Pods and Services Reference

Feature Summary and Revision History

Summary Data

Table 1: Summary Data

Applicable Product(s) or Functional Area	5G-NRF
Applicable Platform(s)	SMI
Feature Default Setting	Enabled - Always-on
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 2: Revision History

Revision Details	**Release**
First introduced.	2026.01

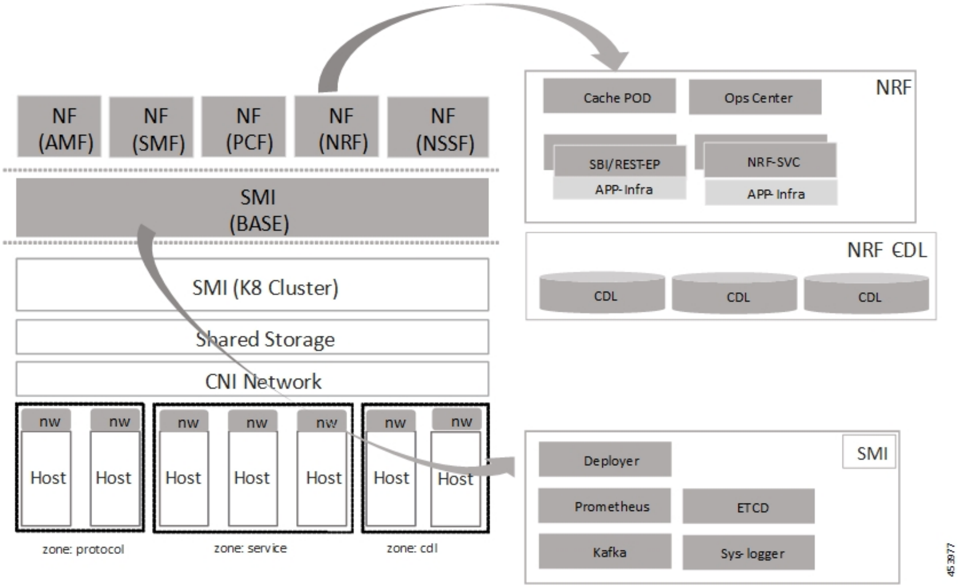
Feature Description

The NRF is built on the Kubernetes cluster strategy, which implies that it has adopted the native concepts of containerization, high availability, scalability, modularity, and ease of deployment. To achieve the benefits offered by Kubernetes, NRF uses the construct that includes the components such as pods and services.

Depending on your deployment environment, the NRF deploys the pods on the virtual machines that you have configured. Pods operate through the services that are responsible for the intrapod communications. If the machine hosting the pods fail or experiences network disruption, the pods are terminated or deleted. However, this situation is transient and NRF spins new pods to replace the invalid pods.

The following workflow provides a high-level visibility into the host machines, and the associated pods and services. It also represents how the pods interact with each other. The representation might defer based on your deployment infrastructure.

Figure 1: Communication Workflow of Pods



Kubernetes deployment includes the kubectl command-line tool to manage the Kubernetes resources in the cluster. You can manage the pods, nodes, and services.

For generic information on the Kubernetes concepts, see the Kubernetes documentation.

Pods

A pod is a process that runs on your Kubernetes cluster. Pod encapsulates a granular unit known as a container. A pod contains one or multiple containers.

Kubernetes deploys one or multiple pods on a single node which can be a physical or virtual machine. Each pod has a discrete identity with an internal IP address and port space. However, the containers within a pod can share the storage and network resources.

The following tables list the NRF and Common Execution Environment (CEE) pod names and the hosts on which they are deployed depending on the labels that you assign. For information on how to assign the labels, see Associating Pods to the Nodes, on page 5.

Table 3: NRF Pods

Pod Name	Description	Host Name
base-entitlement-nrf	Supports Smart Licensing feature.	OAM
cache-pod	Operates as the pod to cache any sort of system information that will be used by other pods as applicable.	Protocol
cdl-ep-session-c1	Provides an interface to the CDL.	Session
cdl-index-session-c1	Preserves the mapping of keys to the session pods.	Session
cdl-slot-session-c1	Operates as the CDL Session pod to store the session data.	Session
documentation	Contains the documentation.	OAM
etcd-nrf-etcd-cluster	Hosts the etcd for the NRF application to store information, such as pod instances, leader information, NF-UUID, endpoints, and so on.	OAM
georeplication	Responsible for cache, etcd replication across sites, and site role management. **Note** In the current release, this pod is not actively used in NRF.	Protocol
grafana-dashboard-app-infra	Contains the default dashboard of app-infra metrics in Grafana.	OAM
grafana-dashboard-cdl	Contains the default dashboard of CDL metrics in Grafana.	OAM
grafana-dashboard-etcd	Contains the default dashboard of etcd metrics in Grafana.	OAM
grafana-dashboard-nrf	Contains the default dashboard of nrf-service metrics in Grafana.	OAM
kafka	Hosts the Kafka details for the CDL replication.	Protocol

Pod Name	Description	Host Name
oam-pod	Operates as the pod to facilitate Ops Center actions, such as show commands, configuration commands, monitor protocol monitor subscriber, and so on.	OAM
ops-center-nrf-ops-center	Acts as the NRF Ops Center.	OAM
prometheus-rules-cdl	Contains the default alerting rules and recording rules for Prometheus CDL.	OAM
prometheus-rules-etcd	Contains the default alerting rules and recording rules for Prometheus etcd.	OAM
smart-agent-nrf-ops-center	Operates as the utility pod for the NRF Ops Center.	OAM
nrf-nrf-service	Contains main business logic of the NRF.	Service
nrf-nrf-rest-ep	Operates as REST endpoint of NRF for HTTP/2 communication.	Protocol
zookeeper	Assists Kafka for topology management.	OAM

Services

The NRF configuration is composed of several microservices that run on a set of discrete pods. Microservices are deployed during the NRF deployment. NRF uses these services to enable communication between the pods. When interacting with another pod, the service identifies the pod's IP address to initiate the transaction and acts as an endpoint for the pod.

The following table describes the NRF services and the pod on which they run.

Table 4: NRF Services and Pods

Service Name	Pod Name	Description
base-entitlement-nrf	base-entitlement-nrf	Supports Smart Licensi
datastore-ep-session	cdl-ep-session-c1	Responsible for the CD
datastore-notification-ep	nrf-rest-ep	Responsible for sending the CDL to the *nrf-servi*
datastore-tls-ep-session	cdl-ep-session-c1	Responsible for the secu
documentation	documentation	Responsible for the NR
etcd	etcd-nrf-etcd-cluster-0	Responsible for pod dis namespace.
etcd-nrf-etcd-cluster	etcd-nrf-etcd-cluster-0	Responsible for synchro the *etcd* cluster.
grafana-dashboard-app-infra	grafana-dashboard-app-infra	Responsible for the defa app-infra metrics in Gra

Service Name	Pod Name	Description
grafana-dashboard-cdl	grafana-dashboard-cdl	Responsible for the metrics in Grafana.
grafana-dashboard-etcd	grafana-dashboard-etcd	Contains the default in Grafana.
grafana-dashboard-nrf	grafana-dashboard-nrf	Responsible for the nrf-service metrics i
kafka	kafka	Processes the Kafka
local-ldap-proxy-nrf-ops-center	ops-center-nrf-ops-center	Responsible for leve credentials by other Grafana.
oam-pod	oam-pod	Responsible to facilit Ops Center.
ops-center-nrf-ops-center	ops-center-nrf-ops-center	Manages the NRF O
ops-center-nrf-ops-center-expose-cli	ops-center-nrf-ops-center	To access NRF Ops address.
smart-agent-nrf-ops-center	smart-agent-nrf-ops-center	Responsible for the
nrf-rest-ep	nrf-rest-ep	Responsible for rout messages to the rest-
nrf-service	nrf-service	Responsible for inter nrf-service pod.
zookeeper	zookeeper	Assists Kafka for to
zookeeper-service	zookeeper	Assists Kafka for to

Associating Pods to the Nodes

This section describes how to associate a pod to the node based on their labels.

After you have configured a cluster, you can associate pods to the nodes through labels. This association enables the pods to get deployed on the appropriate node based on the key-value pair.

Labels are required for the pods to identify the nodes where they must get deployed and to run the services. For example, when you configure the protocol-layer label with the required key-value pair, the pods are deployed on the nodes that match the key-value pair.

To associate pods to the nodes through the labels, use the following configuration:

```
config
  label
    cdl-layer
      key key_value
      value value
    oam-layer
      key key_value
  value value
protocol-layer
  key key_value
  value value
service-layer
  key key_value
  value value
  end
```

Note If you opt not to configure the labels, then NRF assumes the labels with the default key-value pair.

- **label { cdl-layer { key** *key_value* **| value** *value* **}**: Configures the key value pair for CDL.
- **oam-layer { key** *key_value* **| value** *value* **}**: Configures the key value pair for OAM layer.
- **protocol-layer { key** *key_value* **| value** *value* **}**: Configures the key value pair for protocol layer.
- **service-layer { key** *key_value* **| value** *value* **}**: Configures the key value pair for the service layer.

Viewing the Pod Details and Status

If the service requires additional pods, nrf creates and deploys the pods. You can view the list of pods that are participating in your deployment through the nrf Ops Center. You can run the kubectl command from the master node to manage the Kubernetes resources.

- To view the comprehensive pod details, use the following command.

  ```
  kubectl get pods -n nrf pod_name -o yaml
  ```

  The pod details are available in YAML format. The output of this command results in the following information:

  - The IP address of the host where the pod is deployed.
  - The service and application that is running on the pod.
  - The ID and name of the container within the pod.
  - The IP address of the pod.
  - The current state and phase in which the pod is.
  - The start time from which pod is in the current state.

- Use the following command to view the summary of the pod details.

  ```
  kubectl get pods -n nrf_namespace -o wide
  ```

States

Understanding the pod's state lets you determine the current health and prevent the potential risks. The following table describes the pod's states.

Table 5: Pod States

State	Description
Running	The pod is healthy and deployed on a node. It contains one or more containers
Pending	The application is in the process of creating the container images for the pod
Succeeded	Indicates that all the containers in the pod are successfully terminated. These pods cannot be restarted.
Failed	One ore more containers in the pod have failed the termination process. The failure occurred as the container either exited with non zero status or the system terminated the container.
Unknown	The state of the pod could not be determined. Typically, this could be observed because the node where the pod resides was not reachable.