

DEPLOYMENT GUIDE

Aruba AOS-CX Switch Simulator - EVE-NG

CREATING A SWITCHING ENVIRONMENT

OVERVIEW

Aruba AOS-CX Switch Simulator

The Aruba CX switch series is an advanced product family that offers next generation features that integrate seamlessly with the Aruba Edge Services Platform.

AOS-CX Switch Simulator (CX Simulator) is the virtual machine version of the Aruba CX switch series. At its core an ASIC simulator performs switching and routing functions with the AOS-CX operating system managing and controlling the device's operation. It offers 10 ports (1 management and 9 network ports) and allows you to build virtual networks on many different virtualization platforms.

With Aruba CX you can:

- **Create** your own network learning environment
- **Connect** virtual switches and other devices to
- **Configure** different network simulations
- **Manage, monitor** and **automate** your simulated network

EVE-NG

EVE-NG is a clientless multivendor network emulation software that empowers network and security professionals with huge opportunities in the networking world. Clientless management options will allow EVE-NG PRO to be as the best choice for Enterprise engineers without influence of corporate security policies as it can be run in a completely isolated environment.

Community Edition - Free

- Sharing of design (option to share labs, configs online with friend or others)
- General UI improvements (to be able to make 99% of things from UI, CLI will remain of course for advanced users)
- Clientless – telnet, rdp, vnc over html5
- Local client Wireshark capture
- Import/export configs

Professional Edition – License based

- Dynamic console porting, no limits, fixing issues for multi user consoling, Telnet porting choose is random
- Hot links, interconnection running nodes, ports immediately response, shut no shut, Ethernet only
- 1024 nodes support per lab
- Docker containers support
- HTML desktop console to EVE management, clientless EVE management
- Closing feature of running lab placing it to running folder, option run more than one lab simultaneously
- Import/export configs for eve lab to/from local PC
- Multiuser support, Administrator role only

- EVE User account access time limitation
- NAT cloud, integrated NAT option with DHCP on the EVE
- Integrated Wireshark capture using docker (Ethernet Only)
- Multi configurations for single lab
- Lab timer for self-training

INSTALLING THE CX SIMULATOR

IMPORTANT: The following instructions are applicable to both editions: Community and Pro.

Hardware and Software Requirements

The following specifications are recommended for:

- EVE-NG Community Edition running one lab running 5 Aruba CX Virtual Switches
- One NetEdit Server

Physical Specifications

- CPU: 16 Cores
- Memory: 48 GB
- Storage: 256 GB

EVE-NG Server VM

- CPU: 12 vCPU
- Memory: 32 GB
- Storage: 80 GB

NetEdit Server VM

- CPU: 4 vCPU
- Memory: 8 GB
- Storage: 115 GB

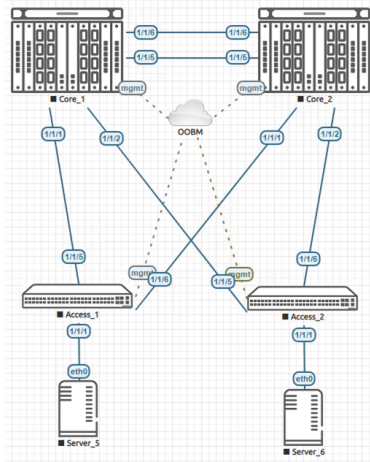


Figure 1. 5 Node Lab

Deployment Model

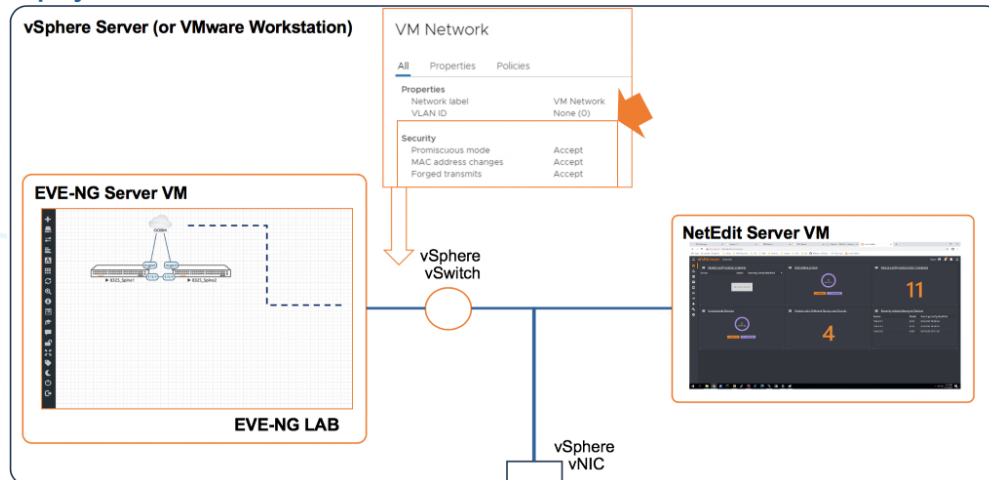


Figure 2. EVE-NG deployment model

To allow communication between the virtual devices in the EVE-NG lab, the port group used must be configured to support promiscuous mode.

Installation and Initialization

- Download EVE-NG: <https://www.eve-ng.net/index.php/download/>
- Find and follow the EVE-NG installation instructions: <https://www.eve-ng.net/index.php/documentation/>
- Before starting the VM edit its properties to reflect the minimum requirements shown above
- Start the VM
- On the Console:
 - Login with: root / eve
- Follow the initial configuration wizard
 - Change the password and save it
 - Enter a hostname
 - Enter the DNS domain
 - Select the IP address method: DHCP or static
 - If static, enter the IP address for the management network and the mask
 - DNS, NTP and Proxy
- SSH to the server – IP address and login: root / “password” (the one entered during initial setup)

IMPORTANT: The following instructions refer to the AOS-CX Switch Simulator Release 10.04.1000. It is recommended that you download the latest version published. To install it just replace the version number in each instruction.

You can have more than one simulator version installed at the same time.

- From the Aruba Download: <https://asp.arubanetworks.com/downloads>
 - Download the ArubaOS-CX_10_04_xxxx_ova.zip
 - Note: a support account is required
- Create a temporary folder (/abc) and copy the zip file into it using FTP (WinSCP / FileZilla) – use the same credentials for FTP and SSH
- Go to the new folder and unzip the file

```
cd /abc
unzip P4_10_04_1000_ova.zip
Archive:  P4_10_04_1000_ova.zip
  inflating: ArubaOS-CX_10_04_1000.ova
  extracting: ArubaOS-CX_10_04_1000.ova.sig
```
- Extract the VMDK file from the OVA file

```
tar xvf ArubaOS-CX_10_04_1000.ova
```
- Convert the vmdk file to the qcow2 format

```
/opt/qemu/bin/qemu-img convert -f vmdk -O qcow2 arubaoscx-disk-image-genericx86-p4-20200311173823.vmdk virtioa.qcow2
```
- Verify the result:

```
ls
ArubaOS-CX_10_04_1000.ova      arubaoscx-disk-image-genericx86-p4-
20200311173823.ovf  P4_10_04_1000_ova.zip ArubaOS-CX_10_04_1000.ova.sig
arubaoscx-disk-image-genericx86-p4-20200311173823.vmdk  virtioa.qcow2
```
- Create new image folder

```
mkdir /opt/unetlab/addons/qemu/arubacx-10.04
```
- Move the file to the new folder

```
mv virtioa.qcow2 /opt/unetlab/addons/qemu/arubacx-10.04/
```
- Delete temporary directory /abc and fix permissions

```
cd
rm -rf /abc
/opt/unetlab/wrappers/unl_wrapper -a fixpermissions
```

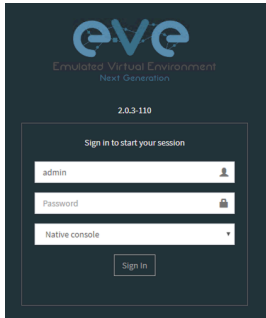
Installing Aruba Icons

EVE-NG allows you to add new icons by simply copying them to: /opt/unetlab/html/images/icons

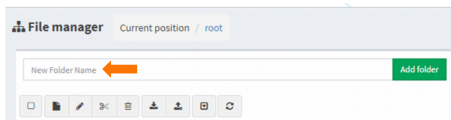
- The icons must be in PNG format
- You may need to resize the icons to make the fit in the diagrams
- Find the latest icons in the Airheads AOS-CX Switch Simulator Discussion Forum

TEST THE INSTALLATION BY CREATING A SIMPLE LAB

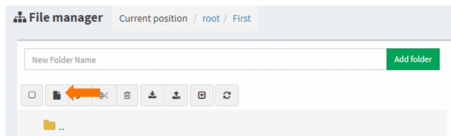
- Connect to the EVE-NG WebUI: <https://w.x.y.z/>
 - Login using the username: *admin* and password: *eve*.
 - Use HTML5 console



- Create a new folder called First



- Enter that folder and create a lab called TEST01

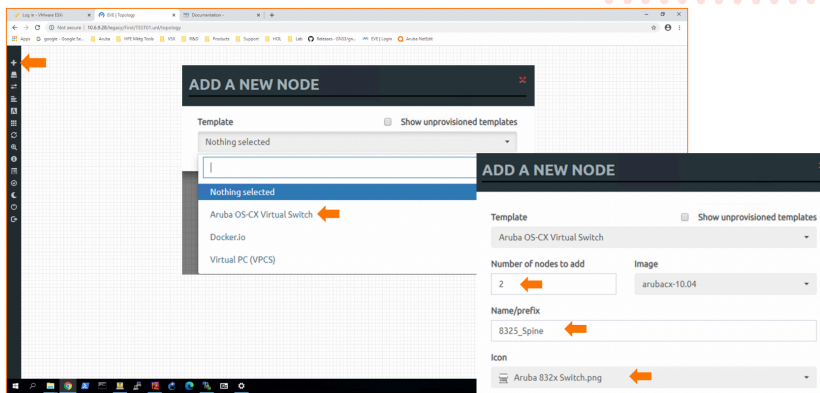


Name*	TEST01	Description	First Lab
Version*	1	Tasks	Create first lab and add 2 CX Switches
Author	Ri		
Config Script Timeout	300		

- You will enter the lab automatically

Create a lab using 2 switches and an external connection to their management interfaces

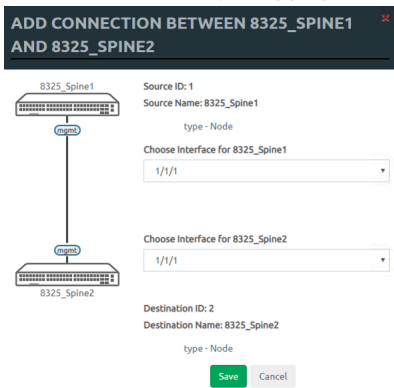
- Click on the + sign (first icon on the left-hand menu)
- Select **Aruba-OS CX Virtual Switch**
- Change the **Number of nodes to add** to 2
- Change the **Name/prefix** to 8325-Spine
- Select the **Icon**



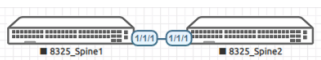
- Notice that the icons are grey (they will appear in color when they are started)
- Rearrange the icons to position them side-by-side



- Interconnect them by dragging the small plug icon located on each icon and select 1/1/1 – 1/1/1



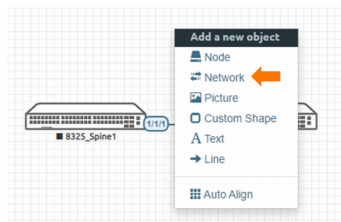
Result:



Add the connection between the external network and the management interfaces of the virtual switches

EVE-NG allows you to connect any port(s) in a lab to external networks. For example, you can use EVE-NG's management connection (Eth0) to connect the OOBM ports on all the virtual CX switches to external NetEdit, Ansible, DHCP and other server or clients.

- Right-click anywhere in the canvas and select Network



- Configure the new network. Use the Name/Prefix: OOBM and select the Type: Management(Cloud0).

ADD A NEW NETWORK

Number of networks to add: 1

Name/Prefix: OOBM

Type: Management(Cloud0)

Left: 696

Top: 292

Save Cancel

- Connect the cloud to the management interface of each switch – Choose interface for 8325_Spine1x: mgmt

ADD CONNECTION BETWEEN OOBM AND 8325_SPINE1

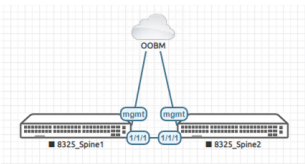
Source ID: 2
Source Name: OOBM
type - Network

Choose Interface for 8325_Spine1: mgmt

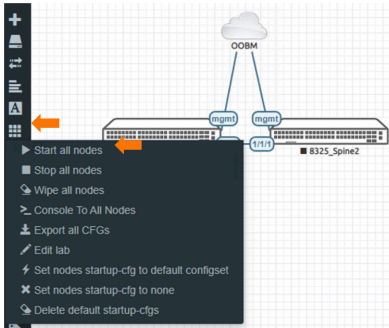
Destination ID: 1
Destination Name: 8325_Spine1
type - Node

Save Cancel

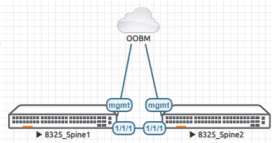
Expected result



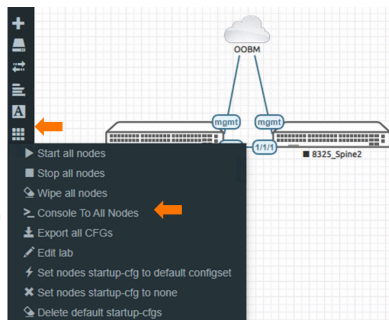
- Start all nodes



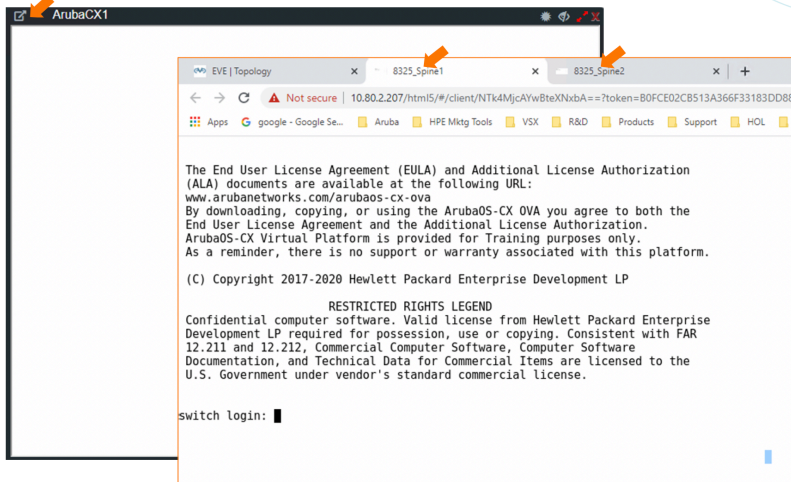
- Result (notice the color in the icon)



- Open the console to each node



- If the console opened in a window (instead of a new tab) click on the icon on its top-left corner



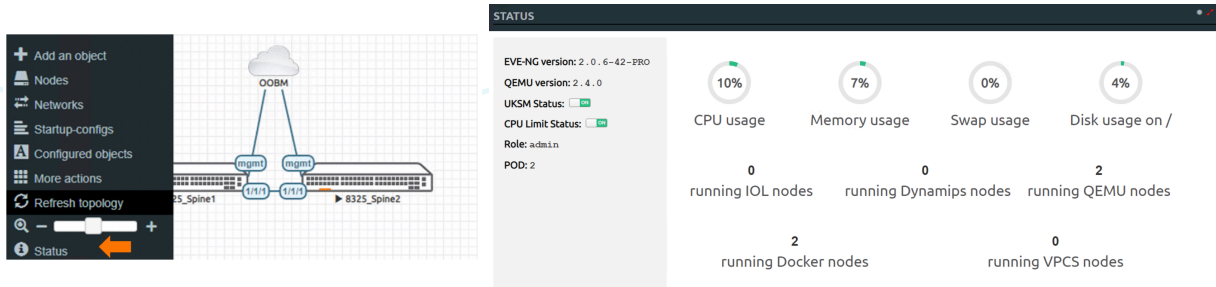
- Wait until both consoles get to the login prompt (depending on the hardware and virtual resources it may take a few minutes)
- On the console of each switch, login with username: *admin* and no password
- You will be prompted to change the password. Assign the password: "*password*"
- Check the IP address of the management interface. If there is a DHCP Server reachable through the EVE-NGs external network interface, an IP address will be assigned. If not, you can enter it manually.

Result with DHCP server:

```
switch# show interface mgmt
  Address Mode: dhcp
  Admin State: up
  Mac Address: 50:02:00:01:00:00
  IPv4 address/subnet-mask: 10.80.2.231/24
  Default gateway IPv4: 10.80.2.3
  IPv6 address/prefix:
  IPv6 link local address/prefix: fe80::5202:ff:fe01:0/64
  Default gateway IPv6:
  Primary Nameserver: 10.80.2.219
  Secondary Nameserver:
```

Check the resource utilization

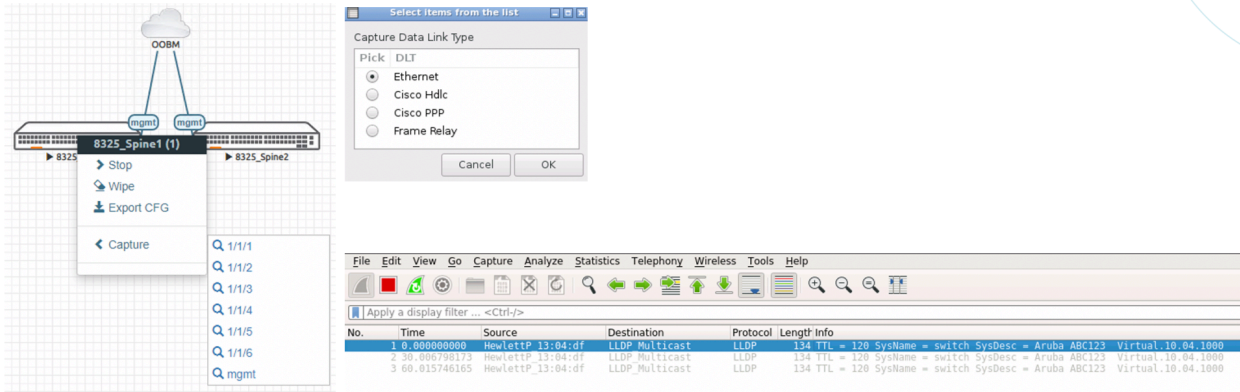
On the left-hand menu select **Status**



Capturing traffic between the switches

EVE-NG allows you to capture traffic on any link. This feature is directly available on the HTML5 console.

- Right click on the switch and select Capture. Select the port, and choose the port type (Ethernet)



Wireshark will appear in a new Tab.

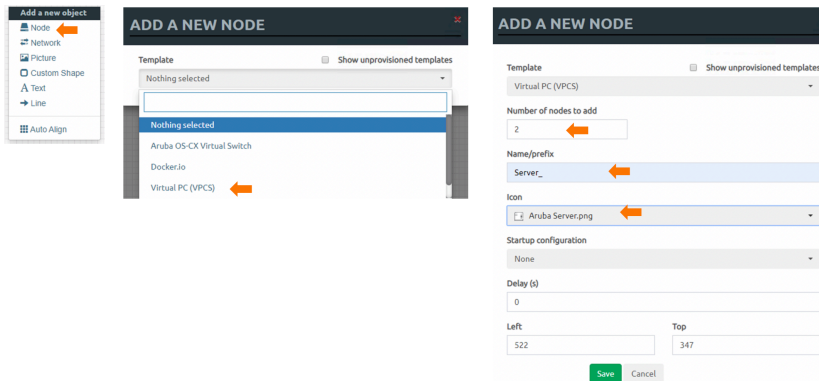
Connecting other devices to the topology

Option 1: connecting an EVE-NG VPC

EVE-NG offers a PC simulation (VPCS) with basic functionality and very low impact on resources. These VPCs can be used to test connectivity without the need to add resource intensive devices.

Note: To add new nodes to an EVE-NG Community Edition lab, the lab must be stopped: links cannot be added to running devices.

- Right-click on the lab background and select Node



- From the list select **Virtual PC (VPCS)**
- Enter the **Number of nodes to add**, **Name/prefix**, and select an **Icon**
- Start the new nodes and open their console
- Use the system help to learn how to use the VPC. Examples:
 - Assign an IP address and default gateway: `VPCS> ip 10.0.1.11/24 10.0.1.254`
 - Display basic configuration: `VPCS> show`

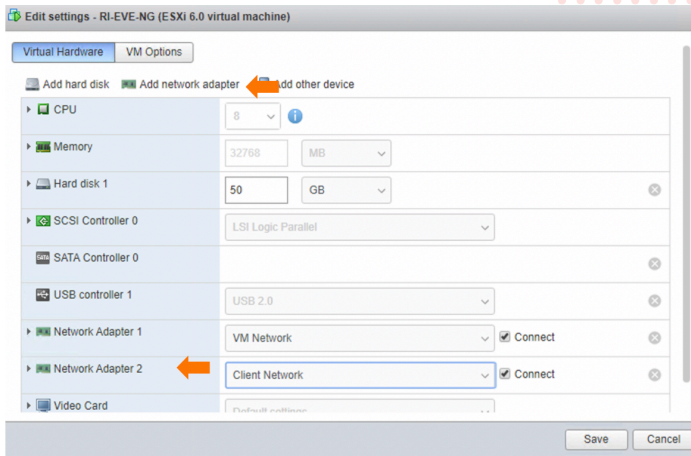
Option 2: connecting an external device to the virtual network

EVE-NG allows you to add up to 9 more NICs to the server, each NIC connected to a different ESXi port-group. If, for example you want to connect your EVE-NG lab's virtual network to a physical network, you can use an additional ESXi network for that purpose.

In the example below, an external Windows 10 VM is connected to port 1/1/2 of a virtual CX switch.

On the ESXI Server

- Add a new Network Adapter to the EVE-NG Server:



IMPORTANT:

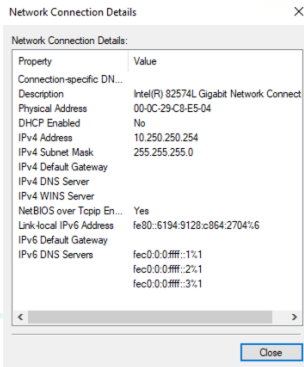
1. EVE-NG does not need to have an IP address or any other configuration on this interface
2. The ESXI network adapters on the EVE-NG server are mapped as follows:

Table 1

ESXI	EVE-NG	Lab
Network Adapter 1	Eth0	Management(Cloud0)
Network Adapter 2	Eth1	Cloud1
Network Adapter 3	Eth2	Cloud2
Network Adapter 4	Eth3	Cloud3

On the Windows Client VM

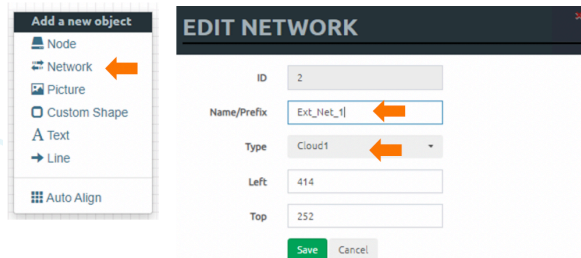
- Ensure that the Win 10 VM has a NIC connected to this same network
- Set the IP address on the Win 10 Client (in this example 10.250.250.254)



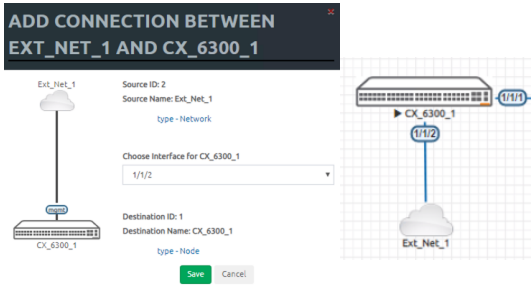
In the EVE-NG Lab

Configure the external network in the EVE-NG lab and connect it to your virtual CX switch.

- Right-click and in the **Add a new object** pop-up select **Network**
- Give it a meaningful name and select **Type: Cloud1** (see Table 1 above)



- Connect it to interface 1/1/2 of the CX_6300_1 switch



Note: A single external network (Cloud) can be connected to multiple devices as in the Management connection above.

- On the virtual CX switch's console configure an IP interface to test the connection, for example:

```

vlan 2
interface 1/1/2
    no shutdown
    no routing
    vlan access 2
interface vlan2
    ip address 10.250.250.20/24
https-server vrf default
  
```

Testing the connection

- On the Win 10 client, ping the IP address entered above
C:\>ping 10.250.250.20

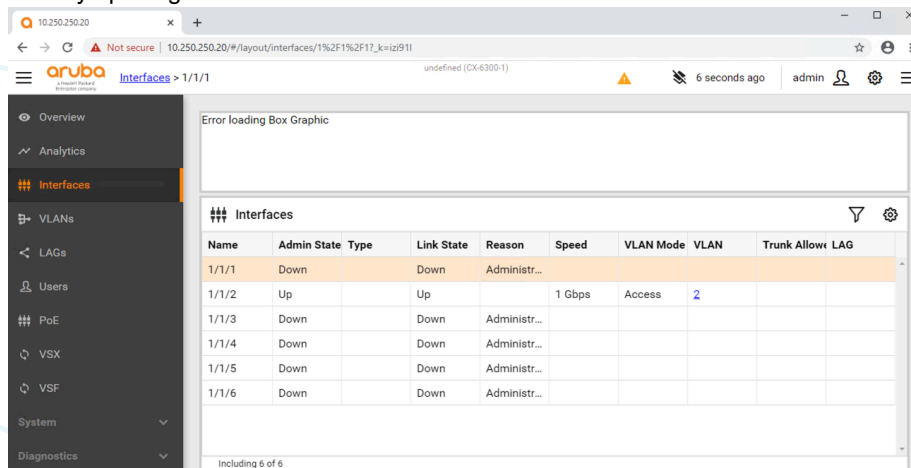
```

Pinging 10.250.250.20 with 32 bytes of data:
Reply from 10.250.250.20: bytes=32 time=9ms TTL=64
Reply from 10.250.250.20: bytes=32 time=4ms TTL=64
Reply from 10.250.250.20: bytes=32 time=3ms TTL=64
Reply from 10.250.250.20: bytes=32 time=7ms TTL=64
  
```

```

Ping statistics for 10.250.250.20:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 3ms, Maximum = 9ms, Average = 5ms
  
```

then try opening the switch's WebUI:



ADDITIONAL RESOURCES



