Intro To VLANS on the CRS

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Joshua Bio

- Joshua Gray
  - Network Engineer Since 2008
  - Finishing masters degree in Network Engineering and Security at DePaul University.
  - Ipv6, MTCNA, MTCRE, MTCWE, MTCINE, InfraGuard

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Brian Bio

As the owner of Baltic Networks and a former wireline and wireless ISP, I'm always looking for that next product or service that makes your job as a service provider easier and improves your bottom line. I started in telecommunications in 1986 and got involved with Mikrotik in 2003 deploying large scale hotpots in airports worldwide. I'm also a certified Mikrotik trainer.

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The Swiss Army knife of VLANs

- The CRS is not your grandfather's switch
- A cornucopia of VLAN fun awaits you
  (Vlan Tag Switching)
- Number one request we get on CRS devices

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Benefits of Using VLANS

- Many switches connected together can create an issue with scalability
  - The larger the broadcast domain the more traffic that is consumed in just broadcast frames
  - One might not want a broadcast to reach a certain port for security concerns
  - VLANS allow a physical layer two network to be split into several virtually isolated networks
  - QOS- Different VLANS can have different priorities.

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VLAN Planning

- Ports can be put into a trunk mode or access level mode
- Broadcasts are sent only to ports that are participating in the VLAN
- Each VLAN should be a single subnet.

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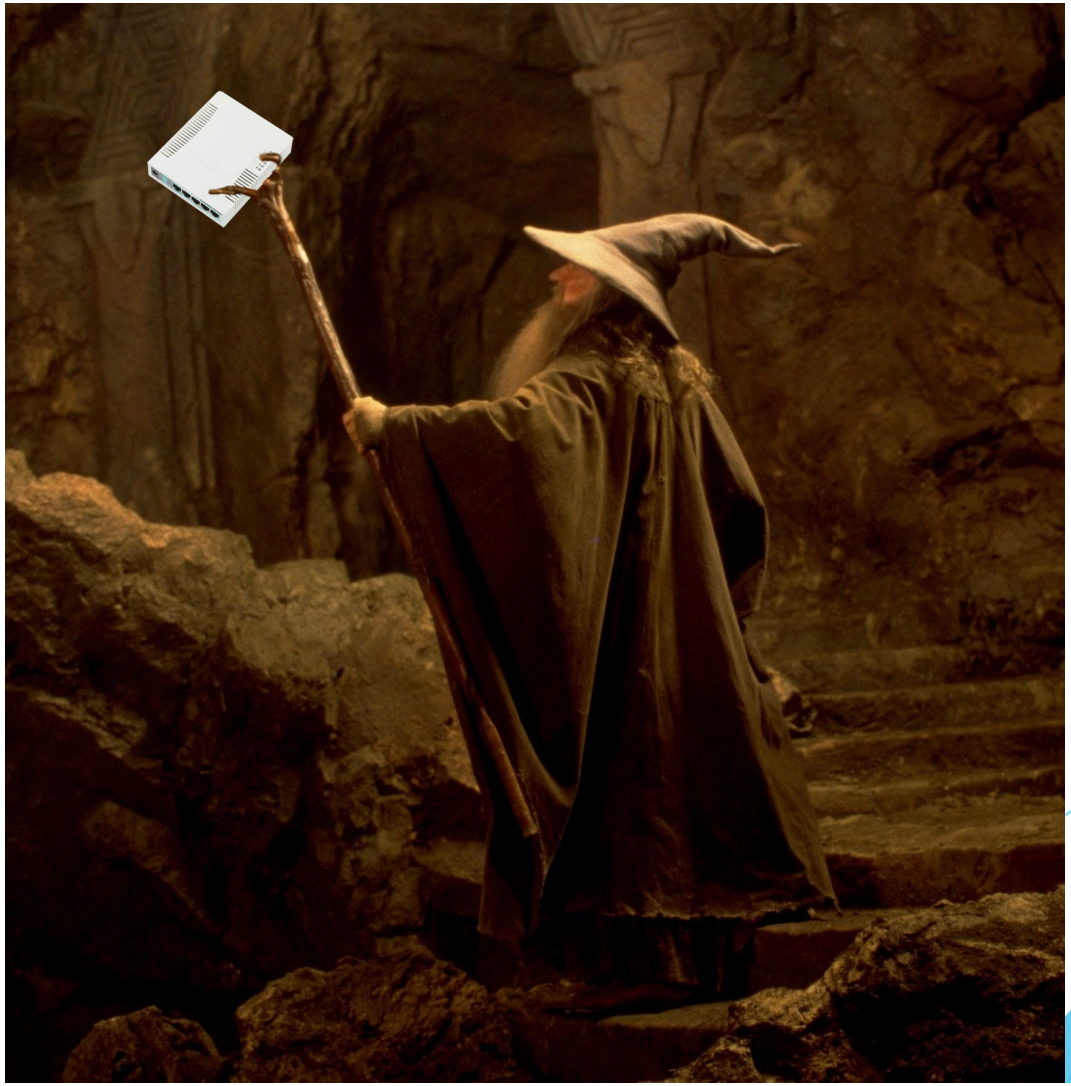
Inter VLAN Routing?!?!

- One can route between vlans using a router on a stick.
- Or using the CRS but keep in mind it is not extremely powerful.



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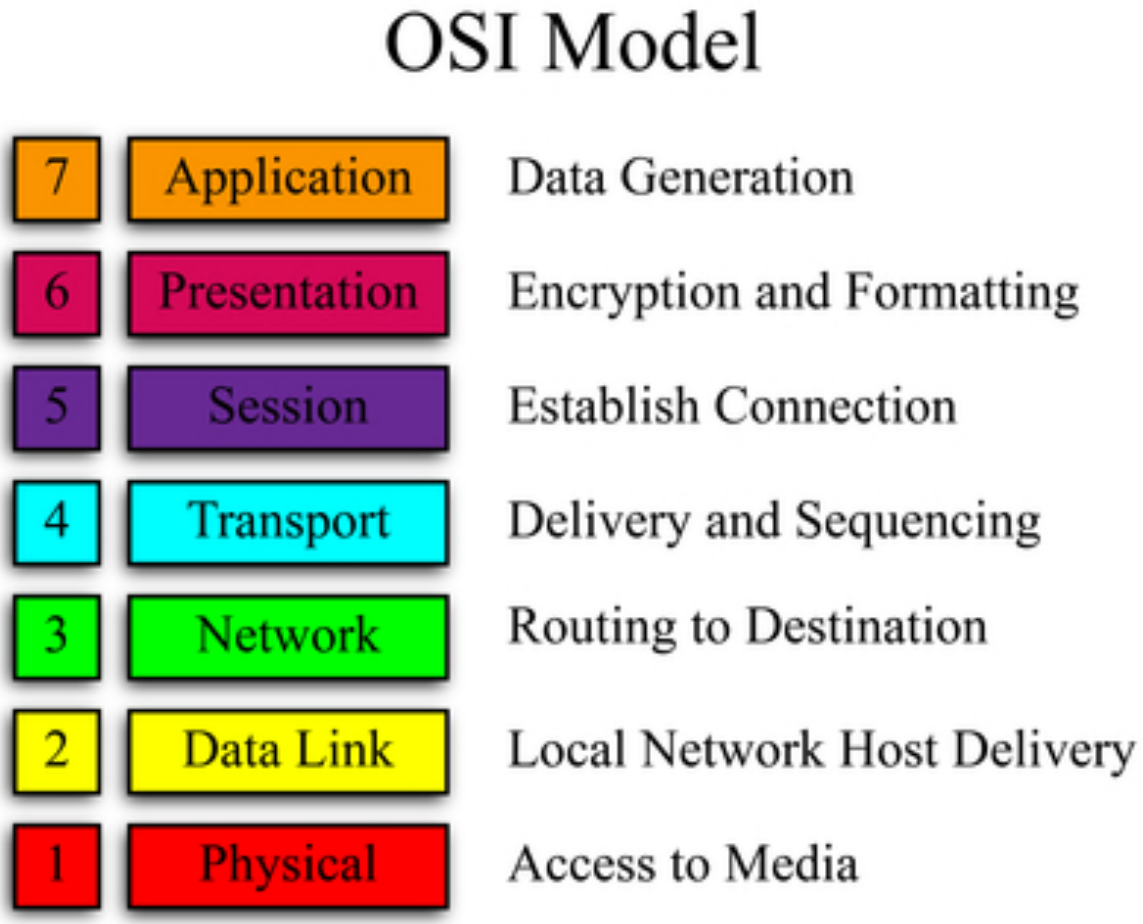
OSI Model



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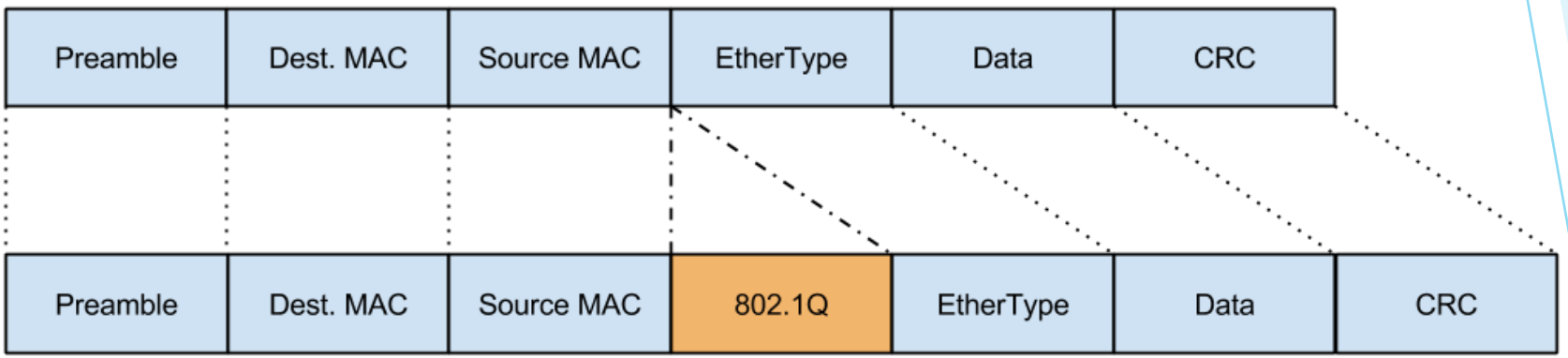
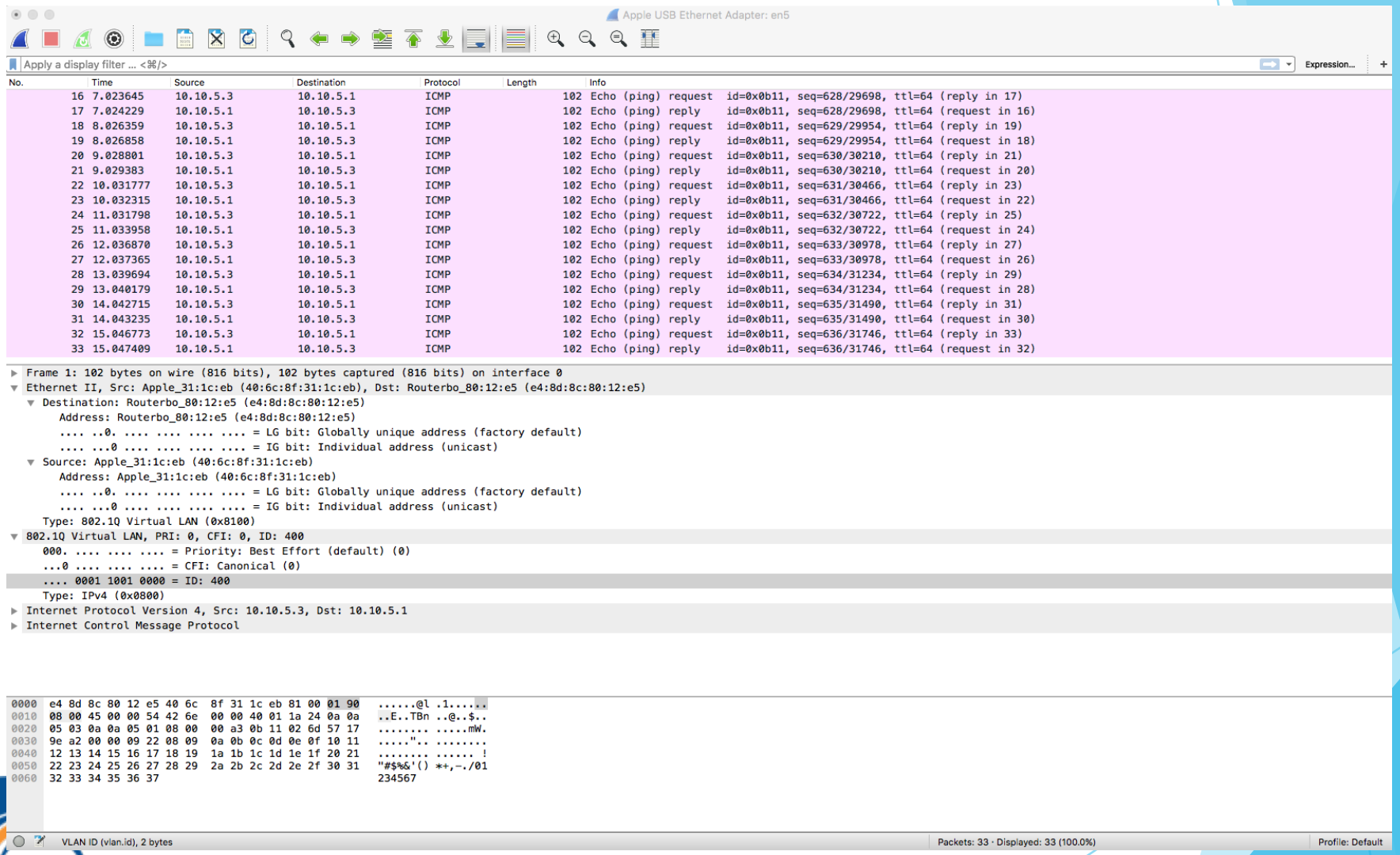
Ethernet Frame



Packet Capture



Packet Capture

```
▼ Ethernet II, Src: Apple_31:1c:eb (40:6c:8f:31:1c:eb), Dst: Routerbo_80:12:e5 (e4:8d:8c:80:12:e5)
  ▼ Destination: Routerbo_80:12:e5 (e4:8d:8c:80:12:e5)
      Address: Routerbo_80:12:e5 (e4:8d:8c:80:12:e5)
      .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
      .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
  ▼ Source: Apple_31:1c:eb (40:6c:8f:31:1c:eb)
      Address: Apple_31:1c:eb (40:6c:8f:31:1c:eb)
      .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
      .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Type: 802.1Q Virtual LAN (0x8100)
▼ 802.1Q Virtual LAN, PRI: 0, CFI: 0, ID: 400
    000. .... .... .... = Priority: Best Effort (default) (0)
    ...0 .... .... .... = CFI: Canonical (0)
    .... 0001 1001 0000 = ID: 400
```

Packet Capture

Trunk

```
▼ 802.1Q Virtual LAN, PRI: 0, CFI: 0, ID: 400
    000. .... .... .... = Priority: Best Effort (default) (0)
    ...0 .... .... .... = CFI: Canonical (0)
    .... 0001 1001 0000 = ID: 400
```

VLAN Tag

Access Level

```
▼ Ethernet II, Src: Apple_31:1c:eb (40:6c:8f:31:1c:eb), Dst: Routerbo_80:12:e5 (e4:8d:8c:80:12:e5)
  ▼ Destination: Routerbo_80:12:e5 (e4:8d:8c:80:12:e5)
      Address: Routerbo_80:12:e5 (e4:8d:8c:80:12:e5)
      .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
      .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
  ▼ Source: Apple_31:1c:eb (40:6c:8f:31:1c:eb)
      Address: Apple_31:1c:eb (40:6c:8f:31:1c:eb)
      .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
      .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
```

No VLAN Tag

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Trunk VS Access

- Trunks
  - Links between switches
  - Links to servers with multiple subnets
  - Links to other network devices that support Vlans
  - Admin systems that need access to multiple Vlans
- Access
  - Links between end user devices
  - Links to APs that only needs single VLAN
  - Guest devices

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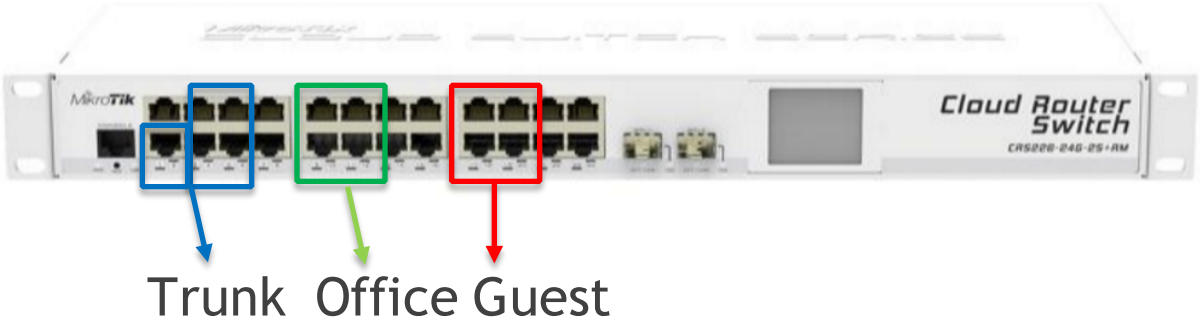
Setup



- One trunk back to core switches. (Eth1)
- Ports 3-6 trunked for multiple SSID on access points
- Ports 9-13 access ports for Office users (VLAN 11)
- Ports 17-20 access ports for Guest users (VLAN 21)

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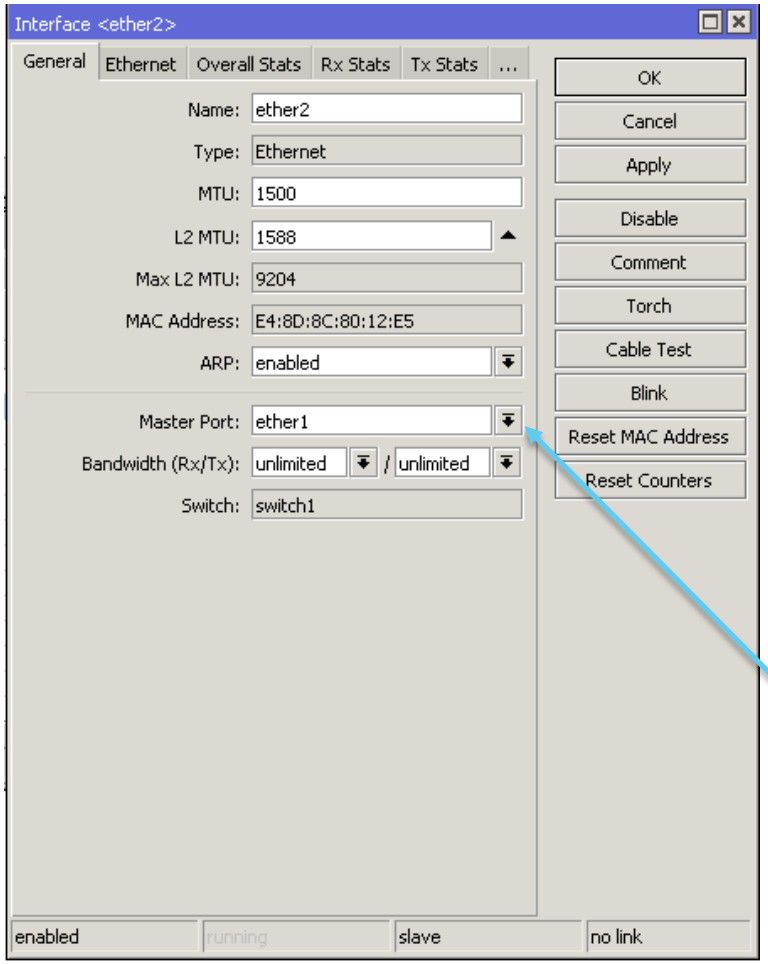
Set up Switch Chip

- Slave all all ports to Eth1



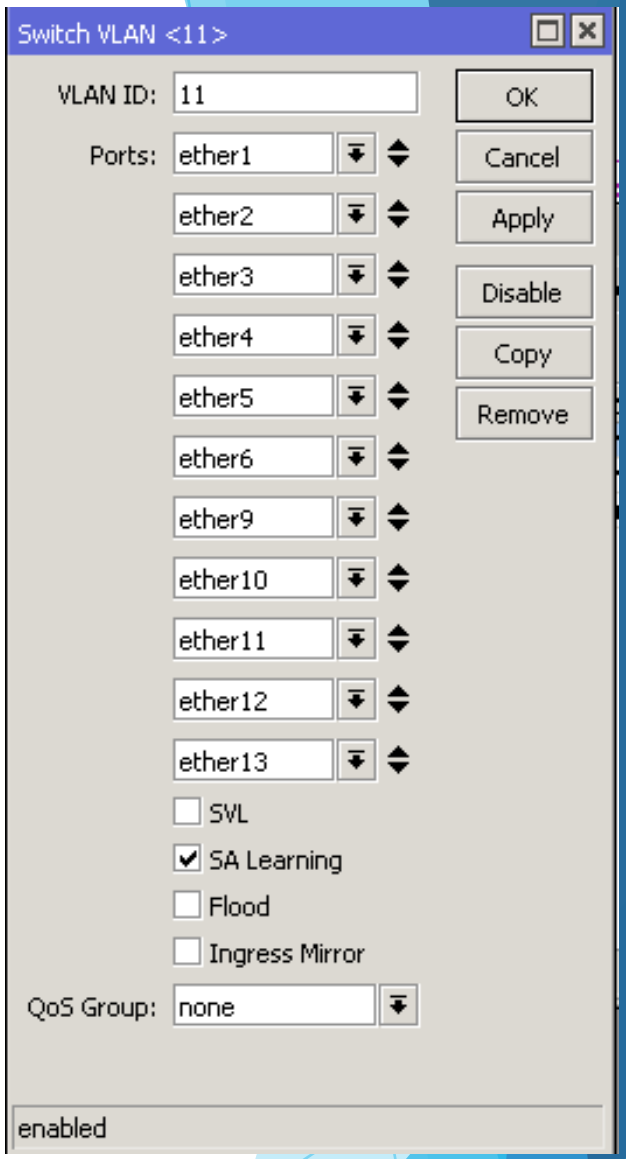
Set up Switch Chip

- Slave all all ports to Eth1

```
/interface ethernet
set [ find default-name=ether2 ] master-port=ether1
set [ find default-name=ether3 ] master-port=ether1
set [ find default-name=ether4 ] master-port=ether1
set [ find default-name=ether5 ] master-port=ether1
set [ find default-name=ether6 ] master-port=ether1
set [ find default-name=ether7 ] master-port=ether1
set [ find default-name=ether8 ] master-port=ether1
set [ find default-name=ether9 ] master-port=ether1
set [ find default-name=ether10 ] master-port=ether1
set [ find default-name=ether11 ] master-port=ether1
set [ find default-name=ether12 ] master-port=ether1
…
```

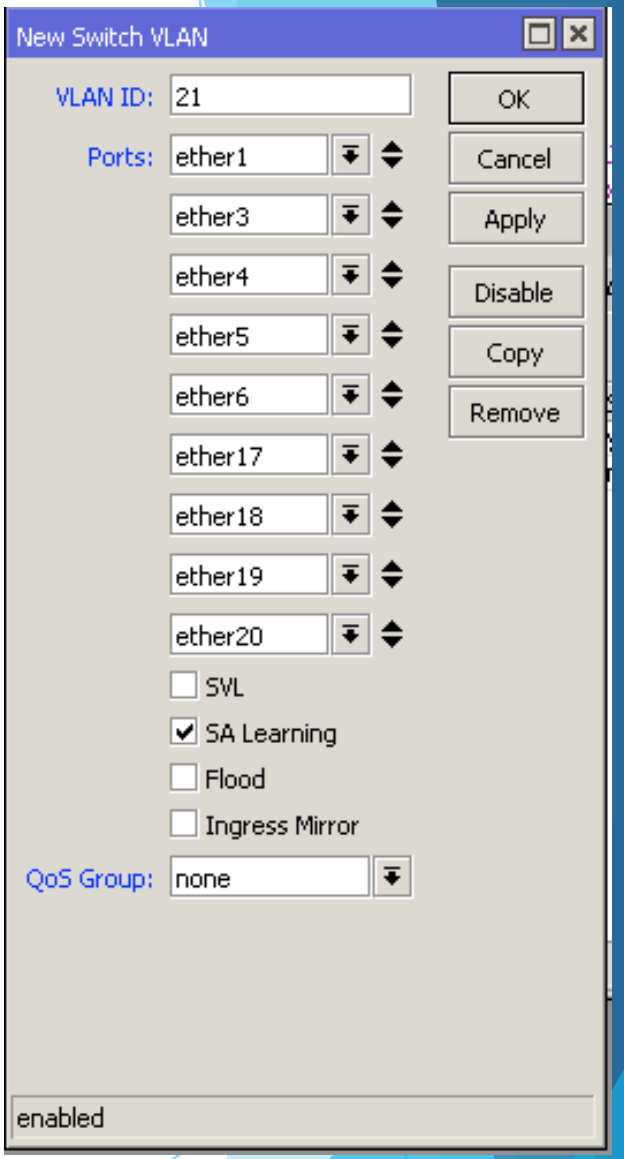
Add Vlans

- Switch > VLAN +
  - Add Vlan 11
  - Add Ports 1,2,3,4,5,6 (Will Be Trunk)
  - Add Ports 9,10,11,12,13 (Will be Access Layer)
  - These ports are for the office network.



Add Vlans

- Switch > VLAN +
  - Add Vlan 21
  - Add Ports 1,3,4,5,6 (Trunk ports)
  - Add Ports17,18,19,20 (Will be Access Layer)
  - These ports are for the office network.



Add Vlans

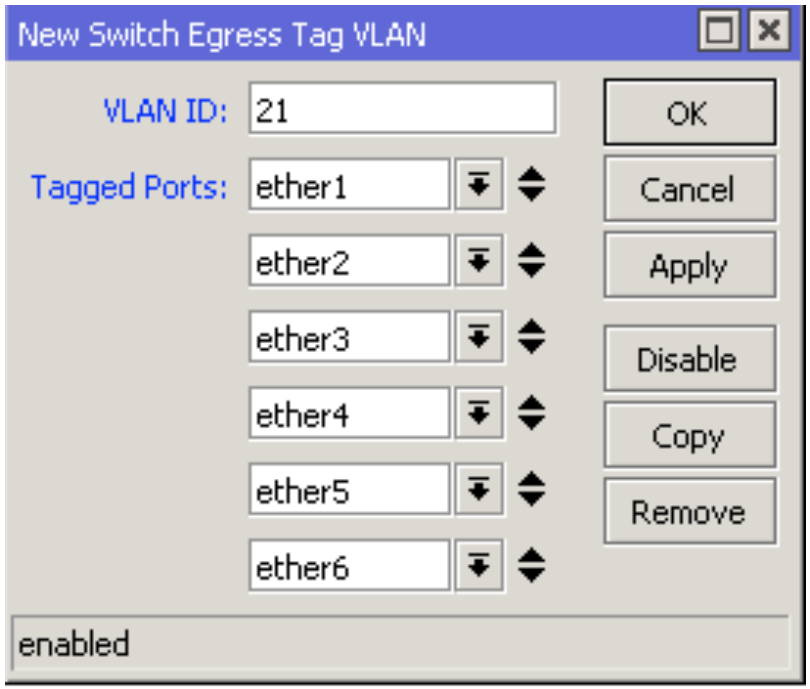
- Switch > VLAN +
  - Add Vlan 11
  - Add Vlan 21

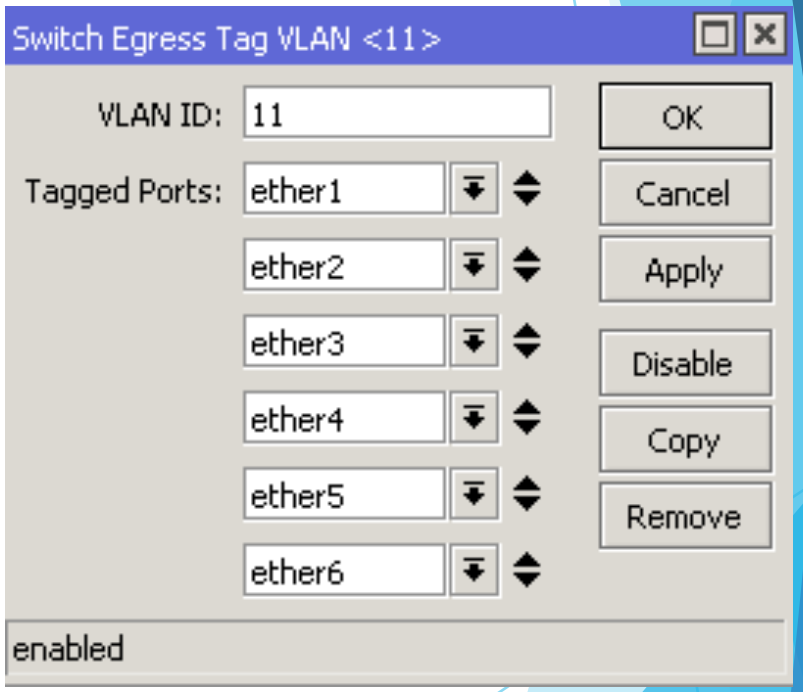
```
/interface ethernet switch vlan
add ports="ether1,ether2,ether3,ether4,ether5,ether6,\
ether9,ether10,ether11,ether12,ether13" vlan-id=11

add ports=ether1,ether3,ether4,ether5,ether6,ether17,\
ether18,ether19,ether20 vlan-id=21
```

Setup Trunk Ports

- Switch > VLAN > Eg. VLAN TAG





Setup Trunk Ports

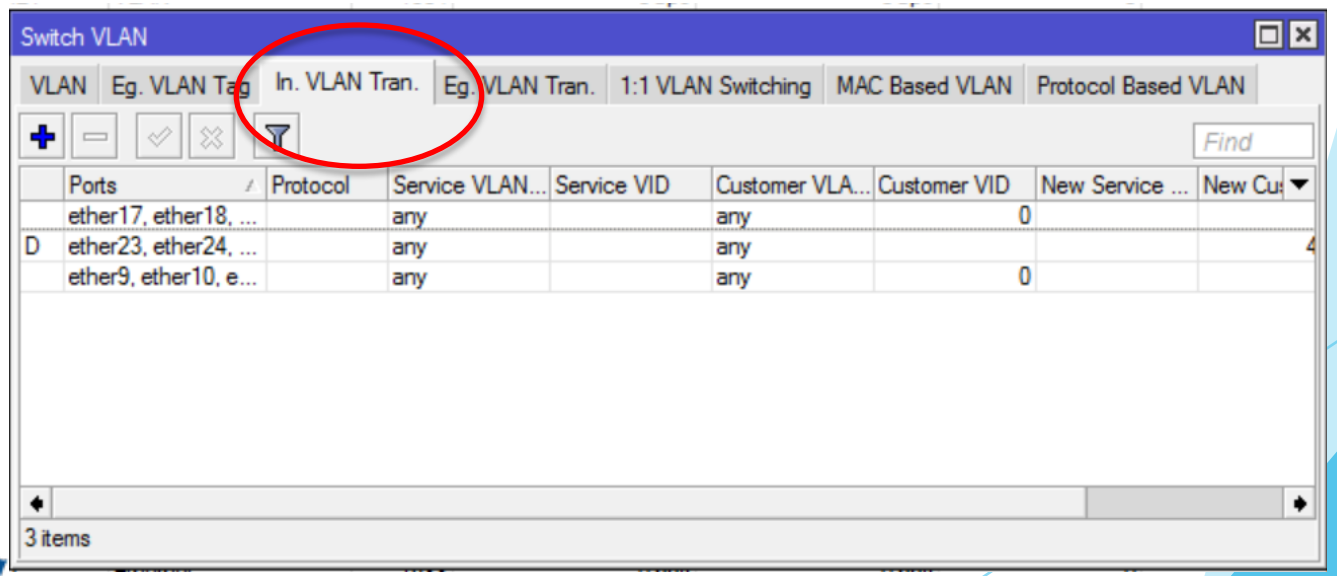
- Switch > VLAN > Eg. VLAN TAG

```
/interface ethernet switch egress-vlan-tag
add tagged-ports=ether1,ether2,ether3,ether4,ether5,\
ether6 vlan-id=21

add tagged-ports=ether1,ether2,ether3,ether4,ether5,\
ether6 vlan-id=11
```

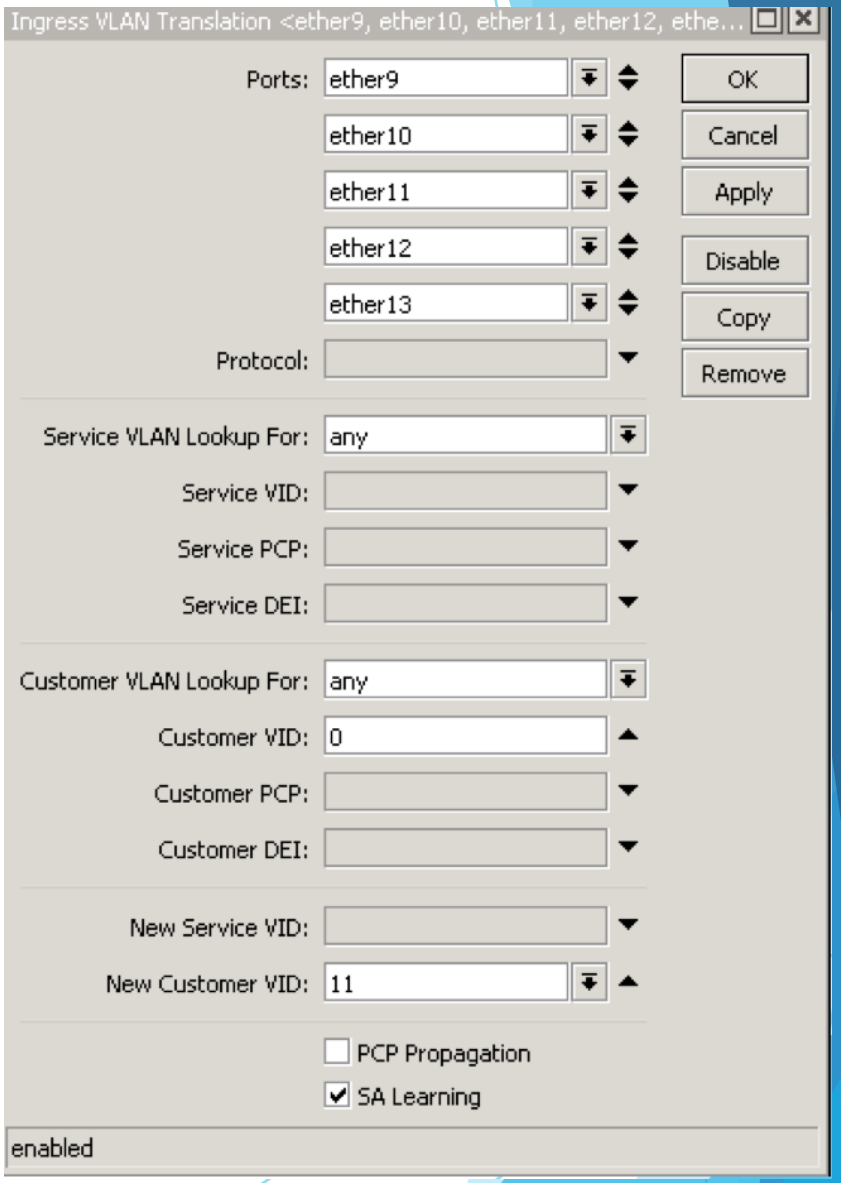
Ingress Ports

- Setup access level ports to tag traffic that comes in appropriately.
- Switch > VLAN > In. VLAN TAG
- Service VID: Used for service provider tagging
- PCP: Used to set priority
- DEI: Drop eligibility indicator



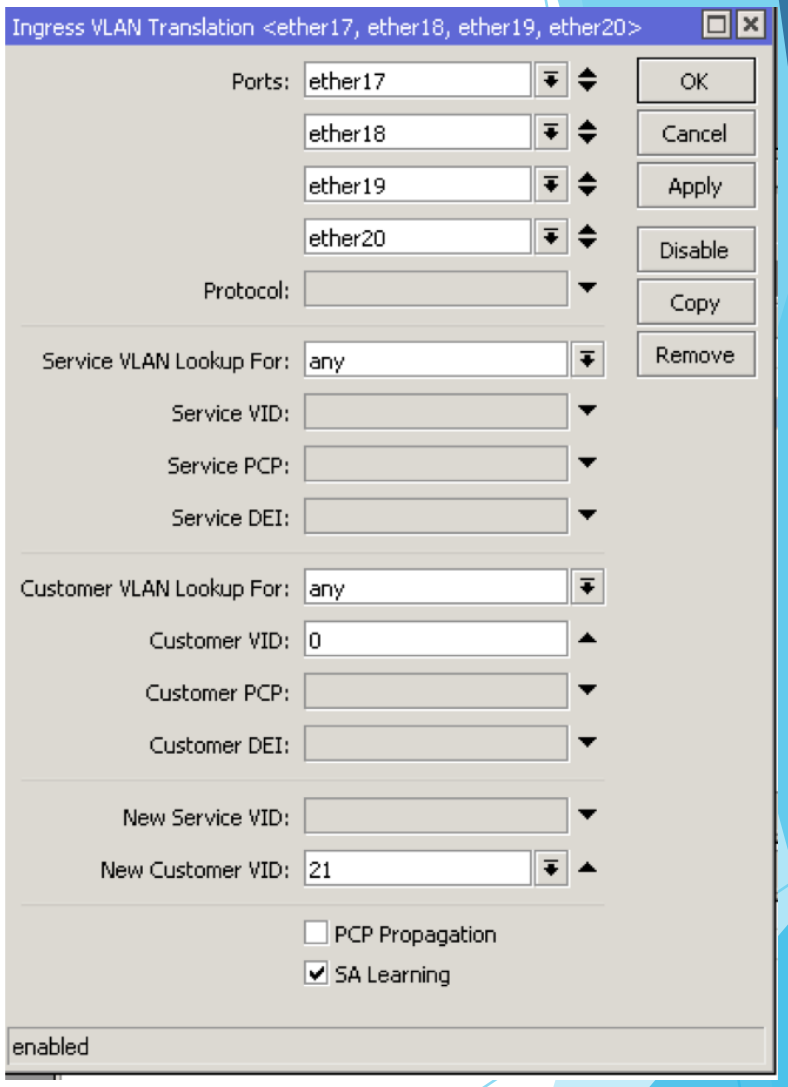
Ingress Ports

- Set access level ports for the office network
  - Traffic inbound to the switch
  - Ports 9, 10, 11,12, 13



Ingress Ports

- Set access level ports for the Guest network
  - Traffic inbound to the switch
  - Ports 17,18,19,20



Ingress Ports

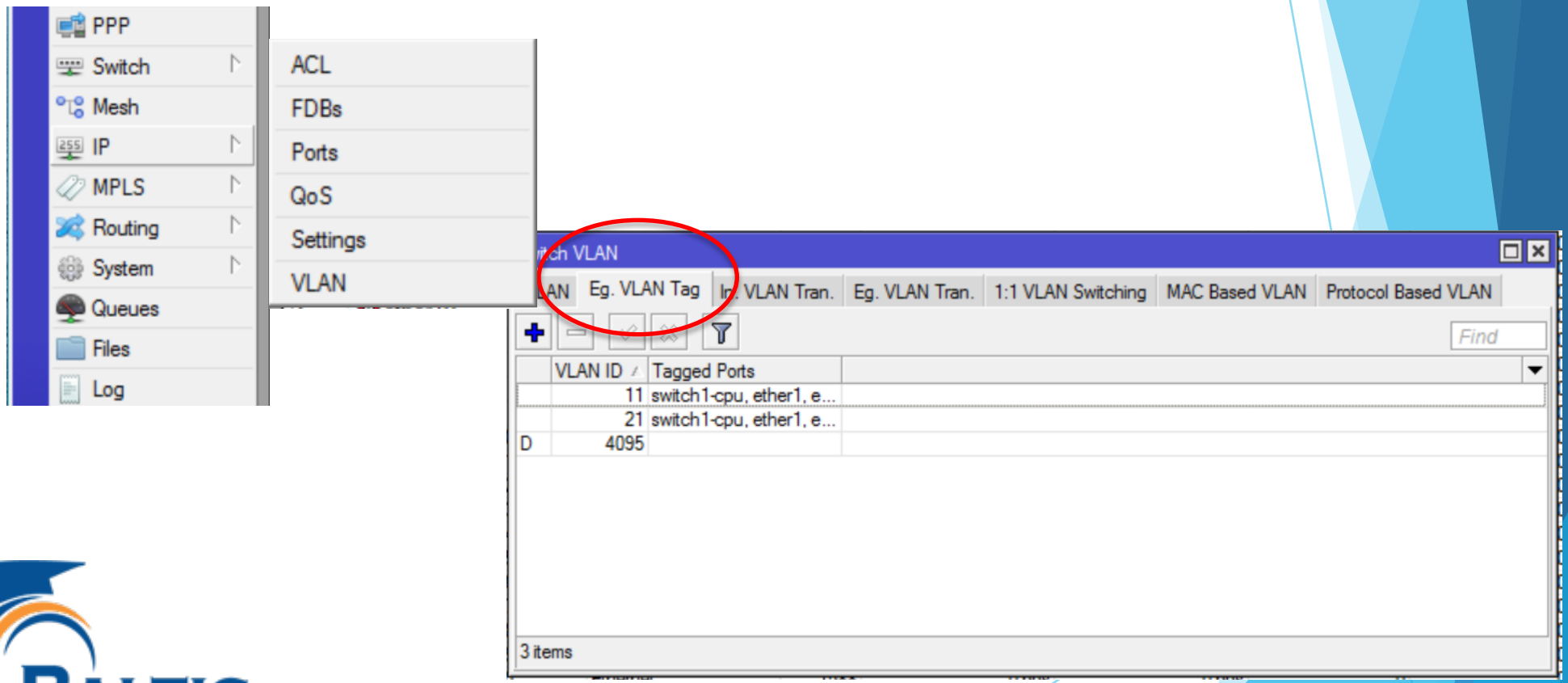
```
/interface ethernet switch ingress-vlan-translation

add customer-vid=0 new-customer-vid=11 ports=\
    ether9,ether10,ether11,ether12,ether13

add customer-vid=0 new-customer-vid=21 ports=ether17\,
ether18,ether19,ether20
```

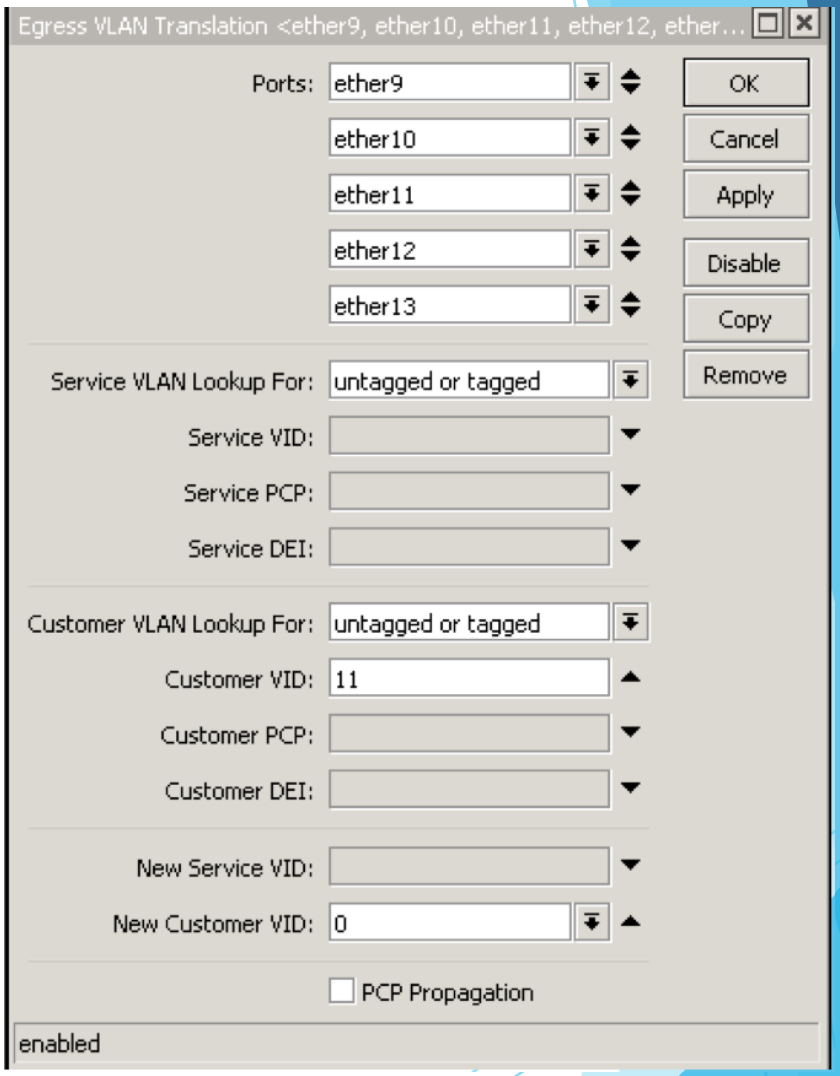
Egress

- Setup access level ports to tag traffic that comes in appropriately.
- Switch > VLAN > Eg. VLAN TAG



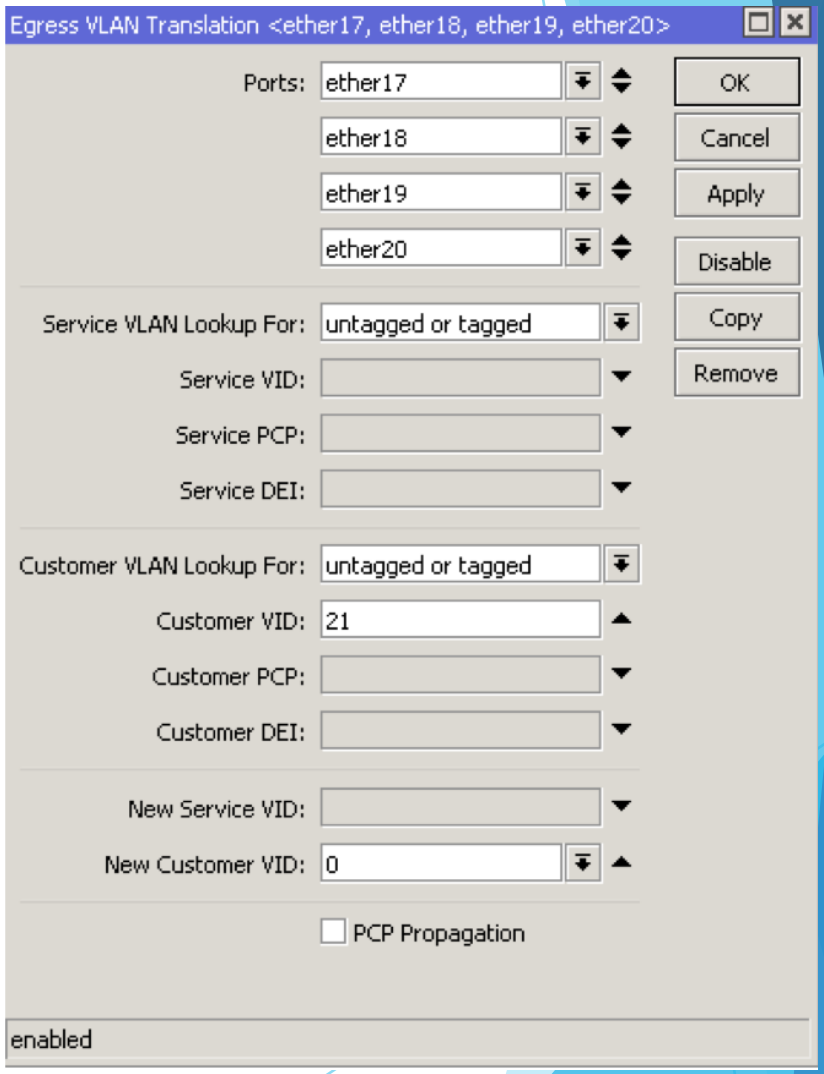
Egress

- Set access level ports for the Guest network
  - Traffic outbound from the switch
  - Ports 9, 10, 11,12, 13



Egress

- Set access level ports for the Guest network
  - Traffic inbound to the switch
  - Ports 17,18,19,20



Egress

```
/interface ethernet switch egress-vlan-translation
add customer-vid=11 customer-vlan-format=untagged-or-tagged\
 new-customer-vid=0 ports=ether9,ether10,ether11,ether12\
,ether13 ports=untagged-or-tagged


add customer-vid=21 customer-vlan-format=untagged-or-tagged\
 new-customer-vid=0 ports=ether17,ether18,ether19,ether20\
 customer-vlan-format=untagged-or-tagged
```

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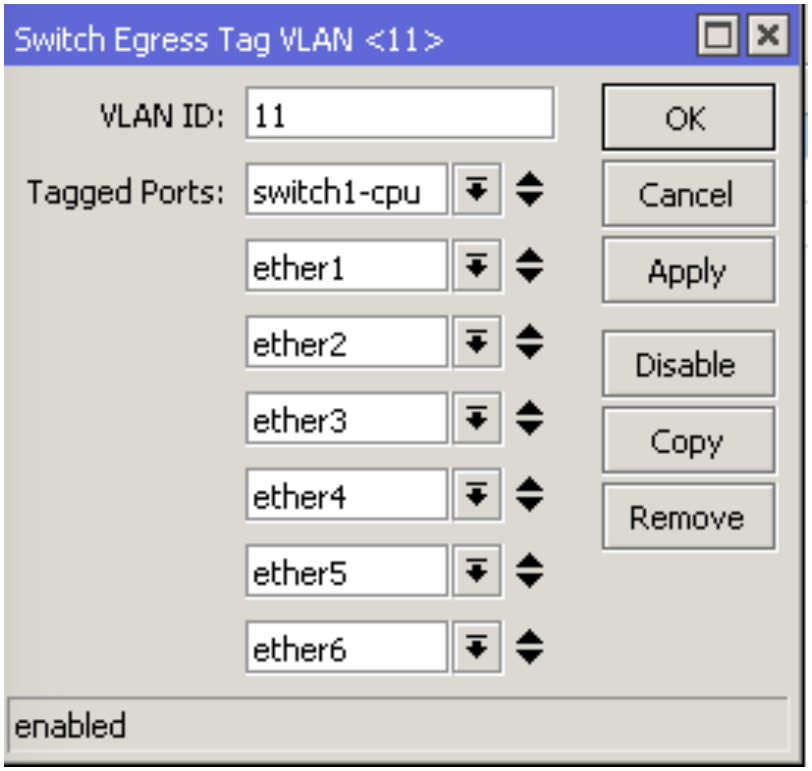
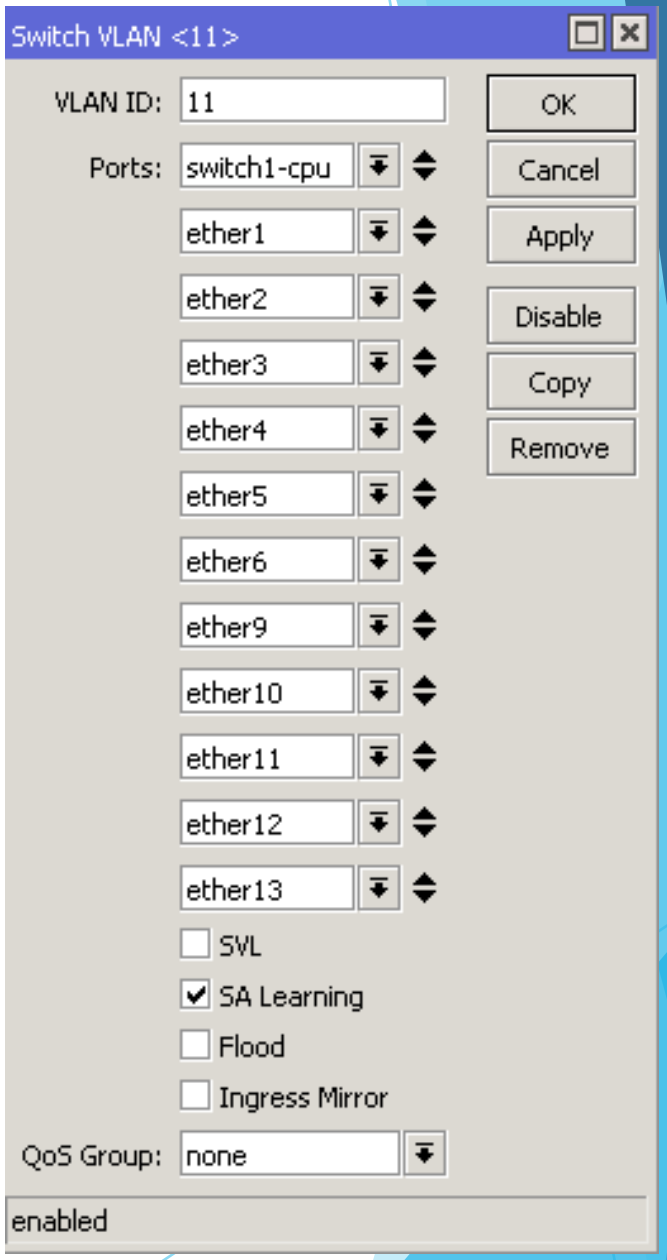
CRS IP on the VLAN?

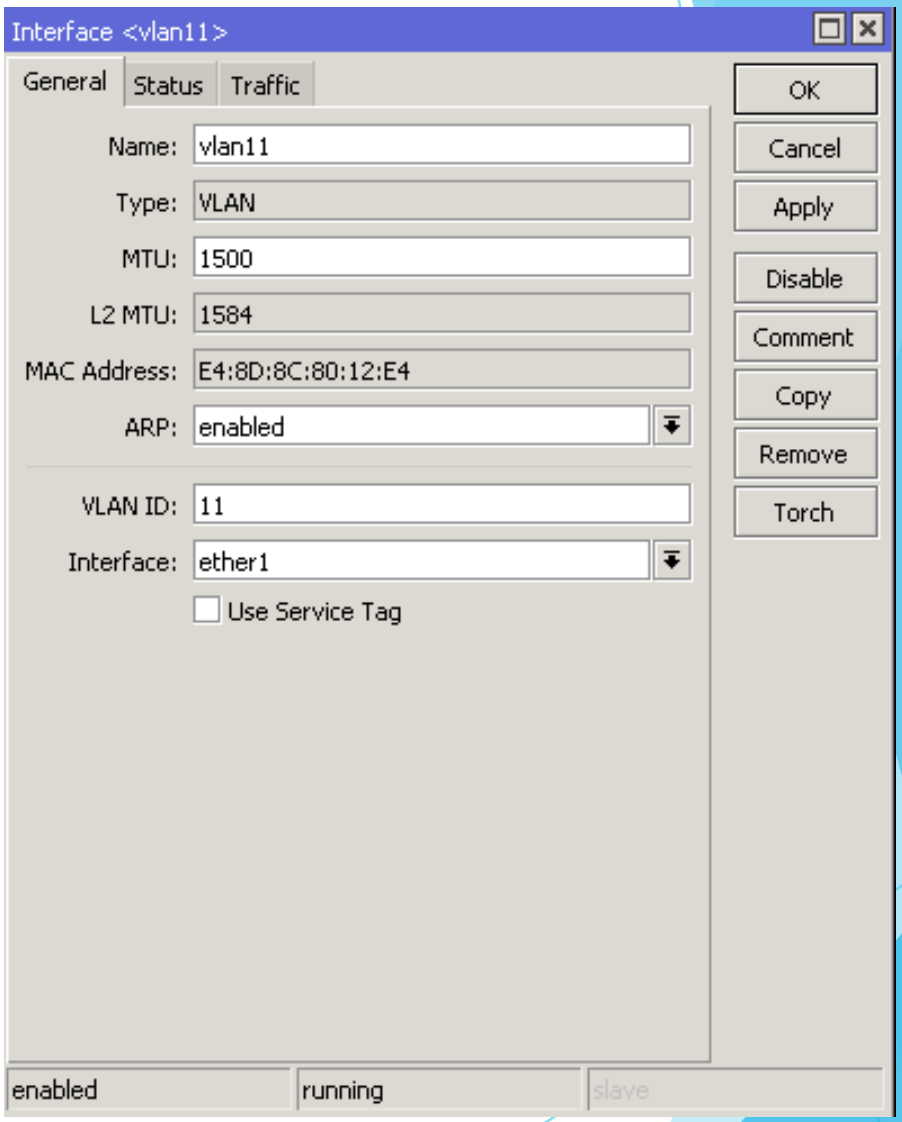
- Add switch chip to VLAN and Eg. VLAN Tag.





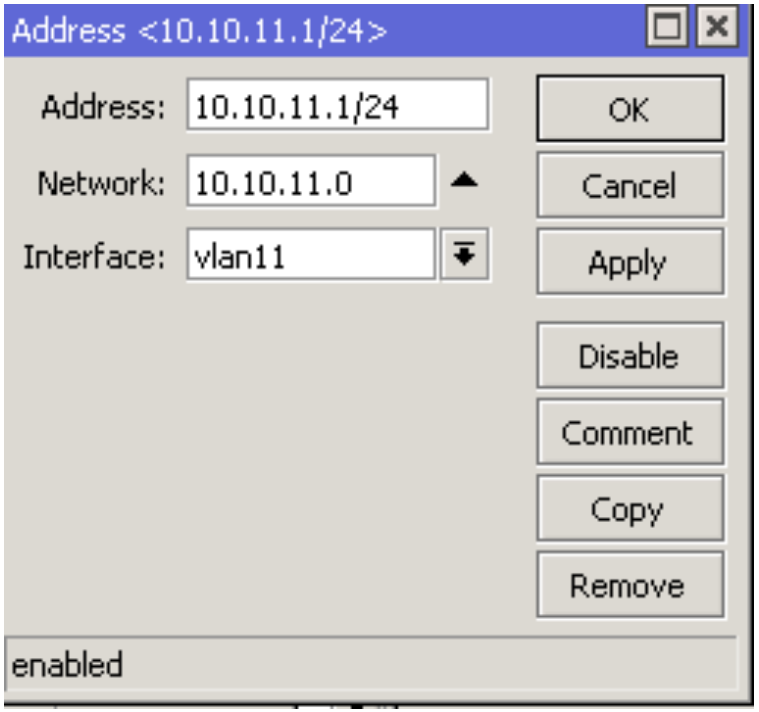
CRS IP on the VLAN?

- Create VLAN on Master Port.



CRS IP on the VLAN?

- Assign IP to that port.



Questions?