Oracle® Communications Network Charging and Control

Diameter Sy Interface Technical Guide

Release 15.0.0

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Contents

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.

Formatting Convention	Type of Information
Special Bold	Items you must select, such as names of tabs. Names of database tables and fields.
Italics	Name of a document, chapter, topic or other publication. Emphasis within text.
Button	The name of a button to click or a key to press. **Example:** To close the window, either click **Close**, or press **Esc**.
Key+Key	Key combinations for which the user must press and hold down one key and then press another. Example: **Ctrl+P** or **Alt+F4**.
`Monospace`	Examples of code or standard output.
`Monospace Bold`	Text that you must enter.
variable	Used to indicate variables or text that should be replaced with an actual value.
menu option > menu option >	Used to indicate the cascading menu option to be selected. Example: **Operator Functions > Report Functions**
hypertext link	Used to indicate a hypertext link.

Specialized terms and acronyms are defined in the glossary at the end of this guide.

Chapter 1

System Overview

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?

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:

Command-Name	Abbreviation	Code
Spending-Limit-Request	SLR	8388635
Spending-Limit-Answer	SLA	8388635
Spending-Status-Notification-Request	SNR	8388636
Spending-Status-Notification-Answer	SNA	8388636
Session-Termination-Request	STR	275
Session-Termination-Answer	STA	275

Features

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Spending-Status-Notification-Answer	SNA	8388636

Session-Termination-Request	STR	275
Session-Termination-Answer	STA	275

Chapter 2

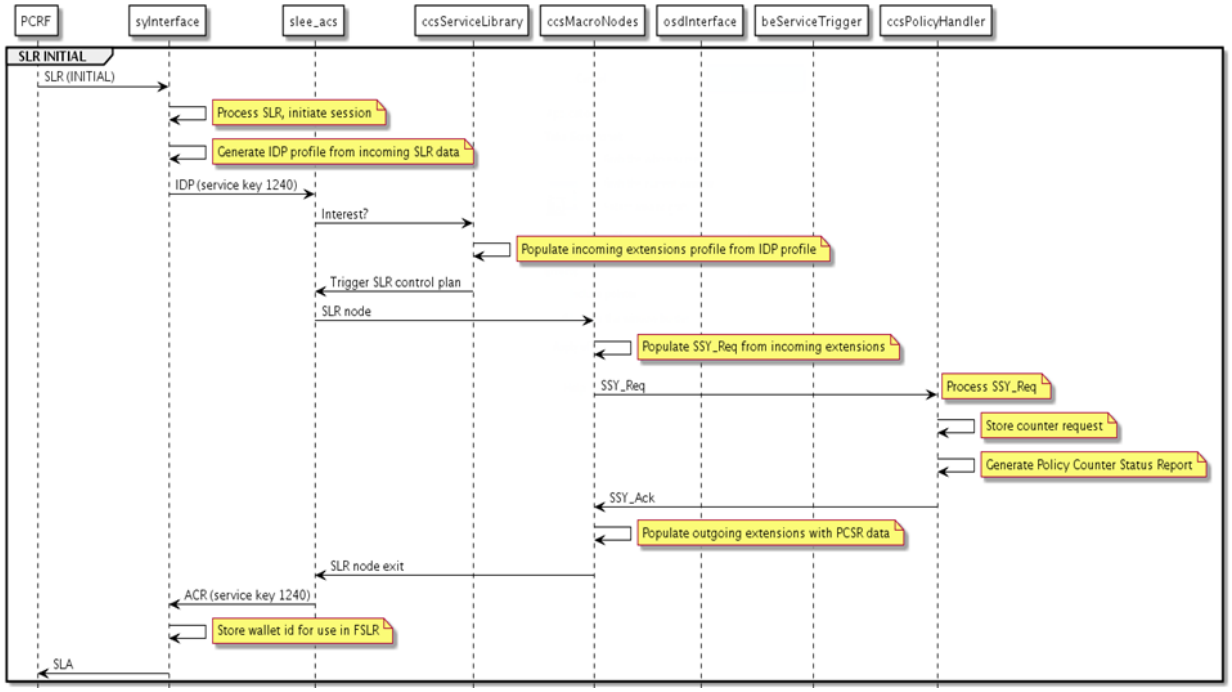
Sy Reference Point

Introduction

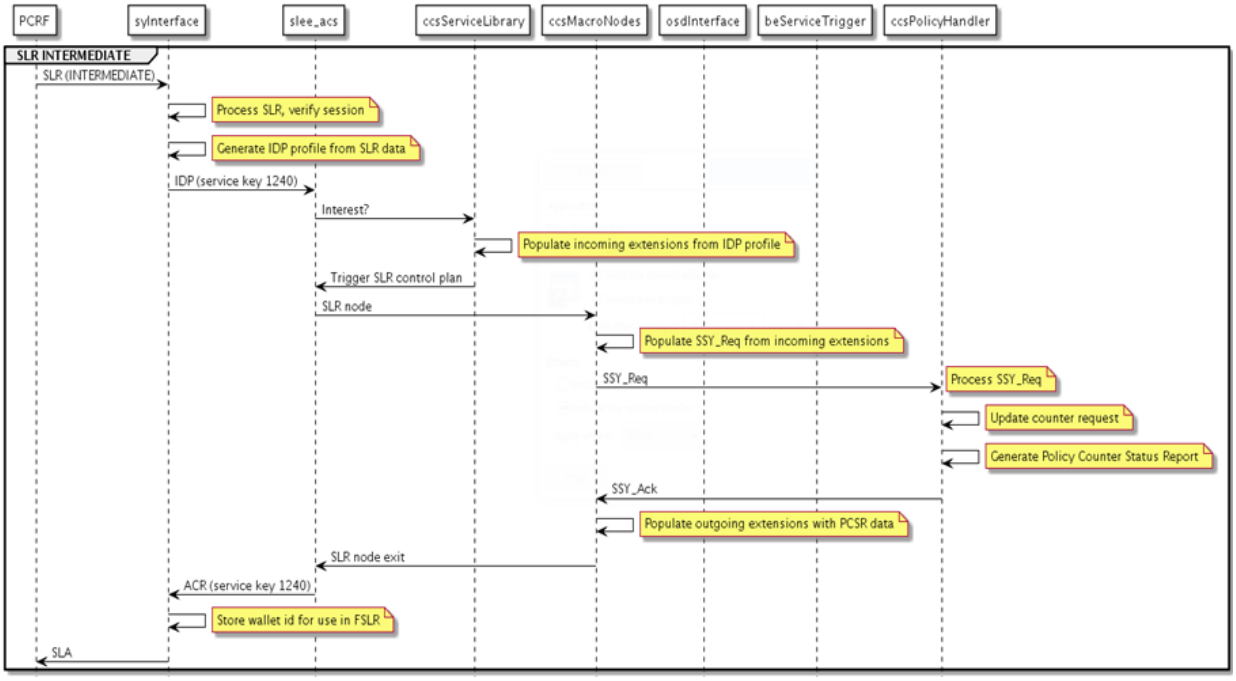
This section illustrates the architecture involved to facilitate the Sy Reference Point functionality.

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.

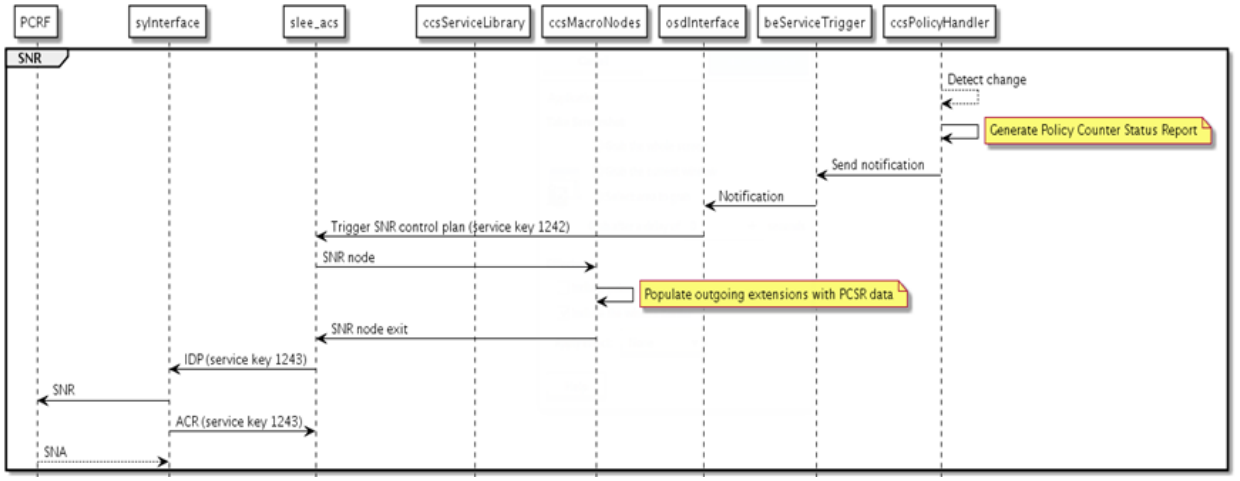


Spending-Limit-Answer

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).

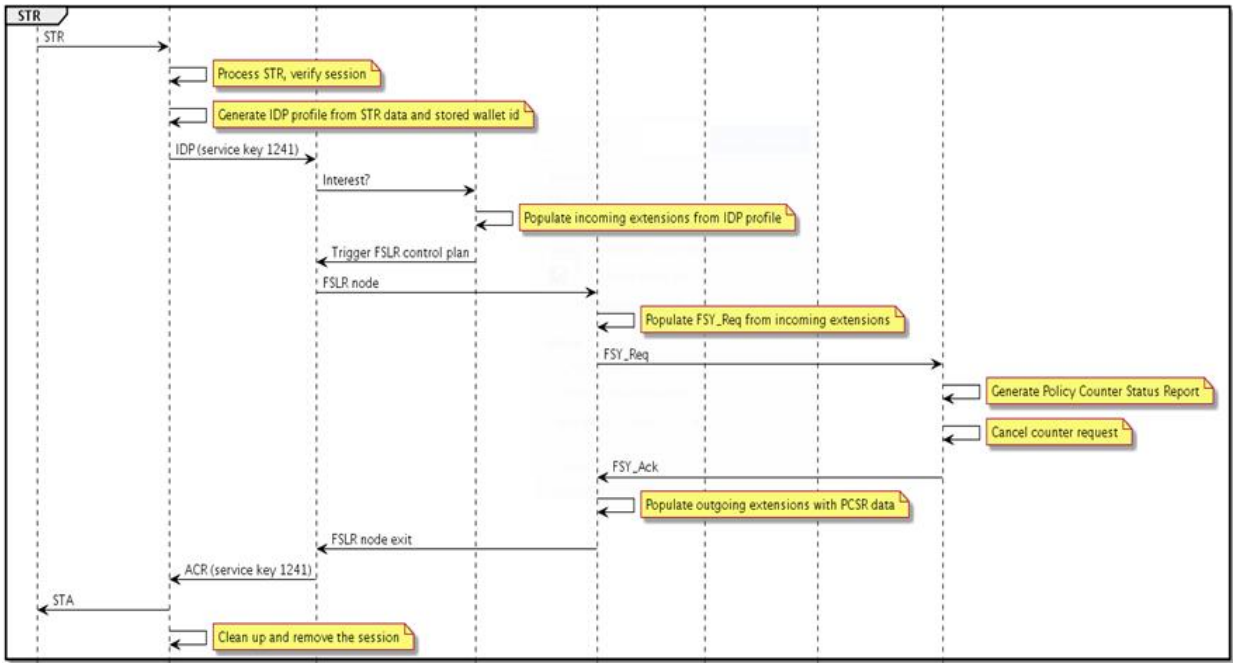


Spending-Status-Notification-Answer

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.

Chapter 3

Configuration

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.

syInterface

The syInterface 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.

Configuration Components

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

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

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

```
DIAMETER = {

    SYDefaults = {
       oracleUserAndPassword = "/@SCP”
       sleeServiceKey = 1243
       sleeTimeout = 15
       tcc = 0
    }

}
```

Parameters

Refer to Charging Control Services Technical Guide.

`oracleUserAndPassword`

Syntax:	`oracleUserAndPassword = 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:	`oracleUserAndPassword = "/@SCP"`

`sleeServiceKey`

Syntax:	`sleeServiceKey = 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:	`sleeServiceKey = 1243`

`sleeTimeOut`

Syntax:	`sleeTimeOut = 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:	`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.
Example:	`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:	`snrMaxRetry = 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:	>=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:

```
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.

```
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 = 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 = "SLR"`

`serviceName`

Syntax:	`serviceName = 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 = "SLRservice"`

`sleeServiceKey`

Syntax:	`sleeServiceKey = 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 = 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:

```
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.

```
DIAMETER = {

    SYInstances = {

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

```
            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`

duplicateTime

Syntax: `duplicateTime = value`
Description: The time in session end to reject new sessions with the same Session-Id.
Type: Integer
Optionality: Optional (default used if not set)
Allowed: Number of seconds
Default: 240
Notes:
Example: `duplicateTime = 240`

inBufferSize

Syntax: `inBufferSize = value`
Description: The size (in bytes) of inbound transport buffer.
Type: Integer
Optionality: Optional (default used if not set)
Allowed: Number of bytes
Default: 0 (kernel default)
Notes:
Example: `inBufferSize = 0`

localOriginHost

Syntax: `localOriginHos t= value`
Description: The number of seconds .....
Type: String
Optionality: Optional (default used if not set)
Allowed:
Default: "hostname"
Notes: Recommended to keep the default value as the hostname of the target node, for example the SLC.
Example: `localOriginHost = "dsy.realm3.oracle.com"`

localOriginRealm

Syntax: `localOriginRealm = value`
Description: The Origin-Realm for messages sent out.
Type: String
Optionality: Optional (default used if not set)
Allowed:
Default:
Notes: Each realm may contain at most one SLC
Example: `localOriginRealm = "realm3.oracle.com"`

outBufferSize

Syntax: `outBufferSize = value`
Description: The size (in bytes) of inbound transport buffer.
Type: Integer

Optionality: Optional (default used if not set)
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"`
	`"aaaa:bbbb:cccc:dddd:eeee:ffff:gggg:hhhh"`
	`]`

`reqSctpInboundStreams`

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

`reqSctpOutboundStreams`

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

Minimum PeerSchemes section

None

CCS eserv.config Configuration

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

ccsServiceLibrary eserv.config Section

```
CCS = {
    ...

    ccsServiceLibrary = {
        ...
        ccsPluginExtend = [
        ...
            {
                library = "libsyCcsSvcExtra.so"
                handleName = "Dsy_SLR" # must match service in slee.cfg
            }
            {
```

```
                library = "libsyCcsSvcExtra.so"
                handleName = "Dsy_FSLR" # must match service in slee.cfg
            }
        ]
    }

} # End of CCS
```

Parameters

Refer to Charging Control Services Technical Guide.

ccsMacroNodes eserv.config Section

```
CCS = {
    ...
    ccsMacroNodes = {
       ...
        syIfServiceKey = 1243
    }

} # End of CCS
```

Parameters

Refer to Charging Control Services Technical Guide.

`syIfServiceKey`

Syntax:	`syIfServiceKey = value`
Description:	Must match the sylf 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:

```
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

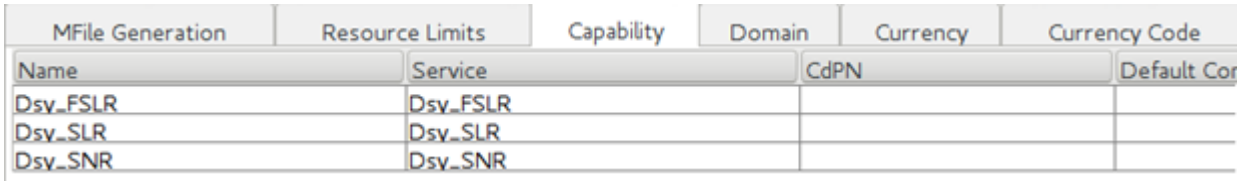
This node implements the Session-Termination-Request. The result of the node is a Session-Termination-Answer.

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.

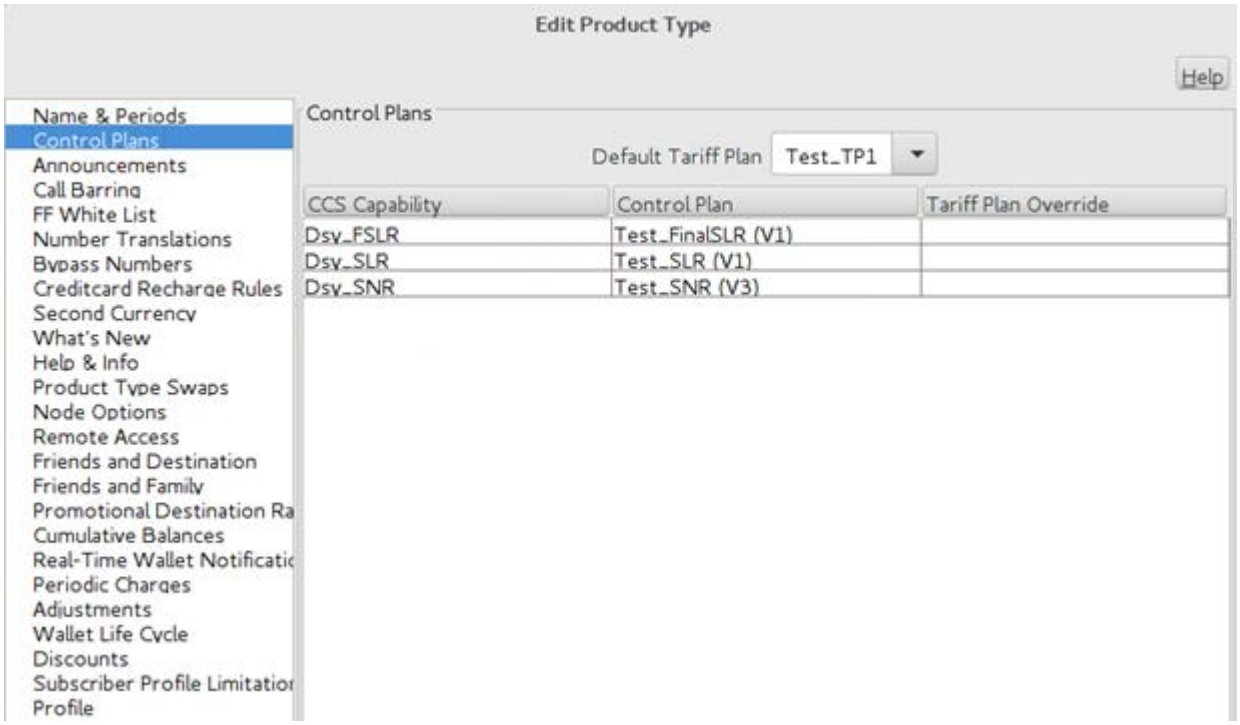
Global Capabilities

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



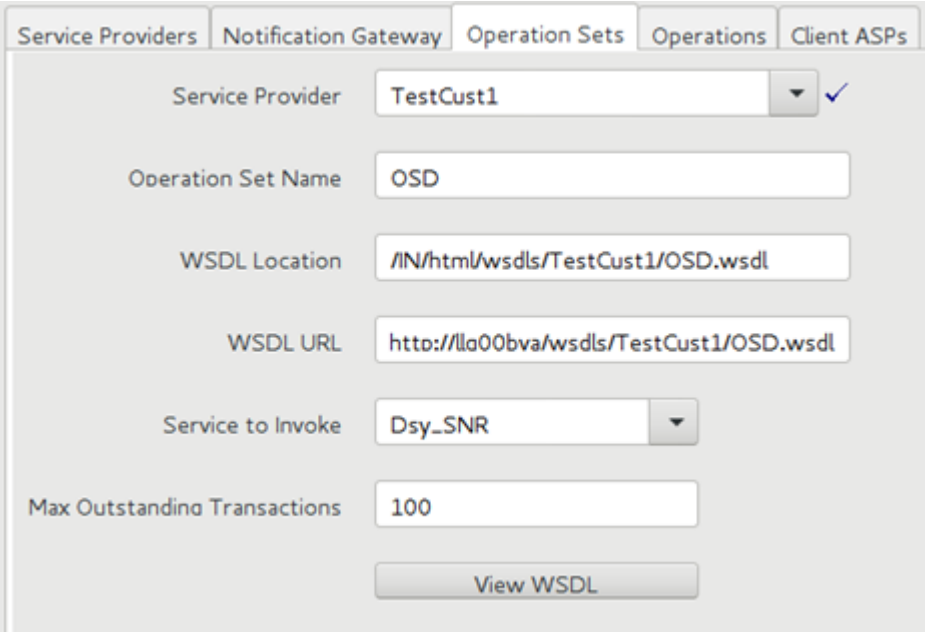
Product Type Control Plans

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

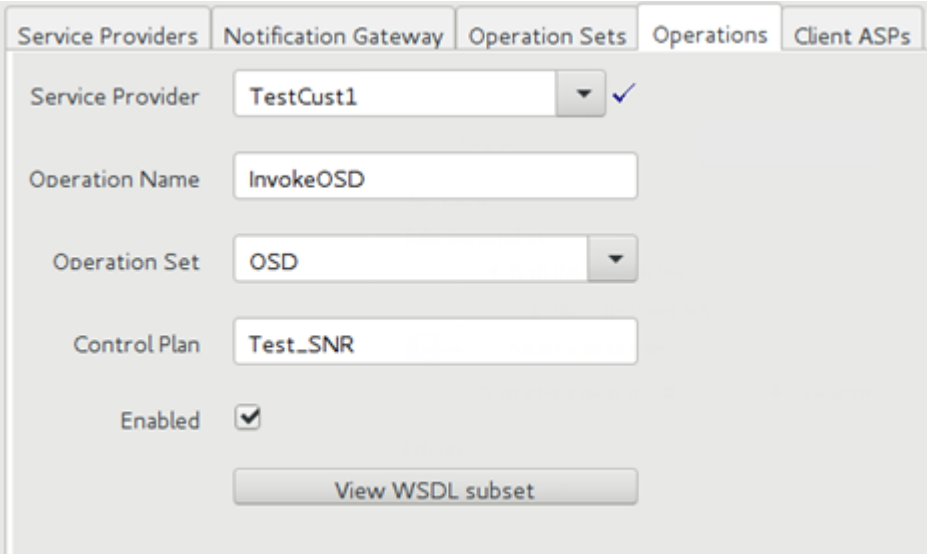


Open Services Development

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.



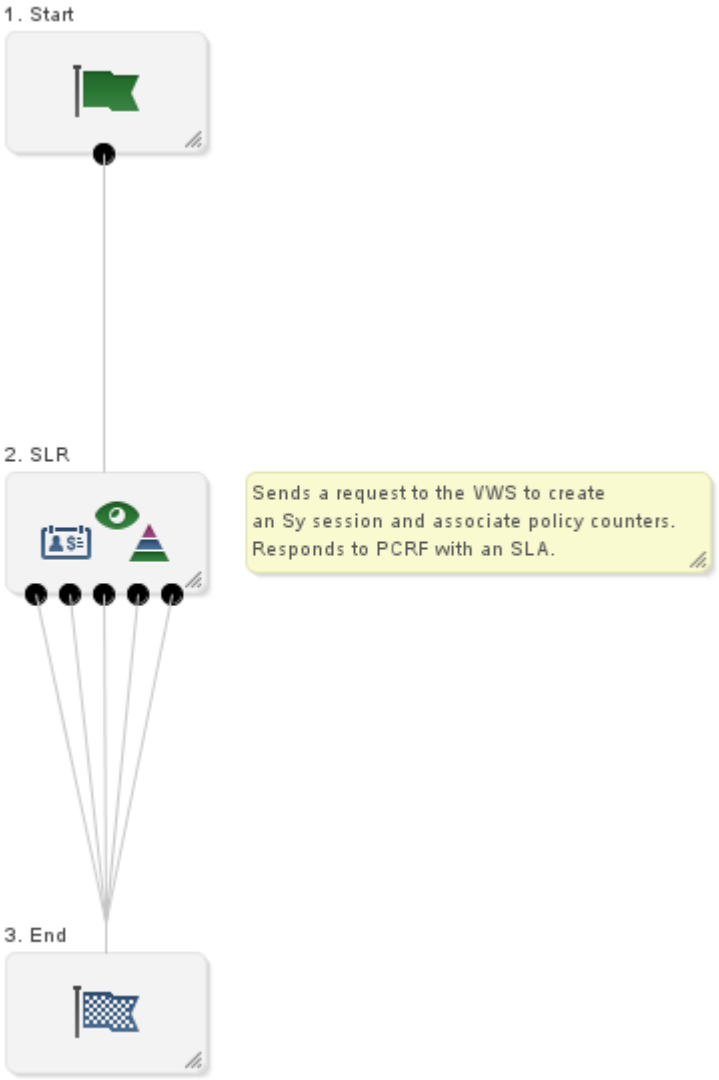
And the Control Plan is associated to the Operation Set in the Operations tab.



Control Plans

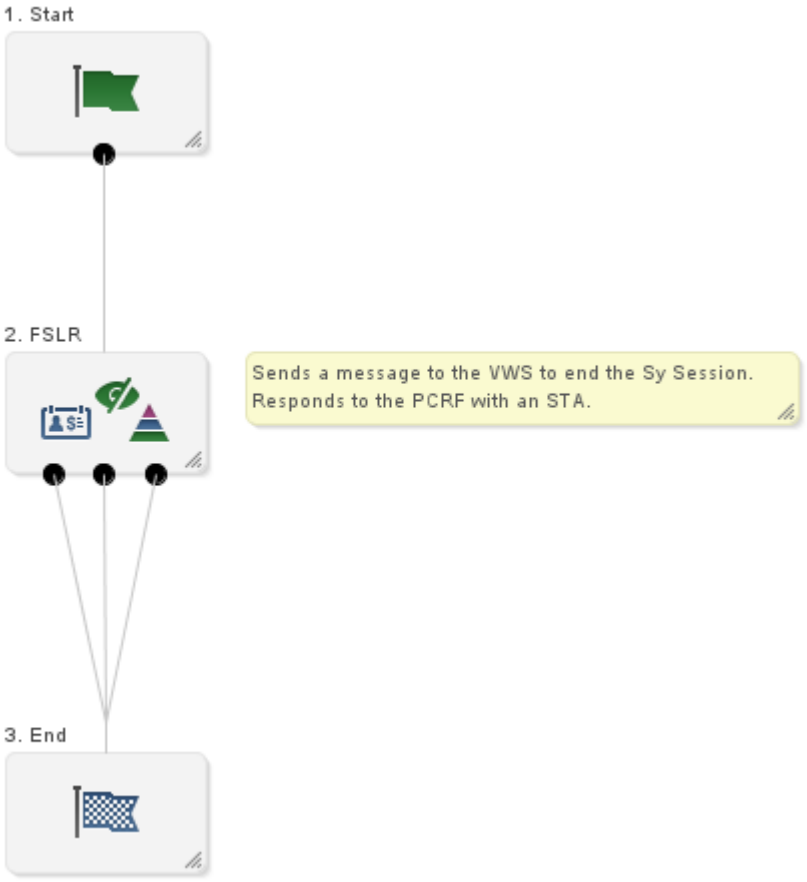
SLR control plan

Control plan to process Spending-Limit-Request invoked by Diameter Sy interface to create session in VWS node detailing the subscribed policy counters.



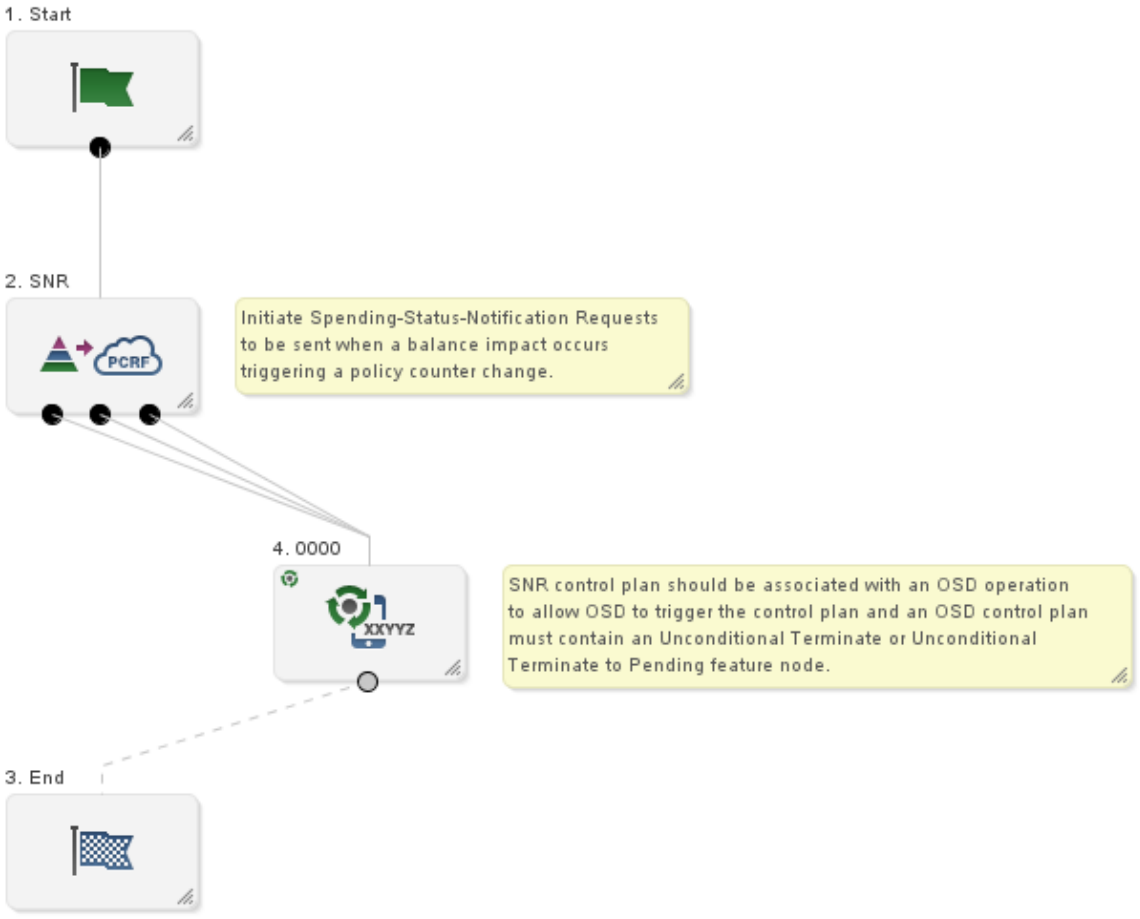
FSLR control plan

Control plan to process Final-Spending-Limit-Request invoked by DSY Interface to terminate the session.



SNR control plan

Control plan invoked by an OSD notification triggered by the VWS, and will send an SNR out of the DSY Control Agent.



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.

Statistics

syInterface Statistics

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

Statistic	Description
UNSUPPORTED_MESSAGES	Unsupported messages received
SUB_SESSIONS_ABORTED	Sub sessions aborted
ABORT_UNABLE_TO_COMPLIES_RECIEVED	Abort unable to comply received
ABORT_ANSWERS_RECEIVED	Abort answers received
TERMINATION_REQUESTS_RECEIVED	Spending Termination Request requests received
TERMINATION_REQUESTS_ANSWERED	Spending Termination Request requests answered
INTERMEDIATE_REQUESTS_ANSWERED	Spending Limit Request intermediate requests answered
INTERMEDIATE_REQUESTS_RECEIVED	Spending Limit Request intermediate requests received
INITIAL_REQUESTS_ANSWERED	Spending Limit Request initial requests answered
INITIAL_REQUESTS_RECEIVED	Spending Limit Request initial requests received
ABORT_REQUESTS_SENT	Abort requests sent
SNA_UNSOLICITED_ANSWER	Spending Notification Answer unsolicited answe
SNA_UNABLE_TO_COMPLY_RECIEVED	Spending Notification Answer unable to comply
SNA_ANSWERS_RECEIVED	Spending Notification Answer received
SNR_UNSOLICITED_ANSWER	Spending Notification Request unsolicited answer
SNR_SENT	Spending Notification Request sent
ABORT_ERRORS_RECEIVED	Abort errors received

ABORTS_UNABLE_TO_BE_DELIVERED	Aborts unable to be delivered
SESSIONS_TIMED_OUT	Session timed out
SNR_ERRORS_RECEIVED	Spending Notification Request received errors
SNR_UNABLE_TO_BE_DELIVERED	Spending Notification Request not delivered
SNA_UNKNOWN_SESSION_ID	Spending Notification Answer unknown session