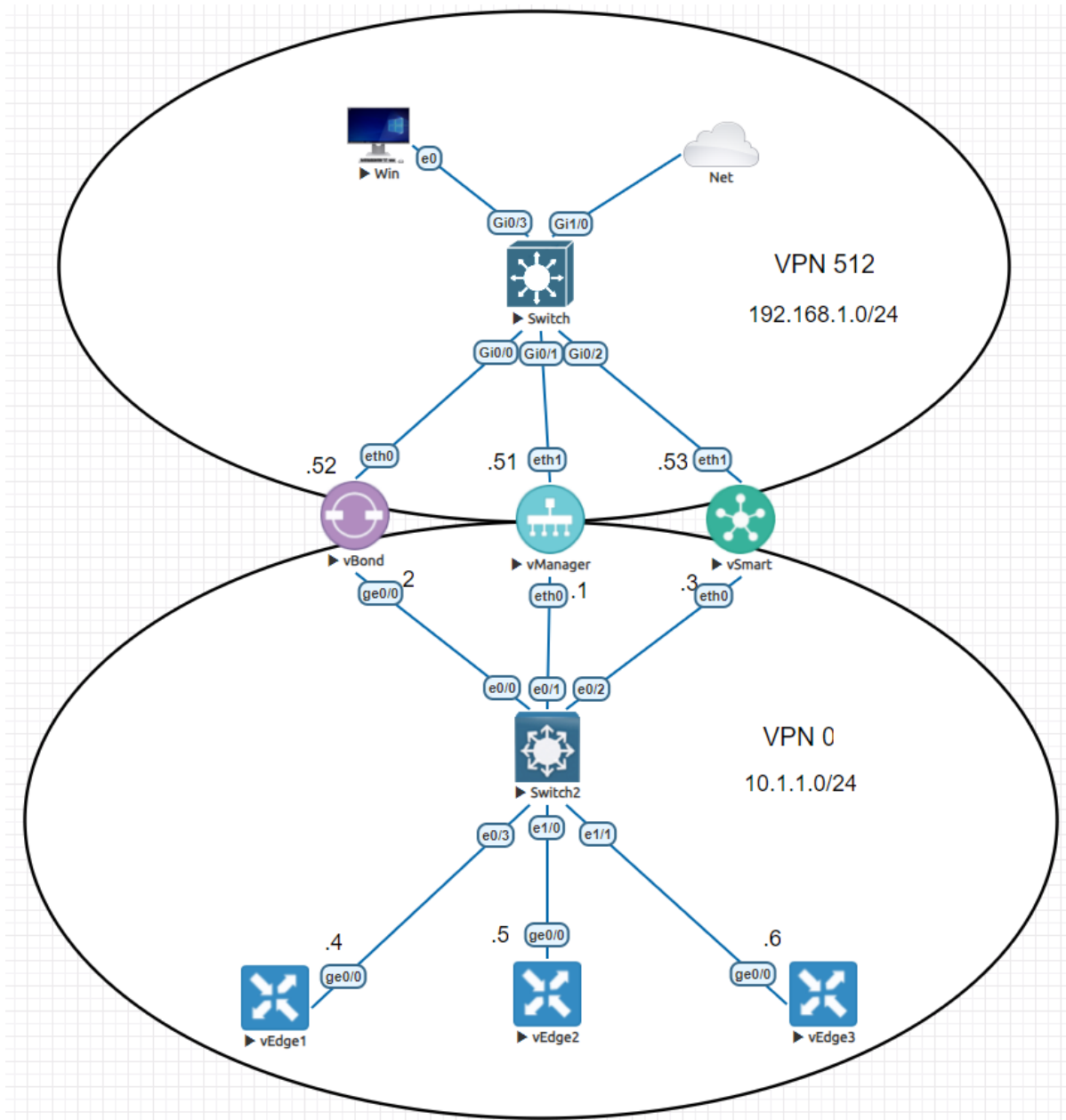


LAB : TRIỂN KHAI THIẾT BỊ VEDGE

I. Sơ đồ



Tên thiết bị	Username	Password	Version
vManage	admin	Admin	20.10.1
vBond	admin	Admin	20.10.1

vSmart	admin	Admin	20.10.1
vEdge	admin	Admin	20.10.1
PC		Test123	Windows 10

II. Yêu cầu

Kết nối và cấu hình địa chỉ IP thiết bị theo mô hình, để đảm bảo các địa chỉ IP WAN ở các site có thể thấy nhau.

Cấu hình bring-up SD-WAN controller: vManage, vBond, vSmart.

III. Thực hiện:

3.1. Cấu hình các thiết bị để đảm bảo để bảo các địa chỉ IP WAN ở các site có thể thấy nhau

Cấu hình vManage:

```
config ter
system
host-name vmanage
system-ip 1.1.1.1
site-id 1000
organization-name VnPro
vbond 10.1.1.2
vpn 0
interface eth0
no shutdown
ip address 10.1.1.1/24
tunnel-interface
allow-service all
vpn 512
interface eth1
no shutdown
ip add 192.168.1.1/24
commit and-quit
```

Cấu hình vSmart:

```
config ter
system
host-name vsmart
system-ip 1.1.1.3
site-id 1000
organization-name VnPro
vbond 10.1.1.2
vpn 0
interface eth0
no shutdown
ip address 10.1.1.3/24
tunnel-interface
allow-service all
vpn 512
int eth1
no shutdown
ip add 192.168.1.3/24
commit and-quit
```

Cấu hình vBond:

```
config ter
system
host-name vbond
system-ip 1.1.1.2
site-id 1000
organization-name VnPro
vbond 10.1.1.2 local vbond-only
```

```
vpn 0
interface ge0/0
no shutdown
ip address 10.1.1.2/24
tunnel-interface
encapsulation ipsec
allow-service all
vpn 512
int eth0
no shutdown
ip address 192.168.1.2/24
commit and-quit
```

Cấu hình vEdge 1:

```
conf ter
system
host-name vedge1
system-ip 2.1.1.1
site-id 1
organization-name VnPro
vbond 10.1.1.2
vpn 0
int ge0/0
no shutdown
ip add 10.1.1.4/24
exit
vpn 512
int eth0
no shutdown
commit and-quit
```

Cấu hình vEdge 2:

```
conf ter
system
host-name vedge2
system-ip 3.1.1.1
site-id 2
organization-name VnPro
vbond 10.1.1.2
vpn 0
int ge0/0
no shutdown
ip add 10.1.1.5/24
exit
vpn 512
int eth0
no shutdown
commit and-quit
```

Cấu hình vEdge 3:

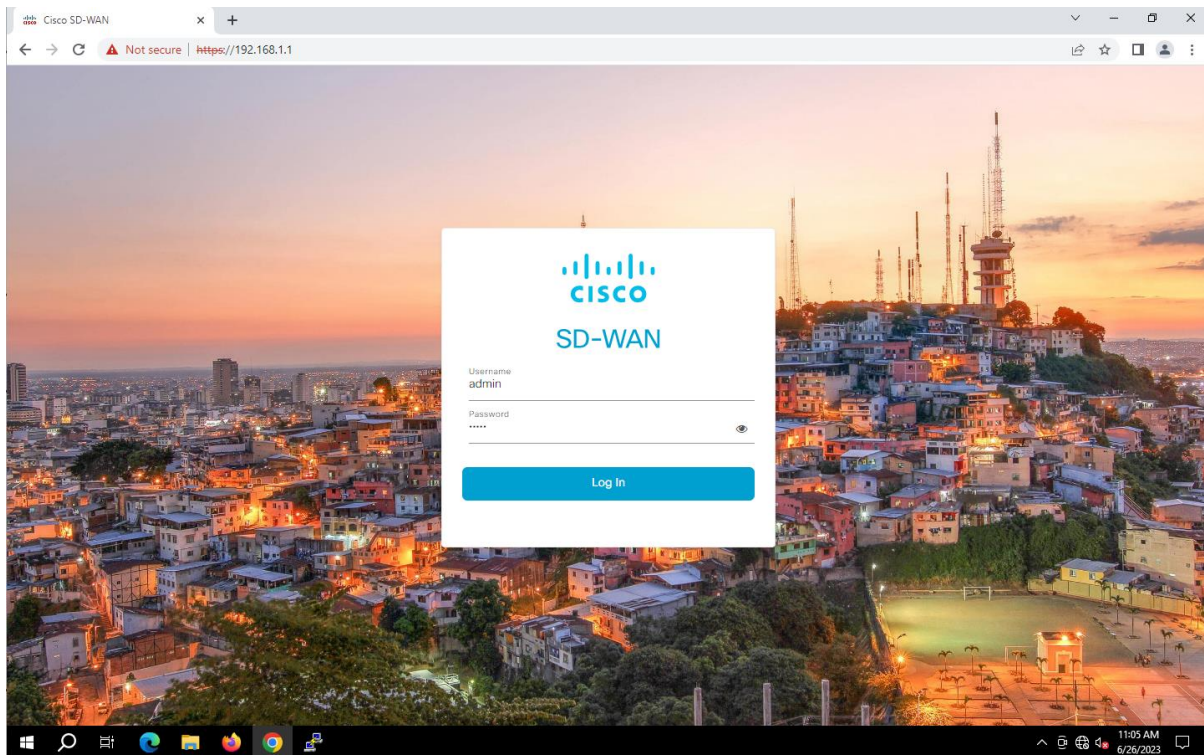
```
conf ter
system
host-name vedge3
system-ip 4.1.1.1
site-id 3
organization-name VnPro
vbond 10.1.1.2
vpn 0
int ge0/0
no shutdown
ip add 10.1.1.6/24
exit
vpn 512
int eth0
no shutdown
```

commit and-quit

3.2. Cấu hình bring-up SD-WAN controller: vManage, vBond, vSmart.

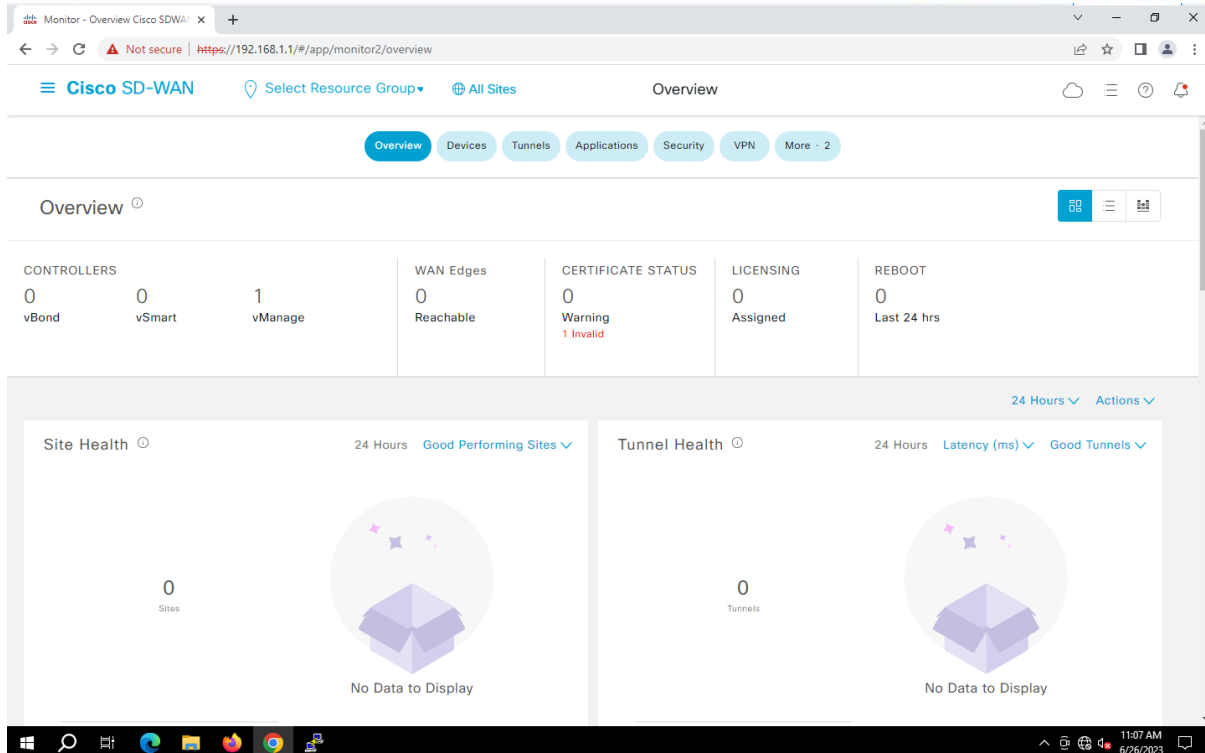
Sau khi đã cấu hình cơ bản cho cả 3 thành phần controller trong SD-WAN fabric ta tiến hành promote vManage lên thành CA(Certificate Authority)

- Dùng trình duyệt trên pc (trong sơ đồ lab) login vào vManage: <https://192.168.1.1> với username: admin và password: Admin



IV. Kiểm tra:

Kết nối thành công vào vManage.



Ở bài lab này chúng ta sẽ dùng vManage làm server chứng thực. Dùng openssl để tạo và ký certificates từ vshell

- Sau khi kết nối thành công vManage ta sẽ tiến hành promote vManage lên thành CA: dùng terminal console trên vManage:

+ Gõ lệnh vshell để vào Shell mode cấu hình openssl: “**vshell**”

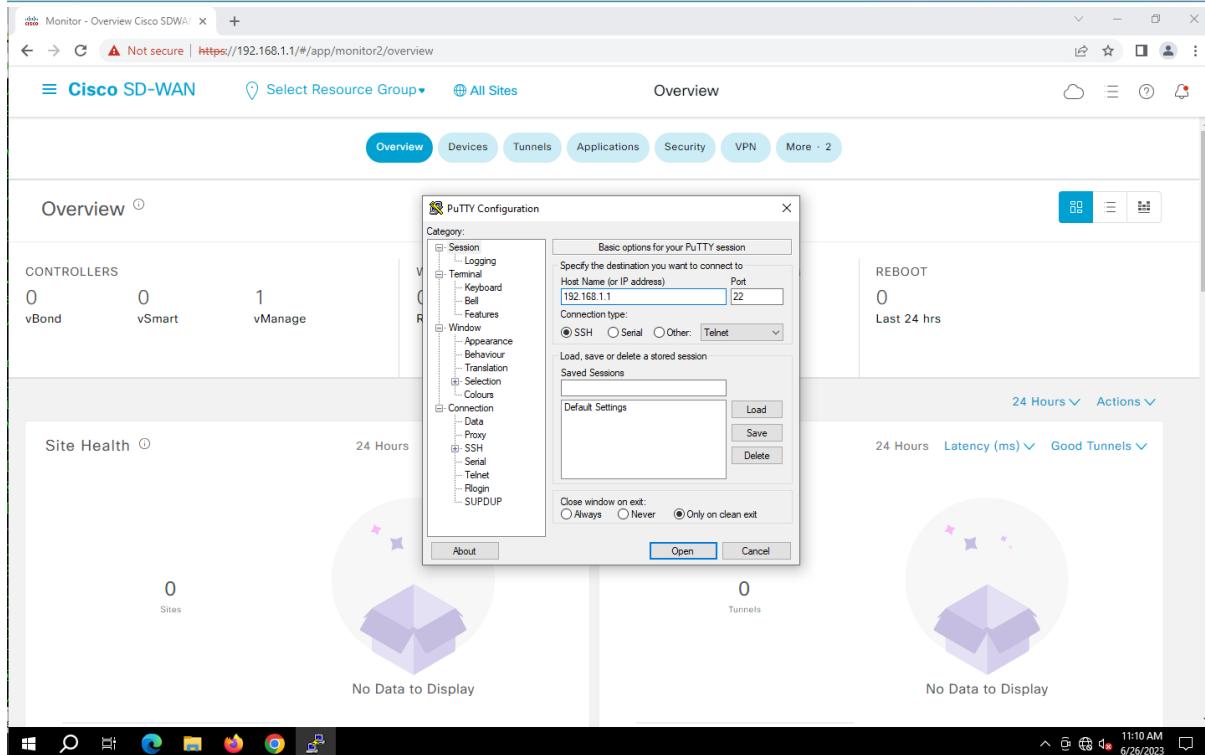
+ Tiếp theo generate key RSA 2048 ta gõ lệnh : “**openssl genrsa -out ROOTCA.key 2048**”

+ Sau khi đã có key ta sẽ generate 1 ROOTCA ta gõ lệnh: “**openssl req -x509 -new -nodes -key ROOTCA.key -sha256 -days 2000 -out ROOTCA.pem**”

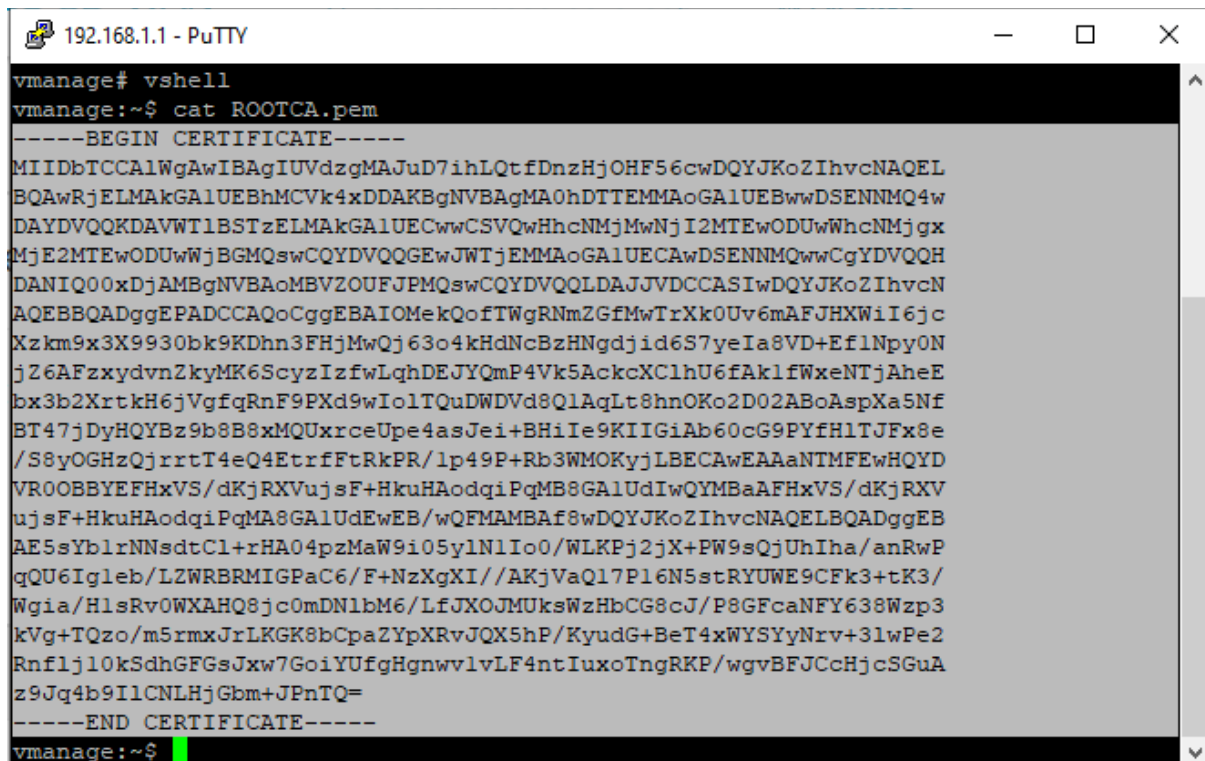
+ Tiếp theo ta gõ theo tùy chọn, còn không gõ gì thì cứ enter cho qua

```
-----
Country Name (2 letter code) [AU]:VN
State or Province Name (full name) [Some-State]:HCM
Locality Name (eg, city) []:HCM
Organization Name (eg, company) [Internet Widgits Pty Ltd]:VNPRO
Organizational Unit Name (eg, section) []:IT
Common Name (e.g. server FQDN or YOUR name) []:
Email Address []:
vmanage:~$
```

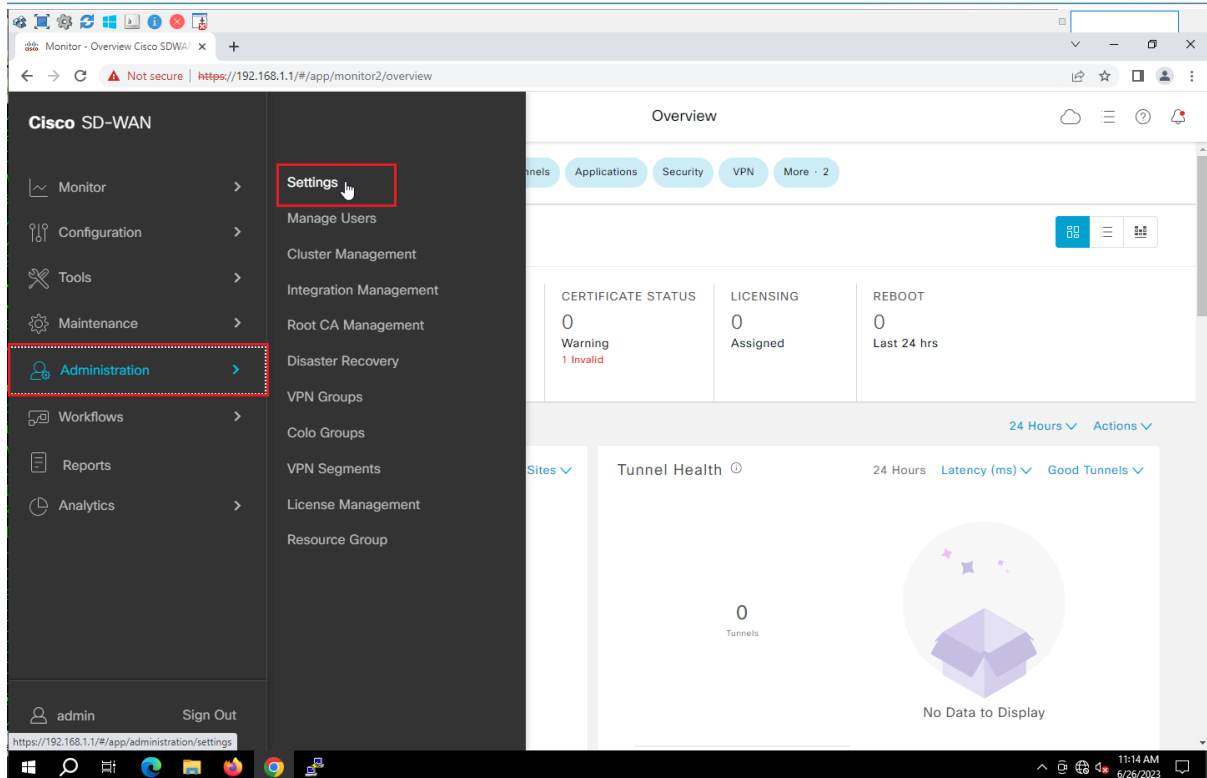
- Tiếp theo vào PC (trong sơ đồ lab) SSH vào vmanage với ip: *192.168.1.1*



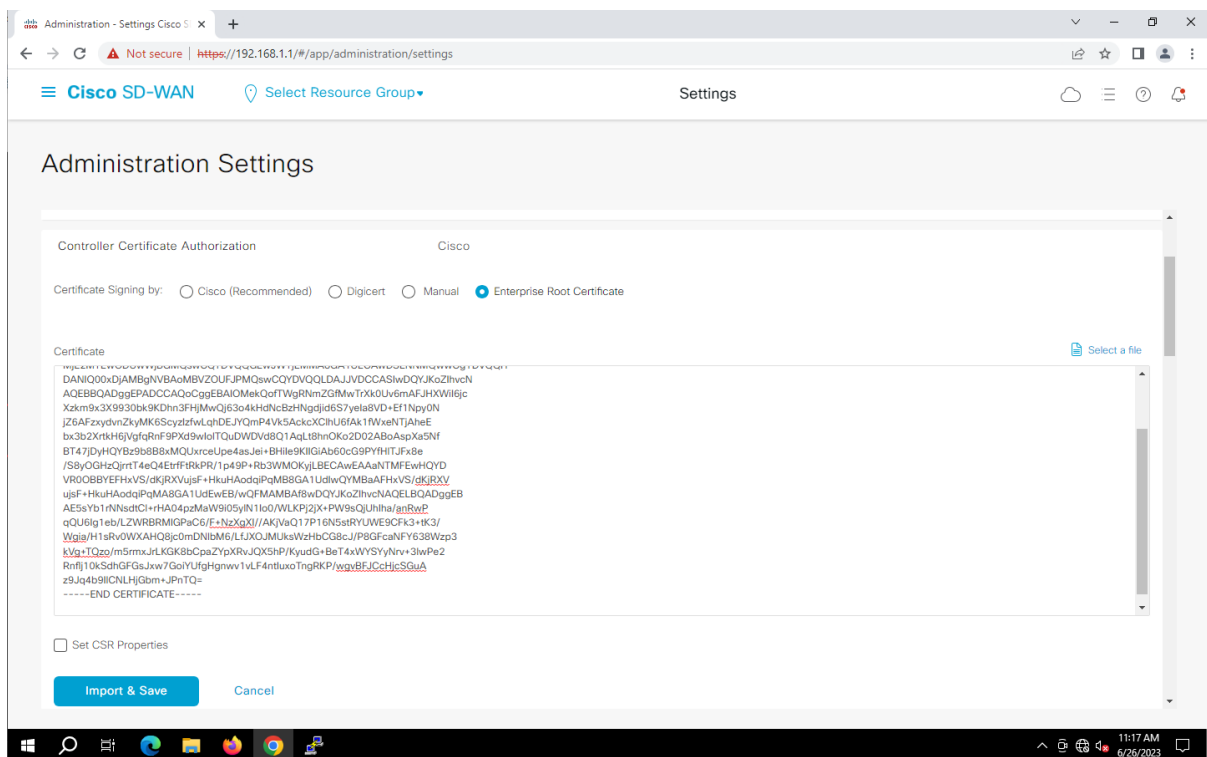
+ Ta vào shell mode với lệnh **vshell** gõ lệnh: **cat ROOTCA.pem** để đọc chứng chỉ số, sau đó ta copy chứng chỉ số đó từ begin đến end



- Sau đó ta vào **Administration** → **Setting** → **Controller Certificate Authorization** → chọn **Enterprise Root Certificate** rồi paste vào Certificate chọn **Import & Save**



The screenshot shows the Cisco SD-WAN Monitor Overview page. The left sidebar has a menu with 'Administration' highlighted. The 'Settings' option is highlighted in the sub-menu. The main content area shows the 'Overview' page with sections for Certificate Status, Licensing, Reboot, and Tunnel Health.

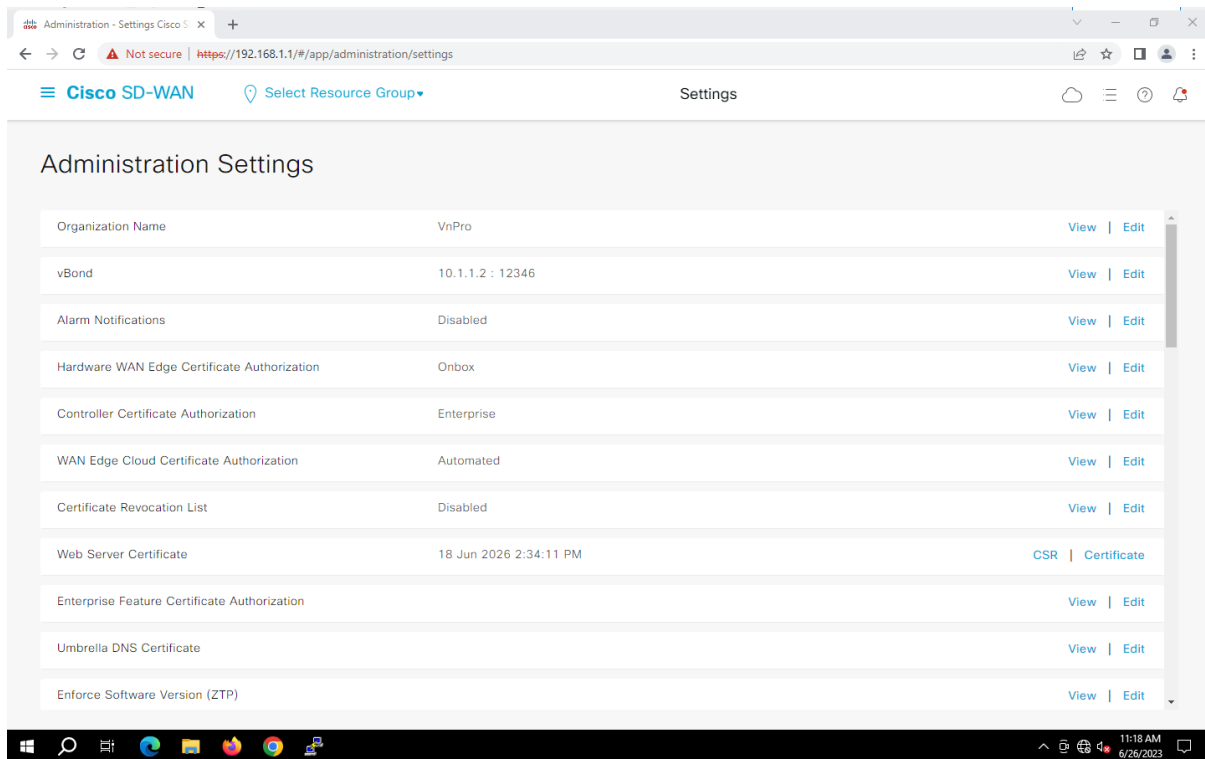


The screenshot shows the Cisco SD-WAN Administration Settings page. The 'Controller Certificate Authorization' section is visible, showing the 'Enterprise Root Certificate' selected. The 'Certificate' field contains a long string of characters.

Ta chỉnh lại :

+ Organization name: **“VnPro”**

+ Vbond: “ 10.1.1.2”



Setting	Value	View	Edit
Organization Name	VnPro	View	Edit
vBond	10.1.1.2 : 12346	View	Edit
Alarm Notifications	Disabled	View	Edit
Hardware WAN Edge Certificate Authorization	Onbox	View	Edit
Controller Certificate Authorization	Enterprise	View	Edit
WAN Edge Cloud Certificate Authorization	Automated	View	Edit
Certificate Revocation List	Disabled	View	Edit
Web Server Certificate	18 Jun 2026 2:34:11 PM	CSR	Certificate
Enterprise Feature Certificate Authorization		View	Edit
Umbrella DNS Certificate		View	Edit
Enforce Software Version (ZTP)		View	Edit

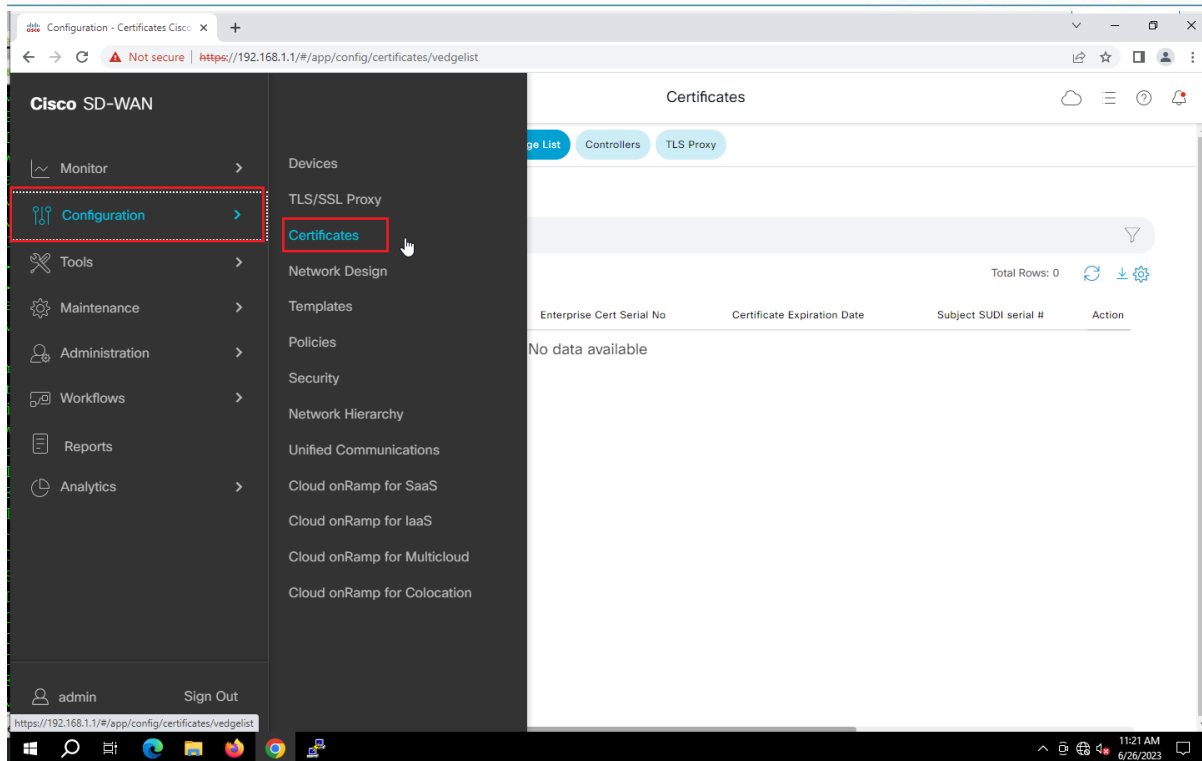
==> vManage đã được promote lên thành CA

- Dùng vManage để ký chứng thực cho vManage, vSmart, vBond.

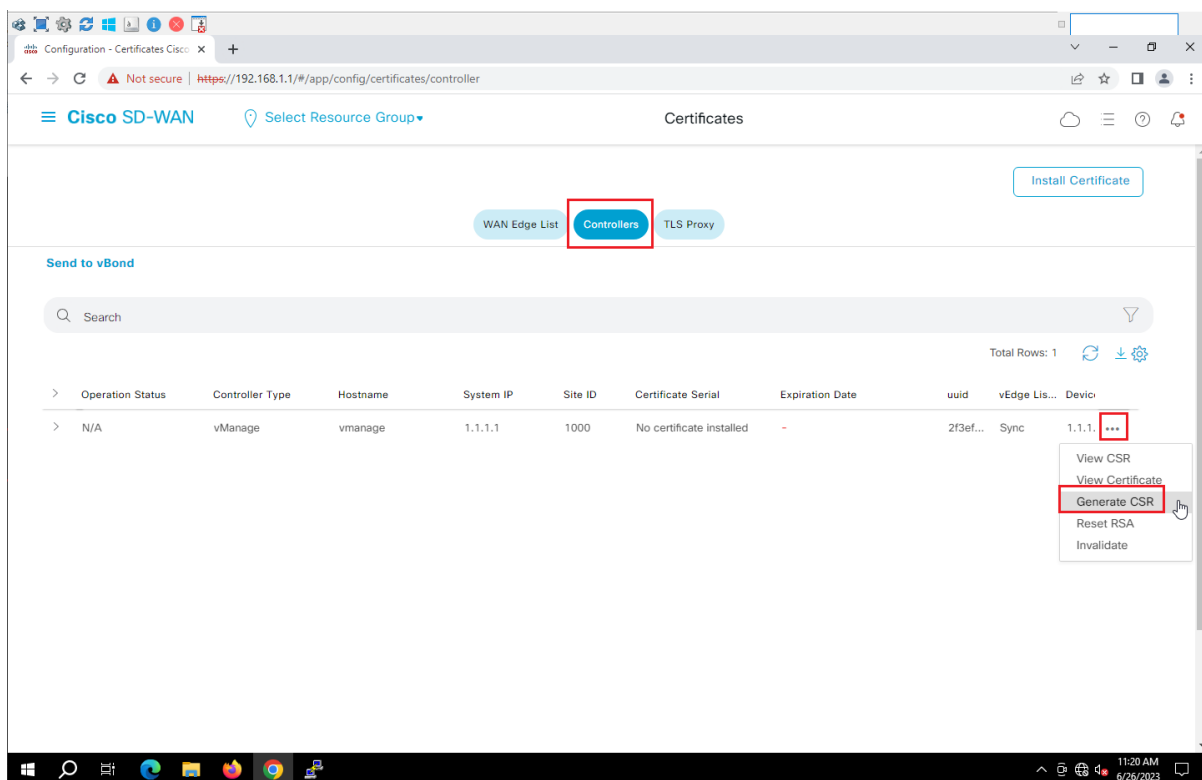
Vmanage

+ Truy cập vào giao diện web để tạo một yêu cầu ký chứng thực

+ **Configuration** → **Certificates** → **Controllers** → **vManage** → **Generate CSR** để tạo file *vmanage_csr*



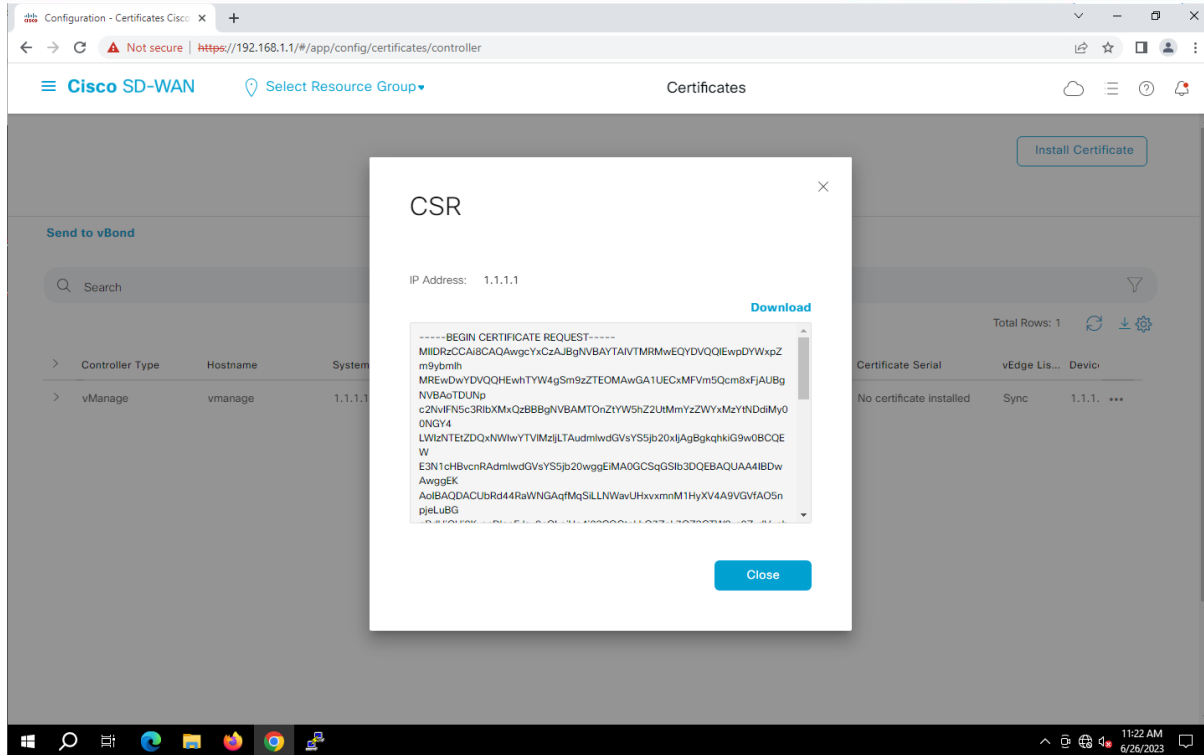
The screenshot shows the Cisco SD-WAN Configuration interface. The left sidebar contains a menu with 'Configuration' highlighted. The main content area is titled 'Certificates' and shows a table with columns: Enterprise Cert Serial No, Certificate Expiration Date, Subject SUDI serial #, and Action. The table is currently empty, displaying 'No data available'.



The screenshot shows the Cisco SD-WAN Configuration interface, specifically the 'Certificates' section under 'Controllers'. The 'Install Certificate' button is visible. Below the tabs, there is a search bar and a table with columns: Operation Status, Controller Type, Hostname, System IP, Site ID, Certificate Serial, Expiration Date, uuid, vEdge Lis..., and Device. The table contains one row with the following data:

Operation Status	Controller Type	Hostname	System IP	Site ID	Certificate Serial	Expiration Date	uuid	vEdge Lis...	Device
N/A	vManage	vmanage	1.1.1.1	1000	No certificate installed	-	2f3ef...	Sync	1.1.1.1

A context menu is open for the 'Device' column, showing options: View CSR, View Certificate, Generate CSR (highlighted), Reset RSA, and Invalidate.

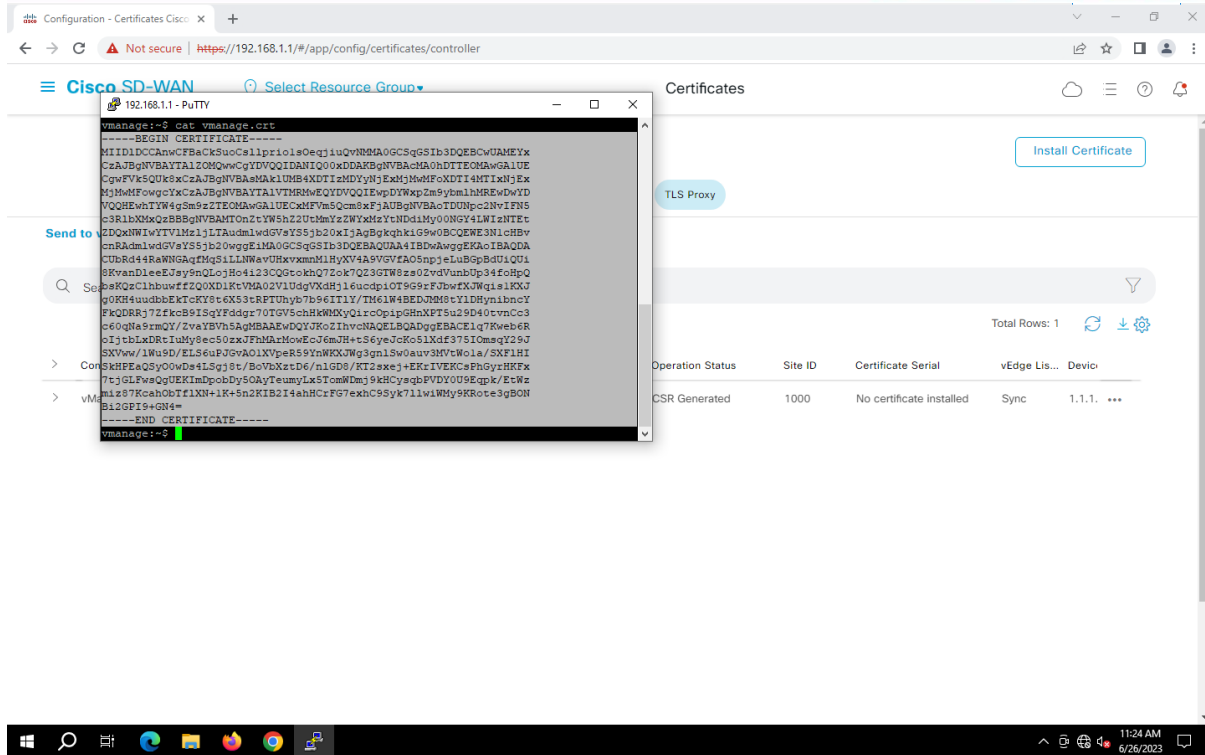


- Sau khi tạo xong file csr, ta dùng khóa ROOTCA.key để ký file vmanage_csr ta vừa tạo ra với câu lệnh như sau: **openssl x509 -req -in vmanage_csr -CA ROOTCA.pem -CAkey ROOTCA.key -CAcreateserial -out vmanage.crt -days 2000 -sha256** ==> tạo file *vmanage.crt*

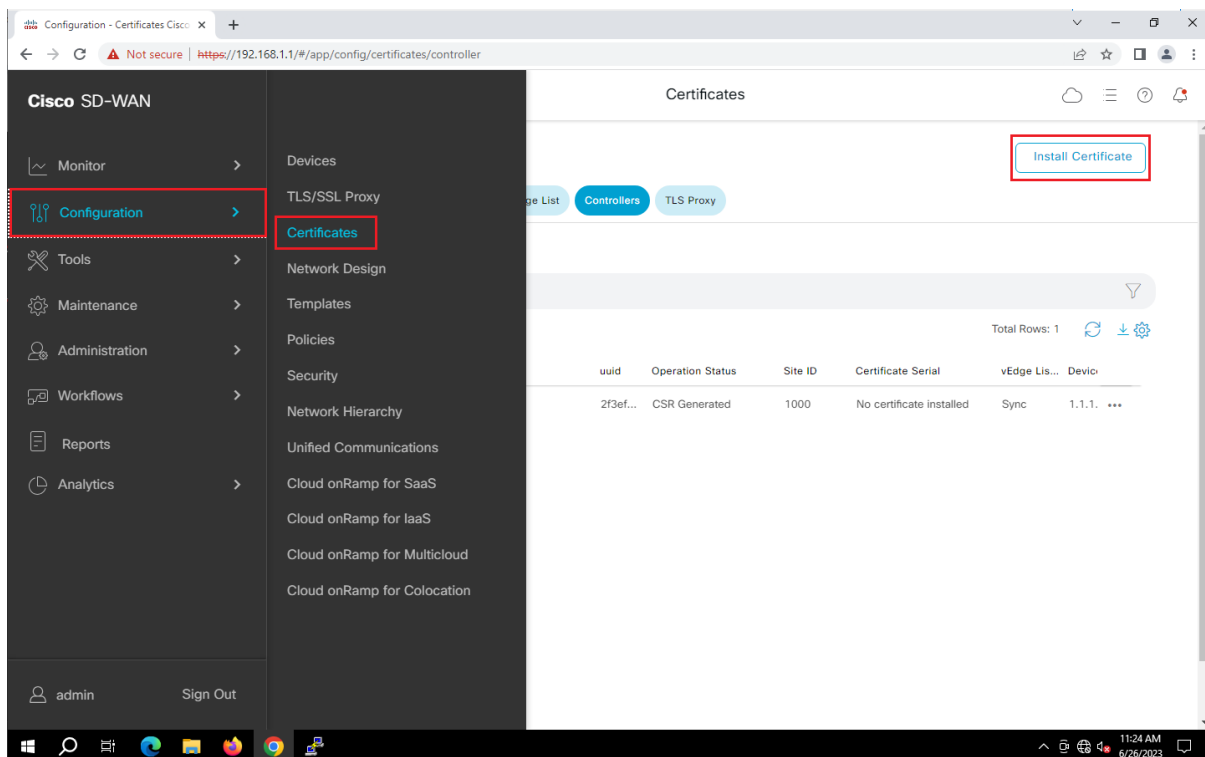
Kiểm tra kết quả là: đã ký thành công

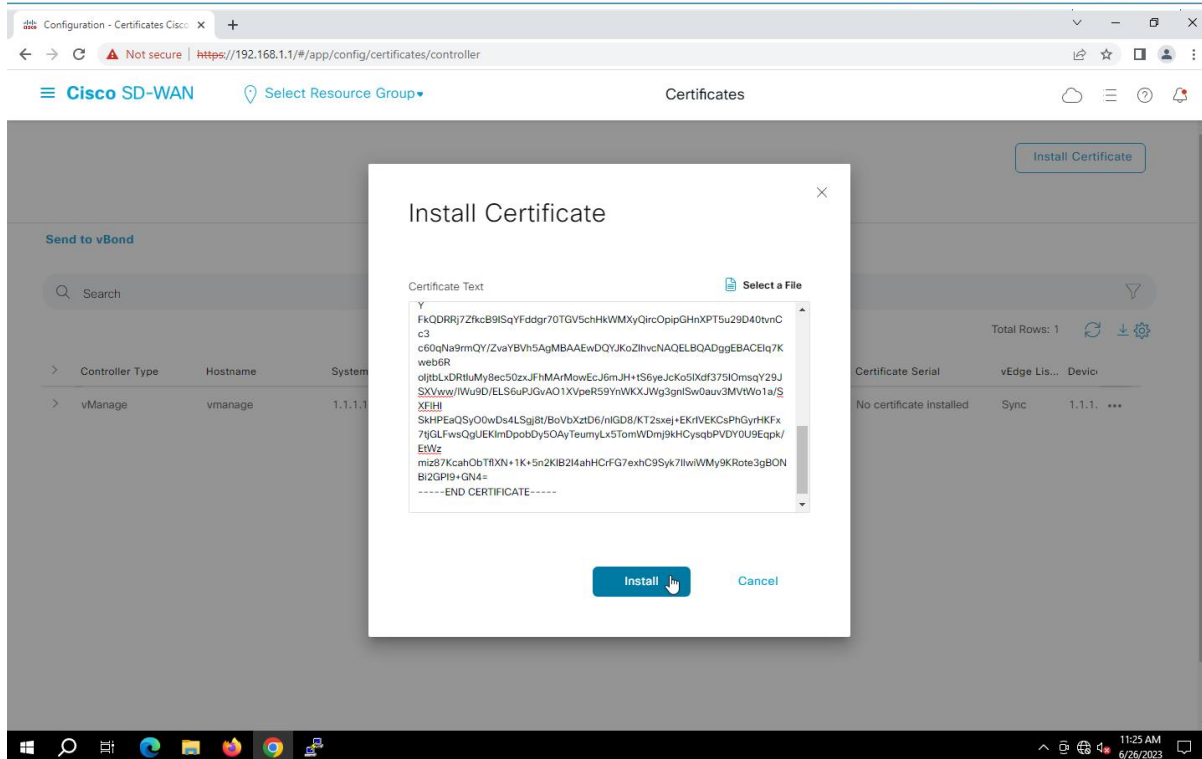
```
vmanage:~$ openssl x509 -req -in vmanage_csr -CA ROOTCA.pem -CAkey
Acreateserial -out vmanage.crt -days 2000 -sha256
Signature ok
subject=C = US, ST = California, L = San Jose, OU = VnPro, O = Cisco Systems, CN = vmanage-2f3ef136-47b3-44f8-b351-d415b0a5e39c-0.viptela.com, emailAddress = support@viptela.com
Getting CA Private Key
vmanage:~$
```

- Ta vào trong PC (trong sơ đồ lab) vào putty gõ địa chỉ **192.168.1.1** rồi SSH Dùng lệnh **cat vmanage.crt** để đọc file *vmanage.crt*

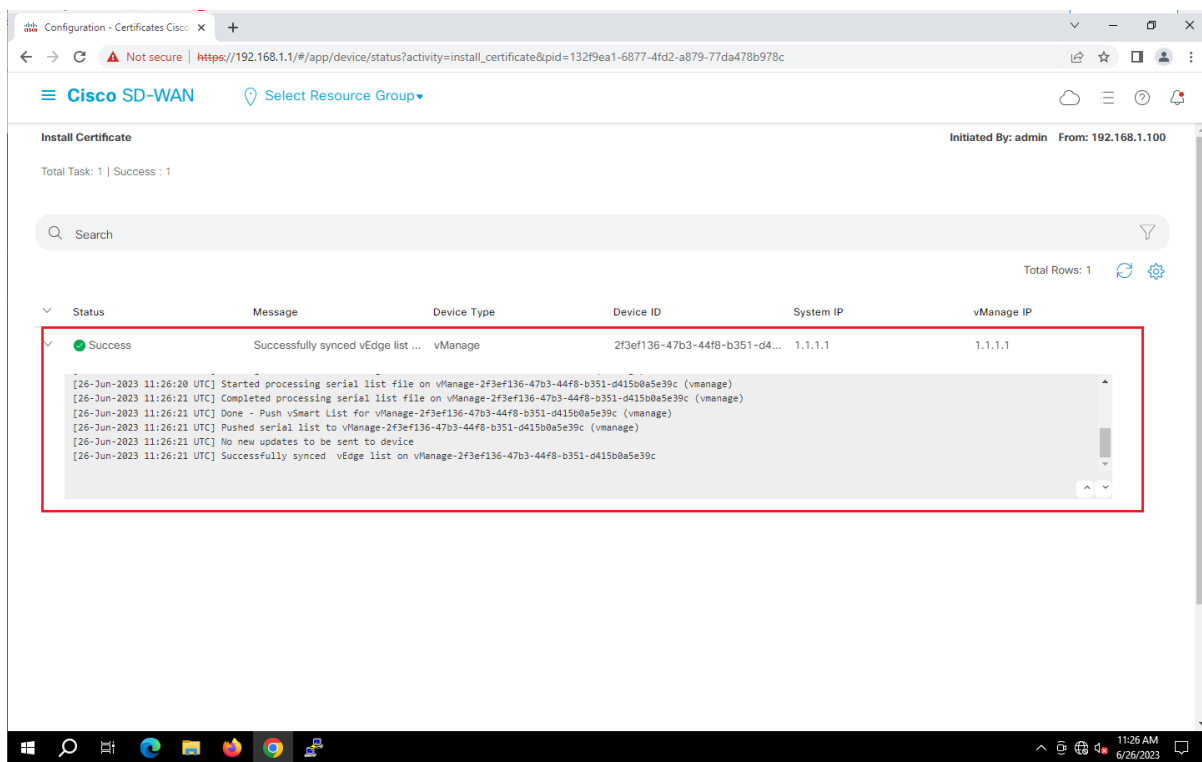


- Và cài đặt chứng thực trên giao diện web: **Configuration → Certificates → Controllers → Install Certificate:**



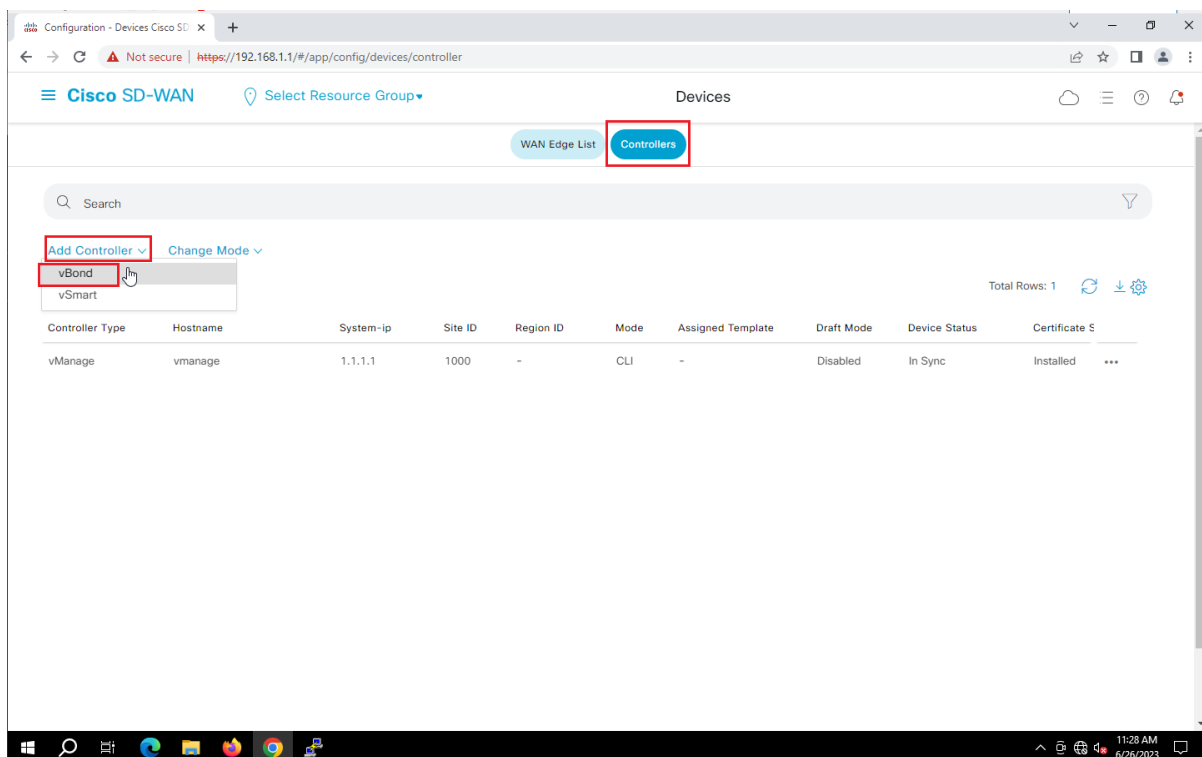
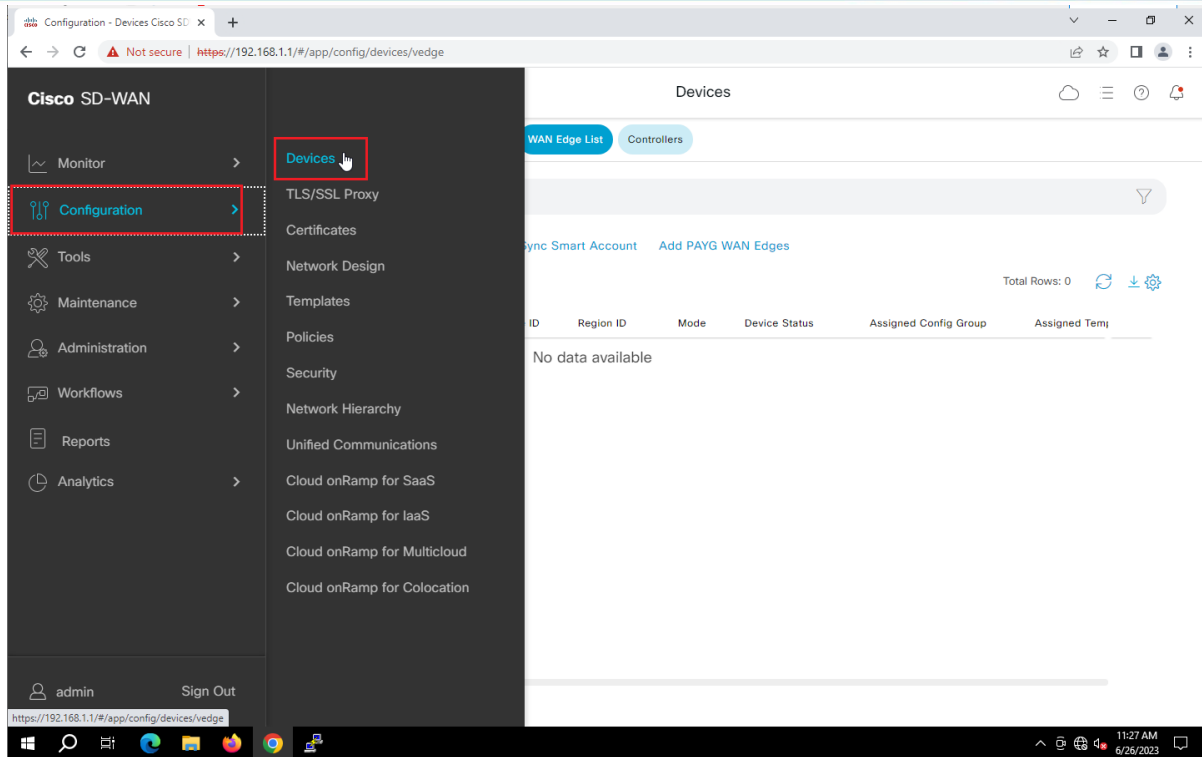


Kiểm Tra: Đã xác thực thành công vManage

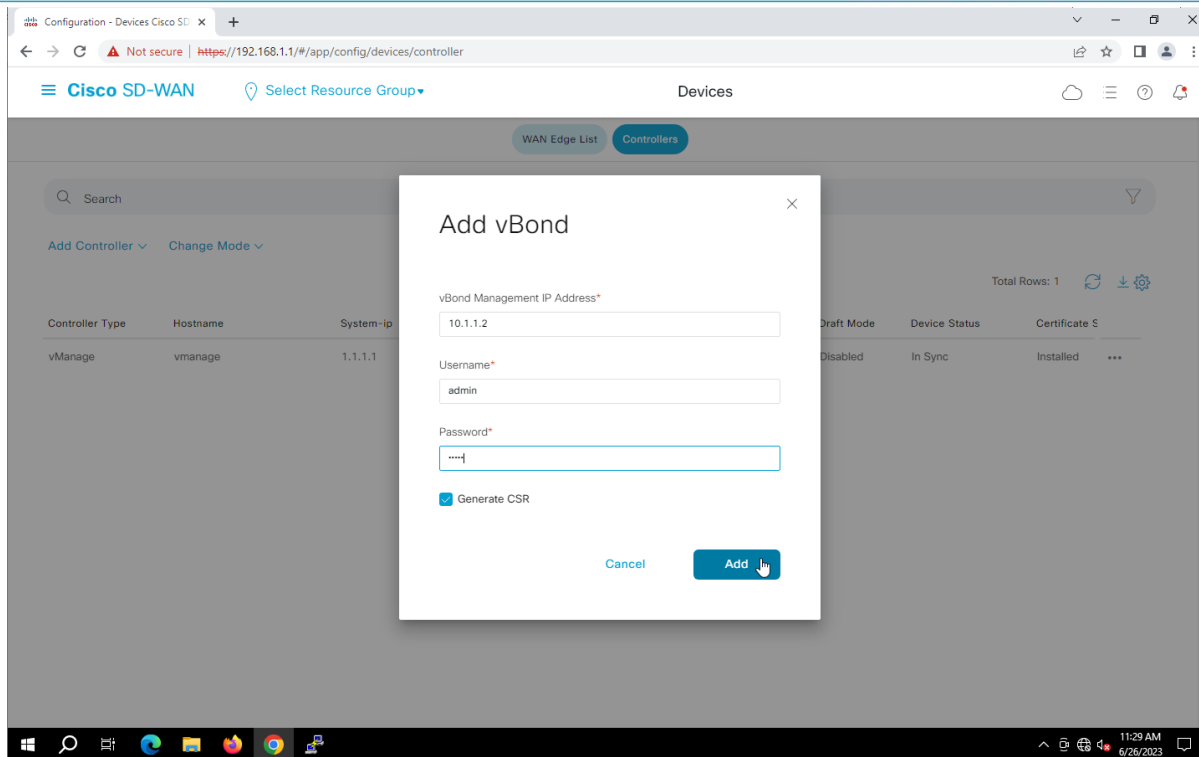


VBond

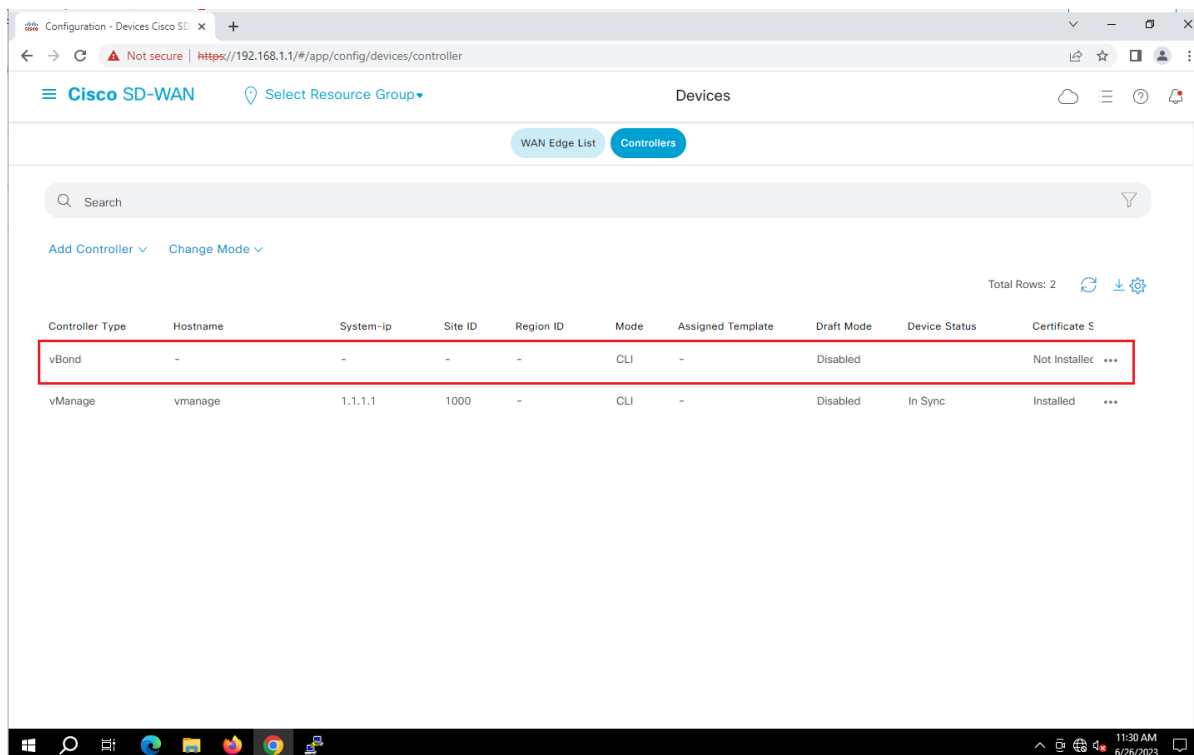
Vào Configuration → Device → Controller → Add controller



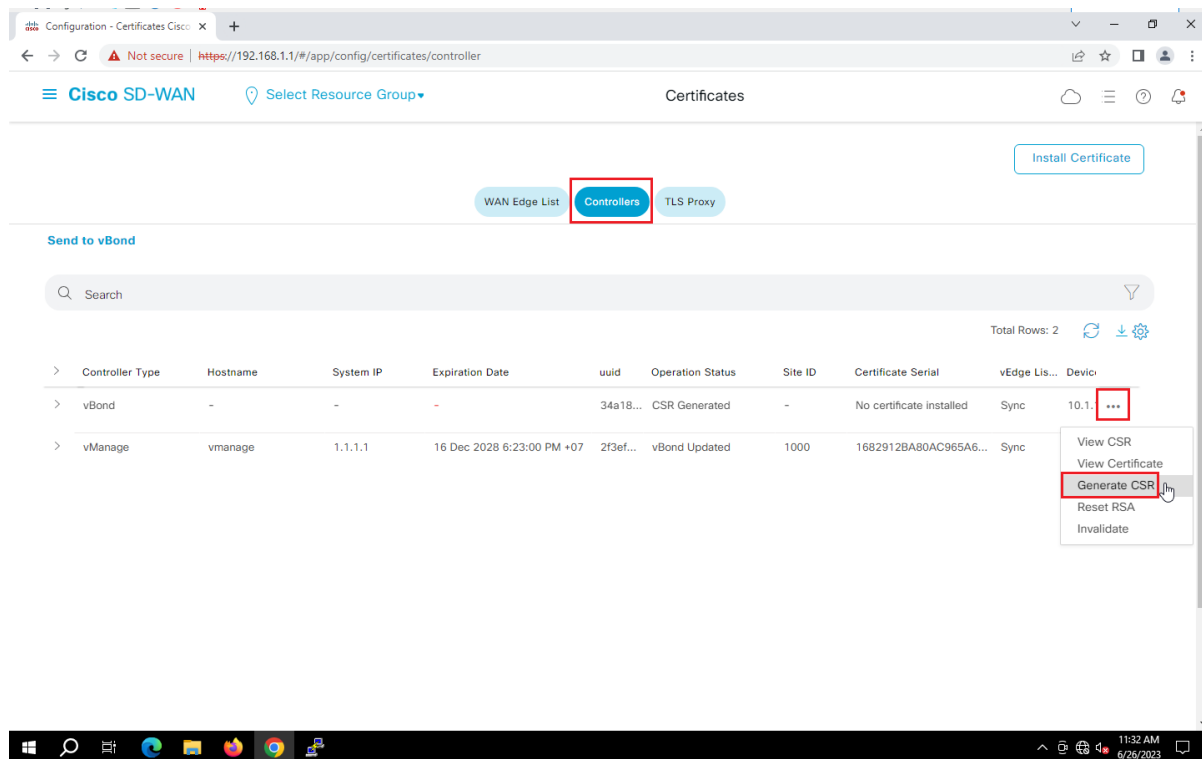
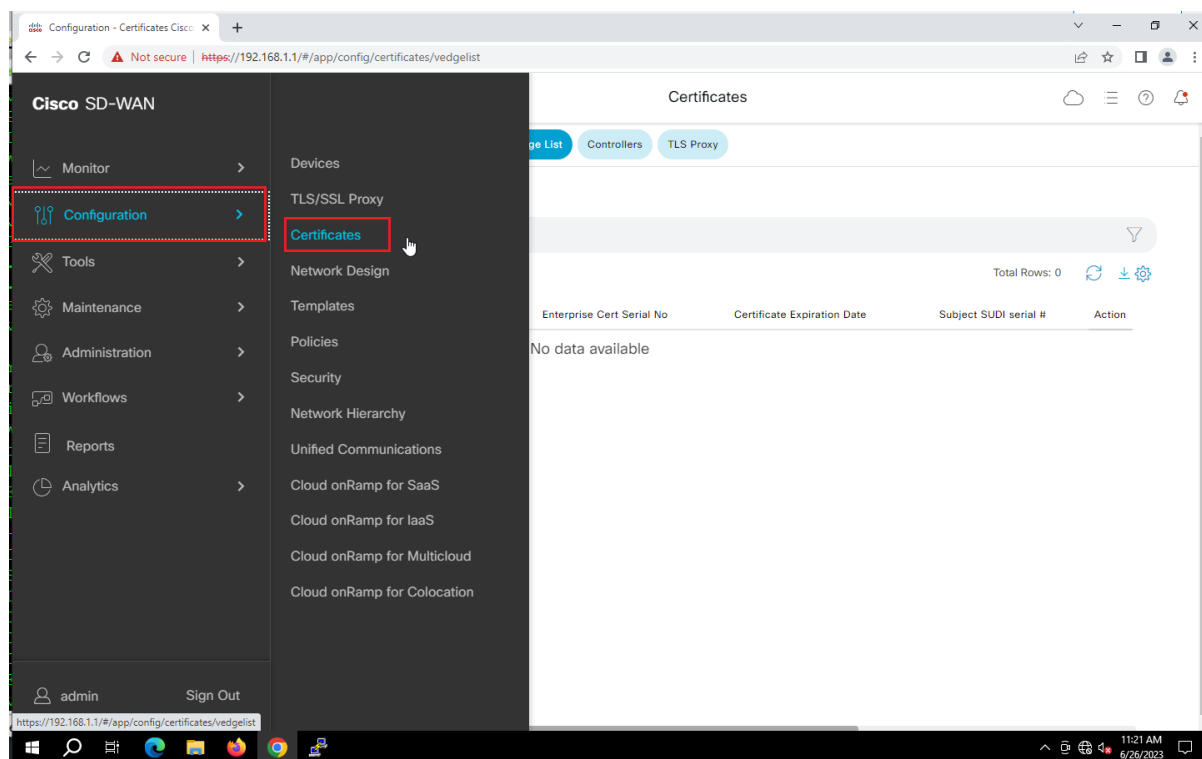
- Cấu hình vbond Management ip address: 10.1.1.2, username: admin, password: Admin

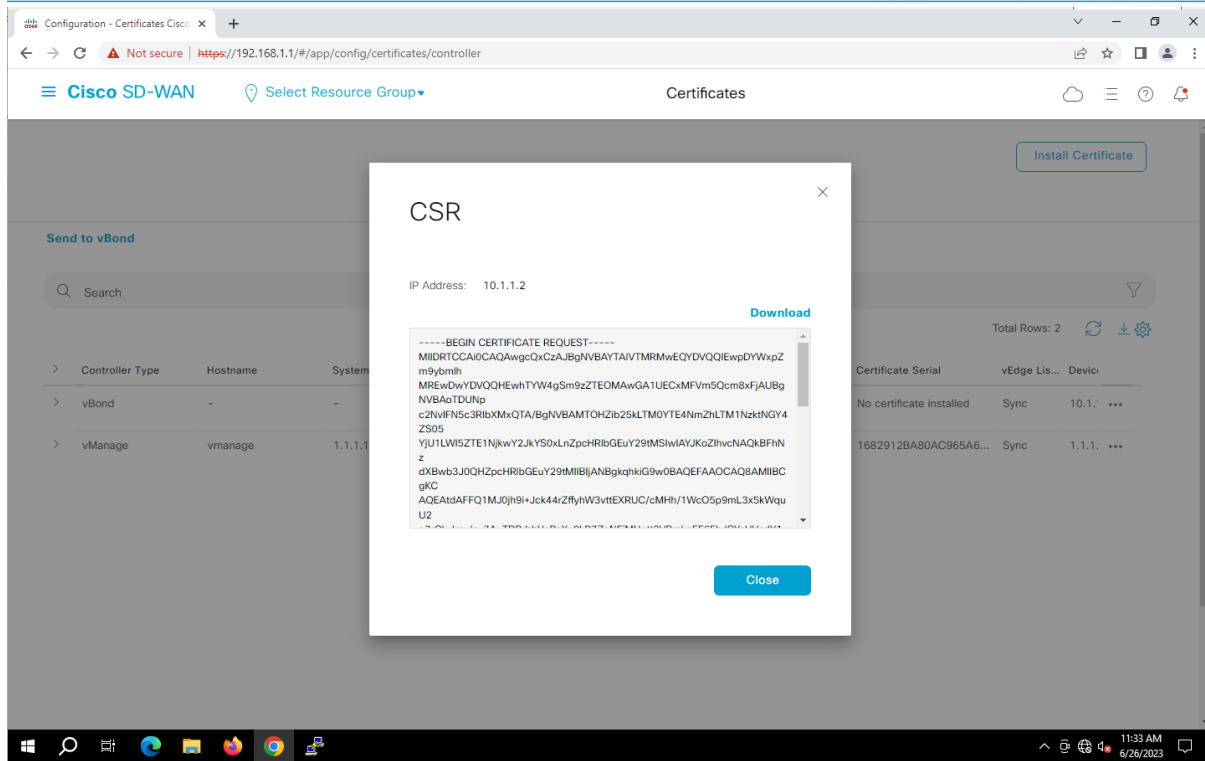


Kiểm tra: xuất hiện vbond



- Tạo file `vbond_csr` bằng cách chọn Generate CSR





- Vào console vbond gõ **cat vbond_csr** và copy chúng chỉ số từ begin đến end
- Sau đó qua console vmanage tạo file **vbond_csr** bằng câu lệnh: **vim vbond_csr** dán chúng chỉ số vừa copy ở vbond bằng cách gõ **i** rồi kích chuột phải để dán, sau đó gõ **esc :wq** để thoát ra.

```
vbond login: admin
Password:
Last login: Mon Jun 26 11:33:38 UTC 2023 from 10.1.1.1 on ssh
Welcome to Viptela CLI
User admin last logged in 2023-06-26T11:33:38.440876+00:00, to vbond, from 10.1.1.1 using netconf-ssh
admin connected from 127.0.0.1 using console on vbond
vbond# vshell
vbond:~$ cat vbond_csr
-----BEGIN CERTIFICATE REQUEST-----
MIIDRTCCAi0CAQAwgcQx+CzAJBgNVBAYTA1VTMRMwEQYDVQQIEwpDYWxpZm9ybmlh
MREwDwYDVQQHEWhTYW4gSm9zZTEOMAwGA1UECxFVbW5Qcm8xZm9uZm9uZm9uZm9u
c2NvIFN5c3RlbXN5c3RlbXN5c3RlbXN5c3RlbXN5c3RlbXN5c3RlbXN5c3RlbXN5
YjU1LWI5ZTE1NjkwY2JkYS0xLnZpcHRlbGEuY29tMSIwIAAJK0ZiHvcNAQkBFhNz
dXBwb3J0QHZpcHRlbGEuY29tMIIIBjANBgkqhkiG9w0BAQEFAAOCAQ8AMIIBCgKC
AQEAtdAFFQlMJ0jh9i+Jck44rZffyhW3vttEXRUC/cMHh/1WcO5p9mL3x5kWquU2
g7rCkxlmY/ax7AuTDPrrbbVoRsX+0kR7ZgNEjMH+tt3VRmkGEE6EhJCYcUVndY1Br
zws0VoOIv2R1EN411iEpIefDIkWQth1IL61rYwbV5cB4DdPryIwDBsgXScmIf/lk
t6XvMtXlQOFTzgYJ4fecGzsspH75mPOletiiGXKOb6SwzP+ajot4nJgGQGE5/eHx
KG4vs6edARVIR6/YyeJuP2I2nRCR2GQnEwFTZbn5w/TCAzahD0NJcnNzuMTfoI9L
ZceVVP4/oYkClx4MRBc7702S3QIDAQABOdswOQYJKoZIhvcNAQkOMSwKjAJBgNV
HRMEAjAAMB0GA1UdDgQWBBTjtbtL/Bwu3/gpv9HzGp7mCpfBsszANBgkqhkiG9w0B
AQsFAAOCAQEAOob7kEp9TGtsIeTaby4Nk9EweOV+xxQp3qWr7wtt3TiuthGA3CQ6h
jzn30FaX8bCWfyx0NEQTyW4VCrebik6piyUoUf3LKEr+PDuOKTbfmtTlUYbFB22Z
hHU1KmsdVLN2HjcYiaE3psa4dYtrQuPJ/LMlsqLbnPWGO340eTnLCKVreypot8NA
Qsuv8lxqZDs+awI7QiTWcFanNGdrl3TIFZ4uTtLKZTIGLCv5QEKEQx93+wcJGpb
0dDug49J8kwgkuyUnr089V3eZ+dhop9ctdEDY1AXlaFbM71r0Le5xubw0LAgTZM1
CEVfWL18i6sUt5MvaJpsMt+ekor6JE+toQ==
-----END CERTIFICATE REQUEST-----
vbond:~$
```

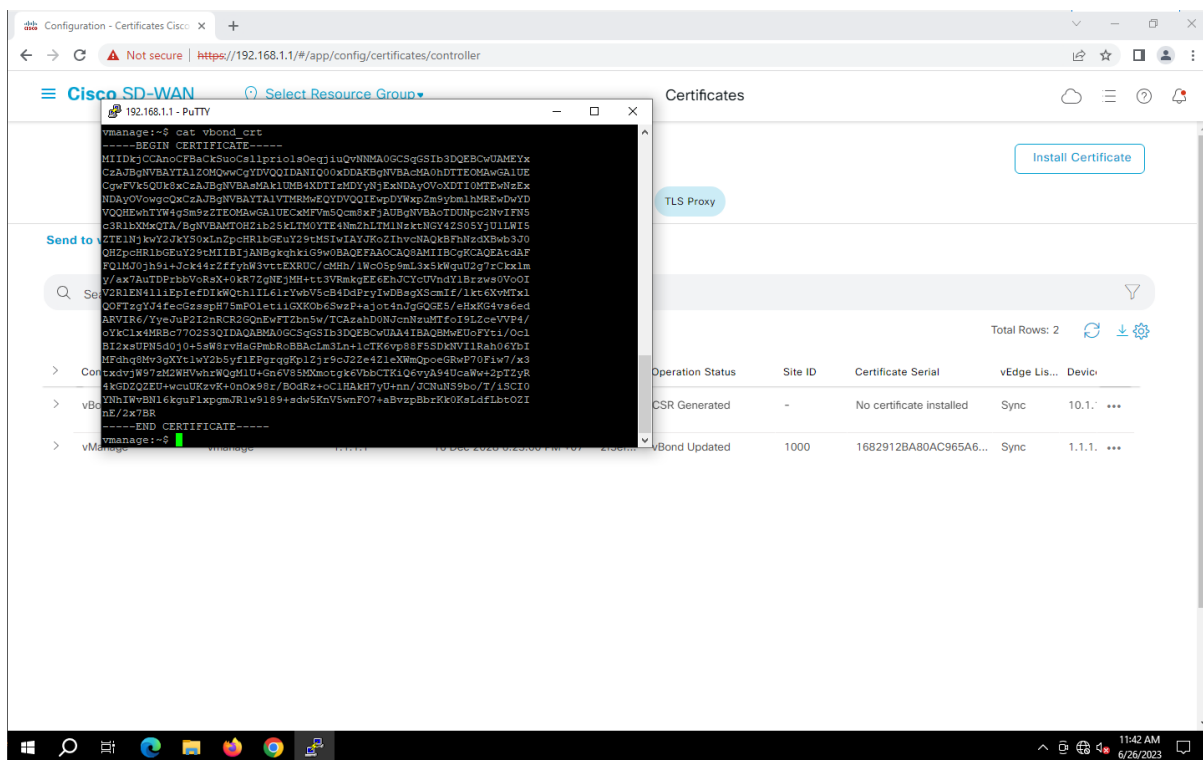
```
vManager
File Edit View Options Transfer Script Tools Window Help
Enter host <Alt+R>
vManager x vBond vSmart vEdge1 vEdge2 vEdge3
-----BEGIN CERTIFICATE REQUEST-----
MIIDRTCCAi0CAQAwgcQxCzAJBgNVBAYTA1VTMRMwEQYDVQQIEwpDYWxpZm9ybmlh
MREwDwYDVQQHEwhTYW4gSm9zZTEOMAwGAlUECxFVWm5Qcm8xZjAUBG9VBAAoTDUNp
c2NvIFN5c3RlbXMxQTA/BG9VBAMTOHZib25kLTMT0YTE4NmZhLTMT1NzktNGY4ZS05
YjU1LWI5ZTE1NjkwY2JkYS0xLnZpcHRlbGEuY29tMSIwIAYJKoZIhvcNAQkBFhNz
dXBwb3J0QHZpcHRlbGEuY29tMIIBIjANBgkqhkiG9w0BAQEFAAOCAQ8AMIIBCgKC
AQEAtdAFFQ1MJ0jh9i+Jck44rZffyhW3vttEXRUC/cMHh/1Wc05p9mL3x5kWquU2
g7rCkxlmY/ax7AuTDPrbbVoRsX+0kR7ZgNEjMH+tt3VRmkgEE6EhJCYcUVndY1Br
zws0VoOIV2R1EN4lliEpIefDIkWQthl1L6lrYwbV5cB4DdPryIwDBsgXScmIf/lk
t6XvMTxlQOFTzgYJ4fecGzsspH75mPOletiiGXKOb6SwzP+ajot4nJgGQGE5/eHx
KG4vs6edARVIR6/YyeJuP2I2nRCR2GQnEwFTZbn5w/TCAzahD0NJcnNzuMTfoI9L
ZceVVP4/oYkClx4MRBc7702S3QIDAQABOdswOQYJKoZIhvcNAQkOMSwKjAJBgNV
HRMEAjAAMB0GA1UdDgQWBBTjtbL/Bwu3/gpv9HzGp7mCpfBsszANBgkqhkiG9w0B
AQsFAAOCAQEAOob7kEp9TGtsIeTaby4Nk9EweOV+xxQp3qWr7wtt3TiuthGA3CQ6h
jzN3OFaX8bCWfyx0NEQTyW4VCrebik6piyUoUf3LKEr+PDuOKTbfmtTlUYbFB22Z
hHU1KmsdVLN2HjcyiaE3psa4dYtrQuPJ/LMlsqLbnPWGO34OeTnLCkVreypot8NA
Qsuv8lxqZDs+awI7QiTWcFanNGdrl3TIFZ4uTtLKZTIgGLCv5QEKEQx93+wcJGpb
0dDug49J8kgwkuyUnr089V3eZ+dhop9ctdEDYlAXlaFbM7lr0Le5xubw0LAgTZM1
CEVfWL18i6sUt5MvaJpsMt+ekor6JE+toQ==
-----END CERTIFICATE REQUEST-----
~
~
~
:wq
Ready Telnet: 10.215.27.145 24, 4 30 Rows, 67 Cols VT100 CAP NUM
```

- Tiếp tục ở console vmanage dùng câu lệnh: “openssl x509 -req -in vbond_csr -CA ROOTCA.pem -CAkey ROOTCA.key -CAcreateserial -out vbond.crt -days 500 -sha256” để chuyển file *vbond_csr* sang *vbond.crt*

```
vmanage:~$ openssl x509 -req -in vbond_csr -CA ROOTCA.pem -CAkey RO
reateserial -out vbond.crt -days 500 -sha256
Signature ok
subject=C = US, ST = California, L = San Jose, OU = VnPro, O = Cisc
o Systems, CN = vbond-34a186fa-3579-4f8e-9b55-b9e15690cbda-1.viptel
a.com, emailAddress = support@viptela.com
Getting CA Private Key
vmanage:~$
```

```
vmanage:~$ ls -l
total 32
-rw----- 1 admin admin 1700 Jun 26 11:08 ROOTCA.key
-rw----- 1 admin admin 1249 Jun 26 11:08 ROOTCA.pem
-rw----- 1 admin admin 41 Jun 26 11:40 ROOTCA.srl
-rw-r--r-- 1 admin admin 566 Jun 26 10:03 archive_id_rsa.pub
-rw----- 1 admin admin 1298 Jun 26 11:40 vbond.crt
-rw----- 1 admin admin 1212 Jun 26 11:40 vbond.csr
-rw----- 1 admin admin 1302 Jun 26 11:23 vmanage.crt
-rw-r--r-- 1 root root 1212 Jun 26 11:22 vmanage.csr
vmanage:~$
```

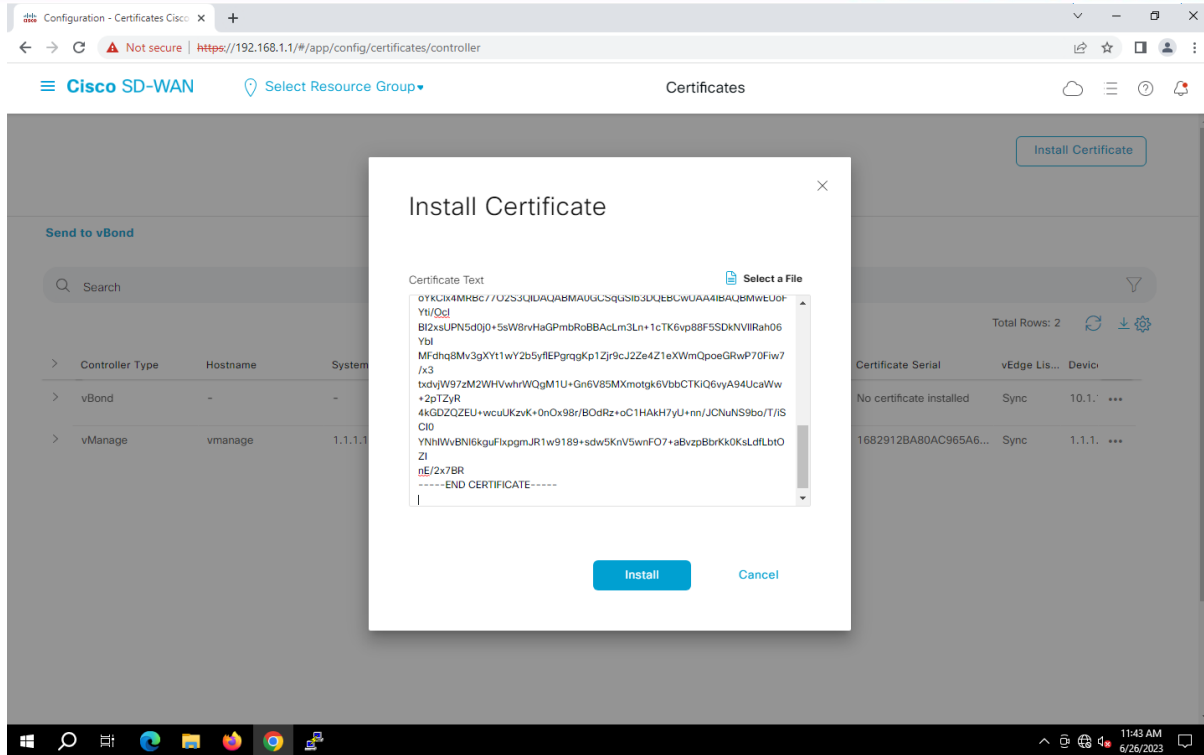
- Vào PC (trong sơ đồ lab) ssh vào vmanage, dùng **cat vbond.crt** để copy chứng chỉ số



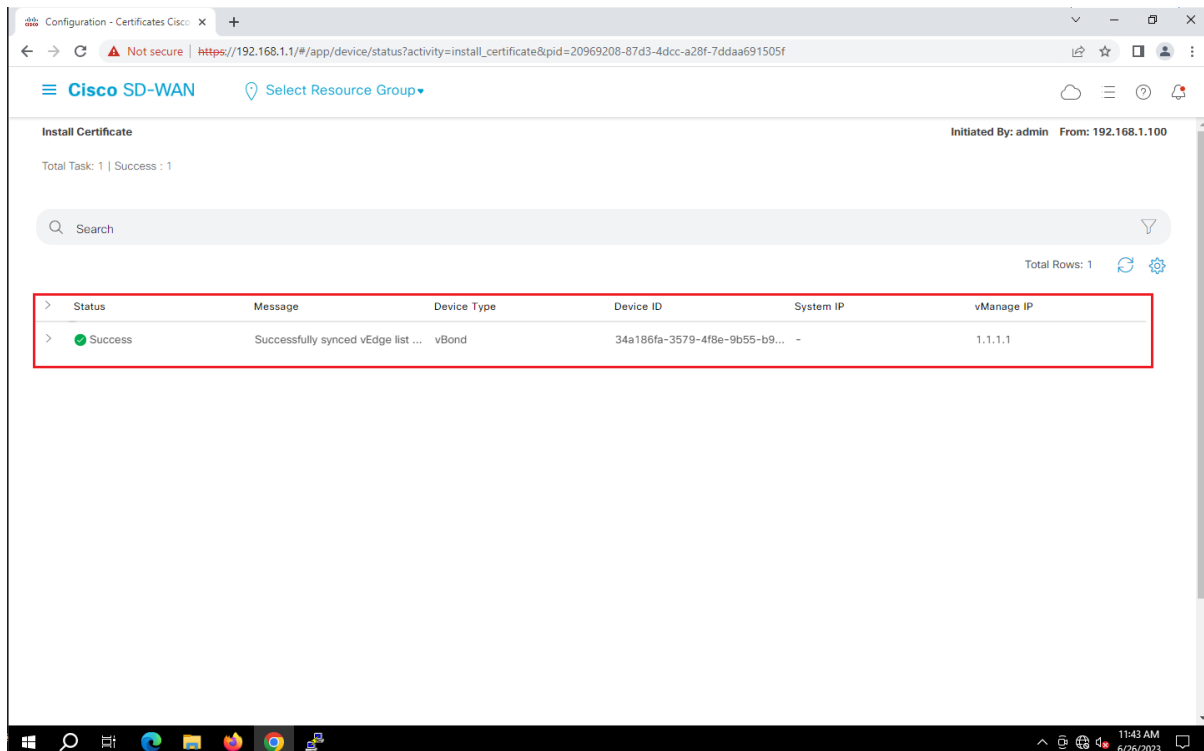
The screenshot shows a web browser window displaying the Cisco SD-WAN configuration page for Certificates. A terminal window is open in the foreground, showing the command `cat vbond.crt` and its output, which is a long base64-encoded string. The background shows the 'Certificates' section of the Cisco SD-WAN interface, with a table listing certificates. The table has columns for Operation Status, Site ID, Certificate Serial, vEdge Lis..., and Devic... The table shows two rows: 'CSR Generated' and 'VBond Updated'.

Operation Status	Site ID	Certificate Serial	vEdge Lis...	Devic...
CSR Generated	-	No certificate installed	Sync	10.1.1...
VBond Updated	1000	1682912BA80AC965A6...	Sync	1.1.1...

- Sau đó vào giao diện trên web vmanage chọn Install Certificate

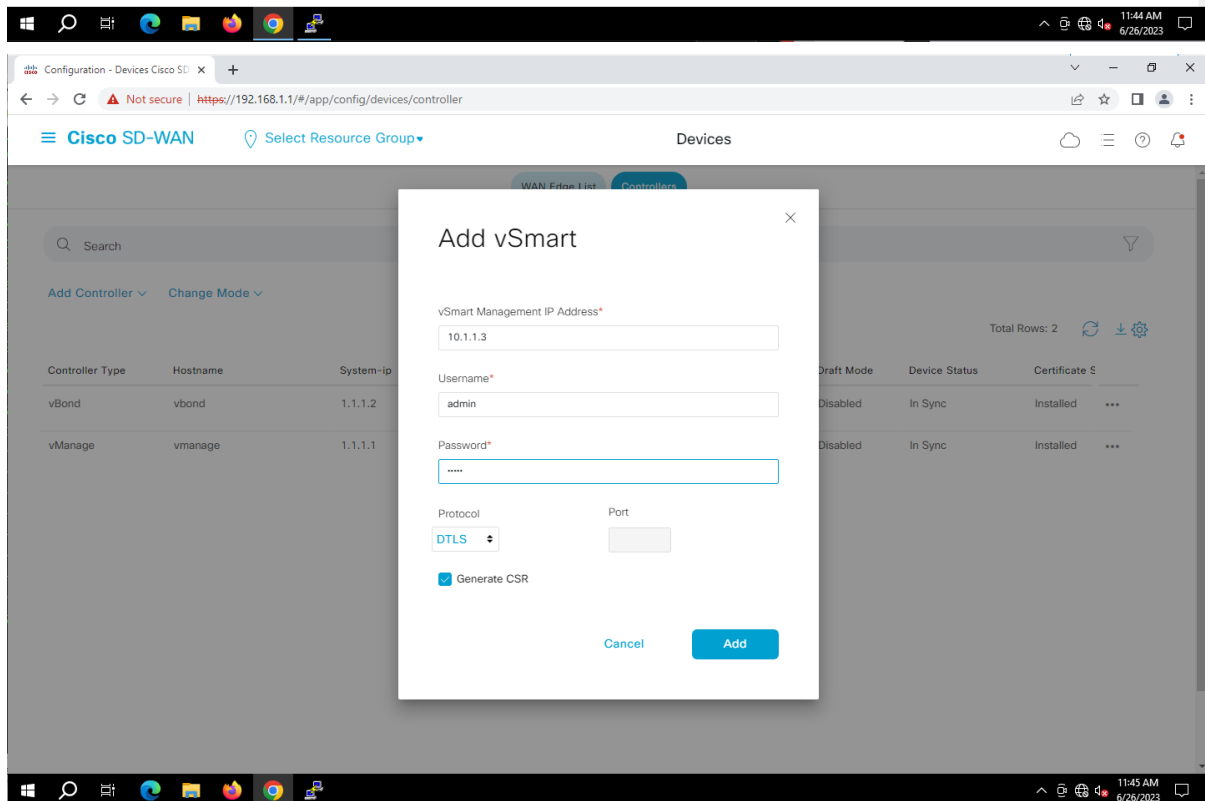
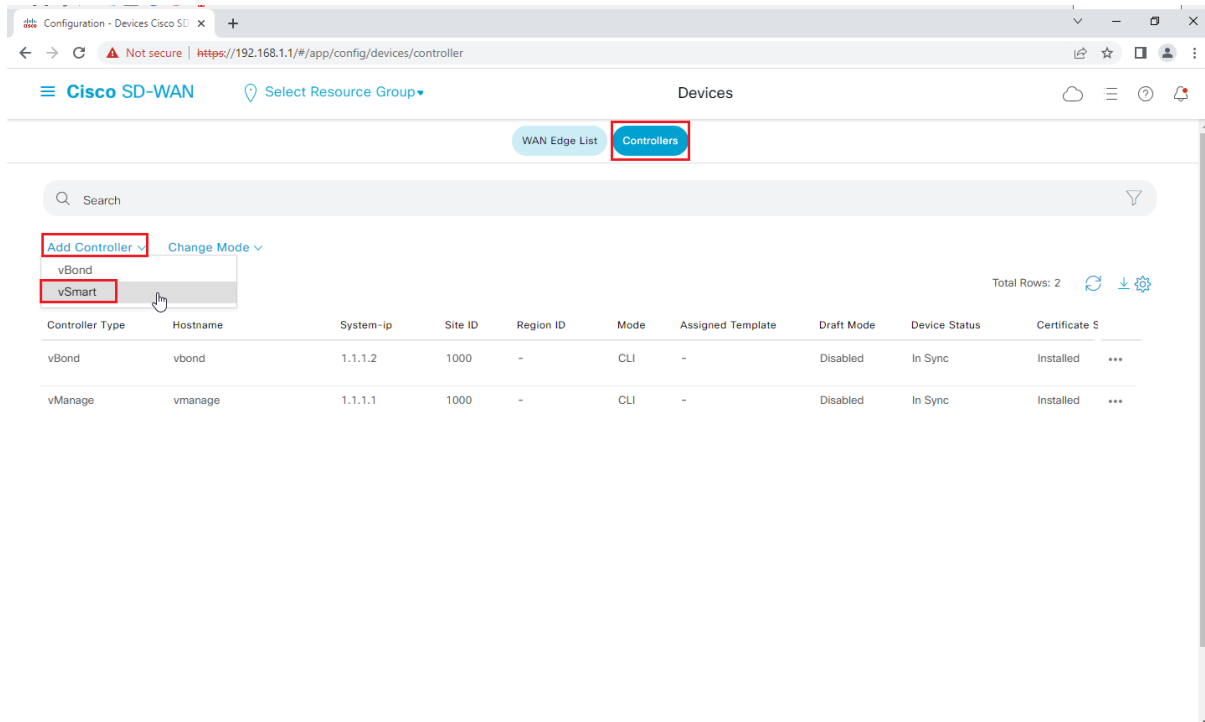


Kiểm tra kết quả: thành công

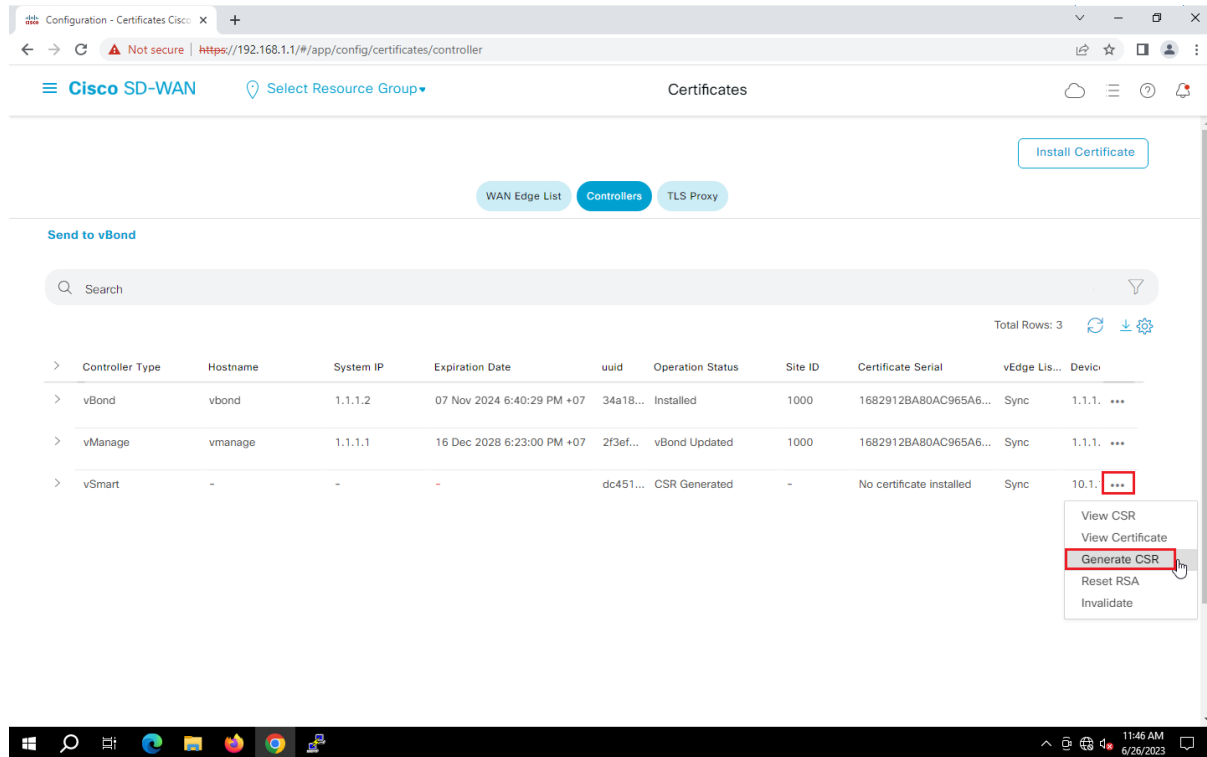


VSmart: tương tự vbond

- Cấu hình vSmart Management ip address: 10.1.1.3, username: admin, password: Admin

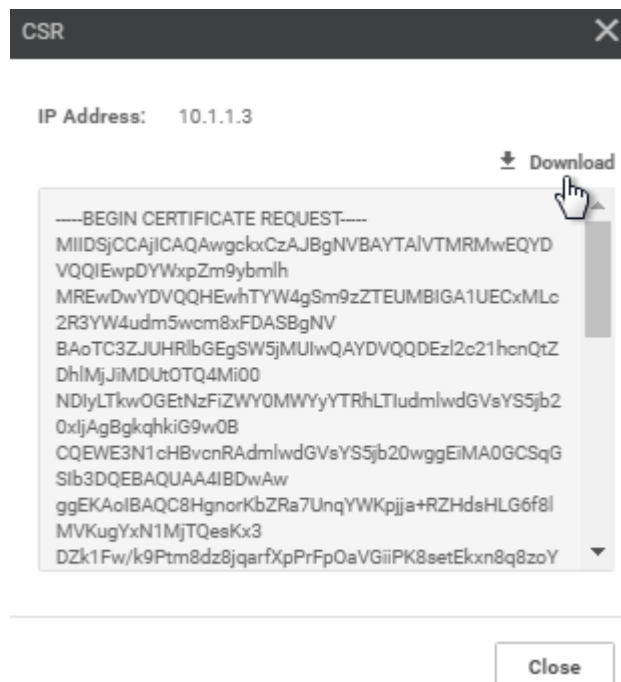


- Tạo file *vsmart_csr* bằng cách chọn Generate CSR



The screenshot shows the Cisco SD-WAN configuration interface for Certificates. The 'Controllers' tab is selected. A table lists the controllers: vBond, vManage, and vSmart. The vSmart controller is highlighted, and a context menu is open with the 'Generate CSR' option selected.

Controller Type	Hostname	System IP	Expiration Date	uuid	Operation Status	Site ID	Certificate Serial	vEdge Lis...	Device
vBond	vbond	1.1.1.2	07 Nov 2024 6:40:29 PM +07	34a18...	Installed	1000	1682912BA80AC965A6...	Sync	1.1.1. ...
vManage	vmanage	1.1.1.1	16 Dec 2028 6:23:00 PM +07	2f3ef...	vBond Updated	1000	1682912BA80AC965A6...	Sync	1.1.1. ...
vSmart	-	-	-	dc451...	CSR Generated	-	No certificate installed	Sync	10.1. ...



The screenshot shows a dialog box titled 'CSR' with the IP Address '10.1.1.3'. A 'Download' button is visible. The main content area displays the generated CSR text, which is a Base64-encoded string starting with '-----BEGIN CERTIFICATE REQUEST-----' and ending with '-----END CERTIFICATE REQUEST-----'.

```
-----BEGIN CERTIFICATE REQUEST-----
MIIDSjCCAjICAQAwgckxCzAJBgNVBAYTAiVTMRMwEQYD
VQIIEwpDYWxpZm9ybmlh
MREwDwYDVQQHEwhTYW4gSm9zZTEUMBGA1UECjMLc
2R3YW4udm5wcm8xZDAsBgNV
BAoTC3ZJUHRlbGEgSW5jMUIwQAYDVQQDEzIc21hcnQtZ
DhlMjJiMDUOTQ4Mi00
NDlyLTkwOGEtNzFiZWY0MmVYyYTRhLTludmlwdGVsYS5jb2
0xIjAgBgkqhkiG9w0B
CQEWE3N1cHBvcnRAdmlwdGVsYS5jb20wggEIMA0GCSqG
Sib3DQEBAQUAA4IBDwAw
ggEKAolBAQC8HgnorKbZRa7UnqYWKpjj+RZHdsHLG6f8l
MVKugYxN1MjTQesKx3
DZk1Fw/k9Ptm8dz8jqarfXpPrFpOaVGiiPK8setEkxn8q8zoY
-----END CERTIFICATE REQUEST-----
```

- Vào console vsmart gõ **cat vsmart_csr** và copy chúng chỉ số từ begin đến end

```
vsmart
File Edit View Options Transfer Script Tools Window Help
vManager vBond vSmart x vEdge1 vEdge2 vEdge3
vsmart login: admin
Password:
Last login: Mon Jun 26 11:47:40 UTC 2023 from 10.1.1.1 on ssh
Welcome to Viptela CLI
User admin last logged in 2023-06-26T11:47:40.694319+00:00, to vsmar
t, from 10.1.1.1 using netconf-ssh
admin connected from 127.0.0.1 using console on vsmart
vsmart# vshell
vsmart:~$ cat vsmart_csr
-----BEGIN CERTIFICATE REQUEST-----
MIIDRjCCAi4CAQAwwgcUxCzAJBgNVBAYTA1VTMRMwEQYDVQQIEwpDYWxpZm9ybmlh
MREwDwYDVQQHEwhTYW4gSm9zZTEOMAwGA1UECxFVbW5Qcm8xZjAUBGNVBAoTUDNp
c2NvIFN5c3RlbnBMXmQjBABGNVBAMTOXZzbWYydC1kYzQ1MWU1Zi1mODFlLTQ2ZDgt
YTY0ZS00NjFjYTJjMGU0OWEtmS52aXB0ZWxhLmNvbTEiMCAgCSqGSIB3DQEJARYT
c3VwcG9ydEB2aXB0ZWxhLmNvbTCCASIwDQYJKoZIhvcNAQEBBQADggEPADCCAQoC
ggEBALcNI4oS59fMfcJCa9DexfitZXhE57khUaKA9Vwrvn9VYyMNo6t5M91a8mQX
Gavz8rAw33PEEiw+fLSE+qVtJ8xDSYeiWCFxNQLMgRXIZXLYGaln8xpoeda2PAz5
uao7TIwkcke+YYWkPfsz8K9KvrlcgQBli8uz1Bk0/Or1/tDmAFbbY0kx6N+bXhom
L0ldit8hIy9us4TQmsDHelCZfiymNyWUcA5kA090KkbREVRuv/rSzhArtBFdsKs
ktYnX2IQY17+T4SQKH9umzJNjHMxWUx41WmzmFXg7uxJ8gou/DGWVegN1LRyH/2r
FSkgwvQU6q3buRhQj7T5ydujRHcCAwEAAa7MDkGCSqGSIB3DQEJDjESMCowCQYD
VR0TBAlWADAdBgNVHQ4EFgQUJ1knH8AY39r7WpZPGSxBmweZuFkwDQYJKoZIhvcN
AQELBQADggEBAcTlsKyX/Vf6VpxRn3vyp/u3GSTlrASq1FNCwhB2de5r2pYWNpPR
En/4NqEUQkbPhRqVl9CGQWeDkKXcgTn51bCSMEUAFrGTxibNqe7xQ2FSd7JhcZvU
O9g4U63SYx/TLz8QZ9D3VO+fw3MiKF4FJYgESFnd9ZCeunISBeG5Qk/6qWKzadb7
+4XvJigl25Xt81kn8MmsJ3KqKpsACT64KCLIWqRl606bqzUEjOCKjEBLff8eM1Ba
McuCToHIkUISA9sjQd04/dxV3q10vUq4wtvQIweB2eGj/GOTYcgICiIAXBxj+vbJ
rsHKOmQ590Dv8J5DLThwcxAmfYK64cyOYDc=
-----END CERTIFICATE REQUEST-----
vsmart:~$
```

- Sau đó qua console vManage tạo file *vsmart_csr* bằng câu lệnh: **vim vsmart_csr** dán chứng chỉ số vừa copy ở vbond bằng cách gõ “i” rồi kích chuột phải để dán, sau đó gõ “**esc :wq**” để lưu và thoát ra.

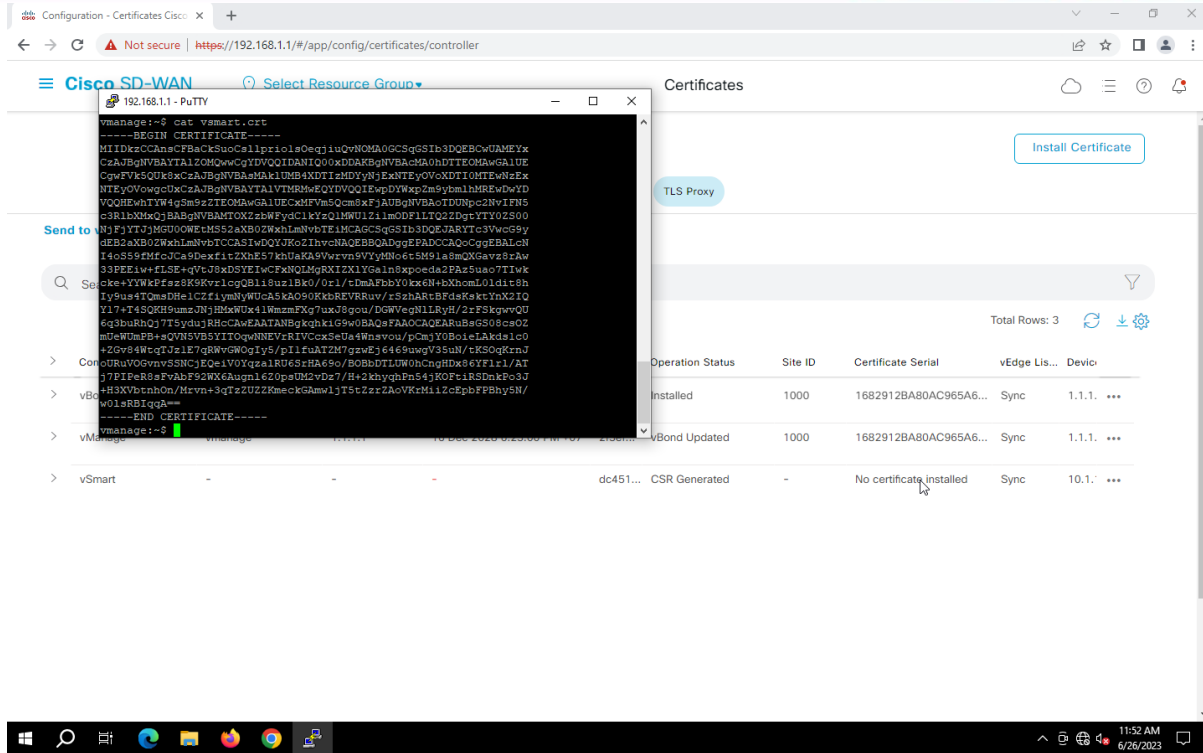
```
vmanage:~$ vim vsmart csr
```

```
vManager
File Edit View Options Transfer Script Tools Window Help
Enter host <Alt+R>
vManager x vBond vSmart vEdge1 vEdge2 vEdge3
-----BEGIN CERTIFICATE REQUEST-----
MIIDRjCCAi4CAQAwgcUxCzAJBgNVBAYTAlVTMRMwEQYDVQQIEwpDYWxpZm9ybmlh
MREwDwYDVQQHEwhTYW4gSm9zZTEOMAwGA1UECzMFMV5Qcm8xZjAUBGNVBAoTDUNp
c2NvIFN5c3R1bXMxQjBBAW5BAMTOXZzbWYyZDk1YzQ1MWU1Zi1mODFlLTQ2ZDgt
YTY0ZS00NjFjYTJjMGU0OWEtMS52aXB0ZWxhLmNvbTEiMCAGCSqGSIb3DQEJARYT
c3VwcG9ydEB2aXB0ZWxhLmNvbTCCASIwDQYJKoZIhvcNAQEBBQADggEPADCCAQoC
ggEBALcNI4oS59fmfcJCa9DexfitZXhE57khUaKA9Vwrvn9VYyMNo6t5M91a8mQX
Gavz8rAw33PEEiw+fLSE+qVtJ8xDSYEIwCFxNQLMgRXIZX1YGaln8xpoeda2PAz5
uao7TIwkcke+YYWkPfsz8K9KvrlcgQBli8uz1Bk0/0r1/tDmAFbbY0kx6N+bXhom
L0ldit8hIy9us4TQmsDHelCZfiymNyWUCa5kAO90KkbREVRuv/rSzhArtBFdsKs
ktYnX2IQY17+T4SQKH9umzJNjHMxWUx41WmzmFXg7uxJ8gou/DGWVegN1LRyH/2r
FSkgwvQU6q3buRhQj7T5ydujRHcCAwEAAaA7MDkGCSqGSIb3DQEJDjEsmCowCQYD
VR0TBAlwADAdBgNVHQ4EFgQUJlknH8AY39r7WpZPGSxBmweZuFkwDQYJKoZIhvcN
AQELBQADggEBACtIsKyX/Vf6VpxRn3vyp/u3GSTlrASq1FNCwhB2de5r2pYWNpPR
En/4NqEUQkbPhRqV19CGQWeDkKXcgTn51bCSMEUAFrGTxiBnqe7xQ2FSd7JhcZvU
O9g4U63SYx/TLz8QZ9D3VO+fw3MiKF4FJYgESFnd9ZCeunIsBeG5Qk/6qWKzadb7
+4XvJig125Xt81kn8MmsJ3KqKpsAct64KCLIWqR1606bgzUEjOCKjEBLff8eM1Ba
McuCToHIkUISa9sjQd04/dxV3q10vUq4wtvQiweB2eGj/GOTYcgICiIAXBxj+vbJ
rsHKOmQ590Dv8J5DLThwcxAmfYK64cyOYDc=
-----END CERTIFICATE REQUEST-----
~
~
~
:wq
Ready Telnet: 10.215.27.145 24, 4 30 Rows, 67 Cols VT100 CAP NUM
```

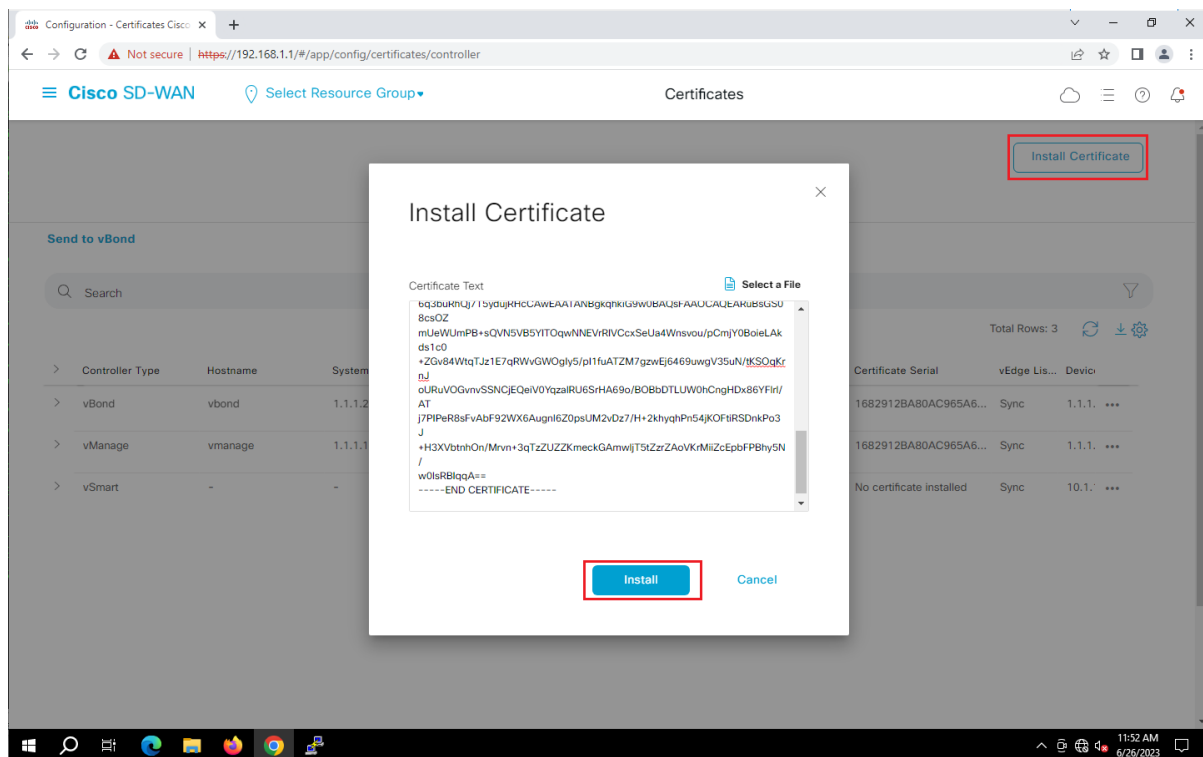
- Tiếp tục ở console vmanage dùng câu lệnh: **“openssl x509 -req -in vsmart_csr -CA ROOTCA.pem -CAkey ROOTCA.key -CAcreateserial -out vsmart.crt -days 500 -sha256”** để chuyển file *vsmart_csr* sang *vsmart.crt*

```
vmanage:~$ openssl x509 -req -in vsmart_csr -CA ROOTCA.pem -CAkey R
createserial -out vsmart.crt -days 500 -sha256
Signature ok
subject=C = US, ST = California, L = San Jose, OU = VnPro, O = Cisc
o Systems, CN = vsmart-dc451e5f-f81e-46d8-a64e-461ca2c0e49a-1.vipte
la.com, emailAddress = support@viptela.com
Getting CA Private Key
vmanage:~$
```

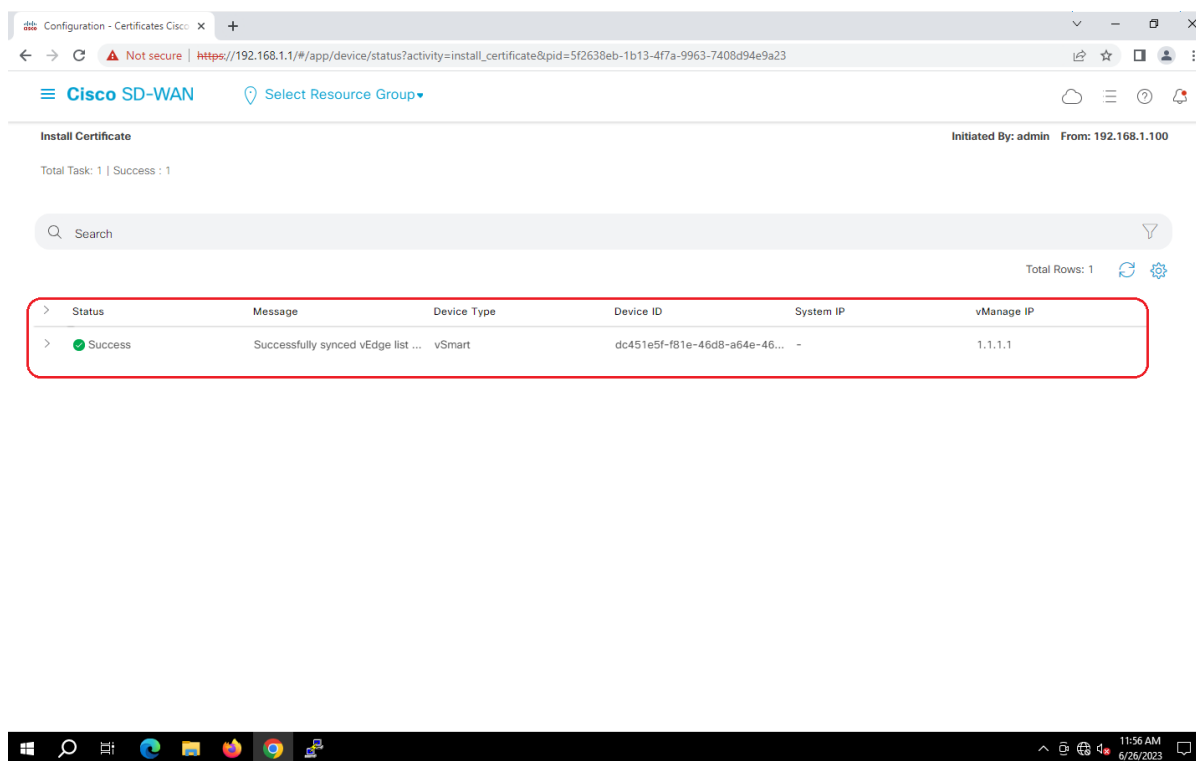
- Vào PC (trong sơ đồ lab) ssh vào vManage, dùng **cat vsmart.crt** để copy chứng chỉ số



- Sau đó vào giao diện trên web vManage chọn Install Certificate



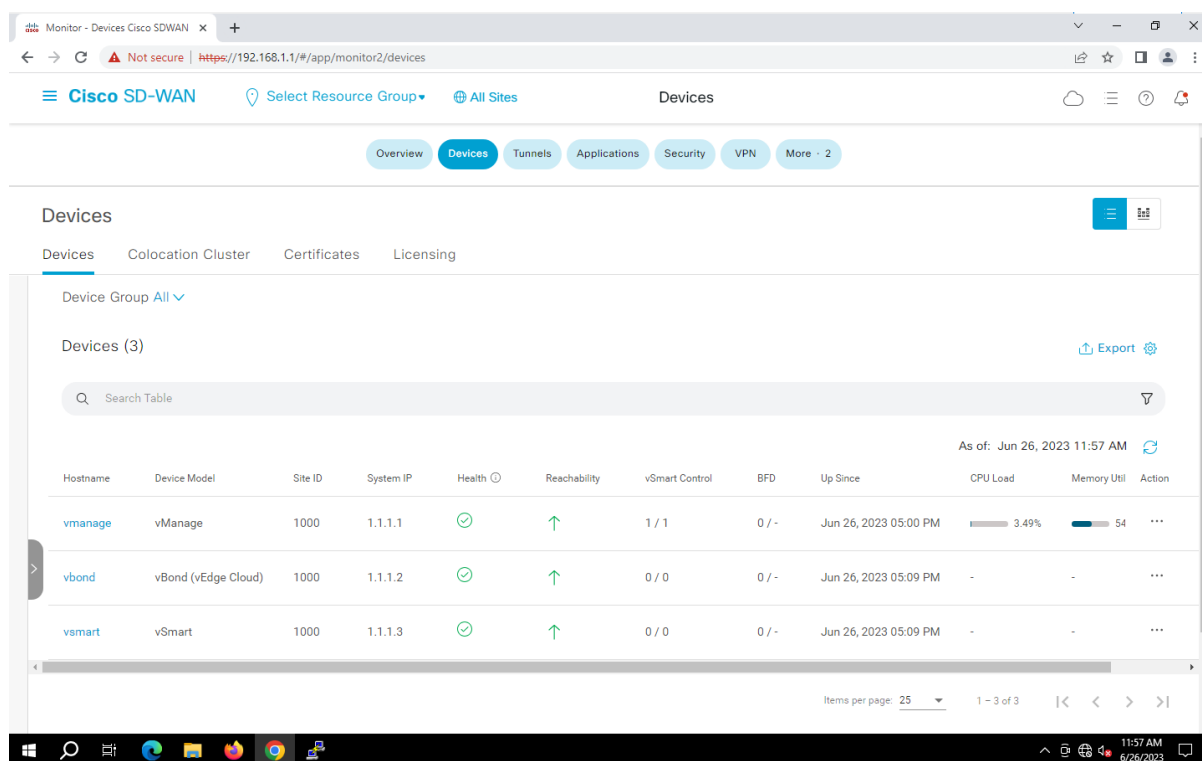
- Kết quả thành công:



The screenshot shows the 'Install Certificate' page in the Cisco SD-WAN configuration interface. The page indicates that the task was successfully completed. A table below the search bar shows the results of the installation.

Status	Message	Device Type	Device ID	System IP	vManage IP
Success	Successfully synced vEdge list ...	vSmart	dc451e5f-f81e-46d8-a64e-46...	-	1.1.1.1

- vManage, vSmart, vBond đã bring-up thành công



The screenshot shows the 'Monitor - Devices Cisco SD-WAN' page. The 'Devices' tab is selected, and the 'Overview' sub-tab is active. The page displays a table of devices that have been successfully brought up.

Hostname	Device Model	Site ID	System IP	Health	Reachability	vSmart Control	BFD	Up Since	CPU Load	Memory Util	Action
vmanage	vManage	1000	1.1.1.1	✓	↑	1 / 1	0 / -	Jun 26, 2023 05:00 PM	3.49%	54	...
vbond	vBond (vEdge Cloud)	1000	1.1.1.2	✓	↑	0 / 0	0 / -	Jun 26, 2023 05:09 PM	-	-	...
vsmart	vSmart	1000	1.1.1.3	✓	↑	0 / 0	0 / -	Jun 26, 2023 05:09 PM	-	-	...

3.3. Thiết lập thiết bị vEdge vào hệ thống Cisco SD-WAN

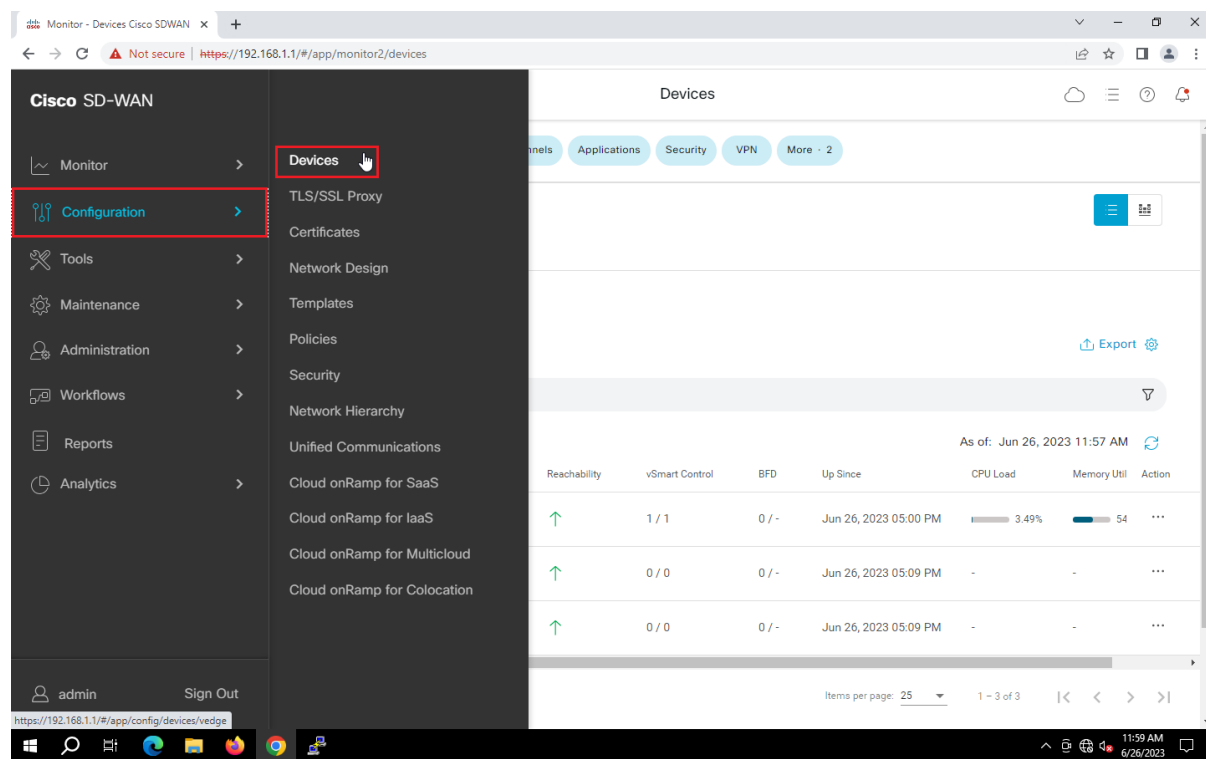
Cấu hình license vEdge

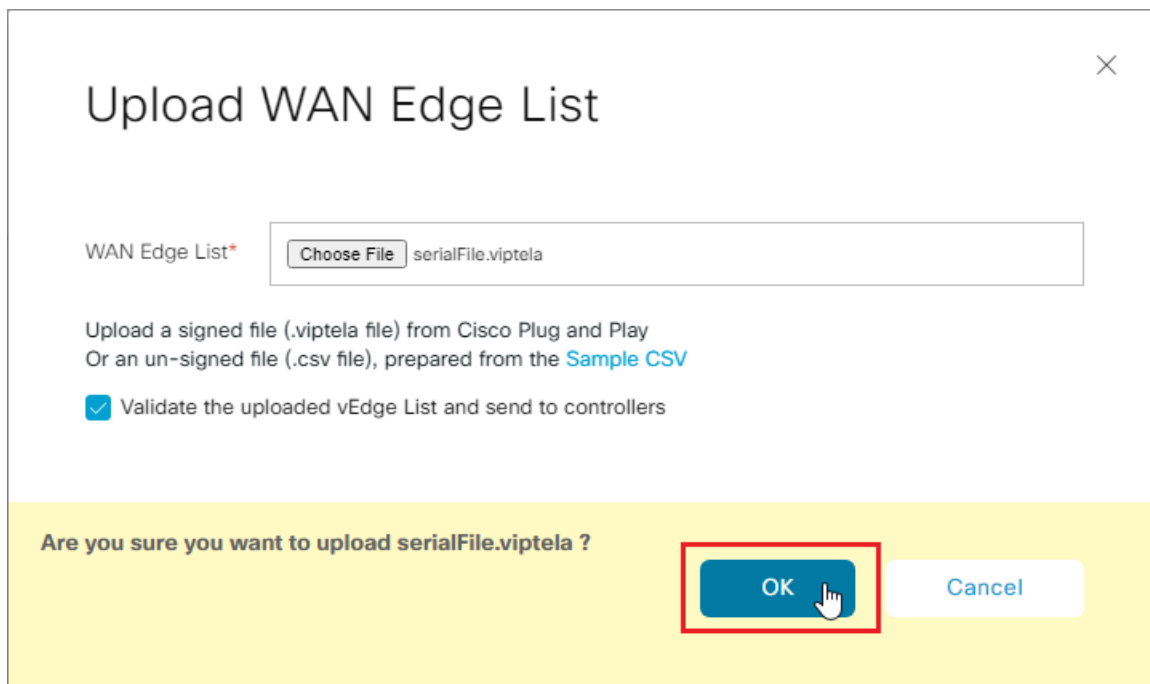
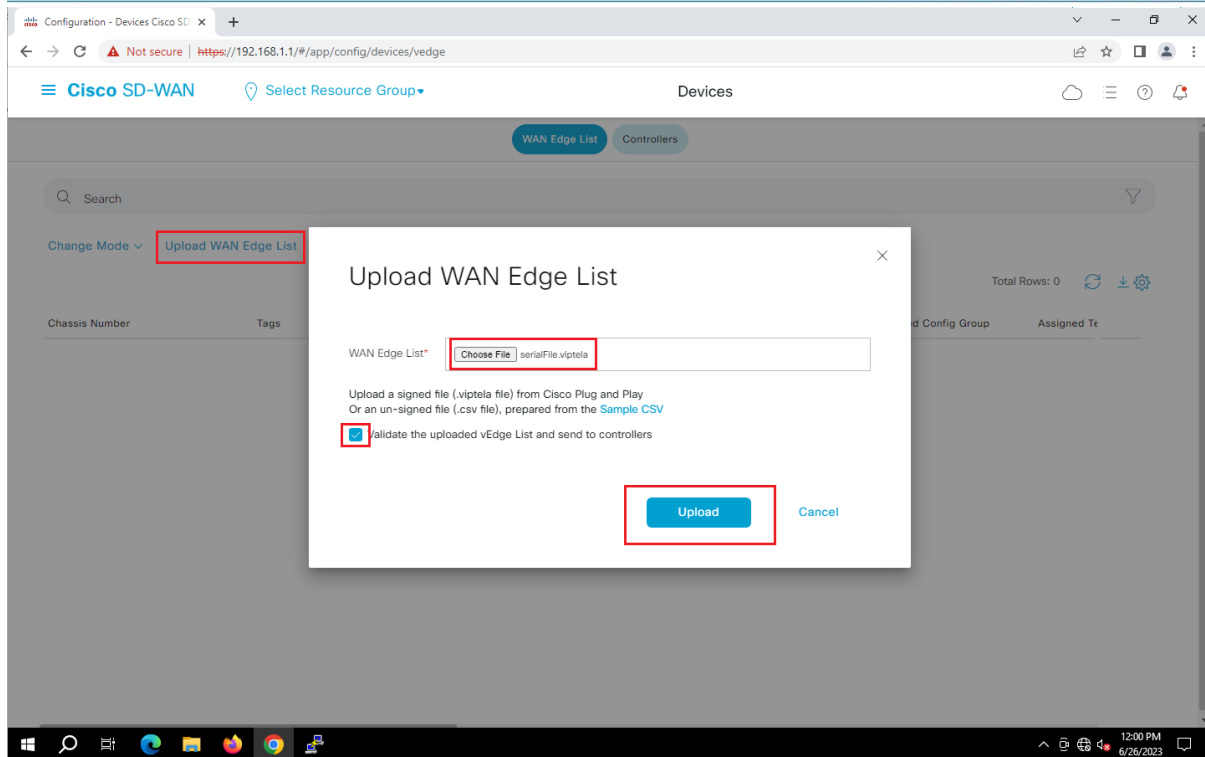
Để có được file (serialFile.viptela) thì ta phải có một smart account hoặc có thể download nó tại đây:

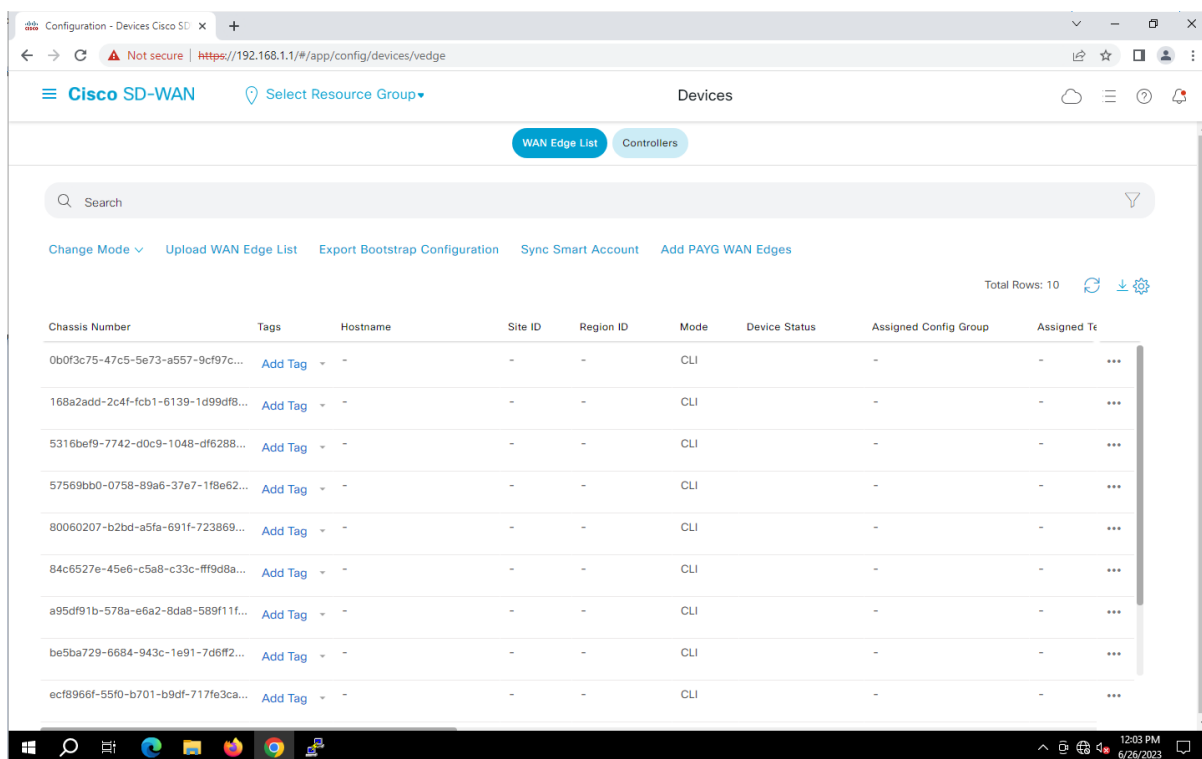
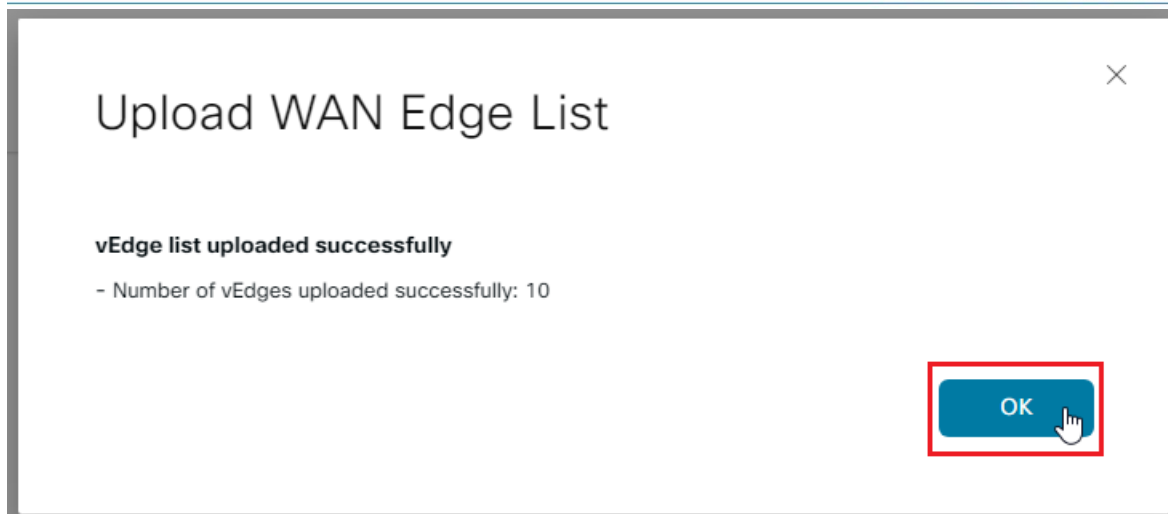
https://drive.google.com/file/d/1rEcGj2ufgs_lqK_PO-mZe7MmZqQcYFf/view?usp=sharing

(cần chỉnh lại organization name trong phần cấu hình các thiết bị là: **VnPro** để có thể upload được file này)

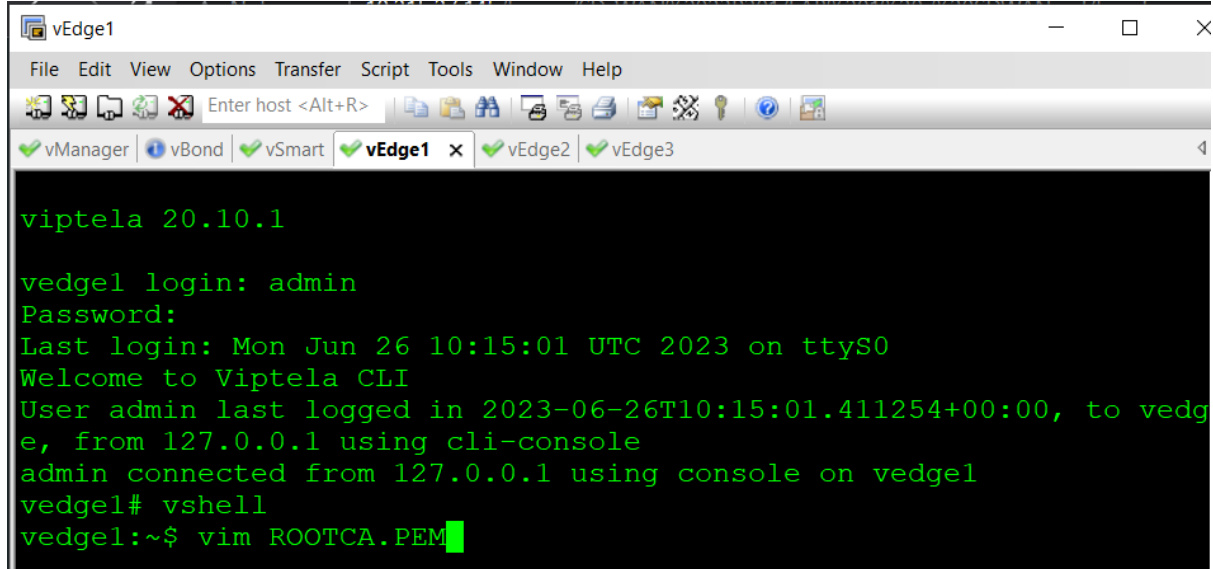
Chọn **Configuration->Devices->Upload WAN Edge List** và chọn file trong phần download (serialFile.viptela)







Vào vshell của vEdge up license như đã làm trên vManage



```
vEdge1
File Edit View Options Transfer Script Tools Window Help
Enter host <Alt+R>
vManager vBond vSmart vEdge1 x vEdge2 vEdge3

viptela 20.10.1

vedgel login: admin
Password:
Last login: Mon Jun 26 10:15:01 UTC 2023 on ttyS0
Welcome to Viptela CLI
User admin last logged in 2023-06-26T10:15:01.411254+00:00, to vedg
e, from 127.0.0.1 using cli-console
admin connected from 127.0.0.1 using console on vedgel
vedgel# vshell
vedgel:~$ vim ROOTCA.PEM
```

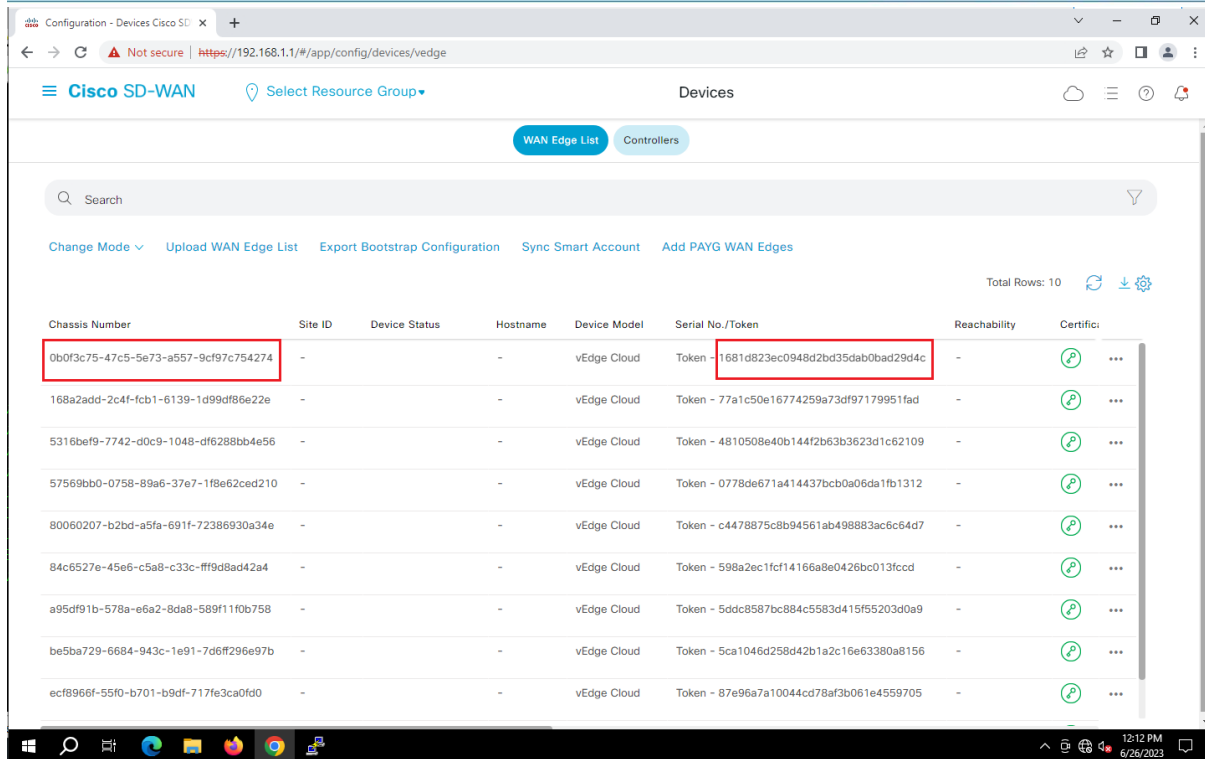
```
vEdge1
File Edit View Options Transfer Script Tools Window Help
Enter host <Alt+R>
vManager vBond vSmart vEdge1 x vEdge2 vEdge3
-----BEGIN CERTIFICATE-----
MIIDbTCCA1WgAwIBAgIUvdzgMAJuD7ihLQtfdnzhjOHF56cwDQYJKoZIhvcNAQEL
BQAwRjELMAkGA1UEBhMCVj4xDDAKBgNVBAGMA0hDTTEMMAoGA1UEBwwDSENNMQ4w
DAYDVQQKDAVWVWt1BStzELMAkGA1UECwwCSVQwHhcNMjMwNjI2MTEwODUwWhcNMjg
MjE2MTEwODUwWjBGMQswCQYDVQGEWJWtjEMMAoGA1UECAwDSENNMQwCgYDVQQH
DANIQ00xDjAMBgNVBAoMBVZOUFJPMQswCQYDVQQLDAJJVDCCASIwDQYJKoZIhvcN
AQEBBQADggEPADCCAQoCggEBAlOMekQofTWGRNmZGfMwTrXk0Uv6mAFJHXWiI6jc
Xzkm9x3X9930bk9KDNh3FHjMwQj63o4kHdNcBzHNgdjid6S7yeIa8VD+EflNpy0N
jZ6AFzxyvdvNzkyMK6ScyzIzfwLqhDEJYQmP4V6k5AckcXClhU6fAk1fWxeNTjAheE
bx3b2XrtkH6jVgfgRnF9PXd9wIo1TQuDWDVd8Q1AqLt8hnOKo2D02ABOAspXa5Nf
BT47jDyHQYBz9b8B8xMQUxrceUpe4asJei+BHiIe9KIIGiAb60cG9PYfH1TJfX8e
/S8yOGHzQjrrtT4eQ4EtrfFtRkPR/1p49P+Rb3WMOKyjLBECawEAAaNTMFEwHQYD
VR0OBBYEFHxVS/dKjRXVujSF+HkuHAodqiPqMB8GA1UdIwQYMBaAFHxVS/dKjRXV
ujSF+HkuHAodqiPqMA8GA1UdEwEB/wQFMAMBAf8wDQYJKoZIhvcNAQELBQADggEB
AE5sYblrNNSdtCl+rHA04pzMaW9i05y1N1Io0/WLKPj2jX+PW9sQjUhIha/anRwP
qQU6IglEb/LZWRBRMIGPaC6/F+NzXgXI//AKjVaQ17P16N5stRYUWE9CFk3+tK3/
Wgia/H1sRv0WXAHQ8jc0mDN1bM6/LfJXOJMUksWzHbCG8cJ/P8GFcaNFY638Wzp3
kVg+TQzo/m5rmxJrLKGK8bCpaZYpXRvJQX5hP/KyudG+BeT4xWYSYyNrv+3lwPe2
Rnflj10kSdhGFGsJxw7GoiYUfgHgnwv1vLF4ntIuxoTngRKP/wgvBFJCcHjCSGuA
z9Jq4b9I1CNLHjGbm+JPnTQ=
-----END CERTIFICATE-----
~
~
:wq
```

Thoát vshell và request license

request root-cert-chain install /home/admin/ROOTCA.PEM

```
vedgel# request root-cert-chain install /home/admin/ROOTCA.PEM
Uploading root-ca-cert-chain via VPN 0
Copying ... /home/admin/ROOTCA.PEM via VPN 0
Updating the root certificate chain..
Successfully installed the root certificate chain
vedgel#
```

Vào web vManage chọn **Configuration -> Certificates** chọn **chassis number** và **token**



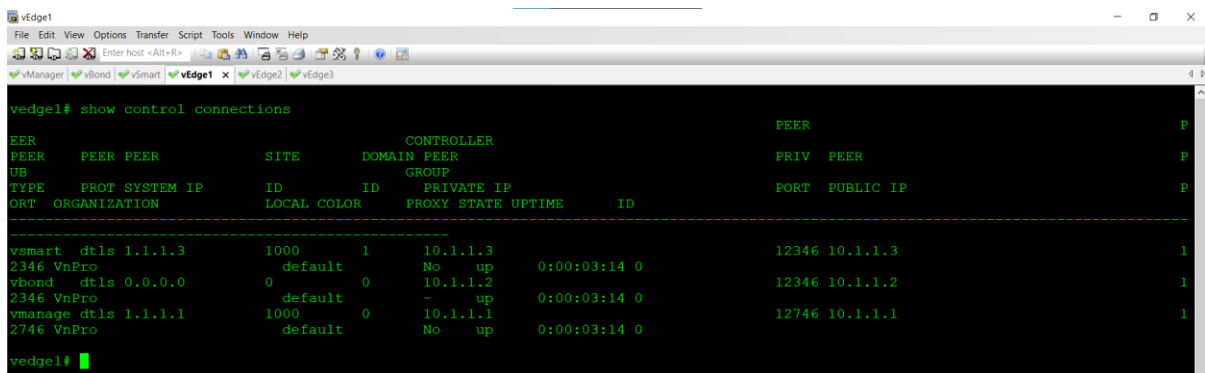
Chassis Number	Site ID	Device Status	Hostname	Device Model	Serial No./Token	Reachability	Certific:
0b0f3c75-47c5-5e73-a557-9cf97c754274	-	-	-	vEdge Cloud	Token - 1681d823ec0948d2bd35dab0bad29d4c	-	...
168a2add-2c4f-fcb1-6139-1d99df86e22e	-	-	-	vEdge Cloud	Token - 77a1c50e16774259a73df97179951fad	-	...
5316bef9-7742-d0c9-1048-df6288bb4e56	-	-	-	vEdge Cloud	Token - 4810508e40b144f2b63b3623d1c62109	-	...
57569bb0-0758-89a6-37e7-1f8e62ced210	-	-	-	vEdge Cloud	Token - 0778de671a414437bcb0a06da1fb1312	-	...
80060207-b2bd-a5fa-691f-72386930a34e	-	-	-	vEdge Cloud	Token - c4478875c8b94561ab498883ac6c64d7	-	...
84c6527e-45e6-c5a8-c33c-fff9d8ad42a4	-	-	-	vEdge Cloud	Token - 598a2ec1fc14166a8e0426bc013fcd	-	...
a95df91b-578a-e6a2-8da8-589f11f0b758	-	-	-	vEdge Cloud	Token - 5ddc8587bc884c5583d415f55203d0a9	-	...
be5ba729-6684-943c-1e91-7d6ff29e97b	-	-	-	vEdge Cloud	Token - 5ca1046d258d42b1a2c16e63380a8156	-	...
ecf8966f-55f0-b701-b9df-717fe3ca0fd0	-	-	-	vEdge Cloud	Token - 87e96a7a10044cd78af3b061e4559705	-	...

Vào lại Putty và gõ lệnh **request vedge-cloud activate chassis-number *chassis-number* token *token***

(chassis number và token đã chọn trong mục certificate)

```
vedge1# request vedge-cloud activate chassis-number
Value for 'chassis-number' (<Chassis number/uuid of the device>): 0
b0f3c75-47c5-5e73-a557-9cf97c754274
Value for 'token' (<Serial number of the device>): 1681d823ec0948d2
bd35dab0bad29d4c
vedge1#
```

IV. Kiểm tra



```
vedge1# show control connections
```

EER	PEER	PEER	SITE	DOMAIN	CONTROLLER	PEER		
UB	TYPE	PROT	SYSTEM	IP	ID	GROUP	PRIV	PEER
ORT	ORGANIZATION				LOCAL	COLOR	PRIVATE	IP
					PROXY	STATE	UPTIME	ID
vsmart	dtls	1.1.1.3	1000	1	10.1.1.3			
2346 VnPro			default	No	up	0:00:03:14	0	12346 10.1.1.3
vbond	dtls	0.0.0.0	0	default	0			12346 10.1.1.2
2346 VnPro			default	-	up	0:00:03:14	0	
vmanage	dtls	1.1.1.1	1000	0	10.1.1.1			12746 10.1.1.1
2746 VnPro			default	No	up	0:00:03:14	0	

vEdge1

```
File Edit View Options Transfer Script Tools Window Help
Enter host <Alt+R>
vManager vBond vSmart vEdge1 x vEdge2 vEdge3
vedge1# show control local-properties
personality vedge
sp-organization-name VnPro
organization-name VnPro
root-ca-chain-status Installed
root-ca-crl-status Not-Installed

certificate-status Installed
certificate-validity Valid
certificate-not-valid-before Jun 26 12:15:40 2023 GMT
certificate-not-valid-after Jun 23 12:15:40 2023 GMT
```

Configuration - Devices Cisco SD-WAN

Not secure | https://192.168.1.1/#/app/config/devices/vedge

Cisco SD-WAN Select Resource Group

Devices

WAN Edge List Controllers

Search

Change Mode Upload WAN Edge List Export Bootstrap Configuration Sync Smart Account Add PAYG WAN Edges

Total Rows: 10

Chassis Number	Hostname	Site ID	Device Status	Device Model	Serial No./Token	Reachability	Certificate State
0b0f3c75-47c5-5e73-a557-9cf97c...	vedge1	1	In Sync	vEdge Cloud	E907EB62	reachable	...
168a2add-2c4f-fcb1-6139-1d99df8...	vedge2	2	In Sync	vEdge Cloud	7CAA31B5	reachable	...
5316bef9-7742-d0c9-1048-df6288...	vedge3	3	In Sync	vEdge Cloud	9DF3CF1B	unreachable	...
57569bb0-0758-89a6-37e7-1f8e62...	-	-	-	vEdge Cloud	Token - 0778de671a...	-	...
80060207-b2bd-a5fa-691f-723869...	-	-	-	vEdge Cloud	Token - c4478875c8...	-	...
84c6527e-45e6-c5a8-c33c-fff9d8a...	-	-	-	vEdge Cloud	Token - 598a2ec1cf1...	-	...
a95df91b-578a-e6a2-8da8-589f11f...	-	-	-	vEdge Cloud	Token - 5ddc8587bc...	-	...
be5ba729-6684-943c-1e91-7d6ff2...	-	-	-	vEdge Cloud	Token - 5ca1046d258...	-	...
ecf8966f-55f0-b701-b9df-717fe3ca...	-	-	-	vEdge Cloud	Token - 87e96a7a100...	-	...

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Monitor - Overview Cisco SD-WAN

Not secure | https://192.168.1.1:8443/#/app/monitor2/overview

Cisco SD-WAN Select Resource Group All Sites Overview

Overview Devices Tunnels Applications Security VPN More · 2

Overview

CONTROLLERS			WAN Edges	CERTIFICATE STATUS	LICENSING	REBOOT
1	1	1	3	0	0	0
vBond	vSmart	vManage	Reachable	Warning	Assigned 3 Unassigned	Last 24 hrs

Site Health

24 Hours Good Performing Sites

0 Sites

No Data to Display

Tunnel Health

24 Hours Latency (ms) Good Tunnels

0 Tunnels

No Data to Display

24 Hours Actions

Firefox

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