Oracle® Communications

Cloud Native Core Solution Upgrade Guide

Release 3.25.2.200.0
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Oracle Communications Cloud Native Core Solution Upgrade Guide, Release 3.25.2.200.0

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Conventions

The following text conventions are used in this document:

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

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- For Non-technical issues such as registration or assistance with My Oracle Support, select **2**.
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You are connected to a live agent who can assist you with My Oracle Support registration and opening a support ticket.

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Acronyms and Terminologies

Table Acronyms and Terminologies

Term	Definition
BSF	Oracle Communications Cloud Native Core, Binding Support Function
CNC	Cloud Native Core
cnDBTier	Oracle Communications Cloud Native Core, Cloud Native Database Tier
CNE	Oracle Communications Cloud Native Core, Cloud Native Environment
Policy	Oracle Communications Cloud Native Core, Converged Policy
NEF	Oracle Communications Cloud Native Core, Network Exposure Function
NF	Network Function
NRF	Oracle Communications Cloud Native Core, Network Repository Function
NSSF	Oracle Communications Cloud Native Core, Network Slice Selection Function
OCCM	Oracle Communications Cloud Native Core, Certification Management
OSO	Oracle Communications Cloud Native Core, Operation Services Overlay
PDB	Pod Distribution Budget
SCP	Oracle Communications Cloud Native Core, Service Communication Proxy
SEPP	Oracle Communications Cloud Native Core, Security Edge Protection Proxy
UDR	Oracle Communications Cloud Native Core, Unified Data Repository
Cloud Native Core (CNC) Network Functions (NFs)	This includes all Oracle NFs such as, Policy, BSF, NRF, UDR, SEPP, NSSF, SCP, NEF.
CNC Companion Components	This includes companion components such as CNCC, cnDBTier, OSO, OCCM.
Oracle CNC Solution	This includes Oracle CNC NFs and Companion components that are deployed on Oracle CNE, Non-Oracle CNE, or OCI.
CNC Components	This includes CNC NFs, CNC Companion Components, and Oracle CNE.

What's New in This Guide

This section introduces the documentation updates for release 3.25.2.2xx.0.

Release 3.25.2.200.0 - G54867-01, April 2026

- Added CNC Installation details in the CNC Installation section to describe the sequence, workflow, pre and post installation procedures of CNC solution.
- Added CNC fault recovery details in the Fault Recovery section to describe the sequence, workflow, and fault recovery procedures of CNC solution.
- Updated the source and target release versions for the upgrade and rollback in the Planning Upgrade and Performing the Rollback respectively in the Upgrade of Oracle CNC Solution deployed on Oracle CNE chapter.
- Updated CNC upgrade sequence in the Supported Upgrade Paths for CNC Components except CNE section to explain the supported upgrade paths.
- Updated CNE upgrade sequence in the CNE Upgrade section to explain the supported CNE upgrade paths.

1 Introduction

This document provides information on Cloud Native Core (CNC) guidelines required to install, upgrade, and rollback Oracle CNC Solution.

1.1 Overview

Oracle's Cloud Native Core (CNC) Network Functions (NFs) support deployment on Oracle Communications Cloud Native Environment (CNE), non-Oracle cloud native environment, and Oracle Cloud Infrastructure (OCI) environment. This document provides information on Cloud Native Core (CNC) guidelines required to install, upgrade, and rollback Oracle CNC Solution in the following environment:

- CNC Solution deployed on CNE
- CNC Solution deployed on non-Oracle CNE
- CNC Solution deployed on OCI

Oracle CNC Solution includes:

- when deployed on Oracle CNE:
  - CNC NFs
  - CNC Companion Components
  - CNE
- when deployed on non-Oracle CNE:
  - CNC NFs
  - CNC Companion Components

CNC NF includes:

- Oracle Communications Cloud Native Core, Binding Support Function (BSF)
- Oracle Communications Cloud Native Core, Converged Policy (Policy)
- Oracle Communications Cloud Native Core, Service Communication Proxy (SCP)
- Oracle Communications Cloud Native Core, Security Edge Protection Proxy (SEPP)
- Oracle Communications Cloud Native Core, Network Exposure Function (NEF)
- Oracle Communications Cloud Native Core, Network Repository Function (NRF)
- Oracle Communications Cloud Native Core, Network Slice Selection Function (NSSF)
- Oracle Communications Cloud Native Core, Unified Data Repository (UDR)

CNC Companion components includes:

- Oracle Communications Cloud Native Configuration Console (CNC Console)
- Oracle Communications Cloud Native Core, cnDBTier (cnDBTier)
- Oracle Communications Operations Services Overlay (OSO)
- Oracle Communications Cloud Native Core, Certification Management (OCCM)

1.2 References

The following references provide additional information on product operations, maintenance, and support:

- *Oracle Communications Cloud Native Core, Cloud Native Environment Installation, Upgrade, and Fault Recovery Guide.*
- *Oracle Communications Cloud Native Configuration Console Installation, Upgrade, and Fault Recovery Guide.*
- *Oracle Communications Cloud Native Core, cnDBTier Installation, Upgrade, and Fault Recovery Guide.*
- *Oracle Communications Cloud Native Core, Operations Services Overlay Installation and Upgrade Guide.*
- *Oracle Communications Cloud Native Core, Network Slice Selection Function Installation, Upgrade, and Fault Recovery Guide.*
- *Oracle Communications Cloud Native Core, Service Communication Proxy Installation, Upgrade, and Fault Recovery Guide.*
- *Oracle Communications Cloud Native Core, Policy Installation, Upgrade, and Fault Recovery Guide.*
- *Oracle Communications Cloud Native Core, Network Exposure Function Installation, Upgrade, and Fault Recovery Guide.*
- *Oracle Communications Cloud Native Core, Unified Data Repository Installation, Upgrade, and Fault Recovery Guide.*
- *Oracle Communications Cloud Native Core, Network Repository Function Installation, Upgrade, and Fault Recovery Guide.*
- *Oracle Communications Cloud Native Core, Security Edge Protection Proxy Installation, Upgrade, and Fault Recovery Guide.*
- *Oracle Communications Cloud Native Core, Binding Support Function Installation, Upgrade, and Fault Recovery Guide.*
- *Oracle Communications Cloud Native Core, Certification Management Installation, Upgrade, and Fault Recovery Guide.*
- *Oracle Communications Cloud Native Core, OCI Adaptor User Guide*
- *Oracle Communications, OCI Deployment Guide*

2 CNC Installation

Oracle's Cloud Native Core (CNC) Network Functions (NFs) support deployment on Oracle Communications Cloud Native Environment (CNE), non-Oracle cloud native environment, and Oracle Cloud Infrastructure (OCI) environment.

This section provides information on Cloud Native Core (CNC) guidelines required to install Oracle CNC Solution in the following environment:

- CNC Solution deployed on CNE: For information on installation procedures, see CNC Installation On CNE.
- CNC Solution deployed on non-Oracle CNE: For information on installation procedures, see CNC Installation with Non-Oracle Cloud Native Environment.
- CNC Solution deployed on OCI: For information on installation procedures, see CNC Installation On OCI.

2.1 CNC Installation On CNE

This chapter provides information about Cloud Native Core (CNC) installation in a Oracle Communications Cloud Native Core, Cloud Native Environment (CNE).

2.1.1 Overview

This chapter describes installation sequence of Oracle Communications Cloud Native Core (CNC) components on Oracle Communications Cloud Native Environment (CNE). You must complete the preinstallation procedures described in each subsection to ensure that the system is ready for an installation.

You can install each Cloud Native Core (CNC) related network function (and its components). Once the required infrastructure is up and running, install CNE infrastructure, followed by NFs.

> **Note**
>
> Installation of the underlying infrastructure (bare metal/virtualization, networking, storage) is not covered in this document. For infrastructure installation procedures, refer to the relevant infrastructure vendor documentation.

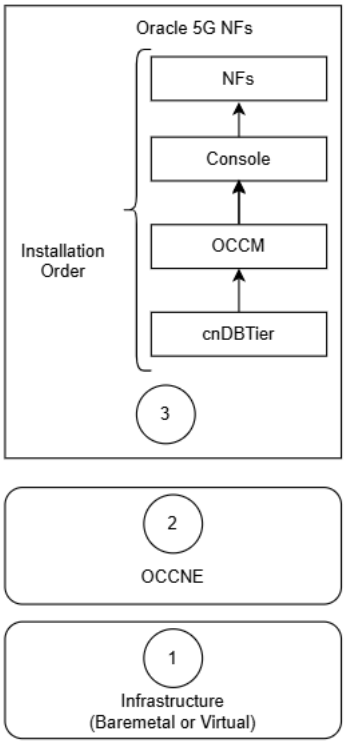
High-level Installation Order (Oracle full-stack)

If you are using Oracle's full-stack, perform the installation procedure in the following sequence:

Option 1: With OCCM

The following diagram explains the sequence to install CNC solution with OCCM.

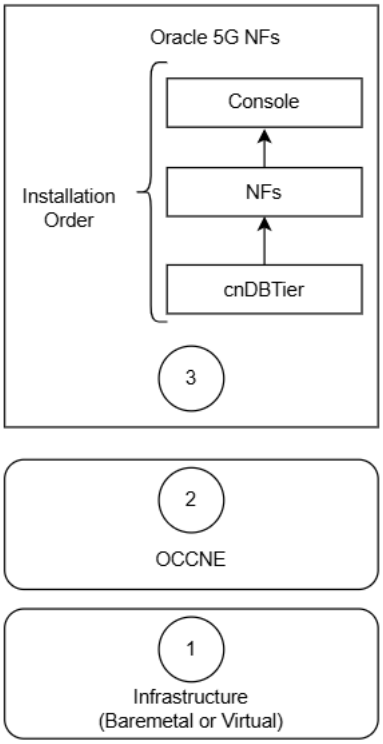
Figure 2-1 CNC Installation Order with OCCM on Oracle Communications Cloud Native Core, Cloud Native Environment



Option 2: Without OCCM

The following diagram explains the sequence to install CNC solution without OCCM.

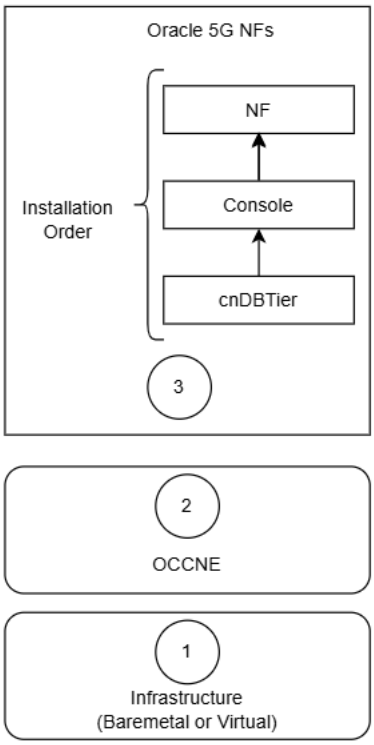
Figure 2-2 CNC Installation Order without OCCM on Oracle Communications Cloud Native Core, Cloud Native Environment



Option 3: Multicluster Console Deployment

The following diagram explains the sequence to install CNC solution on multicluster Console deployment.

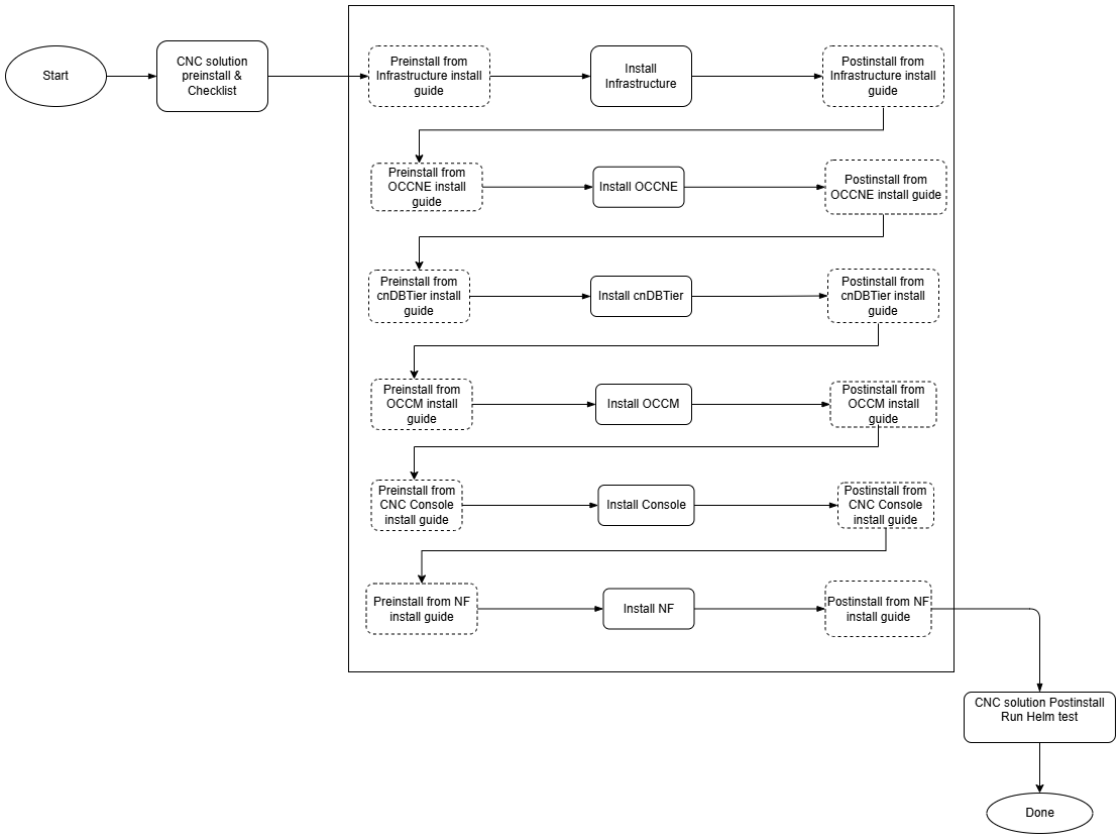
Figure 2-3 CNC Installation Order on Multicluster Console Deployment



2.1.2 Planning Installation

The following flow diagram gives a high-level overview of the sequence to be followed for installation CNC solution with OCCM.

Figure 2-4 Planning Installation of CNC Solution



2.1.2.1 General Guidelines

Oracle recommends the following guidelines for installing CNC solution with CNE:

- Perform installation testing in sandbox or lab deployment before testing in production sites.
- Install all components to the required release, as per the compatibility matrix provided in *Oracle Communications Cloud Native Core Release Notes*.
- In a multisite deployment model, perform the installation of one site at a time.
- It is recommended to perform install of cnDBTier, OCCM, NF, and CNC Console in a single maintenance window. If OCCM is installed along with Console, perform helm upgrade of Console after installing NF. Ensure that the installation order is followed as per the sequence mentioned in Overview.

2.1.2.2 Preinstallation Checklist

Go through the following checklist before performing installation.

2.1.2.2.1 Resource Requirement

This section details about the resources required to install CNE and Oracle Network Functions.

2.1.2.2.1.1 Network Functions

Ensure that the resource requirements and capacity CNC Console, OCCM, NFs, and cnDBTier is as per the requirement, before commissioning the installation. For more information on NF resource requirements, see NF-specific installation and upgrade guides.

2.1.2.2.1.2 Cloud Native Environment

Ensure the CNE cluster has sufficient worker nodes and resources based on the dimensioned NF instance. For more information on CNE resource requirements, see *Oracle Communications Cloud Native Core, Cloud Native Environment Installation, Upgrade, and Fault Recovery Guide*.

2.1.2.3 Installation Workflow

The section provides details about the installation workflow if you are using CNE.

See cnDBTier, OCCM, NF, CNC Console, and CNE installation and upgrade guides for details on upgrading the respective components.

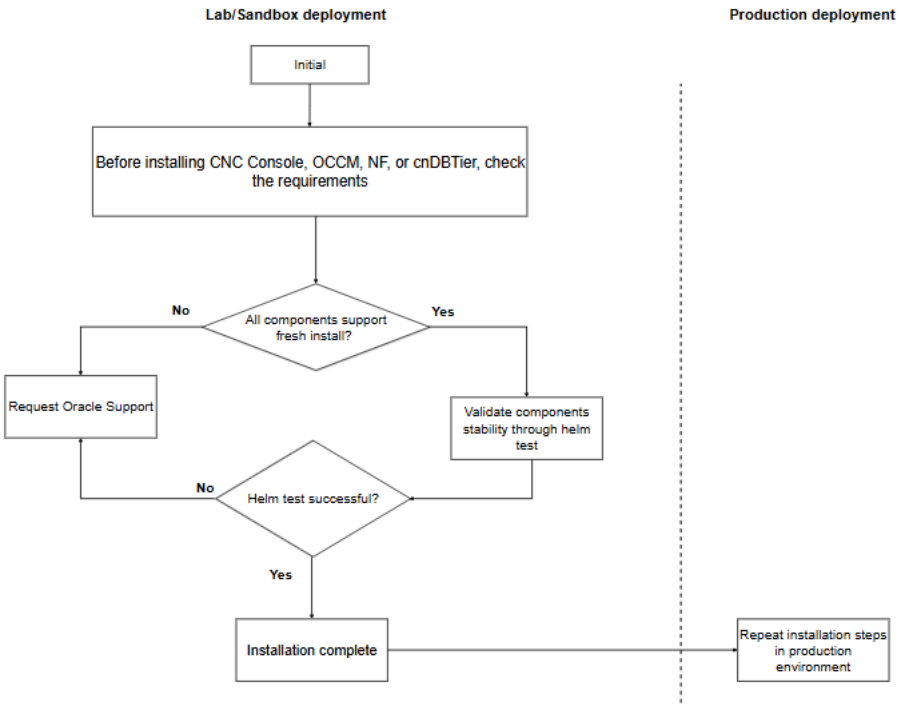
2.1.2.3.1 CNE Installation

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

2.1.2.3.2 NF Installation

The following procedure explains the installation workflow for Oracle NF:

Figure 2-5 cnDBTier, OCCM, NF, and CNC Console Installation with CNE



1. Start the installation process in the lab environment.
2. Before installing CNC Console, OCCM, NF, or cnDBTier, review and verify all requirements. For more information about the requirements, see NF-specific installation and upgrade guides.
3. Check if all components support fresh installation.
   - If any component does not support fresh installation, request Oracle Support and end the procedure.
4. Install components in the approved order for your deployment model (with or without OCCM).
5. After each component installation, perform validation:
   a. Run Helm tests for each installed component (Console/OCCM/NF/cnDBTier).
      i. If any Helm test fails, collect logs (`kubectl`, Helm test pod logs), do not proceed to next component, and contact Oracle Support.
      ii. If all Helm tests pass, proceed to the next installation step/site.
6. Complete the installation in the lab environment.
7. Repeat the installation steps in the production environment.

2.1.3 Performing the Installation

The installation procedures for each component is documented in NF specific installation and upgrade guide. See the following documents for detailed installation procedure of the respective components:

Table 2-1 CNC Network Functions Document Reference

CNC Network Functions	Document Reference
Oracle Communications Cloud Native Core, Binding Support Function (BSF)	*Oracle Communications Cloud Native Core, Binding Support Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Exposure Function (NEF)	*Oracle Communications Cloud Native Core, Network Exposure Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Repository Function (NRF)	*Oracle Communications Cloud Native Core, Network Repository Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Slice Selection Function (NSSF)	*Oracle Communications Cloud Native Core, Network Slice Selection Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Converged Policy (Policy)	*Oracle Communications Cloud Native Core, Converged Policy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Security Edge Protection Proxy (SEPP)	*Oracle Communications Cloud Native Core, Security Edge Protection Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Service Communication Proxy (SCP)	*Oracle Communications Cloud Native Core, Service Communication Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Unified Data Repository (UDR)	*Oracle Communications Cloud Native Core, Unified Data Repository Installation, Upgrade, and Fault Recovery Guide*

Table 2-2 CNC Companion Components Document Reference

CNC Companion Components	Document Reference
Oracle Communications Cloud Native Configuration Console (CNC Console)	*Oracle Communications Cloud Native Configuration Console Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, cnDBTier (cnDBTier)	*Oracle Communications Cloud Native Core, cnDBTier Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Certification Management (OCCM)	*Oracle Communications Cloud Native Core, Certification Management, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Operations Services Overlay (OSO)	*Oracle Communications Cloud Native Core, Operations Services Overlay Installation and Upgrade Guide*

2.1.4 Performing the Postinstallation Tasks

This section explains the postinstallation tasks.

2.1.4.1 NF Postinstallation

- Verify postinstallation of all the components by running the "helm test" provided by CNC Console, OCCM, NF, and cnDBTier to verify the deployment health and status.
- See CNC Console, OCCM, NF, and cnDBTier installation and upgrade guides for postinstallation task details after installing the respective components.

2.1.4.2 CNE Postinstallation

For information on CNE postinstallation tasks, see *Oracle Communications Cloud Native Core, Cloud Native Environment Installation, Upgrade, and Fault Recovery Guide*.

2.2 CNC Installation with Non-Oracle Cloud Native Environment

This chapter provides information about Cloud Native Core (CNC) installation in a non-Oracle cloud native environment.

2.2.1 Overview

This section provides an overview of how to perform installation of Oracle CNC with non-Oracle cloud native environment or Oracle Cloud Infrastructure (OCI).

You can install each Cloud Native Core (CNC) related network function (and its components) from the required release on non-Oracle cloud native environment or infrastructure.

2.2.2 Planning Installation

This section explains the planning for installing CNC with non-Oracle cloud native environment.

2.2.2.1 General Guidelines

Oracle recommends the following guidelines for installing CNC solution in non-Oracle Communications cloud native environment:

- Perform installation testing in sandbox or lab deployment before testing in production sites.
- Install all components to the required release, as per the compatibility matrix provided in the *Oracle Communications Cloud Native Core Release Notes*.
- In a multisite deployment model, perform the installation of one site at a time.
- It is recommended to perform install of cnDBTier, OCCM, NF, and CNC Console in a single maintenance window. Ensure that the installation order is followed as per the sequence mentioned in Installation Workflow.

2.2.2.2 Preinstallation Checklist

Go through the following checklist before performing installation.

2.2.2.2.1 Resource Requirement

This section details about the resources required to install Oracle Network Functions.

2.2.2.2.1.1 Network Functions

For OSO, cnDBTier, NF, and Console installation, evaluate resource requirement before performing the installation. It is possible that OSO, cnDBTier, NF, and Console requires additional resources due to changes in architecture or service model.

For more information on NF resource requirements, see NF-specific installation and upgrade guides.

2.2.2.2.1.2 Cloud Native Environment

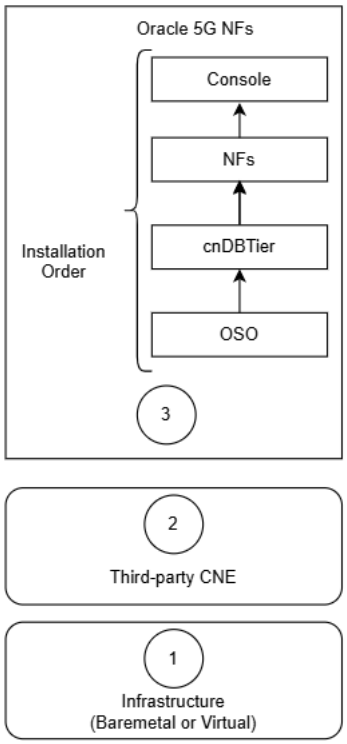
Ensure that the number of planned resources required for OSO, cnDBTier, NF, and Console are available during the non-Oracle cloud native environment installation.

For more information on non-Oracle cloud native environment resource requirements, see the installation and upgrade guide provided by the non-Oracle cloud native environment vendor.

2.2.3 Installation Workflow

The following diagram details the installation sequence of NF components on a non-Oracle cloud native environment.

Figure 2-6 CNC Installation Order on Non-Oracle cloud native environment

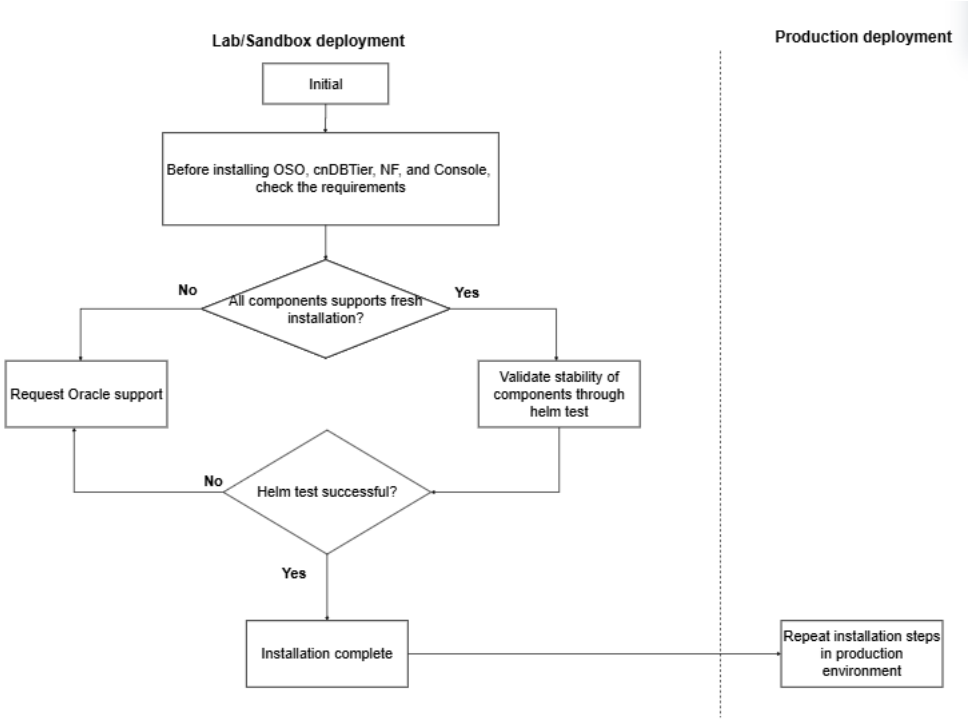


The detailed installation procedures for each component is provided in NF-specific installation and upgrade guides. See OSO, cnDBTier, NF, and Console installation and upgrade guides for details on installing the respective components.

2.2.3.1 NF Installation

The following diagram details the installation workflow of NF components on a non-Oracle cloud native environment.

Figure 2-7 OSO, cnDBTier, NF, and Console Installation with Non-Oracle cloud native environment



The following procedure explains the installation workflow for Oracle NF:

1. Start the installation process in the lab or sandbox environment.
2. Before installing OSO, cnDBTier, NF, and Console, review and verify all requirements.
3. Check if all components support fresh installation.
   - If any component does not support fresh installation, request Oracle Support and end the procedure.
4. If all components support fresh installation, validate component stability by running the Helm test.
5. Determine if the Helm test is successful.
   - If the Helm test is not successful, request Oracle Support and end the procedure.
   - If the Helm test is successful, proceed to the next step.
6. Complete the installation in the lab or sandbox environment.
7. Repeat the installation steps in the production environment.

2.2.4 Performing the NF Installation

The installation procedures for each component is documented in NF specific installation and upgrade guide. See the following documents for detailed installation procedure of the respective components:

Table 2-3 CNC Network Functions Document Reference

CNC Network Functions	Document Reference
Oracle Communications Cloud Native Core, Binding Support Function (BSF)	*Oracle Communications Cloud Native Core, Binding Support Function Installation, Upgrade, and Fault Recovery Guide*

Table 2-3 (Cont.) CNC Network Functions Document Reference

CNC Network Functions	Document Reference
Oracle Communications Cloud Native Core, Network Exposure Function (NEF)	*Oracle Communications Cloud Native Core, Network Exposure Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Repository Function (NRF)	*Oracle Communications Cloud Native Core, Network Repository Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Slice Selection Function (NSSF)	*Oracle Communications Cloud Native Core, Network Slice Selection Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Converged Policy (Policy)	*Oracle Communications Cloud Native Core, Converged Policy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Security Edge Protection Proxy (SEPP)	*Oracle Communications Cloud Native Core, Security Edge Protection Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Service Communication Proxy (SCP)	*Oracle Communications Cloud Native Core, Service Communication Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Unified Data Repository (UDR)	*Oracle Communications Cloud Native Core, Unified Data Repository Installation, Upgrade, and Fault Recovery Guide*

Table 2-4 CNC Companion Components Document Reference

CNC Companion Components	Document Reference
Oracle Communications Cloud Native Configuration Console (CNC Console)	*Oracle Communications Cloud Native Configuration Console Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, cnDBTier (cnDBTier)	*Oracle Communications Cloud Native Core, cnDBTier Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Certification Management (OCCM)	*Oracle Communications Cloud Native Core, Certification Management, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Operations Services Overlay (OSO)	*Oracle Communications Cloud Native Core, Operations Services Overlay Installation and Upgrade Guide*

2.2.5 Performing the Postinstallation Tasks

The installation procedures for each component is documented in NF specific installation and upgrade guide. See the following documents for detailed installation procedure of the respective components:

Table 2-5 CNC Network Functions Document Reference

CNC Network Functions	Document Reference
Oracle Communications Cloud Native Core, Binding Support Function (BSF)	*Oracle Communications Cloud Native Core, Binding Support Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Exposure Function (NEF)	*Oracle Communications Cloud Native Core, Network Exposure Function Installation, Upgrade, and Fault Recovery Guide*

Table 2-5 (Cont.) CNC Network Functions Document Reference

CNC Network Functions	Document Reference
Oracle Communications Cloud Native Core, Network Repository Function (NRF)	*Oracle Communications Cloud Native Core, Network Repository Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Slice Selection Function (NSSF)	*Oracle Communications Cloud Native Core, Network Slice Selection Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Converged Policy (Policy)	*Oracle Communications Cloud Native Core, Converged Policy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Security Edge Protection Proxy (SEPP)	*Oracle Communications Cloud Native Core, Security Edge Protection Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Service Communication Proxy (SCP)	*Oracle Communications Cloud Native Core, Service Communication Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Unified Data Repository (UDR)	*Oracle Communications Cloud Native Core, Unified Data Repository Installation, Upgrade, and Fault Recovery Guide*

2.2.5.1 NF Postinstallation

Perform the following postinstallation steps:

- Verify postinstallation of all the components by running the "`helm test`" provided by OSO, cnDBTier, NF, and Console to verify the deployment health and status.
- See OSO, cnDBTier, NF, and Console installation and upgrade guides for postinstallation task details after installing respective components.

2.3 CNC Installation On OCI

This chapter provides information about Cloud Native Core (CNC) installation in an Oracle Cloud Infrastructure (OCI) environment.

2.3.1 Overview

This section provides an overview of how to perform installation of Oracle CNC on Oracle Cloud Infrastructure (OCI).

You can install each Cloud Native Core (CNC) related network function (and its components) from the required release on Oracle Cloud Infrastructure (OCI).

2.3.2 Planning Installation

This section explains the planning for installing CNC with OCI environment.

2.3.2.1 General Guidelines

Oracle recommends the following guidelines for installing CNC solution in OCI environment:

- Perform installation testing in sandbox or lab deployment before testing in production sites.

- Install all components to the required release, as per the compatibility matrix provided in *Oracle Communications Cloud Native Core Release Notes*.
- In a multisite deployment model, perform the installation of one site at a time.
- It is recommended to perform install of cnDBTier, NF, and CNC Console in a single maintenance window. Ensure that the installation order is followed as per the sequence mentioned in Installation Workflow.

2.3.2.2 Preinstallation Checklist

Go through the following checklist before performing installation.

2.3.2.2.1 Resource Requirement

2.3.2.2.1.1 Network Functions

For OCI Adaptor, cnDBTier, NF, and Console installation, evaluate resource requirement before performing the installation. It is possible that OCI Adaptor, cnDBTier, NF, and Console requires additional resources due to changes in architecture or service model.

For more information on NF resource requirements, see NF-specific installation and upgrade guides.

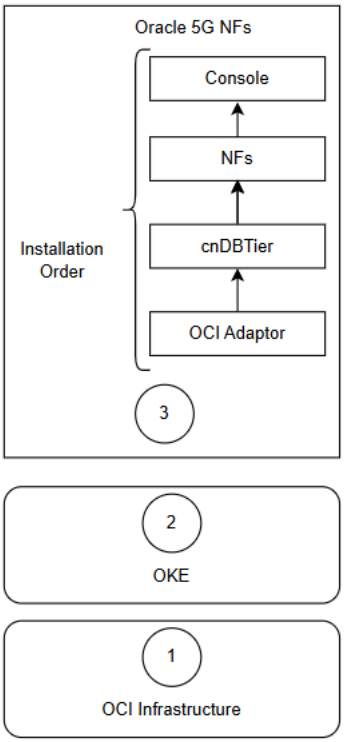
2.3.2.2.1.2 OCI

Ensure that the number of planned resources required for NF, CNC Console, and cnDBTier are available during the installation.

2.3.3 Installation Workflow

The following diagram details the installation sequence of NF components on a OCI environment.

Figure 2-8 CNC Installation Order on OCI environment

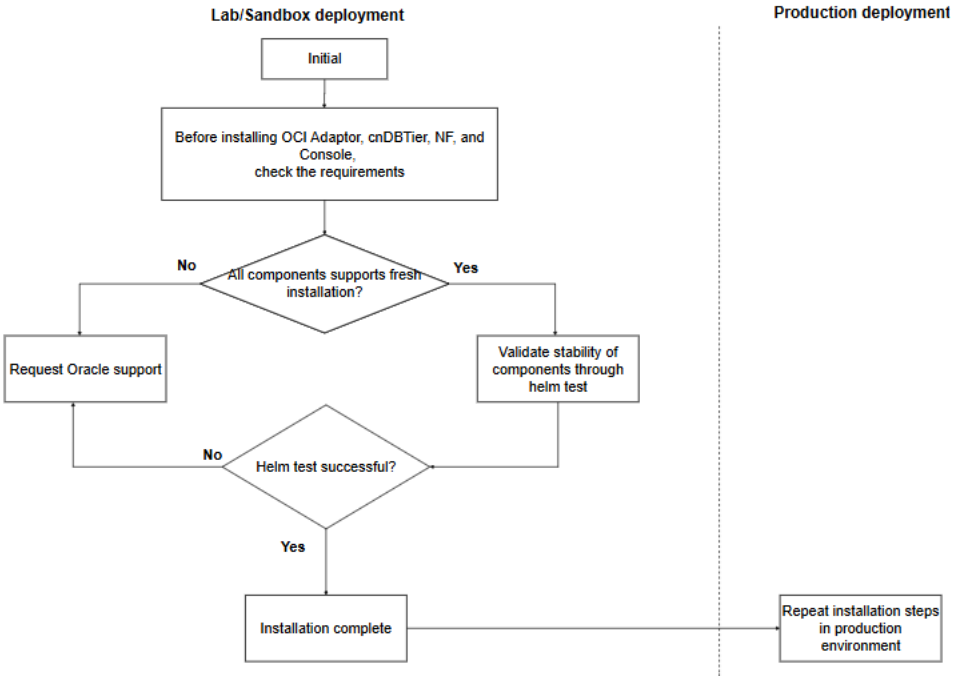


The detailed installation procedures for each component is provided in NF-specific installation and upgrade guides. See OCI Adaptor, cnDBTier, NF, and Console installation and upgrade guides for details on installing the respective components.

2.3.3.1 NF Installation

The following diagram details the installation workflow of NF components on a OCI environment.

Figure 2-9 NF Installation Workflow



The following procedure explains the installation workflow for Oracle NF:

1. Start the installation process in the lab or sandbox environment.
2. Before installing OCI Adaptor, cnDBTier, NF, and Console, review and verify all requirements.
3. Check if all components support fresh installation.
   - If any component does not support fresh installation, request Oracle Support and end the procedure.
4. If all components support fresh installation, validate component stability by running the Helm test.
5. Determine if the Helm test is successful.
   - If the Helm test is not successful, request Oracle Support and end the procedure.
   - If the Helm test is successful, proceed to the next step.
6. Complete the installation in the lab or sandbox environment.
7. Repeat the installation steps in the production environment.

2.3.4 Performing the NF Installation

The following diagram details the installation sequence of NF components on a OCI environment.

The installation procedures for each component is documented in NF specific installation and upgrade guide. See the following documents for detailed installation procedure of the respective components:

Table 2-6 CNC Network Functions Document Reference

CNC Network Functions	Document Reference
Oracle Communications Cloud Native Core, Binding Support Function (BSF)	*Oracle Communications Cloud Native Core, Binding Support Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Exposure Function (NEF)	*Oracle Communications Cloud Native Core, Network Exposure Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Repository Function (NRF)	*Oracle Communications Cloud Native Core, Network Repository Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Slice Selection Function (NSSF)	*Oracle Communications Cloud Native Core, Network Slice Selection Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Converged Policy (Policy)	*Oracle Communications Cloud Native Core, Converged Policy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Security Edge Protection Proxy (SEPP)	*Oracle Communications Cloud Native Core, Security Edge Protection Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Service Communication Proxy (SCP)	*Oracle Communications Cloud Native Core, Service Communication Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Unified Data Repository (UDR)	*Oracle Communications Cloud Native Core, Unified Data Repository Installation, Upgrade, and Fault Recovery Guide*

Table 2-7 CNC Companion Components Document Reference

CNC Companion Components	Document Reference
Oracle Communications Cloud Native Configuration Console (CNC Console)	*Oracle Communications Cloud Native Configuration Console Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, cnDBTier (cnDBTier)	*Oracle Communications Cloud Native Core, cnDBTier Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Certification Management (OCCM)	*Oracle Communications Cloud Native Core, Certification Management, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Operations Services Overlay (OSO)	*Oracle Communications Cloud Native Core, Operations Services Overlay Installation and Upgrade Guide*

2.3.5 Performing the Postinstallation Tasks

The installation procedures for each component is documented in NF specific installation and upgrade guide. See the following documents for detailed installation procedure of the respective components:

Table 2-8 CNC Network Functions Document Reference

CNC Network Functions	Document Reference
Oracle Communications Cloud Native Core, Binding Support Function (BSF)	*Oracle Communications Cloud Native Core, Binding Support Function Installation, Upgrade, and Fault Recovery Guide*

Table 2-8 (Cont.) CNC Network Functions Document Reference

CNC Network Functions	Document Reference
Oracle Communications Cloud Native Core, Network Exposure Function (NEF)	*Oracle Communications Cloud Native Core, Network Exposure Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Repository Function (NRF)	*Oracle Communications Cloud Native Core, Network Repository Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Slice Selection Function (NSSF)	*Oracle Communications Cloud Native Core, Network Slice Selection Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Converged Policy (Policy)	*Oracle Communications Cloud Native Core, Converged Policy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Security Edge Protection Proxy (SEPP)	*Oracle Communications Cloud Native Core, Security Edge Protection Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Service Communication Proxy (SCP)	*Oracle Communications Cloud Native Core, Service Communication Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Unified Data Repository (UDR)	*Oracle Communications Cloud Native Core, Unified Data Repository Installation, Upgrade, and Fault Recovery Guide*

2.3.5.1 NF Postinstallation

Perform the following postinstallation steps:

- Verify postinstallation of all the components by running the "`helm test`" provided by OSO, cnDBTier, NF, and Console to verify the deployment health and status.
- See OSO, cnDBTier, NF, and Console installation and upgrade guides for postinstallation task details after installing respective components.

3
CNC Upgrade

3.1 Overview

Oracle's Cloud Native Core (CNC) Network Functions (NFs) support deployment on Oracle Communications Cloud Native Environment (CNE), non-Oracle cloud native environment, and Oracle Cloud Infrastructure (OCI) environment. This document provides information on Cloud Native Core (CNC) guidelines required to upgrade and rollback Oracle CNC Solution in the following environment:

- CNC Solution deployed on CNE: For information on upgrade or rollback procedures, see Upgrade of Oracle CNC Solution deployed on Oracle CNE.
- CNC Solution deployed on non-Oracle CNE: For information on upgrade or rollback procedures, see Upgrade of Oracle CNC Solution deployed on Non-Oracle CNE.
- CNC Solution deployed on OCI: For information on upgrade or rollback procedures, see Upgrade of Oracle CNC Solution deployed on with OCI.

3.1.1 Supported Upgrade Paths for CNC Components except CNE

Figure 3-1 outlines the supported upgrade paths for different CNC components except CNE. It is not recommend to skip intermediate versions, unless explicitly mentioned.

Figure 3-1 CNC Upgrade Paths for CNC components except CNE

Source Releases	Target Releases						
	24.3. x	25.1.1xx	25.1.2xx	25.2.1xx	25.2.2xx	26.1.2xx	26.2.2xx
24.2. x	Y	Y	NS*	NS	NS	NS	NS
24.3. x	NA	Y	Y	NS	NS	NS	NS
25.1.1xx	NA	NA	Y	NS**	NS	NS	NS
25.1.2xx	NA	NA	NA	Y	Y	NS	NS
25.2.1xx	NA	NA	NA	NA	Y	NS	NS
25.2.2xx	NA	NA	NA	NA	NA	Y	NS
26.1.2xx	NA	NA	NA	NA	NA	NA	Y
26.2.2xx	NA	NA	NA	NA	NA	NA	NA

Legends: NS: Not Supported, NA: Not Applicable, Y: Yes, upgrade supported

> **Note**
>
> - ***** *Policy, CNCC, UDR, SLF, and cnDBTier supports upgrade from **24.2.x** to **25.1.2xx** (this exception applies only to upgrade).*
> - ****** *SCP, SEPP, UDR, SLF, CNCC, and cnDBTier supports upgrade from **25.1.1xx** to **25.2.1xx** (this exception applies only to upgrade).*
> - This upgrade guideline is applicable to CNC components except CNE. For CNE upgrade guideline, see Figure 3-5.
> - This upgrade path is an example, and it does not show future release plans.
> - If the source release is **A.B.1xx**, upgrades must follow an incremental sequence, for example,
>
>   1. A.B.1xx
>   2. A.B.2xx
>   3. A.(B+1).1xx
>
>   Skipping intermediate versions (such as A.B.2xx) is not supported.
> - Upgrading from **A.B.2xx** to **A.(B+1).2xx** is allowed.
> - Be sure to select intermediate versions to maintain compatibility throughout the upgrade.

3.2 Upgrade of Oracle CNC Solution deployed on Oracle CNE

This chapter provides information about Oracle Cloud Native Core (CNC) Solution upgrade when deployed on Oracle Communications Cloud Native Environment (CNE).

3.2.1 Overview

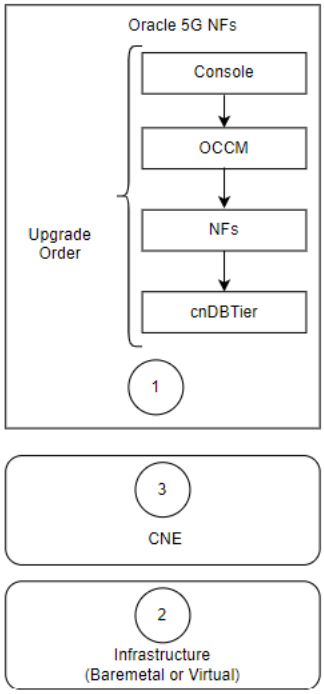
This section provides an overview of upgrade procedures of CNC components. You must complete the preupgrade procedures described in each subsection to ensure that the system is ready for an upgrade.

You can upgrade each Cloud Native Core (CNC) Network Functions (NFs) and Companion components from the specified source release to the target release. Once the required network function is up and running, upgrade infrastructure, followed by CNE upgrade.

> **Note**
>
> The upgrade procedure for the infrastructure is not covered in this document. For more information about infrastructure upgrades, see the relevant infrastructure document.

If you are using CNC Solution on Oracle CNE, perform the upgrade procedure in the following sequence:

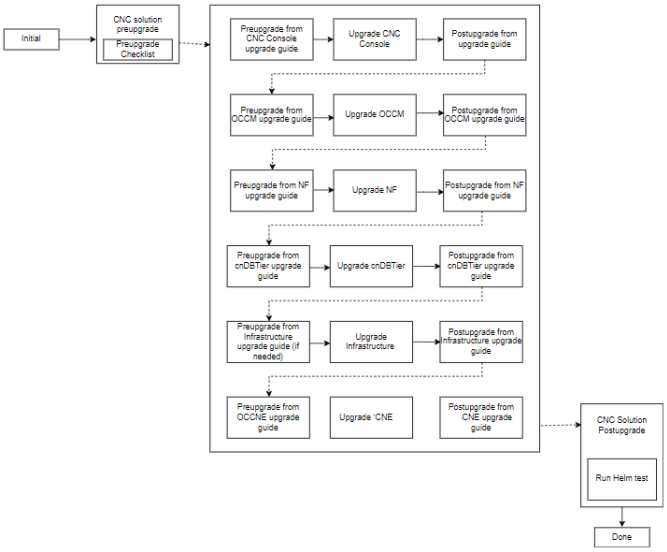
Figure 3-2 CNC Solution Upgrade Order on Oracle CNE



3.2.2 Planning Upgrade

The following flow diagram gives a high-level overview of the sequence to be followed for upgrading CNC Solution deployed on CNE.

Figure 3-3 Planning Upgrade of CNC Solution



The following table lists the supported upgrade sequence:

Table 3-1 Upgrade Sequence

Deployment Mode	Source Version	Target Version	Upgrade Sequence
Single Cluster or Multicluster	25.2.1xx, 25.1.2xx	25.2.2xx	1. Oracle CNC NFs and Companion components: a. CNC Console Upgrade b. OCCM Upgrade c. CNC NF Upgrade d. cnDBTier Upgrade 2. Infrastructure (if needed) 3. CNE

3.2.2.1 General Guidelines

Oracle recommends the following guidelines for upgrading CNC Solution deployed on CNE:

- Perform upgrade testing in sandbox or lab deployment before testing in production sites.
- Follow the upgrade sequence outlined in the Figure 3-1 and CNE Upgrade sections.
- Upgrade all components to their target release, as per the compatibility matrix provided in *Oracle Communications Cloud Native Core Release Notes*.
- In a multisite deployment model, perform the upgrade of one site at a time. Follow the sequence mentioned in upgrade sequence to upgrade all the components in the specific site and then proceed to the next site.
  Refer to cnDBTier and NF-specific installation, upgrade, and fault recovery guide for post upgrade steps to verify the health of cnDBTier services and NF components.
- It is recommended to perform an upgrade of CNC Console, OCCM, NF, and cnDBTier in a single maintenance window. If upgrade takes longer than a single maintenance window, individual components can be upgraded in multiple maintenance windows. Ensure that the upgrade order is followed as per the sequence mentioned in upgrade sequence.
- Ensure that Console and NF versions are compatible with OCCM before upgrade.
- Perform infrastucture upgrade, if needed.
- You can perform a CNE upgrade in multiple maintenance windows. For more information about upgrading CNE, see *Oracle Communications Cloud Native Environment Installation, Upgrade, and Fault Recovery Guide*.
- If CNE is a shared cluster, upgrade all the instances of CNC Console, OCCM, NF, and cnDBTier before upgrading CNE.
- If multiple NFs share a cnDBTier, upgrade all the instances of CNC Console, OCCM, and NFs sharing that cnDBTier of the specific site, before upgrading the cnDBTier of the site.
- Rollback is the reverse order of upgrade.

3.2.2.2 Preupgrade Checklist

Go through the following checklist before performing an upgrade.

3.2.2.2.1 Resource Requirement

This section details about the resources required to upgrade CNE, CNC NFs and Companion components.

3.2.2.2.1.1 CNC NFs and Companion Components

For CNC NFs and Companion components upgrade, reevaluate resource requirement before performing the upgrade. It is possible that CNC NFs and Companion components require additional resources due to changes in architecture or service model.

For more information on NF resource requirements, see NF-specific installation, upgrade, and fault recovery guides.

3.2.2.2.1.2 Cloud Native Environment

CNE automatically drains its worker nodes while performing the upgrade. When a worker node is drained, Kubernetes safely evicts all of the pods that were hosted on that worker node.

> **Note**
>
> NF, cnDBTier, and CNC Console support Pod Distribution Budget (PDB) to gracefully handle worker node draining. Thus, based on available resources, a CNE worker node upgrade will happen. Operator needs to ensure that enough resources are available after draining the worker node. For more information on CNE resource requirements, see *Oracle Communications Cloud Native Core, Cloud Native Environment Installation, Upgrade, and Fault Recovery Guide*.

3.2.2.2.2 Prerequisites

Ensure that the following prerequisites are met before performing an upgrade:

- Verify that all required worker nodes are available for scheduling pods during upgrade. For example, taints applied on worker nodes (for any maintenance activity etc.). Make sure required number of worker nodes are available as per dimensioning before upgrade.
- Ensure that at least two worker nodes (that is, resource for largest worker node in cluster x 2) worth of total resources are free and available in CNE cluster.
- Monitor infrastructure related issue (for example, storage or hardware alarms from infrastructure) manually before CNE or Operating System upgrade.
- Take a backup of the following artifacts after installation of each of the CNC components:
  - custom values.yaml file
  - servicemesh-config-custom-values.yaml file
  - Updated helm charts
  - Secrets
  - Certificates
  - Keys used
- See CNC Console, OCCM, NF, cnDBTier, and CNE installation and upgrade guides for preupgrade task details before upgrading respective components.

3.2.2.3 Upgrade Workflow

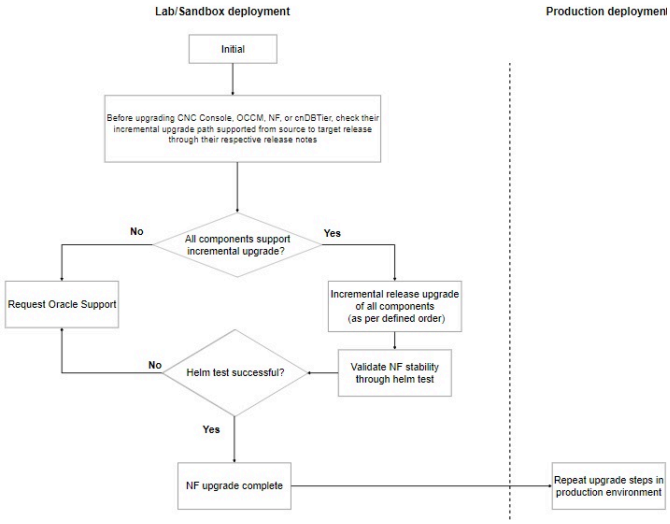
The section provides details about the upgrade sequence.

See CNC NFs, Companion components, and CNE installation, upgrade, and fault recovery guides for details on upgrading the respective components. The infrastructure upgrade is performed (if needed) after CNC components upgrade and before CNE upgrade.

3.2.2.3.1 CNC NFs and Companion Components Upgrade

This section describes the upgrade workflow for CNC Components deployed on CNE.

Figure 3-4 CNC Components Upgrade deployed on CNE



The following procedure explains the upgrade work flow for CNC Components:

1. Check the supported upgrade path for each NF. To know the upgrade path, see *Oracle Communications Cloud Native Core Release Notes*. Check the upgrade sequence mentioned in the Supported Upgrade Paths for CNC Components except CNE section.

   > **Note**
   >
   > For multisite deployment model, follow the procedure on each site.

2. Check if all the CNC components support incremental upgrades. If it is not supported, perform one of the following procedure:
   a. perform multiple hop upgrades.
   b. perform a fresh installation after site isolation.
   c. contact My Oracle Support.
3. Upgrade the CNC components based on the upgrade sequence mentioned in the Planning Upgrade section.
4. Run the Helm test command to check the upgrade status.

5. Once the Helm test is successful, then the upgrade is complete.
6. Perform the above upgrade steps in the production environment.

3.2.2.3.2 CNE Upgrade

Supported CNE Upgrade Paths

To ensure a smooth and supported upgrade process, follow the upgrade sequence outlined in Figure 3-5 outlines the supported upgrade paths for CNE. It is not recommend to skip intermediate versions, unless explicitly mentioned.

Figure 3-5 Supported CNE Upgrade Paths

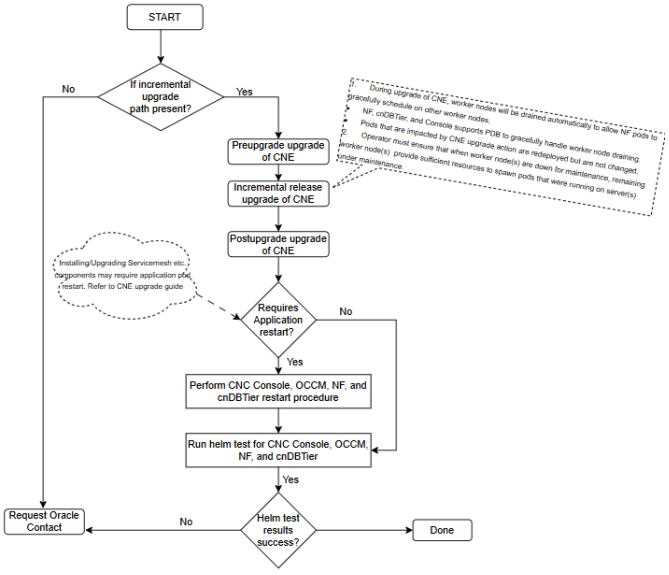
Source Releases	Target Releases						
	24.3. x	25.1.1xx	25.1.2xx	25.2.1xx	25.2.2xx	26.1.2xx	26.2.2xx
24.2. x	Y	NS	NS	NS	NS	NS	NS
24.3. x	NA	Y	NS	NS	NS	NS	NS
25.1.1xx	NA	NA	Y	Y	NS	NS	NS
25.1.2xx	NA	NA	NA	Y	Y	NS	NS
25.2.1xx	NA	NA	NA	NA	Y	NS	NS
25.2.2xx	NA	NA	NA	NA	NA	Y	NS
26.1.2xx	NA	NA	NA	NA	NA	NA	Y
26.2.2xx	NA	NA	NA	NA	NA	NA	NA

Legend: NS: Not Supported, NA: Not Applicable, Y: Yes, upgrade supported

CNE Upgrade Workflow

The following flow diagram explains the process for upgrading CNE:

Figure 3-6 CNE Upgrade Procedure



The following procedure explains the upgrade workflow for Oracle Communications Cloud Native Core, Cloud Native Environment (CNE):

1. Check the supported upgrade path for CNE. To know the upgrade path, see *Oracle Communications Cloud Native Core Release Notes*.
2. Check if CNE supports incremental upgrades. If it is not supported, contact My Oracle Support.
3. Upgrade the components based on the upgrade sequence mentioned in the Planning Upgrade section.
4. Check and perform an application pod restart, if required.
   For example: After upgrading the service mesh, restart the application pods of CNC Console, OCCM, NF, and cnDBTier even if they are running on the latest versions.
5. Run the Helm test command to check the upgrade status.
6. Once the Helm test is successful, the upgrade is complete.

3.2.2.4 Performing the Upgrade

See the following documents for detailed procedures to upgrade the respective components:

Table 3-2 CNC Network Functions Document Reference

CNC Network Functions	Document Reference
Oracle Communications Cloud Native Core, Binding Support Function (BSF)	*Oracle Communications Cloud Native Core, Binding Support Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Exposure Function (NEF)	*Oracle Communications Cloud Native Core, Network Exposure Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Repository Function (NRF)	*Oracle Communications Cloud Native Core, Network Repository Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Slice Selection Function (NSSF)	*Oracle Communications Cloud Native Core, Network Slice Selection Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Converged Policy (Policy)	*Oracle Communications Cloud Native Core, Converged Policy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Security Edge Protection Proxy (SEPP)	*Oracle Communications Cloud Native Core, Security Edge Protection Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Service Communication Proxy (SCP)	*Oracle Communications Cloud Native Core, Service Communication Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Unified Data Repository (UDR)	*Oracle Communications Cloud Native Core, Unified Data Repository Installation, Upgrade, and Fault Recovery Guide*

Table 3-3 CNC Companion Components Document Reference

CNC Companion Components	Document Reference
Oracle Communications Cloud Native Configuration Console (CNC Console)	*Oracle Communications Cloud Native Configuration Console Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, cnDBTier (cnDBTier)	*Oracle Communications Cloud Native Core, cnDBTier Installation, Upgrade, and Fault Recovery Guide*

Table 3-3 (Cont.) CNC Companion Components Document Reference

CNC Companion Components	Document Reference
Oracle Communications Cloud Native Core, Certification Management (OCCM)	*Oracle Communications Cloud Native Core, Certification Management, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Operations Services Overlay (OSO)	*Oracle Communications Cloud Native Core, Operations Services Overlay Installation and Upgrade Guide*

3.2.3 Performing the Postupgrade Tasks

This section explains the postupgrade tasks.

3.2.3.1 NF Postupgrade

- Verify postupgrade of all the CNC NFs and Companion components by running the "`helm test`" to verify the deployment health and status.
- See CNC NFs and Companion components installation, upgrade, and fault recovery guides for postupgrade task details after upgrading the respective components.

3.2.3.2 CNE Postupgrade

For information on CNE postupgrade tasks, see *Oracle Communications Cloud Native Core, Cloud Native Environment Installation, Upgrade, and Fault Recovery Guide*.

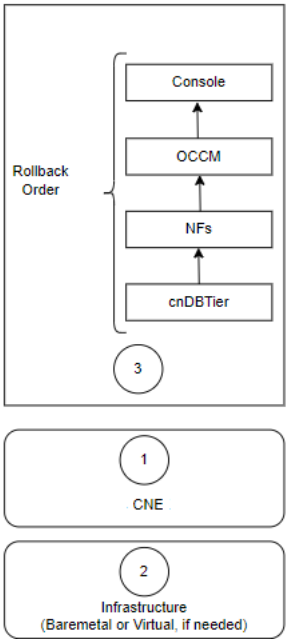
3.2.4 Performing the Rollback

> **Note**
>
> Before rollback contact My Oracle Support to analyze the cause of failure and any possible workarounds.

This section helps you to decide the order of the rollback of the components that were upgraded successfully. For example, a rollback is triggered if the cnDBTier upgrade fails (or validation after an upgrade fails) for any reason, and this guide provides the information to perform the rollback of CNC Components in a given order.

The following diagram details the rollback sequence:

Figure 3-7 Rollback Sequence



The following table lists the supported rollback sequence:

Table 3-4 Rollback Sequence

Deployment Mode	Source Version	Target Version	Rollback Sequence
Single Cluster or Multicluster	25.2.2xx	25.2.1xx, 25.1.2xx	1. CNE roll back 2. Infrastructure roll back 3. CNC NFs and Companion components a. cnDBTier roll back b. NF roll back c. OCCM roll back d. CNC Console roll back

See the following documents for detailed procedures to roll back the respective components:

Table 3-5 CNC Network Functions Document Reference

CNC Network Functions	Document Reference
Oracle Communications Cloud Native Core, Binding Support Function (BSF)	*Oracle Communications Cloud Native Core, Binding Support Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Exposure Function (NEF)	*Oracle Communications Cloud Native Core, Network Exposure Function Installation, Upgrade, and Fault Recovery Guide*

Table 3-5 (Cont.) CNC Network Functions Document Reference

CNC Network Functions	Document Reference
Oracle Communications Cloud Native Core, Network Repository Function (NRF)	*Oracle Communications Cloud Native Core, Network Repository Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Slice Selection Function (NSSF)	*Oracle Communications Cloud Native Core, Network Slice Selection Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Converged Policy (Policy)	*Oracle Communications Cloud Native Core, Converged Policy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Security Edge Protection Proxy (SEPP)	*Oracle Communications Cloud Native Core, Security Edge Protection Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Service Communication Proxy (SCP)	*Oracle Communications Cloud Native Core, Service Communication Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Unified Data Repository (UDR)	*Oracle Communications Cloud Native Core, Unified Data Repository Installation, Upgrade, and Fault Recovery Guide*

Table 3-6 CNC Companion Components Document Reference

CNC Companion Components	Document Reference
Oracle Communications Cloud Native Configuration Console (CNC Console)	*Oracle Communications Cloud Native Configuration Console Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, cnDBTier (cnDBTier)	*Oracle Communications Cloud Native Core, cnDBTier Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Certification Management (OCCM)	*Oracle Communications Cloud Native Core, Certification Management, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Operations Services Overlay (OSO)	*Oracle Communications Cloud Native Core, Operations Services Overlay Installation and Upgrade Guide*

3.2.5 Performing the Postrollback Tasks

Perform the following postrollback tasks:

- Verify the rollback of all the CNC NFs and Companion components by running the "`helm test`" to verify the deployment health and status.
- See CNC NFs and Companion components installation, upgrade, and fault recovery guides for postrollback task details after rolling back respective components.

3.3 Upgrade of Oracle CNC Solution deployed on Non-Oracle CNE

This chapter provides information about Oracle Cloud Native Core (CNC) Solution upgrade when deployed on Non-Oracle cloud native environment.

3.3.1 Overview

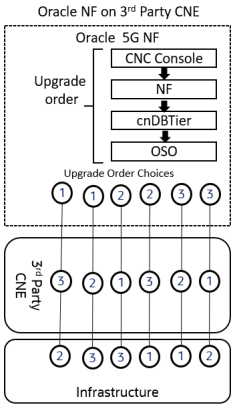
This section provides an overview of upgrade procedures of CNC components. You must complete the preupgrade procedures described in each subsection to ensure that the system is ready for an upgrade.

You can upgrade each Cloud Native Core (CNC) Network Functions (NFs) and Companion components from the specified source release to the target release. Once the required network function is up and running, upgrade non-Oracle cloud native environment or infrastructure.

> **Note**
>
> The upgrade procedure for the infrastructure is not covered in this document. For more information about infrastructure upgrades, see the relevant infrastructure document.

If you are using Oracle CNC Solution on non-Oracle CNE, perform the upgrade procedure in the following sequence:

Figure 3-8 Oracle CNC Solution Upgrade Order on Non-Oracle CNE



See CNC NFs and Companion components installation, upgrade, and fault recovery guides for details on upgrading the respective components.

3.3.2 Planning Upgrade

This section explains the planning for upgrading CNC NFs and Companion components deployed on non-Oracle cloud native environment.

3.3.2.1 General Guidelines

Oracle recommends the following guidelines:

- Perform upgrade testing in sandbox or lab deployment before testing in production sites.
- Follow the upgrade sequence outlined in the Figure 3-1 section.
- Upgrade all components to their target release, as per the compatibility matrix provided in the CNC release notes.

- In a multisite deployment model, perform the upgrade of one site at a time. Follow the sequence mentioned in Figure 3-8 to upgrade all the components in the specific site and then proceed to the next site.
  Refer to cnDBTier and NF-specific installation, upgrade, and fault recovery guide for post upgrade steps to verify the health of cnDBTier services and NF components.
- Perform an upgrade of CNC Console, OCCM, NF, and cnDBTier in a single maintenance window. If upgrade takes longer than a single maintenance window, individual components can be upgraded in multiple maintenance windows. Ensure that the upgrade order is followed as per the sequence mentioned in Figure 3-8.
- Ensure that CNC Console and NF versions are compatible with OCCM before upgrade.
- If multiple NFs share a cnDBTier, upgrade all the instances of CNC Console, OCCM, and NFs sharing that cnDBTier of the specific site, before upgrading the cnDBTier of the site.
- Rollback is the reverse order of upgrade.

3.3.2.2 Preupgrade Checklist

Go through the following checklist before performing an upgrade.

3.3.2.2.1 Resource Requirement

This section details about the resources required to upgrade a non-Oracle cloud native environment, CNC NFs, and Companion components.

3.3.2.2.1.1 CNC NFs and Companion components

For CNC NFs and Companion components upgrade, reevaluate resource requirement before performing the upgrade. It is possible that CNC NFs or Companion components requires additional resources due to changes in architecture or service model.

For more information on CNC NFs and Companion components resource requirements, see NF-specific installation, upgrade, and fault recovery guides.

3.3.2.2.1.2 Cloud Native Environment

Ensure that the number of planned resources required for NF, CNC Console, and cnDBTier are available during the non-Oracle cloud native environment upgrade.

For more information on non-Oracle cloud native environment resource requirements, see the installation and upgrade guide provided by the non-Oracle cloud native environment vendor.

3.3.2.2.2 Prerequisites

Ensure that you have the following prerequisites before performing an upgrade:

- Keep the backup of the following artifacts from your recent successful installation handy:
  - custom values.yaml file
  - servicemesh-config-custom-values.yaml file, if any
  - Updated helm charts
  - Secrets
  - Certificates
  - Keys used

- See CNC Console, OCCM, NF, cnDBTier, and OSO guides for preupgrade task details before upgrading respective components.
- Refer to customer-specific non-Oracle cloud native environment Upgrade document for preupgrade tasks.

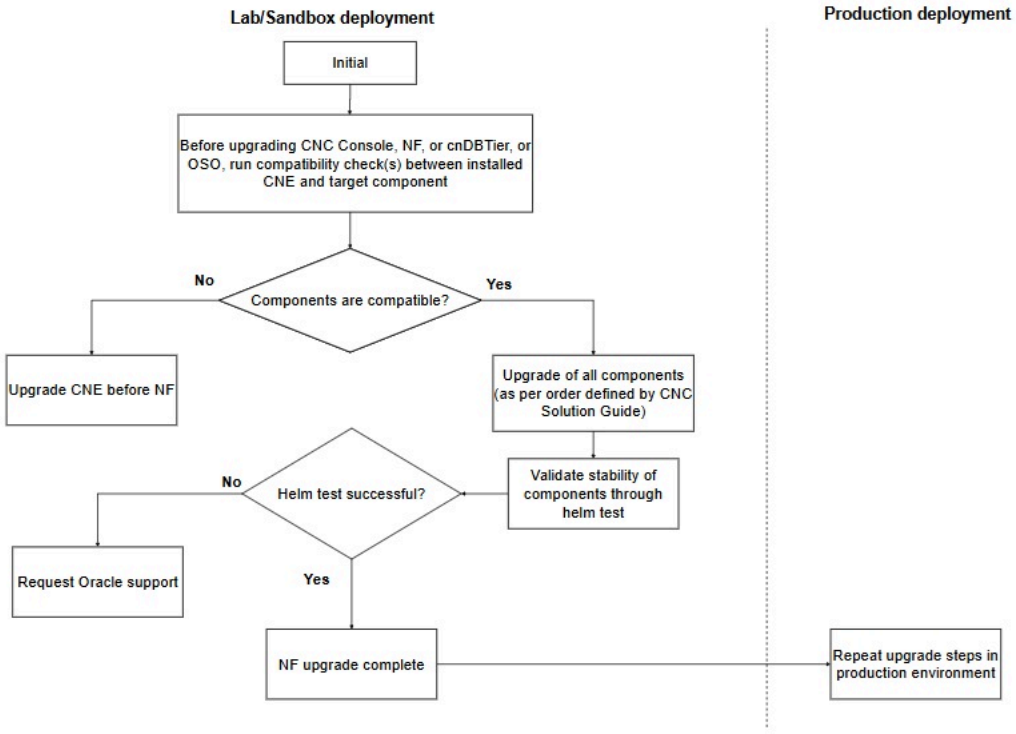
3.3.2.3 Upgrade Workflow

The following diagram details the upgrade sequence if you are using a non-Oracle CNE.

3.3.2.3.1 CNC NFs and Companion Components Upgrade

This section explains the upgrade workflow of CNC NFs and Companion Components deployed on Non-Oracle cloud native environment.

Figure 3-9 CNC NFs and Companion components Upgrade on Non-Oracle cloud native environment



The following procedure explains the upgrade workflow for CNC NFs and Companion Components:

1. Check the supported upgrade path for each CNC NFs and Companion Components. To know the upgrade path, see *Oracle Communications Cloud Native Core Release Notes*.

> **Note**
>
> It is recommended to upgrade in the similar supported upgrade path of the Upgrade Workflow.

2. Check for the compatibility of the target CNC component. See Compatibility check of target NF component with installed CNE section for the procedure.
3. If the CNC components are not compatible, upgrade non-Oracle cloud native environment.
4. If all CNC components are compatible, upgrade the components based on the upgrade sequence mentioned in Upgrade Workflow section.
5. Run the Helm test command to check the upgrade status. In case of any failure, contact My Oracle Support.
6. Once the Helm test is successful, then the upgrade is complete.
7. Perform the above upgrade steps in the production environment.

3.3.2.3.2 Compatibility Check of Target NF Component with Installed Non-Oracle cloud native environment

Follow the procedure to check the compatibility of target NF component with installed Non-Oracle cloud native environment:

1. Run the following command to get the list of resource versions for the installed non-Oracle cloud native environment release:

   ```
   kubectl api-resources --sort-by='name' (or kubectl api-versions)
   ```

   Sample output:

   ```
   serviceaccounts                   sa
   v1                                     true         ServiceAccount
   serviceentries                    se           networking.istio.io/
   v1beta1            true         ServiceEntry
   servicemonitors
   monitoring.coreos.com/v1               true         ServiceMonitor
   services                          svc
   v1                                     true         Service
   sidecars                                      networking.istio.io/
   v1beta1            true         Sidecar ...
   ...
   ...
   ...
   ```

2. Run the following command to get the list of target CNC Console, OCCM, NF, cnDBTier, and OSO resources and their versions:

   ```
   helm upgrade <helm release> <chart tarball> -f <ASM Custom File> -n <helm
   release> --dry-run | egrep -i "^apiVersion:|^kind:" |sed 's/\r$//' | awk
   '{ ORS = (NR%2 ? ", " : RS) } 1' | sort | uniq
   ```

   For example:

   ```
   helm upgrade ocpcf-lp  occnp-23.2.0-od-20230210.tgz -f occnp-23.2.0-
   nb-20230127-custom-values-pcf-ASM.yaml -n ocpcf-lp --dry-run | egrep -i
   "^apiVersion:|^kind:" |sed 's/\r$//' | awk '{ ORS = (NR%2 ? ", " : RS) }
   1' | sort | uniq
   ```

Sample output:

```
apiVersion: apps/v1, kind: Deployment
apiVersion: apps/v1, kind: StatefulSet
apiVersion: autoscaling/v1, kind: HorizontalPodAutoscaler
apiVersion: autoscaling/v2beta1, kind: HorizontalPodAutoscaler
apiVersion: autoscaling/v2beta2, kind: HorizontalPodAutoscaler
apiVersion: batch/v1, kind: Job
apiVersion: policy/v1beta1, kind: PodDisruptionBudget
apiVersion: rbac.authorization.k8s.io/v1beta1, kind: RoleBinding
apiVersion: rbac.authorization.k8s.io/v1, kind: Role
apiVersion: rbac.authorization.k8s.io/v1, kind: RoleBinding
apiVersion: v1, kind: ConfigMap
apiVersion: v1, kind: Service
apiVersion: v1, kind: ServiceAccount
```

3. Verify that installed non-Oracle cloud native environment has all Kubernetes resources and their versions required by CNC Console, OCCM, NF, cnDBTier, and OSO.

3.3.3 Performing the NF Upgrade

See the following documents for detailed procedures to upgrade the respective components:

Table 3-7 CNC Network Functions Document Reference

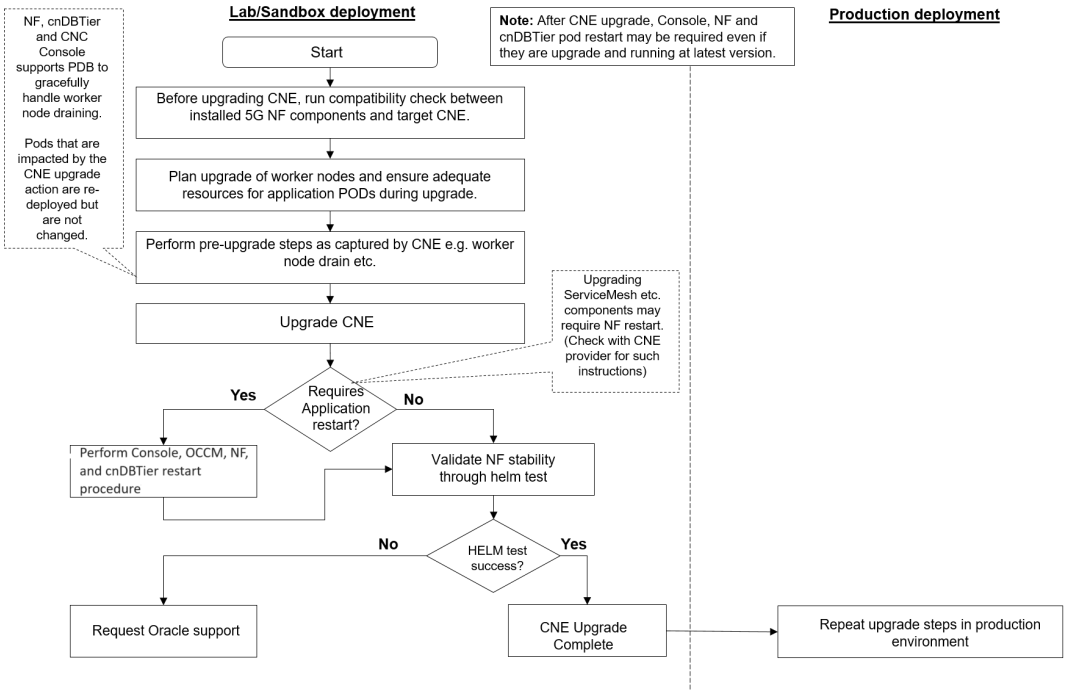
CNC Network Functions	Document Reference
Oracle Communications Cloud Native Core, Binding Support Function (BSF)	*Oracle Communications Cloud Native Core, Binding Support Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Exposure Function (NEF)	*Oracle Communications Cloud Native Core, Network Exposure Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Repository Function (NRF)	*Oracle Communications Cloud Native Core, Network Repository Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Slice Selection Function (NSSF)	*Oracle Communications Cloud Native Core, Network Slice Selection Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Converged Policy (Policy)	*Oracle Communications Cloud Native Core, Converged Policy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Security Edge Protection Proxy (SEPP)	*Oracle Communications Cloud Native Core, Security Edge Protection Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Service Communication Proxy (SCP)	*Oracle Communications Cloud Native Core, Service Communication Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Unified Data Repository (UDR)	*Oracle Communications Cloud Native Core, Unified Data Repository Installation, Upgrade, and Fault Recovery Guide*

Table 3-8 CNC Companion Components Document Reference

CNC Companion Components	Document Reference
Oracle Communications Cloud Native Configuration Console (CNC Console)	*Oracle Communications Cloud Native Configuration Console Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, cnDBTier (cnDBTier)	*Oracle Communications Cloud Native Core, cnDBTier Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Certification Management (OCCM)	*Oracle Communications Cloud Native Core, Certification Management, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Operations Services Overlay (OSO)	*Oracle Communications Cloud Native Core, Operations Services Overlay Installation and Upgrade Guide*

3.3.3.1 Non-Oracle Cloud Native Environment Upgrade

Figure 3-10 Non-Oracle CNE Upgrade



The following procedure explains the upgrade workflow for non-Oracle cloud native environment:

1. Check for the compatibility of the target NF component. Refer to Compatibility check of target NF component with installed CNE section for compatibility check procedure.
2. Check for resource requirements detail for worker nodes upgrade in vendor-specific cloud native core documentation.
3. Upgrade cloud native core and restart the applications, if required.
4. Run the Helm test command to check the upgrade status.

5. Once the Helm test is successful, the upgrade is complete.
6. Perform the above steps in the production environment.

3.3.3.2 Compatibility Check of NF Component with Target Cloud Native Environment

Perform the following compatibility checks:

1. Run the following commands to get the list of deployed resources and their versions from a given CNC Console, OCCM, NF, cnDBTier and OSO release:

   ```
   helm get manifest <helm release>  -n <namespace> | egrep -i "^apiVersion:|
   ^kind:" |sed 's/\r$//' | awk '{ ORS = (NR%2 ? ", " : RS) } 1' | sort | uniq
   ```

   Sample Output:

   ```
   apiVersion: apps/v1, kind: Deployment
   apiVersion: apps/v1, kind: StatefulSet
   apiVersion: autoscaling/v1, kind: HorizontalPodAutoscaler
   apiVersion: autoscaling/v2beta1, kind: HorizontalPodAutoscaler
   apiVersion: autoscaling/v2beta2, kind: HorizontalPodAutoscaler
   apiVersion: policy/v1beta1, kind: PodDisruptionBudget
   apiVersion: rbac.authorization.k8s.io/v1beta1, kind: RoleBinding
   apiVersion: rbac.authorization.k8s.io/v1, kind: Role
   apiVersion: rbac.authorization.k8s.io/v1, kind: RoleBinding
   apiVersion: v1, kind: ConfigMap
   apiVersion: v1, kind: Service
   apiVersion: v1, kind: ServiceAccount
   ```

2. Run the following command to get the list of resource versions for the target cloud native environment release:

   > **Note**
   >
   > - See Kubernetes release documentation for supported resources and versions.
   > - Alternate approach: From any installed target cloud native environment release, run the following command to get a list of all supported api-versions:

   ```
   kubectl api-resources --sort-by='name’ (or kubectl api-versions)
   ```

   Sample output:

   ```
   serviceaccounts                   sa
   v1                                     true         ServiceAccount
   serviceentries                    se           networking.istio.io/
   v1beta1            true         ServiceEntry
   servicemonitors
   monitoring.coreos.com/v1               true         ServiceMonitor
   services                          svc
   v1                                     true         Service
   ```

```
sidecars                                          networking.istio.io/
v1beta1           true         Sidecar ...
...
...
...
```

3. Manually ensure that all installed CNC Console, OCCM, NF, cnDBTier, and OSO resources and their versions are available in the target cloud native environment.

3.3.4 Performing the Postupgrade Tasks

This section explains the postupgrade tasks.

3.3.4.1 NF Postupgrade

- Verify postupgrade of all the CNC NFs and Companion components by running the "`helm test`" to verify the deployment health and status.
- See CNC NFs and Companion components installation, upgrade, and fault recovery guides for postupgrade task details after upgrading respective components.

3.3.4.2 Cloud Native Environment Postupgrade

- Re-validate the stability of all the components by running "`helm test`" provided by CNC Console, OCCM, NF, and cnDBTier to verify the deployment health and status.
- For procedures to perform any restart required by CNC Console, OCCM, NF, cnDBTier, or any other external component, see the component-specific guides or documents.

3.3.5 Performing the Rollback

Once a rollback is triggered for a component, this section of the guide helps you to decide the order of the rollback for other components that were upgraded successfully. For example, a rollback is triggered if the cnDBTier upgrade fails (or validation after an upgrade fails) for any reason, and this guide provides the information to perform the rollback of CNC NFs and CNC Console in a given order.

The following diagram details the rollback sequence:

Figure 3-11 Rollback Sequence with Non-Oracle CNE

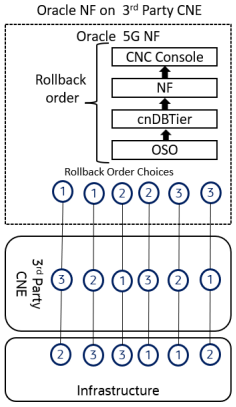


Table 3-9 CNC Network Functions Document Reference

CNC Network Functions	Document Reference
Oracle Communications Cloud Native Core, Binding Support Function (BSF)	*Oracle Communications Cloud Native Core, Binding Support Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Exposure Function (NEF)	*Oracle Communications Cloud Native Core, Network Exposure Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Repository Function (NRF)	*Oracle Communications Cloud Native Core, Network Repository Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Slice Selection Function (NSSF)	*Oracle Communications Cloud Native Core, Network Slice Selection Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Converged Policy (Policy)	*Oracle Communications Cloud Native Core, Converged Policy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Security Edge Protection Proxy (SEPP)	*Oracle Communications Cloud Native Core, Security Edge Protection Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Service Communication Proxy (SCP)	*Oracle Communications Cloud Native Core, Service Communication Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Unified Data Repository (UDR)	*Oracle Communications Cloud Native Core, Unified Data Repository Installation, Upgrade, and Fault Recovery Guide*

Table 3-10 CNC Companion Components Document Reference

CNC Companion Components	Document Reference
Oracle Communications Cloud Native Configuration Console (CNC Console)	*Oracle Communications Cloud Native Configuration Console Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, cnDBTier (cnDBTier)	*Oracle Communications Cloud Native Core, cnDBTier Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Certification Management (OCCM)	*Oracle Communications Cloud Native Core, Certification Management, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Operations Services Overlay (OSO)	*Oracle Communications Cloud Native Core, Operations Services Overlay Installation and Upgrade Guide*

3.3.6 Performing the Postrollback Tasks

Perform the following postrollback tasks:

- Verify the rollback of all the CNC NFs and Companion components by running the "`helm test`" to verify the deployment health and status.
- See CNC NFs and Companion components installation and upgrade guides for postrollback task details after rolling back respective components.

3.4 Upgrade of Oracle CNC Solution deployed on with OCI

This section provides an overview of how to perform an upgrade of Oracle CNC NFs and Companion components in Oracle Cloud Infrastructure (OCI) environment.

3.4.1 Planning Upgrade

This section explains the planning for upgrading CNC with OCI Environment (OKE).

3.4.1.1 Guidelines

Oracle recommends the following guidelines:

- Perform upgrade testing in sandbox or lab deployment before testing in production sites.
- Upgrade all components to their target release, as per the compatibility matrix provided in the CNC release notes.
- In a multisite deployment model, perform the upgrade of one site at a time. Follow the sequence mentioned in upgrade sequence to upgrade all the components in the specific site and then proceed to the next site.
  Refer to cnDBTier and NF-specific installation, upgrade, and fault recovery guide for post upgrade steps to verify the health of cnDBTier services and NF components.
- Perform an upgrade of CNC Console, NF, and cnDBTier in a single maintenance window. If upgrade takes longer than a single maintenance window, individual components can be upgraded in multiple maintenance windows. Ensure that the upgrade order is followed as per the sequence mentioned in upgrade sequence.
- If multiple NFs share a cnDBTier, upgrade all the instances of CNC Console and NFs sharing that cnDBTier of the specific site, before upgrading the cnDBTier of the site.
- Rollback is the reverse order of upgrade.

3.4.1.2 Preupgrade Checklist

Go through the following checklist before performing an upgrade.

3.4.1.2.1 Resource Requirement

This section details about the resources required to upgrade CNC NFs and Companion components deployed on OCI environment.

3.4.1.2.1.1 OCI

Ensure that the number of planned resources required for NF, CNC Console, and cnDBTier are available during the upgrade.

3.4.1.2.1.2 Network Functions

For CNC NFs and Companion components upgrade, reevaluate resource requirement before performing the upgrade. It is possible that CNC NFs and Companion components require additional resources due to changes in architecture or service model.

For more information on NF resource requirements, see NF-specific installation, upgrade, and fault recovery guides.

3.4.1.2.2 Prerequisites

Ensure that you have the following prerequisites before performing an upgrade:

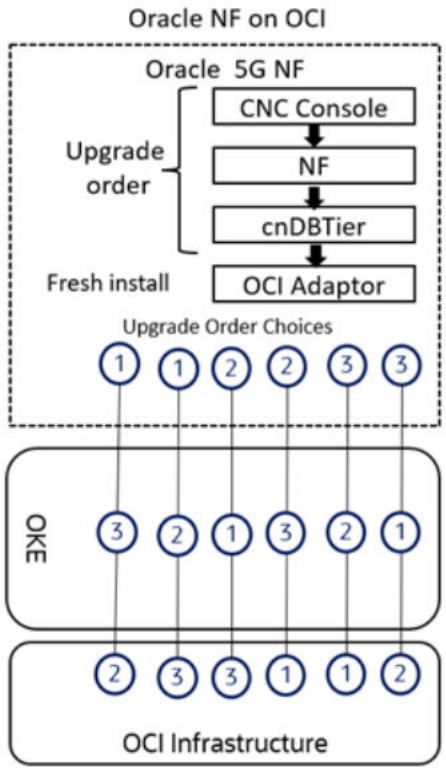
- Keep the backup of the following artifacts from your recent successful installation handy:
  - custom values.yaml file
  - Updated helm charts
  - Secrets
  - Certificates
  - Keys used
- See CNC Console, NF, and cnDBTier guides for preupgrade task details before upgrading respective components.

3.4.1.3 Upgrade Workflow

The following diagram details the upgrade sequence if you are using OCI.

> **Note**
>
> OCI Adaptor doesn't support upgrade. Since OCI Adaptor requires reinstall, metrics scraping is impacted during that period.

Figure 3-12 CNC NFs and Companion components Upgrade Order on OCI Environment

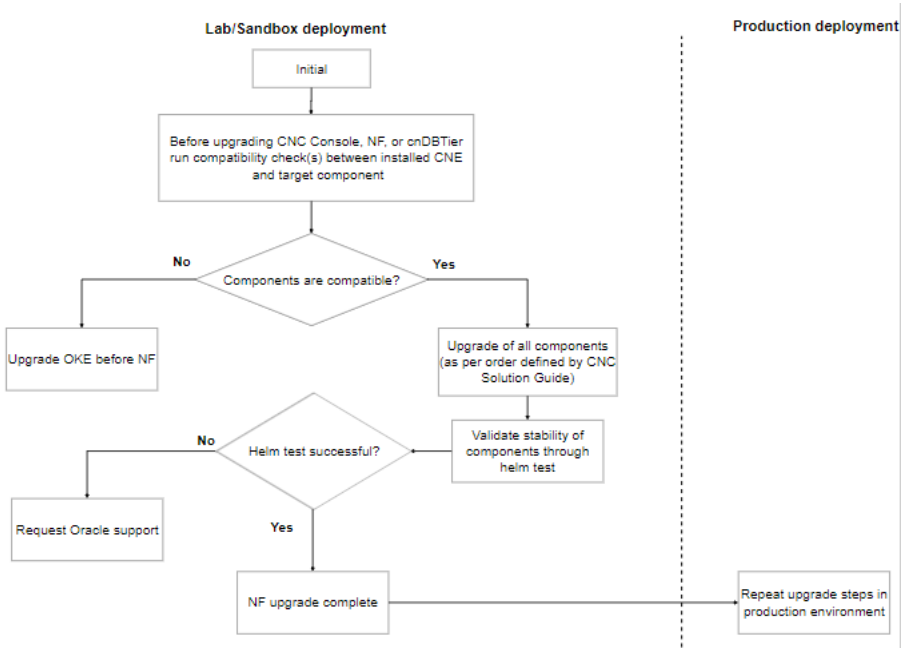


See CNC NFs and Companion components installation, upgrade, and fault recovery guides for details on upgrading the respective components.

3.4.1.3.1 CNC NFs and Companion components Upgrade

This section explains the upgrade workflow of CNC NFs and Companion Components deployed on OCI environment.

Figure 3-13 CNC NFs and Companion components Upgrade on OCI Environment



The following procedure explains the upgrade workflow for Oracle NFs:

1. Check the supported upgrade path for each NF. To know the upgrade path, see *Oracle Communications Cloud Native Core Release Notes*.

   > **Note**
   >
   > It is recommended to upgrade in the similar supported upgrade path of the Upgrade Workflow.

2. Check for the compatibility of the target NF component. See Compatibility check of target NF component with installed CNE section for the procedure.
3. If the NFs are not compatible, upgrade non-Oracle cloud native environment.
4. If all NFs are compatible, upgrade the components based on the upgrade sequence mentioned in Upgrade Workflow section.
5. Run the Helm test command to check the upgrade status. In case of any failure, contact My Oracle Support.
6. Once the Helm test is successful, then the upgrade is complete.
7. Perform the above upgrade steps in the production environment.

3.4.1.4 Compatibility Check of Target NF Component with Installed OCI

1. Run the following command to get the list of resource versions for the installed OCI:

   ```
   kubectl api-versions
   ```

   Sample output:

   ```
   admissionregistration.k8s.io/v1 apiextensions.k8s.io/v1
   apiregistration.k8s.io/v1 apps/v1
   authentication.k8s.io/v1 authorization.k8s.io/v1
   autoscaling/v1
   autoscaling/v2 autoscaling/v2beta2
   batch/v1 certificates.k8s.io/v1 coordination.k8s.io/v1
   discovery.k8s.io/v1 events.k8s.io/v1
   flowcontrol.apiserver.k8s.io/v1beta1
   flowcontrol.apiserver.k8s.io/v1beta2 metrics.k8s.io/v1beta1
   networking.k8s.io/v1 node.k8s.io/v1 policy/v1 rbac.authorization.k8s.io/v1
   scheduling.k8s.io/v1 storage.k8s.io/v1 storage.k8s.io/v1beta1 v1
   ```

2. Run the following command to get the list of target CNC Console, NF, and cnDBTier resources and their versions:

   ```
   helm upgrade <helm release> <chart tarball> -f <Custom File> -n <helm
   release> --dry-run | egrep -i "^apiVersion:|^kind:" |sed 's/\r$//' | awk
   '{ ORS = (NR%2 ? ", " : RS) } 1' | sort | uniq
   ```

   For example:

   ```
   helm upgrade ocudr  ocudr-23.4.0.tgz -f ocudr_custom_values_23.4.0.yaml -n
   ocudr --dry-run | egrep -i "^apiVersion:|^kind:" |sed 's/\r$//' | awk
   '{ ORS = (NR%2 ? ", " : RS) } 1' | sort | uniq
   ```

   Sample output:

   ```
   apiVersion: apps/v1 # for versions before 1.9.0 use apps/v1beta2 ,
   kind: Deployment apiVersion: apps/v1 # for versions before 1.9.0 use apps/
   v1beta2,
   kind: Deployment apiVersion: apps/v1,
   kind: Deployment apiVersion: apps/v1,
   kind: StatefulSet apiVersion: autoscaling/v2,
   kind: HorizontalPodAutoscaler apiVersion: batch/v1,
   kind: Job apiVersion: policy/v1,
   kind: PodDisruptionBudget
   apiVersion: rbac.authorization.k8s.io/v1,
   kind: Role apiVersion: rbac.authorization.k8s.io/v1,
   kind: RoleBinding apiVersion: v1,
   kind: ConfigMap apiVersion: v1,
   kind: Pod apiVersion: v1,
   kind: Service apiVersion: v1,
   kind: ServiceAccount
   kind: Service, apiVersion: v1
   ```

3. Verify that installed OCI has all resources and their versions required by CNC Console, NF, and cnDBTier.

3.4.2 Performing the NF Upgrade

See the following documents for detailed procedures to upgrade the respective components:

Table 3-11 CNC Network Functions Document Reference

CNC Network Functions	Document Reference
Oracle Communications Cloud Native Core, Binding Support Function (BSF)	*Oracle Communications Cloud Native Core, Binding Support Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Exposure Function (NEF)	*Oracle Communications Cloud Native Core, Network Exposure Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Repository Function (NRF)	*Oracle Communications Cloud Native Core, Network Repository Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Slice Selection Function (NSSF)	*Oracle Communications Cloud Native Core, Network Slice Selection Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Converged Policy (Policy)	*Oracle Communications Cloud Native Core, Converged Policy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Security Edge Protection Proxy (SEPP)	*Oracle Communications Cloud Native Core, Security Edge Protection Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Service Communication Proxy (SCP)	*Oracle Communications Cloud Native Core, Service Communication Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Unified Data Repository (UDR)	*Oracle Communications Cloud Native Core, Unified Data Repository Installation, Upgrade, and Fault Recovery Guide*

Table 3-12 CNC Companion Components Document Reference

CNC Companion Components	Document Reference
Oracle Communications Cloud Native Configuration Console (CNC Console)	*Oracle Communications Cloud Native Configuration Console Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, cnDBTier (cnDBTier)	*Oracle Communications Cloud Native Core, cnDBTier Installation, Upgrade, and Fault Recovery Guide*

Table 3-13 OCI Components Document Reference

OCI Components	Document Reference
OCI Adaptor	• *Oracle Communications Cloud Native Core, OCI Adaptor User Guide* • *Oracle Communications Cloud Native Core, OCI Deployment Guide*

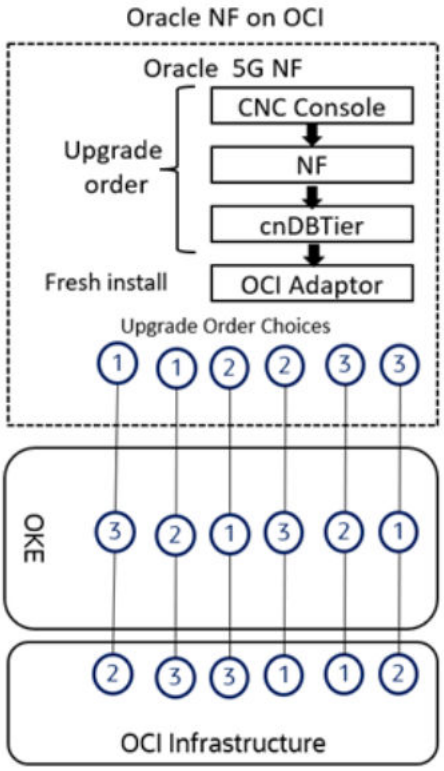
> **Note**
>
> OCI Adaptor doesn't support upgrade.

3.4.2.1 Upgrade Workflow

The following diagram details the upgrade sequence if you are using OCI.

> **Note**
>
> OCI Adaptor doesn't support upgrade. Since OCI Adaptor requires reinstall, metrics scraping is impacted during that period.

Figure 3-14 CNC NFs and Companion components Upgrade Order on OCI Environment



See CNC NFs and Companion components installation, upgrade, and fault recovery guides for details on upgrading the respective components.

3.4.2.2 Compatibility Check of CNC NF Component on Target OCI Environment

Perform the following compatibility checks:

1. Run the following commands to get the list of deployed resources and their versions from a given CNC NFs and Companion components release:

```
helm get manifest ocudr -n ocudr | egrep -i "^apiVersion:|^kind:" |sed
's/\r$//' | awk '{ORS = (NR%2 ? ", " : RS) } 1' | so  rt | uniq
```

Sample output:

```
apiVersion: apps/v1    # for versions before 1.9.0 use apps/v1beta2 ,
kind: Deployment
apiVersion: apps/v1    # for versions before 1.9.0 use apps/v1beta2, kind:
Deployment
apiVersion: apps/v1, kind: Deployment
apiVersion: apps/v1, kind: StatefulSet
apiVersion: autoscaling/v2, kind: HorizontalPodAutoscaler
apiVersion: policy/v1, kind: PodDisruptionBudget
apiVersion: rbac.authorization.k8s.io/v1, kind: Role
apiVersion: rbac.authorization.k8s.io/v1, kind: RoleBinding
apiVersion: v1, kind: ConfigMap
apiVersion: v1, kind: Service
apiVersion: v1, kind: ServiceAccount
```

2. Run the following command to get the list of resource versions for the target cloud native environment release:

> **Note**
>
> - See OKE release documentation for supported resources and versions.
> - Alternate approach: From any installed target cloud native environment release, run the following command to get a list of all supported api-versions:
>
>   ```
>   kubectl api-versions
>   ```

Sample output:

```
admissionregistration.k8s.io/v1 apiextensions.k8s.io/v1
apiregistration.k8s.io/v1 apps/v1
authentication.k8s.io/v1 authorization.k8s.io/v1
autoscaling/v1
autoscaling/v2 autoscaling/v2beta2
batch/v1 certificates.k8s.io/v1 coordination.k8s.io/v1
discovery.k8s.io/v1 events.k8s.io/v1
flowcontrol.apiserver.k8s.io/v1beta1
flowcontrol.apiserver.k8s.io/v1beta2 metrics.k8s.io/v1beta1
networking.k8s.io/v1 node.k8s.io/v1 policy/v1 rbac.authorization.k8s.io/v1
scheduling.k8s.io/v1 storage.k8s.io/v1 storage.k8s.io/v1beta1 v1
```

3. Manually ensure that all installed CNC NFs and Companion components resources and their versions are available in the target OCI environment.

3.4.3 Performing the Postupgrade Tasks

This section explains the postupgrade tasks.

3.4.3.1 NF Postupgrade

Perform the following NF postupgrade tasks:

- Verify postupgrade of all the components by running the "`helm test`" provided by CNC Console, NFs, and cnDBTier to verify the deployment health and status.
- See CNC Console, NFs, and cnDBTier installation, upgrade, and fault recovery guides for postupgrade task details after upgrading respective components.

3.4.3.2 OCI Environment Postupgrade

Perform the following postupgrade tasks:

- Re-validate the stability of all the components by running "`helm test`" provided by CNC Console, NF, and cnDBTier to verify the deployment health and status.
- For procedures to perform any restart required by CNC Console, NF, or cnDBTier, see the NF-specific installation, upgrade, and fault recovery guides.

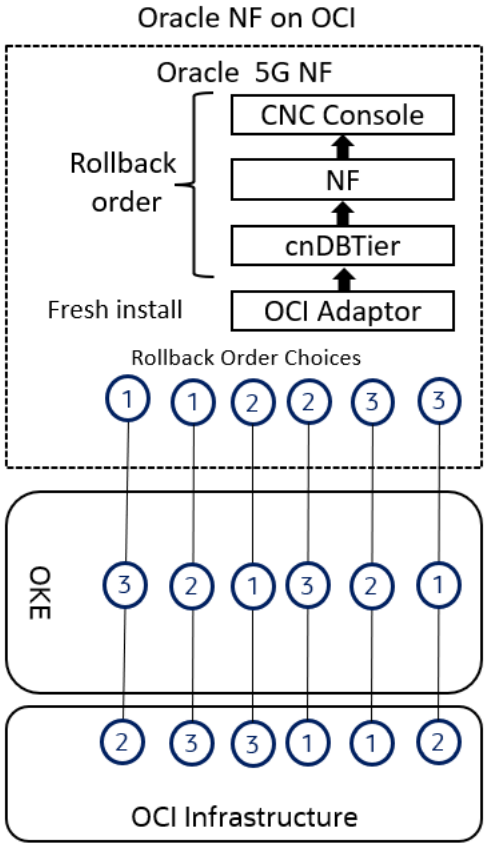
3.4.4 Performing the Rollback

Once a rollback is triggered for a component, this section of the guide helps you to decide the order of the rollback for other components that were upgraded successfully. For example, a rollback is triggered if the cnDBTier upgrade fails (or validation after an upgrade fails) for any reason, and this guide provides the information to perform the rollback of CNC NFs and Companion components in a given order.

> **Note**
>
> OCI Adaptor doesn't support rollback.

The following diagram details the rollback sequence:

Figure 3-15 Performing the Rollback



> **Note**
>
> OCI Adaptor rollback is not supported. The user must use OCI Resource Manager to remove the OCI Adapters stack.

Table 3-14 CNC Network Functions Document Reference

CNC Network Functions	Document Reference
Oracle Communications Cloud Native Core, Binding Support Function (BSF)	*Oracle Communications Cloud Native Core, Binding Support Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Exposure Function (NEF)	*Oracle Communications Cloud Native Core, Network Exposure Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Repository Function (NRF)	*Oracle Communications Cloud Native Core, Network Repository Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Network Slice Selection Function (NSSF)	*Oracle Communications Cloud Native Core, Network Slice Selection Function Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Converged Policy (Policy)	*Oracle Communications Cloud Native Core, Converged Policy Installation, Upgrade, and Fault Recovery Guide*

Table 3-14 (Cont.) CNC Network Functions Document Reference

CNC Network Functions	Document Reference
Oracle Communications Cloud Native Core, Security Edge Protection Proxy (SEPP)	*Oracle Communications Cloud Native Core, Security Edge Protection Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Service Communication Proxy (SCP)	*Oracle Communications Cloud Native Core, Service Communication Proxy Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, Unified Data Repository (UDR)	*Oracle Communications Cloud Native Core, Unified Data Repository Installation, Upgrade, and Fault Recovery Guide*

Table 3-15 CNC Companion Components Document Reference

CNC Companion Components	Document Reference
Oracle Communications Cloud Native Configuration Console (CNC Console)	*Oracle Communications Cloud Native Configuration Console Installation, Upgrade, and Fault Recovery Guide*
Oracle Communications Cloud Native Core, cnDBTier (cnDBTier)	*Oracle Communications Cloud Native Core, cnDBTier Installation, Upgrade, and Fault Recovery Guide*

Table 3-16 OCI Components Document Reference

OCI Components	Document Reference
OCI Adaptor	• *Oracle Communications Cloud Native Core, OCI Adaptor User Guide* • *Oracle Communications Cloud Native Core, OCI Deployment Guide*

3.4.5 Performing the Postrollback Tasks

Perform the following postrollback tasks:

- Verify the rollback of all the CNC NFs and Companion components by running the "`helm test`" to verify the deployment health and status.
- See CNC NFs and Companion components installation, upgrade, and fault recovery guides for postrollback task details after rolling back respective components.

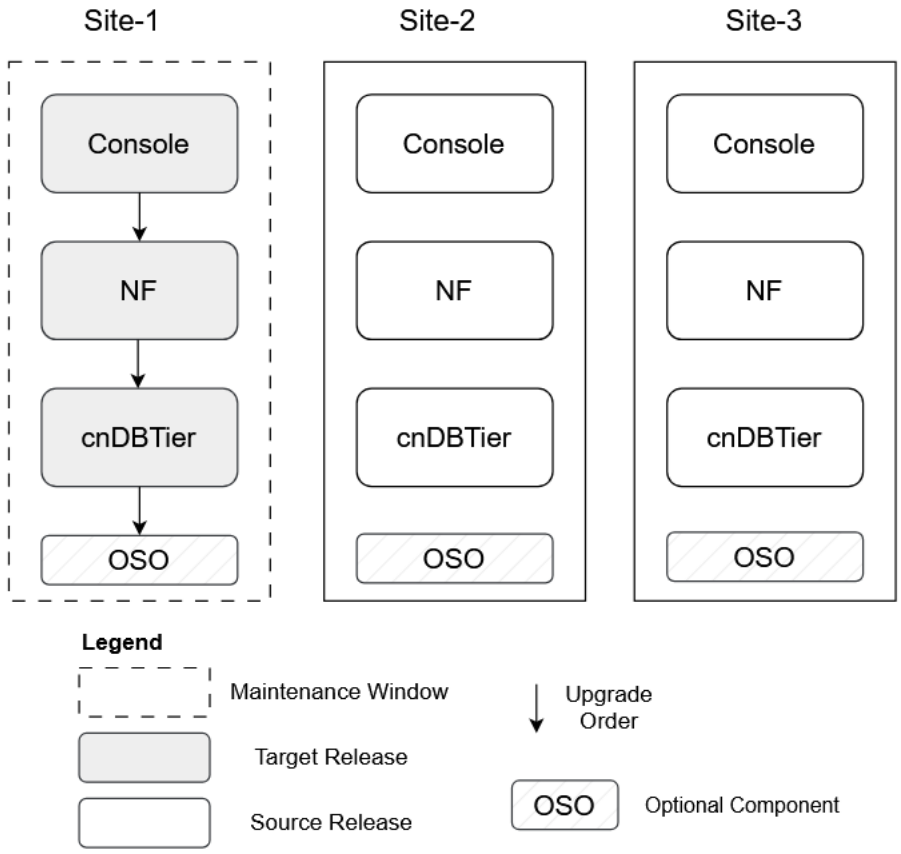
3.5 Upgrade and Rollback Guidelines for Multisite Georeplication Setup

This chapter presents various scenarios related to the upgrade and rollback of Network Functions (NFs). It also outlines robust recovery strategies designed to address errors or failures encountered during the upgrade process, providing guidance on how to efficiently restore services and minimize downtime. In the following scenarios, three-site georeplication setup is considered as an example.

3.5.1 Scenario 1: Site-1 Upgrade

This scenario provides the upgrade guidelines for Site-1.

Figure 3-16 Scenario 1: Site-1 Upgrade

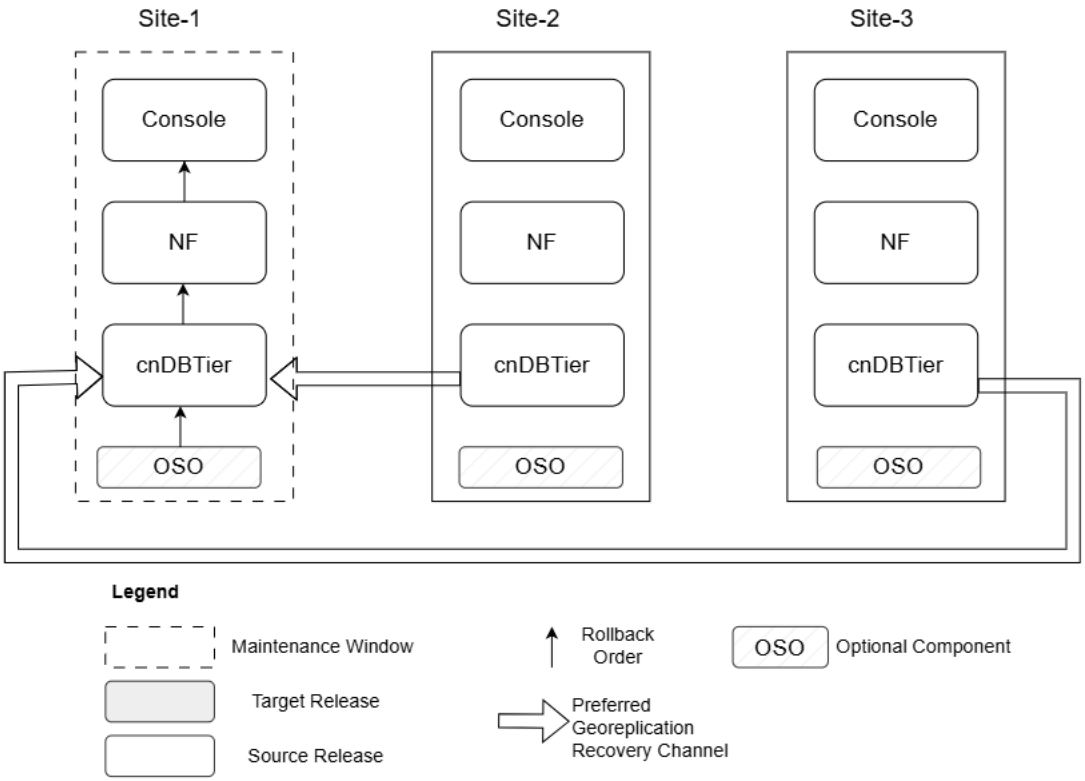


- The upgrade of Site-1 is a pivotal step in any multisite georeplication deployment. The recommended sequence for the upgrade process is to first upgrade the Console, followed by the Network Function (NF), and finally the cnDBTier, as outlined in preceding chapters. For detailed upgrade procedures, see the respective installation, upgrade, and fault recovery guides.
- This upgrade sequence is designed to ensure consistent data processing while minimizing service disruption. Since cnDBTier manages both configuration and subscriber data, which is replicated across all instances, it is essential to upgrade cnDBTier last to maintain data integrity throughout the process. The Site-1 upgrade is conducted as an in-service operation, allowing services to continue running with minimal impact.
- Once the upgrade is complete, system functionality is monitored and any potential service issues are addressed.

3.5.2 Scenario 2: Site-1 Rollback

This scenario provides the rollback guidelines for Site-1.

Figure 3-17 Scenario 2: Site-1 Rollback

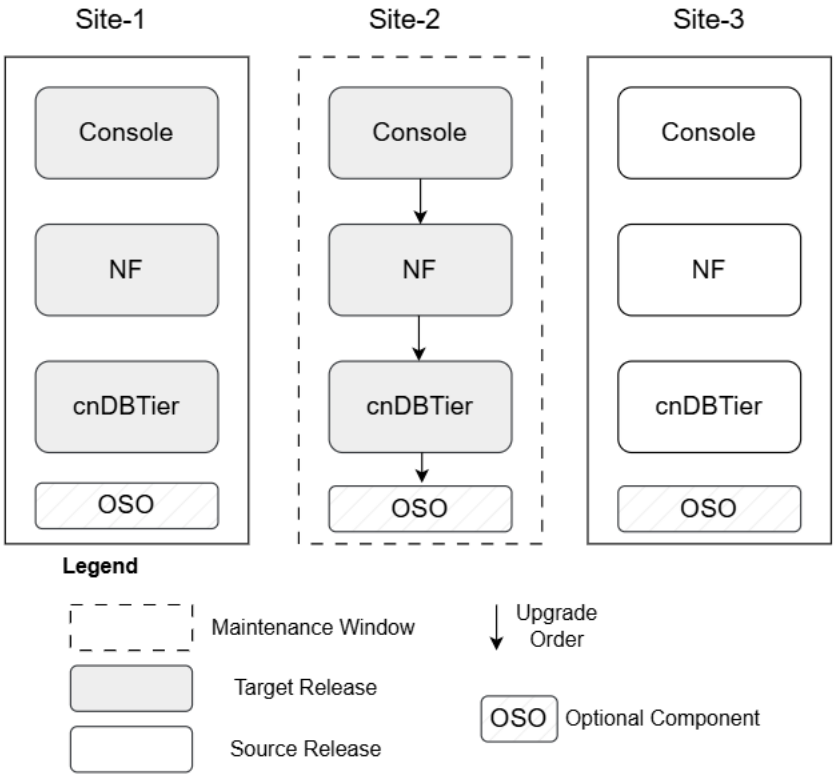


- A rollback at Site-1 serves as a critical recovery measure when the newly deployed release introduces issues that cannot be resolved within the allotted maintenance window. After a Site-1 upgrade, system operations are monitored closely for signs of functional irregularities, performance impact, or any adverse impact on services. In case of any significant issue, particularly one that cannot be addressed through minor configuration adjustments, a rollback procedure is initiated to restore stability.
- Prior to initiating a rollback, troubleshooting is performed with a focus on resolving manageable issues, such as configuration mismatches or custom values file errors, within the current maintenance window. If these efforts are unsuccessful, a rollback action is performed.
- The rollback process follows a defined sequence: first, revert cnDBTier, then the Network Function (NF), and finally the Console. This order is designed to safeguard data integrity and system consistency throughout the operation. Typically, a subsequent upgrade attempt is planned for the next available maintenance window once the underlying issues have been corrected or necessary patches have been made available. For detailed rollback procedures, see the respective installation, upgrade, and fault recovery guides.
- If required, Georeplication Recovery (GRR) for Site-1 can be performed either from Site-2 or Site-3 to facilitate a consistent state across all sites. For more information on the GRR procedure, see *Oracle Communications Cloud Native Core, cnDBTier Installation, Upgrade, and Fault Recovery Guide*.

3.5.3 Scenario 3: Site-2 Upgrade

This scenario provides the upgrade guidelines for Site-2.

Figure 3-18 Scenario 3: Site-2 Upgrade

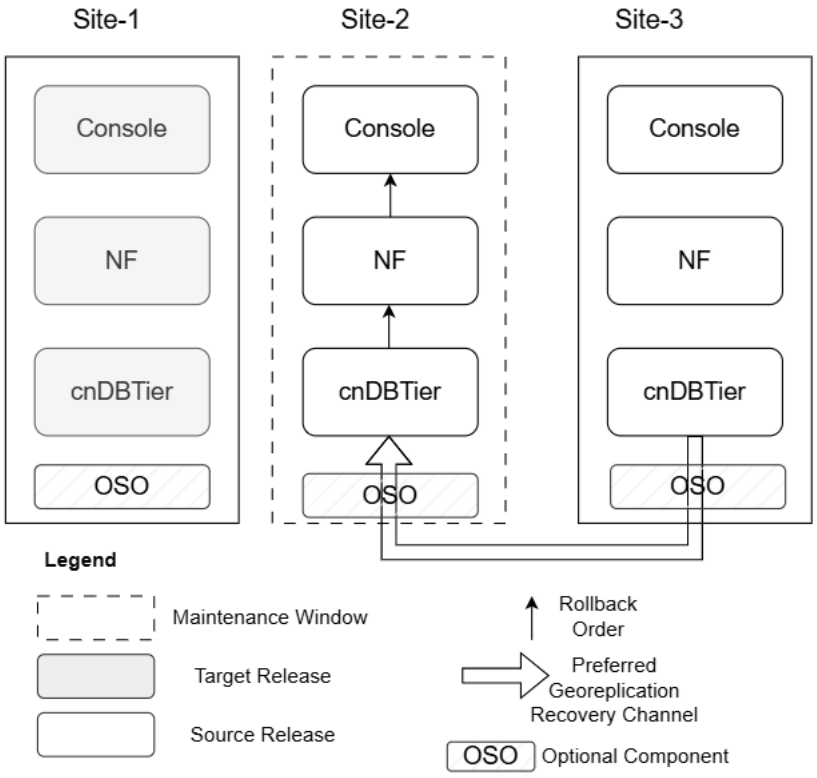


- Once the Site-1 upgrade is successful, the upgrade proceeds to Site-2.
- The recommended sequence for the upgrade process is to first upgrade the Console, followed by the Network Function (NF), and finally the cnDBTier, as outlined in preceding chapters. For detailed procedures, see the installation, upgrade, and fault recovery guides specific to cnDBTier and the NF. This upgrade sequence is designed to ensure consistent data processing while minimizing service disruption. Since cnDBTier manages both configuration and subscriber data, which is replicated across all instances, it is essential to upgrade cnDBTier last to maintain data integrity throughout the process.
- The Site-2 upgrade is conducted as an in-service operation, allowing services to continue running with minimal impact. Once the upgrade is complete, system functionality is monitored and any potential service issues are addressed.

3.5.4 Scenario 4: Site 2 Rollback

This scenario provides the rollback guidelines for Site-2.

Figure 3-19 Scenario 4: Site 2 Rollback

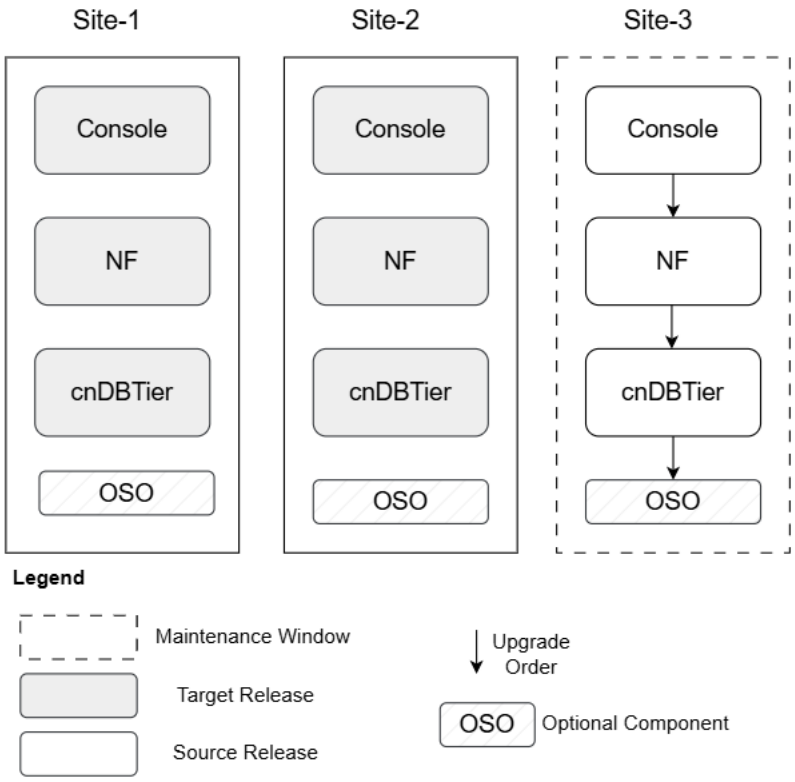


- n case Site-2 upgrade fails, rollback to the source release is recommended.
- Prior to initiating a rollback, troubleshooting is performed with a focus on resolving manageable issues, such as configuration mismatches or custom values file errors, within the current maintenance window. If these efforts are unsuccessful, a rollback action is performed.
- The rollback process follows a defined sequence: first, revert cnDBTier, then the Network Function (NF), and finally the Console. This order is designed to safeguard data integrity and system consistency throughout the operation. Typically, a subsequent upgrade attempt is planned for the next available maintenance window once the underlying issues have been corrected or necessary patches have been made available. For detailed rollback procedures, see the respective installation, upgrade, and fault recovery guides.
- If required, Georeplication Recovery (GRR) for Site-2 is preferred from Site-3 to facilitate a consistent state across all sites. For more information on the GRR procedure, see *Oracle Communications Cloud Native Core, cnDBTier Installation, Upgrade, and Fault Recovery Guide*.

3.5.5 Scenario 5: Site-3 Upgrade

This scenario provides the upgrade guidelines for Site-3.

Figure 3-20 Scenario 5: Site-3 Upgrade

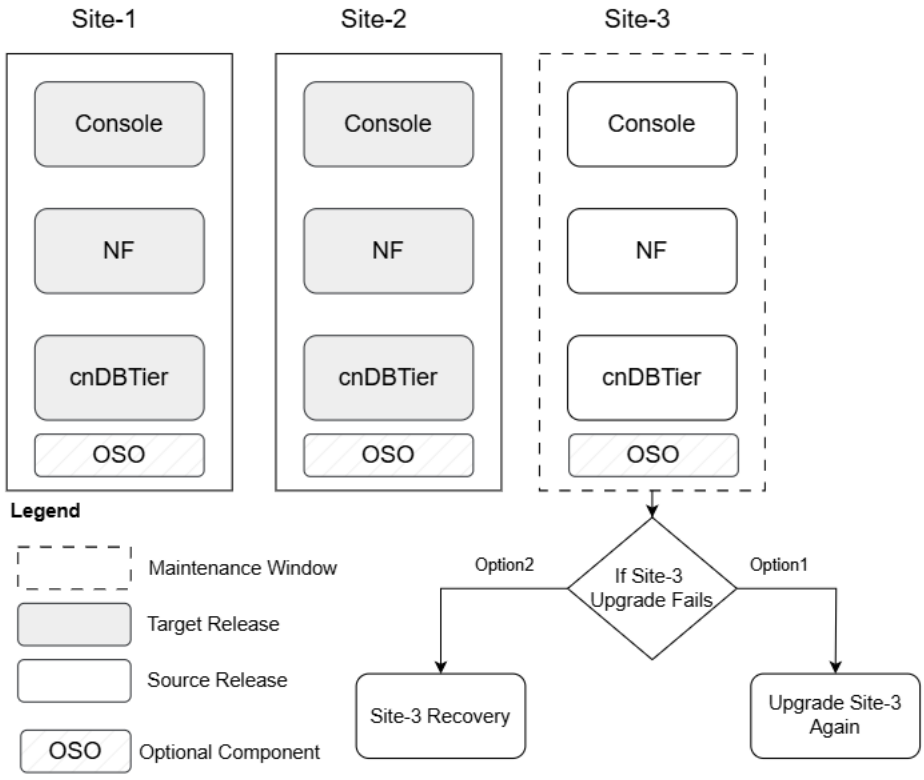


- Site-3 typically undergoes an upgrade only after Site-1 and Site-2 have been successfully upgraded. This staged approach reduces risk, ensuring stability before completing the upgrade cycle. For detailed upgrade procedures, see the respective installation, upgrade, and fault recovery guides.
- Once Site-3 is upgraded, maintenance for the entire set concludes. Although rollbacks are rare at this stage since most issues are caught earlier, if problems like configuration file errors appear, they are corrected and the upgrade is retried. Any persistent problems are addressed through follow-up patch releases.

3.5.6 Scenario 6: Site-3 Rollback

This scenario provides the rollback guidelines for Site-3.

Figure 3-21 Scenario 6: Site-3 Rollback



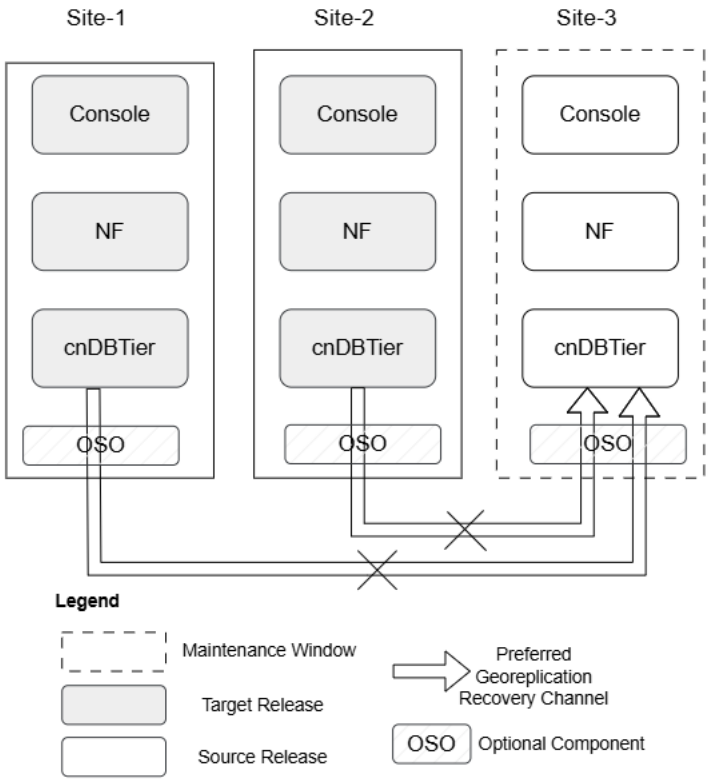
In case upgrade of Site-3 fails, following are the options:

- Troubleshooting is performed with a focus on resolving manageable issues, such as configuration mismatches or custom values file errors, within the current maintenance window.
- **Option1**: Attempt Site-3 upgrade again: In this case, the upgrade Site-3 as mentioned in the Scenario 5: Site-3 Upgrade.
- In case re-upgrade fails then rollback of Site-3 can be performed.
- **Option2**: Rollback all the sites to the source release: In this case, rollback all the sites as mentioned in the Scenario 8: All Sites Rollback.

3.5.7 Scenario 7: Site-3 Recovery when replication breaks

This scenario provides the recovery guidelines when replication channel of Site-3 breaks, after Site-3 upgrade or rollback failure.

Figure 3-22 Scenario 7: Site 3 Rollback when replication break



- In case of Site-3 could not be made operational after Site-3 upgrade or rollback then Site-3 recovery procedure should be followed to restore a healthy environment.
- GRR is only supported between sites running the same software version. Attempting to use GRR to connect a newer release with an older one is not supported and could lead to data inconsistency or system instability.
- Install the target release on Site-3 to match with the version of the other sites.
- Install sequence is as follows:
  - First install the cnDBTier, and establish the replication channels with other sites of the set.
  - Next install the Network Function (NF), and finally the Console.
  - For detailed installation procedures, see the respective installation, upgrade, and fault recovery guides.
  - Existing configuration method of configuring a new site is applied on the newly built set.
  - After full site recovery, traffic is introduced on this site.

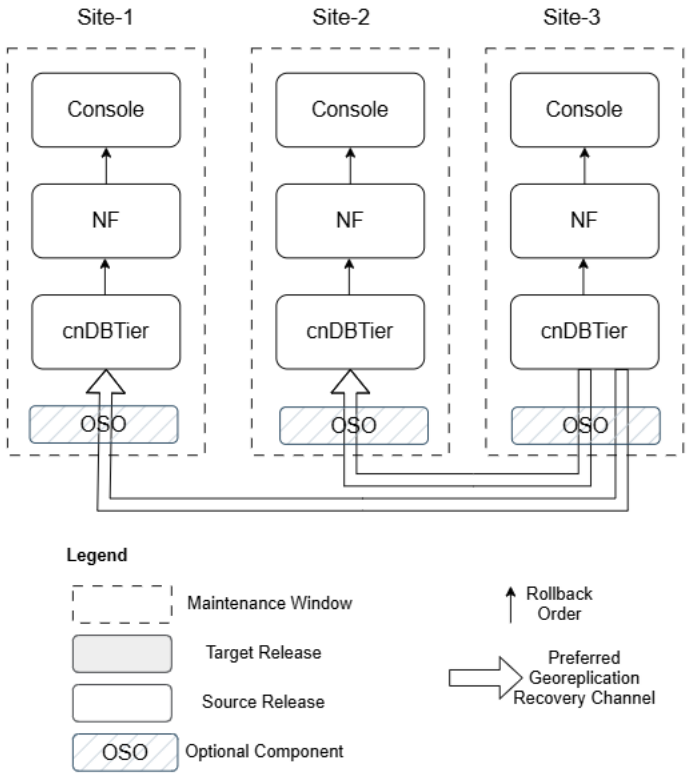
For detailed rollback procedures, see the respective installation, upgrade, and fault recovery guides.

For more information on the GRR procedure, see *Oracle Communications Cloud Native Core, cnDBTier Installation, Upgrade, and Fault Recovery Guide*.

3.5.8 Scenario 8: All Sites Rollback

This scenario addresses the rare situation in which a decision is made to revert (rollback) changes across all three sites.

Figure 3-23 Scenario 8: All Sites Rollback



- Perform Site-3 rollback as mentioned in Scenario-6.
- Once Site-3 rollback is complete, perform Site-2 rollback.
  - Georeplication Recovery (GRR) for Site-2 is performed from Site-3 to facilitate a consistent state across all sites.
- Once Site-2 rollback is complete, perform Site-1 rollback.
  - Georeplication Recovery (GRR) for Site-1 is performed from Site-3 to facilitate a consistent state across all sites.

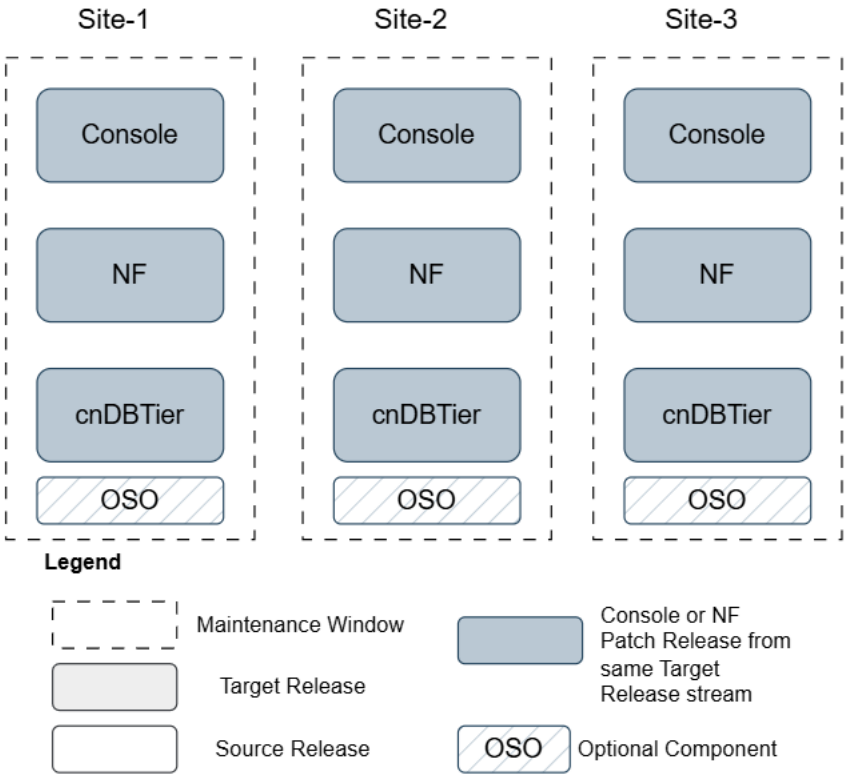
For detailed rollback procedures, see the respective installation, upgrade, and fault recovery guides.

For more information on the GRR procedure, see *Oracle Communications Cloud Native Core, cnDBTier Installation, Upgrade, and Fault Recovery Guide*.

3.5.9 Scenario 9: Patch Upgrade

This scenario provides the patch release upgrade guidelines for Site-3.

Figure 3-24 Scenario 9: Patch Upgrade



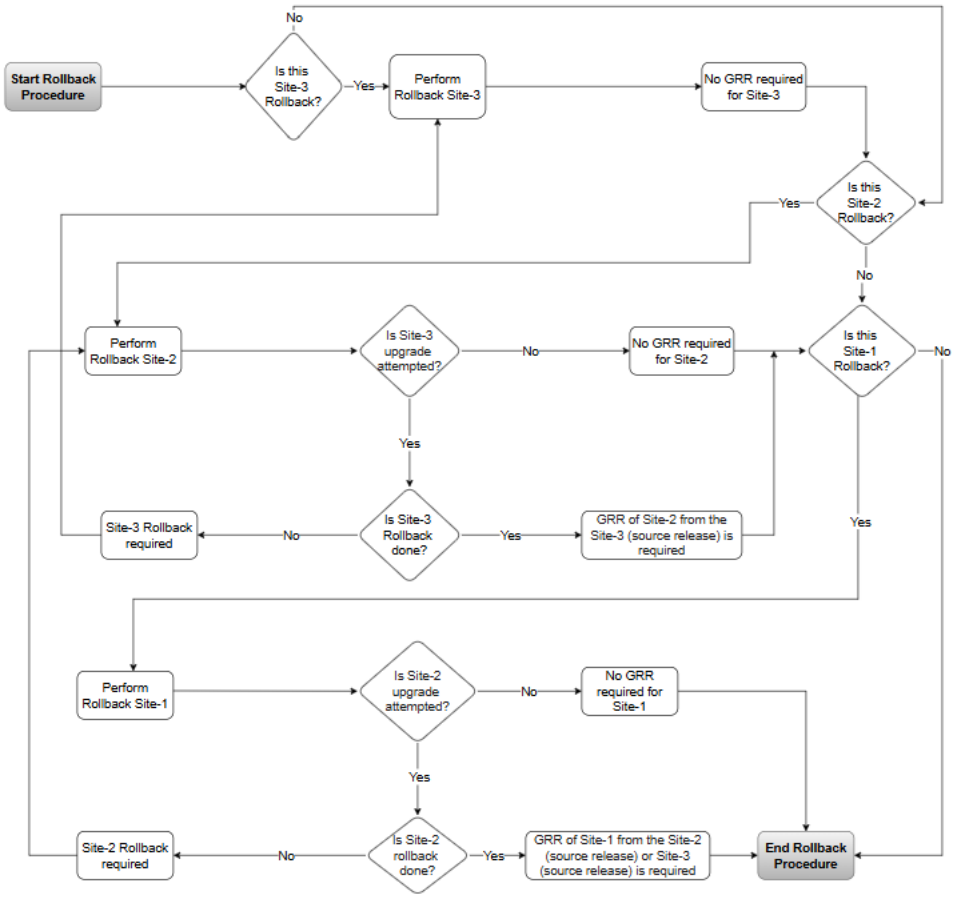
- A patch release upgrade updates software within the same release stream, delivering incremental improvements such as bug fixes, security vulnerability patches, and enhancements to system stability or performance. For example, upgrading a component from version 25.1.100 to 25.1.101 is considered a patch release upgrade.
- Patch upgrades are performed on individual components one by one using a similar methodology as full upgrade. This incremental approach helps to catch issues early, allowing for easy rollback or corrective action before broader deployment. Patch upgrades minimize operational disruption and, if needed, follow the same troubleshooting and rollback logic as main releases. For detailed upgrade procedures, see the respective installation, upgrade, and fault recovery guides.

> **Note**
>
> All patch components (Console, NF, cnDBTier) must align to the same patch release stream (for example, all on 24.3.x, 24.2.x, 25.1.1xx, 25.1.2xx). Mixed patch versions across these components are not supported.

3.5.10 Georeplication Recovery (GRR) procedures to follow after Rollback

The following images describes the rollback guidance based on site that you are rolling back, as explained in the below flow chart:

Figure 3-25 Georeplication Recovery (GRR) procedures to follow after Rollback



Terminologies:

- Source Release: Previously deployed software on the georedundant site set. (Upgrade Source Release -> Target Release and hence rollback Target Release -> Source Release)
- Target Release: New release upgrade done on the georedundant site set. (Upgrade Source Release -> Target Release and hence rollback Target Release -> Source Release)
- Site-1: Represents the site on which upgrade is done first.

> **Note**
>
> Run `helm ls <DbTier release name> -n <namespace>` to determine cnDBTier upgrade order in the sites. For instance, site that is upgraded first is considered as site1, and so on.

- Site-2: Represents the site on which upgrade is done after the Site-1.
- Site-3: Represents the site which got upgraded last.
- Hence the order of upgrade is Site-1 then Site-2 and finally Site-3.

Note

If rollback of multiple sites are required in extreme conditions then it should follow the reverse order of upgrade, that is, Site-3 should be rolled back first, followed by Site-2 and then Site-1 rollback.

4
Fault Recovery

4.1 Overview

This section describes fault recovery for a CNC solution deployment to support rapid service restoration and minimal data loss across sites. It provides procedures for two scenarios:

1. Scenario 1: Rebuild Existing Functional Site
2. Scenario 2: Recovery of Lost site or a cluster

> **Note**
>
> Relocation or migration of site due to infrastructure or geographical changes follow the procedure documented in the Rebuild fault recovery.

4.1.1 Prerequisite for Site Recovery

Before starting site recovery, confirm and document the endpoint identity strategy used between mated sites, either FQDN-based or IP-based. This determines whether post-recovery updates are required for `custom_values` and replication configuration.

1. **Configuration based on FQDN**: If the deployment uses FQDNs for all intersite references, no updates are required to:
   a. `custom_values`
   b. Replication configuration or data for the mated site

   > **Note**
   >
   > FQDNs remain consistent even if underlying IPs change, assuming DNS is correctly restored/updated.

2. **Configuration based on IP address** (same IPs retained post-recovery):
   If the recovered site can retain the original IP addresses used prior to the incident:
   a. After recovery, update `custom_values` with the preserved IP information (to ensure restored configurations reflect the retained addressing).
   b. After recovery, update replication details of the mated site with the preserved IP information (so replication endpoints remain aligned with the configuration before disaster).

> **Note**
>
> Any IP-based peer or replication references must be repointed to the new addressing to restore intersite connectivity and replication.

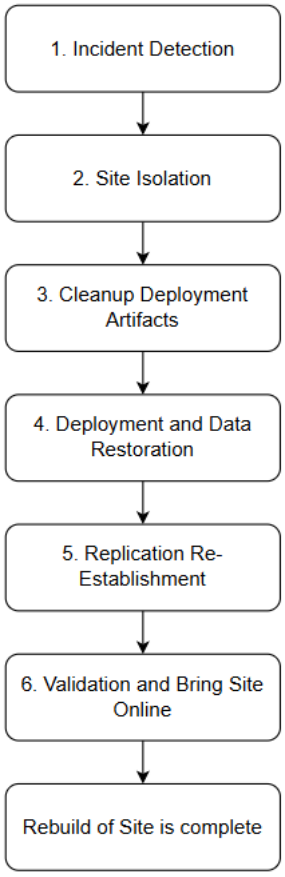
4.2 Scenario 1: Rebuild Existing Functional Site

This section explains the steps when one or more sites remain healthy, but a functional site must be rebuilt (for example, persistent faults, corruption concerns, repeated crashes), while the overall service continues on remaining sites.

4.2.1 Planning Fault Recovery

The following flow diagram gives a high-level overview of the sequence to be followed for fault recovery of CNC solution.

Figure 4-1 Planning Fault Recovery



4.2.2 Fault Recovery Workflow

The section provides details about the procedure to follow while rebuilding a site or cluster.

4.2.2.1 Incident Detection

Follow the below steps to monitor and detect the fault in the site:

- 1. Continuously monitor the health of the infrastructure, applications, and databases for events such as hardware or network failures, service crashes, and data corruption.
  2. Monitor the alerts that indicates the breach of thresholds. For more information about the alerts, see NF specific User Guide. For more information on how to monitor the NF, see NF specific Installation, Upgrade, and Fault Recovery Guide.
  3. Ensure that there is backup is taken periodically. Take data backup of deployment artifacts including secrets, certificates, schemas, if the site is available and allowed to perform. The database backup can be taken from a healthy georedundant mated site or from a latest scheduled automatic backup. For more information on how to take data backup, see NF specific Installation, Upgrade, and Fault Recovery Guide.
  4. In case of any failure, isolate the site as mention in Site isolation step.

4.2.2.2 Site Isolation

Follow the procedure below to isolate the site and verify that replication and service communication are completely stopped:

1. Check if the site isolation is feasible or not.
2. Site isolation is feasible if either of the following can be performed:
   - – Site is able to trigger a shutdown to stop signaling traffic.
   - – Site has the capability to run the procedure required to disable cnDBTier replication from its peer (mate) sites. For more information on how to stop replication, see *Oracle Communications Cloud Native Core, cnDBTier User Guide*.
   - – If site isolation is feasible, perform if either or both isolation method:
     a. Shutdown the site, or stop or redirect the traffic from affected NF as mentioned in the NF specific User Guide.
     b. Disable the cnDBTier replication from its peer (mate) sites. For more information on how to stop replication, see *Oracle Communications Cloud Native Core, cnDBTier User Guide*.
   - – Once the site is isolated:
     a. Verify that no replication or service-level communication is occurring between the isolated site and healthy peer sites.
     b. Use monitoring tools and logs to confirm the site is fully disconnected and that data integrity is maintained on the remaining sites.
3. Site isolation is not feasible if:

- – * Site cannot be shutdown and replication cannot be disabled.
  * If the site isolation is not feasible, cleanup the deployment artifacts as mentioned in the below procedure.

4.2.2.3 Cleanup Deployment artifacts

Follow the procedure below to cleanup the resources:

1. Delete Kubernetes resources (namespace, pods, PVCs, etc.) hosting the failed NFs and associated services on the affected site.
   For more information about deleting the resources, see NF specific Installation, Upgrade, and Fault Recovery Guide.
2. Ensure that all pods (workloads), persistent volume claims (PVCs), and related artifacts are purged to prepare for clean restoration.

4.2.2.4 Deployment and Data Restoration

Follow the procedure below to redeploy the site and restore cnDBTier data from the most recent validated backup:

1. Check if site is FQDN or IP based, follow the instructions mentioned in the Prerequisite for Site Recovery section depending on the configuration.
2. Follow NF specific fault recovery procedures. For the procedure, see NF specific Installation, Upgrade, and Fault Recovery Guide.

4.2.2.5 Replication Re-Establishment

Follow the procedure below to re-establish site-to-site replication, perform georeplication recovery to resynchronize data, and verify that replication stabilizes across all sites:

1. Re-enable site-to-site replication once the recovered site is confirmed healthy, and reconfigure replication parameters as required. For more information about how to enable replication, see *Oracle Communications Cloud Native Core, cnDBTier User Guide*.
2. Perform georeplication recovery using cnDBTier procedures to resynchronize datasets and restore a consistent, unified state across all operational sites. For detailed georeplication recovery steps and prerequisites, see *Oracle Communications Cloud Native Core, cnDBTier User Guide*.
3. Monitor replication health continuously after replication is re-established. For detailed steps to check the replication, see *Oracle Communications Cloud Native Core, cnDBTier User Guide*.
4. Confirm all sites successfully connected in the cluster and that replication reaches a stable and consistent state.

4.2.2.6 Validation and Bring Site Online

Follow the procedure below to validate the site:

1. Ensure all Kubernetes pods for NFs and components (CNCC, OSO) have Running/Ready status, no CrashLoopBackOff conditions, and all services are reachable. For more information on how to verify the state, see NF specific Installation, Upgrade, and Fault Recovery Guide.
2. Run basic call flow or policy lookup tests, and read or write to the database, if test traffic is available.
3. If checks are successful, transition site back to NORMAL mode and resume traffic. For more information on how to change the state, see NF specific User Guide.
4. Closely monitor alarms and logs as the site resumes full participation in the cluster.

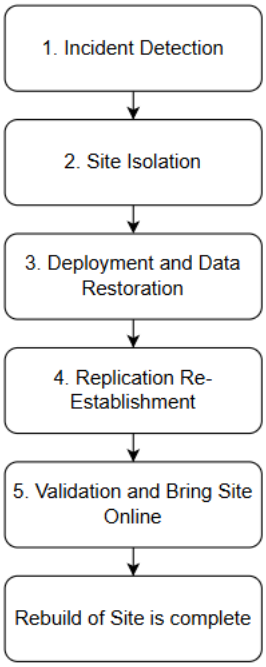
4.3 Scenario 2: Recovery of Lost site or a cluster

This section explains the steps when a site or a cluster is failed and require complete restore, while the overall service continues on remaining sites.

4.3.1 Planning Fault Recovery

The following flow diagram gives a high-level overview of the sequence to be followed for fault recovery of CNC solution.

Figure 4-2 Planning Fault Recovery



4.3.2 Fault Recovery Workflow

The section provides details about the procedure to follow while a site or cluster is lost.

4.3.2.1 Incident Detection

Follow the below steps to monitor and detect the fault in the site:

- 1. Continuously monitor the health of the infrastructure, applications, and databases for events such as hardware or network failures, service crashes, and data corruption.
  2. Monitor the alerts that indicates the breach of thresholds. For more information about the alerts, see NF specific User Guide. For more information on how to monitor the NF, see NF specific Installation, Upgrade, and Fault Recovery Guide.
  3. Ensure that there is backup is taken periodically. Take data backup of deployment artifacts including secrets, certificates, schemas, if the site is available and allowed to perform. The database backup can be taken from a healthy georedundant mated site

or from a latest scheduled automatic backup. For more information on how to take data backup, see NF specific Installation, Upgrade, and Fault Recovery Guide.

4. In case of any failure, isolate the site as mention in Site isolation step.

4.3.2.2 Site Isolation

Follow the procedure below to isolate the site and verify that replication and service communication are completely stopped:

1. In the peer or mated sites, disable the replication details of lost site. For more information on how to stop replication, see *Oracle Communications Cloud Native Core, cnDBTier User Guide*.
2. Confirm the replication is disabled. For more information on how to stop replication, see *Oracle Communications Cloud Native Core, cnDBTier User Guide*.

4.3.2.3 Deployment and Data Restoration

Follow the procedure below to redeploy the site and restore cnDBTier data from the most recent validated backup:

1. Check if site is FQDN or IP based, follow the instructions mentioned in the Prerequisite for Site Recovery section depending on the configuration.
2. Follow NF specific fault recovery procedures. For the procedure, see NF specific Installation, Upgrade, and Fault Recovery Guide.

4.3.2.4 Replication Re-Establishment

Follow the procedure below to re-establish site-to-site replication, perform georeplication recovery to resynchronize data, and verify that replication stabilizes across all sites:

- Re-enable site-to-site replication once the recovered site is confirmed healthy, and reconfigure replication parameters as required. For more information about how to enable replication, see *Oracle Communications Cloud Native Core, cnDBTier User Guide*.
- Perform georeplication recovery using cnDBTier procedures to resynchronize datasets and restore a consistent, unified state across all operational sites. For detailed georeplication recovery steps and prerequisites, see *Oracle Communications Cloud Native Core, cnDBTier User Guide*.
- Monitor replication health continuously after replication is re-established. For detailed steps to check the replication, see *Oracle Communications Cloud Native Core, cnDBTier User Guide*.
- Confirm all sites successfully connected in the cluster and that replication reaches a stable and consistent state.

4.3.2.5 Validation and Bring Site Online

1. Ensure all Kubernetes pods for NFs and components (CNCC, OSO) have Running/Ready status, no CrashLoopBackOff conditions, and all services are reachable. For more information on how to verify the state, see NF specific Installation, Upgrade, and Fault Recovery Guide.
2. Run basic call flow or policy lookup tests, and exercise read/write to the database if test traffic is available.

3. If checks are successful, transition site back to NORMAL mode and resume traffic. For more information on how to change the state, see NF User Guide.
4. Closely monitor alarms and logs as the site resumes full participation in the cluster.

A

Frequently Asked Questions (FAQs)

This section lists the most commonly asked questions while upgrading a Network Function (NF).

What is the upgrade sequence for NFs and cnDBTier when there are multiple NFs in a network?

You can perform upgrade of an NF followed by cnDBTier in a site. This is the only recommended upgrade sequence. There's no fixed order of upgrade between multiple NFs.

For Example: NRF, SCP, or SEPP are deployed in the network, if the NFs are 3GPP compliant, upgrade sequence between NFs isn't dependent. If you upgrade NRF first, then follow the upgrade of cnDBTier connected to NRF. For more information about the upgrade sequence, see the Overview section.

What if during the upgrade of a site, the upgrade fails? What should be the upgrade sequence?

There's no change in the upgrade sequence. You can perform upgrade of an NF followed by cnDBTier. This is the only recommended upgrade sequence. In case the upgrade fails, perform fault recovery procedures for the site. For more information about the upgrade sequence, see the Overview section.

If it's a NF, then follow the fault recovery procedure provided in NF-specific *Installation, Upgrade, and Fault Recovery Guide*.

If it's the cnDBTier, then follow the fault recovery procedure provided in *Oracle Communications Cloud Native Core DBTier Installation, Upgrade, and Fault Recovery Guide*.

During the upgrade, if georeplication fails then what are recommended upgrade procedures to recover the sites?

In case the replication fails during upgrade or postupgrade, then resync the replication after upgrade completion using cnDBTier procedures. For more information about the resync, see *Oracle Communications Cloud Native Core DBTier Installation, Upgrade, and Fault Recovery Guide*. If the issue persists, contact My Oracle Support.

What is the upgrade impact if the NF schema version changes when georeplication is enabled?

NF upgrade takes care of any schema changes automatically. If any NF requires an alternate update strategy due to non-backward compatibility issues, it will be documented in NF-specific *Installation, Upgrade, and Fault Recovery Guide*.

If I want all the NFs to be at the same version before upgrading cnDBTier, does this impact the upgrade strategy?

It isn't suggested upgrading a layer of same NFs across all sites, before moving to the next. There's a higher risk of rollback scenarios of all the sites, which can impact the service. The recommended upgrade sequence is provided in the Overview section.

For Example: In three-site georedundancy, if NRF, SCP, and cnDBTier are deployed, upgrade cnDBTier and the NFs in the specific site, instead of first upgrading cnDBTier across all the sites and then the NFs.

What should I do if I see an error while upgrading?

If you see any upgrade or rollback error, see NF-specific *Troubleshooting Guide*. In case the error persists, collect the log and report it to My Oracle Support.

How do I verify if the upgrade is successful?

Perform verification tasks provided in NF-specific *Installation, Upgrade, and Fault Recovery Guide*. For more information about the upgrade, see the "Upgrade Tasks" section in the NF-specific *Installation, Upgrade, and Fault Recovery Guide*.

When I have a non-Oracle CNE, how do I check if the NFs are compatible or not?

Perform compatibility check between the NFs and non-Oracle CNE. For more information about the procedure, see Compatibility Check of Target NF Component with Installed Non-Oracle cloud native environment.