



cnBNG Installation and Configuration

- [Feature Summary and Revision History, on page 1](#)
- [Feature Description, on page 2](#)

Feature Summary and Revision History

Summary Data

Table 1: Summary Data

Applicable Product(s) or Functional Area	cnBNG
Applicable Platform(s)	SMI
Feature Default Setting	Disabled - Configuration Required
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 2: Revision History

Revision Details	Release
cnBNG CP deployment on bare metal server is supported (with support for IPoE, PPPoE, LAC and LNS call models and High Availability) and fully qualified in this release.	2022.01.0
First introduced.	2021.01.0

Feature Description

This chapter describes cnBNG installation and configuration using the Ultra Cloud Core Subscriber Microservices Infrastructure (SMI) Cluster Manager and the BNG Operations (Ops) Center. The BNG Ops Center is based on the ConfD command line interface (CLI).

To install the SMI Cluster Manager, refer to the "Deploying the SMI Cluster Manager on VMware vCenter" section in the *Ultra Cloud Core Subscriber Microservices Infrastructure - Deployment Guide*.

The SMI Ops Center is the platform to install the cnBNG cluster with the offline or online repository. It is mandatory to install the SMI Ops Center to set up and access the BNG Ops Center.



Note

To access the offline or online repository, contact your Cisco Account Manager or representative to get access to the offline or online repository.

BNG Ops Center

The BNG Ops Center is a system-level infrastructure that provides the following functionality:

- A user interface to trigger a deployment of microservices with the flexibility of providing variable helm chart parameters to control the scale and properties of Kubernetes objects (deployment, pod, services, and so on) associated with the deployment.
- A user interface to push application-specific configuration to one or more microservices through Kubernetes configuration maps.
- A user interface to issue application-specific execution commands (such as show and clear commands). These commands:
 - Invoke some APIs in application-specific pods
 - Display the information returned on the user interface application

The following figure shows a sample of the web-based CLI presented to the user.

```

Username: admin
Warning: Permanently added '[localhost]:2024' (RSA) to the list of known hosts.
admin@localhost's password:

Welcome to the bng CLI on unknown
Copyright © 2016-2020, Cisco Systems, Inc.
All rights reserved.

admin connected from 127.0.0.1 using ssh on ops-center-bng-ops-center-68bb45476f-62jvw
Warning!!! Your password will expire in 9 days!

[unknown] bng# show running-config
helm default-repository bng-master
helm repository bng-lac
  access-token 8giditnr:AKCp5ekcbPU5siifdwWVxqXj5chQkweH7sd1Xve8JktjKbpg6Yj9xufvMn9djkAy8lp2Jo
  url           https://engcl-maven-master.cisco.com/artifactory/smi-fuse-internal-snapshot/mobile-cnat-bng/bng-products/dev-bng-lac/lac/
exit
helm repository bng-master
  access-token 8giditnr:AKCp5ekcbPU5siifdwWVxqXj5chQkweH7sd1Xve8JktjKbpg6Yj9xufvMn9djkAy8lp2Jo
  url           https://engcl-maven-master.cisco.com/artifactory/smi-fuse-internal-snapshot/mobile-cnat-bng/bng-products/master/
exit
k8s name          unknown
k8s namespace     bng
k8s nf-name       bng
k8s registry      dockerhub.cisco.com/smi-fuse-docker-internal
k8s single-node   true
k8s use-volume-claims false
k8s ingress-host-name 10.84.102.189.nip.io
aaa authentication users user admin
uid              117
gid              117
password         $1sk7Evtccp9MPhn3TJHzjNcfnlMispM6l
ssh_keydir       /tmp/admin/.ssh
homedir          /tmp/admin
exit
aaa ios level 0
prompt "h> "
exit
aaa ios level 15
prompt "h# "

```

The BNG Ops Center allows you to configure features such as licensing, REST endpoint, and CDL.

For information on how to deploy BNG Ops Center on bare metal servers (currently Cisco UCS-C servers) environment, see "Operating the SMI Cluster Manager on Bare Metal" section in the *Ultra Cloud Core Subscriber Microservices Infrastructure — Operations Guide*.

Installing cnBNG and Accessing BNG Ops Center

This section describes how to install cnBNG and access the BNG Ops Center.

The Ultra Cloud Core SMI platform is responsible for setting up and managing the Cloud Native Broadband Network Gateway application.

Prerequisites

Before installing cnBNG on the SMI layer in an offline environment:

- Ensure that the SMI Cluster Manager all-in-one (AIO) is installed. This helps orchestrate the K8s Cluster and load the image.
- Ensure that all SMI K8s cluster nodes are in Ready state.
- Run the SMI synchronization operation for the BNG Ops Center and Cloud Native Common Execution Environment (CN-CEE).

For CEE installation, refer to the *Ultra Cloud Core Common Execution Environment- Configuration and Administration Guide*.

- Ensure that the local repositories, which host the product offline TAR ball version, is installed.

System Requirements

Feature	Description
Disk Space	2 x 800 GB SSD (RAID 1) or equivalent input/output operations per second (IOPS) and redundancy.
Hardware	<ul style="list-style-type: none"> • High-performance x86 64-bit chipset • CPU performance Passmark benchmark of 13K rating per chip and 1,365 rating per thread, or better • VMware ESXi-compatible <p>Note The following is recommended:</p> <ul style="list-style-type: none"> • Cisco UCSM5 series blade servers to achieve the best performance. • All the host servers should be UCSC-C240-M5SX or UCSC-C220-M5SX. • All the UCS systems should have SSD storage type. • UCS C240M5 servers for better performance and to avoid infrastructure issues.
Platform	VMware ESXi and VMware vCenter versions 6.5 and 6.7 <p>Note SMI Cluster Manger support is qualified on the preceding platforms.</p>
Memory	<ul style="list-style-type: none"> • At least DDR3-1600 or better than 1600 MT/s • ECC
Deployment Requirement	Hardware oversubscription, network saturation, or CPU oversubscription reduces application performance and productivity. The Cisco Ultra Cloud Core Subscriber Microservices Infrastructure detects and takes action when infrastructure requirements are not met.

Installing cnBNG in an Offline Environment

Using the SMI Cluster Manager, download the offline TAR ball of the cnBNG, the host and its charts, and corresponding images in the local registries. The SMI Cluster Manager supports the deployment of the BNG Ops Center and all the applications and services associated with it. This section describes the procedures involved in installing cnBNG in an offline environment using the SMI Cluster Manager.

To install cnBNG, complete the following steps:

1. Download the TAR ball from the URL.

software-packages download *URL*

Example:

```
SMI Cluster Manager# software-packages download
http://<ipv4address>:<port_number>/packages/bng-2021-02-1.tar
```

2. Verify whether the TAR balls are loaded.

software-packages list

Example:

```
BNG Cluster Manager# software-packages list
[ bng-2021-02-1 ]
[ sample ]
```

3. Configure the necessary SMI Ops Center parameters in the cluster to install cnBNG.

configure

```
cluster cluster_name
  ops-centers app_name instance_name
    repository url
    netconf-ip ipv4_address
    netconf-port port
    ssh-ip ipv4_address
    ssh-port port
    ingress-hostname <ipv4_address>.<customer_specific_domain_name>
    initial-boot-parameters use-volume-claims true/false
    initial-boot-parameters first-boot-password password
    initial-boot-parameters auto-deploy true/false
    initial-boot-parameters single-node true/false
    initial-boot-parameters image-pull-secrets
  exit
```

exit

Example:

```
SMI Cluster Manager# config
Entering configuration mode terminal
SMI Cluster Manager(config)# clusters cnbng-smi-cluster-01
SMI Cluster Manager(config-clusters-cnbng-smi-cluster-01)# ops-centers bng bng
SMI Cluster Manager(config-ops-centers-bng/bng)# repository
https://charts.10.10.105.50.nip.io/bng-2021.02.1
SMI Cluster Manager(config-ops-centers-bng/bng)# ingress-hostname 10.10.105.34.nip.io
SMI Cluster Manager(config-ops-centers-bng/bng)# initial-boot-parameters use-volume-claims
true
SMI Cluster Manager(config-ops-centers-bng/bng)# initial-boot-parameters
first-boot-password test123
SMI Cluster Manager(config-ops-centers-bng/bng)# initial-boot-parameters auto-deploy
false
SMI Cluster Manager(config-ops-centers-bng/bng)# initial-boot-parameters single-node
false
SMI Cluster Manager(config-ops-centers-bng/bng)# exit
SMI Cluster Manager(config-clusters-cnbng-smi-cluster-01)# exit
SMI Cluster Manager(config)#
```

4. Configure the secrets, if your local registry contains secrets.

configure

```
cluster cluster_name
  secrets docker-registry secret_name
    docker-server server_name
    docker-username username
    docker-password password
```

```

docker-email email
namespace k8s namespace
commit
exit
exit

```

Example:

```

SMI Cluster Manager# config
SMI Cluster Manager(config)# clusters test2
SMI Cluster Manager(config-clusters-test2)# secrets docker-registry sec1
SMI Cluster Manager(config-docker-registry-sec1)# docker-server serv1
SMI Cluster Manager(config-docker-registry-sec1)# docker-username user1
SMI Cluster Manager(config-docker-registry-sec1)# docker-password Cisco@123
SMI Cluster Manager(config-docker-registry-sec1)# docker-email reg@cisco.com
SMI Cluster Manager(config-docker-registry-sec1)# bng bng
SMI Cluster Manager(config-docker-registry-sec1)# exit
SMI Cluster Manager(config-clusters-test2)# exit
SMI Cluster Manager(config)#

```

5. Run the cluster synchronization.

```
clusters cluster_name actions sync run
```

Example:

```
SMI Cluster Manager# clusters cnbng-smi-cluster-01 actions sync run
```

Notes:

- **software-packages download url**—Specifies the software packages to be downloaded through HTTP/HTTPS.
- **software-packages list**—Specifies the list of available software packages.
- **ops-centers app_name instance_name**—Specifies the BNG Ops Center and instance. *app_name* is the application name. *instance_name* is the name of the instance.
- **repository url**—Specifies the local registry URL for downloading the charts.
- **netconf-ip ipv4_address**—Specifies the BNG Ops Center netconf IPv4 address.
- **netconf-port port**—Specifies the BNG Ops Center netconf port number.
- **ssh-ip ipv4_address**—Specifies the SSH IPv4 address for the BNG Ops Center.
- **ssh-port port**—Specifies the SSH port number for the BNG Ops Center.
- **ingress-hostname <ipv4_address>.<customer_specific_domain_name>**—Specifies the ingress hostname to be set to the BNG Ops Center. *<customer_specific_domain_name>* specifies the domain name of the customer.
- **initial-boot-parameters**—Specifies the initial boot parameters for deploying the helm charts.
 - **use-volume-claims true/false**—Specifies the usage of persistent volumes. Set this option to True to use persistent volumes. The default value is true.
 - **first-boot-password password**—Specifies the first boot password for the product's Ops Center.
 - **auto-deploy true/false**—Auto deploys all the services of the product. Set this option to false to deploy only the product's Ops Center.

- **single-node** *true/false*– Specifies the product deployment on a single node. Set this option to false for multi node deployments.
- **image-pull-secrets**–Specifies the docker registry secret name to be used.
- **secrets docker-registry** *secret_name*–Specifies the secret name for your docker registry.
 - **docker-server** *server_name*–Specifies the docker server name.
 - **docker-username** *username*–Specifies the docker registry user name.
 - **docker-password** *password*–Specifies the docker registry password.
 - **docker-email** *email*–Specifies the docker registry email.
 - **namespace** *namespace*–Specifies the docker registry namespace.

Verifying the cnBNG Installation

Verify the status of the cnBNG installation deployment through the cnBNG CLI. To verify, use the following commands:

1. Log in to the cnBNG product CLI.
2. Verify whether the charts are loaded in the specific instance (verify the namespace).

show helm charts

Example:

```
bng# show helm charts
CHART      INSTANCE  STATUS   VERSION  REVISION  RELEASE  NAMESPACE
-----
infra-charts - DEPLOYED 0.0.6-rel-2021-01-0073-210208130850-fac5207 1 bng-bng-infra-charts
bng-bng
oam-pod - DEPLOYED 0.1.2-rel-2021-01-0144-210122165946-fcb74ed 1 bng-bng-oam-pod bng-bng
bng-dashboard - DEPLOYED 0.0.1-rel-2021-01-0039-210122165311-0d542be 1
bng-bng-bng-dashboard bng-bng
etcd-cluster - DEPLOYED 0.7.0-0-7-0060-210203074532-f118407 1 bng-bng-etcd-cluster bng-bng
ngn-datastore - DEPLOYED 1.3.0-1-3-0782-210125161812-f50a892 1 bng-bng-ngn-datastore
bng-bng
```

3. Verify the status of the system.

show system status

Example:

```
bng# show system status
system status deployed true
system status percent-ready 100.0
```

Notes:

- **show helm charts**–Displays the helm release details.
- **show system status**–Displays the status of the system.

Accessing BNG Ops Center

You can connect to the BNG Ops Center through SSH or the web-based CLI console.

1. SSH:

```
ssh admin@ops_center_pod_ip -p 2024
```

2. Web-based console:

a. Log in to the Kubernetes master node.

b. Run the following command:

```
kubectl get ingress <namespace>
```

The available ingress connections get listed.

c. Select the appropriate ingress and access the BNG Ops Center.

d. Access the following URL from your web browser:

```
cli.<namespace>-ops-center.<ip_address>.nip.io
```

By default, the Day 0 configuration is loaded into the cnBNG.

Day 0 Configuration

To view the Day 0 configuration, run the following command.

```
show running-config
```

The following is a sample Day 0 configuration:

```
luser@cnbng-smi-cluster-master1:~$ kubectl get svc -n bng-bng | grep
ops-center-bng-bng-ops-center
NAME                                TYPE                CLUSTER-IP          EXTERNAL-IP          PORT(S)
AGE
ops-center-bng-bng-ops-center      ClusterIP           10.96.151.115       <none>
8008/TCP,8080/TCP,2024/TCP,2022/TCP,7681/TCP   7m37s
luser@cnbng-smi-cluster-master1:~$ ssh admin@10.96.151.115 -p 2024
Warning: Permanently added '[10.96.151.115]:2024' (RSA) to the list of known hosts.
admin@10.96.151.115's password:

Welcome to the bng CLI on cnbng-smi-cluster/bng
Copyright © 2016-2020, Cisco Systems, Inc.
All rights reserved.

admin connected from 192.202.0.1 using ssh on ops-center-bng-bng-ops-center-7bdd4cc48-fmb61
[cnbng-smi-cluster/bng] bng# show running-config
system mode running
helm default-repository base-repos
helm repository base-repos
url
https://engci-maven-master.cisco.com/artifactory/smi-fuse-internal-snapshot/mobile-cnat-bng/bng-products/master/
username <username>
password <password>
exit
k8s name          cnbng-smi-cluster
k8s namespace    bng-bng
k8s nf-name      bng
k8s registry     dockerhub.cisco.com/smi-fuse-docker-internal
k8s single-node  false
```



```
k8s use-volume-claims true
k8s ingress-host-name 1.1.1.2.nip.io
aaa authentication users user admin
uid          1117
gid          1117
password     $1$EmkQjvc0$o8K5tXmUzN1.drQgCL0A2/
ssh_keydir   /tmp/admin/.ssh
homedir      /tmp/admin
exit
aaa ios level 0
prompt "\h> "
exit
aaa ios level 15
prompt "\h# "
exit
aaa ios privilege exec
level 0
  command action
  exit
  command autowizard
  exit
  command enable
  exit
  command exit
  exit
  command help
  exit
  command startup
  exit
exit
level 15
  command configure
  exit
exit
exit
nacm write-default deny
nacm groups group admin
user-name [ admin ]
exit
nacm rule-list admin
group [ admin ]
rule any-access
  action permit
exit
exit
nacm rule-list confd-api-manager
group [ confd-api-manager ]
rule any-access
  action permit
exit
exit
nacm rule-list ops-center-security
group [ * ]
rule change-self-password
  module-name      ops-center-security
  path              /smiuser/change-self-password
  access-operations exec
  action            permit
exit
rule smiuser
  module-name      ops-center-security
  path              /smiuser
  access-operations exec
  action            deny
```

```

exit
exit

deployment
  app-name      BNG
  cluster-name  Local
  dc-name       DC
exit
k8 bng
  etcd-endpoint      etcd:2379
  datastore-endpoint datastore-ep-session:8882
  tracing
    enable
    enable-trace-percent 30
    append-messages      true
    endpoint              jaeger-collector:9411
  exit
exit
k8 label protocol-layer key smi.cisco.com/node-type value protocol
exit
k8 label service-layer key smi.cisco.com/node-type value service
exit
k8 label cdl-layer key smi.cisco.com/node-type value session
exit
k8 label oam-layer key smi.cisco.com/node-type value oam
exit
instances instance 1
  system-id DC
  cluster-id Local
  slice-name 1
exit
local-instance instance 1
system mode shutdown
helm default-repository base-repos
helm repository base-repos
  url
  https://engci-maven-master.cisco.com/artifactory/smi-fuse-internal-snapshot/mobile-cnat-bng/bng-products/master/

  username smf-deployer.gen
  password ***
exit
k8s name          svi-cn-bng-tb3
k8s namespace     bng-bng
k8s nf-name       bng
k8s registry      dockerhub.cisco.com/smi-fuse-docker-internal
k8s single-node   false
k8s use-volume-claims true
k8s ingress-host-name 10.81.103.86.nip.io
aaa authentication users user admin
  uid          1117
  gid          1117
  password     $1$vDWeJvJm$v46wiBWqdOj7eWgoPoZZE/
  ssh_keydir   /tmp/admin/.ssh
  homedir      /tmp/admin
exit
aaa ios level 0
  prompt "\h> "
exit
aaa ios level 15
  prompt "\h# "
exit
aaa ios privilege exec
  level 0
  command action
  exit

```

```

command autowizard
exit
command enable
exit
command exit
exit
command help
exit
command startup
exit
exit
level 15
  command configure
  exit
exit
exit
nacm write-default deny
nacm groups group admin
  user-name [ admin ]
exit
nacm rule-list admin
  group [ admin ]
  rule any-access
  action permit
  exit
exit
nacm rule-list confd-api-manager
  group [ confd-api-manager ]
  rule any-access
  action permit
  exit
exit
nacm rule-list ops-center-security
  group [ * ]
  rule change-self-password
    module-name      ops-center-security
    path              /smiuser/change-self-password
    access-operations exec
    action             permit
  exit
  rule smiuser
    module-name      ops-center-security
    path              /smiuser
    access-operations exec
    action             deny
  exit
exit

```

CP and UP Service Configuration

The CP service requires the basic configuration to process the API calls.



Note For information about the User Plane service configuration, refer to the *Cloud Native BNG User Plane Configuration Guide for Cisco ASR 9000 Series Routers, IOS XR Release 7.3.x*

Configuring the CP

The CP configuration is provided using the Ops Center infrastructure.

The following is a sample CP configuration:

```

ipam
source local
address-pool Default-Pool
address-quarantine-timer 60
vrf-name default
ipv4
split-size
per-cache 131072
per-dp 131072
exit
address-range 13.0.0.1 13.1.255.255
exit
ipv6
address-ranges
split-size
per-cache 65536
per-dp 65536
exit
address-range 1:4::1 1:4::ffff
address-range 1:5::1 1:5::ffff
address-range 1:6::1 1:6::ffff
address-range 1:7::1 1:7::ffff
exit
prefix-ranges
split-size
per-cache 65536
per-dp 65536
exit
prefix-range 2003:db0:: length 48
prefix-range 2003:db1:: length 48
prefix-range 2003:db2:: length 48
prefix-range 2003:db3:: length 48
exit
exit
address-pool VRF-Pool
address-quarantine-timer 60
vrf-name it_vrf
ipv4
split-size
per-cache 131072
per-dp 131072
exit
address-range 14.0.0.1 14.1.255.255
exit
ipv6
address-ranges
split-size
per-cache 65536
per-dp 65536
exit
address-range 2:4::1 2:4::ffff
address-range 2:5::1 2:5::ffff
address-range 2:6::1 2:6::ffff
address-range 2:7::1 2:7::ffff
exit
prefix-ranges
split-size
per-cache 65536
per-dp 65536
exit
prefix-range 2004:db0:: length 48
prefix-range 2004:db1:: length 48
prefix-range 2004:db2:: length 48

```

```
    prefix-range 2004:db3:: length 48
  exit
exit
address-pool pool-ISP
  address-quarantine-timer 60
  vrf-name default
  ipv4
    split-size
      per-cache 131072
      per-dp 131072
    exit
  address-range 11.0.0.1 11.1.255.255
  exit
  ipv6
    address-ranges
      split-size
        per-cache 65536
        per-dp 65536
      exit
      address-range 4:2::1 4:2::ffff
      address-range 4:3::1 4:3::ffff
      address-range 4:4::1 4:4::ffff
      address-range 4:5::1 4:5::ffff
    exit
    prefix-ranges
      split-size
        per-cache 65536
        per-dp 65536
      exit
      prefix-range 2001:db0:: length 48
      prefix-range 2001:db1:: length 48
      prefix-range 2001:db2:: length 48
      prefix-range 2001:db3:: length 48
    exit
  exit
  address-pool pool-st
    vrf-name default
    static enable user-plane asr9k-2
    ipv4
      split-size
        per-cache 262144
        per-dp 262144
      exit
      address-range 12.0.0.1 12.3.255.254 default-gateway 12.0.0.1
    exit
    ipv6
      address-ranges
        split-size
          per-cache 8192
          per-dp 8192
        exit
        address-range 2:2::1 2:2::ff00
      exit
      prefix-ranges
        split-size
          per-cache 8192
          per-dp 8192
        exit
        prefix-range 3001:db0:: length 48
      exit
    exit
  exit
exit
```

```
address-pool static-pool
vrf-name access-vrf-1
static enable user-plane asr9k-1
ipv4
  split-size
  no-split
  exit
  address-range 20.20.0.0 20.20.0.255 default-gateway 20.20.0.1
  exit
exit
exit
cdl node-type session
cdl logging default-log-level error
cdl datastore session
  endpoint replica 2
  endpoint settings slot-timeout-ms 750
  index replica 2
  index map 1
  slot replica 2
  slot map 2
  slot notification limit 300
exit
cdl kafka replica 2
profile dhcp dhcp-server1
  ipv4
  mode server
  server
  pool-name pool-ISP
  dns-servers [ 8.8.8.8 ]
  lease hours 6
  lease minutes 40
  exit
exit
  ipv6
  mode server
  server
  iana-pool-name pool-ISP
  iapd-pool-name pool-ISP
  lease days 0
  lease hours 4
  lease minutes 2
  exit
exit
profile dhcp dhcp-server3
  ipv4
  mode server
  server
  pool-name Default-Pool
  dns-servers [ 8.8.8.8 ]
  lease days 1
  lease hours 6
  lease minutes 3
  exit
exit
  ipv6
  mode server
  server
  iana-pool-name Default-Pool
  iapd-pool-name Default-Pool
  lease days 1
  lease hours 6
  lease minutes 3
  exit
```

```

exit
exit
profile dhcp dhcp-server4
  ipv4
    mode server
    server
      pool-name VRF-Pool
      dns-servers [ 8.8.8.8 ]
      lease hours 6
      lease minutes 40
    exit
  exit
  ipv6
    mode server
    server
      iana-pool-name VRF-Pool
      iapd-pool-name VRF-Pool
      lease hours 6
    exit
  exit
exit
profile pppoe bng
  ctrl-pkt-priority 7
  max-payload deny
  service-name [ value]
  ac-name 123@acname
  ac-cookie 123@accokie
exit
profile aaa aaa-profl
  authorization
    type subscriber method-order [ local ]
    username value <username>
    password <password>
  exit
  accounting
    method-order [ local ]
  exit
exit
profile server-group local
  radius-group local
exit
profile subscriber subs-default
  dhcp-profile dhcp-server3
  session-type ipv4v6
  activate-feature-templates [ svc1 QOS_HSI QOS_IPTV QOS_VOICE ]
  aaa authorize aaa-profl
exit
profile subscriber subs-profl
  dhcp-profile dhcp-server1
  session-type ipv4v6
  activate-feature-templates [ svc1 ]
  aaa authorize aaa-profl
exit
profile subscriber subs-profl-pppoe
  dhcp-profile dhcp-server1
  pppoe-profile bng
  session-type ipv4v6
  class ppp_cls_map
  activate-feature-templates [ bng_ft_start ]
  matches
    match-type all
    match protocol [ ppp ]
  exit
exit

```

```

event session-activate
class ppp_cls_map
  activate-feature-templates [ bng_ft_activate ]
  matches
    match-type all
    match protocol [ ppp ]
  exit
  aaa authenticate aaa-prof1
  exit
exit
exit
profile subscriber subs-vrf
  dhcp-profile          dhcp-server4
  session-type          ipv4v6
  activate-feature-templates [ svc3 QOS_VOICE QOS_IPTV QOS_HSI ]
  aaa authorize aaa-prof1
exit
profile subscriber test-ppp-subscriber
  dhcp-profile          dhcp-server3
  pppoe-profile         test-ppp-pppoeprofile
  session-type          ipv4v6
  activate-feature-templates [ svc1 test-ppp-featuretemplate QOS_VOICE QOS_IPTV QOS_HSI ]
  aaa authorize aaa-prof1
exit
profile feature-template ACL-V4
  ipv4
  ingress-acl iACL_BNG_IPv4_IN
  egress-acl  iACL_BNG_IPv4_OUT
  exit
exit
profile feature-template ACL-V6
  ipv6
  ingress-acl v6-IN
  egress-acl  v6-out
  exit
exit
profile feature-template QOS_HSI
  qos
  in-policy   QOS_HSI_100B_IN
  out-policy  QOS_HSI_100B_OUT
  merge-level 30
  exit
  service-accounting
  enable
  aaa-profile   aaa-prof1
  periodic-interval 1800
  exit
exit
profile feature-template QOS_VOICE
  qos
  in-policy   QOS_VOICE_INGRESS
  out-policy  QOS_VOICE_EGRESS
  merge-level 40
  exit
exit
profile feature-template QOS_IPTV
  qos
  in-policy   QOS_IPTV_INGRESS
  out-policy  QOS_IPTV_EGRESS
  merge-level 50
  exit
exit
profile feature-template QOS
  qos

```



```
in-policy QOS-IN
out-policy QOS-OUT
merge-level 10
exit
service-accounting
enable
aaa-profile aaa-profl
exit
exit
profile feature-template bng_ft_activate
ipv4
mtu 1492
ingress-acl in4acl3
disable-unreachables
verify-unicast-source reachable-via-rx
exit
ipv6
mtu 1492
ingress-acl match-ipv6-acl
disable-unreachables
verify-unicast-source reachable-via-rx
exit
session-accounting
enable
aaa-profile aaa-profl
periodic-interval 1200
exit
ppp
ipcp dns 8.8.8.8 1.2.3.4
ipcp peer-address-pool pool-ISP
ipcp renegotiation ignore
ipv6cp renegotiation ignore
exit
exit
profile feature-template bng_ft_start
vrf-name default
session-accounting
enable
aaa-profile aaa-profl
periodic-interval 1200
exit
ppp
authentication [ pap ]
lcp delay seconds 1 milliseconds 0
lcp renegotiation ignore
exit
exit
profile feature-template svcl
vrf-name default
ipv4
mtu 1492
ingress-acl iACL_BNG_IPv4_IN_1
egress-acl iACL_BNG_IPv4_OUT_1
disable-unreachables
verify-unicast-source reachable-via-rx
exit
ipv6
mtu 1492
ingress-acl ipv6-acl-in-1
egress-acl ipv6-acl-out-1
disable-unreachables
verify-unicast-source reachable-via-rx
exit
session-accounting
```

```

    enable
    aaa-profile      aaa-prof1
    periodic-interval 1800
  exit
exit
profile feature-template svc2
  ppp
  ipcp peer-address-pool poolv4
  ipcp renegotiation ignore
  lcp renegotiation ignore
  exit
exit
profile feature-template svc3
  vrf-name it_vrf
  ipv4
  mtu 1492
  ingress-acl iACL_BNG_IPv4_IN_1
  egress-acl iACL_BNG_IPv4_OUT_1
  disable-unreachables
  verify-unicast-source reachable-via-rx
  exit
  ipv6
  mtu 1492
  ingress-acl ipv6-acl-in-1
  egress-acl ipv6-acl-out-1
  disable-unreachables
  verify-unicast-source reachable-via-rx
  exit
  session-accounting
  enable
  aaa-profile      aaa-prof1
  periodic-interval 1800
  exit
exit
profile feature-template svc4
  vrf-name default
  session-accounting
  enable
  aaa-profile      aaa-prof1
  periodic-interval 1800
  exit
exit
profile feature-template test-ppp-featuretemplate
  vrf-name default
  ipv4
  mtu 1400
  exit
  ppp
  ipcp peer-address-pool Default-Pool
  ipcp renegotiation ignore
  ipv6cp renegotiation ignore
  lcp renegotiation ignore
  exit
exit
profile feature-template uRPF
  ipv4
  verify-unicast-source reachable-via-rx
  exit
  ipv6
  verify-unicast-source reachable-via-rx
  exit
exit
profile radius
  algorithm round-robin

```

```
deadtime 3
detect-dead-server response-timeout 60
max-retry 1
timeout 5
server 172.16.254.55 1812
    type auth
    secret <secret_value>
exit
server 172.16.254.55 1813
    type acct
    secret <secret_value>
exit
server 172.16.254.56 1812
    type auth
    secret <secret_value>
exit
server 172.16.254.56 1813
    type acct
    secret <secret_value>
exit
attribute
    nas-identifier < any identifier>
    nas-ip 172.16.254.86
    nas-port-id < add_unique_id>
exit
server-group local
    server auth 172.16.254.55 1812
    exit
    server auth 172.16.254.56 1812
    exit
    server acct 172.16.254.55 1813
    exit
    server acct 172.16.254.56 1813
    exit
exit
exit
profile coa
    client 172.16.254.55
    server-key < key >
    exit
    client 172.16.254.56
    server-key < key >
    exit
exit
user-plane <add UP name like asr9k-11>
    peer-address ipv4 172.16.247.72
    subscriber-profile subs-default
exit
endpoint sm
exit
endpoint nodemgr
exit
endpoint n4-protocol
exit
endpoint dhcp
exit
endpoint radius
    replicas 1
    vip-ip 172.16.254.86
    interface coa-nas
    sla response 140000
    vip-ip 172.16.254.86 vip-port 2000
    exit
exit
```

```

endpoint udp-proxy
  replicas 1
  nodes 2
  vip-ip 172.16.254.86 vip-port 3799
  interface n4
    sla response 150000
  exit
  interface gtpu
    sla response 150000
  exit
exit
endpoint charging
exit
logging transaction duplicate enable
logging name bng-dhcp0.bngfsol.collision level application info
logging name bng-dhcp0.bngfsol.collision level transaction info
logging name infra.application.core level application warn
logging name infra.config.core level application error
logging name infra.config.core level transaction error
k8 bng
  etcd-endpoint etcd:2379
  datastore-endpoint datastore-ep-session:8882
  tracing
    enable
    enable-trace-percent 30
    append-messages true
    endpoint jaeger-collector:9411
  exit
exit
k8 label protocol-layer key smi.cisco.com/vm-type value protocol
exit
k8 label service-layer key smi.cisco.com/vm-type value service
exit
k8 label cdl-layer key smi.cisco.com/vm-type value session
exit
k8 label oam-layer key smi.cisco.com/vm-type value oam
exit
system mode running
exit

ipam
  instance 1
    source local
    address-pool POOL_1
    address-quarantine-timer 60
    vrf-name default
    ipv4
      split-size
        per-cache 32768
        per-dp 32768
      exit
      threshold
        upper-threshold 80
      exit
      address-range 11.0.0.2 11.10.255.254
    exit
    ipv6
      address-ranges
        split-size
          per-cache 32768
          per-dp 32768
        exit
        address-range 2405:1::2 2405:1::ffff
        address-range 2405:2::2 2405:2::ffff
        address-range 2405:3::2 2405:3::ffff
    exit
  exit

```

```
    address-range 2405:4::2 2405:4::ffff
  exit
  prefix-ranges
    split-size
      per-cache 32768
      per-dp    32768
    exit
    prefix-range 3405:1:: length 46
    prefix-range 3405:2:: length 46
    prefix-range 3405:3:: length 46
    prefix-range 3405:4:: length 46
  exit
exit
address-pool POOL_2
address-quarantine-timer 60
vrf-name                VRF-GOLD
ipv4
  split-size
    per-cache 32768
    per-dp    32768
  exit
  threshold
    upper-threshold 80
  exit
  address-range 12.0.0.2 12.10.255.254
exit
ipv6
  address-ranges
    split-size
      per-cache 32768
      per-dp    32768
    exit
    address-range 2406:1::2 2406:1::ffff
    address-range 2406:2::2 2406:2::ffff
    address-range 2406:3::2 2406:3::ffff
    address-range 2406:4::2 2406:4::ffff
  exit
  prefix-ranges
    split-size
      per-cache 32768
      per-dp    32768
    exit
    prefix-range 3406:1:: length 46
    prefix-range 3406:2:: length 46
    prefix-range 3406:3:: length 46
    prefix-range 3406:4:: length 46
  exit
exit
address-pool POOL_3
address-quarantine-timer 60
vrf-name                vrf_lps_asr9k
ipv4
  split-size
    per-cache 32768
    per-dp    32768
  exit
  threshold
    upper-threshold 80
  exit
  address-range 13.0.0.1 13.255.255.255
exit
ipv6
```

```
address-ranges
  split-size
    per-cache 16384
    per-dp    16384
  exit
  address-range 2404:1::1 2404:1::ffff
  address-range 2404:2::1 2404:2::ffff
  address-range 2404:3::1 2404:3::ffff
  address-range 2404:4::1 2404:4::ffff
  address-range 2404:5::1 2404:5::ffff
  address-range 2404:6::1 2404:6::ffff
  address-range 2404:7::1 2404:7::ffff
  address-range 2404:8::1 2404:8::ffff
  address-range 2404:9::1 2404:9::ffff
  address-range 2404:10::1 2404:10::ffff
  address-range 2404:11::1 2404:11::ffff
  address-range 2404:12::1 2404:12::ffff
  address-range 2404:13::1 2404:13::ffff
  address-range 2404:14::1 2404:14::ffff
  address-range 2404:15::1 2404:15::ffff
  address-range 2404:16::1 2404:16::ffff
  address-range 2404:17::1 2404:17::ffff
  address-range 2404:18::1 2404:18::ffff
  address-range 2404:19::1 2404:19::ffff
  address-range 2404:20::1 2404:20::ffff
  address-range 2404:21::1 2404:21::ffff
  address-range 2404:22::1 2404:22::ffff
  address-range 2404:23::1 2404:23::ffff
  address-range 2404:24::1 2404:24::ffff
  address-range 2404:25::1 2404:25::ffff
  address-range 2404:26::1 2404:26::ffff
  address-range 2404:27::1 2404:27::ffff
  address-range 2404:28::1 2404:28::ffff
  address-range 2404:29::1 2404:29::ffff
  address-range 2404:30::1 2404:30::ffff
  address-range 2404:31::1 2404:31::ffff
  address-range 2404:32::1 2404:32::ffff
  address-range 2404:33::1 2404:33::ffff
  address-range 2404:34::1 2404:34::ffff
  address-range 2404:35::1 2404:35::ffff
  address-range 2404:36::1 2404:36::ffff
  address-range 2404:37::1 2404:37::ffff
  address-range 2404:38::1 2404:38::ffff
  address-range 2404:39::1 2404:39::ffff
  address-range 2404:40::1 2404:40::ffff
  exit
  prefix-ranges
    split-size
      per-cache 32768
      per-dp    32768
    exit
    prefix-range 2404:db0:: length 42
    prefix-range 2404:db1:: length 42
    prefix-range 2404:db2:: length 42
    prefix-range 2404:db3:: length 42
    prefix-range 2404:db4:: length 42
    prefix-range 2404:db5:: length 42
    prefix-range 2404:db6:: length 42
    prefix-range 2404:db7:: length 42
    prefix-range 2404:db8:: length 42
    prefix-range 2404:db9:: length 42
  exit
  exit
  exit
```

```
exit
exit
cdl node-type session
cdl logging default-log-level error
cdl datastore session
  slice-names [ 1 ]
  endpoint replica 2
  endpoint settings slot-timeout-ms 750
  index replica 2
  index map 1
  slot replica 2
  slot map 2
  slot notification limit 300
exit
cdl kafka replica 1
profile dhcp DHCP_SERVER_1
  ipv4
  mode server
  server
  pool-name          POOL_1
  dns-servers        [ 8.8.8.8 8.8.8.88 8.8.88.88 ]
  netbios-name-server [ 9.9.9.9 9.9.9.99 9.9.99.99 ]
  domain-name        cisco.com
  boot-filename       cisco.cfg
  next-server         7.7.7.7
  netbios-node-type  broadcast-node
  lease days 1
  lease hours 4
  lease minutes 2
  exit
exit
  ipv6
  mode server
  server
  iana-pool-name     POOL_1
  iapd-pool-name     POOL_1
  dns-servers        [ 2002::1 2002::2 ]
  domain-name        cisco.com
  preference          255
  aftr-name          aftr.cisco.com
  lease days 1
  lease hours 4
  lease minutes 2
  exit
exit
profile dhcp DHCP_SERVER_2
  ipv4
  mode server
  server
  pool-name          POOL_1
  dns-servers        [ 8.8.8.8 8.8.8.88 8.8.88.88 ]
  netbios-name-server [ 9.9.9.9 9.9.9.99 9.9.99.99 ]
  domain-name        cisco.com
  boot-filename       cisco.cfg
  next-server         7.7.7.7
  netbios-node-type  broadcast-node
  lease days 1
  lease hours 4
  lease minutes 2
  exit
exit
  ipv6
  mode server
```

```

server
  iana-pool-name POOL_1
  iapd-pool-name POOL_1
  lease days 1
  lease hours 4
  lease minutes 2
exit
exit
profile dhcp DHCP_SERVER_3
  ipv4
  mode server
  server
    pool-name POOL_3
    dns-servers [ 8.8.8.8 ]
    lease hours 6
    lease minutes 1
  exit
exit
  ipv6
  mode server
  server
    iana-pool-name POOL_3
    iapd-pool-name POOL_3
    lease days 1
    lease hours 4
    lease minutes 2
  exit
exit
profile dhcp DHCP_SERVER_4
  ipv4
  mode server
  server
    pool-name POOL_2
    dns-servers [ 8.8.8.8 ]
    lease hours 6
    lease minutes 1
  exit
exit
  ipv6
  mode server
  server
    iana-pool-name POOL_2
    iapd-pool-name POOL_2
    lease days 1
    lease hours 4
    lease minutes 2
  exit
exit
profile pppoe PPPOE_PROFILE_1
  ctrl-pkt-priority 7
  service-name [ cisco ]
  ac-name 123@acname
  ac-cookie 123@accookie
exit
profile aaa AAA_PROF_1
  authentication
  method-order [ SERVER_GROUP_PROF_1 ]
exit
  authorization
  type subscriber method-order [ SERVER_GROUP_PROF_1 ]
  username identifier client-mac-address

```



```
password cisco
exit
accounting
method-order [ SERVER_GROUP_PROF_1 ]
exit
exit
profile aaa AAA_PROF_2
authentication
method-order [ SERVER_GROUP_PROF_2 ]
exit
authorization
type subscriber method-order [ SERVER_GROUP_PROF_2 ]
username identifier client-mac-address
password cisco
exit
accounting
method-order [ SERVER_GROUP_PROF_2 ]
exit
exit
profile server-group SERVER_GROUP_PROF_1
radius-group SERVER_GROUP_1
exit
profile server-group SERVER_GROUP_PROF_2
radius-group SERVER_GROUP_2
exit
profile subscriber SUBS_IPoE_1
dhcp-profile DHCP_SERVER_1
session-type ipv4v6
activate-feature-templates [ BASE_TPL_1 ]
aaa authorize AAA_PROF_1
exit
profile subscriber SUBS_IPoE_2
dhcp-profile DHCP_SERVER_3
session-type ipv4v6
activate-feature-templates [ BASE_TPL_2 ]
aaa authorize AAA_PROF_2
exit
profile subscriber SUBS_IPoE_3
dhcp-profile DHCP_SERVER_4
session-type ipv4v6
activate-feature-templates [ BASE_TPL_3 ]
aaa authorize AAA_PROF_2
exit
profile subscriber SUBS_PPPOE_1
dhcp-profile DHCP_SERVER_2
pppoe-profile PPPOE_PROFILE_1
session-type ipv4v6
class ppp_cls_map
activate-feature-templates [ FT_START_1 ]
matches
match-type all
match protocol [ ppp ]
exit
exit
event session-activate
class ppp_cls_map
activate-feature-templates [ FT_ACTIVATE_1 ]
matches
match-type all
match protocol [ ppp ]
exit
aaa authenticate AAA_PROF_1
exit
exit
```

```

exit
profile subscriber SUBS_PPpOE_2
dhcp-profile DHCP_SERVER_3
pppoe-profile PPPOE_PROFILE_1
session-type ipv4v6
class ppp_cls_map
  activate-feature-templates [ FT_START_1 ]
  matches
    match-type all
    match protocol [ ppp ]
  exit
exit
event session-activate
class ppp_cls_map
  activate-feature-templates [ FT_ACTIVATE_2 HSI_100MB ]
  matches
    match-type all
    match protocol [ ppp ]
  exit
  aaa authenticate AAA_PROF_1
exit
exit
exit
profile subscriber SUBS_PPpOE_3
dhcp-profile DHCP_SERVER_4
pppoe-profile PPPOE_PROFILE_1
session-type ipv4v6
class ppp_cls_map
  activate-feature-templates [ FT_START_2 ]
  matches
    match-type all
    match protocol [ ppp ]
  exit
exit
event session-activate
class ppp_cls_map
  activate-feature-templates [ FT_ACTIVATE_3 ]
  matches
    match-type all
    match protocol [ ppp ]
  exit
  aaa authenticate AAA_PROF_1
exit
exit
exit
profile feature-template BASE_TPL_1
vrf-name default
ipv4
  mtu 1492
  disable-unreachables
  verify-unicast-source reachable-via-rx
exit
ipv6
  mtu 1492
  disable-unreachables
  verify-unicast-source reachable-via-rx
exit
session-accounting
  enable
  aaa-profile AAA_PROF_1
exit
exit
profile feature-template BASE_TPL_2
vrf-name vrf_lps_asr9k

```

```
ipv4
  mtu 1492
  disable-unreachables
  verify-unicast-source reachable-via-rx
exit
ipv6
  mtu 1492
  disable-unreachables
  verify-unicast-source reachable-via-rx
exit
qos
  in-policy qos_svcl_in
  out-policy qos_svcl_out
exit
session-accounting
  enable
  aaa-profile AAA_PROF_2
exit
profile feature-template BASE_TPL_3
  vrf-name VRF-GOLD
  ipv4
    mtu 1492
    disable-unreachables
    verify-unicast-source reachable-via-rx
  exit
  ipv6
    mtu 1492
    disable-unreachables
    verify-unicast-source reachable-via-rx
  exit
  session-accounting
    enable
    aaa-profile AAA_PROF_2
  exit
exit
profile feature-template FT_ACTIVATE_1
  vrf-name default
  ipv4
    mtu 1492
    disable-unreachables
    verify-unicast-source reachable-via-rx
  exit
  ipv6
    mtu 1492
    disable-unreachables
    verify-unicast-source reachable-via-rx
  exit
  ppp
    ipcp dns 8.8.8.8 1.2.3.4
    ipcp peer-address-pool POOL_1
    ipcp renegotiation ignore
    ipcp wins 4.4.4.4 3.3.3.3
    ipv6cp renegotiation ignore
  exit
exit
profile feature-template FT_ACTIVATE_2
  vrf-name vrf_lps_asr9k
  ipv4
    mtu 1492
    disable-unreachables
    verify-unicast-source reachable-via-rx
  exit
  ipv6
```

```

mtu 1492
disable-unreachables
verify-unicast-source reachable-via-rx
exit
ppp
ipcp dns 8.8.8.8 1.2.3.4
ipcp peer-address-pool POOL_3
ipcp renegotiation ignore
ipcp wins 4.4.4.4 3.3.3.3
ipv6cp renegotiation ignore
exit
exit
profile feature-template FT_ACTIVATE_3
vrf-name VRF-GOLD
ipv4
mtu 1492
disable-unreachables
verify-unicast-source reachable-via-rx
exit
ipv6
mtu 1492
disable-unreachables
verify-unicast-source reachable-via-rx
exit
ppp
ipcp dns 8.8.8.8 1.2.3.4
ipcp peer-address-pool POOL_2
ipcp renegotiation ignore
ipcp wins 4.4.4.4 3.3.3.3
ipv6cp renegotiation ignore
exit
exit
profile feature-template FT_START_1
session-accounting
enable
aaa-profile AAA_PROF_1
exit
ppp
authentication [ pap chap ]
lcp delay seconds 1 milliseconds 0
lcp renegotiation ignore
max-bad-auth 4
max-failure 5
timeout retry 3
keepalive interval 60 retry 5
exit
exit
profile feature-template FT_START_2
session-accounting
enable
aaa-profile AAA_PROF_2
exit
ppp
authentication [ pap chap ]
lcp delay seconds 1 milliseconds 0
lcp renegotiation ignore
max-bad-auth 4
max-failure 5
timeout retry 3
keepalive interval 60 retry 5
exit
exit
profile feature-template HSI_100MB
qos

```

```

    in-policy HSI_UPLOAD_RATE_100MB_IN
    out-policy HSI_DOWNLOAD_RATE_100MB_OUT
  exit
exit
profile feature-template HSI_100MB_NO_Merge
  qos
    in-policy HSI_UPLOAD_RATE_100MB_IN_V4
    out-policy HSI_DOWNLOAD_RATE_100MB_OUT_V4
  exit
exit
profile feature-template HSI_100MB_V4
  qos
    in-policy HSI_UPLOAD_RATE_100MB_IN_V4
    out-policy HSI_DOWNLOAD_RATE_100MB_OUT_V4
  merge-level 40
  exit
  service-accounting
    enable
    aaa-profile AAA_PROF_1
    periodic-interval 1200
  exit
exit
profile radius
  algorithm round-robin
  deadtime 1
  detect-dead-server response-timeout 60
  max-retry 1
  timeout 5
  server 203.203.203.12 1812
    type auth
    secret $8$uCC1/DzxkoOTeUFsUIUQoqF1Gbrzt6bo2HWRmUH9Sck=
  exit
  server 203.203.203.12 1813
    type acct
    secret $8$lmsqnr3OZYu6j0+DRGgvic5m0a/wmNw6sAnH4G7BYms=
  exit
  server 203.203.203.13 1812
    type auth
    secret $8$sI2jG0E3TLnPZ6+EpaSKxIYNayfX6pOo3nV8Y6w2R8I=
  exit
  server 203.203.203.13 1813
    type acct
    secret $8$49TVXKEXstB7DyK/r/QuxbzGcQ6avG1A4wrgSukSp9s=
  exit
  server 203.203.203.14 1812
    type auth
    secret $8$qdAzfoAmxVBIX04Xjw//Xywsire0AuNYC8EbKy11kiQ=
  exit
  server 203.203.203.14 1813
    type acct
    secret $8$Fxs0QXKUmz93ULLuQo6yH6pjR0mB3CgTx7TRYL2U1Ao=
  exit
  server 203.203.203.15 1812
    type auth
    secret $8$j6PMUylUXz9Uggo42Zm2z6xfL0icZ8R5ry7tBP60BYo=
  exit
  server 203.203.203.15 1813
    type acct
    secret $8$oAbeghiPAJ88qqtjZqYihS39VmycliU85WUo6pHpaAw=
  exit
  attribute
    nas-identifier CISCO-BNG
    nas-ip 203.203.203.51
  exit

```

```

server-group SERVER_GROUP_1
  server auth 203.203.203.12 1812
  exit
  server auth 203.203.203.13 1812
  exit
  server acct 203.203.203.12 1813
  exit
  server acct 203.203.203.13 1813
  exit
exit
server-group SERVER_GROUP_2
  server auth 203.203.203.12 1812
  exit
  server auth 203.203.203.13 1812
  exit
  server acct 203.203.203.12 1813
  exit
  server acct 203.203.203.13 1813
  exit
exit
exit
profile coa
  client 203.203.203.11
    server-key $8$l0ZSTRkSki7VIU9Ld31kIFALUH4VipxvUKS0lOskSho=
  exit
  client 203.203.203.13
    server-key $8$ViHTNL8bYPdcrTYXO24AJ1TnsnUJRXp6DBfWF/FX1/8=
  exit
exit
user-plane ASR9k-UP-1
  peer-address ipv4 101.101.101.52
  subscriber-profile SUBS_IPoE_1
  port-id Bundle-Ether5011.1
    subscriber-profile SUBS_IPoE_1
  exit
  port-id Bundle-Ether5011.1011015
    subscriber-profile SUBS_PPpOE_1
  exit
  port-id Bundle-Ether5011.1021015
    subscriber-profile SUBS_PPpOE_1
  exit
  port-id Bundle-Ether5011.1031015
    subscriber-profile SUBS_PPpOE_1
  exit
  port-id Bundle-Ether5011.1041015
    subscriber-profile SUBS_PPpOE_1
  exit
  port-id Bundle-Ether5011.2
    subscriber-profile SUBS_IPoE_1
  exit
  port-id Bundle-Ether5011.3
    subscriber-profile SUBS_IPoE_1
  exit
  port-id Bundle-Ether5011.4
    subscriber-profile SUBS_IPoE_1
  exit
  port-id Bundle-Ether5012.1
    subscriber-profile SUBS_IPoE_3
  exit
  port-id Bundle-Ether5012.1011015
    subscriber-profile SUBS_PPpOE_3
  exit
  port-id Bundle-Ether5012.1021015
    subscriber-profile SUBS_PPpOE_3

```

```
exit
port-id Bundle-Ether5012.1031015
  subscriber-profile SUBS_PPpOE_3
exit
port-id Bundle-Ether5012.1041015
  subscriber-profile SUBS_PPpOE_3
exit
port-id Bundle-Ether5012.2
  subscriber-profile SUBS_IPoE_3
exit
port-id Bundle-Ether5012.3
  subscriber-profile SUBS_IPoE_3
exit
port-id Bundle-Ether5012.4
  subscriber-profile SUBS_IPoE_3
exit
exit
user-plane ASR9k-UP-2
peer-address ipv4 101.101.101.51
subscriber-profile SUBS_IPoE_1
port-id Bundle-Ether1.1011015
  subscriber-profile SUBS_PPpOE_1
exit
port-id Bundle-Ether1.1021015
  subscriber-profile SUBS_PPpOE_1
exit
port-id Bundle-Ether1.1031015
  subscriber-profile SUBS_PPpOE_1
exit
port-id Bundle-Ether1.1041015
  subscriber-profile SUBS_PPpOE_1
exit
exit
user-plane lps_asr9k-1
peer-address ipv4 192.69.1.1
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.2
  subscriber-profile SUBS_PPpOE_2
exit
exit
user-plane lps_asr9k-10
peer-address ipv4 192.69.1.10
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.2
  subscriber-profile SUBS_PPpOE_2
exit
exit
user-plane lps_asr9k-11
peer-address ipv4 192.69.1.11
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
```

```
exit
port-id Bundle-Ether1.2
  subscriber-profile SUBS_PPPoE_2
exit
exit
user-plane lps_asr9k-12
peer-address ipv4 192.69.1.12
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.2
  subscriber-profile SUBS_PPPoE_2
exit
exit
user-plane lps_asr9k-13
peer-address ipv4 192.69.1.13
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.2
  subscriber-profile SUBS_PPPoE_2
exit
exit
user-plane lps_asr9k-14
peer-address ipv4 192.69.1.14
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.2
  subscriber-profile SUBS_PPPoE_2
exit
exit
user-plane lps_asr9k-15
peer-address ipv4 192.69.1.15
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.2
  subscriber-profile SUBS_PPPoE_2
exit
exit
user-plane lps_asr9k-16
peer-address ipv4 192.69.1.16
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.2
  subscriber-profile SUBS_PPPoE_2
exit
```



```
exit
user-plane lps_asr9k-17
peer-address ipv4 192.69.1.17
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.2
  subscriber-profile SUBS_PPpOE_2
exit
exit
user-plane lps_asr9k-18
peer-address ipv4 192.69.1.18
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.2
  subscriber-profile SUBS_PPpOE_2
exit
exit
user-plane lps_asr9k-19
peer-address ipv4 192.69.1.19
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.2
  subscriber-profile SUBS_PPpOE_2
exit
exit
user-plane lps_asr9k-2
peer-address ipv4 192.69.1.2
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.2
  subscriber-profile SUBS_PPpOE_2
exit
exit
user-plane lps_asr9k-20
peer-address ipv4 192.69.1.20
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.2
  subscriber-profile SUBS_PPpOE_2
exit
exit
user-plane lps_asr9k-21
peer-address ipv4 192.69.1.21
port-id 8805
```

```
    subscriber-profile SUBS_IPoE_2
  exit
  port-id Bundle-Ether1.1
    subscriber-profile SUBS_IPoE_2
  exit
  port-id Bundle-Ether1.2
    subscriber-profile SUBS_PPpOE_2
  exit
exit
user-plane lps_asr9k-22
  peer-address ipv4 192.69.1.22
  port-id 8805
    subscriber-profile SUBS_IPoE_2
  exit
  port-id Bundle-Ether1.1
    subscriber-profile SUBS_IPoE_2
  exit
  port-id Bundle-Ether1.2
    subscriber-profile SUBS_PPpOE_2
  exit
exit
user-plane lps_asr9k-23
  peer-address ipv4 192.69.1.23
  port-id 8805
    subscriber-profile SUBS_IPoE_2
  exit
  port-id Bundle-Ether1.1
    subscriber-profile SUBS_IPoE_2
  exit
  port-id Bundle-Ether1.2
    subscriber-profile SUBS_PPpOE_2
  exit
exit
user-plane lps_asr9k-24
  peer-address ipv4 192.69.1.24
  port-id 8805
    subscriber-profile SUBS_IPoE_2
  exit
  port-id Bundle-Ether1.1
    subscriber-profile SUBS_IPoE_2
  exit
  port-id Bundle-Ether1.2
    subscriber-profile SUBS_PPpOE_2
  exit
exit
user-plane lps_asr9k-25
  peer-address ipv4 192.69.1.25
  port-id 8805
    subscriber-profile SUBS_IPoE_2
  exit
  port-id Bundle-Ether1.1
    subscriber-profile SUBS_IPoE_2
  exit
  port-id Bundle-Ether1.2
    subscriber-profile SUBS_PPpOE_2
  exit
exit
user-plane lps_asr9k-26
  peer-address ipv4 192.69.1.26
  port-id 8805
    subscriber-profile SUBS_IPoE_2
  exit
  port-id Bundle-Ether1.1
    subscriber-profile SUBS_IPoE_2
```

```
exit
port-id Bundle-Ether1.2
subscriber-profile SUBS_PPPE_2
exit
exit
user-plane lps_asr9k-27
peer-address ipv4 192.69.1.27
port-id 8805
subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
subscriber-profile SUBS_IPoE_2
exit
exit
user-plane lps_asr9k-28
peer-address ipv4 192.69.1.28
port-id 8805
subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
subscriber-profile SUBS_IPoE_2
exit
exit
user-plane lps_asr9k-29
peer-address ipv4 192.69.1.29
port-id 8805
subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
subscriber-profile SUBS_IPoE_2
exit
exit
user-plane lps_asr9k-3
peer-address ipv4 192.69.1.3
port-id 8805
subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.2
subscriber-profile SUBS_PPPE_2
exit
exit
user-plane lps_asr9k-30
peer-address ipv4 192.69.1.30
port-id 8805
subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
subscriber-profile SUBS_IPoE_2
exit
exit
user-plane lps_asr9k-31
peer-address ipv4 192.69.1.31
port-id 8805
subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
subscriber-profile SUBS_IPoE_2
exit
exit
user-plane lps_asr9k-32
peer-address ipv4 192.69.1.32
```

```
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
exit
user-plane lps_asr9k-33
peer-address ipv4 192.69.1.33
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
exit
user-plane lps_asr9k-34
peer-address ipv4 192.69.1.34
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
exit
user-plane lps_asr9k-35
peer-address ipv4 192.69.1.35
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
exit
user-plane lps_asr9k-36
peer-address ipv4 192.69.1.36
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
exit
user-plane lps_asr9k-37
peer-address ipv4 192.69.1.37
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
exit
user-plane lps_asr9k-38
peer-address ipv4 192.69.1.38
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
exit
user-plane lps_asr9k-39
peer-address ipv4 192.69.1.39
port-id 8805
```

```
    subscriber-profile SUBS_IPoE_2
  exit
  port-id Bundle-Ether1.1
    subscriber-profile SUBS_IPoE_2
  exit
exit
user-plane lps_asr9k-4
  peer-address ipv4 192.69.1.4
  port-id 8805
    subscriber-profile SUBS_IPoE_2
  exit
  port-id Bundle-Ether1.1
    subscriber-profile SUBS_IPoE_2
  exit
  port-id Bundle-Ether1.2
    subscriber-profile SUBS_PPPE_2
  exit
exit
user-plane lps_asr9k-40
  peer-address ipv4 192.69.1.40
  port-id 8805
    subscriber-profile SUBS_IPoE_2
  exit
  port-id Bundle-Ether1.1
    subscriber-profile SUBS_IPoE_2
  exit
exit
user-plane lps_asr9k-41
  peer-address ipv4 192.69.1.41
  port-id 8805
    subscriber-profile SUBS_IPoE_2
  exit
  port-id Bundle-Ether1.1
    subscriber-profile SUBS_IPoE_2
  exit
exit
user-plane lps_asr9k-42
  peer-address ipv4 192.69.1.42
  port-id 8805
    subscriber-profile SUBS_IPoE_2
  exit
  port-id Bundle-Ether1.1
    subscriber-profile SUBS_IPoE_2
  exit
exit
user-plane lps_asr9k-43
  peer-address ipv4 192.69.1.43
  port-id 8805
    subscriber-profile SUBS_IPoE_2
  exit
  port-id Bundle-Ether1.1
    subscriber-profile SUBS_IPoE_2
  exit
exit
user-plane lps_asr9k-44
  peer-address ipv4 192.69.1.44
  port-id 8805
    subscriber-profile SUBS_IPoE_2
  exit
  port-id Bundle-Ether1.1
    subscriber-profile SUBS_IPoE_2
  exit
exit
user-plane lps_asr9k-45
```

```
peer-address ipv4 192.69.1.45
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
exit
user-plane lps_asr9k-46
peer-address ipv4 192.69.1.46
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
exit
user-plane lps_asr9k-47
peer-address ipv4 192.69.1.47
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
exit
user-plane lps_asr9k-48
peer-address ipv4 192.69.1.48
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
exit
user-plane lps_asr9k-49
peer-address ipv4 192.69.1.49
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
exit
user-plane lps_asr9k-5
peer-address ipv4 192.69.1.5
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.2
  subscriber-profile SUBS_PPpPoE_2
exit
exit
user-plane lps_asr9k-50
peer-address ipv4 192.69.1.50
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
```

```
exit
user-plane lps_asr9k-6
peer-address ipv4 192.69.1.6
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.2
  subscriber-profile SUBS_PPpOE_2
exit
exit
user-plane lps_asr9k-7
peer-address ipv4 192.69.1.7
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.2
  subscriber-profile SUBS_PPpOE_2
exit
exit
user-plane lps_asr9k-8
peer-address ipv4 192.69.1.8
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.2
  subscriber-profile SUBS_PPpOE_2
exit
exit
user-plane lps_asr9k-9
peer-address ipv4 192.69.1.9
port-id 8805
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.1
  subscriber-profile SUBS_IPoE_2
exit
port-id Bundle-Ether1.2
  subscriber-profile SUBS_PPpOE_2
exit
exit
instance instance-id 1
  endpoint sm
  exit
  endpoint nodemgr
  exit
  endpoint n4-protocol
    retransmission timeout 0 max-retry 1
  exit
  endpoint dhcp
  exit
  endpoint pppoe
  exit
  endpoint radius
    replicas 1
    vip-ip 203.203.203.51
```

```

interface coa-nas
  sla response 165000
  vip-ip 203.203.203.51 vip-port 3799
exit
exit
endpoint udp-proxy
  replicas 1
  nodes 2
  vip-ip 203.203.203.51 vip-port 2000
interface n4
  sla response 165000
exit
interface gtpu
  sla response 165000
exit
exit
exit
logging transaction duplicate disable
logging level application error
logging level transaction error
logging level tracing error
system mode running
exit

```

Configuring the UP

The following is a sample UP configuration:

```

user-plane asr9k-11
peer-address ipv4 10.105.247.124
subscriber-profile subs-default
port-id Bundle-Ether2.10
  subscriber-profile subs-vrf
exit
port-id Bundle-Ether2.20
  subscriber-profile subs-vrf
port-id Bundle-Ether2.10
exit
port-id Bundle-Ether2.30
  subscriber-profile subs-vrf
port-id Bundle-Ether2.10
exit
port-id Bundle-Ether2.40
  subscriber-profile subs-vrf
port-id Bundle-Ether2.10
exit
exit

```

Loading Day1 Configuration

To load the Day 1 configuration for cnBNG, run the following command:

```
ssh admin@ops_center_pod_ip -p 2024 < Day1config.cli
```



Note The **day1config.cli** file contains the necessary parameters required for the Day 1 configuration.

Alternatively, you can copy the configuration and paste it in the BNG Ops Center CLI to load the Day 1 configuration.

configure

```
<Paste the Day 1 configuration here>
```



```
commit
exit
```

Day1config.cli

The `day1config.cli` file contains the Day 1 configuration for cnBNG. For a sample day1 configuration, see [Configuring the CP, on page 11](#).

Mapping Pods with Node Labels

Prerequisites

- Ensure that the node labels are according to the pod deployment layout.
- Ensure that the external VIPs are according to the requirement of NF.
- Enable Istio for pod to pod traffic load balancing.

Node Labels are key and value pairs that are attached to nodes at cluster synchronization. Each node can have a set of key and value labels defined. Each key must be unique for a node. With labels, users can map their NF pods onto nodes in a loosely coupled manner.



Important

- The pod-level labeling configuration is applicable only when the cnBNG CP is deployed on a bare metal server.
- Ensure to configure the node label on the SMI cluster deployer before mapping the pods. Following is the sample command for master-1 labeling:

```
[cndp-clpnc-cm-cm-primary] SMI Cluster Deployer (config-nodes-master-1)# k8s node-labels
smi.cisco.com/svc-type bng-node
```

To map the pods with node labels, use the following sample configuration:

```
config
k8 label protocol-layer key label_key value label_value
k8 label service-layer key label_key value label_value
k8 label cdl-layer key label_key value label_value
k8 label oam-layer key label_key value label_value
end
```

Following is an example configuration of pod to node-label mapping:

```
k8 label protocol-layer key smi.cisco.com/node-type value bng-proto
exit
k8 label service-layer key vm-type value bng-svc
exit
k8 label cdl-layer key smi.cisco.com/node-type value bng-cdl
exit
k8 label oam-layer key smi.cisco.com/node-type value oam
exit
```

High Availability Support on Bare Metal Server

High Availability on cnBNG CP is validated on bare metal server deployment. For more information about High Availability, see [High Availability and CP Reconciliation](#).