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About This Document

Scope
This statement of compliance compares the Oracle Communications Network Charging and Control (NCC) CAP version 3 GPRS Control Agent (CAP3GPRS Control Agent) to:

- The GPRS specific parts of the CAMEL Application Part (CAP) Phase 3 specification document, ETSI TS 129.078 v4.8.0.

Audience
This guide is intended for use by software engineers and testers who need a description of the message sequences used by the CAP3GPRS Control Agent.

Related Documents
The following documents are related to this document:

- ACS Technical Guide
- CAP3GPRS Control Agent Technical Guide
- CCS Technical Guide
- CCS User's Guide
- SMS Technical Guide
- SMS User's Guide
- SLEE Technical Guide
Document Conventions

Typographical Conventions

The following terms and typographical conventions are used in the Oracle Communications Network Charging and Control (NCC) documentation.

<table>
<thead>
<tr>
<th>Formatting convention</th>
<th>Type of information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special Bold</td>
<td>Items you must select, such as names of tabs. Names of database tables and fields.</td>
</tr>
<tr>
<td>Italics</td>
<td>Name of a document, chapter, topic or other publication. Emphasis within text.</td>
</tr>
<tr>
<td>Button</td>
<td>The name of a button to click or a key to press. Example: To close the window, either click Close, or press Esc.</td>
</tr>
<tr>
<td>Key+Key</td>
<td>Key combinations for which the user must press and hold down one key and then press another. Example: Ctrl+P, or Alt+F4.</td>
</tr>
<tr>
<td>Monospace</td>
<td>Examples of code or standard output.</td>
</tr>
<tr>
<td>Monospace Bold</td>
<td>Text that you must enter.</td>
</tr>
<tr>
<td>variable</td>
<td>Used to indicate variables or text that should be replaced.</td>
</tr>
<tr>
<td>menu option &gt; menu option &gt;</td>
<td>Used to indicate the cascading menu option to be selected, or the location path of a file. Example: Operator Functions &gt; Report Functions</td>
</tr>
<tr>
<td>hypertext link</td>
<td>Used to indicate a hypertext link on an HTML page.</td>
</tr>
</tbody>
</table>

Specialized terms and acronyms are defined in the Glossary at the end of this guide.
Chapter 1

Compliance Statement

Overview

Introduction

This chapter introduces the Oracle Communications Network Charging and Control (NCC) CAP version 3 GPRS Control Agent (CAP3GPRS Control Agent) compliance limitations and configuration.

In this chapter

This chapter contains the following topics.

1 About CAP3GPRS Compliance
2 CAP3GPRS Configuration for Message Sequences

About CAP3GPRS Compliance

Introduction to CAP3GPRS Compliance

This document states the compliance of the CAP3GPRS Control Agent against the following GPRS specific parts of the CAP 3 specification document, ETSI TS 129 078 V4.8.0:

- Section 8, GPRS Control
- Section 12, Services assumed from lower layers

The CAP3GPRS Control Agent translates between CAP 3 GPRS messages and CAP 3 INAP operations. For more information about the CAP3GPRS Control Agent and how to configure it, see CAP3GPRS Control Agent Technical Guide.

For information about specific parameters that directly affect message sequences, see CAP3GPRS Configuration for Message Sequences (on page 2).

The CAP3GPRS Control Agent produces message sequences for:

- Sessions. For more information and examples, see Message Sequences for Sessions (on page 5).
- PDP contexts. For more information and examples, see Message Sequences with PDP Contexts (on page 9).
- ActivityTestGPRS operations. For more information and examples, see Message Sequences for ActivityTestGPRS (on page 18).

For information about the operations supported by CAP3GPRS Control Agent and details of the individual parameters within these operations, see Operations Supported by CAP3GPRS Control Agent (on page 25).

For an explanation of how TCAP message dialogs are used in message sequences, see TCAP Message Dialog Portion Parameters (on page 1).

TCAP Message Dialog Portion Parameters

This section describes how the CAP3GPRS Control Agent complies with the following sections of the CAP 3 specification document, ETSI TS 129 078 V4.8.0:
Chapter 1

- 12.1.3.7, Default mapping to TC dialogue parameters, User information
- 12.1.7, gprsSSF-gsmSCF interface

All the message sequences in this document relate to either a single charging session or to a PDP context within a charging session. Each message sequence for a session can be thought of as a conversation between the CAP3GPRS Control Agent and the SGSN that consists of several TCAP dialogs. The SGSN repeatedly ends one TCAP dialog, by sending an empty TCAP_END message, and then starts a new dialog for the same conversation by sending a TCAP_BEGIN message.

**Note:** The TCAP_BEGIN may come from a different SGSN if the subscriber has moved.

The CAP3GPRS Control Agent uses the destination reference parameter, in the User Information parameter in the transaction portion of each TCAP_BEGIN, to identify the conversation. The CAP3GPRS Control Agent correlates all the TCAP dialogs by using the following method:

1. The first TCAP_BEGIN in the message sequence contains the originating reference but no destination reference. The CAP3GPRS Control Agent uses the received originating reference as the destination reference in all TCAP messages it subsequently sends to the SGSN.
2. The CAP3GPRS Control Agent generates a correlation ID that it uses as the originating reference in all messages it subsequently sends to the SGSN.
3. The SGSN uses the correlation ID as the destination reference in all messages it sends to the CAP3GPRS Control Agent for this conversation.

### CAP3GPRS Configuration for Message Sequences

#### Parameters that Affect Message Sequences

This table lists the CAP3GPRS Control Agent configuration parameters that directly affect the message content, and message sequences, that are sent and received by the control agent.

For more information about CAP3GPRS Control Agent configuration, see *CAP3GPRS Control Agent Technical Guide*.

<table>
<thead>
<tr>
<th>Parameter Definition</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sendContinueWithApplyCharging = true</td>
<td>true</td>
<td>Sets whether to send ContinueGPRS operations in ApplyCharging message sequences.</td>
</tr>
<tr>
<td>sendContinueWithRRGPRSE = true</td>
<td>true</td>
<td>Sets whether to send ContinueGPRS operations in RequestReportGPRSEvent message sequences.</td>
</tr>
<tr>
<td>billingType = 0</td>
<td>1</td>
<td>Sets whether to bill for time or volume. Where:</td>
</tr>
<tr>
<td>sessionTreatment = 1</td>
<td>2</td>
<td>Sets how the control agent handles an InitialDPGPRS operation for a session. Where:</td>
</tr>
<tr>
<td>armAllEdpsAtOnce = true</td>
<td>false</td>
<td>Sets whether to arm all EDPs in a single RequestReportGPRSEvent, or wait for ContextEstablishmentAcknowledgement before arming disconnect.</td>
</tr>
<tr>
<td>maxInactiveTimeForVolume = int</td>
<td>3600</td>
<td>(For volume billing) Sets the number of seconds to wait before sending ActivityTestGPRS.</td>
</tr>
<tr>
<td>Parameter Definition</td>
<td>Default Value</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>---------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>timeBillingInactiveTimeTolerance = int</td>
<td>10</td>
<td>(For duration billing) Sets the number of seconds to add to the time from ApplyCharging when calculating the time to wait before sending ActivityTestGPRS.</td>
</tr>
<tr>
<td>activityTestResultTimeout = int</td>
<td>10</td>
<td>Sets the number of seconds to wait for an ActivityTestGPRS result.</td>
</tr>
<tr>
<td>releaseCauseInsufficientFunds = int</td>
<td>26</td>
<td>The cause value to send in ReleaseGPRS operations for calls released due to insufficient funds.</td>
</tr>
<tr>
<td>releaseCauseNetworkError = int</td>
<td>38</td>
<td>The cause value to send in ReleaseGPRS operations for calls released due to a network error, such as a timeout, or an incorrect message sequence.</td>
</tr>
<tr>
<td>sendAbortForDetachEventType = true</td>
<td>false</td>
<td>Sends either TCAP_ABORT (when true), or ContinueGPRS (when false) in response to a detached GPRS event type in an InitialDPGPRS.</td>
</tr>
<tr>
<td>sendAbortForDisconnectEventType = true</td>
<td>false</td>
<td>Sends either TCAP_ABORT (when true), or ContinueGPRS (when false) in response to a disconnect GPRS event type in an InitialDPGPRS.</td>
</tr>
</tbody>
</table>

**GPRS Event Type Definition in InitialDPGPRS Operations**

The CAP3GPRS Control Agent accepts all valid values of the ENUMERATED GPRS event type in InitialDPGPRS operations. The control agent rejects invalid event types in an InitialDPGPRS by logging an error and sending a TCAP abort.

The following syntax defines the valid ENUMERATED GPRS event types in InitialDPGPRS operations:

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

The CAP3GPRS Control Agent:

- Treats `attach (1)` and `attachChangeOfPosition (2)` as the start of a new data session, and then:
  - Uses the ApplyChargingGPRS operation, if `sessionTreatment` is set to 1, to monitor the duration of the session for charging purposes. Otherwise the control agent ignores the session by sending ContinueGPRS.
  - Assumes that, if charging for separate PDP contexts is required, an InitialDPGPRS will be received for each PDP context so that each one can be charged separately. Therefore, when the control agent receives this type of event, it does not send a RequestReportGPRSEvent to arm for PDP context establishment.
Recognizes that **pdp-ContextEstablishment (11) and pdp-ContextEstablishmentAcknowledgement (12) and pdp-ContextChangeOfPostiion (14)** are relevant to particular PDP contexts. You can configure the control agent to monitor these contexts for charging purposes.

Responds to **detached (3) and disconnect (13)** event types by sending either a TCAP abort or a ContinueGPRS. You can configure which message to send in the `sendAbortForDetachEventType` and `sendAbortForDisconnectEventType` parameters. For details, see *Parameters that Affect Message Sequences* (on page 2). The control agent will also log an error if it sends a TCAP abort.
Overview

Introduction

This chapter describes the message sequences that can be produced by the Oracle Communications Network Charging and Control (NCC) CAP version 3 GPRS Control Agent (CAP3GPRS Control Agent), and provides example message flows.

In this chapter

This chapter contains the following topics.

Message Sequences for Sessions 5
Message Sequences with PDP Contexts 9
Message Sequences for ActivityTestGPRS 18

Message Sequences for Sessions

Introduction to Message Sequences for Sessions

The CAP3GPRS Control Agent can produce the message sequences for sessions as described in the following sections:

- Continue GPRS Session Message Sequence (on page 5)
- Successful Session Charging Message Sequence (on page 6)
- Subscriber Disconnects Session Message Sequence (on page 7)
- Service Denied Session Message Sequence (on page 8)
- Terminate Session Message Sequence (on page 8)

About Sending ContinueGPRS in Messages

If `sendContinueWithRRGPRS` is set to `true` then the control agent sends ContinueGPRS in the message sequences for:

- Successful session charging
- Subscriber disconnects session
- Terminate session

The same message sequence is produced when `sendContinueWithRRGPRS` is set to `false`, except that the control agent does not send a ContinueGPRS operation.

ContinueGPRS Session Message Sequence

The CAP3GPRS Control Agent sends the ContinueGPRS operation in response to an InitialDPGPRS for a session where:

- The `gprsEventType` is set to either `attach` or `attachChangeOfPosition`. 
The `sessionTreatment` parameter for the CAP3GPRS Control Agent is set to 2 (send ContinueGPRS operation).

**ContinueGPRS Session Example**
This example shows a ContinueGPRS session message flow where `gprsEventType` is set to `attach`:

```
SGSN        CAP3GPRS
TCAP_BEGIN(initialDCPGRS(gprsEventType=attach))
TCAP_CONTINUE(ContinueGPRS)
TCAP_END()
```

**Successful Session Charging Message Sequence**
The CAP3GPRS Control Agent supports message sequences for successful charging for the duration of a session where:

- The `gprsEventType` is either set to `attach` or `attachChangeOfPosition`.
- The `sessionTreatment` parameter for the CAP3GPRS Control Agent is set to 1 (send ApplyCharging operation).
**Session Charging Successful Example**

This example shows a session charging successful message flow where `gprsEventType` is set to `attach`.

**Subscriber Disconnects Session Message Sequence**

The CAP3GPRS Control Agent supports message sequences for a subscriber disconnects session where:

- The `gprsEventType` is either set to `attach` or `attachChangeOfPosition`.
- The `sessionTreatment` parameter for the CAP3GPRS Control Agent is set to 1 (send `ApplyCharging` operation).
Disconnect Session Example
This example shows a subscriber disconnects session message flow where gprsEventType is set to attach.

Service Denied Session Message Sequence
The CAP3GPRS Control Agent supports service denied for a subscriber message sequences where:

- The gprsEventType is set to either attach or attachChangeOfPosition.
- The sessionTreatment parameter for the CAP3GPRS Control Agent is set to 1 (send ApplyCharging operation).

For example, the control agent produces a service denied message sequence if the subscriber has no funds, or if the subscriber's MSISDN is not recognized.

Service Denied Session Example
This example shows a service denied message flow where gprsEventType is set to attach.

Terminate Session Message Sequence
The CAP3GPRS Control Agent supports terminate session message sequences where:

- The gprsEventType is set to either attach or attachChangeOfPosition.
- The sessionTreatment parameter for the CAP3GPRS Control Agent is set to 1 (send ApplyCharging operation).
For example, the control agent produces the terminate session message sequence if the subscriber runs out of funds in the middle of a session.

**Terminate Session Example**

This example shows a terminate session message flow for a subscriber who runs out of funds during the session, and where \texttt{gprseventtype} is set to \texttt{attach}.

Message Sequences with PDP Contexts

**Introduction to Message Sequences with PDP Context**

The CAP3GPRS Control Agent can support message sequences, where each message sequence relates to a single PDP context within a session, as described in the following sections:

- \texttt{ContextEstablishmentAcknowledgement Message Sequence} (on page 10)
- \texttt{ContextEstablishment with Successful Charging Message Sequence} (on page 11)
- \texttt{Subscriber Disconnects Session (ContextEstablishment) Message Sequence} (on page 12)
- \texttt{Service Denied (ContextEstablishment) Message Sequence} (on page 13)
- \texttt{Session Terminated (ContextEstablishment) Message Sequence} (on page 13)
- \texttt{ConnectGPRS (ContextEstablishment) Message Sequence} (on page 14)
- \texttt{EntityReleased (ContextEstablishment) Message Sequence} (on page 15)
- \texttt{SCI and FCI Message Sequences} (on page 15)

**Important:** For all message sequences in this section, except context establishment acknowledgement with successful charging, the \texttt{InitialDPGPRS} is for ContextEstablishment and therefore the CAP3GPRS Control Agent must explicitly arm the ContextEstablishmentAcknowledgement event detection point.

**About Sending ContinueGPRS in Messages**

The following configuration determines whether or not the control agent sends ContinueGPRS in messages containing RequestReportGPRSEvent and ApplyChargingGPRS operations:
If $\text{sendContinueWithRRGPRSE} = \text{true}$ then the control agent sends a ContinueGPRS in the message containing the RequestReportGPRSEvent; otherwise it does not send ContinueGPRS in the message.

If $\text{sendContinueWithApplyCharging} = \text{true}$ then the control agent sends a ContinueGPRS in the message containing the first ApplyChargingGPRS; otherwise it does not send ContinueGPRS in the message.

Note: When these parameters are set to false, the message sequences that the control agent produces are the same, except that the control agent does not send a ContinueGPRS operation.

**ContextEstablishmentAcknowledgement Message Sequence**

The CAP3GPRS Control Agent supports message sequences for ContextEstablishmentAcknowledgement with successful charging.
**Context Establishment Acknowledgement Example**

This example shows a ContextEstablishmentAcknowledgement with successful charging message flow, where `sendContinueWithRRGPRSE` is set to `true`.

```
TCAP_BEGIN(initialDPGPRS(gprsEventType=ContextEstablishmentAcknowledgement))

TCAP_CONTINUE(ApplyChargingGPRS
   ,RequestReportGPRSEvent(disconnect)
   ,ContinueGPRS)

TCAP_END()

TCAP_BEGIN(ApplyChargingReportGPRS(gprsActive=true))

TCAP_CONTINUE(ApplyChargingReportGPRSAck
   ,ApplyChargingGPRS)

TCAP_END()

TCAP_BEGIN(ApplyChargingReportGPRS(gprsActive=true))

TCAP_CONTINUE(ApplyChargingReportGPRSAck
   ,ApplyChargingGPRS)

TCAP_END()

TCAP_BEGIN(ApplyChargingReportGPRS(gprsActive=true))

TCAP_CONTINUE(ApplyChargingReportGPRSAck
   ,ReleaseGPRS)

TCAP_CONTINUE(ApplyChargingReportGPRS(gprsActive=false))

TCAP_CONTINUE(ApplyChargingReportGPRSAck)

TCAP_END()
```

**ContextEstablishment with Successful Charging Message Sequence**

The CAP3GPRS Control Agent supports message sequences for ContextEstablishment with successful charging.

**Note:** Because the InitialDPGPRS is for contextEstablishment, the CAP3GPRS Control Agent explicitly arms the contextEstablishmentAcknowledgement event detection point.

**ContextEstablishment with Successful Charging Example**

This example shows a ContextEstablishment with successful charging message flow where:

- `sendContinueWithRRGPRSE` is set to `true`
sendContinueWithApplyCharging is set to true

Subscriber Disconnects Session (ContextEstablishment) Message Sequence

The CAP3GPRS Control Agent supports ContextEstablishment message sequences for subscriber disconnects sessions.

Note: Because the InitialDPGPRS is for ContextEstablishment, the CAP3GPRS Control Agent explicitly arms the ContextEstablishmentAcknowledgement event detection point.

Subscriber Disconnects Session (ContextEstablishment) Example
This example shows a ContextEstablishment message flow for subscriber disconnects session where:
- `sendContinueWithRRGPRSE is set to true`
- `sendContinueWithApplyCharging is set to true`

**Service Denied (ContextEstablishment) Message Sequence**

The CAP3GPRS Control Agent supports service denied for subscriber ContextEstablishment message sequences. For example, the control agent produces a service denied message sequence if the subscriber has no funds, or if the subscriber’s MSISDN is not recognized.

**Service Denied (ContextEstablishment) Example**

This example shows a ContextEstablishment message flow for subscriber denied service.

**Session Terminated (ContextEstablishment) Message Sequence**

The CAP3GPRS Control Agent supports ContextEstablishment message sequences for session terminated service because the subscriber’s funds have expired.

**Note:** Because the `InitialDPGPRS` is for ContextEstablishment, the CAP3GPRS Control Agent explicitly arms the `ContextEstablishmentAcknowledgement` event detection point.
**Session Terminated (ContextEstablishment) Example**
This example shows a ContextEstablishment message flow for session terminated because the subscriber's funds have expired, where:

- `sendContinueWithRRGPRSE` is set to `true`
- `sendContinueWithApplyCharging` is set to `true`

**Note:** The CAP3GPRS Control Agent:
- Produces the same message sequence when these parameters are set to false, except it does not send a ContinueGPRS in messages.
- Only sends ConnectGPRS if the event type in InitialDPGPRS is ContextEstablishment.

**ConnectGPRS (ContextEstablishment) Message Sequence**
The CAP3GPRS Control Agent supports ContextEstablishment ConnectGPRS message sequences.

**ConnectGPRS (ContextEstablishment) Example**
This example shows a ConnectGPRS ContextEstablishment message flow.
Note: The service logic used in this example assumes that no charging is required, and that the ConnectGPRS operation tells the SGSN to connect to a new access point.

EntityReleased (ContextEstablishment) Messages
The CAP3GPRS Control Agent supports EntityReleased ContextEstablishment message sequences.

Note: Because the InitialDPGPRS is for ContextEstablishment, the CAP3GPRS Control Agent explicitly arms the ContextEstablishmentAcknowledgement event detection point.

EntityReleased (ContextEstablishment) Example
This diagram shows how the CAP3GPRS Control Agent handles EntityReleasedGPRS operations in an example ConnectGPRS ContextEstablishment message flow.

In the example message flow, sendContinueWithRRGPRS is set to true.

SCI and FCI Message Sequences
The CAP3GPRS Control Agent can send message sequences for SendChargingInformationGPRS (SCI) and FurnishChargingInformationGPRS (FCI) for any InitialDPGPRS event type (including ContextEstablishment) that it supports. You can send:

- Only one of the operations.
- Both operations.
- Neither operation.

You can configure whether the CAP3GPRS Control Agent sends SCI and FCI data, for example, by including a Set Tariff Code feature node in the control plan, or by using a NCC Software Developer Kit customized plugin.
For more information about the Set Tariff Code feature node, see *NCC Feature Nodes Reference Guide*. For more information about configuring control plans, see *CPE User’s Guide*.

For more information about NCC Software Developer Kit (SDK), see *SDK Developer’s Guide*.

**SCI and FCI (ContextEstablishment) Example**

In this example ContextEstablishment message flow, the CAP3GPRS Control Agent sends both SendChargingInformationGPRS and FurnishChargingInformationGPRS. The control agent always sends SendChargingInformationGPRS first.

In this example, the following configuration has been set for the control agent:

- *sendContinueWithRRGPRS* is set to *true*
• `sendContinueWithApplyCharging` is set to `true`
Message Sequences for ActivityTestGPRS

Introduction to Message Sequences for ActivityTestGPRS

The CAP3GPRS Control Agent supports ActivityTestGPRS message sequences. The control agent produces different ActivityTestGPRS message sequences depending on whether charging is for volume or for duration. The event type in InitialDPGPRS does not affect ActivityTestGPRS message sequences.

For volume charging, the CAP3GPRS Control Agent sends an ActivityTestGPRS operation after a period of activity to check that the session is still alive. If:

- The session is still alive, charging continues.
- The session does not exist, charging is finalized and resources used for this session are cleaned up.

For duration charging, if the SGSN does not respond within a set timeframe (that is, the time set in ApplyChargingGPRS plus the value of timeBillingInactiveTimeTolerance), then an error has occurred. In this case, ActivityTestGPRS is used to establish whether a session still exists, and end the session if it does, before finalizing charging and cleaning up.

Volume Charging, Session Still Exists Example
This example shows the ActivityTestGPRS message flow when charging for volume and the session still exists.
Volume Charging, Session Timeout Example

This example shows the ActivityTestGPRS message flow when charging for volume and the session times out.
Volume Charging, Error Returned Example

This example shows the ActivityTestGPRS message flow when charging for volume and an error is returned.

```
TCAP_BEGIN(initialDPGPRS(grpsEventType=ContextEstablishment))
TCAP_CONTINUE(RequestReportGPRSEvent(ContextEstablishmentAcknowledgment, disconnect))
TCAP_END()
TCAP_BEGIN(EventReportGPRS(ContextEstablishmentAcknowledgment))
TCAP_CONTINUE(EventReportGPRSAck,ApplyChargingGPRS,ContinueGPRS)
TCAP_END()
```

Timer started for maxInactiveTimeForVolume seconds

Timer expired

```
TCAP_BEGIN(ActivityTestGPRS)
TCAP_CONTINUE(ActivityTestGPRSError)
TCAP_ABORT
```

Charging finalized.
Resources cleaned up.
Duration Charging, Session Still Exists Example
This example shows the ActivityTestGPRS message flow when charging for duration and the session still exists.

TCAP_BEGIN(InitialDPGPRS(gprsEventType=ContextEstablishment))
TCAP_CONTINUE(RequestReportGPRSEvent(ContextEstablishmentAcknowledgement, disconnect, ContinueGPRS))
TCAP_END()

TCAP_BEGIN(EventReportGPRS(ContextEstablishmentAcknowledgement))
TCAP_CONTINUE(EventReportGPRSACK, ApplyChargingGPRS, ContinueGPRS)
TCAP_END()

Timer started for maxElapsedTime + timeBillingInactiveTimeTolerance seconds
Timer expired

TCAP_BEGIN(ActivityTestGPRS)
TCAP_CONTINUE(ActivityTestGPRSResult)
TCAP_CONTINUE(ReleaseGPRS)
TCAP_END()

Charging finalized. Resources cleaned up.
**Duration Charging, Session Timeout Example**

This example shows the `ActivityTestGPRS` message flow when charging for duration and the session times out.

```plaintext
SGSN

TCAP_BEGIN(InitialDPGPRS(pprsEventType=ContextEstablishment))

TCAP_CONTINUE(RequestReportGPRSEvent(ContextEstablishmentAcknowledgement, disconnect))
   ContinueGPRS)

TCAP_END()

TCAP_BEGIN(EventReportGPRS(ContextEstablishmentAcknowledgement))

TCAP_CONTINUE(EventReportGPRSAck
   ,ApplyChargingGPRS
   ,ContinueGPRS)

TCAP_END()

Timer started for maxElapsedTime + timeSittingInactiveTimeTolerance seconds

Timer expired

Timer expires. Charging finalized. Resources cleaned up.

SGSN

TCAP_BEGIN(ActivityTestGPRS)

CAP3GPRS
```
Duration Charging, Error Returned Example
This example shows the ActivityTestGPRS message flow when charging for duration and an error is returned.
Overview

Introduction

This chapter lists the operations supported by the Oracle Communications Network Charging and Control (NCC) CAP version 3 GPRS Control Agent (CAP3GPRS Control Agent), and provides details about the supported parameters for each operation.

In this chapter

This chapter contains the following topics.

Operations Sent from SGSN to the Control Agent 25
Operations Sent to SGSN from the Control Agent 28

Operations Sent from SGSN to the Control Agent

About Operations Sent from SGSN

This section lists the supported operations that may be sent from the SGSN to the CAP3GPRS Control Agent, and provides details about the supported parameters for each operation. For example operations, see CAP3GPRS Message Sequences (on page 5).

The following operations are the only operations sent from the SGSN that may be received by the CAP3GPRS Control Agent:

- ApplyChargingReportGPRS Operation (on page 25)
- EntityReleasedGPRS Operation (on page 26)
- InitialDPGPRS Operation (on page 26)
- EventReportGPRS Operation (on page 28)

Note: The CAP3GPRS Control Agent:

- Replies with TCAP_ABORT if it receives an unsupported operation from the SGSN.
- Ignores any unsupported parameters in operations sent by the SGSN.

ApplyChargingReportGPRS Operation

This section describes how the CAP3GPRS Control Agent complies with the following sections of the CAP 3 specification document, ETSI TS 129 078 V4.8.0:

- 8.1, gsmSCF/gprsSSF operations and arguments
- 11.6, ApplyChargingReportGPRS procedure
This table lists the parameters used in ApplyChargingReportGPRS operations, and identifies the parameters that are supported by the CAP3GPRS Control Agent.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Supported</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>chargingResult</td>
<td>Supported</td>
<td>Reports used time, or used volume, to the billing engine.</td>
</tr>
<tr>
<td>qualityOfService</td>
<td>Supported</td>
<td>Defines the qualityOfService parameters that you can use as a basis for making decisions in the control plan service logic.</td>
</tr>
<tr>
<td>active</td>
<td>Supported</td>
<td>Indicates whether the GPRS session or PDP context is still active. Used in charging scenarios.</td>
</tr>
<tr>
<td>pDPID</td>
<td>Not supported</td>
<td>Not relevant, because the CAP3GPRS Control Agent does not send RequestReportGPRSEvent operations to arm for PDP context establishment.</td>
</tr>
<tr>
<td>chargingRollOver</td>
<td>Supported</td>
<td>You can base decisions in the control plan service logic on the value of chargingRollOver. Based on this parameter, the control agent calculates:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For time rollover, a period of time to be used by the billing engine that is greater than one day.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For volume rollover, a 64-bit volume to be used if the billing engine supports 64-bit volumes.</td>
</tr>
</tbody>
</table>

**EntityReleasedGPRS Operation**

This section describes how the CAP3GPRS Control Agent complies with the following sections of the CAP 3 specification document, *ETSI TS 129 078 V4.8.0*:

- 8.1, gsmSCF/gprsSSF operations and arguments
- 11.22, EntityReleasedGPRS procedure

This table lists the parameters used in EntityReleasedGPRS operations, and identifies the parameters that are supported by the CAP3GPRS Control Agent.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Supported</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>gPRSCause</td>
<td>Supported</td>
<td>You can base decisions in the control plan service logic on the value of gPRSCause.</td>
</tr>
<tr>
<td>pDPID</td>
<td>Not supported</td>
<td>NA</td>
</tr>
</tbody>
</table>

**InitialDPGPRS Operation**

This section describes how the CAP3GPRS Control Agent complies with the following sections of the CAP 3 specification document, *ETSI TS 129 078 V4.8.0*:

- 8.1, gsmSCF/gprsSSF operations and arguments
- 11.31, InitialDPGPRS procedure
This table lists the parameters used in InitialDPGPRS operations, and identifies the parameters that are supported by the CAP3GPRS Control Agent.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Supported</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>serviceKey</td>
<td>Supported</td>
<td>Determines the control plan used. You can base decisions in the control plan service logic on the value of serviceKey.</td>
</tr>
<tr>
<td>gPRSEventType</td>
<td>Supported</td>
<td>Defines the GPRS event type. The control agent supports the following event types:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• attach (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• attachChangeOfPosition (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• detached (3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• pdp-ContextEstablishment (11)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• pdp-ContextEstablishmentAcknowledgement (12)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• disconnect (13)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• pdp-ContextChangeOfPosition (14)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For more information, see GPRS Event Type Definition in InitialDPGPRS Operations (on page 3).</td>
</tr>
<tr>
<td>mSISDN</td>
<td>Supported</td>
<td>May be used to select the subscriber to charge, and also to influence the amount charged. You can base decisions in the control plan service logic on the value of mSISDN.</td>
</tr>
<tr>
<td>iMSI</td>
<td>Supported</td>
<td>May be used to select the subscriber to charge. You can base decisions in the control plan service logic on the value of iMSI.</td>
</tr>
<tr>
<td>timeAndTimeZone</td>
<td>Not Supported</td>
<td>NA</td>
</tr>
<tr>
<td>gPRSMSClасс</td>
<td>Not Supported</td>
<td>NA</td>
</tr>
<tr>
<td>endUserAddress</td>
<td>Not Supported</td>
<td>NA</td>
</tr>
<tr>
<td>qualityOfService</td>
<td>Supported</td>
<td>Defines the individual qualityOfService parameters that are available. You can base decisions in the control plan service logic on the value of these parameters.</td>
</tr>
<tr>
<td>accessPointName</td>
<td>Supported</td>
<td>You can base decisions in the control plan service logic on the value of accessPointName.</td>
</tr>
<tr>
<td>routeingAreaIdentity</td>
<td>Supported</td>
<td>You can base decisions in the control plan service logic on the value of routeingAreaIdentity.</td>
</tr>
<tr>
<td>chargingID</td>
<td>Supported</td>
<td>You can base decisions in the control plan service logic on the value of chargingID.</td>
</tr>
<tr>
<td>sGSNCapabilities</td>
<td>Supported</td>
<td>You can base decisions in the control plan service logic on the value of sGSNCapabilities.</td>
</tr>
<tr>
<td>locationInformationGPRS</td>
<td>Supported</td>
<td>Defines the individual locationInformationGPRS parameters that are available. You can base decisions in the control plan service logic on these parameters.</td>
</tr>
</tbody>
</table>
EventReportGPRS Operation

This section describes how the CAP3GPRS Control Agent complies with the following sections of the CAP 3 specification document, ETSI TS 129 078 V4.8.0:

- 8.1, gsmSCF/gprsSSF operations and arguments
- 11.25, EventReportGPRS procedure

This table lists the parameters used in EventReportGPRS operations, and identifies the parameters that are supported by the CAP3GPRS Control Agent.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Supported</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>gPRSEventType</td>
<td>Supported</td>
<td>Defines the GPRS event type. For examples of how gPRSEventType is used, see CAP3GPRS Message Sequences (on page 5).</td>
</tr>
<tr>
<td>miscGPRSInfo</td>
<td>Not supported</td>
<td>NA</td>
</tr>
<tr>
<td>gPRSEventSpecificInformation</td>
<td>Not supported</td>
<td>NA</td>
</tr>
<tr>
<td>pDPID</td>
<td>Not supported</td>
<td>NA</td>
</tr>
</tbody>
</table>

Operations Sent to SGSN from the Control Agent

About Operations Sent to SGSN

This section lists the operations that the CAP3GPRS Control Agent may send to the SGSN, and provides details about the parameters that are supported for each operation. For example operations, see CAP3GPRS Message Sequences (on page 5).

The following operations are the only operations that the CAP3GPRS Control Agent sends to the SGSN:

- ActivityTestGPRS Operation (on page 29)
- ApplyChargingGPRS Operation (on page 29)
- ConnectGPRS Operation (on page 29)
- ContinueGPRS Operation (on page 29)
- ReleaseGPRS Operation (on page 30)
- RequestReportGPRSEvent Operation (on page 30)
- FurnishChargingInformationGPRS Operation (on page 31)
- SendChargingInformationGPRS Operation (on page 31)
Note: Only supported parameters are included in the operations that the CAP3GPRS Control Agent sends.

**ActivityTestGPRS Operation**

This section describes how the CAP3GPRS Control Agent complies with the following sections of the CAP 3 specification document, *ETSI TS 129 078 V4.8.0*:

- 8.1, gsmSCF/gprsSSF operations and arguments
- 11.2, ActivityTestGPRS procedure

There are no parameters for the ActivityTestGPRS operation.

**ApplyChargingGPRS Operation**

This section describes how the CAP3GPRS Control Agent complies with the following sections of the CAP 3 specification document, *ETSI TS 129 078 V4.8.0*:

- 8.1, gsmSCF/gprsSSF operations and arguments
- 11.4, ApplyChargingGPRS procedure

This table lists the parameters used in ApplyChargingGPRS operations, and identifies the parameters that are supported by the CAP3GPRS Control Agent.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Supported</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>chargingCharacteristics</td>
<td>Supported</td>
<td>Enables either billing by time, or billing by volume.</td>
</tr>
<tr>
<td>tariffSwitchInterval</td>
<td>Not supported</td>
<td>NA</td>
</tr>
<tr>
<td>pDPID</td>
<td>Not supported</td>
<td>NA</td>
</tr>
</tbody>
</table>

**ConnectGPRS Operation**

This section describes how the CAP3GPRS Control Agent complies with the following sections of the CAP 3 specification document, *ETSI TS 129 078 V4.8.0*:

- 8.1, gsmSCF/gprsSSF operations and arguments
- 11.14, ConnectGPRS procedure

This table lists parameters used in ConnectGPRS operations, and identifies the parameters that are supported by the CAP3GPRS Control Agent.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Supported</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>accessPointName</td>
<td>Supported</td>
<td>Defines the Access Point Name for the PDP context.</td>
</tr>
<tr>
<td>pDPID</td>
<td>Not supported</td>
<td>NA</td>
</tr>
</tbody>
</table>

**ContinueGPRS Operation**

This section describes how the CAP3GPRS Control Agent complies with the following sections of the CAP 3 specification document, *ETSI TS 129 078 V4.8.0*:

- 8.1, gsmSCF/gprsSSF operations and arguments
Chapter 3

- 11.18, ContinueGPRS procedure
This table lists the parameter used in ContinueGPRS operations. The parameter is not supported by the CAP3GPRS Control Agent.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Supported</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>pDPID</td>
<td>Not supported</td>
<td>NA</td>
</tr>
</tbody>
</table>

ReleaseGPRS Operation

This section describes how the CAP3GPRS Control Agent complies with the following sections of the CAP 3 specification document, ETSI TS 129 078 V4.8.0:
- 8.1, gsmSCF/gprsSSF operations and arguments
- 11.36, ReleaseGPRS procedure
This table lists the parameters used in ReleaseGPRS operations, and identifies the parameters that are supported by the CAP3GPRS Control Agent.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Supported</th>
<th>Notes</th>
</tr>
</thead>
</table>
| gPRSCause | Supported | You configure the release cause values that trigger the CAP3GPRS Control Agent to send ReleaseGPRS in the following locations:
  - In the control plan service logic, you configure the cause value for each circumstance that will trigger ReleaseGPRS.
  - In the CAP3GPRS section of the eserv.config file, you configure the cause value that will trigger ReleaseGPRS for a timeout or an invalid message sequence, and for the expiration of funds.
For more information about CAP3GPRS configuration, see CAP3GPRS Control Agent Technical Guide. |
| pDPID     | Not supported | NA    |

RequestReportGPRSEvent Operation

This section describes how the CAP3GPRS Control Agent complies with the following sections of the CAP 3 specification document, ETSI TS 129 078 V4.8.0:
- 8.1, gsmSCF/gprsSSF operations and arguments
- 11.39, RequestReportGPRS procedure
This table lists the parameters used in RequestReportGPRSEvent operations, and identifies the parameters that are supported by the CAP3GPRS Control Agent.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Supported</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>gPRSEvent</td>
<td>Supported</td>
<td>Defines the GPRS event in RequestReportGPRSEvent operations.</td>
</tr>
<tr>
<td>pDPID</td>
<td>Not supported</td>
<td>NA</td>
</tr>
</tbody>
</table>
FurnishChargingInformationGPRS Operation

This section describes how the CAP3GPRS Control Agent complies with the following sections of the CAP 3 specification document, *ETSI TS 129 078 V4.8.0*:

- 8.1, gsmSCF/gprsSSF operations and arguments
- 11.28, FurnishChargingInformationGPRS procedure

This table lists the parameters used in FurnishChargingInformationGPRS operations, and identifies the parameters that are supported by the CAP3GPRS Control Agent.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Supported</th>
<th>Notes</th>
</tr>
</thead>
</table>
| fCIGPRSBillingCharacteristics       | Supported | See CAP 3 specification document, *ETSI TS 129 078 V4.8.0*, for details of the format and contents of this parameter.  
The CAP3GPRS Control Agent provides only the following support for this parameter:  
  - You may specify a static string of hex digits in the control plan data to represent the whole parameter.  
  **Note:** Customization, by using the NCC Software Developer Kit, would be required to support dynamic data in this parameter. |

SendChargingInformationGPRS Operation

This section describes how the CAP3GPRS Control Agent complies with the following sections of the CAP 3 specification document, *ETSI TS 129 078 V4.8.0*:

- 8.1, gsmSCF/gprsSSF operations and arguments
- 11.45, SendChargingInformationGPRS procedure

This table lists the parameters used in SendChargingInformationGPRS operations, and identifies the parameters that are supported by the CAP3GPRS Control Agent.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Supported</th>
<th>Notes</th>
</tr>
</thead>
</table>
| sCIGPRSBillingCharacteristics       | Supported | See CAP 3 specification document, *ETSI TS 129 078 V4.8.0*, for details of the format and contents of this parameter.  
The CAP3GPRS Control Agent provides only the following support for this parameter:  
  - You may specify a static string of hex digits in the control plan data to represent the whole parameter.  
  **Note:** Customization, by using the NCC Software Developer Kit, would be required to support dynamic data in this parameter. |
NCC Glossary of Terms

ACS
Advanced Control Services configuration platform.

CAMEL
Customized Applications for Mobile network Enhanced Logic
This is a 3GPP (Third Generation Partnership Project) initiative to extend traditional IN services found in fixed networks into mobile networks. The architecture is similar to that of traditional IN, in that the control functions and switching functions are remote. Unlike the fixed IN environment, in mobile networks the subscriber may roam into another PLMN (Public Land Mobile Network), consequently the controlling function must interact with a switching function in a foreign network. CAMEL specifies the agreed information flows that may be passed between these networks.

CAP
CAMEL Application Part

CC
Country Code. Prefix identifying the country for a numeric international address.

CCS
1) Charging Control Services (or Prepaid Charging) component.
2) Common Channel Signalling. A signalling system used in telephone networks that separates signalling information from user data.

CPE
Control Plan Editor (previously Call Plan Editor) - software used to define the logic and data associated with a call - for example, "if the subscriber calls 0800 nnnnnn from a phone at location xxx then put the call through to bb bbb bbbb".

ETSI
European Telecommunications Standards Institute

FCI
Furnish Charging Information. An INAP operation sent from ACS to the SSP to control the contents of EDRs produced by the SSP.

GPRS
General Packet Radio Service - employed to connect mobile cellular users to PDN (Public Data Network - for example the Internet).

HTML
HyperText Markup Language, a small application of SGML used on the World Wide Web.
It defines a very simple class of report-style documents, with section headings, paragraphs, lists, tables, and illustrations, with a few informational and presentational items, and some hypertext and multimedia.

**IN**

Intelligent Network

**INAP**

Intelligent Network Application Part - a protocol offering real time communication between IN elements.

**ISDN**

Integrated Services Digital Network - set of protocols for connecting ISDN stations.

**MSISDN**

Mobile Station ISDN number. Uniquely defines the mobile station as an ISDN terminal. It consists of three parts; the country code (CC), the national destination code (NDC) and the subscriber number (SN).

**Oracle**

Oracle Corporation

**PLMN**

Public Land Mobile Network

**SCI**

Send Charging Information. An INAP operation sent from ACS to the SSP to control real time charging by the SSP.

**SGML**


**SGSN**

Serving GPRS Support Node

**SLEE**

Service Logic Execution Environment

**SMS**

Depending on context, can be:
- Short Message Service
- Service Management System platform
- NCC Service Management System application
SN
Service Number

SSP
Service Switching Point

Switching Point
Anything that can send and receive C7 messages.

TCAP
Transaction Capabilities Application Part – layer in protocol stack, message protocol.
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