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About This Document

Scope

The scope of this document includes all the information required to administer the Diameter SY Interface.

Audience

This guide is written primarily for system administrators and other personnel who administer the Diameter SY Interface. However, the overview sections of the document are useful to anyone requiring an introduction to the application.

Prerequisites

Although it is not a prerequisite to using this guide, familiarity with the target platform would be an advantage.

A solid understanding of Unix and a familiarity with IN concepts are an essential prerequisite 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 Diameter protocol is also required. Refer to the following:

- Internet Engineering Task Force (IETF) specifications:
  - RFC 3588 – Diameter Base Protocol
  - RFC 4006 – Diameter Credit-Control Application
  - RFC 4005 – Diameter Network Access Server Application
- 3GPP TS 29.219 V14.1.0 (2017-03) - 3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; Policy and Charging Control: Spending Limit Reporting over Sy reference point (Release 14)

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:

- Advanced Control Services Technical Guide
- Charging Control Services Technical Guide
- Charging Control Services User's Guide
- Service Management System Technical Guide
- Service Management System User's Guide
- Service Logic Execution Environment Technical Guide
- Open Services Development User's and 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><strong>Special Bold</strong></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. Example: 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. Example: <strong>Ctrl+P</strong> or <strong>Alt+F4</strong>.</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><strong>variable</strong></td>
<td>Used to indicate variables or text that should be replaced with an actual value.</td>
</tr>
<tr>
<td><strong>menu option &gt; menu option &gt;</strong></td>
<td>Used to indicate the cascading menu option to be selected. Example: <strong>Operator Functions &gt; Report Functions</strong></td>
</tr>
<tr>
<td><strong>hypertext link</strong></td>
<td>Used to indicate a hypertext link.</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 application. It explains the basic functionality of the system and lists the main components.

It is not intended to advise on any specific Oracle Communications Network Charging and Control (NCC) network or service implications of the product.

In this Chapter

This chapter contains the following topics.
What is Diameter SY Interface? .......................................................... 1

What is Diameter SY Interface?

Introduction

The Diameter SY (DSY) Interface acts as the Sy reference point between an external Policy and Charging Rule Function (PCRF) and the OCS (Prepaid Charging).

Features

The following Command Codes specified in 3GPP TS 29.219 V14.1.0 (2017-03) are supported:

<table>
<thead>
<tr>
<th>Command-Name</th>
<th>Abbreviation</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spending-Limit-Request</td>
<td>SLR</td>
<td>8388635</td>
</tr>
<tr>
<td>Spending-Limit-Answer</td>
<td>SLA</td>
<td>8388635</td>
</tr>
<tr>
<td>Spending-Status-Notification-Request</td>
<td>SNR</td>
<td>8388636</td>
</tr>
<tr>
<td>Spending-Status-Notification-Answer</td>
<td>SNA</td>
<td>8388636</td>
</tr>
<tr>
<td>Session-Termination-Request</td>
<td>STR</td>
<td>275</td>
</tr>
<tr>
<td>Session-Termination-Answer</td>
<td>STA</td>
<td>275</td>
</tr>
</tbody>
</table>
Chapter 2

Sy Reference Point

Introduction

This section illustrates the architecture involved to facilitate the Sy Reference Point functionality.

Spending-Limit-Request

An Initial Spending Limit Request (SLR) shall be used by the PCRF to request the status of policy counters available at the OCS, and to subscribe to updates of policy counters by the OCS.
An Intermediate SLR shall be used by the PCRF to resubscribe to the policy counters provided by the OCS.

Spending-Limit-Answer

The Spending-Limit-Answer message is sent by the OCS to the PCRF as the result of the Initial or Intermediate Spending Limit Report Request procedure. The content of the SLA will contain a Policy-Counter-Status-Report AVP (2903).
Spending-Status-Notification-Request

The SNR procedure shall be used by the OCS to notify the PCRF of changes in the status of subscribed policy counter(s).

Spending-Status-Notification-Answer

The SNA command is sent by the PCRF to the OCS as part of the Spending Limit Report procedure.
Session-Termination-Request

The STR command is sent by the PCRF to the OCS as part of the Final Spending Limit Report Request procedure. The command will unsubscribe from all policy counter(s) belonging to the Diameter session and terminate the session.

Session-Termination-Answer

The STA command is sent by the OCS to the PCRF as part of the Final Spending Limit Report procedure.
Overview

Introduction

This chapter explains the process which runs automatically as part of the application. This process is started automatically by the SLEE.

In this chapter

This chapter contains the following topics.

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- eserv.config Configuration ........................................... 8
- DIAMETER eserv.config Configuration ............................... 8
- CCS eserv.config Configuration ..................................... 24
- SLEE.cfg Configuration ................................................ 25
- acs.conf Configuration .................................................. 25
- Prepaid Charging Dependency ........................................ 26

sylInterface

The sylInterface executable is a SLEE interface which converts between Diameter messages to enable a Diameter client to communicate with a Policy PCRF.

Configuration Overview

Introduction

The following configuration is delivered as part of the full package installation. The configuration delivered represents the minimum required to safely establish a running instance following a new installation.

The configuration needs to be applied manually for patch installations when the full package is older than 12.0.0.
Chapter 3

Configuration Components

The syInterface is configured by the following components directly on the host machine using command tools.

<table>
<thead>
<tr>
<th>Component</th>
<th>Locations</th>
<th>Description</th>
<th>Further Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>eserv.config</td>
<td>All SLC machines</td>
<td>DSY is configured by the DIAMETER section of eserv.config.</td>
<td>See the DIAMETER eserv.config Configuration section.</td>
</tr>
<tr>
<td>eserv.config</td>
<td>All SLC machines</td>
<td>DSY services mappings are configured in the CCS section of eserv.config.</td>
<td>See the CCS eserv.config Configuration section.</td>
</tr>
<tr>
<td>SLEE.cfg</td>
<td>All SLC machines</td>
<td>The SLEE interface is configured to include the DSY service.</td>
<td>See the SLEE.cfg Configuration section and the SLEE Technical Guide.</td>
</tr>
<tr>
<td>acs.conf</td>
<td>All SLC machines</td>
<td>Configures the ACS runtime services.</td>
<td>See the acs.conf Configuration section.</td>
</tr>
</tbody>
</table>

eserv.config Configuration

Introduction

The eserv.config file is a shared configuration file, from which many applications read their configuration. Each node 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 contains data relevant to it.

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

DIAMETER eserv.config Configuration

SYDefaults eserv.config Section

SYDefaults is a sub-section of the DIAMETER section.

These are the global values used by all DSY services.

Example SY Default Configuration

```plaintext
DIAMETER = {
    SYDefaults = {
        oracleUserAndPassword = "/@SCP"
        sleeServiceKey = 1243
        sleeTimeout = 15
        tcc = 0
    }
}
```
Parameters

Refer to Charging Control Services Technical Guide.

**oracleUserAndPassword**

Syntax: \( \text{oracleUserAndPassword} = \text{value} \)

Description: Database connection string

Type: String

Optionality: Optional (default used if not set)

Allowed: A string recognised by the SCP database as a valid database connection string

Default: "/@SCP"

Notes:

Example: \( \text{oracleUserAndPassword} = "/@SCP" \)

**sleeServiceKey**

Syntax: \( \text{sleeServiceKey} = \text{value} \)

Description: The Service Key value for the sylf SLEE interface.

Type: Integer

Optionality: Optional (default used if not set)

Allowed: This must match the SLEE.cfg service key entry for the sylf SLEE interface. See SLEE.cfg Configuration (on page 27).

Default: 1243

Notes:

Example: \( \text{sleeServiceKey} = 1243 \)

**sleeTimeOut**

Syntax: \( \text{sleeTimeOut} = \text{value} \)

Description: Duration (in seconds) to wait for a response from the SLEE before the session times out

Type: Integer

Optionality: Optional (default used if not set)

Allowed: Number of seconds

Default: 10

Notes:

Example: \( \text{sleeTimeOut} = 10 \)

**tcc**

Syntax: \( \text{tcc} = \text{value} \)

Description: The Session supervision timer timeout

Type: Integer

Optionality: Optional (default used if not set)

Allowed: Number of seconds

Default: 0 (never timeout)

Notes: Refer to RFC 4006.

Example: \( \text{tcc} = 0 \)
Minimum SY Default Configuration

None

SYInstances eserv.config Section

SYInstances is a sub-section of the DIAMETER section.

Example SYInstances Configuration

Here is an example SYInstance section in the DIAMETER configuration.

```
DIAMETER = {
  SYInstances = [
    {
      instanceName = "syIf" # Must be defined
      scheme = "SyScheme" # Must match an entry "PeerSchemes"
      originHostMustBeFQDN = true
      invalidMessageSequenceResultCode = 5012
      systemErrorResultCode = 5012
      snrClientTimeout = 30
      snrMaxRetry = 1
    }
  ] # End of SYInstances sections
} # End of DIAMETER section
```

Parameters

Refer to Charging Control Services Technical Guide.

**instanceName**

**Syntax:** `paraMeter = value`

**Description:** The number of seconds ........................

**Type:** Integer, Decimal, Array, Parameter list, String, Boolean

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

**Allowed:**

**Default:**

**Notes:**

**Example:** `paraMeter =`

**scheme**

**Syntax:** `scheme = value`

**Description:** The name of the scheme configuration this instance uses.

**Type:** String

**Optionality:** Mandatory

**Allowed:** This must be a SchemeName from the PeerSchemes section

**Default:** No default

**Notes:**

**Example:** `scheme = "SyScheme"`
originHostMustBeFQDN
Syntax: originHostMustBeFQDN = boolean
Description: Sets whether the Origin-Host needs to be a fully qualified domain name.
Type: Boolean
Optionality: Optional (default used if not set)
Allowed: true = DSY will reject messages
false = DSY will accept messages
Default: true
Notes: With this parameter set to true, DSY will reject messages from an Origin-Host which is not a fully qualified domain name. If this parameter is set to false, DSY will accept messages regardless of the Origin-Host parameter
Example: originHostMustBeFQDN = true

invalidMessageSequenceResultCode
Syntax: invalidMessageSequenceResultCode = code
Description: The error code for an invalid message sequence result, for example, if TERMINATION_REQUEST is the first message
Type: Integer
Optionality: Optional (default used if not set)
Allowed: A DIAMETER error code
Default: 5012 [Diameter unable to comply]
Notes: See Part 7.1 of RFC 3588 and Part 9 of RFC 4006 for a list valid codes
Example: invalidMessageSequenceResultCode = 5012

systemErrorResultCode
Syntax: systemErrorResultCode = code
Description: The error code for a system error
Type: Integer
Optionality: Optional (default used if not set)
Allowed: A DIAMETER error code
Default: 5012 [Diameter unable to comply]
Notes: See Part 7.1 of RFC 3588 and Part 9 of RFC 4006 for a list valid codes
Example: systemErrorResultCode = 5012

snrClientTimeout
Syntax: snrClientTimeout = integer
Description: Specifies the time, in seconds, that the DSY will wait for an SNR response from the Diameter client.
Type: Integer
Optionality: Optional (default used if not set)
Allowed: >=0
Default: 30
Notes: Set snrClientTimeout to 0 (zero) to disable timeouts.
Example: snrClientTimeout = 30
snrMaxRetry

**Syntax:**  
\[
\text{snrMaxRetry} = \text{integer}
\]

**Description:** Specifies the maximum number of times that the DSY will attempt to re-transmit an SNR to the Diameter client.

**Type:** Integer

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

**Allowed:** \( \geq 0 \)

**Default:** 0

**Notes:** A single re-transmit is allowed per timeout.

**Example:** `parameter = 0`

**Minimum SYInstances section**

Here is the minimum required SYInstances section of the DIAMETER configuration in the eserv.config file:

```plaintext
DIAMETER = {
    SYInstances = [
        {
            instanceName = "syIf" # Must be defined
            scheme = "SyScheme" # Must match an entry "PeerSchemes"
        }
    ] # End of SYInstances sections
} # End of DIAMETER section
```

**Services eserv.config Section**

Services is a sub-section of the SYInstances section.

**Example Services Configuration**

Here is an example Services section in the SYInstances configuration.

```plaintext
DIAMETER = {
    SYInstances = {
        Services = [
            ...
            {
                serviceIdentifier = "SLR"
                serviceName = "SLRService"
                sleeServiceKey = 1240
                sleeTimeout = 15
                tcc = 0
            }
        ] # End of Services section
    } # End of SYInstances sections
} # End of DIAMETER section
```
Parameters

Refer to Charging Control Services Technical Guide.

**serviceIdentifier**

Syntax: \( serviceIdentifier = \text{string} \)

Description: The service identifier

Type: String

Optionality: Mandatory

Allowed: One of “SLR”, “FSLR” or “SNR”

Default: None

Notes: There must be one entry in the Services section array for each of “SLR”, “FSLR” and “SNR”.

Example: \( serviceIdentifier = \text{"SLR"} \)

**serviceName**

Syntax: \( serviceName = \text{value} \)

Description: The service name used internally and in log files.

Type: String

Optionality: Mandatory

Allowed: For example, one of “SLRservice”, “FSLRservice” or “SNRservice”

Default:

Notes: This is a freeform value but should reflect the service referred to.

Example: \( serviceName = \text{"SLRservice"} \)

**sleeServiceKey**

Syntax: \( sleeServiceKey = \text{value} \)

Description: The service key value.

Type: Integer

Optionality: Mandatory

Allowed: This must match the SLEE.cfg service key entry for this SY service. See SLEE.cfg Configuration (on page 27).

Default:

Notes:

Example: \( sleeServiceKey = 1240 \)

**sleeTimeout**

Syntax: \( sleeTimeout = \text{value} \)

Description: Duration (in seconds) to wait for a response from the SLEE before the session times out

Type: Integer

Optionality: Optional (default used if not set)

Allowed: Number of seconds

Default: 10

Notes: This overrides the default set in SYDefaults.sleeServiceKey for this service.

Example: \( sleeTimeout = 10 \)
**tcc**

**Syntax:**  
`tcc = value`

**Description:**  
The Session supervision timer timeout

**Type:**  
Integer

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

**Allowed:**  
Number of seconds

**Default:**  
0 (never timeout)

**Notes:**  
Refer to RFC 4006. This overrides the default set in SYDefaults.tcc for this service

**Example:**  
`tcc = 0`

---

**Minimum Services section**

Here is the minimum required Services section of the SYInstances configuration in the eserv.config file:

```plaintext
DIAMETER = {

    SYInstances = {

        Services = [

            {
                serviceIdentifier = "SLR"
                serviceName = "SLRService"
                sleeServiceKey = 1240 # Must match the Dsy_SLR service key in SLEE.cfg
            },

            {
                serviceIdentifier = "FSLR"
                serviceName = "FSLRService"
                sleeServiceKey = 1241 # Must match the Dsy_FSLR service key in SLEE.cfg
            },

            {
                serviceIdentifier = "SNR"
                serviceName = "SNRService"
                sleeServiceKey = 1242 # Must match the Dsy_SNR service key in SLEE.cfg
            }

        ] # End of Services section

    } # End of SYInstances sections

} # End of DIAMETER section
```

---

**DiameterServer eserv.config Section**

DiameterServer is a sub-section of the SYInstances section.

**Example DiameterServer Configuration**

Here is an example DiameterServer section in the SYInstances configuration.

```plaintext
DIAMETER = {

    SYInstances = {

        DiameterServer = {
            protocol = "both"
            sctpListenPort = "3869"
            tcpListenPort = "3869"
            tcpBindAddress = "192.168.1.1"

        }

    }

} # End of SYInstances sections
```
sctpBindAddress = "192.168.1.2"
localOriginHost = "dsy.realm3.oracle.com"
localOriginRealm = "realm3.oracle.com"
productName = "Sy Interface"
vendorId = 16247
duplicateTime = 240
connectionTimeout = 30
watchdogPeriod = 30
inBufferSize = 16384
outBufferSize = 16384
sendOriginStateId = false
sessionLimit = 0
throttleLimitError = 3004
overLimitError = 3004
counterLogInterval = 0
throttleThreshold = 100
throttleInterval = 100
sendAbortOnSessionTimeout = true
sessionFallbackTcc = 0

} # End of DiameterServer section

} # End of SYInstances sections

} # End of DIAMETER section

**Parameters**

Refer to Charging Control Services Technical Guide.

**connectionTimeout**

**Syntax:**  
`connectionTimeout = value`

**Description:**  
Duration to wait for a reply before considering there is a transport level problem

**Type:**  
Integer

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

**Allowed:**  
Number of seconds

**Default:**  
30

**Notes:**

Example:  
`connectionTimeout = 30`

**counterLogInterval**

**Syntax:**  
`counterLogInterval = value`

**Description:**  
The interval in seconds between sending request counts to the syslog file. Set to 0 (zero) if you do not want to log requests

**Type:**  
Integer

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

**Allowed:**  
Number of seconds

**Default:**  
600

**Notes:**

This parameter is also used to control the frequency of notice messages that log the number of requests received, and the frequency of warning messages that log the number of throttled requests.

**Example:**

`counterLogInterval = 0`
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Syntax</th>
<th>Description</th>
<th>Type</th>
<th>Optionality</th>
<th>Allowed</th>
<th>Default</th>
<th>Notes</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>duplicateTime</td>
<td>duplicateTime = value</td>
<td>The time in session end to reject new sessions with the same Session-Id.</td>
<td>Integer</td>
<td>Optional (default used if not set)</td>
<td>Number of seconds</td>
<td>240</td>
<td>Recommended to keep the default value as the hostname of the target node, for example the SLC.</td>
<td>duplicateTime = 240</td>
</tr>
<tr>
<td>inBufferSize</td>
<td>inBufferSize = value</td>
<td>The size (in bytes) of inbound transport buffer.</td>
<td>Integer</td>
<td>Optional (default used if not set)</td>
<td>Number of bytes</td>
<td>0 (kernel default)</td>
<td></td>
<td>inBufferSize = 0</td>
</tr>
<tr>
<td>localOriginHost</td>
<td>localOriginHost = value</td>
<td>The number of seconds</td>
<td>String</td>
<td>Optional (default used if not set)</td>
<td>&quot;hostname&quot;</td>
<td>&quot;hostname&quot;</td>
<td>Recommended to keep the default value as the hostname of the target node, for example the SLC.</td>
<td>localOriginHost = &quot;dsy.realm3.oracle.com&quot;</td>
</tr>
<tr>
<td>localOriginRealm</td>
<td>localOriginRealm = value</td>
<td>The Origin-Realm for messages sent out.</td>
<td>String</td>
<td>Optional (default used if not set)</td>
<td></td>
<td></td>
<td>Each realm may contain at most one SLC</td>
<td>localOriginRealm = &quot;realm3.oracle.com&quot;</td>
</tr>
<tr>
<td>outBufferSize</td>
<td>outBufferSize = value</td>
<td>The size (in bytes) of inbound transport buffer.</td>
<td>Integer</td>
<td>Optional (default used if not set)</td>
<td></td>
<td></td>
<td></td>
<td>outBufferSize = value</td>
</tr>
</tbody>
</table>
allowed: Number of bytes  
Default: 0 (kernel default)  
Notes:  
Example: outBufferSize = 0

overLimitError  
Syntax: overLimitError = value  
Description: Sets the error code to use when rejecting a session because the memory or session limit has been exceeded.  
Type: Integer  
Optionality: Optional (default used if not set)  
Allowed: A DIAMETER error code  
Default: 3004 – Diameter too busy  
Notes: See Part 7.1 of RFC 3588 and Part 9 of RFC 4006 for a list valid codes  
Example: overLimitError = 3004

productName  
Syntax: productName = value  
Description: The product name used in Capabilities-Exchange-Answer  
Type: String  
Optionality: Optional (default used if not set)  
Allowed: String  
Default: "Sy Interface"  
Notes:  
Example: productName = "Sy Interface"

protocol  
Syntax: protocol = value  
Description: The protocol for this server.  
Type: Integer, Decimal, Array, Parameter list, String, Boolean  
Optionality: Optional (default used if not set)  
Allowed:  
  - "sctp"  
  - "tcp"  
  - "both"  
Default: "tcp"  
Notes:  
Example: protocol = "tcp"

sctpBindAddress  
Syntax: sctpBindAddress = value  
Description: The SCTP address to listen on for this instance.  
Type: String  
Optionality: Optional (default used if not set)  
Allowed:  
Default: 0 (that is, INADR_ANY)
Notes:
Example:  sctpBindAddress = "192.168.1.2"

sctpListenPort
Syntax:  sctpListenPort = value
Description:  The SCTP port to listen on
Type:  String
Optionality:  Optional (default used if not set)
Allowed:
Default:  "3869"
Notes:
Example:  sctpListenPort = "3869"

sendAbortOnSessionTimeout
Syntax:  sendAbortOnSessionTimeout = value
Description:  Indicates whether Sy Interface will send an abort session request to the diameter client when the session for that client times out.
Type:  Boolean
Optionality:  Optional (default used if not set)
Allowed:
Default:  "false"
Notes:
Example:  sendAbortOnSessionTimeout = "false"

sendOriginStateId
Syntax:  sendOriginStateId = value
Description:  To send or not send the origin state id flag.
Type:  Boolean
Optionality:  Optional (default used if not set)
Allowed:  true, false
Default:  true
Notes:  Must be set to false if you do not want to send
Example:  sendOriginStateId = "false"

sessionFallbackTcc
Syntax:  sessionFallbackTcc = value
Description:  The session fallback tcc timer (in seconds).
Type:  Integer
Optionality:  Optional (default used if not set)
Allowed:  >= 0
Default:  0
Notes:  This value is used as the tcc timer for sessions that do not have an associated service. 0 is never timeout.
Example:  sessionFallbackTcc = "0"
sessionLimit
Syntax: sessionLimit = value
Description: The maximum number of active Sy sessions allowed to be processed.
Type: Integer
Optionality: Optional (default used if not set)
Allowed: A positive value
Default: 0 - do not apply a limit
Notes: This is not the total number of open sessions which is unlimited.
Example: sessionLimit = "0"

tcpBindAddress
Syntax: tcpBindAddress = value
Description: The TCP address to listen on for this instance.
Type: String
Optionality: Optional (default used if not set)
Allowed: Default: 0 (that is, INADR_ANY)
Notes: Example: tcpBindAddress = "192.168.1.1"

tcpListenPort
Syntax: tcpListenPort = value
Description: The TCP port to listen on
Type: String
Optionality: Optional (default used if not set)
Allowed: Default: "3869"
Notes: Example: tcpListenPort = "3869"

throttleLimitError
Syntax: throttleLimitError = value
Description: The error code generated when a throttle limit is breached.
Type: Integer
Optionality: Optional (default used if not set)
Allowed: A DIAMETER error code
Default: 3004 – Diameter too busy
Notes: See Part 7.1 of RFC 3588 and Part 9 of RFC 4006 for a list valid codes
Example: throttleLimitError = 3004

throttleInterval
Syntax: throttleInterval = value
Description: The length, in milli-seconds, of each interval for which new requests will be counted and checked against the threshold specified in throttleThreshold.
Type: Integer
Optionality: Optional (default used if not set)
Allowed: >= 0
Default: 0
Notes: If the value of the throttleInterval is set to any value other than 0 (zero), DSY rejects new requests and reports an error until the time set by the throttleInterval.
Example: throttleInterval = 0

throttleThreshold

Syntax: throttleThreshold = value
Description: The number of initial or event requests to allow in a single interval. You set the length of the interval by using the throttleInterval parameter. The Sy Interface counts the number of initial reservations or events received in the current interval and rejects new requests once the count has gone above the threshold.
Type: Integer
Optionality: Optional (default used if not set)
Allowed: >= 0
Default: 0 – Allow all requests
Notes:
Example: throttleThreshold = 50

vendorId

Syntax: vendorId = value
Description: The Vendor ID to be supplied in the Capabilities-Exchange-Answer.
Type: Integer
Optionality: Optional (default used if not set)
Allowed: Default: 0
Notes:
Example: vendorId = 0

watchdogPeriod

Syntax: watchdogPeriod = value
Description: The period between sending out Device Watchdog messages to next-hop peer.
Type: Integer
Optionality: Optional (default used if not set)
Allowed: seconds
Default: 30
Notes:
Example: watchdogPeriod = 30

Minimum DiameterServer section

Here is the minimum required DiameterServer section of the DIAMETER configuration in the eserv.config file.

DIAMETER = {


SYInstances = {

... 

DiameterServer = {
    tcpListenPort = "3869" # Default is 3869
    sctpListenPort = "3869" # Default is 3869
    localOriginHost = "host.realm" # must match target environment
    localOriginRealm = "realm"     # must match target environment
}
} # End of SYInstances
}
} # End of DIAMETER

PeerSchemes eserv.config Section

PeerSchemes is a sub-section of the DIAMETER section.

Example PeerSchemes Configuration

Here is an example PeerSchemes section in the DIAMETER configuration on the SLC.

DIAMETER = {

PeerSchemes = [

    { 
        schemeName = "SyScheme"
    } # End of SyScheme

] # End of PeerSchemes section

} # End of DIAMETER section

Parameters

Refer to Charging Control Services Technical Guide.

schemeName

Syntax:_schemeName = value

Description: The name identifying the scheme.

Type: String

Optionality: Mandatory

Allowed: 

Default: 

Notes: 

Example: schemeName = "SyScheme"

Minimum PeerSchemes section

Here is the minimum required PeerSchemes section of the DIAMETER configuration in the eserv.config file.

DIAMETER = {


PeerSchemes = [
   ...
   
   { 
      schemeName = "SyScheme" # Must match the SyInstances.scheme
   }
]
} # End of DIAMETER section

Peers eserv.config Section

Peers is a sub-section of the PeerSchemes section.

Example PeerSchemes Configuration

Here is an example Peers section in the PeersScheme configuration on the SLC.

DIAMETER = {
   PeerSchemes = [
      ...
      
      Peers = [
      
      { 
         name = "host1"
         permittedOriginHosts = [ 
            "host1.realm1.oracle.com"
         ]
         RemoteAddresses = [ 
            "192.168.1.10"
         ]
         netmaskBits = 32
         netmask6Bits = 128
         permittedInstances = 0
         reqSctpInboundStreams = 8
         reqSctpOutboundStreams = 8
      }
      ] # End of Peers
   ] # End of PeerSchemes section
}

Parameters

Refer to Charging Control Services Technical Guide.

netmaskBits

Syntax: netmaskBits = value
Description: The number of bits for an IP version 4 netmask.
Type: Integer
Optionality: Optional (default used if not set)
Allowed: Default: 32 (bits for netmask, that is, a single machine (/32))
Notes: Example: netmaskBits = 32
netmask6Bits
Syntax: netmask6Bits = value
Description: The number of bits for the IP version 6 prefix
Type: Integer
Optionality: Optional (default used if not set)
Allowed: Default: 128 (bits for the address prefix, that is, a single machine (/128))
Notes: Example: netmask6Bits = 128

permittedInstances
Syntax: permittedInstances = value
Description: The number of permitted instances.
Type: Integer
Optionality: Optional (default used if not set)
Allowed: Default: 0 (allow all)
Notes: If set to 0 then allow all.
Example: permittedInstances = 0

permittedOriginHosts
Syntax: permittedOriginHosts = value
Description: The list of peer names which will be checked against the OriginHost AVP, during the capabilities exchange.
Type: String
Optionality: Optional (default used if not set)
Allowed: Default: Allow all if not set
Notes: Example: permittedOriginHosts = "host1.realm1.oracle.com"

RemoteAddresses
Syntax: RemoteAddresses = value
Description: The list of allowed remote IP addresses.
Type: Array of string parameters
Optionality: Mandatory
Allowed: Default: No default
Notes: The addresses may be in IPv4 or IPv6 format, or a mixture of both
Example: RemoteAddresses = [ "aaa.bbb.ccc.ddd"
                        ]
reqSctpInboundStreams
Syntax: \texttt{reqSctpInboundStreams = value}
Description: The number of requested inbound sctp streams.
Type: Integer
Optionality: Optional (default used if not set)
Allowed: 8
Default: 8
Notes: There is no guarantee you will actually get these.
Example: \texttt{reqSctpInboundStreams = 8}

reqSctpOutboundStreams
Syntax: \texttt{reqSctpOutboundStreams = value}
Description: The number of requested outbound sctp streams.
Type: Integer
Optionality: Optional (default used if not set)
Allowed: 8
Default: 8
Notes: There is no guarantee you will actually get these.
Example: \texttt{reqSctpOutboundStreams = 8}

Minimum PeerSchemes section
None

CCS eserv.config Configuration

The \texttt{eserv.config} file must be configured to integrate with the Prepaid Charging product. The minimum configuration required is as follows:

ccsServiceLibrary eserv.config Section

\begin{verbatim}
CCS = {
  ...
  ccsServiceLibrary = {
    ...
    ccsPluginExtend = [{
      ...
      library = "libsycssvcExtra.so"
      handleName = "Dsy_SLR" # must match service in slee.cfg
    }
    {
      library = "libsycssvcExtra.so"
      handleName = "Dsy_FSLR" # must match service in slee.cfg
    }
  ]
} # End of CCS
\end{verbatim}
**Parameters**

Refer to Charging Control Services Technical Guide.

**ccsMacroNodes eserv.config Section**

```plaintext
CCS = {
  ...  
  ccsMacroNodes = {
    ...  
    syIfServiceKey = 1243  
  }
}  # End of CCS
```

**Parameters**

Refer to Charging Control Services Technical Guide.

**syIfServiceKey**

**Syntax:**  
`syIfServiceKey = value`

**Description:**  
Must match the syIf SERVICEKEY in SLEE.cfg

**Type:**  
Integer

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

**Allowed:**

**Default:**

**Notes:**  
Defaults to the Dsy_SNR service key value + 1

**Example:**  
`syIfServiceKey = 1243`

**SLEE.cfg Configuration**

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

The SLEE.cfg file must be configured to enable the interface to work. The minimum configuration required is as follows:

```plaintext
INTERFACE=syIf syInterface.sh /IN/service_packages/DSY/bin EVENT
SERVICEKEY=INTEGER 1240 Dsy_SLR  
SERVICEKEY=INTEGER 1241 Dsy_FSLR  
SERVICEKEY=INTEGER 1242 Dsy_SNR  
SERVICEKEY=INTEGER 1243 syIf  
SERVICE=Dsy_SLR 1 slee_acs Dsy_SLR # must match SLRSERVICE key in eserv.config
SERVICE=Dsy_FSLR 1 slee_acs Dsy_FSLR # must match FSLRSERVICE key in eserv.config
SERVICE=Dsy_SNR 1 slee_acs Dsy_SNR # must match SNRSERVICE key in eserv.config
```

**Note:** It is essential for the correct operation of this application that the SLEE Interface type is always set to EVENT.

**acs.conf Configuration**

The ACS configuration file is located at `/IN/service_packages/ACS/etc/acs.conf`. 
The acs.conf file must be configured to enable the services. The minimum configuration required is as follows:

```
ServiceEntry (Dsy_SLR,ccsSvcLibrary.so)  # must match Dsy SLR service in SLEE.cfg
ServiceEntry (Dsy_FSLR,ccsSvcLibrary.so) # must match Dsy SLR service in SLEE.cfg
ServiceEntry (Dsy_SNR,ccsSvcLibrary.so)  # must match Dsy SLR service in SLEE.cfg
```

Prepaid Charging Dependency

Overview

Subscriber balances and their association to a policy counter is a feature of Prepaid Charging (CCS), the DSY Interface mediates between the Diameter network and the Prepaid Charging Platform it is part of.

For example a Subscriber-Limit-Request message requires a session to be created on the VWS node detailing the subscribed policy counters and engages the VWS to initiate Spending-Status-Notification-Requests to be sent when a balance impact occurs triggering a policy counter change. The framework required to implement the requirement belongs to CCS, therefore the DSY Interface has a dependency on the CCS components listed in the following sections.

Further detailed information on each component can be found in the CCS technical guide.

Feature Nodes

Each operation SLR, STA, SNR will be implemented by a feature node within a control plan invoked by the DSY Interface.

Spending-Limit-Request

This node will create the session and associate the policy counters.

The result of the node will be a Spending-Limit-Answer containing a Policy-Counter-Status-Report.

The same node can be used for both initial and intermediate SLR messages.

Final-Spending-Limit-Request

This node implements the Session-Termination-Request. The result of the node is a Session-Termination-Answer.

Spending-Status-Notification-Request

This node implements the SNR. It will take a notification from the beServiceTrigger though the OSD service interface following a balance impact action. The DSY interface can then send a Spending-Status-Notification-Request.
Global Capabilities

For each Service created in SLEE.cfg a capability entry is required in CCS Service Capability tab.

<table>
<thead>
<tr>
<th>MFile Generation</th>
<th>Resource Limits</th>
<th>Capability</th>
<th>Domain</th>
<th>Currency</th>
<th>Currency Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dsy_FSLR</td>
<td></td>
<td>Dsy_FSLR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dsy_SLR</td>
<td></td>
<td>Dsy_SLR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dsy_SNR</td>
<td></td>
<td>Dsy_SNR</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Product Type Control Plans

For each capability created, an association to a control plan to be executed needs to be added per Product Type.
Open Services Development

For SNR operations where the control plan is triggered through the OSD service, it is recommended that the “Service to Invoke” is aligned to the "Dsy_SNR" service handle in the Operation Set tab.

And the Control Plan is associated to the Operation Set in the Operations tab.
Chapter 4
Tools and Utilities

Overview

Introduction

This chapter explains the tools and utilities that are available.

In this chapter

This chapter contains the following topics.
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Statistics

sylInterface Statistics

The following table describes the statistics that the sylInterface can generate.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNSUPPORTED_MESSAGES</td>
<td>Unsupported messages received</td>
</tr>
<tr>
<td>SUB_SESSIONS_ABORTED</td>
<td>Sub sessions aborted</td>
</tr>
<tr>
<td>ABORT_UNABLE_TO_COMPLIES_RECIEVED</td>
<td>Abort unable to comply received</td>
</tr>
<tr>
<td>ABORT_ANSWERS_RECEIVED</td>
<td>Abort answers received</td>
</tr>
<tr>
<td>TERMINATION_REQUESTS_RECEIVED</td>
<td>Spending Termination Request requests received</td>
</tr>
<tr>
<td>TERMINATION_REQUESTS_ANSWERED</td>
<td>Spending Termination Request requests answered</td>
</tr>
<tr>
<td>INTERMEDIATE_REQUESTS_RECEIVED</td>
<td>Spending Limit Request intermediate requests received</td>
</tr>
<tr>
<td>INTERMEDIATE_REQUESTS_ANSWERED</td>
<td>Spending Limit Request intermediate requests answered</td>
</tr>
<tr>
<td>INITIAL_REQUESTS_ANSWERED</td>
<td>Spending Limit Request initial requests answered</td>
</tr>
<tr>
<td>INITIAL_REQUESTS_RECEIVED</td>
<td>Spending Limit Request initial requests received</td>
</tr>
<tr>
<td>ABORT_REQUESTS_SENT</td>
<td>Abort requests sent</td>
</tr>
<tr>
<td>SNA_UNSOLICITED_ANSWER</td>
<td>Spending Notification Answer unsolicited answer</td>
</tr>
<tr>
<td>SNA_UNABLE_TO_COMPLY_RECIEVED</td>
<td>Spending Notification Answer unable to comply</td>
</tr>
<tr>
<td>SNA_ANSWERS_RECEIVED</td>
<td>Spending Notification Answer received</td>
</tr>
<tr>
<td>SNR_UNSOLICITED_ANSWER</td>
<td>Spending Notification Request unsolicited answer</td>
</tr>
<tr>
<td>SNR_SENT</td>
<td>Spending Notification Request sent</td>
</tr>
<tr>
<td>ABORT_ERRORS_RECEIVED</td>
<td>Abort errors received</td>
</tr>
<tr>
<td>Error Code</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>ABORTS_UNABLE_TO_BE_DELIVERED</td>
<td>Aborts unable to be delivered</td>
</tr>
<tr>
<td>SESSIONS_TIMED_OUT</td>
<td>Session timed out</td>
</tr>
<tr>
<td>SNR_ERRORS_RECEIVED</td>
<td>Spending Notification Request received errors</td>
</tr>
<tr>
<td>SNR_UNABLE_TO_BE_DELIVERED</td>
<td>Spending Notification Request not delivered</td>
</tr>
<tr>
<td>SNA_UNKNOWN_SESSION_ID</td>
<td>Spending Notification Answer unknown session</td>
</tr>
</tbody>
</table>
Glossary of Terms

AAA

ACS
Advanced Control Services configuration platform.

AVP
Attribute Value Pair, used in Diameter to represent properties of a particular request or answer.

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

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

DTMF
Dual Tone Multi-Frequency - system used by touch tone telephones where one high and one low frequency, or tone, is assigned to each touch tone button on the phone.

IN
Intelligent Network

IP
1) Internet Protocol
2) Intelligent Peripheral - This is a node in an Intelligent Network containing a Specialized Resource Function (SRF).

IP address
Internet Protocol Address - network address of a card on a computer.

SCP
Service Control Point. Also known as SLC.

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).

SLC
Service Logic Controller (formerly UAS).

SLEE
Service Logic Execution Environment

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

SRF
Specialized Resource Function – This is a node on an IN which can connect to both the SSP and the SLC and delivers additional special resources into the call, mostly related to voice data, for example play voice announcements or collect DTMF tones from the user. Can be present on an SSP or an Intelligent Peripheral (IP).

SSP
Service Switching Point

STA
Session message: Session-Termination Answer

STR
Session message: Session-Termination Request

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.

VWS
Oracle Voucher and Wallet Server (formerly UBE).
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