



# Flexible Tenant Placement on Multitenant Cisco vSmart Controllers

**Table 1: Feature History**

Feature Name	Release Information	Description
Flexible Tenant Placement on Multitenant Cisco vSmart Controllers	Cisco vManage Release 20.9.1	With this feature, while onboarding a tenant to a multitenant deployment, you can choose the pair of multitenant Cisco vSmart Controllers that serve the tenant. After onboarding a tenant, you can migrate the tenant to a different pair of multitenant Cisco vSmart Controllers, if necessary.

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## Information About Flexible Tenant Placement on Multitenant Cisco vSmart Controllers

### Automatic Tenant Placement by Cisco vManage

In Cisco vManage Release 20.8.x and earlier releases, when you onboard a tenant, Cisco vManage assigns a pair of multitenant Cisco vSmart Controllers to the tenant based on an internal algorithm that considers factors such as the following:

- number of tenant WAN edge devices that you forecast for the tenant
- number of tenants served by a pair of multitenant Cisco vSmart Controllers
- number of WAN edge devices connected to a pair of multitenant Cisco vSmart Controllers

After the tenant is onboarded, if the tenant needs to add more devices than you originally forecast, you can modify the forecast if the pair of multitenant Cisco vSmart Controllers serving the tenant can accommodate these additional WAN edge devices. If the Cisco vSmart Controllers cannot accommodate the additional WAN edge devices, you must delete the tenant and onboard the tenant again with the revised device forecast so that Cisco vManage assigns a suitable pair of Cisco vSmart Controllers. If none of the pairs of multitenant Cisco vSmart Controllers can accommodate the revised device forecast, add a new pair of Cisco vSmart Controllers and then onboard the tenant.

### Flexible Tenant Placement by Provide Admin User

From Cisco vManage Release 20.9.1, while onboarding a tenant, you have the flexibility to choose the pair of multitenant Cisco vSmart Controllers that are assigned to the tenant. Automatic tenant placement by Cisco vManage continues to be the default behavior with flexible tenant placement as an optional configuration.

To help you with flexible tenant placement, Cisco vManage lists available multitenant Cisco vSmart Controllers and provides the following details, as a percentage, for each controller:

- number of tenants assigned
- number of tenant WAN edge devices connected
- memory utilized
- CPU utilized

A multitenant Cisco vSmart Controller can serve a maximum of 24 tenants and 1000 tenant WAN edge devices across all the tenants. While onboarding a tenant, choose a pair of controllers that can be assigned one more tenant and can also connect to the number of WAN edge devices forecast for the tenant.

After the tenant is onboarded, if the tenant needs to add more devices than you originally forecast and the assigned pair of multitenant Cisco vSmart Controllers cannot connect to these additional WAN edge devices, you can migrate the tenant to another pair of Cisco vSmart Controllers that can serve one more tenant and accommodate the revised WAN edge device forecast for the tenant. If none of the multitenant Cisco vSmart Controllers pairs can accommodate the revised device forecast, you can migrate other tenants to alternative Cisco vSmart Controllers so that the controller utilization is efficient and the tenant assignment is optimal. If the optimization doesn't create the capacity required to accommodate the revised device forecast for the tenant, add a new pair of Cisco vSmart Controllers and then migrate the tenant.

## Benefits of Flexible Tenant Placement on Multitenant Cisco vSmart Controllers

- Choose Cisco vSmart Controllers deployed in different failure zones to reduce the probability of both the controllers failing simultaneously. In a cloud environment, choose controllers deployed in different regions.
- Choose Cisco vSmart Controllers deployed in the same geographical region as the tenant WAN edge devices to reduce latency.
- Choose Cisco vSmart Controllers based on the CPU, DRAM, and hard disk resources allocated, and the utilization of these resources.
- Migrate a tenant to a different Cisco vSmart Controller to accommodate changes in the tenant device forecast.

# Restrictions for Flexible Tenant Placement on Multitenant Cisco vSmart Controllers

If you wish to migrate a tenant to different pair of Cisco vSmart Controllers, you must change the Cisco vSmart Controllers assigned to the tenant one at a time. Doing so ensures that one of the Cisco vSmart Controllers is available to the tenant WAN edge devices during the migration and prevents disruptions in traffic.

## Assign Cisco vSmart Controllers to Tenants During Onboarding

### Prerequisites

- At least two Cisco vSmart Controllers must be operational and in the vManage mode before you can add new tenants.

A Cisco vSmart Controller enters the **vManage** mode when you push a template to the controller from Cisco vManage. A Cisco vSmart Controller in the **CLI** mode cannot serve multiple tenants.

- Each pair of Cisco vSmart Controllers can serve a maximum of 24 tenants and a maximum of 1000 tenant devices. Ensure that there are at least two Cisco vSmart Controllers that can serve a new tenant. If no pair of Cisco vSmart Controllers in the deployment can serve a new tenant, add two Cisco vSmart Controllers and change their mode to **vManage**.
- Add up to 16 tenants in a single operation. If you add more than one tenant, during the **Add Tenant** task, Cisco vManage adds the tenants one after another and not in parallel.

While an **Add Tenant** task is in progress, do not perform a second tenant addition operation. If you do so, the second Add Tenant task fails.

- Each tenant must have a unique Virtual Account (VA) on Plug and Play Connect on [Cisco Software Central](#). The tenant VA should belong to the same Smart Account (SA) as the provider VA.
- For an on-premises deployment, create a Cisco vBond Orchestrator controller profile for the tenant on Plug and Play Connect. The fields in the following table are mandatory.

Field	Description
<b>Profile Name</b>	Enter a name for the controller profile.
<b>Multi-Tenancy</b>	From the drop-down list, select <b>Yes</b> .
<b>SP Organization Name</b>	Enter the provider organization name.
<b>Organization Name</b>	Enter the tenant organization name in the format <SP Org Name>-<Tenant Org Name>. The organization name can be up to 64 characters.
<b>Primary Controller</b>	Enter the host details for the primary Cisco vBond Orchestrator.

For a cloud deployment, the Cisco vBond Orchestrator controller profile is created automatically as part of the tenant creation process.

1. Log in to Cisco vManage as the provider **admin** user.
2. From the Cisco vManage menu, choose **Administration > Tenant Management**.
3. Click **Add Tenant**.
4. In the **Add Tenant** slide-in pane, click **New Tenant**.
5. Configure the following tenant details:

Field	Description
<b>Name</b>	Enter a name for the tenant.  For a cloud deployment, the tenant name should be same as the tenant VA name on Plug and Play Connect.
<b>Description</b>	Enter a description for the tenant.  The description can have up to 256 characters and can contain only alphanumeric characters.
<b>Organization Name</b>	Enter the name of the tenant organization. The organization name can have up to 64 characters.  The organization name is case-sensitive. Each tenant or customer must have a unique organization name.  Enter the organization name in the following format:  <SP Org Name>-<Tenant Org Name>  For example, if the provider organization name is 'managed-sp' and the tenant organization name is 'customer1', while adding the tenant, enter the organization name as 'managed-sp-customer1'.

Field	Description
URL Subdomain	

Field	Description
	<p>Enter the fully qualified subdomain name of the tenant.</p> <ul style="list-style-type: none"> <li>The subdomain name must include the domain name of the service provider. For example, for the managed-sp.com service provider, a valid domain name for customer1 is customer1.managed-sp.com.</li> </ul> <p><b>Note</b> The service provider name is shared amongst all tenants. Ensure that the URL naming convention follows the same domain name convention that was followed while enabling multitenancy using <b>Administration &gt; Settings &gt; Tenancy Mode</b>.</p> <ul style="list-style-type: none"> <li>For an on-premises deployment, add the fully qualified subdomain name of the tenant to the DNS. Map the fully qualified subdomain name to the IP addresses of the three Cisco vManage instances in the Cisco vManage cluster. <ul style="list-style-type: none"> <li>Provider DNS: Create a DNS A record and map it to the IP addresses of the Cisco vManage instances running in the Cisco vManage cluster. The A record is derived from the provider's domain name and the cluster ID that was created while enabling multitenancy on Cisco vManage. For example, if the provider's domain name is <code>sdwan.cisco.com</code> and the cluster ID is <code>vmanage123</code>, configure the A record as <code>vmanage123.sdwan.cisco.com</code>.</li> </ul> <p><b>Note</b> If you fail to add the DNS A record, you will experience authentication errors when logging in to Cisco vManage.</p> <p>Validate that the DNS is configured correctly by using the <b>nslookup</b> command. Example: <code>nslookup vmanage123.sdwan.cisco.com</code>.</p></li> <li>Tenant DNS: Create DNS CNAME records for each tenant that you created and map them to the provider FQDN. For example, if the provider's domain name is <code>sdwan.cisco.com</code> and tenant name is <code>customer1</code>, configure the CNAME record as <code>customer1.sdwan.cisco.com</code>.</li> </ul> <p>Cluster ID is not required in the CNAME record.</p> <p>Validate that the DNS is configured correctly by using the <b>nslookup</b> command. Example: <code>nslookup customer1.sdwan.cisco.com</code>. <li>For a cloud deployment, the fully qualified subdomain name of the tenant is automatically added to the DNS as part of the tenant creation process. After you add a tenant, it could take</li> </p>

Field	Description								
	up to an hour before the fully qualified subdomain name of the tenant can be resolved by the DNS.								
<b>Forecasted Devices</b>	<p>Enter the number of WAN edge devices that the tenant can add to the overlay.</p> <p>If the tenant tries to add WAN edge devices beyond this number, Cisco vManage reports an error and the device addition fails.</p>								
<b>Select two vSmarts</b>	<ul style="list-style-type: none"> <li>Automatic tenant placement: Ensure that the <b>Select two vSmarts</b> field has the value <b>Autoplacement</b>. This is the default configuration.</li> <li>Flexible tenant placement: <ul style="list-style-type: none"> <li>a. Click the <b>Select two vSmarts</b> drop-down list. <p>Cisco vManage lists the hostnames of the available Cisco vSmart Controllers. For each Cisco vSmart Controller, Cisco vManage shows whether the controller is reachable and reports the following utilization details:</p> <table border="1"> <tbody> <tr> <td>Tenant hosting capacity</td> <td>Each Cisco vSmart Controller can serve a maximum of 24 tenants. Tenant hosting capacity represents the number of tenants to which the Cisco vSmart Controller is assigned in the form of a percentage. This value indicates whether you can assign another tenant to this controller.</td> </tr> <tr> <td>Used device capacity</td> <td>Each Cisco vSmart Controller can support a maximum of 1000 tenant WAN edge devices. Used device capacity represents the number of tenant WAN edge devices connected to the Cisco vSmart Controller in the form of a percentage of the maximum capacity (1000 WAN edge devices). This value indicates whether the Cisco vSmart Controller can support the number of devices forecast for the tenant that you are onboarding.</td> </tr> <tr> <td>Memory utilized</td> <td>This value represents memory consumption as a percentage.</td> </tr> <tr> <td>CPU utilized</td> <td>This value represents CPU usage as a percentage.</td> </tr> </tbody> </table> </li> <li>b. Select two Cisco vSmart Controllers to assign to the tenant based on the utilization details. <p>To select a Cisco vSmart Controller, check the check box adjacent to its hostname.</p> </li> </ul> </li> </ul>	Tenant hosting capacity	Each Cisco vSmart Controller can serve a maximum of 24 tenants. Tenant hosting capacity represents the number of tenants to which the Cisco vSmart Controller is assigned in the form of a percentage. This value indicates whether you can assign another tenant to this controller.	Used device capacity	Each Cisco vSmart Controller can support a maximum of 1000 tenant WAN edge devices. Used device capacity represents the number of tenant WAN edge devices connected to the Cisco vSmart Controller in the form of a percentage of the maximum capacity (1000 WAN edge devices). This value indicates whether the Cisco vSmart Controller can support the number of devices forecast for the tenant that you are onboarding.	Memory utilized	This value represents memory consumption as a percentage.	CPU utilized	This value represents CPU usage as a percentage.
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CPU utilized	This value represents CPU usage as a percentage.								

- To save the tenant configuration, click **Save**.
- To add another tenant, repeat Step 4 to Step 6.

8. To onboard tenants to the deployment, click **Add**.

Cisco vManage initiates the Create Tenant Bulk task to onboard the tenants.

As part of this task, Cisco vManage performs the following activities:

- creates the tenant
- assigns two Cisco vSmart Controllers to serve the tenant and pushes a CLI template to these controllers to configure tenant information
- sends the tenant and Cisco vSmart Controller information to Cisco vBond Orchestrators

When the task is successfully completed, you can view the tenant information, including the Cisco vSmart Controllers assigned to the tenant, on the **Administration > Tenant Management** page.

## Update Cisco vSmart Controllers Placement For a Tenant

You can migrate a tenant to a different pair of Cisco vSmart Controllers from the controllers that are currently assigned to the tenant. For instance, if you need to increase the tenant WAN edge device forecast and the controllers assigned to the tenant cannot connect to these revised number of tenant WAN edge devices, you can migrate the tenant to a pair of controllers that can accommodate the revised forecast.

If you wish to migrate a tenant to different pair of Cisco vSmart Controllers, you must change the Cisco vSmart Controllers that are assigned to the tenant one at a time. Doing so ensures that one of the Cisco vSmart Controllers is available to the tenant WAN edge devices during the migration and prevents disruptions in traffic.

1. Log in to Cisco vManage as the provider **admin** user.
2. From the Cisco vManage menu, choose **Administration > Tenant Management**.
3. For the tenant you wish to migrate to a different controller, click **...** adjacent to the tenant organization name.
4. Click **Update vSmart Placement**.
5. In the **Update vSmart Placement** slide-in pane, configure the following:



Field	Description								
Source vSmart (currently applied)	<p data-bbox="833 285 1520 317"><b>a.</b> Click the <b>Source vSmart (currently applied)</b> drop-down list.</p> <p data-bbox="873 331 1503 457">Cisco vManage lists the hostnames of the Cisco vSmart Controllers assigned to the tenant. For each Cisco vSmart Controller, Cisco vManage shows whether the controller is reachable and reports the following utilization details:</p> <table border="1" data-bbox="873 478 1624 1115"> <tbody> <tr> <td data-bbox="873 478 1068 684">Tenant hosting capacity</td> <td data-bbox="1068 478 1624 684">Each Cisco vSmart Controller can serve a maximum of 24 tenants. Tenant hosting capacity represents the number of tenants to which the Cisco vSmart Controller is assigned in the form of a percentage. This value indicates whether you can assign another tenant to this controller.</td> </tr> <tr> <td data-bbox="873 684 1068 989">Used device capacity</td> <td data-bbox="1068 684 1624 989">Each Cisco vSmart Controller can support a maximum of 1000 tenant WAN edge devices. Used device capacity represents the number of tenant WAN edge devices connected to the Cisco vSmart Controller in the form of a percentage of the maximum capacity (1000 devices). This value indicates whether the Cisco vSmart Controller can support the number of devices forecast for the tenant that you are onboarding.</td> </tr> <tr> <td data-bbox="873 989 1068 1066">Memory utilized</td> <td data-bbox="1068 989 1624 1066">This value represents memory consumption as a percentage.</td> </tr> <tr> <td data-bbox="873 1066 1068 1115">CPU utilized</td> <td data-bbox="1068 1066 1624 1115">This value represents CPU usage as a percentage.</td> </tr> </tbody> </table> <p data-bbox="833 1136 1520 1199"><b>b.</b> Check the check box adjacent to the hostname of one of the Cisco vSmart Controllers assigned to the tenant.</p>	Tenant hosting capacity	Each Cisco vSmart Controller can serve a maximum of 24 tenants. Tenant hosting capacity represents the number of tenants to which the Cisco vSmart Controller is assigned in the form of a percentage. This value indicates whether you can assign another tenant to this controller.	Used device capacity	Each Cisco vSmart Controller can support a maximum of 1000 tenant WAN edge devices. Used device capacity represents the number of tenant WAN edge devices connected to the Cisco vSmart Controller in the form of a percentage of the maximum capacity (1000 devices). This value indicates whether the Cisco vSmart Controller can support the number of devices forecast for the tenant that you are onboarding.	Memory utilized	This value represents memory consumption as a percentage.	CPU utilized	This value represents CPU usage as a percentage.
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Field	Description								
<b>Destination vSmart</b>	<p><b>a.</b> Click the <b>Destination vSmart</b> drop-down list.</p> <p>Cisco vManage lists the hostnames of the available Cisco vSmart Controllers that are not assigned to the tenant. For each Cisco vSmart Controller, Cisco vManage shows whether the controller is reachable and reports the following utilization details:</p> <table border="1"> <tbody> <tr> <td>Tenant hosting capacity</td> <td>Each Cisco vSmart Controller can serve a maximum of 24 tenants. Tenant hosting capacity represents the number of tenants to which the Cisco vSmart Controller is assigned in the form of a percentage. This value indicates whether you can assign another tenant to this controller.</td> </tr> <tr> <td>Used device capacity</td> <td>Each Cisco vSmart Controller can support a maximum of 1000 tenant WAN edge devices. Used device capacity represents the number of tenant WAN edge devices connected to the Cisco vSmart Controller in the form of a percentage of the maximum capacity (1000 devices). This value indicates whether the Cisco vSmart Controller can support the number of devices forecast for the tenant that you are onboarding.</td> </tr> <tr> <td>Memory utilized</td> <td>This value represents memory consumption as a percentage.</td> </tr> <tr> <td>CPU utilized</td> <td>This value represents CPU usage as a percentage.</td> </tr> </tbody> </table> <p><b>b.</b> Check the check box adjacent to the hostname of the Cisco vSmart Controller you want to assign to the tenant.</p> <p>If you select a Cisco vSmart Controller that does not have the required capacity to serve the tenant devices, the update operation fails.</p>	Tenant hosting capacity	Each Cisco vSmart Controller can serve a maximum of 24 tenants. Tenant hosting capacity represents the number of tenants to which the Cisco vSmart Controller is assigned in the form of a percentage. This value indicates whether you can assign another tenant to this controller.	Used device capacity	Each Cisco vSmart Controller can support a maximum of 1000 tenant WAN edge devices. Used device capacity represents the number of tenant WAN edge devices connected to the Cisco vSmart Controller in the form of a percentage of the maximum capacity (1000 devices). This value indicates whether the Cisco vSmart Controller can support the number of devices forecast for the tenant that you are onboarding.	Memory utilized	This value represents memory consumption as a percentage.	CPU utilized	This value represents CPU usage as a percentage.
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Memory utilized	This value represents memory consumption as a percentage.								
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**6.** Click **Update**.

**7.** To change the other Cisco vSmart Controller that is assigned to the tenant, repeat Step 3 to Step 6.

Cisco vManage initiates the Tenant vSmart Update task to assign the selected Cisco vSmart Controller to the tenant, migrating the tenant details from the Cisco vSmart Controller that was previously assigned. When the task is successfully completed, you can view the tenant information, including the Cisco vSmart Controllers assigned to the tenant, on the **Administration > Tenant Management** page.