3GPP TSG_CN **Tdoc NP-000280**
Plenary Meeting #8, Dusseldorf, Germany
21st – 23rd June 2000.

Source: **TSG_N WG 2**

Title: **CRs to 3G Work Item CAMEL phase 3 - Stage 3**

Agenda item: **6.2.2**

Document for: **APPROVAL**

Introduction:

This document contains **1** CRs on **Work Item CAMEL phase 3,** that have been agreed by **TSG_N WG 2,** and are forwarded to **TSG_N Plenary** meeting #8 for approval.

Tdoc	Spec	CR	Rev	CAT	Rel.	Old Ver	New Ver	Subject
N2-000251	29.078	087	3	C	R99	3.3.0	3.4.0	Introduction of GPRS reference in TCAP dialogue portion

3GPP N2 Meeting
Rotenburg, Germany, 22-26 May 2000

***Document* N2-000251**
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

29.078	CR	087r3	Current Version:	3.3.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: CN#8 *list expected approval meeting # here ↑*	for approval	X	strategic		*(for SMG use only)*
	for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)*	(U)SIM		ME		UTRAN / Radio		Core Network	X

Source: N2 **Date:** 31 May 2000

Subject: Introduction of GPRS reference in TCAP dialogue portion

Work item: CAMEL Phase 3

Category: *(only one category shall be marked with an X)*			**Release:**	
F	Correction		Phase 2	
A	Corresponds to a correction in an earlier release		Release 96	
B	Addition of feature		Release 97	
C	Functional modification of feature	X	Release 98	
D	Editorial modification		Release 99	X
			Release 00	

Reason for change:

Instead of (supplier specific) optimisation of existing TCAP handling a short term handling was agreed which lead to the introduction of a new (logical) layer above TCAP Dialogue mechanism.

Proposal:

- Going another step into that direction, this new layer should be reflected by a tidy GPRS dialogue handling.
- This dialogue handling should be done by using existing TCAP dialogue handling primitives.

This results in:

→ Definition of GPRS CAP PDUs used to correlate the short term TCAP dialogues.

→ As a copy of structured TCAP dialogue handling (a mechanism which is widely used in the field of communications) peer entities address each other with a destination reference. In case of dialogue establishment and dialogue continuation the originating reference (sending entity) is transmitted either allowing the partner to address the partner's process properly.
Reference is simply achieved with an integer4. The mechanism is basically agreed.

Changes:

1. Chapters 5, 8, 11: Deletion of gprsReferenceNumber in all affected parameters and operations.
2. Chapter 8: Deletion of 'Unknown Reference' Error TypeChapt.
3. Chapter 8: Introduction of new parameter 'SGSN Number' in 'initialDPGPRS' operation. SGSN Number shall be used by the SCP as SCCP Global Title to construct the SCP initiated TCAP dialogues.
4. Chapter 10.1.17: Error 'Unknown GPRS Reference' deleted.
5. Chapter 12.1.1.3.7 : ASN.1 formal definition of dialogueInformation CLASS.
6. Chapter 12.1.8.1.1.1:Explanation of the usage of origination and destination reference within a TCAP dialogue.

Reason for change:	Instead of (supplier specific) optimisation of existing TCAP handling a short term handling was agreed which lead to the introduction of a new (logical) layer above TCAP Dialogue mechanism.
Clauses affected:	5, 8, 10, 11, 12

Other specs affected:				
	Other 3G core specifications		→	List of CRs:
	Other GSM core specifications		→	List of CRs:
	MS test specifications		→	List of CRs:
	BSS test specifications		→	List of CRs:
	O&M specifications		→	List of CRs:

Other comments:	

***** First modified part in 5.1 *****

```
CAMEL-FCIGPRSBillingChargingCharacteristics {PARAMETERS-BOUND : bound} ::= SEQUENCE{
    gPRS-ReferenceNumber                    [0] GPRS-ReferenceNumber,
    fCIBCCCAMELsequence1                    [10] SEQUENCE {
        freeFormatData                          [0] OCTET STRING (SIZE
                                                        (bound.&minFCIBillingChargingDataLength..
                                                        bound.&maxFCIBillingChargingDataLength)),
        pDPID                                   [1] PDPID OPTIONAL,
        appendFreeFormatData                    [2] AppendFreeFormatData    DEFAULT overwrite
        }
    }

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

    bound.&maxFCIBillingChargingDataLength)),
        appendFreeFormatData        [1] AppendFreeFormatData DEFAULT overwrite
        }
    }

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

CAMEL-SCIGPRSBillingChargingCharacteristics ::= SEQUENCE {
    gPRS-ReferenceNumber                    [0] GPRS-ReferenceNumber,
    aOCGPRS                                 [10] AOCGPRS,
    pDPID                                   [21] PDPID      OPTIONAL
    }

Cause {PARAMETERS-BOUND : bound}            ::= OCTET STRING (SIZE (minCauseLength..
        bound.&maxCauseLength))
-- Indicates the cause for interface related information.
-- Refer to ETS 300 356-1 [4] Cause parameter for encoding.
-- For the use of cause and location values refer to ITU-T Recommendation Q.850
-- Shall only include the cause value.
```

***** Next modified part in 5.1 *****

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

GPRS-ReferenceNumber                ::= SEQUENCE {
    gPRS-Reference                  [0] Integer4,
    gprsSSF-Address                 [1] ISDN-AddressString
    }
--  Indicates the software instance that takes care of the FSM in the SCP.
--  This Ie is used to identify the relationship between SGSN and the SCP.

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

***** Next modified part in 5.2 *****

5.2 Error types

```
CAP-errortypes {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-network(1)
modules(3) cAP-errortypes(51) version3(2)}
-- This module contains the type definitions for the IN CS2 errors.
-- Where a parameter of type CHOICE is tagged with a specific tag value, the tag is automatically
-- replaced with an EXPLICIT tag of the same value.

DEFINITIONS IMPLICIT TAGS ::= BEGIN


IMPORTS

    ros-InformationObjects,
    datatypes,
    errorcodes
FROM CAP-object-identifiers {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cAP-object-identifiers(17) version3(2)}

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

    InvokeID,
    UnavailableNetworkResource
FROM CAP-datatypes datatypes

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

;

-- TYPE DEFINITION FOR CAP ERRORS FOLLOWS

canceled ERROR              ::= {
    CODE    errcode-canceled
```

```
    }
-- The operation has been canceled.

cancelFailed ERROR          ::= {
    PARAMETER   SEQUENCE {
        problem                 [0] ENUMERATED {
            unknownOperation        (0),
            tooLate                 (1),
            operationNotCancellable (2)
            },
        operation               [1] InvokeID,
        ...
        }
    CODE    errcode-cancelFailed
    }
-- The operation failed to be canceled.

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

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

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

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

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

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

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

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

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

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

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

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

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

unknownPDPID ERROR      ::= {
    CODE    errcode-unknownPDPID
    }
-- PDPID not known by the receiving entity.

unknownGPRSReference ERROR      ::= {
    CODE    errcode-unknownGPRSReference
    }
-- GPRS Reference not known by the receiving entity.

overlappingDialogue ERROR       ::= {
    CODE    errcode-overlappingDialogue
    }
-- A dialogue exists already for the same relationship.

END
```

***** Next modified part in 5.4 *****

5.4 Error codes

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


DEFINITIONS ::= BEGIN

IMPORTS

    ros-InformationObjects
FROM CAP-object-identifiers {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cAP-object-identifiers(17) version3(2)}

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

;

errcode-canceled                        Code ::= local: 0
errcode-cancelFailed                    Code ::= local: 1
errcode-eTCFailed                       Code ::= local: 3
errcode-improperCallerResponse          Code ::= local: 4
errcode-missingCustomerRecord           Code ::= local: 6
errcode-missingParameter                Code ::= local: 7
errcode-parameterOutOfRange             Code ::= local: 8
errcode-requestedInfoError              Code ::= local: 10
errcode-systemFailure                   Code ::= local: 11
errcode-taskRefused                     Code ::= local: 12
errcode-unavailableResource             Code ::= local: 13
errcode-unexpectedComponentSequence     Code ::= local: 14
errcode-unexpectedDataValue             Code ::= local: 15
errcode-unexpectedParameter             Code ::= local: 16
errcode-unknownLegID                    Code ::= local: 17
errcode-unknownPDPID                    Code ::= local: 18
errcode-unknownGPRSReference            Code ::= local: 19
errcode-overlappingDialogue             Code ::= local: 20

END
```

***** Next modified part in 8.1 *****

8.1 gsmSCF/gprsSSF operations and arguments

```
CAP-gprsSSF-gsmSCF-ops-args {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
umts-network(1) modules(3) cAP-GPRS-ops-args(24) version3(2)}

DEFINITIONS IMPLICIT TAGS::= BEGIN

IMPORTS

    errortypes,
    datatypes,
    operationcodes,
    classes,
    ros-InformationObjects
FROM CAP-object-identifiers {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-
network(1) modules(3) cAP-object-identifiers(17) version3(2)}

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

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

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

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

    PARAMETERS-BOUND
FROM CAP-classes classes

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

    AccessPointName {},
    GPRSCause {},
    ChargingCharacteristics,
    ChargingResult,
    FCIGPRSBillingChargingCharacteristics,
    GPRSChargingID,
    GPRSEventSpecificInformation {},
    GPRSEvent,
    GPRSEventType,
    GPRSMSClass,
    GPRS-ReferenceNumber
    PDPID,
    PDPType,
    QualityOfService,
    RAIdentity,
    SCIGPRSBillingChargingCharacteristics,
    SGSNCapabilities,
    TimeAndTimezone {},
    TimerID,
    TimerValue
FROM CAP-datatypes datatypes

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

```
    unknownPDPID,
    unknownGPRSReference,
    overlappingDialogue
FROM CAP-errortypes errortypes
;

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

ActivityTestGPRSArg             ::= SEQUENCE {
    gPRS-ReferenceNumber            [0] GPRS-ReferenceNumber
    }

applyChargingGPRS                   OPERATION ::= {
    ARGUMENT
        ApplyChargingGPRSArg
    RETURN RESULT   TRUE
    ERRORS {
        missingParameter |
        unexpectedComponentSequence |
        unexpectedParameter |
        unexpectedDataValue |
        parameterOutOfRange |
        systemFailure |
        taskRefused |
        unknownPDPID |
        UnknownGPRSReference |
        OverlappingDialogue
        }
    CODE opcode-applyChargingGPRS
    }

--  Direction gsmSCF -> gprsSSF, Timer Tacg
--  This operation is used for interacting from the gsmSCF with the gprsSSF CSE-controlled
--  GPRS session or PDP context charging mechanism.

ApplyChargingGPRSArg                ::= SEQUENCE {
        gPRS-ReferenceNumber            [0] GPRS-ReferenceNumber,
        chargingCharacteristics         [01] ChargingCharacteristics,
        tariffSwitchInterval            [12]    INTEGER (1..86400)              OPTIONAL,
        pDPID                           [23]    PDPID                           OPTIONAL
        }

--  tariffSwitchInterval is measured in 1 second units.

applyChargingReportGPRS          OPERATION ::= {
    ARGUMENT
        ApplyChargingReportGPRSArg
    RETURN RESULT   TRUE
    ERRORS {
        missingParameter |
        unexpectedComponentSequence |
        unexpectedParameter |
        unexpectedDataValue |
        parameterOutOfRange |
        systemFailure |
        taskRefused |
        unknownPDPID |
        UnknownGPRSReference
        }
    CODE opcode-applyChargingReportGPRS
    }

--  Direction gprsSSF -> gsmSCF,Timer Tagcr
--  The ApplyChargingReportGPRS operation provides the feedback from the gprsSCF to the gsmSCF
--  CSE-controlled GPRS session charging mechanism.


ApplyChargingReportGPRSArg          ::= SEQUENCE {
        gPRS-ReferenceNumber            [0] GPRS-ReferenceNumber,
        chargingResult                  [01] ChargingResult,
        qualityOfService                [12] QualityOfService       OPTIONAL,
        active                          [23] BOOLEAN                    DEFAULT TRUE,
        pDPID                           [34]    PDPID   OPTIONAL
        }
```

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


cancelGPRS                          OPERATION ::= {
    ARGUMENT
        CancelGPRSArg
    RETURN RESULT   TRUE
    ERRORS {
        missingParameter |
        taskRefused |
        unknownPDPID |
        UnknownGPRSReference |
        OverlappingDialogue
        }
    CODE opcode-cancelGPRS
    }

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


CancelGPRSArg                           ::= SEQUENCE {
    gPRS-ReferenceNumber                [0] GPRS-ReferenceNumber,
    pDPID                               [01]    PDPID OPTIONAL
    }

connectGPRS {PARAMETERS-BOUND: bound} OPERATION::= {
    ARGUMENT    ConnectGPRSArg {bound}
    RETURN RESULT    FALSE  ERRORS  {missingParameter |
            parameterOutOfRange |
            unknownPDPID |
            systemFailure |
            taskRefused |
            unexpectedComponentSequence |
            unexpectedDataValue |
            unexpectedParameter}
    CODE    opcode-connectGPRS
    }
-- Direction: gsmSCF -> gprsSSF, Timer: Tcon
-- This operation is used to modify the Access Point Name used when establishing a PDP Context.

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

continueGPRS                        OPERATION ::= {
    ARGUMENT
        ContinueGPRSArg
    RETURN RESULT   FALSE
    ERRORS {
        missingParameter |
        unknownPDPID |
        unexpectedDataValue
        }
    CODE opcode-continueGPRS
    }

--  Direction: gsmSCF -> gprsSSF, Timer: Tcue
--  This operation is used to request the gprsSSF to proceed with processing at the DP at
--  which it previously suspended processing to await gsmSCF instructions (i.e., proceed to
--  the next point in processing  in the Attach/Detach FSM or PDP Context FSM) without
--  substituting new data from the gsmSCF.

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

entityReleasedGPRS  {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT
        EntityReleasedGPRSArg {bound}
    RETURN RESULT   TRUE
    ERRORS {
        missingParameter |
        taskRefused |
        unknownPDPID |
        UnknownGPRSReference
        }
    CODE opcode-entityReleasedGPRS
    }

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

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

EntityReleasedGPRSArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
        gPRS-ReferenceNumber            [0] GPRS-ReferenceNumber,
        gPRSCause                       [01] GPRSCause {bound},
        pDPID                           [12]    PDPID
        }

furnishChargingInformationGPRS {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT        FurnishChargingInformationGPRSArg {bound}
    RETURN RESULT   TRUE
    ERRORS      {missingParameter |
                 taskRefused |
                 unexpectedComponentSequence |
                 unexpectedDataValue |
                 unexpectedParameter |
                 unknownPDPID |
                 unknownGPRSReference |
                 overlappingDialogue
                 }
    CODE        opcode-furnishChargingInformationGPRS
    }
-- Direction: gsmSCF -> gprsSSF, Timer: Tfcig
-- This operation is used to request the gprsSSF to generate, register a logical record or to
-- include some information in the default logical GPRS record.
-- The registered logical record is intended for off line charging of the GPRS session
-- or PDP context.

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

initialDPGPRS {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT
        InitialDPGPRSArg {bound}
    RETURN RESULT    TRUE
    ERRORS {
        missingCustomerRecord |
        missingParameter |
        parameterOutOfRange |
        systemFailure |
        taskRefused |
        unexpectedComponentSequence |
        unexpectedDataValue |
        unexpectedParameter
        }
    CODE opcode-initialDPGPRS
    }

--  Direction gprsSSF -> gsmSCF,Timer Tdpg
--  This operation is used by the gprsSSF when a trigger is detected at a DP in the GPRS state
--  machines to request instructions from the gsmSCF

InitialDPGPRSArg{PARAMETERS-BOUND : bound}::= SEQUENCE {
        gPRS-ReferenceNumber            [0] GPRS-ReferenceNumber,
        sGSN-Address                    [0] ISDN-AddressString,
        serviceKey                      [1] ServiceKey,
        gPRSEventType                   [2] GPRSEventType,
        mSISDN                          [3] ISDN-AddressString,
        iMSI                            [4] IMSI,
        timeAndTimeZone                 [5] TimeAndTimezone {bound},
        gPRSMSClass                     [6] GPRSMSClass                 OPTIONAL,
        pDPType                         [7] PDPType                     OPTIONAL,
        qualityOfService                [8] QualityOfService                OPTIONAL,
        accessPointName                 [9] AccessPointName{bound}              OPTIONAL,
        routeingAreaIdentity            [10] RAIdentity                     OPTIONAL,
        chargingID                      [11] GPRSChargingID             OPTIONAL,
        sGSNCapabilities                [12]SGSNCapabilities                OPTIONAL,
        extensions                      [13] SEQUENCE SIZE(1..bound.&numOfExtensions)   OF
                                                ExtensionField {bound}      OPTIONAL,
        ...,
        SGSN                            [14] ISDN-AddressString
}

releaseGPRS {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT
        ReleaseGPRSArg {bound}
    RETURN RESULT   TRUE
    ERRORS {
        cancelFailed |
        missingParameter |
        taskRefused |
        unknownPDPID |
        UnknownGPRSReference |
        OverlappingDialogue
        }
```

```
    CODE opcode-releaseGPRS
    }
--  Direction: gsmSCF -> gprsSSF, Timer: Trg
--  This operation is used to tear down an existing GPRS session or PDP Context at any phase.

ReleaseGPRSArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
        gPRS-ReferenceNumber            [0] GPRS-ReferenceNumber,
        gprsCause                       [01] GPRSCause {bound},
        pDPID                           [12]    PDPID OPTIONAL
        }

eventReportGPRS {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT
        EventReportGPRSArg {bound}
    RETURN RESULT   TRUE
    ERRORS {
        UnknownGPRSReference |
        unknownPDPID
        }
    CODE opcode-eventReportGPRS
    }

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


EventReportGPRSArg {PARAMETERS-BOUND : bound}::= SEQUENCE {
        gPRS-ReferenceNumber            [0] GPRS-ReferenceNumber,
        gPRSEventType                   [01] GPRSEventType,
        miscGPRSInfo                    [12] MiscCallInfo DEFAULT {messageType request},
        gPRSEventSpecificInformation    [23]    GPRSEventSpecificInformation {bound}    OPTIONAL,
        pDPID                           [34]    PDPID OPTIONAL
        }

requestReportGPRSEvent {PARAMETERS-BOUND : bound} OPERATION ::= {
    ARGUMENT
        RequestReportGPRSEventArg {bound}
    RETURN RESULT   TRUE
    ERRORS {
        missingParameter |
        parameterOutOfRange |
        systemFailure |
        taskRefused |
        unexpectedComponentSequence |
        unexpectedDataValue |
        unexpectedParameter |
        unknownPDPID |
        UnknownGPRSReference |
        OverlappingDialogue
        }
    CODE opcode-requestReportGPRSEvent
    }

--  Direction: gsmSCF -> gprsSSF, Timer: Trrge
--  This operation is used to request the gprsSSF to monitor for an event (e.g., GPRS events
--  such as attach or PDP context activiation), then send a notification back to the
-- gsmSCF when the event is detected.

RequestReportGPRSEventArg {PARAMETERS-BOUND : bound} ::= SEQUENCE {
        gPRS-ReferenceNumber        [0] GPRS-ReferenceNumber,
        gPRSEvent                   [01] SEQUENCE SIZE (1..bound.&numOfGPRSEvents)  OF GPRSEvent,
        pDPID                       [12]    PDPID           OPTIONAL
        }

--  Indicates the GPRS related events for notification.


resetTimerGPRS                      OPERATION ::= {
    ARGUMENT
        ResetTimerGPRSArg
    ERRORS {
        missingParameter |
        parameterOutOfRange |
        taskRefused |
        unexpectedComponentSequence |
        unexpectedDataValue |
        unexpectedParameter |
        unknownPDPID
        }
    CODE opcode-resetTimerGPRS
    }

--  Direction: gsmSCF –> gprsSSF, Timer: Trtg
```

```
--  This operation is used to request the gprsSSF to refresh an application timer in the gprsSSF.


ResetTimerGPRSArg               ::= SEQUENCE {
        timerID                     [0] TimerID                 DEFAULT tssf,
        timervalue                  [2] TimerValue,
        pDPID                       [3] PDPID           OPTIONAL
        }

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


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

END

CAP-U-ABORT-Data {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-Network(1)
modules(3) cap-u-abort-data(110) version3(2)}
DEFINITION ::=
BEGIN
id-CAP-U-ABORT-Reason OBJECT IDENTIFIER ::= {ccitt(0) identified-organization(4) etsi(0)
mobileDomain(0) umts-Network(1) AS(1) cap-u-abort-reason(2) version3(2)}
cAP-U-ABORT-Reason-Abstract-Syntax  ABSTRACT-SYNTAX ::= {CAP-U-ABORT-REASON IDENTIFIED BY id-CAP-U-
ABORT-Reason}
CAP-U-ABORT-REASON ::= ENUMERATED {
no-reason-given(1),
application-timer-expired(2),
not-allowed-procedures(3),
abnormal-processing(4),
congestion(5),
invalid-reference(6)
}
-- application-timer-expired  shall be set when application timer (e.g. Tssf ) is expired.
-- not-allowed-fsm-procedures shall be set when received signal is not allowed in CAP
-- procedures.
-- For example, when class4 operation is received from SCF and the operation is not
-- allowed in SSF FSM.
-- (SSF FSM cannot continue state transition). (e.g. ReleaseCall operation received in
-- Waiting for End of Temporary Connection state.)
-- abnormal-processing shall be set when abnormal procedures occur at entity action.
-- congestion shall be set when requested resource is unavailable due to congestion at
-- TC user (CAP) level.
-- no-reason-given shall be set when any other reasons above do not apply
-- invalid-reference shall be set if the received destinationReference is unknown or
-- for a known destination Reference the received originationReference does not match
-- with the stored originationReference.  This abort reason is used for CAP defined
-- GPRS-ReferenceNumber.
END -- of  CAP-U-ABORT-Data


CAP-GPRS-ReferenceNumber {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-
Network(1) modules(3) cap-dialogueInformation(111) version3(2)}
DEFINITIONS ::=
BEGIN
EXPORTS
id-CAP-GPRS-ReferenceNumber-Abstract-Syntax,
CAP-GPRS-ReferenceNumber-Abstract-Syntax
IMPORTS
    Integer4
FROM CS1-DataTypes {ccitt(0) identified-organization(4) etsi(0) inDomain(1) in-network(1)
modules(0) cs1-datatypes(2) version1(0)}
;
id-CAP-GPRS-ReferenceNumber-Abstract-Syntax OBJECT IDENTIFIER ::= {ccitt(0) identified-
organization(4) etsi(0) mobileDomain(0) umts-Network(1) as-Id(1) cap-GPRS-ReferenceNumber(5)
version3(2)}
```

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

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

***** Next modified part in 10.1.17 *****

~~10.1.17 UnknownGPRSReference~~

~~10.1.17.1 General description~~

~~10.1.17.1.1 Error description~~

~~This error is used to indicate to the gsmSCF or to gprsSSF that a specific instance, indicated by the GPRS-ReferenceNumber parameter value in the operation, is unknown to the gprsSSF or gsmSCF.~~

~~10.1.17.2 Operations gprsSSF→gsmSCF~~

~~**GPRS Related**~~

~~ApplyChargingReportGPRS~~

~~EventReportGPRS~~

~~EntityReleasedGPRS~~

~~10.1.17.3 Operations gsmSCF→gprsSSF~~

~~**GPRS Related**~~

~~ApplyChargingGPRS~~

~~CancelGPRS~~

~~FurnishChargingInformationGPRS~~

~~RequestReportGPRSEvent~~

~~SendChargingInformationGPRS~~

***** Next modified part in 10.1.18 *****

10.1.18 OverlappingDialogue

10.1.18.1 General description

10.1.18.1.1 Error description

This error is used to indicate to the gsmSCF a specific instance~~, indicated by the GPRS-ReferenceNumber parameter value in the operation~~, already has an TCAP dialogue open. This error cause typically is obtained when both the gsmSCF and gprsSSF open a new dialogue at the same time. While the gprsSSF waits for response to an operation send in TC-BEGIN it may receive an operation from the gsmSCF in TC-BEGIN. In such cases the dialogue opened by the gprsSSF is maintained and the dialogue opened by the gsmSCF is closed with this error code.

10.1.18.2 Operations gsmSCF→gprsSSF

GPRS Related

ApplyChargingGPRS

CancelGPRS

FurnishChargingInformationGPRS

ReleaseGPRS

RequestReportGPRSEvent

SendChargingInformationGPRS

***** Next modified part in 11.2 *****

11.2 ActivityTestGPRS procedure

11.2.1 General description

This operation is used to check for the continued existence of a relationship between the gsmSCF and gprsSSF. If the relationship is still in existence, then the identified instance of gprsSSF will respond. If no reply is received within a given time period, then the gsmSCF which sent this operation will assume that the receiving entity has failed in some way and will take the appropriate action. This operation opens a new SS7 dialogue between gsmSCF and gprsSSF.

11.2.1.1 Parameters

~~GPRS-ReferenceNumber:~~

~~This parameter identifies the instance of the gprsSSF. Each gprsSSF instance is uniquely related to a gsmSCF instance in the SCP.~~

11.2.2 Responding entity (gprsSSF)

11.2.2.1 Normal procedure

gprsSSF precondition:

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

gprsSSF postcondition:

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

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

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

(3) The temporary TC dialogue is closed.

11.2.2.2 Error handling

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

***** Next modified part in 11.5 *****

11.5 ApplyChargingGPRS procedure

11.5.1 General description

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

11.5.1.1 Parameters

~~- GPRS-ReferenceNumber:~~

~~This parameter identifies the instance of the gprsSSF. Each gprsSSF instance is uniquely related to a gsmSCF instance in the SCP.~~

- chargingCharacteristics:

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

  - maxTransferredVolume:

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

  - maxElapsedTime:

    This parameter specifies the period of time for which a GPRS session or a PDP context can exist before a ApplyChargingReportGPRS shall be sent to the gsmSCF.

- tariffSwitchInterval:

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

- PDPID:

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

***** Next modified part in 11.7 *****

11.7 ApplyChargingReportGPRS procedure

11.7.1 General description

This operation is used by the gprsSSF to report charging related information to the gsmSCF as requested by the gsmSCF using the ApplyChargingGPRS operation. A report shall be made either when a PDP context deactivation, Change of Position Session, Change of Position Context, Detach event or Change in QoS is detected by the gprsSSF or when the gprsSSF detects that the transferred volume or elapsed time duration indicated in parameter transferredVolume or elapsedTime (received in ApplyChargingGPRS operation) has been reached. Note that sending of ApplyChargingReportGPRS shall only be made on chargable QoS changes, i.e. normally upon MS initiated QoS changes.

11.7.1.1 Parameters

~~- GPRS-ReferenceNumber:~~
~~This parameter identifies the instance of the gprsSSF. Each gprsSSF instance is uniquely related to a gsmSCF instance in the SCP.~~

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

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

    - volumeIfNoTariffSwitch:
      This parameter will be present if no tariff switch has occurred since the detection of the event that triggered volume count (i.e. PDP context activation) occurred. If present, then the volume transferred since the tariff switch will be reported.

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

      - volumeSinceLastTariffSwitch:
        The volume since the last tariffSwitch is reported.

      - VolumeTariffSwitchInterval:
        This paramter is present only if a tariff switch was detected between the start of volume count for the current volume count period. If present, the volume between either the detection the event that triggered volume count or the previous tariff switch (whichever is first) and the last tariff switch is reported.

***** Next modified part in 11.12 *****

11.12 CancelGPRS procedure

11.12.1 General description

The gsmSCF uses this class 1 operation to request the gprsSSF to cancel all outstanding requests for a GPRS session or a specific PDP context and enable the state machine in the gprsSSF to go to "Idle" if there are no futher PDP contexts pending. The CancelGPRS operation does not specify any specific operation to be cancelled.

11.12.1.1 Parameters

~~- GPRS-ReferenceNumber:~~
~~This parameter identifies the instance of the gprsSSF. Each gprsSSF instance is uniquely related to a gsmSCF instance in the SCP.~~

- PDPID:
  This parameter if present specifies for which PDP context the active requests for EventGPRSReport and ApplyGPRSChargingReport is to be cancelled.

11.12.2 Responding entity (gprsSSF)

11.12.2.1 Normal procedure

gprsSSF precondition:

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

gprsSSF postcondition:

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

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

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

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

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

11.12.2.2 Error handling

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

***** Next modified part in 11.12 *****

11.22 EntityReleasedGPRS procedure

11.22.1 General description

This operation is used by the gprsSSF to inform the gsmSCF that a PDP context has terminated abnormally. It is sent if the rekationship has to be kept because of one or more other existing PDP contexts within this GPRS Reference Number which are not affectyed by this error/exception..

11.22.1.1 Parameters

~~- GPRS-ReferenceNumber:~~
~~This parameter identifies the instance of the gprsSSF. Each gprsSSF instance is uniquely related to a gsmSCF instance in the SCP.~~

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

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

11.22.2 Invoking entity (gprsSSF)

11.22.2.1 Normal procedure

gprsSSF preconditions:

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

gprsSSF postcondition:

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

11.22.2.2 Error handling

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

***** Next modified part in 11.25 *****

11.25 EventReportGPRS procedure

11.25.1 General description

This operation is used to notify the gsmSCF of a GPRS session or PDP context event previously requested by the gsmSCF in a RequestGPRSReportGPRSEvent operation. The monitoring of more than one event could be requested with a RequestReportGPRSEvent operation, but each of these requested events is reported in a separate EventReportGPRS operation.

11.25.1.1 Parameters

~~- GPRS-ReferenceNumber:~~
~~This parameter identifies the instance of the gprsSSF. Each gprsSSF instance is uniquely related to a gsmSCF instance in the SCP.~~

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

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

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

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

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

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

- miscGPRSInfo:
  This parameter indicates DP related information.

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

- PDPID:
  This parameter if present identifies the PDP context within the control relationship for which the event is reported.

***** Next modified part in 11.28 *****

11.28 FurnishChargingInformationGPRS procedure

11.28.1 General description

This operation is used to send charging related information to a logical GPRS record. This logical GPRS record is CAMEL specific. The first GPRS FCI leads to the generation of a logical GPRS record. Receipt of subsequent FCIs shall overwrite or append the contents of the logical record.

11.28.1.1 Parameters

~~- GPRS-ReferenceNumber:~~
~~This parameter identifies the instance of the gprsSSF. Each gprsSSF instance is uniquely related to a gsmSCF instance in the SCP.~~

- FCIGPRSBillingChargingCharacteristics:
  This parameter contains the following sub-parameters;

  - FCIBCCCAMELsequence1:
    This parameter contains the following sub-parameters;

    - FreeFormatData:
      This parameter contains free-format billing and/or charging characteristics.

    - AppendFreeFormatData:
      This parameter indicates whether previous FCI free format data is appended or overwritten. See 3G TS 23.078.

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

***** Next modified part in 11.31 *****

11.31 InitialDPGPRS procedure

11.31.1 General description

This operation is sent by the gprsSSF after detection of a TDP-R in the GPRS session or PDP context state machine, to request the gsmSCF for instructions to complete the GPRS session or PDP context.

11.31.1.1 Parameters

- serviceKey:
  This parameter indicates to the gsmSCF the requested IN service. It is used to address the required application/SLP within the gsmSCF (not for SCP addressing).

- gPRSEventType:
  This parameter indicates the armed GPRS Attach/Detach SM or PDP Context SM DP event, resulting in the InitialDPGPRS operation.

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

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

- timeAndTimezone:
  This parameter contains the time that the gprsSSF was triggered, and the time zone that the invoking gprsSSF resides in.

- gPRSMSClass:
  This parameter contains the MS Station capabilites of the mobile subscriber for which the CAMEL service is invoked.

  - MSNetworkCapabilities:
    This parameter contains the Network Capabilities of the GPRS session.

  - MSRadioAccessCapabilities:
    This parameter contains the Radio Access Capabilities of the MS.

- pDPType:
  This parameter identifies the PDP type and the actual PDP address.

- pDPTypeOrganization:
  This parameter contains the type of PDP address, e.g. ETSI or an IETF type of address. For encoding see 3G TS 29.060 [x].

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

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

- accessPointName:
  This parameter contains the requested address that the MS for which the CAMEL service is invoked for wants to connect to. For encoding see 3G TS 29.060 [X].

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

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

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

~~- GPRS-ReferenceNumber:~~
~~This parameter identifies the instance of the gprsSSF. Each gprsSSF instance is uniquely related to a gsmSCF instance in the SCP.~~

***** Next modified part in 11.36 *****

11.36 ReleaseGPRS procedure

11.36.1 General description

This operation is used to tear down by the gsmSCF an existing GPRS session or PDP context at any phase. The operation can only be sent within a control relationship and is not allowed in a monitor relationship.

11.36.1.1 Parameters

~~- GPRS-ReferenceNumber:~~
~~This parameter identifies the instance of the gprsSSF. Each gprsSSF instance is uniquely related to a gsmSCF instance in the SCP.~~

- GPRSCause
  A number giving an indication to the gprsSSF about the reason of releasing the GPRS session or a specific PDP context. This may be used by gprsSSF for generating specific indications to the MS or to fill in the "cause" in the release message.

- PDPID:
  This parameter if present identifies the PDP context within the control relationship for which the processing shall be released.

11.36.2 Responding entity (gprsSSF)

11.36.2.1 Normal procedure

gprsSSF preconditions:

(1) A control relationship exists between gsmSCF and gprsSSF. More specifically, in order to tear down an individual PDP context, an EDP-R must be armed for that PDP context. In order to make a SCP controlled detach an EDP-R must be armed for the GPRS session.

(2) The gprsSSF is in state "Waiting for Instructions" or State "Monitoring".

gprsSSF postcondition:

(1) "Idle", after sending any outstanding ApplyGPRSChargingReport and no more PDP contexts are pending. Possible armed EDPs are ignored. All connections and resources related to the GPRS session or PDP context for the corresponding PDPID are released.

11.36.2.2 Error handling

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

***** Next modified part in 11.39 *****

11.39 RequestReportGPRSEvent procedure

11.39.1 General description

This operation is used to request the gprsSSF to monitor for a GPRS session or PDP context related event (e.g., events such as PDP context establishment or detach), then send a notification back to the gsmSCF when the event is detected.

11.39.1.1 Parameters

~~- GPRS-ReferenceNumber:~~
~~This parameter identifies the instance of the gprsSSF. Each gprsSSF instance is uniquely related to a gsmSCF instance in the SCP.~~

- gPRSEvent:
  This parameter specifies the event or events of which a report is requested.
  - gPRSEventType:
    This parameter specifies the type of event of which a report is requested.
  - monitorMode:
    This parameter indicates how the event shall be reported. When the "monitorMode" is "interrupted", the event shall be reported as a request, if the "monitorMode" is "notifyAndContinue", the event shall be reported as a notification, if the "monitorMode" is "transparent", the event shall not be reported.
- PDPID:
  This parameter if present identifies the PDP context within the control relationship for which the event reporting is requested.

***** Next modified part in 11.45 *****

11.45 SendChargingInformationGPRS Procedure

11.45.1 General description

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

11.45.1.1 Parameters

~~- GPRS-ReferenceNumber:~~
~~This parameter identifies the instance of the gprsSSF. Each gprsSSF instance is uniquely related to a gsmSCF instance in the SCP.~~

- SCIGPRSBillingChargingCharacteristics:
  This parameter contains the Advice of Charge information:

  - aOCGPRS:
    This parameter specifies the Advice of Charge information that shall be forwarded to the MS. It may contain one or more of the following parameters:

    - aOCInitial:
      This is a set of GSM Charge Advice Information elements, as defined in 3G TS 22.024.These CAI elements are sent by the gprsSSF to the MS when an Activate PDP Context Accept or Attach Accept is sent to MS and a tariff switch has not yet occurred. It may also be sent at any other time e.g. upon change of QoS or RAI.

    - aOCSubsequent:
      This parameter may indicate the following information:

      - CAIElements
        This is a set of GSM Charge Advice Information elements, as defined in 3G TS 22.024. These CAI elements are sent to the MS when an Activate PDP Context Accept or Attach Accept is detected and a tariff switch has occurred previously, or when Activate PDP Context Accept or Attach Accept has previously been detected and a tariff switch occurs.

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

***** Next modified part in 12.1.1.3.7 *****

12.1.1.3 Dialogue handling

.....

12.1.1.3.7 Default mapping to TC dialogue parameters

Dialogue Id

The value of this parameter is associated with the CAP invocation in an implementation dependent manner. This parameter uniquely identifies a specific TC dialogue to a remote CAP AE for an CAP AE.

Application-context-name

The application-context-name parameter is set according to the set of operations which need to be supported by the TC dialogue. The defined AC Names can be found in clauses 6 to 8.

User information

This parameter may be used by both initiating and responding application processes. 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) [x]and the definition of EXTERNAL type provided in X.690[34], with the restriction that:

- a size (1..10) constraint of SEQUENCE OF EXTERNAL;
- an Object Identifier shall always be present to identify the user information and the entity which sent it;
- a single-ASN-1-type is used for encoding.

For the use of CAP defined TC-U-Abort reason, see the ~~following~~ ASN.1 notation in the subclause 8.1.~~applies:~~

```
CAP-U-ABORT-Data {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) umts-Network(1)
modules(3) cap-u-abort-data(56) version1(0)}
DEFINITION ::=
BEGIN
id-CAP-U-ABORT-Reason OBJECT IDENTIFIER ::= {ccitt(0) identified-organization(4) etsi(0)
mobileDomain(0) gsm-Network(1) AS(1) cap-u-abort-reason(2) version1(0)}
cAP-U-ABORT-Reason-Abstract-Syntax  ABSTRACT-SYNTAX ::= {CAP-U-ABORT-REASON IDENTIFIED BY id-CAP-U-
ABORT-Reason}
CAP-U-ABORT-REASON ::= ENUMERATED {
no-reason-given(1),
application-timer-expired(2),
not-allowed-procedures(3),
abnormal-processing(4),
congestion(5)
}
-- application-timer-expired  shall be set when application timer (e.g. Tssf ) is expired.
-- not-allowed-fsm-procedures shall be set when received signal is not allowed in CAP
-- procedures.
-- For example, when class4 operation is received from SCF and the operation is not
-- allowed in SSF FSM.
-- (SSF FSM cannot continue state transition). (e.g. ReleaseCall operation received in
-- Waiting for End of Temporary Connection state.)
-- abnormal-processing shall be set when abnormal procedures occur at entity action.
-- congestion shall be set when requested resource is unavailable due to congestion at
-- TC user (CAP) level.
-- no-reason-given shall be set when any other reasons above do not apply
END -- of  CAP-U-ABORT-Data
```

Component present

This parameter is used by TC-USER as described in ETS 300 287-1 [6].

Termination

The value of the release method parameter of the TC-END request primitive is set by TC-USER according to the rules as stated in subclauses 12.1.2.1.1 and 12.1.2.1.2.

Quality of service

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

- Sequencing requested
- return option, this parameter is set by TC-USER in an implementation dependent manner

***** Next modified part in 12.1.8 *****

12.1.8 gprsSSF-gsmSCF interface

12.1.8.1 Normal procedures

12.1.8.1.1 TC-dialogues and relationships

A ***relationship*** exists between gprsSSF and gsmSCF if at least one of the following conditions is fulfilled:

There is at least one EDP armed.

At least one report is pending.

gprsSSF is in a TDP or EDP in state WaitingForInstructions.

The gprsSSF and gsmSCF ***relationship*** can consist of multiple ***TC-dialogues***. The TC-dialogues are closed and (re)opened whenever necessary.

12.1.8.1.1.1 Useing of the GPRS Reference

For the use of CAP defined GPRS-ReferenceNumber, see also the ASN.1 notation in the subclause 8.1.

When the gprsSSF sends the first operation for a new GPRS dialogue (InitialDPGPRS), the gprsSSF shall include a GPRS Reference Number in the TCAP message. This GPRS Reference Number shall consist of the ***SGSN Process Id*** as originationReference, which is internally allocated by the gprsSSF. This number is used by the gprsSSF to associate an incoming TCAP message with an internal GPRS Process.

When the gsmSCF has received the InitialDPGPRS operation, it shall store the SGSN Process ID and allocate an ***SCP Process Id*** which is used by the gsmSCF to associate an incoming TCAP message with an internal SCP Process.

The SCP shall include the GPRS Reference Number in the first TCAP message, ***SGSN Process Id*** in destinationReference and ***SCP Process Id*** in originationReference, returned to the gprsSSF.

When the gprsSSF receives the first TCAP message from the SCP for this dialogue, the gprsSSF shall store the SCP Process Id together with the SGSN Process Id.

From here onwards all the TCAP messages that open a new TCAP dialogue shall include the GPRS Reference Number consisting of the originationReference and the destinationReference to associate the internal process in the origination entity and the destination entity, respectively, until the end of the relationship between these processes.

For any TC-CONTINUE in the existing TCAP dialogue, transporting the GPRS Reference Number is not needed except for the first response after the InitialDPGPRS operation.

12.1.8.1.2 gprsSSF-to-gsmSCF messages

This subclause defines the normal procedures for TC messages from the gprsSSF to the gsmSCF.

gsmSSF-FSM related messages

A dialogue shall be established for the first time when the gprsSSF moves from the state **Idle** to the state **Active**. The InitialDPGPRS operation shall be transmitted in the same message. The gprsSSF may intiate the dialogue with the following operations:

ApplyChargingReportGPRS

EntityReleasedGPRS

EventReportGPRS

InitialDPGPRS

The gprsSSF shall memorise the gsmSCF address from the InitialDPGPRS response, and use it in the further dialogues. The gsmSCF shall memorise the gprsSSF address received along with the InitialDPGPRS, and use it in the further dialogues. The gsmSCF may open a dialogue with the following CAP operations:

ActivityTestGPRS

ApplyChargingGPRS

CancelGPRS

FurnishChargingInformationGPRS

ReleaseGPRS

RequestReportGPRSEvent

SendChargingInformationGPRS

The CAP operation that opens a dialogue shall be sent with a TC-BEGIN request primitive.

The dialogue shall be closed for the idle periods, i.e. in the end of a DP, in the end end of a GPRS session or PDPB context. Each *dialogue* shall be terminated by using basic end. Similarly each *relationship* may be terminated in a pre-arranged way or explicitly by using EntitityReleasedGPRS operation. The following operations can cause pre-arranged end of the *relationship*:

ContinueGPRS

ConnectGPRS

ApplyChargingReportGPRS

EntityReleasedGPRS

EventReportGPRS (EDP-N).

CancelGPRS

ReleaseGPRS

RequestReportGPRSEvent (disarming of DPs)

When the gprsSSF makes a non-error case state transition to the state **Idle** and there is one or more pending operation and TCAP dialogue is established, TCAP dialogue may be terminated by TC-END primitive with zero component(s) after all pending operations have been sent. When the gsmSSF sends the last EventReportGPRS or ApplyChargingReportGPRS the relationship may be ended from the gprsSSF by a TC-END request primitive with basic end.

In the case that there is no pending operation, result nor error, and TCAP dialogue is established, TCAP dialogue shall be terminated by TC-END primitive with zero component.

In the case where a PDP context release or detach is initiated by any other entity than an gsmSCF, the gprsSSF shall end a relationship with the EntityReleasedGPRS operation if the gprsSSF has no armed DP to report nor pending ApplyChargingReportGPRS which should reported.

When the gprsSSF has sent the last EventReportGPRS or ApplyChargingReportGPRS the relationship may be ended from the gsmSCF by a TC-END request primitive with basic end.

In the case of overlapping dialogues for the same relationship the gsmSCF opened dialogue is closed by the gprsSSF with an error code as specified in clause 10.

SSME-FSM related messages

The following procedures shall be followed:

The dialogue shall be ended with basic end when the ActivityTestGPRS Return Result is sent.