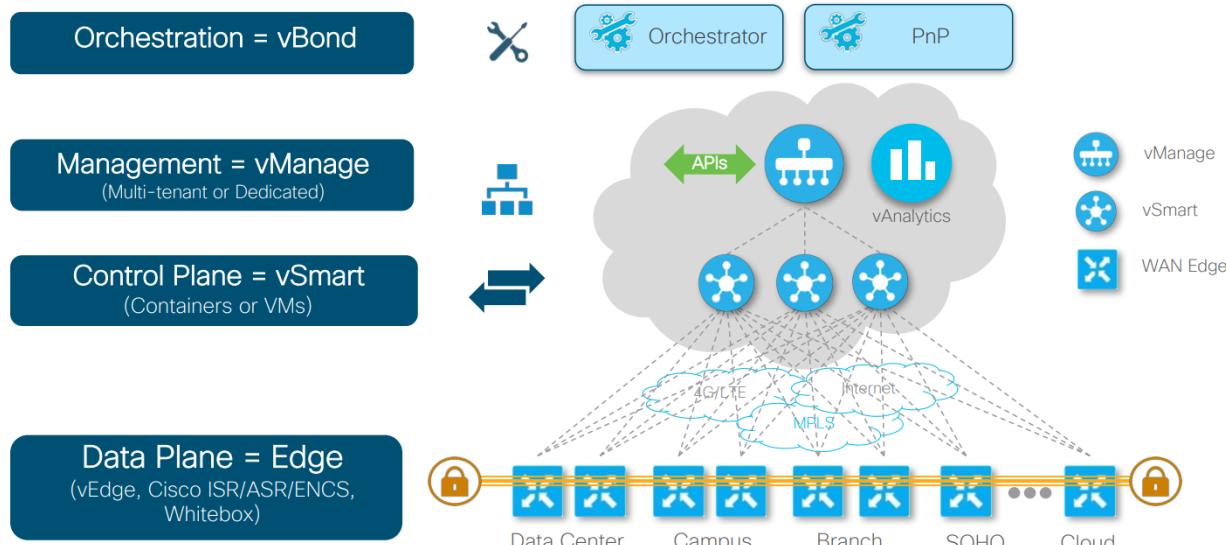


Cisco SD-WAN (Software-Defined Wide Area Network)

Cisco SD-WAN Architecture Overview



ในยุคที่เครือข่ายต้องการความยืดหยุ่น ปลอดภัย และมีประสิทธิภาพสูง Cisco SD-WAN (Software-Defined Wide Area Network) ได้เข้ามายึดบทบาทสำคัญในการปรับปรุงการเชื่อมต่อระหว่างสาขาขององค์กรกับศูนย์ข้อมูลหรือคลาวด์โดยใช้ซอฟต์แวร์ควบคุมแทนวิธีการตั้งเดิม SD-WAN ของ Cisco มีองค์ประกอบหลัก 4 ส่วน ได้แก่ Orchestration (vBond), Management (vManage), Control Plane (vSmart) และ Data Plane (Edge) ซึ่งทำงานร่วมกันเพื่อให้ได้เครือข่ายที่มีความสามารถในการจัดการสูงขึ้นและปลอดภัยมากขึ้น

1. Orchestration (vBond) - ตัวจัดการการเชื่อมต่อ

vBond ทำหน้าที่เป็น Orchestrator หรือผู้ประสานงานที่ช่วยให้การเชื่อมต่อระหว่างอุปกรณ์ใน SD-WAN เป็นไปได้อย่างราบรื่น เมื่ออุปกรณ์ใหม่เข้าสู่เครือข่าย vBond จะทำหน้าที่ตรวจสอบความถูกต้องของอุปกรณ์ก่อนและให้ข้อมูลเกี่ยวกับวิธีการเชื่อมต่อไปยัง Control Plane และ Management Plane

2. Management (vManage) - ศูนย์กลางการบริหารจัดการ

vManage เป็นศูนย์ควบคุมที่ใช้สำหรับ กำหนดค่า ควบคุม ตรวจสอบ และวิเคราะห์เครือข่าย ผ่านอินเทอร์เฟซแบบกราฟิก (GUI) ซึ่งช่วยให้ผู้ดูแลระบบสามารถจัดการอุปกรณ์ SD-WAN ได้จากส่วนกลาง สามารถใช้งานแบบ Multi-tenant หรือ Dedicated ได้ตามขนาดขององค์กรและความต้องการในการใช้งาน

3. Control Plane (vSmart) - ระบบควบคุมเครือข่าย

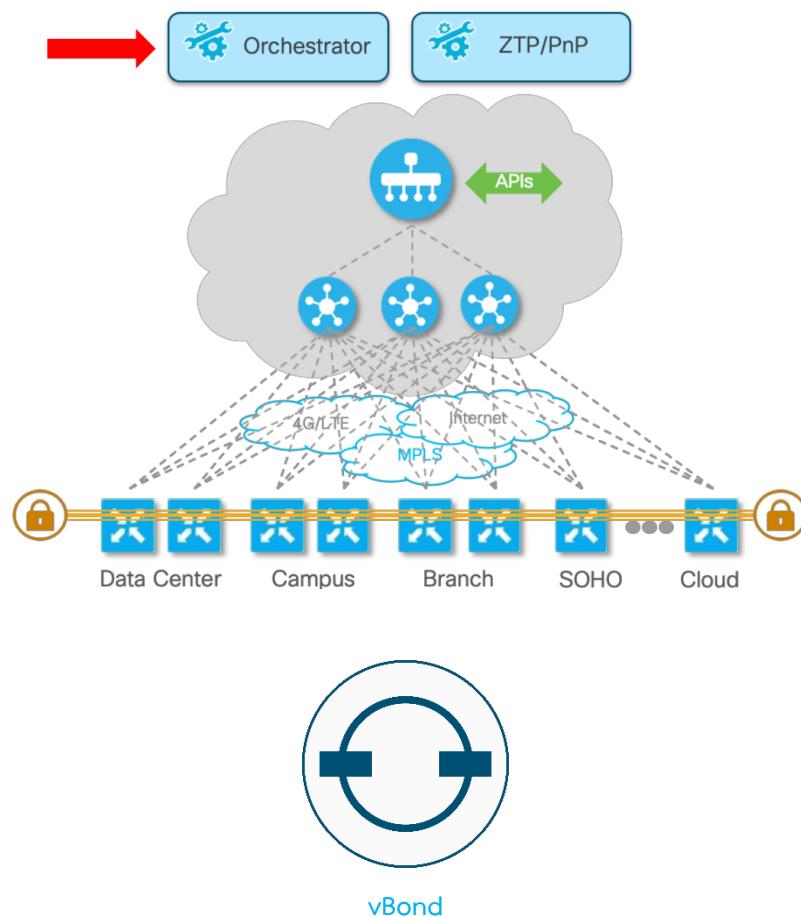
vSmart เป็น Control Plane ที่มีบทบาทสำคัญในการควบคุมนโยบายการส่งข้อมูลของ SD-WAN รวมถึง การกำหนดเส้นทาง, การบังคับใช้นโยบายความปลอดภัย และการเข้ารหัสข้อมูล โดยอุปกรณ์ vSmart ทำงานแบบกระจายตัวเพื่อเพิ่มความสามารถของเครือข่ายและลดจุดบกพร่องของระบบ

4. Data Plane (Edge) - อุปกรณ์สำหรับรับส่งข้อมูล

อุปกรณ์ในส่วนของ Data Plane คืออุปกรณ์ที่ทำหน้าที่รับส่งข้อมูลระหว่างไซต์ต่าง ๆ เช่น vEdge, Cisco ISR/ASR/ENCS หรืออุปกรณ์ Whitebox ซึ่งสามารถเชื่อมต่อผ่าน MPLS, Internet หรือ 4G/LTE และมีความสามารถในการเข้ารหัสข้อมูลเพื่อความปลอดภัยของเครือข่าย

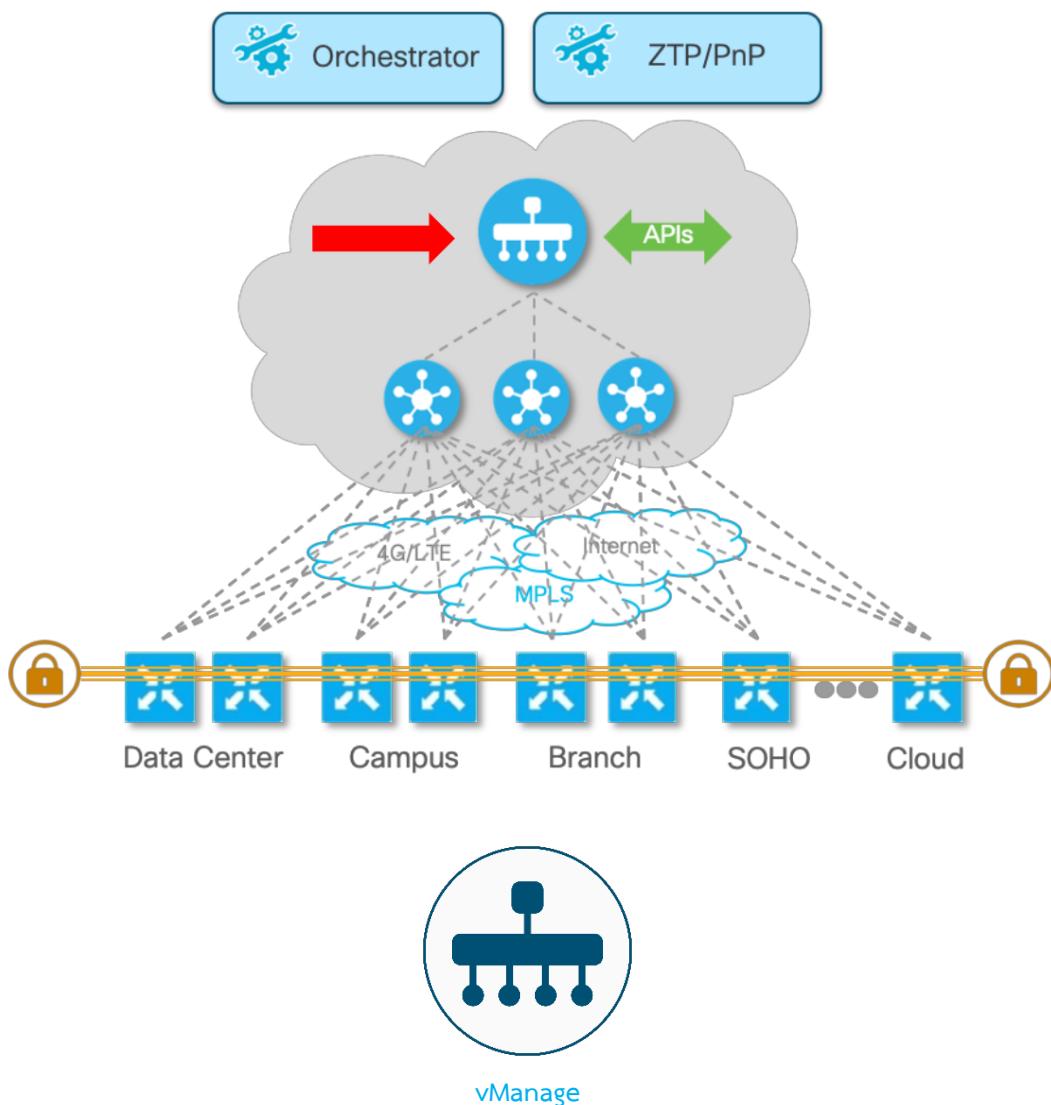
vAnalytics - การวิเคราะห์ข้อมูลเชิงลึก

Cisco SD-WAN ยังมีระบบ vAnalytics ที่ช่วยให้ผู้ดูแลระบบสามารถวิเคราะห์ข้อมูลเชิงลึกเกี่ยวกับ การใช้เครือข่าย, ประสิทธิภาพของแอปพลิเคชัน และการคาดการณ์ปัญหาต่าง ๆ เพื่อให้สามารถปรับปรุงเครือข่ายให้มีประสิทธิภาพมากขึ้น



vBond เป็นส่วนหนึ่งของ Cisco SD-WAN ที่ทำหน้าที่เป็น Orchestrator หรือผู้ประสานงานการเชื่อมต่อของอุปกรณ์ทั้งหมดในเครือข่าย SD-WAN โดยมีบทบาทหลักคือ ตรวจสอบตัวตนของอุปกรณ์ (authentication) และกำหนดวิธีการเชื่อมต่อระหว่างอุปกรณ์ SD-WAN กับ Control Plane และ Management Plane เพื่อให้เครือข่ายสามารถทำงานได้อย่างปลอดภัยและมีประสิทธิภาพ

Orchestration ใน SD-WAN หมายถึงกระบวนการ ควบคุมและบริหารจัดการการเชื่อมต่อของอุปกรณ์ในเครือข่ายแบบอัตโนมัติ เพื่อให้การตั้งค่าและการใช้งานเครือข่ายเป็นไปอย่างง่ายดาย ลดความซับซ้อน และเพิ่มความปลอดภัยของการสื่อสารระหว่างอุปกรณ์

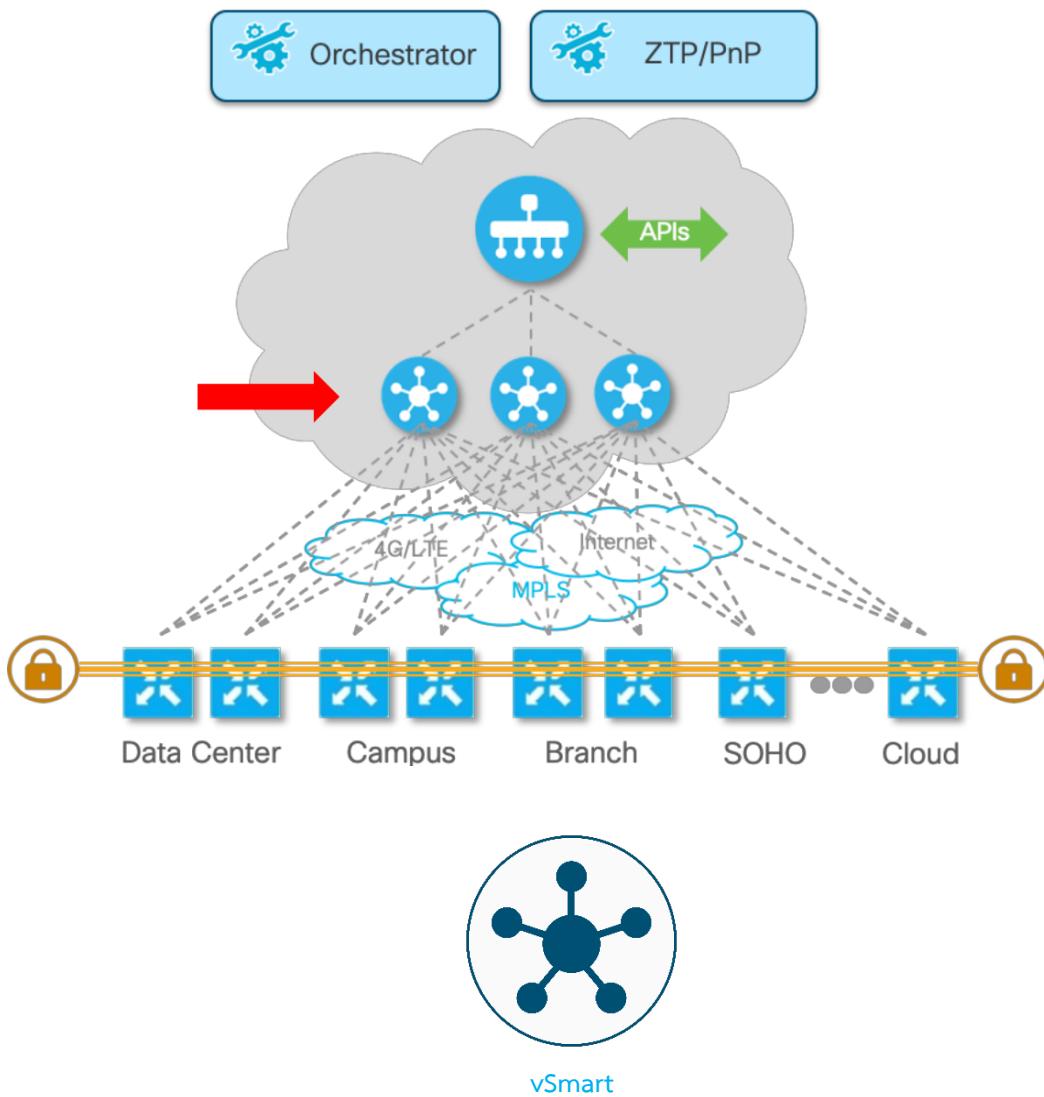


vManage เป็นระบบบริหารจัดการศูนย์กลาง (Centralized Management) ของ Cisco SD-WAN ที่ช่วยให้ผู้ดูแลระบบสามารถควบคุม, กำหนดค่า และตรวจสอบเครือข่าย ได้ผ่าน เว็บอินเทอร์เฟซ (GUI) โดยไม่ต้องใช้คำสั่ง CLI แบบเดิม

vManage ทำอะไรบ้าง?

- ตั้งค่าและกำหนดนโยบาย ให้กับอุปกรณ์ SD-WAN ทั้งหมดจากศูนย์กลาง
- monitor เครือข่าย ดูสถานะอุปกรณ์และเส้นทางการเชื่อมต่อ
- วิเคราะห์และตรวจสอบปัญหา โดยใช้ข้อมูลเชิงลึกจาก vAnalytics
- อัปเดตเฟิร์มแวร์และแพตช์ ให้กับอุปกรณ์ทั้งหมดโดยอัตโนมัติ

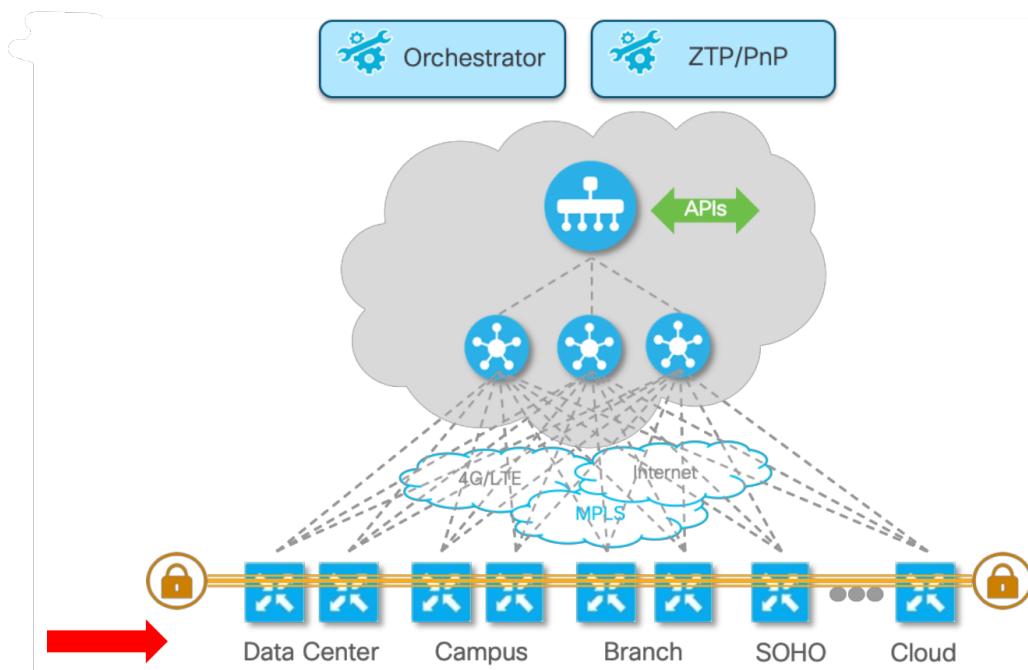
สรุปแล้ว vManage ช่วยให้การจัดการ SD-WAN ง่ายขึ้น ลดความยุ่งยากในการบริหารเครือข่าย และเพิ่มประสิทธิภาพให้กับองค์กร



vSmart เป็น Control Plane ของ Cisco SD-WAN ที่ทำหน้าที่ ควบคุมนโยบายเครือข่าย และ กำหนดเส้นทางการรับส่งข้อมูล ระหว่างอุปกรณ์ SD-WAN เพื่อให้การเชื่อมต่อเป็นไปอย่างปลอดภัยและมีประสิทธิภาพ

vSmart ทำอะไรบ้าง?

- กำหนดเส้นทางการรับส่งข้อมูล (Routing Control) เลือกเส้นทางที่ดีที่สุดให้กับทรัพฟิกเครือข่าย
- บังคับใช้นโยบายความปลอดภัย (Security Policy Enforcement) เช่น การเข้ารหัสข้อมูลและการกำหนดสิทธิ์การเข้าถึง
- จัดการการเชื่อมต่อระหว่างสาขา เพื่อให้มั่นใจว่าการสื่อสารระหว่างอุปกรณ์ WAN Edge เป็นไปตามนโยบายที่กำหนด สรุปแล้ว vSmart เป็นตัวกลางที่ช่วย ควบคุม, ปรับแต่งเส้นทาง และรักษาความปลอดภัยของข้อมูล ทำให้เครือข่าย SD-WAN ทำงานได้อย่างมีประสิทธิภาพสูงสุด



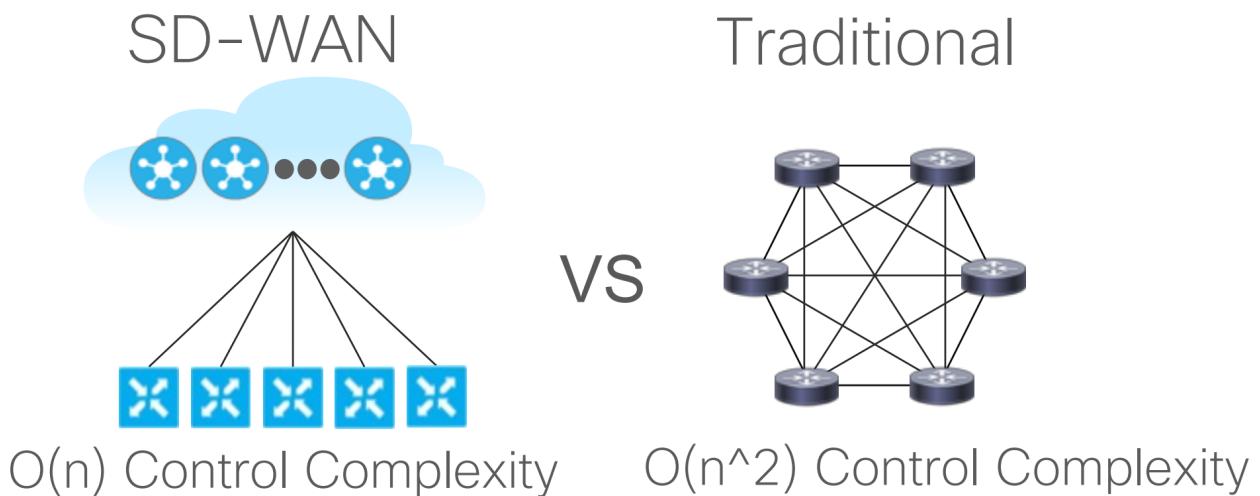
vEdge

vEdge เป็นอุปกรณ์ใน Data Plane ของ Cisco SD-WAN ที่ทำหน้าที่ รับ-ส่งข้อมูล ระหว่างไซต์ต่างๆ เช่น Data Center, Branch, SOHO และ Cloud โดยเชื่อมต่อผ่าน MPLS, Internet หรือ 4G/LTE

vEdge ทำอะไรบ้าง?

- ส่งต่อข้อมูล (Forwarding Traffic) ระหว่างอุปกรณ์ในเครือข่าย SD-WAN
- เข้ารหัสข้อมูล (Encryption) เพื่อความปลอดภัยของทรัพฟิก
- เลือกเส้นทางที่ดีที่สุด (Path Selection) ตามนโยบายที่กำหนดโดย vSmart
- รองรับการเชื่อมต่อหลายเส้นทาง (Multi-Transport Support) เช่น MPLS, Broadband, LTE

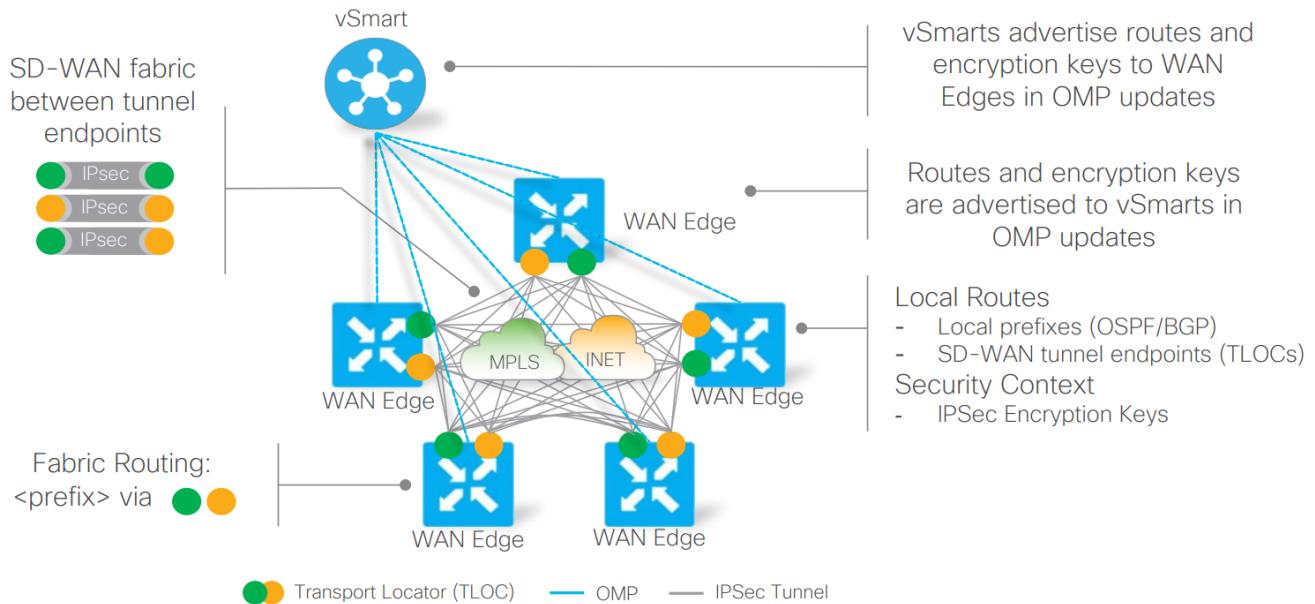
สรุปแล้ว vEdge คืออุปกรณ์ปลายทางที่ช่วยให้ การรับ-ส่งข้อมูลปลอดภัย, มีเสถียรภาพ และรองรับการเชื่อมต่อหลายรูปแบบ ตามแนวคิดของ SD-WAN



Unified Control Plane (แผนควบคุมแบบรวมศูนย์)

- โปรโตคอล Overlay Management Protocol (OMP) เป็นโปรโตคอลที่ใช้สำหรับจัดการการเชื่อมต่อใน SD-WAN
- ทำงานระหว่างเราเตอร์ WAN Edge และตัวควบคุม vSmart รวมถึงระหว่าง vSmart ด้วยกันเอง
- ใช้การเชื่อมต่อที่ปลอดภัย (TLS/DTLS) เพื่อรับรองความปลอดภัยของข้อมูล
- ลดความซับซ้อนของ Control Plane อย่างมาก และเพิ่มขีดความสามารถในการขยายเครือข่าย SD-WAN

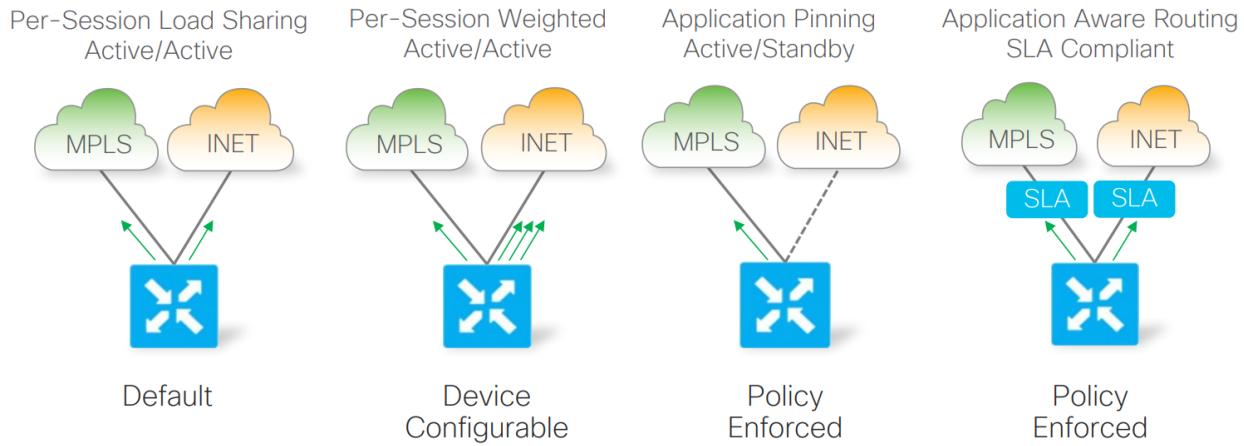
Data Plane Establishment



Data Plane ใน Cisco SD-WAN ក្នុងរាយការណ៍ដោយការប្រើប្រាស់ IPSec Tunnel រវាង WAN Edge ដែលត្រូវបានគ្រប់គ្រង ដើម្បីអាចគ្រប់គ្រងសេវាអំពីភាពនៃភាពព័ត៌មាន និងការបញ្ចប់ភាពព័ត៌មាន នៃភាពព័ត៌មាន ដែលបានផ្តល់ទៅ។

vSmart ធានាការណ៍សេវាអំពីភាពនៃភាពព័ត៌មាន និងការបញ្ចប់ភាពព័ត៌មាន ដែលបានផ្តល់ទៅ។ នៅពេល vSmart ធានាការណ៍សេវាអំពីភាពនៃភាពព័ត៌មាន និងការបញ្ចប់ភាពព័ត៌មាន ដែលបានផ្តល់ទៅ នឹងបានគ្រប់គ្រង ដើម្បីអាចគ្រប់គ្រងសេវាអំពីភាពនៃភាពព័ត៌មាន និងការបញ្ចប់ភាពព័ត៌មាន នៃភាពព័ត៌មាន ដែលបានផ្តល់ទៅ។

Common Data Plane Communication



ในการสื่อสารของ Data Plane ใน SD-WAN มีหลายรูปแบบที่ช่วยให้การส่งข้อมูลมีประสิทธิภาพและตรงตามความต้องการของเครือข่าย รูปแบบแรกคือ **Per-Session Load Sharing Active/Active** ซึ่งเป็นค่าเดิมอยู่แล้วที่อุปกรณ์จะกระจาย traffik ไปยัง MPLS และอินเทอร์เน็ตอย่างสมดุล รูปแบบที่สองคือ **Per-Session Weighted Active/Active** ซึ่งอุปกรณ์สามารถกำหนดสัดส่วนของ traffik ที่ส่งไปยังแต่ละเส้นทางได้

ในรูปแบบ **Application Pinning Active/Standby** นั้น ระบบจะใช้เส้นทางหลักสำหรับแอปพลิเคชัน และหากมีปัญหา ก็จะเปลี่ยนไปใช้เส้นทางสำรองโดยอัตโนมัติ และสุดท้ายคือ **Application Aware Routing SLA Compliant** ซึ่งเป็นรูปแบบที่มีการกำหนดนโยบายเพื่อเลือกเส้นทางที่ตรงตาม SLA โดยพิจารณาค่าต่าง ๆ เช่น latency, jitter และ packet loss เพื่อให้แน่ใจว่าแต่ละแอปพลิเคชันได้รับเส้นทางที่เหมาะสมที่สุด

Installation Guide



1. តិចតាំងកម្មវិធី VMware Workstation
2. EVE NG Emulator នៃ VMware Workstation ដាក់ឡើងតាមអាជីវកម្ម
 - <https://customers.eve-ng.net/eve-ce-prod-6.2.0-4-full.iso>
3. វិធីការតិចតាំង EVE NG ទ្រាសែបតាមអាជីវកម្ម
 - a. តិចតាំង Windows Client Side (for telnet, vnc, wireshark, rdp applications)
[Windows integration pack](https://www.eve-ng.net/index.php/documentation/community-cookbook/)
4. ដាក់ឡើង Images ព័ត៌មាន Cisco SD-WAN តាមអាជីវកម្ម
 - <https://networkrare.com/free-download-cisco-viptela-images-vmanage-vsmart-vbond-vedge-cedge-for-eve-ng/>

Download the Cisco Viptela SDWAN images for EVE-NG From below given links:

Please use the username and password as **admin/admin** for login the devices.

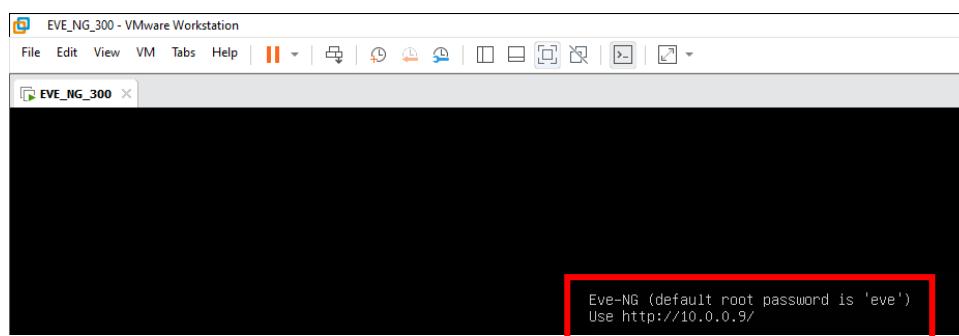
| Sr. | Image Name | Version | File Type | Download |
|-----|-----------------|----------------------|-----------|--------------------------|
| 1 | CSR 1000v | IOS-XE CSR 1000v | QCOW2 | Download |
| 2 | Viptela vBond | Viptela 16.2.11 | QCOW2 | Download |
| 3 | Viptela vEdge | Viptela 18.4.4 | QCOW2 | Download |
| 4 | Viptela vSmart | Viptela 16.2.11 | QCOW2 | Download |
| 5 | Viptela vManage | Viptela 16.2.11 | QCOW2 | Download |
| 6 | Viptela vBond | Cisco Viptela 19.2.0 | QCOW2 | Download |
| 7 | Viptela vEdge | Cisco Viptela 19.2.0 | QCOW2 | Download |
| 8 | Viptela vSmart | Cisco Viptela 19.2.0 | QCOW2 | Download |
| 9 | Viptela vManage | Cisco Viptela 19.2.0 | QCOW2 | Download |

5. ดาวน์โหลดและติดตั้งโปรแกรม WinSCP สำหรับการนำ Images เข้าสู่ EVE-NG

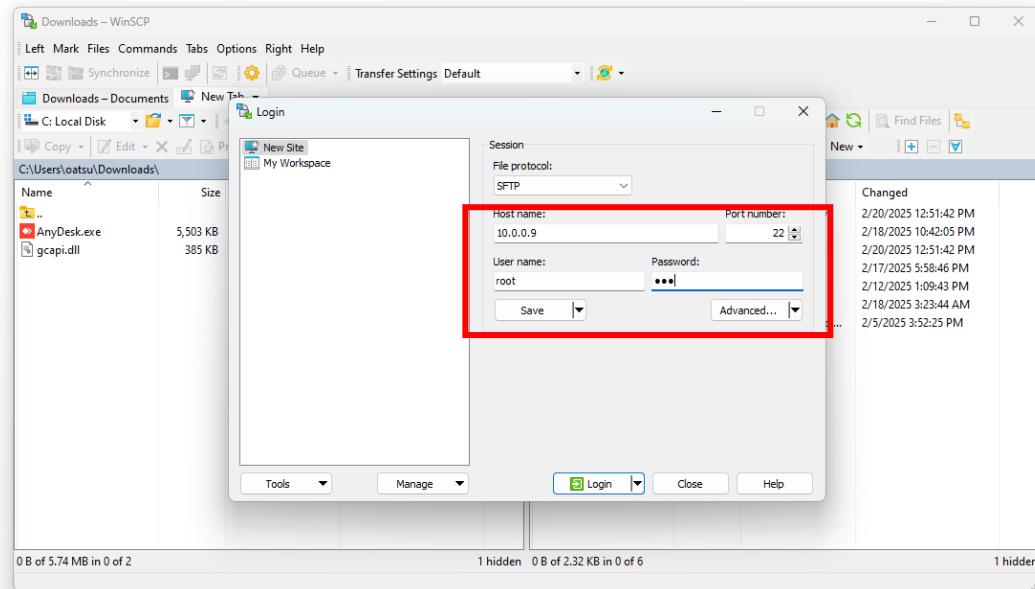
<https://winscp.net/eng/downloads.php>

6. เปิดโปรแกรม WinSCP

- a. กรอก IP ของ EVE NG (สามารถตรวจสอบได้ที่โปรแกรม VMware ที่รัน EVE NG)

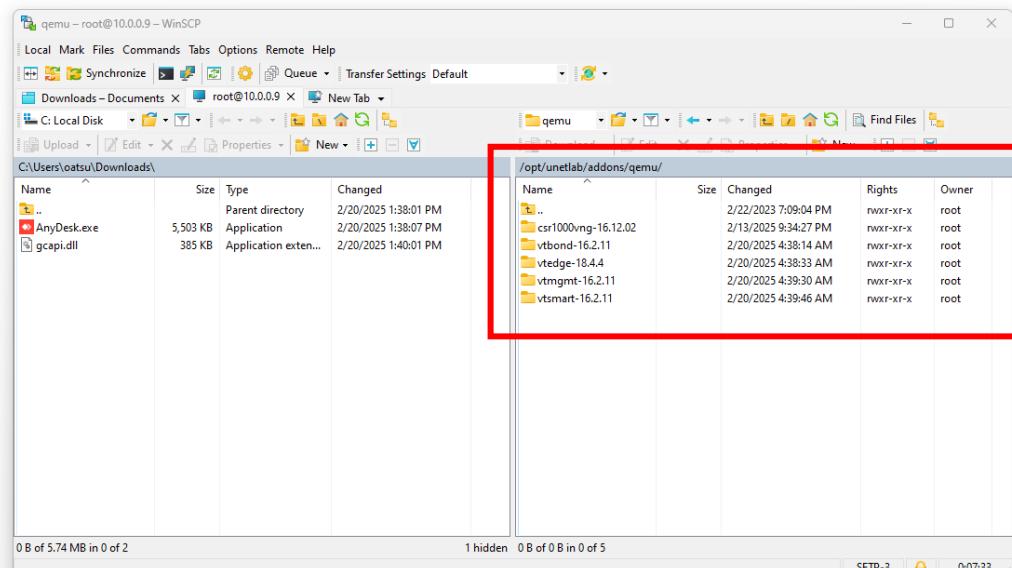


- b. กรอก username , password โดยปกติแล้วจะเป็น root : eve

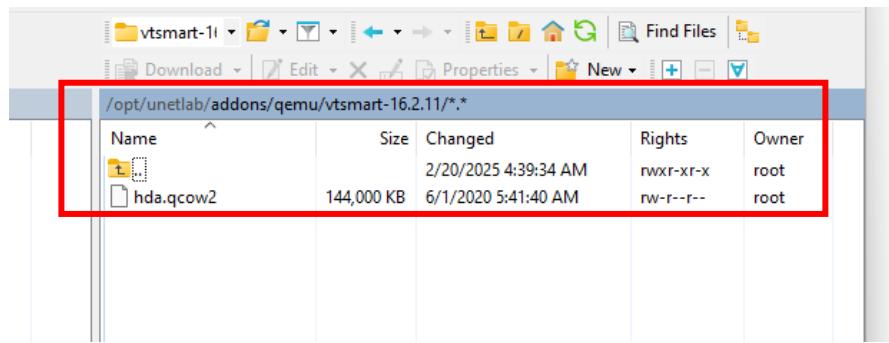


c. นำไฟล์ Images SD-Wan ที่ดาวน์โหลดมาไว้ที่ Path Forder ด้านล่างของ EVE NG

```
/opt/unetlab addons/qemu
```



d. ตรวจสอบชื่อไฟล์เดอร์ของแต่ละ Image ให้ดีและตรวจสอบชื่อของ Image จะต้องเป็น hda.qcow2



e. ໃຊ້កຳສັ່ງດ້ານລ່າງທີ່ EVE NG

```
/opt/unetlab/wrappers/unl_wrapper -a fixpermissions
```

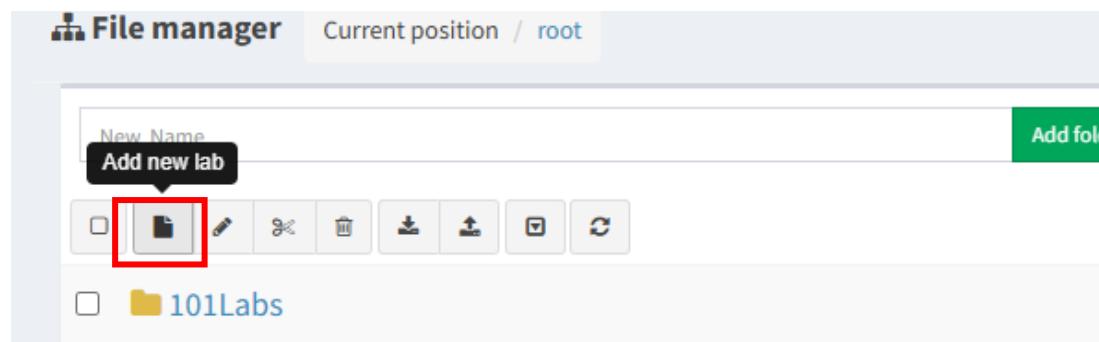
7. ທົດສອບການທຳມານຂອງ Images ໂດຍເຂົ້າສູ່ Web GUI ຂອງ EVE-NG ຜ່ານເວັບແບຣາວ໌ເຊື່ອ

a. ເຂົ້າສູ່ເວັບແອປພິເຄີ້ນ

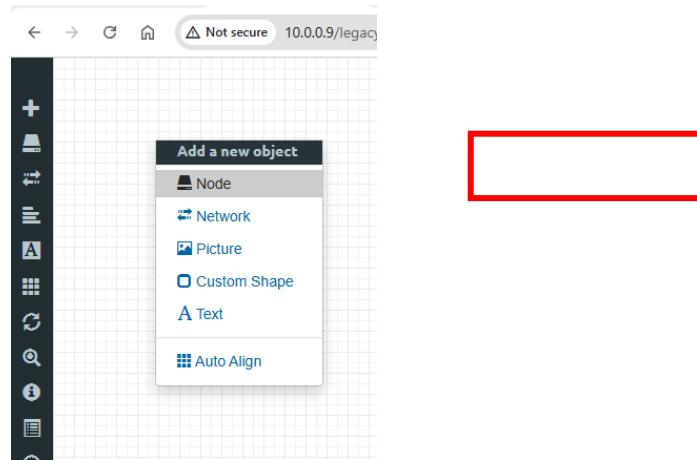
The screenshot shows a web browser window with the title "EVE | Main menu". The address bar displays "Not secure 10.0.0.9/#/main". The main content area is a "File manager" with the current position set to "/ root". The interface includes a toolbar with icons for creating new files/folders, deleting, and navigating. A list of files and folders is shown:

- 101Labs
- BGP-WORKBOOK
- __MACOSX
- 16_1_4_Lab_Implement_GRE_over_IPsec.unl (modified 19 Feb 2025 14:49)
- 16_1_5_Lab_Implement_IPsec_VTI_Site-to-Site_VPNs.unl (modified 19 Feb 2025 14:50)
- GRE.unl (modified 19 Feb 2025 09:41)

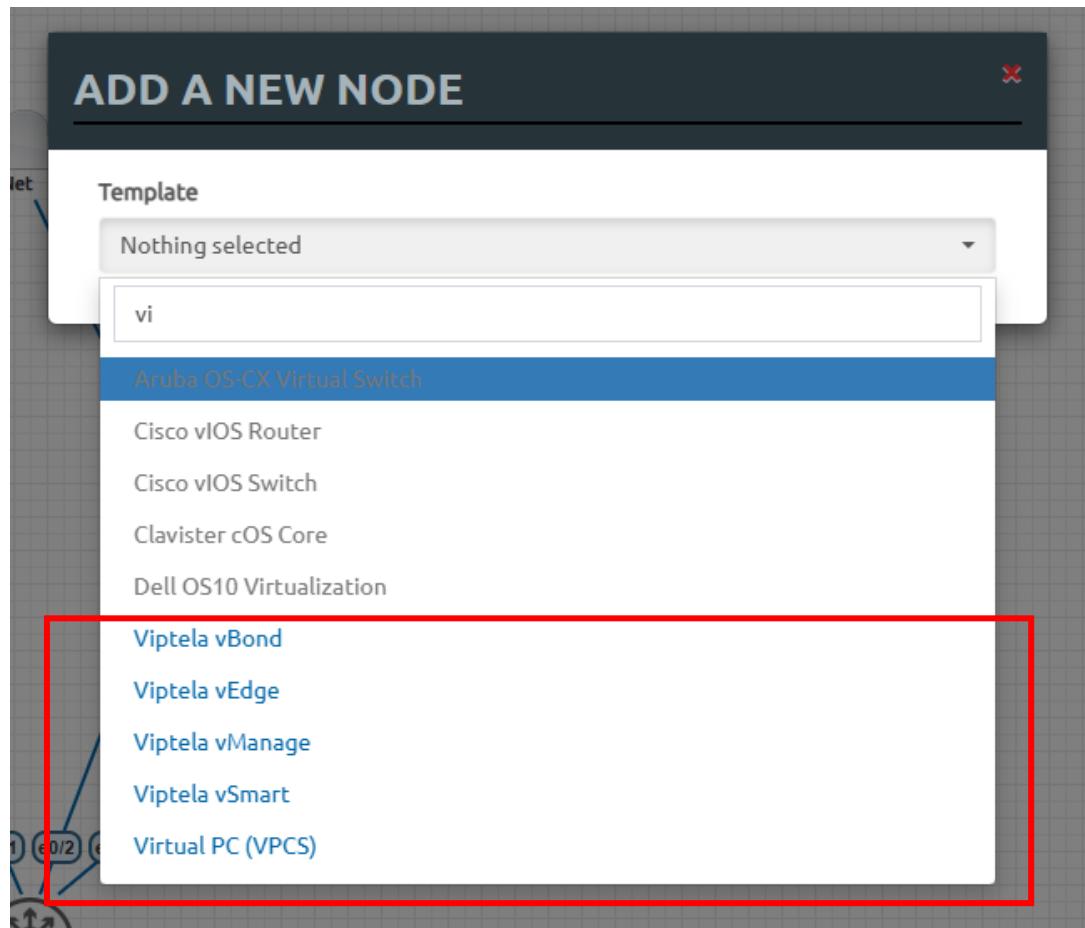
b. ສ້າງແລັບໃໝ່ແລະຕັ້ງចື່ອ



c. ทดลองเพิ่ม Node ต่างๆ



d. เพิ่ม vBound, vManage, vEdge, vSmart หรือค้นด้วยคำว่า Viptela



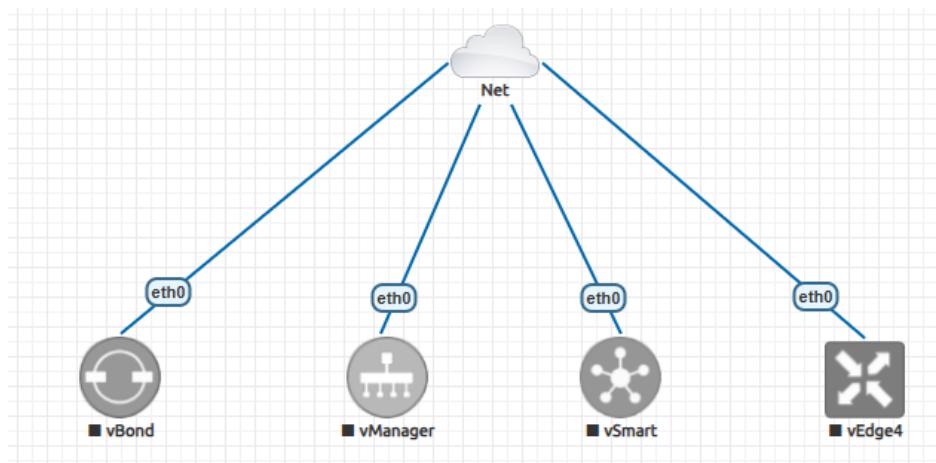
e. ផើម Network Type Management(Cloud0)

The screenshot shows the 'ADD A NEW NETWORK' dialog box with the following fields:

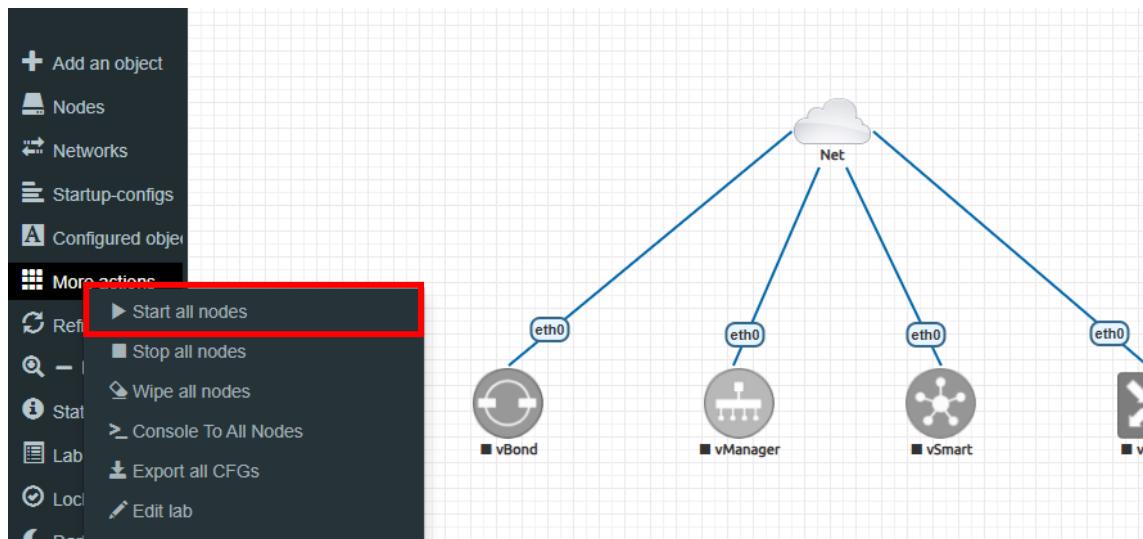
- Number of networks to add: 1
- Name/Prefix: Net
- Type: Management(Cloud0) (selected)
- Left: bridge
- Top: Management(Cloud0) (selected)
- Cloud1
- Cloud2
- Cloud3
- Cloud4
- Cloud5
- Cloud6
- Cloud7
- Cloud8
- Cloud9

To the right of the dialog box, there is a network diagram consisting of a cloud icon labeled 'Net' and a bridge node.

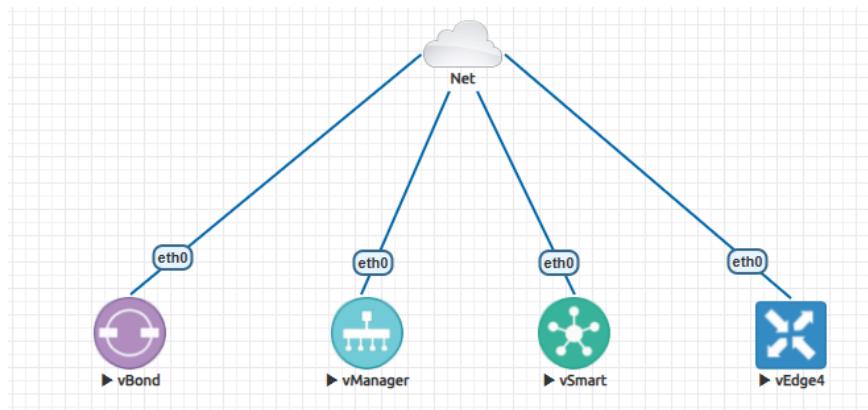
f. ខ្លឹមពេល Topology ដោយចាត់បន្ទាប់ពេលរករាយ



8. ចាកចែងលើក More actions -> Start all nodes

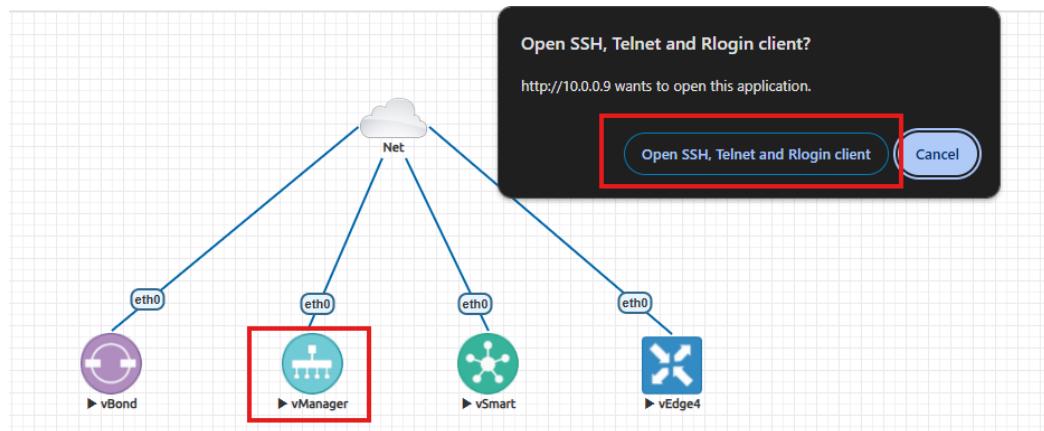


9. ផ្តាសកការណ៍នៃការងារដែលត្រូវបានធ្វើឡើង



10. ទទួលរាយការណ៍ vManage

- a. គោរពទៅ Node vManage

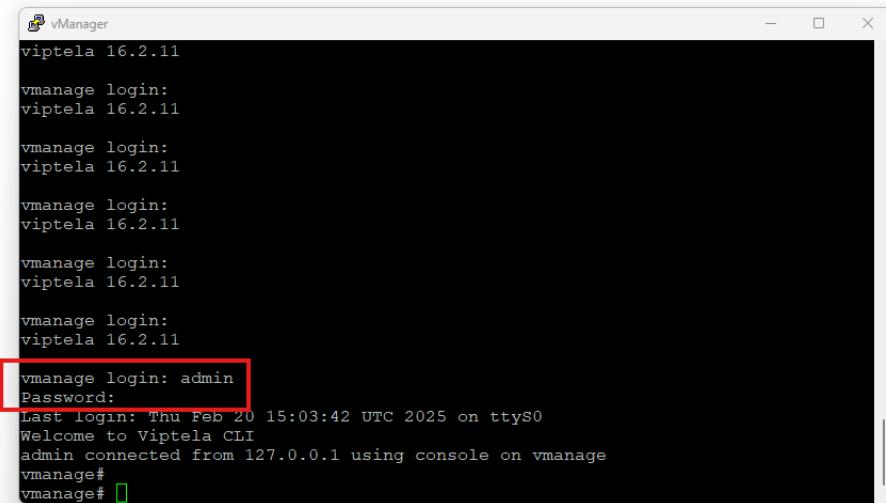


- b. ធ្វើ login ដោយ **admin/admin** ចាប់ផ្តើមការណ៍នៃការចិត្តការណ៍ setup តាមរൂបរាងខាងលាភ

```
vManage login:  
viptela 16.2.11  
  
vmanage login: admin  
Password:  
Welcome to Viptela CLI  
admin connected from 127.0.0.1 using console on vmanage  
Available storage devices:  
hdb 100GB  
hdc 3GB  
1) hdb  
2) hdc  
Select storage device to use: 1  
Would you like to format hdb? (y/n): y  
kernel.hung_task_panic = 0  
mke2fs 1.42.9 (28-Dec-2013)  
/dev/hdb is entire device, not just one partition!  
Proceed anyway? (y,n) y  
Filesystem label=  
OS type: Linux  
Block size=4096 (log=2)  
Fragment size=4096 (log=2)  
Stride=0 blocks, Stripe width=0 blocks  
6553600 inodes, 26214400 blocks
```

របៀបចាប់ផ្តើមការ Format Disk និងការចិត្តការណ៍សេវា និងការចិត្តការណ៍ផែនការ

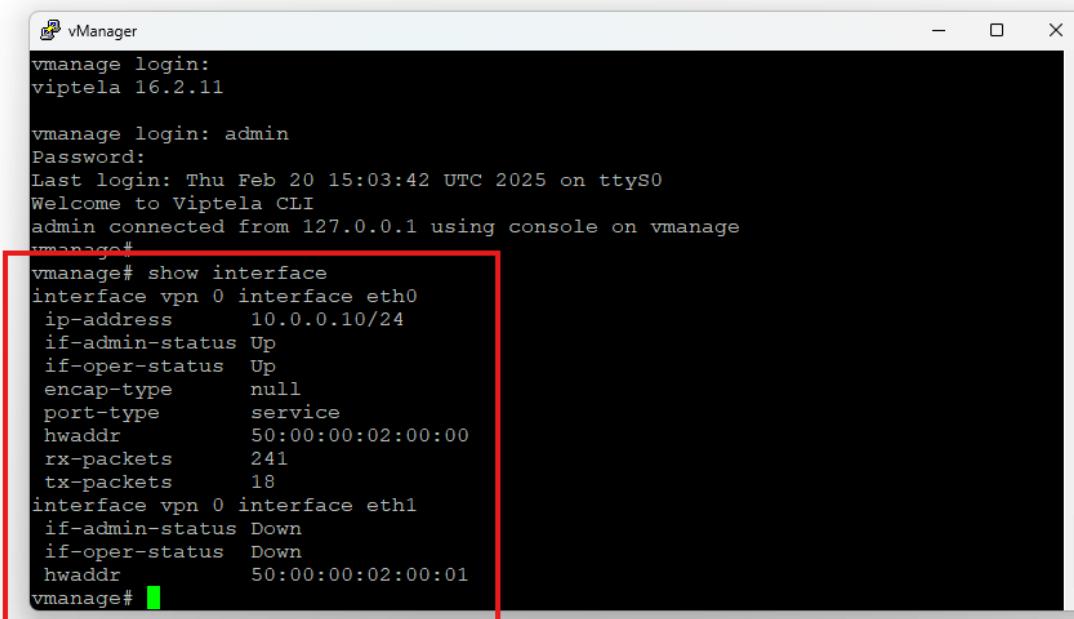
- c. អនុវត្តការណ៍សេវាដែលធ្វើឡើ ធ្វើ login ដោយ user ទីកន្លែងនៃឯ៉េ 10.b



```
viptela 16.2.11
vmanage login:
viptela 16.2.11
vmanage login: admin
Password:
Last login: Thu Feb 20 15:03:42 UTC 2025 on ttys0
Welcome to Viptela CLI
admin connected from 127.0.0.1 using console on vmanage
vmanage#
vmanage#
```

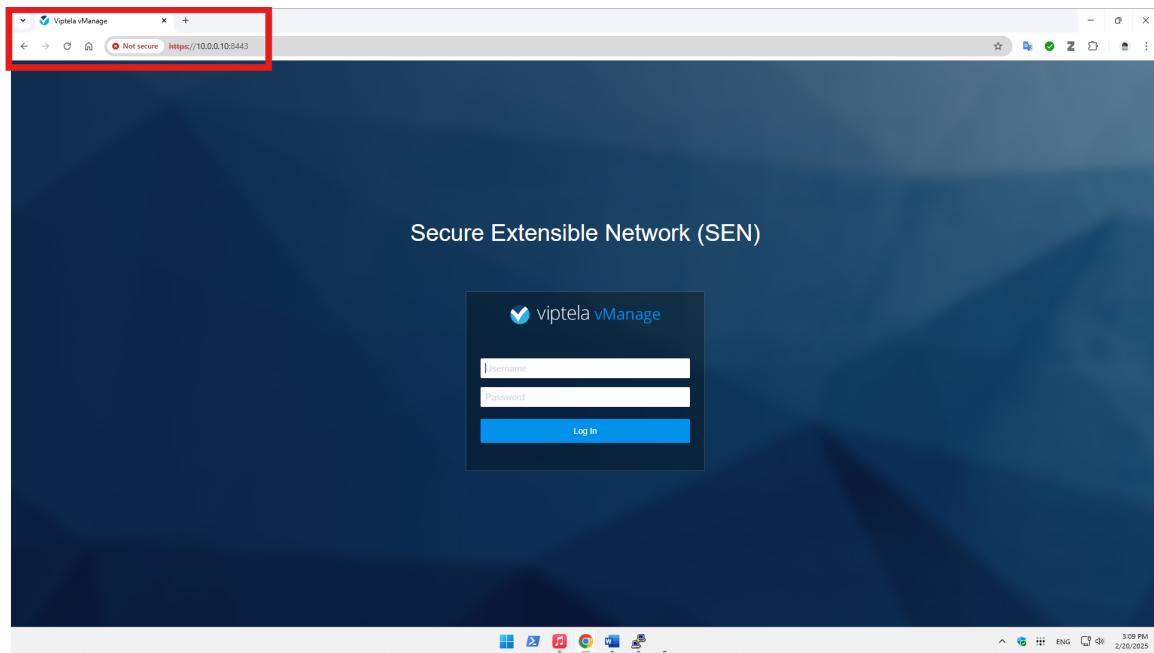
11. ตรวจสอบ IP Address ที่ vManage ได้รับผ่าน Interface eth0

show interface



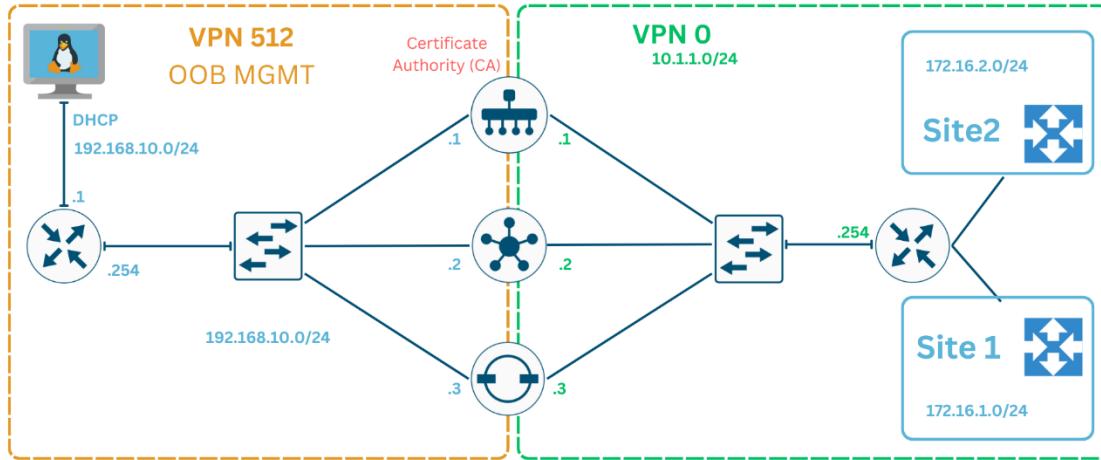
```
viptela 16.2.11
vmanage login: admin
Password:
Last login: Thu Feb 20 15:03:42 UTC 2025 on ttys0
Welcome to Viptela CLI
admin connected from 127.0.0.1 using console on vmanage
vmanage#
vmanage# show interface
interface vpn 0 interface eth0
  ip-address      10.0.0.10/24
  if-admin-status Up
  if-oper-status  Up
  encaps-type    null
  port-type       service
  hwaddr         50:00:00:02:00:00
  rx-packets     241
  tx-packets     18
interface vpn 0 interface eth1
  if-admin-status Down
  if-oper-status  Down
  hwaddr         50:00:00:02:00:01
vmanage#
```

12. ทดสอบ Access vManage ผ่านเว็บเบราว์เซอร์ด้วย IP Address (IP Address eth0's vManage)



13. Login ដោយ **admin/admin** តើអៅបៀនការទទស់សេវាឈីន

SD-WAN: Basic initial Lab

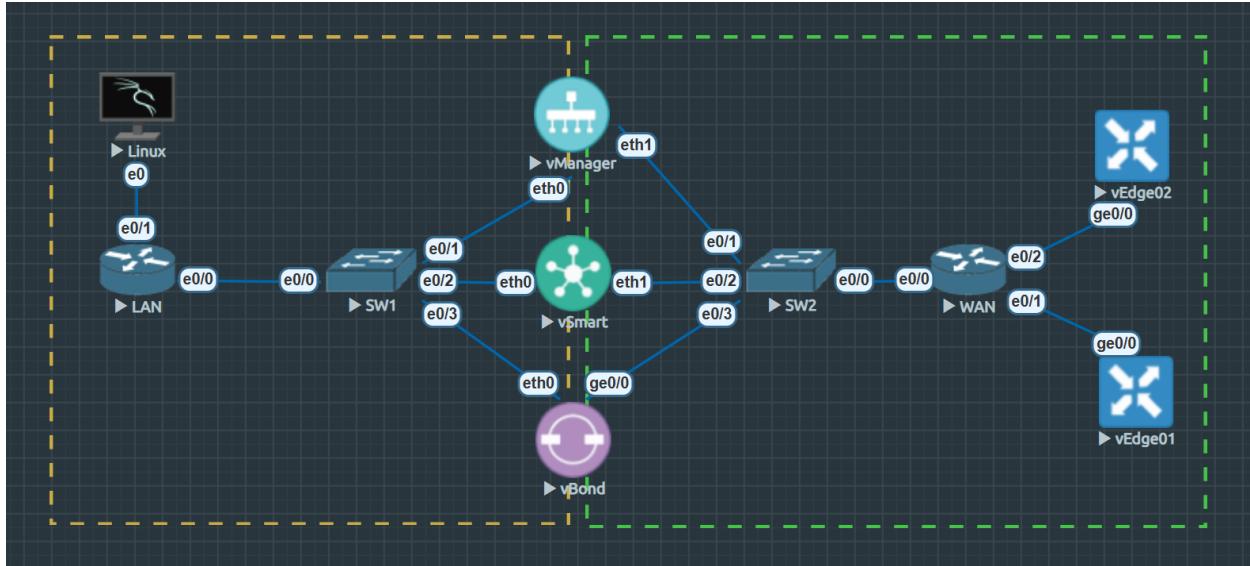


Note: រាយការ Image ទាំងនេះ

| ឧបករណ៍ | Image |
|------------------|--|
| Kali Linux | linux-kali-2023 |
| L3 & L2 Switch | i86bi_linux_l2-adventerprisek9-ms.SSA.high_iron_20190423 |
| Router | i86bi_LinuxL3-AdvEnterpriseK9-M2_157_3_May_2018 |
| vManage (vtmgmt) | vtmgmt-16.2.11 |
| vSmart (vtsmart) | vtsmart-16.2.11 |
| vBond (vtbond) | vtbond-16.2.11 |
| vEdge (vtedge) | vtedge-18.4.4 |

ຈាក topology នៃរាយការ មានការបង់ចុះដោយបានបង្ហាញពី 2 VPN:

- VPN 512 (OOB MGMT) ដើម្បីត្រួតព័ត៌មានអំពីការកំណត់របៀបបង្ហាញ (Out-of-Band Management)
- VPN 0 ដើម្បីត្រួតព័ត៌មានអំពីការបង្ហាញពី 2 Site (Site1 និង Site2)

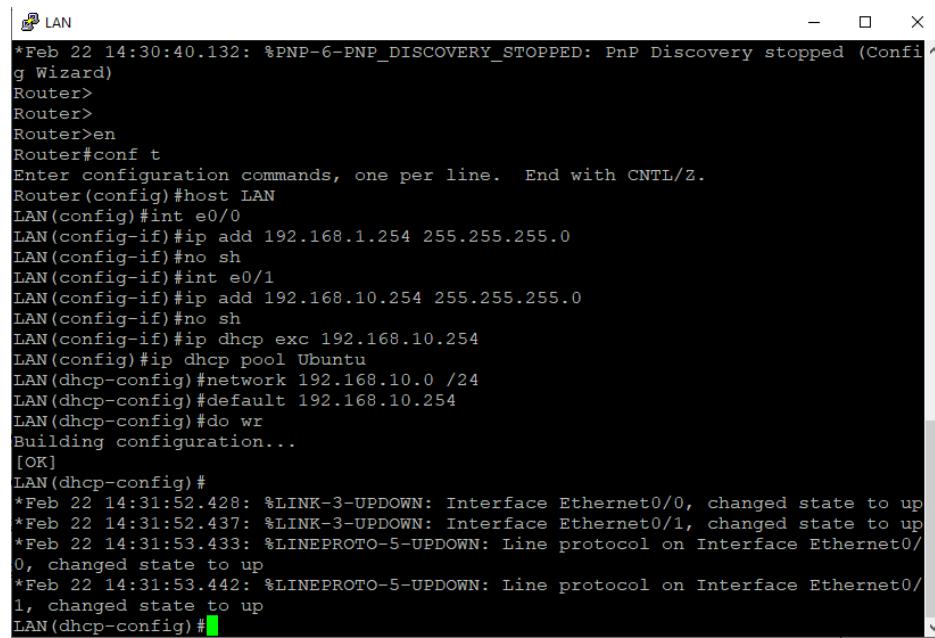


1. สร้างตาม Topology ควรกำหนด port การเชื่อมต่อต่างๆให้ตรงตามรูปด้วยอย่าง
2. Configure LAN and WAN routers
 - a. **LAN :** นำ config ด้านล่างนี้ไปวางที่ Router LAN

```

en
conf t
host LAN
int e0/0
ip add 192.168.1.254 255.255.255.0
no sh
int e0/1
ip add 192.168.10.254 255.255.255.0
no sh
ip dhcp exc 192.168.10.254
ip dhcp pool Ubuntu
network 192.168.10.0 /24
default 192.168.10.254
do wr

```



```

LAN
*Feb 22 14:30:40.132: %PNP-6-PNP_DISCOVERY_STOPPED: PnP Discovery stopped (Config Wizard)
Router>
Router>
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#host LAN
LAN(config)#int e0/0
LAN(config-if)#ip add 192.168.1.254 255.255.255.0
LAN(config-if)#no sh
LAN(config-if)#int e0/1
LAN(config-if)#ip add 192.168.10.254 255.255.255.0
LAN(config-if)#no sh
LAN(config-if)#ip dhcp exc 192.168.10.254
LAN(config)#ip dhcp pool Ubuntu
LAN(dhcp-config)#network 192.168.10.0 /24
LAN(dhcp-config)#default 192.168.10.254
LAN(dhcp-config)#do wr
Building configuration...
[OK]
LAN(dhcp-config)#
*Feb 22 14:31:52.428: %LINK-3-UPDOWN: Interface Ethernet0/0, changed state to up
*Feb 22 14:31:52.437: %LINK-3-UPDOWN: Interface Ethernet0/1, changed state to up
*Feb 22 14:31:53.433: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0, changed state to up
*Feb 22 14:31:53.442: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state to up
LAN(dhcp-config)#

```

b. **WAN :** នាំ config តាមតម្លៃនេះថ្មីរបស់ Router WAN

```

en
conf t
host WAN
int e0/0
no sh
ip add 10.1.1.254 255.255.255.0
int e0/1
ip add 172.16.1.254 255.255.255.0
no sh
int e0/2
ip add 172.16.2.254 255.255.255.0
no sh
do wr

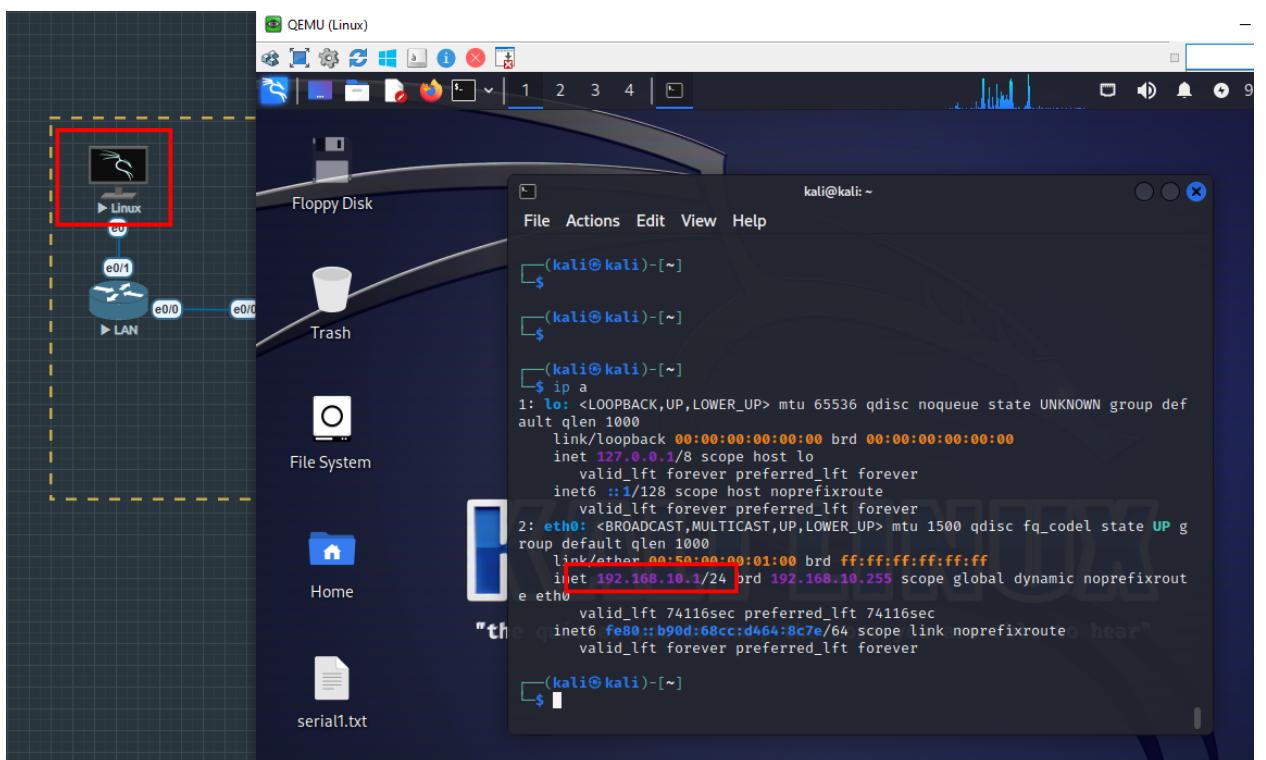
```

```

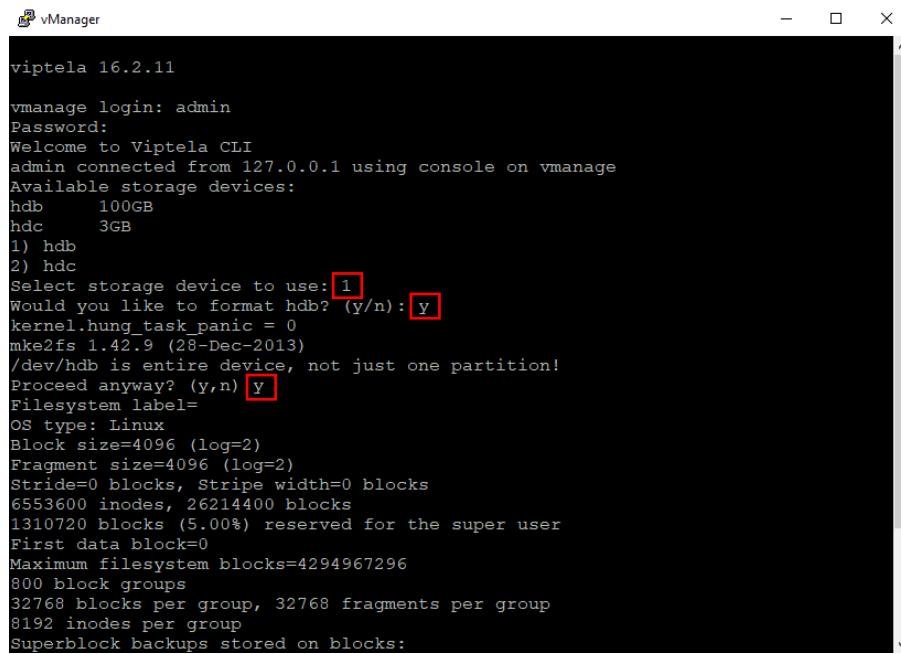
Router>
Router>
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#host WAN
WAN(config)#int e0/0
WAN(config-if)#no sh
WAN(config-if)#ip add 10.1.1.254 255.255.255.0
WAN(config-if)#int e0/1
WAN(config-if)#ip add 172.16.1.254 255.255.255.0
WAN(config-if)#no sh
WAN(config-if)#int e0/2
WAN(config-if)#ip add 172.16.2.254 255.255.255.0
WAN(config-if)#no sh
WAN(config-if)#do wr
Building configuration...
[OK]
WAN(config-if)#
*Feb 22 14:35:44.024: %LINK-3-UPDOWN: Interface Ethernet0/0, changed state to up
*Feb 22 14:35:44.042: %LINK-3-UPDOWN: Interface Ethernet0/1, changed state to up
*Feb 22 14:35:44.042: %LINK-3-UPDOWN: Interface Ethernet0/2, changed state to up
*Feb 22 14:35:44.528: %PnP-6-PNP_DISCOVERY_STOPPED: PnP Discovery stopped (Start
up Config Present)
WAN(config-if)#
*Feb 22 14:35:45.028: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
0, changed state to up
*Feb 22 14:35:45.050: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
1, changed state to up
*Feb 22 14:35:45.050: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/
2, changed state to up
WAN(config-if)#

```

c. ทดสอบว่า Linux ได้รับ IP หรือไม่



3. vManage : ពិនិត្យបៀវង់ពីនៅក្នុងទូទាត់ ដើម្បីផ្លូវ Disk 1 ចាកចារនកណា y/y (default password admin:admin)



```

vManage login: admin
Password:
Welcome to Viptela CLI
admin connected from 127.0.0.1 using console on vmanage
Available storage devices:
hdb    100GB
hdc    3GB
1) hdb
2) hdc
Select storage device to use: 1
Would you like to format hdb? (y/n): y
kernel.hung_task_panic = 0
mke2fs 1.42.9 (28-Dec-2013)
/dev/hdb is entire device, not just one partition!
Proceed anyway? (y,n) y
Filesystem label=
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
Stride=0 blocks, Stripe width=0 blocks
6553600 inodes, 26214400 blocks
1310720 blocks (5.00%) reserved for the super user
First data block=0
Maximum filesystem blocks=4294967296
800 block groups
32768 blocks per group, 32768 fragments per group
8192 inodes per group
Superblock backups stored on blocks:

```

ចាកចារនកណា ការសំរែងថ្មីរវាងវិក្សបិន vManage

```

conf t

vpn 512

interface eth0
ip address 192.168.1.1/24
no shutdown
!

ip route 0.0.0.0/0 192.168.1.254

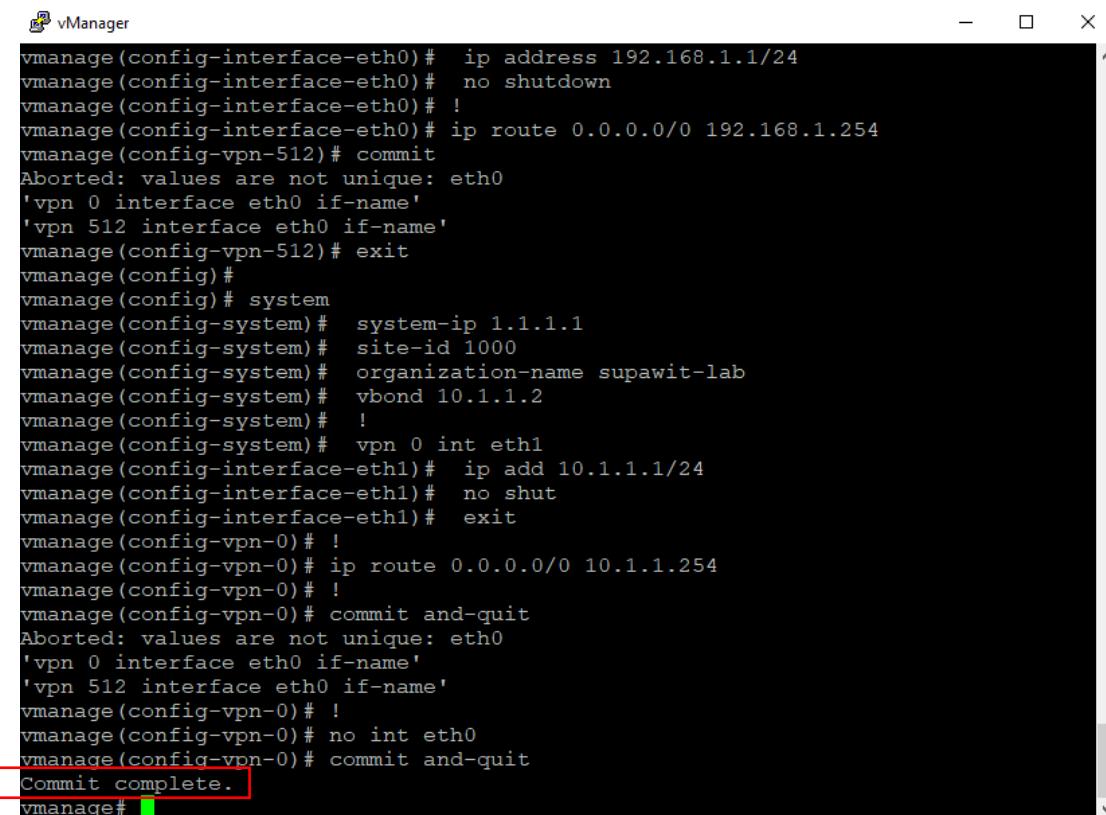
commit

exit

system
system-ip 1.1.1.1
site-id 1000
organization-name supawit-lab

```

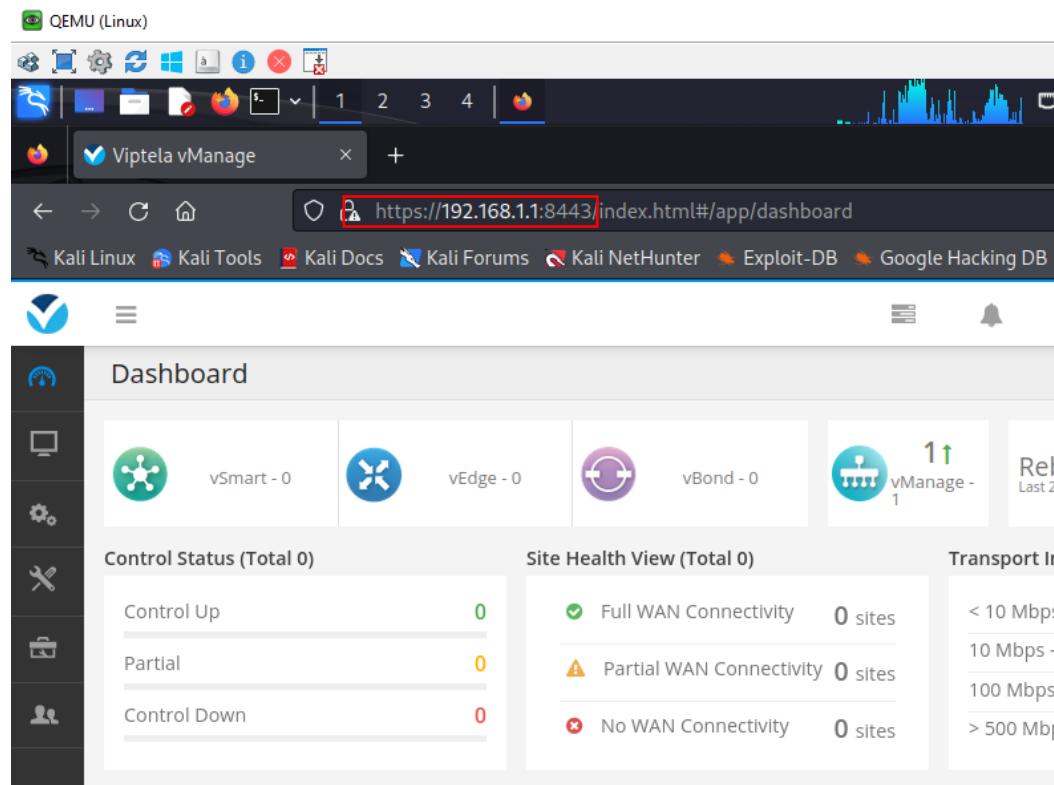
```
vbond 10.1.1.2
!
vpn 0 int eth1
ip add 10.1.1.1/24
no shut
exit
!
ip route 0.0.0.0/0 10.1.1.254
!
commit and-quit
!
no int eth0
commit and-quit
```



The screenshot shows a terminal window titled 'vManager' with the following configuration commands:

```
vmanage(config-interface-eth0)# ip address 192.168.1.1/24
vmanage(config-interface-eth0)# no shutdown
vmanage(config-interface-eth0)# !
vmanage(config-interface-eth0)# ip route 0.0.0.0/0 192.168.1.254
vmanage(config-vpn-512)# commit
Aborted: values are not unique: eth0
'vpn 0 interface eth0 if-name'
'vpn 512 interface eth0 if-name'
vmanage(config-vpn-512)# exit
vmanage(config)#
vmanage(config)# system
vmanage(config-system)# system-ip 1.1.1.1
vmanage(config-system)# site-id 1000
vmanage(config-system)# organization-name supawit-lab
vmanage(config-system)# vbond 10.1.1.2
vmanage(config-system)# !
vmanage(config-system)# vpn 0 int eth1
vmanage(config-interface-eth1)# ip add 10.1.1.1/24
vmanage(config-interface-eth1)# no shut
vmanage(config-interface-eth1)# exit
vmanage(config-vpn-0)# !
vmanage(config-vpn-0)# ip route 0.0.0.0/0 10.1.1.254
vmanage(config-vpn-0)# !
vmanage(config-vpn-0)# commit and-quit
Aborted: values are not unique: eth0
'vpn 0 interface eth0 if-name'
'vpn 512 interface eth0 if-name'
vmanage(config-vpn-0)# !
vmanage(config-vpn-0)# no int eth0
vmanage(config-vpn-0)# commit and-quit
Commit complete.
vmanage#
```

ทดสอบ Access ម៉ោង vManage GUI โดยໃຫ្ញរក IP Address ទៅលើ vManage តាមគេលីវ port 8443
 (Default password admin:admin)



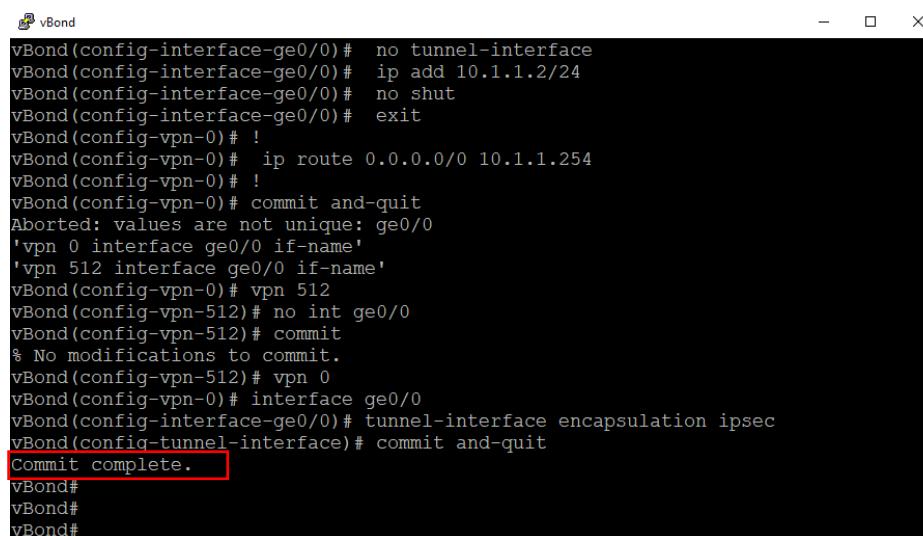
4. **vBond** : នាំ config ໄປវារៀងទៅ vBond (Default password admin:admin)

```
conf t

system
host-name vBond
system-ip 1.1.1.2
site-id 1000
organization-name supawit-lab
vbond 10.1.1.2 local vbond-only
!
vpn 512 int eth0
ip add 192.168.1.2/24
no shut
```

```
exit
!
ip route 0.0.0.0/0 192.168.1.254

interface ge0/0
vpn 0 int ge0/0
no tunnel-interface
ip add 10.1.1.2/24
no shut
exit
!
ip route 0.0.0.0/0 10.1.1.254
!
commit and-quit
vpn 512
no int ge0/0
commit and-quit
```



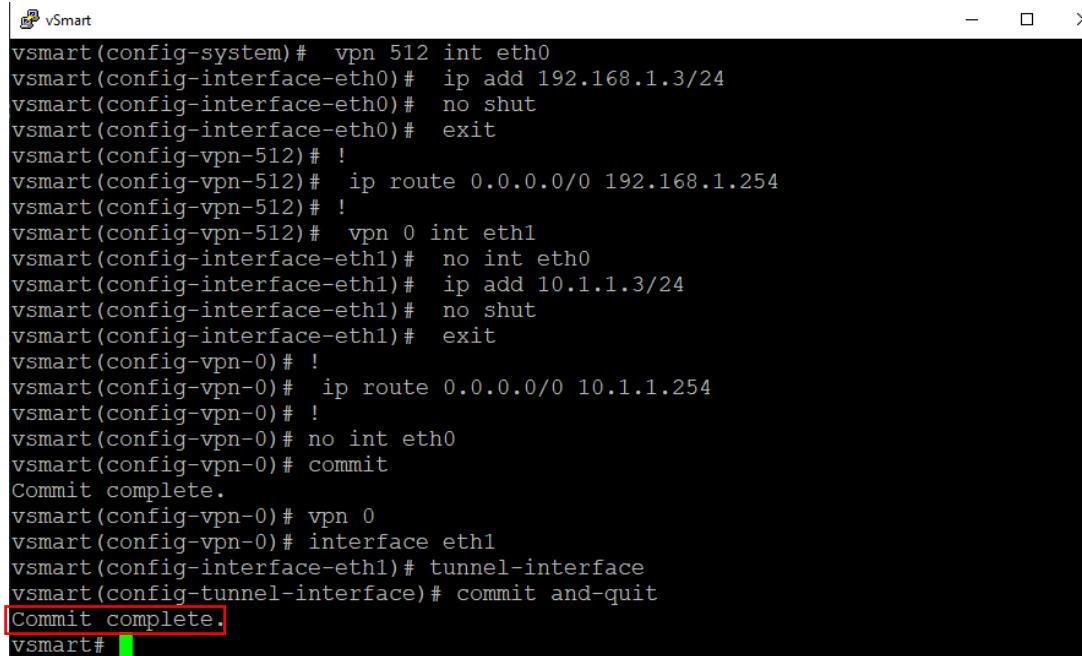
A screenshot of a terminal window titled "vBond". The window contains the following Cisco IOS configuration commands:

```
vBond(config-interface-ge0/0)# no tunnel-interface
vBond(config-interface-ge0/0)# ip add 10.1.1.2/24
vBond(config-interface-ge0/0)# no shut
vBond(config-interface-ge0/0)# exit
vBond(config-vpn-0)# !
vBond(config-vpn-0)# ip route 0.0.0.0/0 10.1.1.254
vBond(config-vpn-0)# !
vBond(config-vpn-0)# commit and-quit
Aborted: values are not unique: ge0/0
'vpn 0 interface ge0/0 if-name'
'vpn 512 interface ge0/0 if-name'
vBond(config-vpn-0)# vpn 512
vBond(config-vpn-512)# no int ge0/0
vBond(config-vpn-512)# commit
% No modifications to commit.
vBond(config-vpn-512)# vpn 0
vBond(config-vpn-0)# interface ge0/0
vBond(config-interface-ge0/0)# tunnel-interface encapsulation ipsec
vBond(config-tunnel-interface)# commit and-quit
Commit complete.
vBond#
vBond#
vBond#
```

5. vSmart : ដំ config នៅរាជធី vSmart (Default password admin:admin)

```
conf t

system
system-ip 1.1.1.3
site-id 1000
organization-name supawit-lab
vbond 10.1.1.2
!
vpn 512 int eth0
ip add 192.168.1.3/24
no shut
exit
!
ip route 0.0.0.0/0 192.168.1.254
!
vpn 0 int eth1
no int eth0
ip add 10.1.1.3/24
no shut
exit
!
ip route 0.0.0.0/0 10.1.1.254
!
no int eth0
commit and-quit
```



```

vSmart
vsmart(config-system)# vpn 512 int eth0
vsmart(config-interface-eth0)# ip add 192.168.1.3/24
vsmart(config-interface-eth0)# no shut
vsmart(config-interface-eth0)# exit
vsmart(config-vpn-512)# !
vsmart(config-vpn-512)# ip route 0.0.0.0/0 192.168.1.254
vsmart(config-vpn-512)# !
vsmart(config-vpn-512)# vpn 0 int eth1
vsmart(config-interface-eth1)# no int eth0
vsmart(config-interface-eth1)# ip add 10.1.1.3/24
vsmart(config-interface-eth1)# no shut
vsmart(config-interface-eth1)# exit
vsmart(config-vpn-0)# !
vsmart(config-vpn-0)# ip route 0.0.0.0/0 10.1.1.254
vsmart(config-vpn-0)# !
vsmart(config-vpn-0)# no int eth0
vsmart(config-vpn-0)# commit
Commit complete.
vsmart(config-vpn-0)# vpn 0
vsmart(config-vpn-0)# interface eth1
vsmart(config-interface-eth1)# tunnel-interface
vsmart(config-tunnel-interface)# commit and-quit
Commit complete.
vsmart#

```

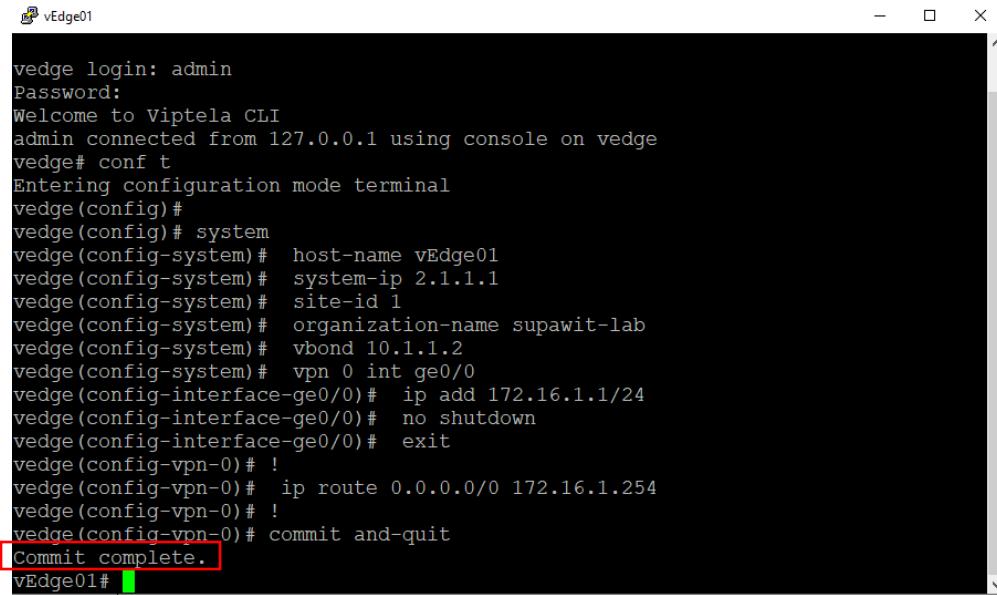
6. vEdge01 : ដំ config វៀវាគេរី vEdge01 (Default password **admin:admin**)

```

conf t

system
host-name vEdge01
system-ip 2.1.1.1
site-id 1
organization-name supawit-lab
vbond 10.1.1.2
vpn 0 int ge0/0
ip add 172.16.1.1/24
no shutdown
exit
!
ip route 0.0.0.0/0 172.16.1.254
!
commit and-quit

```



```
vedge login: admin
Password:
Welcome to Viptela CLI
admin connected from 127.0.0.1 using console on vedge
vedge# conf t
Entering configuration mode terminal
vedge(config)#
vedge(config)# system
vedge(config-system)#
host-name vEdge01
vedge(config-system)#
system-ip 2.1.1.1
vedge(config-system)#
site-id 1
vedge(config-system)#
organization-name supawit-lab
vedge(config-system)#
vbond 10.1.1.2
vedge(config-system)#
vpn 0 int ge0/0
vedge(config-interface-ge0/0)#
ip add 172.16.1.1/24
vedge(config-interface-ge0/0)#
no shutdown
vedge(config-interface-ge0/0)#
exit
vedge(config-vpn-0)#
ip route 0.0.0.0/0 172.16.1.254
vedge(config-vpn-0)#
vedge(config-vpn-0)#
commit and-quit
Commit complete.
vEdge01#
```

7. vEdge02 : ដំឡើង config តាមរាយការណ៍ vEdge02 (Default password **admin:admin**)

```
conf t

system
host-name vEdge02
system-ip 3.1.1.1
site-id 2
organization-name supawit-lab
vbond 10.1.1.2
vpn 0 int ge0/0
ip add 172.16.2.1/24
no shutdown
exit
!
ip route 0.0.0.0/0 172.16.2.254
!
commit and-quit
```

vManage ทำหน้าที่เป็น Certificate Authority (CA) สำหรับโครงสร้าง SD-WAN และบันทึกโดยทำหน้าที่ออกใบรับรอง (Certificate) และจัดการกระบวนการรับรองความถูกต้อง (Authentication) ของอุปกรณ์ต่าง ๆ เช่น vBond, vSmart และ vEdge

vManage เป็น Certificate Authority (CA) อย่างไร?

1. สร้าง Root CA
 - ใช้คำสั่ง openssl genrsa และ openssl req เพื่อสร้าง Private Key (sdwan-lab-root-ca.key) และ Self-Signed Certificate (sdwan-lab-root-ca.pem)
 - ตั้งค่าการทำให้ vManage เป็น Root CA
2. แจกจ่าย Root CA ไปยังอุปกรณ์อื่น
 - ติดตั้ง Root CA Certificate (sdwan-lab-root-ca.pem) บนอุปกรณ์ vBond, vSmart และ vEdge เพื่อให้ทุกอุปกรณ์เชื่อมต่อ กัน
3. ออกใบรับรอง (Certificate) ให้แต่ละอุปกรณ์
 - อุปกรณ์ต่าง ๆ เช่น vBond, vSmart, vEdge จะสร้าง Certificate Signing Request (CSR) และส่งไปให้ vManage
 - vManage ใช้ Root CA ที่สร้างขึ้นมาเพื่อออกใบรับรอง (.crt) ให้กับแต่ละอุปกรณ์
 - หลังจากออกใบรับรองแล้ว จะติดตั้งกลับไปยังอุปกรณ์ต้นทาง
4. ลงทะเบียนอุปกรณ์ในระบบ SD-WAN
 - เมื่ออุปกรณ์ได้รับใบรับรอง (.crt) และติดตั้งเรียบร้อยแล้ว จะต้องอัปโหลดเข้าสู่ vManage
 - จากนั้น vManage จะจัดการ Authentication และ Authorization ให้ทุกอุปกรณ์สามารถทำงานร่วมกันได้อย่างปลอดภัย

ไฟล์ CSR (Certificate Signing Request) คือไฟล์ที่สร้างขึ้นเพื่อใช้เป็นคำร้องขอลงนามสำหรับใบรับรองดิจิทัล ภายในไฟล์จะมีบล็อกของข้อความที่ถูกเข้ารหัส ซึ่งใช้ระบุข้อมูลของผู้ขอใบรับรอง รวมถึงข้อมูลที่ถูกเข้ารหัส เช่น ประเทศ รหัส องค์กร โดเมน อีเมล และกุญแจสาธารณะ (Public Key)

.CER หรือ .CRT – เป็นไฟล์ใบรับรอง X.509 ที่เข้ารหัสแบบ Base64 หรือ DER ซึ่งใช้เก็บใบรับรองเพียงใบเดียว และไม่รองรับการเก็บกุญแจส่วนตัว (Private Key)

vManage: Generate RSA sdwan-lab-root-ca.key

```
vmanage# vshell
vmanage:~$ openssl genrsa -out sdwan-lab-root-ca.key 2048
```

```
viptela 16.2.11

vmanage login: admin
Password:
Last login: Sat Feb 22 15:59:10 UTC 2025 on ttys0
Welcome to Viptela CLI
admin connected from 127.0.0.1 using console on vmanage
vmanage# vsh
vmanage:~$ openssl genrsa -out sdwan-lab-root-ca.key 2048
Generating RSA private key, 2048 bit long modulus
.....
+++
.....
.....+++
e is 65537 (0x10001)
vmanage:~$
```

สร้างไฟล์ sdwan-lab-root-ca.pem ด้วย sdwan-lab-root-ca.key

```
openssl req -x509 -new -nodes -key sdwan-lab-root-ca.key -sha256 -days 1024 -subj
"/C=TH/ST=BKK/L=BKK/O=supawit-lab /CN=vmanage.lab" -out sdwan-lab-root-ca.pem
```

```
vmanage:~$ openssl genrsa -out sdwan-lab-root-ca.key 2048
Generating RSA private key, 2048 bit long modulus
.....
+++
.....
.....+++
e is 65537 (0x10001)
vmanage:~$ openssl req -x509 -new -nodes -key sdwan-lab-root-ca.key -sha256 -days 1024 -subj "/C=TH/ST=BKK/L=BKK/O=supawit-lab /CN=vmanage.lab" -out sdwan-lab-root-ca.pem
vmanage:~$
```

```
vmanage# request root-cert-chain install /home/admin/sdwan-lab-root-ca.pem
```

```
vmanage:~$ exit
exit
vmanage# request root-cert-chain install /home/admin/sdwan-lab-root-ca.pem
Uploading root-ca-cert-chain via VPN 0
Copying ... /home/admin/sdwan-lab-root-ca.pem via VPN 0
Successfully installed the root certificate chain
vmanage#
```

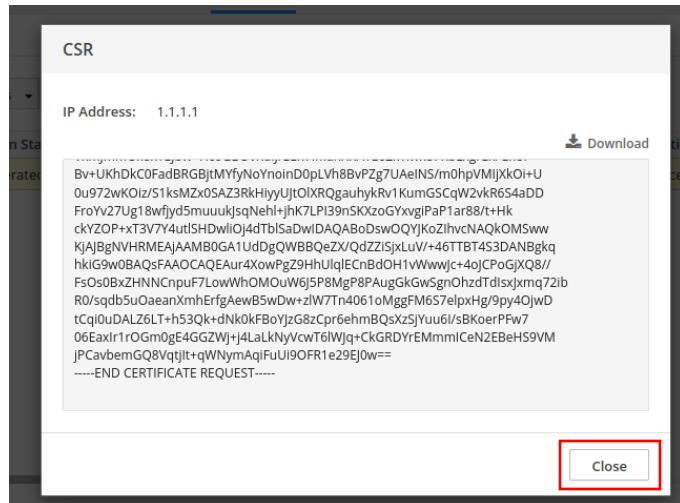
vManage GUI

ឱ្យចូល Configuration → Certificates → Controllers → vManage

រក្សាន់ គ្រប់គ្រង 3 ខ្លួន → Generate CSR

The screenshot shows the vManage GUI interface. In the top navigation bar, there is a link labeled 'Viptela vManage'. Below the navigation bar, the main content area has a title 'Certificates' and a sub-section 'vEdge List'. At the top of the main content area, there is a tab labeled 'Controllers' which is currently selected, indicated by a blue border. On the left side, there is a sidebar with several icons and a list of options: 'Certificates' (highlighted with a red box), 'Templates', and 'Policy'. In the main content area, there is a table with columns: Controller Type, Hostname, System IP, Site ID, and Certificate Serial. The table shows one entry: 'Controller Type' is 'vmanage', 'Hostname' is 'vmanage', 'System IP' is '1.1.1.1', 'Site ID' is '1000', and 'Certificate Serial' is 'No certificate installed'. At the bottom right of the table, there is a small icon with three horizontal lines, which is highlighted with a red box.

This screenshot shows a detailed view of the 'Certificates' table from the previous screenshot. The table has columns: Operation Status, Controller Type, Hostname, System IP, Site ID, and Certificate Serial. The first row shows 'Operation Status' as 'N/A', 'Controller Type' as 'vmanage', 'Hostname' as 'vmanage', 'System IP' as '1.1.1.1', 'Site ID' as '1000', and 'Certificate Serial' as 'No certificate installed'. To the right of the table, there is a context menu with several options: 'View CSR', 'View Certificate', 'Generate CSR' (which is highlighted with a red box), 'Reset RSA', and 'Invalidate'. The menu is also highlighted with a red box.



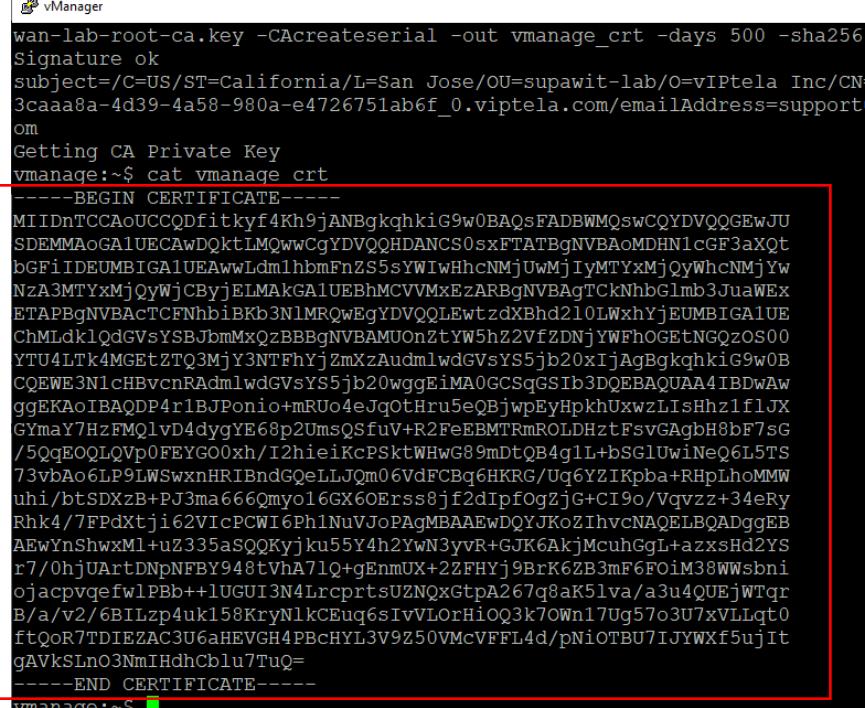
ໄປថែង vManage vshell

```
#vshell
openssl x509 -req -in vmanage_csr -CA sdwan-lab-root-ca.pem -CAkey sdwan-lab-root-
ca.key -CAcreateserial -out vmanage_crt -days 500 -sha256
```

```
vmanage# vsh
vmanage:~$ openssl x509 -req -in vmanage_csr -CA sdwan-lab-root-ca.pem -CAkey sd-
wan-lab-root-ca.key -CAcreateserial -out vmanage_crt -days 500 -sha256
Signature ok
subject=/C=US/ST=California/L=San Jose/OU=supawit-lab/O=viptela Inc/CN=vmanage_d-
3ccaa8a-4d39-4a58-980a-e4726751ab6f_0.viptela.com/emailAddress=support@viptela.c-
om
Getting CA Private Key
vmanage:~$
```

គណន៍ឯកសារនេះអាចបង្កើតឯកសារ vmanage.crt ឡាតិចតាំងលើរូបរងនៃ vManage

```
cat vmanage_crt
```

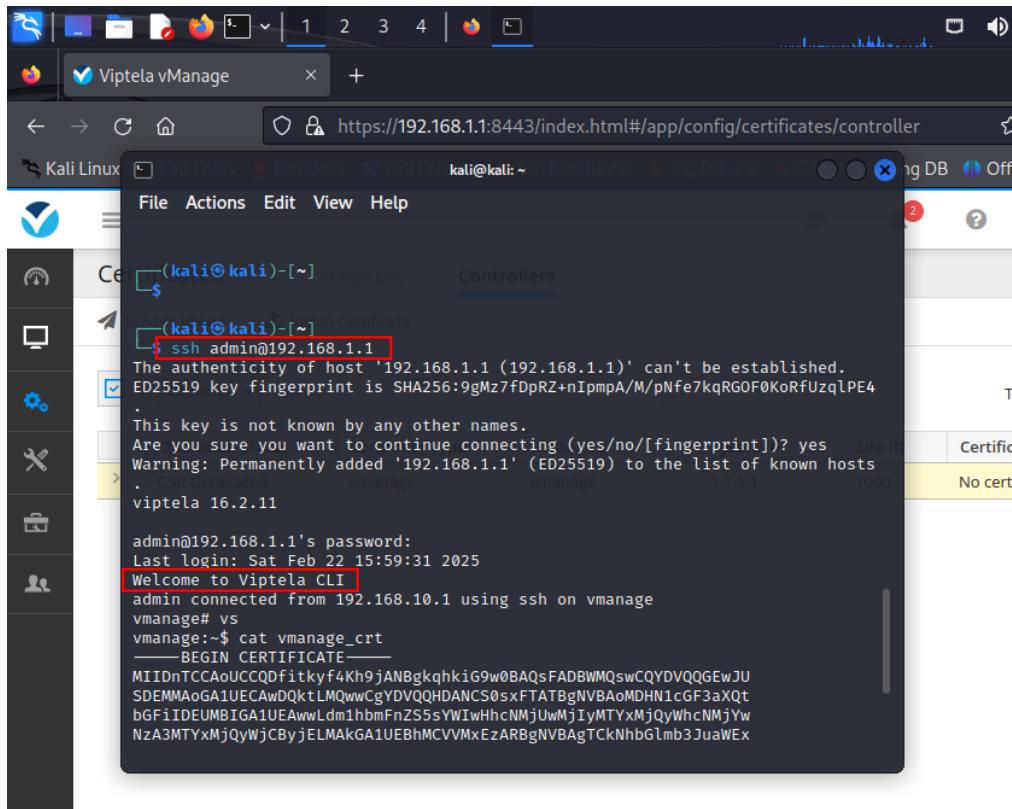


```

vManager
wan-lab-root-ca.key -CAcreateserial -out vmanage_crt -days 500 -sha256
Signature ok
subject=/C=US/ST=California/L=San Jose/OU=supawit-lab/O=ViPtela Inc/CN=v
3caaa8a-4d39-4a58-980a-e4726751ab6f_0.viptela.com/emailAddress=support@v
om
Getting CA Private Key
vmanage:~$ cat vmanage crt
-----BEGIN CERTIFICATE-----
MIIDnTCCAoUCCQDfityk4Kh9jANBqkqhkiG9w0BAQsFADBWMQswCQYDVQQGEwJU
SDEMMaoGA1UECAwDQk1LMQwwCgYDVQQHDANCS0sxFTATBgNVBAoMDHN1cGF3aXQt
bGFiIDEUMBIGA1UEAwLdm1hbmlFnZS5sYWIwHcNMjUwMjIyMTYxMjQyWhcNMjYw
NzA3MTYxMjQyWjCBYjELMAkGA1UEBhMCVVmxEzARBgNVBAgTCkNhbgLmb3JuaWE
ETAPBgNVBACTCFNhb1kbnMlMRQWEgYDVQQLEwtzdBhd210LWxhYjEUMBIGA1UE
ChMLdk1QdGVsYSBvBnMxQzBBgNVBUOn2tYW5hZ2VfZDNjYWFhOGEtNGQzOS00
YTU41Tk4MGEtZTQ3MjY3NTFhYjZmXzAudmlwdGVsY5jb20xIjAgBqkqhkiG9w0B
CQEWE3N1cHBvcnRAdmlwdGVsY5jb20wggiMA0GCSqGSIb3DQEBAQUAA4IBDwAw
ggEKAoIBAQDP4r1BJPonio+mRUo4eJqotHru5eQBjwpEyHpkhUxwzLIsHz1f1JX
GYmaY7HzFMQ1vD4dygYE68p2UmsQSfuV+R2FeEBMTRmROLDHztFsvGAqbH8bF7sG
/5QqEOQLQVp0FEYKcPSktWHwG89mDtQB4g1L+bSG1Uw1NeQ6L5TS
73vbAo6LP9LW5WxnhRIBndGQeLLJQm06VdFCBq6HKRG/Uq6YZIKpba+RHpjLhoMMW
uhi/btSDXzb+B+j3ma666Qmyo16GX60Erss8jf2dIpfoGzjG+C19o/Vqvzz+34eRy
Rhk4/7FPdXtji62ViCPCWI6Ph1NuVJoPAqgMBAEwDQYJKoZIhvNAQELBQADggEB
AEwYnShwxMl+uZ335asQQKyjku55Y4h2YwN3yvR+GJK6AkjMcuhGgL+azxsHd2YS
r7/OhjUArtDNpNFBy948tVhA71q+gEnmUX+2ZFHYj9BrK6ZB3mF6FOIM38WWsbni
ojacpvgefwlPBb++lUGUI3N4LrcprtsUZNqxGtpA267q8aK5lva/a3u4QUEjWTqr
B/a/v2/6BILzp4uk158KryNlkCEuq6sIvVLorHioQ3k7OWn17Ug57o3U7xVLLqt0
ftQR7TDIEZAC3U6aHEVGH4PBcHyl3V9z50VMcVFfL4d/pNiOTBU7IJYWXf5ujIt
gAvkSlno3NmIHdhCbly7TuQ=
-----END CERTIFICATE-----
vmanage:~$ 

```

ໃຊ້ Linux ssh → vManage ຈາກນັ້ນໄທ້ copy ເນື້ອຫາທັງໝາດ ເຮີມຕັ້ງແຕ່ ----BEGIN



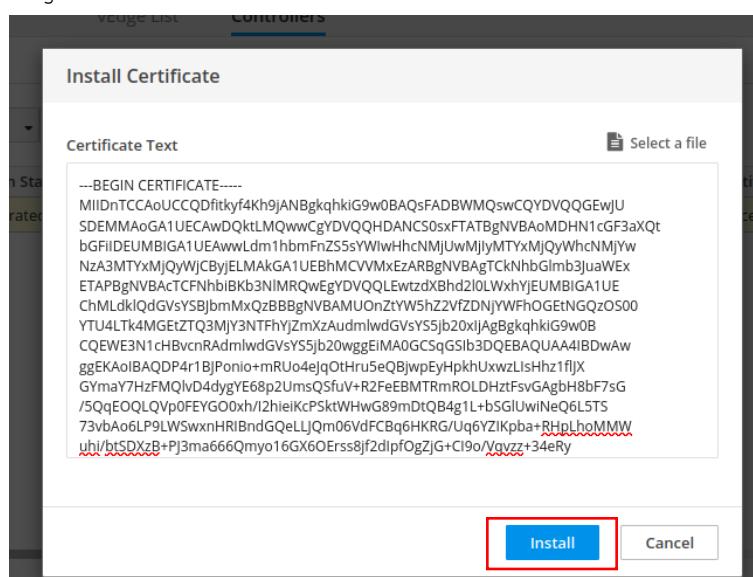
```

linux ~ % Kali Tools ~ Kali Docs ~ Kali ~ kali@kali: ~ NetHunter ~ Exploit-DB ~ Go ~ Off
File Actions Edit View Help
admin connected from 192.168.10.1 using ssh on vmanage
vmanage# vs
vmanage:~$ cat vmanage.crt
-----BEGIN CERTIFICATE-----
MIIDnTCCAoUCCQDfitykf4Kh9jANBgkqhkiG9w0BAQsFADBWMQswCQYDVQQGEwJU
SDEMMaG1UECAwDQkLMQwwCgYDVQHQHDANC0sxFTATBgNVBAoMDHN1cGF3aXQt
bGF1lDEUMBIGA1UEAwLdm1hbmFnZ5sYWiwHcNMjUwMjIyMTYxMjQyWhcNMjYw
NzA3MTYxMjQyWjCByjELMAKGA1UEBhMCVVMxEzARBgNVBAgTCKNhbgImb3JuaWE
ETAPBgNVBACTCFnhb3nLMRQwEgYDVQQLEwtzdBhd2l0LwxhYjEUMBIGA1UE
ChMLdklQdGVySBjmXqZBBgNVBAMUOnZtYW5hZ2VfZDNjYWFlh0GETNGQzOS00
YTU4LTk4MGEtZTQ3MjY3NTfhYjZmXzAudmlwdGvsYS5jb20xjAgBgkqhkiG9w0B
CQEWE3N1cHBvcnRadmlwdGvsYS5jb20wggEiMA0GCSqGSIb3DQEBAQUAA4IBDwAw
ggEKAoIBAQDP4r1BjPonio+mRUo4eJq0tHru5eQBjwpEyHpkhUxwzLisHh1fljX
GYma7HzFMQlvD4dygYE68p2UmsQsfuV+R2FeEBMTrmROLDHztFsvGAgbH8bf7sG
/5QqEOQLQvp0FEYGO0xh/I2hieicKpSktWhwG89mDtQB4g1L+bSGLUwiNeQ6L5TS
73vbAo6LP9LWSwxnHRIBndGQeLLJQm06VdFCBq6HKRG/Uq6YZIKpb+aRHplhoMMW
uhI/btSDXzb+Pj3ma666Qmyo16GX60Erss8jf2d1pf0gZjG+CI9o/Vqvzz+34eRy
Rhk4/7FPdXtji62VicPCWI6Ph1NuVj0PAgMBAEwDQYJKoZIhvcNAQELBQAQdgGE
AEwYnShwxMl+uZ335aSQKQyjku55Y4h2Yn3yvR+GJK6AkjMcuhGgL+azshd2YS
r7/ojhUARTDnpNFBy94tVhA7lQ+gEnmUX+2ZFHYj9Brk6ZB3mF6F0im38WWsbnI
ojacpvqefwlpBbb+lUGUI3N4LrcprtsUZNQxGtpA267q8aK51va/a3u4QUEjWTqr
B/a/v2/6BILzp4uk158kryNlkCeuq6sIVvLOrh0Q3k70Wn17ug57o3U7xVLLqt0
ftQoR7TDIEZAC3U6aHEVGH4PBcHYL3V9Z50VmVFfL4d/pNi0TBU7IjYWxf5ujIt
gAVkSLn03NmIHdhcbu7Tu0=
-----END CERTIFICATE-----
vmanage:~$
vmanage:~$ 

```

ឯកសារ Configuration → Certificates → Controllers → Install Certificate

ចាប់ផ្តើម វាង (Paste) vmanage.crt → Install



| | Operation Status | Controller Type | Hostname | System IP | Site ID | Certificate Serial |
|---|------------------|-----------------|----------|-----------|---------|--------------------|
| > | Installed | vmanage | vmanage | 1.1.1.1 | 1000 | DF8AD9327F82A1F6 |

Config នៃ vManage cli

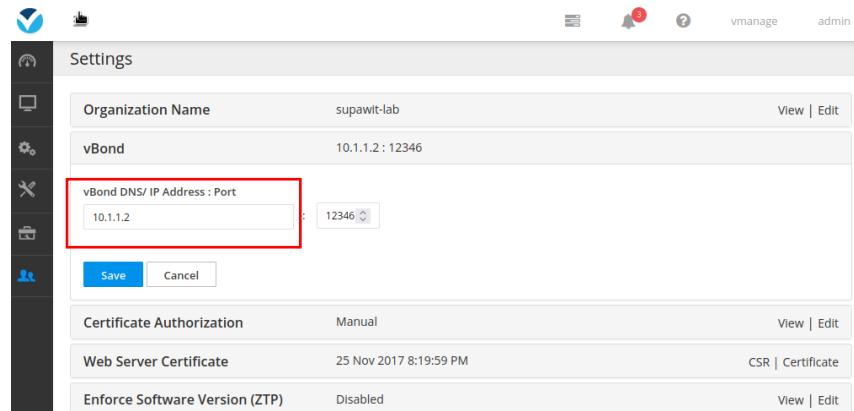
```
vpn 0
interface eth1
tunnel-interface
commit-quit
```

```
vmanage(config)# vpn 0
vmanage(config-vpn-0)# interface eth1
vmanage(config-interface-eth1)# tunnel-interface
vmanage(config-tunnel-interface)#
vmanage(config-tunnel-interface)# commit and-quit
Commit complete.
vmanage#
```

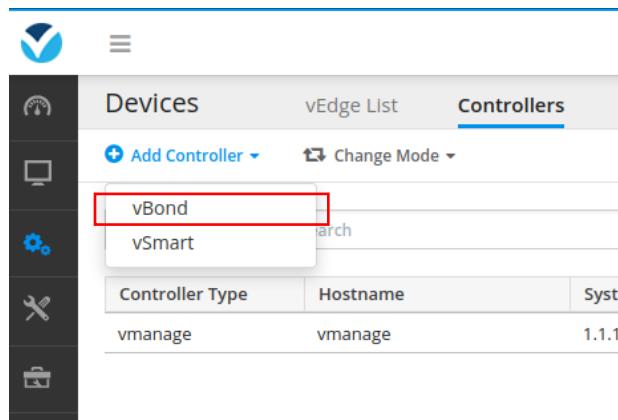
vBond

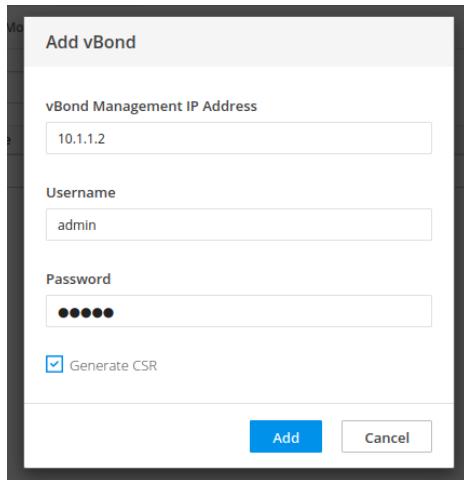
ធ្វើការ vBond ប្រចាំថ្ងៃ vManage

vManage GUI → Administration → Settings → vBond → Edit ចាប់ផ្តើមករណ៍ IP នៃ vBond → Save



Configuration → Devices → Controllers → Add Controller → vBond





vBond Mgmt IP: 10.1.1.2

Username: admin

Password: admin

| Devices | | vEdge List | Controllers |
|--|----------|----------------|--------------------|
| | | Add Controller | Change Mode |
| <input checked="" type="checkbox"/> Contains <input type="text" value="Search"/> | | | Total Rows: 2 of 2 |
| Controller Type | Hostname | System IP | Site ID |
| vmanage | vmanage | 1.1.1.1 | 1000 |
| vbond | vBond | 1.1.1.2 | 1000 |

ໃຊ້កຳສັ່ນນີ້ທີ່ vBond cli

```
request root-cert-chain install scp://admin@192.168.1.1:/home/admin/sdwan-lab-root-
ca.pem vpn 512
```

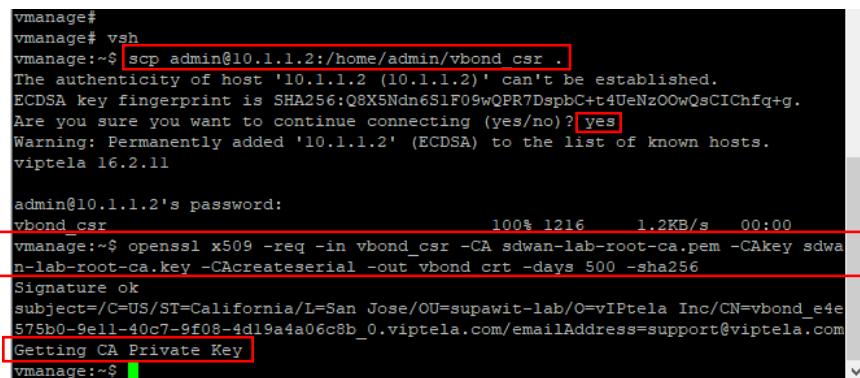
```
vBond#
vBond# request root-cert-chain install scp://admin@192.168.1.1:/home/admin/sdwan-
-lab-root-ca.pem vpn 512
Uploading root-ca-cert-chain via VPN 512
Copying ... admin@192.168.1.1:/home/admin/sdwan-lab-root-ca.pem via VPN 512
Warning: Permanently added '192.168.1.1' (ECDSA) to the list of known hosts.
viptela 16.2.11

admin@192.168.1.1's password:
sdwan-lab-root-ca.pem                                              100% 1273      1.2KB/s   00:00
Successfully installed the root certificate chain
vBond#
```

ប្រព័ន្ធភន្លឹម vManage vshell

vshell

```
scp admin@10.1.1.2:/home/admin/vbond_csr .
openssl x509 -req -in vbond_csr -CA sdwan-lab-root-ca.pem -CAkey sdwan-lab-root-
ca.key -CAcreateserial -out vbond_crt -days 500 -sha256
```



```
vmanage#  
vmanage# vsh  
vmanage:~$ scp admin@10.1.1.2:/home/admin/vbond_csr .  
The authenticity of host '10.1.1.2 (10.1.1.2)' can't be established.  
ECDSA key fingerprint is SHA256:Q8X5NdN6SlF09wQPR7DspbC+t4UeNzO0wQsCIChfq+g.  
Are you sure you want to continue connecting (yes/no)? yes  
Warning: Permanently added '10.1.1.2' (ECDSA) to the list of known hosts.  
viptela 16.2.11  
  
admin@10.1.1.2's password:  
vbond_csr 100% 1216 1.2KB/s 00:00  
vmanage:~$ openssl x509 -req -in vbond_csr -CA sdwan-lab-root-ca.pem -CAkey sdwa  
n-lab-root-ca.key -CAcreateserial -out vbond crt -days 500 -sha256  
Signature ok  
subject=/C=US/ST=California/L=San Jose/OU=supawit-lab/O=vIPtela Inc/CN=vbond_e4e  
575b0-9ell-40c7-9f08-4d19a4a06c8b_0.viptela.com/emailAddress=support@viptela.com  
Getting CA Private Key  
vmanage:~$
```

ໃຊ້ Linux ssh → vManage ຈາກនີ້ໃຫ້ copy ເນື້ອຫາທີ່ໜຳດວອງ vbond.crt ເຮັມຕັ້ງແຕ່ ----BEGIN

```

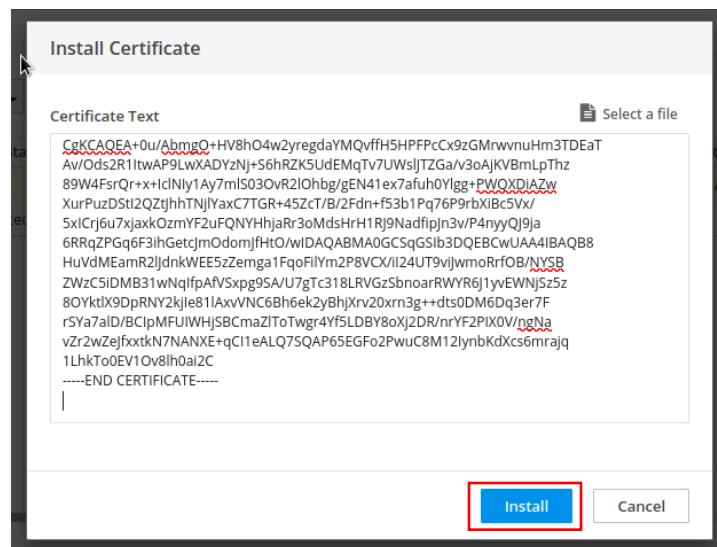
kali㉿kali: ~
$ ssh admin@192.168.1.1
viptela 16.2.11

admin@192.168.1.1's password:
Last login: Sat Feb 22 17:09:30 2025 from 192.168.10.1
Welcome to Viptela CLI
admin connected from 192.168.10.1 using ssh on vmanage
vmanage# vsh
vmanage:~$ cat v
vmanage:~$ cat vbond_crt
vmanage:~$ cat vbond_crt
-----BEGIN CERTIFICATE-----
MIIDmzCAoMCCQDfikyf4kh9zANBgkqhkiG9w0BAQsFADBWQMswCQYDVQQGEwJU
SDEMAoGA1UEAwLDM1hbFnZ5sYWIwhcNMjUwMjIyMTcwNDM2WhcNMjYw
bGF1IDEUMBIGA1UEAwLdm1hbFnZ5sYWIwhcNMjUwMjIyMTcwNDM2WhcNMjYw
NzA3MTcwNDM2WjCByDELMKAga1UEBhMCVVMxExARBgNVBAgTckNhbGlmb3JuaWE
ETAPBgNVBAcTCFNhb1Bkb3NlMRQwEgYDVQQLewtZBhd2l0LwxhYjEUMBIGA1UE
ChMLdkldqGvSbnMxQTA/BgNVBAMUOHZib25kX2U0ZTU3NWlwlMTetNDBj
Ny05ZjaA4LTRkMTlhNGEwNmM4Yl8wLnpcHrlbGEuY29tMSIwIAYJKoZIhvcNAQkB
FhNzdXBwb3J0QHZpcHrlbGEuY29tMTIBjANBgkqhkiG9w0BAQEFAAOCAQAMIB
CgKCAQEa+0u/AbmgO+HV8hO4w2yregdaYMQvffH5HPFPcCx9zMGrwvnuHm3TDEaT
Av/Ods2R1twAP9LwXADYzNj+S6hRZK5UdEMqTv7UWs1JTZGa/v3oAjKVbmLpThz
89W4FsRQr+x+IclNly1Ay7mls030vR2lOhbg/gEN41ex7afuh0Ylgg+PWQXDIAZw
XurPuzDStI2ZtJhTNjlyaxC7TGR+45ZcT/B/2Fdnl+f53b1Pq76P9rbXbc5Vx/
5xICrj6u7jaxkOzmYF2uFQNYHhjaRr3oMdsHrH1Rj9NadfpJn3v/P4nyyQJ9ja
6RRqzPGq6F3ihGetcmJodomJfhtO/wIDAQABMA0GCSqGSIb3DQEBCwUA4IBAQB8
HuVdmEamR2lJdnkWEE5zZemga1FqoFilym2PBVCX/iI24UT9vijwmoRrf0B/NYSB
ZWzC5iDMB31wNqIfpAfVSxpg9SA/U7gTc318LRVGzSbnoarRWYR6J1yvEWNjs5z
80Yktlx9dpRNy2kjTe81lAxvNC6Bh6ek2yBhjxrv20xrn3g++dts0DM6dq3er7F
rSYa7aLD/BCIpMFU1WHjSCmazlToTwgr4Yf5LDBY8oXj2DR/nrYF2PIX0V/ngNa
vZr2wZeJfxxtkN7NANXE+qCI1eALQ7SQAP65EGFo2PwuC8M12lynbKdXcs6mrqjq
1LhkTo0EV1Ov8lh0ai2C
-----END CERTIFICATE-----
vmanage:~$ 

```

ឱ្យ Configuration → Certificates → Controllers → Install Certificate

ចាប់ផ្តើម រាយនៅក្នុង vbond.crt → Install



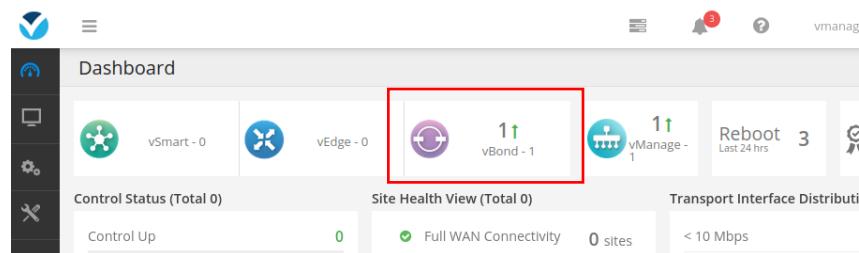
ខ្លួនបានដែលត្រួតពិនិត្យនៅក្នុងការកំណត់តម្លៃ

| Install Certificate | | | | | |
|---|---------|------------------------------------|-------------|-----------|------------|
| Total - 1 Success - 1 | | | | | |
| | Status | Message | Device Type | Device IP | vManage IP |
| ✓ | Success | Done - Push vSmart List f... vbond | | 10.1.1.2 | 1.1.1.1 |
| [22-Feb-2025 17:22:40 UTC] Pushing new serial Number to all controllers [22-Feb-2025 17:22:41 UTC] Installing Certificate on device 10.1.1.2 [22-Feb-2025 17:22:43 UTC] Installing Certificate on device 10.1.1.2 successful [22-Feb-2025 17:22:44 UTC] Pushing serial list to device 10.1.1.2 (vBond) [22-Feb-2025 17:22:44 UTC] Starting processing serial list file on 10.1.1.2 (vBond) [22-Feb-2025 17:22:45 UTC] Completed processing serial list file on 10.1.1.2 (vBond) [22-Feb-2025 17:22:46 UTC] Done - Push vSmart List for 10.1.1.2 (vBond) | | | | | |

ໄປយ៉ាង vBond cli តួងគាត់តាមការដំឡើង

```
vpn 0
interface ge0/0
tunnel-interface encapsulation ipsec
commit and-quit
```

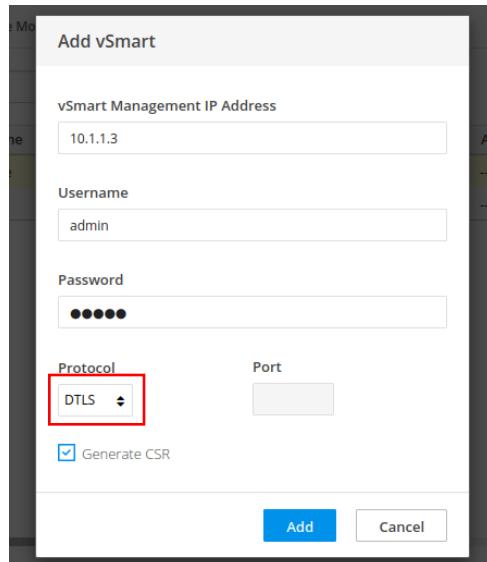
រួចសកគ្គរៀលវាងលើកនុងពាណិជ្ជកម្មនៃ Dashboard ដូចនេះថា ពីពេលនេះ vBond UP តែងតាំង



vSmart

ធើនុវត្តន៍ vSmart ໄປយ៉ាង vManage

vManage GUI → Administration → Settings → vSmart → Edit ចាប់ផ្តើមក្រឡាបទ IP នៃ vSmart → Save



ໃຊ້ការສ້າງនີ້ທີ່ vSmart cli

```
request root-cert-chain install scp://admin@192.168.1.1:/home/admin/sdwan-lab-root-
ca.pem vpn 512
```

```
vsmart# request root-cert-chain install scp://admin@192.168.1.1:/home/admin/sdwa
n-lab-root-ca.pem vpn 512
Uploading root-ca-cert-chain via VPN 512
Copying ... admin@192.168.1.1:/home/admin/sdwan-lab-root-ca.pem via VPN 512
Warning: Permanently added '192.168.1.1' (ECDSA) to the list of known hosts.
viptela 16.2.11

admin@192.168.1.1's password:
sdwan-lab-root-ca.pem                                100% 1273      1.2KB/s   00:00
Successfully installed the root certificate chain
vsmart#
```

ໃປໜ້າ vManage vshell

```
vshell
scp admin@10.1.1.3:/home/admin/vsmart_csr .
openssl x509 -req -in vsmart_csr -CA sdwan-lab-root-ca.pem -CAkey sdwan-lab-root-
ca.key -CAcreateserial -out vsmart_crt -days 500 -sha256
```

```
vmanage#
vmanage#
vmanage# vsh
vmanage:~$ scp admin@10.1.1.3:/home/admin/vsmart_csr .
The authenticity of host '10.1.1.3 (10.1.1.3)' can't be established.
ECDSA key fingerprint is SHA256:XYGrQobyhsx7wJdv0iEp76RT9rrgehZjXnOEAIq316I.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '10.1.1.3' (ECDSA) to the list of known hosts.
viptela 16.2.11

admin@10.1.1.3's password:                                     100% 1216      1.2KB/s   00:00
vsmart csr
vmanage:~$ openssl x509 -req -in vsmart_csr -CA sdwan-lab-root-ca.pem -CAkey sdwan-lab-root-ca.key -CAcreateserial -out vsmart_crt -days 500 -sha256
Signature ok
subject=/C=US/ST=California/L=San Jose/OU=supawit-lab/O=vIPtela Inc/CN=vsmart_09dal83-db56-43e4-aeac-849be7721ce7_0.viptela.com/emailAddress=support@viptela.com
Getting CA Private Key
vmanage:~$
```

ໃຊ້ Linux ssh → vManage ຈາກນີ້ໄທ້ copy ເນື້ອຫາທັງໝາດຂອງ vsmart.crt ເຮີມຕັ້ງແຕ່ ---BEGIN

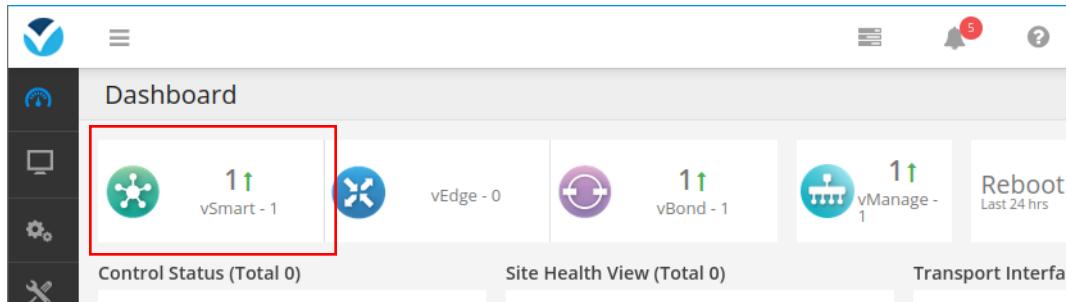
```
kali@kali: ~
File Actions Edit View Help
vmanage:~$ vmanage:~$ vmanage:~$ vmanage:~$ vmanage:~$ ls -l
total 40
-rw-r--r-- 1 admin admin 394 Feb 22 16:50 archive_id_rsa.pub
-rw-r--r-- 1 admin admin 1679 Feb 22 16:00 sdwan-lab-root-ca.key
-rw-r--r-- 1 admin admin 1273 Feb 22 16:03 sdwan-lab-root-ca.pem
-rw-r--r-- 1 admin admin 17 Feb 22 17:36 sdwan-lab-root-ca.srl
-rw-r--r-- 1 admin admin 1310 Feb 22 17:18 vbond_crt
-rw-r--r-- 1 admin admin 1216 Feb 22 17:15 vbond_csr
-rw-r--r-- 1 admin admin 1314 Feb 22 16:12 vmanage_crt
-rw-r--r-- 1 root root 1220 Feb 22 16:10 vmanage_csr
-rw-r--r-- 1 admin admin 1314 Feb 22 17:33 vsmart_crt
-rw-r--r-- 1 admin admin 1216 Feb 22 17:36 vsmart_csr
vmanage:~$ cat vsmart crt
-----BEGIN CERTIFICATE-----
MIIDnCCAOQCQDfitkyf4Kh+jANBgkqhkiG9w0BAQsFADBWMQswCQYDVQQGEwJU
SDEMMAoGA1UEAwQDKtLMQwnWgYDVQQHANC5OsoxFtATgNVBAoMDHN1cGF3aXQt
bGFiIDEUMBIGA1UEAwLdm1hbmfNz5sYWIwHhcNMjUwMjIyMTczNjMwWhcNMjYw
NzA3MTczNjMwJCBByTELMAkGA1UEBhMCVVMxEzARBgNVBAgTCKhbGlmB3JuaWEx
ETAPBgNVBAcTCFnbbiBkb3nLMR0wEgYDVQQLEwtzdBhd2l0LwxhyjEUMBIGA1UE
ChMLdklQdGVsYSBjbmMxQJBABgNVBAMUOXzzbwFydF8wOWRMWY4My1KyjU2LTQz
ZTQtYWVhYy04NDliZTc3MjFjZTdfMC52aXB0ZWxhLmNbTE1MCAGCSqGSIb3DQEJ
ARYTc3WcG9ydeB2aXB0ZWxhLmNbTE1HQJkoZhvcNAQEBOADggEPADCC
AQoCggEBAK26rjx7Ec@0MLsgk/NPyp4IGRJKhjf+UEK/04AzAU1X0+NnayIGym
ajoo5wQ3gi+Y2STD9uNLZ1nP0esbuYHdADzXTeZhoGgKSFZywYX/MvPm2n5Ghx5C
1fipkuueekgICoAmaw53/jfAVFbekphPyba+x18uTmzSh6J257sHR6BvQSGIg6F
e5VuoxJ/A6M9yLGv21+FNNT23RyTZE1HQj/qoYHh1mh6/KzxBBGi2nlMdiqx
cmfjZIsx+WP4HTQAmPuT5tiirJLGVNZUGxQ3lhnyN308dX16a1ZFyip8C1jsDv
ulugG1XXmuRzsRa8m63LstcXFHaRoqccAwEAATANBgkqhkiG9w0BAQsFAAOCAQEA
v56Bfl9Taq9VRSKEtxIT5F4kzM2FmZJYLmryC+2KU95Wfae0iJ6dKGnUgvkkXaS+
```

ໄປທີ Configuration → Certificates → Controllers → Install Certificate (ທໍາເໜືອນກັບ vBond ແລ້ວເປີ່ມໃໝ່)

ຈາກນີ້ ວາງເນື້ອຫາທີ່ຄັດລອກມາຈາກ vsmart.crt → Install

ໄປຢັ້ງ vSmart cli ຕັ້ງຄ່າຕາມຄໍາສຳໜັ້ນ

```
vpn 0
interface ge0/0
tunnel-interface encapsulation ipsec
commit and-quit
```



vEdge01&02

ໃນ vManage ໃຊ້កຳສັ່ງນີ້ເພື່ອຕຽບສອບ

```
cat sdwan-lab-root-ca.pem
```

```
vmanage# vsh
vmanage:~$ cat sdwan-lab-root-ca.pem
-----BEGIN CERTIFICATE-----
MIIDfzCCAAegAwIBAgIJANg8VmM85SpiMA0GCSqGSIb3DQEBCwUAMFYxCzAJBgNV
BAYTA1RIMQwwCgYDVQQIDANCS0sxDDAKBgNVBAcMA0JLSzEVMBMGA1UECgwMc3Vw
YXdpdC1sYWIgMRQwEgYDVQQDDAt2bWFuYWdlLmxhYjAeFwOyNTAyMjIxNjAzMjla
FwOyNzEyMTMxNjAzMj1aMFYxCzAJBgNVBAYTA1RIMQwwCgYDVQQIDANCS0sxDDAK
BgNVBAcMA0JLSzEVMBMGA1UECgwMc3VwYXdpdC1sYWIgMRQwEgYDVQQDDAt2bWFu
YWdlLmxhYjCCAS1vDOXJKoZIbxwNAOFBROADggERADCCAOcCggFBAMwghdTH1Kgh
```

ເປີດ vEdge01 ແລະ 02 ໃໃຊ້ກຳສັ່ງ

```
vshell
```

```
vi sdwan-lab-root-ca.pem
```

```
viptela 18.4.4

vEdge02 login: admin
Password:
Welcome to Viptela CLI
admin connected from 127.0.0.1 using console on vEdge02
vEdge02# vsh
vEdge02:~$ vi sdwan-lab-root-ca.pem
```

(ທຳຫັ້ງຄູ)

วางแผนเนื้อหาที่คัดลอกจาก vmanange ไปยังทั้งคู่

```
vEdge01
-----BEGIN CERTIFICATE-----
MIIDfzCCAmegAwIBAgIJANG8Vm85SpiMA0GCSqGSIB3DQEBCwUAMFYxCzAxBgNV
BAYTA1RIMQwwCgYDVQQIDANCSoxxDDAKBgNVBAcMA0JLSzEVMBMG1UECgwMc3Vw
YXdpdC1sYWlqMRQwEgYDVQDDAt2bWFuYWdlLmxhYjAeFw0yNTAyMjIxNjAzMjla
Fw0yNzEyMTMxNAzEiM1aMFYxCzAxBgNVBAYTA1RIMQwwCgYDVQQIDANCSoxxDDAK
BgNVBAcMA0JLSzEVMBMG1UECgwMc3VwYXdpdC1sYWlqMRQwEgYDVQDDAt2bWFu
YWdlLmxhYjCCAS1wDQYJKoZIhvCNQEBBQADggEPADCCAQoCggEBAMmhqtTU1Kqh
LctvbbR01ixD5ALI++3LNyNnWtcd3/JqXY+D8KS5RjRydA2wV58rCaJwypyIxBl
9+pWTfgxws5x5yXP/OddFzQlgaXTwaiGd4qy2pp0ODqH/oSFC17rz2qE220xA2o
zqPxmwdqt4q7seTIME1hTgfnbEtNld/R2T/MBDu16dK72ib/uRbdL5IK30NRTGRB
8cdElbuupYSDHLha8fkLBHwSbXP3j7MT/WM5+q++WtwZArzxkjju7SO/F4siOzOK
4js3t9QHCJ7gT55H/hjkw0ulgWeildDu2sQnuQdmxiUiVH5dn3g81kI2GnfPC+aN
ir36ylcYbeUCAwEAAAQME4wQDYVR0OBByEFP1EM4gUBLQT4tsQ23qzKLH4T
MBIGAU1DwQYMBaaAF1EPFM4gUBLQT4tsQ23qzKLH4TfMAwGAU1DwQFNAMBAA6w
DQYJKoZIhvCNQEBBQADggEBALKPBBMmKd1QDw5sktkhNqZKzo5bMeCpmHqj0
g67jJrUVnV62ax6xDGTqUVUj61VY1491PVNIXqTSJ10y1jCtKMFshqKwz42/Dv
M1xj200MmGSh2Lyk3rQO2ucSQfuf06Ob+T5fKnpjklg26llrsB9wVVV/lgf4Gx
Xe5UEUrc9f1x571fNBvr1NdvewzWR0WkudSH9473GEDaBPFMzbz7zsmjELW
1RaDfu2g01cl2WK/HIR/sVrk5AF4ARJa7P1YEF7dMfdQtTQzXEvVgss5jlp3iP
deD1i9maS/eyKzR1YRz2+cHuqT7ojaQCyeRb/8oH7yJ93I=
-----END CERTIFICATE-----
"sdwan-lab-root-ca.pem" [New File]

vEdge02
-----BEGIN CERTIFICATE-----
MIIDfzCCAmegAwIBAgIJANG8Vm85SpiMA0GCSqGSIB3DQEBCwUAMFYxCzAxBgNV
BAYTA1RIMQwwCgYDVQQIDANCSoxxDDAKBgNVBAcMA0JLSzEVMBMG1UECgwMc3Vw
YXdpdC1sYWlqMRQwEgYDVQDDAt2bWFuYWdlLmxhYjAeFw0yNTAyMjIxNjAzMjla
Fw0yNzEyMTMxNAzEiM1aMFYxCzAxBgNVBAYTA1RIMQwwCgYDVQQIDANCSoxxDDAK
BgNVBAcMA0JLSzEVMBMG1UECgwMc3VwYXdpdC1sYWlqMRQwEgYDVQDDAt2bWFu
YWdlLmxhYjCCAS1wDQYJKoZIhvCNQEBBQADggEPADCCAQoCggEBAMmhqtTU1Kqh
LctvbbR01ixD5ALI++3LNyNnWtcd3/JqXY+D8KS5RjRydA2wV58rCaJwypyIxBl
9+pWTfgxws5x5yXP/OddFzQlgaXTwaiGd4qy2pp0ODqH/oSFC17rz2qE220xA2o
zqPxmwdqt4q7seTIME1hTgfnbEtNld/R2T/MBDu16dK72ib/uRbdL5IK30NRTGRB
8cdElbuupYSDHLha8fkLBHwSbXP3j7MT/WM5+q++WtwZArzxkjju7SO/F4siOzOK
4js3t9QHCJ7gT55H/hjkw0ulgWeildDu2sQnuQdmxiUiVH5dn3g81kI2GnfPC+aN
-----END CERTIFICATE-----
"sdwan-lab-root-ca.pem" [New File]
```

ตรวจสอบด้วยคำสั่ง cat

```
vEdge01
-----END CERTIFICATE-----
"
"
"sdwan-lab-root-ca.pem" [New File] 21 lines, 1273 characters written
vEdge01:~$ cat sdwan-lab-root-ca.pem
-----BEGIN CERTIFICATE-----
MIIDfzCCAmegAwIBAgIJANG8Vm85SpiMA0GCSqGSIB3DQEBCwUAMFYxCzAxBgNV
BAYTA1RIMQwwCgYDVQQIDANCSoxxDDAKBgNVBAcMA0JLSzEVMBMG1UECgwMc3Vw
YXdpdC1sYWlqMRQwEgYDVQDDAt2bWFuYWdlLmxhYjAeFw0yNTAyMjIxNjAzMjla
Fw0yNzEyMTMxNAzEiM1aMFYxCzAxBgNVBAYTA1RIMQwwCgYDVQQIDANCSoxxDDAK
BgNVBAcMA0JLSzEVMBMG1UECgwMc3VwYXdpdC1sYWlqMRQwEgYDVQDDAt2bWFu
YWdlLmxhYjCCAS1wDQYJKoZIhvCNQEBBQADggEPADCCAQoCggEBAMmhqtTU1Kqh
LctvbbR01ixD5ALI++3LNyNnWtcd3/JqXY+D8KS5RjRydA2wV58rCaJwypyIxBl
9+pWTfgxws5x5yXP/OddFzQlgaXTwaiGd4qy2pp0ODqH/oSFC17rz2qE220xA2o
zqPxmwdqt4q7seTIME1hTgfnbEtNld/R2T/MBDu16dK72ib/uRbdL5IK30NRTGRB
8cdElbuupYSDHLha8fkLBHwSbXP3j7MT/WM5+q++WtwZArzxkjju7SO/F4siOzOK
4js3t9QHCJ7gT55H/hjkw0ulgWeildDu2sQnuQdmxiUiVH5dn3g81kI2GnfPC+aN
-----END CERTIFICATE-----
```

จากนั้นใช้คำสั่งนี้ทั้งคู่

`request root-cert-chain install /home/admin/sdwan-lab-root-ca.pem`

```
vEdge02#
vEdge02# request root-cert-chain install /home/admin/sdwan-lab-root-ca.pem
Uploading root-ca-cert-chain via VPN 0
Copying ... /home/admin/sdwan-lab-root-ca.pem via VPN 0
Updating the root certificate chain..
Successfully installed the root certificate chain
vEdge02#
```

សរាងไฟล់ vedge01_csr បន្ថែម vEdge01

```
request csr upload /home/admin/vedge01_csr
supawit-lab
supawit-lab
```

សរាងไฟល់ vedge02_csr បន្ថែម vEdge02

```
request csr upload /home/admin/vedge02_csr
supawit-lab
supawit-lab
```

```
vEdge02# request csr upload /home/admin/vedge02_csr
Uploading CSR via VPN 0
Enter organization-unit name : Re-enter organization-unit name
: Generating private/public pair and CSR for this vedge device
Generating CSR for this vedge device .....[DONE]
Copying ... /home/admin/vedge02_csr via VPN 0
CSR upload successful
```

ឲ្យកាំស៉ែងពរាងសុខទៅក្នុង និងអីក៏ដល់ការបញ្ចប់ដើម្បីប្រើប្រាស់ vManage

cat vedge(\$number)_csr

The screenshot shows two terminal windows. The left window (vEdge01) displays the command `cat vedge01_csr`. The right window (vEdge02) displays the command `cat vedge02_csr`. Both windows show the output of CSR generation and copying.

```
vEdge01
Enter organization-unit name : Re-enter organization-unit name
: Generating CSR for this vedge device .....[DONE]
Copying ... /home/admin/vedge01_csr via VPN 0
CSR upload successful

vEdge02#
vEdge02#
vEdge02# vsh
vEdge02:~$ cat ved
cat: ved: No such file or directory
vEdge02:~$ cat vedge02_csr
-----BEGIN CERTIFICATE REQUEST-----
MIIDSTCCAjECAQAwgcgxCzAJBgNVBAYTA1VTMRMwEQYDVQQIEwpDYWxpZm9ybmlh
MREwDwYDVQQHEwhTYW4gSm9zZTEUMBIGA1UECxMLc3VwYXdpdC1sYWIXFDASBgNV
BAoTC3ZJUHRLbGEgsW5jMUEwPwYDVQQDEzh2ZWRnZS1hM2FhZDQ1Yi0xYThhLTQ1
NDMtOThiNy03OTbkNWNkYjNkYTUtMS52aXB0ZWxhLmNvbTEiMCAGCSqGSIb3DQEJ
ARYTc3VwcG9ydeB2aXB0ZWxhLmNvbTCCASIwDQYJKoZIhvCNQEBBQADggEPADCC
AQoCggEBANVV5oWrus2sSSNVHHnZ9W8yuQ/8uXQOEU/8/sXUkod0PwFoghsBFks2H
DCY454h42p5hXEnrqA1luoL74nTh13G7mqdjo9vj52wDCxxE+d6UjJqzs3bu2aTE
-----END CERTIFICATE REQUEST-----
```

ឲ្យយក vManage cli និងសរាងไฟល់តាមរបៀប vEdge01 ដាក់នៅវានៅក្នុងការបញ្ចប់

```
vsh
vi vedge01_csr
```

```
vmanage#
vmanage# vsh
vmanage:~$ vi vedge01_csr
```

```

-----BEGIN CERTIFICATE REQUEST-----
MIIDSTCCAjECAQAwgcgxCzAJBgNVBAYTA1VTMRMwEQYDVQQIEwpDYWxpZm9ybmlh
MREwDwYDVQQHEwhTYW4gSm9zZTEUMBIGA1UECxMlc3VwYXdpdC1sYWlxFDASBgNV
BAoTC3JUHrlbEgSW5jMUEWpWdYDVQDEzh2ZWRnZs1hm2FzZDQ1Yi0xYThhLT01
NDMtOThiNy03OTBkNWNKjNkYTUtMS52aXB0ZWxhLmNvbTEiMCAGCSqGS1b3DQEJ
ARYTc3VwcG9ydEB2aXB02WxhLmNvbTCCASIwDQYJKoZhvcNAQEBBQADggEPADCC
AQcggEBANV5cWr2sSSNVHn29W8yuQ/8uXOEU/8/sXUkod0PwFoGhsBFks2H
DCY454h42p5hXEnrqAlluoL74n1h13G7mQdjo9v5z2wDCxx+d6ujJqzs3buZaTE
gBplxfHyaaDFD45A7q0JYbW1tgI6EzEG8K88D4jAKy5ZgqyR30WgycWc20OQeq4cD
lQMxGhIpSczhvDK07DXhjrr4zeryB4BptHcRiSXg4NiVqmiCBu5jvdccwqNf5
kuqUJLuWrMLCvg3+DLKyj3ysOm9d4UatWBt/m5ixWNv03QuocU+F/qzEmNUymJ0
7J3j3R+IpCWRR8EuE4ehWmcC0WAfxsUJccAwEAAAa7MDkGCSqGS1b3DQEJDjEsMCow
CQYDVROTBAlwADQbgNVHQ4EFgQU0tLzthMLdWWvJM0j8KYFLS5El1yWdQJKoZI
hvcNAQELBQADggEBAGVdidssF4NKD3gEzuUnFP9Bz204tVIN06vlsqZccvmlJlkf
TxnvYjm1nmhIgDX7tdy0jg9RHFlgLer/GYAg0FW52BY786a/oHKRWMmFotoSirJH
GmtZf3xChApE0KxCcWlhsqffzAutoZS+3PxcYu3Y6T8vwhWcx76hRG/yAqAXKc
iTz9nWZFlWrxyv18T+Ip2FE4rOo2Np0wMMPLAQGRMd1piAbG3ECSeH5chWz9LS
YGUGIl2BlusT89I8+ueicqIVP5fFmn6DAbYDukwlnkDlagCTck4x1kxbl8tnM4aW
Nh4R1TjXGLU9N9UjVQsaFYdnxcZ7wxENpUquSs=
-----END CERTIFICATE REQUEST-----
~
~
```

"vedge01_csr" [New File]

ເຂົ້າແລ້ວສ້າງຂອງ vedge02 ດ້ວຍເຂັ້ນກັນ

```

vmanage:~$ vi vedge01_csr
vmanage:~$ vi vedge02_csr
vmanage:~$ ls -l
total 48
-rw-r--r-- 1 admin admin 394 Feb 22 16:50 archive_id_rsa.pub
-rw-r--r-- 1 admin admin 1679 Feb 22 16:00 sdwan-lab-root-ca.key
-rw-r--r-- 1 admin admin 1273 Feb 22 16:03 sdwan-lab-root-ca.pem
-rw-r--r-- 1 admin admin 17 Feb 22 17:36 sdwan-lab-root-ca.srl
-rw-r--r-- 1 admin admin 1310 Feb 22 17:18 vbond_crt
-rw-r--r-- 1 admin admin 1216 Feb 22 17:15 vbond_csr
-rw-r--r-- 1 admin admin 1216 Feb 22 18:24 vedge01_csr
-rw-r--r-- 1 admin admin 1216 Feb 22 18:24 vedge02_csr
-rw-r--r-- 1 admin admin 1314 Feb 22 16:12 vmanage_crt
-rw-r--r-- 1 root root 1220 Feb 22 16:10 vmanage_csr
-rw-r--r-- 1 admin admin 1314 Feb 22 17:36 vsmart_crt
-rw-r--r-- 1 admin admin 1216 Feb 22 17:36 vsmart_csr
vmanage:~$
```

ໃຫ້ຄໍາສັ່ງດັ່ງນີ້ ທີ່ vManage

```

openssl x509 -req -in vedge01_csr -CA sdwan-lab-root-ca.pem -CAkey sdwan-lab-root-
ca.key -CAcreateserial -out vedge01_crt -days 500 -sha256
openssl x509 -req -in vedge02_csr -CA sdwan-lab-root-ca.pem -CAkey sdwan-lab-root-
ca.key -CAcreateserial -out vedge02_crt -days 500 -sha256

```

```

vmanage:~$ openssl x509 -req -in vedge01_csr -CA sdwan-lab-root-ca.pem -CAkey sd
wan-lab-root-ca.key -CAcreateserial -out vedge01_crt -days 500 -sha256
Signature ok
subject=/C=US/ST=California/L=San Jose/OU=supawit-lab/O=vIPtela Inc/CN=vedge-a3a
dad45b-1a8a-4543-98b7-790d5cdb3da5-1.viptela.com/emailAddress=support@viptela.com
Getting CA Private Key
vmanage:~$ openssl x509 -req -in vedge02_csr -CA sdwan-lab-root-ca.pem -CAkey sd
wan-lab-root-ca.key -CAcreateserial -out vedge02_crt -days 500 -sha256
Signature ok
subject=/C=US/ST=California/L=San Jose/OU=supawit-lab/O=vIPtela Inc/CN=vedge-887
b740f-b630-4089-9670-9ce7cbc7343e-0.viptela.com/emailAddress=support@viptela.com
Getting CA Private Key
vmanage:~$
```

จากนั้นใช้คำสั่ง cat ตรวจสอบ

```
cat vedge01_crt
cat vedge02_crt
```

ไปยัง vEdge01 cli และนำเนื้อที่คัดลอกจาก vManage มาใส่ (ทำที่ vEdge02) ด้วย

```
vshell
vi vedge01_crt
```

```
vEdge01:~$ ls -l
total 16
-rw-r--r-- 1 admin admin 392 Feb 22 18:39 archive_id_rsa.pub
-rw-r--r-- 1 admin admin 1273 Feb 22 18:01 sdwan-lab-root-ca.pem
-rw-r--r-- 1 admin admin 1311 Feb 22 18:41 vedge01_crt
-rw-r--r-- 1 admin admin 1216 Feb 22 18:10 vedge01_csr
vEdge01:~$ 
-rw-r--r-- 1 admin admin 392 Feb 22 14:26 archive_id_rsa.pub
-rw-r--r-- 1 admin admin 1273 Feb 22 18:00 sdwan-lab-root-ca.pem
-rw-r--r-- 1 admin admin 1311 Feb 22 18:39 vedge02_crt
-rw-r--r-- 1 root root 1216 Feb 22 18:10 vedge02_csr
vEdge02:~$ 
```

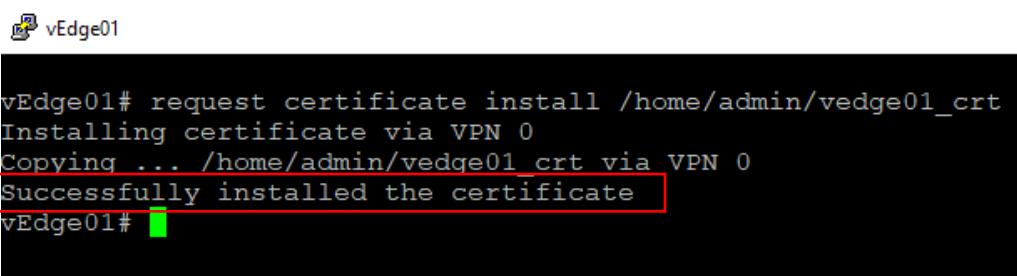
ใช้คำสั่งที่ vEdge01 cli

```
request certificate install /home/admin/vedge01_crt
```

ใช้คำสั่งที่ vEdge02 cli

```
request certificate install /home/admin/vedge02_crt
```

(ที่ vEdge02 ก็ต้อง Successful!!!)



```
vEdge01# request certificate install /home/admin/vedge01_crt
Installing certificate via VPN 0
Copying ... /home/admin/vedge01_crt via VPN 0
Successfully installed the certificate
vEdge01# 
```

ឲ្យកាំស៉ាំពី vEdge01 & vEdge02

show certificate serial

ឲ្យកត់តួរលត្រូវទៅក្នុង Notepad នូវលប់ “Chassis number:”, “serial number:” ចាប់ពី ឲ្យកាំដោយ comma ពេល

```
vEdge02# show certificate serial
Chassis number: 887b740f-b630-4089-9670-9ce7cbc7343e serial number: DF8AD9327F82A200
A200
A1FF
vEdge01# show certificate serial
Chassis number: a3aad45b-1a8a-4543-98b7-790d5cdb3da5 serial number: DF8AD9327F82A1FF
A1FF
vEdge01#
```

*Untitled - Notepad
File Edit Format View Help
887b740f-b630-4089-9670-9ce7cbc7343e, DF8AD9327F82A200
a3aad45b-1a8a-4543-98b7-790d5cdb3da5, DF8AD9327F82A1FF

ឲ្យបង្ហើរឲ្យកាំស៉ាំពី vManage cli ដើម្បីរក្សាទុកបញ្ជីសម្រាប់ការបញ្ចូនឈាម

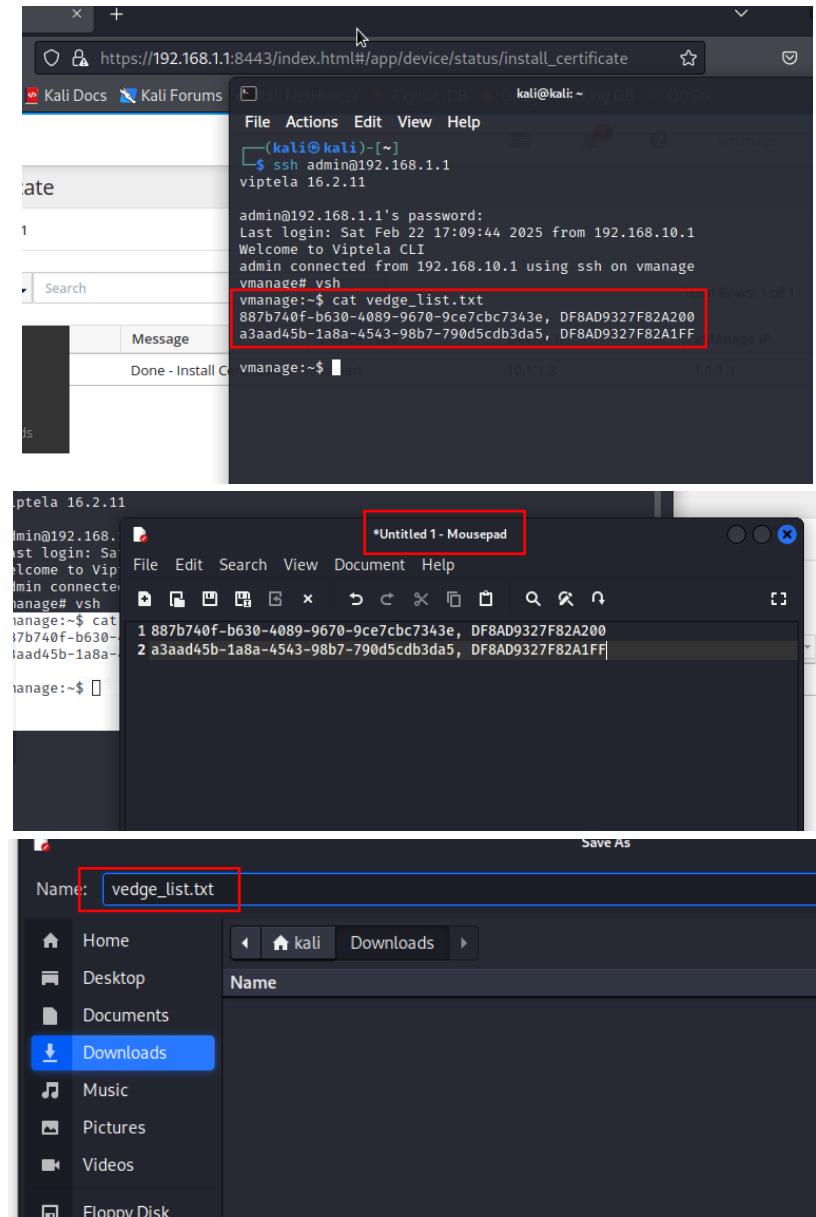
vmanag:~\$ vi vedge_list.txt

ឲ្យកត់តួរលត្រូវទៅក្នុង Notepad លើក

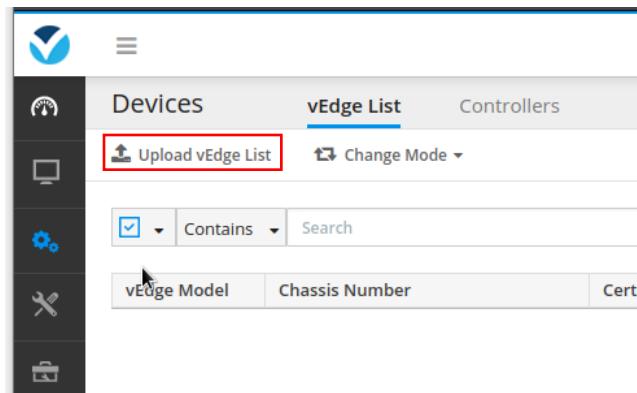
```
vManager
887b740f-b630-4089-9670-9ce7cbc7343e, DF8AD9327F82A200
a3aad45b-1a8a-4543-98b7-790d5cdb3da5, DF8AD9327F82A1FF
```

"vedge_list.txt" [New File]

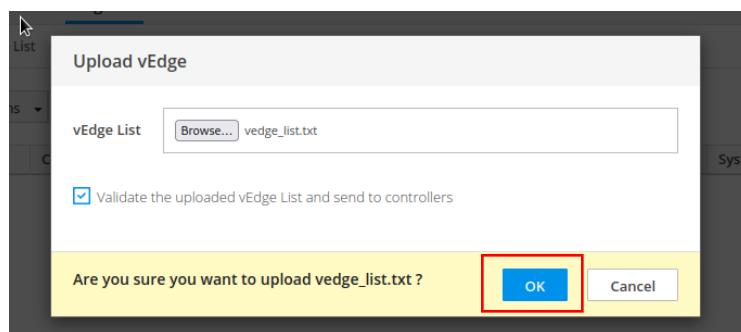
เปิด kali (linux) remote ssh ไปที่ vManage และคัดลอกเนื้อหารายละเอียดอุปกรณ์เก็บไว้ในรูปแบบ .txt



จากนั้นไปที่ vManage GUI : Devices → vEdge List → Upload vEdge List



ให้อัพโหลดไฟล์รายละเอียดอุปกรณ์ (vedge_list.txt)



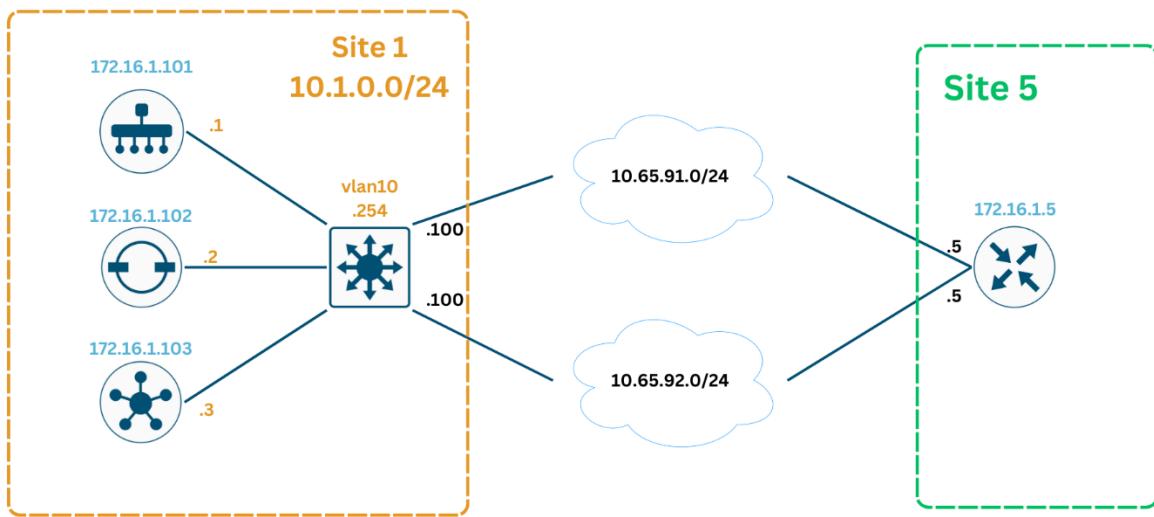
รอสักครู่แล้วไปตรวจสอบที่ Dashboard

| Control Status (Total 1) | | Site Health View (Total 0) | | Transport Interface Distr |
|--------------------------|---|----------------------------|---------|---------------------------|
| Control Up | 1 | Full WAN Connectivity | 0 sites | < 10 Mbps |
| Partial | 0 | Partial WAN Connectivity | 0 sites | 10 Mbps - 100 Mbps |
| Control Down | 0 | | - | 100 Mbps - 500 Mbps |

All done! 😊

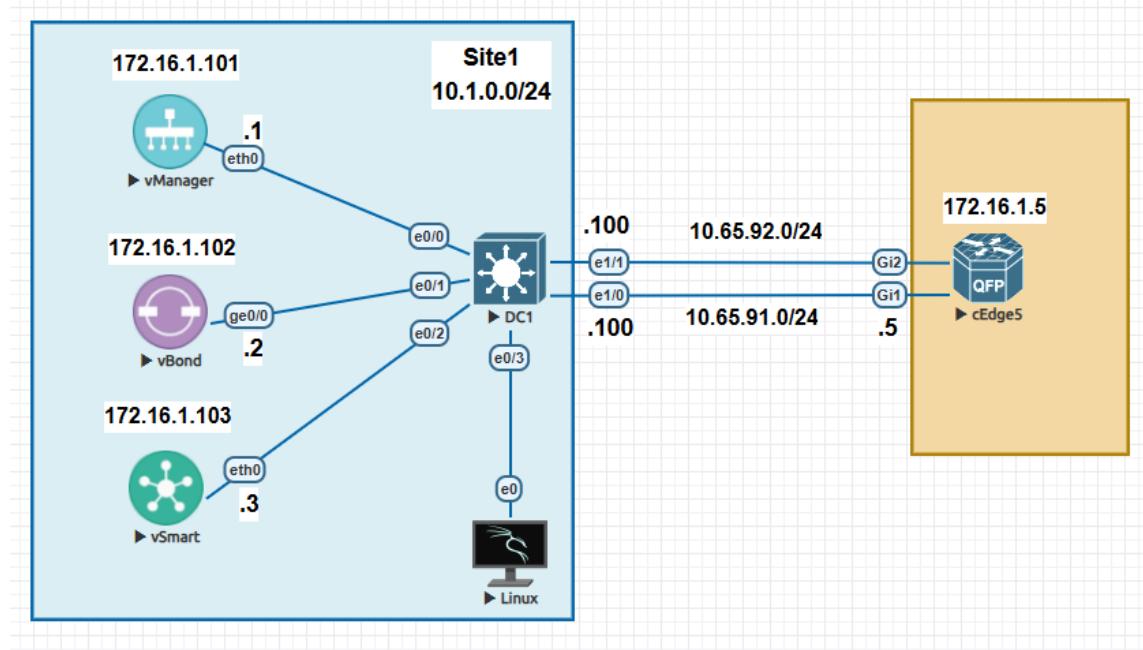
Cisco SD-WAN: cEdge

Cisco SD-WAN cEdge Onboarding



Note: រាយការ Image នេះបានទូទាត់នៅ Lab នេះ

| ឧបករណ៍ | Image |
|------------------|--|
| Kali Linux | linux-kali-2023 |
| L3 & L2 Switch | i86bi_linux_l2-adventerprisek9-ms.SSA.high_iron_20190423 |
| vManage (vtmgmt) | vtmgmt-19.2.0 |
| vSmart (vtsmart) | vtsmart-19.2.0 |
| vBond (vtbond) | vtbond-19.2.0 |
| vEdge (vtedge) | csr1000vng-ucmk9.16.12.1b-sdwan |



1. สร้าง Topology ดังนี้ ควรมี port การเชื่อมต่อเหมือนกับในรูป
2. นำ Config ด้านล่างไปกำหนดให้กับอุปกรณ์

vManage :

```

conf t
system
host-name          vManage1
system-ip          172.16.1.101
site-id            1
organization-name supawit-sd-lab-cisco
vbond 10.1.0.2
!
vpn 0
interface eth0
  ip address 10.1.0.1/24
  tunnel-interface
    allow-service all
  !
  no shutdown
!
ip route 0.0.0.0/0 10.1.0.254
commit and-quit

```

vBond :

```
conf t
system
host-name          vBond1
system-ip          172.16.1.102
site-id            1
organization-name supawit-sd-lab-cisco
vbond 10.1.0.2 local
!
vpn 0
interface ge0/0
  ip address 10.1.0.2/24
  tunnel-interface
    encapsulation ipsec
    allow-service all
  !
  no shutdown
!
ip route 0.0.0.0/0 10.1.0.254
commit and-quit
```

vSmart :

```
conf t
system
host-name          vSmart1
system-ip          172.16.1.103
site-id            1
organization-name supawit-sd-lab-cisco

vbond 10.1.0.2
!
vpn 0
interface eth0
  ip address 10.1.0.3/24
  tunnel-interface
    allow-service all
  !
  no shutdown
!
ip route 0.0.0.0/0 10.1.0.254
commit and-quit
```

DC1 :

```
ena
conf t
hostname DC1
!
ip cef
ip routing
!
interface e0/0
switchport access vlan 10
switchport mode access
!
interface e0/1
switchport access vlan 10
switchport mode access
!
interface e0/2
switchport access vlan 10
switchport mode access
!
interface e1/0
no switchport
ip address 10.65.91.100 255.255.255.0
!
interface e1/1
no switchport
ip address 10.65.92.100 255.255.255.0
!
ip route 0.0.0.0 0.0.0.0 10.65.91.254
!
end
conf t
ip dh po LAN-Site1
network 10.1.0.0 255.255.255.0
default 10.1.0.254
domain supawit.com
exit
int vlan 10
ip add 10.1.0.254 255.255.255.0
no sh
end
conf t
int e0/3
sw mo ac
sw ac vl 10
end
```

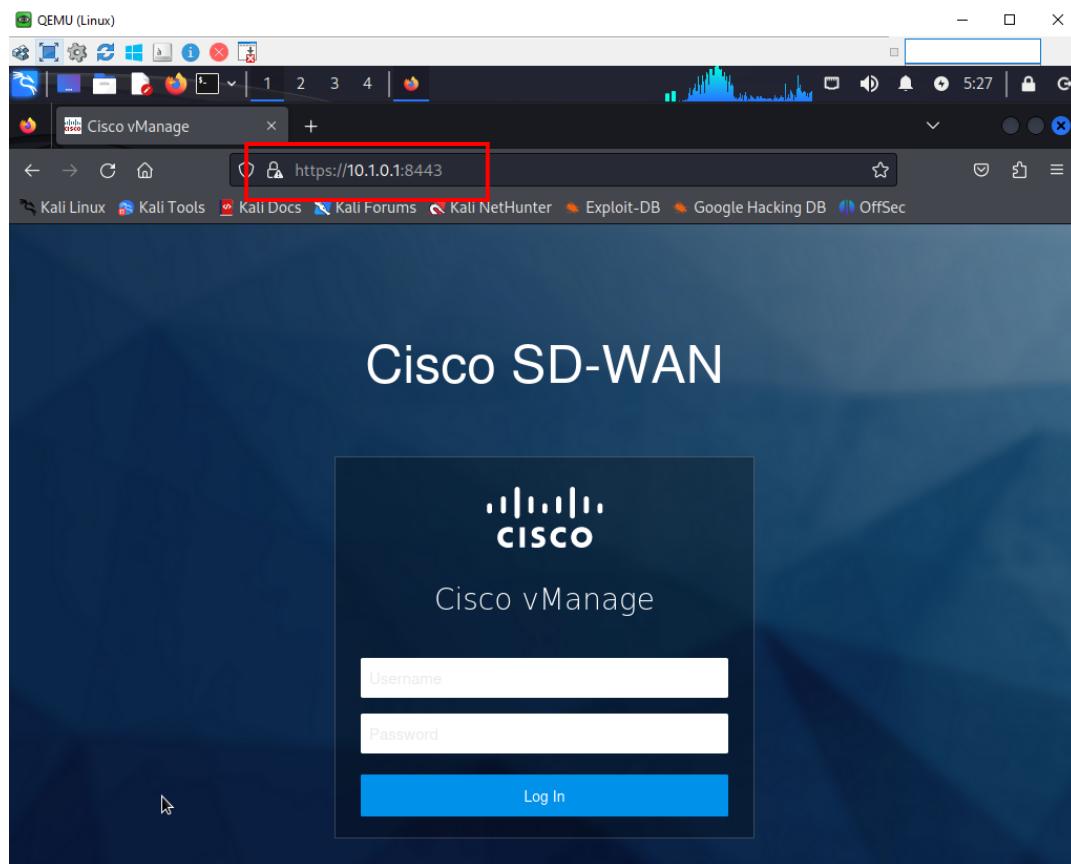
wri

cEdge (CSR1000) : (Default Password admin:admin)

```
config-trans
system
    system-ip          172.16.1.5
    site-id            5
    admin-tech-on-failure
    organization-name  supawit-sd-lab-cisco
    vbond vbond1
!
hostname cEdge5
!
ip host vbond1 10.1.0.2
ip route 10.1.0.0 255.255.255.0 10.65.91.100
!
interface GigabitEthernet1
    no shutdown
    ip address 10.65.91.5 255.255.255.0
!
interface GigabitEthernet2
    no shutdown
    ip address 10.65.92.5 255.255.255.0
    no mop enabled
    no mop sysid
    negotiation auto
!
interface Tunnel1
    no shutdown
    ip unnumbered GigabitEthernet1
    tunnel source GigabitEthernet1
    tunnel mode sdwan
!
interface Tunnel2
    no shutdown
    ip unnumbered GigabitEthernet2
    tunnel source GigabitEthernet2
    tunnel mode sdwan
!
sdwan
    interface GigabitEthernet1
        tunnel-interface
        encapsulation ipsec
        color biz-internet
```

```
allow-service all
interface GigabitEthernet2
  tunnel-interface
    encapsulation ipsec
    color public-internet
    allow-service all
  exit
exit
omp
  no shutdown
  graceful-restart
  address-family ipv4
    advertise connected
    advertise static
  !
  address-family ipv6
    advertise connected
    advertise static
commit
```

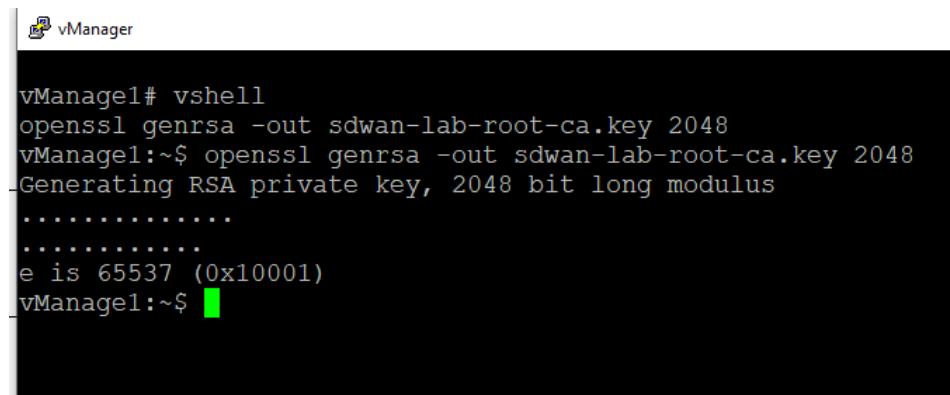
3. ทดสอบ Access vManage GUI (10.1.0.1) ,admin:admin



4. vManage for CA

```
vshell
```

```
openssl genrsa -out sdwan-lab-root-ca.key 2048
```



```
vManage1# vshell
openssl genrsa -out sdwan-lab-root-ca.key 2048
vManage1:~$ openssl genrsa -out sdwan-lab-root-ca.key 2048
Generating RSA private key, 2048 bit long modulus
.
.
.
e is 65537 (0x10001)
vManage1:~$
```

```
openssl req -x509 -new -nodes -key sdwan-lab-root-ca.key -sha256 -days 1024 -subj
```

```
"/C=TH/ST=BKK/L=BKK/O=supawit-lab /CN=vmanage.lab" -out sdwan-lab-root-ca.pem
```

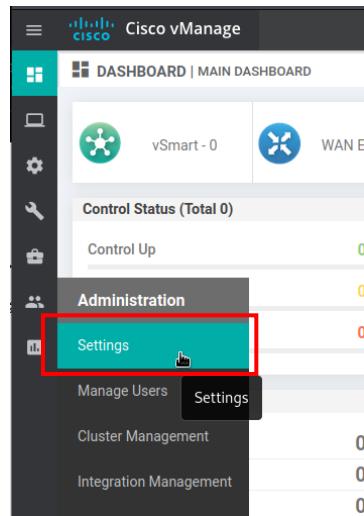
```
vManage1:~$ openssl req -x509 -new -nodes -key sdwan-lab-root-ca.key -sha256 -da
ys 1024 -subj "/C=TH/ST=BKK/L=BKK/O=supawit-lab /CN=vmanage.lab" -out sdwan-lab-
root-ca.pem
vManage1:~$
```

```
request root-cert-chain install /home/admin/sdwan-lab-root-ca.pem
```

```
vManage1#
vManage1# request root-cert-chain install /home/admin/sdwan-lab-root-ca.pem
Uploading root-ca-cert-chain via VPN 0
Copying ... /home/admin/sdwan-lab-root-ca.pem via VPN 0
Updating the root certificate chain..
Successfully installed the root certificate chain
vManage1#
```

5. vManage Certification

Administration → Settings



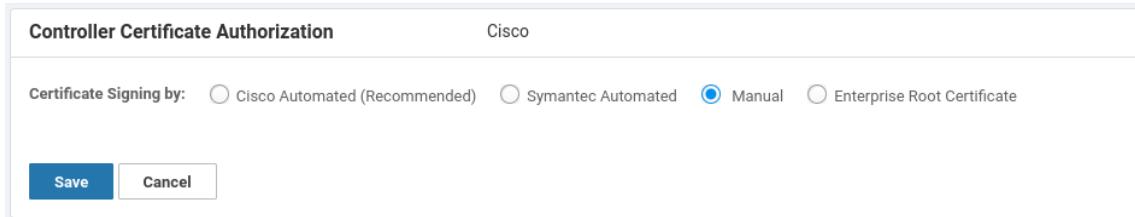
Organization Name → Edit → supawit-sd-lab-cisco → Save

This is a modal dialog titled 'ADMINISTRATION | SETTINGS'. It shows the current 'Organization Name' as 'Not Configured'. Below it, there is a field labeled 'Organization Name' containing 'supawit-sd-lab-cisco'. At the bottom are two buttons: 'Save' (highlighted) and 'Cancel'.

vBond → Edit → 10.1.0.2 → Save

This is a modal dialog titled 'vBond'. It shows the current status as 'Not Configured'. Below it, there is a field labeled 'vBond DNS/ IP Address : Port' containing '10.1.0.2 : 12346'. At the bottom are two buttons: 'Save' (highlighted) and 'Cancel'.

Controller Certificate Authorization → Edit → **Manual** → Save



ໃປពី Configuration → Certificates → Controllers → **vManage** → Generate CSR

| | Operation Status | Controller Type | Hostname | System IP | Site ID | Certificate | Actions |
|---|------------------|-----------------|----------|--------------|---------|--------------------------|------------|
| > | Normal | vManage | vManage1 | 172.16.1.101 | 1 | No certificate installed | ... |

ໃປពី vManage vshell

```
#vshell
openssl x509 -req -in vmanage_csr -CA sdwan-lab-root-ca.pem -CAkey sdwan-lab-root-ca.key -
CAcreateserial -out vmanage_crt -days 500 -sha256
```

```
vManage1#
vManage1# vsh
vManage1:~$ openssl x509 -req -in vmanage_csr -CA sdwan-lab-root-ca.pem -CAkey sdwan-lab-root-ca.key -CAcreateserial -out vmanage_crt -days 500 -sha256
Signature ok
subject=/C=US/ST=California/L=San Jose/OU=supawit-sd-lab-cisco/O=Viptela LLC/CN=vmanage-c2f2a8cf-bee3-4af8-9da9-01814c83c6d6-0.viptela.com/emailAddress=support@viptela.com
Getting CA Private Key
vManage1:~$
```

គឺត្រូវការកែតម្រូវនៅក្នុង vmanage_crt ដើម្បីប្រើប្រាស់របស់ vManage GUI

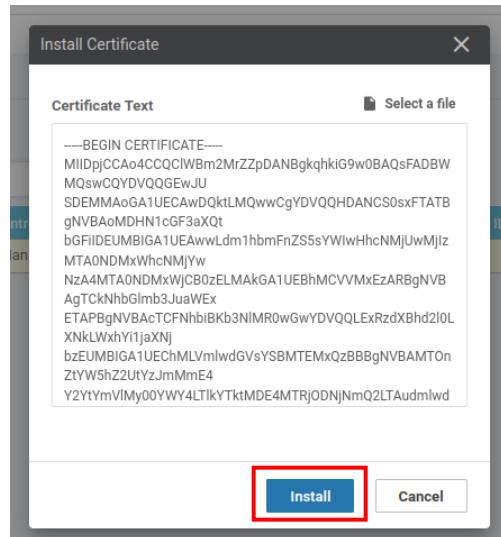
```
(kali㉿kali)-[~]
$ ssh admin@10.1.0.1
The authenticity of host '10.1.0.1 (10.1.0.1)' can't be established.
ECDSA key fingerprint is SHA256:0B1IQGFvdnTirS/0QzvLgMI5Y4+b9Jmbcn3jX77ge7E.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '10.1.0.1' (ECDSA) to the list of known hosts.
viptela 19.2.0

admin@10.1.0.1's password:
Welcome to Viptela CLT
admin connected from 10.1.0.4 using ssh on vManage1
vManage1# vsh

vManage1:~$ cat vmanage_crt
-----BEGIN CERTIFICATE-----
MIIDpjCCAo4CCQC1WBm2MrZZpDANBgkqhkiG9w0BAQsFADBWMQswCQYDVQQGEwJU
SDEMMAoGA1UECAwDQkTLMQwwCgYDVQQHDANCS0sxFTATBgNVBAoMDHN1cGF3aXQt
bGFIIDEUMBIGA1UEAwLdm1hbmFnZS5sYWIwHhcNMjUwMjIzMTA0NDMxWhcNMjYw
NzA4MTA0NDMxWjCB0zELMAkGA1UEBhMCVVMxEzARBgNVBAgTCkNhbGlmb3JuawEx
ETAPBgNVBAcTCFNhb1BKb3NLMR0wGwYDVQQLExRzdXBhd2l0LXNkLWxhYi1jaXNj
bzEUMBIGA1UEChMLVmLwdGVsYSBMTEmQzBBBgNVBAMTOnZtYW5hZ2UtYzJmMmE4
Y2YtYmVlMy00YWY4LTlkYTktMDE4MTRjODNjNmQ2LTAudmlwdGVsYS5jb20xIjAg
BgkqhkiG9w0BCQEWE3N1cHBvcnRadmlwdGVsYS5jb20wggEiMA0GCSqGSIb3DQE
AQAA4IBDwAwggEKAoIBAQD59+ppfRllJnSYEsu6Exr4jnQKAYkhfD1FtDhnGUy
I8hWV1XejIaD+LQQSM4cCn636wtwOeg7PPAJrRp68FFtz3fomPrFuJ050v4iUEho
9+cch90+IoUIPOCLuQtrDXrSPjpeCelKGTYznw7aT0BXryE188pJqUyJb77RU0mY
ezTE4x0o+HvR4y/CTj9DiPGR3AHUL6Qy/5LP1jixZ1vEyfjkEk0JZhAh4doXGY6M
GLv4HBmua+Mof40eTa1HAoXfPiwgFkTxrnqASRSLYNLiugChhPUf/r2t3B4ZKAua
vzErGLp4TS0iQvmLGNUJ9zlMwQJ9xxkxGUoS5S063tpdAgMBAAEwDQYJKoZIhvcN
AQELBQADggEBAGlJoMTKqLQwgkT+ACrHNvQS4SpItHlt5Yx4aZiVEkkhRivLrIn0
yC/uV4a3nvRK/sCFRFKZwR5CB1v1TVAoV3HHngcKZTEJhrrvyuV6eP7kHSoQau3s
ZZfL0jjJ21ny5uPfLEwA7mq0eGo59dv5sDJwNYQ1qH0Y/7RRs7kb6IR8rOchSz35
W8vaS9JnsgZp3JRIXHQEUmds1b9kQXg/zdyxpMORD+xrPgAxV+xR/T2+XDn7QAxC
jITpYHT527lc/JhlzMrnOF6IxvpXfuBRv9VYKbzpKcDnG7ksE+VpfWEULOIkbl
Gyxhd0cn3g8R+TAAEK/o/P+2s+VJulsyGo=
-----END CERTIFICATE-----
vManage1:~$
```

The screenshot shows the Cisco vManage configuration interface. The top navigation bar includes the Cisco logo, the title 'Cisco vManage', and a user dropdown for 'admin'. Below the navigation, there are two tabs: 'WAN Edge List' and 'Controllers', with 'Controllers' being the active tab. Under the 'Controllers' tab, there is a sub-section titled 'Send to vBond'. A search bar and a 'Search Options' dropdown are located at the top of the table area. The main content is a table with the following columns: Operation Status, Controller Type, Hostname, System IP, Site ID, Certificate Serial, and an ellipsis column. There is one row displayed, which is highlighted with a yellow background. The 'Operation Status' column shows 'CSR Generated', the 'Controller Type' is 'vManage', the 'Hostname' is 'vManage1', the 'System IP' is '172.16.1.101', the 'Site ID' is '1', and the 'Certificate Serial' column indicates 'No certificate installed'. At the bottom right of the table, it says 'Total Rows: 1'. On the far right of the table, there are three icons: a refresh symbol, a download symbol, and a menu symbol. A red box highlights the 'Install Certificate' button located in the top right corner of the table header.

| > | Operation Status | Controller Type | Hostname | System IP | Site ID | Certificate Serial | |
|---|------------------|-----------------|----------|--------------|---------|--------------------------|--------|
| > | CSR Generated | vManage | vManage1 | 172.16.1.101 | 1 | No certificate installed | ... |



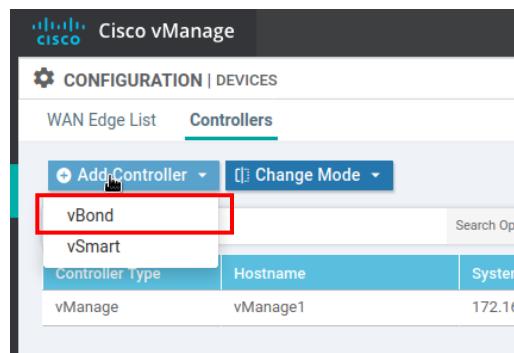
| | Status | Message | Device Type | Device ID | System IP | vManage IP |
|---|---------|--------------------------|-------------|-------------------------|--------------|--------------|
| ✓ | Success | Successfully synced v... | vManage | c2f2a8cf-bee3-4af8-9... | 172.16.1.101 | 172.16.1.101 |
| [23-Feb-2025 10:51:17 UTC] Install Certificate, on device c2f2a8cf-bee3-4af8-9da9-01814c83c6d6, started by user "admin" | | | | | | |
| [23-Feb-2025 10:51:17 UTC] Pushing serial list to vManage-c2f2a8cf-bee3-4af8-9da9-01814c83c6d6 (vManage1) | | | | | | |
| [23-Feb-2025 10:51:18 UTC] Started processing serial list file on vManage-c2f2a8cf-bee3-4af8-9da9-01814c83c6d6 (vManage1) | | | | | | |
| [23-Feb-2025 10:51:19 UTC] Completed processing serial list file on vManage-c2f2a8cf-bee3-4af8-9da9-01814c83c6d6 (vManage1) | | | | | | |
| [23-Feb-2025 10:51:19 UTC] Done - Push vSmart List for vManage-c2f2a8cf-bee3-4af8-9da9-01814c83c6d6 (vManage1) | | | | | | |
| [23-Feb-2025 10:51:19 UTC] Updated controllers with new certificate serial number of vManage-c2f2a8cf-bee3-4af8-9da9-01814c83c6d6 | | | | | | |
| [23-Feb-2025 10:51:20 UTC] Certificate Installed for vManage-c2f2a8cf-bee3-4af8-9da9-01814c83c6d6 | | | | | | |

ការណែនាំត្រូវចូលពីរបៀប នៅក្នុងការចូលរួមនៃពាក្យសម្រាប់ Format key តើមី ----Begin និងលេងទៅ ---End

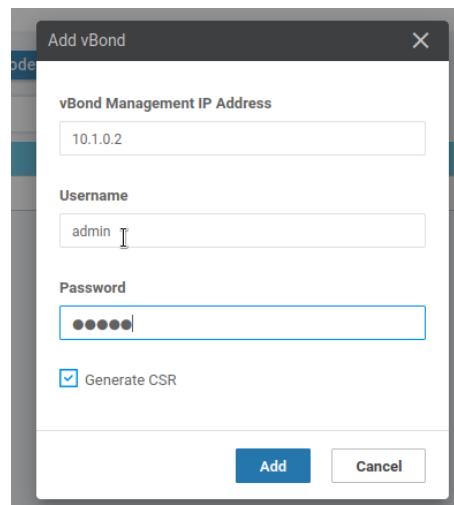
6. vBond Certification

ធំនឹង vBond ឱ្យប្រើប្រាស់ vManage

Configuration → Devices → Controllers → Add Controller → vBond



IP 10.1.0.2 , admin:admin, Generate CSR check



Add Controller Change Mode

Total Rows: 2

| Controller Type | Hostname | System IP | Site ID | Mode | Assigned Template | Device Status | |
|-----------------|----------|--------------|---------|------|-------------------|---------------|-----|
| vManage | vManage1 | 172.16.1.101 | 1 | CLI | -- | In Sync | ... |
| vBond | -- | -- | -- | CLI | -- | -- | ... |

ใช้คำสั่งนี้ที่ vBond cli และให้กรอก Password : admin

```
request root-cert-chain install scp://admin@10.1.0.1:/home/admin/sdwan-lab-root-ca.pem
```

```

vBond1#
vBond1#
vBond1# request root-cert-chain install scp://admin@10.1.0.1:/home/ad
min/sdwan-lab-root-ca.pem
Uploading root-ca-cert-chain via VPN 0
Copying ... admin@10.1.0.1:/home/admin/sdwan-lab-root-ca.pem via VPN
0
Warning: Permanently added '10.1.0.1' (ECDSA) to the list of known ho
sts.
viptela 19.2.0
admin@10.1.0.1's password: [REDACTED]
sdwan-lab-root-ca.pem 0% 0 0.0KB/s
sdwan-lab-root-ca.pem 100% 1273 57.3KB/s
0:00
Updating the root certificate chain..
Successfully installed the root certificate chain
vBond1# [REDACTED]

```

ໄປទៅ vManage vshell

```
vshell
scp admin@10.1.0.2:/home/admin/vbond_csr .
openssl x509 -req -in vbond_csr -CA sdwan-lab-root-ca.pem -CAkey sdwan-lab-root-ca.key -
CAcreateserial -out vbond_crt -days 500 -sha256
```

```
vManage1#
vManage1# vshell
` scp admin@10.1.0.2:/home/admin/vbond_csr .
openssl x509 -req -in vbond_csr -CA sdwan-lab-root-ca.pem -CAkey sdwan-lab-root-
ca.key -CAcreateserial -out vbond_crt -days 500 -sha256
vManage1:~$ scp admin@10.1.0.2:/home/admin/vbond_csr .
The authenticity of host '10.1.0.2 (10.1.0.2)' can't be established.
ECDSA key fingerprint is SHA256:A7EMeYsMgMh8Uxz+WUtHwtiTRQfTWuL/4EwugArzc52k.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '10.1.0.2' (ECDSA) to the list of known hosts.
-viptela 19.2.0

admin@10.1.0.2's password:
vbond_csr                                         100% 1228     38.4KB/s  00:00
vManage1:~$
```

```
vManage1:~$ ls -l
total 28
-rw-r--r-- 1 admin admin  394 Feb 23 10:05 archive_id_rsa.pub
-rw-r--r-- 1 admin admin 1675 Feb 23 10:31 sdwan-lab-root-ca.key
-rw-r--r-- 1 admin admin 1273 Feb 23 10:32 sdwan-lab-root-ca.pem
-rw-r--r-- 1 admin admin   17 Feb 23 10:44 sdwan-lab-root-ca.srl
-rw-r--r-- 1 admin admin 1228 Feb 23 11:01 vbond_csr
-rw-r--r-- 1 admin admin 1326 Feb 23 10:44 vmanage_crt
-rw-r--r-- 1 root  root 1232 Feb 23 10:42 vmanage_csr
vManage1:~$ openssl x509 -req -in vbond_csr -CA sdwan-lab-root-ca.pem -CAkey sdwan-lab-root-ca.key -CAcreateserial -out vbond_crt -days 500 -sha256
Signature ok
subject=/C=US/ST=California/L=San Jose/OU=supawit-sd-lab-cisco/O=Viptela LLC/CN=
vbond-8b27e08a-3502-4b3d-b473-9a2d67a15af7-0.viptela.com/emailAddress=support@viptela.com
Getting CA Private Key
vManage1:~$
```

នាំ [vbond_crt](#) ទៅបង្រាក់ពីកម្មវិធី vManage GUI ដោយមើនកំណត់ថា vManage Certificate

The terminal window shows the command `cat vbond_crt` being run, displaying a long certificate string. The string begins with `--BEGIN CERTIFICATE--` and ends with `--END CERTIFICATE--`. The certificate is for a vBond controller.

```

kali@kali:~$ ls -l
total 32
-rw-r--r-- 1 admin admin 394 Feb 23 10:05 archive_id_rsa.pub
-rw-r--r-- 1 admin admin 1675 Feb 23 10:31 sdwan-lab-root-ca.key
-rw-r--r-- 1 admin admin 1273 Feb 23 10:32 sdwan-lab-root-ca.pem
-rw-r--r-- 1 admin admin 17 Feb 23 11:02 sdwan-lab-root-ca.srl
-rw-r--r-- 1 admin admin 1322 Feb 23 11:02 vbond_crt
-rw-r--r-- 1 admin admin 1228 Feb 23 11:01 vbond_csr
-rw-r--r-- 1 admin admin 1326 Feb 23 10:44 vmanage_crt
-rw-r--r-- 1 root root 1832 Feb 23 10:42 vmanage_csr
vManage1:~ cat vbond_crt
-----BEGIN CERTIFICATE-----
MIIDp0CCAwCCQICBm2MrZzP TANBgqhkiG9w0BAQsFADBWMQswCQYDVQQGEwJU
SDEMMaoGAIUECAwDQktLMQwwCgYDVQHQHANC5osxFTATBgNVBAoMDH1cGF3aXQt
bGFjIDEUMBIGA1UEAwLdm1hbmfNz5sYWlwIwhcNMjUwMjZtMTewMjUwchcNMjYw
NzA4MTewMjUzWjC80TELMAKGA1UEBhMCVVMxEzARBgNVBAgTckNhbGlmb3uuWE
ETAPBgNVBAcTCFNhbibKb3NlMR0wGwYDVQQLExRzdXbhd2l0LXNkLWxhYi1jaXnj
bzEUMBIGA1UECHMLVmldwGVsYSBMTEmQTA/BgNVBAMTOHZib25kLTh1mdj1MDhh
LT1MDItNGiZC1iNDczLThMmQ2NzExNWFmNy0wLnZpcHRlbEuY29tMTStwTAY3
KoZlhvcNAOkBFHmrdXBwb3J0QHcZpcHrLbGeUY29tMTIBjIANBgkhiG9w0BAQEF
AAOCaQ8AMTIBcgCAQEAmTS0w9htcv0z2wK1g6GM/ZGChfrs6Lz43jAcKb
Rf5dZ5MM3bjefr34xZfKa0QtmCup0s3a+bVNNTsUSMPdfRnmcdIbfB87ed27
G3CP59EkgCB1D/42x51JB8/ZwAHR3RUm0aspigkrqo+1BFhv51NuJ/3eaHcnh
/x/k5krgrzxc23p7QFAK1ik9FrIfeTeoDrEE1TqfdAzDirk9nB1BOUD1Ewqim/H2
XCF4Jwcj60WPprM8mjm50YVwApPA9qs1a2kMvoc7300Pa69nrraPcpGGbkah9Ek
X9dx5N/kVNB8AHV8ANkaRx6NmjLw40ST2X9sjtNwIDAQABMA0GCSqGSIb3DQE
CwIA4IBAQcGxG6tzWNX/e7MTlu80mkQ70Yti40dUelnxNK1d+r//MoY1K2z1j
he0ITzliIw07c6zmGGWJXgfPUh32jmqmy0yh4k0BaAdTt2yaeYy/3nMjZj1TK
O1VAj2Av+7sRvGR0xt9uSUHrfmgaURMj70b0b+6D3JA1XsBKmNPB4AgRzf9u/k
WBqqfMRoVodw+HT05Bw/667Z7PdzsQ+usrm3LBKI83psMJ3ee/LTlcmb80WY
ZkmzIC5zira02THiu8j6QsWwly19c4Rmm/XKM0sbp3Ph1eX7yy3nrU8zhuzVT
XwBvYIGUJeQlo0jv0ChWY1kzxJ5RpDk
-----END CERTIFICATE-----
vManage1:~
```

The browser window shows the Cisco vManage interface with the "Install Certificate" button highlighted.

| Status | Message | Device Type | Device ID | System IP | vManage IP |
|----------------------------|--|-------------|-----------------------|-----------|--------------|
| Success | Successfully synced v... | vBond | 8b27e08a-3502-4b3d... | - | 172.16.1.101 |
| [23-Feb-2025 11:06:53 UTC] | Install Certificate, on device 8b27e08a-3502-4b3d-b473-9a2d67a15af7, started by user "admin" | | | | |
| [23-Feb-2025 11:06:54 UTC] | Certificate Installed for vBond-8b27e08a-3502-4b3d-b473-9a2d67a15af7 | | | | |
| [23-Feb-2025 11:06:55 UTC] | Pushing serial list to vBond-8b27e08a-3502-4b3d-b473-9a2d67a15af7 | | | | |
| [23-Feb-2025 11:06:55 UTC] | Started processing serial list file on vBond-8b27e08a-3502-4b3d-b473-9a2d67a15af7 | | | | |
| [23-Feb-2025 11:06:56 UTC] | Completed processing serial list file on vBond-8b27e08a-3502-4b3d-b473-9a2d67a15af7 | | | | |
| [23-Feb-2025 11:06:56 UTC] | Done - Push vSmart List for vBond-8b27e08a-3502-4b3d-b473-9a2d67a15af7 | | | | |
| [23-Feb-2025 11:06:56 UTC] | Successfully synced vSmart list on vBond-8b27e08a-3502-4b3d-b473-9a2d67a15af7 | | | | |

รอสักครู่ไปที่ Dashboard → Main Dashboard จะเห็นว่า vBond มีการเชื่อมต่อ กับ vManage ได้แล้ว

The screenshot shows the Cisco vManage Main Dashboard. In the top right corner, there is a summary card for 'vBond - 1' which indicates 1 site is connected. This card is highlighted with a red box. Below it, under 'Site Health (Total 0)', there are three status categories: 'Full WAN Connectivity' (0 sites), 'Partial WAN Connectivity' (0 sites), and 'No WAN Connectivity' (0 sites). To the right of these cards, there is a section titled 'Transport Interface Distribution' with four categories: '< 10 Mbps', '10 Mbps - 100 Mbps', '100 Mbps - 500 Mbps', and '> 500 Mbps'. A link 'View Percent Utilization' is also present.

7. vSmart Certification : วิธีการจะเมื่อันกับ vBond

เพิ่ม vSmart ที่ vManage GUI

The screenshot shows the Cisco vManage Configuration screen under the 'Devices' tab. A modal dialog box is open for 'Add vSmart'. The 'Add vSmart' button is highlighted with a red box. Inside the dialog, there are fields for 'vSmart Management IP Address' (10.1.0.3), 'Username' (admin), and 'Password' (*****). There is also a 'Protocol' dropdown set to 'DTLS' and a checked checkbox for 'Generate CSR'. At the bottom of the dialog are 'Add' and 'Cancel' buttons.

ใช้คำสั่งนี้ที่ vSmart cli

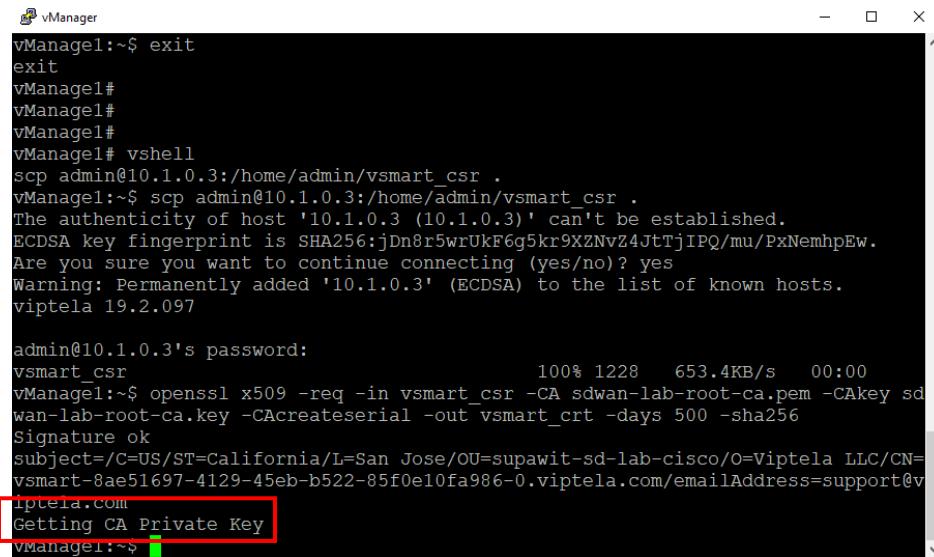
```
request root-cert-chain install scp://admin@10.1.0.1:/home/admin/sdwan-lab-root-ca.pem
```

ไปที่ vManage vshell

```
vshell
```

```
scp admin@10.1.0.3:/home/admin/vsmart_csr .
```

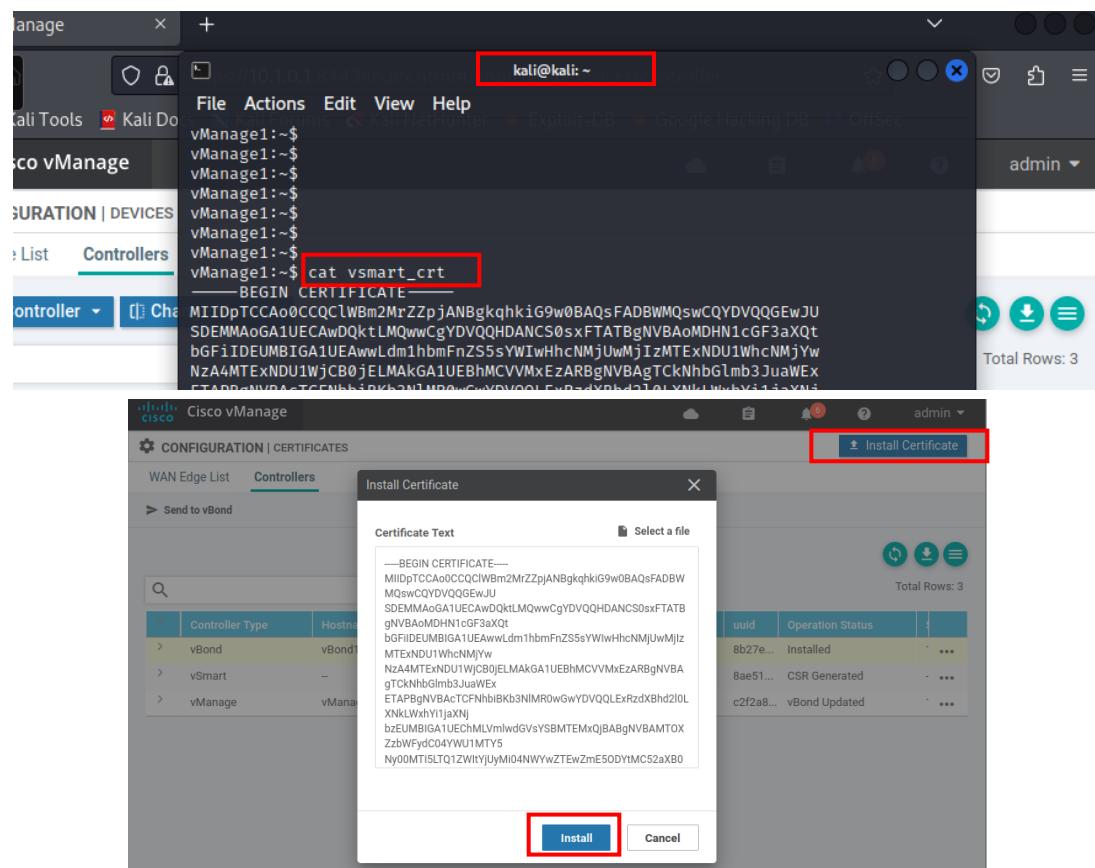
```
openssl x509 -req -in vsmart_csr -CA sdwan-lab-root-ca.pem -CAkey sdwan-lab-root-ca.key -CAcreateserial -out vsmart_crt -days 500 -sha256
```



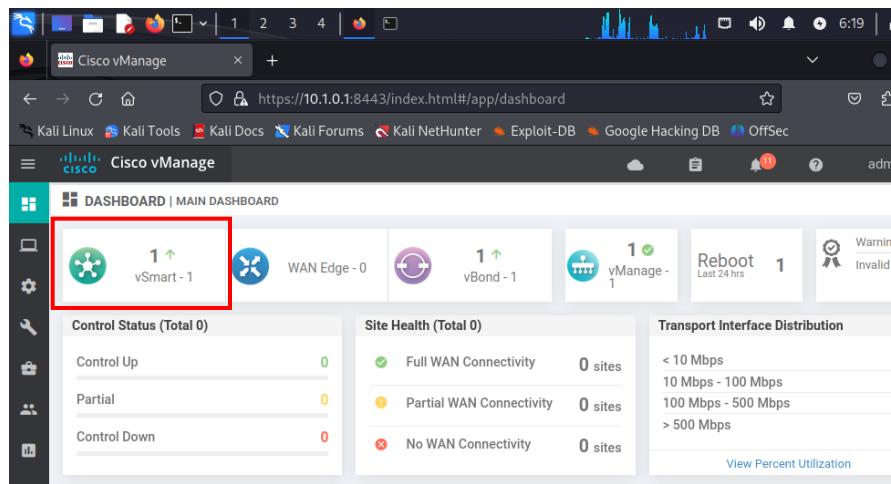
```
vManager
vManage1:~$ exit
exit
vManage1#
vManage1#
vManage1#
vManage1# vshell
scp admin@10.1.0.3:/home/admin/vsmart_csr .
vManage1:~$ scp admin@10.1.0.3:/home/admin/vsmart_csr .
The authenticity of host '10.1.0.3 (10.1.0.3)' can't be established.
ECDSA key fingerprint is SHA256:jDn8r5wrUkF6g5kr9XNvZ4JtTjIPQ/mu/PxNemhpEw.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '10.1.0.3' (ECDSA) to the list of known hosts.
viptela 19.2.097

admin@10.1.0.3's password:
vsmart_csr
vManage1:~$ openssl x509 -req -in vsmart_csr -CA sdwan-lab-root-ca.pem -CAkey sdwan-lab-root-ca.key -CAcreateserial -out vsmart_crt -days 500 -sha256
Signature ok
subject=/C=US/ST=California/L=San Jose/OU=supawit-sd-lab-cisco/O=Viptela LLC/CN=vsmart-8ae51697-4129-45eb-b522-85f0e10fa986-0.viptela.com/emailAddress=support@viptela.com
Getting CA Private Key
vManage1:~$
```

កំណត់កូវិនីអាងាំនៅលើ vsmart_csr ដើម្បីបង្កើតព័ត៌មាន vManage GUI ទាំងអស់នៃការចិត្តព័ត៌មាន vManage Certificate



ទាញសួបពីទាំងអស់ Dashboard



8. cEdge Certification :

ໃຊ້ vManage เปิดไฟล์ sdwan-lab-root-ca.pem

```
vManager
vManager1:~$ cat sdwan-lab-root-ca.pem
-----BEGIN CERTIFICATE-----
MIIDfzCCAmegAwIBAgIJANHHiKi62C8iMA0GCSqGSIb3DQEBCwUAMFYxCzAJBgNV
BAYTA1RIMQwwCgYDVQQIDANCS0sxDDAKBqNVBAcMA0JLSzEVMBMGA1UECgwMc3Vw
YXdpdC1sYWIgMRQwEgYDVQQDDAt2bWFuYWd1LmxhYjAeFw0yNTAyMjMxMDMyNDBa
Fw0yNzEyMTQxMDMyNDBaMFYxCzAJBgNVBAYTA1RIMQwwCgYDVQQIDANCS0sxDDAK
BqNVBAcMA0JLSzEVMBMGA1UECqwMc3VwYXdpdC1sYWIgMRQwEgYDVQQDDAt2bWFu
```

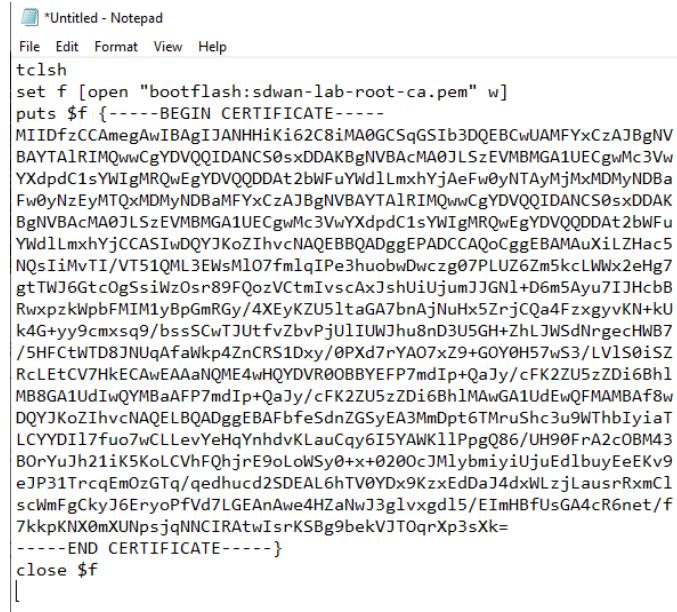
ຈាកន័ែងបើក Notepad แล้วវាងចាំស៉ាងឡាតាំងនេះដើរ Notepad

```
tclsh
set f [open "bootflash:sdwan-lab-root-ca.pem" w]
puts $f {-----BEGIN.....  

          គឺត្រូវលក់នៅហាងការពីការបង្ហាញនៃឯកសារនេះ  

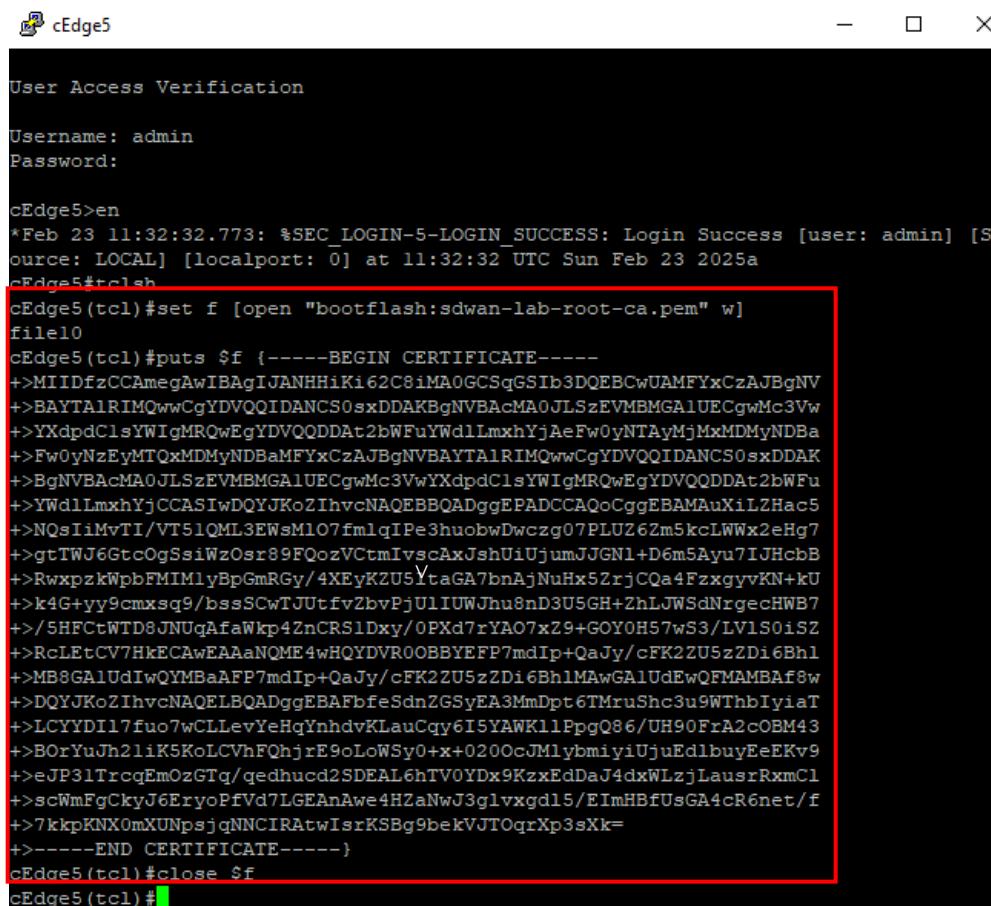
-----END CE.....}
close $f
```

ធ្វូរព័ត៌មាននៃការបង្ហាញនៃឯកសារនេះ



```
*Untitled - Notepad
File Edit Format View Help
tclsh
set f [open "bootflash:sdwan-lab-root-ca.pem" w]
puts $f {-----BEGIN CERTIFICATE-----
MIIDfzCCAmegAwIBAgIJANHHiKi62C8iMA0GCSqGSIb3DQEBCwUAMFYxCzAJBgNV
BAYTA1RIMQwCgYDVQQIDANCS0sxDDAKBgNVBAcMA0JLSzEVMBMGA1UECgwMc3Vw
YXdpdC1sYWIgMRQwEgYDVQQDDAt2bWFuYwd1LmxhYjAeFw0yNTAyMjMxMDMyNDBa
Fw0yNzEyMTQxMDMyNDBaMFYxCzAJBgNVBAYTA1RIMQwCgYDVQQIDANCS0sxDDAK
BgNVBAcMA0JLSzEVMBMGA1UECgwMc3VwYXdpdC1sYWIgMRQwEgYDVQQDDAt2bWFu
Ywd1LmxhYjACASIwDQYJKoZIhvcNAQEBBQADggEPADCCAQoCggEBAMAuXilZHac5
NQsIiMvTI/VT51QML3EWsM107fmlqIPe3huobwDwcgb07PLUZ6Zm5kcLWWx2ehg7
gtTWJ6Gtc0gSsiWosr89FQozVCtmIvscAxJshUiUjumJJGN1+D6m5Ayu7IJHcbB
RwxpkzklpbFMIMlyBpGmRGy/4XEyKZU5lt+aGA7bnAjNuHx5ZrjCQa4FzxgyvKN+kU
k4G+yy9cmxsq9/bssScwTJUtfvzbvPjU1IUWJhu8nD3U5GH+ZhlJWSdNrgechWB7
/5HFctWTD8JNUqAfaWkp4ZnCRS1Dxy/0PXd7rYA07xZ9+GOY0H57wS3/LV1S0iS2
RcLETcv7HKECAwEAAsAnQME4whQYDVR00BBYEFP7mdIp+QaJy/cFK2ZU5zZDi6bh1
MB8GA1UdIwQYMbaAFP7mdIp+QaJy/cFK2ZU5zZDi6bh1MAwGA1UdEwQFMAMBaf8w
DQYJKoZIhvcNAQELBQAQDggEBAFbfeSdnZGSyEA3MmDpt6TMruShc3u9WThbIyiaT
LCYYDI17fu07wCLLevYeHqYnhdvKLauCqy6I5YAWK11PpgQ86/UH90FrA2cOBM43
BOrYuJh21iK5KoLCvhFQhjrE9oLoWSy0+x+0200cJMlybmiyiUjuEdlbuyEeEkv9
+eJP31TrcqEmOzGTq/qedhucd2SDEAL6hTV0YDx9KzxEdDaJ4dxWLzjLausrRxmCl
scWmFgCkyJ6EryoPFvd7LGEAnAwe4HZaNwJ3glvxgd15/EImHBfUsGA4cR6net/f
+7kkpKNX0mXUNpsjqNNCIRAtwIsrKSBg9bekVJT0qrXp3sXk=
-----END CERTIFICATE-----}
close $f
|
```

ຈາກនັ້ນគັດລອກທີ່ໜໍາໜໍາໄປວາງໃກ້ກັບ cEdge5



```
cEdge5
User Access Verification

Username: admin
Password:

cEdge5>en
*Feb 23 11:32:32.773: %SEC_LOGIN-5-LOGIN_SUCCESS: Login Success [user: admin] [S
ource: LOCAL] [localport: 0] at 11:32:32 UTC Sun Feb 23 2025a
cEdge5#tclsh
cEdge5(tcl)#set f [open "bootflash:sdwan-lab-root-ca.pem" w]
file10
cEdge5(tcl)#puts $f {-----BEGIN CERTIFICATE-----
+>MIIDfzCCAmegAwIBAgIJANHHiKi62C8iMA0GCSqGSIb3DQEBCwUAMFYxCzAJBgNV
+>BAYTA1RIMQwCgYDVQQIDANCS0sxDDAKBgNVBAcMA0JLSzEVMBMGA1UECgwMc3Vw
+>YXdpdC1sYWIgMRQwEgYDVQQDDAt2bWFuYwd1LmxhYjAeFw0yNTAyMjMxMDMyNDBa
+>Fw0yNzEyMTQxMDMyNDBaMFYxCzAJBgNVBAYTA1RIMQwCgYDVQQIDANCS0sxDDAK
+>BgNVBAcMA0JLSzEVMBMGA1UECgwMc3VwYXdpdC1sYWIgMRQwEgYDVQQDDAt2bWFu
+>Ywd1LmxhYjACASIwDQYJKoZIhvcNAQEBBQADggEPADCCAQoCggEBAMAuXilZHac5
+>NQsIiMvTI/VT51QML3EWsM107fmlqIPe3huobwDwcgb07PLUZ6Zm5kcLWWx2ehg7
+>gtTWJ6Gtc0gSsiWosr89FQozVCtmIvscAxJshUiUjumJJGN1+D6m5Ayu7IJHcbB
+>RwxpkzklpbFMIMlyBpGmRGy/4XEyKZU5lt+aGA7bnAjNuHx5ZrjCQa4FzxgyvKN+kU
+>k4G+yy9cmxsq9/bssScwTJUtfvzbvPjU1IUWJhu8nD3U5GH+ZhlJWSdNrgechWB7
+>/5HFctWTD8JNUqAfaWkp4ZnCRS1Dxy/0PXd7rYA07xZ9+GOY0H57wS3/LV1S0iS2
+>RcLETcv7HKECAwEAAsAnQME4whQYDVR00BBYEFP7mdIp+QaJy/cFK2ZU5zZDi6bh1
+>MB8GA1UdIwQYMbaAFP7mdIp+QaJy/cFK2ZU5zZDi6bh1MAwGA1UdEwQFMAMBaf8w
+>DQYJKoZIhvcNAQELBQAQDggEBAFbfeSdnZGSyEA3MmDpt6TMruShc3u9WThbIyiaT
+>LCYYDI17fu07wCLLevYeHqYnhdvKLauCqy6I5YAWK11PpgQ86/UH90FrA2cOBM43
+>BOrYuJh21iK5KoLCvhFQhjrE9oLoWSy0+x+0200cJMlybmiyiUjuEdlbuyEeEkv9
+>+eJP31TrcqEmOzGTq/qedhucd2SDEAL6hTV0YDx9KzxEdDaJ4dxWLzjLausrRxmCl
+>+scWmFgCkyJ6EryoPFvd7LGEAnAwe4HZaNwJ3glvxgd15/EImHBfUsGA4cR6net/f
+>+7kkpKNX0mXUNpsjqNNCIRAtwIsrKSBg9bekVJT0qrXp3sXk=
+>-----END CERTIFICATE-----}
cEdge5(tcl)#close $f
cEdge5(tcl)#
|
```

ໃใชការសំង្គ់ក្នុង cEdge5

request platform software sdwan root-cert-chain install bootflash:sdwan-lab-root-ca.pem

```
cEdge5(tcl) #exit
cEdge5#$ware sdwan root-cert-chain install bootflash:sdwan-lab-root-ca.pem
Uploading root-ca-cert-chain via VPN 0
Copying ... /bootflash/sdwan-lab-root-ca.pem via VPN 0
Updating the root certificate chain..
Successfully installed the root certificate chain
cEdge5#
*Feb 23 11:34:34.542: %Cisco-SDWAN-cEdge5-action_notifier-6-INFO-1400002: R0/0:
VCONFD_NOTIFIER: Notification: 2/23/2025 11:34:34 security-install-rcc severity-
level:minor host-name:default system-ip:172.16.1.5
cEdge5#
```

តាមដែនការណ៍ នឹងផ្តល់ពាក្យសម្រាប់នៅ bootflash កន្លែង វានឹងមិនមែន file sdwan-lab-root-ca.pem ទេឬអ្វី

ໃใชការសំង្គ់ក្នុង cEdge5

request platform software sdwan csr upload bootflash:cedge5_csr

supawit-sd-lab-cisco (x2)

```
cEdge5#
cEdge5#request platform software sdwan csr upload bootflash:cedge5_csr
Uploading CSR via VPN 0
Enter organization name      : supawit-sd-lab-cisco
Re-enter organization name   : supawit-sd-lab-cisco
Generating private/public pair and CSR for this vedge device
Generating CSR for this vedge device .....[DONE]
Copying ... /bootflash/cedge5_csr via VPN 0
CSR upload successful
cEdge5#
*Feb 23 11:38:08.945: %Cisco-SDWAN-cEdge5-action_notifier-6-INFO-1400002: R0/0:
VCONFD_NOTIFIER: Notification: 2/23/2025 11:38:8 security-install-csr severity-
level:minor host-name:default system-ip:172.16.1.5
```

ໃຊការសំង្គ់ក្នុង cEdge5

more bootflash:/cedge5_csr

```
cEdge5#
cEdge5#more bootflash:/cedge5_csr
-----BEGIN CERTIFICATE REQUEST-----
MIIDVjCCAj4CAQAwgdUxCzAJBgNVBAYTA1VTMRMwEQYDVQQIEwpDYWxpZm9ybmlh
MREwDwYDVQQHEwhTYW4gSm9zZTEdMBsGA1UECxMUc3VwYXdpdC1zzC1sYWItY2lz
Y28xFDASBqNVBAoTC3ZJUHR1bGEgSW5jMUUwQwYDVQQDEzx2ZWRnZs1DU1ItZDFh
MTkxMDgtMWQ0YS00NmJlLTk4ZjAtODc2NjZjMDkyOWEwLTEudmlwdGVsYS5jb20x
IjAgBqkqhkiG9w0BCQEWE3N1cHBvcnRAdmlwdGVsYS5jb20wggEiMA0GCSqGSIb3
DQEBAQUAA4IBDwAwggEKAoIBAQCbw6TXd2AOG1IdtW7//9x0fmcwnpJrO0VVVcYm
Rb521vKPpsd2NbW/B09iI9e7P99lehqR2HtkRFTHTI7MrlSFp64D452k2djVDhFN
hhDi5du2TAnghbxW+st7camVnP+uWn12T8C1+2NEPmijU0umCY287m7O7DP9/C+721
```

ไปที่ vManage cli แล้วให้สร้างไฟล์ cedge5.csr แล้วคัดลอกเนื้อหา key จาก cedge5_csr ใส่ลงไป

```
vsh
```

```
vi cedge5.csr
```

```
cEdge5# more bootflash:cedge5.csr
-----BEGIN CERTIFICATE REQUEST-----
MIIDVCCA14CAQAwgdUXCzAxBgNVBAYTA1TMRMwEQQYDVQGIWpDYWxpZm9ybmlh
MREwDwYDVQHewhTYW4qSm9zTEdMBsGA1UECxMUC3WvXdpclzCzlSY1IzY2Iz
Y28xFDASeNBgVAoTC3ZJUHlrbEGsW5jMUUwQwYDVQDEzx22WRnZS1DU1tZDFh
MTkxMDgtMWQOYSOUnJlItk4zAtODc2N1zJMDkyWEwlTsundlwgVsY5jb20x
IjAgBgkhkiGw0BCQEWE3N1CHBvcnRAdmlwdGVsY5jb20x
DQEBAQAA4IBDwAwgEKAAIBAQCbw6Txz2AOGLidwt7//9x0fmcvnpJr0VVVcYm
Rb521yKPPsd2NbxB091I9eP991ehqR2HtkRFTHT17Mr15Fp64n452k2djVdnFN
hhDj5dx2ApqxhxW-s1samVeBa-wr13t8sk3NFRmjH9wnCX287mZo2P89/G+721
EvarFpZnX1v3seic61CgjxJ-T9pk978gsT7x1T7qjxGeUinatcP0fcHu4xbIm
IKzfr7yair3QWUmwyg67xcb75i2v7dkOh9sus23krdrw674mnZKFkLX10pLzq46
Bk3Ckzil05tqxfNq1lgCJzvneNUmZ7J711RrVMqo2z6yfkfbAgMBAAGoza5bgkq
hkiGw0BCQAxLDaqKA1UdEwQCMAAwHQYDVROOBByYEFC5Ckjhk/yyczyYkkc5
DrarQcNvMA0GCSgG51b3DQEBCUAAA1BAQGuZimEWIc76WOCkDWJC4n0GzEd
ml+88Kw7+T0ME615JGbhuewppl1DCgkZG64JNfCkb9V7q5Drmuj02bcQY1a6
CoFvpamgkvPnNxjAhs35Wq7huh0m31gUKrI3zK7aqd3xevURnhba/34lbd0aw
w5omZvtImgAPf7HDkgq9vTf820uEz1v8V2L5y6112w/nwMendAF5Fc1WWBrU
KZV1k4EF07Opku0GCBwv1h6EZbhrQQuJaFCAP7gr7wQMNqoA4rv5c1wRuToUQ
MKYtZhY+icDLqEt7DcwPNOoPiXUDg7BN1lycL5wBoHct0Em05awbp
-----END CERTIFICATE REQUEST-----
cEdge5#
```

"cedge5.csr" (New File)

ใช้คำสั่งนี้ที่ vManage cli

```
openssl x509 -req -in cedge5.csr -CA sdwan-lab-root-ca.pem -CAkey sdwan-lab-root-ca.key -CAcreateserial -out
cedge5.crt -days 2000 -sha256
```

```
vManage1:~$ openssl x509 -req -in cedge5.csr -CA sdwan-lab-root-ca.pem -CAkey sdwan-lab-root-ca.key -CAcreateserial -out cedge5.crt -days 2000 -sha256
Signature ok
subject=/C=US/ST=California/L=San Jose/OU=supawit-sd-lab-cisco/O=vIPtela Inc/CN=
vedge-CSR-dla19108-1d4a-46bb-98f0-87666c0929a0-1.viptela.com/emailAddress=supor
t@viptela.com
Getting CA Private Key
vManage1:~$
```

เปิดเนื้อหาที่ได้

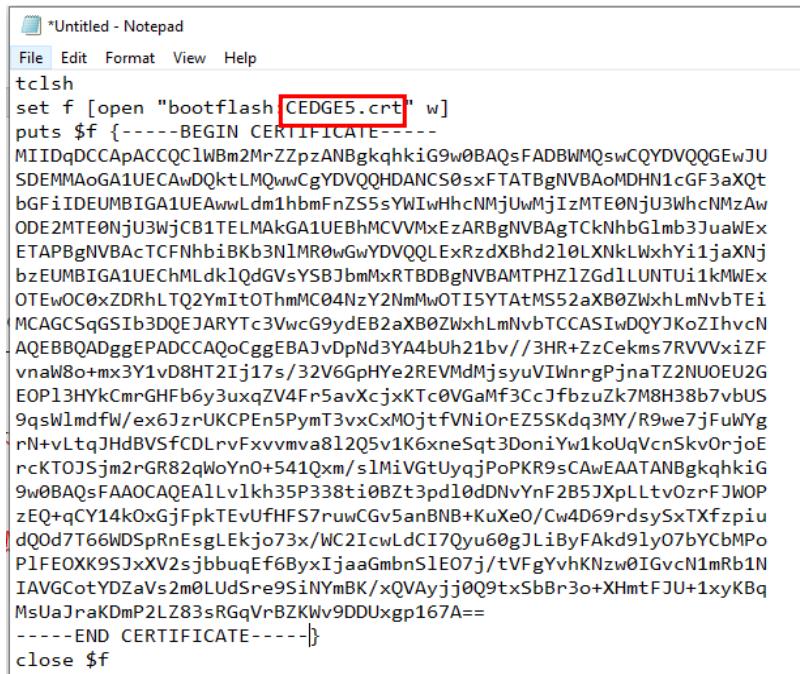
```
cat cedge5.crt
```

```
vManage1:~$ cat cedge5.crt
-----BEGIN CERTIFICATE-----
MIIDqDCCApACCQClWBm2MrZpZANBqkqhkiG9w0BAQsFADBWMQswCQYDVQQGEwJU
SDEMMAoGA1UECAwDQktLMQwwCgYDVQQHDANCS0sxFTATBqNVBAoMDHN1cGF3aXQt
bGF1IDEUMBIGA1UEAwLdm1hbmfNzS5sYWIwHhcNMjUwMjIzMTE0NjU3WhcNMzAw
ODE2MTE0NjU3WjCB1TELMAkGA1UEBhMCVVMxEzARBqNVBAgTCkNhbg1mb3JuaWEw
ETAPBqNVBAcTCF NhbiBKb3N1MR0wGwYDVQQLEXRzdXBhd210LXNkLWxhYi1jaXnj
bzEUMBIGA1UEChMLdk1QdGVsYSBjbmMxRTBDBgNVBAMTPH1ZGd1LUNTUi1kMWEx
OTEwOC0xZDRhLTQ2YmItOThmMC04NzY2NmMwOTI5YTAtMS52aXB0ZWxhLmNvbTEi
```

ការណែនាំ បើក Notepad ថ្មី និងរកសាខាដំឡើងនៅក្នុង Notepad

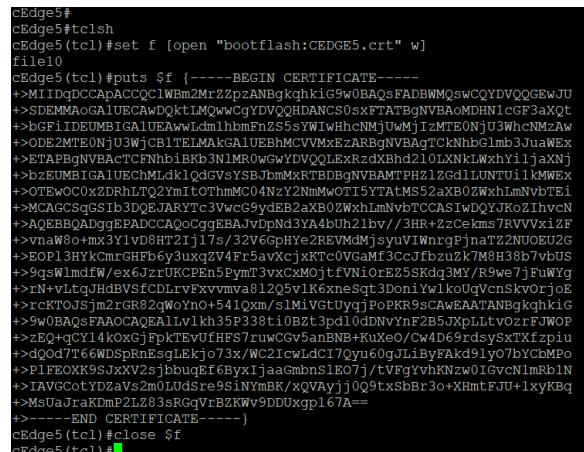
```
tclsh
set f [open "bootflash:CEDGE5.crt" w]
puts $f {----BEGIN.....
គឺត្រូវដោលភាពពីការបើកតួនាទីមិនអាចបានបាន
-----END CE.....}
close $f
```

ពាយខ្លួន



```
*Untitled - Notepad
File Edit Format View Help
tclsh
set f [open "bootflash:CEDGE5.crt" w]
puts $f {----BEGIN CERTIFICATE-----
MIIDqDCCApACCQC1WBm2MrZZpzANBqkqhkiG9w0BAQsFADBWMQswCQYDVQQGEwJU
SDEMMaGAIUECAwDQktLMQwCgYDVQHdANC0sxFtATBgNVBAoMDHN1cGF3aXQt
bGFiIDEUMBIGA1UEAwLdm1hbmfNzS5sYWlwhHcNMjUwMjIzMTE0NjU3WhcNMzAw
ODE2MTE0NjU3WjCB1TELMAkGA1UEBhMCVVMxEzARBgNVBAgTCKhNbGlmb3JuawEx
ETAPBgNVBAcTCFNhbiBKb3N1MR0wGwYDVQQLExRzdXBhd210LNkLWxhYi1jaXNj
bzEUMBIGA1UEChMLdklQdGVsYSBjbmxRTBDBgNVBAMTPH1ZGd1LUNTUi1kMWEx
OTEwC0xZDRhLTQ2YmItOTM0NzY2NmMwOT15YTAtMS52aXB0ZWxhLmNvbTEi
MCAGCSqGSib3DQEJARYTc3WcG9ydeB2aXB0ZWxhLmNvbTCCASIwDQYJKoZIhvcN
AQEBBQADggEPADCCQAc0cgGEBAJvDpNdzY4abUh21bv//3HR+ZzCekms7RVVxizF
vnaW8o+mx3Y1vD8HT2Ij17s/32V6GpHYe2REVMdMjsyuVIWnrgPjnaTZ2NUOEU2G
EOPl3HYkCmrGHFb6y3uxqZV4Fr5avXcjxKtc0VGAmf3CcJfbzuZk7M8H38b7vbUS
9qsWlmdfW/ex6JzrUKCPEn5PymT3vxCxMOjtfnViOrEZ5SKdq3MY/R9we7jFuWYg
rN+vltqJhdBVsfCDLrvFxvvma812Q5v1K6xneSqt3DoniYw1koUqVcnSkvOrjoE
rcKTOJSjm2rGR82qWoYn0+541Qxm/s1MiVgtUyqjPoPKR9sCAwEAATANBqkqhkiG
9w0BAQsFAOCAQEAL1vkh35P338ti0BZt3pd10dDNvYnF2B5JXpLLtvOzrFJWOP
zEQ+qCY14k0xGjFpkTeVfHFS7ruwCgv5anBw+KuXe0/Cw4D69rdsySxTXfpipu
dQod7T66WDSpRnEsgLEkj073x/WC21cwLdC17Qyu60gJLiByFAkd9ly07bYCbMPo
P1FEOK9SJxXV2sjbbuqEf6Byxtjaagmbns1E07j/tVFgYvhKNzw0IGvcNlmRb1N
IAVGcotYDzaVs2m0LUDsre9SiNYmBK/xQVayjj0Q9txSbBr3o+XHmtFJU+1xyKBq
MsuaJraKdmP2LZ83sRGqVrBZKwv9DDUxgp167A==
-----END CERTIFICATE-----}
close $f
```

ការណែនាំ បើកតួនាទីមិនអាចបានបាន



```
cEdge5#
cEdge5#tclsh
cEdge5(tcl)#set f [open "bootflash:CEDGE5.crt" w]
file10
cEdge5(tcl)#puts $f {----BEGIN CERTIFICATE-----
>MIIDqDCCApACCQC1WBm2MrZZpzANBqkqhkiG9w0BAQsFADBWMQswCQYDVQQGEwJU
>>SDEMMaGAIUECAwDQktLMQwCgYDVQHdANC0sxFtATBgNVBAoMDHN1cGF3aXQt
>>bGFiIDEUMBIGA1UEAwLdm1hbmfNzS5sYWlwhHcNMjUwMjIzMTE0NjU3WhcNMzAw
>>ODE2MTE0NjU3WjCB1TELMAkGA1UEBhMCVVMxEzARBgNVBAgTCKhNbGlmb3JuawEx
>>ETAPBgNVBAcTCFNhbiBKb3N1MR0wGwYDVQQLExRzdXBhd210LNkLWxhYi1jaXNj
>>bzEUMBIGA1UEChMLdklQdGVsYSBjbmxRTBDBgNVBAMTPH1ZGd1LUNTUi1kMWEx
>>OTEwC0xZDRhLTQ2YmItOTM0NzY2NmMwOT15YTAtMS52aXB0ZWxhLmNvbTEi
>>MCAGCSqGSib3DQEJARYTc3WcG9ydeB2aXB0ZWxhLmNvbTCCASIwDQYJKoZIhvcN
>>AQEBBQADggEPADCCQAc0cgGEBAJvDpNdzY4abUh21bv//3HR+ZzCekms7RVVxizF
>>vnaW8o+mx3Y1vD8HT2Ij17s/32V6GpHYe2REVMdMjsyuVIWnrgPjnaTZ2NUOEU2G
>>EOPl3HYkCmrGHFb6y3uxqZV4Fr5avXcjxKtc0VGAmf3CcJfbzuZk7M8H38b7vbUS
>>9qsWlmdfW/ex6JzrUKCPEn5PymT3vxCxMOjtfnViOrEZ5SKdq3MY/R9we7jFuWYg
>>rN+vltqJhdBVsfCDLrvFxvvma812Q5v1K6xneSqt3DoniYw1koUqVcnSkvOrjoE
>>rcKTOJSjm2rGR82qWoYn0+541Qxm/s1MiVgtUyqjPoPKR9sCAwEAATANBqkqhkiG
>>9w0BAQsFAOCAQEAL1vkh35P338ti0BZt3pd10dDNvYnF2B5JXpLLtvOzrFJWOP
>>zEQ+qCY14k0xGjFpkTeVfHFS7ruwCgv5anBw+KuXe0/Cw4D69rdsySxTXfpipu
>>dQod7T66WDSpRnEsgLEkj073x/WC21cwLdC17Qyu60gJLiByFAkd9ly07bYCbMPo
>>P1FEOK9SJxXV2sjbbuqEf6Byxtjaagmbns1E07j/tVFgYvhKNzw0IGvcNlmRb1N
>>IAVGcotYDzaVs2m0LUDsre9SiNYmBK/xQVayjj0Q9txSbBr3o+XHmtFJU+1xyKBq
>>MsuaJraKdmP2LZ83sRGqVrBZKwv9DDUxgp167A==
>>-----END CERTIFICATE-----}
cEdge5(tcl) #close $f
cEdge5(tcl) #
```

ໃຫ្នោតាំងន័ំទាញសួបឯកសារពី cEdge5

dir bootflash:

cEdge5 តួងមីឈើលីថីខ្លួវា CEDGE5.crt

```
18 -rw-          157 Feb 23 2025 11:29:23 +00:00 csrlxc-cfg.log
333249 drwx      4096 Feb 23 2025 10:19:07 +00:00 onep
227585 drwx      4096 Feb 23 2025 10:19:47 +00:00 sdwan
19 -rw-        419430400 Feb 23 2025 11:43:46 +00:00 .sdwaninstallerfs
105665 drwx      1024 Feb 23 2025 10:19:16 +00:00 .sdwaninstaller
97537 drwx      4096 Feb 23 2025 10:19:16 +00:00 vmanage-admin
21 -rw-         1273 Feb 23 2025 11:32:37 +00:00 sdwan-lab-root-ca.pem
22 -rw-         1232 Feb 23 2025 11:38:08 +00:00 cedge5_csr
23 -rw-        1330 Feb 23 2025 11:52:39 +00:00 CEDGE5.crt
```

7897796608 bytes total (6667452416 bytes free)

cEdge5#
cEdge5#

ໃຫ្នោតាំងន័ំទី cEdge5

request platform software sdwan certificate install bootflash:CEDGE5.crt

```
cEdge5#
cEdge5#
cEdge5#$tform software sdwan certificate install bootflash:CEDGE5.crt
Installing certificate via VPN 0
Copying ... /bootflash/CEDGE5.crt via VPN 0
Successfully installed the certificate
cEdge5#
*Feb 23 11:57:32.238: %Cisco-SDWAN-cEdge5-action_notifier-6-INFO-1400002: R0/0:
VCONF_D_NOTIFIER: Notification: 2/23/2025 11:57:32 security-install-certificate s
everity-level:minor host-name:default system-ip:172.16.1.5
```

ໃຫ្នោតាំងន័ំទី cEdge5 ទាញសួប , cEdge5 តួងមី Chassis number และ serial number

show sdwan certificate serial

```
cEdge5#
cEdge5#show sdwan certificate serial
Chassis number: CSR-d1a19108-1d4a-46bb-98f0-87666c0929a0 serial number: A55819B6
32B659A7

cEdge5#
```

ໃຫ្នោតតួនាទី Chassis number, Serial number เកែវិវឌ្ឍន៍ (Notepad)

9. Add cEdge to Manager !

ໃຊ້ការស້າງនີ້ທີ່ vManage & vBond

request vedge add chassis-num [ແຫນ້ວ່າ chassis-number] serial-num [ແຫນ້ວ່າ serial-number]

```

viptela 19.2.0

vBond1 login: admin
Password:
Welcome to Viptela CLI
admin connected from 127.0.0.1 using console on vBond1
vBond1# request vedge add chassis-num CSR-d1a19108-1d4a-46bb-98f0-876
66c0929a0 serial-num A55819B632B659A7
vBond1#
vBond1# [REDACTED]

vManage1:~$ 
vManage1:~$ exit
exit
vManage1# request vedge add chassis-num CSR-d1a19108-1d4a-46bb-98f0-87666c0929a0
    serial-num A55819B632B659A7
vManage1#
vManage1# [REDACTED]

```

ลองទຽបសອບທີ່ Dashboard ຕື່ອເປັນກາຮເສົ້າຈິນ !

The screenshot shows the Cisco vManage interface. At the top, there's a navigation bar with tabs like 'Cisco vManage' and a search bar. Below it is a main dashboard section with various metrics and icons. A red box highlights the 'WAN Edge - 1' status card, which shows 1 up and 1 green arrow icon. To the left of the dashboard is a sidebar with icons for network, settings, and monitoring. Below the dashboard is a 'MONITOR | NETWORK' section with tabs for 'WAN - Edge' and 'Colocation Clusters'. Under 'WAN - Edge', there's a table titled 'Device Group' showing four devices: vManage1, vSmart1, vBond1, and cEdge5. A red box highlights the first three rows of this table. The table columns include Hostname, State, System IP, Reachability, Site ID, Device Model, BFD, Control, and Version.

| Hostname | State | System IP | Reachability | Site ID | Device Model | BFD | Control | Version |
|----------|-------|--------------|--------------|---------|----------------------|-----|---------|----------|
| vManage1 | ✓ | 172.16.1.101 | reachable | 1 | vManage | – | 1 | 19.2.0 |
| vSmart1 | ✓ | 172.16.1.103 | reachable | 1 | vSmart | – | 1 | 19.2.097 |
| vBond1 | ✓ | 172.16.1.102 | reachable | 1 | vEdge Cloud (vBo...) | – | – | 19.2.0 |
| cEdge5 | ✓ | 172.16.1.5 | reachable | 5 | CSR1000v | 0 | 1 | 16.11.1a |

Summary add cEdge

tclsh

```
set f [open "bootflash:sdwan-lab-root-ca.pem" w]
puts $f {----BEGIN CERTIFICATE----
-----END CERTIFICATE----}
close $f
```

dir bootflash: (តួនាទីផល)

```
request platform software sdwan root-cert-chain install bootflash:sdwan-lab-root-ca.pem
```

```
request platform software sdwan csr upload bootflash:cedge5_csr
(organization-set)
```

```
copy to manager (vim cedge5.csr)more bootflash:/cedge5_csr
```

```
openssl x509 -req -in cedge5.csr -CA sdwan-lab-root-ca.pem -CAkey sdwan-lab-root-ca.key -CAcreateserial -out
cedge5.crt -days 2000 -sha256
```

```
cat cedge5.crt
```

tclsh

```
set f [open "bootflash:CEDGE5.crt" w]
puts $f {----BEGIN CERTIFICATE----
-----END CERTIFICATE----}
close $f
```

dir bootflash:

request platform software sdwan certificate install bootflash:CEDGE5.crt

show sdwan certificate serial

vbond & manage: request vedge add chassis-num CSR-7c2369a5-5311-43ee-b5e7-7bdb1a2943a9 serial-num
C5A4665FF705FBA1