
- 3) The gsmSSF waits for instructions.

gsmSSF postconditions:

- 1) The gsmSSF performs the call processing actions to route the call to the assisting SSP or IP.
- 2) The gsmSSF waits for end of temporary connection.

On receipt of this operation in the gsmSSF state "Waiting for Instructions", the gsmSSF has to perform the following actions:

- reset the T_{SSF} to T_{ETC} ;
- route the call to gsmSRF or assisting gsmSSF using "assistingSSPIPRoutingAddress";
- 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.

9.15.3.2 Error handling

Until the connection setup has been accepted by the assisting SSP/IP, 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). The operation timer for ETC shall be longer than the maximum allowed time for the signalling procedures to accept the connection.

NOTE: The connection setup may fail if CorrelationID or SCFiD are not supported as separate ISUP parameters. The error ETCFailed will be returned if SCFiD or CorrelationID are not supported in the gsmSSF.

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.

9.16 Spare

9.17 EventReportBCSM procedure

9.17.1 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.

9.17.1.1 Parameters

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

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

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

If the busy event is triggered by an ISUP release message, the BusyCause is a copy of the ISUP release cause, for example: Subscriber absent, 20 or User busy, 17.

If the Busy event is triggered by a MAP error, for example : Absent subscriber, received from the HLR, the MAP cause is mapped to the corresponding ISUP release cause.

Note: If no BusyCause is received, the gsmSCF should assume busy.

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

If the busy event is triggered by an ISUP release message, the BusyCause is a copy of the ISUP release cause, for example: Subscriber absent, 20 or User busy, 17.

If the Busy event is triggered by a MAP error, for example : Absent subscriber, received from the HLR, the MAP cause is mapped to the corresponding ISUP release cause.

Note: If no BusyCause is received, the gsmSCF should assume busy.

If the busy event is triggered by call forwarding at the GMSC, the BusyCause reflects the forwarding reason (Subscriber Absent, 20 or User busy, 17). The eventSpecificInformationBCSM will also contain the CallForwarded indication.

For O-NoAnswer it will be empty.

For T-NoAnswer it may contain the CallForwarded indication.

If the no answer event is triggered by an ISUP release message or expiry of the CAMEL timer TNRY, the eventSpecificInformationBCSM will be empty.

If the no answer event is triggered by call forwarding at the GMSC, the eventSpecificInformationBCSM will contain the CallForwarded indication.

For O- or T-Answer it will be empty.

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

- legID:
This parameter indicates the party in the call for which the event is reported. gsmSSF will use the option "receivingSideID" only.

- receivingSideID:

If not included, the following defaults are assumed:

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

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

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

- miscCallInfo:

This parameter indicates DP related information.

- messageType:

This parameter indicates whether the message is a request, i.e. resulting from a RequestReportBCSMEvent with "monitorMode" = "interrupted", or a notification, i.e. resulting from a RequestReportBCSMEvent with "monitorMode" = "notifyAndContinue".

9.17.2 Invoking entity (gsmSSF)

9.17.2.1 Normal procedure

gsmSSF preconditions:

- (1) The gsmSSF shall be in the state "Monitoring"; or the gsmSSF may be in state "Waiting for Instructions" if the Disconnect DP is armed and encountered; or the gsmSSF may be in any state if the Abandon DP is armed and encountered.
- (2) The BCSM proceeds to an EDP that is armed.

gsmSSF postconditions:

- (1) The gsmSSF stays in the state "Monitoring" if the message type was notification and there are still EDPs armed or a CallInformationReport or ApplyChargingReport requested.
- (2) The gsmSSF moves to the state "Idle" if the message type was notification and there are no more EDPs armed, or no CallInformationReport or ApplyChargingReport is requested.
- (3) The gsmSSF moves to the state "Waiting for Instructions" if the message type was request. Call processing is interrupted.

If a EDP-R is met that causes the release of the related leg all EDPs related to that leg are disarmed and the event is reported via EventReportBCSM.

9.17.2.2 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 instructs the GMSC/MSC to handle the call according to the Default Call Handling parameter of the valid CSI.

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

9.18 FurnishChargingInformation procedure

9.18.1 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. Receipt of subsequent FCIs on the same leg shall overwrite the contents of the logical call record. When additional FCIs are to be used an EDP-R shall be armed in order to be able to apply FCI before the termination of the call record generation.

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.

9.18.1.1 Parameters

- FCIBillingChargingCharacteristics:
This parameter contains the following sub-parameters;
- FCIBCCAMELsequence1:
This parameter contains the following sub-parameters;
 - FreeFormatData
This parameter indicates free-format billing and/or charging characteristics.
 - PartyToCharge
This parameter indicates the party to bill and/or charge.

9.18.2 Spare

9.18.3 Responding entity (gsmSSF)

9.18.3.1 Normal procedure

gsmSSF preconditions:

- (1) gsmSSF State "Waiting for Instructions" or
gsmSSF State "Waiting for End of User Interaction" or
gsmSSF State "Waiting for End of Temporary Connection" or
gsmSSF state "Monitoring"

gsmSSF postcondition:

- (1) No FSM state transition.

On receipt of this operation the SSF performs actions to create the call record if necessary, and writes the free-format information carried in the operation into the call record. Note that an FCI operation will create a Logical Call Data Record (CDR) if such a record does not already exist for the indicated leg. Subsequent FCI operations received for a given leg, before a disconnection event has been received from or propagated to that leg, will overwrite the data previously written in the free-format CDR field.

The Logical CDRs will be associated for a given call into one or more physical CDRs, as specified in GSM 12.05.

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. I.e. subsequent FCIs indicating the calling leg (leg1) override data from previously received FCI(s) indicating that calling leg during that entire call or call attempt. Subsequent FCIs indicating the called leg (leg2) override any previously received data from an FCI 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 override the data from any previous FCI 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.

9.18.3.2 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.

9.19 InitialDP procedure

9.19.1 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.

9.19.1.1 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 gsmSCF addressing).

- calledPartyNumber:

This parameter contains the number used to identify the called party in the forward direction, e.g. the Called party number of ISUP (see ETS 300 356-1 [3]). This parameter shall be sent only in the Mobile Terminating and Mobile Forwarding cases.

- callingPartyNumber:

This parameter carries the calling party number to identify the calling party or the origin of the call. The encoding of the parameter is defined in ETS 300 356-1 [3].

- callingPartysCategory:

Indicates the type of calling party (e.g., operator, pay phone, ordinary subscriber).

- originalCalledPartyID:

This parameter carries the dialled digits if the call has met call forwarding on the route to the gsmSSF.

- locationNumber:

This parameter is used to convey the geographical area address for mobility services. It is used when "callingPartyNumber" does not contain any information about the geographical location of the calling party (e.g., origin dependent routing when the calling party is a mobile subscriber).

- bearerCapability:

This parameter indicates the type of the bearer capability connection to the user:

- bearerCap:

This parameter contains the value of the ISUP User Service Information parameter.

The parameter "bearerCapability" shall only be included in the InitialDP operation in case the ISUP User Service Information parameter is available at the gsmSSF.

If User Service Information and User Service Information Prime are available at the gsmSSF the "bearerCap" shall contain the value of the User Service Information Prime parameter.

- eventTypeBCSM:
This parameter indicates the armed BCSM DP event, resulting in the InitialDP operation.
- redirectingPartyID:
This parameter indicates the directory number the call was redirected from.
- redirectionInformation:
It contains forwarding related information, such as redirecting counter.
- iPSSPCapabilities:
Indicates which gsmSRF resources supported within the VMSC/GMSC the gsmSSF resides in are attached and available.
- additionalCallingPartyNumber:
The calling party number provided by the access signalling system of the calling user.
- 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 (see ETS 300 403-1 [4]) is used.
- iMSI:
IMSI of the mobile subscriber for which the CAMEL service is invoked. For encoding see GSM 09.02 [14].
- subscriberState:
The state of the mobile subscriber for which the CAMEL service is invoked. The possible states are Busy, Idle, Not reachable and Not provided from VLR. For encoding see GSM 09.02 [14].
- locationInformation:
This parameter indicates the whereabouts of the MS, and the age of the information defining the whereabouts. For encoding see GSM 09.02 [14].
- ext-BasicServiceCode:
Indicates the Basic Service Code. For encoding see GSM 09.02 [14].
- callReferenceNumber:
This parameter gives the network call reference number assigned to the call by the GMSC/MSC. For encoding see GSM 09.02 [14].
- mscAddress:
This parameter gives the mscId assigned to the GMSC/MSC. For encoding see GSM 09.02 [14].
- 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 # digits. This parameter shall be sent only in the MO case.
- 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 forwarded call.

- gsmcAddress:

This parameter gives the mscId assigned to the GMSC. For encoding see GSM 09.02 [14].

9.19.2 Invoking entity (gsmSSF)

9.19.2.1 Normal procedure

gsmSSF preconditions:

- 1) A Call attempt has been initiated.
- 2) An event has been detected at a DP.

gsmSSF postcondition:

- 1) A control relationship has been established and the gsmSSF waits for instructions from the gsmSCF.

The address of the gsmSCF the InitialDP operation shall be sent to is fetched from the valid CSI. The gsmSSF provides all available parameters.

A control relationship is established to the gsmSCF. The gsmSSF application timer T_{SSF} is set when the gsmSSF sends InitialDP for requesting instructions from the gsmSCF. It is used to prevent from excessive call suspension time.

9.19.2.2 Error handling

If the destination gsmSCF is not accessible then the gsmSSF instructs the GMSC/MSC to handle the call according to the Default Call Handling parameter of the valid CSI.

On expiration of T_{SSF} before receiving any operation, the gsmSSF aborts the interaction with the gsmSCF and instructs the GMSC/VMSC to handle the call according to the Default Call Handling parameter of the valid CSI.

If the calling party abandons after the sending of InitialDP, then the gsmSSF 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.

9.19.3 Spare

9.20 Spare

9.21 PlayAnnouncement procedure

9.21.1 General description

This operation is used for inband interaction with a GSM user.

9.21.1.1 Parameters

- **informationToSend:**
This parameter indicates an announcement, or a tone to be sent to the end user by the gsmSRF.
- **inbandInfo:**
This parameter specifies the inband information to be sent.
 - **messageID:**
This parameter indicates the message(s) to be sent, this can be one of the following:
 - **elementaryMessageID:**
This parameter indicates a single announcement.
 - **text:**
This parameter indicates a text to be sent. The text shall be transformed to inband information (speech) by the gsmSRF. The attributes of text may consist of items such as language.
 - **elementaryMessageIDs:**
This parameter specifies a sequence of announcements.
 - **variableMessage:**
This 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 shall only be used when the number of repetitions is greater than one.
- **tone:**
This parameter specifies a tone to be sent to the end-user.
 - **toneID:**
This parameter indicates the tone to be sent.
 - **duration:**
This parameter indicates the time duration in seconds of the tone to be sent. ZERO indicates infinite duration.
- **disconnectFromIPForbidden:**
This parameter indicates whether or not the gsmSRF shall 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.

9.21.2 Spare

9.21.3 Responding entity (gsmSRF)

9.21.3.1 Normal procedure

gsmSRF precondition:

- 1) The gsmSRF is in the state "Connected"; or in the state "User Interaction" if the gsmSRF received previously an operation from the gsmSCF.

gsmSRF postconditions:

- 1) The gsmSRF sends the information to the user as indicated by "informationToSend".
- 2) The gsmSRF 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 gsmSRF sends a SpecializedResourceReport operation to the gsmSCF.
- 4) If all information has been sent and "disconnectFromIPForbidden" was set FALSE, the gsmSRF disconnects 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 either condition is satisfied (whatever comes first).

9.21.3.2 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 "Cancelled" is reported to the gsmSCF.

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.

9.22 PromptAndCollectUserInformation procedure

9.22.1 General description

This operation is used to interact with the calling party in order to collect information.

9.22.1.1 Parameters

- collectedInfo:
- collectedDigits:
- minimumNbOfDigits:

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

- maximumNbOfDigits:

This parameter shall always be present and specifies the maximum number of valid digits to be collected. The following applies:
"maximumNbOfDigits" \geq "minimumNbOfDigits".

- endOfReplyDigit:

This parameter indicates the digit(s) used to signal the end of input, and can be one or two digits.

In case the "maximumNbOfDigits" > "minimumNbOfDigits" the following applies:

If "endOfReplyDigit" is not present, the end of input is indicated:

- when the inter-digit timer expires; or
- when the number of valid digits received equals the "maximumNbOfDigits".

If "endOfReplyDigit" is present, the end of input is indicated:

- when the inter-digit timer expires; or
- when the end of reply digit is received; or
- when the number of valid digits received equals the "maximumNbOfDigits".

When the end of input is attained, the collected digits are sent from gsmSRF to the gsmSCF. In the case the number of valid digits received is less than the "minimumNbOfDigits" when the inter-digit timer expires or when the end of reply digit is received, the input is specified as being erroneous.

- cancelDigit:

If this parameter is present, the cancel digit(s) can be entered by the user to request a possible retry. This parameter can be one or two digits. All digits already received by the gsmSRF are discarded and the same PromptAndCollectUserInformation procedure is performed again, thus e.g. the same announcement to request user information is given to the user and information is collected. If this parameter is not present, the user is not able to request a possible retry.

- startDigit:

If this parameter is present, the start digit indicates the start of the valid digits to be collected. The digits that are received by the gsmSRF before this start digit is received, are discarded and are not considered to be valid. This parameter can be one or two digits.

If this parameter is not present, all received digits are considered to be valid.

When the end of input is attained, the collected digits are sent from gsmSRF to the gsmSCF, including the 'startDigit' if received by the gsmSRF.

- firstDigitTimeOut:

If this parameter is present, the first digit should be received by the gsmSRF before the first-digit timer expiration. If the first digit is not received before first-digit timer expiration, the input is regarded to be erroneous. After receipt of the first valid or invalid input digit, the corresponding first-digit timer is stopped.

If this parameter is not present, then the gsmSRF uses a default value for the first-digit timer.

If "startDigit" is present, the first-digit timer is stopped after the start digit is received.

- interDigitTimeOut:

If this parameter is present any subsequent valid or invalid digit, should be received by the gsmSRF before the inter-digit timer expires. As a result the inter-digit timer is reset and restarted.

If a subsequent valid or invalid digit is not received before the inter-digit timer expires and the number of received valid digits is less than the "minimumNbOfDigits", the input is regarded to be unsuccessful.

If a subsequent valid or invalid digit is not received before the inter-digit timer expires and the number of received valid digits is greater than the "minimumNbOfDigits", and less than or equal to the "maximumNbOfDigits", the input is regarded to be successful.

If the "interDigitTimeOut" is not present, then the gsmSRF uses a default value for the inter-digit timer.

- errorTreatment:

This optional parameter defines what specific action should be taken by the gsmSRF in the event of error conditions occurring. The default value is stdErrorAndInfo.

- interruptableAnnInd:

This parameter is optional, where the default value is TRUE.

If this parameter is TRUE, the announcement is interrupted after the first valid or invalid digit is received by the gsmSRF. If the announcement is interrupted, a possible start-digit timer will not apply anymore. However, if the announcement has not been interrupted, a possible start-digit timer is started after the announcement has been finished.

If this parameter is present and explicitly set to FALSE, the announcement will not be interrupted after the first digit is received by the gsmSRF. The received digits during the announcement are discarded and considered to be invalid. All other specified parameters ("minimumNbOfDigits", "maximumNbOfDigits", "endOfReplyDigit", etc.) do not apply before the announcement has been finished. The possible start-digit timer is started after the announcement has been finished.

- voiceInformation:

This parameter is optional, where the default value is FALSE. If the "voiceInformation" parameter is FALSE, all valid or invalid digits are entered by DTMF.

If this parameter is present and explicitly set to TRUE, the calling user is required to provide all valid or invalid information by speech. The gsmSRF will perform voice recognition and translation of the provided information into digits. A possible end of reply digit will also have to be provided by speech.

- voiceBack:

This parameter is optional, where the default value is FALSE. If the "voiceBack" parameter is FALSE, no voice back information is given by the gsmSRF.

If this parameter is present and explicitly set to TRUE, the valid input digits received by the gsmSRF will be announced back to the calling user immediately after the end of input is received. The invalid input digits will not be announced back to the calling user. A possible end of reply digit is not voiced back.

- disconnectFromIPForbidden:

This parameter indicates whether the gsmSRF should initiate disconnection to the gsmSSF after the interaction has been completed. If the parameter is not present or set to TRUE, the gsmSRF shall not initiate disconnection.

- informationToSend:

This parameter indicates an announcement or tone to be sent to the end user by the gsmSRF.

- inbandInfo:

This parameter specifies the inband information to be sent.

- messageID:

This parameter indicates the message(s) to be sent, this can be one of the following:

- elementaryMessageID:

This parameter indicates a single announcement.

- text:

This parameter indicates a text to be sent. The text shall be transformed to inband information (speech) by the gsmSRF. The attributes of text may consist of items such as language.

- elementaryMessageIDs:

This parameter specifies a sequence of announcements.

- variableMessage:

This parameter specifies an announcement with one or more variable parts.

- numberOfRepetitions:

This parameter indicates the maximum number of times the message shall be sent to the end-user.

- duration:

This parameter indicates the maximum time duration in seconds that the message shall be played/repeated. ZERO indicates endless repetition.

- interval:

This parameter indicates the time interval in seconds between repetitions, i.e. the time between the end of the announcement and the start of the next repetition. This parameter can only be used when the number of repetitions is greater than one.

- tone:

This parameter specifies a tone to be sent to the end-user.

- toneID:

This parameter indicates the tone to be sent.

- duration:

This parameter indicates the time duration in seconds of the tone to be sent. ZERO indicates infinite duration.

- digitsResponse:

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

9.22.2 Spare

9.22.3 Responding entity (gsmSRF)

9.22.3.1 Normal procedure

gsmSRF precondition:

- 1) The gsmSRF is in the state "Connected", or in state "User Interaction" if the gsmSRF received previously an operation from the gsmSCF.

gsmSRF postconditions:

- 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 gsmSRF moves to the state "Idle".
- 4) Otherwise the gsmSRF moves to the state "User Interaction"; or remains in the same state.

The announcement is 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 either condition 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 parameter "errorTreatment" specifies how the gsmSRF shall treat the error "ImproperCallerResponse". The default value "stdErrorAndInfo" means that the error shall be reported to gsmSCF as specified in Clause 8. The value "help" indicates that no error shall be reported to gsmSCF but assistance shall be given to the end-user in the form of a network dependent default announcement. 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 PromptAndCollect-UserInformation operation.

The receipt of any 'endOfInput' condition (maximumNbOfDigits, endOfReplyDigit, cancelDigit, firstDigitTimeout, interDigitTimeout) terminates immediately the ongoing input.

NOTE: In other words when e.g. an endOfReplyDigit is received, the receipt of a subsequent cancelDigit will not be processed anymore.

9.22.3.2 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 "Cancelled" is reported to the invoking entity.

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

9.23 ReleaseCall procedure

9.23.1 General description

This operation is used to tear down by the gsmSCF an existing call at any phase of the call for all parties involved in the call. The operation can only be sent within a control relationship and is not allowed in a monitor relationship. This operation shall not be sent to an assisting gsmSSF.

9.23.1.1 Parameters

- Cause

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.

9.23.2 Spare

9.23.3 Responding entity (gsmSSF)

9.23.3.1 Normal procedure

gsmSSF preconditions:

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

gsmSSF postcondition:

- 1) "Idle", after sending any outstanding CallInformationReport. Possible armed EDPs are ignored. All connections and resources related to the call are released.

9.23.3.2 Error handling

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

9.24 Spare

9.25 RequestReportBCSMEvent procedure

9.25.1 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.

9.25.1.1 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 and termAttemptAuthorized are not valid for the RequestReportBCSMEvent 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.

- 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 DP 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. The timer shall be shorter than the network NoAnswer timer.

9.25.2 Spare

9.25.3 Responding entity (gsmSSF)

9.25.3.1 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 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 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".

9.25.3.2 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.

9.26 ResetTimer procedure

9.26.1 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.

9.26.1.1 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.

9.26.2 Spare

9.26.3 Responding entity (gsmSSF)

9.26.3.1 Normal procedure

gsmSSF preconditions:

- 1) Call origination attempt has been initiated.
- 2) Basic call processing has been suspended at a DP.
- 3) The gsmSSF is in the "Waiting for Instruction" state or in the "Waiting for End of User Interaction" state or in the "Waiting for End of Temporary Connection" state.

gsmSSF postconditions:

- 1) The T_{SSF} timer has been reset.
- 2) The gsmSSF remains in the same state.

9.26.3.2 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.

9.27 SendChargingInformation procedure

9.27.1 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.

9.27.1.1 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 SRF. 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 02.24 [25], 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 GSM 02.24 [25], 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 SRF. 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 GSM 02.24 [25], 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. The legID shall be set to 1.

9.27.2 Spare

9.27.3 Responding entity (gsmSSF)

9.27.3.1 Normal procedure

gsmSSF preconditions:

- 1) 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"; or
gsmSSF FSM State f: "Monitoring".

gsmSSF postcondition:

- 1) No state transition.

On receipt of this operation the gsmSSF performs actions to send the advice of charge information to the indicated Call Party 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.

9.27.3.2 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 8 and the TCAP services which are used for reporting operation errors are described in Clause 10.

9.28 Spare

9.29 SpecializedResourceReport procedure

9.29.1 General description

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

9.29.1.1 Parameters

None.

9.29.2 Invoking entity (gsmSRF)

9.29.2.1 Normal procedure

gsmSRF preconditions:

- 1) The gsmSRF is in the state "User Interaction".
- 2) A PlayAnnouncement operation is being executed for which the parameter "RequestAnnouncementComplete" was set TRUE.
- 3) All information has been sent to the user.

gsmSRF postconditions:

- 1) The gsmSRF remains in the same state.
- 2) If the "DisconnectFromIPForbidden" parameter was set FALSE, the SRSF initiates a bearer channel disconnect sequence to the gsmSSF using the applicable bearer channel signalling system after sending the SpecializedResourceReport operation to the gsmSCF. The gsmSRF moves to the state "Idle".

9.29.2.2 Error handling

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

10 Services assumed from TCAP

10.1 Normal procedures

This subclause describes the procedures and TCAP primitives that shall be used for transmitting messages between gsmSSF and gsmSCF 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 physical entities:

- 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:
 - operations leading to a termination of the control relationship can be transmitted by the gsmSCF with a TC-END request primitive (basic) in case the gsmSCF is not interested in the reception of any ERROR or REJECT components for these sent operations;

once the gsmSCF dialogue resources have been released any ERROR or REJECT components received for these sent operations will be discarded by TC as described in ETS 300 287 [2] (ITU-T Recommendation Q.774);
 - if the gsmSCF entity has received an operation leading to the termination of the control relationship, a TC-END request primitive (basic) with zero components can be sent from the gsmSCF;
 - if the gsmSSF has no pending operations or reports to process and no armed detection points which could be triggered, then a TC-END request primitive (basic) with zero components can be sent from the gsmSSF;
 - pre-arranged end:

in case of an entity being interested in possible ERROR or REJECT messages in response to sent operations leading to a termination of the control relationship, the dialogue is ended with a TC-END request primitive (pre-arranged end) after the last associated operation timer expires. The receiving entity shall end the dialogue with a TC-END request primitive (basic or pre-arranged end) after successful processing of these operations (i.e. the control relationship is terminated);

10.1.1 gsmSSF-to-gsmSCF messages

10.1.1.1 gsmSSF related messages

A dialogue shall be established when the gsmSSF has finalised trigger processing and moves to the state **Waiting for Instructions**. The relevant CAP operation, which can only be the InitialDP operation, shall be transmitted in the same message.

For all other operations sent from the gsmSSF, the dialogue shall be maintained.

The dialogue shall no longer be maintained when the prearranged end condition is met in the gsmSSF. When the gsmSSF 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 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.

10.1.1.2 Spare

10.1.1.3 SSME FSM related messages

The following procedures shall be followed:

- the dialogue shall be maintained when the ActivityTest return result is sent;

10.1.2 gsmSCF-to-gsmSSF messages

10.1.2.1 SCSM FSM related messages

For subsequent operations sent from the SCSM FSM, the dialogue shall be maintained, 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).

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.

10.1.2.2 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;

10.1.3 gsmSCF-to/from-gsmSRF messages

A dialogue is established when the gsmSRF sends an AssistRequestInstructions operation to the gsmSCF. For all other operations sent from the SRF, the dialogue shall be maintained.

The dialogue shall no longer be maintained when the prearranged end condition is met in both the gsmSRF and gsmSCF. When the gsmSRF makes a transition to the SRF FSM state **Idle** (see ETS 300 374-1, [13]), the dialogue is locally ended by means of a TC-END request 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 gsmSCF can send the last operation to the gsmSRF with a TC-END request primitive (basic end) when the gsmSCF does not expect any further messages and is no longer interested in any possible error and reject messages.

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.

10.2 Abnormal procedures

This subclause describes the procedures and TCAP primitives that shall be used for reporting abnormal situations between gsmSSF and gsmSCF. The error cases are defined in Clause 8.

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;
- a dialogue shall be aborted by the TC-user with a TC-U-ABORT request primitive.

For abnormal situations detected by TCAP the same rules shall apply for transmission 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.

In error situations prearranged end shall not be used. 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 gsmSSF is not in a state to terminate the control 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 [2] (ITU-T Recommendation Q.774).

10.2.1 gsmSCF-to-gsmSSF/relay gsmSRF messages

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

- operation errors and rejection of TCAP components shall be transmitted to the gsmSSF (and relayed as necessary to the gsmSRF) respectively gsmSRF with a TC-END request primitive, basic end.

If, in violation of the above procedure, an ERROR or REJECT component is received with a TC-CONTINUE indication primitive, the gsmSSF respectively gsmSRF shall abort the dialogue with a TC-U-ABORT request primitive.

10.2.2 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;

If the error processing in the gsmSSF/gsmSRF leads to the case where the gsmSSF/gsmSRF is not able to process further gsmSCF operations while the dialogue is to be maintained, the gsmSSF/gsmSRF aborts the dialogue with a TC-U-ABORT request primitive.

The gsmSSF aborts a dialogue with a TC-U-ABORT request primitive if call release is initiated by any other entity than the gsmSCF and the gsmSSF has no pending ApplyChargingReposers or CallInformationReports nor any armed EDPs to notify the gsmSCF of the call release.

10.3 Dialogue establishment

The establishment of an CAP dialogue involves two application processes as described in subclause 4.3, one that is the dialogue-initiator and one that is the dialogue-responder.

AC negotiation may not be supported in all physical entities 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.

10.3.1 Sending of a TC-BEGIN request primitive

Before issuing a TC-BEGIN request primitive, SACF shall store the AC-name and if present the user-information parameter.

SACF shall request the invocation of the associated operations using the TC-INVOKE service. See subclause 10.8 for a description of the invocation procedure.

After processing of the last invocation request, SACF shall issue a TC-BEGIN request primitive.

The requesting side SACF 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".

10.3.2 Receipt of a TC-BEGIN indication

On receipt of a TC-BEGIN indication primitive, SACF shall:

- analyze the application-context-name included in the primitive and if it is supported, process any other indication primitives received from TC as described in subclause 10.8.

Once all the received primitives have been processed, SACF does not accept any primitive from TC, except a TC-P-ABORT indication.

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.

NOTE: If the gsmSSF provides an AC which is not acceptable to the gsmSCF, then an alternate AC should not be returned.

10.3.3 Receipt of the first TC-CONTINUE indication

On receipt of the first TC-CONTINUE indication primitive for a dialogue, SACF shall check the value of the application-context-name parameter. If this value matches the one used in the TC-BEGIN request primitive, SACF shall process the following TC component handling indication primitives as described in subclause 10.8, otherwise it shall issue a TC-U-ABORT request primitive.

10.3.4 Receipt of a TC-END indication

On receipt of a TC-END indication primitive in the dialogue initiated state, SACF shall check the value of the application-context-name parameter. If this value matches the one used in the TC-BEGIN request primitive then the SACF shall process the following TC component handling indication primitives as described in subclause 10.8, otherwise it shall not be processed.

10.3.5 Receipt of a TC-U-ABORT indication

Receipt of a TC-U-ABORT indication primitive is described as part of user abort procedure (see subclause 10.6.2).

If the abort reason is application-context-name not supported, the responding side may propose an alternative application-context-name in the TC-U-ABORT indication. If an alternative application context is proposed the receiving entity shall check this name and if it can be supported a new dialogue may be established.

NOTE: If an alternate application context is offered to the gsmSSF, it should not attempt to establish a new dialogue.

10.3.6 Receipt of a TC-P-ABORT indication

Receipt of a TC-P-ABORT indication primitive is described as part of provider abort procedure (see subclause 10.7.1).

10.4 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.

10.4.1 Sending entity

SACF shall process any component handling request primitives as described in subclause 10.8.

After processing the last component handling request primitive, SACF shall issue a TC-CONTINUE request primitive.

10.4.2 Receiving entity

On receipt of a TC-CONTINUE indication primitive SACF shall accept zero, one or several TC component handling indication primitives and process them as described in subclause 10.8.

10.5 Dialogue termination

Both the dialogue-initiator and the dialogue-responder have the ability to request the termination of a dialogue 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 10.1 and 10.2.

The dialogue termination procedure is driven by the following events:

- a TC-END request primitive;
- a TC-END indication primitive.

10.5.1 Sending of TC-END request

When the dialogue shall no longer be maintained, SACF shall process any component handling request primitives as described in subclause 10.8.

After processing the last component handling request primitive (if any), SACF shall issue a TC-END request primitive with the release method parameter set to "basic end" or "pre-arranged release", according to the rules as stated in subclauses 10.1 and 10.2.

When no dialogue is to be established, refer to subclauses 10.3.1 and 10.3.2.

10.5.2 Receipt of a TC-END indication

On receipt of a TC-END indication primitive, the SACF shall accept any component handling indication primitives and process them as described in subclause 10.8.

After processing the last component handling primitive all dialogue related resources are released.

10.6 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.

10.6.1 Sending of TC-U-ABORT request

After issuing a TC-U-ABORT request primitive, all dialogue related resources are released.

10.6.2 Receipt of a TC-U-ABORT indication

On receipt of a TC-U-ABORT indication all dialogue related resources are released.

10.7 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.

10.7.1 Receipt of a TC-P-ABORT indication

On receipt of a TC-P-ABORT indication, all dialogue related resources are released.

10.8 Procedures for CAP operations

This subclause describes the procedures for CAP operations.

10.8.1 Operation invocation

SACF shall build an operation argument from the parameters received and request the invocation of the associated operation using the TC-INVOKE procedure.

10.8.2 Operation invocation receipt

On receipt of a TC-INVOKE indication primitive, SACF shall:

- if the invoke ID is already in use by an active operation, request the transfer of a reject component using the TC-U-REJECT request primitive with the appropriate problem code (duplicated invokeID);
- 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 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 dialogue is about to be released, requests the transfer of a 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, SACF waits for the corresponding response.

10.8.3 Operation response

For user confirmed operations, SACF 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.

10.8.4 Receipt of a response

10.8.4.1 Receipt of TC-RESULT-NL indication

On receipt of a TC-RESULT-NL indication, SACF shall:

- request the transfer of a reject component using the TC-U-REJECT request primitive, with the appropriate problem code (mistyped parameter).

10.8.4.2 Receipt of TC-RESULT-L indication

On receipt of a TC-RESULT-L indication, SACF 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.

10.8.4.3 Receipt of TC-U-ERROR indication

On receipt of a TC-U-ERROR indication, SACF shall:

- if the error code is not defined for the SACF or is not one associated with the operation referred to by the invoke identifier, request the transfer of a reject component using the TC-U-REJECT request primitive, with the appropriate problem code (unrecognised 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.

10.8.4.4 Receipt of TC-U-REJECT indication

On receipt of a TC-U-REJECT indication primitive which affects a pending operation, SACF shall accept the TC-U-REJECT indication primitive.

10.8.4.5 Receipt of a TC-L-REJECT indication

This event occurs when the local TC detects a protocol error in an incoming component which affects an operation.

On receipt of a TC-L-REJECT indicating "return result problem, return result unexpected", SACF shall inform the application process.

On receipt of a TC-L-REJECT indicating "return error problem, return error unexpected", SACF shall inform the application process.

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 SACF in such a case is described in subclause 10.8.5.3.

10.8.4.6 Receipt of a TC-L-CANCEL indication

On receipt of a TC-L-CANCEL indication, the SACF 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.

10.8.5 Other events

This subclause describes the behaviour of SACF on receipt of a component handling indication primitive which cannot be related to any operation or which does not affect a pending one.

10.8.5.1 Receipt of a TC-U-REJECT

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 10.2. This is also applicable for invoke problems related to a class 4 linked operation.

10.8.5.2 Receipt of a TC-R-REJECT indication

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 10.2.

10.8.5.3 Receipt of a TC-L-REJECT indication

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.

10.8.5.4 Receipt of a TC-NOTICE indication

This informs the SACF that a message cannot be delivered by the Network Layer, this can only occur if the Return Option has been set (see subclause 10.9.1.8). It is for the application process to decide whether to terminate the dialogue or retry.

10.9 Mapping on to TC services

10.9.1 Dialogue control

The TC-UNI service is not used by CAP.

10.9.1.1 Destination address

This parameter is set by the dialogue initiating application process, and may optionally be modified by the responding dialogue in the first backward TC-CONTINUE.

10.9.1.2 Originating address

This parameter is set by the dialogue initiating application process.

10.9.1.3 Dialogue ID

The value of this parameter is associated with the CAP invocation in an implementation dependent manner.

10.9.1.4 Application-context-name

The application-context-name parameter is set by SACF as defined in subclause 6.4.

10.9.1.5 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 [21], with the restriction that an Object Identifier shall always be present to identify the user information and the entity which sent it.

10.9.1.6 Component present

This parameter is used by SACF as described in ETS 300 287 [2] (ITU-T Recommendation Q.771).

10.9.1.7 Termination

The value of the release method parameter of the TC-END request primitive is set by SACF according to the rules as stated in subclauses 10.1 and 10.2.

10.9.1.8 Quality of service

The quality of service of TC request primitives is set by the SACF to the following value:

- sequencing requested if required by the application (see subclause 4.4.2);
- return option as required by the application (see subclause 4.4.2).

10.9.2 Operation procedures

10.9.2.1 Invoke ID

This parameter is set by the sending application process.

10.9.2.2 Linked ID

This parameter is set by the sending application process.

10.9.2.3 Dialogue ID

The value of this parameter is associated with the CAP invocation in an implementation dependent manner.

10.9.2.4 Class

The value of this parameter is set by SACF according to the type of the operation to be invoked according to subclause 6.1.

10.9.2.5 Operation

The operation code of a TC-INVOKE request primitive is set by the sending application process as defined in subclause 6.4.

SACF shall set the operation code of the TC-RESULT-L primitive (if required) to the same value as the one received at invocation time.

10.9.2.6 Error

The error parameter of the TC-U-ERROR request primitive is set by the sending application process as defined in subclause 6.4.

10.9.2.7 Parameters

The argument parameter of TC-INVOKE primitives is set by the sending application process as defined in subclauses 6.1 and 6.3.

The result parameter of TC-RESULT-L primitives is set by the sending application process as defined in subclauses 6.1 and 6.3.

The parameter of TC-U-ERROR primitives are set by the sending application process as defined in subclauses 6.2 and 6.3.

10.9.2.8 Time out

The value of this parameter is set by SACF according to the type of operation invoked.

10.9.2.9 Last component

This parameter is used by SACF as described in ETS 300 287 [2] (ITU-T Recommendation Q.771).

10.9.2.10 Problem code

This parameter is used by SACF as described in subclause 10.8.

Annex A (normative): Mapping between CAP and ISUP

This annex defines the mapping between the CAP parameters and the call parameters sent/received in the ISUP. The functional handling of these parameters is defined in GSM 03.78 [15].

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 (1 st priority)	highLayerCompatibility
High layer compatibility IE contained in access transport (2 nd priority) (Note 2)	
Generic number 'additional calling party number'	additionalCallingPartyNumber
User service information prime (1 st priority)	bearerCapability
User service information (2 nd priority)	
Redirecting number	redirectingPartyID
Redirection information	redirectionInformation

NOTE 1: Optional parameters may be absent, i.e. they are only mapped, if these parameters are available at the DP.

NOTE 2: If two high layer compatibility information elements are contained in the access transport parameter, then the second information element, carrying the preferred HLC, is mapped to the CAP highLayerCompatibility parameter.

A.2 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.2). 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 GSM 09.12 [23].

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.2

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)

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 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.4 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 GSM 09.12 [23], 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 both-way through connection 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.5 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 GSM 09.12 [23]. In addition, an ISUP IAM shall be sent to the succeeding exchange.

Table A.3 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.3

CAP operation EstablishTemporaryConnection (Note 1)	ISUP message IAM
assistingSSPIPRoutingAddress	Called party number
correlationID	Correlation id (note 1)
scfId	SCF 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.6 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

SMG	TDoc	SPEC	PH	VER	NEW_VER	SUBJECT
s25	98-0083	09.78	R97	5.3.0	6.0.0	CAMEL phase 2
s26	98-0404	09.78	R97	6.0.0	6.1.0	CR A024
s26	98-0411	09.78	R97	6.0.0	6.1.0	CRs A026, A027, A028, A029
s27	98-0724	09.78	R97	6.1.0	6.2.0	Corrections
s27	98-0724	09.78	R97	6.1.0	6.2.0	Support of CAMEL Phase 2
s28	P99-192	09.78	R97	6.2.1	6.3.0	CR A040 on Addition of Blue Book SCCP to the reference
s28	P99-192	09.78	R97	6.2.1	6.3.0	CR A035 on Time zone Coding Reference Correction
s28	P99-192	09.78	R97	6.2.1	6.3.0	CR A038r1 on Missing error on UnknownLegID in 09.78
s28	P99-192	09.78	R97	6.2.1	6.3.0	CR A039r1 on Clarification of
s28	P99-192	09.78	R97	6.2.1	6.3.0	CR A046r1 on Use of 'DP-Busy' for 'Not Reachable' in
s28	P99-192	09.78	R97	6.2.1	6.3.0	CR A047r2 on CAP message segmentation for CAMEL
s28	P99-192	09.78	R97	6.2.1	6.3.0	CR A049r1 on Addition of North American Carrier related
s28	P99-192	09.78	R97	6.2.1	6.3.0	CR A051r2 on CAMEL 2 clarification to a charging issue
s28	P-99-192	09.78	R97	6.2.1	6.3.0	CR A052 on Syntactical and editorial error corrections in 09.78
S29	N2-99239	09.78	R97	6.3.0	6.4.0	CR A042r3 on 3GPP N2/ETSI SMG3 WPC
S29	3C99-407	09.78	R97	6.3.0	6.4.0	CR A055 on Corrections
S29	N2-99181	09.78	R97	6.3.0	6.4.0	CR A057 on Inclusion of Activity Test IF between gsmSCF & gsmSRF and gsmSCF and assistSSF
S29	N2-99344	09.78	R97	6.3.0	6.4.0	CR A058r2 on Corrections on the ASN.1 descriptions and Procedure Flow descriptions
S29	N2-99336	09.78	R97	6.3.0	6.4.0	CR A064r1 on Support of ANSI MTP and ANSI SCCP for CAMEL phase 2
S29	N2-99334	09.78	R97	6.3.0	6.4.0	CR A065 on Removal of redundant reference
S29	N2-99521	09.78	R97	6.3.0	6.4.0	CR A066 on Imports from MAP
S29	N2-99593	09.78	R97	6.3.0	6.4.0	CR A068r1 Notification of Call Forwarding to the gsmSCF
S29	N2-99647	09.78	R97	6.3.0	6.4.0	CR A070r1 on MSC address in the InitialDP operation
S29	N2-99639	09.78	R97	6.3.0	6.4.0	CR A072r1 on Interworking with Q.1218 and ETSI Core INAP
S29		09.78	R98	6.4.0	7.0.0	Version upgrade only to R98

History

Document history		
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