Copyright

Copyright © 2013, Oracle and/or its affiliates. All rights reserved.

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish, or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

If this is software or related documentation that is delivered to the U.S. Government or anyone licensing it on behalf of the U.S. Government, the following notice is applicable:

U.S. GOVERNMENT END USERS: Oracle programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, delivered to U.S. Government end users are "commercial computer software" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, use, duplication, disclosure, modification, and adaptation of the programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, shall be subject to license terms and license restrictions applicable to the programs. No other rights are granted to the U.S. Government.

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications that may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate fail-safe, backup, redundancy, and other measures to ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

This software or hardware and documentation may provide access to or information on content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services.
## Contents

About This Document ........................................................................................................... v
Document Conventions ......................................................................................................... vi

### Chapter 1

**System Overview** ........................................................................................................... 1
  - Overview ......................................................................................................................... 1
  - What is the CAP3GPRS Control Agent? ........................................................................ 1

### Chapter 2

**Configuration** ................................................................................................................ 3
  - Overview ......................................................................................................................... 3
  - Configuration Overview ............................................................................................... 3
  - eserv.config Configuration .......................................................................................... 4
  - Switch Type Configuration for CAP3GPRS ................................................................. 4
  - CAP3GPRS eserv.config Configuration ...................................................................... 6
  - SLEE.cfg Configuration ............................................................................................... 17
  - Incoming and Outgoing Session Data .......................................................................... 18
  - Parameter Mappings ..................................................................................................... 21

### Chapter 3

**Background Processes** .................................................................................................. 25
  - Overview ......................................................................................................................... 25
  - cap3gprsControlAgent Process .................................................................................... 25
  - Statistics Logged by the CAP3GPRS Control Agent .................................................. 25

### Chapter 4

**CAP3GPRS Operations and Message Sequences** ......................................................... 27
  - Overview ......................................................................................................................... 27
  - Supported CAP3 GPRS and CAP3 INAP Operations ................................................... 27
  - GPRS Context Flows ..................................................................................................... 28
  - Message Flows for GPRS Sessions .............................................................................. 37
  - Activity Test Flows ......................................................................................................... 43

### Chapter 5

**Troubleshooting** ............................................................................................................. 45
  - Overview ......................................................................................................................... 45
  - Message Sequences and Memory Leaks ....................................................................... 45

### Chapter 6

**About Installation and Removal** .................................................................................. 47
  - Overview ......................................................................................................................... 47
  - Installation and Removal Overview .............................................................................. 47
About This Document

Scope
The scope of this document includes all the information required to install, configure and administer the Oracle Communications Network Charging and Control (NCC) CAP version 3 GPRS Control Agent (CAP3GPRS Control Agent) application.

Audience
This guide was written primarily for system administrators and persons installing, configuring and administering the CAP3GPRS Control Agent application. However, sections of the document may be useful to anyone requiring an introduction to the application.

Prerequisites
A solid understanding of UNIX and a familiarity with IN concepts are essential prerequisites for safely using the information contained in this technical guide. Attempting to install, remove, configure or otherwise alter the described system without the appropriate background skills could cause damage to the system; including temporary or permanent incorrect operation, loss of service, and may render your system beyond recovery.

A familiarity with the CAP version 3 GPRS protocol is also required. Refer to the following document:
CAMEL Application Part (CAP) specification (3GPP TS 29.078), version 4.8.0 Release 4
This manual describes system tasks that should only be carried out by suitably trained operators.

Related documents
The following documents are related to this document:

- ACS Technical Guide
- CAP3GPRS Compliance Protocol Conformance Statement 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><strong>Italics</strong></td>
<td>Name of a document, chapter, topic or other publication. Emphasis within text.</td>
</tr>
<tr>
<td><strong>Button</strong></td>
<td>The name of a button to click or a key to press. <strong>Example:</strong> To close the window, either click <strong>Close</strong>, or press <strong>Esc</strong>.</td>
</tr>
<tr>
<td><strong>Key+Key</strong></td>
<td>Key combinations for which the user must press and hold down one key and then press another. <strong>Example:</strong> Ctrl+P, or Alt+F4.</td>
</tr>
<tr>
<td><strong>Monospace</strong></td>
<td>Examples of code or standard output.</td>
</tr>
<tr>
<td><strong>Monospace Bold</strong></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. <strong>Example:</strong> Operator Functions &gt; Report Functions <strong>Example:</strong> /IN/html/SMS/Helptext/</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.
Overview

Introduction

This chapter provides a high-level overview of the Oracle Communications Network Charging and Control (NCC) CAP version 3 GPRS Control Agent (CAP3GPRS Control Agent). It describes the main functionality and components of the CAP3GPRS Control Agent.

This guide is not intended to advise on any specific NCC network or service implications of the product.

In this chapter

This chapter contains the following topics.

What is the CAP3GPRS Control Agent?

What is the CAP3GPRS Control Agent?

Introduction

The CAP3GPRS Control Agent is a SLEE application that translates between CAP3 GPRS messages and internal INAP operations.

The CAP3GPRS protocol is used to charge for data usage on GSM mobile devices.

Billing Using the UATB Feature Node

You should include the Universal Attempt Termination with Billing (UATB) feature node in control plans that are triggered by the CAP3GPRS Control Agent. You use the UATB feature node to bill for sessions.

For more information about the UATB feature node, see NCC Feature Nodes Reference Guide.

Note: For volume billing, time will be converted to volume by using the multiplication factor set in conversionFactor (on page 14). A single GPRS request may bill for time or volume, but not both.
System Overview Diagram

This diagram shows how the CAP3GPRS Control Agent is implemented in an NCC system.

For more information about NCC system architecture, see the discussion on NCC system architecture in the *NCC System Administrator's Guide*. 
Overview

Introduction

This chapter describes the configuration options for the Oracle Communications Network Charging and Control (NCC) CAP version 3 GPRS Control Agent (CAP3GPRS Control Agent).

In this chapter

This chapter contains the following topics.

Configuration Overview
eserv.config Configuration
Switch Type Configuration for CAP3GPRS
CAP3GPRS eserv.config Configuration
SLEE.cfg Configuration
Incoming and Outgoing Session Data
Parameter Mappings

Configuration Overview

Introduction

This section provides a high-level overview of how you configure the CAP3GPRS Control Agent.

The configuration files contain some configuration settings that are not explained in this chapter. These configuration settings are required by the application and should not be changed.

Configuration Components

This table lists the components of the CAP3GPRS Control Agent that you can configure, and the configuration file where each component is configured.

<table>
<thead>
<tr>
<th>Component</th>
<th>Configuration File</th>
<th>Further Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAP3GPRS switch type</td>
<td>Configure the switch type for CAP3GPRS in the acsCharging section of eserv.config on SLC nodes.</td>
<td>Switch Type Configuration for CAP3GPRS (on page 4)</td>
</tr>
<tr>
<td>cap3gprsControlAgent</td>
<td>Configure the cap3gprsControlAgent binary in the CAP3GPRS section of eserv.config on SLC nodes.</td>
<td>CAP3GPRS eserv.config Configuration (on page 6)</td>
</tr>
<tr>
<td>cap3gprsControlAgent application</td>
<td>Configure the cap3gprsControlAgent application and the ACSGPRS service in SLEE.cfg on SLC nodes.</td>
<td>SLEE.cfg Configuration (on page 17) and SLEE Technical Guide</td>
</tr>
</tbody>
</table>
eserv.config Configuration

Introduction

The `eserv.config` file is a shared configuration file, from which many NCC applications read their configuration. Each NCC machine (SMS, SLC, and VWS) has its own version of this configuration file, containing configuration relevant to that machine. The `eserv.config` file contains different sections; each application reads the sections of the file that contain data relevant to it.

The `eserv.config` file is located in the `/IN/service_packages/` directory.

The `eserv.config` file format uses hierarchical groupings, and most applications make use of this to divide up the options into logical groupings.

Example Configuration File

Most applications come with an example of the section of the `eserv.config` configuration specific to that application, in a file called `eserv.config.example` in the root of the application directory. The example file for CAP3GPRS Control Agent is:

```
/IN/service_packages/CAP3GPRS/etc/eserv.config.example
```

This example file contains commented examples of all of the parameters you can use to configure the application. You can use the example configuration for reference if you need to update the configuration for the control agent in the `eserv.config` file; for example, to add an optional parameter configuration.

Switch Type Configuration for CAP3GPRS

Introduction

The `acsCharging` section of `eserv.config` defines the switch types used to control the switch communication flows for the UATB feature node. You use the UATB feature node in control plans that are triggered by the CAP3GPRS Control Agent, to bill for sessions.

You must include a definition for the `cap3` switch type in the `acsCharging` section of `eserv.config`.

Example: This example shows the default `cap3` switch type configuration.

```
acsCharging = {
    switchConfiguration = [
        {
            switchType = "cap3"
            addContinue = false
            addDisconnectOrRelease = false
        }
    ]
}
```

For more information about `acsCharging` configuration, see *NCC Charging Control Services Technical Guide*.

acsCharging Parameters

**switchConfiguration**

*Syntax:* `switchConfiguration = [switch_parameters]`

*Description:* Defines the switch type that will be used by the control agent during sessions.

*Type:* Array

*Optionality:* Required
Default: None

Notes: Additional switch types may be defined for other services. For more information, see NCC Charging Control Services Technical Guide.

Example:

```python
switchConfiguration = [
    {
        switchType = "cap3"
        addContinue = false
        addDisconnectOrRelease = false
    }
]
```

switchType

Syntax: `switchType = "str"`

Description: Sets the switch type for a UATB feature node.

Type: String

Optionality: Required

Allowed: Use "cap3" switch type for CAP3GPRS.

Default: None

Example: `switchType = "cap3"`

addContinue

Syntax: `addContinue = true|false`

Description: Defines whether the UATB feature node should enable send responses, add responses, and continue responses to the TCAP to enable charging for a successful subsequent reservation on the Voucher and Wallet Server.

Type: Boolean

Optionality: Optional (default used if not set)

Allowed: true, false

Default: false

Example: `addContinue = false`

addDisconnectOrRelease

Syntax: `addDisconnectOrRelease = true|false`

Description: Sets whether the UATB feature node can release or disconnect sessions during billing scenarios; for example, if the calling party has exhausted his or her funds or the maximum call limit has been reached.

Type: Boolean

Optionality: Optional (default used if not set)

Allowed: 
- true – Enable release or disconnect calls
- false – Disable release or disconnect calls

Default: false

Example: `addDisconnectOrRelease = true`
CAP3GPRS eserv.config Configuration

Introduction

The CAP3GPRS section in eserv.config configures the cap3gprsControlAgent binary process. See cap3gprsControlAgent Process (on page 25) for details.

Note: The CAP3GPRS Control Agent is configured at installation time by the post installation configuration script that runs automatically. You only need to modify this configuration if you want to change the default configuration.

Example CAP3GPRS Section

Here is an example CAP3GPRS section in the eserv.config configuration file.

```plaintext
CAP3GPRS = {
    sleepTimeMicroseconds = 10000
    sendContinueWithApplyCharging = true
    sendContinueWithRRGPRSE = true
    defaultCalledPartyNumber = "4839100008"
    defaultBillingType = 1
    defaultSessionTreatment = 1
    armAllEdpsAtOnce = true
    displayMessageSequences = false
    minimumInstancesForObjectCounting = 1000
    tssf = 10
    maxInactiveTimeForVolume = 600
    timeBillingInactiveTimeTolerance = 10
    activityTestResultTimeout = 10
    tcapInterfaceName = "sua_if"
    alarmOnLatency = true
    latencyInterval = 10
    releaseCauseInsufficientFunds = 26
    releaseCauseNetworkError = 38
    sendAbortForDetachEventType = false
    sendAbortForDisconnectEventType = false

    Services = [ 
        { 
            serviceName = "AcsGprs"
            gprsServiceKey = 8111
            sleeServiceKey = 1
            inapServiceKey = 110
            calledPartyNumber = "4839100009"
            billingType = 1
            conversionFactor = 104857.6
            sessionTreatment = 1
        }
    ]

    NumberRules = [ 
        { fromNoa=4, remove=0, prepend="00" } 
        { fromNoa=3, remove=0, prepend="0064" } 
    ]

    Tracing = {
        OrigAddress = [ 
            "0064212",
            "0064213",
        ]
    }
}
```
```
"0064214"
]
DestAddress = [
   "0064213",
   "0064214"
]

traceDebugLevel = "cap3gprsMessageSequences"
}
}

**CAP3GPRS Parameters**

### sleepTimeMicroseconds

**Syntax:**

```plaintext
sleepTimeMicroseconds = microsecs
```

**Description:**

The maximum number of microseconds to sleep when there are no SLEE events to process.

**Type:**

Integer

**Optionality:**

Optional (default used if not set)

**Default:**

100

**Example:**

```plaintext
sleepTimeMicroseconds = 10000
```

### sendContinueWithApplyCharging

**Syntax:**

```plaintext
sendContinueWithApplyCharging = true|false
```

**Description:**

Whether or not to send ContinueGPRS operations with ApplyCharging INAP operations

**Type:**

Boolean

**Optionality:**

Optional (default used if not set)

**Allowed:**

- true – send ContinueGPRS
- false – do not send ContinueGPRS

**Default:**

true

**Example:**

```plaintext
sendContinueWithApplyCharging = true
```

### sendContinueWithRRGPRSE

**Syntax:**

```plaintext
sendContinueWithRRGPRSE = true|false
```

**Description:**

Whether or not to send ContinueGPRS messages with RequestReportGPRSEvent INAP operations.

**Type:**

Boolean

**Optionality:**

Optional (default used if not set)

**Allowed:**

- true – Send ContinueGPRS
- false – Do not send ContinueGPRS

**Default:**

true

**Example:**

```plaintext
sendContinueWithRRGPRSE = true
```
defaultCalledPartyNumber
Syntax: defaultCalledPartyNumber = "num"
Description: The default called party BCD number to put in the InitialDP that is used by CCS for CLI-DN charging.
Type: String
Optionality: Optional (default used if not set)
Allowed: A valid destination number.
Default: 0000
Example: defaultCalledPartyNumber = "4839100008"

defaultBillingType
Syntax: defaultBillingType = int
Description: Sets the default billing type to either time or volume.
Type: Integer
Optionality: Optional (default used if not set)
Allowed: 0 – Sets the default billing type to time.
        1 – Sets the default billing type to volume.
Default: 1
Example: defaultBillingType = 0

defaultSessionTreatment
Syntax: defaultSessionTreatment = int
Description: Defines the default method used by CAP3GPRS Control Agent to handle InitialDPGPRS operations during a session.
Type: Integer
Optionality: Optional (default used if not set)
Allowed: 1 – Send ApplyCharging INAP operations for the duration of the session and do not arm PDP context establishment.
        2 – Send ContinueGPRS operations, and monitor individual PDP contexts during the session, but do not monitor the session as a whole.
Default: 1
Example: defaultSessionTreatment = 1

armAllEdpsAtOnce
Syntax: armAllEdpsAtOnce = true|false
Description: Whether to arm all EDPs in a single RequestReportGPRSEvent operation, or wait for ContextEstablishmentAcknowledgement before arming disconnect.
Type: Boolean
Optionality: Optional (default used if not set)
Allowed: true – Arm all EDPs in a single RequestReportGPRSEvent operation.
        false – Wait for ContextEstablishmentAcknowledgement
Default: true
Example: armAllEdpsAtOnce = true
displayMessageSequences

Syntax:  
displayMessageSequences = true|false

Description:  
Whether or not to display message sequences to standard output. Message sequences are displayed as one line per message.

Type:  
Boolean

Optionality:  
Optional (default used if not set)

Allowed:  
- true – Display message sequences to standard output
- false – Do not display message sequences

Default:  
false

Notes:  
Here is an example message output:
SLEECALLID 1234567 GPRS SCF->slee_acs:TCAP_BEGIN(InitialDP)  
slee_acs:TCAP_CONTINUE(ApplyCharging(releaseIfDurationExceeded)n,RequestReportBCSNEvent\n,Continue)  
GPRS SCF->SGSN:TCAP_CONTINUE(RequestReportBCSNEvent(ContextEstablishmentAcknowledgement\n,disconnect)\n,ContinueGPRS)  
SGSN->GPRS SCF:TCAP_END()  
....

You can use grep and sed UNIX commands to collect all the output from a particular session and remove the first two fields from each line. The output would then look like this:
GPRS SCF->slee_acs:TCAP_BEGIN(InitialDP)  
slee_acs->GPRS  
SCF:TCAP_CONTINUE(ApplyCharging(releaseIfDurationExceeded)n,RequestReportBCSNEvent\n,Continue)  
GPRS SCF->SGSN:TCAP_CONTINUE(RequestReportBCSNEvent(ContextEstablishmentAcknowledgement\n,disconnect)\n,ContinueGPRS)  
SGSN->GPRS SCF:TCAP_END()  
....

You can then convert this type of output to a graphical message sequence, by using a web-based sequence diagrams tool. For example:
http://www.plantuml.com/plantuml/

Example:  
displayMessageSequences = true

minimumInstancesForObjectCounting

Syntax:  
minimumInstancesForObjectCounting = int

Description:  
Sets the minimum number of instances allowed of a class for object counting debugging. For example, if you set the cap3gprsObjectReport debug flag, then the CAP3GPRS Control Agent prints a debug line every time the number of a class of objects reaches a multiple of minimumInstancesForObjectCounting.

You can use the reported output to help identify the source of any memory leaks. See Finding the cause of a memory leak (on page 46) for more information.

Type:  
Integer

Optionality:  
Optional (default used if not set)

Default:  
1000

Notes:  
If you set the cap3gprsObjectCounts debug flag, then the CAP3GPRS Control Agent produces one debug line every time the number of objects for a class changes.

For more information about debug and debug flags, see NCC System Administrator's Guide.

Example:  
minimumInstancesForObjectCounting = 900
### tssf

**Syntax:**
\[
\text{tssf} = \text{secs}
\]

**Description:**
Sets the tssf timer in seconds. The CAP3GPRS Control Agent runs this timer whenever it sends an operation to slee_acs that needs a response. If the timer expires before sle_acs responds, the control agent logs an error and closes the dialog with the GGSN.

**Type:**
Integer

**Optionality:**
Optional (default used if not set)

**Default:**
10

**Example:**
\[
\text{tssf} = 10
\]

### maxInactiveTimeForVolume

**Syntax:**
\[
\text{maxInactiveTimeForVolume} = \text{secs}
\]

**Description:**
Sets the number of seconds to wait before sending ActivityTestGPRS operations for volume billing.

**Type:**
Integer

**Optionality:**
Optional (default used if not set)

**Default:**
3600

**Notes:**
This parameter does not apply when billing by time.

**Example:**
\[
\text{maxInactiveTimeForVolume} = 600
\]

### timeBillingInactiveTimeTolerance

**Syntax:**
\[
\text{timeBillingInactiveTimeTolerance} = \text{secs}
\]

**Description:**
Sets the number of seconds to add to the time taken for duration billing in ApplyCharging INAP operations. This value is used to calculate the time to wait before sending ActivityTestGPRS operations.

**Type:**
Integer

**Optionality:**
Optional (default used if not set)

**Default:**
10

**Notes:**
This parameter does not apply when billing by volume.

**Example:**
\[
\text{timeBillingInactiveTimeTolerance} = 10
\]

### activityTestResultTimeout

**Syntax:**
\[
\text{activityTestResultTimeout} = \text{secs}
\]

**Description:**
How long to wait (in seconds) for an ActivityTestGPRS result.

**Type:**
Integer

**Optionality:**
Optional (default used if not set)

**Default:**
10

**Example:**
\[
\text{activityTestResultTimeout} = 10
\]

### tcapInterfaceName

**Syntax:**
\[
\text{tcapInterfaceName} = "\text{if\_name}"
\]

**Description:**
The TCAP interface name to use for sending ActivityTestGPRS operations. The named interface must be configured in SLEE.cfg. For information about configuring interfaces in SLEE.cfg, see NCC Service Logic Execution Environment Technical Guide.

**Type:**
String
**Optionality:** Required

**Default:** None

**Notes:** If this configuration entry is missing or empty, then the ActivityTestGPRS operation will not be sent.

**Example:**

tcapInterfaceName = "sua_if"

Where sua_if is the name for the SIGTRAN TCAP interface.

**alarmOnLatency**

**Syntax:** alarmOnLatency = true|false

**Description:** Sets whether or not notice alarms should be generated with latency information for IDPs and ACRs (Diameter Accounting-Request Commands), for example when waiting on slee_acs.

**Type:** Boolean

**Optionality:** Optional (default used if not set)

**Allowed:**
- true – Include latency information
- false – Do not include latency information

**Default:** false

**Example:**
alarmOnLatency = true

**latencyInterval**

**Syntax:** latencyInterval = secs

**Description:** How long (in seconds) to wait between each latency report.

**Type:** Integer

**Optionality:** Optional (default used if not set)

**Default:** 60

**Notes:** To prevent any latency reporting, set latencyInterval to 0 (zero).

**Example:**

latencyInterval = 10

**releaseCauseInsufficientFunds**

**Syntax:** releaseCauseInsufficientFunds = int

**Description:** The cause value to send in the releaseGPRS message when a call is released due to insufficient funds.

**Type:** Integer

**Optionality:** Optional (default used if not set)

**Default:** 26 – ‘Insufficient resources’ SM cause in TS 24.008

**Notes:** Because the SGSN does not necessarily follow TS 24.009, another cause value may be more appropriate than 26, for a given SGSN.

**Example:**

releaseCauseInsufficientFunds = 26

**releaseCauseNetworkError**

**Syntax:** releaseCauseNetworkError = int

**Description:** The cause value to send in releaseGPRS messages when a call is released due to a network error, such as a timeout, or an incorrect message sequence.

**Type:** Integer

**Optionality:** Optional (default used if not set)

**Default:** 38 – ‘Network failure’ SM cause in TS 24.008
Notes: Because the SGSN does not necessarily follow TS 24.008, another cause value may be more appropriate than 38, for a given SGSN.
Example: releaseCauseNetworkError = 38

sendAbortForDetachEventType
Syntax: sendAbortForDetachEventType = true|false
Description: Whether to send TCAP_ABORT or ContinueGPRS in response to a ‘detach’ GPRS event type in an InitialDPGPRS.
Type: Boolean
Optionality: Optional (default used if not set)
Allowed:  
  • true – Send TCAP_ABORT in the response.
  • false – Send ContinueGPRS in the response.
Default: false
Example: sendAbortForDetachEventType = true

sendAbortForDisconnectEventType
Syntax: sendAbortForDisconnectEventType = true|false
Description: Whether to send TCAP_ABORT or ContinueGPRS in response to a ‘disconnect’ GPRS event type in an InitialDPGPRS.
Type: Boolean
Optionality: Optional (default used if not set)
Allowed:  
  • true – Send TCAP_ABORT in the response.
  • false – Send ContinueGPRS in the response.
Default: false
Example: sendAbortForDisconnectEventType = true

Services Parameters
You configure a CAP3GPRS service by configuring the parameters in the CAP3GPRS, Services section of eserv.config. You can configure one or more services.

The following example Services section configures the AcsGprs service:

```
Services = [
    {
        serviceName = "AcsGprs"
        gprsServiceKey = 8111
        slesServiceKey = 1
        inapServiceKey = 110
        calledPartyNumber = "4839100009"
        billingType = 1
        conversionFactor = 104857.6
        sessionTreatment = 1
    }
]
```

serviceName
Syntax: serviceName = "name"
Description: The unique name of the service.
Type: String
Optionality: Mandatory
Allowed: Any string
Default: Default
Example:: serviceName = "AcsGprs"

**gprsServiceKey**

Syntax: \texttt{gprsServiceKey = int}

Description: The incoming GPRS service key number.

Type: Integer

Optionality: Optional (default used if not set)

Default: 1

Example: \texttt{gprsServiceKey = 8111}

**sleeServiceKey**

Syntax: \texttt{sleeServiceKey = int}

Description: The SLEE service key for the serviceName (on page 12) service. Used when sending an InitialDP to the SLEE. For more information about service keys, see *NCC Service Logic Execution Environment Technical Guide*.

Type: Integer

Optionality: Optional (default used if not set)

Default: 1

Example: \texttt{sleeServiceKey = 12}

**inapServiceKey**

Syntax: \texttt{inapServiceKey = int}

Description: Sets the INAP service key to use when sending InitialDP to the SLEE.

Type: Integer

Optionality: Optional (default used if not set)

Default: 1

Example: \texttt{inapServiceKey = 110}

**calledPartyNumber**

Syntax: \texttt{calledPartyNumber = "called_number"}

Description: The called party BCD number to put in the InitialDP. It is used by CCS for CLI-DN charging.

Type: String

Optionality: Optional (default used if not set)

Allowed: A valid destination number.

Default: Defaults to the value specified in the defaultCalledPartyNumber parameter.

Example: \texttt{calledPartyNumber = "4839100009"}

**billingType**

Syntax: \texttt{billingType = int}

Description: Sets whether to bill based on time or volume.

Type: Integer

Optionality: Optional (default used if not set)
Chapter 2

Allowed: 0 – Sets the billing type to time
         1 – Sets the billing type to volume
Default: Defaults to the value of defaultBillingType.
Example: billingType = 1

collectionFactor
Syntax:  conversionFactor = num
Description: The conversion factor to use when communicating with ACS to change
deciseconds to octets. This factor is applied only when billingType is set to 1
(for volume billing).
Type: Float
Optionality: Optional (default used if not set)
Default: 104857.6 (converts one megabyte to one second)
Notes: The billing engine charges based on the number of deciseconds used. When
charging by volume, the number of “fake” deciseconds is calculated by applying
the conversion factor to the number of bytes used. The actual conversion factor
used is determined by the system administrator responsible for designing the
service.
Example: conversionFactor = 104857.6

sessionTreatment
Syntax:  sessionTreatment = int
Description: Sets how the CAP3GPRS Control Agent handles an InitialDPGPRS operation for
a session.
Type: Integer
Optionality: Optional (default used if not set)
Allowed:
   1 – Send ApplyCharging INAP operations for the duration of the session
       and do not arm PDP context establishment.
   2 – Send ContinueGPRS operations to monitor individual PDP contexts
during the session, but do not monitor the session as a whole.
Default: Defaults to the value of defaultSessionTreatment.
Example: sessionTreatment = 1

NumberRules Parameters
You can configure the number normalization rules for the CAP3GPRS Control Agent by configuring the
parameters in the optional NumberRules section of eserv.config.
Example:

NumberRules = [
   { fromNoa=4, min=1, max=9, remove=0, prepend="" } 
   { fromNoa=3, remove=0, prepend="0064", prefix="", targetNoa=4 } 
   { fromNoa=1, remove=0, prepend="0064", prefix="", targetNoa=4 } 
]

fromNoa
Syntax:  fromNoa = int
Description: Used when attempting to match the nature of address (NoA) number contained in
a message. If there is a match, the fromNoa part of the number rule is evaluated.
Type: Integer
Optionality: Required
Allowed: 2 – For unknown NoAs
3 – For national NoAs
4 – For international NoAs
Notes: If you omit fromNoa from the NumberRules parameter section, then no matching rule will be found.
Example: fromNoa = 3

max
Syntax: max = num
Description: Specifies the maximum number of digits a number may contain. To meet the max part of the number rule, the number of digits in the number must be equal to or less than the value of max.
Type: Integer
Optionality: Optional (default used if not set)
Default: 999
Example: max = 9

min
Syntax: min = num
Description: Specifies the minimum number of digits a number may contain. To meet the min part of the number rule, the number of digits in the number must be equal to or greater than the value of min.
Type: Integer
Optionality: Optional (default used if not set)
Default: 0
Notes: The value of the min parameter must be greater than or equal to the value of the remove (on page 16) parameter.
Example: min = 5

prefix
Syntax: prefix = "pref"
Description: Contains a digit or digits. Used to attempt to match the first digit or digits of a prefix number with the specified value. If the digit or digits match, the prefix part of the number rule is met.
Type: String
Optionality: Optional
Allowed: One or more decimal digits
Notes: This parameter is an element of the NumberRules parameter array.
Example: prefix = "25"

prepend
Syntax: prepend = "digits"
Description: Defines digits added to the beginning of a number.
Type: String
Optionality: Optional
Allowed: Any combination of decimal digits, or a null string ("").
Notes:
- If the remove and prepend parameters are both used in the same number rule, "prepend" is added to the beginning of the number after the number has been modified by the remove parameter.
- The prepend parameter is an element of the NumberRules parameter array.
Example: prepend = "0"

remove
Syntax: remove = num
Description: The number of digits stripped from the beginning of a number.
Type: Integer
Optionality: Required
Notes: The value of the remove parameter must be less than or equal to the value of the min (on page 15) parameter.
Example: remove = 2

targetNoa
Syntax: targetNoa = int
Description: Target nature of address.
Type: Integer
Optionality: Optional
Notes:
- A value is typically specified in denormalization rules.
- The targetNoa parameter is an element of the NumberRules parameter array.
Example: targetNoa = 4

Tracing Parameters
The following parameters are used for tracing activities. They are all found within the Tracing = { } statement.

enabled
Syntax: enabled = true|false
Description: Switches tracing on or off.
Type: Boolean
Optionality: Optional
Allowed: true, false
Default: false
Notes: If false, then the parameters in the Tracing section are ignored.
Example: enabled = false

OrigAddress
Syntax: OrigAddress = ["addr","addr"...]
Description: Lists the originating addresses to be traced.
Type: String
SLEE.cfg Configuration

Introduction

The SLEE.cfg file is configured to enable the CAP3GPRS Control Agent to work. All necessary SLEE configuration is done at installation time by the configuration script; this section is for information only.

The SLEE configuration file is located in /IN/service_packages/SLEE/etc/SLEE.cfg.

See SLEE Technical Guide for information about configuring the SLEE.
Chapter 2

CAP3GPRS Control Agent SLEE Configuration

During installation, the following lines are automatically added to the configuration in SLEE.cfg:

```
APPLICATION=cap3GprsControlAgent cap3GprsControlAgent.sh
/IN/service_packages/CAP3GPRS/bin 1 1 1000
SERVICE=ACSGPRS 1 cap3GprsControlAgent ACSGPRS
SERVICEKEY=INTEGER 8111 ACSGPRS
```

**Note:** SLEE.cfg must contain at least one SERVICE line and one SERVICEKEY line referring to the cap3GprsControlAgent APPLICATION line.

**SERVICEKEY values**

Here is an example SERVICEKEY entry in SLEE.cfg.

```
SERVICEKEY=INTEGER 0x1920000004b ACSGPRS
```

In this example the SERVICEKEY has the value of 0x1920000004b. This number can be broken down into three parts.

1. The service key always starts with 0x1.
2. The next two digits (92) are the SCCP sub-system number from the SCCP called party address in hexadecimal digits.
3. The last digits are the serviceKey parameter in InitialDPGPRS operations (also in hex).

The example configuration causes all InitialDPGPRS operations sent to sub-system number 146 and with serviceKey 75, to use the ACSGPRS service.

Example Configuration

```
APPLICATION=cap3GprsControlAgent cap3GprsControlAgent.sh
/IN/service_packages/CAP3GPRS/bin 1 1 1000
SERVICE=ACSGPRS 1 cap3GprsControlAgent ACSGPRS
SERVICEKEY=INTEGER 0x1000000004b ACSGPRS
SERVICEKEY=INTEGER 0x1920000004b ACSGPRS
SERVICEKEY=INTEGER 0x1920000004c ACSGPRS
SERVICEKEY=INTEGER 8111 ACSGPRS
SERVICEKEY=INTEGER 8112 ACSGPRS
SERVICEKEY=INTEGER 8113 ACSGPRS
SERVICEKEY=INTEGER 8114 ACSGPRS
SERVICEKEY=INTEGER 8115 ACSGPRS
```

Incoming and Outgoing Session Data

**Introduction**

The CAP3GPRS Control Agent determines incoming and outgoing session data values from ACS profile tag values.

**Note:** Profile tags are stored in profile blocks and configured in the ACS user interface (UI). See the discussion on ACS configuration in *NCC Advanced Control Services User's Guide* for more information.

**IDP Extensions Parameter**

The CAP3GPRS Control Agent passes a profile block to ACS in the InitialDP.extensions parameter as extension type 701. The slee_acs process makes the profile tags from this profile block available to a feature node through the Session data, Incoming Session Data option in the feature node configuration window.
IDP Profile Tags
This table lists the information written into IDP extension type 701 by the CAP3GPRS Control Agent.

<table>
<thead>
<tr>
<th>Profile Tag Number</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>18030001</td>
<td>GPRS Access Point Name</td>
</tr>
<tr>
<td>18030002</td>
<td>GPRS Event Type</td>
</tr>
<tr>
<td>18030003</td>
<td>GPRS Requested QOS Delay Class</td>
</tr>
<tr>
<td>18030004</td>
<td>GPRS Requested QOS Reliability Class</td>
</tr>
<tr>
<td>18030005</td>
<td>GPRS Requested QOS Peak Throughput</td>
</tr>
<tr>
<td>18030006</td>
<td>GPRS Requested QOS Precedence Class</td>
</tr>
<tr>
<td>18030007</td>
<td>GPRS Requested QOS Mean Throughput</td>
</tr>
<tr>
<td>18030008</td>
<td>GPRS Long Requested QOS Priority Level</td>
</tr>
<tr>
<td>18030009</td>
<td>GPRS Long Requested QOS Traffic Class</td>
</tr>
<tr>
<td>18030010</td>
<td>GPRS Long Requested QOS Delivery Order</td>
</tr>
<tr>
<td>18030011</td>
<td>GPRS Long Requested QOS Delivery Of Erroneous SDU</td>
</tr>
<tr>
<td>18030012</td>
<td>GPRS Long Requested QOS Max SDU Size</td>
</tr>
<tr>
<td>18030013</td>
<td>GPRS Long Requested QOS Max Bit Rate For Up Link</td>
</tr>
<tr>
<td>18030014</td>
<td>GPRS Long Requested QOS Max Bit Rate For Down Link</td>
</tr>
<tr>
<td>18030015</td>
<td>GPRS Long Requested QOS Residual BER</td>
</tr>
<tr>
<td>18030016</td>
<td>GPRS Long Requested QOS SDU Error Ratio</td>
</tr>
<tr>
<td>18030017</td>
<td>GPRS Long Requested QOS Transfer Delay</td>
</tr>
<tr>
<td>18030018</td>
<td>GPRS Long Requested QOS Traffic Handling Priority</td>
</tr>
<tr>
<td>18030019</td>
<td>GPRS Long Req QOS Guaranteed Rate For Up Link</td>
</tr>
<tr>
<td>18030020</td>
<td>GPRS Long Req QOS Guaranteed Rate For Down Link</td>
</tr>
<tr>
<td>18030021</td>
<td>GPRS Subscribed QOS Delay Class</td>
</tr>
<tr>
<td>18030022</td>
<td>GPRS Subscribed QOS Reliability Class</td>
</tr>
<tr>
<td>18030023</td>
<td>GPRS Subscribed QOS Peak Throughput</td>
</tr>
<tr>
<td>18030024</td>
<td>GPRS Subscribed QOS Precedence Class</td>
</tr>
<tr>
<td>18030025</td>
<td>GPRS Subscribed QOS Mean Throughput</td>
</tr>
<tr>
<td>18030026</td>
<td>GPRS Long Subscribed QOS Priority Level</td>
</tr>
<tr>
<td>18030027</td>
<td>GPRS Long Subscribed QOS Traffic Class</td>
</tr>
<tr>
<td>18030028</td>
<td>GPRS Long Subscribed QOS Delivery Order</td>
</tr>
<tr>
<td>18030029</td>
<td>GPRS Long Subscribed QOS Delivery Of Erroneous SDU</td>
</tr>
<tr>
<td>18030030</td>
<td>GPRS Long Subscribed QOS Max SDU Size</td>
</tr>
<tr>
<td>18030031</td>
<td>GPRS Long Subscribed QOS Max Bit Rate For Up Link</td>
</tr>
<tr>
<td>18030032</td>
<td>GPRS Long Subscribed QOS Max Rate For Down Link</td>
</tr>
<tr>
<td>18030033</td>
<td>GPRS Long Subscribed QOS Residual BER</td>
</tr>
<tr>
<td>18030034</td>
<td>GPRS Long Subscribed QOS SDU Error Ratio</td>
</tr>
<tr>
<td>18030035</td>
<td>GPRS Long Subscribed QOS Transfer Delay</td>
</tr>
<tr>
<td>18030036</td>
<td>GPRS Long Subscribed QOS Traffic Handling Priority</td>
</tr>
<tr>
<td>18030037</td>
<td>GPRS Long Sub QOS Guaranteed Rate For Up Link</td>
</tr>
<tr>
<td>18030038</td>
<td>GPRS Long Sub QOS Guaranteed Rate For Down Link</td>
</tr>
<tr>
<td>18030039</td>
<td>GPRS Negotiated QOS Delay Class</td>
</tr>
<tr>
<td>Profile Tag Number</td>
<td>Name</td>
</tr>
<tr>
<td>--------------------</td>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>18030040</td>
<td>GPRS Negotiated QOS Reliability Class</td>
</tr>
<tr>
<td>18030041</td>
<td>GPRS Negotiated QOS Peak Throughput</td>
</tr>
<tr>
<td>18030042</td>
<td>GPRS Negotiated QOS Precedence Class</td>
</tr>
<tr>
<td>18030043</td>
<td>GPRS Negotiated QOS Mean Throughput</td>
</tr>
<tr>
<td>18030044</td>
<td>GPRS Long Negotiated QOS Priority Level</td>
</tr>
<tr>
<td>18030045</td>
<td>GPRS Long Negotiated QOS Traffic Class</td>
</tr>
<tr>
<td>18030046</td>
<td>GPRS Long Negotiated QOS Delivery Order</td>
</tr>
<tr>
<td>18030047</td>
<td>GPRS Long Negotiated QOS Delivery Of Erroneous SDU</td>
</tr>
<tr>
<td>18030048</td>
<td>GPRS Long Negotiated QOS Max SDU Size</td>
</tr>
<tr>
<td>18030049</td>
<td>GPRS Long Negotiated QOS Max Bit Rate For Up Link</td>
</tr>
<tr>
<td>18030050</td>
<td>GPRS Long Negotiated QOS Max Rate For Down Link</td>
</tr>
<tr>
<td>18030051</td>
<td>GPRS Long Negotiated QOS Residual BER</td>
</tr>
<tr>
<td>18030052</td>
<td>GPRS Long Negotiated QOS SDU Error Ration</td>
</tr>
<tr>
<td>18030053</td>
<td>GPRS Long Negotiated QOS Transfer Delay</td>
</tr>
<tr>
<td>18030054</td>
<td>GPRS Long Negotiated QOS Traffic Handling Priority</td>
</tr>
<tr>
<td>18030055</td>
<td>GPRS Long Neg QOS Guaranteed Rate For Up Link</td>
</tr>
<tr>
<td>18030056</td>
<td>GPRS Long Neg QOS Rate For Down Link</td>
</tr>
<tr>
<td>18030057</td>
<td>GPRS Routing Area Identity Country Code</td>
</tr>
<tr>
<td>18030058</td>
<td>GPRS Routing Area Identity Network Code</td>
</tr>
<tr>
<td>18030059</td>
<td>GPRS Routing Area Identity Location Area Code</td>
</tr>
<tr>
<td>18030060</td>
<td>GPRS Routing Area Identity Routing Area Code</td>
</tr>
<tr>
<td>18030061</td>
<td>GPRS Charging ID</td>
</tr>
<tr>
<td>18030062</td>
<td>GPRS SGSN Capabilities</td>
</tr>
<tr>
<td>18030063</td>
<td>GPRS Location Information Country Code</td>
</tr>
<tr>
<td>18030064</td>
<td>GPRS Location Information Network Code</td>
</tr>
<tr>
<td>18030065</td>
<td>GPRS Location Information Location Area Code</td>
</tr>
<tr>
<td>18030066</td>
<td>GPRS Location Information Cell Identity</td>
</tr>
<tr>
<td>18030067</td>
<td>GPRS Location Information SAI Present</td>
</tr>
<tr>
<td>18030068</td>
<td>GPRS PDP Initiation Type</td>
</tr>
<tr>
<td>18030069</td>
<td>GPRS GGSN Address</td>
</tr>
<tr>
<td>18030070</td>
<td>GPRS Secondary PDP Context</td>
</tr>
<tr>
<td>18030071</td>
<td>GPRS Billing Type</td>
</tr>
<tr>
<td>18030072</td>
<td>GPRS SGSN Number Digits</td>
</tr>
<tr>
<td>18030073</td>
<td>GPRS SGSN Number NoA</td>
</tr>
</tbody>
</table>

**ApplyChargingReport.extensions Parameter**

The CAP3GPRS Control Agent passes a profile block to ACS in the `ApplyChargingReport.extensions` parameter as extension type 701. The `slee_acs` process makes the profile tags from this profile block available to feature node through the `Session data, Incoming Session Data` option in the feature node configuration window.
ApplyCharging Report Profile Tags
This table lists the information written into ApplyChargingReport extension type 701 by the CAP3GPRS Control Agent.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>18030201</td>
<td>GPRS Total Transferred Volume</td>
</tr>
<tr>
<td>18030202</td>
<td>GPRS 32 Bit Transferred Volume</td>
</tr>
<tr>
<td>18030203</td>
<td>GPRS Transferred Volume Rollover</td>
</tr>
</tbody>
</table>

Connect.extensions Parameter
When a feature node writes session data into the feature node configuration option for outgoing session data, the slee_acs sends a profile block in the Connect.extensions parameter as extension type 701. The CAP3GPRS Control Agent can then use the applicable profile tags from this profile block.

Connect Profile Tags
This table lists the information derived from the outgoing connect extension type 701 by the CAP3GPRS Control Agent.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>18030001</td>
<td>GPRS Access Point Name</td>
</tr>
<tr>
<td>18030071</td>
<td>GPRS Billing Type</td>
</tr>
</tbody>
</table>

Parameter Mappings
Introduction
This section describes the mappings between INAP parameters and CAP3GPRS parameters.

GPRS Parameters Received from the SGSN
This table lists the mappings for GPRS parameters received from the SGSN.

<table>
<thead>
<tr>
<th>GPRS Parameter</th>
<th>Mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>InitialIDPGPRS.serviceKey</td>
<td>Identifies the correct service using the configuration defined in the CAP3GPRS, Services section of eserv.config.</td>
</tr>
<tr>
<td>InitialIDPGPRS.gPRSEventType</td>
<td>Put in IDP.incomingExtensions. Used by the state machine logic, for example, when selecting billing type.</td>
</tr>
<tr>
<td>InitialIDPGPRS.requestedQOS</td>
<td>Put in IDP.incomingExtensions.</td>
</tr>
<tr>
<td>InitialIDPGPRS.subscriberQOS</td>
<td>Put in IDP.incomingExtensions.</td>
</tr>
<tr>
<td>InitialIDPGPRS.negotiatedQOS</td>
<td>Put in IDP.incomingExtensions.</td>
</tr>
<tr>
<td>InitialIDPGPRS.routingIdentity</td>
<td>Put in IDP.incomingExtensions.</td>
</tr>
<tr>
<td>InitialIDPGPRS.chargingID</td>
<td>Put in IDP.incomingExtensions.</td>
</tr>
</tbody>
</table>
### GPRS Parameters Sent to SGSN

This table lists the GPRS parameters sent to SGSN, and defines how they are set.

<table>
<thead>
<tr>
<th>GPRS Parameter</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>RequestReportGPRS.eventtypeGPRS</td>
<td>Set by state machine logic.</td>
</tr>
<tr>
<td>RequestReportGPRS.monitorMode</td>
<td>Set by state machine logic.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GPRS Parameter</th>
<th>Mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>InitialIDPGPRS.sGSNCapabilities</td>
<td>Put in IDP.incomingExtensions.</td>
</tr>
<tr>
<td>InitialIDPGPRS.cellGlobalAreaIdOrServiceAreaIdOrLAI</td>
<td>Put in IDP.incomingExtensions.</td>
</tr>
<tr>
<td>InitialIDPGPRS.sai_Present</td>
<td>Put in IDP.incomingExtensions.</td>
</tr>
<tr>
<td>InitialIDPGPRS.pDPInitiationType</td>
<td>Put in IDP.incomingExtensions.</td>
</tr>
<tr>
<td>InitialIDPGPRS.gGSNAddress</td>
<td>Put in IDP.incomingExtensions.</td>
</tr>
<tr>
<td>InitialIDPGPRS.sgsnNumber</td>
<td>Put in IDP.incomingExtensions.</td>
</tr>
<tr>
<td>InitialIDPGPRS.secondaryPDP-context</td>
<td>Put in IDP.incomingExtensions.</td>
</tr>
<tr>
<td>InitialIDPGPRS.mSISDN</td>
<td>Put in IDP.callingpartynumber.</td>
</tr>
<tr>
<td>InitialIDPGPRS.IMSI</td>
<td>Put in IDP.IMSI.</td>
</tr>
<tr>
<td>InitialIDPGPRS.accessPointName</td>
<td>Put in IDP.incomingExtensions.</td>
</tr>
<tr>
<td>EntityReleasedGPRS.gPRSCause</td>
<td>Put in EventReportBCSM.routeSelectFailureSpecificInfo</td>
</tr>
<tr>
<td>ApplyChargingReportGPRS.volumeIfNoTariffSwitch</td>
<td>Add 4294967296 multiplied by transferredVolumeRollover. Divide by conversion factor and put in ApplyChargingReport.timeIfNoTariffSwitch. Put the unmodified value of volumeIfNoTariffSwitch (without applying the conversion factor) in ApplyChargingReport.incomingExtensions.</td>
</tr>
<tr>
<td>ApplyChargingReportGPRS.timeGPRSIfNoTariffSwitch</td>
<td>Multiply by 10 and put in ApplyCharging.timeIfNoTariffSwitch.</td>
</tr>
<tr>
<td>EventReportGPRS.GPRSEventType</td>
<td>Used in state machine logic and put in ApplyChargingReport.callActive.</td>
</tr>
</tbody>
</table>

---

22 NCC CAP3GPRS Control Agent Technical Guide
### GPRS Parameter Definition

<table>
<thead>
<tr>
<th>GPRS Parameter</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ApplyChargingGPRS.maxElapsedTime</td>
<td>Set to ApplyCharging.maxDuration divided by 10 for duration billing.</td>
</tr>
<tr>
<td>ApplyChargingGPRS.maxTransferredVolume</td>
<td>Set to ApplyCharging.maxDuration multiplied by conversion factor for volume billing.</td>
</tr>
<tr>
<td>connectGPRS.accessPointName</td>
<td>Set from Connect.outgoingExtensions.</td>
</tr>
<tr>
<td>FurnishChargingGPRS.fciGPRSBillingCharacteristics</td>
<td>Set from FurnishChargingInformation.fciBillingChargingCharacteristics.</td>
</tr>
<tr>
<td>SendChargingGPRS sciGPRS SBillingChargingCharacteristics</td>
<td>Set from SendChargingInformation.sciBillingChargingCharacteristics.</td>
</tr>
</tbody>
</table>

### INAP Parameters Sent to slee_acs

This table lists the INAP parameters sent to slee_acs, and defines how they are set.

<table>
<thead>
<tr>
<th>INAP Parameter</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDP.callingPartyNumber</td>
<td>Set to IDPGPRS.mSISDN.</td>
</tr>
<tr>
<td>IDP.iMSI</td>
<td>Set to IDPGPRS.iMSI.</td>
</tr>
<tr>
<td>IDP.calledPartyBCDNumber</td>
<td>Set from the calledpartyNumber defined in the CAP3GPRS, Services section of eserv.config.</td>
</tr>
<tr>
<td>IDP.eventTypeBCSM</td>
<td>Set to analyzedInformation.</td>
</tr>
<tr>
<td>IDP.bearerCapability</td>
<td>Set to indicated “Speech” for duration billing or “unrestricted digital information with tones and announcements” for volume billing.</td>
</tr>
<tr>
<td>IDP.extensions</td>
<td>The binary data that is placed in extension 701 (incoming extensions), and that contains various pieces of information, such as the transferredVolumeRollover value.</td>
</tr>
<tr>
<td>ApplyChargingReport.callActive</td>
<td>Set to ApplyChargingReportGPRS.active or to false if in StateOpenFinal.</td>
</tr>
<tr>
<td>ApplyChargingReport.callReleaseAtTcpExpiry</td>
<td>Only set if ApplyChargingReportGPRS (active = true) is received in StateOpenFinal.</td>
</tr>
<tr>
<td>ApplyChargingReport.timeoutIfNoTariffSwitch</td>
<td>Set to one of:</td>
</tr>
<tr>
<td></td>
<td>10 * (elapsedTime + 86400 * elapsedTimeRollover) for duration billing</td>
</tr>
<tr>
<td></td>
<td>(transferredVolume + 4294967296) / conversion factor for volume billing</td>
</tr>
<tr>
<td>EventReportBCSM.routeSelectFailureSpecificInfo</td>
<td>Set to EntityReleaseGPRS.gPRSCause.</td>
</tr>
<tr>
<td>EventReportBCSM.messageType</td>
<td>If EventReportBCSM.eventTypeBCSM is set to:</td>
</tr>
<tr>
<td></td>
<td>routeSelectFailure (RSF) then EventReportBCSM.messageType is set to request.</td>
</tr>
<tr>
<td></td>
<td>oDisconnect or oAnswer then EventReportBCSM.messageType is set to notification.</td>
</tr>
<tr>
<td>EventReportBCSM.receivingSideID</td>
<td>Set to leg 1.</td>
</tr>
</tbody>
</table>
### INAP Parameter Definition

<table>
<thead>
<tr>
<th>INAP Parameter</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>EventReportBCSM.oDisconnectSpecificInfo</td>
<td>Set to 31.</td>
</tr>
<tr>
<td>EventReportBCSM.eventTypeBCSM</td>
<td>Set according to state machine logic to one of:</td>
</tr>
<tr>
<td></td>
<td>• routeSelectFailure</td>
</tr>
<tr>
<td></td>
<td>• oAnswer</td>
</tr>
<tr>
<td></td>
<td>• oDisconnect</td>
</tr>
</tbody>
</table>

### INAP Parameters Received from slee_acs

This table lists the INAP parameters received from slee_acs and how they are mapped in GPRS.

<table>
<thead>
<tr>
<th>INAP Parameter</th>
<th>GPRS Mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>ApplyCharging.releaseDurationExceeded</td>
<td>Put into either StateOpen or StateOpenFinal as determined by the state machine.</td>
</tr>
<tr>
<td>ApplyCharging.maxDuration</td>
<td>For duration billing, divide by ten and put in the ApplyChargingGPRS.maxElapsedTime parameter. For volume billing, multiply by conversion factor and put in the ApplyChargingGPRS.maxTransferredVolume parameter.</td>
</tr>
<tr>
<td>Connect.extensions</td>
<td>Outgoing extensions (extension 701) used to change billing type to set access point name in ConnectGPRS.</td>
</tr>
<tr>
<td>EventReportBCSM.eventTypeBCSM</td>
<td>Used in state machine logic.</td>
</tr>
<tr>
<td>EventReportBCSM.monitorMode</td>
<td>Used in state machine logic.</td>
</tr>
<tr>
<td>Connect.destinationRoutingAddress</td>
<td>Ignored.</td>
</tr>
<tr>
<td>ReleaseCall.reason</td>
<td>Used in ReleaseGPRS.fciGPRSBilling.</td>
</tr>
<tr>
<td>FurnishChargingInformation.fciBilling ChargingCharacteristics</td>
<td>Put in FurnishChargingGPRS.fciGPRSBilling ChargingCharacteristics</td>
</tr>
<tr>
<td>SendChargingInformation.sciBilling ChargingCharacteristics</td>
<td>Put in SendChargingGPRS.sciGPRSBilling ChargingCharacteristics.</td>
</tr>
</tbody>
</table>
Overview

Introduction

This chapter describes the background process that is run automatically by the Oracle Communications Network Charging and Control (NCC) CAP version 3 GPRS Control Agent (CAP3GPRS Control Agent) and lists the statistics that are logged by the control agent.

In this chapter

This chapter contains the following topics.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>cap3gprsControlAgent Process</td>
<td>25</td>
</tr>
<tr>
<td>Statistics Logged by the CAP3GPRS Control Agent</td>
<td>25</td>
</tr>
</tbody>
</table>

cap3gprsControlAgent Process

Purpose

The cap3gprsControlAgent binary is a SLEE application that translates between CAP3 GPRS messages and CAP3 INAP operations. It enables a CAP3 SGSN client to talk to a CAP3 SCF such as CCS or ACS.

Startup

The cap3gprsControlAgent binary process is started automatically by the SLEE. For more information, see SLEE.cfg Configuration (on page 17).

Configuration

The cap3gprsControlAgent binary process is configured by the CAP3GPRS section in eserv.config. For details, see CAP3GPRS eserv.config Configuration (on page 6).

Failure

If the cap3gprsControlAgent fails, no operations will be processed for the CAP3GPRS Control Agent.

Statistics Logged by the CAP3GPRS Control Agent

Introduction

CAP3GPRS statistics are generated by each Service Logic Controller (SLC), and then transferred at periodic intervals to the Service Management System (SMS) for permanent storage and analysis.

The statistics are logged by the smsStats functions provided by the SMS application. For more information, see SMS Technical Guide.
CAP3GPRS Statistics

The following statistics are logged for the CAP3GPRS Control Agent. Each statistic logged has APPLICATION_ID = ‘CAP3GPRS’ (application number 113):

- IDPGPRS_RECEIVED
- GPRS_TIMED_OUT
- IN_TIMED_OUT
- ENDED_IN_ERROR
- CHARGED_USER_DISCONNECTED
- CHARGED_TERMINATED_NO_FUNDS
- RELEASED
- NOT_CHARGED
- CHARGED
- CHARGED_ERROR
- CONTINUE_GPRS_NO_TRIGGER
- IDP_SENT
- NOT_CHARGED_CONNECT
- NOT_CHARGED_CONTINUE

For each statistic, the gprsEventType from the original InitailDPGPRS is put into the statistics detail field, SMF_STATISTICS.DETAIL, in the form of a string (for example: “ContextEstablishment”).

CAP3GPRS Statistics Reports

You can generate the following statistics reports for the CAP3GPRS Control Agent:

- CAP3GPRS System Stats
- CAP3GPRS System Stats by EDP

For each report type, you can specify whether to report on all entries or only totals. When you run the CAP3GPRS System Stats by EDP report, you specify the EDP to report on by selecting one of the following EDPs:

- attach
- attachChangeOfPosition
- ContextEstablishment
- ContextEstablishmentAcknowledgement, or
- Unsupported

Chapter 4

CAP3GPRS Operations and Message Sequences

Overview

Introduction

This chapter lists the INAP and GPRS operations supported by the Oracle Communications Network Charging and Control (NCC) CAP version 3 GPRS Control Agent (CAP3GPRS Control Agent), and provides example message sequence charts that show the flows through the software when messages are sent or received by the CAP3GPRS Control Agent.

In this chapter

This chapter contains the following topics.

Supported CAP3 GPRS and CAP3 INAP Operations 27
GPRS Context Flows 28
Message Flows for GPRS Sessions 37
Activity Test Flows 43

Supported CAP3 GPRS and CAP3 INAP Operations

CAP3 GPRS Supported Operations

The CAP3GPRS Control Agent supports the following CAP3 GPRS operations:

- ApplyChargingReportGPRS
- EntityReleasedGPRS
- EventReportGPRS
- InitialDPGPRS
- ApplyChargingGPRS
- RequestReportGPRSEvent
- ConnectGPRS
- ContinueGPRS
- ReleaseGPRS
- SendChargingInformationGPRS
- FurnishChargingInformationGPRS

CAP3 INAP Supported Operations

The CAP3GPRS Control Agent supports the following CAP3 INAP operations:

- ApplyCharging
- ApplyChargingReport
- Connect
GPRS Context Flows

Introduction

This section details the GPRS PDP context flows that the CAP3GPRS Control Agent can produce. For all these message sequences the IDPGRS.gprsEventType is 11 (ContextEstablishment).

Received ApplyCharging(releaseIfDurationExceeded)

Here is an example message sequence for an ApplyCharging(releaseIfDurationExceeded) operation received by the CAP3GPRS Control Agent.
Note: Billing can be configured for either duration or volume.
Credit Expiry Example 1

Here is an example message sequence for a credit expiry after several successful balance updates.
INAP Connect, New accessPointName, with No Charging

Here is an example message sequence where an INAP connect specifies a new accessPointName with no charging.

![Message sequence diagram]

TCAP_BEGIN(InitialDPGPRS(gprsEventType=ContextEstablishment))
GPRS SCF
Slee_acs

TCAP_BEGIN(InitialDP)

TCAP_CONTINUE(ConnectGPRS(accessPointName))

TCAP_END(Connect(accessPointName))

TCAP_END()}
INAP Connect, New accessPointName, with Charging

Here is an example message sequence where an INAP connect specifies a new accessPointName with charging.

TCAP_BEGIN(InitialDPGPRS
(gprsEventType=ContextEstablishment))

TCAP_CONTINUE(ApplyCharging)
TCAP_CONTINUE(ApplyChargingReport)
TCAP_CONTINUE(ApplyCharging)
TCAP_CONTINUE(ApplyChargingReport)
INAP Continue Received

Here is an example message sequence for an INAP Continue received.

```
TCAP_BEGIN(InitialDPGPRS
    (gprsEventType=ContextEstablishment))

TCAP_CONTINUE(RequestReportGPRSEvent
    (ContextEstablishmentAcknowledgement,disconnect)
    ,ContinueGPRS)

TCAP_END()  

TCAP_BEGIN(EventReportGPRS
    (ContextEstablishmentAcknowledgement))

TCAP_CONTINUE(EventReportGPRSAck
    ,ApplyChargingGPRS
    ,ContinueGPRS)

TCAP_END()  

TCAP_BEGIN(ApplyChargingReportGPRS(gprsActive=false))

TCAP_CONTINUE(ApplyChargingReportGPRSAck)

TCAP_CONTINUE(EventReportGPRS(disconnect))

TCAP_CONTINUE(EventReportGPRSAck)

TCAP_END()
```

```
TCAP_BEGIN(InitialDP)

TCAP_CONTINUE(ApplyCharging(releaseIfDurationExceeded)
    ,RequestReportBCSMEvent
    ,Continue)

TCAP_CONTINUE(EventReportBCSMDisconnect)

TCAP_CONTINUE(EventReportGPRS(disconnect))

TCAP_CONTINUE(ApplyChargingReport)

TCAP_END(EventReportBCSM(oDisconnect))
```
User Disconnects with Charging

Here is an example message sequence for user disconnects with charging.
PDP Context Detached, Example 1

Here is an example message sequence for a PDP context detached before context establishment acknowledgement (first variant).

\[\text{SGSN} \xrightarrow{\text{TCAP\_BEGIN(InitialDPGPRS (gprsEventType=ContextEstablishment))}} \text{GPRS SCF} \xrightarrow{\text{TCAP\_BEGIN(InitialDP)}} \text{Slee\_acs} \xrightarrow{\text{TCAP\_BEGIN(ReleaseCall)}}\]

\[\text{TCAP\_CONTINUE(RequestReportGPRSEvent (ContextEstablishmentAcknowledgement, disconnect), ContinueGPRS)} \xrightarrow{\text{TCAP\_END()}} \text{SGSN} \]
PDP Context Detached, Example 2

Here is an example message sequence for a PDP context detached before context establishment acknowledgement (second variant).

ReleaseCall Operation Received from slee_acs

Here is an example message sequence for a ReleaseCall operation received from slee_acs.
Message Flows for GPRS Sessions

Introduction to GPRS Sessions

This section details the message sequences that the CAP3GPRS Control Agent can produce for GPRS sessions. The message sequences start with an InitialDPGPRS for the session as a whole (rather than for individual PDP contexts). The CAP3GPRS Control Agent will not arm the ContextEstablishment or ContextEstablishmentAcknowledgement EDPs for these sessions. This means that billing for individual PDP contexts must be done by using separate InitialDPGPRS operations, and therefore the control agent will only charge for the session as a whole. The IDPGPRS.gprsEventType is 1 (attach) in all cases.

Note: Volume billing is not available for GPRS sessions.
**Received ApplyCharging(releaseDurationExceeded)**

Here is an example message sequence for a `ApplyCharging(releaseDurationExceeded)` operation received by the CAP3GPRS Control Agent.
Credit Expiry, Example 2

Here is an example message sequence for credit expiry after several successful balance updates.
INAP Connect, New accessPointName with No Charging

Here is an example message sequence for INAP connect request that specifies new accessPointName with no charging. This shows what can happen when an error occurs during control plan processing. The CAP3GPRS protocol does not support changing accessPointName for event types other than ContextEstablishment and therefore aborts the dialog.

INAP Connect, New accessPointName, with Charging

Here is an example message sequence for INAP connect request that specifies new accessPointName with charging. This example shows what can happen when an error occurs during control plan processing. The CAP3GPRS protocol does not support changing accessPointName for event types other than ContextEstablishment and therefore aborts the dialog.
INAP Continue Received

Here is an example INAP continue received message sequence.

```
TCAP_BEGIN(InitialDPGPRS
    (gprsEventType=Attach))
GPRS SCF
Slee_acs
TCAP_BEGIN(InitialDP)
TCAP_CONTINUE(ContinueGPRS)
TCAP_END()
TCAP_END(Continue)
```
User Disconnects with Charging

Here is an example user disconnects with charging message sequence.
**ReleaseCall Operation from slee_acs**

Here is an example message sequence for a ReleaseCall operation received from slee_acs.

```
TCAP_BEGIN(InitialDPGPRS
  (gprsEventType=Attach))
GPRS SCF
SGSN Slee_acs
TCAP_BEGIN(InitialDP)
TCAP_CONTINUE(ReleaseGPRS)
TCAP_END()
TCAP_END(ReleaseCall)
```

**No Charging for Session**

Here is an example message sequence for sessions with no charging.

```
TCAP_BEGIN(InitialDPGPRS
  (gprsEventType=Attach))
GPRS SCF
SGSN
TCAP_CONTINUE(ContinueGPRS)
TCAP_END()
```

**Activity Test Flows**

**Inactive Session Check**

If a session has been inactive (no TCAP messages have been received) for longer than the maximum period configured for the operation timer, then the CAP3GPRS Control Agent sends an ActivityTestGPRS to the SGSN to determine whether the session is still open.
ActivityTestGPRS Message Sequence Example
Here is an example ActivityTestGPRS message sequence. The session is aborted if it is no longer active.
Overview

Introduction

This chapter explains how to investigate message sequences and memory leaks in the Oracle Communications Network Charging and Control (NCC) CAP version 3 GPRS Control Agent (CAP3GRPS Control Agent).

In this chapter

This chapter contains the following topics.

Message Sequences and Memory Leaks

Message Sequences and Memory Leaks

Determining the Message Sequence for a Session

This example explains how you can set the Tracing.OrigAddress and Tracing.traceDebugLevel parameters and then determine the message sequence for a session by starting a data session using a test phone.

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Open the eserv.config configuration file, located in the /IN/service_packages/ directory, in a text editor.</td>
</tr>
<tr>
<td>2</td>
<td>Set Tracing.OrigAddress to:</td>
</tr>
<tr>
<td></td>
<td>OrigAddress = [ &quot;num&quot; ]</td>
</tr>
<tr>
<td></td>
<td>Where num is your test phone number (that is, the calling number).</td>
</tr>
<tr>
<td>3</td>
<td>Set Tracing.traceDebugLevel to:</td>
</tr>
<tr>
<td></td>
<td>cap3gprsMessageSequences</td>
</tr>
<tr>
<td>4</td>
<td>Save and close the eserv.config file.</td>
</tr>
<tr>
<td>5</td>
<td>Force the cap3gprsControlAgent to re-read its configuration by entering the following command:</td>
</tr>
<tr>
<td></td>
<td>-kill -HUP pid</td>
</tr>
<tr>
<td></td>
<td>Where pid is the PID for the cap3gprsControlAgent binary.</td>
</tr>
<tr>
<td>6</td>
<td>Start a data session using your test phone.</td>
</tr>
<tr>
<td>7</td>
<td>Look at the cap3gprsControlAgent.log file. You should see a line like this for each test session:</td>
</tr>
<tr>
<td></td>
<td>SLEECALLID num GPRS SCF-&gt;slee_acs:TCAP-BEGIN(InitialDP)</td>
</tr>
<tr>
<td></td>
<td>Where num is your test phone number.</td>
</tr>
</tbody>
</table>
### Finding the Cause of a Memory Leak

To find the cause of a memory leak:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
</table>
| 1    | Insert the following lines into the `cap3GprsControlAgent.sh` startup file immediately before the `exec` line:  
    DEBUG=cap3gprsObjectReport  
    export DEBUG  
| 2    | Ensure that a debug line is not written each time an object is created or deleted by adding the following line in the CAP3GPRS section of `eserv.config`:  
    minimumInstancesForObjectCounting = 1000  
| 3    | Restart the SLEE by entering the following command as the user root:  
    SUPPORT/bin/slee-ctrl start  
    Each time the number of a particular type of object reaches a multiple of 1000, a line will be written to the log file detailing the number of this type of object. This will make any object that is leaking easy to identify. |

### Example `cap3GprsControlAgent.sh` Startup File

```bash
#!/usr/bin/bash  
DEBUG=cap3gprsObjectReport  
export DEBUG  
exec /IN/service_packages/CAP3GPRS/bin/cap3GprsControlAgent >>  
/IN/service_packages/CAP3GPRS/tmp/cap3GprsControlAgent.log
```
Overview

Introduction

This chapter provides information about the installed components for the Oracle Communications Network Charging and Control (NCC) CAP version 3 GPRS Control Agent (CAP3GPRS Control Agent) and the CAP3GPRS files you can check for to ensure the control agent was successfully installed.

In this chapter

This chapter contains the following topics.

Installation and Removal Overview

Installation and Removal Overview

Introduction

For information about the following requirements and tasks, see NCC Installation Guide:

- NCC system requirements
- Pre-installation tasks
- Installing and removing NCC packages

CAP3GPRS Control Agent Installed Packages

When you install the CAP3GPRS Control Agent, the following packages are installed:

- The cap3gpsrsSms package on the SMS node
- The cap3gpsrsScp package on the SLC node

Checking the cap3gpsrsSms Installation

Check that the following directories have been created on the SMS:

/IN/service_packages/CAP3GPRS/db
/IN/service_packages/CAP3GPRS/lib

Checking the cap3gpsrsScp Installation

Check that the following directories have been created on the SLC:

/IN/service_packages/CAP3GPRS/bin
/IN/service_packages/CAP3GPRS/etc
/IN/service_packages/CAP3GPRS/lib
/IN/service_packages/CAP3GPRS/tmp
Check that the binary and the example configuration file for the CAP3GPRS Control Agent have been installed on the SLC:

/IN/services_packages/CAP3GPRS/bin/cap3GprsControlAgent
/IN/services_packages/CAP3GPRS/etc/eserv.config.example
NCC Glossary of Terms

AAA

ACS
Advanced Control Services configuration platform.

ANI
Automatic Number Identification - Term used in the USA by long-distance carriers for CLI.

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.

CLI
Calling Line Identification - the telephone number of the caller. Also referred to as ANI.

Connection
Transport level link between two peers, providing for multiple sessions.

Diameter
A feature rich AAA protocol. Utilises SCTP and TCP transports.

DP
Detection Point
EDP
Event Detection Point.

FDA
First Delivery Attempt - the delivery of a short message directly to the SME rather than relaying it through the MC.

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

GSM
Global System for Mobile communication.
It is a second generation cellular telecommunication system. Unlike first generation systems, GSM is digital and thus introduced greater enhancements such as security, capacity, quality and the ability to support integrated services.

HLR
The Home Location Register is a database within the HPLMN (Home Public Land Mobile Network). It provides routing information for MT calls and SMS. It is also responsible for the maintenance of user subscription information. This is distributed to the relevant VLR, or SGSN (Serving GPRS Support Node) through the attach process and mobility management procedures such as Location Area and Routing Area updates.

HPLMN
Home PLMN

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.

IDP
INAP message: Initial DP (Initial Detection Point)

IMSI
International Mobile Subscriber Identifier. A unique identifier allocated to each mobile subscriber in a GSM and UMTS network. It consists of a MCC (Mobile Country Code), a MNC (Mobile Network Code) and a MSIN (Mobile Station Identification Number).
The IMSI is returned by the HLR query (SRI-SM) when doing FDA. This tells the MSC exactly who the subscriber is that the message is to be sent to.

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

Initial DP
Initial Detection Point - INAP Operation. This is the operation that is sent when the switch reaches a trigger detection point.

ISUP
ISDN User Part - part of the SS7 protocol layer and used in the setting up, management, and release of trunks that carry voice and data between calling and called parties.

ITU
International Telecommunication Union

MC
Message Centre. Also known as SMSC.

MCC
Mobile Country Code. In the location information context, this is padded to three digits with leading zeros. Refer to ITU E.212 (“Land Mobile Numbering Plan”) documentation for a list of codes.

MNC
Mobile Network Code. The part of an international address following the mobile country code (MCC), or at the start of a national format address. This specifies the mobile network code, that is, the operator owning the address. In the location information context, this is padded to two digits with a leading zero. Refer to ITU E.212 (“Land Mobile Numbering Plan”) documentation for a list of codes.

MS
Mobile Station

MSC
Mobile Switching Centre. Also known as a switch.

MSIN
Mobile Station Identification Number.

MT
Mobile Terminated

MTP
Message Transfer Part (part of the SS7 protocol stack).

Oracle
Oracle Corporation
PLMN
Public Land Mobile Network

SAI
Service Area Indicator. The 3G equivalent of a Cell ID. The smallest granularity (fourth component) of a location information field.

SCCP
Signalling Connection Control Part (part of the SS7 protocol stack).

SCF
Service Control Function - this is the application of service logic to control functional entities in providing Intelligent Network services.

SCTP
Stream Control Transmission Protocol. A transport-layer protocol analogous to the TCP or User Datagram Protocol (UDP). SCTP provides some similar services as TCP (reliable, in-sequence transport of messages with congestion control) but adds high availability.

Session
Diameter exchange relating to a particular user or subscriber access to a provided service (for example, a telephone call).

SGML

SGSN
Serving GPRS Support Node

SLC
Service Logic Controller (formerly UAS).

SLEE
Service Logic Execution Environment

SME
Short Message Entity - an entity which may send or receive Short Messages. It may be located in a fixed network, a mobile, or an SMSC.

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

**SN**
Service Number

**SRI**
Send Routing Information - This process is used on a GSM network to interrogate the HLR for subscriber routing information.

**SS7**
A Common Channel Signalling system used in many modern telecoms networks that provides a suite of protocols which enables circuit and non circuit related information to be routed about and between networks. The main protocols include MTP, SCCP and ISUP.

**System Administrator**
The person(s) responsible for the overall set-up and maintenance of the IN.

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

**TCP**
Transmission Control Protocol. This is a reliable octet streaming protocol used by the majority of applications on the Internet. It provides a connection-oriented, full-duplex, point to point service between hosts.

**VLR**
Visitor Location Register - contains all subscriber data required for call handling and mobility management for mobile subscribers currently located in the area controlled by the VLR.

**VWS**
Oracle Voucher and Wallet Server (formerly UBE).
# Index

**A**

AAA • 51  
About Installation and Removal • 49  
About This Document • v  
ACS • 51  
acsCharging Parameters • 5  
Activity Test Flows • 45  
ActivityTestGPRS Message Sequence Example • 46  
activityTestResultTimeout • 10  
addContinue • 5  
addDisconnectOrRelease • 5  
alarmOnLatency • 11  
ANI • 51  
ApplyCharging Report Profile Tags • 21  
ApplyChargingReport.extensions Parameter • 21  
amAllEdpsAtOnce • 8  
Audience • v

**B**

Background Processes • 27  
Billing Using the UATB Feature Node • 1  
billingType • 14

**C**

calledPartyNumber • 14  
CAMEL • 51  
CAP • 51  
CAP3 GPRS Supported Operations • 29  
CAP3 INAP Supported Operations • 29  
CAP3GPRS Control Agent Installed Packages • 49  
CAP3GPRS Control Agent SLEE Configuration • 18  
CAP3GPRS eserv.config Configuration • 3, 6, 27  
CAP3GPRS Operations and Message Sequences • 29  
CAP3GPRS Parameters • 7  
CAP3GPRS Statistics • 28  
CAP3GPRS Statistics Reports • 28  
cap3gprsControlAgent Process • 6, 27  
CC • 51  
CCS • 51  
Checking the cap3gprsScp Installation • 49  
Checking the cap3gprsSms Installation • 49  
CLI • 51  
Configuration • 3, 27  
Configuration Components • 3  
Configuration Overview • 3  
Connect Profile Tags • 22  
Connect.extensions Parameter • 22  
Connection • 51

**D**

cconversionFactor • 1, 14  
Copyright • ii  
Credit Expiry Example 1 • 32  
Credit Expiry, Example 2 • 41

**E**

defaultBillingType • 8  
defaultCalledPartyNumber • 8  
defaultSessionTreatment • 8  
DestAddress • 17  
Determining the Message Sequence for a Session • 47  
Diameter • 51  
displayMessageSequences • 9  
Document Conventions • vi  
DP • 51

**F**

Failure • 27  
FDA • 52  
Finding the Cause of a Memory Leak • 9, 48  
fromNoa • 15

**G**

GPRS • 52  
GPRS Context Flows • 30  
GPRS Parameters Received from the SGSN • 22  
GPRS Parameters Sent to SGSN • 23  
gprsServiceKey • 13  
GSM • 52

**H**

HLR • 52  
HPLMN • 52  
HTML • 52

**I**

IDP • 52  
IDP Extensions Parameter • 19  
IDP Profile Tags • 19  
IMSI • 52  
IN • 52  
Inactive Session Check • 45  
INAP • 53
INAP Connect, New accessPointName with No Charging • 42
INAP Connect, New accessPointName, with Charging • 34, 42
INAP Connect, New accessPointName, with No Charging • 33
INAP Continue Received • 35, 43
INAP Parameters Received from slee_acs • 25
INAP Parameters Sent to slee_acs • 24
inapServiceKey • 13
Incoming and Outgoing Session Data • 19
Initial DP • 53
Installation and Removal Overview • 49
Introduction • 1, 3, 4, 6, 18, 19, 22, 27, 30, 49
Introduction to GPRS Sessions • 39
ISUP • 53
ITU • 53
L
latencyInterval • 11
M
max • 15
maxInactiveTimeForVolume • 10
MC • 53
MCC • 53
Message Flows for GPRS Sessions • 39
Message Sequences and Memory Leaks • 47
min • 15, 16
minimumInstancesForObjectCounting • 9
MNC • 53
MS • 53
MSC • 53
MSIN • 53
MT • 53
MTP • 53
N
No Charging for Session • 45
NumberRules Parameters • 15
O
Oracle • 53
OrigAddress • 17
Overview • 1, 3, 27, 29, 47, 49
P
Parameter Mappings • 22
PDP Context Detached, Example 1 • 37
PDP Context Detached, Example 2 • 38
PLMN • 54
prefix • 16
prepend • 16
Prerequisites • v
Purpose • 27
R
Received
ApplyCharging(releaseDurationExceeded) • 40
Received
ApplyCharging(releaseIfDurationExceeded) • 30
Related documents • v
ReleaseCall Operation from slee_acs • 45
ReleaseCall Operation Received from slee_acs • 38
releaseCauseInsufficientFunds • 11
releaseCauseNetworkError • 12
remove • 16
S
SAI • 54
SCCP • 54
SCF • 54
Scope • v
SCTP • 54
sendAbortForDetachEventType • 12
sendAbortForDisconnectEventType • 12
sendContinueWithApplyCharging • 7
sendContinueWithRRGPRSE • 7
SERVICEKEY values • 18
serviceName • 13
Services Parameters • 12
Session • 54
sessionTreatment • 14
SGML • 54
SGSN • 54
SLC • 54
SLEE • 54
SLEE.cfg Configuration • 4, 18, 27
sleepTimeMicroseconds • 7
sleeServiceKey • 13
SME • 54
SMS • 54
SN • 55
SRI • 55
SS7 • 55
Startup • 27
Statistics Logged by the CAP3GPRS Control Agent • 27
Supported CAP3 GPRS and CAP3 INAP Operations • 29
Switch Type Configuration for CAP3GPRS • 3, 4
switchConfiguration • 5
switchType • 5
System Administrator • 55
System Overview • 1
System Overview Diagram • 2
T

targetNoa • 17
TCAP • 55
tcapInterfaceName • 11
TCP • 55
timeBillingInactiveTimeTolerance • 10
traceDebugLevel • 18
Tracing Parameters • 17
Troubleshooting • 47
tssf • 10
Typographical Conventions • vi

U

User Disconnects with Charging • 36, 44

V

VLR • 55
VWS • 55

W

What is the CAP3GPRS Control Agent? • 1