Oracle® Communications
Cloud Native Core, Unified Data Repository Benchmarking Guide

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Preface

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Acronyms

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

Table   Acronyms and Terminologies

Acronym	Description
AMF	Access and Mobility Management Function
AUSF	Authentication Server Function
CNE	Oracle Communications Cloud Native Core, Cloud Native Environment
CPU	Central Processing Unit
EIC	Equipment Identity Check
EIR	Equipment Identity Repository
GPSI	Generic Public Subscription Identifier
HTTP	Hypertext Transfer Protocol
MPS	Messages Per Second
NF	Network Function
NRF	Oracle Communications Cloud Native Core, Network Repository Function
PVC	Persistent Volume Claim
RAM	Random Access Memory
SLF	Subscriber Location Function
SOAP	Simple Object Access Protocol
SUPI	Subscription Permanent Identifier
TPS	Transactions Per Second
UDM	Unified Data Management
UDR	Oracle Communications Cloud Native Core, Unified Data Repository
vCNE	Virtual Cloud Native Environment

What's New in This Guide

This section introduces the documentation updates for Release 25.1.2xx.

Release 25.1.200 - G37599-01, July 2025

- Updated the values in the Consolidated Resource Requirement, CPU Allocation Per Pod, and Total Resources in the following sections:

    – [SLF Call Model: 50K lookup + 1.44K Provisioning TPS (64M Subscribers)](#)

    – [Test Scenario 4: 25K N36 and 600 Provisioning (SOAP) Profile (35M Subscribers)](#)

    – [Test Scenario 5: 17.2K N36 + 10K SH and 600 Provisioing (SOAP) Profile (35M Subscribers)](#)

- Removed the SLF Call Model: 34K TPS and 1.44K Provisioning TPS section from this document.

- Removed the Policy Data: 17.2K N36, 300 TPS Notifications and 500 TPS Provisioning section from this document.

1

Introduction

Oracle Communications Cloud Native Core Unified Data Repository (UDR) is a key component of the 5G Service Based Architecture. It is implemented as a cloud native function and offers a unified database for storing application, subscription, authentication, service authorization, policy data, session binding, and application state information. For more information about UDR architecture, see *Oracle Communications Cloud Native Core, Unified Data Repository User Guide*.

1.1 Purpose and Scope

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

It is recommended that UDR 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 predict resource requirements when UDR is scaled up.

1.2 References

- *Oracle Communications Cloud Native Core, Unified Data Repository Installation, Upgrade, and Fault Recovery Guide*
- *Oracle Communications Cloud Native Core, Unified Data Repository User Guide*
- *Oracle Communications Cloud Native Core, Unified Data Repository REST Specification Guide*
- *Oracle Communications Cloud Native Core, Unified Data Repository Troubleshooting Guide*
- *Oracle Communications Cloud Native Core, Provisioning Gateway Installation Guide*
- *Oracle Communications Cloud Native Core, Provisioning Gateway Interface Specification Guide*

2

Deployment Environment

This section provides information about the cloud native infrastructure used for UDR, SLF, and EIR benchmarking.

2.1 Deployed Components

Deployment Platform

Oracle Communications Cloud Native Environment (OCCNE) and BareMetal is used for performing benchmark tests.

Observability Services

The following table lists services that are used for UDR benchmark tests. These services fetch UDR metrics, alerts, logs, and traces. For more information about mentioned software, see *Oracle Communications Cloud Native Core, Unified Data Repository Installation, Upgrade, and Fault Recovery Guide*

Table 2-1   Observability Services

Service
Opensearch
Fluentd
Kibana
Prometheus
Grafana
Jaeger

Cloud Native Orchestrator

Kubernetes is used for managing application pods across the cluster.

cnDBTier

cnDBTier is used for performing benchmark tests.

For more information about above mentioned components, see *Oracle Communications Cloud Native Core, Unified Data Repository Installation, Upgrade, and Fault Recovery Guide*.

2.2 Deployment Resources

The performance and capacity of UDR can vary based on the chosen environment and how UDR is deployed. This section provides information about CNE resources used to perform benchmark tests.

2.2.1 Resource Requirements for CNE Observability Services

The following table provides information about number of pods required by each CNE service.

Table 2-2   Resource Requirements for CNE Observability Services

Service Name	Number of Pods
Prometheus Server	1
Prometheus-pushgateway	1
Alert Manager	2
Fluentd	1 per Worker node
Prom-node-exporter	1 per Worker node
MetalLB speaker	1 per Worker node
Opensearch Data/Master	3/3
Opensearch Client	1
Grafana	1
Kibana	1
kube-state-metrics	1
jaeger-agent	1 per Worker node
jaeger-collector	1
jaeger-query	1
rook-ceph-osd	1 for each raw disk available to OS on all Worker nodes
rook-ceph-mgr	1
rook-ceph-mon	3
rook-ceph-osd	1

3
UDR Benchmark Testing

This chapter describes UDR, SLF, and EIR test scenarios.

3.1 Test Scenario 1: SLF Call Deployment Model

This section provides information about SLF call deployment model test scenarios.

3.1.1 SLF Call Model: 50K lookup + 1.44K Provisioning TPS (64M Subscribers)

This test scenario describes performance and capacity of SLF functionality offered by UDR and provides the benchmarking results for various deployment sizes.

The following features are enabled for SLF in this testcase:

- Ingress Gateway Pod Protection Using Rate Limiting
- OAuth2
- Alternate Routing Service
- Support for User-Agent Header
- Overload Handling
- Support for LCI and OCI Header
- Auto Create
- Network Function Scoring for a Site
- Conflict Resolution
- Controlled Shutdown of an Instance
- Error Response and Logging Enhancement

The following features are enabled for Provisioning Gateway in this testcase:

- Auditor Service
- Provgw global configuration

You can perform benchmark tests on SLF for compute and storage resources by considering the following conditions:

- Signaling (SLF Look Up): 50K TPS
- Provisioning: 1.44 K
- Total Subscribers: 64 Million
- Profile Size: 450 bytes

The following table describes the benchmarking parameters and their values:

Table 3-1   Traffic Model Details

Request Type	Details	TPS
Lookup 50k	SLF Lookup GET Requests	50K
Provisioning (1.44K using Provgw)	CREATE	210
	DELETE	210
	UPDATE	510
	GET	510

The following table describes the testcase parameters and their values:

Table 3-2   Testcase Parameters

Input Parameter Details	Configuration Values
UDR Version Tag	25.1.200
Target TPS	50K Lookup + 1.44K Provisioning
Traffic Profile	SLF 50K Profile
Notification Rate	OFF
UDR Response Timeout	900ms
Client Timeout	30s
Signaling Requests Latency Recorded on Client	17ms
Provisioning Requests Latency Recorded on Client	38ms

The following table describes consolidated resource requirement:

Table 3-3   Consolidated Resource Requirement

Resource	CPU	Memory	Ephemeral Storage	PVC
cnDBTier	134	453 GB	20 GB	1064 GB
SLF	384	225 GB	53 GB	NA
ProvGw	39	39 GB	9 GB	NA
Buffer	50	50 GB	50 GB	50 GB
Total	607	767 GB	132 GB	1114 GB

> ⓘ **Note**
>
> All values are inclusive of ASM sidecar.

The following table provides OSO resources:

Table 3-4   OSO Resources (Retention period: 14 days)

Service	CPU Limit	RAM Limit	PVC
Prometheus (snapshot utility enabled)	4	8 GB	75 GB

Table 3-4 (Cont.) OSO Resources (Retention period: 14 days)

Service	CPU Limit	RAM Limit	PVC
Prometheus AlertManager	4	4 GB	NA
Total	8	12 GB	75 GB

Table 3-5 cnDBTier Resources

Microservice Name	Container Name	Number of Pods	CPU Allocation Per Pod (cnDBtier1)	Memory Allocation Per Pod (cnDBtier1)	Ephemeral Storage Per Pod	PVC Allocation Per Pod	Total Resources (cnDBtier)
Management node (ndbmgmd)	mysqlndbcluster	2	2 CPUs	12 GB	1 GB	16 GB	6 CPUs 26 GB **Ephemeral Storage:** 2 GB **PVC Allocation:** 32 GB
	istio-proxy		1 CPUs	1 GB			
Data node (ndbmtd)	mysqlndbcluster	6	4 CPUs	50 GB	1 GB	65 GB (Backup: 63 GB)	42 CPUs 324 GB **Ephemeral Storage:** 6 GB **PVC Allocation:** 768 GB
	istio-proxy		2 CPUs	2 GB			
	db-backup-executor-svc		1 CPU	2 GB			
APP SQL node (ndbappmysqld)	mysqlndbcluster	7	6 CPUs	4 GB	1 GB	10 GB	63 CPUs 42 GB **Ephemeral Storage:** 7 GB **PVC Allocation:** 70 GB
	istio-proxy		3 CPUs	2 GB			
SQL node (Used for Replication) (ndbmysqld)	mysqlndbcluster	2	4 CPUs	16 GB	1 GB	16 GB	13 CPUs 41 GB **Ephemeral Storage:** 2 GB **PVC Allocation:** 32 GB
	istio-proxy		2 CPUs	4 GB			
	init-sidecar		100m CPU	256 MB			
DB Monitor Service (db-monitor-svc)	db-monitor-svc	1	4 CPUs	4 GB	1 GB	NA	5 CPUs 5 GB **Ephemeral Storage:** 1 GB
	istio-proxy		1 CPUs	1 GB			
DB Backup Manager Service	backup-manager-svc	1	1 CPU	1 GB	1 GB	NA	2 CPUs 2 GB

Table 3-5   (Cont.) cnDBTier Resources

Microservice Name	Container Name	Number of Pods	CPU Allocation Per Pod (cnDBtier1)	Memory Allocation Per Pod (cnDBtier1)	Ephemeral Storage Per Pod	PVC Allocation Per Pod	Total Resources (cnDBtier)
(backup-manager-svc)	istio-proxy		1 CPUs	1 GB			**Ephemeral Storage:** 1 GB
Replication Service (db-replication-svc)	db-replication-svc	1	2 CPU	12 GB	1 GB	160 GB	3 CPUs 13 GB **Ephemeral Storage:** 1 GB **PVC Allocation:** 160 GB
	istio-proxy		200m CPU	500 MB			

Additional cnDBTier configuration are as follows:

```
ndb:
  annotations:
    - sidecar.istio.io/inject: "true"
    - proxy.istio.io/config: "{concurrency: 8}"
    - sidecar.istio.io/proxyCPU: "2000m"
    - sidecar.istio.io/proxyCPULimit: "2000m"
    - sidecar.istio.io/proxyMemory: "4Gi"
    - sidecar.istio.io/proxyMemoryLimit: "4Gi"

mgm:
  annotations:
    - sidecar.istio.io/inject: "true"
    - proxy.istio.io/config: "{concurrency: 8}"
    - sidecar.istio.io/proxyCPU: "1000m"
    - sidecar.istio.io/proxyCPULimit: "1000m"
    - sidecar.istio.io/proxyMemory: "4Gi"
    - sidecar.istio.io/proxyMemoryLimit: "4Gi"

api:
  annotations:
    - sidecar.istio.io/inject: "true"
    - proxy.istio.io/config: "{concurrency: 8}"
    - sidecar.istio.io/proxyCPU: "2000m"
    - sidecar.istio.io/proxyCPULimit: "2000m"
    - sidecar.istio.io/proxyMemory: "4Gi"
    - sidecar.istio.io/proxyMemoryLimit: "4Gi"
  ndbapp:
    annotations:
      - sidecar.istio.io/inject: "true"
      - proxy.istio.io/config: "{concurrency: 8}"
      - sidecar.istio.io/proxyCPU: "3000m"
      - sidecar.istio.io/proxyCPULimit: "3000m"
```

```
- sidecar.istio.io/proxyMemory: "4Gi"
- sidecar.istio.io/proxyMemoryLimit: "4Gi"
```

The following table describes SLF resources (Lookup Latency: 17ms):

Table 3-6   SLF Resources and Usage

Microservice name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod	Ephemeral Storage Per Pod	Total Resources
Ingress-gateway-sig	ingressgateway-sig	19	6 CPUs	4 GB	1 GB	190 CPUs 95 GB Memory **Ephemeral Storage:** 19 GB
	istio-proxy		4 CPUs	1 GB		
Ingress-gateway-prov	ingressgateway-prov	2	4 CPUs	4 GB	1 GB	12 CPUs 10 GB **Ephemeral Storage:** 2 GB
	istio-proxy		2 CPUs	1 GB		
Nudr-dr-service	nudr-drservice	15	6 CPUs	4 GB	1 GB	135 CPUs 75 GB **Ephemeral Storage:** 15 GB
	istio-proxy		3 CPUs	1 GB		
Nudr-dr-provservice	nudr-dr-provservice	2	4 CPUs	4 GB	1 GB	12 CPUs 10 GB **Ephemeral Storage:** 2 GB
	istio-proxy		2 CPUs	1 GB		
Nudr-nrf-client-nfmanagement	nrf-client-nfmanagement	2	1 CPU	1 GB	1 GB	4 CPUs 4 GB **Ephemeral Storage:** 2 GB
	istio-proxy		1 CPUs	1 GB		
Nudr-egress-gateway	egressgateway	2	1 CPUs	1 GB	1 GB	4 CPUs 4 GB **Ephemeral Storage:** 2 GB
	istio-proxy		1 CPUs	1 GB		
Nudr-config	nudr-config	2	2 CPUs	2 GB	1 GB	6 CPUs 6 GB **Ephemeral Storage:** 2 GB
	istio-proxy		1 CPUs	1 GB		
Nudr-config-server	nudr-config-server	2	2 CPUs	2 GB	1 GB	6 CPUs 6 GB **Ephemeral Storage:** 2 GB
	istio-proxy		1 CPUs	1 GB		

Table 3-6   (Cont.) SLF Resources and Usage

Microservice name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod	Ephemeral Storage Per Pod	Total Resources
alternate-route	alternate-route	2	1 CPUs	1 GB	1 GB	4 CPUs 4 GB **Ephemeral Storage:** 2 GB
	istio-proxy		1 CPUs	1 GB		
app-info	app-info	2	1 CPUs	1 GB	1 GB	4 CPUs 4 GB **Ephemeral Storage:** 2 GB
	istio-proxy		1 CPUs	1 GB		
perf-info	perf-info	2	1 CPUs	1 GB	1 GB	4 CPUs 4 GB **Ephemeral Storage:** 2 GB
	istio-proxy		1 CPUs	1 GB		
Nudr-dbcr-auditor	nudr-dbcr-auditor-service	1	2 CPUs	2 GB	1 GB	3 CPUs 3 GB **Ephemeral Storage:** 1 GB
	istio-proxy		1 CPUs	1 GB		

> ⓘ **Note**
>
> The same resources and usage are used for Site2.

Table 3-7   Provision Gateway Resources (Provisioning Latency: 38 ms)

Microservice name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod	Ephemeral Storage Per Pod	Total Resources
provgw-ingress-gateway	ingressgateway	2	4 CPUs	4 GB	1 GB	10 CPUs 10 GB Memory **Ephemeral Storage:** 2 GB
	istio-proxy		1 CPUs	1 GB		
provgw-egress-gateway	egressgateway	2	4 CPUs	4 GB	1 GB	10 CPUs 10 GB Memory **Ephemeral Storage:** 2 GB
	istio-proxy		1 CPUs	1 GB		
provgw-service	provgw-service	2	4 CPUs	4 GB	1 GB	10 CPUs 10 GB Memory

Table 3-7   (Cont.) Provision Gateway Resources (Provisioning Latency: 38 ms)

Microservice name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod	Ephemeral Storage Per Pod	Total Resources
	istio-proxy		1 CPUs	1 GB		**Ephemeral Storage:** 2 GB
provgw-config	provgw-config	2	2 CPUs	2 GB	1 GB	6 CPUs 6 GB Memory **Ephemeral Storage:** 2 GB
	istio-proxy		1 CPUs	1 GB		
provgw-auditor-service	auditor-service	1	2 CPUs	2 GB	1 GB	3 CPUs 3 GB Memory **Ephemeral Storage:** 1 GB
	istio-proxy		1 CPU	1 GB		

The following table provides observation data for the performance test that can be used for the benchmark testing to scale up SLF performance:

Table 3-8   Result and Observation

Parameter	Values
TPS Achieved	50K SLF Lookup + 1.44K Provisioning
Success Rate	100%
Average SLF processing time for signaling requests	19ms
Average SLF processing time for provisioning requests	42ms

3.2 Test Scenario 2: EIR 10K TPS and 10k Diameter S13 Interface TPS (600 K Subscribers)

This test scenario describes performance and capacity improvements of EIR functionality offered by UDR and provides the benchmarking results for various deployment sizes.

The following features are enabled for this testcase:

- Auto Create
- Diameter S13 Interface
- Subscriber Activity Logging
- International Mobile Subscriber Identity (IMSI) Fallback Lookup

EIR is benchmarked for compute and storage resources under the following conditions:

- EIR Look Up: 20K

- Total Subscribers: 600 K

- Profile Size: 130 bytes

The following table describes the benchmarking parameters and their values:

Table 3-9   Traffic Model Details

Request Type	Details	TPS
EIR GET	N17 GET Request	10K
ECR message	Diameter S13 Interface ECR	10K

The following table describes the testcase parameters and their values:

Table 3-10   Testcase Parameters

Input Parameter Details	Configuration Values
UDR Version Tag	25.1.200
Target TPS	20K Lookup
Traffic Profile	20K
EIR Response Timeout	2.7s
Client Timeout	10s
N17 Latency:	6 ms
S13 Latency	7 ms

The following table describes the consolidated resource requirements:

Table 3-11   Consolidated Resource Requirement

Resource	CPUs	Memory	Ephemeral Storage	PVC
cnDBTier	48	664 GB	21 GB	1893 GB
EIR	215	155 GB	48 GB	NA GB
Buffer	50	50 GB	20 GB	200 GB
Total	362	814 GB	89 GB	2015 GB

The following table describes cnDBTier resources:

Table 3-12   cnDBTier Resources

Micro service name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod (cnDBTier1)	Total Resources (cnDBTier1)
Management node	mysqlndbcluster	2	2 CPUs	12 GB	4 CPU 23 GB Memory **Ephemeral Storage:** 2 GB **PVC Allocation:** 32 GB

Table 3-12   (Cont.) cnDBTier Resources

Micro service name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod (cnDBTier1)	Total Resources (cnDBTier1)
Data node	mysqlndbcluster	4	4 CPUs	20 GB	16 CPU 80 GB Memory **Ephemeral Storage:** 4 GB **PVC Allocation:** 336 GB
APP SQL node	mysqlndbcluster	5	4 CPUs	4 GB	20 CPU 20 GB Memory **Ephemeral Storage:** 5 GB **PVC Allocation:** 50 GB
SQL node (Used for Replication)	mysqlndbcluster	2	4 CPUs	5 GB	8 CPU 10 GB Memory **Ephemeral Storage:** 2 GB **PVC Allocation:** 32 GB
DB Monitor Service (db-monitor-svc)	db-monitor-svc	1	4 CPUs	4 GB	4 CPUs 4 GB Memory **Ephemeral Storage:** 1 GB
DB Backup Manager Service (backup-manager-svc)	backup-manager-svc	1	100m CPUs	128 MB	100m CPUs 128 MB Memory **Ephemeral Storage:** 1 GB
Replication Service (db-replication-svc)	db-replication-svc	1	2 CPU	2 GB	2 CPUs 2 MB Memory **Ephemeral Storage:** 1 GB **PVC Allocation:** 66 GB

The following table describes EIR resources:

Table 3-13   EIR Resources

Micro service name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod	Ephemeral Storage Per Pod	Total Resources
Ingress-gateway-sig	Ingress-gateway-sig	4	6 CPUs	4 GB	1 GB	24 CPUs 16 GB Memory **Ephemeral Storage:** 4 GB
Ingress-gateway-prov	Ingress-gateway-prov	2	4 CPUs	4 GB	1 GB	8 CPUs 8 GB Memory **Ephemeral Storage:** 2 GB
Nudr-dr-service	nudr-drservice	3	6 CPUs	4 GB	1 GB	18 CPUs 12 GB Memory **Ephemeral Storage:** 3 GB
Nudr-dr-provservice	nudr-dr-provservice	2	4 CPUs	4 GB	1 GB	8 CPUs 8 GB Memory **Ephemeral Storage:** 2 GB
Nudr-diam-gateway	nudr-diam-gateway	2	6 CPUs	4 GB	1 GB	12 CPUs 8 GB Memory **Ephemeral Storage:** 2 GB
Nudr-diameterproxy	nudr-diameterproxy	8	6 CPUs	4 GB	1 GB	48 CPUs 32 GB Memory **Ephemeral Storage:** 8 GB
Nudr-config	nudr-config	2	1 CPUs	1 GB	1 GB	2 CPUs 2 GB Memory **Ephemeral Storage:** 2 GB

Table 3-13   (Cont.) EIR Resources

Micro service name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod	Ephemeral Storage Per Pod	Total Resources
Nudr-config-server	nudr-config-server	2	1 CPUs	1 GB	1 GB	2 CPU 2 GB Memory **Ephemeral Storage:** 2 GB
Alternate-route	alternate-route	2	1 CPUs	1 GB	1 GB	2 CPU 2 GB Memory **Ephemeral Storage:** 2 GB
Nudr-nrf-client-nfmanagement-service	nrf-client-nfmanagement	2	1 CPUs	1 GB	1 GB	2 CPU 2 GB Memory **Ephemeral Storage:** 2 GB
App-info	app-info	2	1 CPUs	1 GB	1 GB	2 CPU 2 GB Memory **Ephemeral Storage:** 2 GB
Perf-info	perf-info	2	1 CPUs	1 GB	1 GB	2 CPU 2 GB Memory **Ephemeral Storage:** 2 GB
Nudr-dbcr-auditor-service	nudr-dbcr-auditor-service	1	1 CPUs	1 GB	1 GB	1 CPU 1 GB Memory **Ephemeral Storage:** 1 GB

The following table provides observation data for the performance test that can be used for the benchmark testing to scale up EIR performance:

Table 3-14   Result and Observation

Parameter	Values
TPS Achieved	20K
Success Rate	100%

Table 3-14   (Cont.) Result and Observation

Parameter	Values
Average EIR processing time (Request and Response)	9 ms

3.3 Test Scenario 3: SOAP and Diameter Deployment Model (1M - 10M Subscribers)

2K SOAP provisioning TPS for ProvGw for Medium profile + Diameter 25K with Large profile

The following features are disabled for this testcase:

*   TLS

*   OAuth2.0

*   Header Validations like XFCC, server header, and user agent header

UDR is benchmarked for compute and storage resources under following conditions:

*   Signaling : 10K TPS

*   Provisioning: 2K TPS

*   Total Subscribers: 1M - 10M range used for Diameter Sh and 1M range used for SOAP/XML

*   Profile Size: 2.2KB

*   Average HTTP Provisioning Request Packet Size: NA

*   Average HTTP Provisioning Response Packet Size: NA

Figure 3-1   SOAP and Diameter Deployment Model
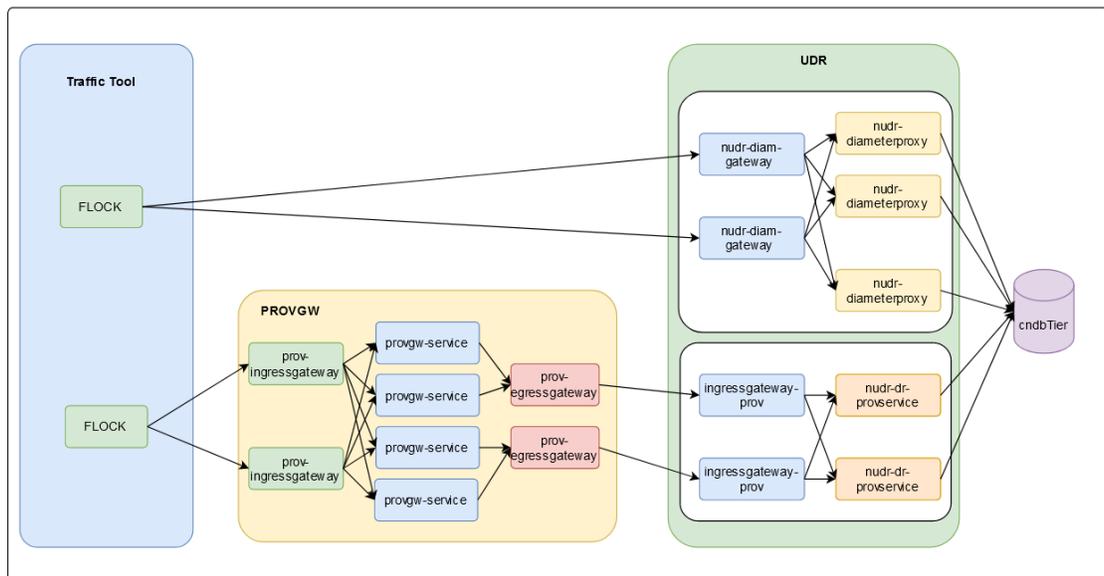
The following table describes the benchmarking parameters and their values:

Table 3-15   Traffic Model Details

Request Type	Details	TPS
Diameter SH Traffic	SH Traffic	25K
Provisioning (2K using Provgw)	SOAP Traffic	2K

Table 3-16   SOAP Traffic Model

Request Type	SOAP Traffic %
GET	33%
DELETE	11%
POST	11%
PUT	45%

Table 3-17   Diameter Traffic Model

Request Type	Diameter Traffic %
SNR	25%
PUR	50%
UDR	25%

The following table describes the benchmarking parameters and their values:

Table 3-18   Testcase Parameters

Input Parameter Details	Configuration Values
UDR Version Tag	22.2.0
Target TPS	25K + 2K
Traffic Profile	25K sh + 2K SOAP
Notification Rate	OFF
UDR Response Timeout	5s
Client timeout	10s
Signaling Requests Latency Recorded on Client	NA
Provisioning Requests Latency Recorded on Client	NA

> ⓘ **Note**
>
> PNR scenarios are not tested because server stub is not used.

The following table describes cnDBTier resources:

Table 3-19   cnDBTier Resources

Micro service name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod	Total Resources
Management node	mysqlndbcluster	3	4 CPUs	10 GB	12 CPUs 30 GB Memory
Data node	mysqlndbcluster	4	15 CPUs	98 GB	64 CPU 408 GB Memory
	db-backup-executor-svc		100m CPU	128 MB	
APP SQL node	mysqlndbcluster	4	16 CPUs	16 GB	64 CPUs 64 GB Memory
SQL node (Used for Replication)	mysqlndbcluster	4	8 CPUs	16 GB	49 CPUs 81 GB Memory
DB Monitor Service	db-monitor-svc	1	200m CPUs	500 MB	3 CPUs 2 GB Memory
DB Backup Manager Service	replication-svc	1	200m CPU	500 MB	3 CPUs 2 GB Memory

cnDBTier Metrics:

- Data memory usage: 72GB (5.164GB used)

- DB Reads per second: 52k

- DB Writes per second: 24k

The following table describes UDR resources:

Table 3-20   UDR Resources (Request Latency: 40ms)

Micro service name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod	Total Resources
nudr-diameterproxy	nudr-diameterproxy	19	2.5 CPUs	4 GB	47.5 CPUs 76 GB Memory
nudr-diam-gateway	nudr-diam-gateway	3	6 CPUs	4 GB	18 CPUs 12 GB Memory
Ingress-gateway-sig	ingressgateway-sig	2	2 CPUs	2 GB	4 CPUs 4 GB Memory
Ingress-gateway-prov	ingressgateway-prov	2	2 CPUs	2 GB	4 CPUs 4 GB Memory
Nudr-dr-service	nudr-drservice	2	2 CPUs	2 GB	4 CPUs 4 GB Memory
Nudr-dr-provservice	nudr-dr-provservice	2	2 CPUs	2 GB	4 CPUs 4 GB Memory

Table 3-20   (Cont.) UDR Resources (Request Latency: 40ms)

Micro service name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod	Total Resources
Nudr-nrf-client-nfmanagement	nrf-client-nfmanagement	2	1 CPUs	1 GB	2 CPUs 2 GB Memory
Nudr-egress-gateway	egressgateway	2	2 CPUs	2 GB	4 CPU 4 GB Memory
Nudr-config	nudr-config	2	1 CPUs	1 GB	2 CPU 2 GB Memory
Nudr-config-server	nudr-config-server	2	1 CPUs	1 GB	2 CPU 2 GB Memory
alternate-route	alternate-route	2	1 CPUs	1 GB	2 CPU 2 GB Memory
app-info	app-info	2	1 CPUs	1 GB	2 CPU 2 GB Memory
perf-info	perf-info	2	1 CPUs	1 GB	2 CPU 2 GB Memory

The following table describes provisioning gateway resources:

Table 3-21   Provisioning Gateway Resources (Provisioning Request Latency: 40ms)

Micro service name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod	Total Resources
provgw-ingress-gatewa	ingressgateway	3	2 CPUs	2 GB	6 CPUs 6 GB Memory
provgw-egress-gateway	egressgateway	2	2 CPUs	2 GB	4 CPUs 4 GB Memory
provgw-service	provgw-service	4	2.5 CPUs	3 GB	10 CPUs 12 GB Memory
provgw-config	provgw-config	2	1 CPUs	1 GB	2 CPUs 2 GB Memory
provgw-config-server	provgw-config-server	2	1 CPUs	1 GB	2 CPUs 2 GB Memory

Resources calculation for UDR, Provisioning Gateway, and cnDBTier are shown below:

Table 3-22   cnUDR and ProvGw Resources Calculation

Resources	cnUDR			ProvGw		
	Core services used for traffic runs (Nudr-diamgw, Nudr-diamproxy, Nudr-ingressgateway-prov and Nudr-dr-prov) at 70% usage	Other Microservices	Total	Core services used for traffic runs (ProvGw-ingressgateway, ProvGw-provgw service and ProvGw-egressgateway) at 70% usage	Other Microservice	Total
CPU	73.5	24	97.5	20	4	24
Memory in GB	96	24	120	22	4	26
Disk Volume (Ephemeral storage) in GB	26	16	42	9	4	13

Table 3-23   cnDBTier Resources Calculation

Resources	cnDbTier					
	SQL nodes (at actual usage)	SQL Nodes (Overhead/ Buffer resources at 20%)	Data nodes (at actual usage)	Data nodes (Overhead/ Buffer resources at 10%)	MGM nodes and other resources (Default resources)	Total
CPU	76	16	23.2	5	18	138.5
Memory in GB	70.4	14	368	36	34	522
Disk Volume (Ephemeral storage) in GB	8	NA	960 (ndbdisksize = 240*4)	NA	20	988

Table 3-24   Total Resources Calculation

Resources	Total
CPU	260
Memory in GB	668 GB
Disk Volume (Ephemeral storage) in GB	104 GB

The following table provides observation data for the performance test that can be used for the benchmark testing to scale up UDR performance:

Table 3-25   Result and Observation

Parameter	Values
TPS Achieved	10K

Table 3-25   (Cont.) Result and Observation

Parameter	Values
Success Rate	100%
Average UDR processing time (Request and Response)	40ms

3.4 Test Scenario 4: 25K N36 and 600 Provisioning (SOAP) Profile (35M Subscribers)

You can perform benchmark tests on UDR for compute and storage resources by considering the following conditions:

- Signaling: 25K TPS

- Provisioning: 600 TPS

- Total Subscribers: 35 Million

The following features are enabled for this testcase:

- Auto Enrollment and Auto Create Features

- Overload Handling

- ETag (Entity Tag)

- Ingress Gateway Pod Protection

- Support for User-Agent Header

- 3gpp-Sbi-Correlation-Info Header

- Suppress Notification

- Support for Post Operation for an Existing Subscription

- Subscriber Activity Logging

The following table describes the benchmarking parameters and their values:

Table 3-26   Traffic Model Details

Request Type	Details	TPS
N36 traffic 25K TPS	subs-to-notify POST	5K (20%)
	sm-data GET	5K (20%)
	subs-to-notify DELETE	5K (20%
	sm-data PATCH	10K (40%)
SOAP PROVISIONING 600 TPS	GET	100
	UPDATE QUOTA	50
	UPDATE DYNAMIC QUOTA	50
	UPDATE STATE	100
	UPDATE SUBSCRIBER	100
	CREATE SUBSCRIBER	100
	DELETE SUBSCRIBER	100

The following table describes the test case parameters and their values:

Table 3-27   Testcase Parameters

Input Parameter Details	Configuration Values
UDR Version Tag	25.1.200
Target TPS	25K TPS Signaling
Notification Rate	300
UDR Response Timeout	2.7s
Signaling Requests Latency Recorded on Client	25ms
Provisioning Requests Latency Recorded on Client	25ms

Table 3-28   Consolidated Resource Requirement

Resource	CPU	Memory	Ephemeral Storage	PVC
cnDBTier	163 CPUs	640 GB	29 GB	1875 GB
UDR	247CPUs	184 GB	55 GB	NA
PROVGW	28	28	10	NA
Buffer	50 CPUs	50 GB	20 GB	200 GB
Total	488 CPUs	902 GB	114 GB	2075 GB

The following table describes cnDBTier resources:

Table 3-29   cnDBTier Resources

Microservice name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod	Ephemeral Storage Per Pod	PVC Allocation Per Pod	Total Resources
Management node (ndbmgmd)	mysqlndbcluster	2	2 CPUs	9 GB	1 GB	15 GB	4 CPUs 18 GB **Ephemeral Storage:** 2 GB **PVC Allocation:** 30 GB
Data node (ndbmtd)	mysqlndbcluster	4	9 CPUs	124 GB	1 GB	132 GB Backup: 220 GB	36 CPUs 496 GB **Ephemeral Storage:** 4 GB **PVC Allocation:** 1408 GB

Table 3-29   (Cont.) cnDBTier Resources

Microservice name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod	Ephemeral Storage Per Pod	PVC Allocation Per Pod	Total Resources
APP SQL node (ndbappmysqld)	mysqlndbcluster	18	6 CPUs	4 GB	1 GB	4 GB	108 CPUs 72 GB **Ephemeral Storage:** 18 GB **PVC Allocation:** 72 GB
SQL node (ndbmysqld ,used for replication)	mysqlndbcluster	2	4 CPUs	24 GB	1 GB	110 GB	8 CPUs 48 GB **Ephemeral Storage:** 2 GB **PVC Allocation:** 220 GB
DB Monitor Service (db-monitor-svc)	db-monitor-svc	1	4 CPUs	4 GB	1 GB	NA	4 CPU 4 MB **Ephemeral Storage:** 1 GB
DB Backup Manager Service (backup-manager-svc)	backup-manager-svc	1	100 millicores CPUs	128 MB	1 GB	NA	1 CPU 128 MB **Ephemeral Storage:** 1 GB
Replication service (Multi site cases)	replication-svc	1	2 CPUs	2 GB	1 GB	143 GB	2 CPUs 2 GB **Ephemeral Storage:** 1 GB **PVC Allocation:** 143 GB

The following table describes UDR resources:

Table 3-30   UDR Resources (Average Latency: 50ms (N36/PROV) and N36: 25ms / PROV: 75ms

Micro service name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod	Ephemeral Storage Per Pod	Total Resources
Ingress-gateway-sig	ingressgateway-sig	13	6 CPUs	4 GB	1 GB	78 CPUs 52 GB **Ephemeral Storage:** 13 GB
Ingress-gateway-prov	ingressgateway-prov	2	4 CPUs	4 GB	1 GB	8 CPUs 8 GB **Ephemeral Storage:** 2 GB
Nudr-dr-service	nudr-drservice	20	6 CPUs	4 GB	1 GB	120 CPUs 80 GB **Ephemeral Storage:** 20 GB
Nudr-dr-provservice	nudr-dr-provservice	2	4 CPUs	4 GB	1 GB	8 CPUs 8 GB **Ephemeral Storage:** 2 GB
Nudr-notify-service	nudr-notify-service	3	6 CPUs	5 GB	1 GB	18 CPUs 15 GB **Ephemeral Storage:** 3 GB
Nudr-egress-gateway	egressgateway	2	6 CPUs	4 GB	1 GB	12 CPUs 8 GB **Ephemeral Storage:** 2 GB
Nudr-config	nudr-config	2	1 CPU	1 GB	1 GB	2 CPUs 2 GB **Ephemeral Storage:** 2 GB
Nudr-config-server	nudr-config-server	2	1 CPU	1 GB	1 GB	2 CPUs 2 GB **Ephemeral Storage:** 2 GB
Alternate-route	alternate-route	2	1 CPU	1 GB	1 GB	2 CPUs 2 GB **Ephemeral Storage:** 2 GB

Table 3-30   (Cont.) UDR Resources (Average Latency: 50ms (N36/PROV) and N36: 25ms / PROV: 75ms

Micro service name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod	Ephemeral Storage Per Pod	Total Resources
Nudr-nrf-client-nfmanagement-service	nrf-client-nfmanagement	2	1 CPU	1 GB	1 GB	2 CPUs 2 GB **Ephemeral Storage:** 2 GB
App-info	app-info	2	1 CPU	1 GB	1 GB	2 CPUs 2 GB **Ephemeral Storage:** 2 GB
Perf-info	perf-info	2	1 CPU	1 GB	1 GB	2 CPUs 2 GB **Ephemeral Storage:** 2 GB
Nudr-dbcr-auditor-service	nudr-dbcr-auditor-service	1	1 CPU	1 GB	1 GB	1 CPU 1 GB **Ephemeral Storage:** 1 GB

The following table describes Provisioning Gateway resources:

Table 3-31   Provisioning Gateway Resources

Micro service name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod	Total Resources
provgw-ingress-gateway	ingressgateway	2	4 CPUs	4 GB	8 CPUs 8 GB **Ephemeral Storage:** 2 GB
provgw-egress-gateway	egressgateway	2	4 CPUs	4 GB	8 CPUs 8 GB **Ephemeral Storage:** 2 GB
provgw-service	provgw-service	4	2 CPUs	2 GB	8 CPUs 8 GB **Ephemeral Storage:** 2 GB
provgw-config	provgw-config	2	2 CPUs	2 GB	4 CPUs 4 GB Memory **Ephemeral Storage:** 2 GB

The following table provides observation data for the performance test that can be used for the benchmark testing to scale up UDR performance:

Table 3-32   Result and Observation

Parameter	Values
TPS Achieved	25K Signaling + 600K Provisioning
UDR Processing Average Latency	50ms
Success rate	100%

3.5 Test Scenario 5: 17.2K N36 + 10K SH and 600 Provisioing (SOAP) Profile (35M Subscribers)

You can perform benchmark tests on UDR for compute and storage resources by considering the following conditions:

- Signaling : 17.2K N36 + 10K SH
- Provisioning: 600 TPS
- Total Subscribers: 35 Million

The following features are enabled for this testcase:

- Auto Enrollment and Auto Create Features
- Overload Handling
- ETag (Entity Tag)
- Ingress Gateway Pod Protection
- Support for User-Agent Header
- 3gpp-Sbi-Correlation-Info Header
- Suppress Notification
- Subscriber Activity Logging
- Diameter Gateway Pod Congestion Control
- Support for Post Operation for an Existing Subscription

The following table describes the benchmarking parameters and their values:

Table 3-33   Traffic Model Details

Request Type	Details	TPS
N36 17.2K TPS	subs-to-notify POST	3.6K (20%)
	sm-data GET	3.6K (20%)
	subs-to-notify DELETE	3.6K (20%)
	sm-data PATCH	6.4K (40%)
SH 10K TPS	UDR	4K
	PUR	1.2K
	SNR	4.8K
SH PNR 1.2K TPS	PNR	1.2K

Table 3-33   (Cont.) Traffic Model Details

Request Type	Details	TPS
SOAP PROVISIONING 600 TPS	GET	100
	UPDATE QUOTA	50
	UPDATE DYNAMIC QUOTA	50
	UPDATE STATE	100
	UPDATE SUBSCRIBER	100
	CREATE SUBSCRIBER	100
	DELETE SUBSCRIBER	100

The following table describes the test case parameters and their values:

Table 3-34   Testcase Parameters

Input Parameter Details	Configuration Values
UDR Version Tag	25.1.200
Target TPS	17.2K N36 + 10K SH
Notification Rate	1.2K
UDR Response Timeout	2.7s
Signaling Requests Latency Recorded on Client	36ms
Provisioning Requests Latency Recorded on Client	36ms
Diameter (SH) Requests Latency Recorded on Client	40ms

Table 3-35   Consolidated Resource Requirement

Resource	CPU	Memory	Ephemeral Storage	PVC
cnDBTier	139 CPUs	625 GB	25 GB	1823
UDR	281 CPUs	201 GB	59 GB	NA
PROVGW	28	28	10	NA
Buffer	50 CPUs	50 GB	20 GB	200 GB
Total	498 CPUs	901 GB	114 GB	2023 GB

The following table describes cnDBTier resources:

Table 3-36   cnDBTier Resource

Microservice name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod	Ephemeral Storage Per Pod	PVC Allocation Per Pod	Total Resources
Management node (ndbmgmd)	mysqlndbcluster	2	2 CPUs	9 GB	1 GB	15 GB	4 CPUs 18 GB **Ephemeral Storage:** 2 GB **PVC Allocation:** 30 GB
Data node (ndbmtd)	mysqlndbcluster	4	9 CPUs	124 GB	1 GB	132 GB Backup: 220 GB	36 CPUs 496 GB **Ephemeral Storage:** 4 GB **PVC Allocation:** 1408 GB
APP SQL node (ndbappmysqld)	mysqlndbcluster	14	6 CPUs	4 GB	1 GB	4 GB	84 CPUs 56 GB **Ephemeral Storage:** 14 GB **PVC Allocation:** 20 GB
SQL node (ndbmysqld ,used for replication)	mysqlndbcluster	2	4 CPUs	24 GB	1 GB	110 GB	8 CPUs 48 GB **Ephemeral Storage:** 2 GB **PVC Allocation:** 220 GB
DB Monitor Service	db-monitor-svc	1	4 CPUs	4 GB	1 GB	NA	4 CPU 4 MB **Ephemeral Storage:** 1 GB
DB Backup Manager Service	backup-manager-svc	1	100 millicores CPUs	128 MB	1 GB	NA	1 CPU 128 MB **Ephemeral Storage:** 1 GB

Table 3-36   (Cont.) cnDBTier Resource

Microservice name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod	Ephemeral Storage Per Pod	PVC Allocation Per Pod	Total Resources
Replication service (Multi site cases)	replication-svc	1	2 CPUs	2 GB	1 GB	143 GB	2 CPUs 2 GB **Ephemeral Storage:** 1 GB **PVC Allocation:** 143 GB

The following table describes UDR resources:

Table 3-37   UDR Resources (Average Latency: 47ms [30ms (N36) / 30ms (SH) / 80ms Provisioning]).

Micro service name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod	Ephemeral Storage Per Pod	Total Resources
Ingress-gateway-sig	ingressgateway-sig	9	6 CPUs	4 GB	1 GB	54 CPUs 36 GB **Ephemeral Storage:** 9 GB
Ingress-gateway-prov	ingressgateway-prov	2	4 CPUs	4 GB	1 GB	8 CPUs 8 GB **Ephemeral Storage:** 2 GB
Nudr-dr-service	nudr-drservice	17	6 CPUs	4 GB	1 GB	102 CPUs 68 GB **Ephemeral Storage:** 17 GB
Nudr-dr-provservice	nudr-dr-provservice	2	4 CPUs	4 GB	1 GB	8 CPUs 8 GB **Ephemeral Storage:** 2 GB
Nudr-notify-service	nudr-notify-service	3	6 CPUs	5 GB	1 GB	18 CPUs 15 GB **Ephemeral Storage:** 3 GB

Table 3-37   (Cont.) UDR Resources (Average Latency: 47ms [30ms (N36) / 30ms (SH) / 80ms Provisioning]).

Micro service name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod	Ephemeral Storage Per Pod	Total Resources
Nudr-egress-gateway	egressgateway	2	6 CPUs	4 GB	1 GB	12 CPUs 8 GB **Ephemeral Storage:** 2 GB
Nudr-diam-gateway	nudr-diam-gateway	2	6 CPUs	5 GB	1 GB	12 CPUs 10 GB **Ephemeral Storage:** 2 GB
Nudr-diameterproxy	nudr-diameterproxy	9	6 CPUs	4 GB	1 GB	54 CPUs 36 GB **Ephemeral Storage:** 9 GB
Nudr-config	nudr-config	2	1 CPU	1 GB	1 GB	2 CPUs 2 GB **Ephemeral Storage:** 2 GB
Nudr-config-server	nudr-config-server	2	1 CPU	1 GB	1 GB	2 CPUs 2 GB **Ephemeral Storage:** 2 GB
Alternate-route	alternate-route	2	1 CPU	1 GB	1 GB	2 CPUs 2 GB **Ephemeral Storage:** 2 GB
Nudr-nrf-client-nfmanagement-service	nrf-client-nfmanagement	2	1 CPU	1 GB	1 GB	2 CPUs 2 GB **Ephemeral Storage:** 2 GB
App-info	app-info	2	1 CPU	1 GB	1 GB	2 CPUs 2 GB **Ephemeral Storage:** 2 GB
Perf-info	perf-info	2	1 CPU	1 GB	1 GB	2 CPUs 2 GB **Ephemeral Storage:** 2 GB

Table 3-37   (Cont.) UDR Resources (Average Latency: 47ms [30ms (N36) / 30ms (SH) / 80ms Provisioning]).

Micro service name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod	Ephemeral Storage Per Pod	Total Resources
Nudr-dbcr-auditor-service	nudr-dbcr-auditor-service	1	1 CPU	1 GB	1 GB	1 CPU 1 GB **Ephemeral Storage:** 1 GB

The following table describes Provisioning Gateway resources:

Table 3-38   Provisioning Gateway Resources

Micro service name	Container name	Number of Pods	CPU Allocation Per Pod	Memory Allocation Per Pod	Total Resources
provgw-ingress-gateway	ingressgateway	2	4 CPUs	4 GB	8 CPUs 8 GB **Ephemeral Storage:** 2 GB
provgw-egress-gateway	egressgateway	2	4 CPUs	4 GB	8 CPUs 8 GB **Ephemeral Storage:** 2 GB
provgw-service	provgw-service	4	2 CPUs	2 GB	8 CPUs 8 GB **Ephemeral Storage:** 2 GB
provgw-config	provgw-config	2	2 CPUs	2 GB	4 CPUs 4 GB Memory **Ephemeral Storage:** 2 GB

The following table provides observation data for the performance test that can be used for the benchmark testing to scale up UDR performance:

Table 3-39   Result and Observation

Parameter	Values
TPS Achieved	17.2K N36 + 10K SH + 600K Provisioning
UDR Processing Average Latency	47ms
Success rate	100%