

Cisco SD-WAN. Edges licensing and onboarding.

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In this post we generate and install the necessary licenses for Edge devices and then connect them to the controllers. This is the second part from Cisco SD-WAN On-boarding series on building a self hosted SD-WAN lab. For first part click [here](#).

At first we need to obtain the necessary licenses from the Cisco site. That's why we need a Smart Account that includes a Virtual one. Go to software.cisco.com, from the Administration area select Manage Smart Account:

The screenshot displays the Cisco Software Central interface. At the top is a navigation bar with tabs: Home, Order, Download & Upgrades, Provisioning, License, and Administration. The 'License' tab is active, showing a grid of options: Download & Upgrade, Network Plug and Play, and License. The 'License' section includes links for Traditional Licensing, Smart Software Licensing, and Enterprise Agreements. Below this, the 'Administration' section is visible, containing links for All Users (Request a Smart Account, Request Access to an Existing Smart Account, Manage Smart Account) and Additional for Partners (Request a Partner Holding Account, Manage Pending Smart Accounts). The 'Manage Smart Account' link is highlighted in yellow.

Download & Upgrade	Network Plug and Play	License
Software Download Download new software or updates to your current software	Plug and Play Connect Device management through Plug and Play Connect portal	Traditional Licensing Generate and manage PAK-based and other device licenses, including demo licenses
eDelivery Get fast electronic fulfillment of software, licenses, and documentation	Learn about Network Plug and Play Training, documentation and videos	Smart Software Licensing Track and manage Smart Software Licenses.
Product Upgrade Tool (PUT) Order major upgrades to software such as Unified Communications		Enterprise Agreements Generate and manage licenses from Enterprise Agreements.
Upgradeable Products Browse a list of all available software updates.		

Order	Administration
Buy Directly from Cisco Configure, price, and order Cisco products, software, and services. Available to partners and to customers with a direct purchasing agreement.	All Users:
End User License and SAAS Terms Cisco software is not sold, but is licensed to the registered end user. The terms and conditions provided govern your use of that software. Read them here.	Request a Smart Account Get a Smart Account for your organization or initiate it for someone else
	Request Access to an Existing Smart Account Submit a request for access to a Smart Account
	Manage Smart Account Modify the properties of your Smart Accounts and associate individual Cisco Accounts with Smart Accounts.
	Learn about Smart Accounts Access documentation and training.
	Additional for Partners:
	Request a Partner Holding Account Allows Cisco Partners to request a Holding Smart Account
	Manage Pending Smart Accounts View the properties of Smart Accounts in 'Pending' status requested on behalf of Customers and take actions to activate the Smart Accounts

then, select Virtual Accounts

Cisco Software Central > Manage Smart Account

[Account Properties](#) | [Virtual Accounts](#) | [Users](#) | [User Groups](#) | [Custom Tags](#) | [Requests](#) | [Account Agreements](#) | [Event Log](#)

next, select New Virtual Account

My Smart Account

[Account Properties](#) | [Virtual Accounts](#) | [Users](#) | [User Groups](#) | [Custom Tags](#) | [Requests](#) | [Account Agreements](#) | [Event Log](#)

Virtual Accounts

New Virtual Account... Search by name				
Virtual Account Name	Commerce Access Level	Description	Preferred End Date	Actions
DEFAULT	Public	This is the default virtual account created during company account crea...	–	–

fill the form with the name of the new Virtual Account and save.

New Virtual Account

Enter a name and optional description for your Virtual Account.

* Name

Description :

* Commerce Access Level : ☐ Public ☒ Private

By setting to Private, this Virtual Account WILL NOT be searchable by any user in Cisco Commerce Tools.

Preferred End Date :

Save

Cancel

Next step is to add a vBond profile. Go back to Software Central page and from the Network Plug and Play area, choose Plug and Play Connect.

[Home](#) | [Order](#) | [Download & Upgrades](#) | [Provisioning](#) | [License](#) | [Administration](#)



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Get fast electronic fulfillment of software, licenses, and documentation

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Order major upgrades to software such as Unified Communications

[Upgradeable Products](#)
Browse a list of all available software updates.



Network Plug and Play

[Plug and Play Connect](#)
Device management through Plug and Play Connect portal

[Learn about Network Plug and Play](#)
Training, documentation and videos



License

[Traditional Licensing](#)
Generate and manage PAK-based and other device licenses, including demo licenses

[Smart Software Licensing](#)
Track and manage Smart Software Licenses.

[Enterprise Agreements](#)
Generate and manage licenses from Enterprise Agreements.

From the top right drop-down menu select the virtual account created before.

Plug and Play Connect

[Devices](#) | [Controller Profiles](#) | [Network](#) | [Certificates](#) | [Manage External Virtual Account](#)

[+ Add Devices...](#) [+ Add Software Devices...](#) [✎ Edit Selected...](#) [🗑 Delete Selected...](#) [Enable External Management...](#) 

☐	Serial Number	Base PID	Product Group	Controller	Last Modified	Status	Actions
☐			Any ▾	Any ▾	Select Range ▾	Any ▾	Clear Filters

No Devices to display.

Next, select Controller Profiles, then select Add Profile button.

Plug and Play Connect

[Feedback](#) [Support](#) [Help](#)[Devices](#) | [Controller Profiles](#) | [Network](#) | [Certificates](#) | [Manage External Virtual Account](#)

[+ Add Profile](#) [✎ Edit Selected...](#) [🗑 Delete Selected...](#) [✓ Make Default...](#) [📄 Show Log...](#) 

☐	Profile Name	Controller Type	Default	Description	Used By	Download
☐		Any ▾				

No items found.

For the controller type, VBOND must be selected.

Add Controller Profile



STEP 1

Profile Type

...
Conditional Steps

Choose the type of Profile to be created:

* Controller Type: [Cancel](#) [Next](#)

In the next page, fill the required fields and pay attention to Organization Name (this defines the OU to match in the Certificate Auth Process and must be consistent across the Viptela domain) and Primary Controller (this name/address will be used for vBond), then Submit.

Add Controller Profile



STEP 1

STEP 2

STEP 3

STEP 4

Profile Type

Profile Settings

Review

Confirmation

Profile Settings:

- Profile Name:
- Description:
- Default Profile:
- Multi-Tenancy:
- Organization Name:
- Primary Controller:
- Server Root CA:

To add Virtual edges (vEdge or cEdge) devices, from the Plug and Play Connect page, select Devices link.

Plug and Play Connect

[Feedback](#)
[Support](#)
[Help](#)

[Devices](#)
[Controller Profiles](#)
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[Certificates](#)
[Manage External Virtual Account](#)

+ Add Profile...

Edit Selected...

Delete Selected...

Make Default...

Show Log...

☐	Profile Name	Controller Type	Default	Description	Used By	Download
☐		Any				
☐	SD-WAN-LAB	VBOND	☒		0	--

then select Add Software Devices button

Plug and Play Connect

[Feedback](#)
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Add Software Device(s)

STEP 1

STEP 2

STEP 3

Identify Device(s)

Review & Submit

Results

Identify Devices

Enter device details by clicking Add Software Device button and click Next to proceed to the next step.

0 All

0 Valid

0 Errors

0 Existing

Row	Base PID	Quantity	Controller	Description	Actions
No Devices to display.					

No Records to Display

To add a vEdge, in the Identify Device window, enter VEDGE-CLOUD-DNA in the Base PID field.

Identify Device



* Base PID	VEDGE-CLOUD-DNA
* Quantity	5
Controller Profile	SD-WAN-LAB
Description	Enter short optional description for this device.

Cancel

Save

For cEdge, the Base PID is CSR1KV and for ISRv is ISRv.

Identify Device



* Base PID	CSR1KV
* Quantity	2
Controller Profile	SD-WAN-LAB
Description	Enter short optional description for this device.

Cancel

Save

After finishing adding devices, click Next, then check Review and Submit, and Done

Plug and Play Connect

[Feedback](#) [Support](#) [Help](#)[Devices](#) | [Controller Profiles](#) | [Network](#) | [Certificates](#) | [Manage External Virtual Account](#)

Add Software Device(s)

STEP 1
Identify Device(s)

STEP 2
Review & Submit

STEP 3
Results

Identify Devices

Enter device details by clicking Add Software Device button and click Next to proceed to the next step.

2 All 2 Valid 0 Errors 0 Existing

+ Add Software Device...					
Row	Base PID	Quantity	Controller	Description	Actions
1	VEDGE-CLOUD-DNA	5	SD-WAN-LAB	--	 
2	CSR1KV	2	SD-WAN-LAB	--	 

Showing All 2 Records

[Cancel](#)[Next](#)

Now devices are added, for a few minutes they will be on **Pending for publish** state

Plug and Play Connect

[Feedback](#) [Support](#) [Help](#)[Devices](#) | [Controller Profiles](#) | [Network](#) | [Certificates](#) | [Manage External Virtual Account](#)

+ Add Devices... + Add Software Devices... Edit Selected... Delete Selected... Enable External Management... 							
☐	Serial Number	Base PID	Product Group	Controller	Last Modified	Status	Actions
			Any	Any	Select Range	Any	Clear Filters
	2C4A3A0C-1353-9670-977C...	VEDGE-CLOUD-DNA	Router	SD-WAN-LAB	2019-Jun-19, 10:15:13	Pending for publish	Show Log...
	BF2012DA-739C-DE7E-89F9...	VEDGE-CLOUD-DNA	Router	SD-WAN-LAB	2019-Jun-19, 10:15:13	Pending for publish	Show Log...
	48C14431-CAC4-B0B3-FB5...	VEDGE-CLOUD-DNA	Router	SD-WAN-LAB	2019-Jun-19, 10:15:13	Pending for publish	Show Log...
	6C74F1B6-800A-A3A7-AD2...	VEDGE-CLOUD-DNA	Router	SD-WAN-LAB	2019-Jun-19, 10:15:13	Pending for publish	Show Log...
	EBAD1856-1B4A-C89C-D12...	VEDGE-CLOUD-DNA	Router	SD-WAN-LAB	2019-Jun-19, 10:15:13	Pending for publish	Show Log...
	CSR-55E81869-D385-9813-E...	CSR1KV	Router	SD-WAN-LAB	2019-Jun-19, 10:15:13	Pending for publish	Show Log...
	CSR-6170246D-E8C4-1D4A-...	CSR1KV	Router	SD-WAN-LAB	2019-Jun-19, 10:15:13	Pending for publish	Show Log...

Showing All 7 Records

Once the status become Provisioned, we can go to Controller Profiles and select the check box in front of Profile Name and then Provisioning File link, to download the provisioning file.

Plug and Play Connect

[Feedback](#) [Support](#) [Help](#)

[Devices](#) | [Controller Profiles](#) | [Network](#) | [Certificates](#) | [Manage External Virtual Account](#)

[+ Add Profile...](#) [✎ Edit Selected...](#) [🗑 Delete Selected...](#) [✓ Make Default...](#) [📄 Show Log...](#) [🔄](#)

☒	Profile Name	Controller Type	Default	Description	Used By	Download
☒	SD-WAN-LAB	VBOND	✓		7	Provisioning File

Showing 1 Record

In the Download Provisioning File dialog, select Controller Versions 18.3 and newer and download the file.

Download Provisioning File

✕

★ Controller Versions

18.3 and newer

Download

Transfer the downloaded file to the docker node, if you don't know how, look on [EVE-NG Cookbook](#) section 13.2 and you will find how.

Navigate to Configuration > Devices and select Upload vEdge List to upload provisioning file downloaded from Cisco website. On the page are displayed several unused device licenses being successfully added to the system.

Cisco vManage

admin

CONFIGURATION | DEVICES

WAN Edge List

Controllers

[Change Mode](#) [Upload WAN Edge List](#) [Export Bootstrap Configuration](#) [Sync Smart Account](#)

Search Options

Total Rows: 7

State	Device Model	Chassis Number	Serial No./Token	Enterprise Cert Serial No	Enterprise Cert Expiration Date	Hostn
🟢	vEdge Cloud	ebad1856-1b4a-c89c-d120-25ed7d6945...	Token - 993286f816d79...	NA	NA	---
🟢	vEdge Cloud	6c74f1b6-800a-a3a7-ad2d-8962a3b59f9d	Token - 5604b0515e50d...	NA	NA	---
🟢	CSR1000v	CSR-6170246D-E8C4-1D4A-A972-5EF14...	Token - 8f0d0712a5ac0...	NA	NA	---
🟢	CSR1000v	CSR-55E81869-D385-9813-ED05-9DA98...	Token - 696bae5e14783...	NA	NA	---
🟢	vEdge Cloud	2c4a3a0c-1353-9670-977c-27fba1e3e4bd	Token - feec425c6d0c...	NA	NA	---
🟢	vEdge Cloud	48c14431-cac4-b0b3-fb5a-2bd120033204	Token - 77ddbafc3f616...	NA	NA	---
🟢	vEdge Cloud	bf2012da-739c-de7e-89f9-3b823727170d	Token - cd038cc14ce96...	NA	NA	---

Onboarding Edge nodes

vEdge

First step in configuring vEdge is applying the following template:

```
system
 host-name vEdge
 system-ip <vEdge system IP>
 site-id 1
 organization-name "pocvlab sdwan"
 clock timezone Europe/Bucharest
 vbond <VPN0 VBOND IP>
!
vpn 0
 interface ge0/0
  ip address <VPN0 IP address/netmask>
  ipv6 dhcp-client
  tunnel-interface
   encapsulation ipsec
  no shutdown
!
ip route 0.0.0.0/0 <VPN0 gateway address>
```

Verify connection with vBond (10.10.0.3), vManage (10.10.0.2) and vSmart (10.10.0.4) using ping.

Now, we have to copy/paste CA certificate content from docker node to a file on vEdge. Open a terminal on Docker and `cat CA.crt`, select and copy content.

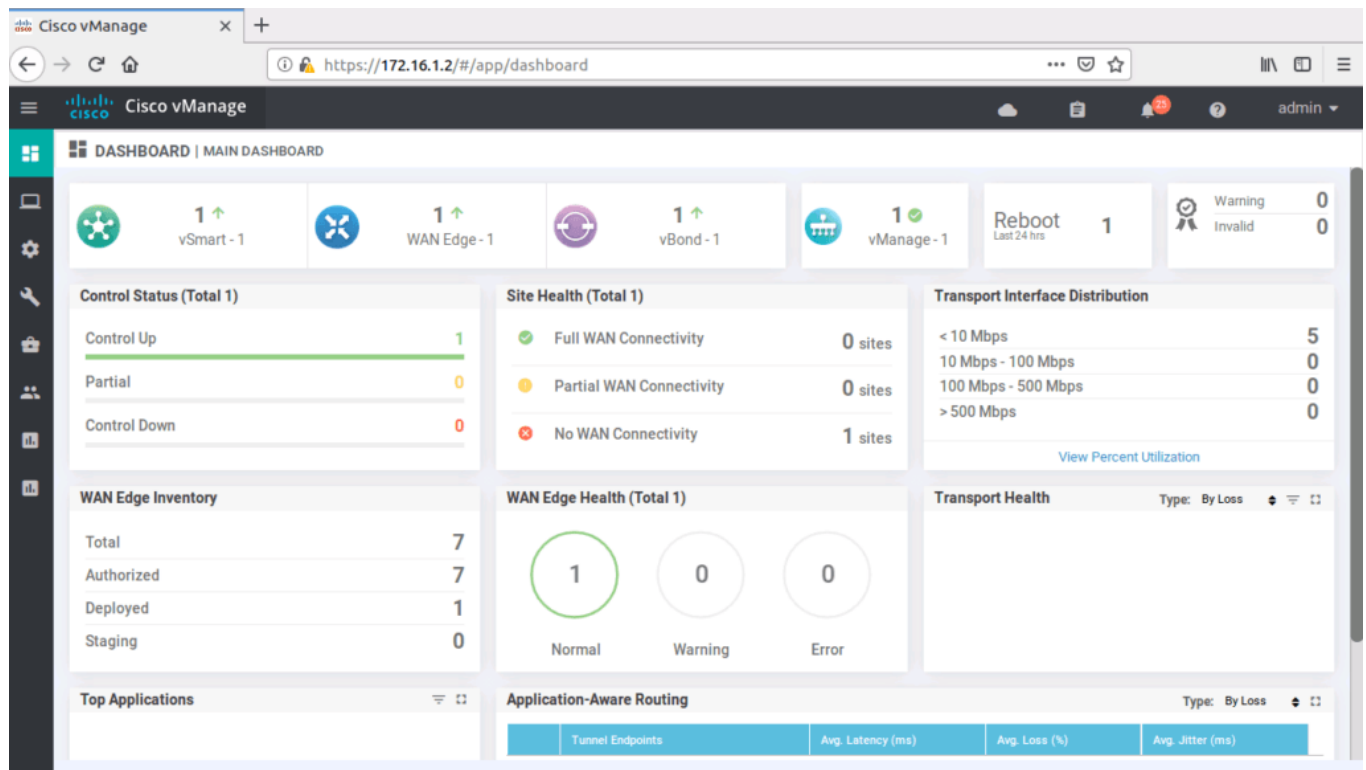
On vEdge go to linux shell using `vshell` command, type `vim CA.crt` to open a empty file in vim editor. Press `i` key to start inserting text and paste the previous copied content. Use `<Esc>wq` to write the file and quit. Type `exit` to go back in vEdge CLI. Now we can import root CA certificate:

```
vEdge# request root-cert-chain install /home/admin/CA.crt
Uploading root-ca-cert-chain via VPN 0
Copying ... /home/admin/CA.crt via VPN 0
Updating the root certificate chain..
Successfully installed the root certificate chain
```

In vManage interface, navigate to Configuration > Devices and select unused vEdge entry, click on the three dots on the right side and select Generate bootstrap configuration. Accept the defaults and click OK. From the new window open we need UUID code and OTP. Go to vEdge console and insert UUID and OTP in the following command:

```
request vedge-cloud activate chassis <UUID> token <OTP>
example bellow:
request vedge-cloud activate chassis-number ebad1856-1b4a-c89c-d120-
25ed7d6945b5 token 58b4fb93b34a13dbfdb8a0c2f29d4fad
```

in about a minute you can use `show control local-properties` to check certificate status on vEdge CLI, it should be Installed.



cEdge

Because we have to copy root certificate from Docker node to cEdge bootflash, at first we configure only basic system properties and IP address for Ge0/0 interface, using following template:

```
config-transaction
!
hostname cEdge
!
system
  system-ip <cEdge system IP>
  site-id 2
  admin-tech-on-failure
  organization-name "pocvlab sdwan"
  vbond <VPN0 VBOND IP>
!
interface GigabitEthernet1
  no shutdown
  ip address <VPN0 IP address/netmask>
!
commit
end
```

on the Docker node, edit /etc/ssh/sshd_config and permit ssh root login, restart sshd service (not recommended in production environment). Next step is to copy CA root certificate file from Docker to cEdge bootflash, using next command:

```
cEdge#copy scp://root@10.10.0.1 bootflash:
Address or name of remote host [10.10.0.1]?
```

```
Source username [root]?
Source filename [root/CA.crt]? /root/CA.crt
Destination filename [CA.crt]?
Password:
```

once file is copied, we can proceed to install certificate:

```
cEdge#request platform software sdwan root-cert-chain install
bootflash:CA.crt
Uploading root-ca-cert-chain via VPN 0
Copying ... /bootflash/CA.crt via VPN 0
Updating the root certificate chain..
Successfully installed the root certificate chain
```

now we can go ahead and finish configuration for cEdge:

```
config-transaction
!
interface Tunnel0
 no shutdown
 ip unnumbered GigabitEthernet1
 tunnel source GigabitEthernet1
 tunnel mode sdwan
exit
sdwan
 interface GigabitEthernet1
  tunnel-interface
   encapsulation ipsec
   color default
 exit
exit
!
commit
end
```

Activate cEdge manually, using chassis number and OTP from Bootstrap Configuration. This is generated from vManage web, Configuration > Devices, select unused CSR1000v line.

```
request platform software sdwan vedge_cloud activate chassis-number <UUID>
token <OTP>
example bellow:
request platform software sdwan vedge_cloud activate chassis-number CSR-
6170246D-E8C4-1D4A-A972-5EF144184AB9 token
c448da2783609afcc3e9a7a7a17f1dfd
```

After one minute or so, Tunnel0 interface should go up and certificate installation done, you can check status of control connections on cEdge CLI with `show sdwan control connections`.

From vManage web interface Configuration > Device we can see the state of WAN Edges:

Cisco vManage

https://172.16.1.2/#/app/config/devices/vedge

CONFIGURATION | DEVICES

WAN Edge List

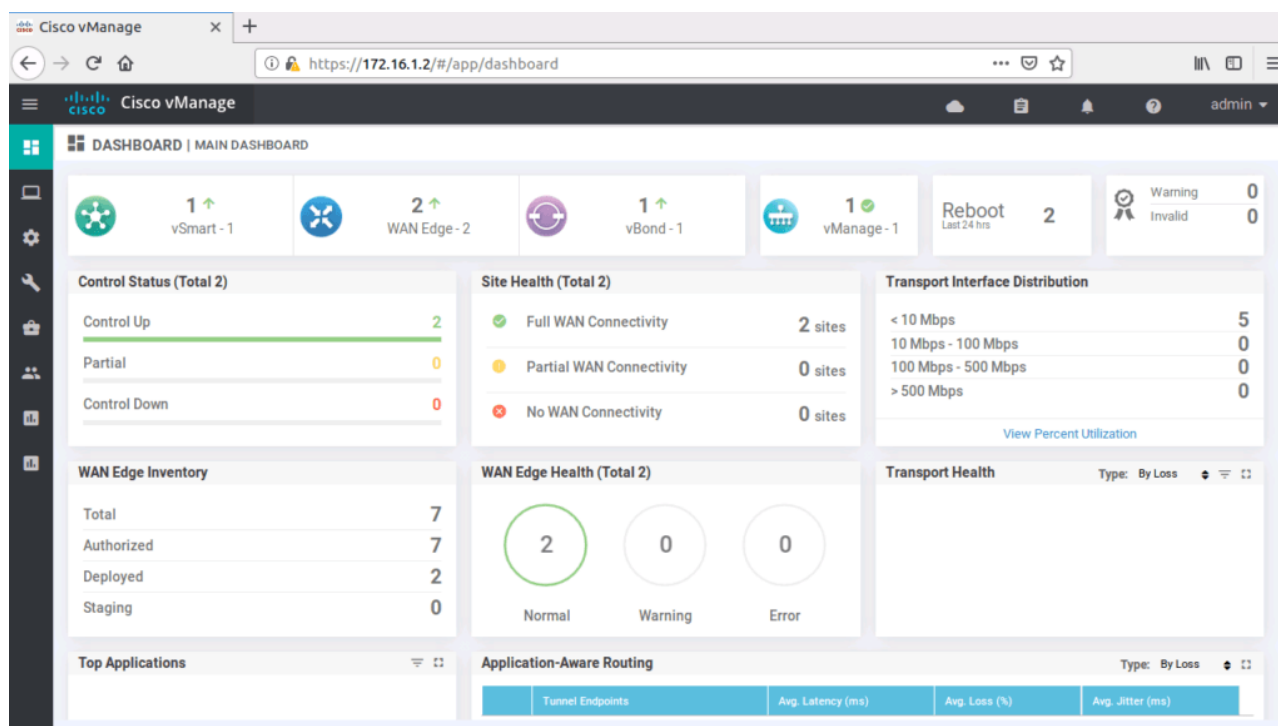
Change Mode Upload WAN Edge List Export Bootstrap Configuration Sync Smart Account

Search Options

Total Rows: 7

State	Device Model	Chassis Number	Serial No./Token	Enterprise Cert Serial No	Enterprise Cert Expiration Date	Hostn
	vEdge Cloud	ebad1856-1b4a-c89c-d120-25ed7d6945...	6BA3DC78	NA	NA	vEdge ...
	vEdge Cloud	6c74f1b6-800a-a3a7-ad2d-8962a3b59f9d	Token - 7f795a2f28f374...	NA	NA	-- ...
	CSR1000v	CSR-6170246D-E8C4-1D4A-A972-5EF14...	D3CB48B4	NA	NA	cEdge ...
	CSR1000v	CSR-55E81869-D385-9813-ED05-9DA98...	Token - ba010ace9053a...	NA	NA	-- ...
	vEdge Cloud	2c4a3a0c-1353-9670-977c-27fba1e3e4bd	Token - c03fd5cd45059...	NA	NA	-- ...
	vEdge Cloud	48c14431-cac4-b0b3-fb5a-2bd120033204	Token - 3d90b270279ad...	NA	NA	-- ...
	vEdge Cloud	bf2012da-739c-de7e-89f9-3b823727170d	Token - b99ef5ab9a928...	NA	NA	-- ...

and in the main Dashboard status of all connected nodes:



Ok, here is the end of this long post. I hope it will be useful.