

LAB GUIDE

Part II Campus 2 Tier. Layer 3 Access with OSPF and Security

IMPORTANT! THIS GUIDE ASSUMES THAT THE AOS-CX OVA HAS BEEN INSTALLED AND WORKS IN GNS3 OR EVE-NG PLEASE REFER TO GNS3/EVE-NG INITIAL SETUP LABS IF REQUIRED.

https://www.eve-ng.net/index.php/documentation/howtos/howto-add-aruba-cx-switch

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Lab Objective

The lab will enable the user to gain hands on knowledge and experience in setup basic Campus 2 Tier Network with L3 Access using OSPF with Security for OSPF links.

Aruba CX 6200 and 6300 typically can be used for L3 access in the Campus.

For further details on Aruba CX switches and other features please refer to the latest Aruba documentation located on https://asp.arubanetworks.com/

Lab Overview

This lab set up is as shown in Figure 1. This lab is a follow and it is a prerequisite to have Part I Campus Tier 2 Layer 3 Access with OSPF completed where the underpinning infrastructure was built.

In this follow on lab we will secure the OSPF links, this acts as a precaution so that limited influence can be injected into the network by unknowingly misconfigurations or from potential bad actors. Some basic trouble shooting steps are also shown and explained

Lab Network Layout



Figure 1. Lab topology

Lab Tasks

Task 1 - Lab setup

Prerequisite please complete the lab "Part I Campus Tier 2 Layer 3 Access with OSPF"

Task 2 - Configure OSPF security between links between Campus Core

On Switch A and B Core configure:

- Add MD5 authentication between the two cores
- Note as part of the configuration you add a password between the communicating links these must match on both sides of the link for the link to come up correctly

| SwitchA# | SwitchB# |
|---|---|
| interface lag 256 | interface lag 256 |
| ip ospf authentication message-digest | ip ospf authentication message-digest |
| ospf message-digest-key 1 md5 plaintext | ospf message-digest-key 1 md5 plaintext |
| <your_password_here></your_password_here> | <your_password_here></your_password_here> |

 Ensure the OSPF neighbors remain intact after the configuration as shown below. Here we show output from Switch A

| e witten / | • | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------|-------------|---------------|-----------------|-----------|-------------|-------------|-----|----------|------|------|-----|-----|-----|-----|-----|-----|-----|------|-------|-------|------|-----|-----|
| C. J. J. P. | | | | | | | | | | | | | | | | | | | | | | | |
| SWITCHA# | . 1. 1 | | | | | | | | | | | | | | | | | | | | | | |
| snow ip ospi nei | gibors | | D | • • | | • • | • • | | 0 0 | • • | 0 0 | • • | • • | • | | | | | | | | | |
| VRF : default | | | Process : 1 | 5.0 | | • • | • • | • • • | • • | • • | • • | • • | • • | • • | | | | | | | | | |
| | | | | = • | | • • | • • | | • • | • • | • • | • • | • • | • • | | | | | | | | | |
| | | | | • | • • • • • • | • • | • • | • • • | ••• | ••• | | ••• | • • | • • | • | | | | | | | | |
| Total Number of | Neighbors | : 2 | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | 0 0 | | | | | | | | | | | | | | |
| Neighbor ID | Priority | State | Nbr Ad | ddress | Inter | rtac | e | | • • | | | | | • • | • • | • • | | | | | | | |
| | · | | | | | | • • | | • • | • • | • • | • • | • • | • • | • • | • • | • • | 6 N. | | | | | |
| 192.168.2.3 | n/a | FULL | 192.1 | 68.4.1 | • • 1/1/ | 3 | • • | | • • | • • | • • | • • | • • | • • | • • | • • | • • | | 0 . L | | | | |
| | | | | | 0 0 0 | 0 0 | • • | • • • | • • | • • | • • | • • | • • | • • | • • | • • | • • | | | 5.6 | | | |
| 192.168.2.2 | n/a | FULL | 192.1 | 68.4.9 | lag | 2 <u>56</u> | | | • • | ••• | | | ••• | • • | ••• | • • | • • | | | | | | |
| | | | | | | | | | | | | | 11 | | | | | | | | | | |
| You car | h show you | i have auther | ntication on th | ie LAG | | | | | | | | | | | | | | | | | | | |
| | ,, , | | | | | • • | • • | | | | | | | • • | • • | | | | | | | | • • |
| | | | | | | • | • • | | • • | • • | • • | • • | • • | • • | • • | • • | • • | | • • • | | | • • | • • |
| SwitchA# | | | | | | | • • | • • • | • • | • • | • • | • • | • • | • • | • • | • • | • • | | | | | | • • |
| show ip ospf int | erface lac | 256 | | | | | • | • • • | • • | • • | • • | • • | • • | • • | • • | • • | • • | | | | | • • | • • |
| Codes: DR - Desi | gnated rou | ter BDR - B | ackup Design | ated rou | iter | | | • • • | ••• | ••• | • • | • • | • • | • • | ••• | • • | | | | | | | • • |
| 00000 010 0001 | gilacea 100 | COL DDIC D | aonap bebigin | 1000 100 | | | | | | | | | | | | | | | | | | | |
| Interface lag256 | is up. li | ne protocol | is up | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | • • | | • • | | | | | | | • • |
| | | | | | | | | | | × • | • • | • • | • • | • • | • • | • • | • • | | • • • | | | • • | • • |
| VRF | : default | | | Process | | : | 1 | | | | • • | • • | • • | • • | • • | • • | • • | | | | | | • • |
| TP Address | : 192 168 | 4 8/31 | | Area | | : | 0 | 0 0 | 0 | | | • • | • • | | • • | • • | • • | | |) • (| | • • | • • |
| 11 maarcoob | 19211001 | 110/01 | | | | | ۰. | 0.0. | • | | | | | | | | ••• | | | | | | |
| Status | מוו : | | 1 | Network | Tyne | : | Po | int- | to-r | no i | | | | | | | | | | | | | |
| nt | up | | | NC CWOIN | 1720 | - | 10 | THE | 1 00 | 01 | | | | | | | | | | | | | |
| Hello Interval | : 10 sec | | 1 | Dead Int | erval | : | 40 | g A | c | | | | | | | | | | | | | | • • |
| Transit Delay | : 1 sec | | | Retransm | nit Interva | .1 : | 5 | SC SC | c | | | | | | | | | | • • • | | | • • | • • |
| Authentication | · Md5 | | | Link Sne | and | | 20 | 00Mb | ne | | | | | | | | | | 2.8 | | | | • • |
| Cost Configured | : NA | | - | Cost Cal | lculated | | 50 | 0.0140 | 20 | | | | | | | | | | | | | | • • |
| State/Type | : Point-to | -noint | 1 | Router I | riority | | n / | a | | | | | | | | | | | | | | | |
| DR | : No | Potne | 1 | RDR | TTOTTCY | | NO | u | | | | | | | | | | | | | | | |
| Link LSAg | : 0 | | | Chockeyn | n S11m | | 100 | | | | | | | | | | | | | | | | |
| BFD | : Disabled | 1 | · | cricensul | ii Duin | | 5 | | | | | | | | | | | | | | | | |

• To trouble shoot you can use the ospf statistics command. The authentication errors should not increment this may point to a mismatch in passwords or configuration. A small number of authentication errors are expected during the initial configuration change as links are not configured simultaneously.

| show ip ospf statistics inter OSPF Process ID 1 VRF default | face lag 256 , interface lag256 statistics ==================================== | (cleared 3h54m27s ago) |
|--|--|---|
| Tx Hello Packets: 1407Tx Hello Bytes: 98480Tx DD Packets: 4Tx DD Bytes: 320Tx LS Request Packets: 1Tx LS Request Bytes: 56Tx LS Update Packets: 25Tx LS Update Bytes: 3664Tx LS Ack Packets: 16Tx LS Ack Bytes: 1104 | Rx Hello Packets Rx Hello Bytes Rx DD Packets Rx DD Bytes Rx LS Request Packets Rx LS Request Bytes Rx LS Update Packets Rx LS Update Bytes Rx LS Ack Packets Rx LS Ack Bytes | : 1386 : 96876 : 4 : 320 : 1 : 56 : 27 : 3756 : 14 : 984 |
| Total Number of State Changes Number of LSAs LSA Checksum Sum Total Transmit Failures Total OSPF Packets Discarded Reason | : 18 : 0 : 0 : 15 | |
| Invalid type | 0 | |
| Invalid length | 0 | |
| Invalid checksum | 0 | |
| Invalid version | 0 | |
| Bad or unknown source | 0 | |
| Self-originated | 0 | |
| Duplicate router ID | 0 | |
| Interface standby | 0 | |
| Total Hello packets dropped | 0 | |
| Network Mask mismatch | 0 | |
| Hello interval mismatch | 0 | |
| Dead interval mismatch | 0 | |
| Options mismatch | 0 | |
| MTU mismatch | 0 | |
| Authentication errors | 0 15 | |
| | 10 | |

| | | 2 | |
|--|----------------------------|---|--------|
| | | | |
| | |) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | |
| | |) 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 | |
| | | Lab Gu | uide |
| | | Compute 2 Tior L 2 Accords with OSPE and Soc | ourity |
| | | Campus 2 Tier ES Access with Oor 1 and Sec | Junty |
| | | \circ | |
| Type mismatch | 12 | \circ | |
| Authentication failu | ires 3 | $5 \circ \circ$ | |
| Wrong protocol | 0 | | |
| Resource failures | 0 | | |
| Bad LSA length | 0 | · · · · · · · · · · · · · · · · · · · | |
| Bad DD packets | 0 | $\mathbf{y} = 0 + $ | |
| Others | 0 | | |
| others | 0 | \circ | |
| | | $3 \circ 0 \circ $ | |
| Total LSAs Ignored : (|) | | |
| Bad Type : (|) | | |
| Bad Length : (|) | | |
| Invalid Data : (|) | | |
| Invalid Checksum : (|) | | |
| | | | |
| | | | |
| | | | |
| | | | |
| Took 2 Add OS | DE coourity botwoo | romaining links and Access | |
| Task 5 – Add 05 | PF security betwee | Tremaining links and Access | |
| | - | | |
| Add MD5 auth | pentication between the ty | o cores that connect to Access Switch C | |
| | | | |
| Initial loss of a | communication is expecte | to the access switch on first configuration as changes are not done | |
| simultaneousl | V | | |
| Simalahoodsi | <i>.</i> | | |
| | | | |
| | | | |
| Switch&#</th><th></th><th>Switch B#</th><th></th></tr><tr><th>Switcens#</th><th></th><th></th><th>• • •</th></tr><tr><th></th><td></td><td></td><td></td></tr></tbody></table> | | | |

| SwitchA# | SwitchB# |
|--|---|
| ! | `````````````````````````````````````` |
| interface 1/1/3 | interface 1/1/3 |
| ip ospf authentication message-digest | ip ospf authentication message-digest |
| ospf message-digest-key 1 md5 plaintext | ospf message-digest-key 1 md5 plaintext |
| <your here="" password=""></your> | <your here="" password=""></your> |
| | |
| | · · · · · · · · · · · · · · · · · · · |
| | |
| • Add MDE authentication on the Access unlinks that Is | ad to Switch A and P respectively |
| | |

Add MD5 authentication on the Access uplinks that lead to Switch A and B respectively. •

```
SwitchC#
configure
interface 1/1/1-1/1/2
ip ospf authentication message-digest
ospf message-digest-key 1 md5 plaintext <your_password_here>
```

- Carry out similar checks and troubleshooting as in the previous steps •
- Ensure the OSPF neighbors remain intact •

| show ip ospf ne VRF : default | ighbors | Process : 1 | |
|----------------------------------|-----------------------|-------------|-----------|
| Total Number of | Neighbors : 2 | | |
| Neighbor ID | Priority State | Nbr Address | Interface |
| 192.168.2.1 | n/a <mark>FULL</mark> | 192.168.4.0 | 1/1/1 |
| 192.168.2.2 | n/a <mark>FULL</mark> | 192.168.4.4 | 1/1/2 |

You can show you have authentication on the link ٠

SwitchC# show ip ospf interface 1/1/1 Codes: DR - Designated router BDR - Backup Designated router

Interface 1/1/1 is up, line protocol is up _____

| VRF | : | default | Process | : | 1 | |
|-----------------|---|----------------|---------------------|---|------|-------------|
| IP Address | : | 192.168.4.1/31 | Area | : | 0.0 | .0.0 |
| Status | : | up | Network Type | : | Poir | nt-to-point |
| Hello Interval | : | 10 sec | Dead Interval | : | 40 | sec |
| Transit Delay | : | 1 sec | Retransmit Interval | : | 5 | sec |
| Authentication | : | Md5 | Link Speed | : | 100 | OMbps |
| Cost Configured | : | NA | Cost Calculated | : | 100 | |
| State/Type | : | Point-to-point | Router Priority | : | n/a | |
| DR | : | No | BDR | : | No | |
| Link LSAs | : | 0 | Checksum Sum | : | 0 | |
| | | | | | | |

| | | | | | 0 0 0 C | |
|--|-----------------------------------|--|---|-----------------------------------|--|---|
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| | | | | | | |
| BFD : | Disabled | | | | | |
| | | | | | 0 0 0 0 0 0 L | |
| SwitchC# show ip o | spf interfac | ce 1/1/2 | | | • • • • • • • • | |
| Codes: DR - Design | ated router | BDR - Backup | Designated rou | ter | | |
| | | | | | | |
| Interface 1/1/2 is | up, line pr | rotocol is up | | | | |
| | | | | | | |
| | 1 6 1. | | · · · · · · · · | | · · · · · · · · · · · · · · · · · · · | |
| VRF : | default | / 0.1 | Process | | | |
| IP Address : | 192.168.4.5/ | 31 | Area 💧 | | | |
| Status : | up | | Network | Туре | : Point-to-point | |
| Hello Interval : | 10 sec | | Dead Int | erval | : 40 sec | |
| Transit Delay : | 1 sec | | Retransm | it Interval | 5 sec | |
| Authentication : | Md5 | | Link Spe | ed | : 1000Mbps | |
| Cost Configured : | NA | | Cost Cal | culated | : 100 | |
| State/Type : | Point-to-poi | int | Router P | riority | : n/a | |
| DR : | No | | BDR | •••••• | : No | |
| Link LSAs : | 0 | | Checksum | Sum | : 0 | |
| | | | | | | |
| point to a mis initial configu SwitchC# show ip o | smatch in pass iration change | swords or configue as links are not | uration. A small nu configured simulta | umber of auther aneously. Only | ntication errors are expected during the link 1/1/1 for Switch C is shown here. | 0 0 |
| | | , incertace i/. | | | | |
| | | | | | · • • • • • • • • • • • • • • • • • • • | • • • • • • • • |
| Tx Hello Packets | : 1340 | Ry Hel | lo Packets | : 1321 | ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ | |
| Tx Hello Bytes | : 95532 | Rx Hel' | lo Bytes | : 94272 | 2 0 0 | |
| Tx DD Packets | : 4 | Rx DD I | Packets | : 5 | | ~ ~ • • • • • |
| Tx DD Bytes | : 360 | Rx DD I | Rytes | : 428 | | |
| Ty LS Request Dack | eta: 0 | Ry LS I | Pequest Dackets | : 1 | | |
| Ty LS Request Byte | | RY LS I | Request Butes | : 72 | | |
| Ty LS Update Dacke | $3 \cdot 0$ | PV LG I | Todate Dacketa | • 18 | | |
| TX LS Update Packe | | RX LS (| Indate Packets | · 10 | | |
| IX LS Update Bytes | • 3200 • 10 | RX LS (| Deale Byles | · 2428 | | |
| Tx LS Ack Packets | : 10 | RX LS A | Ack Packets | : 14 | | |
| Tx LS Ack Bytes | : 672 | Rx LS A | Ack Bytes | : 944 | | |
| Total Number of St Number of LSAs LSA Checksum Sum Total Transmit Fai Total OSPF Packets | ate Changes lures Discarded | : 21 : 0 : 0 : 0 : 20 | | | | |
| Reason | | Packets Droppe | ed | | | |
| | | | | | | |
| Invalid type | | 0 | | | | |
| Invalid length | | 0 | | | | |
| Invalid checksum | | 0 | | | | |
| Invalid version | | 0 | | | | |
| Bad or unknown sou | rce | 0 | | | | |
| Area mismatch | | 0 | | | | |
| Self-originated | | 0 | | | | |
| Duplicate router I | .D | 0 | | | | |
| Interface standby | | 0 | | | | |
| Total Hello packet | s dropped | 0 | | | | |
| Network Mask mis | match | 0 | | | | |
| Hello interval m | ismatch | 0 | | | | |
| Dead interval mi | smatch | 0 | | | | |
| Options mismatch | L | 0 | | | | |
| MTU mismatch | | 0 | | | | |
| Neighbor ignored | Ĺ | 0 | | | | |
| Authentication err | ors | 20 | | | | |
| Type mismatch | | 17 | | | | |
| Authentication f | ailures | 3 | | | | |
| Wrong protocol | | 0 | | | | |
| Resource failures | | 0 | | | | |
| Bad LSA length | | 0 | | | | |
| Bad DD packets | | 0 | | | | |
| Others - | | 0 | | | | |
| | | | | | | |
| Total LSAs Ignored | 1:0 | | | | | |
| Bad Type | : 0 | | | | | |
| Bad Length | : 0 | | | | | |
| Invalid Data | : 0 | | | | | |
| Invalid Checksum | : 0 | | | | | |
| | 1 | | | | | |
| | | | | | | |

| | | | | | | | | | | | | • • | • • | • • | • • • | • • • | • • | ••• | • • • | |
|---|---------------|------------|------------|-------|-------|-------|------------|-------|-------|-------|-----|------|-----|-------|-------|-------|------|-------|-------|----|
| | End of I | ap | | | | | | | | | | | | | | | | | | |
| | First C | - 1- | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | • • | • • • | • • • | • • | • • | • • | • • | • • • | • • • | • • | • • | • • • | |
| | | | | | | | N • | • • | • • • | | • • | • • | • • | • • | • • • | | • • | • • | | |
| | | | | | | | • • | • • | | | | • • | • • | • • | • • • | | • • | • • | | |
| | | | | | | | | | | | | | | | | | | | | |
| The reader can check further reachability a | s well as con | figure | VPC | 52 t | o ex | kplo | re fu | irthe | er. | | | | | | | | | | | |
| - | | <i>.</i> . | | | | | | | | | | | | | | | | | | |
| 51 5/005 110m 172.100.2.1 10mp_504-5 001-05 | CINC-2.013 | mo | | | | • • • | ••• | • • | • • • | | | • • | • • | • • | • • • | | • • | | ••• | |
| 84 bytes from 192 168 2 1 jcmp seg=5 $\pm\pm1=63$ | time=2 815 | ms | | • • | | • • | • • | • • | • • • | | • • | • • | • • | • • | • • • | • • • | • • | • • | • • • | |
| 84 bytes from 192.168.2.1 icmp seg=4 ttl=63 | time=5.539 | ms | • • | • • | • • • | • • | • • | • • | • • • | • • • | • • | • • | • • | • • | • • • | • • • | • • | • • | • • • | |
| 84 bytes from 192.168.2.1 icmp_seq=3 ttl=63 | time=5.554 | ms | | | | | | • • | | | | | • • | • • | | | | | | |
| 84 bytes from 192.168.2.1 icmp_seq=2 ttl=63 | time=5.527 | ms | | | | | | | | | | | | | | | | | | |
| 84 bytes from 192.168.2.1 icmp_seq=1 ttl=63 | time=2.546 | ms 🙎 | • • • | • | | ••• | ••• | ••• | • • • | | ••• | • • | • • | ••• | ••• | | • • | ••• | ••• | |
| | | | • • • | • • | | • • | • • | • • | • • • | • • • | • • | • • | • • | • • | • • • | • • • | • • | • | | |
| VPCS> ping 192.168.2.1 | | | | | | • • | • • | • • | | | • • | • • | • • | • • | • • • | | | | | |
| | 0 | | | | | | | | | | | | | | | | | | | |
| Check various Reachability .Here we check | to Core Swi | tcn A | | | | | | | | | | | | ÷ . | | | | | | |
| Oberdusseriese Reachability Hans we also | | 4 Ι- ο Λο | • • • | • • • | | • • | • • | • • | • • • | | • • | • • | • • | | | | | | | |
| | | | • • • | • • • | | • • | • • | • • | • • • | | • • | • • | | | | | | | | |
| PC1 : 10.10.100.1 255.255.255.0 gateway 10. | 10.100.254 | | | | | | | | | | | | | | | | | | | |
| Checking for duplicate address | | | | | | | | | | | | | | | | | | | | |
| VPCS> ip 10.10.100.1/24 10.10.100.254 | | | | | | | ••• | ••• | ••• | | | | | | | | | | | |
| | | | • • • | • • • | | • • | • • | • • | • • • | • • • | | | | | | | | | | |
| | | | | | | | • • | • • | | • • | | | | | | | | | | |
| Configure VPC1 | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| TASK 4 – CONINGULE VPC and lest leach | ability (Op | liona | 1) | • • • | • • • | • • • | • • | • • | • • | | | | | | | | | | | |
| Tack 4 Configure V/PC and test reach | ability (On | tions | 11 | • • | | • • | • • | • • | • • | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | ., |
| | | | • • • | • • • | | • • | • • | C | amp | us 2 | Tie | r L3 | Acc | ess v | with | OSP | F ar | id Se | curi | tv |
| | | | • • • | • • | | • • | • • | • • | | | | | | | | | La | ab G | Guid | е |
| | | | | | | | | | | | | | | | | | | | | |
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Campus 2 Tier L3 Access with OSPF and Security

Appendix – Complete Configurations

- · If you face issues during your lab, you can verify your configs with the configs listed in this section
- If configs are the same, try powering off/powering on the switches to reboot them.

Switch A

```
SwitchA#
!Version ArubaOS-CX Virtual.10.07.0010
!export-password: default
hostname SwitchA
led locator on
ntp server pool.ntp.org minpoll 4 maxpoll 4 iburst
ntp enable
1
1
ssh server vrf mgmt
vlan 1
interface mgmt
    no shutdown
    ip dhcp
interface lag 256
    no shutdown
    description to SwitchB_
    ip address 192.168.4.8/31
    lacp mode active
    ip ospf 1 area 0.0.0.0
    no ip ospf passive
    ip ospf network point-to-point
    ip ospf authentication message-digest
    ip ospf message-digest-key 1 md5 plaintext <your_password_here>
interface 1/1/1
    no shutdown
    mtu 9198
    description core link
    lag 256
interface 1/1/2
    no shutdown
    mtu 9198
    description core link
    lag 256
interface 1/1/3
    no shutdown
    mtu 9198
    description to SwitchC_
    ip address 192.168.4.0/31
    ip ospf 1 area 0.0.0.0
    no ip ospf passive
    ip ospf network point-to-point
    ip ospf authentication message-digest
    ip ospf message-digest-key 1 md5 plaintext <your_password_here>
interface loopback 0
    ip address 192.168.2.1/32
    ip ospf 1 area 0.0.0.0
!
1
router ospf 1
    router-id 192.168.2.1
    max-metric router-lsa on-startup
    passive-interface default
    graceful-restart restart-interval 300
    trap-enable
   area 0.0.0.0
https-server vrf mgmt
```

Switch B

!Version ArubaOS-CX Virtual.10.07.0010
!export-password: default
hostname SwitchB
led locator on

Lab Guide Campus 2 Tier L3 Access with OSPF and Security ntp server pool.ntp.org minpoll 4 maxpoll 4 iburst ntp enable 1 ! 1 ssh server vrf mgmt vlan 1 interface mgmt no shutdown ip dhcp interface lag 256 no shutdown description to SwitchA ip address 192.168.4.9/31 lacp mode active ip ospf 1 area 0.0.0.0 no ip ospf passive ip ospf network point-to-point ip ospf authentication message-digest ip ospf message-digest-key 1 md5 plaintext <your_password_here> interface 1/1/1 no shutdown mtu 9198 description core link lag 256 interface 1/1/2 no shutdown mtu 9198 description core link lag 256 interface 1/1/3 no shutdown mtu 9198 description to SwitchC_ ip address 192.168.4.4/31 ip ospf 1 area 0.0.0.0 no ip ospf passive ip ospf network point-to-point interface 1/1/3 no shutdown mtu 9198 description to SwitchC_ ip address 192.168.4.4/31 ip ospf 1 area 0.0.0.0 no ip ospf passive ip ospf network point-to-point ip ospf authentication message-digest ip ospf message-digest-key 1 md5 plaintext <your_password_here> interface loopback 0 ip address 192.168.2.2/32 ip ospf 1 area 0.0.0.0 ! 1 router ospf 1 router-id 192.168.2.2 max-metric router-lsa on-startup passive-interface default graceful-restart restart-interval 300 trap-enable area 0.0.0.0 https-server vrf mgmt Switch C SwitchC# show run Current configuration: ! !Version ArubaOS-CX Virtual.10.07.0010 !export-password: default hostname SwitchC led locator on ntp server pool.ntp.org minpoll 4 maxpoll 4 iburst ntp enable ! !

```
Lab Guide
                                                                              Campus 2 Tier L3 Access with OSPF and Security
ssh server vrf mgmt
vlan 1,100,200
interface mgmt
    no shutdown
    ip dhcp
interface 1/1/1
    no shutdown
    mtu 9198
    description to SwitchA
    ip address 192.168.4.1/31
    ip ospf 1 area 0.0.0.0
    no ip ospf passive
    ip ospf network point-to-point
    ip ospf authentication message-digest
    ip ospf message-digest-key 1 md5 plaintext <your_password_here>
interface 1/1/2
    no shutdown
    mtu 9198
    description to SwitchB
    ip address 192.168.4.5/31
    ip ospf 1 area 0.0.0.0
    no ip ospf passive
    ip ospf network point-to-point
    ip ospf authentication message-digest
    ip ospf message-digest-key 1 md5 plaintext <your_password_here>
interface 1/1/8
    no shutdown
    no routing
    vlan access 100
interface 1/1/9
    no shutdown
    no routing
    vlan access 200
interface loopback 0
    ip address 192.168.2.3/32
    ip ospf 1 area 0.0.0.0
interface vlan 100
   ip address 10.10.100.254/24
ip ospf 1 area 0.0.0.0
    no ip ospf passive
interface vlan 200
    ip address 10.10.200.254/24
    ip ospf 1 area 0.0.0.0
    no ip ospf passive
!
!
router ospf 1
    router-id 192.168.2.3
    max-metric router-lsa on-startup
    passive-interface default
    graceful-restart restart-interval 300
    trap-enable
    area 0.0.0.0
https-server vrf mgmt
SwitchC#
```



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