Configuring Users, Roles, and Security, Release 4.1.1

Table of Contents

New and changed information

The following table provides an overview of the significant changes up to this current release. The table does not provide an exhaustive list of all changes or of the new features up to this release.

Release Version	Feature	Description
Nexus Dashboard 4.1.1	Improved navigation and workflow when configuring users and security for Nexus Dashboard	Beginning with Nexus Dashboard 4.1.1, the navigation and workflow when configuring users and security for Nexus Dashboard have been enhanced.
Nexus Dashboard 4.1.1	Site Manager role includes Designer permission for managing change control	Beginning with Nexus Dashboard 4.1.1, a Designer role, with access to all tenants within a fabric, can modify fabric and monitoring policies. This capability was previously reserved only for the Site Administrator. For more information, see Roles and permissions.
Nexus Dashboard 4.1.1	Password complexity enhancements	Beginning with Nexus Dashboard 4.1.1, this feature enhances security by enforcing a minimum password length of 8 characters and allowing all special characters. Ensures compatibility with existing passwords. Requires re-authentication with the current password when changing it to protect against any unauthorized access during unattended sessions. For more information, see Violation action.
Nexus Dashboard 4.1.1	Multi-cluster primary as an authentication domain	In Nexus Dashboard 4.1.1, you can now configure the multi-cluster primary cluster as an authentication domain. For more information, see Multi-cluster primary as an authentication domain.

Roles and permissions

You can choose how the users logging into the Nexus Dashboard GUI are authenticated. This release supports local authentication as well as LDAP, RADIUS, and TACACS remote authentication servers. User roles and permissions are described in this section, remote authentication configuration is described in Remote authentication, and local user configuration is described in Users.

Cisco Nexus Dashboard allows user access according to roles defined by role-based access control (RBAC). Roles are used in both local and external authentication.

These sections describe the user roles available in Nexus Dashboard and their associated permissions within the platform. The same roles can be configured on a remote authentication server and the server can be used to authenticate the Nexus Dashboard users. Additional details about remote authentication are available in the Remote authentication section.

- Roles and permissions in Nexus Dashboard 4.1.1
- Mapping roles from previous releases

Roles and permissions in Nexus Dashboard 4.1.1

User role	AV pair value	Description
Super Administrator	super-admin	Users with this role have full access to all resources in every security domain. A user with this role can perform all operations on the Nexus Dashboard, including backup and restore processes.
Fabric Administrator	fabric-admin	Users with this role have permissions for full fabric management, including creation of network policies, interface configurations and software upgrades. Users with this role and the all security domain access can also add and delete Nexus Dashboard and APIC clusters. See Connecting Clusters for more information.
Designer	designer	Users with this role can make changes to the configuration (the intent) but cannot deploy those changes to the network fabrics.
Approver	approver	When change control is enabled, users with this role can perform operations related to the approval or denial of submitted configuration changes.
Observer	observer	Primarily a read-only user.

User role	AV pair value	Description
Support Engineer	support-engineer	Users with this role are able to perform tasks related to support, such as collecting tech support, creating backups, deploying templates, and general troubleshooting. When change control is enabled, users with this role can also deploy and revert policy changes that were approved. Users with this role are not able to make configuration changes.

Mapping roles from previous releases

Prior to Nexus Dashboard 4.1.1, there were roles provided at the Nexus Dashboard level and in the services running in Nexus Dashboard. These sections map those roles from the previous releases to the roles available in Nexus Dashboard 4.1.1.

> The Insights service did not support RBAC (any account that could log in to the Nexus Dashboard had full access to Insights), so there is no role-mapping information from previous releases for Insights.

- Mapping Nexus Dashboard and Orchestrator roles
- Mapping Nexus Dashboard Fabric Controller roles

Mapping Nexus Dashboard and Orchestrator roles

User Role in Previous Releases	User Role in Nexus Dashboard 4.1.1
admin (read-only)	Observer
Administrator	Super Administrator
Approver	Approver
Dashboard User	Observer
Deployer	Support Engineer
Power-User	Super Administrator
Site Administrator	Fabric Administrator
Site Manager	Designer
Tenant Manager	Designer
User Manager	Super Administrator

Mapping Nexus Dashboard Fabric Controller roles

User Role in Previous Releases	User Role in Nexus Dashboard 4.1.1
NDFC Access Admin	Fabric Administrator
NDFC Change Approver	Approver

User Role in Previous Releases	User Role in Nexus Dashboard 4.1.1
NDFC Change Deployer	Support Engineer
NDFC Device Upgrade Admin	Fabric Administrator
NDFC Network Admin	Fabric Administrator
NDFC Network Operator	Observer
NDFC Network Stager	Designer

Choosing a default authentication domain

By default, the login screen will select the local domain for user authentication; you can manually change the domain at login time by selecting any of the available login domains from the dropdown menu.

Alternatively, you can set a different default login domain to the most commonly used as follows:

> The domain must already exist before you can set it as the default domain. Adding remote authentication domains is described in Remote Authentication.

1. Choose the default login domain.
   a. From the main navigation menu, select **Admin > Users and Security**.
   b. Click the **Authentication** tab.
   c. In the top right of the **Default authentication** tile, click the **Edit** icon.

      The **Edit default authentication** page opens.
2. In the **Edit default authentication** page that opens, choose the **Login domain** from the dropdown, then click **Save**.

Multi-factor authentication

You can configure your Nexus Dashboard to use multi-factor authentication (MFA) for user login.

When configuring multi-factor authentication:

- You will configure each user in your MFA provider, as described in Configure an Okta account as an MFA provider

  This release supports only Okta as an MFA provider.

- You will establish MFA provider and client integration, as described in Configure an MFA client.

  This release supports only Duo as MFA client.

- You will add the MFA provider as an external authentication domain in Nexus Dashboard, as described in Add Okta as a remote authentication provider.

Configure an Okta account as an MFA provider

The following steps provide basic configuration required to enable MFA for Nexus Dashboard using Okta as a provider. Detailed Okta configurations are outside the scope of this document, see Okta documentation for all available options.

To configure Okta for Nexus Dashboard MFA:

1. Log in to your Okta account.

   To create an account, browse to https://developer.okta.com.

2. Create a new app integration.

   a. From the left navigation menu, select **Applications > Applications**.

   b. Click **Create App Integration**.

   c. For **Sign-in method**, select OIDC - OpenID Connect.

   d. For **Application Type**, select Web Application.

   e. Click **Next**.

   f. Provide **App integration name**, for example, nd-mfa.

      The following steps assume you used nd-mfa as the app integration name. If you choose a different name, replace nd-mfa where appropriate.

   g. For **Sign-in redirect URIs**, enter https://<nd-node1-ip>/oidccallback

      Replace the <nd-node1-ip> with your cluster node IP address, then click **+Add URI** to provide the URIs for all nodes in the cluster.

   h. For **Controlled Access**, choose Skip group assignment for now.

   i. Leave other fields at their default values and click **Save**.

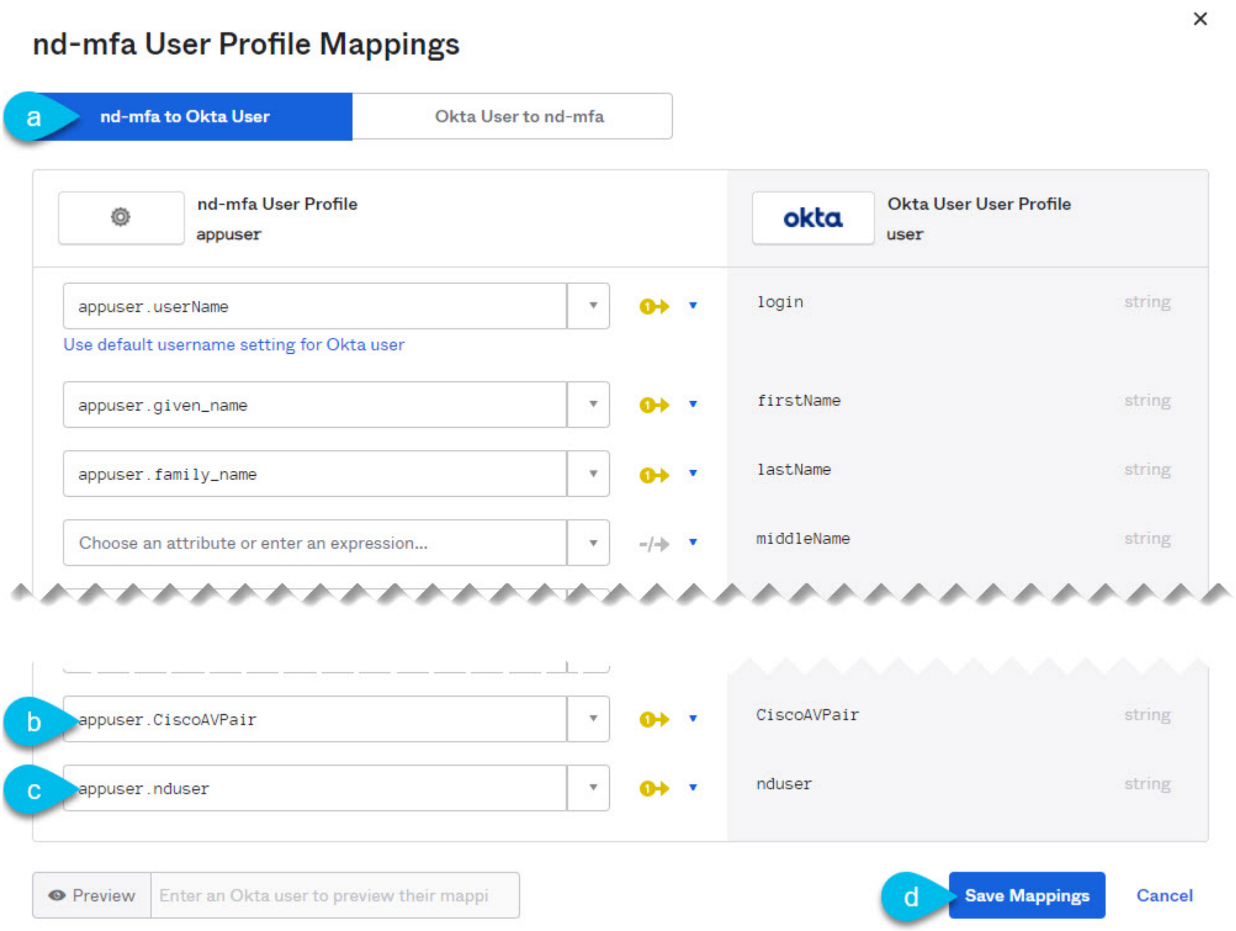
3. Add the required attributes to the default user.

    a. From the left navigation menu, select **Directory > Profile Editor**.
    b. Click the **Okta User (default)** profile.
    c. Click **+Add Attribute**.
    d. For **Data type**, choose string.
    e. For **Display name**, **Variable name**, and **Description**, enter CiscoAVPair.
    f. Ensure that **Attribute required** is unchecked.
    g. Leave other fields at default values and click **Save and Add Another**.
    h. For **Data type**, choose string.
    i. For **Display name**, **Variable name**, and **Description**, enter nduser.
    j. Ensure that **Attribute required** is unchecked.
    k. Leave other fields at default values and click **Save**.

4. Add the required attributes to the nd-mfa user you created.
    a. From the left navigation menu, select **Directory > Profile Editor**.
    b. Click the **nd-mfa User (default)** profile.
    c. Click **+Add Attribute**.
    d. For **Data type**, choose string.
    e. For **Display name**, **Variable name**, and **Description**, enter CiscoAVPair.
    f. Ensure that **Attribute required** is checked.
    g. Leave other fields at default values and click **Save and Add Another**.
    h. For **Data type**, choose string.
    i. For **Display name**, **Variable name**, and **Description**, enter nduser.
    j. Ensure that **Attribute required** is checked.
    k. Leave other fields at default values and click **Save**.

5. Map the attributes.
    a. From the left navigation menu, select **Directory > Profile Editor**.
    b. Click the **nd-mfa User** profile.
    c. In the **Attributes** area of the main page, click **Mappings**.

       The **nd-mfa User Profile Mappings** page opens.



nd-mfa User Profile Mappings

nd-mfa to Okta User | Okta User to nd-mfa

nd-mfa User Profile
appuser

Okta User User Profile
user

appuser.userName Use default username setting for Okta user	login string
appuser.given_name	firstName string
appuser.family_name	lastName string
Choose an attribute or enter an expression...	middleName string
appuser.CiscoAVPair	CiscoAVPair string
appuser.nduser	nduser string

Preview | Enter an Okta user to preview their mappi

Save Mappings | Cancel

d. At the top of the **nd-mfa User Profile Mappings** page, click **nd-mfa to Okta User**.

e. Select app.CiscoAVPair from the dropdown menu next to CiscoAVPair.

f. Select app.nduser from the dropdown menu next to nduser.

g. Click **Save Mappings**.

h. Click **Apply updates now**.

6. Create users.

   a. From the left navigation menu, select **Directory > People**.

   b. Click **+Add person**.

   c. Provide the user information.

   d. Click **Save and Add Another** to add another user or click **Save** to finish.

      You must add all users that you want to be able to log in to your Nexus Dashboard.

7. Assign users to the app.

   a. From the left navigation menu, select **Applications > Application**.

   b. Click the application you created (nd-mfa).

   c. Select the **Assignments** tab.

   d. Choose **Assign > Assign to People**.

      The **Assign nd-mfa to People** page opens.

e. In the **Assign nd-mfa to People** page, click **Assign** next to the user you want to be able to log in to your Nexus Dashboard.

f. In the user details page that opens, provide a value for **CiscoAVPair** and **nduser** fields.

The **CiscoAVPair** values are described in the Configure a remote authentication server, for example shell:domains=all/super-admin/.

The **nduser** value will be used as the username for this user when logging in to your Nexus Dashboard.

g. Click **Save and Go Back**.

h. Assign another user or click **Done** to finish.

You must add all users that you created in a previous step.

8. Configure **Claims** for the app.

   a. From the left navigation menu, select **Security > API**.

   b. Click the **default** name.

   c. Select the **Claims** tab.

   d. Click **+Add Claim** to add the CiscoAVPair claim.

   e. In the **Name** field, enter CiscoAVPair.

   f. From the **Include in token type** dropdown, select ID Token.

   We recommend using ID Token, however Access Token is also supported.

   g. In the **Value** field, enter appuser.CiscoAVPair.

   h. Click **Save**.

   i. Click **+Add Claim** to add the nduser claim.

   j. In the **Name** field, enter nduser.

   k. From the **Include in token type** dropdown, select ID Token.

   You must create both claims in the same token, mixing ID Token and Access Token is not supported.

   l. In the **Value** field, enter appuser.nduser.

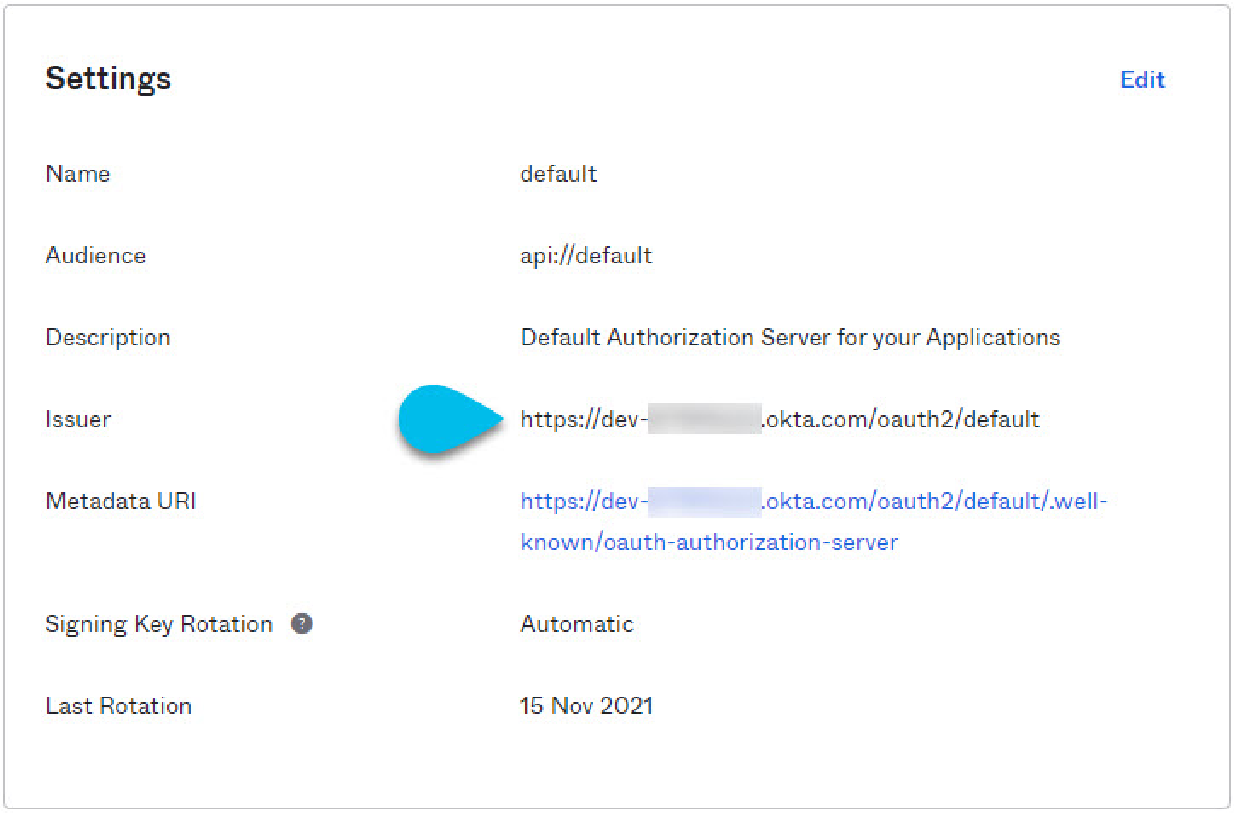
   m. Click **Save**.

9. Gather the required Okta account information for adding it as authentication provider for your Nexus Dashboard.

   a. From the left navigation menu, select **Security > API**.

   b. Click the **default** name.

   c. Note down the **Issuer** value.



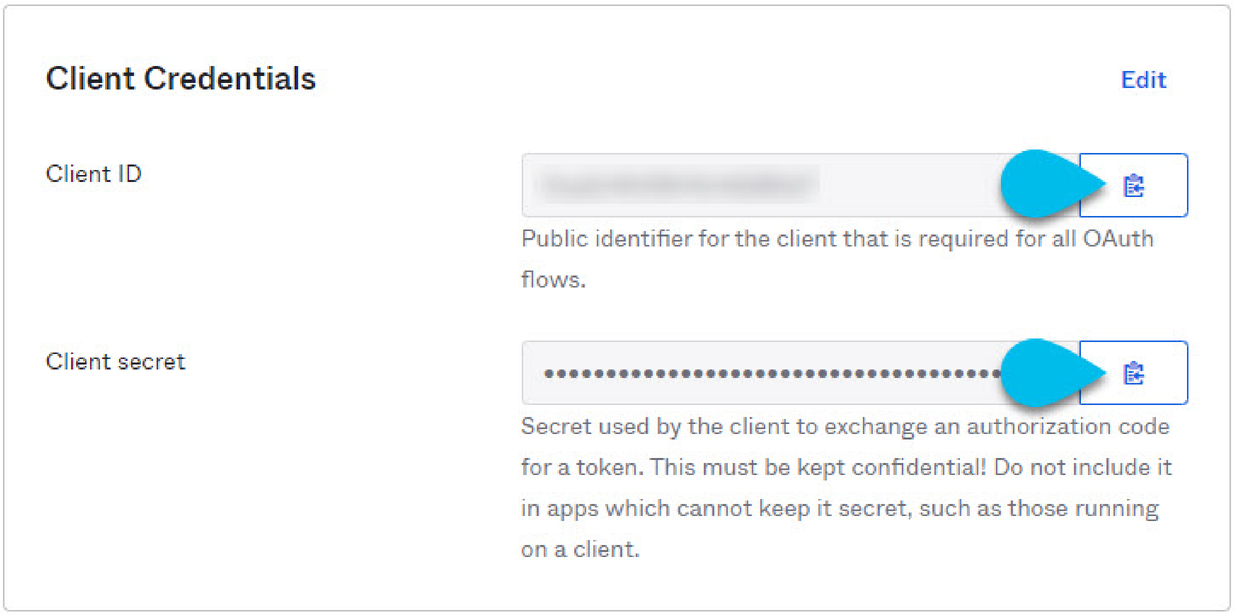
Settings

Name	default
Audience	api://default
Description	Default Authorization Server for your Applications
Issuer	https://dev-[redacted].okta.com/oauth2/default
Metadata URI	https://dev-[redacted].okta.com/oauth2/default/.well-known/oauth-authorization-server
Signing Key Rotation	Automatic
Last Rotation	15 Nov 2021

d. From the left navigation menu, select **Application > Applications**.

e. Click the application you created (nd-mfa).

f. Note down the **Client ID** and **Client Secret** values.



Client Credentials

Client ID

[redacted]

Public identifier for the client that is required for all OAuth flows.

Client secret

••••••••••••••••••••••••••••••••••••

Secret used by the client to exchange an authorization code for a token. This must be kept confidential! Do not include it in apps which cannot keep it secret, such as those running on a client.

Configure an MFA client

This release supports only Cisco Duo as MFA client.

The following steps provide basic configuration required to enable using Cisco Duo for Nexus Dashboard MFA. Detailed Duo configurations are outside the scope of this document, see Cisco Duo documentation for all available options.

To configure Duo:

1. Log in to your Okta account.
2. Add DUO as an MFA type.
   1. From the left navigation menu, select **Security > Multifactor**.
   2. In the **Factor Types** tab, select Duo Security.

      If you do not have the Duo Security option, you will need to open a support case with Okta from https://support.okta.com/help/s/opencase.
   3. In the **Duo Security** page, provide the required information.

      For more information on how to obtain integration key, secret key, and API hostname, see https://duo.com/docs/okta.

      Ensure that **Duo Username Format** is set to Email.
   4. Click **Save**.
3. Create a Duo rule.
   1. From the left navigation menu, select **Applications > Application**.
   2. Click the application you created (nd-mfa).
   3. Select the **Sign On** tab.
   4. In the **Sign On Policy** area, click **+Add Rule**.
   5. Provide the name for the rule.
   6. In the **Access** area, enable **Prompt for factor** and select **Every sign on**.
   7. Specify other options as required by your use case.
   8. Click **Save**.
4. Configure Okta and Duo integration.

   There are two ways you can allow the users you configured in Okta to use the Duo app for MFA—have the Duo admin add all the same users in Duo dashboard or have each individual user log in to Okta and self-enroll.

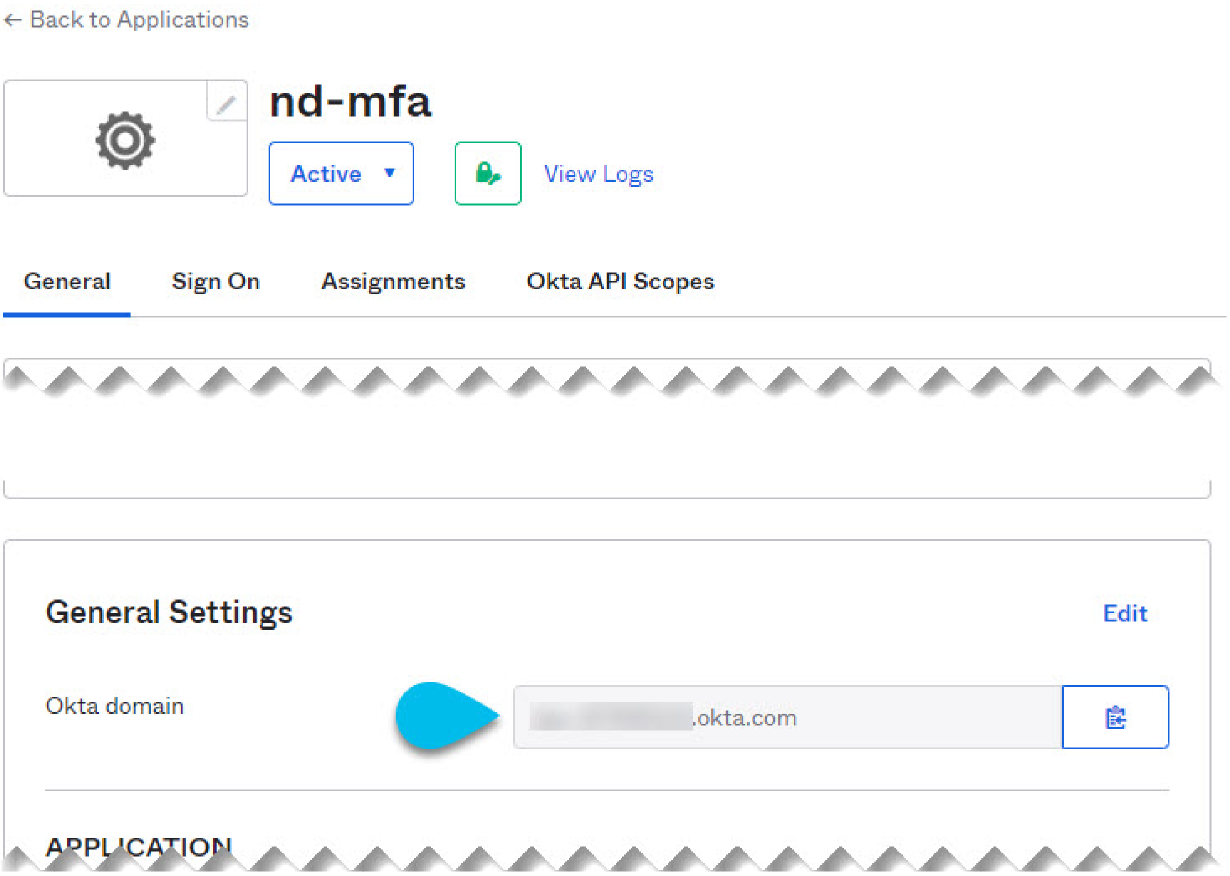
   To configure users in Duo dashboard:

   1. Log in to your Duo dashboard as admin user.
   2. From the left navigation menu, select **Users**.
   3. Click **Add User** and provide the details that match the user's information in Okta.
   4. Repeat this step for all users you added in Okta.

   To self-enroll:

   1. Instruct every user you created in Configure an Okta account as an MFA provider to log in to Okta on their own using your specific Okta domain.

      You can determine the Okta domain to use by navigating to **Application > Application**, then clicking the nd-mfa application you created and copying the **Okta domain** URL:



Okta domain [redacted].okta.com

b. Once they're logged in, they can navigate to the **Settings** page from the top right user menu.

c. Choose **Duo Security Setup** and follow the instructions on the screen.

Add Okta as a remote authentication provider

Before you begin

- You must have at least one user already configured in Okta as described in Configure an Okta account as an MFA provider.
- You must have the **Client ID**, **Client Secret**, and **Issuer** information from your Okta account available, which is described in the last step of Configure an Okta account as an MFA provider.
- If you want to use a proxy to connect to your Okta account, the proxy must already be configured as described in Add a proxy server.

To add Okta as a remote authentication provider:

1. Add an authentication domain.
   a. From the main navigation menu, select **Admin > Users and Security**.
   b. Click the **Authentication** tab.
   c. In the main pane, click **Create login domain**.
2. In the **Create login domain** screen that opens, provide domain details.
   a. Provide the **Name** for the domain.
   b. (Optional) Provide its **Description**.
   c. From the **Realm** dropdown, select OIDC.

d. In the **Client ID** field, enter the client ID you obtained from your Okta account.

e. In the **Client Secret** field, enter the client secret you obtained from your Okta account.

f. In the **Issuer** field, enter the URI you obtained from your Okta account.

g. (Optional) Check the **User Proxy** option if you want to connect to Okta over a proxy.

h. Leave the **Scopes** options unchecked.

   This release supports the openid scope only.

3. Click **Save** to finish adding the domain.

Logging in to Nexus Dashboard using MFA

1. Navigate to one of your Nexus Dashboard IPs as your typically would.
2. From the **Login Domain** dropdown, select the OIDC domain that you created in Add Okta as a remote authentication provider.

   The **Username** and **Password** fields will not be displayed.

3. Click **Login**.

   You will be redirected to the Okta login page.

4. Log in using a user that was configured in Okta as described in Configure an Okta account as an MFA provider.

   A push notification will be sent to your Duo client.

5. Approve the login using Duo.

   You will be redirected back to the Nexus Dashboard UI and logged in using the Okta user.

Multi-cluster primary as an authentication domain

In Nexus Dashboard, you can configure the primary cluster as the authentication domain to support role-based access control (RBAC) across clusters, eliminating the need for a an external authentication provider, such as a AAA remote authentication server. Local users (with admin-role) configured on the primary cluster can login as remote users from any clusters with a login domain in Multi-cluster realm type. For more information, see Log in using a multi-cluster domain.

> A cluster can have only one multi-cluster authentication login domain of the Multi-cluster realm type.

You can create a multi-cluster login domain in Nexus Dashboard during onboarding. You can check the **Enable multi-cluster authentication domain** check box and provide a name for the multi-cluster login domain. For more information on creating multi-cluster login domain, see Onboard multi-cluster and enable primary cluster to act as an authentication domain.

Guidelines and limitations

- When you enable a multi-cluster domain and provide a login name during creation (greenfield), the login domain is created for both primary and secondary clusters.
- If you enable the multi-cluster domain during a subsequent onboarding, the login domain is created in the primary cluster and only on the new secondary cluster being onboarded. You must manually create the domain for all other secondary clusters.
- If a multi-cluster domain login already exists during onboarding, attempting to create it using the **Enable multi-cluster authentication domain** check box will result in no action.
- Upgrades from previous Nexus Dashboard releases require manually creating a multi-cluster domain login. For example, if you are upgrading from Nexus Dashboard 3.2 to 4.1.1, you can manually create a multi-cluster domain login to use this feature. For more information, see Enable primary cluster to act as an authentication domain and create multi-cluster login domain manually
- Disabling the multi-cluster domain login on a secondary cluster affects only that cluster, while disabling it on the primary cluster affects all clusters.

Onboard multi-cluster and enable primary cluster to act as an authentication domain

Follow these steps to onboard multi-cluster and enable primary cluster to act as an authentication domain.

1. Log in to the Nexus Dashboard of the cluster to designate it as the primary cluster.
2. Add the second cluster.
3. Navigate to **Admin > System Settings**.
4. Click **Multi-cluster connectivity.**
5. Click **Connect Cluster**.

6. In **Select type**, choose **Nexus Dashboard**.
7. Click **Next**.
8. In the Remote cluster settings page, enter these field values:
    a. **Hostname IP Address**
    b. **Username**
    c. **Password**
    d. **Login domain**
9. Check the **Enable multi-cluster authentication domain** check box.
10. Enter a name for **Multi-cluster login domain name**, for example, MulticlusterAuth.
11. Click **Next** to connect the clusters.

Enable primary cluster to act as an authentication domain and create multi-cluster login domain manually

Follow these steps to enable primary cluster to act as an authentication domain and create multi-cluster login domain manually.

1. From the main navigation menu, choose **Admin > Users and Security**.
2. Click the **Authentication** tab.
3. Check the check box next to the multi-cluster domain you created.
4. Choose **Actions > Create login domain**.
5. In the **Create login domain**, provide domain details.
    a. Provide the **Name** for the domain.
    b. (Optional) Add a description for the domain **Description**.
    c. From the **Realm** drop-down list, choose Multi-cluster realm type.
6. Check the **Enable multi-cluster authentication domain** check box.
7. Click **Save**

    You can use the **Actions** drop-down list to perform these actions.

    - Choose **Actions > Set as default** to set the multi-cluster domain as the default authentication provider.
    - Choose **Actions > Edit** to make changes to the login domain information.
    - Choose **Actions > Delete** to delete the multi-cluster domain.

Log in using a multi-cluster domain

Follow these steps to log in using a multi-cluster domain.

1. Navigate to one of your Nexus Dashboard IP addresses.
2. Enter your username and password in the **Username** and **Password** fields.

3. From the **Login Domain** drop-down list, choose multi-cluster domain name you created. For example, Multi-cluster domain.

4. Click **Login**.

Users

The **Users** page allows you to view and manage all users that have access to the Nexus Dashboard.

The **Local** tab displays all local users while the **Remote** tab displays users that are configured on the remote authentication servers you have added as described in the Remote authentication section.

- The default local admin user cannot be deleted.
- Single sign-on (SSO) between the Nexus Dashboard, fabrics, and applications is available for remote users only. For more information on configuring remote users, see Remote authentication.

Add local users

1. Create a new local user.
   a. From the main navigation menu, select **Admin > Users and Security**.
   b. Click the **Users** tab.
   c. In the main pane, click **Create local user**.
2. In the **Create local user** screen that opens, provide user details.
   a. Provide the **User ID** that will be used for logging in.
   b. Provide and confirm the initial **Password**.
   c. Provide the **First Name**, **Last Name**, and **Email** for the user.
   d. Determine if you want to set the **Remote user authentication** field to **Enabled** or **Disabled**.

      Remote user authentication is used for signing into Nexus Dashboard when using identity providers that cannot provide authorization claims. If you choose **Enabled** for this **Remote user authentication** field, the local user ID can’t be used to directly log in to the Nexus Dashboard.

   e. Provide the **Remote ID claim** information.
   f. Click **+ Add Security Domain and Roles**.
   g. In the **Security Domain Name** field, choose the security domain to associate with this user.
   h. In the **Role** field, choose the role to associate with this user.

      You can select one or more roles for each user. The available roles and their permissions are described in Roles and permissions.

      For all of the user roles you select, you can choose to enable read-only or read-write access. In case of read-only access, the user will be able to view the objects and settings allowed by their user **Role** but unable to make any changes to them.

   i. Click **Create** to save the user.

Edit local users

1. Open user details screen.
    a. From the main navigation menu, select **Admin > Users and Security**.
    b. Click the **Users** tab.
    c. In the main pane, click on the user’s name.
    d. In the details pane that opens, click the **Details** icon.
2. In the ***<user-name>*** details screen that opens, click the **Edit** icon.
3. In the **Edit User** screen that opens, update the settings as necessary.

View remote user information

To view remote users:

1. From the main navigation menu, select **Admin > Users and Security**.
2. Choose **Users > Remote**.

    If you use remote authentication for TACACS or RADIUS, those remote users will appear on this page after their first login to Nexus Dashboard with their remote credentials.

Remote authentication

Cisco Nexus Dashboard supports a number of remote authentication providers, including LDAP, TACACS, and Radius.

When configuring external authentication servers:

- You must configure each user on the remote authentication servers.
- All LDAP configurations are case sensitive.

  For example, if you have OU=Cisco Users on the LDAP server and OU=cisco users on the Nexus Dashboard, the authentication will not work.

- For LDAP configurations, we recommend using CiscoAVPair as the attribute string. If, for any reason, you are unable to use an Object ID 1.3.6.1.4.1.9.22.1, an additional Object IDs 1.3.6.1.4.1.9.2742.1-5 can also be used in the LDAP server.

  Alternatively, instead of configuring the Cisco AVPair values for each user, you can create LDAP group maps in the Nexus Dashboard.

- Single sign-on (SSO) between the Nexus Dashboard, fabrics, and applications is available for remote users only.
- When using SSO to cross-launch into an APIC fabric from your Nexus Dashboard's **Fabrics** page, the AV pairs defined for the Nexus Dashboard user are also used when logging into the APIC.

  For example, a user defined as admin for the Nexus Dashboard cluster will also have admin privileges in the APIC.

Configure a remote authentication server

When configuring the remote authentication server for the Nexus Dashboard users, you must add a custom attribute-value (AV) pair, specifying the username and the roles assigned to them.

The user roles and their permissions are the same as for the local users you would configure directly in the Nexus Dashboard GUI as described in Roles and permissions. See Roles and permissions in Nexus Dashboard 4.1.1 for a list of the Nexus Dashboard user roles and the AV pair you would use to define the roles on a remote authentication server, such as LDAP.

The AV pair string format differs when configuring a read-write role, read-only role, or a combination of read-write and read-only roles for a specific user. A typical string includes the domain, followed by the read-write roles separated from the read-only roles using the slash (/) character; individual roles are separated by the pipe (|) character:

```
shell:domains=<domain>/<writeRole1>|<writeRole2>/<readRole1>|<readRole2>
```

For example, the following string illustrates how to assign the Tenant Manager and Policy Manager roles to a user, while still allowing them to see objects visible to the User Manager users:

```
shell:domains=all/tenant-policy|site-policy/aaa
```

Note that if you want to configure only the read-only or only read-write permissions for a user, you must still include the slash (/) character. The following examples show how to set just the read-write or read-only access to the objects available to Site Administrator role:

- Read-only: shell:domains=all//site-admin
- Read-write: shell:domains=all/site-admin/

Add LDAP as the remote authentication provider

Before you begin

- You must have at least one user already configured on the LDAP server as described in Configure a remote authentication server.

  You will need to use an existing user for end-to-end verification of LDAP configuration settings.

To add an LDAP remote authentication provider:

1. Add an authentication domain.
   a. From the main navigation menu, select **Admin > Users and Security**.
   b. Click the **Authentication** tab.
   c. In the main pane, click **Create login domain**.
2. In the **Create login domain** screen that opens, provide domain details.
   a. Provide the **Name** for the domain.
   b. (Optional) Provide its **Description**.
   c. From the **Realm** dropdown, select LDAP.
   d. Then click **+Add Provider** to add a remote authentication server.

      The **Add Provider** page opens.
3. Provide the remote authentication server details.
   a. Provide the **Hostname** or **IP Address** of the server.
   b. (Optional) Provide the **Description** of the server.
   c. Provide the **Port** number.

      The default port is 389 for LDAP.
   d. Provide the **Base DN** and **Bind DN**.

      The Base DN and Bind DN depend on how your LDAP server is configured. You can get the Base DN and Bind DN values from the distinguished name of the user created on the LDAP server.

      Base DN is the point from which the server will search for users. For example, DC=nd,DC=local.

Bind DN is the credentials used to authenticate against the server. For example, CN=admin, CN=Users,DC=nd,DC=local.

e. Provide and confirm the **Key**.

   This is the password for your Bind DN user. Anonymous bind is not supported, so you must provide a valid value in these fields.

f. Specify the **Timeout** and number of **Retries** for connecting to the authentication server.

g. Provide the **LDAP Attribute** field for determining group membership and roles.

   The following two options are supported:

   - ciscoAVPair (default)—used for LDAP servers configured with Cisco AVPair attributes for user roles.
   - memberOf—used for LDAP servers configured with LDAP group maps. Adding a group map is described in a following step.

h. (Optional) Enable **SSL** for LDAP communication.

   If you enable SSL, you must also provide the **SSL Certificate** and the **SSL Certificate Validation** type:

   - Permissive: Accept a certificate signed by any certificate authority (CA) and use it for encryption.
   - Strict: Verify the entire certificate chain before using it.

i. Choose **Default** or **Custom** in the **Filter Type** field.

   If you choose **Custom** LDAP filter, a sample of a working syntax is (cn={username}).

j. (Optional) Enable **Server Monitoring**.

   If you choose to enable monitoring, you must also provide the **Username** and **Password** for it.

k. In the **Validation** fields, provide a **Username** and **Password** of a user already configured on the LDAP server you are adding.

   Nexus Dashboard will use this user to verify the end-to-end authentication to ensure that the settings you provided are valid.

l. Click **Save** to complete provider configuration.

m. Repeat this step for any additional LDAP authentication servers you want to use with this domain.

4. (Optional) Enable and configure **LDAP Group Map Rules**.

   If you want to authenticate your LDAP users using Cisco AV pair strings, skip this step.

   a. In the **LDAP Auth Choice**, select LDAP Group Map Rules.

   b. Click **Add LDAP Group Map Rule**.

      The **Add LDAP Group Map Rule** page opens.

c. Provide the **Group DN** for the group.

   The format depends on your LDAP tree. For example: DN=xxx,OU=xxx,DC=xxx and so on.

d. Select one or more **Roles** for the group.

e. Click **Save** to save the group configuration.

f. Repeat this step for any additional LDAP groups.

5. Click **Save** to finish adding the domain.

Add Radius or TACACS as the remote authentication provider

> ℹ Beginning with Nexus Dashboard release 4.0.1 and later, the Message-Authenticator attribute sends messages for Access-Accept, Access-Reject, and Access-Request packets to the Radius server. Due to the change of behavior for Nexus Dashboard, the Radius server may require configuration changes to process the Message-Authenticator attribute in the request. The Radius server must enforce receiving the Message-Authenticator attribute. For more information, see Blast-RADIUS (CVE-2024-3596) Protocol Spoofing Mitigation.

Before you begin

- You must have at least one user already configured on the remote authentication server as described in Configure a remote authentication server.

  You will need to use an existing user for end-to-end verification of the provider configuration settings.

To add a RADIUS or TACACS+ remote authentication provider:

1. Add an authentication domain.
   a. From the main navigation menu, select **Admin > Users and Security**.
   b. Click the **Authentication** tab.
   c. In the main pane, click **Create login domain**.
2. In the **Create login domain** screen that opens, provide domain details.
   a. Provide the **Name** for the domain.
   b. (Optional) Provide its **Description**.
   c. From the **Realm** dropdown, select RADIUS or TACACS+.
   d. Then click **+Add Provider** to add a remote authentication server.

      The **Add Provider** page opens.
3. Provide the remote authentication server details.
   a. Provide the **Hostame** or **IP Address** of the server.
   b. (Optional) Provide the **Description** of the server.
   c. Choose **Authorization Protocol** used by the server.

    You can choose PAP, CHAP, or MS-CHAP.

  d. Provide the **Port** number.

    The default port is 1812 for RADIUS and 49 for TACACS

  e. Provide and confirm the **Key**.

    This is the password used for connecting to the provider server.

  f. (Optional) Choose whether you want to enable **Server Monitoring**.

    If you choose to enable monitoring, you must also provide the **Username** and **Password** for it.

  g. In the **Validation** fields, provide a **Username** and **Password** of a user already configured on the remote server you are adding.

    Nexus Dashboard will use this user to verify the end-to-end authentication to ensure that the settings you provided are valid.

  h. Click **Save** to complete provider configuration.

  i. Repeat this step for any additional remote authentication servers.

4. Click **Save** to finish adding the domain.

Edit remote authentication domains

If you want to make changes to a domain that you have created:

1. From the main navigation menu, select **Admin > Users and Security**.
2. Click the **Authentication** tab.
3. From the **Actions** menu for the domain, select **Edit Login Domain**.

   You cannot change the name and the type of the authentication domain, but you can make changes to the description and provider configuration.

   > ℹ If you make any changes to the login domain, including simply updating the description, you must re-enter the key for all existing providers.

Delete remote authentication domains

1. From the main navigation menu, select **Admin > Users and Security**.
2. Click the **Authentication** tab.
3. From the **Actions** menu for the domain, select **Delete Login Domain**.
4. In the **Confirm Delete** prompt, click **OK** to confirm.

AAA remote authentication passthrough

The authentication, authorization, and accounting (AAA) remote authentication passthrough feature allows authentication for remote users and eliminates the need to update user credentials manually. When the AAA remote authentication passthrough feature is enabled, it automatically saves discovery and device credentials for remote users after successful login. This feature enhances the workflow for managing fabrics and switches, as users no longer need to change credentials every time a password is changed or updated in the remote server.

Network administrators can enable the AAA remote passthrough feature in the Nexus Dashboard **Admin > System Settings > Fabric Management**. See Enable AAA remote passthrough for more information.

Discovery and device credentials

When a SAN fabric is created or discovered, information on **Fabric Name**, **Seed Switch IP**, **username**, and **password** are added to Nexus Dashboard. The **username** and **password** information entered at this time are called the SAN Discovery Credentials.

ℹ You can only have one discovery credential for a fabric.

The Nexus Dashboard discovery feature uses the discovery credentials entered at the time of fabric creation to get the latest state of switches and update the inventory information every 5 minutes.

For SAN devices, the device credentials are automatically saved after a user discovers a SAN fabric. Users who don’t discover a SAN fabric will need to manually enter credentials in the Nexus Dashboard **Manage > Device credentials**. The Nexus Dashboard will use the device credentials whenever the user tries to push the SAN configuration changes to the switches. Each user will have their own device credential for a fabric.

ℹ Certain switches with new organizationally unique IDs (OUIs) are not discovered during the Nexus Dashboard initial SAN discovery process. You can enter the OUI of the switch followed by 'Cisco m' in the **Add New OUIs for Discovering Switch, End Device with Format** field in **Discovery**. For example, for a switch with an OUI, 0x70a983, you can enter the value '0x70a983 Cisco m' in the **Add New OUIs for Discovering Switch, End Device with Format** field and save this information.

Enable AAA remote passthrough

The AAA remote passthrough feature is disabled by default.

Before enabling this feature, ensure that the Nexus Dashboard and switches are configured with the same remote authentication server.

Follow these steps to enable the AAA remote passthrough:

1. Navigate to **Admin > System Settings > Fabric Management > Management**.
2. Check the **Enable AAA Passthrough of device credentials** checkbox.
3. Click **Save** to close the **Switch bootstrap** page.

4. Choose **Discovery** in **Advance settings** and check the **Enable AAA Passthrough feature** checkbox.
5. Choose a value for the auth privacy type in the **AAA Passthrough Authentication / Privacy** field.
6. Click **Save**.

Security

The **Security** page allows you to view and manage certificates used by the Nexus Dashboard. To access the **Security** page, navigate to **Admin > Users and Security > Security**. Use these tabs to configure security in this page:

- Security configuration
- Violation action
- Security domains
- JWT keys
- Credentials store

Security configuration

The **Security configuration** page allows you to configure authentication session timeouts and security certificates used by your Nexus Dashboard cluster.

Before you begin

- You must have the keys and certificates you plan to use with Nexus Dashboard already generated.

  Typically, this includes the following files:

  - Private key (nd.key)
  - Certificate Authority's (CA) public certificate (ca.crt)
  - CA-signed certificate (nd.crt)

  Generating these files for self-signed certificates is described in the section " Generating a private key and self-signed certificate" in the Managing Certificates in your Nexus Dashboard.

- We recommend creating a configuration backup of your Nexus Dashboard cluster before making changes to the security configurations.

  For more information about backups, see " Backup and Restore" in Backing Up and Restoring Your Nexus Dashboard.

To edit security configuration:

1. Edit security configuration.
   a. From the main navigation menu, select **Admin > Users and Security**.
   b. Click the **Security** tab.
   c. In the main pane, click the **Security configuration** tab.
   d. In the main pane, click the **Edit** icon.
2. In the **Edit security configuration** screen that opens, update one or more fields as required:

   Note that uploading the keys and certificate files is not supported and you will need to paste the information in the following fields.

   a. Update the **Session timeout**.

      This field defines the duration of the API tokens with the default duration set to 20 minutes.

   b. In the **Domain name** field, provide your domain.
   c. Check the box in the **Minimum TSL version: TLSV1.3** field if you want to set the minimum SSL version to TLSV1.3.

      The minimum SSL version is set to TLSV1.2 by default. Checking this box to set the minimum version to TLSV1.3 will reject all clients using a TLSV1.2 connection request.

   d. To disable Qualtrics integration from the browser at a system wide level, check the box in the **Enforce strict content security policy** field.
   e. Click the **SSL Ciphers** field and select any additional cipher suites you want to enable from the dropdown or click the **x** icon on an existing cipher suite to remove it.

      Cipher suites define agorithms (such as key exchange, bulk encryption, and message authentication code) used to secure a network connection. This field allows you to customize which cipher suites your Nexus Dashboard cluster will use for network communication and disable any undesired suites, such as the less secure TLS1.2 and TLS1.3.

a. In the **Key** field, provide your private key.
b. In the **RSA Certificate** field, provide the CA-signed or self-signed certificate.
c. In the **Root Certificate** field, provide the CA’s public certificate.
d. (Optional) If your CA provided an Intermediate Certificate, provide it in the **Intermediate Certificate** field.
e. Click **Save** to save the changes.

   After you save your changes, the GUI will reload using the new settings.

Violation action

The **Violation action** page shows the number of unsuccessful attempted login actions.

To edit the information that is provided in the **Violation action** page:

1. From the main navigation menu, select **Admin > Users and Security**.
2. Click the **Security** tab.
3. In the main pane, click the **Violation action** tab.

   Information on unsuccessful attempted login actions is displayed.

4. Click **Edit**.

   The **Login attempt action** page appears.

5. Edit the **Login attempt action** settings, if necessary.
   a. In the **Maximum login attempts** field, set the maximum number of login attempts until the maximum action is triggered.

The default entry is 0.

b. In the **Maximum password length** field, set the maximum password length.

The default entry is 8.

c. In the **Maximum login attempted action** field, choose the action that will take place when the number of maximum login attempts has been surpassed.

- In the **Block for** field, set the amount of time, in seconds, minutes, or hours, that a login block will take place when the number of maximum login attempts has been surpassed.
- In the **Block admin for** field, set the amount of time, in seconds, minutes, or hours, that an admin login block will take place when the number of maximum login attempts has been surpassed.

6. Click **Save**.

Security domains

A restricted security domain allows an administrator to prevent a group of users from viewing or modifying any objects created by a group of users in a different security domain, even when users in both groups have the same assigned privileges.

For example, an administrator in restricted security domain (domain1) will not be able to see fabrics, services, cluster or user configurations in another security domain (domain2).

Note that a user will always have read-only visibility to system-created configurations for which the user has proper privileges. A user in a restricted security domain can be given a broad level of privileges within that domain without the concern that the user could inadvertently affect another group’s physical environment.

To create a security domain:

1. Create a new security domain.
   a. From the main navigation menu, select **Admin > Users and Security**.
   b. Click the **Security** tab.
   c. In the main pane, click the **Security domains** tab.
   d. In the main pane, click **Create security domain**.
2. In the **Create security domain** screen that opens, provide the domain details.
   a. Provide the **Name** for the domain.
   b. (Optional) Provide a description for the domain.
   c. Click **Save** to save the domain.

JWT keys

To create a JWT key:

1. From the main navigation menu, select **Admin > Users and Security**.

2. Click the **Security** tab.
3. In the main pane, click the **JWT keys** tab.
4. Click **Create JWT key**.

   The **Create JWT key** page appears.

5. Enter a service name for the JWT key in the **Service name** field.
6. Enter a JWT API key in the **JWT API key** field.
7. Enter a JWT public key in the **JWT public key** field.
8. Enter the remote ID claim information in the **Remote ID claim** field.
9. Click **Create**.

Credentials store

You can add an external Credentials store that allows you to store and retrieve network credentials from an external vault, such as the CyberArk vault, instead of a local storage system.

To add a credentials store:

1. From the main navigation menu, select **Admin > Users and Security**.
2. Click the **Security** tab.
3. In the main pane, click the **Credentials store** tab.
4. Click **Add credential store**.

   The **Edit credential store** page appears.

5. In the **Store type** field, choose a store type, such as CyberArk.
6. Enter the necessary information in the remaining fields, depending on the choice that you made in the **Store type** field.

   For example, if you chose CyberArk in the **Store type** field, make the necessary choices in the following fields:

   - In the **CyberArk CCP URL** field, enter the CyberArk Central Credential Provider (CCP) URL.

     For more information, see Central Credential Provider (CCP).

   - In the **Certificate name** field, choose the appropriate certificate from the dropdown list.

     The **Certificate name** field lists the certificates that you configured in **Admin > Certificate Management**.

     > Ensure that the system certificate you configured is mapped to the CyberArk feature to use the certificate name here.

     For more information on system certificates, see Managing Certificates in your Nexus Dashboard.

7. Click **Resync/Save**.

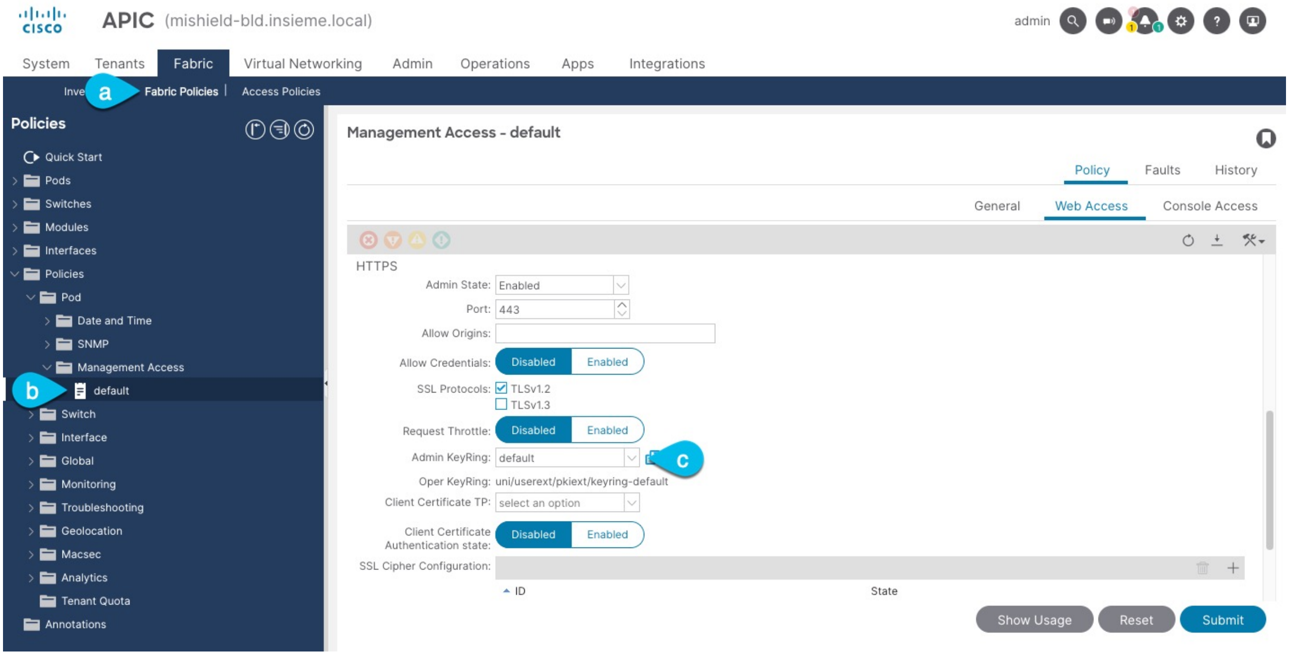
> If there is a password change in CyberArk, whether automatically or manually, Nexus Dashboard will require approximately 10 minutes to reflect the updated password. To retrieve the updated password, navigate to the **Credential Store** and perform a **Resync**.

Validate peer certificates

You can import a fabric controller's Certificate Authority (CA) root certificate chain into Nexus Dashboard. This allows you to verify that the certificates of hosts to which your Nexus Dashboard connects (such as fabric controllers) are valid and are signed by a trusted Certificate Authority (CA) when you add the fabrics.

Export a certificate chain from Cisco APIC

1. Log in to your Cisco APIC.
2. Check which key ring is being used for management access:



Admin State: Enabled

Port: 443

Allow Origins:

Allow Credentials: [✓ Disabled] Enabled

SSL Protocols: ☑ TLSv1.2 ☐ TLSv1.3

Request Throttle: [✓ Disabled] Enabled

Admin KeyRing: default

Oper KeyRing: uni/userext/pkiext/keyring-default

Client Certificate TP: select an option

Client Certificate Authentication state: [✓ Disabled] Enabled

SSL Cipher Configuration:

a. In the top navigation bar, choose **Fabric > Fabric Policies**.

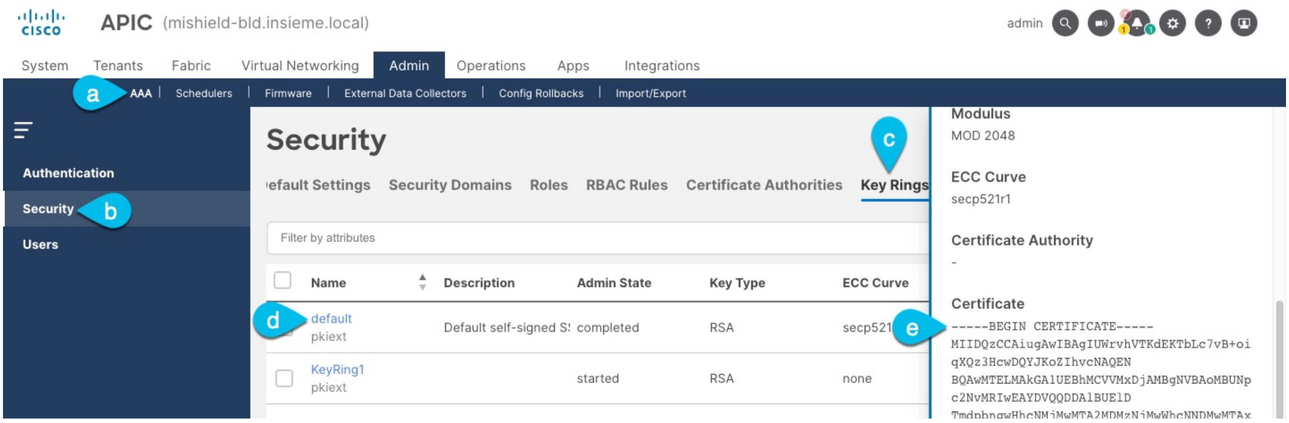
b. In the left navigation menu, choose **Policies > Pod> Management Access**.

c. In the main pane, note the name in the **Admin KeyRing** field.

   In the above example, the default key ring is being used. However, if you created a custom key ring with a custom certificate chain, the name of that key ring would be listed in the **Admin KeyRing** field.

   Custom security configuration for Cisco APIC is described in detail in *Cisco APIC Security Configuration Guide* for your release.

3. Export the certificate used by the key ring:



Name	Description	Admin State	Key Type	ECC Curve
default pkiext	Default self-signed S!	completed	RSA	secp521
KeyRing1 pkiext		started	RSA	none

Modulus
MOD 2048

ECC Curve
secp521r1

Certificate Authority
-

Certificate

```
-----BEGIN CERTIFICATE-----
MIIDQzCCAiugAwIBAgIUWrvhVTKdEKTbLc7vB+oi
qXQz3HcwDQYJKoZIhvcNAQEN
BQAwMTELMAkGA1UEBhMCVVMxDjAMBgNVBAoMBUNp
c2NvMRIwEAYDVQQDDAlBUElD
TmdpbnqwHhcNMjMwMTA2MDMzNjMwWhcNNDMwMTAx
```

a. In the top navigation bar, choose **Admin > AAA**.

b. In the left navigation menu, choose **Security**.

c. In the main pane, choose the **Key Rings** tab.

d. Click the name of the key ring you found in the previous step and copy the **Certificate**.

   The above example shows the default key ring from the previous step. However, if you had a custom key ring configured, choose the CA certificate chain used to create the key ring.

   You must include the -----BEGIN CERTIFICATE----- and -----END CERTIFICATE----- in the text you copy, for example:

   ```
   -----BEGIN CERTIFICATE-----
   MIIDQzCCAiugAwIBAgIUWrvhVTKdEKTbLc7vB+oiqXQz3HcwDQYJKoZIhvcNAQEN
   [...]
   -----END CERTIFICATE-----
   ```

Import certificates into Nexus Dashboard

1. Log in to your Nexus Dashboard where you plan to onboard the fabrics.
2. Import the certificate into Nexus Dashboard.
   a. Log in to your Nexus Dashboard where you will onboard the fabrics.
   b. From the main navigation menu, select **Admin > Certificate Management**.
   c. Click the **CA Certificates** tab.
   d. Click **Add CA certificate**, provide a unique name for the certificate, and paste the certificate chain you copied from your fabric's controller.
3. Proceed with adding the fabric as you typically would, but enable the **Verify Peer Certificate** option.

   Note that if you enable the **Verify Peer Certificate** option but don't import the valid certificate, fabric onboarding will fail.

   Adding fabrics is described in Creating LAN and ACI Fabrics and Fabric Groups.

Add a proxy server

In certain deployment scenarios, you may have to access the Internet through a proxy.

Note that Nexus Dashboard uses two main route tables—one for the Management network and one for the Data network—and by default, it will use the routing table of the originating IP address. In other words, Nexus Dashboard will attempt to reach the proxy from the routing table of the POD/Service that is trying to use the proxy.

For example, if you configure a proxy and establish Intersight connectivity from your Nexus Dashboard and then attempt to configure the AppDynamics integration from the Insights service running in the cluster, you may get an error stating that the AppDynamics host is not reachable. This happens because the proxy is only accessible from the management interface, so in such cases you also need to add a management network route for the proxy IP address.

To add a proxy server:

1. Navigate to **Admin > System Settings > General**.
2. In the **Proxy configuration** area, click **Edit**.
3. Click **+ Add HTTP Server** in the proxy configuration window.
4. From the **Type** dropdown, select the type of traffic that you want to be proxied.
5. In the **Server** field, provide the full address for the proxy server, including the port if required.

   For example http://proxy.company.com:80.

6. If the server requires login credentials, provide the **Username** and **Password**.
7. (Optional) Click **+ Add Ignore Host** to provide any hosts that will ignore the proxy.

   You can add one or more hosts with which the cluster will communicate directly bypassing the proxy.

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