CDL for Multiple AMF Instances

Feature Summary and Revision History

Summary Data

Table 1: Summary Data

Applicable Product(s) or Functional Area	AMF
Applicable Platform(s)	SMI
Feature Default Setting	Enabled - Always-on
Related Documentation	Not Applicable

Revision History

Table 2: Revision History

Revision Details	Release
First introduced.	2021.04.0

Feature Description

Common Data Layer (CDL) can be deployed separately as a common datastore for multiple AMF instances.

The deployment possibilities when the CDL pods come up in the same namespace as that of AMF namespace are:

• CDL created locally in the same namespace per AMF.

• CDL created in a separate namespace common to multiple AMF instances.

Architecture

A network function (NF) consists of the following layers as part of the cloud native architecture:

• Protocol Layer

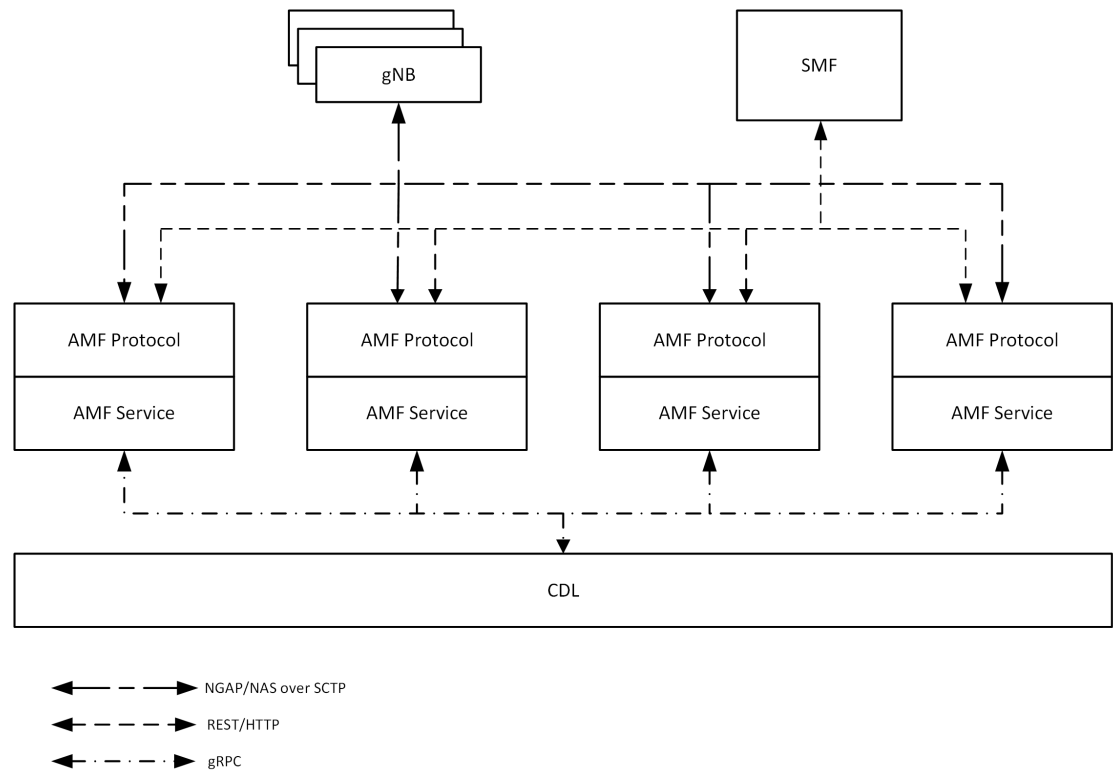• Service Layer

• Datastore Layer

The layers in AMF are as follows:

• Protocol Layer—NGAP/NAS over SCTP transport and SBA over REST/HTTP transport

Example: AMF-protocol and AMF REST-EP

• Service Layer—Business logic of AMF functionality

Example: AMF-service pod

• Data Store Layer—Supports session storage

Example: CDL

The management entities Etcd, Cache pod, and NodeMgr provide services to the Protocol Layer, Service Layer, and Data Store Layer functionalities.

Figure 1: Multiple AMF Instances Architecture

The following figure explains the Architecture of Multiple AMF instances.

```
      ┌──────┐                          ┌──────────┐
      │┌──────┐                         │          │
      ││┌──────┐                        │   SMF    │
      │││ gNB  │                        │          │
      └┴┴──────┘                        └──────────┘
```

AMF Protocol	AMF Protocol	AMF Protocol	AMF Protocol
AMF Service	AMF Service	AMF Service	AMF Service

CDL

◄ ─ ─ ─ ► NGAP/NAS over SCTP

◄ ─ ─ ─ ► REST/HTTP

◄ ─ · ─ · ► gRPC

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The CDL is deployed as an independent entity which acts as a session store for all the instances of AMF during AMF scaling. Each AMF instance performs the following:

- Uses the common CDL for session store.

- Contains all the elements of AMF deployment.

- Doesn't interact with another AMF instance.

- Registers with NRF service endpoint on instantiation, and deregisters the service endpoint on moving out of service.

- Embeds its instance ID as a pointer in GUAMI identity.

  The gNBs have a mesh connectivity with all the instances of AMF. The SMF and other network elements discover the AMF instances through the NRF.

The CDL can be configured with slice name as AMF to store the AMF sessions. The AMF instance performs the following:

- AMF instance provide instance ID by enhansing the existing session gRPC APIs of CDL or using session-related CDL gRPC APIs..

- Uses the slice name as AMF for session store with CDL.

The CDL exposes the gRPC API to register or deregister notification URI. The AMF instance uses gRPC API to provide the notification URI details to CDL.

The CDL searches for the notification URI in session lookup with instance ID. If the notification URI fails, the CDL picks another URI from the list in round robin.

Feature Configuration

Configuring this feature involves the following steps:

- CDL configuration in same namespace as AMF - This configuration provides the commands to configure CDL locally per AMF in the same namespace. For more information, refer to Configuring the CDL in same namespace as AMF, on page 4.

- CDL configuration in different namespace as AMF - To deploy CDL in different namespace, install CDL Ops Center in a separate namespace. This configuration provides the commands to configure CDL in separate namespace. For more information, refer to Configuring the CDL in different namespace as AMF, on page 5.

Configuring the CDL in same namespace as AMF

The CDL in same namespace as AMF configuration must be done in AMF Ops Center.

To configure CDL in same namespace as AMF, use the following configuration:

```
config
  cdl datastore datastore_name
   endpoint replica no_of_replicas
     slot map no_of_slot_maps
     slot replica no_of_replicas_per_map
     index map no_of_index_maps
     index replica no_of_replicas_per_map
     end
```

NOTES:

- **cdl datastore** *datastore_name*—Specify the name of the datastore to be deployed.

- **endpoint replica** *no_of_replicas*—Specify the number of high availability (HA) instances to be created. Must be an integer in the range of 1–16.

- **slot map** *no_of_slot_maps*—Specify the number of partitions to be created for slot. Must be an integer in the range of 1–1024.

- **slot replica** *no_of_replicas_per_map*—Specify the number of HA instances to be created. Must be an integer in the range of 1–4.

- **index map** *no_of_index_maps*—Specify the number of partitions to be created for index. Must be in the range of 1–1024.

- **index replica** *no_of_replicas_per_map*—Specify the number of HA instances to be created. Must be an integer either 1 or 2.

Configuration Example

The following is an example configuration in CDL Ops Center.

```
config
 cdl datastore session
  endpoint replica 2
```

```
        slot map 2
        slot replica 2
        index map 1
        index replica 2
        end
```

Configuring the CDL in different namespace as AMF

To configure CDL in a different namespace as AMF, use the following configuration:

```
config
 cdl datastore datastore_name
  endpoint replica no_of_replicas
   slot map no_of_slot_maps
   slot replica no_of_replicas_per_map
   slot notification dynamic-provisioning { true | false }
   index map no_of_index_maps
   index replica no_of_replicas_per_map
   end
```

NOTES:

- **cdl datastore** *datastore_name*—Specify the name of the datastore to be deployed.

- **endpoint replica** *no_of_replicas*—Specify the number of high availability (HA) instances to be created. Must be an integer in the range of 1–16.

- **slot map** *no_of_slot_maps*—Specify the number of partitions to be created for slot. Must be an integer in the range of 1–1024.

- **slot replica** *no_of_replicas_per_map*—Specify the number of HA instances to be created. Must be an integer in the range of 1–4.

- **slot notification dynamic-provisioning true**—Enable application to provide notification endpoint dynamically through API.

- **index map** *no_of_index_maps*—Specify the number of partitions to be created for slot. Must be an integer in the range of 1–1024.

- **index replica** *no_of_replicas_per_map*—Specify the number of HA instances to be created. Must be an integer either 1 or 2.

Note In AMF Ops Center:

- CDL configuration must not be available.

- **show running-config** cdl command must not return the configuration.

Configuration Example

The following is an example configuration in CDL Ops Center.

```
config
 cdl datastore session
```

```
endpoint replica 2
 slot map 2
 slot replica 2
 slot notification dynamic-provisioning true
 index map 1
 index replica 2
 end
```