Oracle® Communications

Cloud Native Core, Binding Support Function Installation, Upgrade, and Fault Recovery Guide

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Oracle Communications Cloud Native Core, Binding Support Function Installation, Upgrade, and Fault Recovery Guide, Release 24.3.0

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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 Equipement
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 24.3.x.

Release 24.3.0 - G12792-01, November 2024

Installation Updates:

- Updated the Installing BSF Package section to provide information on how to install BSF 24.3.0.
- Updated configuration details of Service Entries, Destination Rule, and envoyFilters in Deploying BSF With ASM.

Upgrade and Rollback Updates:

- Updated procedure for upgrading to BSF 24.3.0 from any of the previous supported versions, see Upgrading BSF section.
- Updated procedure for rolling back BSF from 24.3.0 to a previous supported version, see Rolling Back BSF section.

Generic Updates:

- Updated the release version number to 24.3.0.
- Added the following parameters to Configuring Ingress Gateway:
  - `ingress-gateway.message-copy.enabled`
  - `ingress-gateway.message-copy.copyPayload`
  - `ingress-gateway.message-copy.topicName`
  - `ingress-gateway.message-copy.ackRequired`
  - `ingress-gateway.message-copy.retryOnFailure`
  - `ingress-gateway.message-copy.threadPoolConfigurations.coreSize`
  - `ingress-gateway.message-copy.threadPoolConfigurations.maxSize`
  - `ingress-gateway.message-copy.threadPoolConfigurations.queueCapacity`
  - `ingress-gateway.message-copy.security.enabled`
  - `ingress-gateway.message-copy.security.protocol`
  - `ingress-gateway.message-copy.security.tlsVersion`
  - `ingress-gateway.message-copy.security.saslConfiguration.username`
  - `ingress-gateway.message-copy.security.saslConfiguration.username.password.k8SecretName`
  - `ingress-gateway.message-copy.security.saslConfiguration.username.password.k8NameSpace`
  - `ingress-gateway.message-copy.security.saslConfiguration.username.password.fileName`
  - `ingress-gateway.kafka.bootstrapAddress`
- Added the following parameters to Configuring Egress Gateway:
  - `egress-gateway.message-copy.enabled`

  - egress-gateway.message-copy.copyPayload
  - egress-gateway.message-copy.topicName
  - egress-gateway.message-copy.ackRequired
  - egress-gateway.message-copy.retryOnFailure
  - egress-gateway.message-copy.threadPoolConfigurations.coreSize
  - egress-gateway.message-copy.threadPoolConfigurations.maxSize
  - egress-gateway.message-copy.threadPoolConfigurations.queueCapacity
  - egress-gateway.message-copy.security.enabled
  - egress-gateway.message-copy.security.protocol
  - egress-gateway.message-copy.security.tlsVersion
  - egress-gateway.message-copy.security.saslConfiguration.username
  - egress-gateway.message-copy.security.saslConfiguration.username.password.k8SecretName
  - egress-gateway.message-copy.security.saslConfiguration.username.password.k8NameSpace
  - egress-gateway.message-copy.security.saslConfiguration.username.password.fileName
  - egress-gateway.kafka.bootstrapAddress
- Added Configuring Kafka for NF message feed to describe the following parameters for configuring message feed for Kafka:
  - global.nfType
  - global.nfInstanceId
  - global.nfFqdn
- Added Creating Secret for Support of TLS in Diameter Gateway to describe the step to create secret for TLS in Daimeter Gateway.
- Added the following parameters to TLS Configuration in Diameter Gateway:
  - TLS_ENABLED
  - TLS_DIAMETER_PORT
  - TLS_CIPHER_SUITE
  - TLS_INITIAL_ALGORITHM
  - TLS_SECRET_NAME
  - TLS_RSA_PRIVATE_KEY_FILENAME
  - TLS_ECDSA_PRIVATE_KEY_FILENAME
  - TLS_RSA_CERTIFICATE_FILENAME
  - TLS_ECDSA_CERTIFICATE_FILENAME
  - TLS_CA_BUNDLE_FILENAME
  - TLS_MTLS_ENABLED

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1 Introduction

This guide describes how to install or upgrade Oracle Communications Cloud Native Core, Binding Support Function (BSF) in a cloud native environment.

> **Note**
>
> - This guide covers the installation instructions when Podman is the container platform with Helm as the Packaging Manager. For any other container platform, the operator must use the commands based on their deployed container runtime environment.
> - `kubectl` commands can vary based on the platform deployment. Replace `kubectl` with Kubernetes environment-specific command line tool to configure Kubernetes resources through kube-api server. The instructions provided in this document are as per the CNE version of `kube-api server`.

> **Caution**
>
> User, computer and applications, and character encoding settings can cause an issue when copy-pasting commands or any content from PDF. PDF reader version also affects the copy-pasting functionality. It is recommended to verify the pasted content especially when the hyphens or any special characters are part of the copied content.

1.1 Overview

BSF is a key component of the 5G Service Based Architecture (SBA). BSF allows Policy Control Function (PCF) to register, update, and remove the binding information from it, and allows Network Function (NF) consumers to discover the selected Policy Control Function. BSF stores the binding information for certain Protocol Data Unit (PDU) sessions and discovers the selected PCF according to the binding information. It also acts as diameter proxy agent or diameter redirect agent to Rx requests targeting an IP address of a User Equipment (UE) to the selected Policy Control Function.

For any Application Function (AF) using Rx, such as Proxy-Call Session Control Function (P-CSCF), BSF determines the selected Policy Control Function address according to the information carried by the incoming Rx requests.

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

BSF service allows:

- Policy Control Function users to register, update, and remove the binding information.
- NF consumers to retrieve the binding information.

For more information, see *Oracle Communications Cloud Native Core, Binding Support Function User Guide*.

1.2 References

Refer to the following documents while deploying BSF:

- *Oracle Communications Cloud Native Core, Cloud Native Environment Installation Guide*
- *Oracle Communications Cloud Native Core, Binding Support Function User Guide*
- *Oracle Communications Cloud Native Core, Binding Support Function REST Specification Guide*
- *Oracle Communications Cloud Native Core, Binding Support Function Troubleshooting Guide*
- *Oracle Communications Cloud Native Core, Binding Support Function Network Impact Report*
- *Oracle Communications Cloud Native Core, cnDBTier User Guide*
- *Oracle Communications Cloud Native Core, Data Collector User Guide*

1.3 Oracle Error Correction Policy

The table below outlines the key details for the current and past releases, their General Availability (GA) dates, the latest patch versions, and the end dates for the Error Correction Grace Period.

Table 1-1 Oracle Error Correction Policy

Release Number	General Availability (GA) Date	Latest Patch Version	Error Correction Grace Period End Date
3.24.3	November 2024	24.3.0	November 2025
3.24.2	October 2024	24.2.1	October 2025
3.24.1	July 2024	24.1.0	July 2025
3.23.4	November 2024	23.4.5	November 2025

> **Note**
>
> For a release, Sev1 and Critical Patch Update (CPU) patches are supported for 12 months. For more information, see Oracle Communications Cloud Native Core and Network Analytics Error Correction Policy.

1.4 Oracle Open Source Support Policies

Oracle Communications Cloud Native Core uses open source technology governed by the Oracle Open Source Support Policies. For more information, see Oracle Open Source Support Policies.

2
Installing BSF

This chapter provides information about installing Oracle Communications Cloud Native Core, Binding Support Function (BSF) in a cloud native environment.

> **Note**
>
> - BSF supports fresh installation, and it can also be upgraded from 24.2.x and 24.1.x. For more information on how to upgrade BSF, see Upgrading BSF.

2.1 Prerequisites

Before installing and configuring BSF, ensure that the following prerequisites are met.

2.1.1 Software Requirements

This section lists the software that must be installed before installing BSF:

Table 2-1 Preinstalled Software

Software	Versions
Kubernetes	1.30.x,1.29.x, 1.28.x
Helm	3.14.2
Podman	4.9.4

> **Note**
>
> CNE 24.3.x, 24.2.x, and 24.1.x versions can be used to install BSF 24.3.0.

To check the current CNE, Helm, Kubernetes, and Podman version installed, run the following commands:

```
echo $OCCNE_VERSION
```

```
helm version
```

```
kubectl version
```

```
podman version
```

> **Note**
>
> This guide covers the installation instructions for BSF when Podman is the container platform with Helm as the Packaging Manager. For non-CNE, the operator can use commands based on their deployed Container Runtime Environment, see the *Oracle Communications Cloud Native Core, Cloud Native Environment (CNE) Installation, Upgrade and Fault Recovery Guide*.

The following software are available if BSF is deployed in CNE. If you are deploying BSF in any other cloud native environment, these additional software must be installed before installing BSF.

To check the installed software, run the following command:

```
helm ls -A
```

Table 2-2 Additional Software

Software	Version	Purpose
AlertManager	0.27.0	Alerts Manager
Calico	3.27.3	Security Solution
cert-manager	1.12.4	Secrets Manager
Containerd	1.7.16	Container Runtime Manager
Fluentd - OpenSearch	1.16.2	Logging
Grafana	9.5.3	Metrics
HAProxy	3.0.2	Load Balancer
Istio	1.18.2	Service Mesh
Jaeger	1.60.0	Tracing
Kyverno	1.12.5	Logging
MetalLB	0.14.4	External IP
Oracle OpenSearch	2.11.0	Logging
Oracle OpenSearch Dashboard	2.11.0	Logging
Prometheus	2.52.0	Metrics
Prometheus Operator	0.76.0	Metrics
Velero	1.12.0	Logging
elastic-curator	5.5.4	Logging
elastic-exporter	1.1.0	Logging
elastic-master	7.9.3	Logging
Logs	3.1.0	Logging
prometheus-kube-state-metric	1.9.7	Metrics
prometheus-node-exporter	1.0.1	Metrics
metrics-server	0.3.6	Metric Server
occne-snmp-notifier	1.2.1	Metric Server
tracer	1.22.0	Tracing

> **Important**
>
> If you are using NRF with BSF, install it before proceeding with the BSF installation. BSF 24.3.0 supports NRF 24.3.x.

2.1.2 Environment Setup Requirements

This section describes the environment setup requirements required for installing BSF.

2.1.2.1 Client Machine Requirement

This section describes the requirements for client machine, that is, the machine used by the user to run deployment commands.

The client machine must have:

- Helm repository configured on the client.
- network access to the Helm repository and Docker image repository.
- network access to the Kubernetes cluster.
- required environment settings to run the `kubectl`, `podman`, and `docker` commands. The environment should have privileges to create namespace in the Kubernetes cluster.
- Helm client installed with the `push` plugin. The environment should be configured so that the `helm install` command deploys the software in the Kubernetes cluster.

2.1.2.2 Network Access Requirement

The Kubernetes cluster hosts must have network access to the following repositories:

- **Local Helm Repository**: It contains the BSF Helm charts.
  To check if the Kubernetes cluster hosts have network access to the local Helm repository, run the following command:

  ```
  helm repo update
  ```

- **Local Docker Image Repository**: It contains the BSF Docker images.
  To check if the Kubernetes cluster hosts can access the local Docker image repository, pull any image with an `image-tag`, using the following command:

  ```
  docker pull <docker-repo>/<image-name>:<image-tag>
  ```

  ```
  podman pull <docker-repo>/<image-name>:<image-tag>
  ```

  Where:

  - `<docker-repo>` is the IP address or host name of the Docker repository.
  - `<podman-repo>` is the IP address or host name of the Podman repository.
  - `image-name` is the Docker image name.
  - `image-tag` is the tag assigned to the Docker image used for the BSF pod.

  For Example:

```
docker pull CUSTOMER_REPO/oc-app-info:24.3.4
```

For CNE 1.8.0 and later versions, use the following command:

```
podman pull <docker-repo>/<image-name>:<image-tag>
```

For Example:

```
podman pull CUSTOMER_REPO/oc-app-info:24.3.4
```

> **Note**
>
> Run the `kubectl` and Helm commands on a system based on the deployment or infrastructure. For instance, you can run these commands on a client machine such as VM, server, local desktop, and so on.

2.1.2.3 Server or Space Requirement

For information about server or space requirements, see the *Oracle Communications Cloud Native Core, Cloud Native Environment (CNE) Installation, Upgrade and Fault Recovery Guide*.

2.1.2.4 CNE Requirement

This section is applicable only if you are installing BSF on Cloud Native Environment (CNE). BSF supports CNE 24.3.x, 24.2.x, and 24.1.x.

To check the CNE version, run the following command:

```
echo $OCCNE_VERSION
```

For more information, see *Oracle Communications Cloud Native Core, Cloud Native Environment (CNE) Installation, Upgrade, and Fault Recovery Guide*.

2.1.2.5 cnDBTier Requirement

BSF supports cnDBTier 24.3.x, 24.2.x, and 24.1.x. cnDBTier must be configured and running before installing BSF. For more information about cnDBTier installation, see *Oracle Communications Cloud Native Core, cnDBTier (cnDBTier) Installation, Upgrade, and Fault Recovery Guide*.

2.1.2.6 OSO Requirement

BSF supports Operations Services Overlay (OSO) 24.3.x, 24.2.x, and 24.1.x for common operation services (Prometheus and components such as Alertmanager, Pushgateway) on a Kubernetes cluster, which does not have these common services. For more information on installation procedure, see *Oracle Communications Cloud Native Core, Operations Services Overlay Installation, Upgrade, and Fault Recovery Guide*.

2.1.2.7 CNC Console Requirements

BSF supports CNC Console (CNCC) 24.3.x.

For more information about CNCC, see *Oracle Communications Cloud Native Configuration Console Installation, Upgrade, and Fault Recovery Guide and Oracle Communications Cloud Native Configuration Console User Guide.*

2.1.2.8 OCCM Requirements

BSF supports OCCM 24.3.x. To support automated certificate lifecycle management, BSF integrates with Oracle Communications Cloud Native Core, Certificate Management (OCCM) in compliance with 3GPP security recommendations. For more information about OCCM in BSF, see the *Support for Automated Certificate Lifecycle Management* section in *Oracle Communications Cloud Native Core, Binding Support Function User Guide*.

For more information about OCCM, see the following guides:

- *Oracle Communications Cloud Native Core, Certificate Manager Installation, Upgrade, and Fault Recovery Guide*
- *Oracle Communications Cloud Native Core, Certificate Manager User Guide*

2.1.3 Resource Requirement

This section lists the resource requirements to install and run BSF.

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

2.1.3.1 BSF Services

The following table lists resource requirement for BSF Services:

Table 2-3 BSF Services

Service	CPU		Memory (Gi)		Replica(s)			Ephemeral Storage (If Enabled)	
	Min	Max	Min	Max	Min	Max	Count	Min	Max
bsf-management-service	3	4	1	4	2	8	1	78.1Mi	4Gi

To modify the default values of replicas for any BSF microservice, you must add the following parameters under the required service group with CPU and memory in `ocbsf_custom_values_24.3.0.yaml` file:

```
minReplicas: 1
maxReplicas: 1
```

For example, to update the default values for Ingress gateway or Egress gateway, add the parameters under `ingress-gateway` or `egress-gateway` group:

```
ingress-gateway:
  #Resource details
  resources:
    limits:
      cpu: 1
      memory: 6Gi
    requests:
      cpu: 1
      memory: 2Gi
    target:
      averageCpuUtil: 80
  minReplicas: 1
  maxReplicas: 1
egress-gateway:
  #Resource details
  resources:
    limits:
      cpu: 1
      memory: 6Gi
    requests:
      cpu: 1
      memory: 2Gi
    target:
      averageCpuUtil: 80
  minReplicas: 1
  maxReplicas: 1
```

> **Note**
>
> It is recommended to avoid altering the above mentioned standard resources. Either increasing or decreasing the CPU or memory will result in unpredictable behavior of the pods. Contact My Oracle Support (MOS) team for Min Replicas and Max Replicas count values.

2.1.3.2 Upgrade

Following is the resource requirement for upgrading BSF.

Table 2-4 Upgrade

Service	CPU		Memory (Gi)		Replica(s)
	Min	Max	Min	Max	Max
Alternate Route Service	1	2	1	2	1
bsf-management-service	1	2	1	2	1
Diameter Gateway	1	2	1	2	1

Table 2-4 (Cont.) Upgrade

Service	CPU		Memory (Gi)		Replica(s)
	Min	Max	Min	Max	Max
Egress Gateway	1	2	1	2	1
Ingress Gateway	1	2	1	2	1
NRF Client NF Management	1	2	1	2	1
Perf-Info	1	2	1	2	1
App-info	1	2	1	2	1
Query Service	1	2	1	2	1
CM Service	1	2	1	2	1
Config Server	1	2	1	2	1
Audit Service	1	2	1	2	1

2.1.3.3 Common Services Container

Table 2-5 Common Services Container

Service	CPU		Memory (Gi)		Replica(s)			Ephemeral Storage (If Enabled)	
	Min	Max	Min	Max	Min	Max	Count	Min	Max
Alternate Route Service	1	2	2	4	2	5	1	78.1Mi	4Gi

Table 2-5 (Cont.) Common Services Container

Service	CPU		Memory (Gi)		Replica(s)			Ephemeral Storage (If Enabled)	
	Min	Max	Min	Max	Min	Max	Count	Min	Max
Diameter Gateway	3	4	0.5	2	2	Max replica per service should be set based on required TPS and other dimensioning factors. You must take Upgrade resources into account during dimensioning. Default upgrade resource requirements are 25% above max 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. If a max	1	78.1Mi	2Gi

Table 2-5 (Cont.) Common Services Container

Service	CPU		Memory (Gi)		Replica(s)			Ephemeral Storage (If Enabled)	
	Min	Max	Min	Max	Min	Max	Count	Min	Max
						replica is 1, one additional pod would be required (rounding 0.25 to 1).			
Egress Gateway	3	4	4	6	2	5	2	78.1Mi	6Gi
Ingress Gateway	3	4	4	6	2	5	2	78.1Mi	6Gi
NRF Client NF Management	1	1	1	1	NA	NA	2	78.1Mi	1Gi
Perf-Info	3	4	0.5	1	NA	NA	1	78.1Mi	1Gi
App-info	1	1	0.5	1	1	2	1	78.1Mi	1Gi
Query Service	1	2	1	1	1	2	1	78.1Mi	1Gi
CM Service	2	4	0.5	2	NA	NA	2	78.1Mi	2Gi
Config Server	2	4	0.5	2	1	2	1	78.1Mi	2Gi
Audit Service	1	2	1	1	2	8	1	78.1Mi	1Gi

2.2 Installation Sequence

This section describes preinstallation, installation, and postinstallation tasks for BSF.

2.2.1 Preinstallation Tasks

Before installing BSF, perform the tasks described in this section.

2.2.1.1 Verifying and Creating Namespace

This section explains how to verify and create a namespace in the system.

> **Note**
>
> This is a mandatory procedure, run this before proceeding further with the installation. The namespace created or verified in this procedure is an input for the next procedures.

To verify and create a namespace:

1. Run the following command to verify if the required namespace already exists in system:

   ```
   kubectl get namespaces
   ```

   In the output of the above command, if the namespace exists, continue with Creating Service Account, Role, and RoleBinding.
2. If the required namespace is unavailable, create the namespace using the following command:

   ```
   kubectl create namespace <required namespace>
   ```

   Where, `<required namespace>` is the name of the namespace.

   For example:

   ```
   kubectl create namespace ocbsf
   ```

   Sample output:

   ```
   namespace/ocbsf created
   ```

Naming Convention for Namespaces

The namespace must meet the following requirements:

- The namespace should:start and end with an alphanumeric character.
- contains 63 characters or less
- contains only alphanumeric characters or '-'

> **Note**
>
> It is recommended to avoid using the prefix `kube-` when creating namespace. The prefix is reserved for Kubernetes system namespaces.

2.2.1.2 Creating Service Account, Role, and RoleBinding

This section is optional and it describes how to manually create a service account, Role, and RoleBinding resources.

> **Note**
>
> The secret(s) should exist in the same namespace where BSF is getting deployed. This helps to bind the Kubernetes role with the given service account.

To create service account, role and rolebinding:

1. Create a Global Service Account.

create a YAML file `bsf-sample-serviceaccount-template.yaml` using the following sample code:

```
apiVersion: v1
kind: ServiceAccount
metadata:
  name: <helm-release>-serviceaccount
  namespace: <namespace>
```

Where,

`<helm-release>` is a name provided to identify the Helm deployment.

`<namespace>` is a name provided to identify the Kubernetes namespace of BSF. All the BSF microservices are deployed in this Kubernetes namespace.

2. Define role permissions using roles for the BSF namespace.

   Create a YAML file `bsf-sample-role-template.yaml` using the following sample code:

```
apiVersion: rbac.authorization.k8s.io/v1
kind: Role
metadata:
  name: <helm-release>-role
  namespace: <namespace>
rules:
   - apiGroups:
       - ""
     resources:
       - services
       - configmaps
       - pods
       - secrets
       - endpoints
       - nodes
       - events
       - persistentvolumeclaims
     verbs:
       - get
       - list
       - watch
   - apiGroups:
       - apps
     resources:
       - deployments
       - statefulsets
     verbs:
       - get
       - watch
       - list
   - apiGroups:
       - autoscaling
     resources:
       - horizontalpodautoscalers
     verbs:
       - get
```

```
    - watch
    - list
```

3. To bind the role defined in the `bsf-sample-role-binding template.yaml` file with the service account, create a `bsf-sample-rolebinding-template.yaml` file using the following sample code:

```
apiVersion: rbac.authorization.k8s.io/v1beta1
kind: RoleBinding
metadata:
  name: <helm-release>-rolebinding
  namespace: <namespace>
roleRef:
  apiGroup: rbac.authorization.k8s.io
  kind: Role
  name: <helm-release>-role
subjects:
- kind: ServiceAccount
  name:  <helm-release>-serviceaccount
  namespace: <namespace>
```

> **Note**
>
> If you are installing BSF 22.1.0 using CNE 22.2.0 or later versions, change the apiVersion from `rbac.authorization.k8s.io/v1beta1` to `rbac.authorization.k8s.io/v1`.

4. Run the following commands to create resources:

```
kubectl -n <namespace> create -f bsf-sample-serviceaccount-template.yaml;
kubectl -n <namespace> create -f bsf-sample-role-template.yaml;
kubectl -n <namespace> create -f bsf-sample-rolebinding-template.yaml
```

> **Note**
>
> Once the global service account is added, you must add `globalServiceAccountName` in the `ocbsf_custom_values_24.3.0.yaml` file. Otherwise, installation may fail as a result of creating and deleting Custom Resource Definition (CRD).

> **Note**
>
> `PodSecurityPolicy` kind is required for Pod Security Policy service account. For more information, see *Oracle Communications Cloud Native Core, Binding Support Function Troubleshooting Guide*.
>
> .

2.2.1.3 Configuring cnDBTier

With cnDBTier, BSF facilitates automatic user creation with its pre-install hook. However, ensure that there is a privileged user on the NDB cluster, which has privileges similar to root user. You must have necessary permissions to allow connections from remote hosts.

Single Site Deployment

Perform the following steps on each of the SQL nodes.

1. Log in to MySQL on each of the API nodes of cnDBTier to verify this.

```
mysql>select host from mysql.user where User='<privileged username>';
+------+
| host |
+------+
| %    |
+------+
1 rowinset(0.00 sec)
```

2. If you do not see '%' in the output of the above query, modify this field to allow remote connections to root.

```
mysql>update mysql.user set host='%' where User='<privileged username>';
Query OK, 0rowsaffected (0.00 sec)
Rowsmatched: 1  Changed: 0  Warnings: 0
mysql> flush privileges;
Query OK, 0rowsaffected (0.06 sec)
```

> **Note**
>
> Perform this step on each SQL node.

Multisite Deployment

To configure cnDBTier in case of multisite deployment:

1. Update mysqld configuration in the cnDBTier `custom-values.yaml` file before installing or upgrading BSF.

```
global:
  ndbconfigurations:
    api
      auto_increment_increment: 3
      auto_increment_offset: 1
```

> **Note**
>
> - Set the `auto_increment_increment` parameter same as number of sites. For example: If the number of sites is 2, set its value as 2 and if the number of sites is 3, set its value as 3.
> - Set the `auto_increment_offset` parameter as site ID. For example: The site ID for Site 1 is 1, Site 2 is 2, for Site 3 is 3, and so on.

2. If the fresh installation or upgrade of BSF on cnDBTier is not planned, then run the following command to edit the `mysqldconfig` configmap on all the cnDBTier sites.

   ```
   kubectl edit configmap mysqldconfig <db-site-namespace>
   ```

   For example:

   ```
   kubectl edit configmap mysqldconfig -n site1
   ```

   > **Note**
   >
   > Update the `auto_increment_increment` and `auto_increment_offset` values as mentioned in the previous step for all sites.

2.2.1.4 Configuring Multiple Site Deployment

In case of multiple site deployment of BSF, there is only one subscriber database which is used by each site and different configuration databases for each site, as each site has its own configuration. To have different configuration databases and same subscriber database, you need to create secrets accordingly. For more information about creating secrets, see **Configuring Kubernetes Secret for Accessing Database**.

To configure multiple site deployment:

1. Configure `nfInstanceId` under the global section of the `ocbsf_custom_values_24.3.0.yaml` file differently for each BSF site deployed.

   > **Note**
   >
   > Ensure that the `nfInstanceId` configuration in the global section is same as that in the `appProfile` section of nrf-client.

   ```
   global:
     # Unique ID to register to NRF, Should be configured differently on
   multi site deployments for each BSF
     nfInstanceId: &nfInsId 5a7bd676-ceeb-44bb-95e0-f6a55a328b03

   nrf-client:
     configmapApplicationConfig:
       profile: |-
         appProfiles=[{"nfInstanceId":"5a7bd676-ceeb-44bb-95e0-
   f6a55a328b03","nfStatus":"REGISTERED","fqdn":"ocbsf-
   ```

```
ingressgateway.mybsf.svc.cluster.local","nfType":"BSF","allowedNfTypes":
["NRF"],"plmnList":
[{"mnc":"14","mcc":"310"}],"priority":10,"capacity":500,"load":0,"locality"
:"bangalore","nfServices":[{"load":0,"scheme":"http","versions":
[{"apiFullVersion":"2.1.0.alpha-3","apiVersionInUri":"v1"}],"fqdn":"ocbsf-
ingressgateway.mybsf.svc.cluster.local","ipEndPoints":
[{"port":"80","ipv4Address":"10.0.0.0","transport":"TCP"}],"nfServiceStatus
":"REGISTERED","allowedNfTypes":
["NRF"],"serviceInstanceId":"547d42af-628a-4d5d-
a8bd-38c4ba672682","serviceName":"nbsf-group-id-
map","priority":10,"capacity":500}],"udrInfo":
{"groupId":"bsf-1","externalGroupIdentifiersRanges":
[{"start":"10000000000","end":"20000000000"}],"supiRanges":
[{"start":"10000000000","end":"20000000000"}],"gpsiRanges":
[{"start":"10000000000","end":"20000000000"}]},"heartBeatTimer":90,"nfServi
cePersistence":false,"nfProfileChangesSupportInd":false,"nfSetIdList":
["setxyz.bsfset.5gc.mnc012.mcc345"]}]
```

2. Configure `fullnameOverride` under the `config-server` section to `<helm-release-name>-config-server`. It should be different for each site deployed.

   ```
   config-server:
     fullnameOverride: ocudr1-config-server
   ```

3. Configure `fullnameOverride` under the `appinfo` section to `<helm-release-name>-app-info`. It should be different for each site deployed.

   ```
   appinfo:
     fullnameOverride: ocudr1-app-info
   ```

4. For cnDBTier configurations in multiple site deployment, see Configuring cnDBTier.

2.2.1.5 Creating Service Account, Role, and Role Binding for Helm Test

This section describes the procedure to create service account, role, and role binding resources for Helm Test.

Important

The steps described in this section are optional and users may skip it in any of the following scenarios:

- If user wants service accounts to be created automatically at the time of deploying BSF.
- Global service account with associated role and role bindings is already configured or the user has any in-house procedure to create service accounts.

Creating Global Service Account

To create the global service account, create a YAML file `bsf-sample-helmtestserviceaccount-template.yaml` using the following sample code:

```
apiVersion: v1
kind: ServiceAccount
metadata:
  name: <helm-release>-helmtestserviceaccount
  namespace: <namespace>
```

Where,

`<helm-release>` is a name provided to identify the helm deployment.

`<namespace>` is a name provided to identify the Kubernetes namespace of BSF. All the BSF microservices are deployed in this Kubernetes namespace.

Define Role Permissions

To define permissions using roles for the BSF namespace, create a YAML file `bsf-sample-helmtestsrole-template.yaml` using the following sample code:

```
apiVersion: rbac.authorization.k8s.io/v1
kind: Role
metadata:
  name: <helm-release>-helmtest-role
  namespace: <namespace>
rules:
   - apiGroups:
       - ""
     resources:
    -pods
        -persistentvolumeclaims
        -services
        -endpoints
        -configmaps
        -events
        -secrets
        -serviceaccounts
        verbs:
        -list
        -get
        -watch
        -apiGroups:
        -apps
        resources:
        -deployments
        -statefulsets
        verbs:
        -get
        -watch
        -list
        -apiGroups:
        -autoscaling
```

```
resources:
-horizontalpodautoscalers
verbs:
-get
-watch
-list
-apiGroups:
-policy
resources:
-poddisruptionbudgets
verbs:
-get
-watch
-list
-apiGroups:
-rbac.authorization.k8s.io
resources:
-roles
-rolebindings
verbs:
-get
-watch
-list
```

Creating Helm Test Role Binding Template

To bind the role defined in the `bsf-sample-role-template.yaml` file with the service account, create a `bsf-sample-helmttestrolebinding-template.yaml` file using the following sample code:

```
apiVersion: rbac.authorization.k8s.io/v1beta1
kind: RoleBinding
metadata:
  name: <helm-release>-helmtest-rolebinding
  namespace: <namespace>
roleRef:
  apiGroup: rbac.authorization.k8s.io
  kind: Role
  name: <helm-release>-helmtest-role
subjects:
- kind: ServiceAccount
  name:  <helm-release>-helmtestserviceaccount
  namespace: <namespace>
```

Creating resources

Run the following commands to create resources:

```
kubectl -n <namespace> create -f bsf-sample-helmtestserviceaccount-
template.yaml;
kubectl -n <namespace> create -f bsf-sample-role-template.yaml;
kubectl -n <namespace> create -f bsf-sample-rolebinding-template.yaml
```

> **Note**
>
> Once the global service account is added, users must add `helmTestServiceAccountName` in the `ocbsf_custom_values_24.3.0.yaml` file. Otherwise, installation may fail as a result of creating and deleting Custom Resource Definition (CRD).

2.2.1.6 Configuring Database, Creating Users, and Granting Permissions

This section explains how database administrators can create users and database in a single and multisite deployment.

BSF has four databases (Provisional, State, Release, Leaderpod, and NRF Client Database) and two users (Application and Privileged).

> **Note**
>
> - Before running the procedure for georedundant sites, ensure that the cnDBTier for georedundant sites is already up and replication channels are enabled.
> - While performing a fresh installation, if BSF release is already deployed, purge the deployment and remove the database and users that were used for the previous deployment. For uninstallation procedure, see Uninstalling BSF.

BSF Databases

For BSF applications, four types of databases are required:

1. **Provisional Database**: Provisional Database contains configuration information. The same configuration must be done on each site by the operator. Both Privileged User and Application User have access to this database. In case of georedundant deployments, each site must have a unique Provisional Database. BSF sites can access only the information in their unique Provisional Database.
   For example:
   - For Site 1: ocbsf_config_server_site1
   - For Site 2: ocbsf_config_server_site2
   - For Site 3: ocbsf_config_server_site3
2. **State Database**: This database maintains the running state of BSF sites and has information of subscriptions, pending notification triggers, and availability data. It is replicated and the same configuration is maintained by all BSF georedundant sites. Both Privileged User and Application User have access to this database.
3. **Release Database**: This database maintains release version state, and it is used during upgrade and rollback scenarios. Only Privileged User has access to this database.
4. **Leaderpod Database**: This database is used to store leader and follower if PDB is enabled for microservices that require a single pod to be up in all the instances. The configuration of this database must be done on each site. In case of georedundant deployments, each site must have a unique Leaderpod database.
   For example:
   - For Site 1: ocbsf_leaderPodDb_site1
   - For Site 2: ocbsf_leaderPodDb_site2

- For Site 3: ocbsf_leaderPodDb_site3

> **Note**
>
> This database is used only when `nrf-client-nfmanagement.enablePDBSupport` is set to `true` in the `ocbsf_custom_values_24.3.0.yaml`.

5. **NRF Client Database**: This database is used to support NRF Client features. Only Privileged User has access to this database and it is used only when the caching feature is enabled. In case of georedundant deployments, each site must have a unique NRF Client database and its configuration must be done on each site.

   For example:

   - For Site 1: ocbsf_nrf_client_site1
   - For Site 2: ocbsf_nrf_client_site2
   - For Site 3: ocbsf_nrf_client_site3

BSF Users

There are two types of BSF database users with different set of permissions:

1. **Privileged User**: This user has a complete set of permissions. This user can perform create, alter, or drop operations on tables to perform install, upgrade, rollback, or delete operations.

   > **Note**
   >
   > In examples given in this document, Privileged User's username is '`bsfprivilegedusr`' and password is '`bsfprivilegedpasswd`'.

2. **Application User**: This user has a limited set of permissions and is used by BSF application to handle service operations. This user can insert, update, get, or remove the records. This user will not be able to create, alter, or drop the database or tables.

   > **Note**
   >
   > In examples given in this document, Application User's username is '`bsfusr`' and password is '`bsfpasswd`'.

Default Databases

BSF microservices use the MySQL database to store the configuration and run time data.

Before deploying BSF, make sure that the MySQL user and databases are created.

Each microservice has a default database assigned to it.

The following table lists the default database names and applicable deployment modes for various databases that need to be configured while deploying BSF.

Table 2-6 Default Database Names for BSF Microservices

Service Name	Default Database Name	Database Type
Config Server	`ocbsf_config_server`	Provisional
CM Service	`ocbsf_commonconfig` `ocbsf_cmservice`	Provisional
BSF Service	`ocpm_bsf`	State
Audit Service	`ocbsf_audit_service`	Provisional
NRF Client	`ocbsf_nrf_client` `ocbsf_leaderPodDb`	Provisional

In addition, create the **ocbsf_release** (default name) database to store and manipulate the release versions of BSF services during the install, upgrade, and rollback procedure. This database name is specified in the **releaseDbName** parameter in the `ocbsf_custom_values_24.3.0.yaml` file.

2.2.1.6.1 Single Site

This section explains how a database administrator can create database and users for a single site deployment.

Configuring Database

Perform the following steps to configure MySQL database for different microservices:

1. Log in to the server where the SSH keys are stored and have permission to access the SQL nodes of NDB cluster.
2. Connect to the SQL nodes.
3. Log in to the MySQL prompt using root permission, or log in as a user who has the permission to create users as per conditions explained in the next step.
   Example:

   ```
   mysql -h 127.0.0.1 -uroot -p
   ```

   > **Note**
   >
   > This command varies between systems, path for MySQL binary, root user, and root password. After running this command, enter the password specific to the user mentioned in the command.

4. Run the following command to check if both the BSF users already exist:

   ```
   SELECT User FROM mysql.user;
   ```

   If the users already exist, go to the next step. Else, create the respective new user or users by following the steps below:

- Run the following command to create a new Privileged User:

  ```
  CREATE USER '<BSF Privileged-User Name>'@'%' IDENTIFIED BY '<BSF
  Privileged-User Password>';
  ```

  Example:

  ```
  CREATE USER 'bsfprivilegedusr'@'%' IDENTIFIED BY 'bsfprivilegedpasswd';
  ```

- Run the following command to create a new Application User:

  ```
  CREATE USER '<Application User Name>'@'%' IDENTIFIED BY '<APPLICATION
  Password>';
  ```

  Example:

  ```
  CREATE USER 'bsfusr'@'%' IDENTIFIED BY 'bsfpasswd';
  ```

5. Run the following command to check whether any of the BSF databases already exists:

   ```
   show databases;
   ```

   a. If any of the previously configured database is already present, remove them. Otherwise, skip this step.
   Run the following command to remove a preconfigured BSF database:

   ```
   DROP DATABASE if exists <DB Name>;
   ```

   Example:

   ```
   DROP DATABASE if exists ocbsf_audit_service;
   ```

   b. Run the following command to create new BSF database if it does not exist, or after dropping an existing database:

   ```
   CREATE DATABASE IF NOT EXISTS <DB Name> CHARACTER SET utf8;
   ```

   For example:

   ```
   CREATE DATABASE IF NOT EXISTS ocbsf_config_server CHARACTER SET utf8;
   CREATE DATABASE IF NOT EXISTS ocbsf_release CHARACTER SET utf8;
   CREATE DATABASE IF NOT EXISTS ocbsf_commonconfig CHARACTER SET utf8;
   CREATE DATABASE IF NOT EXISTS ocbsf_cmservice CHARACTER SET utf8;
   CREATE DATABASE IF NOT EXISTS ocbsf_audit_service CHARACTER SET utf8;
   CREATE DATABASE IF NOT EXISTS ocpm_bsf CHARACTER SET utf8;
   CREATE DATABASE IF NOT EXISTS ocbsf_nrf_client CHARACTER SET utf8;
   CREATE DATABASE IF NOT EXISTS ocbsf_leaderPodDb CHARACTER SET utf8;
   ```

> **Note**
>
> Ensure that you use the same database names while creating database that you have used in the global parameters of `ocbsf_custom_values_24.3.0.yaml` files.
>
> Following is an example of what are the names of the BSF database names configured in the `ocbsf_custom_values_24.3.0.yaml` file:

```
global:
  releaseDbName: &releaseDbName 'ocbsf_release'
  nrfClientDbName: 'ocbsf_nrf_client'
bsf-management-service:
  envMysqlDatabase: 'ocpm_bsf'
config-server:
  envMysqlDatabase: *configServerDB
cm-service:
  envMysqlDatabase: ocbsf_cmservice
nrf-client-nfmanagement:
  dbConfig:
    leaderPodDbName: ocbsf_leaderPodDb
audit-service:
  envMysqlDatabase: ocbsf_audit_service
```

> BSF follows the best database practices by having the idle connection timeout for client applications lesser than the idle connection timeout of the database server.
>
> The default idle connection timeout value of BSF applications is 540 seconds or 9 minutes. This value remains changed.

Creating Users and Granting Permissions

> **Note**
>
> Creation of database is optional if grant is scoped to all database, that is, database name is not mentioned in grant command.

To create users and grant permissions, perform the following steps:

1. Run the following set of commands to grant all the necessary permissions:

```
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, REFERENCES, ALTER,
CREATE TEMPORARY TABLES, LOCK TABLES, EXECUTE ON <DB Name>.*TO `<BSF
Privileged-User Name>`@`%`;
```

In the following example, "bsfprivilegedusr" is used as username, "bsfprivilegedpasswd" is used as password. Here, all permissions are being granted to "bsfprivilegedusr".

```
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, ALTER, REFERENCES,
INDEX ON ocbsf_config_server.* TO 'bsfprivilegedusr'@'%';
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, ALTER, REFERENCES,
INDEX ON ocbsf_release.* TO 'bsfprivilegedusr'@'%';
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, ALTER, REFERENCES,
INDEX ON ocpm_bsf.* TO 'bsfprivilegedusr'@'%';
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, ALTER, REFERENCES,
INDEX ON ocbsf_commonconfig.* TO 'bsfprivilegedusr'@'%';
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, ALTER, REFERENCES,
INDEX ON ocbsf_audit_service.* TO 'bsfprivilegedusr'@'%';
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, ALTER, REFERENCES,
INDEX ON ocbsf_cmservice.* TO 'bsfprivilegedusr'@'%';
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP ON
mysql.ndb_replication TO 'bsfprivilegedusr'@'%';
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, REFERENCES, INDEX,
ALTER ON ocbsf_nrf_client.* TO 'bsfprivilegedusr'@'%';
GRANT SELECT, INSERT, CREATE, ALTER, DROP, LOCK TABLES, CREATE TEMPORARY
TABLES, DELETE, UPDATE, EXECUTE ON ocbsf_leaderPodDb.* TO
'bsfprivilegedusr'@'%';
FLUSH PRIVILEGES;
```

2. Run the following command to grant NDB_STORED_USER permissions to the Privileged User:

```
GRANT NDB_STORED_USER ON *.* TO 'bsfprivilegedusr'@'%';
```

3. Grant all the necessary permissions by running the following set of commands.

> **Note**
>
> The database name is specified in the **envMysqlDatabase** parameter for respective services in the `ocbsf_custom_values_24.3.0.yaml` file.

It is recommended to use a unique database name when there are multiple instances of BSF deployed in the network as they share the same data tier (MySQL cluster).

To grant permissions:

```
GRANT SELECT, INSERT, LOCK TABLES, DELETE, UPDATE, REFERENCES, EXECUTE ON
<DB Name>.* TO '<Application User Name>'@'%';
```

In the following example, "bsfusr" is used as username, "bsfpasswd" is used as password. Here, all permissions are being granted to "bsfusr".

```
GRANT SELECT, INSERT, UPDATE, DELETE ON ocbsf_config_server.* TO
'bsfusr'@'%';
GRANT SELECT, INSERT, UPDATE, DELETE ON ocbsf_release.* TO 'bsfusr'@'%';
GRANT SELECT, INSERT, UPDATE, DELETE ON ocpm_bsf.* TO 'bsfusr'@'%';
GRANT CREATE, SELECT, INSERT, UPDATE, DELETE ON ocbsf_commonconfig.* TO
'bsfusr'@'%';
GRANT CREATE, SELECT, INSERT, UPDATE, DELETE ON ocbsf_audit_service.* TO
```

```
'bsfusr'@'%';
GRANT CREATE, SELECT, INSERT, UPDATE, DELETE ON ocbsf_nrf_client.* TO
'bsfusr'@'%';
GRANT CREATE, SELECT, INSERT, UPDATE, DELETE ON ocbsf_cmservice.* TO
'bsfusr'@'%';
FLUSH PRIVILEGES;
```

4. Run the following command to grant NDB_STORED_USER permissions to the Application User:

   ```
   GRANT NDB_STORED_USER ON *.* TO 'bsfusr'@'%';
   ```

5. Run the following commands to verify that the privileged or application users have all the required permission:

   ```
   show grants for username;
   ```

   where `username` is the name of the privileged or application user.

   Example:

   ```
   show grants for bsfprivilegedusr;
   show grants for bsfusr;
   ```

6. Run the following command to flush privileges:

   ```
   FLUSH PRIVILEGES;
   ```

7. Exit from the database and logout from the MySQL node.

2.2.1.6.2 Multisite

This section explains how database administrator can create the databases and users for a multisite deployment.

For BSF georedundant deployment, listed databases names must be unique for each site. For the remaining databases, the database name must be same across all the sites.

It is recommended to use unique database names when multiple instances of BSF use and share a single cnDBTier (MySQL cluster) in the network. To maintain unique database names for all the NF instances in the network, a good practice is to add the deployment name of the BSF instance as a prefix or suffix to the database name. However, you can use any prefix or suffix to create the unique database name. For example, if the BSF deployment nfInstance value is "site1" then the BSF Configuration service database can be named as "ocbsf_config_server_site1".

> **Note**
>
> Before running the procedure for georedundant sites, ensure that the cnDBTier for georedundant sites is up and replication channels are enabled.

Table 2-7 BSF Unique Databases names for two site and three site deployment

Two Site Database Names	Three Site Database Names
ocbsf_config_server_site1 ocbsf_config_server_site2	ocbsf_config_server_site1 ocbsf_config_server_site2 ocbsf_config_server_site3
ocbsf_cmservice_site1 ocbsf_cmservice_site2	ocbsf_cmservice_site1 ocbsf_cmservice_site2 ocbsf_cmservice_site3
ocbsf_commonconfig_site1 ocbsf_commonconfig_site2	ocbsf_commonconfig_site1 ocbsf_commonconfig_site2 ocbsf_commonconfig_site3
ocbsf_leaderPodDb_site1 ocbsf_leaderPodDb_site2	ocbsf_leaderPodDb_site1 ocbsf_leaderPodDb_site2 ocbsf_leaderPodDb_site3
ocbsf_overload_site1 ocbsf_overload_site2	ocbsf_overload_site1 ocbsf_overload_site2 ocbsf_overload_site3
ocbsf_audit_service_site1 ocbsf_audit_service_site2	ocbsf_audit_service_site1 ocbsf_audit_service_site2 ocbsf_audit_service_site3
ocbsf_nrf_client_site1 ocbsf_nrf_client_site2	ocbsf_nrf_client_site1 ocbsf_nrf_client_site2 ocbsf_nrf_client_site3

Configuring Database

Perform the following steps to configure MySQL database for different microservices:

1. Log in to the server where the SSH keys are stored and have permission to access the SQL nodes of NDB cluster.
2. Connect to the SQL nodes.
3. Log in to the database either as a root user or as a user who has the permission to create users as per conditions explained in the next step.

   Example:

   ```
   mysql -h 127.0.0.1 -uroot -p
   ```

   > **Note**
   >
   > This command varies between systems, path for MySQL binary, root user, and root password. After running this command, enter the password specific to the user mentioned in the command.

4. Run the following command to check if both the BSF users already exist:

   ```
   SELECT User FROM mysql.user;
   ```

If the users already exist, go to the next step. Otherwise, create the respective new user or users by following the steps below:

- Run the following command to create a new Privileged User:

  ```
  CREATE USER '<BSF Privileged-User Name>'@'%' IDENTIFIED BY '<BSF
  Privileged-User Password>';
  ```

  Example:

  ```
  CREATE USER 'bsfprivilegedusr'@'%' IDENTIFIED BY 'bsfprivilegedpasswd';
  ```

- Run the following command to create a new Application User:

  ```
  CREATE USER '<Application User Name>'@'%' IDENTIFIED BY '<APPLICATION
  Password>';
  ```

  Example:

  ```
  CREATE USER 'bsfusr'@'%' IDENTIFIED BY 'bsfpasswd';
  ```

> **Note**
>
> You must create both the users on all the SQL nodes for all georedundant sites.

5. Run the following command to check whether any of the BSF databases already exists:

   ```
   show databases;
   ```

   a. If any of the previously configured database is already present, remove them. Otherwise, skip this step.

   > **Caution**
   >
   > In case you have georedundant sites configured, removal of the database from any one of the SQL nodes of any cluster will remove the database from all georedundant sites.

   Run the following command to remove a preconfigured BSF database:

   ```
   DROP DATABASE if exists <DB Name>;
   ```

   Example:

   ```
   DROP DATABASE if exists ocbsf_audit_service;
   ```

   b. Run the following command to create new BSF database if it does not exist, or after dropping an existing database:

   ```
   CREATE DATABASE IF NOT EXISTS <DB Name> CHARACTER SET utf8;
   ```

For example: Sample illustration for creating all database required for BSF installation in site1.

```
CREATE DATABASE IF NOT EXISTS ocbsf_config_server_site1 CHARACTER SET
utf8;
CREATE DATABASE IF NOT EXISTS ocbsf_commonconfig_site1 CHARACTER SET
utf8;
CREATE DATABASE IF NOT EXISTS ocbsf_cmservice_site1 CHARACTER SET utf8;
CREATE DATABASE IF NOT EXISTS ocbsf_audit_service_site1 CHARACTER SET
utf8;
CREATE DATABASE IF NOT EXISTS ocbsf_nrf_client_site1 CHARACTER SET utf8;
CREATE DATABASE IF NOT EXISTS ocbsf_leaderPodDb_site1 CHARACTER SET
utf8;
```

For example: Sample illustration for creating all database required for BSF installation in site2.

```
CREATE DATABASE IF NOT EXISTS ocbsf_config_server_site2 CHARACTER SET
utf8;
CREATE DATABASE IF NOT EXISTS ocbsf_commonconfig_site2 CHARACTER SET
utf8;
CREATE DATABASE IF NOT EXISTS ocbsf_cmservice_site2 CHARACTER SET utf8;
CREATE DATABASE IF NOT EXISTS ocbsf_audit_service_site2 CHARACTER SET
utf8;
CREATE DATABASE IF NOT EXISTS ocbsf_nrf_client_site2 CHARACTER SET utf8;
CREATE DATABASE IF NOT EXISTS ocbsf_leaderPodDb_site2 CHARACTER SET
utf8;
```

> **Note**
>
> Ensure that you use the same database names while creating database that you have used in the global parameters of `ocbsf_custom_values_24.3.0.yaml` files.
>
> BSF follows the best database practices by having the idle connection timeout for client applications lesser than the idle connection timeout of the database server.
>
> The default idle connection timeout value of BSF applications is 540 seconds or 9 minutes. This value remains changed.

Granting Permissions to Users on the Database

> **Note**
>
> - Run this step on all the SQL nodes for each BSF standalone site in a georedundant deployment.
> - Creation of database is optional if grant is scoped to all databases, that is, database name is not mentioned in grant command.

1. Run the following command to grant Privileged User permission on all BSF Databases:

```
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, REFERENCES, ALTER,
CREATE TEMPORARY TABLES, LOCK TABLES, EXECUTE ON <DB Name>_<site_name>.*TO
`<BSF Privileged-User Name>`@`%`;
```

In the following example, "bsfprivilegedusr" is used as username, "bsfprivilegedpasswd" is used as password. Here, all permissions are being granted to "bsfprivilegedusr".

Example for site1:

```
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, ALTER, REFERENCES,
INDEX ON ocbsf_config_server_site1.* TO 'bsfprivilegedusr'@'%';
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, ALTER, REFERENCES,
INDEX ON ocbsf_commonconfig_site1.* TO 'bsfprivilegedusr'@'%';
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, ALTER, REFERENCES,
INDEX ON ocbsf_audit_service_site1.* TO 'bsfprivilegedusr'@'%';
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, ALTER, REFERENCES,
INDEX ON ocbsf_cmservice_site1.* TO 'bsfprivilegedusr'@'%';
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP ON
mysql.ndb_replication TO 'bsfprivilegedusr'@'%';
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, REFERENCES, INDEX,
ALTER ON ocbsf_nrf_client_site1.* TO 'bsfprivilegedusr'@'%';
GRANT SELECT, INSERT, CREATE, ALTER, DROP, LOCK TABLES, CREATE TEMPORARY
TABLES, DELETE, UPDATE, EXECUTE ON ocbsf_leaderPodDb_site1.* TO
'bsfprivilegedusr'@'%';
FLUSH PRIVILEGES;
```

Example for site2:

```
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, ALTER, REFERENCES,
INDEX ON ocbsf_config_server_site2.* TO 'bsfprivilegedusr'@'%';
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, ALTER, REFERENCES,
INDEX ON ocbsf_commonconfig_site2.* TO 'bsfprivilegedusr'@'%';
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, ALTER, REFERENCES,
INDEX ON ocbsf_audit_service_site2.* TO 'bsfprivilegedusr'@'%';
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, ALTER, REFERENCES,
INDEX ON ocbsf_cmservice_site2.* TO 'bsfprivilegedusr'@'%';
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP ON
mysql.ndb_replication TO 'bsfprivilegedusr'@'%';
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, REFERENCES, INDEX,
ALTER ON ocbsf_nrf_client_site2.* TO 'bsfprivilegedusr'@'%';
GRANT SELECT, INSERT, CREATE, ALTER, DROP, LOCK TABLES, CREATE TEMPORARY
TABLES, DELETE, UPDATE, EXECUTE ON ocbsf_leaderPodDb_site2.* TO
'bsfprivilegedusr'@'%';
FLUSH PRIVILEGES;
```

2. Run the following command to grant NDB_STORED_USER permissions to the Privileged User:

```
GRANT NDB_STORED_USER ON *.* TO 'bsfprivilegedusr'@'%';
```

3. Run the following command to grant Application User permission on all BSF Databases:

   ```
   GRANT SELECT, INSERT, LOCK TABLES, DELETE, UPDATE, REFERENCES, EXECUTE ON
   <DB Name>_<site_name>.* TO '<Application User Name>'@'%';
   ```

   In the following example, "bsfusr" is used as username, "bsfpasswd" is used as password. Here, all permissions are being granted to "bsfusr".

   For example in BSF site1:

   ```
   GRANT SELECT, INSERT, UPDATE, DELETE ON ocbsf_config_server_site1.* TO
   'bsfusr'@'%';
   GRANT CREATE, SELECT, INSERT, UPDATE, DELETE ON ocbsf_commonconfig_site1.*
   TO 'bsfusr'@'%';
   GRANT CREATE, SELECT, INSERT, UPDATE, DELETE ON
   ocbsf_audit_service_site1.* TO 'bsfusr'@'%';
   GRANT SELECT, INSERT, UPDATE, DELETE, CREATE ON ocbsf_nrf_client_site1.*
   TO 'bsfusr'@'%';
   GRANT CREATE, SELECT, INSERT, UPDATE, DELETE ON ocbsf_cmservice_site1.* TO
   'bsfusr'@'%';
   FLUSH PRIVILEGES;
   ```

   Example for site2:

   ```
   GRANT SELECT, INSERT, UPDATE, DELETE ON ocbsf_config_server_site2.* TO
   'bsfusr'@'%';
   GRANT CREATE, SELECT, INSERT, UPDATE, DELETE ON ocbsf_commonconfig_site2.*
   TO 'bsfusr'@'%';
   GRANT CREATE, SELECT, INSERT, UPDATE, DELETE ON
   ocbsf_audit_service_site2.* TO 'bsfusr'@'%';
   GRANT SELECT, INSERT, UPDATE, DELETE, CREATE ON ocbsf_nrf_client_site2.*
   TO 'bsfusr'@'%';
   GRANT CREATE, SELECT, INSERT, UPDATE, DELETE ON ocbsf_cmservice_site2.* TO
   'bsfusr'@'%';
   FLUSH PRIVILEGES;
   ```

4. Run the following command to grant NDB_STORED_USER permissions to the Application User:

   ```
   GRANT NDB_STORED_USER ON *.* TO 'bsfusr'@'%';
   ```

5. Run the following command to verify that the privileged or application users have all the required permissions:

   ```
   show grants for username;
   ```

   where `username` is the name of the privileged or application user.

   For example:

   ```
   show grants for bsfprivilegedusr;
   show grants for bsfusr;
   ```

6. Run the following command to flush privileges:

   ```
   FLUSH PRIVILEGES;
   ```

7. Exit from MySQL prompt and SQL nodes.

2.2.1.7 Configuring Kubernetes Secret for Accessing Database

This section explains how to configure Kubernetes secrets for accessing BSF database.

2.2.1.7.1 Creating and Updating Secret for Privileged Database User

This section explains how to create and update Kubernetes secret for Privileged User to access the database.

1. Run the following command to create Kubernetes secret:

   ```
   kubectl create secret generic <Privileged User secret name> --from-
   literal=mysql-username=<Privileged Mysql database username> --from-
   literal=mysql-password=<Privileged Mysql User database password> -n
   <Namespace>
   ```

   Where,

   `<Privileged User secret name>` is the secret name of the Privileged User.

   `<Privileged MySQL database username>` is the username of the Privileged User.

   `<Privileged MySQL User database password>` is the password of the Privileged User.

   `<Namespace>` is the namespace of BSF deployment.

   > **Note**
   >
   > Note down the command used during the creation of Kubernetes secret. This command is used for updating the secrets in future.

   For example:

   ```
   kubectl create secret generic ocbsf-privileged-db-pass --from-
   literal=mysql-username=bsfprivilegedusr --from-literal=mysql-
   password=bsfprivilegedpasswd -n ocbsf
   ```

2. Run the following command to verify the secret created:

   ```
   kubectl describe secret <Privileged User secret name> -n <Namespace>
   ```

   Where,

   `<Privileged User secret name>` is the secret name of the database.

   `<Namespace>` is the namespace of BSF deployment.

For example:

```
kubectl describe secret ocbsf-privileged-db-pass -n ocbsf
```

Sample output:

```
Name:  ocbsf-privileged-db-pass
Namespace:    ocbsf
Labels:       <none>
Annotations:  <none>

Type:  Opaque

Data
====
mysql-password:  10 bytes
mysql-username:  17 bytes
```

3. Update the command used in step 1 with string "`--dry-run -o yaml`" and "`kubectl replace -f - -n <Namespace of BSF deployment>`". After the update is performed, use the following command:

   ```
   kubectl create secret generic <Privileged User secret name> --from-
   literal=dbUsername=<Privileged MySQL database username> --from-
   literal=dbPassword=<Privileged Mysql database password> --dry-run -o yaml -
   n <Namespace> | kubectl replace -f - -n <Namespace>
   ```

   Where,

   `<Privileged User secret name>` is the secret name of the Privileged User.

   `<Privileged MySQL database username>` is the username of the Privileged User.

   `<Privileged MySQL User database passsword>` is the password of the Privileged User.

   `<Namespace>` is the namespace of BSF deployment.

4. Run the updated command. The following message is displayed:
   `secret/<Privileged User secret name> replaced`

   Where,

   `<Privileged User secret name>` is the updated secret name of the Privileged User.

2.2.1.7.2 Creating and Updating Secret for Application Database User

This section explains how to create and update Kubernetes secret for application user to access the database.

1. Run the following command to create Kubernetes secret:

   ```
   kubectl create secret generic <Application User secret name> --from-
   literal=mysql-username=<Application MySQL Database Username> --from-
   literal=mysql-password=<Application MySQL User database password> -n
   <Namespace>
   ```

   Where,

<Application User secret name> is the secret name of the Application User.

<Application MySQL database username> is the username of the Application User.

<Application MySQL User database password> is the password of the Application User.

<Namespace> is the namespace of BSF deployment.

> **Note**
>
> Note down the command used during the creation of Kubernetes secret. This command is used for updating the secrets in future.

For example:

```
kubectl create secret generic ocbsf-db-pass --from-literal=mysql-
username=bsfusr --from-literal=mysql-password=bsfpasswd -n ocbsf
```

2. Run the following command to verify the secret created:

```
kubectl describe secret <Application User secret name> -n <Namespace>
```

Where,

<Application User secret name> is the secret name of the database.

<Namespace> is the namespace of BSF deployment.

For example:

```
kubectl describe secret ocbsf-db-pass -n ocbsf
```

Sample output:

```
Name:  ocbsf-db-pass
Namespace:    ocbsf
Labels:       <none>
Annotations:  <none>

Type:  Opaque

Data
====
mysql-password:  10 bytes
mysql-username:  17 bytes
```

3. Update the command used in step 1 with string "--dry-run -o yaml" and "kubectl replace -f - -n <Namespace of BSF deployment>". After the update is performed, use the following command:

```
kubectl create secret generic <Application User secret name> --from-
literal=dbUsername=<Application MySQL database username> --from-
literal=dbPassword=<Application Mysql database password> --dry-run -o yaml
-n <Namespace> | kubectl replace -f - -n <Namespace>
```

Where,

`<Application User secret name>` is the secret name of the Application User.

`<Application MySQL database username>` is the username of the Application User.

`<Application MySQL User database password>` is the password of the Application User.

`<Namespace>` is the namespace of BSF deployment.

4. Run the updated command. The following message is appears:
   `secret/<Application User secret name> replaced`

   Where,

   `<Application User secret name>` is the updated secret name of the Application User.

2.2.1.7.3 Creating Secret for Support of TLS in Diameter Gateway

This section explains how to create Kubernetes secret to store private key, public key, and trust chain certificates to support TLS in Diameter Gateway.

1. Run the following command to create Kubernetes secret:

   ```
   $ kubectl create secret generic <TLS_SECRET_NAME> --from-
   file=<TLS_RSA_PRIVATE_KEY_FILENAME/TLS_ECDSA_PRIVATE_KEY_FILENAME> --from-
   file=<TLS_CA_BUNDLE_FILENAME> --from-file=<TLS_RSA_CERTIFICATE_FILENAME/
   TLS_ECDSA_CERTIFICATE_FILENAME> -n <Namespace of OCCNP deployment>.
   ```

   For example:

   ```
   kubectl create secret generic dgw-tls-secret --from-file=dgw-key.pem --
   from-file=ca-cert.cer --from-file=dgw-cert.crt -n vega-ns6
   ```

   Where,

   `dgw-key.pem` is the private Key of diam-gateway (either generated by RSA or ECDSA).

   `dgw-cert.crt` is the public Key certificate of diam-gateway (either generated by RSA or ECDSA).

   `ca-cert.cer` is the trust Chain Certificate file, either an Intermediate CA or Root CA.

   `dgw-tls-secret` is the default name of the secret.

2.2.1.8 Configuring Secrets for Enabling HTTPS

This section explains the steps to create and update the Kubernetes secret and enable HTTPS at Ingress Gateway.

This step is optional. It is required only when SSL settings need to be enabled on Ingress Gateway and Egress Gateway microservices of BSF.

2.2.1.8.1 Configuring HTTPS at Ingress Gateway

This section explains the steps to configure secrets for enabling HTTPS in Ingress Gateway. This procedure must be performed before deploying CNC BSF.

> **Note**
>
> The passwords for TrustStore and KeyStore are stored in respective password files mentioned below.

To create Kubernetes secret for HTTPS, following files are required:

- ECDSA private key and CA signed certificate of OCBSF, if initialAlgorithm is ES256
- RSA private key and CA signed certificate of OCBSF, if initialAlgorithm is RS256
- TrustStore password file
- KeyStore password file
- Trust Chain Certificate file, either an Intermediate CA or Root CA,

> **Note**
>
> Creation process for private keys, certificates and passwords is based on discretion of user or operator.

2.2.1.8.1.1 Creating Secrets for Enabling HTTPS in Ingress Gateway

This section provides the steps to create secrets for enabling HTTPS in ingress gateway. Perform this procedure before deploying BSF.

1. Run the following command to create secret:

```
$ kubectl create secret generic <ocingress-secret-name> --from-
file=<ssl_ecdsa_private_key.pem> --from-file=<rsa_private_key_pkcs1.pem> --
from-file=<ssl_truststore.txt> --from-file=<ssl_keystore.txt> --from-
file=<caroot.cer> --from-file=<ssl_rsa_certificate.crt> --from-
file=<ssl_ecdsa_certificate.crt> -n <Namespace of OCBSF deployment>
```

> **Note**
>
> Note down the command used during the creation of the secret. Use the command for updating the secrets in future.

Example: The names used below are same as provided in `ocbsf_custom_values_24.3.0.yaml` in BSF deployment.

```
$ kubectl create secret generic ocingress-secret --from-
file=ssl_ecdsa_private_key.pem --from-file=rsa_private_key_pkcs1.pem --
from-file=ssl_truststore.txt --from-file=ssl_keystore.txt --from-
file=caroot.cer --from-file=ssl_rsa_certificate.crt --from-
file=ssl_ecdsa_certificate.crt -n ocbsf
```

> **Note**
>
> It is recommended to use the same secret name as mentioned in the example. In case you change `<ocingress-secret-name>`, then update the `k8SecretName` parameter under `ingressgateway attributes` section in the `ocbsf_custom_values_24.3.0.yaml` file.

2. Run the following command to verify the secret created:

```
$ kubectl describe secret <ocingress-secret-name> -n <Namespace of OCBSF
deployment>
```

Example:

```
$ kubectl describe secret ocingress-secret -n ocbsf
```

2.2.1.8.1.2 Updating Secrets for Enabling HTTPS in Ingress Gateway

This section explains how to update the secrets.

1. Copy the exact command used in the section during creation of secret.
2. Update the same command with string "--dry-run -o yaml" and "kubectl replace -f - -n <Namespace of OCBSF deployment>".
   The updated command is as follows:

```
$ kubectl create secret generic <ocingress-secret-name> --from-
file=<ssl_ecdsa_private_key.pem> --from-file=<rsa_private_key_pkcs1.pem> --
from-file=<ssl_truststore.txt> --from-file=<ssl_keystore.txt> --from-
file=<caroot.cer> --from-file=<ssl_rsa_certificate.crt> --from-
file=<ssl_ecdsa_certificate.crt> --dry-run -o yaml -n <Namespace of OCBSF
deployment> | kubectl replace -f - -n <Namespace of OCBSF deployment>
```

Example:

```
$ kubectl create secret generic ocingress-secret --from-
file=ssl_ecdsa_private_key.pem --from-file=rsa_private_key_pkcs1.pem --
from-file=ssl_truststore.txt --from-file=ssl_keystore.txt --from-
file=caroot.cer --from-file=ssl_rsa_certificate.crt --from-
file=ssl_ecdsa_certificate.crt --dry-run -o yaml -n ocbsf | kubectl
replace -f - -n ocbsf
```

> **Note**
>
> The names used in the aforementioned command must be as same as the names provided in the ocbsf-24.3.0 `ocbsf_custom_values_24.3.0.yaml` in OCCNP deployment.

3. Run the updated command.
   After the secret update is complete, the following message appears:

```
secret/<ocingress-secret> replaced
```

2.2.1.8.1.3 Enabling HTTPS at Ingress Gateway

This step is optional. It is required only when SSL settings needs to be enabled on Ingress Gateway microservice of OCBSF.

1. Enable `enableIncomingHttps` parameter under `Ingress Gateway Global Parameters` section in the `ocbsf_custom_values_24.3.0.yaml` file. For more information about `enableIncomingHttps` parameter, see under global parameters section of the `ocbsf_custom_values_24.3.0.yaml` file. section.
2. Configure the following details in the `ssl` section under `ingressgateway attributes`, in case you have changed the attributes while creating secret:
   - Kubernetes namespace
   - Kubernetes secret name holding the certificate details
   - Certificate information

```
ingress-gateway:
  # ---- HTTPS Configuration - BEGIN ----
  enableIncomingHttps: false

  service:
    ssl:
      privateKey:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        rsa:
          fileName: rsa_private_key_pkcs1.pem
      certificate:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        rsa:
          fileName: ocegress.cer
      caBundle:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        fileName: caroot.cer
      keyStorePassword:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        fileName: key.txt
      trustStorePassword:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        fileName: trust.txt
```

3. Save the `ocbsf_custom_values_24.3.0.yaml` file.

2.2.1.8.2 Configuring HTTPS at Egress Gateway

This section explains the steps to configure secrets for enabling HTTPS in Egress Gateway. This procedure must be performed before deploying OCBSF.

> **Note**
>
> The passwords for TrustStore and KeyStore are stored in respective password files mentioned below.

To create Kubernetes secret for HTTPS, following files are required:

- ECDSA private key and CA signed certificate of OCBSF, if initialAlgorithm is ES256
- RSA private key and CA signed certificate of OCBSF, if initialAlgorithm is RS256
- TrustStore password file
- KeyStore password file
- Trust Chain Certificate file, either an Intermediate CA or Root CA,

> **Note**
>
> Creation process for private keys, certificates and passwords is based on discretion of user or operator.

2.2.1.8.2.1 Creating Secrets for Enabling HTTPS in Egress Gateway

This section provides information about how to create secret for HTTPS related details. Perform this procedure before enabling HTTPS in OCBSF Egress Gateway.

1. Run the following command to create secret.

```
$ kubectl create secret generic <ocegress-secret-name> --from-
file=<ssl_ecdsa_private_key.pem>  --from-file=<ssl_rsa_private_key.pem> --
from-file=<ssl_truststore.txt> --from-file=<ssl_keystore.txt> --from-
file=<ssl_cabundle.crt> --from-file=<ssl_rsa_certificate.crt> --from-
file=<ssl_ecdsa_certificate.crt> -n <Namespace of OCBSF deployment>
```

> **Note**
>
> Note down the command used during the creation of the secret. Use the command for updating the secrets in future.

Example:

```
$ kubectl create secret generic ocegress-secret --from-
file=ssl_ecdsa_private_key.pem --from-file=ssl_rsa_private_key.pem --from-
file=ssl_truststore.txt --from-file=ssl_keystore.txt --from-
file=ssl_cabundle.crt --from-file=ssl_rsa_certificate.crt --from-
file=ssl_ecdsa_certificate.crt -n ocbsf
```

> **Note**
>
> It is recommended to use the same secret name as mentioned in the example. In case you change `<ocegress-secret-name>`, then update the `k8SecretName` parameter under `egressgateway attributes` section in the `ocbsf_custom_values_24.3.0.yaml` file.

2. Run the following command to verify the secret created:

   ```
   $ kubectl describe secret <ocegress-secret-name> -n <Namespace of OCBSF
   deployment>
   ```

   Example:

   ```
   $ kubectl describe secret ocegress-secret -n ocbsf
   ```

2.2.1.8.2.2 Updating Secrets for Enabling HTTPS in Egress Gateway

This section explains how to update the secret with related details.

1. Copy the exact command used in the section during creation of secret.
2. Update the same command with string "--dry-run -o yaml" and "kubectl replace -f - -n <Namespace of OCBSF deployment>".
   The updated command is as follows:

   ```
   kubectl create secret generic <ocegress-secret-name> --from-
   file=<ssl_ecdsa_private_key.pem> --from-file=<ssl_rsa_private_key.pem> --
   from-file=<ssl_truststore.txt> --from-file=<ssl_keystore.txt> --from-
   file=<ssl_cabundle.crt> --from-file=<ssl_rsa_certificate.crt> --from-
   file=<ssl_ecdsa_certificate.crt> --dry-run -o yaml -n <Namespace of OCBSF
   Egress Gateway secret> | kubectl replace -f - -n <Namespace of OCBSF
   deployment>
   ```

   Example:

   ```
   $ kubectl create secret generic egress-secret --from-
   file=ssl_ecdsa_private_key.pem --from-file=rsa_private_key_pkcs1.pem --
   from-file=ssl_truststore.txt --from-file=ssl_keystore.txt --from-
   file=caroot.cer --from-file=ssl_rsa_certificate.crt --from-
   file=ssl_ecdsa_certificate.crt --dry-run -o yaml -n ocbsf | kubectl
   replace -f - -n ocbsf
   ```

   > **Note**
   >
   > The names used in the aforementioned command must be as same as the names provided in the `ocbsf_custom_values_24.3.0.yaml` in OCBSF deployment.

3. Run the updated command.
   After the secret update is complete, the following message appears:

   ```
   secret/<ocingress-secret> replaced
   ```

2.2.1.8.2.3 Enabling HTTPS at Egress Gateway

This step is optional. It is required only when SSL settings needs to be enabled on Egress Gateway microservice of OCBSF.

1. Enable `enableOutgoingHttps` parameter under `egressgateway attributes` section in the `ocbsf_custom_values_24.3.0.yaml` file. For more information about `enableOutgoingHttps` parameter, see the Egress Gateway section.
2. Configure the following details in the `ssl` section under `egressgateway attributes`, in case you have changed the attributes while creating secret:
   - Kubernetes namespace
   - Kubernetes secret name holding the certificate details
   - Certificate information

```
egress-gateway:
  #Enabling it for egress https requests
  enableOutgoingHttps: false

  service:
    ssl:
      privateKey:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        rsa:
          fileName: rsa_private_key_pkcs1.pem
        ecdsa:
          fileName: ssl_ecdsa_private_key.pem
      certificate:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        rsa:
          fileName: ocegress.cer
        ecdsa:
          fileName: ssl_ecdsa_certificate.crt
      caBundle:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        fileName: caroot.cer
      keyStorePassword:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        fileName: key.txt
      trustStorePassword:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        fileName: trust.txt
```

3. Save the `ocbsf_custom_values_24.3.0.yaml` file.

2.2.1.9 Configuring Secret for Enabling Access Token Validation

This section explains how to configure a secret for enabling access token service.

2.2.1.9.1 Generating KeyPairs for NRF Instances

> **Important**
>
> It is at the user's discretion to create the private keys and certificates, and it is not in the scope of BSF. This section lists only samples to create KeyPairs.

Using the Openssl tool, you can generate KeyPairs for each of the NRF instances. The commands to generate the KeyPairs are as follows:

> **Note**
>
> Here, it is assumed that there are only two NRF instances with the the following instance IDs:
>
> - NRF Instance 1: 664b344e-7429-4c8f-a5d2-e7dfaaaba407
> - NRF Instance 2: 601aed2c-e314-46a7-a3e6-f18ca02faacc

Example Command to generate KeyPair for NRF Instance 1

```
Generate a 2048-bit RSA private key

openssl genrsa -out private_key.pem 2048
Convert private Key to PKCS#8 format (so Java can read it)

openssl pkcs8 -topk8 -inform PEM -outform PEM -in private_key.pem -out
private_key_pkcs.der -nocrypt
Output public key portion in PEM format (so Java can read it)

openssl rsa -in private_key.pem -pubout -outform PEM -out public_key.pem

Create reqs.conf and place the required content for NRF certificate
[req]
distinguished_name = req_distinguished_name
req_extensions = v3_req
prompt = no
[req_distinguished_name]
C = IN
ST = BLR
L = TempleTerrace
O = Personal
CN = nnrf-001.tmtrflaa.5gc.tmp.com
[v3_req]
basicConstraints = CA:FALSE
keyUsage = digitalSignature, dataEncipherment
subjectAltName = DNS:nnrf-001.tmtrflaa.5gc.tmp.com
#subjectAltName = URI:UUID:6faf1bbc-6e4a-4454-a507-a14ef8e1bc5c
#subjectAltName = otherName:UTF8:NRF

Output ECSDA private key portion in PEM format and corresponding NRF
certificate in {nrfInstanceId}_ES256.crt file
```

```
openssl req -x509 -new -out {nrfInstanceId}_ES256.crt -newkey ec:<(openssl
ecparam -name secp521r1) -nodes -sha256 -keyout ecdsa_private_key.key -config
reqs.conf

#Replace the place holder "{nrfInstanceId}" with NRF Instance 1's UUID while
running the command.
Example below
openssl req -x509 -new -out 664b344e-7429-4c8f-a5d2-e7dfaaaba407_ES256.crt -
newkey ec:<(openssl ecparam -name secp521r1) -nodes -sha256 -keyout
ecdsa_private_key.key -config reqs.conf
```

The output is a set of Private Key and NRF Certificate similar to the following:

NRF1 (Private key: ecdsa_private_key.key, NRF Public Certificate: 664b344e-7429-4c8f-a5d2-e7dfaaaba407_ES256.crt)

Example Command to generate KeyPair for NRF Instance 2

```
Generate a 2048-bit RSA private key

openssl genrsa -out private_key.pem 2048
Convert private Key to PKCS#8 format (so Java can read it)

openssl pkcs8 -topk8 -inform PEM -outform PEM -in private_key.pem -out
private_key_pkcs.der -nocrypt
Output public key portion in PEM format (so Java can read it)

openssl rsa -in private_key.pem -pubout -outform PEM -out public_key.pem

Create reqs.conf and place the required content for NRF certificate
[req]
distinguished_name = req_distinguished_name
req_extensions = v3_req
prompt = no
[req_distinguished_name]
C = IN
ST = BLR
L = TempleTerrace
O = Personal
CN = nnrf-001.tmtrflaa.5gc.tmp.com
[v3_req]
basicConstraints = CA:FALSE
keyUsage = digitalSignature, dataEncipherment
subjectAltName = DNS:nnrf-001.tmtrflaa.5gc.tmp.com
#subjectAltName = URI:UUID:6faf1bbc-6e4a-4454-a507-a14ef8e1bc5c
#subjectAltName = otherName:UTF8:NRF

Output ECSDA private key portion in PEM format and corresponding NRF
certificate in {nrfInstanceId}_ES256.crt file

openssl req -x509 -new -out {nrfInstanceId}_ES256.crt -newkey ec:<(openssl
ecparam -name prime256v1) -nodes -sha256 -keyout ecdsa_private_key.key -
config reqs.conf

#Replace the place holder "{nrfInstanceId}" with NRF Instance 2's UUID while
```

```
running the command.
Example below
openssl req -x509 -new -out 601aed2c-e314-46a7-a3e6-f18ca02faacc_ES256.crt -
newkey ec:<(openssl ecparam -name prime256v1) -nodes -sha256 -keyout
ecdsa_private_key.key -config reqs.conf
```

The output is a set of Private Key and NRF Certificate similar to the following:

NRF2 (Private key: ecdsa_private_key.key, PublicCerificate: 601aed2c-e314-46a7-a3e6-f18ca02faacc_ES256.crt)

2.2.1.9.2 Enabling and Configuring Access Token

Enabling and Configuring Access Token

To enable access token validation, configure both Helm-based and REST-based configurations on Ingress Gateway.

Configuration using Helm:

For Helm-based configuration, perform the following steps:

1. Create a Namespace for Secrets. The namespace is used as an input to create Kubernetes secret for private keys and public certificates. Create a namespace using the following command:

   ```
   kubectl create namespace <required namespace>
   ```

   Where,

   <required namespace> is the name of the namespace.

   For example, the following command creates the namespace, `ocbsf`:

   ```
   kubectl create namespace ocbsf
   ```

2. Create Kubernetes Secret for NRF Public Key. To create a secret using the Public keys of the NRF instances, run the following command:

   ```
   kubectl create secret generic <secret-name> --from-file=<filename.crt> -n
   <Namespace>
   ```

   Where,

   <secret-name> is the secret name.

   <Namespace> is the BSF namespace.

   <filename.crt> is the public key certificate and we can have any number of certificates in the secret.

   For example:

   ```
   kubectl create secret generic nrfpublickeysecret --from-file=./
   664b344e-7429-4c8fa5d2-e7dfaaaba407_ES256.crt --from-file=./601aed2c-
   e314-46a7-a3e6-f18ca02faacc_ES256.crt -n ocbsf
   ```

> **Note**
>
> In the above command:
>
> - `nrfpublickeysecret` is the secret name
> - `ocbsf` is the namespace
> - `.crt` files is the public key certificates

3. Enable Access token using Helm Configuration by setting the Ingress Gateway parameter `oauthValidatorEnabled` parameter value to `true`.
   Further, configure the secret and namespace on Ingress Gateway in the OAUTH CONFIGURATION section of the custom-value.yaml file.

   The following is a sample Helm configuration. For more information on parameters and their supported values, see OAUTH Configuration.

```
# ----OAUTH CONFIGURATION - BEGIN ----
oauthValidatorEnabled: true
nfInstanceId: 6faf1bbc-6e4a-4454-a507-a14ef8e1bc11
allowedClockSkewSeconds: 0
nrfPublicKeyKubeSecret: 'nrfpublickeysecret' //SECRET NAME
nrfPublicKeyKubeNamespace: 'osbsf'           //NAME SPACE of BSF
validationType: strict
producerPlmnMNC: 123
producerPlmnMCC: 456
nfType: BSF
```

Configuration using REST API:

After Helm configuration, send the REST requests to Ingress Gateway to use configured public key certificates. Using REST-based configuration, you can distinguish between the certificates configured on different NRFs and can use these certificates to validate the token received from a specific NRF.

Following are the 3 types of OAuth Validation Mode:

- INSTANCEID_ONLY **(Default)**: Ingress Gateway validates access token based on public keys indexed with NRF Instance ID in the issuer field.
- KID_ONLY: Ingress Gateway validates access token based on public keys indexed with key-id only.
- KID_PREFERRED: Ingress Gateway validates access token based on public keys indexed with Key-ID. If Key-ID is not FOUND in Access token, Ingress Gateway attempts token validation using public keys indexed with NRF instance ID in the issuer field.

Table 2-8 Configuring oauth Validator

URI	Operation
/{nfType}/nf-common-component/v1/{serviceName}/oauthvalidatorconfiguration For example: http://10.75.152.236:8000/bsf/nf-common-component/v1/igw/oAuthValidatorConfiguration	PUT

Sample JSON:

```
"oAuthValidatorConfiguration": {
   "type": "object",
   "description": "Validator configurations for oAuth",
   "properties": {
      "keyIdList": {
         "type": ["array","null"],
         "uniqueItems": true,
         "maxItems": 150,
         "description": "Array containing KID based configuration",
         "items": {
            "anyOf": [
               {
                  "type": "object",
                  "properties": {
                     "keyId":{"type": "string",  "minLength": 1, "maxLength":
36,"pattern": "[a-zA-Z0-9]"},
                     "kSecretName": {"type": "string"},
                     "certName": {"type": "string"},
                     "certAlgorithm": {"type": "string"}
                  },
                  "required": [
                     "keyId",
                     "kSecretName",
                     "certName",
                     "certAlgorithm"
             ]
               }
            ]
         }
      },
      "instanceIdList": {
         "type": ["array","null"],
         "uniqueItems": true,
         "maxItems": 150,
         "description": "Array containing Instance Id based configuration",
         "items": {
```

```
            "anyOf": [
               {
                  "type": "object",
                  "properties": {
                     "instanceId": {"type": "string"},
                     "kSecretName": {"type": "string"},
                     "certName": {"type": "string"},
                     "certAlgorithm": {"type": "string"}
                  },
                  "required": [
                     "instanceId",
                     "kSecretName",
                     "certName",
                     "certAlgorithm"
            ]
               }
            ]
         }
      },
      "oauthValidationMode": {
         "type": "string",
         "enum": [
            "KID_ONLY",
            "INSTANCEID_ONLY",
            "KID_PREFERRED"
      ],
         "description": "Mode of validation"
        }
    }
}
```

Validating OAuth Token

The following Curl command sends a request to create PCF Bindings with valid oAuth header:

```
curl -X POST --http2-prior-knowledge -i "http://10.75.233.75:32564/nbsf-
management/v1/pcfBindings" -H "Content-Type: application/json" -H
Authorization:'Bearer
eyJ0eXAiOiJKV1QiLCJraWQiOiI2MDFhZWQyYy1lMzE0LTQ2YTctYTNlNi1mMThjYTAyZmFheHgiLC
JhbGciOiJFUzI1NiJ9.eyJpc3MiOiI2NjRiMzQ0ZS03NDI5LTRjOGYtYTVkMi1lN2RmYWFhYmE0MDc
iLCJzdWIiOiJmZTdkOTkyYi0wNTQxLTRjN2QtYWI4NC1jNmQ3MGIxYjAxYjEiLCJhdWQiOiJTTUYiL
CJzY29wZSI6Im5zbWYtcGR1c2Vzc2lvbiIsImV4cCI6MTYxNzM1NzkzN30.oGAYtR3FnD33xOCmtUP
KBEA5RMTNvkfDqaK46ZEnnZvgN5Cyfgvlr85Zzdpo2lNISADBgDumD_m5xHJF8baNJQ'-d '{
  "supi": "imsi-310410000000015",
  "gpsi": "5084943708",
  "ipv4Addr": "10.10.10.10",
  "dnn": "internet",
  "pcfFqdn": "pcf-smservice.oracle.com",
  "pcfDiamHost": "pcf-smservice.oracle.com",
  "pcfDiamRealm": "oracle.com",
  "snssai": {
    "sst": 11,
    "sd": "abc123"
  }
}
```

2.2.1.10 Configuring BSF to Support Aspen Service Mesh

BSF leverages the Platform Service Mesh (for example, Aspen Service Mesh) for all internal and external Transport Layer Security (TLS) communication. The service mesh integration provides inter-NF communication and allows API gateway co-working with service mesh. The servicemesh integration supports the services by deploying a special sidecar proxy in each pod to intercept all network communications between microservices.

Supported ASM version: 1.11.x and 1.14.x

For ASM installation and configuration, see official Aspen Service Mesh website for details.

The Aspen Service Mesh (ASM) configurations are classified into:

- **Control Plane:** It involves adding labels or annotations to inject a sidecar.
- **Data Plane:** It helps in traffic management such as handling NF call flows by adding Service Entries (SE), Destination Rules (DR), Envoy Filters (EF) and other resource changes such as API version changes between versions. Data plane configuration is done manually depending on each NF requirement and ASM deployment.

Data Plane Configuration

The Data Plane configuration consists of the following Custom Resource Definitions (CRDs):

- Service Entry (SE)
- Destination Rule (DR)
- Envoy Filter (EF)
- Peer Authentication (PA)
- Authorization Policy (AP)
- Virtual Service (VS)
- requestAuthentication

> **Note**
>
> Use Helm charts to add or delete CRDs that you may require due to ASM upgrades to configure features across different releases.

The Data Plane configuration is applicable in the following scenarios:

- **NF to NF Communication:** During NF to NF communication where sidecar is injected on both NFs, you need SE and DR to communicate with the other NF, otherwise sidecar rejects the communication. All Egress communications of NFs must have an entry for SE and DR and the same needs to be configured.

> **Note**
>
> For out of cluster communication, you must configure the core DNS with the producer NF endpoint to enable access.

- **Kube-api-server:** For Kube-api-server, a few NF flows may require access to the Kubernetes API server. The ASM proxy (mTLS enabled) may block this. As per the F5 recommendation, the NF requires to add SE for Kubernetes API server in its namespace.
- **Envoy Filters:** When Sidecars rewrite the header value with its default value, the headers from back-end services are lost. To overcome this situation, Envoy Filters help in passing the headers from back-end services to use it as is.

ASM Configuration File

A sample `ocbsf_custom_values_servicemesh_config_24.3.0.yaml` is available in `Custom_Templates` folder. For downloading the file, see Customizing BSF.

2.2.1.10.1 Predeployment configurations

This section explains the pre-deployment configuration procedure to install Cloud Native Core Binding Support Function (BSF) with ASM support.

Step 1 - Creating BSF Namespace

Create a namespace and apply istio injection to it by using the following command:

```
kubectl label --overwrite namespace <required namespace> istio-
injection=enabled
```

Example

```
kubectl label --overwrite namespace ocbsf istio-injection=enabled
```

Step 2 - The Operator should have special capabilities at service account level to start pre-install init container.

Example of some special capabilities:

```
readOnlyRootFilesystem: false
  allowPrivilegeEscalation: true
  allowedCapabilities:
  - NET_ADMIN
  - NET_RAW
  runAsUser:
    rule: RunAsAny
```

2.2.1.10.2 Deploying BSF With ASM

Customize the `ocbsf-24.3.0-custom-values-servicemesh-config.yaml` file

To customize the `ocbsf_custom_values_servicemesh_config_24.3.0.yaml` file, uncomment and modify the parameters as per your requirements.

A sample `ocbsf_custom_values_servicemesh_config_24.3.0.yaml` is available in Custom_Templates file. For downloading the file, see Customizing BSF.

> **Note**
>
> When BSF is deployed with ASM and cnDBTier is also installed in the same namespace or cluster, then you can skip installing service entries and destination rules.

To update **Service Entries**, make the required changes using the following sample template:

```
#serviceEntries:
#  - hosts: |-
#      [ "mysql-connectivity-service.<cndbtiernamespace>.svc.<clustername>" ]
#    exportTo: |-
#      [ "." ]
#    location: MESH_EXTERNAL
#    ports:
#    - number: 3306
#      name: mysql
#      protocol: MySQL
#    name: ocbsf-to-mysql-external-se-test
#  - hosts: |-
#      [ "*.cluster-bsfnrf" ]
#    exportTo: |-
#      [ "." ]
#    location: MESH_EXTERNAL
#    ports:
#    - number: 8090
#      name: http2-8090
#      protocol: TCP
#    - number: 80
#      name: HTTP2-80
#      protocol: TCP
#    name: ocbsf-to-other-nf-se-test
#  - hosts: |-
#      [ "kubernetes.default.svc.<clustername>" ]
#    exportTo: |-
#      [ "." ]
#    location: MESH_INTERNAL
#    addresses: |-
#      [ "192.168.200.36" ]
#    ports:
#    - number: 443
#      name: https
#      protocol: HTTPS
#    name: nf-to-kube-api-server
```

To customize **Destination Rule**, make the required changes using the following sample template:

```
# destinationRules:
#  - host: "*.<clustername>"
#    mode: DISABLE
#    name: ocbsf-to-other-nf-dr-test
#    sbitimers: true
```

```
#    tcpConnectTimeout: "750ms"
#    tcpKeepAliveProbes: 3
#    tcpKeepAliveTime: "1500ms"
#    tcpKeepAliveInterval: "1s"
#  - host: mysql-connectivity-service.<cnDBTiernamespace>.svc.cluster.local
#    mode: DISABLE
#    name: mysql-occne
#    sbitimers: false
```

For customizing **envoyFilters** according to the Istio version installed on the Bastion server, use any of the following templates:

For Istio version 1.11.x and 1.14.x

```
#envoyFilters_v_19x_111x:
# - name: set-xfcc-bsf
#   labelselector: "app.kubernetes.io/instance: ocbsf"
#   applyTo: NETWORK_FILTER
#   filtername: envoy.filters.network.http_connection_manager
#   operation: MERGE
#   typeconfig: type.googleapis.com/
envoy.extensions.filters.network.http_connection_manager.v3.HttpConnectionMana
ger
#   configkey: forward_client_cert_details
#   configvalue: ALWAYS_FORWARD_ONLY
# - name: serverheaderfilter
#   labelselector: "app.kubernetes.io/instance: ocbsf"
#   applyTo: NETWORK_FILTER
#   filtername: envoy.filters.network.http_connection_manager
#   operation: MERGE
#   typeconfig: type.googleapis.com/
envoy.extensions.filters.network.http_connection_manager.v3.HttpConnectionMana
ger
#   configkey: server_header_transformation
#   configvalue: PASS_THROUGH
# - name: custom-http-stream
#   labelselector: "app.kubernetes.io/instance: ocbsf"
#   applyTo: NETWORK_FILTER
#   filtername: envoy.filters.network.http_connection_manager
#   operation: MERGE
#   typeconfig: type.googleapis.com/
envoy.extensions.filters.network.http_connection_manager.v3.HttpConnectionMana
ger
#   configkey: server_header_transformation
#   configvalue: PASS_THROUGH
#   stream_idle_timeout: "6000ms"
#   max_stream_duration: "7000ms"
#   patchContext: SIDECAR_OUTBOUND
#   networkFilter_listener_port: 8000
# - name: custom-tcpsocket-timeout
#   labelselector: "app.kubernetes.io/instance: ocbsf"
#   applyTo: FILTER_CHAIN
#   patchContext: SIDECAR_INBOUND
#   operation: MERGE
#   transport_socket_connect_timeout: "750ms"
```

```
#   filterChain_listener_port: 8000
# - name: custom-http-route
#   labelselector: "app.kubernetes.io/instance: ocbsf"
#   applyTo: HTTP_ROUTE
#   patchContext: SIDECAR_OUTBOUND
#   operation: MERGE
#   route_idle_timeout: "6000ms"
#   route_max_stream_duration: "7000ms"
#   httpRoute_routeConfiguration_port: 8000
#   vhostname: "bsf-ocbsf-policy-ds.ocbsf.svc.cluster:8000"
```

For Istio version 1.11.x and 1.14.x

> **Note**
>
> Istio 1.11.x and 1.14.x support the same template for **envoyFilters** configurations.

```
envoyFilters_v_19x_111x:
  - name: xfccfilter
    labelselector: "app.kubernetes.io/instance: ocbsf"
    configpatch:
      - applyTo: NETWORK_FILTER
        filtername: envoy.filters.network.http_connection_manager
        operation: MERGE
        typeconfig: type.googleapis.com/
envoy.extensions.filters.network.http_connection_manager.v3.HttpConnectionMana
ger
        configkey: forward_client_cert_details
        configvalue: ALWAYS_FORWARD_ONLY
  - name: serverheaderfilter
    labelselector: "app.kubernetes.io/instance: ocbsf"
    configpatch:
      - applyTo: NETWORK_FILTER
        filtername: envoy.filters.network.http_connection_manager
        operation: MERGE
        typeconfig: type.googleapis.com/
envoy.extensions.filters.network.http_connection_manager.v3.HttpConnectionMana
ger
        configkey: server_header_transformation
        configvalue: PASS_THROUGH
  - name: custom-http-stream
    labelselector: "app.kubernetes.io/instance: ocbsf"
    configpatch:
      - applyTo: NETWORK_FILTER
        filtername: envoy.filters.network.http_connection_manager
        operation: MERGE
        typeconfig: type.googleapis.com/
envoy.extensions.filters.network.http_connection_manager.v3.HttpConnectionMana
ger
        configkey: server_header_transformation
        configvalue: PASS_THROUGH
        stream_idle_timeout: "6000ms"
```

```
        max_stream_duration: "7000ms"
        patchContext: SIDECAR_OUTBOUND
        networkFilter_listener_port: 8000
  - name: custom-tcpsocket-timeout
    labelselector: "app.kubernetes.io/instance: ocbsf"
    configpatch:
      - applyTo: FILTER_CHAIN
        patchContext: SIDECAR_INBOUND
        operation: MERGE
        transport_socket_connect_timeout: "750ms"
        filterChain_listener_port: 8000
  - name: custom-http-route
    labelselector: "app.kubernetes.io/instance: ocbsf"
    configpatch:
      - applyTo: HTTP_ROUTE
        patchContext: SIDECAR_OUTBOUND
        operation: MERGE
        route_idle_timeout: "6000ms"
        route_max_stream_duration: "7000ms"
        httpRoute_routeConfiguration_port: 8000
        vhostname: "ocbsf.svc.cluster:8000"
  - name: logicaldnscluster
    labelselector: "app.kubernetes.io/instance: ocbsf"
    configpatch:
      - applyTo: CLUSTER
        clusterservice: rchltxekvzwcamf-y-ec-
x-002.amf.5gc.mnc480.mcc311.3gppnetwork.org
        operation: MERGE
        logicaldns: LOGICAL_DNS
      - applyTo: CLUSTER
        clusterservice: rchltxekvzwcamd-y-ec-
x-002.amf.5gc.mnc480.mcc311.3gppnetwork.org
        operation: MERGE
        logicaldns: LOGICAL_DNS
```

> **Note**
>
> The parameter *vhostname* is mandatory when *applyTo* is **HTTP_ROUTE**.

> **Note**
>
> Depending on the Istio version, update the correct value of envoy filters in the following line:
>
> ```
> {{- range .Values.envoyFilters_v_19x_111x }}
> ```

For customizing **PeerAuthentication**, make the required changes using the following sample template:

```
#peerAuthentication:
#   - name: default
```

```
#     tlsmode: PERMISSIVE
#   - name: cm-service
#     labelselector: "app.kubernetes.io/name: cm-service"
#     tlsmode: PERMISSIVE
#   - name: ingress
#     labelselector: "app.kubernetes.io/name: ocbsf-ingress-gateway"
#     tlsmode: PERMISSIVE
#   - name: diam-gw
#     labelselector: "app.kubernetes.io/name: diam-gateway"
#     tlsmode: PERMISSIVE
```

Istio **Authorization Policy** enables access control on workloads in the mesh. Authorization policy supports CUSTOM, DENY and ALLOW actions for access control. When CUSTOM, DENY and ALLOW actions are used for a workload at the same time, the CUSTOM action is evaluated first, then the DENY action, and finally the ALLOW action.

For more details on Istio Authorization Policy, see Istio / Authorization Policy.

To customize the Authorization Policy, make the required changes using the following sample template:

```
#authorizationPolicies:
#- name: allow-all-provisioning-on-ingressgateway-ap
#  labelselector: "app.kubernetes.io/name: ingressgateway"
#  action: "ALLOW"
#  hosts:
#    - "*"
#  paths:
#    - "/nudr-dr-prov/*"
#    - "/nudr-dr-mgm/*"
#    - "/nudr-group-id-map-prov/*"
#    - "/slf-group-prov/*"
#- name: allow-all-sbi-on-ingressgateway-ap
#  labelselector: "app.kubernetes.io/name: ingressgateway"
#  action: "ALLOW"
#  hosts:
#    - "*"
# paths:
#   - "/nbsf-policyauthorization/*"
# xfccvalues:
#   - "*DNS=nrf1.site1.com"
#   - "*DNS=nrf2.site2.com"
#   - "*DNS=scp1.site1.com"
#   - "*DNS=scp1.site2.com"
#   - "*DNS=scp1.site3.com
```

VirtualService is required to configure the retry attempts for the destination host. For instance, for error response code value 503, the default behaviour of Istio is to retry two times. However, if the user wants to configure the number of retry attempts, then it can be done using `virtualService`.

In the following example, the number of retry attempts are set to 0:

```
#virtualService:
#  - name: scp1site1vs
#    host: “scp1.site1.com”
```

```
#    destinationhost: “scp1.site1.com”
#    port: 8000
#    exportTo: |-
#      [ "." ]
#    attempts: "0"
#    timeout: 7s
#  - name: scp1site2vs
#    host: “scp1.site2.com”
#    destinationhost: “scp1.site2.com”
#    port: 8000
#    exportTo: |-
#      [ "." ]
#    retryon: 5xx
#    attempts: "1"
#    timeout: 7s
```

`where, host or destination name uses the format - <release_name>-<egress_svc_name>`

To get the <egress_svc_name>, run the following command:

```
kubectl get svc -n <namespace>
```

> **Note**
>
> For 5xx response codes, set the value of retry attempts to 1.

Request Authentication is used to configure JWT tokens for Oauth validation. Network functions need to authenticate the OAuth token sent by consumer network functions by using the Public key of the NRF signing certificate and using service mesh to authenticate the token. Using the following sample format, users can configure **requestAuthentication** as per their system requirements:

```
requestAuthentication:
#  - name: jwttokenwithjson
#    labelselector: httpbin
#    issuer: "jwtissue"
#    jwks: |-
#     '{
#       "keys": [{
#       "kid": "1",
#       "kty": "EC",
#       "crv": "P-256",
#       "x": "Qrl5t1-Apuj8uRI2o_BP9loqvaBnyM4OPTPAD_peDe4",
#       "y": "Y7vNMKGNAtlteMV-KJIaG-0UlCVRGFHtUVI8ZoXIzRY"
#      }]
#     }'
#  - name: jwttoken
#    labelselector: httpbin
#    issuer: "jwtissue"
#    jwksUri: https://example.com/.well-known/jwks.json
```

> **Note**
>
> For requestAuthetication, use either `jwks` or `jwksUri`.

Run the following command to create the Custom Resource Definitions (CRDs):

```
helm install ocbsf-servicemesh-config ocbsf-servicemesh-config-24.3.0.tgz  -n
ocbsf -f ocbsf_custom_values_servicemesh_config_24.3.0.yaml
```

2.2.1.10.3 Post-deployment Configurations

To verify if the CDRs have been created, run the following command::

```
kubectl get
se,dr,peerauthentication,envoyfilter,vs,authorizationpolicy,requestauthenticat
ion -n ocbsf
```

The following is a sample output:

```
NAME
HOSTS                                              LOCATION
RESOLUTION   AGE
serviceentry.networking.istio.io/nf-to-kube-api-server
["kubernetes.default.svc.vega"]                    MESH_INTERNAL
NONE         17h
serviceentry.networking.istio.io/vega-ns1a-to-mysql-external-se-test
["mysql-connectivity-service.vega-ns1.svc.vega"]   MESH_EXTERNAL
NONE         17h
serviceentry.networking.istio.io/vega-ns1a-to-other-nf-se-test
["*.vega"]                                         MESH_EXTERNAL
NONE
17hNAME
HOST                                                    AGE
destinationrule.networking.istio.io/jaeger-dr                       occne-
tracer-jaeger-query.occne-infra                    17h
destinationrule.networking.istio.io/mysql-occne                     mysql-
connectivity-service.vega-ns1.svc.cluster.local   17h
destinationrule.networking.istio.io/prometheus-dr                   occne-
prometheus-server.occne-infra                      17h
destinationrule.networking.istio.io/vega-ns1a-to-other-nf-dr-test
*.vega
17hNAME                                                 MODE         AGE
peerauthentication.security.istio.io/cm-service     PERMISSIVE   17h
peerauthentication.security.istio.io/default        PERMISSIVE   17h
peerauthentication.security.istio.io/diam-gw        PERMISSIVE   17h
peerauthentication.security.istio.io/ingress        PERMISSIVE   17h
peerauthentication.security.istio.io/ocats-policy   PERMISSIVE
17hNAME                                                        AGE
envoyfilter.networking.istio.io/ocats-policy-xfcc           17h
envoyfilter.networking.istio.io/serverheaderfilter          17h
envoyfilter.networking.istio.io/serverheaderfilter-nf1stub  17h
envoyfilter.networking.istio.io/serverheaderfilter-nf2stub  17h
envoyfilter.networking.istio.io/set-xfcc-bsf
```

```
17hNAME                                                    GATEWAYS
HOSTS                                    AGE
virtualservice.networking.istio.io/nrfvirtual1             ["vega-ns1a-occnp-
egress-gateway"]   17h
[cloud-user@vega-bastion-1 ~]$
```

Then, perform the steps described in Installing BSF Package.

2.2.1.10.4 Deleting Service Mesh

This section describes the steps to delete Aspen Service Mesh (ASM) for ASM based BSF.

1. Disable ASM.

   ```
   kubectl label --overwrite <namespace> ocbsf istio-injection=disabled
   ```

   where,

   `namespace-name` is the deployment namespace used by helm command.

2. Delete all the pods in the namespace.

   ```
   kubectl delete pods --all -n <namespace>
   ```

3. Delete ASM.

   ```
   helm delete <helm-release-name> -n <namespace-name>
   ```

   where, `helm-release-name` is the release name used by the `helm install` command. This release name must be the same as the release name used for ServiceMesh.

   `namespace-name` is the deployment namespace used by helm command.

   Example:

   ```
   helm delete ocbsf-servicemesh-config -n ocbsf
   ```

4. Verify ASM deletion.

   ```
   kubectl get se,dr,peerauthentication,envoyfilter,vs -n ocbsf
   ```

2.2.1.11 Configuring Network Policies

Network Policies allow you to define ingress or egress rules based on Kubernetes resources such as Pod, Namespace, IP, and Port. These rules are selected based on Kubernetes labels in the application. These Network Policies enforce access restrictions for all the applicable data flows except communication from Kubernetes node to pod for invoking container probe.

> **Note**
>
> Configuring Network Policy is optional. Based on the security requirements, Network Policy can be configured.

For more information on Network Policies, see https://kubernetes.io/docs/concepts/services-networking/network-policies/.

> **Note**
>
> - If the traffic is blocked or unblocked between the pods even after applying Network Policies, check if any existing policy is impacting the same pod or set of pods that might alter the overall cumulative behavior.
> - If changing default ports of services such as Prometheus, Database, Jaegar, or if Ingress or Egress Gateway names is overridden, update them in the corresponding Network Policies.

Configuring Network Policies

Network Policies support Container Network Interface (CNI) plugins for cluster networking.

> **Note**
>
> For any deployment with CNI, it must be ensured that Network Policy is supported.

Following are the various operations that can be performed for Network Policies:

2.2.1.11.1 Installing Network Policies

Prerequisite

Network Policies are implemented by using the network plug-in. To use Network Policies, you must be using a networking solution that supports Network Policy.

> **Note**
>
> For a fresh installation, it is recommended to install Network Policies before installing BSF. However, if BSF is already installed, you can still install the Network Policies.

To install Network Policies:

1. Open the `ocbsf-network-policy-custom-values.yaml` file provided in the release package zip file.
   For downloading the file, see Downloading BSF package and Pushing the Images to Customer Docker Registry
2. The file is provided with the default Network Policies. If required, update the `ocbsf-network-policy-custom-values.yaml` file. For more information on the parameters, see Configuration Parameters for Network Policies.

Note

- To run ATS, uncomment the following policies from `ocbsf-network-policy-custom-values.yaml`:
  - allow-egress-for-ats
  - allow-ingress-to-ats
  - allow-egress-to-ats-pods-from-bsf-pods
  - allow-ingress-from-ats-pods-to-bsf-pods
- To connect with CNC Console, update the following parameter in the allow-ingress-from-console Network Policy in the `ocbsf-network-policy-custom-values.yaml`:

  ```
  kubernetes.io/metadata.name: <namespace in which CNCC is deployed>
  ```

- In `allow-ingress-prometheus` policy, `kubernetes.io/metadata.name` parameter must contain the value for the namespace where Prometheus is deployed, and `app.kubernetes.io/name` parameter value should match the label from Prometheus pod.

3. Run the following command to install the Network Policies:

   ```
   helm install <helm-release-name> ocbsf-network-policy/ -n <namespace> -f
       <custom-value-file>
   ```

   where:

   - <helm-release-name> is the ocbsf-network-policy Helm release name.
   - <yaml-file> is the ocbsf-network-policy-custom-value file.
   - <namespace> is the OCBSF namespace.

   For example:

   ```
   helm install ocbsf-network-policy ocbsf-network-policy/ -n ocbsf
         -f ocbsf-network-policy-custom-values.yaml
   ```

Note

- Connections that were created before installing Network Policy and still persist are not impacted by the new Network Policy. Only the new connections would be impacted.
- If you are using ATS suite along with Network Policies, it is required to install the BSF and ATS in the same namespace.
- It is highly recommended to run ATS after deploying Network Policies to detect any missing/invalid rule that can impact signaling flows.

2.2.1.11.2 Upgrading Network Policies

To add, delete, or update Network Policies:

1. Modify the `ocbsf-network-policy-custom-values.yaml` file to update, add, or delete the Network Policy.
2. Run the following command to upgrade the Network Policies:

   ```
   helm upgrade <helm-release-name> network-policy/ -n <namespace> -f
       <custom-value-file>
   ```

   where:

   - <helm-release-name> is the ocbsf-network-policy helm release name.
   - <yaml-file> is the ocbsf-network-policy-custom-value file.
   - <namespace> is the OCBSF namespace.

   For example:

   ```
   helm upgrade ocbsf-network-policy ocbsf-network-policy/ -n ocbsf
         -f ocbsf-network-policy-custom-values.yaml
   ```

2.2.1.11.3 Verifying Network Policies

Run the following command to verify if the Network Policies are deployed successfully:

```
kubectl get <helm-release-name> -n <namespace>
```

For example:

```
kubectl get ocbsf-network-policy -n ocbsf
```

Where,

- helm-release-name: ocbsf-network-policy Helm release name.
- namespace: CNC Console namespace.

2.2.1.11.4 Uninstalling Network Policies

Run the following command to uninstall network policies:

```
helm uninstall <helm-release-name> -n <namespace>
```

For example:

```
helm uninstall ocbsf-network-policy -n ocbsf
```

> **Note**
>
> While using the debug container, it is recommended to uninstall the network policies or update them as required to establish the connections.

2.2.1.11.5 Configuration Parameters for Network Policies

Table 2-9 Supported Kubernetes Resource for Configuring Network Policies

Parameter	Description	Details
apiVersion	This is a mandatory parameter. Specifies the Kubernetes version for access control. **Note**: This is the supported api version for network policy. This is a read-only parameter.	**Data Type**: string **Default Value**: `networking.k8s.i o/v1`
kind	This is a mandatory parameter. Represents the REST resource this object represents. **Note**: This is a read-only parameter.	Data Type: string Default Value: NetworkPolicy

Table 2-10 Supported Parameters for Configuring Network Policies

Parameter	Description	Details
metadata.name	This is a mandatory parameter. Specifies a unique name for Network Policies.	**DataType**: String **Default Value**: {{ .metadata.name }}
spec.{}	This is a mandatory parameter. This consists of all the information needed to define a particular network policy in the given namespace. **Note**: Policy supports the spec parameters defined in "Supported Kubernetes Resource for Configuring Network Policies".	**Default Value**: NA

For more information, see *Network Policies* in *Oracle Communications Cloud Native Core, Binding Support Function User Guide*.

2.2.2 Installation Tasks

This section explains how to install BSF.

> **Note**
>
> - Before installing BSF, you must complete Prerequisites and Preinstallation Tasks.
> - In a georedundant deployment, perform the steps explained in this section on all the georedundant sites.

2.2.2.1 Downloading BSF package

To download the BSF package from My Oracle Support (MOS), perform the following steps:

1. Log in to My Oracle Support with your credentials.
2. Select the **Patches and Updates** tab.
3. In the **Patch Search** window, click **Product or Family (Advanced)** option.
4. Enter *Oracle Communications Cloud Native Core - 5G* in the **Product** field, and select the Product from the drop-down list.
5. From the **Release** drop-down list, select "**Oracle Communications Cloud Native Core, Converged Policy <release_number>**".
   Where, `<release_number>` indicates the required release number of Policy.
6. Click **Search**.
   The Patch Advanced Search Results lists appears
7. Select the required patch from the results.
   The Patch Details window papers.
8. Click **Download**.
   File Download window appears.
9. Click the *<p********_<release_number>_Tekelec>.zip* file to download the BSF release package.

2.2.2.2 Pushing the Images to Customer Docker Registry

BSF deployment package includes ready-to-use images and Helm charts to orchestrate containers in Kubernetes.

Table 2-11 Docker Images for BSF

Service Name	Docker Image Name	Image Tag
Alternate Route Service	alternate_route	24.3.3
BSF Management	oc-bsf-management	24.3.0
Application Info Service	oc-app-info	24.3.4
Common Configuration Hook	common_config_hook	24.3.3
Config Server	oc-config-server	24.3.4
Configuration Management Server	oc-config-mgmt	24.3.4
Debug Tool	ocdebug-tools	24.3.1
Diameter Connector	oc-diam-connector	24.3.4
Diameter Gateway	oc-diam-gateway	24.3.4
Egress Gateway	ocegress_gateway	24.3.3
NF Test	nf_test	24.3.2

Table 2-11 (Cont.) Docker Images for BSF

Service Name	Docker Image Name	Image Tag
Ingress Gateway	ocingress_gateway	24.3.3
Ingress Gateway/Egress Gateway init configuration	configurationinit	24.3.3
Ingress Gateway/Egress Gateway update configuration	configurationupdate	24.3.3
NRF Client Service	nrf-client	24.3.2
Performance Monitoring Service	oc-perf-info	24.3.4
Query Service	oc-query	24.3.4
Session State Audit	oc-audit	24.3.4

Pushing images

To push the images to the registry:

1. Run the following command to untar the BSF package file to get the BSF docker image tar file:

   ```
   tar -xvzf <ReleaseName>-pkg-<Releasenumber>.tgz
   ```

   Example: `tar -xvzf ocbsf-pkg-24.3.0.0.0.tgz`

   The directory consists of the following:

   - **BSF Docker Images File:**
     `ocbsf-images-24.3.0.tar`
   - **Helm File:**
     `ocbsf-24.3.0.tgz`
   - **Readme txt File:**
     `Readme.txt`
   - **Checksum for Helm chart tgz file:**
     `ocbsf-24.3.0.tgz.sha256`
   - **Checksum for Helm chart for Service Mesh tgz file:**
     `ocbsf-servicemesh-config-24.3.0.tgz.sha256`
   - **Checksum for images' tgz file:**
     `ocbsf-images-24.3.0.tar.sha256`
2. Run one of the following commands to load the `ocbsf-images-<release_number>.tar` file:

   ```
   docker load --input /IMAGE_PATH/ocbsf-images-24.3.0.tar
   ```

   where *IMAGE_PATH* points to the location where `ocbsf-images-24.3.0.tar` is stored.

   For CNE 1.8.0 and later versions, use the following command:

   ```
   podman load --input /IMAGE_PATH/ocbsf-images-24.3.0.tar
   ```
3. Run one of the following commands to verify that the images are loaded:

   ```
   docker images
   ```

```
podman images
```

Verify the list of images shown in the output with the list of images shown in the table Table 2-11. If the list does not match, reload the image tar file.

For more information on docker images available in BSF, see Docker Images.

4. Run one of the following commands to tag the images to the registry:

```
docker tag <image-name>:<image-tag> <docker-repo>/<image-name>:<image-tag>
```

```
podman tag <image-name>:<image-tag> <docker-repo>/<image-name>:<image-tag>
```

5. Run one of the following commands to push the images to the registry:

```
docker push <docker-repo>/<image-name>:<image-tag>
```

```
podman push <docker-repo>/<image-name>:<image-tag>
```

> **Note**
>
> It is recommended to configure the Docker certificate before running the push command to access customer registry through HTTPS, otherwise docker push command may fail.

Example for OCCNE 1.8.0 and later versions

```
podman tag docker.io/ocbsf/oc-config-mgmt:24.3.4 occne-repo-host/oc-config-
mgmt:24.3.4
podman push occne-repo-host/oc-config-mgmt:24.3.4

podman tag docker.io/ocbsf/nf_test:24.3.2 occne-repo-host/nf_test:24.3.2
podman push occne-repo-host/nf_test:24.3.2

podman tag docker.io/ocbsf/alternate_route:24.3.3 occne-repo-host/
alternate_route:24.3.3
podman push occne-repo-host/alternate_route:24.3.3

podman tag docker.io/ocbsf/oc-config-server:24.3.4 occne-repo-host/oc-config-
server:24.3.4
podman push occne-repo-host/oc-config-server:24.3.4

podman tag docker.io/ocbsf/configurationupdate:24.3.3 occne-repo-host/
configurationupdate:24.3.3
podman push occne-repo-host/configurationupdate:24.3.3

podman tag docker.io/ocbsf/oc-app-info:24.3.4 occne-repo-host/oc-app-
info:24.3.4
podman push occne-repo-host/oc-app-info:24.3.4

podman tag docker.io/ocbsf/ocingress_gateway:24.3.3 occne-repo-host/
ocingress_gateway:24.3.3
podman push occne-repo-host/ocingress_gateway:24.3.3

podman tag docker.io/ocbsf/ocegress_gateway:24.3.3 occne-repo-host/
ocegress_gateway:24.3.3
podman push occne-repo-host/ocegress_gateway:24.3.3

podman tag docker.io/ocbsf/oc-diam-gateway:24.3.4 occne-repo-host/oc-diam-
```

```
gateway:24.3.4
podman push occne-repo-host/oc-diam-gateway:24.3.4

podman tag docker.io/ocbsf/oc-bsf-management:24.3.0 occne-repo-host/oc-bsf-
management:24.3.0
podman push occne-repo-host/oc-bsf-management:24.3.0

podman tag docker.io/ocbsf/oc-query:24.3.4 occne-repo-host/oc-query:24.3.4
podman push occne-repo-host/oc-query:24.3.4

podman tag docker.io/ocbsf/oc-perf-info:24.3.4 occne-repo-host/oc-perf-
info:24.3.4
podman push occne-repo-host/oc-perf-info:24.3.4

podman tag docker.io/ocbsf/nrf-client:24.3.2 occne-repo-host/nrf-client:24.3.2
podman push occne-repo-host/nrf-client:24.3.2

podman tag docker.io/ocbsf/configurationinit:24.3.3 occne-repo-host/
configurationinit:24.3.3
podman push occne-repo-host/configurationinit:24.3.3

podman tag docker.io/ocbsf/common_config_hook:24.3.3 occne-repo-host/
common_config_hook:24.3.3
podman push occne-repo-host/common_config_hook:24.3.3

podman tag docker.io/ocbsf/ocdebug-tools:24.3.1 occne-repo-host/ocdebug-
tools:24.3.1
podman push occne-repo-host/ocdebug-tools:24.3.1

podman tag docker.io/ocbsf/oc-audit:24.3.4 occne-repo-host/oc-audit:24.3.4
podman push occne-repo-host/oc-audit:24.3.4
```

2.2.2.3 Installing BSF Package

This section describes how to install BSF package.

To install BSF package, perform the following steps:

1. Unzip the release package to the location where you want to install BSF. The package is as follows `ReleaseName_pkg_Releasenumber.tgz`:
   where:

   `ReleaseName` is a name that is used to track this installation instance.

   `Releasenumber` is the release number. For example, `ocbsf_pkg_24.3.0_0_0.tgz`.

   Run the following command to access the extracted package:
2. Customize the `ocbsf_custom_values_24.3.0.yaml` file. For more information, see Customizing BSF.

> **Note**
>
> The values of the parameters mentioned in the `ocbsf_custom_values_24.3.0.yaml` file overrides the default values specified in the Helm chart. If the `envMysqlDatabase` parameter is modified, you must modify the `configDbName` parameter with the same value.

> **Note**
>
> The URL syntax for perf-info must be in the correct syntax otherwise, it keeps restarting. The following is a URL example for the bastion server if the BSF is deployed on OCCNE platform. On any other PaaS platform, the url should be updated according to the *Prometheus* and *Jaeger* query deployment.
>
> ```
> # Values provided must match the Kubernetes environment.
> perf-info:
>   configmapPerformance:
>     prometheus: http://occne-prometheus-server.occne-infra.svc/
> clustername/prometheus
>     jaeger:jaeger-agent.occne-infra
>     jaeger_query_url:http://jaeger-query.occne-infra/clustername/
> jaeger
> ```
>
> At least three configuration items must be present in the config map for perf-info, failing which perf-info will not work. If `jaeger` is not enabled, the `jaeger` and `jaeger_query_url` parameter can be omitted.

3. Install BSF using Helm:

   ```
   helm install <release-name> -f <custom_file>  <helm-chart> -namespace
   <release-namespace> --atomic  --timeout 10m
   ```

   where:

   - `helm-chart` is the location of the Helm chart extracted from `ocbsf-pkg-24.3.0.0.0.tgz` file
   - `release_name` is the release name used by Helm command. The maximum allowed length is 63 characters.
   - `release_namespace` is the deployment namespace used by `helm` command.
   - `custom_file` is the name of the custom values yaml file (including location).

   > **Note**
   >
   > To verify installation while running the install command, run the following command on a separate window:
   >
   > ```
   > watch kubectl get jobs,pods -n release_namespace
   > ```

For example:

```
helm install ocbsf /home/cloud-user/bsf-24.3.0.0.0.tgz --namespace ocbsf -f
      ocbsf-custom-values-24.3.0.yaml --atomic
```

Parameters in `helm install` command:

- `atomic`: If this parameter is set, the installation process purges the Helm chart on failure. The `wait` flag will be set automatically.
- `wait`: If this parameter is set, installation process will wait until all pods, PVCs, Services, and minimum number of pods of a deployment, `StatefulSet`, or `ReplicaSet` are in a ready state before marking the release as successful. It will wait for as long as --timeout.
- **timeout duration** (optional): This parameter specifies the wait time for individual Kubernetes operations such as Jobs for hooks. The default value is 300s (in seconds) in Helm. If the helm install command fails to create a Kubernetes object, it will internally call the purge to delete after reaching the default timeout value.

> **Note**
>
> Timeout value is not for the overall install but for automatic purge on installation failure.

> **Caution**
>
> When you run the install command, make sure that you do not exit from the `helm install` command manually. After running the `helm install` command, installing all the services may take some time. In the meantime, you must not press "ctrl+c" to come out from the `helm install` command as it leads to anomalous behavior.

> **Note**
>
> In Georedundant deployment, if you want to add or remove a site, refer to <Appendix B and Appendix C>.

> **Note**
>
> The following warnings must be ignored for BSF installation on 24.3.0, 24.2.0 and 24.1.0 CNE:
>
> ```
> helm install <release-name> -f <custom.yaml> <tgz-file> -n
> <namespace>
> W0301 07:39:30.096125 1718193 warnings.go:70]
> spec.template.spec.containers[0].ports[3]: duplicate port
> definition with spec.template.spec.containers[0].ports[1]
> W0301 07:39:34.033420 1718193 warnings.go:70]
> spec.template.spec.containers[0].ports[3]: duplicate port
> definition with spec.template.spec.containers[0].ports[2]
> NAME: <release-name>
> LAST DEPLOYED: <Date-Time>
> NAMESPACE: <namespace>
> STATUS: deployed
> REVISION: <N>
> ```

4. Press "Ctrl+C" to exit watch mode. Make sure to run the `watch` command on a different terminal.

   For Helm 2:

   ```
   helm status <helm-release> -n <namespace>
   ```

2.2.3 Postinstallation Tasks

This section explains the postinstallation tasks for BSF.

2.2.3.1 Verifying BSF Installation

To verify if BSF is installed:

1. Run the following command to verify the installation status:

   For Helm:

   ```
   helm status <helm-release> -n <namespace>
   ```

   For example:

   ```
   helm status ocbsf -n ocbsf
   ```

   Status should be `DEPLOYED`.

2. Run the following command to verify if the pods are up and active:

   ```
   kubectl get pods -n <release_namespace>
   ```

For example:

```
kubectl get pod -n ocbsf
```

You should see the status as `Running` and `Ready` for all the pods.

3. Run the following command to verify if the services are deployed and active:

```
kubectl get services -n <release_namespace>
```

For example:

```
kubectl get services -n ocbsf
```

> **Note**
>
> If the installation is not successful or you do not see the status as Running for all the pods, perform the troubleshooting steps mentioned in *Oracle Communications Cloud Native Core, Binding Support Function Troubleshooting Guide*.

2.2.3.2 Performing Helm Test

This section describes how to perform sanity check for BSF installation through Helm test. The pods to be checked should be based on the namespace and label selector configured for the Helm test configurations.

Helm Test is a feature that validates successful installation of BSF and determines if the NF is ready to take traffic. The pods that are checked are based on the namespace and label selector configured for the Helm test configurations.

> **Note**
>
> - Helm test can be performed only on Helm3.
> - If `nrf-client-nfmanagement.enablePDBSupport` is set to `true` in the `custom-values.yaml`, Helm test fails. It is an expected behavior as the mode is active and on standby, the leader pod (`nrf-client-management`) will be in ready state but the follower will not be in ready state, which will lead to failure in the Helm test.

Before running Helm test, complete the Helm test configurations.

To perform the helm test, run the following command:

```
helm test <helm-release_name> -n <namespace>
```

where:

`helm-release-name` is the release name.

`namespace` is the deployment namespace where BSF is installed.

Example:

```
helm test ocbsf -n ocbsf
```

Sample output:

```
Pod ocbsf-helm-test-test pending
Pod ocbsf-helm-test-test pending
Pod ocbsf-helm-test-test pending
Pod ocbsf-helm-test-test running
Pod ocbsf-helm-test-test succeeded
NAME: ocbsf-helm-test
LAST DEPLOYED: Thu May 19 12:22:20 2022
NAMESPACE: ocbsf-helm-test
STATUS: deployed
REVISION: 1
TEST SUITE:     ocbsf-helm-test-test
Last Started:   Thu May 19 12:24:23 2022
Last Completed: Thu May 19 12:24:35 2022
Phase:          Succeeded
```

If the Helm test failed, run the following command to view the logs:

```
helm test <release_name> -n <namespace> --logs
```

Note

- Helm Test expects all of the pods of given microservice to be in `READY` state for a successful result. However, the NRF Client Management microservice comes with `Active/Standby` model for the multi-pod support in the current release. When the multi-pod support for NRF Client Management service is enabled, you may ignore if the Helm Test for NRF-Client-Management pod fails.
- If Helm test fails, for details on troubleshooting the installation, see *Oracle Communications Cloud Native Core, Binding Support Function Troubleshooting Guide*.

2.2.3.3 Backing Up Important Files

Take a backup of the following files that are required during fault recovery:

- updated `ocbsf_custom_values_24.3.0.yaml` file
- updated `ocbsf_custom_values_servicemesh_config_24.3.0.yaml` file
- updated Helm charts
- secrets, certificates, and keys used during the installation

3
Customizing BSF

This chapter describes how to customize the Oracle Communications Cloud Native Core, Binding Support Function (BSF) deployment in a cloud native environment.

The BSF deployment is customized by overriding the default values of various configurable parameters in the `ocbsf_custom_values_24.3.0.yaml` file.

To customize the `ocbsf_custom_values_24.3.0.yaml` file as per the required parameters, perform the following steps:

1. Download the custom template from My Oracle Support (MOS). The custom template file is available in the software package.
2. Customize the file.
3. Save the updated file.

The BSF deployment is customized by overriding the default values of various configurable parameters in the `ocbsf_custom_values_24.3.0.yaml` file.

To customize the custom yaml file, perform the following steps:

1. Unzip `Custom_Templates` file available in the extracted documentation release package. For more information on how to download the package from MOS, see Downloading BSF package section.
   The following files are used to customize the deployment parameters during installation:
   - `ocbsf_custom_values_24.3.0.yaml`: This file is used to customize the deployment parameters of BSF.
   - `ocbsf_custom_values_servicemesh_config_24.3.0.yaml`: This file is used while configuring ASM Data Plane.
2. Save the updated files.

> **Note**
>
> - All parameters mentioned as mandatory must be present in the `ocbsf_custom_values_24.3.0.yaml` file.
> - All fixed value parameters listed must be present in the custom-values yaml file with the exact values as specified in this section.

3.1 Configurations for Pre and Post Upgrade/Install Validations

This section describes mandatory configurable parameters that you must customize in the `ocbsf_custom_values_24.3.0.yaml` file for successful validation checks required on the application, databases, and related tables before and after BSF application upgrade/install.

Table 3-1 Configuration Parameter for Pre and Post Flight Checks

Parameter	Description	Mandatory(M)/ Optional(O) Parameter	Accepted values	Default Value
global.hookValidation.dbSchemaValidate	Specifies to perform database validations in case of pre-installation, pre-upgrade/post-upgrade/post-installation. Checks if the required databases and tables exist. Validates that the required columns exist in the tables and the correct foreign key exists (for config-server).	M	true/false	false **Note**: By default, this flag is false. In that case, validations is performed, and if the validation fails, a warning is logged and install/upgrade will continue. If this flag is true and the validation fails, an error is thrown and installation/upgrade fails.
global.operationalState	Specifies to control deployment operationalState, mainly during fault recovery set up installation in inactive mode, i.e., complete shutdown mode.	M	• NORMAL • PARTIAL_SHUTDOWN • COMPLETE_SHUTDOWN	`&systemOperationalState NORMAL` **Note**: Need to use this field along with enabling the field `enableControlledShutdown` as `true`

Table 3-1 (Cont.) Configuration Parameter for Pre and Post Flight Checks

Parameter	Description	Mandatory(M)/ Optional(O) Parameter	Accepted values	Default Value
global.hookValidation.infraValidate	Specifies to perform pre-flight infrastructure related validations like Replication Status, Critical Alerts, Kubernetes Version, and cnDbtier Version. Infrastructure related validations are done in the very beginning of the upgrade/install and if it fails, then install/upgrade will fail at this stage.	M	true/false	false **Note**: • Ensure helm parameters for `replicationUri`, `dbTierVersionUri` and `alertmanagerUrl` are pointing to working URI/URL respectively. • Before enabling infra Validate flag, ensure that there are no critical alarms exists before upgrading/ installing a new release in order to avoid failures. Also, make sure that replication is up.
appinfo.dbTierVersionUri	Specifies the URI provided by the db monitor service to query the cnDBtier Version. For example: http://mysql-cluster-db-monitor-svc.occne-cndbtier:8080/db-tier/version	M	URI	empty string

Table 3-1 (Cont.) Configuration Parameter for Pre and Post Flight Checks

Parameter	Description	Mandatory(M)/ Optional(O) Parameter	Accepted values	Default Value
global.mySql.execution.ddlDelayTimeInMs	Adds a delay before the creation of configuration_item table, ensuring that topic_info table is created first and then the configuration_item table is created which has a foreign key dependency on topic_info. Specifies delay interval of 200 ms before inserting any entry into the ndb_replication table.	M	Interval in milliseconds	200 ms
appinfo.defaultReplicationStatusOnError	Specifies Replication Value in Case of any error on Infra Validation Replication Status	O	• UP • DOWN If the value is UP or empty string and the application throws an error while fetching replication status during infra-validation, the value of replication will be set as UP. If the value is DOWN, in case of any error while fetching replication status, the value of replication status will be set as DOWN.	UP
appinfo.nfReleaseVersion	Specifies the NF release version for the minViablePath validation.	O	NF release version If no value is provided, the minViablePath will validate the app-info-release version only.	Default Value is empty string: "".

3.2 Configuring Mandatory Parameters

This section describes the mandatory configurable parameters that you must customize in the `ocbsf_custom_values_24.3.0.yaml` file for successful installation of Binding Support Function (BSF).

Table 3-2 Configurable Parameters for Mandatory Configurations

Parameter	Description
global.dockerRegistry	This **mandatory** parameter specifies the name of the Docker registry that hosts Binding Support Function docker images. **Note**: The Docker registry runs in OCCNE bastion server where all OAuth docker images are loaded.
global.nfInstanceId	This **mandatory** parameter specifies the unique NF InstanceID for each site deployed for BSF. To setup georedundancy, users must specify the value while deploying BSF; otherwise, georedundancy will not be supported. Default value for the parameter is UUID. Ensure `nfInstanceId` should be provided as UUID for fresh installation. On upgrade, the user should be using the original UUID or site Id which was provided during installation to avoid issues in upgrade. For more information, see Upgrading BSF. The same global `nfInstanceId` should be provided in appProfiles as well. The value of `nfInstanceId` must be unique for each site in a multi-site deployment.
global.envMysqlHost	This **mandatory** parameter specifies the IP address or host name of the MySQL server where BSF databases are hosted. **Example**: `10.196.33.106`
global.envMysqlPort	This **mandatory** parameter specifies the port number of the MySQL server where BSF databases are hosted. **Example**: `3306`
global.dbCredSecretName	This **mandatory** parameter specifies the name of the Kubernetes secret object that contains Database username and password. **Default Value**: `ocbsf-db-pass`
global.privilegedDbCredSecretName	This **mandatory** parameter specifies the name of the Kubernetes secret object containing Database username and password for an admin user. **Default Value**: `ocbsf-privileged-db-pass`
global.releaseDbName	This **mandatory** parameter specifies the name of the release database that contains details of release version. **Default Value**: `ocbsf_release`

Here is a sample configuration for mandatory parameters in `ocbsf_custom_values_24.3.0.yaml` file:

```
global:
  # Docker registry name
  dockerRegistry: ''
  nfInstanceId: "fe7d992b-0541-4c7d-ab84-c6d70b1b0666"
  # Primary MYSQL Host IP or Hostname
  envMysqlHost: &mySqlHostRef ''
  envMysqlPort: &mySqlPortRef ''
  # Jaegar hostname
  envJaegerAgentHost: ''
  # K8s secret object name containing OCBSF MYSQL UserName and Password
  dbCredSecretName: &dbCredSecretNameRef 'ocbsf-db-pass'
  privilegedDbCredSecretName: 'ocbsf-privileged-db-pass'
```

```
#Release DB name containing release version details
releaseDbName: 'ocbsf_release'
```

3.3 Enabling or Disabling Services Configurations

This section describes the configuration parameters that can be used to select the services that you want to enable or disable for your deployment.

To enable or disable the services, you must configure the following configurable parameters in the `ocbsf_custom_values_24.3.0.yaml` file:

Table 3-3 Configurable Parameters for Enabling/Disabling the BSF Core Service

Parameter	Description
global.bsfManagementEnable	This parameter determines if the BSF core service is enabled or not. **Default Value**: true
global.bsfManagementVersion1Enable	NA
global.bsfManagementVersion2Enable	NA

> **Note**
>
> The below section is applicable only when NF is required to register with NRF.

Table 3-4 Configurable Parameters for Enabling/Disabling the NRF Client Services

Parameter	Description
global.nrfClientNfManagementEnable	This is an optional parameter. **Default Value**: true
global.appinfoServiceEnable	This optional parameter determines if the app info service is enabled or not. **Default Value**: true
global.performanceServiceEnable	This optional parameter determines if the performance service is enabled or not. **Default Value**: true

Table 3-5 Configurable Parameters for Enabling/Disabling the Diameter Gateway

Parameter	Description
global.diamGatewayEnable	This optional parameter determines if the diameter gateway is enabled or not. **Default Value**: true

Here is a sample configuration for configurable parameters in `ocbsf_custom_values_24.3.0.yaml` file:

```
global:
# BSF Core Services Enable/Disable option
  bsfManagementEnable: true
  bsfManagementVersion1Enable: false
  bsfManagementVersion2Enable: false

  nrfClientNfManagementEnable: true
  appinfoServiceEnable: true
  performanceServiceEnable: true
```

Table 3-6 Configurable Parameters for Enabling or Disabling PCF services for Query service

Parameter	Description
global.amServiceEnable	This optional parameter determines whether to enable query service for AM service. **Default Value**: false
global.smServiceEnable	This optional parameter determines whether to enable query service for SM service. **Default Value**: false
global.ueServiceEnable	This optional parameter determines whether to enable query service for UE service. **Default Value**: false
global.policydsEnable	This optional parameter determines whether to enable query service for Policy DS service. **Default Value**: false
global.pcrfCoreEnable	This optional parameter determines whether to enable query service for PCRF Core service. **Default Value**: false
global.bindingSvcEnabled	This optional parameter determines whether to enable query service for Binding service. **Default Value**: false

Table 3-7 Configurable Parameters to enable or disable the Audit Service

Parameter	Description
global.auditServiceEnable	Use this parameter to enable or disable audit service. **Default Value**: true
bsf-management-service.auditHandleNullAsStale	Specifies whether to handle null value as stale or not while auditing the tables of the service. **Default Value**: true
audit-service.recordsQueueCapacity	Specifies the number of stale records the queue can hold in an audit cycle. **Default Value**: • 5K records if audit service configuration is based on `ocbsf_custom_values_minimal_24.3.0.yaml` file. • 100K records if audit service configuration is based on `ocbsf_custom_values_24.3.0.yaml` file.
audit-service.maxTtlForceInterval	Specifies the grace interval (in seconds) after the expiry of Maximum TTL (Session Age) that is given to the service to delete an expired record gracefully. On expiry of this grace interval, Audit service will forcefully delete the records. **Default Value**: 259200 in minutes

3.4 Configuring Tracing Parameters

This section describes the configurable tracing parameters that you may customize in the `ocbsf_custom_values_24.3.0.yaml` file.

Table 3-8 Common Policy Configurable Parameters for OpenTelelemetry

Parameter	Description	Mandatory/ Optional Parameter	Default Value	Added/ Deprecated/ Updated in Release	Notes
envJaegerCollectorHost	Specifies the host direction where the Jaeger Collector is found.	Mandatory	occne-tracer-jaeger-collector.occne-infra	Added in Release 23.4.0	Make sure the jaeger Collector service is up and running inside OCCNE-Infra, with port specified in values.yaml

Table 3-8 (Cont.) Common Policy Configurable Parameters for OpenTelelemetry

Parameter	Description	Mandatory/ Optional Parameter	Default Value	Added/ Deprecated/ Updated in Release	Notes
envJaegerCollectorPort	Specifies the port where the Jaeger Collector is listening to receive spans.	Mandatory	4318		Make sure this port matches with the one of your Jaeger Collector service port that is listening for OTLP formatted traces.
tracingEnabled	Specifies When 'true' enables the service to be instrumented by OpenTelemetry's Java Agent.	Mandatory	false		
tracingSamplerRatio	Specifies a ratio of spans which will be sent to the Jaeger Collector; i.e. of the total amount of spans, specify how many are going to be sent to the Jaeger Collector.	Mandatory	.001		Example: A value of "0.2" specifies that only 20 % of the spans are going to be sent. Range is 0 to 1.
tracingJdbcEnabled	Specifies when 'true' OpenTelemetry Java Agent will also show spans related to Database Operations.	Mandatory	false		If tracingEnabled is true on deployment, this will be enabled by default. In case tracingEnabled is false, this will also be false by default
tracingLogsEnabled	Specifies when 'true' enables spans and tracing logging	Mandatory	false		

Here is a sample configurations for OpenTelemetry in `ocbsf_custom_values_24.3.0.yaml` file:

```
envJaegerCollectorHost: 'occne-tracer-jaeger-collector.occne-infra'
envJaegerCollectorPort: 4318 -> Make sure this matches with OCCNE-INFRA
jaeger collector service port.
tracing:
  tracingEnabled: 'true'
  tracingSamplerRatio: 0.001
  tracingJdbcEnabled: 'true'
  tracingLogsEnabled: 'false'
```

Table 3-9 Configurable Parameters for Tracing Configuration in Ingress Gateway

Parameter	Description
global.envJaegerAgentHost	This **mandatory** parameter specifies the Hostname or IP address for the jaeger agent. It is the FQDN of Jaeger Agent service running in OCCNE cluster under namespace `occne-infra`. It is written in the following format: <JAEGER_SVC_NAME>.<JAEGER_NAMESPACE>
global.envJaegerQueryUrl	This **optional** parameter specifies the query URL for the jaeger agent. Default Value: empty string
ingress-gateway.jaegerTelemetryTracingEnabled	This **optional** parameter specifies whether to enable or disable OpenTelemetry at Ingress Gateway. **Default Value**: false
ingress-gateway.openTelemetry.jaeger.httpExporter.host	This is a **mandatory** paramter, if `ingress-gateway.jaegerTelemetryT racingEnabled` flag is set to true. It specifies the host name of Jaeger collector host. **Default Value**: `jaegercollector. cne-infra`
ingress-gateway.openTelemetry.jaeger.httpExporter.port	This is a **mandatory** paramter, if `ingress-gateway.jaegerTelemetryT racingEnabled` flag is set to true. It specifies the port of Jaeger collector port. **Default Value**: `4318`
ingress-gateway.openTelemetry.jaeger.probabilistic Sampler	This is a **mandatory** paramter, if `ingress-gateway.jaegerTelemetryT racingEnabled` flag is set to true. It specifies the sampler where value is between 0.0 (no sampling) and 1.0 (sampling of every request). **Default Value**: `0.5`

Here is a sample configuration for tracing in ingress-gateway in `ocbsf_custom_values_24.3.0.yaml` file:

```
jaegerTelemetryTracingEnabled: *tracingEnabled

  openTelemetry:
    jaeger:
      httpExporter:
        host: *envJaegerCollectorHost
        port: *envJaegerCollectorPort
      probabilisticSampler: *tracingSamplerRatio
```

Table 3-10 Configurable Parameters for Tracing Configuration in Egress Gateway

Parameter	Description
egress-gateway.jaegerTelemetryTracingEnabled	This **optional** parameter specifies whether to enable or disable Jaeger Tracing at Egress Gateway. **Default Value**: true
egress-gateway.openTelemetry.jaeger. httpExporter.host	This is a **mandatory** paramter, if `ingress-gateway.jaegerTelemetryT racingEnabled` flag is set to true. It specifies the host name of Jaeger collector host. **Default Value**: `jaegercollector. cne-infra`

Table 3-10 (Cont.) Configurable Parameters for Tracing Configuration in Egress Gateway

Parameter	Description
egress-gateway.openTelemetry.jaeger. httpExporter.port	This is a **mandatory** paramter, if `ingress-gateway.jaegerTelemetryT racingEnabled` flag is set to true. It specifies the port of Jaeger collector port. **Default Value**: `4318`
egress-gateway.openTelemetry.jaeger. probabilisticSampler	This is a **mandatory** paramter, if `ingress-gateway.jaegerTelemetryT racingEnabled` flag is set to true. It specifies the sampler where value is between 0.0 (no sampling) and 1.0 (sampling of every request). **Default Value**: `0.5`

Here is a sample configuration for tracing in egress-gateway in `ocbsf_custom_values_24.3.0.yaml` file:

```
jaegerTelemetryTracingEnabled: *tracingEnabled

  openTelemetry:
    jaeger:
      httpExporter:
        host: *envJaegerCollectorHost
        port: *envJaegerCollectorPort
      probabilisticSampler: *tracingSamplerRatio
```

To configure tracing in `nrf-client-nfdiscovery`, you may configure the following configurable parameters in `ocbsf_custom_values_24.3.0.yaml` file:

Table 3-11 Configurable Parameters for Tracing Configuration in nrfClientNfDiscovery

Parameter	Description
nrf-client.nrf-client-nfdiscovery.envJaegerSamplerParam	**Note**: You must customize this parameter only when NRF client services are enabled. **Default Value**: 1
nrf-client.nrf-client-nfdiscovery.envJaegerSamplerType	**Note**: You must customize this parameter only when NRF client services are enabled. **Default Value**: ratelimiting
nrf-client.nrf-client-nfdiscovery.envJaegerServiceName	**Note**: You must customize this parameter only when NRF client services are enabled. **Default Value**: pcf-nrf-client-nfdiscovery

Here is a sample configurations for tracing in `ocbsf_custom_values_24.3.0.yaml` file:

```
nrf-client-nfdiscovery:
    envJaegerSamplerParam: '1'
    envJaegerSamplerType: ratelimiting
    envJaegerServiceName: pcf-nrf-client-nfdiscovery
```

To configure tracing in `nrf-client-nfmanagement`, you may configure the following configurable parameters in `ocbsf_custom_values_24.3.0.yaml` file:

Table 3-12 Configurable Parameters for Tracing Configuration in nrf-client-nfmanagement

Parameter	Description
nrf-client.nrf-client-nfmanagement.envJaegerSamplerParam	**Note**: You must customize this parameter only when NRF client services are enabled. **Default Value**: 1
nrf-client.nrf-client-nfmanagement.envJaegerSamplerType	**Note**: You must customize this parameter only when NRF client services are enabled. **Default Value**: ratelimiting
nrf-client.nrf-client-nfmanagement.envJaegerServiceName	**Note**: You must customize this parameter only when NRF client services are enabled. **Default Value**: pcf-nrf-client-nfmanagement

Here is a sample configuration for tracing under nrf-client-nfmanagement in `ocbsf_custom_values_24.3.0.yaml` file:

```
nrf-client-nfmanagement:
    envJaegerSamplerParam: '1'
    envJaegerSamplerType: ratelimiting
    envJaegerServiceName: pcf-nrf-client-nfmanagement
```

To configure tracing in Alternate Route service, you should configure the following configurable parameters in `ocbsf_custom_values_24.3.0.yaml` file:

Table 3-13 Configurable Parameters for Tracing Configuration in Alternate Route Service

Parameter	Description
alternate-route.jaegerTracingEnabled	**Note**: You must customize this parameter only when the alternate route service is enabled. **Default Value**: false
alternate-route.openTracing.jaeger.udpSender.host	**Note**: You must customize this parameter only when the alternate route service is enabled. **Default Value**: occne-tracer-jaeger-agent.occne-infra
alternate-route.openTracing.jaeger.udpSender.port	**Note**: You must customize this parameter only when the alternate route service is enabled. **Default Value**: 6831
alternate-route.openTracing.jaeger.probabilisticSampler	**Note**: You must customize this parameter only when the alternate route service is enabled. **Default Value**: 0.5

Here is a sample configurations for tracing in `ocbsf_custom_values_24.3.0.yaml` file:

```
jaegerTracingEnabled: true
openTracing :
    jaeger:
```

```
udpSender:
  # udpsender host
  host: "occne-tracer-jaeger-agent.occne-infra"
  # udpsender port
  port: 6831
probabilisticSampler: 0.5
```

3.5 Configuring Database Names

This section describes the configuration parameters that can be used to customize the database names.

> **Note**
>
> Database name specified in the custom.yaml file should be used while creating the database during installation. See Configuring Database, Creating Users, and Granting Permissions.

Table 3-14 Customizable Parameters for Database Name Configuration for BSF Services

Parameter	Description
bsf-management-service.envMysqlDatabase	This parameter specifies the name of the database of BSF Management Service. **Default Value**: ocpm_bsf
bsf-management-service.configserverContainerImage	This parameter specifies the name of the container image for Config Server. **Note**: Keep the image same as that of config server. **Default Value**: oc-config-server
bsf-management-service.envMysqlDatabaseConfigServer	This parameter specifies the name of the container image for Config Server. **Default Value**: ocbsf_config_server
bsf-management-service.envXnioTaskThreadPoolSize	This parameter specifies the number of XNIO Task threadpool size of BSF Management Service. **Default Value**: 180 **Note**: This parameter is not available in `ocbsf_custom_values_24.3.0.yaml` file. You must add this parameter to `ocbsf_custom_values_24.3.0.yaml` file with the given default value when required.

Table 3-14 (Cont.) Customizable Parameters for Database Name Configuration for BSF Services

Parameter	Description
config-server.envMysqlDatabase	This optional parameter specifies the name of the database for Config Server service. **Default Value**: ocbsf_config_server
cm-service.envCommonConfigMysqlDatabase	This optional parameter specifies the name of the database for CM service. **Default Value**: ocbsf_commonconfig
cm-service.envMysqlDatabase	This optional parameter specifies the name of the database for CM service. **Default Value**: ocbsf_cmservice
cm-service.configserverContainerImage	This optional parameter specifies the container image name of Config Server service. **Default Value**:oc-config-server
cm-service.envMysqlDatabaseConfigServer	This optional parameter specifies the database name of Config Server service. **Default Value**:ocbsf_config_server
audit-service.envMysqlDatabase	This parameter specifies the name of the database for audit service. **Default Value**: ocbsf_audit_service
global.nrfClientDbName	This parameter specifies the name of the database of NRF Client. **Default Value**: ocbsf_nrf_client

Here is a sample configuration for configurable parameters in `ocbsf_custom_values_24.3.0.yaml` file:

```
global:
  nrfClientDbName: 'ocbsf_nrf_client'
bsf-management-service:
  envMysqlDatabase: 'ocpm_bsf'
  configserverContainerImage: oc-config-server
  envMysqlDatabaseConfigServer: 'ocbsf_config_server'

config-server:
  envMysqlDatabase: ocbsf_config_server

cm-service:
  envCommonConfigMysqlDatabase: ocbsf_commonconfig
  envMysqlDatabase: ocbsf_cmservice
```

```
  configserverContainerImage: oc-config-server
  envMysqlDatabaseConfigServer: 'ocbsf_config_server'

audit-service:
  envMysqlDatabase: ocbsf_audit_service
```

Cofiguring Database Engine

The following table describes the parameter that you can configure to customize the default database engine used by BSF:

Table 3-15 Customizable Parameters for Database Engine for BSF

Parameter	Description	Notes
dbConfig.dbEngine	This **mandatory** parameter specifies the MySQL engine that is used by BSF to store information in the MySQL database. **Default value**: NDBCLUSTER	If the database engine is not NDBCLUSTER, then the value for this parameter can be changed only during fresh installation of BSF. Do not change the value of this parameter during upgrade scenarios.

Cofiguring NRF Client Multipod Feature

The following table describes the parameter that you can configure to customize the multipod support for NRF Client:

Table 3-16 Customizable Parameters for NRF Client Multipod Feature

Parameter	Description	Notes
nrf-client.nrf-client-nfmanagement.dbConfig.leaderPodDbName	Specifies the database name for LeaderPodDb database. This database is unique per site. **Default value**: ocbsf_leaderPodDb	
nrf-client.nrf-client-nfmanagement.dbConfig.networkDbName	Specifies the release database name. **Default value**: ocbsf_release	

Configuring Database for Conflict Resolution

The following table describes the parameter that you can configure the database for conflict resolution in NDB cluster with replication:

Table 3-17 Customizable Parameters to enable or disable the Database for Conflict Resolution

Parameter	Description	Notes
global.mySql.conflictResolution.ndbConflictResolutionEnabled	This flag is used to prevent data conflicts in georeplicated deployments. When there are multiple sites with real-time replication, if a session is updated at both sites simultaneously, this is considered as a conflict. This flag configures the MySQL cluster replication to compare the updated timestamp in the session record, so the conflicts can be automatically resolved. In a single-site PCF, set this parameter to false. **Note**: This feature is only available if the database is MySQL cluster (NDB). For MySQL (innodb), the value for this flag must be set to false.	Even if its a single-site BSF NF deployment, set this parameter to true. As this will keep georedundancy and geo-replication enabled among the sites during multi-site deployment.
global.mySql.conflictResolution.useMaxDeleteWinInsConflictFn	This flag is used to update the Conflict Resolution Function to MAX_DEL_WIN_INS. **Note**: This feature is available if the NDB version is 8.0.30. If NDB version is less than 8.0.30, the value for this flag must be set to false.	

3.6 Configuring NRF client

This section describes the configurable parameters that you may customize for configuring NRF client. The configurations under `nrf-client` section allow Binding Support Function to register with NRF.

> **Important**
>
> Before customizing parameters mentioned in this section, ensure that the NRF Client services are enabled by setting the value as `true` for `nrfClientNfManagementEnable`.

Table 3-18 Configurable Parameters for NRF Client Configuration

Parameter	Description
global.nrfClientDbName	This **mandatory** parameter that specifies the NRF Client database name. **Default value**: `ocbsf_nrf_client`

Table 3-18 (Cont.) Configurable Parameters for NRF Client Configuration

Parameter	Description
global.deploymentNrfClientService.envNfNamespace	This **mandatory** parameter that specifies the Kubernetes namespace of BSF.
global.nrfClientCommonServicePort	This **mandatory** parameter that specifies the port to be used for readiness and liveness probes. **Default value**: 9000

Here is a sample configuration for NRF client in `ocbsf_custom_values_24.3.0.yaml` file:

```
global:

  nrfClientDbName: 'ocbsf_nrf_client'

  deploymentNrfClientService:
    envEgressGatewayPort: *svcEgressGatewayHttp
    #K8s namespace of BSF
    envNfNamespace: ''
    #same as bsfApiRoot
    nfApiRoot: ''

  nrfClientCommonServicePort: *containerMonitoringHttp
```

Table 3-19 Configurable Parameters for NRF Client Configuration

Parameter	Description
nrf-client.configmapApplicationConfig	This **mandatory** parameter is used to provide inputs to NRF-Client.
&configRef	This **mandatory** reference variable is used to take the input from the config map.
nrf-client.configmapApplicationConfig.profile	This **mandatory** parameter specifies the NF profile of BSF that is registered with NRF. See config-map table for more details.
appinfo.infraServices	Specifies the URI for the health check of InfraServices that need to be monitored. **Examples**: http://mysql-cluster-db-monitor-svc.vzw1-cndbtier:8080/actuator/health http://mysql-cluster-db-replication-svc.vzw1-cndbtier/actuator/health Uncomment this parameter and set this parameter to an empty array if any one of following conditions is true: • Deploying on OCCNE 1.4 or lower version • Not deploying on OCCNE • Do not wish to monitor infra services such as db-monitor service This parameter uses the default namespace - `occne-infra`. If cnDBTier is used to deploy BSF, this field must be updated accordingly.

Table 3-19 (Cont.) Configurable Parameters for NRF Client Configuration

Parameter	Description
appinfo.core_services.bsf	Specifies the list of BSF services to be monitored.
appinfo.core_services.common	Specifies the list of common services to be monitored.
perf-info.configmapPerformance.prometheus	This conditional parameter specifies the Prometheus server URL. **Default Value**: `http://prometheus-server.prometheus:5802 jaeger=jaeger-agent.occne-infra jaeger_query_url=http://jaeger-query.occne-infra` **Note**: If you do not specify any value for this parameter, BSF reports 0 loads to NRF.

Configurable parameters for NRF Client Configuration in Config-map

Parameter	Description
primaryNrfApiRoot	Primary NRF hostname and port in the following format: <http scheme>://<Hostname/IP>:<Port> This parameter can only contain valid API root. For example: `http://nrf1-api-gateway.svc:80`
secondaryNrfApiRoot	Secondary NRF hostname and port in the following format: <http scheme>://<Hostname/IP>:<Port> This parameter can only contain valid API root. For example: `http://nrf2-api-gateway.svc:80`
retryAfterTime	When primary NRF is down, this will be the wait Time (in ISO 8601 duration format) after which request to primary NRF will be retried to detect primary NRF's availability. This parameter can only contain valid ISO 8601 duration format. For example: `PT120S`
nrfClientType	The NfType of the NF registering. The value for this parameter must be set to BSF.
nrfClientSubscribeTypes	Network functions for which BSF wants to discover and subscribe to the NRF.
appProfiles	NfProfile of BSF to be registered with NRF. This parameter can only contain valid NF profile. During fresh install or upgrade, the value of this parameter is loaded into the database and then used to trigger NfRegister or NfUpdate operation to NRF. For any subsequent changes to appProfile, REST API or CNC Console must be used. For more information, see *Oracle Communications Cloud Native Core Binding Support Function REST Specification Guide* or *Oracle Communications Cloud Native Core Binding Support Function User Guide.* **Note**: It is a 3GPP defined data type. To know more about its attributes, refer to *3GPP TS 29.510 version 16.4.0 Release 16*.

Parameter	Description
enableF3	Support for 29.510 Release 15.3 This parameter can only have **true** (default) or false as values.
enableF5	Support for 29.510 Release 15.5 This parameter can only have **true** (default) or false as values.
renewalTimeBeforeExpiry	Time Period (in seconds) before the Subscription Validity time expires. For example: 3600
validityTime	The default validity time (in days) for subscriptions. For example: 30
enableSubscriptionAutoRenewal	This parameter can be used to enable renewal of subscriptions automatically. This parameter can only have **true** (default) or false as values.
nfHeartbeatRate	This parameter specifies the rate at which BSF shall heartbeat with the NRF. The value shall be configured in terms of percentage (1-100). If the heartbeatTimer is 60s, then the NF shall heartbeat at nfHeartBeatRate * 60/100. **Default Value**: 80
acceptAdditionalAttributes	This parameter can be used to enable additional Attributes as part of 29.510 Release 15.5. This parameter can only have true or **false** (default) as values.
enableVirtualNrfResolution	This parameter can be used to enable or disable virtual NRF session retry by Alternate routing service. This parameter can only have true or **false** (default) as values.
virtualNrfFqdn	This parameter specifies the virtual NRF FQDN being used to query static list of route. By default, the value for this parameter is set to false.
virtualNrfScheme	This parameter specifies the scheme to be used with the virtual Fqdn. By default, the value for this parameter is set to `http`.
virtualNrfPort	This parameter specifies the port to be used with the virtual Fqdn. By default, the value for this parameter is set to `8080`.
requestTimeoutGracePeriod	An additional grace period where no response is received from the NRF.This additional period shall be added to the requestTimeout value. It ensures that the egress-gateway shall first timeout, and send an error response to the NRF-client. **Default Value**: 2
nrfRetryConfig	It specifies the configurations required for the NRF Retry mechanism.
healthCheckConfig	It specifies the configurations required for the Health check of NRFs.

Parameter	Description
serviceRequestType	Specifies the type of service request.
primaryNRFRetryCount	Specifies the number of times a service request is retried to the primary NRF in case of failure.
nonPrimaryNRFRetryCount	Specifies the number of times a service request is retried to the non-primary NRF in case of failure.
alternateNRFRetryCount	Specifies the number of alternate NRFs that are retried in case of failure. When the value is specified as -1, all available NRF instances are tried.
errorReasonsForFailure	Specifies the HTTP status codes or exceptions for which retry is attempted.

Parameter	Description
gatewayErrorCodes	Specifies the HTTP status codes sent by the Egress Gateway for which retry is attempted.
requestTimeout	Specifies the timeout period where no response is received from the Egress Gateway.

Parameter	Description
healthCheckCount	Specifies the number of consecutive success or failures responses required to mark an NRF instance healthy or unhealthy.
healthCheckInterval	Specifies the interval at which a health check of an NRF is performed.
requestTimeout	Specifies the timeout period where no response is received from the Egress Gateway.
errorReasonsForFailure	Specifies the HTTP status codes or exceptions for which retry is attempted.
gatewayErrorCodes	Specifies the HTTP status codes sent by the Egress Gateway for which retry is attempted.

Here is a sample configuration for NRF client in `ocbsf_custom_values_24.3.0.yaml` file:

```
deploymentNrfClientService:
    #K8s namespace of BSF
    envNfNamespace: ''


appinfo:
  serviceAccountName: ''
  # Set Infrastructure services to empty array if any one of below condition
is met
  #  1. Deploying on occne 1.4 or lesser version
  #  2. Not deploying on OCCNE
  #  3. Do not wish to monitor infra services such as db-monitor service
  # then the below mentioned attribute 'infra_services' should be uncommneted
and epmty array should be passed as already mentioned.
  #infraServices: []

perf-info:
  configmapPerformance:
    prometheus: ''


nrf-client:
  # This config map is for providing inputs to NRF-Client
  configmapApplicationConfig:
    # primaryNrfApiRoot - Primary NRF Hostname and Port
    # SecondaryNrfApiRoot - Secondary NRF Hostname and Port
    # retryAfterTime - Default downtime(in ISO 8601 duration format) of an
NRF detected to be unavailable.
    # nrfClientType - The NfType of the NF registering
    # nrfClientSubscribeTypes - the NFType for which the NF wants to
subscribe to the NRF.
    # appProfiles - The NfProfile of the NF to be registered with NRF.
    # enableF3 - Support for 29.510 Release 15.3
    # enableF5 - Support for 29.510 Release 15.5
```

```
    # renewalTimeBeforeExpiry - Time Period(seconds) before the Subscription
Validity time expires.
    # validityTime - The default validity time(days) for subscriptions.
    # enableSubscriptionAutoRenewal - Enable Renewal of Subscriptions
automatically.
    # acceptAdditionalAttributes - Enable additionalAttributes as part of
29.510 Release 15.5
    # enableVirtualNrfResolution=false
    # virtualNrfFqdn=nf1stub.ocpcf.svc:8080
    # virtualNrfScheme=http
    # virtualNrfPort=8080
    # requestTimeoutGracePeriod=2
    # nrfRetryConfig=[{ "serviceRequestType": "ALL_REQUESTS",
"primaryNRFRetryCount": 1, "nonPrimaryNRFRetryCount" : 1,
"alternateNRFRetryCount" : -1, "errorReasonsForFailure":
[503,504,500,"SocketTimeoutException","JsonProcessingException","UnknownHostEx
ception","NoRouteToHostException", "IOException"], "gatewayErrorCodes":
[503,429], "requestTimeout": 100 },{"serviceRequestType":
"AUTONOMOUS_NFREGISTER", "primaryNRFRetryCount": 1,
"nonPrimaryNRFRetryCount": 1, "alternateNRFRetryCount": -1,
"errorReasonsForFailure":
[503,504,500,"SocketTimeoutException","JsonProcessingException","UnknownHostEx
ception","NoRouteToHostException", "IOException"], "gatewayErrorCodes":
[503,429], "requestTimeout": 100 }]
    # healthCheckConfig={ "healthCheckCount": -1, "healthCheckInterval": 5,
"requestTimeout": 10, "errorReasonsForFailure":
[503,504,500,"SocketTimeoutException","JsonProcessingException","UnknownHostEx
ception","NoRouteToHostException", "IOException"], "gatewayErrorCodes":
[503,429] }
   profile: |-
    [appcfg]
    primaryNrfApiRoot=nrf1-api-gateway.svc:80
    secondaryNrfApiRoot=nrf2-api-gateway.svc:80
    nrfScheme=http
    retryAfterTime=PT120S
    nrfClientType=BSF
    nrfClientSubscribeTypes=CHF,UDR,BSF
    appProfiles=[{ "nfInstanceId": "fe7d992b-0541-4c7d-ab84-c6d70b1b0123",
"nfSetIdList" = ["set1yz.pcfset.5gc.mnc012.mcc345",
"set1a.pcfset.5gc.mnc112.mcc345"] ,"nfType": "PCF", "nfStatus": "REGISTERED",
"plmnList": null, "nsiList": null, "fqdn": "occnp-ocpm-ingress-
gateway.ocpcf.svc", "interPlmnFqdn": null, "ipv4Addresses": null,
"ipv6Addresses": null, "priority": null, "capacity": null, "load": 80,
"locality": null, "pcfInfo": { "dnnList": [ "internet", "volte" ],
"supiRanges": [ { "start": "12123444444", "end": "232332323323232",
"pattern": null } ] }, "customInfo": null, "recoveryTime": null,
"nfServices": [ { "serviceInstanceId": "03063893-
cf9e-4f7a-9827-067f6fa9dd01", "serviceName": "npcf-am-policy-control",
"versions": [ { "apiVersionInUri": "v1", "apiFullVersion": "1.0.0", "expiry":
null } ], "scheme": "http", "nfServiceStatus": "REGISTERED", "fqdn": "occnp-
ocpm-ingress-gateway.ocpcf.svc", "interPlmnFqdn": null, "ipEndPoints": null,
"apiPrefix": null, "defaultNotificationSubscriptions": null, "allowedPlmns":
null, "allowedNfTypes": [ "AMF", "NEF" ], "allowedNfDomains": null,
"allowedNssais": null, "priority": null, "capacity": null, "load": null,
"recoveryTime": null, "supportedFeatures": null }, { "serviceInstanceId":
"03063893-cf9e-4f7a-9827-067f6fa9dd02", "serviceName": "npcf-
```

```
smpolicycontrol", "versions": [ { "apiVersionInUri": "v1", "apiFullVersion":
"1.0.0", "expiry": null } ], "scheme": "http", "nfServiceStatus":
"REGISTERED", "fqdn": "occnp-ocpm-ingress-gateway.ocpcf.svc",
"interPlmnFqdn": null, "ipEndPoints": null, "apiPrefix": null,
"defaultNotificationSubscriptions": null, "allowedPlmns": null,
"allowedNfTypes": [ "SMF", "NEF", "AF" ], "allowedNfDomains": null,
"allowedNssais": null, "priority": null, "capacity": null, "load": null,
"recoveryTime": null, "supportedFeatures": null }, { "serviceInstanceId":
"03063893-cf9e-4f7a-9827-067f6fa9dd03", "serviceName": "npcf-ue-policy-
control", "versions": [ { "apiVersionInUri": "v1", "apiFullVersion": "1.0.0",
"expiry": null } ], "scheme": "http", "nfServiceStatus": "REGISTERED",
"fqdn": "occnp-ocpm-ingress-gateway.ocpcf.svc", "interPlmnFqdn": null,
"ipEndPoints": null, "apiPrefix": null, "defaultNotificationSubscriptions":
null, "allowedPlmns": null, "allowedNfTypes": [ "AMF" ], "allowedNfDomains":
null, "allowedNssais": null, "priority": null, "capacity": null, "load":
null, "recoveryTime": null, "supportedFeatures": null } ]}]
    enableF3=true
    enableF5=true
    renewalTimeBeforeExpiry=3600
    validityTime=30
    enableSubscriptionAutoRenewal=true
    acceptAdditionalAttributes=false
    supportedDataSetId=POLICY
```

Table 3-20 Configurable Parameters for nrf-client-nfdiscovery

Parameter	Description
nrf-client.nrf-client-nfdiscovery.configmapApplicationConfig	This **mandatory** parameter is used to provide inputs to NRF Client for NF discovery.
nrf-client.nrf-client-nfdiscovery.readinessProbe.httpGet.port	This **mandaroty** parameter that specifies the port to be used for readiness probes. **Default Value**: 9000
nrf-client.nrf-client-nfdiscovery.livenessProbe.httpGet.port	This **mandaroty** parameter that specifies the port to be used for liveness probes. **Default Value**: 9000

Here is a sample configuration for NRF client in `ocbsf_custom_values_24.3.0.yaml` file:

```
nrf-client:
 nrf-client-nfdiscovery:
  readinessProbe:
```

```
   httpGet:
    port: *containerMonitoringHttp
  livenessProbe:
   httpGet:
    port: *containerMonitoringHttp
```

Table 3-21 Configurable Parameters for nrf-client-nfmanagement

Parameter	Description
nrf-client.nrf-client-nfmanagement.configmapApplicationConfig	This **mandatory** is used to provide inputs to NRF Client for NF management.
nrf-client.nrf-client-nfmanagement.readinessProbe.httpGet.port	This **mandatory** parameter that specifies the port to be used for readiness probes. **Default Value**: 9000
nrf-client.nrf-client-nfmanagement.livenessProbe.httpGet.port	This **mandatory** parameter that specifies the port to be used for liveness probes. **Default Value**: 9000

Here is a sample configuration for NRF client in `ocbsf_custom_values_24.3.0.yaml` file:

```
nrf-client:
 nrf-client-nfmanagement:
  readinessProbe:
   httpGet:
    port: *containerMonitoringHttp
  livenessProbe:
   httpGet:
    port: *containerMonitoringHttp
```

3.7 Configuring Diameter Gateway

This section describes the configurable parameters that you may customize for configuring diameter gateway,

> **Note**
>
> You must configure the parameters listed in the following table only when diameter gateway is enabled.

Table 3-22 Configurable Parameters for Diameter Gateway

Parameter	Description
diam-gateway.configserverContainerImage	This parameter specifies the name of the container image of configuration service for Diameter Gateway. For BSF, the default value is set to `oc-config-server`.
diam-gateway.envMysqlDatabaseConfigServer	This parameter specifies the name of the database of configuration service for Diameter Gateway. For BSF, the default value is set to `ocbsf_config_server`.
diam-gateway.envDiameterRealm	This mandatory parameter specifies the Diameter Realm of BSF diameter gateway. For example, `oracle.com`.
diam-gateway.envDiameterIdentity	This mandatory parameter specifies the Diameter host of BSF diameter gateway. For example, `ocbsf-diam-gateway`.
diam-gateway.envDbConnStatusHttpEnabled	This parameter specifies whether to enable or disable monitoring of the connectivity status of the database service. The default value of this parameter is `false`.
diam-gateway.envSupportedIpAddressType	This parameter specifies the IP address type to be configured as diameter peer nodes. When the value is specified as IPv4, hosts with IPv4 address type are configured as diameter peer nodes and hosts with IPv6 address type are ignored. When the value is specified as IPv6, hosts with IPv6 address type are configured as diameter peer nodes and hosts with IPv4 address type are ignored. To configure hosts with both IPv4 and IPv6 address types, set the value for this parameter as `Both`.
diam-gateway.envDiameterHostIp	Contains all the k8s cluster worker node names and corresponding IP addresses in the following format: NodeName1=<ip1>,NodeName2=<ip2> If LoadBalancer is being used, provide its IP.

Here is a sample configuration in `ocbsf_custom_values_24.3.0.yaml` file:

```
diam-gateway:
  configserverContainerImage: *configServerImage
  envMysqlDatabaseConfigServer: *configServerDB

  # Graceful Termination
  gracefulShutdown:
    gracePeriod: 30s
  envDiameterRealm: 'oracle.com'
  envDiameterIdentity: 'ocbsf-diam-gateway'
  #This should contain all the k8s cluster worker node name and ip
  #corresponding to it in a format i.e. NodeName1=<ip1>,NodeName2=<ip2>
  #If LoadBalancer is being used then give all ip as LoadBalancer's ip
  envDiameterHostIp: ''
  envDbConnStatusHttpEnabled: false
  envSupportedIpAddressType: 'IPv4'
  staticIpAddress: ''
  staticDiamNodePort: *svcDiamGatewayDiamNodePort
  deployment:
```

```
    customExtension:
      annotations: {
          # Enable this section for service-mesh based installation
  #          traffic.sidecar.istio.io/excludeOutboundPorts: "9000,5801",
  #          traffic.sidecar.istio.io/excludeInboundPorts: "9000,5801"
      }
```

The `lbService` provides the annotations and labels for service diameter gateway and the `nonlbService` provides annotations and labels for headless diameter gateway.

3.8 API Root Configuration for Notification URI

This section describes the configuration parameters that can be used to API Root configuration.

To configure these parameters, you should configure the following configurable parameters in the `ocbsf_custom_values_24.3.0.yaml` file:

Table 3-23 Configurable Parameters for Api Root Configuration for Notification URI

Parameter	Description
global.bsfApiRoot	This optional parameter specifies the API root of BSF that is used in notification URLs generated by BSF's when sending request to other producer NFs. If the value is not configured for this parameter, the ingress gateway service name and port is used as default value. For example: `https://<Helm namespace>-ocbsf-ingress-gateway:443`.
global.deploymentNrfClientService.nfApiRoot	This mandatory parameter specifies Api root of BSF. **Note**: This parameter must be configured only when when NRF Client services are enabled. Its value should be same as the value of "`global.bsfApiRoot`" parameter.

```
# API root of BSF that will be used in notification URLs generated by BSF's
when sending request to other producer NFs
  #If not configured then the ingress gateway service name and port will be
used as default value. ex:"https://<helm name>-ocbsf-ingress-gateway:443"
global:
    bsfApiRoot: ''
    deploymentNrfClientService:
        #same as bsfApiRoot
        nfApiRoot: ''
```

3.9 TLS Configurations

The following table describes the newly introduced and updated parameters for TLS:

Table 3-24 Helm Parameters

Parameter Name	Description	Mandatory/ Optional/ Conditional	Details
clientDisabledExtension	Disables the extension sent by messages originated by clients (ClientHello).	O	Data Type: String Range: NA Default Value: ec_point_formats
serverDisabledExtension	Disables the extension sent by messages originated by servers (ServerHello).	O	Data Type: String Range: NA Default Value: null
tlsNamedGroups	Provides a list of values sent in the supported_groups extension. These are comma-separated values.	O	Data Type: String Range: NA Default Value: null
clientSignatureSchemes	Provides a list of values sent in the signature_algorithms extension. These are comma-separated values.	O	Data Type: String Range: NA Default Value: null
tlsVersion	Indicates the TLS version.	M	Data Type: String Range: • TLSv1.2, TLSv1.3 • TLSv1.2 • TLSv1.3 Default Value: TLSv1.2, TLSv1.3
allowedCipherSuites	Indicates allowed Ciphers suites.	O	Data Type: String Range: NA Default Values: • TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 • TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384 • TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256 • TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 • TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 • TLS_AES_256_GCM_SHA384 • TLS_AES_128_GCM_SHA256 • TLS_CHACHA20_POLY1305_SHA256

Table 3-24 (Cont.) Helm Parameters

Parameter Name	Description	Mandatory/ Optional/ Conditional	Details
cipherSuites	Indicates supported cipher suites.	O	Data Type: String Range: NA Default Values: • TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 • TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384 • TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256 • TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 • TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 • TLS_AES_256_GCM_SHA384 • TLS_AES_128_GCM_SHA256 • TLS_CHACHA20_POLY1305_SHA256

The following global sample Helm configuration is required for TLS 1.3:

```
global:
    tlsVersion: &tlsVersion 'TLSv1.2,TLSv1.3'
  # supportedCipherSuiteList: &supportedCipherSuiteList
'TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256'
  cipherSuites: &cipherSuites
    - TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384
    - TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384
    - TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256
    - TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256
    - TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256
    - TLS_AES_256_GCM_SHA384
    - TLS_AES_128_GCM_SHA256
    - TLS_CHACHA20_POLY1305_SHA256

  allowedCipherSuites: &allowedCipherSuites
    - TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384
    - TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384
    - TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256
    - TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256
    - TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256
    - TLS_AES_256_GCM_SHA384
    - TLS_AES_128_GCM_SHA256
    - TLS_CHACHA20_POLY1305_SHA256
```

The following Egress Gateway configuration is required for TLS 1.3:

```
egress-gateway:
#Cipher Suites to be enabled on client side
  clientDisabledExtension: null
  serverDisabledExtension: null
  tlsNamedGroups: null
  clientSignatureSchemes: null




  #Enabling it for egress https requests
  enableOutgoingHttps: true

  #Enabling it for egress http1.1 requests
  http1:
    enableOutgoingHTTP1: false # Flag to enable or disable the feature

  egressGwCertReloadEnabled: false
  egressGwCertReloadPath: /egress-gw/store/reloadservice:
    ssl:
      tlsVersion: *tlsVersion
      #supportedCipherSuiteList:*supportedCipherSuiteList
      privateKey:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        rsa:
          fileName: rsa_private_key_pkcs1.pem
        ecdsa:
          fileName: ssl_ecdsa_private_key.pem
      certificate:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        rsa:
          fileName: ocegress.cer
        ecdsa:
          fileName: ssl_ecdsa_certificate.crt
      caBundle:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        fileName: caroot.cer
      keyStorePassword:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        fileName: key.txt
      trustStorePassword:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        fileName: trust.txt



  httpsTargetOnly: "true"
```

```
  #true: Means change Scheme of RURI to http
  #false: Keep scheme as is.
  httpRuriOnly: "false"
```

> **Note**
>
> "httpsTargetOnly" must be set to `true` and "httpRuriOnly" must be set to `false`.

The following Ingress Gateway configuration is required for TLS 1.3:

```
ingress-gateway:
#Cipher Suites to be enabled on client side
  clientDisabledExtension: null
  serverDisabledExtension: null
  tlsNamedGroups: null
  clientSignatureSchemes: null



  # Enable it to accept incoming http requests
  enableIncomingHttp: true

  # ---- HTTPS Configuration - BEGIN ----
  enableIncomingHttps: true

  service:
    ssl:
      tlsVersion: *tlsVersion
      #supportedCipherSuiteList: *supportedCipherSuiteList
      privateKey:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        rsa:
          fileName: rsa_private_key_pkcs1.pem
      certificate:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        rsa:
          fileName: ocegress.cer
      caBundle:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        fileName: caroot.cer
      keyStorePassword:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        fileName: key.txt
      trustStorePassword:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        fileName: trust.txt
```

For more information on HTTPS Configurations in Egress/Ingress Gateway, see Configuring Ingress/Egress Gateway HTTPS.

The following NRF configuration is required for TLS 1.3:

```
nrf-client:
  profile: |-
      [appcfg]
      primaryNrfApiRoot=nrf1-api-gateway.svc:8443
      secondaryNrfApiRoot=nrf2-api-gateway.svc:8443
      nrfScheme=https
```

> **Note**
>
> NRF ports must be changed from `8080` to `8443`. Moreover, the `nrfScheme` must be changed from `http` to `https`.

3.10 TLS Configuration in Diameter Gateway

Configurable Parameters for TLS in Diameter Gateway:

Table 3-25 Configurable Parameters for TLS in Diameter Gateway

Parameter	Description	Mandatory/Optional/ Conditional	Default Vaue
TLS_ENABLED	To enable or disable TLS.	O	false
TLS_DIAMETER_PORT	Listening port diameter TLS.	O	5868

Table 3-25 (Cont.) Configurable Parameters for TLS in Diameter Gateway

Parameter	Description	Mandatory/Optional/ Conditional	Default Vaue
TLS_CIPHER_SUITE	To configure ciphers suites.	O	**TLS 1.2** • TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 • TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384 • TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256 • TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 • TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 **TLS 1.3** • TLS_AES_256_GCM_SHA384 • TLS_AES_128_GCM_SHA256 • TLS_CHACHA20_POLY1305_SHA256
TLS_INITIAL_ALGORITHM	To configure initial algorithm. ES256 or RS256	O	RS256
TLS_SECRET_NAME	Secret name for TLS configs	O	dgw-tls-secret
TLS_RSA_PRIVATE_KEY_FILENAME	To configure the filename for RSA private key, that will be stored in secret.	O	dgw-key.pem
TLS_ECDSA_PRIVATE_KEY_FILENAME	To configure the filename for ECDSA private key, that will be stored in secret.	O	dgw-ecdsa-private-key.pem
TLS_RSA_CERTIFICATE_FILENAME	To configure the filename for RSA certificate, that will be stored in secret.	O	dgw-cert.crt
TLS_ECDSA_CERTIFICATE_FILENAME	To configure the filename for ECDSA certificate, that will be stored in secret.	O	dgw-ecdsa-certificate.crt
TLS_CA_BUNDLE_FILENAME	To configure the filename for CA Bundle, that will be stored in secret.	O	ca-cert.cer
TLS_MTLS_ENABLED	To enable or disable mTLS	O	true

> **Note**
>
> Selective enabling of TLS version can be done through Diameter Gateway deployment file. The TLS_VERSION can be
>
> - TLSv1.2, TLSv1.3
> - TLSv1.2
> - TLSv1.3

The following global sample Helm configuration is required for TLS in Diameter Gateway:

```
tls:
    enabled: false
    initialAlgorithm: 'RS256'
    secretName: 'dgw-tls-secret'
    cipherSuites:
      - TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384
      - TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384
      - TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256
      - TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256
      - TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256
      - TLS_AES_256_GCM_SHA384
      - TLS_AES_128_GCM_SHA256
      - TLS_CHACHA20_POLY1305_SHA256
```

3.11 Configuring Ingress Gateway

This section describes the configuration parameters that are required for configurations in Ingress Gateway.

> **Note**
>
> Following configurations are applicable only when Ingress Gateway is enabled.

Table 3-26 Configurable Parameters for Ingress Gateway at Global Section

Parameter	Description	Mandatory/ Optional Parameter	Default Value
global.metalLbIpAllocationEnabled	Enable or disable IP Address allocation from Metallb Pool	Optional	false
global.metalLbIpAllocationAnnotation	Address Pool Annotation for Metallb	Optional	`metallb.universe.tf/address-pool: signaling`

Table 3-27 Configurable Parameters for Ingress Gateway

Parameter	Description	Mandatory /Optional Parameter	Default Value
ingress-gateway.enableIncomingHttp	Enable it to accept incoming http requests	Optional	true
ingress-gateway.ingressServer.keepAlive.enabled		Optional	false
ingress-gateway.ingressServer.keepAlive.idealTime		Optional	180 (in seconds)
ingress-gateway.ingressServer.keepAlive.count		Optional	9
ingress-gateway.ingressServer.keepAlive.interval		Optional	60 (in seconds)
ingress-gateway.isIpv6Enabled	Set the value to true for this parameter when NF is deployed in IPv6 cluster.	Optional	false
ingress-gateway.minAvailable	Specifies the number of pods that must always be available, even during a disruption.	Optional	1
ingress-gateway.minReplicas	Specifies the minimum replicas to scale to maintain an average CPU utilization.	Optional	1
ingress-gateway.maxReplicas	Specifies the maximum replicas to scale to maintain an average CPU utilization.	Optional	1
ingress-gateway.userAgentHeaderValidationConfigMode	This flag is used to accept the user-agent configurations from Helm or REST.	Mandatory	Helm
ingress-gateway. userAgentHeaderValidation.enabled	Specifies the type of validation that will be taken into consideration when processing the values born on the user agent header.	Mandatory	False
ingress-gateway.userAgentHeaderValidation.validationType	Specifies the type of validation that will be taken into consideration when processing the values on the user agent header.	Mandatory	Relaxed
ingress-gateway.userAgentHeaderValidation.consumerNfTypes	Compares the NF Type born in the user agent header present in the incoming requests towards CNC PCF's Ingress Gateway.	Mandatory	EMPTY
ingress-gateway.enableIncomingHttps	To enable HTTPS for ingress traffic.	Mandatory	false
ingress-gateway.service.ssl.privateKey.k8SecretName	Name of the Kubernetes Secret which contains the private key for BSF,	Mandatory	Not applicable

Table 3-27 (Cont.) Configurable Parameters for Ingress Gateway

Parameter	Description	Mandatory /Optional Parameter	Default Value
ingress-gateway.service.ssl.privateKey.k8NameSpace	Name of the Kubernetes Namespace where the Kubernetes Secret containing the private key for BSF can be found	Mandatory	Not applicable
ingress-gateway.service.ssl.privateKey.rsa.fileName	File name for BSF's private key generated using the RSA algorithm	Mandatory	Not applicable
ingress-gateway.service.ssl.certificate.k8SecretName	Name of the Kubernetes Secret which contains the BSF Certificate.	Mandatory	Not applicable
ingress-gateway.service.ssl.certificate.k8NameSpace	Name of the Kubernetes Namespace where the Kubernetes Secret containing the BSF Certificate can be found.	Mandatory	Not Applicable
ingress-gateway.service.ssl.certificate.rsa.fileName	File name for BSF's Certificate, generated using an RSA resources.	Mandatory	Not Applicable
ingress-gateway.service.ssl.caBundle.k8SecretName	Name of the Kubernetes Secret which contains the Trust Chain Certificate.	Mandatory	Not Applicable
ingress-gateway.service.ssl.caBundle.k8NameSpace	Name of the Kubernetes Namespace where the Kubernetes Secret containing the Trust Chain Certificate can be found.	Mandatory	Not Applicable
ingress-gateway.service.ssl.caBundle.fileName	File name for the Trust Chain Certificate	Mandatory	Not Applicable
ingress-gateway.service.ssl.keyStorePassword.k8SecretName	Name of the Kubernetes Secret which contains the Key Store Password file	Mandatory	Not Applicable
ingress-gateway.service.ssl.keyStorePassword.k8NameSpace	Name of the Kubernetes Namespace where the Kubernetes Secret containing the Key Store Password file can be found.	Mandatory	Not Applicable
ingress-gateway.service.ssl.keyStorePassword.fileName	File name that has password for keyStore	Mandatory	Not Applicable
ingress-gateway.service.ssl.trustStorePassword.k8SecretName	Name of the Kubernetes Secret which contains the Trust Store Password file.	Mandatory	Not Applicable
ingress-gateway.service.ssl.trustStorePassword.k8NameSpace	Name of the Kubernetes Namespace where the Kubernetes Secret containing the Trust Store Password file can be found.	Mandatory	Not Applicable

Table 3-27 (Cont.) Configurable Parameters for Ingress Gateway

Parameter	Description	Mandatory /Optional Parameter	Default Value
ingress-gateway.service.ssl.trustStorePassword.fileName	File name that has password for TrustStore	Mandatory	Not Applicable
ingress-gateway.service.ssl.tlsVersion	Indicates the TLS version.	Mandatory	**Data Type**: String **Default Value**: TLSv1.2 **Range**: • TLSv1.2 • TLSv1.3
ingress-gateway.allowedCipherSuites	Indicates the allowed Ciphers suites.	Optional	**Data Type**: String **Default Value**: NA **Range**: • TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 • TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384 • TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256 • TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 • TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256

Table 3-27 (Cont.) Configurable Parameters for Ingress Gateway

Parameter	Description	Mandatory /Optional Parameter	Default Value
ingress-gateway.cipherSuites	Indicates the supported cipher suites.	Optional	**Data Type**: String **Default Value**: NA **Range**: • TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 • TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384 • TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256 • TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 • TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 • TLS_AES_256_GCM_SHA384 • TLS_AES_128_GCM_SHA256 • TLS_CHACHA20_POLY1305_SHA256
ingress-gateway.message-copy.enabled	Indicates whether to enable or disable message copy at the Gateway.	Optional	false
ingress-gateway.message-copy.copyPayload	Indicates whether to enable or disable message payload (HTTP message body) in the feed towards Oracle Communications Network Analytics Data Director (OCNADD).		true
ingress-gateway.message-copy.topicName	List of comma-separated Kafka Nodes.		
ingress-gateway.message-copy.ackRequired	Indicates whether to whether to wait for acknowledgement from Kafka or not.		false
ingress-gateway.message-copy.retryOnFailure	Specifies the number of times Ingress Gateway must retry if the message was not sent to Kafka successfully.		0
ingress-gateway.message-copy.threadPoolConfigurations.coreSize	Specifies the core size of the thread pool.		8

Table 3-27 (Cont.) Configurable Parameters for Ingress Gateway

Parameter	Description	Mandatory /Optional Parameter	Default Value
ingress-gateway.message-copy.threadPoolConfigurations.maxSize	Specifies the maximum size of the thread pool.		8

Note

Configuring threadPoolConfigurations.coreSize

Table 3-27 (Cont.) Configurable Parameters for Ingress Gateway

Parameter	Description	Mandatory /Optional Parameter	Default Value
			and threadPoolConfigurations.maxSizeensuresthefixedsi

Table 3-27 (Cont.) Configurable Parameters for Ingress Gateway

Parameter	Description	Mandatory /Optional Parameter	Default Value
			zethreadpool, whichelimineatesthepeerformanceoverheadof

Table 3-27 (Cont.) Configurable Parameters for Ingress Gateway

Parameter	Description	Mandatory /Optional Parameter	Default Value
			threadcreationatruntime.
ingress-gateway.message-copy.threadPoolConfigurations.queueCapacity	Specifies the the maximum number of message copy events that may remain on a queue once published.		1000
ingress-gateway.message-copy.security.enabled	Enables the SSL/SASL_SSL based communication between NRF and OCNADD		false
ingress-gateway.message-copy.security.protocol	This parameter is used to define the security mechanism using which NRF and OCNADD will communicate over the wire.		SASL_SSL
ingress-gateway.message-copy.security.tlsVersion	This parameter is used to define the supported TLS version by NRF, which will be used during TLS version negotiation		TLSv1.2
ingress-gateway.message-copy.security.saslConfiguration.username	This parameters is used to define the username that will be used by NRF to authenticate itself with DD if the messageCopy.security.protocol=SASL_SSL.		

Table 3-27 (Cont.) Configurable Parameters for Ingress Gateway

Parameter	Description	Mandatory /Optional Parameter	Default Value
ingress-gateway.message-copy.security.saslConfiguration.username.password.k8SecretName	This parameters is used to define the password that will be used by NRF to authenticate itself with DD if the messageCopy.security.protocol=SASL_SSL. The password is stored in a k8s secret. security.saslConfiguration.username.password.k8SecretName stores the secret name.		
ingress-gateway.message-copy.security.saslConfiguration.username.password.k8NameSpace	Stores the name of the NRF deployment namespace.		
ingress-gateway.message-copy.security.saslConfiguration.username.password.fileName	Indicates the password file which is used to create ssl secret.		
ingress-gateway.kafka.bootstrapAddress	Indicates the bootstrap address of the broker from where the Kakfa client can retrieve the metadata of the clusters.		

Here is a sample configuration for configurable parameters in `ocbsf_custom_values_24.3.0.yaml` file:

```
ingress-gateway:

  #keep alive settings
  ingressServer:
    keepAlive:
      enabled: false
      idealTime: 180  #in seconds
      count: 9
      interval: 60 #in seconds

  allowedCipherSuites:
    - TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384
    - TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384
    - TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256
    - TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256
    - TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256

  cipherSuites:
    - TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384
    - TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384
    - TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256
```

```
    - TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256
    - TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256

  # ----  User Agent Validation Configuration - BEGIN ----
  userAgentHeaderValidationConfigMode: HELM
  userAgentHeaderValidation:
    enabled: false
    validationType: relaxed
    # List of consumer NF Types to be matched against the value of User-Agent
header in the request
    consumerNfTypes:
      - "PCF"
      - "AF"
      - "NEF"
  # ----  User Agent Validation Configuration - END ----

  # Enable it to accept incoming http requests
  enableIncomingHttp: true

  # ---- HTTPS Configuration - BEGIN ----
  enableIncomingHttps: false

  service:
    ssl:
      tlsVersion: TLSv1.2
      #supportedCipherSuiteList: TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256
      privateKey:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        rsa:
          fileName: rsa_private_key_pkcs1.pem
      certificate:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        rsa:
          fileName: ocegress.cer
      caBundle:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        fileName: caroot.cer
      keyStorePassword:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        fileName: key.txt
      trustStorePassword:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        fileName: trust.txt

  # Enable or disable IP Address allocation from Metallb Pool
  metalLbIpAllocationEnabled: false

  # Address Pool Annotation for Metallb
  metalLbIpAllocationAnnotation: "metallb.universe.tf/address-pool: signaling"
  # -----Ingress Gateway Settings - END-----
  message-copy:
```

```
    enabled: false
    copyPayload: false
    topicName: bsfMessageFeed
    ackRequired: false
    retryOnFailure: 0
    security:
      enabled: false
      protocol: SASL_SSL
      tlsVersion: TLSv1.2
      saslConfiguration:
        userName: test
        password:
          k8SecretName: message-copy-secret
          k8NameSpace: bsf
          fileName: password.txt
    threadPoolConfigurations:
      coreSize: 8
      maxSize: 8
      queueCapacity: 1000

  kafka:
    bootstrapAddress:
```

3.12 Configuring Egress Gateway

This section describes the configuration parameters that are required for configurations in Egress Gateway.

> **Note**
>
> Following configurations are applicable only when Egress Gateway is enabled.

Table 3-28 Configurable Parameters for Configurations in Egress Gateway

Parameter	Description
egress-gateway.enableForwardedHeader	Enabling this parameter, egress-gateway will add Forwarded and x-Forwaredheaders. By default, the value is set to false.
egress-gateway.isIpv6Enabled	Set the value to true for this parameter when NF is deployed in IPv6 cluster.
egress-gateway.minAvailable	Specifies the number of pods that must always be available, even during a disruption.
egress-gateway.minReplicas	Specifies the minimum replicas to scale to maintain an average CPU utilization.
egress-gateway.maxReplicas	Specifies the maximum replicas to scale to maintain an average CPU utilization.
egress-gateway.userAgentHeaderConfigMode	This parameter is used to accept the user-agent configurations from Helm or REST.

Table 3-28 (Cont.) Configurable Parameters for Configurations in Egress Gateway

Parameter	Description
egress-gateway.userAgentHeader.enabled	Specifies whether the feature is enabled or disabled. By default, the value is set to false.
egress-gateway.userAgentHeader.nfType	This parameter holds the nfType that will be used to generate the user agent header.
egress-gateway.userAgentHeader.nfInstanceId	This parameter represents the UUID of the CNPCF deployment that will be used to generate the user agent header.
egress-gateway.userAgentHeader.addFqdnToHeader	This parameter specifies if the user agent will use the FQDN information under the module to append it when generating the user agent header.The default value is set to 'false' meaning that the FQDN information will not be encoded into the user agent header during its generation. By default, the value is set to false.
egress-gateway.userAgentHeader.nfFqdn	This is an optional parameter and can be present or not, if operators want to include the FQDN string configured under this section then the parameter userAgentHeader.addFqdnToHeader needs to be enabled.
egress-gateway.userAgentHeader.overwriteHeader	This parameter specifies if the the user agent header is sent or not.
egress-gateway.sniHeader.enabled	Enabling this parameter, egress-gateway will add SNI flag in client hello message of outbound traffic. **Note:** SNI enabling is depending on the initssl parameter from egress-gateway helm charts (Default value of initssl=true[TLS enable] , initssl=false[TLS disable]). It is an optional parameter. By default, the value is set to false.
egress-gateway.enableOutgoingHttps	This parameter is used to enable HTTPS for egress traffic. **Default value**: false
egress-gateway.egressGwCertReloadEnabled	**Default value**: false
egress-gateway.egressGwCertReloadPath	Accepts a valid reload path. **Default value**: /egress-gw/store/reload
egress-gateway.service.ssl.privateKey.k8SecretName	Name of the Kubernetes Secret which contains the private key for BSF, **Default value**: Not applicable
egress-gateway.service.ssl.privateKey.k8NameSpace	Name of the Kubernetes Namespace where the Kubernetes Secret containing the private key for BSF can be found **Default value**: Not applicable

Table 3-28 (Cont.) Configurable Parameters for Configurations in Egress Gateway

Parameter	Description
egress-gateway.service.ssl.privateKey.rsa.fileName	File name for BSF's private key generated using the RSA algorithm **Default value**: Not applicable
egress-gateway.service.ssl.privateKey.ecdsa.fileName	File name for BSF's private key generated using the ECDSA algorithm **Default value**: Not applicable
egress-gateway.service.ssl.certificate.k8SecretName	Name of the Kubernetes Secret which contains the BSF Certificate. **Default value**: Not applicable
egress-gateway.service.ssl.certificate.k8NameSpace	Name of the Kubernetes Namespace where the Kubernetes Secret containing the BSF Certificate can be found. **Default value**: Not applicable
egress-gateway.service.ssl.certificate.rsa.fileName	File name for BSF's Certificate, generated using an RSA resources. **Default value**: Not applicable
egress-gateway.service.ssl.certificate.ecdsa.fileName	File name for BSF's Certificate, generated using an ECDSA resources. **Default value**: Not applicable
egress-gateway.service.ssl.caBundle.k8SecretName	Name of the Kubernetes Secret which contains the Trust Chain Certificate. **Default value**: Not applicable
egress-gateway.service.ssl.caBundle.k8NameSpace	Name of the Kubernetes Namespace where the Kubernetes Secret containing the Trust Chain Certificate can be found. **Default value**: Not applicable
egress-gateway.service.ssl.caBundle.fileName	File name for the Trust Chain Certificate **Default value**: Not applicable
egress-gateway.service.ssl.keyStorePassword.k8SecretName	Name of the Kubernetes Secret which contains the Key Store Password file. **Default value**: Not applicable
egress-gateway.service.ssl.keyStorePassword.k8NameSpace	Name of the Kubernetes Namespace where the Kubernetes Secret containing the Key Store Password file can be found. **Default value**: Not applicable
egress-gateway.service.ssl.keyStorePassword.fileName	File name that has password for keyStore **Default value**: Not applicable
egress-gateway.service.ssl.trustStorePassword.k8SecretName	Name of the Kubernetes Secret which contains the Trust Store Password file. **Default value**: Not applicable
egress-gateway.service.ssl.trustStorePassword.k8NameSpace	Name of the Kubernetes Namespace where the Kubernetes Secret containing the Trust Store Password file can be found. **Default value**: Not applicable

Table 3-28 (Cont.) Configurable Parameters for Configurations in Egress Gateway

Parameter	Description
egress-gateway.service.ssl.trustStorePassword.fileName	File name that has password for TrustStore. **Default value**: Not applicable
egress-gateway.service.ssl.tlsVersion	Indicates the TLS version, a mandatory field. **Data Type**: String **Default Value**: TLSv1.2 **Range**: • TLSv1.2 • TLSv1.3
egress-gateway.allowedCipherSuites	Indicates the allowed Ciphers suites. **Data Type**: String **Default Value**: NA **Range**: • TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 • TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384 • TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256 • TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 • TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256
egress-gateway.cipherSuites	Indicates the supported cipher suites. **Data Type**: String **Default Value**: NA **Range**: • TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 • TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384 • TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256 • TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 • TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 • TLS_AES_256_GCM_SHA384 • TLS_AES_128_GCM_SHA256 • TLS_CHACHA20_POLY1305_SHA256
egress-gateway.message-copy.enabled	Indicates whether to enable or disable message copy at the Gateway. **Default value**: false

Table 3-28 (Cont.) Configurable Parameters for Configurations in Egress Gateway

Parameter	Description
egress-gateway.message-copy.copyPayload	Indicates whether to enable or disable message payload (HTTP message body) in the feed towards Oracle Communications Network Analytics Data Director (OCNADD). **Default value**: true
egress-gateway.message-copy.topicName	List of comma-separated Kafka Nodes.
egress-gateway.message-copy.ackRequired	Indicates whether to whether to wait for acknowledgement from Kafka or not. **Default value**: false
egress-gateway.message-copy.retryOnFailure	Specifies the number of times Egress Gateway must retry if the message was not sent to Kafka successfully. **Default value**: 0
egress-gateway.message-copy.threadPoolConfigurations.coreSize	Specifies the core size of the thread pool. **Default value**: 8
egress-gateway.message-copy.threadPoolConfigurations.maxSize	Specifies the maximum size of the thread pool. **Default value**: 8 **Note** Configuring threadPoolConfigurations.coreSize and threadPoolConfigurations.maxSize ensures the fixed size thread pool, which eliminates the performance overhead of thread creation at runtime.
egress-gateway.message-copy.threadPoolConfigurations.queueCapacity	Specifies the the maximum number of message copy events that may remain on a queue once published. **Default value**: 1000
egress-gateway.message-copy.security.enabled	Enables the SSL/SASL_SSL based communication between NRF and OCNADD. **Default value**: false

Table 3-28 (Cont.) Configurable Parameters for Configurations in Egress Gateway

Parameter	Description
egress-gateway.message-copy.security.protocol	This parameter is used to define the security mechanism using which NRF and OCNADD will communicate over the wire. **Default value**: SASL_SSL
egress-gateway.message-copy.security.tlsVersion	This parameter is used to define the supported TLS version by NRF, which will be used during TLS version negotiation. **Default value**: TLSv1.2
egress-gateway.message-copy.security.saslConfiguration.username	This parameters is used to define the username that will be used by NRF to authenticate itself with DD if the messageCopy.security.protocol=SASL_SSL.
egress-gateway.message-copy.security.saslConfiguration.username.password.k8SecretName	This parameters is used to define the password that will be used by NRF to authenticate itself with DD if the messageCopy.security.protocol=SASL_SSL. The password is stored in a k8s secret. security.saslConfiguration.username.password.k8SecretName stores the secret name.
egress-gateway.message-copy.security.saslConfiguration.username.password.k8NameSpace	Stores the name of the NRF deployment namespace.
egress-gateway.message-copy.security.saslConfiguration.username.password.fileName	Indicates the password file which is used to create SSL secret.
egress-gateway.kafka.bootstrapAddress	Indicates the bootstrap address of the broker from where the Kakfa client can retrieve the metadata of the clusters.

Here is a sample configuration for configurable parameters in `ocbsf_custom_values_24.3.0.yaml`.file:

```
egress-gateway:

  #Enabled when deployed in Ipv6 cluster
  isIpv6Enabled: false

  # enabling this egress-gateway will add Forwarded and x-Forwaredheaders
  enableForwardedHeader: false

  #Cipher Suites to be enabled on client side
  cipherSuites:
    - TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384
    - TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384
    - TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256
    - TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256
    - TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256
```

```
  allowedCipherSuites:
    - TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384
    - TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384
    - TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256
    - TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256
    - TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256

  # ---- User-agent Header configuration - BEGIN ----
  userAgentHeaderConfigMode: HELM
  userAgentHeader:
    enabled: false  # flag to enable or disable the feature
    nfType: ""  # NF type of consumer NF
    nfInstanceId: ""  # NF type of consumer NF
    addFqdnToHeader: false  # Flag to add fqdn. If enabled then user-agent
header will be generated along with the fqdn configured otherwise fqdn will
not be added
    nfFqdn: ""  #fqdn of NF. This is not the fqdn of gateway
    overwriteHeader: false
  # ---- User-agent Header Configuration - END ----

  # ---- HTTPS Configuration - BEGIN ----

  #Enabling it for egress https requests
  enableOutgoingHttps: false

  #Enabling it for egress http1.1 requests
  http1:
    enableOutgoingHTTP1: false # Flag to enable or disable the feature

  egressGwCertReloadEnabled: false
  egressGwCertReloadPath: /egress-gw/store/reload

  service:
    ssl:
      tlsVersion: TLSv1.2
      #supportedCipherSuiteList: TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256
      privateKey:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        rsa:
          fileName: rsa_private_key_pkcs1.pem
        ecdsa:
          fileName: ssl_ecdsa_private_key.pem
      certificate:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        rsa:
          fileName: ocegress.cer
        ecdsa:
          fileName: ssl_ecdsa_certificate.crt
      caBundle:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        fileName: caroot.cer
      keyStorePassword:
```

```
      k8SecretName: ocbsf-gateway-secret
      k8NameSpace: ocbsf
      fileName: key.txt
    trustStorePassword:
      k8SecretName: ocbsf-gateway-secret
      k8NameSpace: ocbsf
      fileName: trust.txt
# ---- HTTPS Configuration - END ----
message-copy:
  enabled: false
  copyPayload: false
  topicName: bsfMessageFeed
  ackRequired: false
  retryOnFailure: 0
  security:
    enabled: false
    protocol: SASL_SSL
    tlsVersion: TLSv1.2
    saslConfiguration:
      userName: test
      password:
         k8SecretName: message-copy-secret
         k8NameSpace: bsf
        fileName: password.txt
  threadPoolConfigurations:
    coreSize: 8
    maxSize: 8
    queueCapacity: 1000

kafka:
  bootstrapAddress:
```

3.13 Configuring Service and Container Ports

This section describes the customizations that you can make in `ocbsf_custom_values_24.3.0.yaml` file to configure service and container ports.

> **Note**
>
> For upgrade scenario, changing port will cause temporary service disruption.

To override the default port numbers, used by service and container ports, and customize them as per your requirements, you can configure the following configurable parameters in `ocbsf_custom_values_24.3.0.yaml` file:

Table 3-29 Customizable Parameters for Service Ports Configuration

Parameter	Description	Mandatory/ Optional Parameter	Default Value
global.servicePorts.bsfManagementServiceHttp	HTTP signaling port for BSF management service.	Optional	5903

Table 3-29 (Cont.) Customizable Parameters for Service Ports Configuration

Parameter	Description	Mandatory/ Optional Parameter	Default Value
global.servicePorts.bsfManagementServiceHttps	HTTPS signaling port for BSF management service.	Optional	8443
global.servicePorts.appInfoHttp	HTTP signaling port for app info. Note: The value for this port must be same as `svcAppInfoHttp`	Optional	5906
global.servicePorts.cmServiceHttp	HTTP signaling port for CM service.	Optional	5808
global.servicePorts.configServerHttp	HTTP signaling port for config server. Note: The value for this port must be same as `svcConfigServerHttp`	Optional	5807
global.servicePorts.diamGatewayHttp	HTTP signaling port for Diameter gateway.	Optional	8080
global.servicePorts.diamGatewayDiameter	Port for Diameter gateway.	Optional	3868
global.servicePorts.perfInfoHttp	HTTP signaling port for perf info. The value for this port must be same as `svcPerfInfoHttp`.	Optional	5905
global.servicePorts.queryServiceHttp	HTTP signaling port for query service.	Optional	5805
global.servicePorts.auditServiceHttp	This HTTP signaling port is used for audit service.	Optional	8000
global.servicePorts.egressGatewayHttp	HTTP signaling port for Egress Gateway. The value for this port must be same as `svcEgressGatewayHttp`.	Optional	8080
global.servicePorts.nrfClientNfManagementHttp	HTTP signaling port for NRF client management service. The value for this port must be same as `svcNrfClientNfManagementHttp`.	Optional	5910
global.servicePorts.nrfClientNfManagementHttps	HTTPS signaling port for NRF client management service. The value for this port must be same as `svcNrfClientNfManagementHttps`.	Optional	5805

Table 3-29 (Cont.) Customizable Parameters for Service Ports Configuration

Parameter	Description	Mandatory/ Optional Parameter	Default Value
global.servicePorts.nrfClientNfDiscoveryHttp	HTTP signaling port for NF discovery service by NRF client. The value for this port must be same as `svcNrfClientNfDiscoveryHttp`.	Optional	8000
global.servicePorts.nrfClientNfDiscoveryHttps	HTTP signaling port for NF discovery service by NRF client. The value for this port must be same as `svcNrfClientNfDiscoveryHttps`.	Optional	9443
global.servicePorts.alternateRouteServiceHttp	HTTP signaling port for alternate route service. The value for this port must be same as `svcAlternateRouteServiceHttp`.	Optional	8000
global.servicePorts.alternateRouteServiceHazelcast	The value for this port must be same as `svcAlternateRouteServiceHazelcast`.	Optional	8000

Here is a sample of service ports configurable parameters in `ocbsf_custom_values_24.3.0.yaml` file:

```
servicePorts:
    bsfManagementServiceHttp: 5903
    bsfManagementServiceHttps: 8443
    # app info
    appInfoHttp: &svcAppInfoHttp 8000
    # cm service
    cmServiceHttp: &svcCmServiceHttp 8000
    # config server
    configServerHttp: &svcConfigServerHttp 8000
    # diameter gateway
    diamGatewayHttp: 8000
    diamGatewayDiameter: 3868
    # perf info
    perfInfoHttp: &svcPerfInfoHttp 8000
    # query service
    queryServiceHttp: 8000
    # audit service
    auditServiceHttp: 8000
    # egress gateway
    egressGatewayHttp: &svcEgressGatewayHttp 8000
    # nrf client
```

```
nrfClientNfDiscoveryHttp: &svcNrfClientNfDiscoveryHttp 8000
nrfClientNfManagementHttp: &svcNrfClientNfManagementHttp 8000
nrfClientNfDiscoveryHttps: &svcNrfClientNfDiscoveryHttps 9443
nrfClientNfManagementHttps: &svcNrfClientNfManagementHttps 9443
# alternate route
alternateRouteServiceHttp: &svcAlternateRouteServiceHttp 8000
alternateRouteServiceHazelcast: &svcAlternateRouteServiceHazelcast 8000
```

Table 3-30 Customizable Parameters for Container Ports Configuration

Parameter	Description	Mandatory/ Optional Parameter	Default Value
global.containerPorts.monitoringHttp	HTTP signaling port for monitoring. Note: The value for this port must be same as `containerMonitoringHttp`.	Optional	9000
global.containerPorts.bsfManagementServiceHttp	HTTP signaling port for BSF Management service.	Optional	8080
global.containerPorts.bsfManagementServiceHttps	HTTPS signaling port for BSF Management service.	Optional	8443
global.containerPorts.appInfoHttp	HTTP signaling port for app info.	Optional	5906
global.containerPorts.cmServiceHttp	HTTP signaling port for CMservice.	Optional	5807
global.containerPorts.configServerHttp	HTTP signaling port for config server.	Optional	8001
global.containerPorts.diamGatewayHttp	HTTP signaling port for Diameter Gateway.	Optional	8080
global.containerPorts.diamGatewayDiameter	Diameter gateway.	Optional	3868
global.containerPorts.perfInfoHttp	HTTP signaling port for perf-info.	Optional	5905
global.containerPorts.queryServiceHttp	HTTP signaling port for queryservice.	Optional	8081
global.containerPorts.auditServiceHttp	HTTP signaling port for audit service.	Optional	8000
global.containerPorts.nrfClientNfManagementHttp	HTTP signaling port for NRF client management. Note: The value for this port must be same as `containerNrfClientNfManagementHttp`.	Optional	8000
global.containerPorts.nrfClientNfDiscoveryHttp	HTTP signaling port for NF discovery service by NRF client. The value for this port must be same as `containerNrfClientNfDiscoveryHttp`.	Optional	8000

Table 3-30 (Cont.) Customizable Parameters for Container Ports Configuration

Parameter	Description	Mandatory/ Optional Parameter	Default Value
global.containerPorts.nrfClientNfManagementHttps	HTTPS signaling port for NRF client management. Note: The value for this port must be same as `containerNrfClientNfManagementHttps`.	Optional	9443
global.containerPorts.nrfClientNfDiscoveryHttps	HTTPS signaling port for NF discovery service by NRF client. The value for this port must be same as `containerNrfClientNfDiscoveryHttps`.	Optional	9443
global.containerPorts.ingressGatewayHttp	HTTP signaling port for Ingress Gateway. Note: The value for this port must be same as `containerIngressGatewayHttp`.	Optional	8081
global.containerPorts.ingressGatewayHttps	HTTPS signaling port for Ingress Gateway. Note: The value for this port must be same as `containerIngressGatewayHttps`.	Optional	9443
global.containerPorts.alternateRouteServiceHttp	HTTP Signaling port for alternate route service. Note: The value for this port must be same as `containerAlternateRouteServiceHttp`.	Optional	8004

Here is a sample of service ports configurable parameters in `ocbsf_custom_values_24.3.0.yaml` file:

```
containerPorts:
    bsfManagementServiceHttp: 8080
    bsfManagementServiceHttps: 8443
    monitoringHttp: &containerMonitoringHttp 9000
    # app info
    appInfoHttp: 8000
    # cm service
    cmServiceHttp: 8000
    # config server
    configServerHttp: 8000
    # diameter gateway
    diamGatewayHttp: 8000
    diamGatewayDiameter: 3868
    # perf info
    perfInfoHttp: 8000
```

```
    # query service
    queryServiceHttp: 8000
    # audit service
    auditServiceHttp: 8000
    # nrf client
    nrfClientNfDiscoveryHttp: &containerNrfClientNfDiscoveryHttp 8000
    nrfClientNfManagementHttp: &containerNrfClientNfManagementHttp 8000
    nrfClientNfDiscoveryHttps: &containerNrfClientNfDiscoveryHttps 9443
    nrfClientNfManagementHttps: &containerNrfClientNfManagementHttps 9443
    # ingress gateway
    ingressGatewayHttp: &containerIngressGatewayHttp 8000
    ingressGatewayHttps: &containerIngressGatewayHttps 9443
    # alternate route service : Note: This port shall not be same as
alternateRouteServiceHazelcast which is 8000 in this sample custom values file
    alternateRouteServiceHttp: &containerAlternateRouteServiceHttp 8004
```

Table 3-31 Customizable Parameters for Ports Configuration in Ingress Gateway

Parameter	Description	Mandatory/ Optional Parameter	Default Value
global.publicHttpSignalingPort	HTTP/2.0 Port of ingress gateway	Optional	80
global.publicHttpsSignalingPort	HTTPS/2.0 Port of ingress gateway The value for this port must be set to 0 if HTTPS is disabled.	Optional	443
global.configServerPort	HTTP signaling port for config server.	Optional	Note: The value for this port must be same as `svcConfigServerHttp`.
ingress-gateway.ports.actuatorPort		Optional	Same value as `containerMonitoringHttp`
ingress-gateway.ports.containerPort		Optional	Same value as `containerIngressGatewayHttp`
ingress-gateway.ports.containersslPort		Optional	Same value as `containerIngressGatewayHttps`

Here is a sample of configurable parameters for ingress-gateway's ports in `ocbsf_custom_values_24.3.0.yaml` file:

```
# -----Ingress Gateway Settings - BEGIN-----
  # If httpsEnabled is false, this Port would be HTTP/2.0 Port (unsecured)
  publicHttpSignalingPort: 80
  # If httpsEnabled is true, this Port would be HTTPS/2.0 Port (secured SSL)
  publicHttpsSignalingPort: 443
```

```
  configServerPort: *svcConfigServerHttp


ingress-gateway:
  ports:
    actuatorPort: *containerMonitoringHttp
    containerPort: *containerIngressGatewayHttp
    containersslPort: *containerIngressGatewayHttps
```

Table 3-32 Customizable Parameters for Ports Configuration in Egress Gateway

Parameter	Description	Mandatory/ Optional Parameter	Default Value
egress-gateway.serviceEgressGateway.actuatorPort		Optional	Same value as `containerMonitoringHttp`
egress-gateway.serviceEgressGateway.Port		Optional	Same value as `svcEgressGatewayHttp`

Here is a sample of configurable parameters for egress-gateway's ports in `ocbsf_custom_values_24.3.0.yaml` file:

```
egress-gateway:
  serviceEgressGateway:
    actuatorPort: *containerMonitoringHttp
    port: *svcEgressGatewayHttp
```

Table 3-33 Customizable Parameters for Ports Configuration in nrf-client-nfdiscovery

Parameter	Description	Mandatory/ Optional Parameter	Default Value	Notes
global.nrf-client-nfdiscovery.envPlatformServicePort	HTTP signaling port for app info.	Optional	5906	Same value as `svcAppInfoHttp`
global.nrf-client-nfdiscovery.envPerformanceServicePort	HTTP signaling port for perf info.	Optional	5905	Same value as `svcPerfInfoHttp`
global.nrf-client-nfdiscovery.envCfgServerPort	HTTP signaling port for config server.	No	5807	same vale as `svcConfigServerHttp`

Table 3-33 (Cont.) Customizable Parameters for Ports Configuration in nrf-client-nfdiscovery

Parameter	Description	Mandatory/ Optional Parameter	Default Value	Notes
global.nrf-client-nfdiscovery.containerHttpPort	HTTP signaling port for NRF client discovery.	Optional	8000	Same value as `containerNrfClientNfDiscoveryHttp`
global.nrf-client-nfdiscovery.containerHttpsPort	HTTPS signaling port for NRF client discovery.	Optional	9443	Same value as `containerNrfClientNfDiscoveryHttps`
global.nrf-client-nfdiscovery.serviceHttpPort	HTTP signaling port for NRF client discovery service.	Optional	5910	Same value as `svcNrfClientNfDiscoveryHttp`
global.nrf-client-nfdiscovery.serviceHttpsPort	HTTPS signaling port for NRF client discovery service.	Optional	8443	Same value as `svcNrfClientNfDiscoveryHttps`

Here is a sample of configurable parameters for nrf-client-nfdiscovery's ports in `ocbsf_custom_values_24.3.0.yaml` file:

```
nrf-client-nfdiscovery:
    envJaegerSamplerParam: '1'
    envJaegerSamplerType: ratelimiting
    envJaegerServiceName: pcf-nrf-client-nfdiscovery
    envPlatformServicePort: *svcAppInfoHttp
    envPerformanceServicePort: *svcPerfInfoHttp
    envCfgServerPort: *svcConfigServerHttp
    containerHttpPort: *containerNrfClientNfDiscoveryHttp
    containerHttpsPort: *containerNrfClientNfDiscoveryHttps
    serviceHttpPort: *svcNrfClientNfDiscoveryHttp
    serviceHttpsPort: *svcNrfClientNfDiscoveryHttps
    envDiscoveryServicePort: *svcNrfClientNfDiscoveryHttp
    envManagementServicePort : *svcNrfClientNfManagementHttp
    alternateRouteServiceEnabled: false
```

Table 3-34 Customizable Parameters for Ports Configuration in nrf-client-nfmanagement

Parameter	Description	Mandatory/ Optional Parameter	Default Value	Value
global.nrf-client-nfmanagement.envPlatformServicePort	HTTP signaling port for app info.	Optional	5906	Same value as `svcAppInfoHttp`
global.nrf-client-nfmanagement.envPerformanceServicePort	HTTP signaling port for perf info.	Optional	5905	Same value as `svcPerfInfoHttp`
global.nrf-client-nfmanagement.envCfgServerPort	HTTP signaling port for config server.	Optional	5807	same vale as `svcConfigServerHttp`
global.nrf-client-nfmanagement.containerHttpPort	HTTP signaling port for NRF client discovery.	Optional	8000	Same value as `containerNrfClientNfManagementHttp`
global.nrf-client-nfmanagement.containerHttpsPort	HTTPS signaling port for NRF client discovery.	Optional	9443	Same value as `containerNrfClientNfManagementHttps`
global.nrf-client-nfmanagement.serviceHttpPort	HTTP signaling port for NRF client discovery service.	Optional	5910	Same value as `svcNrfClientNfManagementHttp`
global.nrf-client-nfmanagement.serviceHttpsPort	HTTPS signaling port for NRF client discovery service.	Optional	8443	Same value as `svcNrfClientNfManagementHttps`

Here is a sample of configurable parameters for nrf-client-nfmanagement's ports in `ocbsf_custom_values_24.3.0.yaml` file:

```
nrf-client-nfmanagement:
    envJaegerSamplerParam: '1'
    envJaegerSamplerType: ratelimiting
    envJaegerServiceName: pcf-nrf-client-nfmanagement
    envPlatformServicePort: *svcAppInfoHttp
    envPerformanceServicePort: *svcPerfInfoHttp
    envCfgServerPort: *svcConfigServerHttp
    containerHttpPort: *containerNrfClientNfManagementHttp
    containerHttpsPort: *containerNrfClientNfManagementHttps
    serviceHttpPort: *svcNrfClientNfManagementHttp
```

```
    serviceHttpsPort: *svcNrfClientNfManagementHttps
    alternateRouteServiceEnabled: false
```

Table 3-35 Customizable Parameters for Ports Configuration in Alternate Route Service

Parameter	Description	Mandatory/ Optional Parameter	Default Value	Notes
alternate-route.ports.servicePort	HTTP signaling port for alternate route service.	Optional	8000	Same value as `svcAlternateRouteServiceHttp`
alternate-route.ports.containerPort	HTTP signaling port for alternate route service.	Optional	8004	Same value as `containerAlternateRouteServiceHttp`
alternate-route.ports.actuatorPort	HTTP signaling port for monitoring.	Optional	9000	Same value as `containerMonitoringHttp`
alternate-route.hazelcast.port		Optional	8000	Same value as `svcAlternateRouteServiceHazelcast`

Here is a sample of configurable parameters for alternate route service's ports in `ocbsf_custom_values_24.3.0.yaml` file:

```
alternate-route:
  ports:
    servicePort: *svcAlternateRouteServiceHttp
    containerPort: *containerAlternateRouteServiceHttp
    actuatorPort: *containerMonitoringHttp
  hazelcast:
    port: *svcAlternateRouteServiceHazelcast
```

3.14 OAUTH Configuration

This section describes the customizations that you should make in `ocbsf_custom_values_24.3.0.yaml` files to configure OAUTH in ingress/egress gateway.

> **Note**
>
> These configurations are applicable when the Ingress/Egress Gatway is enabled and the NRF Client services are enabled.

To configure OAUTH in ingress-gateway, you should configure the following configurable parameters in custom-value.yaml file:

Table 3-36 Configurable Parameters for OAUTH Configuration in Ingress Gateway

Parameter	Description	Mandatory/ Optional Parameter	Default Value
ingress-gateway.oauthValidatorEnabled	Enable or disable OAuth Validator. If Access Token service is not required, operator can choose to set the value of this parameter as false. By doing so, Access Token microservice will not be deployed.	Optional	false
ingress-gateway.nfInstanceId	NF Instance Id of service producer	Optional	6faf1bbc-6e4a-4454-a507-a14ef8e1bc11
ingress-gateway.allowedClockSkewSeconds	set this value if clock on the parsing NF (producer) is not perfectly in sync with the clock on the NF (consumer) that created by JWT	Optional	0
ingress-gateway.nrfPublicKeyKubeSecret	Name of the secret which stores the public key(s) of NRF	Optional	
ingress-gateway.nrfPublicKeyKubeNamespace	Namespace of the NRF public key secret	Optional	
ingress-gateway.validationType	Possible values are: • strict • relaxed strict- If incoming request does not contain "Authorization" (Access Token) header, the request is rejected. relaxed- relaxed means that if Incoming request contains "Authorization" header, it is validated. If Incoming request does not contain "Authorization" header, validation is ignored.	Optional	relaxed
ingress-gateway.producerPlmnMNC	MNC of the service producer	Optional	123
ingress-gateway.producerPlmnMCC	MCC of the service producer	Optional	456

Table 3-36 (Cont.) Configurable Parameters for OAUTH Configuration in Ingress Gateway

Parameter	Description	Mandatory/ Optional Parameter	Default Value
ingress-gateway.producerScope	Contains the NF service name(s) of the NF service producer(s). The service name(s) included in this attribute shall be any of the services defined in the ServiceName enumerated type. **Note**: `producerScope` must be configured in `custom-values.yaml` only if different from the default values.	Mandatory	nbsf-management
ingress-gateway.nfType	Specifies the NF type of the NF service producer. It is included when the access token request is for an NF or NF service instance.	Optional	BSF

Here is a sample OAUTH configurations in ingress-gateway in `ocbsf_custom_values_24.3.0.yaml` file:

```
# ----OAUTH CONFIGURATION - BEGIN ----
 oauthValidatorEnabled: false
 nfInstanceId: 6faf1bbc-6e4a-4454-a507-a14ef8e1bc11
 allowedClockSkewSeconds: 0
 nrfPublicKeyKubeSecret: ''
 nrfPublicKeyKubeNamespace: ''
 validationType: relaxed
 producerPlmnMNC: 123
 producerPlmnMCC: 456
 nfType: BSF
 # ----OAUTH CONFIGURATION - END ----
```

Table 3-37 Configurable Parameters for OAUTH Configuration in Egress Gateway

Parameter	Description	Mandatory/ Optional Parameter	Default Value
egress-gateway.oauthClient.enabled	OAuth Validator Enabled	Optional	false
egress-gateway.oauthClient.dnsSrvEnabled	Enable/Dsiable the DNS-SRV query to coreDNS Server	Optional	false
egress-gateway.oauthClient.httpsEnabled	Determine if https support is enabled or not which is a deciding factor for oauth request scheme and search query parameter in dns-srv request.	Optional	false
egress-gateway.oauthClient.nrfClientQueryEnabled	Determines if NRF-Client Query is enabled or not (Dynamic configuration).	Optional	false

Table 3-37 (Cont.) Configurable Parameters for OAUTH Configuration in Egress Gateway

Parameter	Description	Mandatory/ Optional Parameter	Default Value
egress-gateway.oauthClient.virtualFqdn	Indicates the name of the virtual FQDN or FQDN that needs to be sent in the dns-srv query.	Conditional (If dnsSrvEnabled is set to true.)	string Example: nrf.oracle.com:80
egress-gateway.oauthClient.staticNrfList	List of Static NRF's	Conditional (If oAuth is enabled.)	
egress-gateway.oauthClient.nfInstanceId	NF InstanceId of Producer	Optional	`fe7d992b-0541-4c7d-ab84-c6d70b1b01b1` Note: Update the parameter with actual value, if OAuth is enabled.
egress-gateway.oauthClient.consumerPlmnMNC	MNC of service Consumer	Optional	345 Note: Update the parameter with actual value, if OAuth is enabled.
egress-gateway.oauthClient.consumerPlmnMCC	MCC of service Consumer	Optional	567 Note: Update the parameter with actual value, if OAuth is enabled.
egress-gateway.oauthClient.maxRetry	Maximum number of retry that need to be performed to other NRF Fqdn's in case of failure response from first contacted NRF based on the errorCodeSeries configured.	Conditional (If oAuth is enabled.)	2
egress-gateway.oauthClient.apiPrefix	apiPrefix that needs to be appended in the Oauth request flow.	Conditional (If oAuth is enabled.)	
egress-gateway.oauthClient.errorCodeSeries	Determines the fallback condition to other NRF in case of failure response from currently contacted NRF.	Conditional (If oAuth is enabled and required a different error code series.)	4XX
egress-gateway.oauthClient.retryAfter	RetryAfter value in milliseconds that needs to be set for a particular NRF Fqdn, if the error matched the configured errorCodeSeries.	Conditional (If oAuth is enabled.)	5000

Table 3-37 (Cont.) Configurable Parameters for OAUTH Configuration in Egress Gateway

Parameter	Description	Mandatory/ Optional Parameter	Default Value
egress-gateway.oauthClient.nrfClientConfig	Determines the NRF-Client Mgmt Svc configurations which are required when dynamic configurations are in place at Egress-Gateway.		
egress-gateway.oauthClient.nrfClientConfig.serviceName	The service name of NRF-Client Mgmt Svc		ocbsf-nrf-client-nfmanagement
egress-gateway.oauthClient.nrfClientConfig.host	The address of NRF-Client Mgmt Svc		10.233.49.44
egress-gateway.oauthClient.nrfClientConfig.port	Determines the port configuration for NRF-Client Mgmt Svc for sending Subscription requests.		8000
egress-gateway.oauthClient.nrfClientRequestMap	Determines the request mapping URL for sending Subscription requests from Egress-Gateway to NRF-Client Mgmt Svc.		/v1/nrf-client/subscriptions/nrfRouteList

Here is a sample OAUTH configurations in egress-gateway in `ocbsf_custom_values_24.3.0.yaml` file:

```
oauthClient:
    enabled: false
    dnsSrvEnabled: false
    httpsEnabled: false
    nrfClientQueryEnabled: false
    virtualFqdn: nrf.oracle.com:80
    staticNrfList:
      - nrf1.oracle.com:80
    nfInstanceId: fe7d992b-0541-4c7d-ab84-c6d70b1b01b1
    consumerPlmnMNC: 345
    consumerPlmnMCC: 567
    maxRetry: 2
    apiPrefix: ""
    errorCodeSeries: 4XX
    retryAfter: 5000
    nrfClientConfig:
      serviceName: "ocbsf-nrf-client-nfmanagement"
      host: 10.233.49.44
      port: 8000
      nrfClientRequestMap: "/v1/nrf-client/subscriptions/nrfRouteList"
  # ---- Oauth Configuration - END ----
```

3.15 Configuring Ingress/Egress Gateway HTTPS

This section describes the customizations that you should make in `ocbsf_custom_values_24.3.0.yaml` files to configure HTTPS in ingress/egress gateway.

> **Note**
>
> These configurations are applicable only when ingress/egress gateway is enabled and the following parameters are set to true in `ocbsf_custom_values_24.3.0.yaml` file:
>
> - `ingress-gateway.enableIncomingHttps`
> - `egress-gateway.enableOutgoingHttps`

To configure HTTPS in ingress-gateway, you should configure the following configurable parameters in custom-value.yaml file:

Table 3-38 Configurable Parameters for HTTPS Configurations in Ingress Gateway

Parameter	Description	Mandatory/ Optional Parameter	Default Value	Notes
ingress-gateway.enableIncomingHttps	To enable https for ingress traffic	Optional	False	
ingress-gateway.service.ssl.privateKey.k8SecretName	Name of the private key secret.	Optional	Not Applicable	required if enableIncomingHttps is true
ingress-gateway.service.ssl.privateKey.k8NameSpace	Namespace of private key.	Optional	Not Applicable	required if enableIncomingHttps is true
ingress-gateway.service.ssl.privateKey.rsa.fileName	rsa private key file name.	Optional	Not Applicable	required if enableIncomingHttps is true
ingress-gateway.service.ssl.certificate.k8SecretName	Name of the private key secret	Optional	Not Applicable	required if enableIncomingHttps is true
ingress-gateway.service.ssl.certificate.k8NameSpace	Namespace of private key	Optional	Not Applicable	required if enableIncomingHttps is true
ingress-gateway.service.ssl.certificate.rsa.fileName	rsa private key file name	Optional	Not Applicable	required if enableIncomingHttps is true
ingress-gateway.service.ssl.caBundle.k8SecretName	Name of the private key secret	Optional	Not Applicable	required if enableIncomingHttps is true

Table 3-38 (Cont.) Configurable Parameters for HTTPS Configurations in Ingress Gateway

Parameter	Description	Mandatory/ Optional Parameter	Default Value	Notes
ingress-gateway.service.ssl.caBundle.k8NameSpace	Namespace of private key	Optional	Not Applicable	required if enableIncomingHttps is true
ingress-gateway.service.ssl.caBundle.fileName	private key file name	Optional	Not Applicable	required if enableIncomingHttps is true
ingress-gateway.service.ssl.keyStorePassword.k8SecretName	Name of the privatekey secret	Optional	Not Applicable	required if enableIncomingHttp is true
ingress-gateway.service.ssl.keyStorePassword.k8NameSpace	Namespace of privatekey	Optional	Not Applicable	required if enableIncomingHttps is true
ingress-gateway.service.ssl.keyStorePassword.fileName	File name that has password for keyStore	Optional	Not Applicable	required if enableIncomingHttps is true
ingress-gateway.service.ssl.trustStorePassword.k8SecretName	Name of the privatekey secret	Optional	Not Applicable	required if enableIncomingHttps is true
ingress-gateway.service.ssl.trustStorePassword.k8NameSpace	Namespace of privatekey	Optional	Not Applicable	required if enableIncomingHttps is true
ingress-gateway.service.ssl.trustStorePassword.fileName	File name that has password for trustStore	Optional	Not Applicable	required if enableIncomingHttps is true

Here is a sample HTTPS configurations in ingress-gateway in `ocbsf_custom_values_24.3.0.yaml` file:

```
# ---- HTTPS Configuration - BEGIN ----
  enableIncomingHttps: false

  service:
    ssl:
      privateKey:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        rsa:
          fileName: rsa_private_key_pkcs1.pem
      certificate:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        rsa:
```

```
    fileName: ocegress.cer
caBundle:
  k8SecretName: ocbsf-gateway-secret
  k8NameSpace: ocbsf
  fileName: caroot.cer
keyStorePassword:
  k8SecretName: ocbsf-gateway-secret
  k8NameSpace: ocbsf
  fileName: key.txt
trustStorePassword:
  k8SecretName: ocbsf-gateway-secret
  k8NameSpace: ocbsf
  fileName: trust.txt
```

Table 3-39 Configurable Parameters for HTTPS Configurations in Egress Gateway

Parameter	Description	Mandatory/ Optional Parameter	Default Value	Notes
egress-gateway.enableOutgoingHttps	Enabling it for outgoing https request	No	false	
egress-gateway.egressGwCertReloadEnabled		No	false	
egress-gateway.egressGwCertReloadPath		No	/egress-gw/store/reload	
egress-gateway.service.ssl.privateKey.k8SecretName	Name of the privatekey secret	No	Not Applicable	
egress-gateway.service.ssl.privateKey.k8NameSpace	Namespace of privatekey	No	Not Applicable	
egress-gateway.service.ssl.privateKey.rsa.fileName	rsa private key file name	No	Not Applicable	
egress-gateway.service.ssl.privateKey.ecdsa.fileName	ecdsa private key file name	No	Not Applicable	
egress-gateway.service.ssl.certificate.k8SecretName	Name of the privatekey secret	No	Not Applicable	
egress-gateway.service.ssl.certificate.k8NameSpace	Namespace of privatekey	No	Not Applicable	
egress-gateway.service.ssl.certificate.rsa.fileName	rsa private key file name	No	Not Applicable	
egress-gateway.service.ssl.certificate.ecdsa.fileName	ecdsa private key file name	No	Not Applicable	
egress-gateway.service.ssl.caBundle.k8SecretName	Name of the privatekey secret	No	Not Applicable	

Table 3-39 (Cont.) Configurable Parameters for HTTPS Configurations in Egress Gateway

Parameter	Description	Mandatory/ Optional Parameter	Default Value	Notes
egress-gateway.service.ssl.caBundle.k8NameSpace	Namespace of privatekey	No	Not Applicable	
egress-gateway.service.ssl.caBundle.fileName	private key file name	No	Not Applicable	
egress-gateway.service.ssl.keyStorePassword.k8SecretName	Name of the privatekey secret	No	Not Applicable	
egress-gateway.service.ssl.keyStorePassword.k8NameSpace	Namespace of privatekey	No	Not Applicable	
egress-gateway.service.ssl.keyStorePassword.fileName	File name that has password for keyStore	No	Not Applicable	
egress-gateway.service.ssl.trustStorePassword.k8SecretName	Name of the privatekey secret	No	Not Applicable	
egress-gateway.service.ssl.trustStorePassword.k8NameSpace	Namespace of privatekey	No	Not Applicable	
egress-gateway.service.ssl.trustStorePassword.fileName	File name that has password for trustStore	No	Not Applicable	

Here is a sample HTTPS configurations in egress-gateway in `ocbsf_custom_values_24.3.0.yaml` file:

```
# ---- HTTPS Configuration - BEGIN ----

  #Enabling it for egress https requests
  enableOutgoingHttps: false

  egressGwCertReloadEnabled: false
  egressGwCertReloadPath: /egress-gw/store/reload

  service:
    ssl:
      privateKey:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
        rsa:
          fileName: rsa_private_key_pkcs1.pem
        ecdsa:
          fileName: ssl_ecdsa_private_key.pem
      certificate:
        k8SecretName: ocbsf-gateway-secret
        k8NameSpace: ocbsf
```

```
      rsa:
        fileName: ocegress.cer
      ecdsa:
        fileName: ssl_ecdsa_certificate.crt
    caBundle:
      k8SecretName: ocbsf-gateway-secret
      k8NameSpace: ocbsf
      fileName: caroot.cer
    keyStorePassword:
      k8SecretName: ocbsf-gateway-secret
      k8NameSpace: ocbsf
      fileName: key.txt
    trustStorePassword:
      k8SecretName: ocbsf-gateway-secret
      k8NameSpace: ocbsf
      fileName: trust.txt
# ---- HTTPS Configuration - END ----
```

3.16 Configuring SCP

This section describes the customizatons that you can make in `ocbsf_custom_values_24.3.0.yaml` files to support SCP integration including SBI routing.

Important

- Routes supporting the SBI-Routing configuration are updated in Egress Gateway only when its configuration details are provided correctly. Example: `PeerSetConfiguration`, `PeerConfiguration`, `sbiroutingerrorcriteriasets`, and `sbiroutingerroractionsets`. Routes not supporting the SBI-Routing configuration are updated only when they have valid route definition.

To configure SBI-Routing:

- Use `Peerconfiguration` to define the list of peers to which Egress Gateway can send request. This list contains peers that support HTTP/ HTTP-Proxy / HTTPS communication.
- Use `Peersetconfiguration` to logically group the peers into sets. Each set contains a list of peers that support HTTP and HTTPS communication modes.
- Use `sbiRoutingErrorCriteriaSets` to define an array of errorCriteriaSet , where each errorCriteriaSet depicts an ID, set of HTTP Methods, set of HTTP Response status codes set of exceptions with headerMatching functionality.
- Use `sbiRoutingErrorActionSets` to define an array of actionset, where each depicts an ID, action to be performed (Currently on REROUTE action is supported) and blacklist configurations.
- Configure the `Priority` for each peer in the set. Depending on the priority, it selects the primary, secondary, or tertiary peers to route requests.

> **Note**
>
> - Egress Gateway accepts route configuration updates only if SBI-Routing feature is configured correctly.
> - If the peer contains a virtual host address, Egress Gateway resolves the virtual host address using DNS-SRV query. If a peer is defined based on virtual host, then peerset can contain only one such peer for `httpconfiguration` and `httpsconfiguration`. User should not configure more than one virtual host based on peer in a given peerset for a given HTTP / HTTPS configuration.
> - In case of peers based on virtual host, Egress Gateway does not consider priority values configured rather it retrieves priority from DNS-SRV records.

The following flags determine whether the configuration for routes and sbiRouting needs to be picked up from Helm

```
routeConfigMode: HELM
```

Configurations for SBI Routing

To enable and configure SBI Routing, perform the following configurations

- For `sbiRoutingDefaultScheme` parameter, the default value is `http`. The value specified in this field is considered when `3gpp-sbi-target-apiroot` header is missing.
- Now, configure a list of peers and peer sets. Each peer must contain `id`, `host`, `port`, and `apiPrefix`. Each peer set must contain HTTP or HTTPS instances where in each instance contains priority and peer identifier, which maps to peers configured under `peerConfiguration`.
  No two instances should have same priority for a given HTTP or HTTPS configuration. In addition, more than one virtual FQDN should not be configured for a given HTTP or HTTPS configuration.

```
sbiRouting:
    # Default scheme applicable when 3gpp-sbi-target-apiroot header is missing
    sbiRoutingDefaultScheme: http



    peerConfiguration:
      - id: peer1
        host: scp1.test.com
        port: 80
        apiPrefix: "/"
      - id: peer2
        host: scp2.test.com
        port: 80
        apiPrefix: "/"
    peerSetConfiguration:
      - id: set0
        httpConfiguration:
          - priority: 1
            peerIdentifier: peer1
          - priority: 2
```

```
        peerIdentifier: peer2
    httpsConfiguration:
      - priority: 1
        peerIdentifier: peer1
      - priority: 2
        peerIdentifier: peer2
```

> **Note**
>
> If required, users can configure more SCP instances in a similar way.

Route-level Configuration

Each route must have configured filters. In case, the SBIRouting functionality is required without the reroutes, then configure `routes[0].metadata.sbiRoutingEnabled=true`, SbiRouting in `filterName1`, and set arguments without the `errorHandling` section.

If SbiRouting functionality is required with the reroute mechanism, then configure `routes[0].metadata.sbiRoutingEnabled=true`, SbiRouting in `filterName1`, and set arguments with the `errorHandling` section.

The `errorHandling` section contains an array of `errorcriteriaset` and `actionset` mapping with priority. The `errorcriteriaset` and `actionset` are configured through Helm using `sbiRoutingErrorCriteriaSets` and `sbiRoutingErrorActionSets`.

The `sbiRoutingErrorCriteriaSets` contains an array of `errorCriteriaSet` , where each `errorCriteriaSet` depicts an ID, set of HTTP Methods, set of HTTP Response status codes set of exceptions with headerMatching functionality .

The `sbiRoutingErrorActionSets` contains an array of actionset, where each depicts an ID, action to be performed (Currently on REROUTE action is supported) and blacklist configurations.

Following is the SBI routing configuration with the re-route functionality:

> **Note**
>
> Ensure to configure `sbiRoutingErrorCriteriaSets` and `sbiRoutingErrorActionSets`.

The `httpRuriOnly` and `httpsTargetOnly` parameters are used to enable HTTP-Proxy mode communication between Egress Gateway and Peer.

```
- id: nrf_direct
#      uri: https://dummy.dontchange
#      path: /nnrf-disc/**
#      order: 4
#      metadata:

#        httpsTargetOnly: false
#        httpRuriOnly: false
#        sbiRoutingEnabled: false
#      filterName1:
#        name: SbiRouting
```

```
#        args:
#          peerSetIdentifier: set0
#          customPeerSelectorEnabled: false
#          errorHandling:
#            - errorCriteriaSet: scp_direct2_criteria_1
#              actionSet: scp_direct2_action_1
#              priority: 1
#            - errorCriteriaSet: scp_direct2_criteria_0
#              actionSet: scp_direct2_action_0
#              priority: 2
#    - id: scp_route
```

Enable Re-routing

The Re-route mechanism works only for the incoming requests to Egress Gateway that are bound for SBI-Routing. The SBI-Routing bound requests must be re-routed to other instances of SBI based on certain response error codes or exceptions.

> **Note**
>
> The above configuration is effective only when `sbiRoutingEnabled` is set to `true`.

The `errorHandling` section contains an array of `errorcriteriaset` and `actionset` mapping with priority. The `errorcriteriaset` and `actionset` are configured through Helm using `sbiRoutingErrorCriteriaSets` and `sbiRoutingErrorActionSets`.

> **Note**
>
> `errorcriteriaset` and `actionset` must be configured for reroute to work.

To enable re-route functionality with `SBIrouting` , add the following values in the Helm configuration file:

```
routesConfig:
 - id: scp_direct2
   uri: https://dummy.dontchange2
   path: /dummy
   order: 3
   metadata:
    httpsTargetOnly: false
    httpRuriOnly: false
    sbiRoutingEnabled: false
   filterName1:
     name: SbiRouting
     args:
       peerSetIdentifier: set0
       customPeerSelectorEnabled: false
       errorHandling:
        - errorCriteriaSet: scp_direct2_criteria_1
          actionSet: scp_direct2_action_1
          priority: 1
        - errorCriteriaSet: scp_direct2_criteria_0
```

```
          actionSet: scp_direct2_action_0
          priority: 2

sbiRoutingErrorCriteriaSets:
 - id: scp_direct2_criteria_0
   method:
   - GET
   - POST
   - PUT
   - DELETE
   - PATCH
   exceptions:
   - java.util.concurrent.TimeoutException
   - java.net.UnknownHostException
 - id: scp_direct2_criteria_1
   method:
   - GET
   - POST
   - PUT
   - DELETE
   - PATCH
   response:
    statuses:
     - statusSeries: 4xx
       status:
       - 400
       - 404
     - statusSeries: 5xx
       status:
       - 500
       - 503
    headersMatchingScript: "headerCheck,server,via,.*(SEPP|UDR).*"


sbiRoutingErrorActionSets:
 - id: scp_direct2_action_0
   action: reroute
   attempts:2
   blackList:
    enabled: false
    duration: 60000

 - id: scp_direct2_action_1
   action: reroute
   attempts:3
   blackList:
    enabled: false
    duration: 60000
```

Handling Server and Via Header

This is an enhancement to the SBI routing functionality. An additional alternate routing rule is applied to the Egress Gateway when the header check is included in the configuration. This can be configured through `sbiroutingerrrorcriteriaset` and corresponding action can be taken by configuring `sbierroractionsets`.

To configure SBI Routing with Reroute functionality, see "Enable Rerouting" section.

To enable Server and Via Header handling, add `headersMatchingScript` under the response entity within `sbiRoutingErrorCriteriaSets`.

> **Note**
>
> `headersMatchingScript` is a configuration that accepts a single string with comma seperated tokens.

Sample `sbiRoutingErrorCriteriaSets` configuration:

```
sbiRoutingErrorCriteriaSets:
  - id: scp_direct2_criteria_1
    method:
      - GET
      - POST
      - PUT
      - DELETE
      - PATCH
    response:
      statuses:
        - statusSeries: 4xx
          status:
            - 400
            - 404
        - statusSeries: 5xx
          status:
            - 500
            - 503
      headersMatchingScript: "headerCheck,server,via,.*(SEPP|UDR).*"
```

The `headersMatchingScript` contains the following tokens:

- `headerCheck` : The Validation function name. It must be constant.
- `server`: Header name
- `Via` : Header Name
- `*(SEPP|UDR).*` : Regex expression against which the server or via header will be matched against.

This `headersMatchingScript` configuration gets satisfied if the response contains server or via header and the content of the header matches the regex configured. Fot the criteriaset to be matched, the response method, response status code, and `headersMatchingScript` configuration should be satisfied. The `actionset` is configured to blacklist the peer if the correspondng criteriaset is matched.

Sample `sbiRoutingErrorActionSets` configuration:

```
sbiRoutingErrorActionSets:
  - id: scp_direct2_action_0
    action: reroute
    attempts: 2
    blackList:
```

```
    enabled: true
    duration: 60000
```

Once the `sbiRoutingErrorCriteriaSets` is selected, map this actionset to the selected criteriaset in the **errorHandling** section. The corresponding FQDN or Host in the server header value is blacklisted for the duration mentioned in the blackList section within the `sbiRoutingErrorActionSets`.

> **Note**
>
> While configuring the `sbiRoutingErrorCriteriaSets` with server header checks (`headersMatchingScript`), ensure that criteriaset has the highest priority in the **errorHandling** section. And, while configuring criteriaset without the server header checks, ensure to keep the `blackList.enabled` as false. This is done for server header blacklisting when server header check is required.

3.17 Logging Configuration

This section describes the customizations that you should make in `ocbsf_custom_values_24.3.0.yaml` file to configure logging.

To configure logging in ingress-gateway, configure the following parameters in `ocbsf_custom_values_24.3.0.yaml` file:

Table 3-40 Configurable Parameters for Logging Configuration in Ingress Gateway

Parameter	Description
ingress-gateway.log.level.root	**Note**: Configure this parameter only when ingress-gateway is enabled. This parameter refers to the Log level for root logs. **Default Value**: WARN
ingress-gateway.log.level.ingress	**Note**: Configure this parameter only when ingress-gateway is enabled. This parameter refers to the Log level for ingress logs. **Default Value**: WARN
ingress-gateway.log.level.oauth	**Note**: Configure this parameter only when ingress-gateway is enabled. This parameter refers to the Log level for oauth logs. **Default Value**: WARN

Here is a sample configuration for logging in ingress-gateway in `ocbsf_custom_values_24.3.0.yaml` file:

```
ingress-gateway:

  log:
```

```
    level:
      root: WARN
      ingress: WARN
      oauth: WARN
```

Table 3-41 Configurable Parameters for Logging Configuration in Egress Gateway

Parameter	Description
egress-gateway.log.level.root	**Note**: Configure this parameter only when egress-gateway is enabled. This parameter refers to the Log level for root logs. **Default Value**: WARN
egress-gateway.log.level.egress	**Note**: Configure this parameter only when egress-gateway is enabled. This parameter refers to the Log level for ingress logs. **Default Value**: WARN
egress-gateway.log.level.oauth	**Note**: Configure this parameter only when egress-gateway is enabled. This parameter refers to the Log level for oauth logs. **Default Value**: WARN

Here is a sample configuration for logging in egress-gateway in `ocbsf_custom_values_24.3.0.yaml` file:

```
egress-gateway:

  log:
    level:
      root: WARN
      egress: WARN
      oauth: WARN
```

Table 3-42 Configurable Parameters for Logging Configuration in Alternate Route Service

Parameter	Description
alternate-route.log.level.root	This parameter specifies the Log level for root logs. The default value for this parameter is WARN. Note: It is required only when alternate route service is enabled.
alternate-route.log.level.altroute	This parameter specifies the log level for alternate route logs. The default value for this parameter is WARN. Note: It is required only when alternate route service is enabled.

Here is a sample configurations for logging in `ocbsf_custom_values_24.3.0.yaml` file:

```
alternate-route:

  log:
    level:
      root: WARN
      altroute: WARN
```

Configurations for Debug Tool

At the global level, the `extraContainers` flag can be used to enable or disable injecting extra container, that is, Debug Tool. Users can set DISABLED (default value) or ENABLED values for this parameter.

The following is a snippet from the `ocbsf_custom_values_24.3.0.yaml` file:

```
 # Use 'extraContainers' attribute to control the usage of extra
container(DEBUG tool).
  # Allowed Values: DISABLED, ENABLED
  extraContainers: DISABLED
```

For more information on Debug Tool, see Oracle Communications Cloud Native Core Binding Support Function Troubleshooting Guide.

To configure label names for Prometheus, you should configure the following configurable parameters in custom-value.yaml file:

Table 3-43 Configurable Parameters for Logging Configuration in Prometheus

Parameter	Description	Mandatory/ Optional Parameter	Default Value
tagNamespace	Specifies the Kubernetes namespace.	Mandatory	`kubernetes_namespace` (for CNE 1.8.0) `namespace` (for CNE 1.9)
tagContainerName	Specifies the tag used for specifying name of the container.	Mandatory	`container_name` (for CNE 1.8.0) `container` (for CNE 1.9)
tagServiceName	Specifies the tag used for specifying name of the service.	Mandatory	`kubernetes_name` (for CNE 1.8.0) `service` (for CNE 1.9)

The following is a snippet from the `ocbsf_custom_values_24.3.0.yaml` file:

```
#Values for CNE 1.8 {tagNamespace: kubernetes_namespace, tagContainerName:
container_name, tagServiceName: kubernetes_name}
#Values for CNE 1.9 {tagNamespace: namespace, tagContainerName: container,
tagServiceName: service}
tagNamespace: kubernetes_namespace
tagContainerName: container_name
tagServiceName: kubernetes_name
```

3.18 XFCC Header Validation Configuration

This section describes the customizatons that you can make in `ocbsf_custom_values_24.3.0.yaml` file to configure XFCC header.

XFCC introduces support for Binding Support Function (BSF) as a producer, to check, if SCP which has sent the HTTP request is the same proxy consumer/client – expected to send an HTTP2 request.

BSF can achieve this by comparing the FQDN of the SCP present in the "x-forwarded-client-cert" (XFCC) of http2 header, with the FQDN of the SCPs configured in the CNC BSF.

To configure XFCC header, you must configure the following parameters in `ocbsf_custom_values_24.3.0.yaml` file:

Table 3-44 Configurable Parameters for XFCC Header Validation Configuration

Parameter	Description
ingress-gateway.xfccHeaderValidation.validation.enabled	This optional parameter determines if incoming xfcc header needs to be validated. **Default Value**: false
ingress-gateway.xfccHeaderValidation.validation.peerList	**Note**: Configure this parameter only when xfccHeader validation is enabled. Specifies the list of configured NF FQDN's against which the matchField entry configured, present in the XFCC Header will be validated.
ingress-gateway.xfccHeaderValidation.validation.matchCerts	**Note**: Configure this parameter only when xfccHeader validation is enabled. This parameter refers to the number of certificates that need to be validated; starting from the right most entry in the XFCC header. • If the parameter is set to -1 (**default value**), validation is performed against all entries. • If parameter is set to a positive number, validation is performed starting from the right most entry in backwards direction.
ingress-gateway.xfccHeaderValidation.validation.matchField	**Note**: Configure this parameter only when xfccHeader validation is enabled. This parameter refers to the field in a corresponding XFCC header against which the configured scpList FQDN validation is performed. **Default Value**: DNS

Table 3-44 (Cont.) Configurable Parameters for XFCC Header Validation Configuration

Parameter	Description
ingress-gateway.xfccHeaderValidation.validation.dnsResolutionInterval	Specifies the interval (in milliseconds) used to resolve failed FQDNs. **Default value**: 300000
global.xfccHeaderValidation.validation.errorTrigger[i].exceptionType	Specifies the configurable exception or error type for an error scenario in Ingress Gateway. **Default value**: XFCC_HEADER_INVALID XFCC_MATCHCERTCOUNT_GREATER_THAN_CERTS_IN_HEADER XFCC_HEADER_NOT_PRESENT_OR_EMPTY
global.xfccHeaderValidation.validation.errorTrigger[i].errorCode	Specifies the configurable error code to be returned when the exception or error configured in exceptionType occurs at Ingress Gateway. **Default value**: 401 402 403
global.xfccHeaderValidation.validation.errorTrigger[i].errorCause	Specifies the configurable error cause to be returned when the exception or error configured in exceptionType occurs at Ingress Gateway. **Default value**: xfcc header is invalid matchCerts count is greater than the certs in the request xfcc header is not present or empty in the request
global.xfccHeaderValidation.validation.errorTrigger[i].errorTitle	Specifies the configurable error title to be returned when the exception or error configured in exceptionType occurs at Ingress Gateway. **Default value**: Invalid XFCC Header
global.xfccHeaderValidation.validation.errorTrigger[i].errorDescription	Specifies the configurable error description to be returned when the exception or error configured in exceptionType occurs at Ingress Gateway. **Default value**: empty string

Here is a sample configurations for XFCC header in `ocbsf_custom_values_24.3.0.yaml` file:

```
global:
    xfccHeaderValidation:
      validation:
        enabled: false
        peerList:
          - name: scp.com
          - name: smf.com
          - name: amf.com
          - name: scp1.com
            enabled: true
```

```
            - name: scp2.com
            - name: scp3.com
              enabled: false
            - name: xyz.test.com
              enabled: true
              scheme: http
              type: virtual
            - name: abc.test.com
              enabled: true
              scheme: https
              type: virtual
            - name: xfcc.test.com
              enabled: false
              scheme: http
              type: virtual
          matchCerts: -1
          matchField: DNS
          dnsResolutionInterval: 300000
          errorTrigger:
            - exceptionType: XFCC_HEADER_INVALID
              errorCode: '401'
              errorCause: xfcc header is invalid
              errorTitle: 'Invalid XFCC Header'
              errorDescription: 'Invalid XFCC Header'
            - exceptionType: XFCC_MATCHCERTCOUNT_GREATER_THAN_CERTS_IN_HEADER
              errorCode: '402'
              errorCause: matchCerts count is greater than the certs in the
request
              errorTitle: ''
              errorDescription: ''
            - exceptionType: qaZ
              errorCode: '403'
              errorCause: xfcc header is not present or empty in the request
              errorTitle: ''
              errorDescription: ''
```

XFCC Header - Route Level

To enable or disable XFCC header per route, set the `validationEnabled` parameter to true under each route (in Ingress Gateway):

```
routesConfig:
    - id: reverse_bsf_service
      uri: http://{{ template "service-prefix" . }}-bsf-management:
{{ .Values.global.servicePorts.bsfManagementServiceHttp }}
      path: /nbsf-management/**
      order: 1
    - id: reverse_nrf_notify_service
      uri: http://{{ template "service-prefix" . }}-nrf-client-nfmanagement:
{{ .Values.global.servicePorts.nrfClientNfManagementHttp }}
      path: /nnrf-client/**
      order: 2
```

> **Note**
>
> These routes are for internal consumption and determine how the incoming traffic is distributed among microservices on the basis of routing properties. To make any modification to these routes other than enabling or disabling XFCC header feature, kindly contact My Oracle Support.

3.19 Aspen service mesh configurations

This section describes the customizatons required in `ocbsf_custom_values_24.3.0.yaml` file of Binding Support Function (BSF) to integrate Aspen service mesh with BSF.

- Enable ASM by setting the value for `serviceMeshEnabled` parameter, under global section, as true.
- Configure the values for the parameters described in the following table:

Table 3-45 Configurable Parameters for Aspen Servicemesh Configuration

Parameter	Description	Mandatory Parameter	Default Value	Notes
istioSidecarQuitUrl	Specifies the sidecar quit URL (envoy container quite URL) if deployed with serviceMesh. This URL is needed to explicitly shutdown the sidecar container.	Conditional	`http://127.0.0.1:15000/quitquitquit`	Applicable only when `serviceMeshCheck` parameter is set to true.
istioSidecarReadyUrl	Specifies the sidecar ready URL (envoy container quite URL) if deployed with serviceMesh. This URL is needed to check the readiness of the sidecar container during initialization process. The gateway container will come up only after sidecar container is ready.	Conditional	`http://127.0.0.1:15000/ready`	Applicable only when `serviceMeshCheck` parameter is set to true.

- In the global section, uncomment the following annotations to include port 9000 - a Prometheus scrap port

```
allResources:
      labels: {}
      annotations: {
      #Enable this section for service-mesh based installation
        # traffic.sidecar.istio.io/excludeInboundPorts: "9000",
        # traffic.sidecar.istio.io/excludeOutboundPorts: "9000"
      }
```

- (Optional) If BSF is deployed with OSO, the pods need to have an annotation **oracle.com/cnc: true**.

```
lbServices:
      labels: {}
      annotations: {}

    lbDeployments:
      labels: {}
      annotations: {}
          # The annotation oracle.com/cnc: "true" is required if OSO is
used
          #oracle.com/cnc: "true"
          #sidecar.istio.io/inject: "true"
          #sidecar.istio.io/rewriteAppHTTPProbers: "true"

    nonlbServices:
      labels: {}
      annotations: {}

    nonlbDeployments:
      labels: {}
      annotations: {}
          # The annotation oracle.com/cnc: "true" is required if OSO is
used
          #oracle.com/cnc: "true"
          #sidecar.istio.io/inject: "true"
          #sidecar.istio.io/rewriteAppHTTPProbers: "true"
```

- Uncomment the following annotations in the deployment sections of `nrf-client-nfdiscovery`, `nrf-client-nfmanagement`, `diam-gateway`, `ingress-gateway`, `egress-gateway`, and `alternate-route` services

```
deployment:
      customExtension:
        annotations: {
           #Enable this section for service-mesh based
installation:
  #           traffic.sidecar.istio.io/excludeOutboundPorts:
"9000,8095,8096,7,53",
  #           traffic.sidecar.istio.io/excludeInboundPorts:
"9000,8095,8096,7,53"
        }
```

Here, 8095 and 8096 are Coherence ports.

> **Note**
>
> Port 53 is included only if DNS lookup bypasses the sidecar connection management.

- **Disable init containers**: Init containers do not work when the namespace has aspen service mTLS enabled. To disable init containers, set the value for `initContainerEnable` to false in custom values file.

```
global:
  initContainerEnable: false
```

- **PERMISSIVE rule**: To set Permissive rule for Diameter Gateway and Ingress Gateway Service, set the following flags to true in `ocbsf_custom_values_24.3.0.yaml` file:

```
global:
  istioIngressTlsSupport:
      diamGateway: false
```

3.20 Alternate Route Service Configuration

This section describes how to configure alternate route service (DNS-SRV) by customizing parameters in the `ocbsf_custom_values_24.3.0.yaml` file.

> **Note**
>
> Users must customize parameters, described in this section, only when alternate route service is enabled.

With SRV Records, you can configure and maintain NF FQDN dynamically at the DNS Server, which can be further selected by Cloud Native Core Binding Support function, when there is a network function failure. It is achieved by performing a SRV query on the virtual FQDN configured at the BSF, instead of configuring primary and secondary NRF statically in every CNC BSF, only during instantiation time. This option of DNS lookup for SRV records would also provide alternate NFs to the BSF during failover.

To configure DNS-SRV, you should configure the following configurable parameters in custom-value.yaml file:

Table 3-46 Configurable Parameters for Alternate Route Service Configuration

Parameter	Description
global.alternateRouteServiceEnable	This global parameter describes whether to enable or disable Alternate Route service during Helm deployment. By default, the value for this parameter is set to true.
alternate-route.staticVirtualFqdns[0].name	This optional parameter describes the name of the virtual FQDN/FQDN.
alternate-route.staticVirtualFqdns[0].alternateFqdns[0].target	This paramter describes the name of the alternate FQDN mapped to the virtual FQDN - described in the previous row. **Note**: Users must define the value of this parameter if `staticVirtualFqdns[0].name` is defined.
alternate-route.staticVirtualFqdns[0].alternateFqdns[0].port	This paramter describes the port number of the alternate FQDN. **Note**: Users must define the value of this parameter if `staticVirtualFqdns[0].name` is defined.

Table 3-46 (Cont.) Configurable Parameters for Alternate Route Service Configuration

Parameter	Description
alternate-route.staticVirtualFqdns[0].alternateFqdns[0].priority	This parameter describes the priority of the alternate FQDN. **Note**: Users must define the value of this parameter if `staticVirtualFqdns[0].name` is defined.
alternate-route.dnsSrvEnabled	This parameter describes whether to enable or disable the DNS-SRV query to coreDNS Server. By default, the value is set to true.
alternate-route.dnsSrvFqdnSetting.enabled	This parameter describes whethe to enable or disable the usage of custom pattern for the FQDN while triggering DNS-SRV query. By default, the value is set to true. **Note**: If this flag is set to false, then default value: "_{scheme}._tcp.{fqdn}." will be used.
alternate-route.dnsSrvFqdnSetting.pattern	This parameter describes the pattern of the FQDN that is used to format the incoming FQDN and Scheme while triggering DNS-SRV query. The default value for this parameter is `_{scheme}._tcp.{fqdn}.` **Note**: Users must define the value of this parameter if `dnsSrvFqdnSetting.enabled` is set to true.
egress-gateway.dnsSrv.port	This parameter describes the port of DNS Alternate Route Service. **Default Value**: *svcAlternateRouteServiceHttp **Note**: Users must define the value of this parameter if DnsSrv is required.
nrf-client-nfmanagement.alternateRouteServiceEnabled	This parameter notifies nrf-client services if alternate route service is deployed or not. By default, this parameter is set to false. **Note**: Users must set this parameter to true if `global.alternateRouteServiceEnable` is set to true.
nrf-client-nfdiscovery.alternateRouteServiceEnabled	This parameter notifies nrf-client services if alternate route service is deployed or not. By default, this parameter is set to false. **Note**: Users must set this parameter to true if `global.alternateRouteServiceEnable` is set to true.
alternate-route.isIpv6Enabled	Set the value to true for this parameter when NF is deployed in IPv6 cluster.
alternate-route.minReplicas	Specifies the minimum replicas to scale to maintain an average CPU utilization.
alternate-route.maxReplicas	Specifies the maximum replicas to scale to maintain an average CPU utilization.

Here is a sample configurations for DNS-SRV in `ocbsf_custom_values_24.3.0.yaml` file:

```
#Static virtual FQDN Config
  staticVirtualFqdns:
    - name: https://abc.test.com
      alternateFqdns:
        - target: abc.test.com
          port: 5060
          priority: 10
        - target: xyz.test.com
          port: 5060
          priority: 20
```

```
    - name: http://xyz.test.com
      alternateFqdns:
        - target: xyz.test.com
          port: 5060
          priority: 10
        - target: abc.test.com
          port: 5060
          priority: 20  #Flag to control if DNS-SRV queries are sent to
coreDNS or not
  dnsSrvEnabled: true
  #Below configuration is for customizing the format of FQDN which will used
while querying coreDNS for SRV Records
  dnsSrvFqdnSetting:
    enabled: true  #If this flag is disabled, then default value of
"_{scheme}._tcp.{fqdn}." will be used for Pattern
    pattern: "_{scheme}._tcp.{fqdn}."   #Ex: _http._tcp.service.example.org.



egress-gateway:
  dnsSrv:
    host: 10.75.225.67
    port: 32081
```

3.21 Additional Configurations

- **Annotation to support custom extension global parameters**: To support custom extension global parameters, update the following parameters in `custom extension` under `global` section of `ocbsf_custom_values_24.3.0.yaml` file:

```
global:
  customExtension:
    allResources:
      labels: {}
      annotations: {}

    lbServices:
      labels: {}
      annotations: {}

    lbDeployments:
      labels: {}
      annotations: {}

    nonlbServices:
      labels: {}
      annotations: {}

    nonlbDeployments:
      labels: {}
      annotations: {}
```

- **Annotation to support OSO**: To deploy BSF with OSO, you must add the following annotation to the custom extension under global section of `ocbsf_custom_values_24.3.0.yaml` file:

```
global:
  customExtension:
    lbDeployments:
      annotations:
          oracle.com/cnc: "true"

    nonlbDeployments:
      annotations:
          oracle.com/cnc: "true"
```

> **Note**
>
> After helm install is complete, all the nodes should have the above mentioned notation.

- **Custom container name**: You can customize the name of containers of a pod with a prefix and suffix. To do so, add the prefix and suffix to the k8sResource under global section of `ocbsf_custom_values_24.3.0.yaml` file:

```
global:
  k8sResource:
    container:
      prefix: ABC
      suffix: XYZ
```

Then, after installing BSF, you will see the container names as shown below:

```
Containers:
  abcd-am-service-xyz:
```

- **Kubernetes service account name**: You can use a custom service account for all services by adding it to `appinfo` section in the `ocbsf_custom_values_24.3.0.yaml` file:

```
appinfo:
  serviceAccountName: ocbsfsaccount
```

> **Note**
>
> You can create the service account and roles before the installation as well.

AppInfo Configurations

The following table describes the configurable parameters for AppInfo service:

Table 3-47 Customizable Parameters for Common Configuration Service in appinfo

Parameter	Description	Default Value	Notes
appinfo.watchMySQL	If the value for this parameter is set to true, appinfo periodically queries local DB status from the db monitor service specified by dbStatusUri. The DB monitor service returns 200 if the database is healthy, and 503 if database is not usable. If DB status is not good, then appinfo will inform nrfclient to mark PCF suspended.	false	When its value is set to true, the user must specify `dbStatusUri`.
appinfo.replicationStatusCheck	When the value for this parameter is set to true, then appinfo periodically queries the replication status from the db monitor service specified by replicationUri. This value is then used by NRF.	false	When its value is set to true, the user must specify `replicationUri`.
appinfo.dbStatusUri	Specifies the URI provided by the DB monitor service to query local database status. Example: http://occne-db-monitor-svc.occne-infra:8080/db-tier/status/local	empty string	
appinfo.realtimeDbStatusUri	Specifies the URI provided by the realtime DB monitor service to query the status of the realtime DB pointing to the cluster. http://occne-db-monitor-svc.occne-infra:8080/db-tier/status/cluster/local/realtime	empty string	
appinfo.replicationUri	Specifies the URI provided by the DB monitor service to query replication status. Example: http://occne-db-monitor-svc.occne-infra:8080/db-tier/status/replication	empty string	
appinfo.commonCfgClient.enabled	Specifies whether to enable or disable dynamic logging using common configuration service.	true	

Table 3-47 (Cont.) Customizable Parameters for Common Configuration Service in appinfo

Parameter	Description	Default Value	Notes
appinfo.commonCfgServer.port	Specifies the port of common configuration server.	8000	Same value as `servicePorts.cmServiceHttp`.
appinfo.dbConfig.dbHost	Specifies the Hostname of MySQL that is used to store configurations.	Not applicable	Same value as `global.envMysqlHost`.
appinfo.dbConfig.dbPort	Specifies the port number of MySQL.	Not applicable	Same value as `global.envMysqlPort`.
appinfo.dbConfig.secretName	Specifies the database secret from which the db name, db password and db user name is picked.	occnp-db-pass	Same value as `global.dbCredSecretName`.
appinfo.dbConfig.dbName	Specifies the database name to be used to store the common configuration.	occnp_commonconfig	
appinfo.dbConfig.dbUNameLiteral	Specifies the database literal name that shall be used as per the `<dbConfig.secretName>`.	mysql-username	
appinfo.dbConfig.dbPwdLiteral	Specifies the database password literal name that shall be used as per the `<dbConfig.secretName>`.	mysql-password	
appinfo.dbTierVersionUri	Specified the URI provided by the replication service to query Db tier version. For example:`http://mysql-cluster-sitea-siteb-replication-svc/db-tier/version`	empty string	Before Enabling Infra Validate flag Customers are suggested to make sure that there are no critical alarms before upgrading/installing a new release in order to avoid failures. Also, make sure that replication is up.

3.22 Configurations for metrics

Global Metrics Configurations

Starting with CNE 1.9.0, if the user wants to enable monitoring via Prometheus, the following parameters must be configured:

Table 3-48 Global Configurations for Metrics

Parameter	Description
cncMetricsName	This parameter specifies the port, that is, `cnc-metrics` that Prometheus will scrape on.
exposeObservabilityAtService	This parameter specifies whether to enable or disable Prometheus monitoring of services. By default, the value is set to false and services are not captured in Prometheus GUI.

You can add prefix and suffix to metrics for BSF services by using the following parameters:

```
metricPrefix: &metricPrefix 'ocbsf'
  metricSuffix: &metricSuffix ''
```

Table 3-49 Prefix and Suffix for Metrics

Parameter	Description
metricPrefix	This parameter specifies the prefix that you want to add to the metrics for BSF services. **Default value**: occnp
metricSuffix	This parameter specifies the suffix that you want to add to the metrics for BSF services. **Default value**: empty string

A reference is made to the metricPrefix and metricSuffix parameters, defined in the global section, under `nrf-client-nfdiscovery` and `nrf-client-nfmanagement` configurations.

> **Note**
>
> - If you choose to customize prefix, then it is required to align the NF delivered Grafana charts and Prometheus alerts with the updated metric names.
> - When you define a suffix for metrics, it may happen that the suffix appears in the middle of the metric name, and not towards the end. This is due to the fact that Micrometer library autogenerates some metrics and adds a suffix after the user-defined suffix.
>
> **Example**: If you define suffix as `ocbsf`, then the resulting metric name would appear in the system as `http_in_conn_response_`**`ocbsf`**`_total`.

3.23 Overload Manager Configurations

This section describes the customizatons that can be done in `ocbsf_custom_values_24.3.0.yaml` file to configure Overload Manager feature under perf-info.

Table 3-50 Configurable Parameters for overload Manager Configuration in Perf-Info

Parameter	Description	Mandatory/ Optional Parameter	Default Value
perf-info.overloadManager.enabled	Specifies whether to enable or disable overload reporting.	Optional	false
perf-info.envMysqlDatabase	Specifies the name of the database used for overload management. For georedundant setup, the value for this parameter must be unique for each site.	Conditional **Note:** This parameter value is required if the overload manager functionality is enabled by setting the value of `perf-info.overloadManager.enabled` to `true`.	
perf-info.overloadManager.ingressGatewaySvcName	Specifies the names of backend services		ocbsf-ingress-gateway
perf-info.overloadManager.ingressGatewayPort	Specifies the port number of Ingress Gateway	Mandatory	80
perf-info.overloadManager.nfType	Specifies the NF type that is used to query configurration from common configuration server.		BSF

Here is a sample overloadManager configurations in perf-info in `ocbsf_custom_values_24.3.0.yaml` file:

```
perf-info:
  configmapPerformance:
    prometheus: ''
  # envMysqlDatabase is used for overload management.
  # If the customer does not use the overload management feature, this can be
ignored.
  envMysqlDatabase: ''
  overloadManager:
    enabled: false
    # nfType is used to query configuration from common cfg server
    nfType: BSF
```

3.24 Configurable Error Codes

This section describes the parameters that you can customize for configurable error codes.

Table 3-51 Configurable Parameters for Error Codes - Global

Parameter	Description	Mandatory/ Optional Parameter	Default Value
configurableErrorCodes.enabled	Specifies whether to enable or disable configurable error codes that can be used for messages over Ingress Gateway and Egress Gateway.	Optional	false

For a given error scenario, you can define exceptionType, errorCode, errorDescription, errorCause, and errorTitle as shown in the following snippet from the `occnp_custom_values_24.3.0.yaml` file.

Following is the configuration for error codes at global level:

```
ingress-gateway:

  configurableErrorCodes:
    enabled: true
    errorScenarios:
      - exceptionType: "XFCC_HEADER_INVALID"
        errorProfileName: "ERR_1300"
      - exceptionType: "XFCC_HEADER_VALIDATION_FAILURE"
        errorProfileName: "ERR_1300"

  errorCodeProfiles:
    - name: ERR_1300
      errorCode: 401
      errorCause: "xfcc header is invalid"
      errorTitle: "Invalid XFCC Header"
      errorDescription: "Invalid XFCC Header"
```

Following points must be noted for the global level configuration:

- To enable configurable error code global configurableErrorCodes flag must be set to true. If this flag is false then the hardcoded error codes will be returned when an exception is encountered at Ingress and Egress Gateways.
- If global configurableErrorCodes flag is set to true then atleast one entry must be configured in the errorScenarios section.
- For every Exception in errorScenarios there must be an error profile with that exceptionType. Moreover, a profile with that name must be configured in errorCodeProfiles section example - if errorProfileName: "ERR_1300" has been configured then a profile with name ERR_1300 must be present in errorCodeProfiles section.
- ExceptionType field in global and in the routes section is non configurable. These are hard coded values and can be taken from custom.yaml file.

Following is the configuration for error codes at route level:

```
routesConfig:
   - id: route1
     uri:
     path: /dummy/*/dummies
     order: 1
```

```
method: POST
metadata:
  configurableErrorCodes:
    enabled: true
    errorScenarios:
      - exceptionType: "XFCC_HEADER_INVALID"
        errorProfileName: "ERR_1300"
      - exceptionType: "XFCC_HEADER_VALIDATION_FAILURE"
        errorProfileName: "ERR_1300"
```

Following points must be noted for the route level configuration:

- If Route level is enabled, it has higher precedence over global level.
- For Route level configurable error codes to work, configurableErrorCodes flag must be set to true both at route level as well as global level.
- For a given exception at gateway, if there is no match at route level then global level is matched. If there is no match at global level, then hardcoded error values are returned.
- If configurableErrorCodes flag is disabled for a specific route and if an exception occurs at that route then hardcoded error responses will be returned irrespective of what is defined at global level.

> **Note**
>
> For every errorScenario, `exceptionType` and `errorCode` are manadatory parameter configurations.

Configurable Error Codes - SCP Integration

The following parameters are added under Egress Gateway for SCP related configurations. These error code configurations are included in error response from Egress Gateway when it is unable to resolve DNS successfully:

```
dnsSrv:
    port: *svcAlternateRouteServiceHttp
```

For more information about the error codes, see Configurable Error Codes.

3.25 Server Header Configurations

This section describes the parameters that you can configure to enable support for server header at Ingress Gateway.

Table 3-52 Configurable Parameters for Server Header at Ingress Gateway

Parameter	Description	Default Value
ingress-gateway.serverHeaderConfigMode	This optional parameter specifies the mode of operation for configuring server header configuration. The possible values this parameters can be set to is: • REST • HELM Based on the value assigned to this parameter, the feature flag for "serverheaderdetails" must be enabled either in Rest or Helm configurations respectively For more information, see "Server Header Support on Ingress Gateway" section in *Oracle Communications Cloud Native Core, Binding Support Function REST Specification Guide*.	REST

The following is a snippet from the `ocbsf-24.1.0-custom-values.yaml` file:

```
ingress-gateway:
  serverHeaderConfigMode: REST # Possible values: HELM, REST. Based on this
value, the feature flag for "server"  header will need to be enabled either
in Helm configuration or Rest  configuration.
```

3.26 Creating Custom Headers

This section provides information on how to create custom headers for routes in BSF.

You can customize the headers present in the requests and responses based on the type of HTTP methods. This framework modifies the outgoing request or response by adding a new header either with a static value or with a value based on incoming request or response headers at entry or exit points.

By setting the `override` attribute value as true, you can override the existing headers. It is an optional attribute. It adds a new header or replaces the value of an existing header if one of the value is mapped to the source header. The value of this attribute is false by default.

The following is a sample configuration for custom header in `bsf_management_deregister`:

```
- id: bsf_management_deregister
      uri: http://{{ template "service-name-bsf-management" . }}:
{{ .Values.global.servicePorts.bsfManagementServiceHttp }}
      path: /nbsf-management/**
      order: 2
      method: DELETE
      filters:
        customReqHeaderEntryFilter:
          headers:
            - methods:
              - DELETE
              headersList:
                - headerName: 3gpp-Sbi-Message-Priority
                  defaultVal: 18
                  source: incomingReq
```

```
sourceHeader: 3gpp-Sbi-Message-Priority
override: false
```

> **Note**
>
> The attributes `headerName` and `sourceHeader` are case sensitive. Ensure that the value is same as in the incoming request or response in order to extract values from or override value of any particular header.

3.27 Ingress Gateway Readiness Probe Configuration

This section describes the readiness probe configurations in the Ingress Gateway.

Ingress Gateway uses the readiness logic provided by Kubernetes to determine if a pod can accept or reject the incoming requests.

This feature enhances the readiness logic to determine the status of the pod. You can configure the feature in BSF only through Helm. Based on the configurations, further checks are performed to determine the health of the pod.

An in-memory cache is maintained to store the updated configuration. The cache is updated if a profile is modified, added, or deleted. Ingress gateway periodically makes a GET request to the URLs that are configured using a scheduler that runs in the background. If the GET request is successful, then other checks can take place. Otherwise, the pod is marked as unhealthy.

> **Note**
>
> If there are any pending requests waiting for the response and readiness state of pod changes from READY to NOT_READY, then these requests are not considered.

The following table describes the parameters for configuring Readiness Probe in Ingress Gateway:

Table 3-53 Configurable Parameters for Readiness Probe Configuration

Parameter	Description	Mandatory/ Optional Parameter	Default Value	Notes
readinessConfigMode	Specifies the mode to configure Readiness Probe in Ingress Gateway.	Mandatory	HELM	
readinessCheckEnabled	Specifies whether to enable or disable Readiness Probe in Ingress Gateway.	Mandatory	false	

Table 3-53 (Cont.) Configurable Parameters for Readiness Probe Configuration

Parameter	Description	Mandatory/ Optional Parameter	Default Value	Notes
readinessIndicatorPollingInterval	Specifies the time (in milliseconds) at which the **Readiness Cache** updates the readiness status of Ingress Gateway performing the probe or setting the readiness state value to onExceptionUsePreviousState.	Mandatory	3000	
readinessConfig.serviceProfiles.id	Specifies the ID of the profile.	Mandatory	Readiness-profile-DBStatus	
readinessConfig.serviceProfiles.url	Specifies the URL to which the Readiness Probe is sent out to retrieve a response, on the basis of which the state of the Ingress Gateway pod will be decided.	Mandatory	http://{{ template "service-name-app-info" . }}:{{ .Values.global.containerPorts.appInfoHttp }}/status/category/realtimedatabase	In addition to the default value, you can use the following values: 1. FQDN/IP Address. 2. Any microservice to define dependency upon: `http://<Helm Release Name>-<BSF Service Name>:9000/actuator/health/readiness`
readinessConfig.serviceProfiles.responseCode	Specifies the response code expected from the service. If the actual response code matches with the configured one then pod will be marked as healthy.	Mandatory	200	

Table 3-53 (Cont.) Configurable Parameters for Readiness Probe Configuration

Parameter	Description	Mandatory/ Optional Parameter	Default Value	Notes
readinessConfig.serviceProfiles.responseBody	Specifies the response expected from the service. If the actual response matches with the configured one then pod will be marked as healthy.	Mandatory	Running	
readinessConfig.serviceProfiles.onExceptionUsePreviousState	Specifies whether to use the previous state of Ingress Gateway. When this flag is set to true, response and responseCode checks are not made irrespective of the previous state of service on Ingress Gateway.	Mandatory	true	
readinessConfig.serviceProfiles.initialState	Specifies the inital state to be specified. It can be either ACCEPTING_TRAFFIC (to accept all incoming requests) or REFUSING_TRAFFIC (to reject all incoming requests).	Mandatory	ACCEPTING_TRAFFIC	
readinessConfig.serviceProfiles.requestTimeout	Specifies the timeout value of the probe in milliseconds.	Optional	2000	

Check the following when the Ingress Gateway pod comes up:

1. If the service profiles are not configured, then the readiness probe of Ingress Gateway fails and the pod is marked as unhealthy.
2. If the service profiles are configured, check the mandatory parameters: `id`, `url`, `onExceptionUsePreviousState`, and `initialState` for thieir validity. If they are invalid, then the pod is marked as unhealthy.

> **Note**
>
> You must configure one of these parameters: `responseBody` or `responseCode` in the service profile. If any of these checks fail, then the pod does not come up in the case of Helm based configuration.

3. If there is any error like connection failure or connection timeout during making a request to backend service, then `onExceptionUsePreviousState` attribute is checked. If it is set to true, then previous state is used for that URL. If previous state is unavailable, then initial state is used. If `onExceptionUsePreviousState` is false, then the pod is marked as unhealthy.

3.28 Late Arrival Handling Configurations

This section describes the parameters that user can configure for late arrival handling feature.

Table 3-54 Configurable Parameters for Late Arrival Handling at Ingress Gateway

Parameter	Description	Mandatory/ Optional Parameter	Default Value	Applicable to Deployment	Added/ Deprecated/ Updated in Release
ingress-gateway.isSbiTimerEnabled	Specifies whether to enable or disable SBI timer header enhancement. If the value of this parameter is set to true, SBI headers (3gpp-Sbi-Sender-Timestamp, 3gpp-Sbi-Max-Rsp-Time, and 3gpp-Sbi-Origination-Timestamp) are used along with route level (if configured) and global level request timeout to calculate final request timeout. After calculating the final request timeout, original values of 3gpp-Sbi-Sender-Timestamp, 3gpp-Sbi-Max-Rsp-Time and 3gpp-Sbi-Origination-Timestamp are published in custom headers Orig-3gpp-Sbi-Sender-Timestamp, Orig-3gpp-Sbi-Max-Rsp-Time and Orig-3gpp-Sbi-Origination-Timestamp respectively. If the value for this parameter is set to false, SBI headers are not taken into consideration even if they are present and no custom headers are published.	Optional	false	CNC BSF, CNC Policy & PCF	Added in Release 1.15.0
ingress-gateway.publishHeaders	Specifies if the originating headers shall be populated and sent to the backend.	Optional	false	CNC BSF, CNC Policy & PCF	Added in Release 1.15.0
ingress-gateway.sbiTimerTimezone	Specifies the time zone. It can be either set to `GMT` or `ANY`. If it is set to GMT then, the GMT should be specified in the header. If it is not specified, the time zone is assumed as GMT. If it is set to ANY then, the required time zone must be specified in the header. The timeout calculation is made as per the time zone specified in the header. If time zone is not specified then, the request is rejected and a gauge metric is pegged.	Optional	GMT	CNC BSF, CNC Policy, PCF, & PCRF	Added in Release 1.15.0

The following is a snippet from the `occnp-1.15.0-custom-values.yaml` file:

```
# Late arrival handling
  isSbiTimerEnabled: false
  publishHeaders: false
  sbiTimerTimezone: GMT
```

Table 3-55 Configurable Parameters for Late Arrival Handling at Egress Gateway

Parameter	Description	Mandatory/ Optional Parameter	Default Value	Applicable to Deployment	Added/ Deprecated/ Updated in Release
egress-gateway.isSbiTimerEnabled	Specifies whether to enable or disable SBI timer header enhancement. If the value of this parameter is set to true, SBI headers (3gpp-Sbi-Sender-Timestamp, 3gpp-Sbi-Max-Rsp-Time, and 3gpp-Sbi-Origination-Timestamp) are used along with route level (if configured) and global level request timeout to calculate final request timeout. After calculating the final request timeout, original values of 3gpp-Sbi-Sender-Timestamp, 3gpp-Sbi-Max-Rsp-Time and 3gpp-Sbi-Origination-Timestamp are published in custom headers Orig-3gpp-Sbi-Sender-Timestamp, Orig-3gpp-Sbi-Max-Rsp-Time and Orig-3gpp-Sbi-Origination-Timestamp respectively. If the value for this parameter is set to false, SBI headers are not taken into consideration even if they are present and no custom headers are published.	Optional	false	CNC BSF, CNC Policy & PCF	Added in Release 1.15.0
egress-gateway.sbiTimerTimezone	Specifies the time zone. It can be either set to `GMT` or `ANY`. If it is set to GMT then, the GMT should be specified in the header. If it is not specified, the time zone is assumed as GMT. If it is set to ANY then, the required time zone must be specified in the header. The timeout calculation is made as per the time zone specified in the header. If time zone is not specified then, the request is rejected and a gauge metric is pegged.	Optional	GMT	CNC BSF, CNC Policy & PCF	Added in Release 1.15.0
egress-gateway-ignoreMaxRspTimeHeader	Specifies whether to ignore *3gpp-Max-Rsp-Time* while calculating the final request timeout.	Optional	false	CNC BSF, CNC Policy & PCF	Added in Release 1.15.0

To create the collision headers that are used for collision detection in BSF it is necessary to add the following configuration to BSF Ingress Gateway.

```
routesConfig:
    - id: bsf_management_register
      uri: http://{{ template "service-name-bsf-management" . }}:
{{ .Values.global.servicePorts.bsfManagementServiceHttp }}
      path: /nbsf-management/**
      order: 1
      method: POST
      filters:
        customReqHeaderEntryFilter:
          headers:
            - methods:
```

```
- POST
headersList:
  - headerName: 3gpp-Sbi-Message-Priority
    defaultVal: 24
    source: incomingReq
    sourceHeader: 3gpp-Sbi-Message-Priority
    override: false
  - headerName: collision-3gpp-origination-timestamp
    source: incomingReq
    sourceHeader: 3gpp-Sbi-Origination-Timestamp
    override: false
  - headerName: collision-custom-sender-timestamp
    source: incomingReq
    sourceHeader: Custom-Sbi-Sender-Timestamp
    override: false

 - headerName: collision-3gpp-sender-timestamp
    source: incomingReq
    sourceHeader: 3gpp-Sbi-Sender-Timestamp
    override: false
```

3.29 Controlled Shutdown Configurations

This section describes the customizations that can be done in `ocbsf_custom_values_24.3.0.yaml` file to configure controlled shutdown feature.

Table 3-56 Global Parameter for Controlled Shutdown

Parameter	Description	Mandatory/ Optional Parameter	Default Value
global.enableControlledShutdown	Specifies whether to enable or disable the Controlled Shutdown feature.	Mandatory	False

Table 3-57 Configurable Parameters for Controlled Shutdown in Egress Gateway

Parameter	Description	Mandatory/ Optional Parameter	Default Value
egress-gateway.errorcodeprofiles	Error defined by the user	Optional	NA
egress-gateway.errorcodeprofiles.name	Name of the error profile	Optional	NA
egress-gateway.errorcodeprofiles.errorCode	Error code of the error profile	Optional	NA
egress-gateway.errorcodeprofiles.errorCause	Cause of the error profile	Optional	NA
egress-gateway.errorcodeprofiles.errorTitle	Title of the error profile	Optional	NA

Table 3-57 (Cont.) Configurable Parameters for Controlled Shutdown in Egress Gateway

Parameter	Description	Mandatory/ Optional Parameter	Default Value
egress-gateway.errorcodeprofiles.errorDescription	Description of the error profile	Optional	NA
egress-gateway.routesConfig	Routes configuration processed by the Egress Gateway	Optional	NA
egress-gateway.routesConfig.id	ID of the route	Optional	NA
egress-gateway.routesConfig.uri	URI of the route	Optional	NA
egress-gateway.routesConfig.path	Path of the route	Optional	NA
egress-gateway.routesConfig.order	Order in which the routes will be processed	Optional	NA
egress-gateway.routesConfig.filters	Conditions on the routes	Optional	NA
egress-gateway.routesConfig.filters.controlledShutdownFilter	Filter specified for Controlled Shutdown feature	Optional	NA
egress-gateway.routesConfig.filters.controlledShutdownFilter.applicableShutdownStates	States of Controlled shutdown feature, that is COMPLETE_SHUTDOWN	Optional	NA
egress-gateway.routesConfig.filters.controlledShutdownFilter.unsupportedOperations	Operations which needs not be supported for controlled shutdown feature	Optional	NA
egress-gateway.controlledShutdownErrorMapping	Array containing route ID and error profile name	Optional	NA
egress-gateway.controlledShutdownErrorMapping.routeErrorProfileList	List of route ID and their corresponding error profile names	Optional	NA
egress-gateway.controlledShutdownErrorMapping.routeErrorProfileList.routeId	Route ID on which the error profile name needs to be mapped	Optional	NA
egress-gateway.controlledShutdownErrorMapping.routeErrorProfileList.errorProfileName	Error name from the error code profiles to be mapped in route ID	Optional	NA

Here is a sample Error Codes configuratiom in Egress Gateway in the `ocbsf_custom_values_24.3.0.yaml` file:

```
errorcodeprofiles:
  - name: error300,
    errorCode: 300,
    errorCause: "",
    errorTitle: "",
    retry-after: "",
```

```
    errorDescription: ""
  - name: error500,
    errorCode: 500,
    errorCause: "",
    errorTitle: "",
    retryAfter: "",
    errorDescription: ""
```

Here is a sample routes configuration for Controlled Shutdown in Egress Gateway in the `ocbsf_custom_values_24.3.0.yaml` file:

```
routesConfig:
  - id: nrf_state
    uri: https://dummy.dontchange_1
    path: /nnrf-nfm/*
    order: 1
  - id: sampleRoute
    uri: https://dummy.dontchange_2
    path: /**
    order: 2
    metadata:
      httpsTargetOnly: false
      httpRuriOnly: false
      sbiRoutingEnabled: true
      oauthEnabled: false
    filterNameControlShutdown:
      name: ControlledShutdownFilter
      args:
        applicableShutdownStates:
          - COMPLETE_SHUTDOWN
        unsupportedOperations:
          - GET
          - PUT
          - PATCH
          - POST
          - DELETE
```

Here is a sample Error Codes Mapping configuratiom in Egress Gateway in the `ocbsf_custom_values_24.3.0.yaml` file:

```
controlledShutdownErrorMapping:
  routeErrorProfileList:
    - routeId: sampleRoute
      errorProfileName: "error503"
```

3.30 Common Configurations for Services

This section describes the configurable parameters that can be used to perform some common configurations applicable to different services while deploying BSF.

Common Reference Configurations

You can configure some common parameters that are used in multiple services by configuring `commonRef` section under `global` parameters section of the Custom Values YAML file. The

parameter values can be set under `commonRef` and same value is used by all the services through the reference variable for the configuration.

The following section describes the `commonRef` parameters for common configuration:

Table 3-58 Common Reference Configurations

Parameter	Description	Mandatory Parameter	Default Value	Notes
&configServerImage	Specifies the name of the config server container image.	Yes	oc-config-server	
&configServerDB	Specifies the name of the config server database.	Yes	ocbsf_config_server	
&commonConfigDB	Specifies the name of the common config database.	Yes	ocbsf_commonconfig	
commonCfgSvc.commonCfgServer.port	Specifies the common config server port for common config service.	Yes	8000	Same value as `global.servicePorts.cmServiceHttp`.
&dbCommonConfig.dbHost	Specifies the MySQL database host for services.	Yes		Same value as `global.envMysqlHost`.
&dbCommonConfig.dbPort	Specifies MySQL database port for services.	Yes		Same value as `global.envMysqlPort`.
&dbCommonConfig.dbName	Specifies common config database name for services to store common configurations.	Yes	ocbsf_commonconfig	Same value as `global.commonRef.commonConfigDB`
&dbCommonConfig.dbUNameLiteral	Specifies the database literal name for services to be used as per the `<dbConfig.secretName>`.	Yes	mysql-username	
&dbCommonConfig.dbPwdLiteral	Specifies the database literal password for services to be used as per the `<dbConfig.secretName>`.	Yes	mysql-password	

Common Configurations Service and Database configurations in nrf-client-nfdiscovery

Table 3-59 Common Configurations Service and Database configurations in nrf-client-nfdiscovery

Parameter	Description	Mandatory Parameter	Default Value	Notes
nrf-client-nfdiscovery.commonCfgServer.port	Specifies the common config server port for common config service.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
nrf-client-nfdiscovery.dbConfig.dbHost	Specifies the MySQL database host for services.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
nrf-client-nfdiscovery.dbConfig.dbPort	Specifies MySQL database port for services.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
nrf-client-nfdiscovery..dbConfig.secretName	Specifies kubernetes secret object name from which MYSQL username and password is picked.	Yes	occnp-db-pass	Same value as `global.dbCredSecretName`
nrf-client-nfdiscovery.dbConfig.dbName	Specifies common config database name for services to store common configurations.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
nrf-client-nfdiscovery.dbConfig.dbUNameLiteral	Specifies the database literal name for services to be used as per the `<dbConfig.secretName>`.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
nrf-client-nfdiscovery.dbConfig.dbPwdLiteral	Specifies the database literal password for services to be used as per the `<dbConfig.secretName>`.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.

Common Configurations Service and Database configurations in nrf-client-nfmanagement

Table 3-60 Common Configuration Service and Database configurations in nrf-client-nfmangement

Parameter	Description	Mandatory Parameter	Default Value	Notes
nrf-client-nfmanagement.commonCfgServer.port	Specifies the common config server port for common config service.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
nrf-client-nfmanagement.dbConfig.dbHost	Specifies the MySQL database host for services.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
nrf-client-nfmanagement.dbConfig.dbPort	Specifies MySQL database port for services.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
nrf-client-nfmanagement.dbConfig.secretName	Specifies kubernetes secret object name from which MYSQL username and password is picked.	Yes	occnp-privileged-db-pass	Same value as `global.priviledgedDbCredSecretName`
nrf-client-nfmanagement.dbConfig.dbName	Specifies common config database name for services to store common configurations.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
nrf-client-nfmanagement.dbConfig.dbUNameLiteral	Specifies the database literal name for services to be used as per the `<dbConfig.secretName>`.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
nrf-client-nfmanagement.dbConfig.dbPwdLiteral	Specifies the database literal password for services to be used as per the `<dbConfig.secretName>`.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.

Common Configurations Service and Database configurations in appinfo

Table 3-61 Common Configuration Service and Database configurations in appinfo

Parameter	Description	Mandatory Parameter	Default Value	Notes
appinfo.commonCfgClient.enabled	Specifies whether to enable or disable common config client for common config service.	Yes	true	
appinfo.commonCfgServer.port	Specifies the common config server port for common config service.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
appinfo.dbConfig.dbHost	Specifies the MySQL database host for services.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
appinfo.dbConfig.dbPort	Specifies MySQL database port for services.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
appinfo.dbConfig.secretName	Specifies kubernetes secret object name from which MYSQL username and password is picked.	Yes	occnp-db-pass	Same value as `global.dbCredSecretName`
appinfo.dbConfig.dbName	Specifies common config database name for services to store common configurations.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
appinfo.dbConfig.dbUNameLiteral	Specifies the database literal name for services to be used as per the `<dbConfig.secretName>`.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.

Table 3-61 (Cont.) Common Configuration Service and Database configurations in appinfo

Parameter	Description	Mandatory Parameter	Default Value	Notes
appinfo.dbConfig.dbPwdLiteral	Specifies the database literal password for services to be used as per the <dbConfig.secretName>.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.

Non real-time based status API from the monitor service is dependent on the Prometheus. If Promethus-server and prometheus-kube-state-metrics is not working or installed properly then the non real-time API provides the wrong value.

It is recommended to use real-time DBstatus URIs because these URIs always provide the right values.

For example:

```
db_status_uri : http://occndbtier-db-monitor-svc:8080/db-tier/status/cluster/local/
realtime
realtime_db_status_uri : http://occndbtier-db-monitor-svc:8080/db-tier/status/cluster/
local/realtime
replication_status_uri : http://occndbtier-db-monitor-svc:8080/db-tier/status/
replication/realtime
```

Common Configuration Service and Database configurations in perf-info

Table 3-62 Common Configuration Service and Database configurations in perf-info

Parameter	Description	Mandatory Parameter	Default Value	Notes
perf-info.commonCfgClient.enabled	Specifies whether to enable or disable common config client for common config service.	Yes	true	
perf-info.commonCfgServer.port	Specifies the common config server port for common config service.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
perf-info.dbConfig.dbHost	Specifies the MySQL database host for services.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.

Table 3-62 (Cont.) Common Configuration Service and Database configurations in perf-info

Parameter	Description	Mandatory Parameter	Default Value	Notes
perf-info.dbConfig.dbPort	Specifies MySQL database port for services.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
perf-info.dbConfig.secretName	Specifies kubernetes secret object name from which MYSQL username and password is picked.	Yes	occnp-db-pass	Same value as `global.dbCredSecretName`
perf-info.dbConfig.dbName	Specifies common config database name for services to store common configurations.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
perf-info.dbConfig.dbUNameLiteral	Specifies the database literal name for services to be used as per the `<dbConfig.secretName>`.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
perf-info.dbConfig.dbPwdLiteral	Specifies the database literal password for services to be used as per the `<dbConfig.secretName>`.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.

Common Configuration Service and Database configurations in ingress-gateway

Table 3-63 Common Configuration Service and Database configurations in ingress-gateway

Parameter	Description	Mandatory Parameter	Default Value	Notes
ingress-gateway.commonCfgServer.port	Specifies the common config server port for common config service.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.

Table 3-63 (Cont.) Common Configuration Service and Database configurations in ingress-gateway

Parameter	Description	Mandatory Parameter	Default Value	Notes
ingress-gateway.dbConfig.dbHost	Specifies the MySQL database host for services.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
ingress-gateway.dbConfig.dbPort	Specifies MySQL database port for services.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
ingress-gateway.dbConfig.secretName	Specifies kubernetes secret object name from which MYSQL username and password is picked.	Yes	occnp-db-pass	Same value as `global.dbCredSecretName`
ingress-gateway.dbConfig.dbName	Specifies common config database name for services to store common configurations.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
ingress-gateway.dbConfig.dbUNameLiteral	Specifies the database literal name for services to be used as per the `<dbConfig.secretName>`.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
ingress-gateway.dbConfig.dbPwdLiteral	Specifies the database literal password for services to be used as per the `<dbConfig.secretName>`.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.

Common Configuration Service and Databse configurations in egress-gateway

Table 3-64 Common Configuration Service and Databse configurations in egress-gateway

Parameter	Description	Mandatory Parameter	Default Value	Notes
egress-gateway.commonCfgServer.port	Specifies the common config server port for common config service.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
egress-gateway.dbConfig.dbHost	Specifies the MySQL database host for services.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
egress-gateway.dbConfig.dbPort	Specifies MySQL database port for services.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
egress-gateway.dbConfig.secretName	Specifies kubernetes secret object name from which MYSQL username and password is picked.	Yes	occnp-db-pass	Same value as `global.dbCredSecretName`
egress-gateway.dbConfig.dbName	Specifies common config database name for services to store common configurations.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
egress-gateway.dbConfig.dbUNameLiteral	Specifies the database literal name for services to be used as per the `<dbConfig.secretName>`.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
egress-gateway.dbConfig.dbPwdLiteral	Specifies the database literal password for services to be used as per the `<dbConfig.secretName>`.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.

Common Configuration Service and Databse configurations in alternate-route

Table 3-65 Customizable Parameters for Common Configuration Service in alternate-route

Parameter	Description	Mandatory Parameter	Default Value	Notes
alternate-route.commonCfgServer.port	Specifies the common config server port for common config service.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
alternate-route.dbConfig.dbHost	Specifies the MySQL database host for services.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
alternate-route.dbConfig.dbPort	Specifies MySQL database port for services.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
alternate-route.dbConfig.secretName	Specifies kubernetes secret object name from which MYSQL username and password is picked.	Yes	occnp-db-pass	Same value as `global.dbCredSecretName`
alternate-route.dbConfig.dbName	Specifies common config database name for services to store common configurations.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
alternate-route.dbConfig.dbUNameLiteral	Specifies the database literal name for services to be used as per the `<dbConfig.secretName>`.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.
alternate-route.dbConfig.dbPwdLiteral	Specifies the database literal password for services to be used as per the `<dbConfig.secretName>`.	Yes	Same as the value provided in the Table 3-58	To use a different values than the default value, remove the comment (#) from the respective parameters and edit the values.

Note

You can add additional parameters under the `dbConfig` for each service by adding key value pair after the `<<: *dbCommonConfig` text.
The following snippet shows an example:

```
dbConfig:
 <<: *dbCommonConfig
 <key>:<value>
```

where, *<key>* is the parameter to be configured and *<value>* is the configured value for *<key>*.

3.31 Graceful Shutdown Configurations

This section describes the customizatons that can be done in `ocbsf_custom_values_24.3.0.yaml` file to configure graceful shutdown of Kubernetes pods.

Table 3-66 Configurable Parameters for Graceful Termination in BSF services

Parameter	Description	Mandatory/ Optional Parameter	Default Value
• bsf-management-service.gracefulShutdown.gracePeriod • config-server.gracefulShutdown.gracePeriod • cm-service.gracefulShutdown.gracePeriod • queryservice.gracefulShutdown.gracePeriod • audit-service.gracefulShutdown.gracePeriod • nrf-client.nrf-client-nfdiscovery.gracefulShutdown.gracePeriod • nrf-client.nrf-client-nfmanagement.gracefulShutdown.gracePeriod • appinfo.gracefulShutdown.gracePeriod • perf-info.gracefulShutdown.gracePeriod • diam-gateway.gracefulShutdown.gracePeriod • ingress-gateway.gracefulShutdown.gracePeriod • egress-gatewaygracefulShutdown.gracePeriod	Specifies the waiting grace period for current requests to be processed. If there are no current requests then this period is neglected.	Optional	30s **Note**: 's' in case of seconds and 'm' in case of minutes.

Here is a sample configuration for graceful shutdown parameters in `ocbsf_custom_values_24.3.0.yaml` file:

```
bsf-management-service:
  # Graceful Termination
  gracefulShutdown:
    gracePeriod: 30s

config-server:
  # Graceful Termination
  gracefulShutdown:
    gracePeriod: 30s

cm-service:
  # Graceful Termination
```

```
  gracefulShutdown:
    gracePeriod: 30s
```

3.32 Configurations for NodeSelector

Kubernetes `nodeSelector` feature is used for manual pod scheduling. A pod is assigned to only those nodes that have label(s) identical to label(s) defined in the `nodeSelector`.

To see all the labels attached to a node you can run:

```
kubectl describe node pollux-k8s-node-1
Name:               pollux-k8s-node-1
Roles:              <none>
Labels:             beta.kubernetes.io/arch=amd64
                    kubernetes.io/hostname=pollux-k8s-node-1
                    kubernetes.io/os=linux
                    topology.kubernetes.io/region=RegionOne
                    topology.kubernetes.io/zone=nova
```

The default labels attached to kubernetes nodes are displayed. In order to assign a pod to the node in BSF, you need to set custom configurations in `ocbsf_custom_values_24.3.0.yaml` file.

You can configure nodeselection field under global/local services section of the `ocbsf_custom_values_24.3.0.yaml` file. For ingress gateway, egress gateway and alternate route services `nodeselector` is configured at global section.

Table 3-67 Configurations for NodeSelector

Parameter	Description	Values	Notes

global.nodeSelection	Specifies if pods needs to assigned to a specific node manually or not.	Allowed Values:
		• ENABLED
		• DISABLED
		Default Value: DISABLED
			`global:`
			`  nodeSelection: ENABLED`
			`  nodeSelector:`
			`  nodeKey: key`
			`  nodeValue: value`
			
			For example:
			
			`global:`
			`  nodeSelection: ENABLED`
			`  nodeSelector:`
			`  nodeKey: 'kubernetes.io/os'`

global.nodeSelector.nodeKey	Specifies a valid key that is a node label of a particular node in the cluster.	Not Applicable	

Table 3-67 (Cont.) Configurations for NodeSelector

Parameter	Description	Values	Notes
global.nodeSelector.nodeValue	Specifies valid value pair for the above key for a label for a particular node.	'Not Applicable	`nodeValue: 'linux'`

Table 3-68 Configurations for NodeSelector

Parameter	Description	Values	Notes

bsf-management-service.nodeSelectorEnabled	Specifies if pods needs to assigned to a specific node manually or not.	Allowed Values:
		• true
		• false
		Default Value: false
			`bsf-management-service:`
			`nodeSelectorEnabled: true`
			`nodeSelectorKey: key`
			`nodeSelectorValue: value`
			For example:
			`bsf-management-service:`
			`nodeSelectorEnabled: true`
			`nodeSelectorKey: kubernetes.io/os`
			`nodeSelectorValue: linux`

bsf-management-service.nodeSelectorKey	Specifies a valid key that is a node label of a particular node in the cluster.	Not Applicable	
bsf-management-service.nodeSelectorValue	Specifies valid value pair for the above key for a label of a particular node.	Not Applicable	

config-server.nodeSelectorEnabled	Specifies if pods needs to assigned to a specific node manually or not.	Allowed Values:
		• true
		• false
		Default Value: false
			`config-server:`
			`nodeSelectorEnabled: true`
			`nodeSelectorKey: key`

config-server.nodeSelectorKey	Specifies a valid key that is a node label of a particular node in the cluster.	Not Applicable	

Table 3-68 (Cont.) Configurations for NodeSelector

Parameter	Description	Values	Notes

config-server.nodeSelectorValue	Specifies valid value pair for the above key for a label of a particular node.	Not Applicable	`nodeSelectorValue: value`
			
			For example:
			
			`config-server:`
			`nodeSelectorEnabled: true`
			`nodeSelectorKey: kubernetes.io/os`
			`nodeSelectorValue: linux`

queryservice.nodeSelectorEnabled	Specifies if pods needs to assigned to a specific node manually or not.	Allowed Values:
		• true
		• false
		Default Value: false
			`queryservice:`
			`nodeSelectorEnabled: true`
			`nodeSelectorKey: key`
			`nodeSelectorValue: value`
			
			For example:
			
			`queryservice:`
			`nodeSelectorEnabled: true`
			`nodeSelectorKey: kubernetes.io/os`
			`nodeSelectorValue: linux`

queryservice.nodeSelectorKey	Specifies a valid key that is a node label of a particular node in the cluster.	Not Applicable	
queryservice.nodeSelectorValue	Specifies valid value pair for the above key for a label of a particular node.	Not Applicable	

Table 3-68 (Cont.) Configurations for NodeSelector

Parameter	Description	Values	Notes

cm-service.nodeSelectorEnabled	Specifies if pods needs to assigned to a specific node manually or not.	Allowed Values:
		• true
		• false
		Default Value: false
			`cm-service:`
			`nodeSelectorEnabled: true`
			`nodeSelectorKey: key`
			`nodeSelectorValue: value`
			For example:
			`cm-service:`
			`nodeSelectorEnabled: true`
			`nodeSelectorKey: kubernetes.io/os`
			`nodeSelectorValue: linux`

cm-service.nodeSelectorKey	Specifies a valid key that is a node label of a particular node in the cluster.	Not Applicable	
cm-service.nodeSelectorValue	Specifies valid value pair for the above key for a label of a particular node.	Not Applicable	

audit-service.nodeSelectorEnabled	Specifies if pods needs to assigned to a specific node manually or not.	Allowed Values:
		• true
		• false
		Default Value: false
			`audit-service:`
			`nodeSelectorEnabled: true`
			`nodeSelectorKey: key`
			`nodeSelectorValue: value`
			For example:
			`audit-service:`
			`nodeSelectorEnabled: true`

audit-service.nodeSelectorKey	Specifies a valid key that is a node label of a particular node in the cluster.	Not Applicable	

Table 3-68 (Cont.) Configurations for NodeSelector

Parameter	Description	Values	Notes

audit-service.nodeSelectorValue	Specifies valid value pair for the above key for a label of a particular node.	Not Applicable	`nodeSelectorKey: kubernetes.io/os`
			
			`nodeSelectorValue : linux`

nrf-client.nrf-client-nfdiscovery.global.deploymentNrfClientService.nodeSelectorEnabled	Specifies if pods needs to assigned to a specific node manually or not.	Allowed Values:
		• true
		• false
		Default Value: false
			`nrf-client:`
			`  nrf-client-nfdiscovery:`
			`  global:`
			
			`ephemeralStorageLimit: 1024`
			
			`deploymentNrfClientService:`
			
			`nodeSelectorEnabled: true`
			
			`nodeSelectorKey: kubernetes.io/os`
			
			`nodeSelectorValue : linux`
			
			For example:
			
			`nrf-client:`
			`  nrf-client-nfdiscovery:`
			`  global:`
			
			`ephemeralStorageLimit: 1024`
			
			`deploymentNrfClientService:`
			
			`nodeSelectorEnabled: true`
			
			`nodeSelectorKey: kubernetes.io/os`

nrf-client.nrf-client-nfdiscovery.global.deploymentNrfClientService.nodeSelectorKey	Specifies a valid key that is a node label of a particular node in the cluster.	Not Applicable	

Table 3-68 (Cont.) Configurations for NodeSelector

Parameter	Description	Values	Notes
nrf-client.nrf-client-nfdiscovery.global.deploymentNrfClientService.nodeSelectorValue	Specifies valid value pair for the above key for a label of a particular node.	Not Applicable	`nodeSelectorValue: linux`

nrf-client.nrf-client-nfmanagement.global.deploymentNrfClientService.nodeSelectorEnabled	Specifies if pods needs to assigned to a specific node manually or not.	Allowed Values:
		• true
		• false
		Default Value: false
			`nrf-client:`
			`  nrf-client-nfmanagement:`
			`  global:`
			`deploymentNrfClientService:`
			`nodeSelectorEnabled: true`
			`nodeSelectorKey: kubernetes.io/os`
			`nodeSelectorValue: linux`
			
			For example:
			
			`nrf-client:`
			`  nrf-client-nfmanagement:`
			`  global:`
			`deploymentNrfClientService:`
			`nodeSelectorEnabled: true`
			`nodeSelectorKey: kubernetes.io/os`
			`nodeSelectorValue: linux`

nrf-client.nrf-client-nfmanagement.global.deploymentNrfClientService.nodeSelectorKey	Specifies a valid key that is a node label of a particular node in the cluster.	Not Applicable	
nrf-clientnrf-client-nfmanagement.global.deploymentNrfClientService.nodeSelectorValue	Specifies valid value pair for the above key for a label of a particular node.	Not Applicable	
appinfo.nodeSelection	Specifies if pods needs to assigned to a specific node manually or not.	Allowed Values: • ENABLED • DISABLED **Default Value**: DISABLED	`appinfo:` `  nodeSelection:`

Table 3-68 (Cont.) Configurations for NodeSelector

Parameter	Description	Values	Notes

appinfo.nodeSelector	Specifies the key value pair for a label of a particular node.	Not Applicable	ENABLED
			  nodeSelector:
			  key: value
			
			For example:
			
			appinfo:
			  nodeSelection:
			ENABLED
			  nodeSelector:
			
			'kubernetes.io/
			os': 'linux'

perf-info.nodeSelectorEnabled	Specifies if pods needs to assigned to a specific node manually or not.	Allowed Values: • true • false **Default Value**: false	perf-info: nodeSelectorEnabled: true nodeSelectorKey: key nodeSelectorValue: value For example: perf-info: nodeSelectorEnabled: true nodeSelectorKey: kubernetes.io/os nodeSelectorValue: linux
perf-info.nodeSelectorKey	Specifies a valid key that is a node label of a particular node in the cluster.	Not Applicable	
perf-info.nodeSelectorValue	Specifies valid value pair for the above key for a label of a particular node.	Not Applicable	
diam-connector.nodeSelectorEnabled	Specifies if pods needs to assigned to a specific node manually or not.	Allowed Values: • true • false **Default Value**: false	diam-connector:

Table 3-68 (Cont.) Configurations for NodeSelector

Parameter	Description	Values	Notes

diam-connector.nodeSelectorKey	Specifies a valid key that is a node label of a particular node in the cluster.	Not Applicable	`nodeSelectorEnabled: true`
			
			`nodeSelectorKey: kubernetes.io/os`
			
			`nodeSelectorValue: linux`
			
			For example:
			
			`diam-connector:`
			
			`nodeSelectorEnabled: true`
			
			`nodeSelectorKey: kubernetes.io/os`
			
			`nodeSelectorValue: linux`

diam-connector.nodeSelectorValue	Specifies valid value pair for the above key for a label of a particular node.	Not Applicable	

diam-gateway.nodeSelectorEnabled	Specifies if pods needs to assigned to a specific node manually or not.	Allowed Values:
		• true
		• false
		Default Value: false
			`diam-gateway:`
			
			`nodeSelectorEnabled: true`
			
			`nodeSelectorKey: kubernetes.io/os`
			
			`nodeSelectorValue: linux`
			
			For example:
			
			`diam-gateway:`
			
			`nodeSelectorEnabled: true`
			
			`nodeSelectorKey: kubernetes.io/os`

diam-gateway.nodeSelectorKey	Specifies a valid key that is a node label of a particular node in the cluster.	Not Applicable	

Table 3-68 (Cont.) Configurations for NodeSelector

Parameter	Description	Values	Notes
diam-gateway.nodeSelectorValue	Specifies valid value pair for the above key for a label of a particular node.	Not Applicable	`nodeSelectorValue : linux`

3.33 Configuration Parameters for IPv6

Table 3-69 Configurable Parameters for IPv6

Parameter	Description	Mandatory Parameter	Default Value	Value to Enable IPv6	Applicable to Deployment	Added/ Deprecated/ Updated in Release	Notes
global.isIpvSixSetup	Enable HTTP communication in IPv6	No	false	True	CNC Policy, PCF, & PCRF	Added in Release 23.4.0	This value must be set to "true" if you are going to require HTTP communication over IPv6.
diam-gateway.envSupportedIpAddressType	Distinguish between the IP address types for which diam-gw would enable connectivity and not depend on the IP address type of the infrastructure.	No	IPv4	IPv6	CNC Policy, PCF, & PCRF	Added in Release 23.4.0	This parameter must be set to IPv6 if the diam-gw connectivity will be exclusively in "IPv6" or "BOTH" if the connectivity will be for IPv4 and IPv6.

Note

You must enable the IPv6 related parameters in Alternate Route, Ingress Gateway, and Egress Gateway services configurations.

> **Note**
>
> When BSF is being installed in a dual stack environment with IPv6 enabled, it is necessary to edit each service by changing "ipFamilies" and "ipFamilyPolicy" as follows:
>
> ```
> ipFamilies:
>  - IPv6
>  - IPv4
> ipFamilyPolicy: RequireDualStack
> ```

3.34 Configuring Kafka for NF message feed

This section describes the parameters that are required to configure Kafka for NF message feed.

Table 3-70 Parameters for Message Feed Configuration for Kafka

Parameter	Description	Mandatory/Optional Parameter	Default Value
global.nfType	Identifies the type of producer NF.	Optional	BSF
global.nfInstanceId	Identifies the producer NF instance.	Optional	6faf1bbc-6e4a-4454-a507-a14ef8e1bc5c
global.nfFqdn	Identifies the producer NF fqdn.	Optional	BSF-d5g.oracle.com

4 Upgrading BSF

This chapter provides information about upgrading Oracle Communications Cloud Native Core, Binding Support Function (BSF) deployment to the latest release. It is recommended to perform BSF upgrade in a specific order. For more information about the upgrade order, see *Oracle Communications Cloud Native Core, Solution Upgrade Guide*.

Note

- In a georedundant deployment, perform the steps explained in this section on all the georedundant sites.
- For BSF georedundant deployments, during a site upgrade the difference between the BSF release versions for all the georedundant sites cannot be more than 1 release.
  For example, In a three-site BSF deployment, all the 3 sites are at the same release version as N. During site upgrade, site 1 and site 2 are upgraded to N+1 version, and site 3 is not upgraded yet. At this State, before upgrading site 3 to N+1, upgrading site 1 and/or site 2 from N+1 version to N+2 version is not supported as the difference between the BSF release versions for all the georedundant sites cannot be more than 1 release.

  For more information about the cnDBTier georedundant deployments, see *Oracle Communications Cloud Native Core, cnDBTier Installation, Upgrade, and Fault Recovery Guide*.

  For more information about the CNC Console georedundant deployments, see *Oracle Communications Cloud Native Core, CNC Console Installation, Upgrade, and Fault Recovery Guide*.

4.1 Supported Upgrade Paths

The following table lists the supported upgrade paths for BSF:

Source Release	Target Release
24.2.x	24.3.0
24.1.x	24.3.0

Note

BSF must be upgraded before upgrading cnDBTier.

.

4.2 Upgrade Strategy

BSF supports in-service upgrade. The supported upgrade strategy is `RollingUpdate`. The rolling update strategy is a gradual process that allows you to update your Kubernetes system with only a minor effect on performance and no downtime. The advantage of the rolling update strategy is that the update is applied Pod-by-Pod so the greater system can remain active.

The following engineering configuration parameters are used to define upgrade strategy:

- `upgradeStrategy` parameter indicates the update strategy used in BSF.
- `maxUnavailable` parameter determines the maximum number of pods that can be unavailable during upgrade.
  For more information on maxUnavailable for each microservices refer PodDisruptionBudget Configuration section.

> **Note**
>
> When BSF is deployed with OCCM, follow the specific upgrade sequence as mentioned in the *Oracle Communications, Cloud Native Core Solution Upgrade Guide*.

4.3 Preupgrade Tasks

This section provides information about preupgrade tasks to be performed before upgrading BSF.

1. Backup the current `custom-values.yaml` file.
2. Update the new `custom_values.yaml` file for target BSF release. For details on customizing this file, see Customizing BSF.
3. Before starting the upgrade, take a manual backup of BSF REST based configuration. This helps if preupgrade data has to be restored.

   > **Note**
   >
   > For Rest API configuration details, see *Oracle Communications Cloud Native Core, Binding Support Function REST Specification Guide*.

4. Before upgrading, perform sanity check using Helm test. See the Performing Helm Test section for the Helm test procedure.
5. Install or upgrade the network policies, if applicable. For more information, see Configuring Network Policies.

> **Note**
>
> It is recommended to perform BSF upgrade in a specific order. For more information about the upgrade order, see *Oracle Communications Cloud Native Core, Solution Upgrade Guide*.

Before starting the procedure to upgrade Binding Support Function (BSF), perform the following tasks:

- Since Diameter Connector is removed from BSF, perform any of the following methods to prepare system for upgrade with functional Diameter Connector:
  One-step Upgrade: Set the value of `diamConnectorEnable` as false in the custom values yaml file and then perform the upgrade. This method is a site isolation upgrade and may have an impact on traffic.

  OR

  Two-step Upgrade:

  1. Set the value of the `diamConnectorEnable` parameter as **true** in the custom values yaml file and perform the upgrade.
  2. After a successful upgrade, change the value of `diamConnectorEnable` to **false** in the same custom values yaml file and rerun the upgrade command.
     Running the same upgrade command twice by changing the `diamConnectorEnable` parameter values does not impact the traffic.

4.4 Upgrade Tasks

This section includes information about upgrading an existing Binding Support Function (BSF) deployment.

Helm Upgrade

Upgrading an existing deployment replaces the running containers and pods with new containers and pods. If there is no change in the pod configuration, it is not replaced. Unless there is a change in the service configuration of a microservice, the service endpoints remain unchanged.

Upgrade Procedure

> ⚠ **Caution**
>
> - Stop the provisioning traffic before you start the upgrade procedure.
> - Do not perform any configuration changes during the upgrade.
> - Do not exit from `helm upgrade` command manually. After running the `helm upgrade` command, it takes some time (depending upon the number of pods to upgrade) to upgrade all the services. In the meantime, you must not press "`ctrl+c`" to come out from `helm upgrade` command. It may lead to anomalous behavior.

1. Unzip the release package file to the system where you want to deploy BSF. The BSF release package is named using the following convention:

   `ReleaseName-pkg-Releasenumber.tgz`

   where, `ReleaseName` is the name used to track a particular installation instance and

   `Releasenumber` is the release number.

   For BSF 24.3.0, the release package file name is `ocbsf-pkg24.3.0.0.0.tgz`.

> **Note**
>
> For information on how to download the package from My Oracle Support (MOS), see Downloading BSF package.

2. Untar the BSF package file to get the docker image tar file:

   ```
   tar -xvzf ReleaseName-pkg-ReleaseNumber.tgz
   ```

   For Example:

   ```
   tar -xvzf ocbsf-pkg-24.3.0.0.0.tgz
   ```

   The directory consists of the following:

   - `ocbsf-images-24.3.0.tar` - BSF Docker Images File
   - `ocbsf-24.3.0.tgz` - Helm Charts
   - `Readme.txt` - Readme txt file
   - `ocbsf-24.3.0.tgz.sha256` - Checksum for Helm chart tgz file
   - `ocbsf-images-24.3.0.tar.sha256` - Checksum for images tgz file
3. Load and Push the Images to Customer Docker Registry. See Pushing the Images to Customer Docker Registry.
4. Modify the required custom-values.yaml file for the target BSF release. To learn how to customize the file or any specific parameters, see Customizing BSF.

   > **Note**
   >
   > The values of the parameters mentioned in the custom values yaml file overrides the defaults values specified in the helm chart. If the **envMysqlDatabase** parameter is modified, then you should modify the **configDbName** parameter with the same value.

5. Upgrade BSF using Helm:

   ```
   helm upgrade <release-name> <helm-chart> -f <custom-file> -n <release-namespace>
   ```

   Example:

   ```
   helm upgrade ocbsf ocbsf-24.3.0.tgz -f ocbsf-24.3.0-custom-values.yaml -n ocbsf
   ```

   where:
   helm_chart is the location of the helm chart extracted from `ocbsf-24.3.0.tgz` file

   release_name is the release name used by helm command.

   release_namespace is the deployment namespace used by helm command.

   custom_file - is the name of the custom values yaml file.

Optional parameters that can be used in the `helm install` command:

- **atomic**:If this parameter is set, installation process purges chart on failure. The --wait flag will be set automatically.
- **wait**: If this parameter is set, installation process will wait until all pods, PVCs, Services, and minimum number of pods of a deployment, StatefulSet, or ReplicaSet are in a ready state before marking the release as successful. It will wait for as long as --timeout.
- **timout duration**: If not specified, default value will be 300 (300 seconds) in Helm. It specifies the time to wait for any individual Kubernetes operation (like Jobs for hooks). If the `helm install` command fails at any point to create a Kubernetes object, it will internally call the purge to delete after the timeout value. Here, the timeout value is not for overall installation, but for automatic purge on installation failure.

> **Note**
>
> It is recommended not to use `--wait` and `--atomic` parameters along with helm upgrade as this might result in upgrade failure.

> **Note**
>
> The following warnings must be ignored for BSF upgrade on 24.3.0, 24.2.0 and 24.1.0 CNE:
>
> ```
> helm install <release-name> -f <custom.yaml> <tgz-file> -n
> <namespace>
> W0301 07:39:30.096125 1718193 warnings.go:70]
> spec.template.spec.containers[0].ports[3]: duplicate port
> definition with spec.template.spec.containers[0].ports[1]
> W0301 07:39:34.033420 1718193 warnings.go:70]
> spec.template.spec.containers[0].ports[3]: duplicate port
> definition with spec.template.spec.containers[0].ports[2]
> Release "<release-name>" has been upgraded. Happy Helming!
> NAME: <release-name>
> LAST DEPLOYED: <Date-Time>
> NAMESPACE: <namespace>
> STATUS: deployed
> REVISION: <N>
> ```

6. Run the following command to check the status of jobs and pods:

   ```
   kubectl get jobs,pods -n release_namespace
   ```

   For example:

   ```
   kubectl get jobs,pods -n ocbsf
   ```

   You should see the status as **Running** for all the pods if BSF is deployed successfully.

7. Before upgrading, perform sanity check using Helm test. See the Performing Helm Test section for the Helm test procedure.
8. If the upgrade for BSF fails due to any of the following conflicts, you are required to delete the conflicting items using the relevant commands as follows:
   - In case of conflict due to rolebinding, run the following command:

     ```
     kubectl delete rolebinding <conflicting item> -n <namespace>
     ```

   - In case of conflict due to PodDisruptionBudget, run the following command:

     ```
     kubectl delete PodDisruptionBudget <conflicting item> -n <namespace>
     ```

   If the upgrade fails due to any other reason, see *Upgrade or Rollback Failure* in *Oracle Communications Cloud Native Core, Binding Support Function Troubleshooting Guide*.

> **Note**
>
> To automate the lifecycle management of the certificates through OCCM, you can migrate certificates and keys from BSF to OCCM. For more information, see "Introducing OCCM in an Existing NF Deployment" in Oracle Communications Cloud Native Core, Certificate Management User Guide.
>
> You can remove Kubernetes secrets if the current version of BSF does not use that secret by checking the `ocbsf_custom_values.yaml` file. Before deleting, please make sure that there is no plan to rollback to the BSF version which uses these secrets. Otherwise Rollback will fail.

4.5 MIB Management

toplevel.mib and *BSF-ALARM-MIB.mib* are two MIB files which are used to generate the traps. You must update these files along with the Alert file in order to fetch the traps in their environment. The MIB files are managed by SNMP manager.

> **Note**
>
> *bsf_alarm_mib.mib* file has been replaced by *BSF-ALARM-MIB.mib* file.

5
Rolling Back BSF

This chapter provides information about rolling back Oracle Communications Cloud Native Core, Binding Support Function (BSF) deployment to the previous release. It is recommended to perform BSF rollback in a specific order. For more information about the rollback order, see *Oracle Communications Cloud Native Core Solution Upgrade Guide*.

5.1 Supported Rollback Paths

The following table lists the supported rollback paths for BSF:

Source Release	Target Release
24.3.0	24.2.x
24.3.0	24.1.x

If georedundancy feature was disabled before upgrading to 24.3.0, then rolling back to a previous version will automatically disable this feature. However, the database will still have records of the `NfInstances` and `NfSubscriptions` from the mated sites. For more information, contact My Oracle Support.

5.2 Rollback Tasks

> **Note**
>
> Ensure that no pod is in the failed state.

To roll back from BSF 24.3.0 to a previous version, perform the following steps:

1. To check which revision you need to roll back to, run any of the following commands:
   Using Helm:

   ```
   helm history <release_name> -n <release_namespace>
   ```

2. Run either of the following commands to roll back to the required version:
   a. Using Helm:

      ```
      helm rollback <release_name> <revision_number> -n <release_namespace>
      ```

> **Note**
>
> The following warnings must be ignored for BSF rollback to 24.2.0 and 24.1.0 CNE:
>
> ```
> helm rollback <releas_name> <revision-version> -n <namespace>
> W0910 07:39:23.637460 3540122 warnings.go:70]
> spec.template.spec.containers[0].ports[3]: duplicate port
> definition with spec.template.spec.containers[0].ports[2]
> W0910 07:39:26.437684 3540122 warnings.go:70]
> spec.template.spec.containers[0].ports[3]: duplicate port
> definition with spec.template.spec.containers[0].ports[1]
> Rollback was a success! Happy Helming!
> ```

3. ***<Applicable for release 22.2.0 and later >*** If you are rolling back from BSF 22.2.0 and later release to 22.1.0 or earlier releases, then run the following command to delete the database that is not applicable:

   ```
   DROP DATABASE ocbsf_LeaderPodDb;
   ```

> **Note**
>
> If the rollback is not successful, perform the troubleshooting steps mentioned in *Oracle Communications Cloud Native Core, Binding Support Function Troubleshooting Guide*.

> **Note**
>
> When rolling back from 23.4.0, Audit Service must be disabled and re-enabled after the rollback is completed. As the audit registration request is resent after the Audit Service pod comes up and the data gets updated in Audit Service tables.

6
Uninstalling BSF

This chapter provides information about uninstalling Oracle Communications Cloud Native Core, Binding Support Function (BSF).

When you uninstall a Helm chart from BSF deployment, it removes only the Kubernetes objects that were created during the installation.

6.1 Uninstalling CNC BSF using Helm

This chapter describes how to uninstall BSF using Helm.

To uninstall BSF, run the following command:

For Helm 2:

```
helm delete -n <release_name>
```

Here, `release_name` is a name provided by the user to identify the helm deployment.

`release-namespace` is a name provided by the user to identify the namespace of BSF deployment.

Helm keeps a record of its releases, so you can still reactivate the release after uninstalling it.

To completely remove a release from the cluster, add the `--purge` parameter to Helm 2 uninstall command:

```
helm delete --purge release_name
```

For example, to completely remove a release named "ocbsf", run the following command:

```
helm delete --purge ocbsf
```

> **Note**
>
> - When you uninstall both BSF and cnDBtier network functions, it is recommended to delete PVC (PersistentVolumeClaims) volumes of cnDBTier that were created at the time of installing cnDBtier. For more information on how to delete PVC volumes, see Deleting PVC Volumes.
> - If you are uninstalling only BSF network function, do not delete PVC volumes.

6.2 Deleting Kubernetes Namespace

This chapter describes how to delete Kubernetes namespace where BSF is deployed.

To delete the Kubernetes namespace, run the following command:

```
kubectl delete namespace <release-namespace>
```

where *release_namespace* is the deployment namespace used by the helm command.

For example, to delete a kubernetes namespace named "ocbsf", run the following command:

```
kubectl delete namespace ocbsf
```

6.3 Removing MySQL Users

This chapter describes how to remove MySQL users.

To remove MySQL users while uninstalling BSF, run the following commands:

```
SELECT user FROM mysql.user;
DROP USER 'bsfprivilegedusr'@'%';
DROP USER 'bsfusr'@'%';
```

6.4 Deleting PVC Volumes

This section describes how to delete a PVC volume.

Following is the procedure for to delete a PVC volume:

1. Get a list of the PVC volumes for the required cnDBTier namespace by running the following command:

   ```
   kubectl get pvc -n <namespace>
   ```

   where, `<namespace>` is the namespace of Policy deployment.

   For example:

   ```
   kubectl get pvc -n occnp
   ```

   Sample Output

   ```
   NAME                                STATUS
   VOLUME                                      CAPACITY   ACCESS MODES
   STORAGECLASS   AGE
   pvc-backup-ndbmtd-ndbmtd-0        Bound    pvc-56420da4-f70c-46fd-8f0a-
   c33ff50ddd98   3Gi        RWO            standard       26d
   pvc-backup-ndbmtd-ndbmtd-1        Bound    pvc-d7e3ef21-4161-40cc-
   abc9-756dfd3c0674   3Gi        RWO            standard       26d
   pvc-ndbappmysqld-ndbappmysqld-0   Bound    pvc-d76f0cbd-
   c0e5-48f1-9a83-1353dbee6c41   2Gi        RWO            standard       26d
   pvc-ndbappmysqld-ndbappmysqld-1   Bound    pvc-c31749df-ae98-48c1-
   a8a7-449535d0f60a   2Gi        RWO            standard       26d
   pvc-ndbmgmd-ndbmgmd-0             Bound    pvc-765a9a4b-726d-43fe-af91-
   a3a6c85ab321   1Gi        RWO            standard       26d
   pvc-ndbmgmd-ndbmgmd-1             Bound    pvc-71b5877e-a753-4fac-
   ```

```
b995-5fdf2d465af8   1Gi        RWO            standard       26d
pvc-ndbmtd-ndbmtd-0              Bound    pvc-e0c5f263-d5d3-4f18-
bb11-44ceaa6a2305   3Gi        RWO            standard       26d
pvc-ndbmtd-ndbmtd-1              Bound    pvc-d03f799d-abe2-4b71-96c4-
c98cacdbeaba   3Gi        RWO            standard       26d
pvc-ndbmysqld-ndbmysqld-0        Bound    pvc-
d80321a9-5239-4e34-9bcf-11053c9de5ef   2Gi        RWO
standard       26d
pvc-ndbmysqld-ndbmysqld-1        Bound    pvc-545e0f35-
ad20-4c24-927a-6f1e49b06cc9   2Gi        RWO            standard       26d
```

2. Delete all the PVC volumes in the cnDBTier namespace by running the following command:

   ```
   kubectl -n <namespace> delete pvc <pvc_name>
   ```

   Example:

   ```
   kubectl -n p1 delete pvc pvc-backup-ndbmtd-ndbmtd-0
   kubectl -n p1 delete pvc pvc-backup-ndbmtd-ndbmtd-1
   kubectl -n p1 delete pvc pvc-ndbappmysqld-ndbappmysqld-0
   kubectl -n p1 delete pvc pvc-ndbappmysqld-ndbappmysqld-1
   kubectl -n p1 delete pvc pvc-ndbmgmd-ndbmgmd-0
   kubectl -n p1 delete pvc pvc-ndbmgmd-ndbmgmd-1
   kubectl -n p1 delete pvc pvc-ndbmtd-ndbmtd-0
   kubectl -n p1 delete pvc pvc-ndbmtd-ndbmtd-1
   kubectl -n p1 delete pvc pvc-ndbmysqld-ndbmysqld-0
   kubectl -n p1 delete pvc pvc-ndbmysqld-ndbmysqld-1
   ```

6.5 Uninstalling Site in Georedundant Deployment

This chapter describes how to uninstall a site (except the last site) when BSF is deployed in georedundant setup.

Deleting entries of unique databases
For georedundant deployment, run the following command to delete entries of unique databases from the `occnp_release` database:

```
delete from ReleaseConfig where SiteId='7c4f7f05-ffdd-408f-ba78-b2c4dc83b1fd'
AND CfgKey='public.hook.auditservice';
delete from ReleaseConfig where SiteId='7c4f7f05-ffdd-408f-ba78-b2c4dc83b1fd'
AND CfgKey='public.hook.cmservice';
delete from ReleaseConfig where SiteId='7c4f7f05-ffdd-408f-ba78-b2c4dc83b1fd'
AND CfgKey='public.hook.configserver';
```

Cleaning up NDB Replication Table
In addition, clean up the entries in "mysql.ndb_replication" table by running the following command:

1. Select cast(db as char), cast(table_name as char), cast(conflict_fn as char) from mysql.ndb_replication:

```
mysql> select cast(db as char), cast(table_name as char), cast(conflict_fn
as char) from mysql.ndb_replication;
```

Sample Output

```
+-----------------+-------------------------
+-----------------------------------------+
| cast(db as char) | cast(table_name as char) | cast(conflict_fn as
char)                 |
+-----------------+-------------------------
+-----------------------------------------+
| ocpm_bsf         | pcf_binding              |
NDB$MAX_DELETE_WIN(last_access_timestamp) |
+-----------------+-------------------------
+-----------------------------------------+
1 rows in set (0.01 sec)
```

If the output for this command shows BSF databases as shown in the sample output, then perform Step 2.

2. Delete from mysql.ndb_replication:

```
delete from mysql.ndb_replication where cast(db as char)="<database_name>";
```

Example

```
delete from mysql.ndb_replication where cast(db as char)="ocpm_bsf";
```

6.6 Uninstalling Last Site in Georedundant Deployment

This chapter describes how to uninstall the last site when BSF is deployed in georedundant setup. The same steps can be performed to uninstall BSF in standalone deployment.

6.6.1 Cleaning up NDB Replication Table

This chapter describes how to cleanup NDB replication table while uninstalling BSF.

To clean up the entries in "mysql.ndb_replication" table, run the following commands:

1. Select cast(db as char), cast(table_name as char), cast(conflict_fn as char) from mysql.ndb_replication:

```
mysql> select cast(db as char), cast(table_name as char), cast(conflict_fn
as char) from mysql.ndb_replication;
```

Sample Output

```
+-----------------+-------------------------
+-----------------------------------------+
| cast(db as char) | cast(table_name as char) | cast(conflict_fn as
```

```
char)                |
+-----------------+-------------------------
+-----------------------------------------+
| ocpm_bsf         | pcf_binding              |
NDB$MAX_DELETE_WIN(last_access_timestamp) |
+-----------------+-------------------------
+-----------------------------------------+
1 rows in set (0.01 sec)
```

If the output for this command shows BSF databases as shown in the sample output, then perform Step 2.

2. Delete from mysql.ndb_replication:

```
delete from mysql.ndb_replication where cast(db as char)="<database_name>";
```

Example

```
delete from mysql.ndb_replication where cast(db as char)="ocpm_bsf";
```

6.6.2 Cleaning up Databases

This chapter describes how to clean up databases when uninstalling BSF.

> **Note**
>
> For georedundant deployment, run the commands provided in this section only if the site being uninstalled is the last site in the complete georedundant group.

To clean up database for the different microservices, run the following command:

```
DROP DATABASE IF EXISTS ocbsf_release;
DROP DATABASE IF EXISTS ocbsf_commonconfig;
DROP DATABASE IF EXISTS ocbsf_config_server;
DROP DATABASE IF EXISTS ocpm_bsf;
DROP DATABASE IF EXISTS ocbsf_audit_service;
DROP DATABASE IF EXISTS ocbsf_cmservice;
DROP DATABASE IF EXISTS ocbsf_nrf_client;
DROP DATABASE IF EXISTS ocbsf_leaderPodDb;
```

7 Fault Recovery

This chapter provides information about fault recovery for Oracle Communications Cloud Native Core, Binding Support Function (BSF) deployment.

7.1 Overview

You must take database backup and restore it either on the same or a different cluster. It uses the BSF database (MySQL NDB Cluster) is used to run any command or follow instructions.

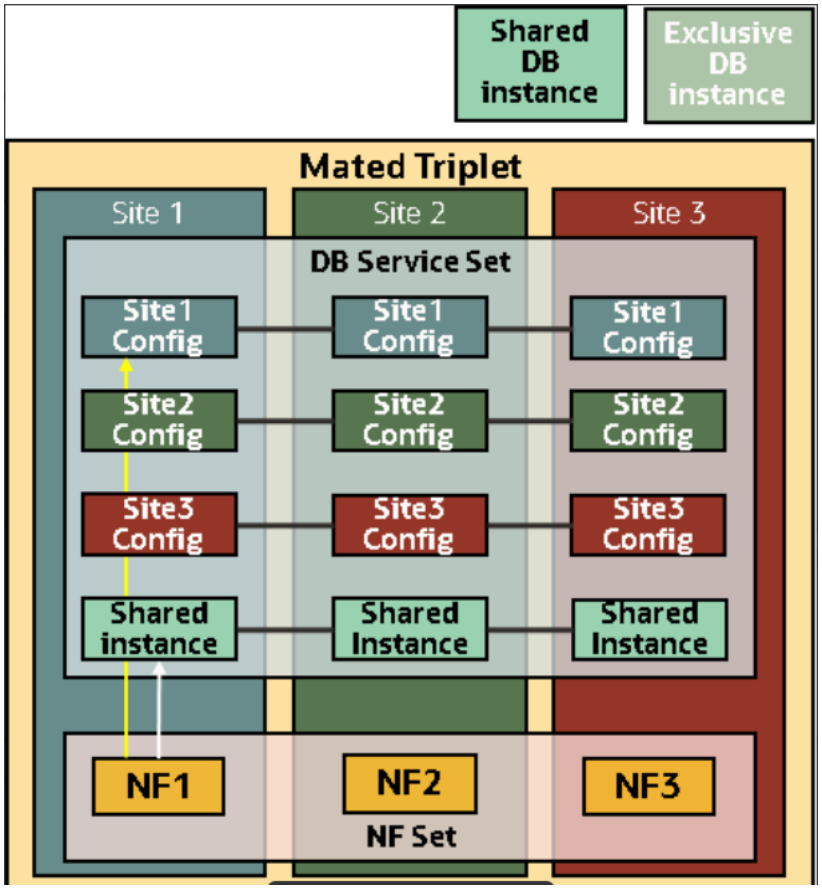
Database Model of BSF

BSF database consists of the following two data types:

- **Configuration Data**: The configuration data is exclusive for a given site. Thus, an exclusive logical database is created and used by a site to store its configuration data. Using CNC Console and Configuration Management service, an operator can configure data in the respective site only.
- **Binding Data**: The binding data is shared across sites. Thus, a common logical database is created and used by all sites. The data is replicated across sites to preserve and share binding information with mated sites. In case of cross sites messaging or a site failure, shared binding data helps in continuity of service.

The following image shows the BSF database model in three different sites:

Figure 7-1 Database Model



7.2 Impacted Areas

The following table shares information about the impacted areas during BSF fault recovery:

Scenario	Requires Fault Recovery or re-install of CNE?	Requires Fault Recovery or re-install of cnDBTier?	Requires Fault Recovery or re-install of CNC BSF?	Other
Scenario 1A: Recovering Corrupted Binding Database(s)	No	Yes Restoring cnDBTier from older backup is the only way to restore back to restore point.	No Only if cnDBTier credentials are changed.	All sites require Fault Recovery.
Scenario: All or Multiple Site Failure	Yes	Yes	Yes	NA

7.3 Prerequisites

Before performing any fault recovery procedure, ensure that the following prerequisites are met:

- DBTier must be in a healthy state and available on multiple sites along with BSF. To check the cnDBTier status, perform the following steps:
  1. Run the following command to ensure that all the nodes are connected:
     ```
     ndb_mgm> show
     ```
  2. Run the following command to check the pod status:
     ```
     kubectl get pods -n <namespace>
     ```
     If the pod status is `Running`, cnDBTier is in healthy state.
  3. Run the following command to check if the replication is up:
     ```
     mysql> show slave status\G
     ```
     In case there is any error, see *Oracle Communications Cloud Native Core, DBTier Installation and Upgrade Guide*.
  4. Run the following command to check which DBTier is having `ACTIVE` replication to take backup:
     ```
     select * from replication_info.DBTIER_REPLICATION_CHANNEL_INFO;
     ```
- You must enable automatic backup on DBTier. Enabling automatic backup helps in achieving the following:
  - Restore stable version of the network function database
  - Minimize significant loss of data due to upgrade or roll back failures
  - Minimize loss of data due to system failure
  - Minimize loss of data due to data corruption or deletion due to external input
  - Migrate database information for a network function from one site to another
- The following files must be available for fault recovery:
  - Custom values file
  - Helm charts
  - Secrets and Certificates
  - RBAC resources

For details on enabling automatic backup, see *Fault Recovery* section in *Oracle Communications Cloud Native Core, cnDBTier (cnDBTier) Installation, Upgreade and Fault Recovery Guide*.

7.4 Fault Recovery Scenarios

This section describes the fault recovery procedures for various scenarios.

> **Note**
>
> This chapter describes scenario based procedures to restore BSF databases only. To restore all the databases that are part of DBTier, see *Fault Recovery* chapter in *Oracle Communications Cloud Native Core, DBTier Installation, Upgrade and Fault Recovery Guide* available on My Oracle Support (MOS).

7.4.1 Scenario: Binding Database Corruption

This section describes how to recover BSF when its binding database corrupts.

When the binding database corrupts, the database on all other sites can also corrupt due to data replication. It depends on the replication status after the corruption has occurred. If the data replication is broken due to database corruption, DBTier fails in either single or multiple sites (not all sites). And if the data replication is successful, then database corruption replicates to all the DBTier sites and DBTier fails in all sites.

The fault recovery procedure covers following sub-scenarios:

- When cnDBTier Failed in All Sites

7.4.1.1 When cnDBTier Failed in All Sites

This section describes how to recover binding database when successful data replication corrupts all the cnDBTier sites.

To recover binding database, perform the following steps:

1. Uninstall BSF Helm charts on all sites. For more information about uninstalling Helm charts, see *Oracle Communication Cloud Native Core, Binding Support Function Installation, Upgrade, and Fault Recovery Guide* available on MOS.
2. Perform DBTier fault recovery procedure:
   a. Use auto-data backup file for restore procedure. For more information about cnDBTier restore, see *Oracle Communications Cloud Native Core, cnDBTier Installation, Upgrade, and Fault Recovery Guide* available on MOS.
3. Install BSF Helm charts. For more information about installing Helm charts, see *Oracle Communication Cloud Native Core, Binding Support Function Installation, Upgrade and Fault Recovery Guide* available on MOS.

> **Note**
>
> You can also refer to the `ocbsf_custom_values_24.3.0.yaml` file used at the time of BSF installation for Helm charts installation.

7.4.2 Scenario: Site Failure

This section describes how to perform fault recovery when either one or many of your sites have software failure. This section consists of the following:

- Single or Multiple Site Failure

7.4.2.1 Single or Multiple Site Failure

This scenario applies when one or more sites, and not all sites, have failed and there is a requirement to perform fault recovery. It is assumed that the user has cnDBTier and BSF installed on multiple sites with automatic data replication and backup enabled.

> **Note**
>
> It is assumed that one of the cnDBTier is in healthy state.

To recover the failed sites, perform the following steps:

> **Note**
>
> Ensure that all the prerequisites mentioned are met.

1. Uninstall BSF. For more information, see the *Uninstalling BSF* section in *Oracle Communications Cloud Native Core, Binding Support Function Installation, Upgrade, and Fault Recovery Guide*.
2. Install a new cluster by performing the Cloud Native Environment (CNE) installation procedure. For more information, see *Oracle Communications Cloud Native Core, Cloud Native Environment Installation, Upgrade, and Fault Recovery Guide* available on My Oracle Support.
3. Install cnDBTier, in case replication is down or cnDBTier pods are not up and running. For information about installing cnDBTier, see *Oracle Communications Cloud Native Core, cnDBTier Installation, Upgrade and Fault Recovery Guide*.
4. Perform DBTier fault recovery procedure:
   a. Perform DBTier fault recovery procedure to take backup from older healthy site by following the *Create On-demand Database Backup* procedure in *Oracle Communications Cloud Native Core, cnDBTier Installation, Upgrade and Fault Recovery Guide*.
   b. Restore the database to new site by following the *Restore Database with Backup* procedure in *Oracle Communications Cloud Native Core, cnDBTier Installation, Upgrade, and Fault Recovery Guide*.
5. Install BSF Helm charts. For more information on installing Helm charts, see *Oracle Communications Cloud Native Core, Binding Support Function Installation, Upgrade, and Fault Recovery Guide*.

A

Resilient BSF Microservices with Kubernetes

BSF microservices pods run on Kubernetes cluster. Occasionally, Kubernetes pod disruptions may occur within the cluster, either from voluntary or involuntary causes. This results in pod/service failing, and the cluster experiences some outage resulting in discontinuity of the service. In order to mitigate these disruptions, the BSF Kubernetes cluster and the services running on it are designed to be resilient by adapting the recommendations and strategies from Kubernetes framework. Thus, improving the availability, prevent/minimize the downtime and outages before they occur.

Described below are the various failure points that might occur in the BSF cluster, and the resilience model that is adopted to handle it.

Table A-1 Failure Point: Worker Node failure

Failure Point: Worker Node failure
Recovery - Multiple pod By having multiple nodes in a cluster, it provides high availability by scheduling pods in different nodes, removing the single point of failure. By running multiple copies of BSF services/pods reduces the chances of outages and service degradation. For more information about this functionality, see section BSF Services.
Recovery - Anti-Affinity rules The placement of the pod and any of its replicas can be controlled using Kubernetes pod affinity and anti-affinity rules. Pod anti-affinity rule is used to instruct Kubernetes not to co-locate pods on the same node. This avoids an outage due to the loss of a node.

Table A-2 Failure Point: Physical Server (Hosting Worker Node/s) failure

Failure Point: Physical Server (Hosting Worker Node/s) failure
Recovery - Pod Topology Spread (PTS) Pod topology spread constraints tells the Kubernetes scheduler how to spread pods across nodes in a cluster. It can be across nodes, zones, regions, or other user-defined topology domains. They allow users to use labels to split nodes into groups. Then users can specify pods using a label selector and indicate to the scheduler how evenly or unevenly those pods can be distributed.

Table A-3 Failure Point: Cluster needs to be upgraded or needs to shut down

Failure Point: Cluster needs to be upgraded or needs to shut down
Recovery - PodDisruptionBudget (PDB) Setting PDB ensures that the cluster have a sufficient number of available replicas, to keep it functioning even during maintenance. Using the PDB, we define a number (or percentage) of pods that can be terminated. With PDB configured, Kubernetes drains a node following the configured disruption schedule. New pods is deployed on other available nodes. This approach ensures Kubernetes schedules workloads in an optimal way while controlling the disruption based on PDB configuration. For more information about this functionality, see section PodDisruptionBudget Configuration.

Table A-3 (Cont.) Failure Point: Cluster needs to be upgraded or needs to shut down

Failure Point: Cluster needs to be upgraded or needs to shut down
Recovery - Terminate gracefully When a pod is evicted, it is gracefully terminated honoring the termination `gracePeriod` setting in the custom yaml file. For more information about this functionality, see section Graceful Shutdown Configurations.

Table A-4 Failure Point: Pod/Application failure

Failure Point: Pod/Application failure
Recovery - Kubernetes Probes Kubernetes provides probes i.e health checks to monitor and act on the state of pods (Containers) and to make sure only healthy pods serve traffic. With help of probes, we can control when a pod should be deemed started, ready for service, or live to serve traffic. Kubernetes gives three types of health checks probes: • Liveness probes let Kubernetes know whether the application is running or not. • Readiness probes let Kubernetes know when the application is ready to serve traffic. • Startup probes let Kubernetes know whether the application has properly started or not.

Table A-5 Failure Point: High traffic Rate

Failure Point: High traffic Rate
Recovery - Horizontal Pod Auto-Scaling (HPA) When there is an increase or drop in the traffic, Kubernetes can automatically increase or decrease the pod replicas that serve the traffic. Horizontal scaling means that the response to increased load is to deploy more pods. If the load decreases, and the number of pods is above the configured minimum, the HorizontalPodAutoscaler instructs the work load resource to scale back down.

Table A-6 NF Communication Failures

Any(including intra/inter-NF communication Failures)
Recovery - All BSF service support metrics/logs to capture the behavior.

BSF Microservices Resilience details

The criticality of the service failures is indicated as HIGH, MEDIUM and LOW, and they mean:

- **HIGH**- Service failure impacts the traffic, and it can not be handled successfully.
- **MEDIUM**- Service failure impacts the traffic, and it cannot be handled successfully by the default processing model.
- **LOW**- Service failure does not impact the traffic directly.

Table A-7 BSF Kubernetes cluster Resiliency details

Service Name	Multi-pod	Affinity/ Anti-affinityRule	HPA	PDB	PTS	Node Selector	Serviceability status tracking	Criticality	Impact of Service loss/ failure	Overload Control/ Protection	Dependent service tracking and reporting
Alternate Route Service	Y	Y	0%/80%	1	N	Y	Y	HIGH	On DNS-SRV based alternate routing is enabled: • Handles subsequent messages on failure of initial producer. • Handles notifications on failure of consumer. • SRV based lookup for NRF and SCP.	N	N
App-info	Y	Y	2%/80%	20%	N	Y	Y	HIGH	This service tracks status of all services and cnDBTier. This is used by services like: • Nrf-client for NF registration: On appInfo pod failure, Nrfclient uses the last known state fetched from AppInfo. However, if NrfClient pod also restarts, cache data is lost, NF service will be suspended at NRF. • Diam-gateway to track readiness status of cnDbtier: On appInfo pod failure, diameter-gateway uses the last known state fetched from AppInfo. However, if diameter-gateway pod also restarts, then it will fail to detect DB availability and will not be able to accept signaling traffic.	N	N
Audit Service	N	Y	0%/60%	50%	Y	N	Y	LOW	This service handles stale session cleanup and retry binding create operation. Loss of this service leads to large number of stale records and failure of retry binding sessions.	N	N

Table A-7 (Cont.) BSF Kubernetes cluster Resiliency details

Service Name	Multi-pod	Affinity/ Anti-affinityRule	HPA	PDB	PTS	Node Selector	Serviceability status tracking	Criticality	Impact of Service loss/ failure	Overload Control/ Protection	Dependent service tracking and reporting
BSF Management Service	Y	Y	0%/40%	20%	N	Y	Y	HIGH	--	N	N
CM Service	Y	Y	--(fixed set of replicas)	20%	N	Y	Y	HIGH	This service provides user interface to make configuration changes for policy (including common service configuration e.g. Ingress gateway, Egress gateway, NrfClient etc). If this service fails, other services will not be able to fetch the configuration data. Common services pods can continue to run with existing configurations, but it will get impacted on pod restart cases.	N	N
Config Server	Y	Y	5%/80%	20%	N	Y	Y	HIGH	This service is responsible for providing any configuration change to other services. Other services continue to work with existing configuration data, but container restart or pod scaling will lead to readiness failure, as they can not accept traffic without new configuration.	N	N
Diameter Gateway	Y	Y	--(fixed set of replicas)	20%	N	Y	Y	HIGH	The failure of this services impacts all diameter related traffic in a site.	Y Enforce overload control for backend services.	DB status is tracked (through appInfo) using helm configuration, to determine the readiness status of gateway pod.

Table A-7 (Cont.) BSF Kubernetes cluster Resiliency details

Service Name	Multi-pod	Affinity/ Anti-affinityRule	HPA	PDB	PTS	NodeSelector	Serviceabilitystatustracking	Criticality	Impact of Service loss/ failure	Overload Control/ Protection	Dependent service tracking and reporting
Egress Gateway	Y	Y	0%/80%	1	N	Y	Y	HIGH	The loss of this service means • NRF marks site as "SUSPENDED" due to loss of HB.	N	None
Igress Gateway	Y	Y	0%/80%	1	N	Y	Y	HIGH	The loss of this service impacts connectivity from SCP, NRF or other peers for ingress flow. Hence it will indicate site failure to peers at network/transport level. **Note**: There shall not be signaling failure, if consumers perform alternate routing to alternate site to achieve session continuity.	Y Enforce overload control for backend services. Backend as well as IGW rate limiting support.	None
NRF Client NF Management Service	Y(Policy need to enable multi-pod support - currently set to 1)	Y	0%/80%	NA	N	Y	Y	HIGH	This service is responsible for NF profile registration with NRF. It also performs NRF HB and NRF health check functionality. Loss of this service for HB Timer interval, means that NRF can mark a given PCF instance as SUSPENDED. As soon as Nrf-mgmt pod becomes available, it will automatically refresh Nf's profile at NRF and bring site back to REGISTERED state (if NRF state was suspended).	None	None

Table A-7 (Cont.) BSF Kubernetes cluster Resiliency details

Service Name	Multi-pod	Affinity/ Anti-affinityRule	HPA	PDB	PTS	Node Selector	Serviceability status tracking	Criticality	Impact of Service loss/ failure	Overload Control/ Protection	Dependent service tracking and reporting
Perf-Info	Y	Y	-- (Fixed set of replicas)	20 %	N	Y	Y	MEDIUM	This service is responsible to calculate load and overload level. This is used by services like: • Nrf-client for load reporting - When perfInfo pod is down, Nrfclient currently use the last known load level fetched from PerfInfo. However, if NrfClient pod also restarts, then it will loose its cache information and hence will report load level as zero. • Ingress gateway/ Diameter-gateway to track overload status of back end services. When perfInfo pod is down, these services currently use the last known state reported by perfInfo.	None	None
Query Service	Y	Y	0% /80 %	20 %	N	Y	Y	LOW	The loss of this service means, operator will not be able to perform query/session viewers functionality. HA to provide better serviceability.	None	None

B
PodDisruptionBudget Configuration

PodDisruptionBudget (PDB) is a Kubernetes resource that allows to achieve high availability of scalable application services when the cluster administrators perform voluntary disruptions to manage the cluster nodes. PDB restricts the number of pods that are down simultaneously from voluntary disruptions. Defining PDB is helpful to keep the services running undisrupted when a pod is deleted accidentally or deliberately. PDB can be defined for high available and scalable BSF services such as BSF Management Service, Diameter Gateway, app-info, and perf-info.

It allows safe eviction of pods when a Kubernetes node is drained to perform maintenance on the node. It uses the default value of the `maxUnavailable` parameter specified in the Helm chart to determine the maximum number of pods that are unavailable during a voluntary disruption. For example, if `maxPdbUnavailable` is 50%, the evictions are allowed until not more than 50% of the desired replicas are unhealthy.

For more information about this functionality, see https://kubernetes.io/docs/concepts/workloads/pods/disruptions/#pod-disruption-budgets.

The following BSF services support PDB:

Table B-1 Default PodDisruptionBudget for BSF

Microservice	PDB Default Value (maxUnavailable)
cm-service	20%
alternate_route	1
ocingress_gateway	1
ocegress_gateway	1
oc-diam-gateway	20%
oc-bsf-management	20%
oc-query	20%
oc-perf-info	20%
nrf-client	NA
app-info	20%
config-server	20%
ocbsf-audit	50%

C

Docker Images

Cloud Native Core Binding Support Function deployment package includes ready-to-use docker images and Helm charts to help you orchestrate containers in Kubernetes.

You can use the Docker images and Helm chart to deploy and manage Pods of BSF product services in Kubernetes. Communication between service pods of services of BSF products are preconfigured in the Helm charts.

The following table lists the docker images for BSF:

Table C-1 Docker Images for BSF

Service Name	Docker Image Name
Alternate Route Service	alternate_route
Audit Service	oc-audit
BSF Service	oc-bsf-management
Diameter Gateway	oc-diam-gateway
NF Test	nf-test
Query Service	oc-query
NRF Client Service	nrf-client
CM Service	oc-config-mgmt
CM Service	common_config_hook
Debug Tool	ocdebug-tools
Config Server Service	oc-config-server
Performance Monitoring Service	oc-perf-info
Application Info service	app_info
Ingress Gateway	ocingress_gateway
Egress Gateway	ocegress_gateway
Ingress/Egress Gateway update configuration	configurationupdate
Ingress/Egress Gateway init configuration	configurationinit

D
Deployment Service Type Selection

Table D-1 Deployment Service Type Selection

Service Type	Description
ClusterIP	Exposes the service on a cluster-internal IP. Specifying this value makes the service only reachable from within the cluster. This is the default ServiceType.
NodePort	Exposes the service on each worker node's IP (public IP address) at a static port (the NodePort). A ClusterIP service, to which the NodePort service will route, is automatically created. You'll be able to contact the NodePort service, from outside the cluster, by requesting *NodeIP*:*NodePort* . Most BSF services use NodePort to deploy in this release.
LoadBalancer	Exposes the service externally using a cloud provider's load balancer. NodePort and ClusterIP services, to which the external load balancer will route, are automatically created. For CM Service, API gateway, Diameter Gateway service, it's recommended to use LoadBalancer type. Given that the CNE already integrated with a load balancer (METALLB, for OCCNE deployed on baremetal).