# Integrating with DCNM

This section includes the following topics:

## DCNM Integration Overview

Prime Network Services Controller supports integration with Cisco Data Center Network Manager (DCNM). As part of this integration, Prime Network Services Controller provides the automation of virtual network services in Cisco Dynamic Fabric Automation (DFA). In the Cisco DFA solution, services like firewalls and load balancers are deployed at leaf nodes within the spine-leaf topology and in border leaf nodes, in contrast to more traditional data centers where these services are deployed at the aggregation layer.

The following table describes the primary items in the Prime Network Services Controller integration with DCNM:

| Item | Description |
|------|-------------|
| Prime Network Services Controller | Provides central management of network services in a multi-tenant environment. |
| DCNM | • Provides the setup, visualization, management, and monitoring of the data center infrastructure.<br>• Provides configuration and image management for the fabric. |
| Dynamic Fabric Automation (DFA) cluster | Provides a simplified spine-leaf architecture, enhanced forwarding, and distributed control plane. |

| Item | Description |
|---|---|
| Prime Network Services Controller Adaptor | • Links Prime Network Services Controller with DCNM.<br><br>• Enables DCNM to interoperate with one or more instances of Prime Network Services Controller.<br><br>• Maps the tenants and virtual data centers to the Prime Network Services Controller instances responsible for network services.<br><br>• Listens to network database updates and communicates those updates to the appropriate Prime Network Services Controller instance.<br><br>• Upon notification of a new network service in a tenant network, notifies DCNM of the change. |

Prime Network Services Controller provides centralized management of network services by supporting the following actions:

• The creation, reading, updating, and deletion of vPath-based service chains.

• The creation, updating, and deletion of network services.

• Communicating changes about network services to the Prime Network Services Controller Adapter.

The Prime Network Services Controller GUI reflects this support by displaying information for networks and subnetworks associated with a tenant, and network services in a tenant's network.

**Terminology**

The following table identifies the corresponding terms in Prime Network Services Controller and DCNM:

| Prime Network Services Controller Name | DCNM Name | Description |
|---|---|---|
| Tenant | Organization | A collection of VDCs for tenant-level separation of resources and data. |
| Virtual Data Center (VDC) | Partition | An independent routing domain that includes a collection of subnetworks. A VDC can belong to only one tenant. |
| Subnetwork | Network | A Layer 2 network with a unique identifier. A subnetwork can belong to only one VDC. |

**Networks**

After an admin user provisions one or more tenant networks in DCNM, DCNM sends the information about the tenant network to Prime Network Services Controller. A tenant-admin user in Prime Network Services Controller can then deploy network services such as firewalls, load balancers, and routers on those networks.

For each network, DCNM provides Prime Network Services Controller with a *handle* that uniquely identifies the network on a VM manager and the network's Layer 3 IP details, such as subnet prefix, mask, and default gateway.

To view these networks in Prime Network Services Controller, choose **Resource Management > Managed Resources > root >** *tenant (or other subordinate organization)*, and then click the **Subnetworks** tab.

You can place the interfaces of a network service that is deployed at a particular level (or *node*) in the tenant organizational hierarchy on available networks at the following locations:

- The organization node on which the service is being deployed.

- Organization nodes that are children of the organization node on which the service is being deployed.

- Organization nodes that are ancestors of the organization node on which the service is being deployed.

**Network Roles**

Networks are qualified by a role property which identifies their intended usage. The following table describes the various network roles.

| Network Role | Description |
|---|---|
| Host | Tenant-specific network intended for tenant application VMs. Service nodes can also be connected to this network. |
| Service | Tenant network intended exclusively for service nodes. |
| External | Tenant network that provides external connectivity. Both tenant application VMs and service nodes can connect to this network. |
| Management | Shared infrastructure network used for communication between service nodes and Prime Network Services Controller. Service node management interfaces connect to this network. |
| HA | Shared infrastructure network intended for high availability communications between service nodes. Service node HA interfaces connect to this network. |

In contrast with tenant networks, which are tenant-specific and provisioned on the data center fabric by DCNM, infrastructure networks are shared by all tenants and are provisioned on the data center fabric out of band.

Details about infrastructure networks need to be added to Prime Network Services Controller by the admin user. Because these networks are shared, they can be added only to root (**Tenant Management > root**).

To add details about infrastructure networks, choose **Resource Management > Managed Resources** and then click the **Subnetworks** tab.

**Roles and Privileges**

The following roles support Prime Network Services Controller integration with DCNM:

| Role | Responsibility |
|---|---|
| admin | • Deploy Prime Network Services Controller if it is not already deployed.<br><br>• Configure the Prime Network Services Controller instance and credentials on DCNM.<br><br>• Confirm communication between Prime Network Services Controller and DCNM.<br><br>• As needed, create tenant-admin user accounts.<br><br>• Provide the tenant-admin user with the Prime Network Services Controller management IP address. |
| tenant-admin | • Add, modify, or delete network services in the scope of the tenant organizational hierarchy provided by DCNM.<br><br>• As part of network service creation, connect the data interfaces on the subnetworks for that tenant. |

# Configuring Connectivity with DCNM

This procedure describes how to configure connectivity between Prime Network Services Controller and DCNM.

After you have successfully configured connectivity, the following aspects apply:

- When operating with DCNM, you cannot create, modify, or delete tenants or virtual data centers from the Prime Network Services Controller GUI.

- Prime Network Services Controller allows admin and tenant-admin users to create, modify, and delete Application and Tier organizational levels under a Virtual Data Center organization.

- The Prime Network Services Controller GUI does not allow admin or tenant-admin users to modify any information related to tenant-scoped network or subnetworks. This restriction does not apply to management or HA networks and subnetworks that are managed by Prime Network Services Controller admin users.

- If you create, update, or delete a network service in Prime Network Services Controller, it will be reflected in both DCNM and Prime Network Services Controller.

### Before You Begin

Confirm the following:

- The DCNM system is running.

- Enhanced Fabric Network was enabled during DCNM deployment.

- You have network access to the DCNM system.

- You have the appropriate privileges for configuring DCNM.

- You have deployed Prime Network Services Controller in Orchestrator mode.

- You have created a user account with the admin role for use only by the Prime Network Services Controller Adaptor in DCNM.

For more information about these prerequisites, see the following links:

- Cisco Prime Data Center Network Manager—http://www.cisco.com/en/US/products/ps9369/tsd_products_support_series_home.html

- Prime Network Services Controller Quick Start Guide—http://www.cisco.com/en/US/products/ps13213/prod_installation_guides_list.html

### Procedure

**Step 1**  Log in to the DCNM VM console as root.

**Step 2**  Navigate to the /opt/nscadapter/bin directory.

**Step 3**  Start the Prime Network Services Controller adaptor by entering the following command: **nsc-adapter-mgr adapter start**

**Step 4**  Using the **nsc-adapter-mgr nsc add** command, enter the following information to provide DCNM with access to Prime Network Services Controller:

- Prime Network Services Controller management IP address

- Username for Prime Network Services Controller access

- Password for Prime Network Services Controller access

The command format is **nsc-adapter-mgr nsc add** *ip-address username password*.

**Step 5**  Log in to the Cisco DCNM GUI and do the following:

a)  Choose **Admin > Dynamic Fabric Automation > Settings**.

b)  Choose **Config > Dynamic Fabric Automation (DFA) > Auto-Configuration**.

c)  Click **Add Organization** and enter the information for the organization. An organization in DCNM corresponds to a tenant in Prime Network Services Controller.

d)  As needed, add partitions to the organization. A partition in DCNM corresponds to virtual data center in Prime Network Services Controller.

e)  Add a network to the partition.

**Step 6**  To confirm that connectivity is established between DCNM and Prime Network Services Controller, log in to Prime Network Services Controller and confirm that the organization is displayed in the Tenant Management tab.

# Troubleshooting Integration Issues

If you encounter issues with the Prime Network Services Controller and DCNM integration, you can look for information in the following locations:

- On the DCNM server, review the log files in /opt/nscadapter/var/log for information.

- In the Prime Network Services Controller GUI:

  ◦ Review faults for services by choosing **Resource Management > Managed Resources > root >** *tenant* **> Network Services >** *network-service* **> Edit > Faults** tab.

  ◦ Review audit logs and faults by choosing **Resource Management > Diagnostics > Audit Logs** or **Faults**.

For either option, double-click a fault to view more information.

The following table describes specific issues that you might encounter and how to address them:

| Symptom | Cause | Resolution |
|---------|-------|------------|
| Organizations and partitions are created in DCNM but no tenants or virtual device contexts (VDCs) are displayed in Prime Network Services Controller | The configurations in DCNM and Prime Network Services Controller are incomplete. | 1  Confirm that the Service Configuration parameters are complete for networks created in DCNM.<br>2  Confirm that Prime Network Services Controller is registered with the VM Manager IP parameter. |

| Symptom | Cause | Resolution |
|---------|-------|------------|
| Networks are created in DCNM but no tenants, VDCs, or subnetworks are displayed in Prime Network Services Controller. | The Network Services Controller (NSC) Adapter does not have an active connection to Prime Network Services Controller. | Use the **nsc-adapter-mgr adapter connections** command to ensure there is an active connection to Prime Network Services Controller. |
| | The NSC Adapter is not active on DCNM. | Use the **nsc-adapter-mgr adapter connections** command to ensure there is an active connection to DCNM. |
| | Prime Network Services Controller does not have the VM Manager IP. | Confirm that Prime Network Services Controller is registered with the correct VM Manager and provide the VM Manager IP address in the VM Manager IP parameter. |
| | Networks were added to DCNM while Prime Network Services Controller or the NSC Adapter was down. | 1 Enter the command **nsc-adapter-mgr adapter connections** and verify that the connections are correct.<br>2 In the DCNM GUI, choose the auto-config interface, choose the network, click **Edit**, and then click **OK** without making changes. |
| Service networks were deleted in DCNM but the tenants, VDCs, and subnetworks are still shown in Prime Network Services Controller. | Networks were deleted from DCNM while Prime Network Services Controller or the NSC Adapter was down. | 1 Enter the **nsc-adapter-mgr adapter connections** command and verify that the connections are correct.<br>2 In the DCNM GUI, choose the auto-config interface, choose the network, click **Edit**, and then click **OK** without making changes. |
| An edge service was removed from Prime Network Services Controller but the Service Node IP Address is still shown in DCNM. | The service was deleted from Prime Network Services Controller while DCNM or the NSC Adapter was down. | Manually delete the Service Node IP Address in DCNM for the affected partition. |
| An edge service was deployed in Prime Network Services Controller but the Service Node IP Address is not shown in DCNM. | The service was deployed in Prime Network Services Controller while DCNM or the NSC Adapter was down. | Manually update the Service Node IP Address in DCNM auto-config for the affected partition. |

| Symptom | Cause | Resolution |
|---|---|---|
| Host traffic does not reach the service node. | • The wrong profile is specified in DCNM for host networks.<br><br>• The service is not attached to the leaf. | • Make sure that the correct profile is specified in DCNM for the host network.<br><br>• Make sure that the auto-config profile and parameters are correct with particular attention to the Service Node IP address. |