Oracle® Communications

Cloud Native Core, Network Repository Function Benchmarking Guide

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Oracle Communications Cloud Native Core, Network Repository Function Benchmarking Guide, Release 23.4.6

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Acronyms

The following table provides information about the acronyms and the terminology used in the document.

Table Acronyms

Term	Definition
ASM	Aspen Service Mesh
CA	Certificate Authority
CNE	Cloud Native Environment
CPU	Central Processing Unit
LB	Load Balancer
NF	Network Function
NRF	Oracle Communications Cloud Native Core, Network Repository Function
OSO	Operations Services Overlay
RAM	Random Access Memory
RTT	Round Trip Time
SBA	Service Based Architecture
TLS	Transport Layer Security
XFCC	x-forwarded-client-cert

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What's New in This Guide

This section lists the documentation updates for release 23.4.x.

Release 23.4.6- F91386-03, March 2025

- Modified the NRF Features section with the following details:
  - Updated the notes for the following features:
    - Subscriber Location Function
    - Access Token Caching during SLF Query
    - Preferred Locality Feature Set
    - NRF Forwarding per NF Type/Service Type
    - Maximum Number of Profiles in Discovery Response
  - Added the following features:
    - NF Screening Feature (Rules)
    - NRF Roaming support (hNRF + vNRF)
    - Access-token Expiry Time
    - Discovery Validity Feature
    - Load Change Threshold for Notifications from NRF
- Updated the Software Test Constraints section with the latest values for the following constraints:
  - Average HTTP Request Packet Size
  - Average HTTP Response Packet Size
  - Average size of NF Profiles
- Modified the table in the STATE Data Quantum at NRF before Performance Run Begins section.
- Updated the Call-Mix section for modifying the Traffic Distribution (in %) and Targeted TPS values of the following requests:
  - NF Discover
  - SLF Query
  - NRF Forwarding (Outgoing)
- Updated the NfDiscover Service Operation query parameters in the Service Operations section.
- Updated the TPS achieved details in the Test Observations section.
- Added the following sections:
  - NF Count Per NF Types
  - Number of Profiles in Response
- Updated the Latency Observations section with the induced values for the following:
  - NRF to SLF
  - Packet Error Ratio Induced

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Release 23.4.0- F91386-02, February 2024

Updated the following details in the Latency Observations section.

- Updated the unit of latency details from ms to s.
- Updated the value of NRF to forwarding simulator and forwarding simulator to NRF from 150 ms to 100 ms.

Release 23.4.0- F91386-01, January 2024

- Updated the type of switch details in the Hardware Details section.
- Updated the Observability Services section.
- Updated the System Software section.
- Updated the CNE common applications resource requirement details in the CNE Common Applications section.
- Updated the NRF services resource requirement details in the NRF Services section.
- Updated the cnDBTier services resource requirements details in the cnDBTier Services section.
- Updated the description in the Topology section.
- Updated the NRF performance with 46.5K TPS in the Test Scenario-1: NRF Performance with 24K TPS section.
- Updated the features list that are enabled during testing in the NRF Features section.
- Updated the test constraints in the Software Test Constraints section.
- Updated the values in the Call-Mix section.
- Updated the NfDiscover Service Operation query parameters in the Service Operations section.
- Updated the TPS achieved details in the Test Observations section.
- Updated the NRF microservices resource utilization for benchmarking in the Resource Utilization section.
- Updated the cnDBTier services resource utilization for benchmarking in the cnDBTier Services Resource Utilization section.
- Updated the latency details in the Latency Observations section.

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1 Introduction

Oracle Communications Cloud Native Core Network Repository Function (NRF) is one of the main components of the 5G Service Based Architecture (SBA). NRF maintains an updated repository of all the Network Functions (NFs) available in the operator's network along with the services provided by each NFs in the 5G core. NRF instantiates, scales, and terminates the services with minimal or no manual intervention.

For more information about NRF architecture, see *Oracle Communications Cloud Native Core, Network Repository Function User Guide.*

1.1 Purpose and Scope

This document describes the measurements that are used to perform the performance evaluation of NRF, microservices, and deployment environment setup software such as Aspen Service Mesh (ASM), Operations Services Overlay (OSO), Cloud Native Environment (CNE), and so on.

This document provides the following information:

- Benchmark NRF performance and capacity
- Benchmark data from our labs
- Key metrics used to manage NRF performance and capacity

> **Note**
>
> The performance and capacity of the NRF system may vary based on the call model, Feature or Interface configuration, and underlying CNE and hardware environment.

1.2 References

Following are the reference documents:

- *Oracle Communications Cloud Native Core, Cloud Native Environment Installation, Upgrade, and Fault Recovery Guide*
- *Oracle Communications Cloud Native Core, Operations Services Overlay Installation and Upgrade Guide*
- *Oracle Communications Cloud Native Core, cnDBTier User Guide*
- *Oracle Communications Cloud Native Core, Network Repository Function User Guide*
- *Oracle Communications Cloud Native Core, Network Repository Function REST Specification Guide*
- *Oracle Communications Cloud Native Core, Network Repository Function Troubleshooting Guide*
- *Oracle Communications Cloud Native Core, Network Repository Function Network Impact Report*

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- *Oracle Communications Cloud Native Configuration Console User Guide*
- *Oracle Communications 5G Automated Test Suite Guide*
- *Oracle Communication Cloud Native Core, Data Collector User Guide*

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2
Deployment Environment

This section provides information about the cloud native infrastructure used for Oracle Communications Cloud Native Core, Network Repository Function (NRF) benchmarking.

2.1 Deployed Components

This section provides details about the deployed components.

2.1.1 Hardware Details

This section describes the hardware details.

Table 2-1 Hardware Details

Nodes	Type
Master Nodes	ORACLE SERVER X8-2
Top of Rack Switch	Cisco 93108TC-EX
Worker Nodes	ORACLE SERVER X8-2

2.1.2 Observability Services

This section describes the observability services used for NRF benchmarking.

Table 2-2 Observability Services

Service Name	Version
OpenSearch	2.3.0
OpenSearch Dashboard	2.3.0
FluentBit	1.9.4
Kyverno	1.9.0
Grafana	9.1.7
Prometheus	2.44.0
Jaeger	1.45.0

2.1.3 System Software

This section describes the system software details.

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Table 2-3 System Software

System Software	Details
Operating System (+Kernel Version)	5.15.0-105.125.6.2.2.el8uek.x86_64 Oracle Linux Server 8.8
Hypervisor	BareMetal Server
CNE	23.3.1
OSO	NA
Kubernetes	1.26.x
ASM	1.14.6
cnDBTier	23.4.0

2.2 Resource Utilization

The CPU and RAM resources that each service consumes are constrained, so that they do not consume excess resources that could be used by applications. Each service is initially allocated a CPU and RAM at the time of deployment and is allowed to grow to a specified upper limit of each resource while it continues to run. For services where little growth is expected, or where increasing the CPU or RAM underneath a running application might cause an unacceptable service disruption, the initial allocation and upper limit are set to the same value. The resource requests and limits are given below:

> **Note**
>
> Max replica count of a service must be adjusted as per the target TPS.

2.2.1 CNE Common Applications

This section describes the CNE common applications.

Table 2-4 CNE Common Applications

Service	Pod replica #	CPU/Pod		Memory (Mi)	
		Requests	Limit	Requests	Limit
Prometheus	2	2000	2000	4096	4096
Prometheus Node Exporter	1 per node	800	800	512	512
Prometheus Operator	1	100	200	100	200
Prometheus AlertManager	2	20	20	64	64
Prometheus Kube State Metrics	1	20	20	32	100
Promxy	1	100	100	512	512
OpenSearch Master	3	1000	1000	2048	2048
OpenSearch Data	3	1000	1000	16384	16384

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Table 2-4 (Cont.) CNE Common Applications

Service	Pod replica #	CPU/Pod		Memory (Mi)	
		Requests	Limit	Requests	Limit
OpenSearch Client	3	1000	1000	2048	2048
OpenSearch Dashboard	1	100	100	512	512
occne-metrics-server	1	100	100	200	200
occne-alertmanager-snmp-notifier	1	100	100	128	128
Fluentd OpenSearch	1 per worker node	500	500	1024	1024
Jaeger Agent	1 per worker node	256	500	128	512
Jaeger Collector	1	500	1250	512	1024
Jaeger query	1	256	500	128	512
MetalLB Controller	1	100	100	100	100
MetalLB Speaker	1 per worker node	100	100	100	100
LB Controller (vCNE only)	1	10	500	128	1024
Egress Controller (vCNE only)	1 per worker node	10	1000	200	500
Bastion Controller	1	10	200	128	256
Kyverno	3	100	200	256	512

2.2.2 NRF Services

Table 2-5 NRF Services Resource Requirements

Service Name	Min Pod Replica Count
Helm test	1
<helm-release-name>-nfregistration	2
<helm-release-name>-nfdiscovery	2
<helm-release-name>-nfsubscription	2
<helm-release-name>-nrfauditor	2
<helm-release-name>-nrfconfiguration	1
<helm-release-name>-nfaccesstoken	2
<helm-release-name>-nrfartisan	1
<helm-release-name>-nrfcachedata	2
<helm-release-name>-ingressgateway	2
<helm-release-name>-egressgateway	2
<helm-release-name>-alternate-route	2
<helm-release-name>-appinfo	2
<helm-release-name>-perfinfo	2

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> **Note**
>
> If you enable Message Feed feature at Ingress Gateway and Egress Gateway, approximately 33% pod capacity is impacted.

Where, <helm-release-name> is prefixed in each microservice name. For example, if helm-release-name is "ocnrf", then nfregistration microservice name is "ocnrf-nfregistration".

For more information about other resource requirements, see *Oracle Communications Cloud Native Core, Network Repository Function Installation, Upgrade, and Fault Recovery Guide*.

2.2.3 cnDBTier Services

Table 2-6 cnDBTier Services Resource Requirements

Service Name	Min Pod Replica Count
MGMT (ndbmgmd)	2
DB (ndbmtd)	4
SQL (ndbmysqld)	2
SQL (ndbappmysqld)	2
Monitor Service (db-monitor-svc)	1
Backup Manager Service (db-backup-manager-svc)	1
Replication Service - Leader	1
Replication Service - Other	0

For more information about other resource requirements and recommended parameter values, see *Oracle Communications Cloud Native Core, Network Repository Function Installation, Upgrade, and Fault Recovery Guide*.

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3
Test Topology

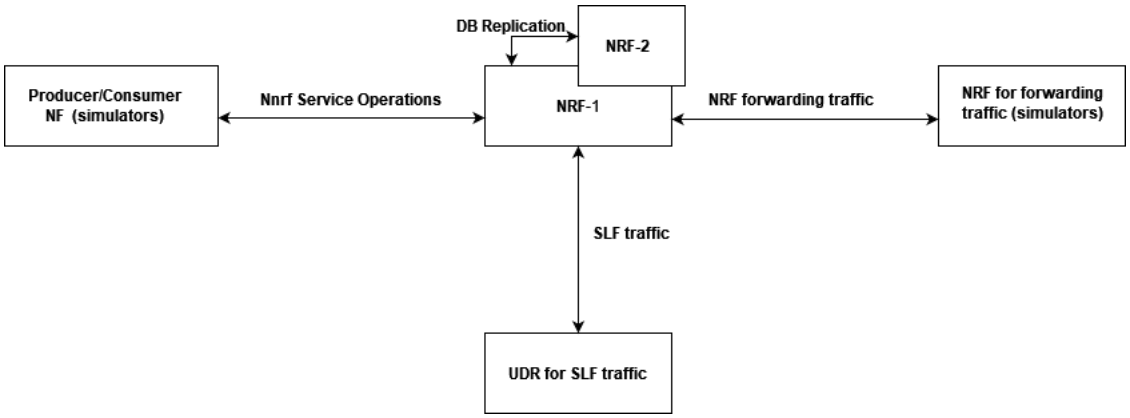
This section describes the topology used for testing Oracle Communications Cloud Native Core, Network Repository Function (NRF).

3.1 Topology

The following image represents the test topology consisting of the following components:

- Two-site NRF
- UDR for SLF traffic
- Producer/Consumer NF for Nnrf service operations (simulators)
- NRF for forwarding to a different segment (simulators)

Figure 3-1 NRF Topology



1. Producer NF sends NfRegister, NfHeartbeat, NfUpdate, and NfDeregister requests to NRF.
2. Consumer NF sends NfStatusSubscribe, NfStatusSubscribe(PATCH), NfStatusUnsubscribe, NfDiscover, NfAccessToken, NfProfileRetrieval, and NfListRetrieval requests to NRF.
3. NRF sends request to UDR for processing SLF based discovery query.
4. NRF sends response to all service requests it receives.
5. NRF triggers NfStatusNotify to all the Consumer NFs who have created subscription.
6. NRF forwards NfDiscovery requests to the NRF simulator.

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4 Benchmark Testing

This section describes the environment used for benchmarking Oracle Communications Cloud Native Core, Network Repository Function (NRF). Benchmarking is performed with the settings described in this section.

The default values or recommendations for any required software or resource are available from third-party vendors. The operators may choose different values.

4.1 Test Scenario-1: NRF Performance with 24K TPS

Overview

To qualify the test run, the following elements are considered:

- Pod restart
- CPU and Memory utilization
- Error rate
- Ingress and egress traffic rate
- Success rate
- Message request and response processing time
- Infrastructure resource requirements and utilization

4.2 NRF Features

Table 4-1 NRF Features

NRF Features	Feature Status	Notes
Subscriber Location Function	ENABLED	SLF is enabled for 3 NfTypes (AUSF, UDR, and UDM) in slfLookupConfig.
SLF Selection from Registered NF Profiles	ENABLED	Dynamic SLF feature is enabled.
Access Token Caching during SLF Query	ENABLED	Access Token Caching during SLF Query is enabled with 24 hour validity period based caching. For more information about the accessTokenCacheEnabled under slfOptions, see *Oracle Communications Cloud Native Core, Network Repository Function Rest Specification Guide*.

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Table 4-1 (Cont.) NRF Features

NRF Features	Feature Status	Notes
Overload Control Based on Percentage Discards	ENABLED	For more information about the configuration, see *Oracle Communications Cloud Native Core, Network Repository Function Rest Specification Guide*.
Preferred Locality Feature Set	ENABLED	Extended Preferred locality is configured with 2 locationTypes,8 locationMappings, 56 preferredLocationDetails.
NRF Forwarding per NF Type/Service Type	ENABLED	Enabled for UDM. Forwarding is enabled for discovery services. 1 host is present in nrfHostConfig and 1 rule is present in forwardingRulesConfig.
EmptyList in Discovery Response	ENABLED	EmptyList feature is enabled and discoveryValidityPeriodCfg under nfDiscoveryOptions is configured with 5 rules.
Access Token Request Authorization	ENABLED	AuthFeature is enabled with 8 rules in authRulesConfig under nfAccessTokenOptions.
Pod Protection Support for NRF Subscription Microservice	ENABLED	For more information about the configuration, see *Oracle Communications Cloud Native Core, Network Repository Function Rest Specification Guide*.
Subscription Limit	ENABLED	Set the subscription limit to 1000. For more information about the configuration, see *Oracle Communications Cloud Native Core, Network Repository Function Rest Specification Guide*.
User-Agent Header for Outgoing Requests	ENABLED	For more information about the configuration, see *Oracle Communications Cloud Native Core, Network Repository Function Rest Specification Guide*.
NRF to Pick Port from ipEndpoints and FQDN from the NF Service or NF level when Selecting SLF	ENABLED	For more information about the configuration, see *Oracle Communications Cloud Native Core, Network Repository Function Rest Specification Guide*.

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Table 4-1 (Cont.) NRF Features

NRF Features	Feature Status	Notes
Ingress Gateway Pod Protection	ENABLED	For more information about the configuration, see *Oracle Communications Cloud Native Core, Network Repository Function Rest Specification Guide*.
ASM Sidecar	ENABLED	For more information about the configuration, see *Oracle Communications Cloud Native Core, Network Repository Function Rest Specification Guide*.
TLS SNI Header Validation	DISABLED	TLS is enabled by sidecar. For more information about the configuration, see *Oracle Communications Cloud Native Core, Network Repository Function Rest Specification Guide*.
Maximum Number of Profiles in Discovery Response	ENABLED	Set the value as 12 for this parameter. For more information about the configuration, see *Oracle Communications Cloud Native Core, Network Repository Function Rest Specification Guide*.**Note**: If the value is > 12, there will be a performance impact.
NRF Georedundancy	ENABLED	For more information about the configuration, see *Oracle Communications Cloud Native Core, Network Repository Function Rest Specification Guide*.
Discovery Validity	ENABLED	Discovery validity feature is enabled with a value as 1 minute (for all NF Types). For more information about the configuration, see *Oracle Communications Cloud Native Core, Network Repository Function Rest Specification Guide*.
Access Token Expire Time	NA	The expiry duration for a NRF signed certificate. The limit is 24 hours. For more information about NRF Access Token Service Usage Details, see *Oracle Communications Cloud Native Core, Network Repository Function User Guide*.

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Table 4-1 (Cont.) NRF Features

NRF Features	Feature Status	Notes
Load Change Threshold for Notifications from NRF	NA	This is nfNotifyLoadThreshold. This is set as 10%. For more information about the configuration, see *Oracle Communications Cloud Native Core, Network Repository Function Rest Specification Guide*.
NF Screening Feature (Rules)	DISABLED	For more information about the configuration, see *Oracle Communications Cloud Native Core, Network Repository Function Rest Specification Guide*.
NRF Roaming support (hNRF + vNRF)	DISABLED	For more information about the configuration, see *Oracle Communications Cloud Native Core, Network Repository Function Rest Specification Guide*.

Note

Apart from these features being enabled, rest of the feature configurations have been set to their default values. For more information about the feature configurations, see *Oracle Communications Cloud Native Core, Network Repository Function REST Specification Guide*. For more information about the features, see *Oracle Communications Cloud Native Core, Network Repository Function User Guide*.

4.3 Software Test Constraints

Table 4-2 Software Test Constraints

Test Constraint	Details
NRF Version	23.4.6
% of traffic forwarded to another NRF	10%
% of traffic forwarded to remote PLMN (case Visited NRF)	Not included in this test
% of traffic received from remote PLMN (case Home NRF)	Not included in this test
Ingress incoming connections	221
Ingress outgoing connections	1.728K
Egress incoming connections	152
Egress outgoing connections	520
Average HTTP Request Packet Size	~630 to 11300 bytes (Based on NfRegister Request)
Average HTTP Response Packet Size	~2520-44000 bytes (Discovery Response with nfProfiles)

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Table 4-2 (Cont.) Software Test Constraints

Test Constraint	Details
Average NF Heartbeats Timer per NF	30s
Average size of NF Profiles	~630 to 11300 bytes

4.4 STATE Data Quantum at NRF before Performance Run Begins

Table 4-3 STATE Data Quantum at NRF before Performance Run Begins

Parameters	Values	Details
Number of Subscriptions in DB	1000	Subscriptions are created with the below conditions: • Subscription to a set of NF Instances identified by their NF Type - 506 • Subscription to a set of NF Instances identified by their NF Instance Id - 260 • Subscription to a set of NF Instances identified by their NF Set Id - 156 • Miscellaneous subscriptions - 78 • NotificationCondition with monitored attributes set to “/priority” or “/load”. • reqNotifEvents set to NF_REGISTERED,NF_DEREGISTERED, NF_PROFILE_CHANGE.

4.5 Call-Mix

Table 4-4 Call-Mix

Type of Request	Traffic Distribution (in %)	Targeted TPS
NF Register	0.00002	1
NF Update	0.00282	1
NF Heartbeat	Not considered	52
NF Subscribe + Update Subscription	0.01416	7
NF Discover	99%	21600 + 10% forwarded traffic = 24000
SLF Query	Extra 95% of Discovery	22875*
NF Access Token for SLF	Extra	0.1
NF Profile Retrieval	0.00141	1
NF List Retrieval	0.00141	1
NF Status Notify	1.52328	750
NF Status UnSubscribe	0.00006	1

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Table 4-4 (Cont.) Call-Mix

Type of Request	Traffic Distribution (in %)	Targeted TPS
NF DeRegister	0.00002	1
NF Access Token for Consumers	0.00141	1
NRF Forwarding (Outgoing)	Extra 10% of 24K	2400*

> **Note**
>
> * This is not included in the calculation of the overall traffic of 24K TPS.

4.5.1 NF Count Per NF Types

Table 4-5 NF Count Per NF Types

Target-NF Types	NF Count	Profile Size (with pretty printing) (in bytes)
AMF	26	8700-11300
AUSF	6	4640
BSF	3	1700
CHF	3	1800
GMLC	4	0630
LMF	4	2400
PCF	10	1500-2500
SMF	80	5700-7400
UDM	6	3200
UDR	30	1700-2000
UPF	78	1500
SLF	3	2100

Total number of NF Count is **250**.

4.5.2 Number of Profiles in Response

Table 4-6 Number of Profiles in Response for NF Types

Target-NF Types	TPS (in %)	Absolute TPS	SLF Queries Posted	Number of Profiles in Response
AMF	1.34	320	0	4
AUSF	9.65	2352	2352	6
BSF	0.00	0	0	3
CHF	0.10	24	0	3
GMLC	0.00	0	0	4
LMF	0.00	0	0	4
PCF	0.27	64	0	10

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Table 4-6 (Cont.) Number of Profiles in Response for NF Types

Target-NF Types	TPS (in %)	Absolute TPS	SLF Queries Posted	Number of Profiles in Response
SMF	2.96	699	0	4
UDM	66.49	16050	16050	6
UDR	18.60	4473	4473	12
UPF	0	0	0	0
SLF	0	0	0	3
Total	**99.41**	**23982**	**22875**	-

4.6 Service Operations

This section list the various service operations with the required query parameters.

NfDiscover Service Operation

The NfDiscover service operations are sent with the following query parameters:

- Target-nf-type, guami, and requester-nssais
- Target-nf-type, requester-nf-type, routing-indicator, and group-id-list
- Target-nf-type, requester-nf-type, supi, and service-names
- Target-nf-type, requester-nf-type, and service-names
- Target-nf-type, requester-nf-type, and group-id-list
- Target-nf-type and pgw
- Target-nf-type, requester-nf-type, supi, and service-names
- Target-nf-type, requester-nf-type, and service-names
- Target-nf-type, dnn, snssai, TAI, and pgw-ind
- Target-nf-type, SUPI, group-id-list, and service-names
- Target-nf-type, dnn, snssai, preferred-locality, and service-names
- Target-nf-type and guami
- Target-nf-type, requester-nf-type, and preferred-locality
- Target-nf-type, requester-nf-type, preferred-locality, and SUPI
- Target-nf-type, requester-nf-type, SUPI, group-id-list, requester-nf-type, and data-set
- Target-nf-type, requester-nf-type, routing-indicator, group-id-list, and service-names

4.7 Test Observations

The following table provides the details of test duration and TPS used for the benchmarking test.

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Table 4-7 Test Observations

Parameter	Values
Test Duration	60 hours
TPS Achieved	24K

4.8 Resource Utilization

The following table describes NRF microservices and their utilization.

Table 4-8 Resource Utilization

NRF Microservices	Number of Pods	Average CPU	Average Memory (in Gi)
nfregistration	2	0.27 (13.5%)	1.21 (40.33%)
nfdiscovery	60	135.08 (56.28%)	74.71 (41.51%)
nfsubscription	2	0.05 (2.5%)	1.18 (39.33%)
nrfAuditor	2	0.02 (1%)	0.89 (29.67%)
nrfconfiguration	1	0.03 (1.5%)	0.84 (42%)
nfaccesstoken	2	0.02 (1%)	1.69 (34.5%)
nrfartisan	1	0 (0%)	0.47 (47%)
nrfcachedata	2	0.58 (7.25%)	2.27 (28.38%)
alternate-route	2	0 (0%)	0 (0%)
appinfo	2	0.06 (6%)	0.25 (25%)
perfinfo	2	0.12 (12%)	0.12 (12%)
ingressgateway	27	53.25 (49.31%)	56.81 (52.6%)
egressgateway	19	33.95 (44.67%)	22.84 (30.05%)

> **Note**
>
> The features enabled for this benchmarking testing do not utilize alternate-route service.

4.8.1 CNE Common Services Resource Utilization

The following table describes CNE microservices and their utilization.

Table 4-9 CNE Common Services Resource Utilization

CNE Observability Services	Pod Count	Average CPU	Average Memory
occne-prometheus-server-1	2	8.07%	64%
occne-elastic-elasticsearch-master-0	1	0.53%	65%
occne-elastic-elasticsearch-master-1	1	0.56%	68%
occne-elastic-elasticsearch-master-2	1	0.53%	65%
occne-elastic-elasticsearch-data-1	1	0.31%	53%

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Table 4-9 (Cont.) CNE Common Services Resource Utilization

CNE Observability Services	Pod Count	Average CPU	Average Memory
occne-elastic-elasticsearch-data-2	1	0.72%	93%
occne-prometheus-node-exporter	16	0.80%	8%

4.8.2 cnDBTier Services Resource Utilization

The following table provides observed values of cnDBTier services.

Table 4-10 cnDBTier Services Resource Requirements

Service Name	Pod Count	Average CPU	Average Memory
SQL (ndbappmysqld)	2	0.4 (10%)	3.47 (57.83%)
DB (ndbmtd)	4	0.56 (2.8%)	15.87 (79.35%)
SQL (ndbmysqld)	2	0.04 (0.5%)	1.92 (19.2%)
MGMT (ndbmgmd)	2	0.01 (0.13%)	0.06 (0.5%)
Monitor Service (db-monitor-svc)	1	0.01 (2.5%)	0.35 (70%)
Backup Manager Service (db-backup-manager-svc)	1	0 (0%)	0.06 (46.88%)
Replication Service	1	0.0 (0.0%)	0.41 (20.5%)

Table 4-11 cnDBTier Statistics

DBTier Statistics	Value
Memory usage of data nodes	1.98%
CPU usage of data nodes	1.88%
Write operations per second	45.6
Read operations per second	2.5k
Transaction rates on data nodes	2.4k

4.8.3 Latency Observations

Table 4-12 Latency Observations

Latency Parameter	Details		
	Min (s)	Max (s)	Avg (s)
Average Turnaround time at Ingress Gateway, Discovery Processing, and SLF Egress Transaction	0.0781	0.199	0.0881
Average Turnaround time for Discovery Processing and SLF Egress Transaction	0.0953	0.116	0.104
Average Turnaround time for cnDBTier access for Discovery Processing	0.0	0.000551	0.0000695
Turnaround time for SLF Egress Transaction (see Note)	0.109	0.150	0.126

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Note

Following simulators are used for performance measurement and their induced latency:

- NF simulator to NRF: 50ms
- NRF to forwarding simulator and forwarding simulator to NRF: 100ms
- NRF to SLF: 150 ms
- Packet Error Ratio Induced: 0.01

The values of Bucketed View, Max, and Average for discovery service operation is maximum among all the other service operations.

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