Oracle® Communications

Cloud Native Core, Converged Policy (Policy) Network Impact Report

Release 23.4.9

F89673-14

February 2025

ORACLE®

Oracle Communications Cloud Native Core, Converged Policy (Policy) Network Impact Report, Release 23.4.9

F89673-14

Contents

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Acronyms

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

Table   Acronyms and Terminologies

Acronym	Definition
3GPP	3rd Generation Partnership Project
AAA	Authorization Authentication Answer
AAR	Authorization Authentication Request
AF	Application Function
AMF	Access and Mobility Management Function
API	Application Programming Interface
ARS	Alternate Route Selection
ASM	Aspen Service Mesh
ASR	Abort-Session-Request
ATS	The core service sends the subscriber state variables to PDS only when there is an update to the variables.
AVP	Attribute Value Pair
BSF	Oracle Communications Cloud Native Core, Binding Support Function
CA	Certificate Authority
CDCS	Oracle Communications CD Control Server
CHF	Charging Function
CM	Configuration Management
CNC	Cloud Native Core
CNC Console	Oracle Communications Cloud Native Configuration Console
CNE	Oracle Communication Cloud Native Core, Cloud Native Environment
CNPCRF	Oracle Communications Cloud Native Core, Policy and Charging Rules Function
CUSTOMER_REPO	Docker registry address including the port number, if the docker registry has an associated port.
cnDBTier	Oracle Communications Cloud Native Core, cnDBTier
DNS	Domain Name System
DRA	Diameter Routing Agent
FQDN	Fully Qualified Domain Name
GUAMI	Globally Unique AMF Identifier
IMAGE_TAG	Image tag from release tar file. You can use any tag number. However, make sure that you use that specific tag number while pushing docker image to the docker registry.
IMS	IP Multimedia Subsystem
HTTPS	Hypertext Transfer Protocol Secure
MCC	Mobile Country Code
MCPTT	Mission-critical push-to-talk
METALLB_ADDRESS_POOL	Address pool configured on metallb to provide external IPs
MNC	Mobile Network Code
NEF	Oracle Communications Cloud Native Core, Network Exposure Function

Table (Cont.) Acronyms and Terminologies

Acronym	Definition
NF	Network Function
NPLI	Network Provided Location Information
NRF	Oracle Communications Cloud Native Core, Network Repository Function
OSO	Oracle Communications Operations Services Overlay
P-CSCF	Proxy Call Session Control Function
PA Service	Policy Authorization Service
PCC	Policy and Charging Control
PDB	Pod Disruption Budget
PLMN	Public Land Mobile Network
PCF	Oracle Communications Cloud Native Core, Policy Control Function
PCRF	Oracle Communications Cloud Native Core, Policy and Charging Rules Function
PCEF	Policy and Charging Enforcement Function
PCSCF	Proxy Call Session Control Function
PDS	Policy Data Service
PRA	Presence Reporting Area
PRE	Policy Runtime Engine
PDU	Protocol Data Unit
Policy	Oracle Communications Cloud Native Core, Converged Policy
QoS	Quality of Service
RAA	Re-Auth-Answer
RAN	Radio Access Network
RAR	Re-Auth-Request
SBI	Service Based Interface
SAN	Subject Alternate Name
SCP	Oracle Communications Cloud Native Core, Service Communication Proxy
SMF	Session Management Function
S-NSSAI	Single Network Slice Selection Assistance Information
UDR	Oracle Communications Cloud Native Core, Unified Data Repository
SRA	Successful Resource Allocation
STR	Session Termination Request
TTL	Time To Live
UE	User Equipment
UPF	User Plane Function
UPSI	UE Policy Section Identifier
URSP	UE Route Selection Policies
UPSC	UE Policy Section Code
URI	Uniform Resource Identifier
VSA	Vendor Specific Attributes

What's New in This Guide

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

Release 23.4.9 - F89673-14, February 2025

- Updated the Common Services Load Lineup section to list the components that are compatible with Policy 23.4.9.

- Updated the Compatibility Matrix section to list the components that are compatible with Policy 23.4.9.

- Added details of the supported upgrade and rollback paths under Supported Upgrade and Rollback Paths section for Policy 23.4.9.

Release 23.4.8 - F89673-13, November 2024

- Updated the Common Services Load Lineup section to list the components that are compatible with Policy 23.4.8.

- Updated the Compatibility Matrix section to list the components that are compatible with Policy 23.4.8.

- Added details of the supported upgrade and rollback paths under Supported Upgrade and Rollback Paths section for Policy 23.4.8.

Release 23.4.7 - F89673-12, October 2024

- Updated the Common Services Load Lineup section to list the components that are compatible with Policy 23.4.7.

- Updated the Compatibility Matrix section to list the components that are compatible with Policy 23.4.7.

- Added details of the supported upgrade and rollback paths under Supported Upgrade and Rollback Paths section for Policy 23.4.7.

Release 23.4.6 - F89673-11, September 2024

- Updated the Common Services Load Lineup section to list the components that are compatible with Policy 23.4.6.

- Updated the Compatibility Matrix section to list the components that are compatible with Policy 23.4.6.

- Added details of the supported upgrade and rollback paths under Supported Upgrade and Rollback Paths section for Policy 23.4.6.

Release 23.4.5 - F89673-10, August 2024

- Updated the Common Services Load Lineup section to list the components that are compatible with Policy 23.4.5.

- Updated the Compatibility Matrix section to list the components that are compatible with Policy 23.4.5.

- Added details of the supported upgrade and rollback paths under Supported Upgrade and Rollback Paths section for Policy 23.4.5.

- Updated the CNC Console section to list the new advanced settings key added to CNC Console for Policy 23.4.5.

- Added details of "Support for DNN Exclusion" feature in Policy Features section for Policy 23.4.5.

Release 23.4.4 - F89673-09, July 2024

- Updated the Common Services Load Lineup section to list the components that are compatible with Policy 23.4.4.

- Updated the Compatibility Matrix section to list the components that are compatible with Policy 23.4.4.

- Added details of the supported upgrade and rollback paths for Policy 23.4.4 under Supported Upgrade and Rollback Paths section.

Release 23.4.3 - F89673-08, July 2024

- Updated CNE, cnDBTier, OSO, and CNC Console versions in the Compatibility Matrix section to list the versions that are compatible with Policy 23.4.3.

- Updated Kubernetes versions in the Software Requirements section to list the Kubernetes versions that are compatible with Policy 23.4.3.

Release 23.4.3 - F89673-04, April 2024

- Updated the Common Services Load Lineup section to list the components that are compatible with Policy 23.4.3.

- Added details of the supported upgrade and rollback paths for Policy 23.4.3 under Supported Upgrade and Rollback Paths section.

Release 23.4.2 - F89673-03, March 2024

- Updated the Common Services Load Lineup section to list the components that are compatible with Policy 23.4.2.

- Added details of the supported upgrade and rollback paths for Policy 23.4.2 under Supported Upgrade and Rollback Paths section.

Release 23.4.1 - F89673-02, February 2024

- Updated the Compatibility Matrix section to list the components that are compatible with Policy 23.4.1.

- Updated the Common Services Load Lineup section to list the components that are compatible with Policy 23.4.1.

- Added details of the supported upgrade and rollback paths for Policy 23.4.1 under Supported Upgrade and Rollback Paths section.

Release 23.4.0 - F89673-01, December 2023

- Updated the Compatibility Matrix section to list the components that are compatible with Policy 23.4.0.

- Updated the Common Services Load Lineup section to list the components that are compatible with Policy 23.4.0.

- Updated the Software Requirements sections to list the software compatible with Policy 23.4.0.

- Updated the Orchestration sections with orchestration changes for Policy 23.4.0.

- Updated the Resource Requirements sections to list the services for which the resource requirement has changed in Policy 23.4.0.

- Added the list of features for Policy 23.4.0 in Policy Features section.
- Added details of the supported upgrade and rollback paths for Policy 23.4.0 under Supported Upgrade and Rollback Paths section.
- Updated the Helm section to list the new parameters added to Helm for Policy 23.4.0.
- Updated the REST API section to include the details of the REST APIs added or modified for Policy 23.4.0 release.
- Updated the CNC Console section to list the new parameters added to CNC Console for Policy 23.4.0.
- Updated the Metrics section with new or updated metrics for Policy 23.4.0.
- Updated the Alerts section with new alerts for Policy 23.4.0.

1
Introduction

1.1 Purpose and Scope

The purpose of this document is to highlight the changes made in Oracle Communications Cloud Native Core, Converged Policy (Policy) from Release 23.2.x to Release 23.4.x. These changes may have impact on the customer network operations and must be considered by the customer while planning the deployment.

1.2 Compatibility Matrix

This section lists the versions of added or updated components in release 23.4.x. To know the list of all the supported versions, see *Oracle Communications Cloud Native Core Release Notes*.

Release 23.4.9

There is no change in the compatibility matrix in this release.

Release 23.4.8

There is no change in the compatibility matrix in this release.

Release 23.4.7

There is no change in the compatibility matrix in this release.

Release 23.4.6

There is no change in the compatibility matrix in this release.

Release 23.4.5

The following table lists the versions of added or updated components in Release 23.4.5:

Table 1-1   Compatibility Matrix

Component	Compatibility Version
ATS	23.4.5

Release 23.4.4

There is no change in the compatibility matrix in this release.

Release 23.4.4

There is no change in the compatibility matrix in this release.

Release 23.4.3

The following table lists the versions of added or updated components in Release 23.4.3:

Table 1-2   Compatibility Matrix

Component	Compatibility Version
ATS	23.4.3

Release 23.4.2

There is no change in the compatibility matrix in this release.

Release 23.4.1

There is no change in the compatibility matrix in this release.

Release 23.4.0

The following table lists the versions of added or updated components in Release 23.4.0.

Table 1-3   Compatibility Matrix

Component	Compatibility Version
CNE	23.4.x, 23.2.x
cnDBTier	23.4.x, 23.2.x
OSO	23.4.x, 23.2.x
CDCS	NA
CNC Console	23.4.x, 23.2.x
ASM	1.14.6
ATS	23.4.0

1.3 Common Services Load Lineup

This section lists the versions of added or updated common services in release 23.4.x. To know the list of all the supported versions, see *Oracle Communications Cloud Native Core Release Notes*.

Release 23.4.9

The following table lists the versions of added or updated common services in release 23.4.9:

Table 1-4   Common Services Load Lineup

Component	Version
App-Info	23.4.16
ASM Configuration Chart	23.4.9
Config Server	23.4.16
Perf-Info	23.4.16

Release 23.4.8

The following table lists the versions of added or updated common services in release 23.4.8:

Table 1-5   Common Services Load Lineup

Component	Version
Alternate Route Service	23.4.10
App-Info	23.4.14
ASM Configuration Chart	23.4.8
Config Server	23.4.14
Debug Tool	23.4.3
Egress Gateway	23.4.10
Ingress Gateway	23.4.10
NRF Client	23.4.7
Helm Test	23.4.3
Perf-Info	23.4.14

Release 23.4.7

The following table lists the versions of added or updated common services in release 23.4.7:

Table 1-6   Common Services Load Lineup

Component	Version
ASM Configuration Chart	23.4.7

Release 23.4.6

The following table lists the versions of added or updated common services in release 23.4.6:

Table 1-7   Common Services Load Lineup

Component	Version
Ingress Gateway	23.4.9

Release 23.4.5

The following table lists the versions of added or updated common services in release 23.4.5:

Table 1-8   Common Services Load Lineup

Component	Version
Alternate Route Service	23.4.8
App-Info	23.4.11
Config Server	23.4.11
Debug Tool	23.4.2
Egress Gateway	23.4.8
Ingress Gateway	23.4.8

Table 1-8   (Cont.) Common Services Load Lineup

Component	Version
Helm Test	23.4.2
NRF Client	23.4.6
Perf-Info	23.4.11

Release 23.4.4

The following table lists the versions of added or updated common services in release 23.4.4:

Table 1-9   Common Services Load Lineup

Component	Version
Alternate Route Service	23.4.6
App-Info	23.4.8
ASM Configuration Chart	23.4.6
ATS Framework	23.4.3
Config Server	23.4.8
Egress Gateway	23.4.6
Ingress Gateway	23.4.6
Helm Test	23.4.1
NRF Client	23.4.4
Perf-Info	23.4.8

Release 23.4.3

The following table lists the versions of added or updated common services in release 23.4.3:

Table 1-10   Common Services Load Lineup

Component	Version
Alternate Route Service	23.4.5
App-Info	23.4.6
ASM Configuration Chart	23.4.5
ATS Framework	23.4.2
Config Server	23.4.6
Debug Tool	23.4.1
Egress Gateway	23.4.5
Ingress Gateway	23.4.5
Helm Test	23.4.5
NRF Client	23.4.3
Perf-Info	23.4.6

Release 23.4.2

The following table lists the versions of added or updated common services in release 23.4.2:

Table 1-11   Common Services Load Lineup

Component	Version
App-Info	23.4.4
Config Server	23.4.4
Perf-Info	23.4.4

Release 23.4.1

The following table lists the versions of added or updated common services in release 23.4.1:

Table 1-12   Common Services Load Lineup

Component	Version
App-Info	23.4.3
ASM Configuration Chart	23.4.3
Config Server	23.4.3
Perf-Info	23.4.3

Release 23.4.0

The following table lists the versions of added or updated common services in release 23.4.0:

Table 1-13   Common Services Load Lineup

Component	Version
Alternate Route Service	23.4.3
App-Info	23.4.2
ASM Configuration Chart	23.4.0
ATS Framework	23.4.0
Config Server	23.4.2
Debug Tool	23.4.0
Egress Gateway	23.4.3
Ingress Gateway	23.4.3
NRF Client	23.4.2
Helm Test	23.4.0
Perf-Info	23.4.2

1.4 Software Requirements

This section lists the added or updated software required to install Policy release 23.4.x. For more information about software requirements, see *Software Requirements* section in *Oracle Communications Cloud Native Core, Converged Policy Installation, Upgrade and Fault Recovery Guide*.

Release 23.4.9

There is no change in the software requirements in this release.

Release 23.4.8

There is no change in the software requirements in this release.

Release 23.4.7

There is no change in the software requirements in this release.

Release 23.4.6

There is no change in the software requirements in this release.

Release 23.4.5

There is no change in the software requirements in this release.

Release 23.4.4

There is no change in the software requirements in this release.

Release 23.4.3

There is no change in the software requirements in this release.

Release 23.4.2

There is no change in the software requirements in this release.

Release 23.4.1

There is no change in the software requirements in this release.

Release 23.4.0

The following table lists the versions of added or updated software required to install release 23.4.0:

Table 1-14   Software Requirements

Software	Version
Kubernetes	1.27.x, 1.25.x
HELM	3.12.3
Podman	4.4.1

Table 1-15   Additional Software

Software	App Version	Required for
OpenSearch	2.3.0	Logging
OpenSearch Dashboard	2.3.0	Logging
Fluentd OpenSearch	1.16.2	Logging
Velero	1.12.0	Logging
Kyverno	1.9.0	Logging
elastic-curator	5.5.4	Logging
elastic-exporter	1.1.0	Logging

Table 1-15   (Cont.) Additional Software

Software	App Version	Required for
elastic-master	7.9.3	Logging
Logs	3.1.0	Logging
Grafana	9.5.3	Metrics
Prometheus	2.44.0	Metrics
prometheus-kube-state-metrics	1.9.7	Metrics
prometheus-node-exporter	1.0.1	Metrics
MetalLB	0.13.11	External IP
metrics-server	0.3.6	Metric Server
occne-snmp-notifier	1.2.1	Metric Server
tracer	1.22.0	Tracing
Jaeger	1.45.0	Tracing
Istio	1.18.2	Service Mesh
cert-manager	1.12.4	Secrets Manager
Calico	3.25.2	Security Solution
containerd	1.7.5	Container Runtime Manager

1.5 Orchestration

This section provides information about orchestration changes in release 23.4.x.

Release 23.4.9

There is no change to the orchestration in this release.

Release 23.4.8

There is no change to the orchestration in this release.

Release 23.4.7

There is no change to the orchestration in this release.

Release 23.4.6

There is no change to the orchestration in this release.

Release 23.4.5

There is no change to the orchestration in this release.

Release 23.4.4

There is no change to the orchestration in this release.

Release 23.4.3

There is no change to the orchestration in this release.

Release 23.4.2

There is no change to the orchestration in this release.

Release 23.4.1

There is no change to the orchestration in this release.

Release 23.4.0

The following table provides information about orchestration changes in release 23.4.0.

Table 1-16   Orchestration

Orchestration Changes	Status	Notes
Support for in-service upgrade and roll back	Yes	For information about upgrade and roll back, see Supported Upgrade and Rollback Paths.

Changes in the `custom_values.yaml` file	Yes	• Renamed the following custom value file names to:
		  – `occnp_custom_values_occnp_23.4.0.yaml`
		  – `occnp_custom_values_pcf_23.4.0.yaml`
		  – `occnp_custom_values_servicemesh_config_23.4.0.yaml`
		• Updated for new version of microservices.
		• Updated the feature specific parameters.
		For information about changes in the `custom values.yaml` file, see Helm.

Changes in the resource information for `custom_values.yaml` file	Yes	For information about changes in the resource requirements, see Resource Requirements.
Changes in the CSAR package	No	No Generic CSAR available. The uniform package naming convention has been followed across the packages. Note: For more information on specific CSAR changes, contact My Oracle Support.
Changes in Role-Based Access Control (RBAC) policy	No	No new RBAC policies are added.
Changes in Life Cycle Management (LCM) Operations	No	No new LCM operations are added.
Helm Test Support	Yes	Policy supports Helm Test. For more information, see *Performing Helm Test* section in *Oracle Communications Cloud Native core, Policy Installation, Upgrade and Fault Recovery Guide*.

1.6 Resource Requirements

This section lists the added or updated resource requirements in release 23.4.x. For more information about resource requirements, see *Resource Requirements* section in *Oracle Communications Cloud Native Core, Converged Policy Installation, Upgrade and Fault Recovery Guide*.

Release 23.4.9

There are no changes to resource requirements in this release.

Release 23.4.8

There are no changes to resource requirements in this release.

Release 23.4.7

There are no changes to resource requirements in this release.

Release 23.4.6

There are no changes to resource requirements in this release.

Release 23.4.5

There are no changes to resource requirements in this release.

Release 23.4.4

There are no changes to resource requirements in this release.

Release 23.4.3

There are no changes to resource requirements in this release.

Release 23.4.2

There are no changes to resource requirements in this release.

Release 23.4.1

There are no changes to resource requirements in this release.

Release 23.4.0

The following table lists the added or updated resource requirements in release 23.4.0.

Table 1-17   Policy Services:

Service Name	CPU		Memory(GB)		Replica(s)			Ephemeral-Storage	
	Min	Max	Min	Max	Count	Min	Max	Min	Max
Alternate Route Service	2	2	**4**	**4**	1	2	5	78.1Mi	4Gi
Usage Monitoring	**4**	**5**	**3**	**4**	2	2	4	78.1Mi	4Gi
AM Service	8	8	**8**	**8**	1	2	[1]	78.1Mi	4Gi
SM Service	7	7	**10**	**10**	2	2		78.1Mi	4Gi
UE Service	8	8	**6**	**6**	2	2		78.1Mi	4Gi

[1] Max replica per service should be set based on required TPS and other dimensioning factors.

Upgrade resources should be taken into account during dimensioning. Default upgrade resource requirements are 25% above maximum replica, rounding up to the next integer. For example, if a service has a max replica count of 8, upgrade resources of 25% will result in additional resources equivalent to 2 pods.

For more information, see *Oracle Communications Cloud Native Core Policy Installation, Upgrade, and Fault Recovery Guide*.

2
Policy Features

This chapter lists the added or updated features in release 23.4.x. For more information about the features, see *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

Release 23.4.9

There are no new features or feature enhancements in this release.

Release 23.4.8

There are no new features or feature enhancements in this release.

Release 23.4.7

There are no new features or feature enhancements in this release.

Release 23.4.6

There are no new features or feature enhancements in this release.

Release 23.4.5

Oracle Communications Cloud Native Core, Converged Policy 23.4.5 has been updated with the following enhancement:

- **Support for DNN Exclusion**: The communication from SM service with Binding service, Bulwark service, and PDS can be skipped based on the DNN using a few advanced settings configurations, *USER.allDataTypes.excludeDnns, BINDING.excludeDnns*, and *BULWARK.excludeDnns* in SM service.
  For more information, see *Support for DNN Exclusion* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

Release 23.4.4

There are no new features or feature enhancements in this release.

Release 23.4.3

There are no new features or feature enhancements in this release.

Release 23.4.2

There are no new features or feature enhancements in this release.

Release 23.4.1

There are no new features or feature enhancements in this release.

Release 23.4.0

Oracle Communications Cloud Native Core, Converged Policy 23.4.0 has been updated with the following enhancements:

- **Diameter Session Retry**: This feature is enhanced to support following multiple configurations in CNC Console to handle session retries on Rx interface:

  – Default error handling configurations

  – Peer cycle back retry configurations

  – Number of session retries configuration

  – Error handling based on error origination peer configurations

  For more information, see *Diameter Session Retry* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- **Bulwark Pod Congestion Control**: Bulwark, a Policy microservice provides distributed lock mechanism using distributed coherence. The traffic at bulwark service is high as all the consumer services use its distributed lock mechanism to handle concurrent transactions. In the production environment, the bulwark pods must be protected from traffic congestion. Bulwark pod congestion control functionality helps in regulating the traffic and improves its service availability.
  For more information, see *Bulwark Pod Congestion Control* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- **Supports UDR Discovery using Group Id**: This feature enables PCF to perform UDR discovery using query parameter "group-id-list" during SM, AM, and UE Policy associations. PCF receives the UDR group id from AMF/SMF services as part of its header requests. From this header, PCF extracts the UDR group id and uses it to discover UDR. With this feature implementation the number of discovery requests to NRF for the same UDR is reduced.
  For more information, see *Supports UDR Discovery using Group Id* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- **Policy Evaluation on AMF Notification on N1Notify and N1N2NotifyFailure**: This feature supports PCF to evaluate Policies and take actions when PCF receives notification such as N1 Message Notify with "command complete" or "command reject" or N1N2Transfer failure notifications from AMF.
  For more information, see *UE Policy Enhancements* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- **PCF UE Service with New Error Fields for N1 Message Retransmission**: This feature supports PCF UE service N1 message retransmission configurations, to handle each of the error failures during N1N2Message transfer with *Action*, *Max Number of Re-transmissions*, and *Re-transmission Failure Behavior* configurations.
  For more information, see *UE Policy Enhancements* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- **Support of Policy Action to send the Notify Terminate**: This feature supports PCF to initiate Policy association termination toward core services (AM/SM/UE) because of notifications coming from UDR or CHF or due to updates coming from AMF/SMF. The initiation of Policy association termination is based on policy evaluation by PRE and policy action that is configured.
  For more information, see *Support of Policy Action to send the Notify Terminate* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- **RAA Error Code Handling:** This feature helps in error handling at SM and PA service where on receipt of error response from Diameter Connector for initiated update-notify or RAR message the operator should be able to take corrective actions. For more details, see "RAA Error Code Handling" section in Oracle Communications Cloud Native Core, Converged Policy User Guide.

- **Support of SUPI-based NRF Discovery Optimization and Response Caching from UDR:** This feature helps in optimizing SUPI based NRF discoveries between the query and

subscription (GET and POST) of the policy data request towards UDR. It is applicable only for SUPI based discovery queries towards UDR. For more details, see "Support of SUPI-based NRF Discovery Optimization and Response Caching from UDR" section in Oracle Communications Cloud Native Core, Converged Policy User Guide.

- **PCF must STOP sending Update Notify on N7 when PCC Rule has Flow Status set to 'REMOVED':** CNC Policy is enhanced to support SM create when it contains flow status set as 'removed' for any of the media components. For more details, see "Support for Resource Allocation for PCC Rules" section in Oracle Communications Cloud Native Core, Converged Policy User Guide.

- **Migration from opentracing to OpenTelemetry:** OpenTelemetry automatic instrumentation has been implemented to show similar traces as Open Tracing in Jaeger UI. For more details, see "*Tracing Configurations"* in *Oracle Communications Cloud Native Core, Converged Policy Installation, Upgrade, and Fault Recovery Guide*.

  – Preupgrade consideration: When upgrading from 23.2.0 to 23.4.0, certain scenarios needs to be considered. For more information, see "*Preupgrade Tasks"* in *Oracle Communications Cloud Native Core, Converged Policy Installation, Upgrade, and Fault Recovery Guide*.

- **Support for Non-SUPI based On Demand Discovery Caching of NF Profiles:** Policy supports caching the NF profiles at NRF Client received from non-SUPI based on-demand discovery from NRF. Caching the NF profiles avoids rediscovering the NF profiles from NRF for every new call flow related to AMF, SMF(Notification) and UDR. For more information, see "*Support for Non-SUPI based On Demand Discovery Caching of NF* Profiles" section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- **Enhancements to discard policy for diameter sessions**: Discard policy for diameter sessions is enhanced with options to discard sessions based on priority and priority percentage. For more information, see "*Load Shedding Profiles"* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- **Support for flexible billing day change**: Usage Monitoring on Gx interface supports changing the billing cycle of the active plan from monthly to yearly, weekly, daily, or hourly and the effect is based on the configured flexible billing day. For more information, see "Usage Monitoring on Gx interface" *section in Oracle Communications Cloud Native Core, Converged Policy User Guide.*

- **Pro-Rating of Monthly quota**: Usage monitoring on Gx interface supports pro-rating of the quota volume when the billing cycle is changed. For more information, see "Usage Monitoring on Gx interface" *section in Oracle Communications Cloud Native Core, Converged Policy User Guide.*

- **Usage monitoring support at PCC rule level**: Policy supports Usage monitoring at either at PCC rule level or at session level. With this feature, usage monitoring can be requested on an individual rule (PCC rule level) or on all the rules activated during a IP-CAN session (session level). For more information, see "Usage Monitoring on Gx interface" *section in Oracle Communications Cloud Native Core, Converged Policy User Guide.*

- **Data Compression in Usage Monitoring**: In order to handle the growing size of the Usage Monitoring database and the replication volume, Policy supports compressing the Usage Monitoring data. For more information, see "Usage Monitoring on Gx interface" *section in Oracle Communications Cloud Native Core, Converged Policy User Guide.*

- **Migrating subscribers from OCPM to PCRF deployment**: Policy supports migrating the subscribers from OCPM deployment to CnPolicy deployment model. The migration includes the quota data as well as the dynamic quota data. For more information, see "*Migration of subscribers from OCPM to PCRF deployment"* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide.*

- **Enhanced Policy Blockly support for UE Policy service conditions and actions**: New blocks are added to support UE Policy service conditions and actions. These new blocks enables to find the delta between the UPSI's id list and UPSI's currently configured in PCF, UPSI's that are sent on UE Policy registration and UPSI's that are on UDR. For more information on the enhancements see "Support for Listing and Comparing UPSIs Received from UDR" in *Oracle Communications Cloud Native Core, Converged Policy User Guide.* For details on the UE Policy blocks, actions, and conditions used for this functionality, see "*UE Policy"* section in *Oracle Communications Cloud Native Core, Converged Policy Design Guide*.

- **Support for Network Policies**: Network Policies are an application-centric construct that allows to specify how a pod communicates with various network entities. It creates pod-level rules to control communication between the cluster's pods and services, and to determine which pods and services can access one another inside a cluster. For more information, see "*Network Policies*" section in *Oracle Communications Cloud Native Core, Converged Policy User Guide.*

- **Handling Race Condition Between Gx and Sy Sessions in two sites**: Policy supports handling race condition between Gx and Sy sessions in two sites that result in Sy stale sessionsin PDS. For more information, see "*Handling Race Condition Between Gx and Sy Sessions over two sites"* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide.*

- **Improvements to exception table** maintenance: Audit service is used to clean up exception tables for Binding service, AM service, SM service, UE Policy service, PCRF Core and PDS. The Audit service configuration for cleaning up these exception tables are predefined using Helm parameters at the time of installation with a default 24hr frequency for auditing. For more information, see "Audit Service" section in *Oracle Communications Cloud Native Core, Converged Policy User Guide.*

Policy Automated Testing Suite (ATS)

Policy ATS 23.4.0 has been updated with the following enhancements:

- **ATS Feature Activation and Deactivation:** This feature allows to activate or deactivate the specific features within the ATS using Helm charts. Once these features are removed, they cannot be reinstated in the deployed ATS. However, users have the option to reinstall the ATS to restore the disabled features.

  For more information about the feature, see "*ATS Feature Activation and Deactivation*" section in *Oracle Communications Cloud Native Core, Automated Testing Suite Guide*.

3
Supported Upgrade and Rollback Paths

This chapter lists the supported upgrade and rollback paths in release 23.4.x. For more information about upgrade and rollback, see *Upgrading Policy* section in *Oracle Communications Cloud Native Core, Converged Policy Installation, Upgrade and Fault Recovery Guide*.

Release 23.4.9

The following table lists the supported upgrade paths in release 23.4.9:

Table 3-1   Supported Upgrade Paths

Source Release	Target Release
23.4.x	23.4.9
23.2.x	23.4.9

The following table lists the supported rollback path in release 23.4.9:

Table 3-2   Supported Rollback Paths

Source Release	Target Release
23.4.9	23.4.x
23.4.9	23.2.x

Release 23.4.8

The following table lists the supported upgrade paths in release 23.4.8:

Table 3-3   Supported Upgrade Paths

Source Release	Target Release
23.4.x	23.4.8
23.2.x	23.4.8

The following table lists the supported rollback path in release 23.4.8:

Table 3-4   Supported Rollback Paths

Source Release	Target Release
23.4.8	23.4.x
23.4.8	23.2.x

Release 23.4.7

The following table lists the supported upgrade paths in release 23.4.7:

Table 3-5   Supported Upgrade Paths

Source Release	Target Release
23.4.x	23.4.7
23.2.x	23.4.7

The following table lists the supported rollback path in release 23.4.7:

Table 3-6   Supported Rollback Paths

Source Release	Target Release
23.4.7	23.4.x
23.4.7	23.2.x

Release 23.4.6

The following table lists the supported upgrade paths in release 23.4.6:

Table 3-7   Supported Upgrade Paths

Source Release	Target Release
23.4.x	23.4.6
23.2.x	23.4.6

The following table lists the supported rollback path in release 23.4.6:

Table 3-8   Supported Rollback Paths

Source Release	Target Release
23.4.6	23.4.x
23.4.6	23.2.x

Release 23.4.5

The following table lists the supported upgrade paths in release 23.4.5:

Table 3-9   Supported Upgrade Paths

Source Release	Target Release
23.4.x	23.4.5
23.2.x	23.4.5

The following table lists the supported rollback path in release 23.4.5:

Table 3-10   Supported Rollback Paths

Source Release	Target Release
23.4.5	23.4.x

Table 3-10   (Cont.) Supported Rollback Paths

Source Release	Target Release
23.4.5	23.2.x

Release 23.4.4

The following table lists the supported upgrade paths in release 23.4.4:

Table 3-11   Supported Upgrade Paths

Source Release	Target Release
23.4.x	23.4.4
23.2.x	23.4.4

The following table lists the supported rollback path in release 23.4.4:

Table 3-12   Supported Rollback Paths

Source Release	Target Release
23.4.4	23.4.x
23.4.4	23.2.x

Release 23.4.3

The following table lists the supported upgrade paths in release 23.4.3:

Table 3-13   Supported Upgrade Paths

Source Release	Target Release
23.4.x	23.4.3
23.2.x	23.4.3

The following table lists the supported rollback path in release 23.4.3:

Table 3-14   Supported Rollback Paths

Source Release	Target Release
23.4.3	23.4.x
23.4.3	23.2.x

Release 23.4.2

The following table lists the supported upgrade paths in release 23.4.2:

Table 3-15   Supported Upgrade Paths

Source Release	Target Release
23.4.x	23.4.2

Table 3-15   (Cont.) Supported Upgrade Paths

Source Release	Target Release
23.2.x	23.4.2

The following table lists the supported rollback path in release 23.4.2:

Table 3-16   Supported Rollback Paths

Source Release	Target Release
23.4.2	23.4.x
23.4.2	23.2.x

Release 23.4.1

The following table lists the supported upgrade paths in release 23.4.1:

Table 3-17   Supported Upgrade Paths

Source Release	Target Release
23.4.0	23.4.1
23.2.x	23.4.1

The following table lists the supported rollback path in release 23.4.1:

Table 3-18   Supported Rollback Paths

Source Release	Target Release
23.4.1	23.4.0
23.4.1	23.2.x

Release 23.4.0

The following table lists the supported upgrade paths in release 23.4.0:

Table 3-19   Supported Upgrade Paths

Source Release	Target Release
23.2.x	23.4.0

The following table lists the supported rollback path in release 23.4.0:

Table 3-20   Supported Rollback Paths

Source Release	Target Release
23.4.0	23.2.x

4

Configuration

This chapter lists the configuration changes in release 23.4.x.

4.1 Helm

This section lists the Helm parameter changes in release 23.4.x. For more information about the Helm parameters, see *Oracle Communications Cloud Native Core, Converged Policy Installation, Upgrade, and Fault Recovery Guide*.

Release 23.4.9

There are no changes in the Helm parameters in this release.

Release 23.4.8

There are no changes in the Helm parameters in this release.

Release 23.4.7

There are no changes in the Helm parameters in this release.

Release 23.4.6

There are no changes in the Helm parameters in this release.

Release 23.4.5

There are no changes in the Helm parameters in this release.

Release 23.4.4

There are no changes in the Helm parameters in this release.

Release 23.4.3

There are no changes in the Helm parameters in this release.

Release 23.4.2

There are no changes in the Helm parameters in this release.

Release 23.4.1

There are no changes in the Helm parameters in this release.

Release 23.4.0

The following are the Helm parameters, (occnp_custom_values_occnp_23.4.0.yaml) changes in release 23.4.0:

- `ingress-gateway.applicationThreadPoolConfig.corePoolSize`

- `ingress-gateway.applicationThreadPoolConfig.maxPoolSize`

- `ingress-gateway.applicationThreadPoolConfig.queueCapacity`
- `global.nrfClientDbName`
- `routesConfig.id.filters.customReqHeaderEntryFilter.headers.methods.headerList.headerName`
- `routesConfig.id.filters.customReqHeaderEntryFilter.headers.methods.headerList.sourceHeader`
- `envJaegerCollectorHost`
- `envJaegerCollectorPort`
- `tracingEnabled`
- `tracingSamplerRatio`
- `tracingJdbcEnabled`
- `tracingLogsEnabled`
- `ingress-gateway.jaegerTelemetryTracingEnabled`
- `ingress-gateway.openTelemetry.ja eger.httpExporter.host`
- `ingress-gateway.openTelemetry.ja eger.httpExporter.port`
- `ingress-gateway.openTelemetry.ja eger.probabilistic Sampler`
- `egress-gateway.jaegerTelemetryTracingEnabled`
- `egress-gateway.openTelemetry.jaeger. httpExporter.host`
- `egress-gateway.openTelemetry.jaeger. httpExporter.port`
- `egress-gateway.openTelemetry.jaeger. probabilisticSampler`
- `egress-gateway.sniHeader.enabled`
- `exceptionTableAuditEnabled`

> ⓘ **Note**
>
> `exceptionTableAuditEnabled` parameter must be added to custom-values.yaml file to enable/disable audit on the exception tables.

The following are the Helm parameters, (occnp_custom_values_sevicemesh_config_23.4.0.yaml) changes in release 23.4.0:

- `envoyFilters_v_19x_111x.name.configpatch.applyTo`
- `envoyFilters_v_19x_111x.name.configpatch.filterName`
- `envoyFilters_v_19x_111x.name.configpatch.operation`
- `envoyFilters_v_19x_111x.name.configpatch.typeconfig`
- `envoyFilters_v_19x_111x.name.configpatch.configkey`
- `envoyFilters_v_19x_111x.name.configpatch.configvalue`

4.2 REST API

This section lists the REST API changes in release 23.4.x. For more information about the REST APIs, see *Oracle Communications Cloud Native Core, Converged Policy REST Specification Guide*.

Release 23.4.9

There are no changes in the REST API in this release.

Release 23.4.8

There are no changes in the REST API in this release.

Release 23.4.7

There are no changes in the REST API in this release.

Release 23.4.6

There are no changes in the REST API in this release.

Release 23.4.5

There are no changes in the REST API in this release.

Release 23.4.4

There are no changes in the REST API in this release.

Release 23.4.3

There are no changes in the REST API in this release.

Release 23.4.2

There are no changes in the REST API in this release.

Release 23.4.1

There are no changes in the REST API in this release.

Release 23.4.0

The following are the REST API changes in release 23.4.0:

- Added the following APIs to support Bulwark Pod Congestion Control:
  - Added the following parameter under /oc-cnpolicy-configuration/v1/ congestionConfigurations/{serviceName} API to support Bulwark Pod Congestion Control Settings:
    * stateChangeSampleCount
    * stateCalculationInterval
    * activeThresholdProfile
  - Added the following parameter under /oc-cnpolicy-configuration/v1/ congestionThresholdProfiles/{serviceName} API to support Bulwark Pod Congestion Control Threshold Profiles:

* name

* value.state

* value.resourceUsageLimit

* isCustomProfile

– Added the following parameter under /oc-cnpolicy-configuration/v1/ congestionLoadSheddingProfile/{serviceName} API to support Bulwark Pod Congestion Control Load Shedding Profile:

* name

* type

– Added the following parameter under /oc-cnpolicy-configuration/v1/ congestionLoadSheddingRule/{serviceName} API to support Bulwark Pod Congestion Control Load Shedding Rules:

* name

* value.state

* value.discardPriority

* isCustomProfile

- Added the following parameters under NRF Agent:

  – onDemandDiscoveryCaching.enableFeature

  – onDemandDiscoveryCaching.queryParameters

  – onDemandDiscoveryCaching.refreshBeforeExpiryTime

  – onDemandDiscoveryCaching.limitCacheEntries

  – onDemandDiscoveryCaching.retentionPeriod

  – onDemandDiscoveryCaching.auditorSchedulerInterval

  – onDemandDiscoveryCaching.auditorPurgePercentage

- Added the following parameters under NF Communication Profile:

  – onDemandDiscoveryCaching.forceDiscovery

  – onDemandDiscoveryCaching.retentionPeriod

- Added monitoringKey parameter under UM Data Limit Profiles API.

4.3 CNC Console

This section lists the CNC Console changes in release 23.4.x. For more information, see *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

Release 23.4.9

There are no changes in the CNC Console in this release.

Release 23.4.8

There are no changes in the CNC Console in this release.

Release 23.4.7

There are no changes in the CNC Console in this release.

Release 23.4.6

There are no changes in the CNC Console in this release.

Release 23.4.5

The following are the CNC Console changes in release 23.4.5:

- Added the following advanced fields to **SM Service** page under **Service Configuration** to support exclusion of DNNs:
    – USER.allDataTypes.excludeDnns
    – BINDING.excludeDnns
    – BULWARK.excludeDnns

    For more details, see *Support for DNN Exclusion* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

Release 23.4.4

There are no changes in the CNC Console in this release.

Release 23.4.3

There are no changes in the CNC Console in this release.

Release 23.4.2

There are no changes in the CNC Console in this release.

Release 23.4.1

There are no changes in the CNC Console in this release.

Release 23.4.0

The following are the CNC Console changes in release 23.4.0:

- Added the following advanced fields to **Error Configurations** page under **Error Handling** to support Diameter session maximum retries and peer cycle back:
    – DIAMETER.ErrorHandler.MaxRetryCount.Rx.RAR
    – DIAMETER.ErrorHandler.CycleBackRetry.Rx.RAR
    – DIAMETER.ErrorHandler.MaxRetryCount.Rx.ASR
    – DIAMETER.ErrorHandler.CycleBackRetry.Rx.ASR

    For more details, see *Error Configurations* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- Added the below mentioned UI page and parameters in CNC Console for the **Congestion Control** page:
    – Added the following fields under **Settings**:
        * Service Name
        * Active Threshold Profile
        * State Change Sample Count
        * State Calculation Interval

- – Added the following fields under **Threshold**:
  - * Service Name
  - * Threshold Profiles
- – Added the following fields under **Load Shedding Rules**:
  - * Service Name
  - * Load Shedding Rules

  For more details, see *Congestion Control* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- Added following fields under **N1 Message Retransmission Settings** in **PCF UE Policy** page.
  - – Action
  - – Max Number of Re-transmissions
  - – Re-transmission Failure Behavior

  For more details, see *UE Policy Enhancements* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- The following fields under **Load Shedding Profiles** are modified to support discarding diameter sessions based on priority and priority percentage.
  - – Scheme
  - – Type
  - – State
  - – Discard Priority
  - – Discard Priority Percentage
  - – Level

  For more information, see *Load Shedding Profiles* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- `USER.ocsSpendingLimit.resetContextOnGxCreate` key is added to Advanced Settings in **Settings** page for **PCRF Core** in **Service Configurations** in CNC Console.
  For more details, see *Settings* under *PCRF Core* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- `UPDATE_SSV_DATASOURCE_INFO_ON_CHANGE` is added to Advanced Settings in **Settings** page for **PDS** in **Service Configurations** in CNC Console.
  For more details, see *Settings* under *PDS* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- The following fields are added to **On Demand Discovery Caching** section in **NRF Agent** page under **Service Configurations**.
  - – Enable Caching
  - – Query Parameters
  - – Retention Period (in ms)
  - – Refresh Before Expiry Time (in ms)
  - – Cached entry limit
  - – Auditor Scheduler Interval (in ms)

- Auditor Purge Percentage

  For more details, see *NRF Agent* section under *Service Configurations* chapter in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- The following fields are added to **On-Demand Discovery Caching** section in **NF Communication Profiles** under **Common** category for **Service Configurations**.

  - Force Discovery

  - Retention Period (in ms)

  For more details, see *NF Communication Profiles* section in *Common* chapter under *Service Configurations* in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- The following fields are added to **Usage Monitoring** page under **Service Configurations**.

  - Enable Quota Migration

  - Enable Pro-rated Data at The Time of Activation

  - Enable Pro-rated Data at The Time of Billing Day Change

  - Apply Billing Day / Data Plan Change

  - Data Compression Scheme

  For more details, see *Usage Monitoring* section under *Service Configurations* chapter in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- The following parameters are added to **Data Limit Profiles** page for **Usage Monitoring** under **Policy Data Configurations**.

  - Monitoring Key

  - Validity Duration

  For more details, see *Data Limit Profiles* section in *Usage Monitoring* under *Policy Data Configurations* chapter in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- Added the *SYSTEM.PA_ERROR_HANDLER_ENABLED* advanced field to **PCF Policy Authorization** page under **Service Configurations** to enable RAA error handling.

- Added the following advanced fields to **PDS Settings** page under **Service Configurations** to configure Support for SUPI based NRF Discovery Optimization and Response Caching from UDR:

  - UDR_FETCH_RELATED_RESOURCE

  - UPDATE_SSV_DATASOURCE_INFO_ON_CHANGE

- Added the following advanced fields to **PCF User Connector** page under **Service Configurations** to configure Support for SUPI based NRF Discovery Optimization and Response Caching from UDR:

  - UDR_NF_PROFILE_COOKIE_ENABLED

  - UDR_NF_PROFILE_COOKIE_COMPRESS

  - UDR_NF_PROFILE_COOKIE_LIMIT

  - UDR_GET_USE_RELATED_RESOURCE

- Added the following advanced fields to **PCF Access and Mobility** and **PCF UE Policy Service** page under **Service Configurations** to configure concurrency handling for AM and UE service, respectively:

  - CONCURRENCY.BULWARK_SERVICE_ENABLED

- CONCURRENCY.N15.CREATE.ENABLED
- CONCURRENCY.N15.CREATE.LOCK_LEASE_DURATION
- CONCURRENCY.N15.CREATE.LOCK_WAIT_DURATION
- CONCURRENCY.N15.CREATE.LOCK_REQUEST_RETRY_COUNT
- CONCURRENCY.N15.CREATE.LOCK_REQUEST_RETRY_BACKOFF
- CONCURRENCY.N15.TERMINATE.ENABLED
- CONCURRENCY.N15.TERMINATE.LOCK_LEASE_DURATION
- CONCURRENCY.N15.TERMINATE.LOCK_REQUEST_RETRY_BACKOFF
- CONCURRENCY.N15.TERMINATE.LOCK_REQUEST_RETRY_COUNT
- CONCURRENCY.N15.TERMINATE.LOCK_WAIT_DURATION
- CONCURRENCY.N15.UPDATE.ENABLED
- CONCURRENCY.N15.UPDATE.LOCK_LEASE_DURATION
- CONCURRENCY.N15.UPDATE.LOCK_REQUEST_RETRY_BACKOFF
- CONCURRENCY.N15.UPDATE.LOCK_REQUEST_RETRY_COUNT
- CONCURRENCY.N15.UPDATE.LOCK_WAIT_DURATION
- CONCURRENCY.N15.UPDATE_NOTIFY.ENABLED
- CONCURRENCY.N15.UPDATE_NOTIFY.LOCK_LEASE_DURATION
- CONCURRENCY.N15.UPDATE_NOTIFY.LOCK_REQUEST_RETRY_BACKOFF
- CONCURRENCY.N15.UPDATE_NOTIFY.LOCK_REQUEST_RETRY_COUNT
- CONCURRENCY.N15.UPDATE_NOTIFY.LOCK_WAIT_DURATION
- RESOURCEID.SUFFIXLIST

Blockly Changes in Release 23.4.0

The following are the blockly changes in release 23.4.0:

- Updated the PCF UE Policy blockly to **support Policy evaluation on AMF Notification on N1Notify and N1N2NotifyFailure** with:

  - Updated *N1 Notify Message Received* block to have `MESSAGE TRANSFER FAILURE` option in its drop-down list.

  - Updated *Attribute in Request Type* block to have `n1TransferFailureCause` option in its drop-down list.

- Updated the PCF UE Policy blockly to **Support of Policy Action to send the Notify Terminate** with:

  - Added *UDR delResources contains* block.

  - Added *Release Session with cause* block.

- Added the following to UE Policy blocks and atributes, which are used for setting operation on two lists.

  - UPSI List

  - UPSIs attribute path

  - PCF Configured UPSIs

  - Convert UPSI Format to 3GPP

      –   Get Configured UPSIs/ UPSI Name/ UPSI Index

- Added the following to Usage Monitoring blocks under Public category:

  –   PCC Rule Hint

  –   Volume Grant Params

  –   Time Grant Params

  –   Active Monitoring Key with PCCRuleHint

For more information, see *Oracle Communications Cloud Native Core, Converged Policy Design Guide*.

5
Observability

This chapter lists the observability changes in release 23.4.x.

5.1 Metrics

This section lists the added or updated metrics in release 23.4.x. For more information about metrics, see *Metrics* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

Release 23.4.9

There are no updates to metrics in this release.

Release 23.4.8

There are no updates to metrics in this release.

Release 23.4.7

There are no updates to metrics in this release.

Release 23.4.6

There are no updates to metrics in this release.

Release 23.4.5

There are no updates to metrics in this release.

Release 23.4.4

There are no updates to metrics in this release.

Release 23.4.3

There are no updates to metrics in this release.

Release 23.4.2

There are no updates to metrics in this release.

Release 23.4.1

There are no updates to metrics in this release.

Release 23.4.0

The following metrics are added in release 23.4.0:

- Added the following metric to UDR Connector, for PCF to support UDR discovery using group id feature:
  - ocpm_nfDiscovery_request_total

- ocpm_nfDiscovery_response_total
- occnp_group_id_list_discovery_header_sent

For more details, see *UDR Metrics* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- Added the following Timer metrics to Binding service:
  - occnp_binding_service_overall_processing_time
  - occnp_bindingservice_db_operation_time

For more details, see *Binding Service Metrics* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- Added the following Timer metrics to User service:
  - occnp_policy_userservice_overall_processing_time

For more details, see *User Service Metrics* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- Added the following Timer metrics to SM service:
  - occnp_pcf_smservice_overall_processing_tim

For more details, see *SM Service Metrics* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- Added the following Timer metrics to Diameter Connector service:
  - occnp_diam_connector_overall_processing_time

For more details, see *Diameter Connector Service Metrics* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- Added the following Timer metrics to PDS service:
  - occnp_policyds_overall_processing_time

For more details, see *Policy DS Metrics* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- Added the following Timer metrics to Configuartion service:
  - occnp_config_server_overall_processing_time
  - occnp_config_server_db_operation_time

For more details, see *Config Server Metrics* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- The following metrics are added to NRF Client metrics:
  - nrfclient.discovery.cache.support.force.discovery
  - nrfclient.discovery.cache.support.cache.hit
  - nrfclient.discovery.cache.support.about.to.expire
  - nrfclient.discovery.cache.support.expired
  - nrfclient.discovery.cache.support.failover
  - nrfclient.discovery.cache.support.non.cache
  - nrfclient.discovery.cache.support.empty.response
  - nrfclient.discovery.cache.support.cache.lookup
  - nrfclient.discovery.cache.support.backend.response

- nrfclient.discovery.cache.support.backend.response

- discovery.cache.support.profiles.per.response

  For more details, see *NRF Client Metrics* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

- Added the following metrics in SM Service metrics for RAA Error Code Handling feature:

  - error_handler_in_total

  - error_handler_exec_total

  - error_handler_out_total

- Added the following metrics in Policy DS Metrics for Support for SUPI based NRF Discovery Optimization and Response Caching from UDR feature:

  - occnp_nf_cookie_forwarded_total

  - occnp_nf_cookie_recieved_total

- Added the following metrics in User Service Metrics for Support for SUPI based NRF Discovery Optimization and Response Caching from UDR feature:

  - occnp_udr_nf_cookie_enabled_total

  - occnp_udr_use_related_resource

  For more details, see *Metrics* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide.*

5.2 Alerts

This section lists the added or updated alerts in release 23.4.x. For more information about alerts, see *Alerts* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

Release 23.4.9

There are no updates to alerts in this release.

Release 23.4.8

There are no updates to alerts in this release.

Release 23.4.7

There are no updates to alerts in this release.

Release 23.4.6

There are no updates to alerts in this release.

Release 23.4.5

There are no updates to alerts in this release.

Release 23.4.4

There are no updates to alerts in this release.

Release 23.4.3

There are no updates to alerts in this release.

Release 23.4.2

There are no updates to alerts in this release.

Release 23.4.1

There are no updates to alerts in this release.

Release 23.4.0

Alerts

The following alerts are added in release 23.4.0:

- Added the following alerts to support Diameter Session Retry for Rx RAR or Rx ASR messages:
  - RAA_RX_FAIL_COUNT_EXCEEDS_CRITICAL_THRESHOLD
  - RAA_RX_FAIL_COUNT_EXCEEDS_MAJOR_THRESHOLD
  - RAA_RX_FAIL_COUNT_EXCEEDS_MINOR_THRESHOLD
  - ASA_RX_FAIL_COUNT_EXCEEDS_CRITICAL_THRESHOLD
  - ASA_RX_FAIL_COUNT_EXCEEDS_MAJOR_THRESHOLD
  - ASA_RX_FAIL_COUNT_EXCEEDS_MINOR_THRESHOLD

5.3 KPIs

This section lists the added or updated KPIs in release 23.4.x. For more information about KPIs, see *KPIs* section in *Oracle Communications Cloud Native Core, Converged Policy User Guide*.

Release 23.4.9

There are no updates to KPIs in this release.

Release 23.4.8

There are no updates to KPIs in this release.

Release 23.4.7

There are no updates to KPIs in this release.

Release 23.4.6

There are no updates to KPIs in this release.

Release 23.4.5

There are no updates to KPIs in this release.

Release 23.4.4

There are no updates to KPIs in this release.

Release 23.4.3

There are no updates to KPIs in this release.

Release 23.4.2

There are no updates to KPIs in this release.

Release 23.4.1

There are no updates to KPIs in this release.

Release 23.4.0

There are no updates to KPIs in this release.