Replace Self-Signed SSL Certificates in Hyperflex Clusters

Contents

Introduction

This document describes how to replace Self-Signed SSL Certificates in Hyperflex clusters with third-party certificates.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Basic understanding of SSL certificates.
- Basic understanding of Linux command line.
- Hyperflex Cluster Operations.

Components Used

The information in this document is based on:

Hyperflex Data Platform(HXDP) 5.0.(2a) and higher

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Background Information

In the Cisco HyperFlex deployment, a set of local certificates are generated between the components to allow for trusted communication.

If your organizations have a certificate authority already in place, it is recommended that you replace the default SSL Certificates with your own certificates.

Ensure that you have these requirements before you attempt this configuration :

- Certificate Authority Server
- Linux Machine

Configure

Step 1. Create a copy of openssl.cnf

Connect to Hyperflex Cluster Management IP (CMIP) using SSH as an administrative user and then switch to diag user.

```
HyperFlex StorageController 5.0(2a)
admin @ X.X.X.X's password:
This is a Restricted shell.
Type '?' or 'help' to get the list of allowed commands.
hxshell:~$ su diag
Password:
 _____ _                 _____ _                              ___               ____
|  ___(_)_   _____     _   |_   _| |__  _ __ ___  ___     _     / _ \ _ __   ___         / ___|  _____
| |_  | \ \ / / _ \  _| |_   | | | '_ \| '__/ _ \/ _ \  _| |_  | | | | '_ \ / _ \  _____  \___ \ / _ \
|  _| | |\ V /  __/ |_   _|  | | | | | | | |  __/  __/ |_   _| | |_| | | | |  __/ |_____|  ___) |  __/\
|_|   |_| \_/ \___|   |_|    |_| |_| |_|_|  \___|\___|   |_|    \___/|_| |_|\___|         |____/ \___|

Enter the output of above expression: 2
Valid captcha
diag#
```

> **Note**: From the 5.0(2a) version, diag user is available to allow users to have more privileges, if your cluster is in 4.5, please contact Cisco TAC to complete this procedure.

Create a directory in **/tmp** folder

In this example, it is named **ssl**.

```
diag# mkdir /tmp/ssl
```

Modify directory permissions.

```
diag# chmod 777 /tmp/ssl
```

Create a copy of **openssl.cnf**

In this example, the copy of **openssl.cnf** is named as **openssl-san.cnf**.

```
diag# cp /etc/ssl/openssl.cnf /tmp/ssl/openssl-san.cnf
diag# ls -l /tmp/ssl/
total 12
-rwxr-xr-x 1 diag diag 10835 Aug  3 21:39 openssl-san.cnf
```

Step 2. Edit openssl-san.cnf file

Create a directory on your local Linux Machine to copy **openssl-san.cnf** content from CMIP .

Edit the content of the file on your Linux Machine.

> **Note**: openssl-san.cnf can be edited under SCVM with vi.

Uncomment the req-extensions line in the [req] section.

Remove the # symbol from the line.

```
[ req ]
default_bits        = 2048
default_keyfile     = privkey.pem
distinguished_name  = req_distinguished_name
attributes      = req_attributes
x509_extensions = v3_ca # The extentions to add to the self signed cert

# Passwords for private keys if not present they will be prompted for
# input_password = secret
# output_password = secret

# This sets a mask for permitted string types. There are several options.
# default: PrintableString, T61String, BMPString.
# pkix   : PrintableString, BMPString (PKIX recommendation before 2004)
# utf8only: only UTF8Strings (PKIX recommendation after 2004).
# nombstr : PrintableString, T61String (no BMPStrings or UTF8Strings).
# MASK:XXXX a literal mask value.
# WARNING: ancient versions of Netscape crash on BMPStrings or UTF8Strings.
string_mask = utf8only

req_extensions = v3_req # The extensions to add to a certificate request

[ req_distinguished_name ]
countryName         = Country Name (2 letter code)
countryName_default     = AU
countryName_min         = 2
countryName_max         = 2
```

Add the Subject Alternative Name (SAN) in the [v3_req] section.

Add the SAN lines in the **[v3_req]** section. Ensure you add all Storage Controller Virtual Machines (SCVMs) and the Hyperflex Cluster Fully qualified domain name (FQDN).

> **Note**: Chrome no longer supports the usage of Common Name and now requires Subject Alternative Names (SAN) to be present in the certificate.

```
[ v3_req ]

# Extensions to add to a certificate request

basicConstraints = CA:FALSE
keyUsage = nonRepudiation, digitalSignature, keyEncipherment

subjectAltName = @alt_names

[alt_names]
DNS.1 = SpringpathControllerS6U6NYVTME
DNS.2 = SpringpathControllerS6U6NYVTME.mxsvlab.com
DNS.3 = SpringpathController5NQ1FDLLEH
DNS.4 = SpringpathController5NQ1FDLLEH.mxsvlab.com
DNS.5 = SpringpathControllerM7L9J9RO04
DNS.6 = SpringpathControllerM7L9J9RO04.mxsvlab.com
DNS.7 = Monterrey
DNS.8 = Monterrey.mxsvlab.com

[ v3_ca ]
```

Note: DNS server must resolve all SCVMs in your cluster.

Step 3. Create the Certificate

Step 3a. Create the CSR

From your Linux Machine run the command :

```
openssl req -nodes -newkey rsa:2048 -keyout /<path where you have openssl-san.conf>/<Host Name of the CV
```

```
user$ openssl req -nodes -newkey rsa:2048 -keyout /Users/user/Documents/SpringpathController5NQ1FDLLEH.k
Generating a 2048 bit RSA private key
.........................+++++
.....................................................................................................+++
writing new private key to '/tmp/ssl/SpringpathControllerM7L9J9RO04.key'
-----
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
```

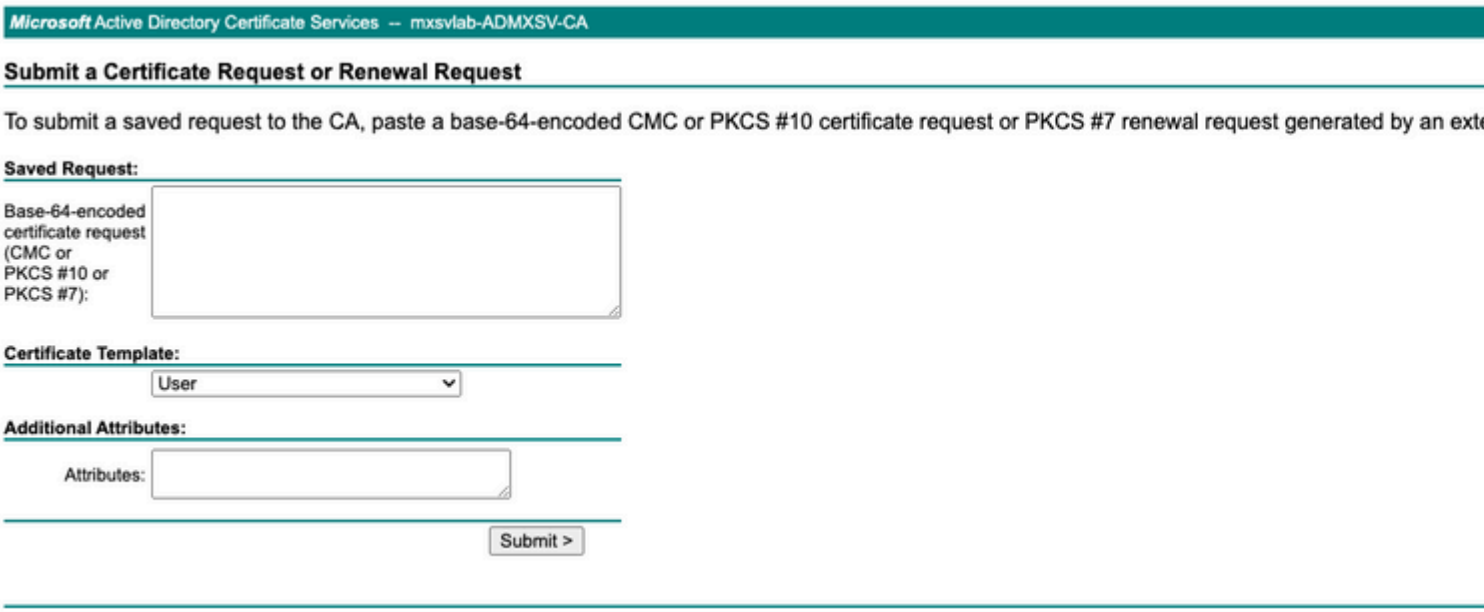
```
Country Name (2 letter code) [AU]:MX
State or Province Name (full name) [Some-State]:CDMX
Locality Name (eg, city) []:Benito Juarez
Organization Name (eg, company) [Internet Widgits Pty Ltd]:Cisco Systems
Organizational Unit Name (eg, section) []:TAC
Common Name (e.g. server FQDN or YOUR name) []:Monterrey.mxsvlab.com
Email Address []:

Please enter the following 'extra' attributes
to be sent with your certificate request
A challenge password []:<password>
An optional company name []:Cisco Systems
```

Two files are generated after the command is run; **.key** and **.csr**.

```
user$ ls -l
total 54
-rw-r--r--@ 1 user staff 1549 Aug 3 14:24 SpringpathControllerM7L9J9RO04.csr
-rw-r--r-- 1 user staff 1704 Aug 3 14:24 SpringpathControllerM7L9J9RO04.key
-rw-r--r-- 1 user staff 11193 Aug 3 14:19 openssl-san.cnf
```

Step 3b. Create a certificate from Certificate Authority (CA)

Navigate to http://<CA-IP>/certsrv/certrqxt.asp

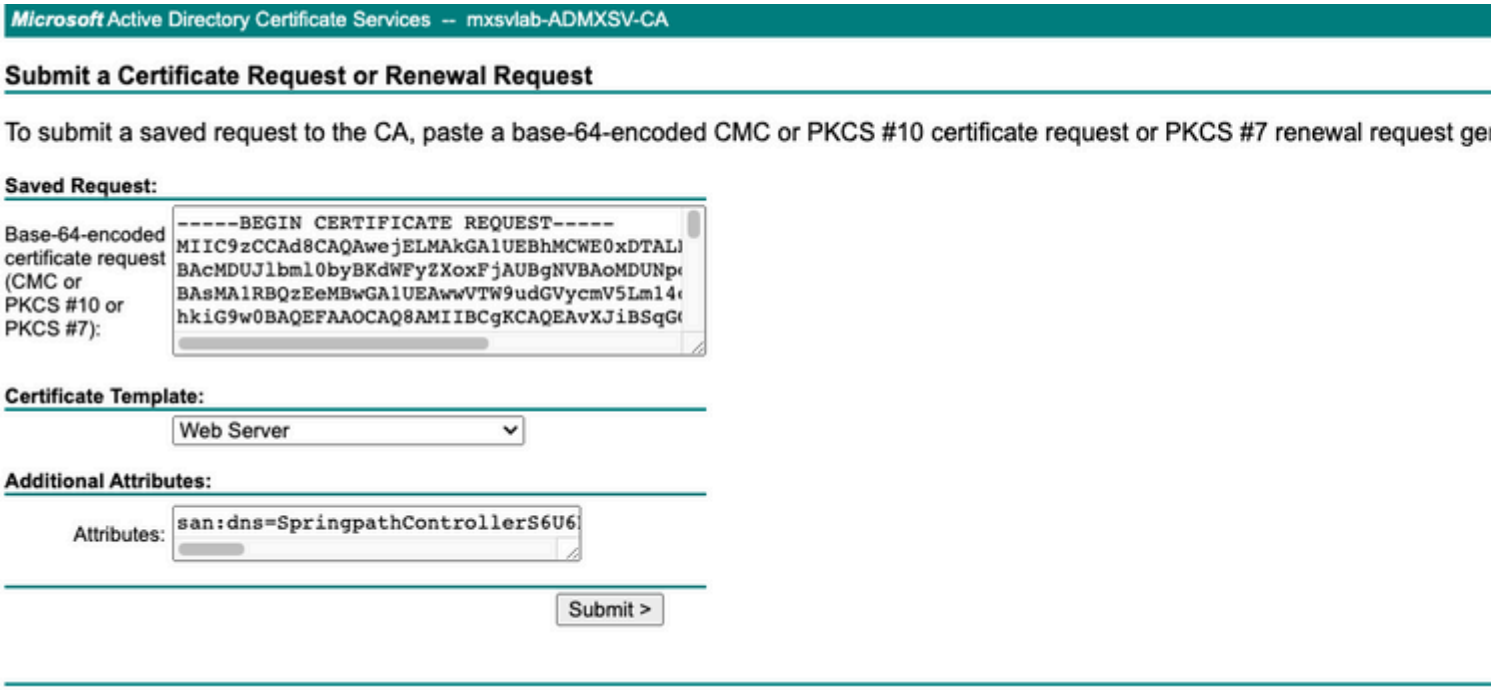


Copy the content of **<Host Name of the CVM>.csr** file and paste it to your Certificate Authority (CA).

Select **Web Server** under **Certificate template**.

Type ALT Names in the next format on Attributes.

```
san:dns=<SCVM01 FQDN>&dns=<SCVM02 FQDN>&dns=<SCVM03 FQDN>&dns=<CMIP FQDN>
```



Click submit to generate the certificate as **.cer** file

> **Note**: Ensure the certificate type is a Web server and the Attributes field has ALT Names.

> **Note**: The content of the X.509 CSR is entered by the user. There are no backend checks on the contents of the entry. If you specify the [multiple] hostnames or IPs of the nodes as subject alternative names, or if you use the wildcard character to specify the hostname for the Common Name, a single certificate can be used for all nodes

---

Step 4. Convert the certificate from .cer to .crt

Copy the .**cer** certificate to your Local Linux Machine

In your local Linux Machine, run the command:

```
openssl x509 -inform PEM -in certnew.cer -out certnew.crt
```

```
user$ openssl x509 -inform PEM -in certnew.cer -out certnew.crt
user$ ls -l
total 56
-rw-r--r--@ 1 user  staff   1549 Aug  3 14:24 SpringpathControllerM7L9J9RO04.csr
-rw-r--r--  1 user  staff   1704 Aug  3 14:24 SpringpathControllerM7L9J9RO04.key
-rw-r--r--@ 1 user staff   2380 Aug  3 15:03 certnew.cer
-rw-r--r--  1 user  staff   2342 Aug  3 15:04 certnew.crt
```

```
-rw-r--r--  1 user  staff  11193 Aug  3 14:19 openssl-san.cnf
```

Step 5. Import the certificate.

Upload the **.key** and **.crt** files from your local Linux VM to **/tmp/ssl** on the CMIP.

> **Note**: You can use SCP to copy the files to the SCVM

```
diag# ls -l
total 20
-rw-r--r-- 1 admin springpath  1704 Aug  3 22:46 SpringpathControllerM7L9J9RO04.key
-rw-r--r-- 1 admin springpath  2342 Aug  3 22:46 certnew.crt
-rwxr-xr-x 1 diag  diag       10835 Aug  3 21:39 openssl-san.cnf
```

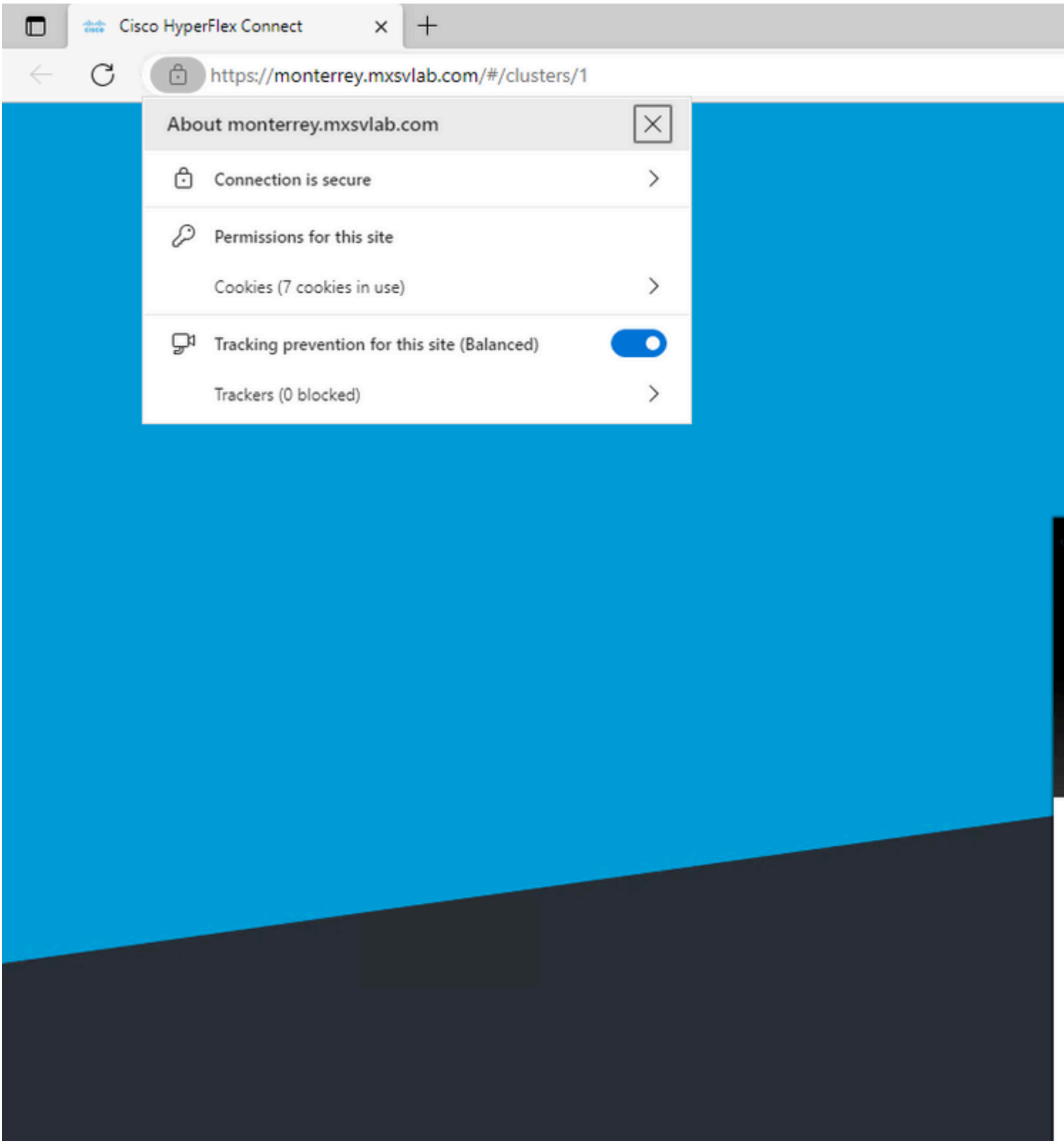
Run this command

```
diag# /usr/share/springpath/storfs-misc/hx-scripts/certificate_import_input.sh
Enter the path for the key: /tmp/ssl/SpringpathControllerM7L9J9RO04.key
Enter the path for the certificate in crt format: /tmp/ssl/certnew.crt
Successfully installed certificate
The cluster needs to be re-registered with vCenter for the certificate import to be completed.
Do you want to continue with re-registration? (y/n): y
Enter vCenter username (user@domain): administrator @ vsphere.local
Enter vCenter Password:
Trying to retrieve vCenter information ....
Cluster re-registration in progress ....
Cluster re-registered successfully with vCenter !!
```

> **Note**: vCenter re-registration is required. Submit administrator credentials.

Verify

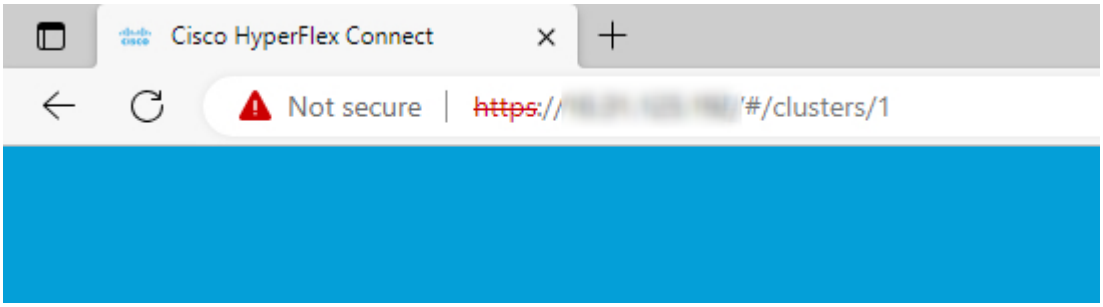
Confirm you have a secure connection after you import the certificate.



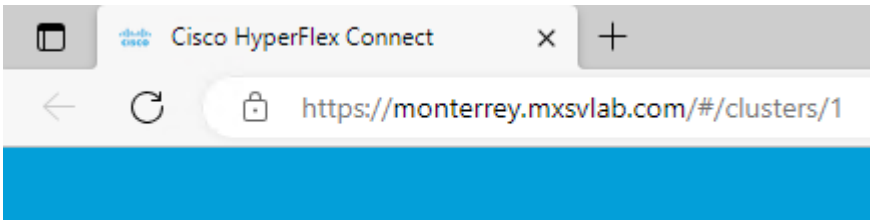
Troubleshoot

Certificate not valid using IP.

The use of SCVMs IP does not have a secure connection as the certificate is generated with FQDNs.



When you use FQDN you have a secure connection.



Related Information

- Cisco HX Data Platform Security Hardening Guide
- Technical Support & Documentation - Cisco Systems