



## CHAPTER 3

# Creating VDCs

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This chapter describes how to create virtual device contexts (VDCs) on NX-OS devices.

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## Information About Creating VDCs

In Cisco NX-OS, only a user with the network-admin role can create VDCs. You can create up to three VDCs.

This section includes the following topics:

- [VDC Resource Templates, page 3-2](#)
- [High-Availability Policies, page 3-3](#)
- [Allocating Interfaces, page 3-3](#)
- [VDC Management Connections, page 3-4](#)
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## VDC Resource Templates

VDC resource templates describe the minimum and maximum resources that the VDC can use. If you do not specify a VDC resource template when you create a VDC, the NX-OS software uses the default template, vdc-default. [Table 3-1](#) and [Table 3-2](#) list the default VDC resource template limits.

**Table 3-1** *Default VDC Resource Template Limits for Cisco NX-OS Release 4.0(1a) and Earlier Releases*

Resource	Minimum	Maximum
IPv4 route memory <sup>1</sup>	8	256
IPv6 route memory <sup>1</sup>	4	256
Port channels	0	256
SPAN sessions	0	2
VLANs	16	4094
VRFs <sup>2</sup>	16	8192

1. Route memory limits are in megabytes.
2. VRFs = virtual routing and forwarding instances

**Table 3-2** *Default VDC Resource Template Limits for Cisco NX-OS Release 4.0(2) and Later Releases*

Resource	Minimum	Maximum
IPv4 route memory <sup>1</sup>	8	320
IPv6 route memory <sup>1</sup>	4	192
Port channels	0	256
SPAN sessions	0	2
VLANs	16	4094
VRFs	16	8192

1. Route memory limits are in megabytes.



### Note

You can have a maximum of two SPAN monitoring sessions on your physical device.

For information about configuring VDC resource templates, see [Chapter 2, “Configuring VDC Resource Templates.”](#)

You can change the individual resource limits after you create the VDC as follows:

- Change an individual resource limit for a single VDC.
- Change the resource limits in a nondefault VDC resource template and apply the template to the VDC.

For information on managing VDC resource limits after you create a VDC, see [Chapter 4, “Managing VDCs.”](#)

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## High-Availability Policies

The high-availability (HA) policies for a VDC defines the action the NX-OS software takes when an unrecoverable VDC fault occurs.

You can specify the HA policies for single supervisor module and dual supervisor module configurations when you create the VDC. The HA policy options are as follows:

- Single supervisor module configuration:
  - Bringdown—Puts the VDC in the failed state. To recover from the failed state, you must reload the physical device.
  - Reload— Reloads the supervisor module.
  - Restart—Takes down the VDC and recreates it using the startup configuration.
- Dual supervisor module configuration:
  - Bringdown—Puts the VDC in the failed state. To recover from the failed state, you must reload the physical device.
  - Restart—Takes down the VDC and recreates it using the startup configuration.
  - Switchover—Initiates a supervisor module switchover.

The default HA policies for a nondefault VDC that you create is restart for a single supervisor modules configuration and switchover for a dual supervisor module configuration. The default HA policy for the default VDC is reload for a single supervisor module configuration and switchover for a dual supervisor module configuration.

For information on changing the HA policies after you create a VDC, see [Chapter 4, “Managing VDCs.”](#)

## Allocating Interfaces

The only physical resources that you can allocate to a VDC are the physical interfaces. You can assign an interface to only one VDC. When you move an interface from one VDC to another VDC, the interface loses all its configuration.

When you first create a VDC, you can specifically allocate interfaces to it. All interfaces initially reside in the default VDC (VDC 1). After you allocate the interfaces to a VDC, you can only view and configure them from that specific VDC. You can also remove interfaces from a VDC by moving them back to the default VDC.



### Caution

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When you move an interface, all configuration on the interface is lost and the interfaces are in the down state.

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You must be aware of the hardware architecture of your platform when allocating interfaces to a VDC. For example, the Cisco Nexus 7000 Series 32-port 10-Gbps Ethernet module (N7K-M132XP-12) requires that you assign all four interfaces in a port group to the same VDC

You can allocate the interfaces on your physical device in any combination, except for the interfaces on the Cisco Nexus 7000 Series 32-port 10-Gbps Ethernet module (N7K-M132XP-12). This module has eight port groups that consist of four interfaces each. You must you assign all four interfaces in a port group to the same VDC. [Table 3-3](#) shows the port numbering for the port groups.

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**Table 3-3 Port Numbers for Port Groups on the Cisco Nexus 7000 Series 32-port 10-Gbps Ethernet Module**

Port Group	Port Numbers
Group 1	1, 3, 5, 7
Group 2	2, 4, 6, 8
Group 3	9, 11, 13, 15
Group 4	10, 12, 14, 16
Group 5	17, 19, 21, 23
Group 6	18, 20, 22, 24
Group 7	25, 27, 29, 31
Group 8	26, 28, 30, 32

For more information on port groups on the Cisco Nexus 7000 Series 32-port 10-Gbps Ethernet module, see the *Cisco Nexus 7000 Series Hardware Installation and Reference Guide*.

For information changing the interface allocation after you create a VDC, see [Chapter 4, “Managing VDCs.”](#)

## VDC Management Connections

The NX-OS software provides a virtual management (mgmt 0) interface for out-of-band management of each VDC. You can configure this interface with a separate IP address that is accessed through the physical mgmt 0 interface. You also use one of the Ethernet interfaces on the physical device for in-band management. For more information on management connections, see the [“VDC Management Connections”](#) section on page 1-8.

## Initializing a New VDC

A new VDC is similar to a new physical device. You must set the VDC admin user account password and perform the basic configuration to establish connectivity to the VDC.

## Licensing Requirements for VDCs

The following table shows the licensing requirements for this feature:

Product	License Requirement
NX-OS	<p>Creating nondefault VDCs requires an Advanced Services license. For a complete explanation of the NX-OS licensing scheme and how to obtain and apply licenses, see the <a href="#">Cisco Nexus 7000 Series NX-OS Licensing Guide, Release 4.1</a>.</p> <p><b>Note</b> The NX-OS software allows a grace period to create and use nondefault VDCs without an Advanced Services license. If the grace period expires before you obtain a license, all VDC configuration is removed from the physical device.</p>

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## Prerequisites for Creating VDCs

VDC creation has the following prerequisites:

- You are logged on to the default VDC with a username that has the network-admin user role.
- The Advance Services license is installed.
- You have a name for the VDC.
- You have resources available on the physical device to allocate to the VDCs.
- You have an IPv4 or IPv6 address to use for configuring connectivity to the VDC.

## Guidelines and Limitations

VDCs have the following guidelines and limitations:

- VDCs cannot share interfaces, VLANs, VRFs, or port channels.
- You can create a maximum of three VDCs on a physical device.
- Only users with the network-admin role can create VDCs.
- You can create VDCs only from the default VDC.

## Process for Creating VDCs

To create VDCs, follow these steps:

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**Step 1** If necessary, create a VDC resource template (see [Chapter 2, “Configuring VDC Resource Templates”](#)).

**Step 2** Create the VDC and allocate interfaces (see the [“Creating VDCs”](#) section on page 3-5).



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**Note** Allocating interfaces to a VDC is optional. You can allocate the interfaces after you have verified the VDC configuration. For information about allocating interface, see the [“Allocating Interfaces to a VDC”](#) section on page 4-4.

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**Step 3** Initialize the VDC (see the [“Initializing a VDC”](#) section on page 3-9).

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## Creating VDCs

You must create a VDC before you can use it. You can create up to three VDCs on your physical device.



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**Note** VDC creation can take a few minutes to complete. Use the **show vdc** command to verify that completion of the create request.

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## BEFORE YOU BEGIN

Log on to the default VDC as a network administrator.

Choose a VDC resource template if you want to use resource limits other than those provided in the default VDC resource template. If there is no resource template available with the limits you want to use, see [Chapter 2, “Configuring VDC Resource Templates.”](#)

## SUMMARY STEPS

1. **config t**
2. **vdc *vdc-name* [ha-policy {dual-sup {bringdown | restart | switchover} [single-sup {bringdown | reload | restart}]} | single-sup {bringdown | reload | restart} [dual-sup {bringdown | restart | switchover}]] [id *vdc-number*] [template *template-name*]**
3. **show vdc membership**
4. **allocate interface ethernet *slot/port***  
**allocate interface ethernet *slot/port* - *last-port***  
**allocate interface ethernet *slot/port*, ethernet *slot/port*, ...**
5. **exit**
6. **show vdc**
7. **copy running-config startup-config**

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## DETAILED STEPS

	Command	Purpose
Step 1	<pre>config t</pre> <p><b>Example:</b> switch# config t switch(config)#</p>	Enters configuration mode.
Step 2	<pre>vdc vdc-name [ha-policy {dual-sup {bringdown   restart   switchover} [single-sup {bringdown   reload   restart}}]   single-sup {bringdown   reload   restart} [dual-sup {bringdown   restart   switchover}}]}] [id vdc-number] [template template-name]</pre> <p><b>Example:</b> switch(config)# vdc admin-vdc</p>	<p>Creates a VDC and enters VDC configuration mode. The VDC name can be a maximum of 32 characters that are not case sensitive. The VDC name cannot begin with a number.</p> <p>Valid VDC numbers range from 1 to 8. The default VDC number is the first available number.</p> <p><b>Note</b> VDC number 1 is reserved for the default VDC.</p> <p>The default resource template is used if you do not specify one.</p> <p>The <b>ha-policy</b> option keywords are as follows:</p> <ul style="list-style-type: none"> <li>• <b>dual-sup:</b> <ul style="list-style-type: none"> <li>– <b>bringdown</b>—Puts the VDC in the failed state. To recover from the failed state, you must reload the physical device.</li> <li>– <b>restart</b>—Takes down the VDC and recreates it using the startup configuration.</li> <li>– <b>switchover</b> — Initiates a supervisor module switchover.</li> </ul> </li> <li>• <b>single-sup:</b> <ul style="list-style-type: none"> <li>– <b>bringdown</b>—Puts the VDC in the failed state. To recover from the failed state, you must reload the physical device.</li> <li>– <b>reload</b> — Reloads the supervisor module.</li> <li>– <b>restart</b>—Takes down the VDC and recreates it using the startup configuration.</li> </ul> </li> </ul> <p>The HA policy default for the <b>dual-sup</b> keyword is <b>switchover</b> and for the <b>single-sup</b> keyword is <b>restart</b>.</p> <p><b>Note</b> The <b>vdc</b> command for a new VDC can take a few minutes to complete depending on the amount of resources that must be reserved.</p>
Step 3	<pre>show vdc membership</pre> <p><b>Example:</b> switch(config-vdc) show vdc membership</p>	(Optional) Displays the interface membership for the VDCs.

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	Command	Purpose
Step 4	<b>allocate interface ethernet slot/port</b>  <b>Example:</b> switch(config-vdc)# allocate interface ethernet 2/1 Moving ports will cause all config associated to them in source vdc to be removed. Are you sure you want to move the ports? [yes] yes	(Optional) Allocates one interface to the VDC.
	<b>allocate interface ethernet slot/port - last-port</b>  <b>Example:</b> switch(config-vdc)# allocate interface ethernet 2/1 - 4 Moving ports will cause all config associated to them in source vdc to be removed. Are you sure you want to move the ports? [yes] yes	(Optional) Allocates a range of interfaces on the same module to the VDC.
	<b>allocate interface ethernet slot/port, ethernet slot/port, ...</b>  <b>Example:</b> switch(config-vdc)# allocate interface ethernet 2/1, ethernet 2/3, ethernet 2/5 Moving ports will cause all config associated to them in source vdc to be removed. Are you sure you want to move the ports? [yes] yes	(Optional) Allocates a list of interfaces to the VDC.
Step 5	<b>exit</b>  <b>Example:</b> switch(config-vdc)# exit switch(config)#	Exits VDC configuration mode.
Step 6	<b>show vdc</b>  <b>Example:</b> switch(config)# show vdc	(Optional) Displays VDC status information.
Step 7	<b>copy running-config startup-config</b>  <b>Example:</b> switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.  <b>Note</b> After you create a VDC, you must copy the default VDC running configuration to the startup configuration so that a VDC user can copy the new VDC running configuration to the startup configuration.

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## Initializing a VDC

A newly created VDC is much like a new physical device. To access a VDC, you must first initialize it. The initialization process includes setting the VDC admin user account password and optionally running the setup script (see the “[Example VDC Creation and Initialization](#)” section on page 3-10). The setup script helps you perform basic configuration tasks such as creating more user accounts and configuring the management interface.



### Note

The VDC admin user account in the nondefault VDC is separate from the network admin user account in the default VDC. The VDC admin user account has its own password and user role.

### BEFORE YOU BEGIN

Log on to the default VDC as a network administrator.

Obtain an IPv4 or IPv6 address for the management interface (mgmt 0) if you want to use out-of-band management for the VDC.

### SUMMARY STEPS

1. **switchto vdc** *vdc-name*
2. **show vdc current-vdc**

### DETAILED STEPS

	Command	Purpose
Step 1	<b>switchto vdc</b> <i>vdc-name</i>  <b>Example:</b> switch# switchto vdc NewVDC switch-NewVDC#	Switches to the VDC.
Step 2	<b>show vdc current-vdc</b>  <b>Example:</b> switch-NewVDC# show vdc current-vdc	(Optional) Displays the current VDC number.

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## Verifying the VDC Configuration

To display VDC configuration information, perform one of the following tasks:

Command	Purpose
<b>show running-config {vdc   vdc-all}</b>	Displays the VDC information in the running configuration. Use this command in the default VDC to display the configuration for all VDCs on the physical device.
<b>show vdc [vdc-name] [detail]</b>	Displays the VDC status information. Use this command in the default VDC to display the status of all VDCs.
<b>show vdc current-vdc</b>	Displays the current VDC number.
<b>show vdc membership [status]</b>	Displays the VDC interface membership information. Use this command to ensure that you move the correct interfaces to a VDC.
<b>show vdc resource template</b>	Displays the VDC template configuration. Use this command to verify the configuration of a VDC resource template before using it to create your VDC.

For detailed information about the fields in the output from these commands, see the [Cisco Nexus 7000 Series NX-OS Virtual Device Context Command Reference, Release 4.1](#).

## Example VDC Creation and Initialization

The following example shows how to create and initialize a VDC:

```
switch# config t
switch(config)# vdc test
switch(config-vdc)# allocate interface ethernet 2/46
Moving ports will cause all config associated to them in source vdc to be removed. Are you
sure you want to move the ports? [yes] yes
switch(config-vdc)# exit
switch(config)# switchto vdc test
```

```
---- System Admin Account Setup ----
```

```
Enter the password for "admin":<password>
Confirm the password for "admin":<password>
```

```
---- Basic System Configuration Dialog ----
```

This setup utility will guide you through the basic configuration of the system. Setup configures only enough connectivity for management of the system.

Please register Cisco Nexus7000 Family devices promptly with your supplier. Failure to register may affect response times for initial service calls. Nexus7000 devices must be registered to receive entitled support services.

Press Enter at anytime to skip a dialog. Use ctrl-c at anytime to skip the remaining dialogs.

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```

Would you like to enter the basic configuration dialog (yes/no): yes

Create another login account (yes/no) [n]: n

Configure read-only SNMP community string (yes/no) [n]: n

Configure read-write SNMP community string (yes/no) [n]: n

Enter the switch name : Test

Continue with Out-of-band (mgmt0) management configuration? (yes/no) [y]:

Mgmt0 IPv4 address : 10.10.5.5

Mgmt0 IPv4 netmask : 255.255.254.0

Configure the default gateway? (yes/no) [y]: y

IPv4 address of the default gateway : 10.10.5.1

Configure advanced IP options? (yes/no) [n]:

Enable the telnet service? (yes/no) [y]:

Enable the ssh service? (yes/no) [n]: y

Type of ssh key you would like to generate (dsa/rsa/rsa1) : rsa

Number of key bits <768-2048> : 768

Configure the ntp server? (yes/no) [n]:

Configure default switchport interface state (shut/noshut) [shut]:

Configure default switchport trunk mode (on/off/auto) [on]:

The following configuration will be applied:
switchname Test
interface mgmt0
ip address 10.10.5.5 255.255.254.0
no shutdown
exit
vrf context management
ip route 0.0.0.0/0 10.10.5.1
exit
telnet server enable
ssh key rsa 768 force
ssh server enable
system default switchport shutdown
system default switchport trunk mode on

Would you like to edit the configuration? (yes/no) [n]:

Use this configuration and save it? (yes/no) [y]:

[#####] 100%

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```
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each such license is available at
http://www.gnu.org/licenses/gpl.html and
http://www.gnu.org/licenses/lgpl.html
switch-test# exit
switch#
```

## **Example VDC Configurations**

This section includes the following topics:

- [Example Running Configuration From the Default VDC, page 3-12](#)
- [Example Running Configuration From a Nondefault VDC, page 3-12](#)

## **Example Running Configuration From the Default VDC**

The following example shows a nondefault VDC configuration from the running configuration of the default VDC:

```
vdc payroll id 2
  limit-resource vlan minimum 16 maximum 4094
  limit-resource monitor-session minimum 0 maximum 2
  limit-resource vrf minimum 16 maximum 8192
  limit-resource port-channel minimum 0 maximum 192
  limit-resource u4route-mem minimum 8 maximum 80
  limit-resource u6route-mem minimum 4 maximum 48
```

## **Example Running Configuration From a Nondefault VDC**

The following example shows the initial running configuration from a nondefault VDC:

```
version 4.0(1)
username admin password 5 $1$/CsUmTw5$/.3SZpb8LRsk9HdWAsQ501 role vdc-admin
telnet server enable
ssh key rsa 768 force
aaa group server radius aaa-private-sg
  use-vrf management
snmp-server user admin vdc-admin auth md5 0x061d8e733d8261dfb2713a713a95e87c priv
0x061d8e733d8261dfb2713a713a95e87c localizedkey
vrf context management
  ip route 0.0.0.0/0 10.10.5.1

interface Ethernet2/46

interface mgmt0
  ip address 10.10.5.5/23
```

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## Default Settings

Table 3-4 lists the default settings for VDC parameters.

**Table 3-4** Default VDC Parameters

Parameters	Default
HA policy for single supervisor module configurations	Reload for the default VDC Restart for nondefault VDCs
HA policy for dual supervisor module configurations	Switchover
VDC ID	First available
Interface allocation	None

## Additional References

For additional information related to creating VDC, see the following sections:

- [Related Documents, page 3-13](#)

## Related Documents

Related Topic	Document Title
DCNM Licensing	<i>Cisco Nexus 7000 Series NX-OS Licensing Guide, Release 4.1</i>
Cisco Nexus 7000 Series 32-port 10-Gbps Ethernet module	<i>Cisco Nexus 7000 Series Hardware Installation and Reference Guide</i>
Command reference	<i>Cisco Nexus 7000 Series NX-OS Virtual Device Context Command Reference, Release 4.1</i>

## Feature History for Creating VDCs

Table 3-5 lists the release history for this feature.

**Table 3-5** Feature History for Creating VDCs

Feature Name	Releases	Feature Information
IPv4 unicast route memory resource	4.0(2)	Changed the default maximum value from 256 to 320.
IPv6 unicast route memory resource	4.0(2)	Changed the default maximum value from 256 to 192.

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