

Oracle® Communications

Cloud Native Core, Security Edge Protection Proxy Benchmarking Guide



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Preface

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Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
<i>italic</i>	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
monospace	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

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Acronyms

The following table lists the acronyms and the terminologies used in the document:

Table Acronyms and Terminologies

Acronym	Description
Cat-0	Category 0 SBI Message Schema Validation Feature
Cat-1	Category 1 Service API Validation Feature
Cat-2	Category 2 Network ID Validation Feature
Cat-3	Category 3 Previous Location Check/ Category 3 Time location check
CNC Console	Oracle Communications Cloud Native Configuration Console
CRD	Custom Resource Definition
CNE	Oracle Communications Cloud Native Environment
cSEPP/C-SEPP	Consumer Security Edge Protection Proxy
DB	Database
DNS	Domain Name System
DRL	Drools Rule Language
EGW	Egress Gateway
FQDN	Fully Qualified Domain Name
GSMA	Groupe Speciale Mobile Association (GSMA). Represents the interests of mobile operators and the broader mobile industry worldwide.
Hosted SEPP	Hosted SEPP functionality provides selective routing in Roaming Hub Mode
IGW	Ingress Gateway
IPX	Internetwork Packet Exchange
K8s	Kubernetes
Local PLMN	PLMN managed by Local SEPP
Local SEPP	SEPP in Local PLMN
MNO	Mobile Network Operator
NDB	Network Database
NF	Network Function
Network Function	A functional building block within a network infrastructure, which has well defined external interfaces and well defined functional behavior. In practical terms, a network function is often a network node or physical appliance.
NF Consumer	A generic way to refer to an NF which consumes services provided by another NF. Example: An AMF acts as a Consumer NF that consumes AMPolicy services provided by the PCF.
NF Instance	A specific instance of a network function type.
NF Producer or NF Provider	A generic way to refer to an NF which provides services that can be consumed by another NF. Example: A PCF acts as a Producer NF that provides AMPolicy Services to the AMF.
NRF	Oracle Communications Cloud Native Core, Network Repository Function
OHC	Oracle Help Center
OSDC	Oracle Software Delivery Cloud
PDB	PodDisruptionBudget

Table (Cont.) Acronyms and Terminologies

Acronym	Description
PLMN	Public Land Mobile Network
pSEPP/P-SEPP	Producer Security Edge Protection Proxy
Remote PLMN	PLMN managed by Remote SEPP
Remote SEPP	SEPP in Remote PLMN
Remote SEPP Set	Set of Remote SEPPs to allow alternate routing across Remote SEPPs
REST API	Representational State Transfer Application Programming Interface
Roaming Hub	Roaming Hub is the deployment mode of SEPP. Roaming Hub is used as an intermediate proxy. Each SEPP connects to the Roaming Hub which further connect to another SEPP. All the Remote SEPPs can communicate with each other through roaming hub.
Scaling	Ability to dynamically extend or reduce resources granted to the Virtual Network Function (VNF) as needed. This includes scaling out and in or scaling up and down.
SCM	Security Countermeasure
SEPP	Oracle Communications Cloud Native Core, Security Edge Protection Proxy
SUCI	Subscription Concealed Identifier
SUPI	Subscription Permanent Identifier
SVC	Service
TLS	Transport Layer Security
TH	Topology Hiding
TUH	Topology Unhiding
TPS	Transactions Per Second
UE	User Equipment
UDR	Oracle Communications Cloud Native Core, Unified Data Repository

What's New in This Guide

This section introduces the documentation updates for Release 25.2.1xx.

Release 25.2.100 - G44346-01, November 2025

Added the following test scenario:

- [Test Scenario 1: SEPP 40K MPS, 72 Hrs Run with Features Enabled with 50ms Delay at Server End](#)

1

Overview

Security Edge Protection Proxy (SEPP) is a key component of the 5G Service Based Architecture. It is a proxy Network Function (NF) which is used for the secured communication for inter Public Land Mobile Network (PLMN) messages.

For more information about the SEPP architecture, see *Oracle Communications Cloud Native Core, Security Edge Protection Proxy User Guide*.

The user can install either SEPP or Roaming Hub/Hosted SEPP.

Note

The performance and capacity of the SEPP system may vary based on the call model, Feature/Interface configuration, and underlying CNE and hardware environment.

1.1 Purpose and Scope

This document is designed to help operators measure the capacity and performance of SEPP, SEPP microservices, and deployment environment setup software such as Cloud Native Environment (CNE) and cnDBTier.

This document provides SEPP performance and capacity data. It is recommended that SEPP is run through a benchmark on the target cloud native infrastructure to determine the capacity and performance in the target infrastructure. This information can be used to adjust the initial deployment resources and to help predict resource requirements when SEPP is scaled up.

1.2 References

For more information on Security Edge Protection Proxy (SEPP), refer to the following documents:

- *Oracle Communications Cloud Native Core, Security Edge Protection Proxy Installation, Upgrade, and Fault Recovery Guide*
- *Oracle Communications Cloud Native Core, Security Edge Protection Proxy User Guide*
- *Oracle Communications Cloud Native Core, Security Edge Protection Proxy REST Specification Guide*
- *Oracle Communications Cloud Native Core, Security Edge Protection Proxy Troubleshooting Guide*
- *Oracle Communications Cloud Native Core, cnDBTier Installation, Upgrade, and Fault Recovery Guide*
- *Oracle Communications Cloud Native Core, cnDBTier User Guide*

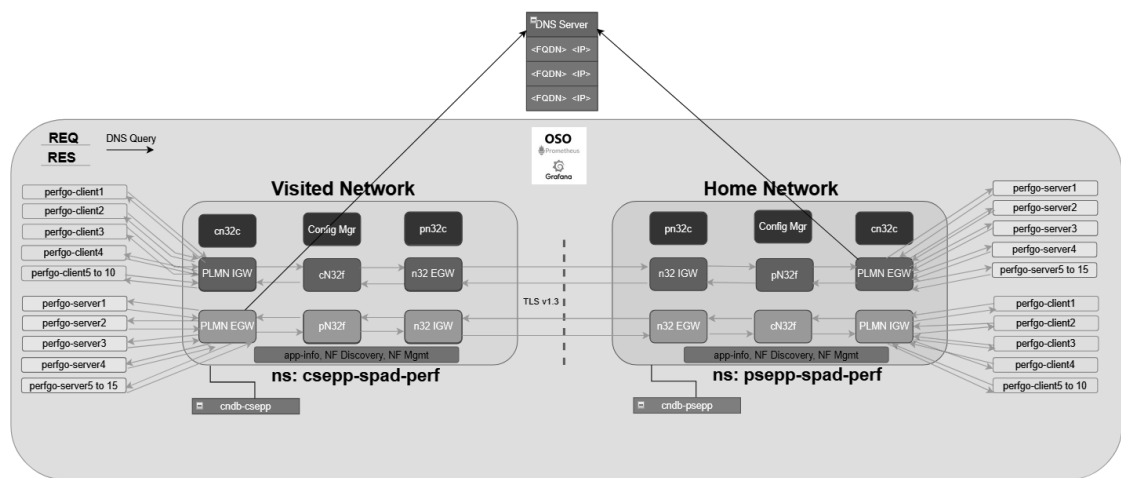
2

Deployment Environment

This section provides information about the cloud native infrastructure used for SEPP benchmarking.

The following diagram represents the deployment configurations of SEPP:

Figure 2-1 Deployment Diagram



The details about the deployment configurations are as follows:

- cnDBTier, cSEPP, pSEPP, perfgo-client, and perfgo-server are deployed in same cluster
- DNS server is running on a standalone VM in a different cluster
- cSEPP to pSEPP n32 TLS 1.3 connection is on External IP (metalLB)
- perfgo-client is sending traffic on SEPP external IP
- SEPP to perfgo-server connection is using External IP (metalLB)
- Both SEPP have 30 local PLMNs
- Network delay of 50 ms on server side

2.1 Overall Summary of Benchmarking Configurations

The following table lists the overall summary of benchmarking configurations.

Overall Summary

Table 2-1 Overall Summary

S. No.	Execution Time	SEP Release	CNC Release	cnDBTier Release	ASM Enabled/ Disabled	OS O(Yes/ No)	HA Proxy Installed	Cluster	Site -1 MP S	Site -2 MP S	Overall MP S	Network Delay on server side	Features Enabled
Run1	72 Hr	25.2.100	25.2.100	25.2.100	Enabled	Yes	NA	Hard head 1	20K	20K	40K	50ms	<ul style="list-style-type: none"> • Topology Hiding • Security Counter Measure features: <ul style="list-style-type: none"> — Cat-0 SBI Message Schema Validation Feature — Cat-1 NRF Service API Query Parameters Validation — Cat-1 Service API Validation Feature — Cat-2 Network ID Validation Feature

Table 2-1 (Cont.) Overall Summary

S. No.	Execution Time	SEP Release	CNC Release	cnDBTie Release	ASM Enabled/ Disabled	OS O(Y es/ No)	HA Proxy Installed	Cluster	Site -1 MP S	Site -2 MP S	Overall MP S	Network Delay on server side	Features Enabled
													<ul style="list-style-type: none"> – Cat-3 Previous Location Check Feature – Cat-3 Time Check for Roaming Subscribers • Overload Control • 5G SBI Message Mediation Support • Steering of Roaming (SOR) Feature • Global Rate Limiting on Ingress Gateway of SEPP • Alternate Routing and Load Sharing based on the DNS SRV Record for Home

Table 2-1 (Cont.) Overall Summary

S. No.	Execution Time	SEP Release	CNC Release	cnDBTier Release	ASM Enabled/ Disabled	OS O(Y es/ No)	HA Proxy Installed	Cluster	Site -1 MP S	Site -2 MP S	Overall MP S	Network Delay on server side	Features Enabled
													Network Functions

3

SEPP Benchmark Testing

This section provides information about the SEPP testcases run in different scenarios.

3.1 Test Scenario 1: SEPP 40K MPS, 72 Hrs Run with Features Enabled with 50ms Delay at Server End

This test scenario describes the performance and capacity of SEPP and provides the benchmarking results for 40K MPS, 72 hours run with the following SEPP features enabled with 50ms delay at the server end:

- Topology Hiding
- Security Counter Measure features:
 - Cat-0 SBI Message Schema Validation Feature
 - Cat-1 NRF Service API Query Parameters Validation
 - Cat-1 Service API Validation Feature
 - Cat -2 Network ID Validation Feature
 - Cat-3 Previous Location Check Feature
 - Cat-3 Time Check for Roaming Subscribers
- Overload Control
- 5G SBI Message Mediation Support
- Steering of Roaming (SOR) Feature
- Global Rate Limiting on Ingress Gateway of SEPP
- Alternate Routing and Load Sharing based on the DNS SRV Record for Home Network Functions

Note

ASM is enabled in this test case scenario.

3.1.1 Testcase and Setup Details

Following are the testcase and setup details:

Traffic Model Details

Table 3-1 Transactions Per Second (TPS)

Total TPS	Site 1	Site 2
40K MPS	20K MPS	20K MPS

Setup Details**Table 3-2 Setup Details**

Setup Details	Values
Active User	NA for SEPP
Execution Time	72 Hrs
Environment	vcNE
Cluster	Hardhead1
cnDBTier	25.2.100
cSEPP	25.2.100
pSEPP	25.2.100
CNC Console	25.2.100
Setup Configuration	<ul style="list-style-type: none"> Both SEPPs are deployed on Model-B. cnDBTier is deployed on both sites.
List of SEPP Features enabled	<ul style="list-style-type: none"> Topology Hiding Security Counter Measure features: <ul style="list-style-type: none"> Cat-0 SBI Message Schema Validation Feature Cat-1 NRF Service API Query Parameters Validation Cat-1 Service API Validation Feature Cat -2 Network ID Validation Feature Cat-3 Previous Location Check Feature Cat-3 Time Check for Roaming Subscribers Overload Control 5G SBI Message Mediation Support Steering of Roaming (SOR) Feature Global Rate Limiting on Ingress Gateway of SEPP Alternate Routing and Load Sharing based on the DNS SRV Record for Home Network Functions

Resource Footprint**Table 3-3 Resource Footprint**

Microservices / container	Container Count	CPU Resource per container (Limit)	CPU Resource per container (Request)	Memory Resource per container (Limit)	Memory Resource per container (Request)
Site2-ocsepp-alternate-route/ alternate-route	2	2	2	4Gi	4Gi

Table 3-3 (Cont.) Resource Footprint

Microservices / container	Container Count	CPU Resource per container (Limit)	CPU Resource per container (Request)	Memory Resource per container (Limit)	Memory Resource per container (Request)
Site2-ocsepp-appinfo/appinfo	2	1	1	2Gi	1Gi
Site2-ocsepp-cn32c-svc/cn32c-svc	2	2	2	2Gi	2Gi
Site2-ocsepp-cn32f-svc/cn32f-svc	7	5	5	8Gi	8Gi
Site2-ocsepp-coherence-svc/coherence-svc	1	4	4	4Gi	4Gi
Site2-ocsepp-config-mgr-svc/config-mgr-svc	1	2	2	2Gi	2Gi
Site2-ocsepp-n32-egress-gateway/n32-egress-gateway	7	5	5	5Gi	5Gi
Site2-ocsepp-n32-ingress-gateway/n32-ingress-gateway	7	6	6	5Gi	5Gi
Site2-ocsepp-nf-mediation/nf-mediation	2	8	8	8Gi	8Gi
Site2-ocsepp-ocpm-config/config-server	2	1	1	1Gi	1Gi
Site2-ocsepp-performance/perf-info	2	2	2	4Gi	200Mi
Site2-ocsepp-plmn-egress-gateway/plmn-egress-gateway	7	5	5	5Gi	5Gi
Site2-ocsepp-plmn-ingress-gateway/plmn-ingress-gateway	7	5	5	5Gi	5Gi
Site2-ocsepp-pn32c-svc/pn32c-svc	2	2	2	2Gi	2Gi
Site2-ocsepp-pn32f-svc/pn32f-svc	7	5	5	8Gi	8Gi

Table 3-3 (Cont.) Resource Footprint

Microservices / container	Container Count	CPU Resource per container (Limit)	CPU Resource per container (Request)	Memory Resource per container (Limit)	Memory Resource per container (Request)
Site2-ocsepp-sepp-nrf-client-nfdiscovery/nrf-client-nfdiscovery	2	2	2	2Gi	2Gi
Site2-ocsepp-sepp-nrf-client-nfmanagement/nrf-client-nfmanagement	2	2	2	2Gi	2Gi
Site1-ocsepp-alternate-route/alternate-route	2	2	2	4Gi	4Gi
Site1-ocsepp-appinfo/appinfo	2	1	1	2Gi	1Gi
Site1-ocsepp-cn32c-svc/cn32c-svc	2	2	2	2Gi	2Gi
Site1-ocsepp-cn32f-svc/cn32f-svc	7	5	5	8Gi	8Gi
Site1-ocsepp-coherence-svc/coherence-svc	1	4	4	4Gi	4Gi
Site1-ocsepp-config-mgr-svc/config-mgr-svc	1	2	2	2Gi	2Gi
Site1-ocsepp-n32-egress-gateway/n32-egress-gateway	7	5	5	5Gi	5Gi
Site1-ocsepp-n32-ingress-gateway/n32-ingress-gateway	7	6	6	5Gi	5Gi
Site1-ocsepp-nf-mediation/nf-mediation	2	8	8	8Gi	8Gi
Site1-ocsepp-ocpm-config/config-server	2	1	1	1Gi	1Gi
Site1-ocsepp-performance/perf-info	2	2	2	4Gi	200Mi
Site1-ocsepp-plmn-egress-gateway/plmn-egress-gateway	7	5	5	5Gi	5Gi

Table 3-3 (Cont.) Resource Footprint

Microservices / container	Container Count	CPU Resource per container (Limit)	CPU Resource per container (Request)	Memory Resource per container (Limit)	Memory Resource per container (Request)
Site1-ocsepp-plmn-ingress-gateway/plmn-ingress-gateway	7	5	5	5Gi	5Gi
Site1-ocsepp-pn32c-svc/pn32c-svc	2	2	2	2Gi	2Gi
Site1-ocsepp-pn32f-svc/pn32f-svc	7	5	5	8Gi	8Gi
Site1-ocsepp-sepp-nrf-client-nfdiscovery/nrf-client-nfdiscovery	2	2	2	2Gi	2Gi
Site1-ocsepp-sepp-nrf-client-nfmanagement/nrf-client-nfmanagement	2	2	2	2Gi	2Gi

Note

- Mi- Megabytes
- Gi- Gigabytes
- m- millicores
- CPU Resource per container without unit is represented in cores

3.1.2 Traffic and Latency

The following tables describe the traffic and latency details:

Traffic Details

Table 3-4 Traffic Details

TPS	Site-1	Site-2
PLMN-IGW-requests-rate	10280.68	10270.93
CN32F-requests-rate	9925.73	9711.63
N32-IGW-requests-rate	9711.61	9925.77
N32-EGW-requests-rate	9925.53	9711.57
PN32F-requests-rate	8441.16	8585.76

Table 3-4 (Cont.) Traffic Details

TPS	Site-1	Site-2
PLMN-EGW-requests-rate	11260.91	11554.10
Total TPS	9924.167	9959.833

Latency Details**Table 3-5 Latency Details**

NF Service Latency(In MilliSecond)	Site-1	Site-2
IGW(s)	0.07	0.07
EGW(s)	0.07	0.07
cn32f(s)	0.04	0.04
pn32f(s)	0.03	0.03

3.1.3 Results

- csepp call success rate: 96.545%

Note

A 3.45% drop was intentionally introduced by enabling global rate limiting on the PLMN Ingress gateway. Actual success rate is 99.995%.

- psepp call success rate: 94.553%

Note

A 5.442% drop was intentionally introduced by enabling global rate limiting on the PLMN Ingress gateway. Actual success rate is 99.995%.

- csepp_Avg_Latency_rate: 94.502ms
- psepp_Avg_Latency_rate: 100.517ms
- No pod restarts are observed
- Perfgo deployed on hardhead 1 cluster with 7 server and 8 client each side
- Run with 50ms server delay
- Features enabled:
 - Topology Hiding
 - Security Counter Measure features:
 - Cat-0 SBI Message Schema Validation Feature
 - Cat-1 NRF Service API Query Parameters Validation
 - Cat-1 Service API Validation Feature

- * Cat -2 Network ID Validation Feature
- * Cat-3 Previous Location Check Feature
- * Cat-3 Time Check for Roaming Subscribers
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