VMware vSphere and Entrust Cryptographic Security Platform Key Management Vault

Integration Guide

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Table of Contents

1. Introduction . . . 1
    1.1. Documents to read first . . . 1
    1.2. Product configuration . . . 1
    1.3. Requirements . . . 1
2. Procedures . . . 2
    2.1. Prerequisites . . . 2
    2.2. Create a KMIP Vault in the Key Management Vault server . . . 2
    2.3. Establish trust between the Key Management KMIP Vault and the VMware vCenter . . . 7
    2.4. Create the KMS cluster in vCenter . . . 8
    2.5. Establish a trusted connection between the KMS cluster and the Key Management KMIP vault . . . 10
    2.6. Enable Encryption for virtual machines . . . 12
    2.7. Enable Data-At-Rest encryption on an existing vSAN cluster . . . 14
3. Integrating with an HSM . . . 15
4. Additional resources and related products . . . 16
    4.1. nShield HSMs . . . 16
    4.2. nShield as a Service . . . 16
    4.3. Entrust CSP Key Manager . . . 16
    4.4. Entrust products . . . 16
    4.5. nShield product documentation . . . 16

Chapter 1. Introduction

This guide describes how to integrate the Entrust Cryptographic Security Platform Key Management Vault with VMware encryption solutions for vSAN and VM encryption. Entrust Cryptographic Security Platform Key Management Vault, configured with an open-standard KMIP Vault, can serve as a KMS in vCenter.

1.1. Documents to read first

- *Entrust Cryptographic Security Platform Key Management Vault nShield HSM Integration Guide*. You can access it from the Entrust Document Library and from the nShield Product Documentation website.
- Cryptographic Security Platform Key Management Vault with VSAN and VMware vSphere VM Encryption.

Also refer to the following documents in the VMware online documentation:

- Using Encryption in a vSAN Cluster.
- Virtual Machine Encryption.

1.2. Product configuration

Vendor	Product	Version
VMware	vSphere	8.0, 9.0
Entrust	Cryptographic Security Platform	1.4, 1.6
Entrust	Key Management Vault	10.5.3, 10.6.1

1.3. Requirements

Entrust recommends that you allow only unprivileged connections unless you are performing administrative tasks.

Chapter 2. Procedures

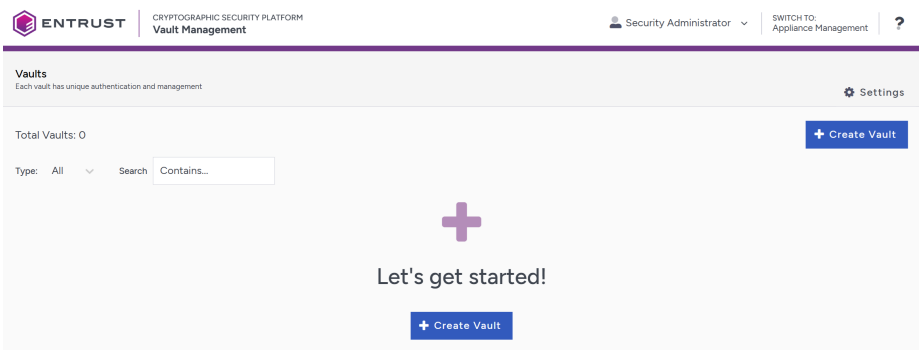
2.1. Prerequisites

Before you perform the integration, complete the following tasks:

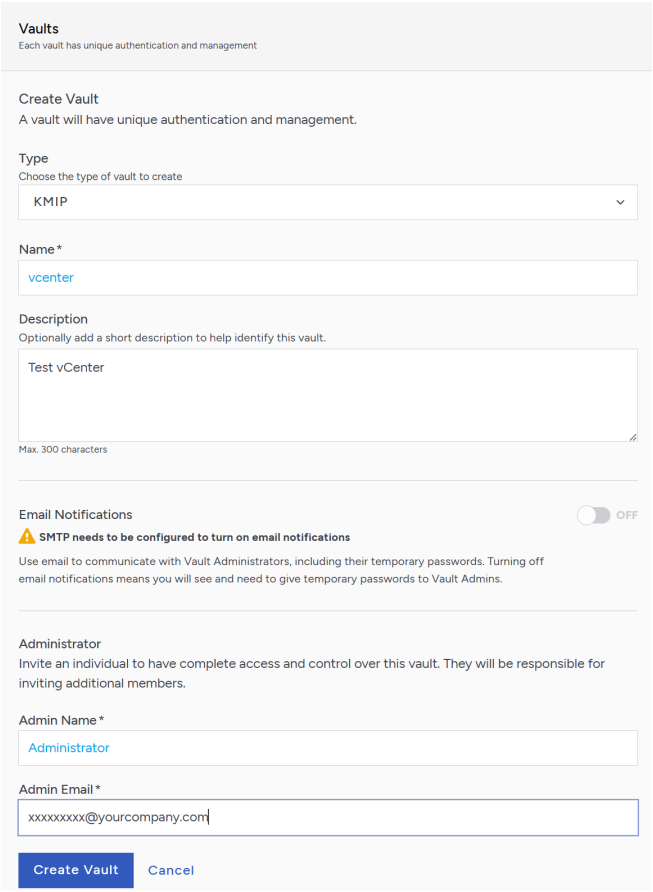
- Key Management Vault is deployed and configured.
- VMware vSphere is deployed and configured using vCenter.
- You have administrator rights to manage the KMS configuration in vCenter.

2.2. Create a KMIP Vault in the Key Management Vault server

1. In your web browser, go to the Key Management Vault server's IP address and sign in with the **secroot** credentials.
2. If you are not in the vault Management interface, select **SWITCH TO: Manage Vaults** in the Menu Header
3. Select **Create Vault**.

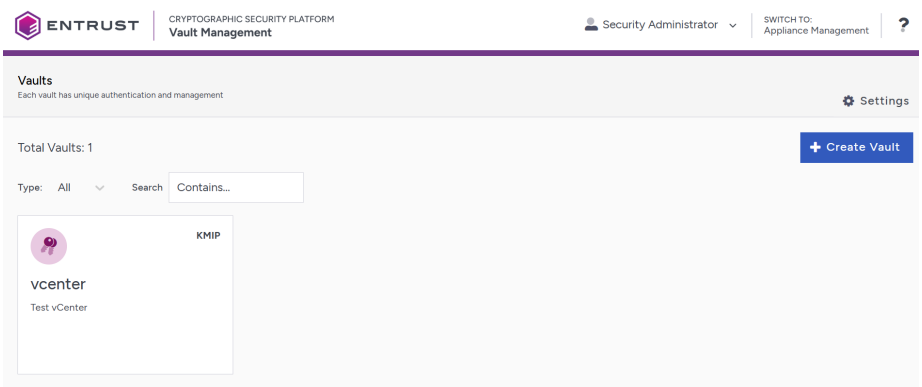


4. Create a **KMIP** Vault:
    - For **Type**, select **KMIP**.
    - For **Name**, enter the name of the vault.
    - For **Description**, enter the description of the vault.
    - For **Admin Name**, enter the name of the administrator of the vault.
    - For **Admin Email**, enter a valid email for the administrator.



A temporary password is emailed to the administrator. The user uses this password to sign in to the KMIP Vaults space in Key Management Vault for the first time. In a closed-gap environment where email is unavailable, the password is displayed when you create the vault. Copy it and send it to the user.

5. Select **Create Vault**.
6. Select **Close** when the vault creation completes.
7. The new vault is added to the vault dashboard.



After the vault has been created, the KMIP server settings on the appliance are **enabled**.

2.2.1. KMIP server settings

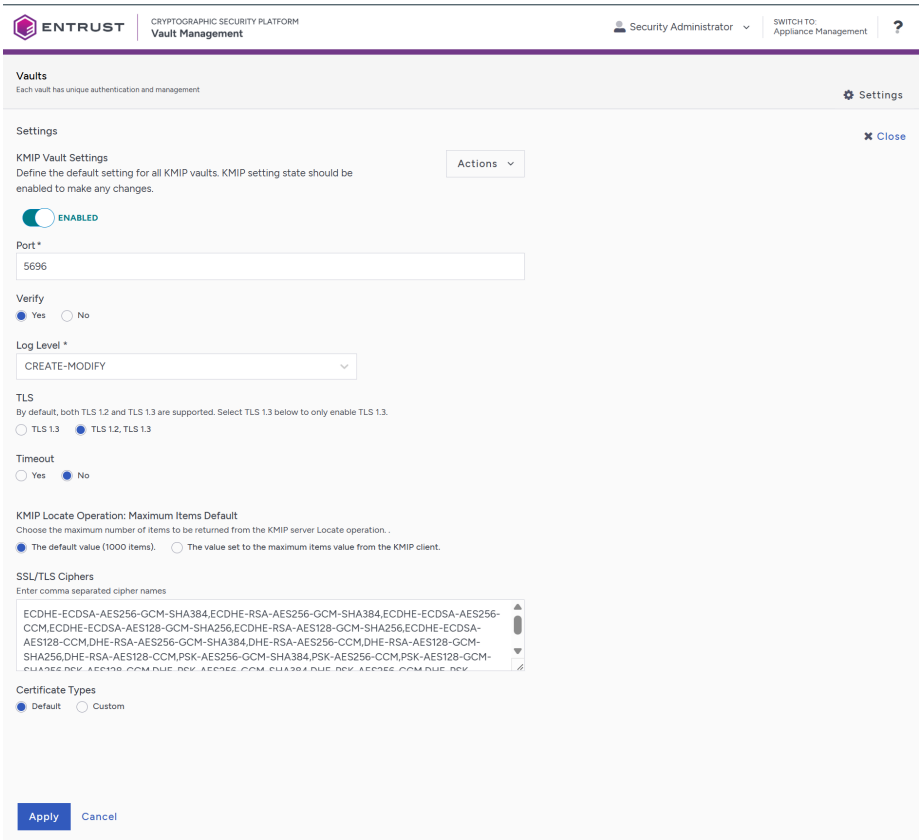
The KMIP server settings are configured at the Key Management Vault appliance level and apply to all KMIP Vaults on the appliance. After a KMIP Vault is created, they are automatically set to **ENABLED**.

To use external key management and configure the Key Management Vault KMIP settings, refer to Configuring a KMIP Server for vSphere KMS.

When you are using external key management, as is the case in this solution, the Key Management Vault server is the KMIP server and the VMware vCenter server is the KMIP client.

1. Select the **Settings** icon at the top right to view or change the KMIP settings.

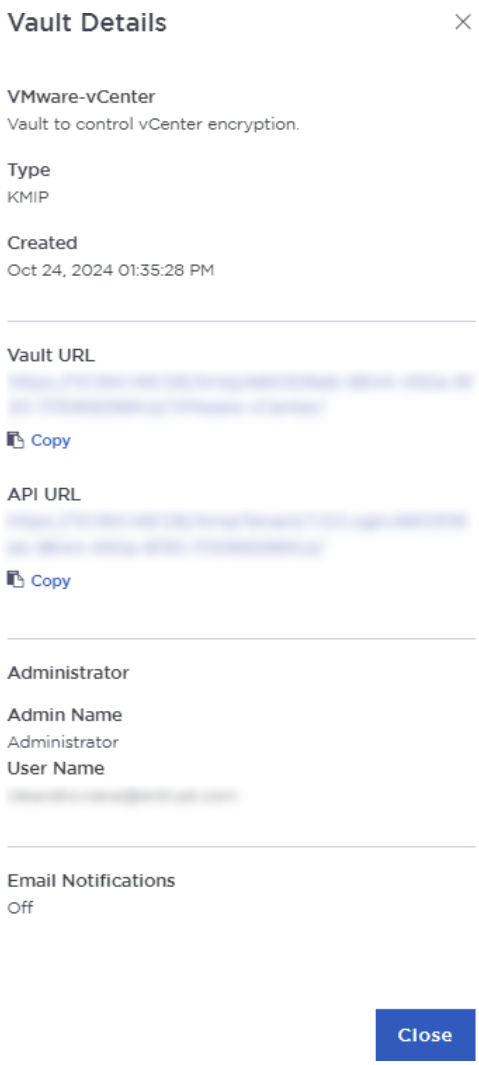
   The default settings are appropriate for most applications. Change them as needed.



2. Select **Apply**.

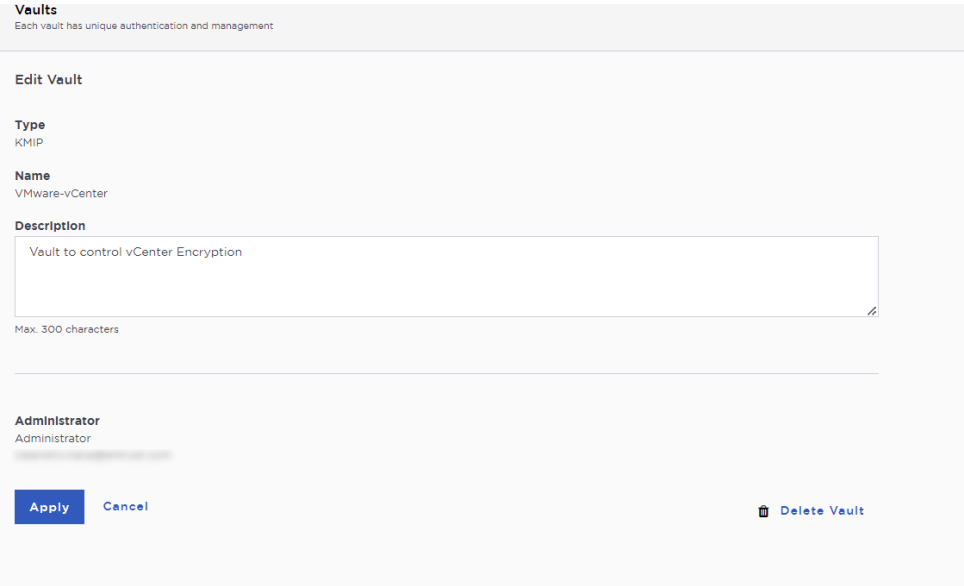
2.2.2. View details for the vault

To view the vault's details, hover over it and select **View Details**.



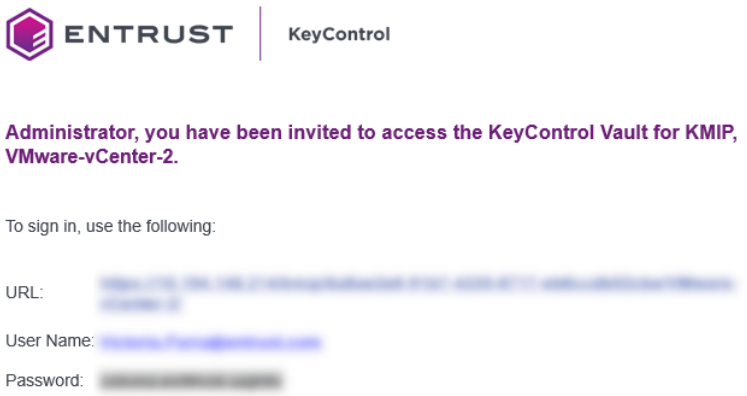
2.2.3. Edit a vault

To edit the details of the vault, select **Edit** when you hover over the vault.



2.2.4. Manage the vault

After creating the vault, check for an email containing its URL and login information. For example:



Open the URL and sign in with the credentials provided. The first time you sign in, you need to change the password.

In a closed-gap environment where email is unavailable, the password is displayed when you create the vault. Copy it and send it to the user.

2.2.5. Set up other administrators

For recovery purposes, add one or more additional administrators to the vault.

1. Select **Security > Users**.

2. In the **Manage Users** dashboard:
    a. Select the **+** icon to add one or more users.
    b. Add the user by providing the information requested in the **Add User** dialog.
    c. Select **Add**.

2.3. Establish trust between the Key Management KMIP Vault and the VMware vCenter

Certificates are required to support KMIP communication between the Key Management Vault KMIP Vault and the vCenter application. Use the built-in capabilities of the Key Management KMIP Vault to create and publish the certificates.

For more information on how to create a certificate bundle, refer to Establishing a Trusted Connection with a CSP Vault-Generated CSR.

The following steps show how to integrate VMware vSphere or VSAN encryption with the Key Management KMIP Vault.

1. Sign in to the KMIP Vault created earlier. Use the login URL and credentials provided to the administrator of the vault.
2. Select **Security**, then **Client Certificates**.

3. In the **Manage Client Certificate** page, select the **+** icon on the right to create a new certificate.

    You can create the following certificate types for vCenter:

    - A certificate with no authentication.

- A certificate with authentication.

4. Create the certificate type that best fits your environment.
5. In the **Create Client Certificate** dialog box:
   - Enter a name in the **Certificate Name** field.
   - Set the certificate's expiration date in the **Certificate Expiration** field.

     If you are creating a certificate with authentication:

   - Select **Add Authentication for Certificate**.
   - Enter the User Name.
   - Enter the Password.

   If you use certificate authentication, enter these credentials in vCenter later.
6. Select **Create**.

   The new certificates are added to the **Manage Client Certificate** pane.
7. Select the certificate and select the **Download** icon to download the certificate.

   The webGUI downloads `certname_datetimestamp.zip`, which contains a client certificate and key file named `certname.pem` and a server certificate file named `cacert.pem`.
8. Unzip the file so that you have the `certname.pem` file available to upload.
9. The ZIP file contains the following files:
   - A `certname.pem` file that includes both the client certificate and private key. In this example, this file is called `vCenterKMS.pem`.

     The client certificate section of the `certname.pem` file includes the lines "-----BEGIN CERTIFICATE-----" and "-----END CERTIFICATE-----" and all text between them.

     The private key section of the `certname.pem` file includes the lines "-----BEGIN PRIVATE KEY-----" and "-----END PRIVATE KEY-----" and all text in between them.
   - A `cacert.pem` file, which is the root certificate for the KMS cluster. It is always named `cacert.pem`.

   Use these files later when you configure the KMS cluster in vCenter.

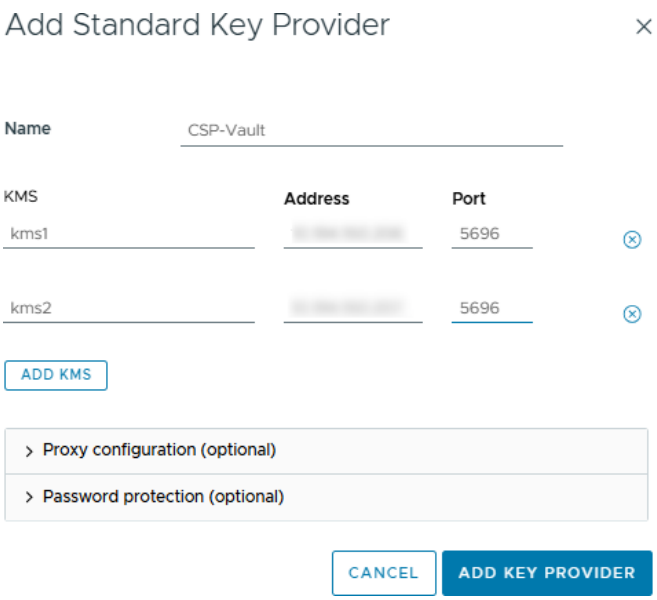
2.4. Create the KMS cluster in vCenter

For more details, see Adding a KMS Cluster in vSphere in the Entrust online documentation.

1. Launch the vSphere Web Client and log into the vCenter server that you want to add to Key Management Vault.
2. Select the required vCenter Server in the **Global Inventory Lists**.
3. Select the **Configure** tab.
4. In the left-hand pane, select **Security > Key Providers**.
5. Select **Add Standard Key Provider**.
6. In the **Add Standard Key Provider** dialog, set the following configuration options:
   - For **Name**, enter the name of the cluster.
   - For each node in the Key Management Vault cluster, enter the **KMS** (node name), **IP Address** and **Port**. The default port is 5696.

     Make sure that the KMIP server resides on a device that is not encrypted using the Key Management Vault server cluster. The KMIP server must be available to provide the keys for the encrypted devices before the encrypted devices can be accessed.

     To add an extra node line, select **Add KMS**.



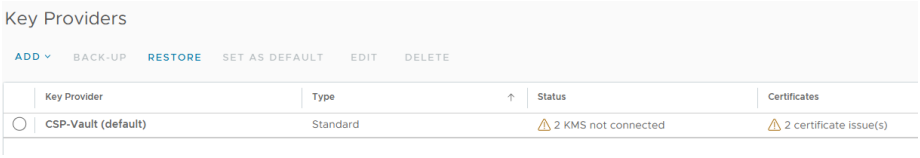
7. If you use a proxy, open and configure **Proxy Configuration**.

   Password protection is optional.

8. If the certificate you created in the Key Management KMIP Vault uses authentication, enter the required credentials.

9. Select **Add Key Provider**.
10. In the **Make vCenter Trust Key Provider** dialog, review the details for each node, then select **Trust**.

    This adds the KMS cluster to vCenter, but its status is **KMS not connected** because of **Certificate issues**. For example:

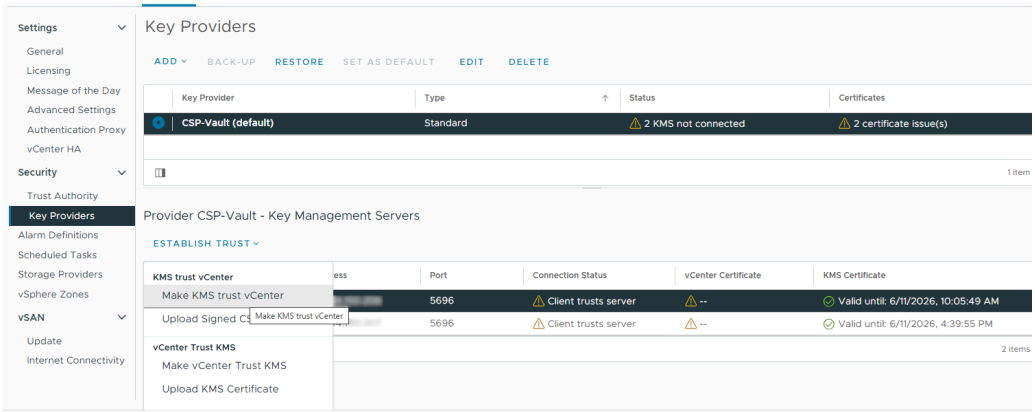


    If you see the message **"Cannot retrieve the requested certificate"**, the issue may be related to the **TLS Configuration** in the Key Management Vault appliances. This can occur with earlier versions of vCenter that do not support **TLS Extended Master Secret**. To resolve the issue, upgrade to the latest version of vCenter or change Key Management Vault so that it does **NOT** enforce EMS in the **TLS configuration**. See Configuring TLS in the Key Management Vault Administration Guide.

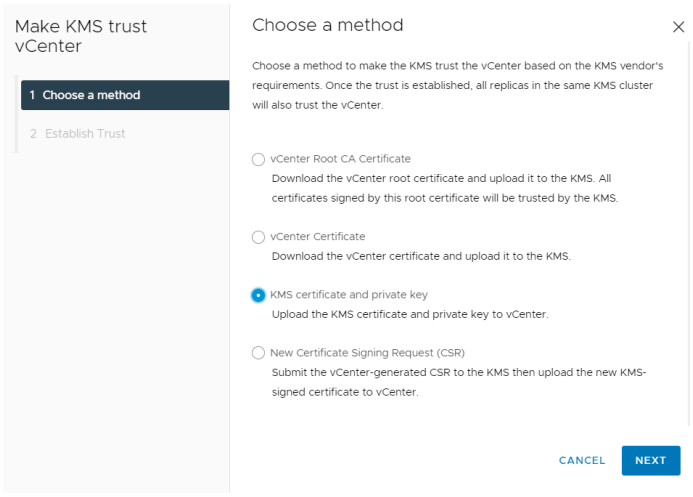
2.5. Establish a trusted connection between the KMS cluster and the Key Management KMIP vault

To establish a trusted connection between the KMS cluster and the Key Management KMIP Vault:

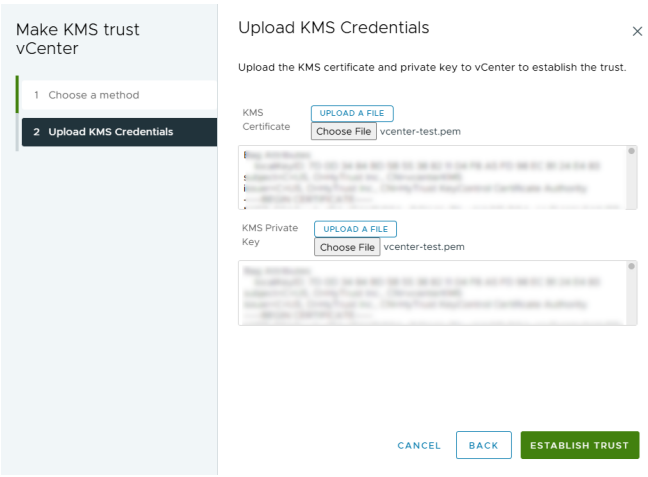
1. Continuing from the previous section, select the KMS cluster in the list, then scroll down to where the nodes are listed.
2. Select a node, then select **Establish Trust** > **Make KMS trust vCenter**. For example:



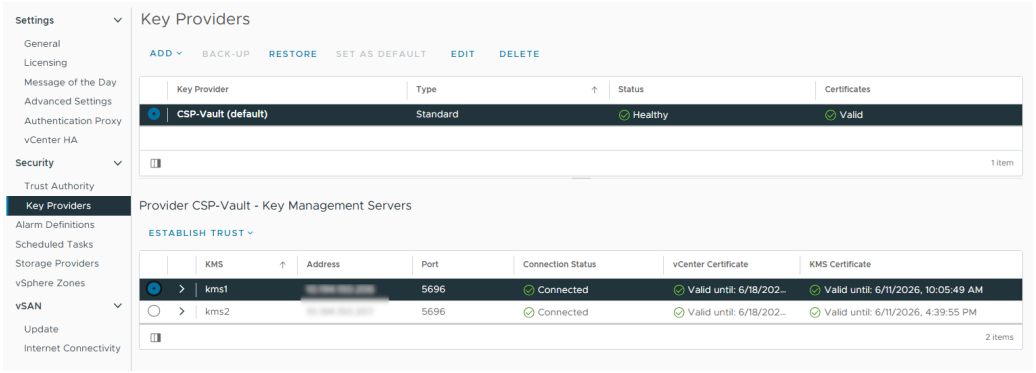
3. In the **Choose method** pane of the **Make KMS Trust vCenter** dialog, select **KMS certificate and private key**.



4. Select **Next**.
5. In the **Upload KMS Credentials** pane of the **Make KMS Trust vCenter** dialog, upload the `certname.pem` file created earlier. Upload this file as both the KMS certificate and the private key:
    a. For **KMS certificate**, select **Upload file**. Select the `certname.pem` file, then select **Open**.
    b. For **Private key**, select **Upload file**. Select the `certname.pem` file again, then select **Open**.
    c. Select **Establish Trust**.



6. Wait for the KMS cluster's connection status in vCenter to change to **Connected**. For example:

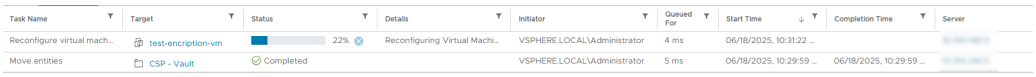


2.6. Enable Encryption for virtual machines

Use a VMware storage policy to enable encryption:

1. Launch the vSphere Web Client and sign in to the vCenter server.
2. Select the VM to encrypt.
3. Make sure the VM is **Powered Off**.
4. Right-click the VM for which you would like to enable encryption and select **VM Policies > Edit VM Storage Policies**.
5. Select the **VM Encryption Policy** storage policy, then select **OK**.

   This reconfigures the VM. For example:



   After the reconfiguration is complete, the disks are encrypted and the keys are managed by the configured KMS.

2.6.1. Check encryption at the VM level

To verify encryption at the VM level:

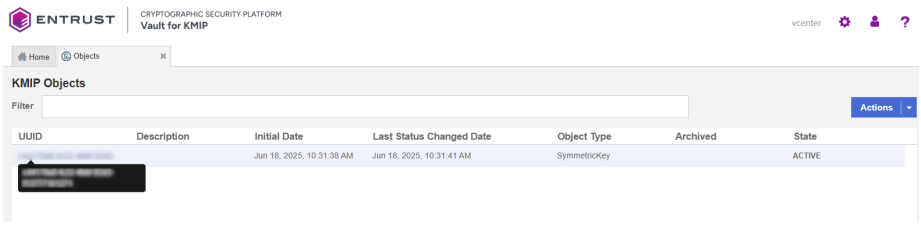
1. Launch the vSphere Web Client and sign in to the vCenter server.
2. Locate a VM and select it.
3. In **VM View**, select the **Summary** tab.
4. Under **Virtual Machine Details** > **Encryption**, the status should be:

```
Encrypted with standard key provider
```

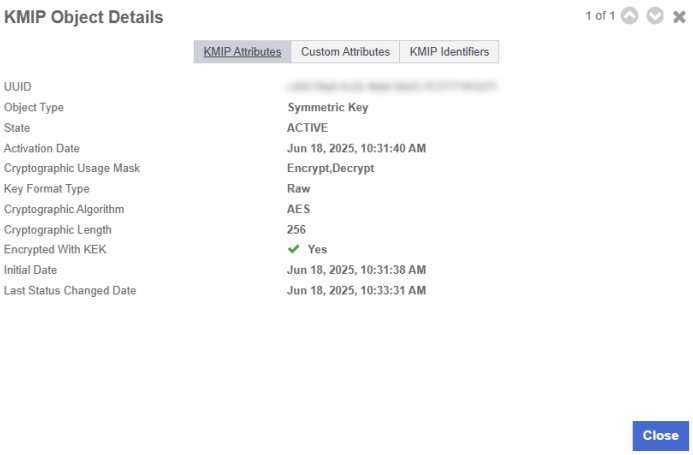
2.6.2. Check encryption by looking for the keys in the Key Management KMIP Vault

To verify encryption by checking for keys:

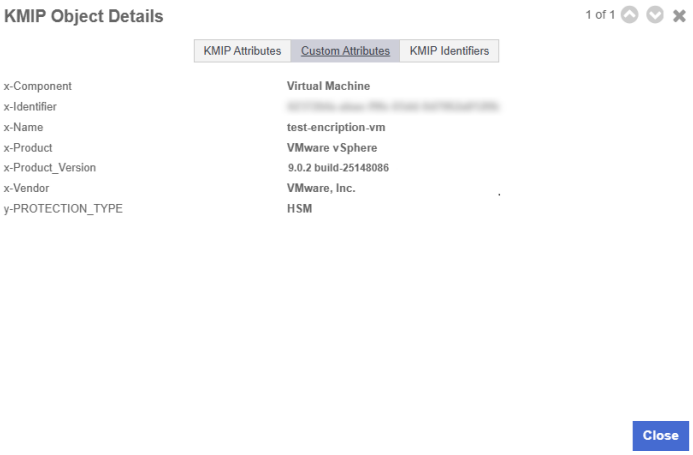
1. In a web browser, sign in to the KMIP Vault.
2. Select the **Objects** tab to view a list of **KMIP Objects**. The list includes the newly created keys. For example:



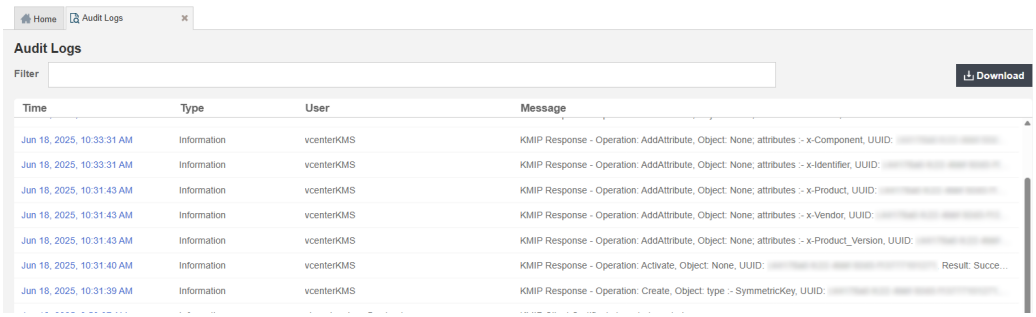
3. Select a key to display its **KMIP Object Details**. For example:



4. Select the **Custom Attributes** tab to confirm that VMware vSphere uses the key.



5. On the main screen, select the **Audit Logs** tab to view records related to key creation. For example:



For more information on this topic, refer to Virtual Machine Encryption on the Broadcom documentation site.

2.7. Enable Data-At-Rest encryption on an existing vSAN cluster

For instructions on enabling Data-At-Rest encryption on an existing vSAN cluster, see Using Encryption in a vSAN Cluster on the Broadcom documentation site.

Do not encrypt the CSP Vault Appliance with its own keys. This will prevent the vSAN from powering back on after a power cycle because it cannot access the keys. You can add a datastore to ESXi hosts. As long as vSAN does not absorb that storage, you can deploy the appliances on a datastore outside vSAN. Alternatively, you can deploy the appliances in another hypervisor supported by Key Management Vault.

Chapter 3. Integrating with an HSM

For guidance on integrating Entrust Key and Secrets Management with a Hardware Security Module (HSM), consult your HSM vendor. If you are using an Entrust nShield HSM, refer to Hardware Security Modules with CSP Vault for instructions on configuring Entrust Key and Secrets Management with FIPS 140-3 or FIPS 140-2 certified protection. Additionally, post-quantum support is available with new nShield HSM firmware.

Chapter 4. Additional resources and related products

4.1. nShield HSMs

4.2. nShield as a Service

4.3. Entrust CSP Key Manager

4.4. Entrust products

4.5. nShield product documentation