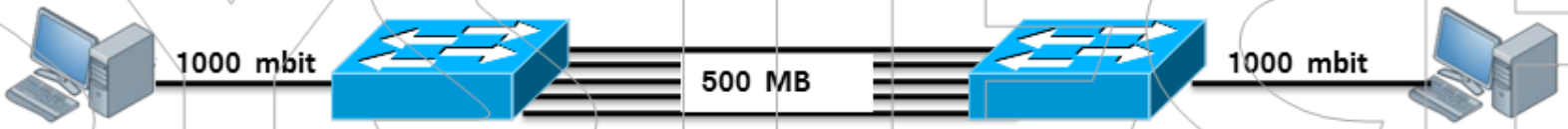
Etherchannel (Link Aggregation)

- ✓ Etherchannel is a technology that lets to bundle multiple physical links into a single logical link

- ✓ Replace link between the switches with faster link
- ✓ Add multiple links and bundel them into an etherchannel



- ✓ Spanning tree will block 3 out of 4 links
- ✓ But in etherchaneel Spanning tree will consider all link as onle logical link so there are no loops
- ✓ Etherchannel will do load balance among the different link and it takes care of redundancy
- ✓ We can use 8 physical interfaces

- ✓ There are two types of protocols to configure etherchannel
  - ✓ PAgP (Cisco proprietaty) Port Aggregation Protocol
  - ✓ LACP (IEEE standard) Link Aggregation Control Protocol

- ✓ These protocol can dynamically configure an etherchannel
- ✓ All the ports must have the same configuration
  - ➢ Duplex has to be the same
  - ➢ Speed has to be same
  - ➢ Same native & allowed VLANs
  - ➢ Same switch port modes (access or Trunk)
    - ✓ If we want to configure PAgP,the interfaces can be configured as

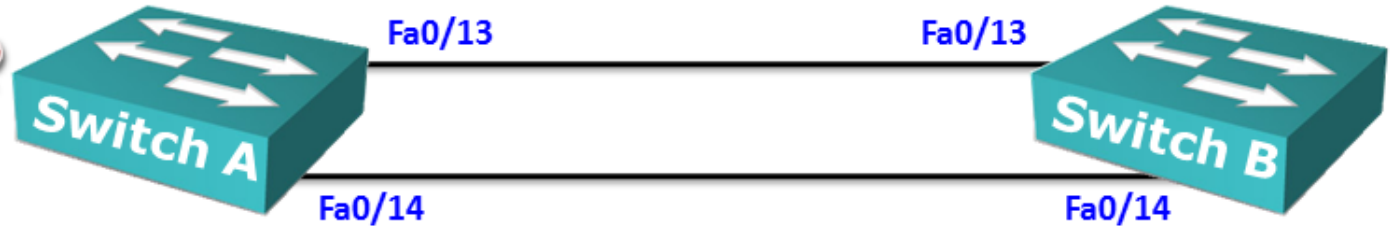
on	Interface become member of etherchannel but does not negotiate
Desirable	It will ask other side to become etherchannel
Auto	Interface will wait passively for the other side to ask to become an etherchannel
off	No etherchannel configured on the interface

- ✓ If we want to configure LACP,the interfaces can be configured as

on	Interface become member of etherchannel but does not negotiate
Active	It will ask other side to become etherchannel
Passive	Interface will wait passively for the other side to ask to become an etherchannel
off	No etherchannel configured on the interface

LAB

PAgP



SWITCH A

```
# interface fa0/13
#Channel-group 1 mode?
#channel-group 1 mode desirable
# interface fa0/14
#channel-group 1 mode desirable
```

SWITCH B

```
# interface fa0/13
#channel-group 1 mode auto
# interface fa0/14
#channel-group 1 mode auto
```

SWITCH A & B

```
#interface port channel 1
#switchport trunk encapsulation dot1q
#switchport mode trunk
```

SWITCH A

```
#show etherchannel 1 port-channel
#show etherchannel summary
#show interface fa0/14 etherchannel
```

	On	Desirable	Auto	off
On	Yes	No	No	No
Desirable	No	No	Yes	No
Auto	No	Yes	No	No
Off	No	No	No	No

LAB
LACP

SWITCH A & B

#default interface fa0/13
#default interface fa0/14

SWITCH A

interface fa0/13
#channel-group 1 mode active
interface fa0/14
#channel-group 1 mode active

SWITCH B

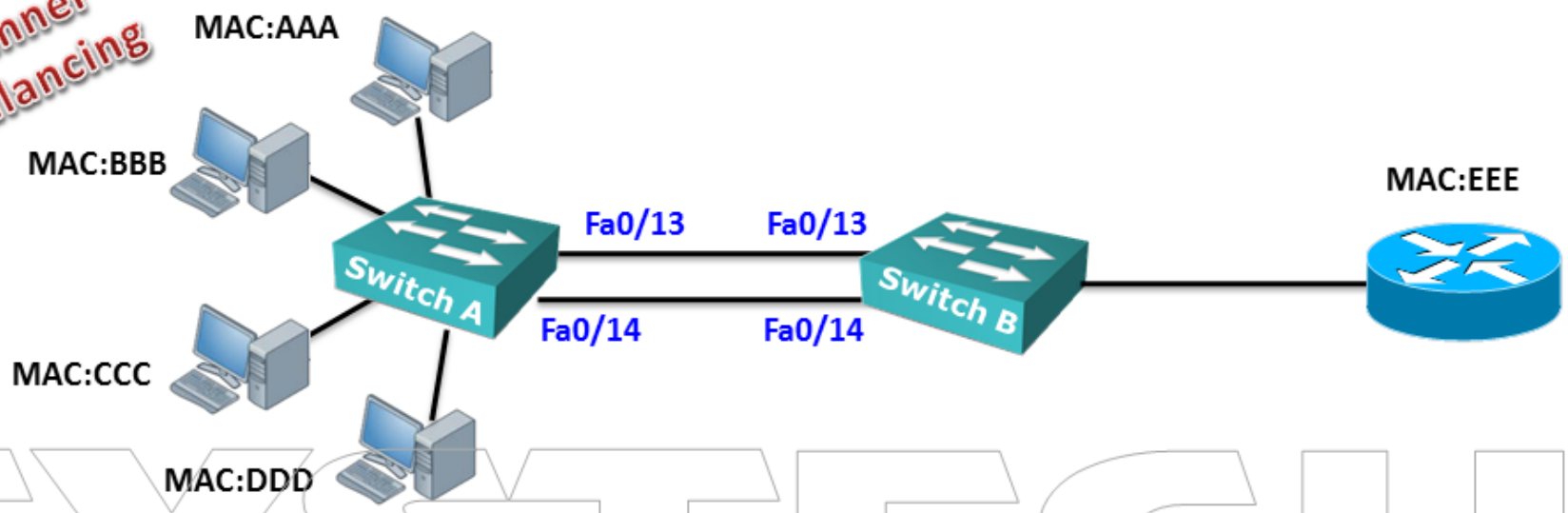
interface fa0/13
#channel-group 1 mode passive
interface fa0/14
#channel-group 1 mode passive

SWITCH A

#show etherchannel 1 port-channel

	On	Desirable	Auto	off
On	Yes	No	No	No
Active	No	No	Yes	No
Passive	No	Yes	No	No
Off	No	No	No	No

Etherchannel Load Balancing

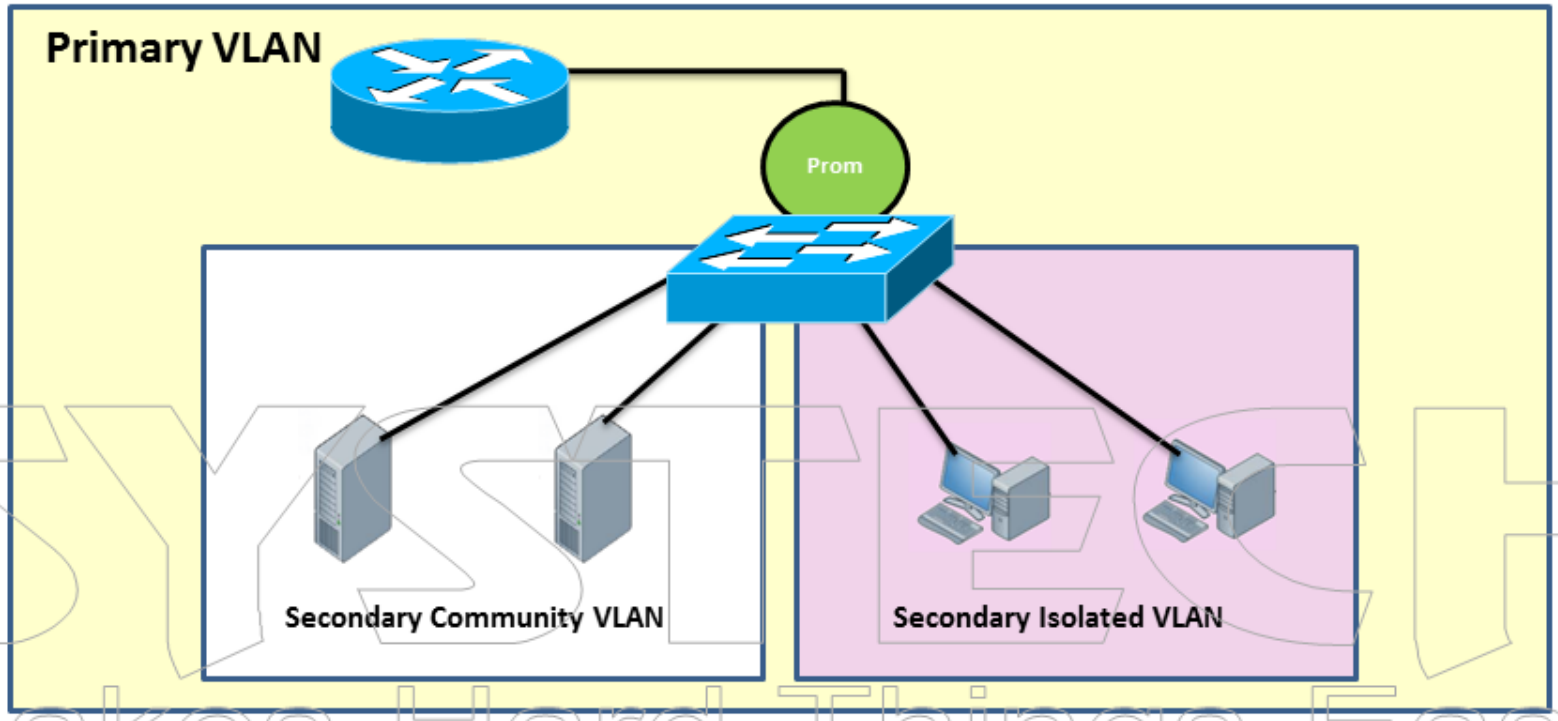


- ✓ Default load balancing mechanism is source MAC address.This means that ALL traffic from one MAC address will be sent down to one and the same physical interface
  1. MAC address AAA will be sent using fa0/13 interface
  2. MAC address BBB will be sent using fa0/14 interface
  3. MAC address AAA will be sent using fa0/13 interface
  4. MAC address BBB will be sent using fa0/14 interface
- ✓ But Switch B will not do Load balancing because it has only one router with MAC EEE.
- ✓ It will select only one physical interface so all traffic from the router will be send down to fa0/13 or fa0/14
- ✓ One of the physical link will not be used

SWITCH B

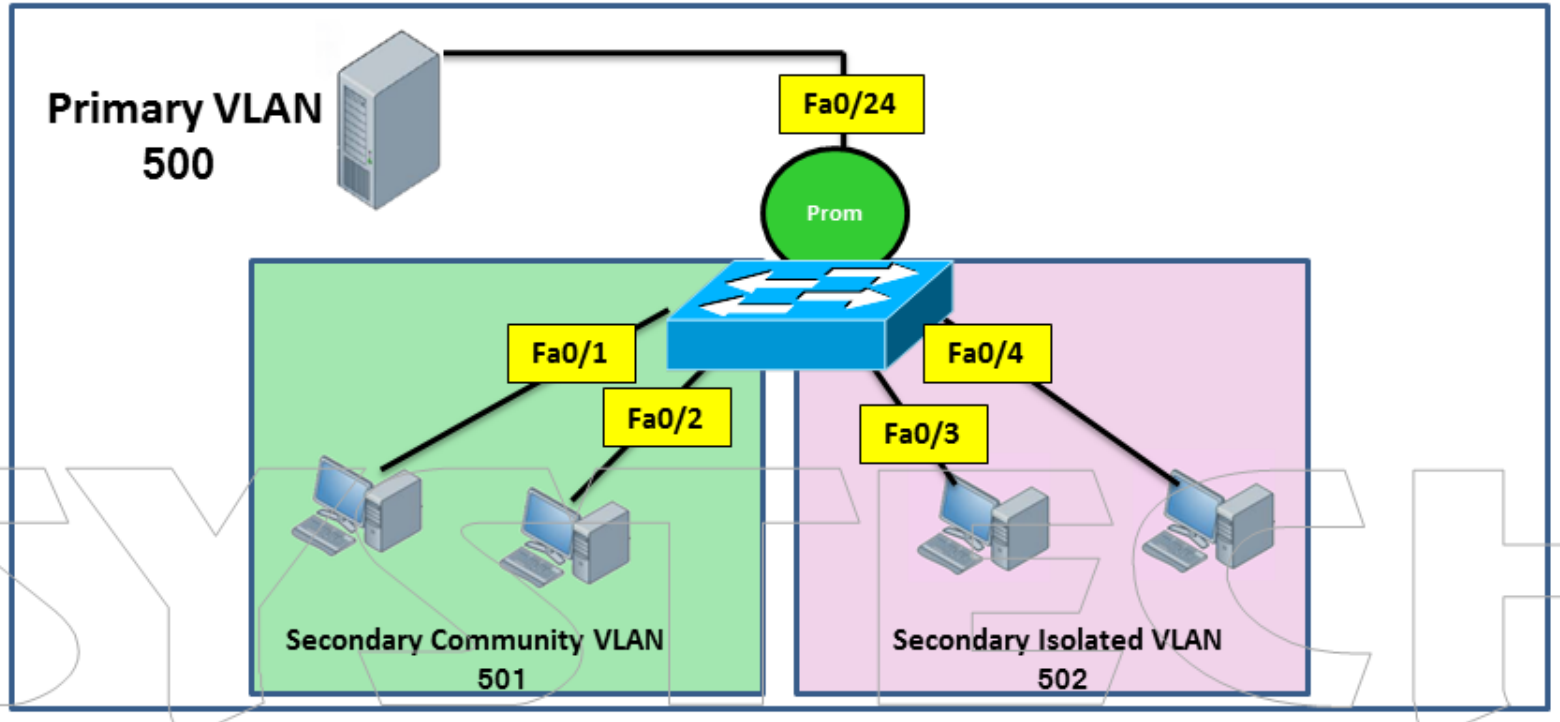
```
#show etherchannel load-balance
#port-channel load-balance ?
#port-channel load-balance dst-mac
```

PRIVATE VLAN



- ✓ The Private VLAN always have one primary VLAN
- ✓ Within primary VLAN it will have promiscuous port
- ✓ All ports can communicate with promiscuous port
- ✓ Within primary VLAN it will have one or more secondary VLANs
- ✓ There are two types of secondary VLAN
  - Community VLAN: All porst will communicate with each other and with promiscuous port
  - Isolated VLAN: All ports will not commincate with each other but with promiscuous port
- ✓ Secondary VLANs will communicate with promiscuous port but not with other secondary VLANs

LAB

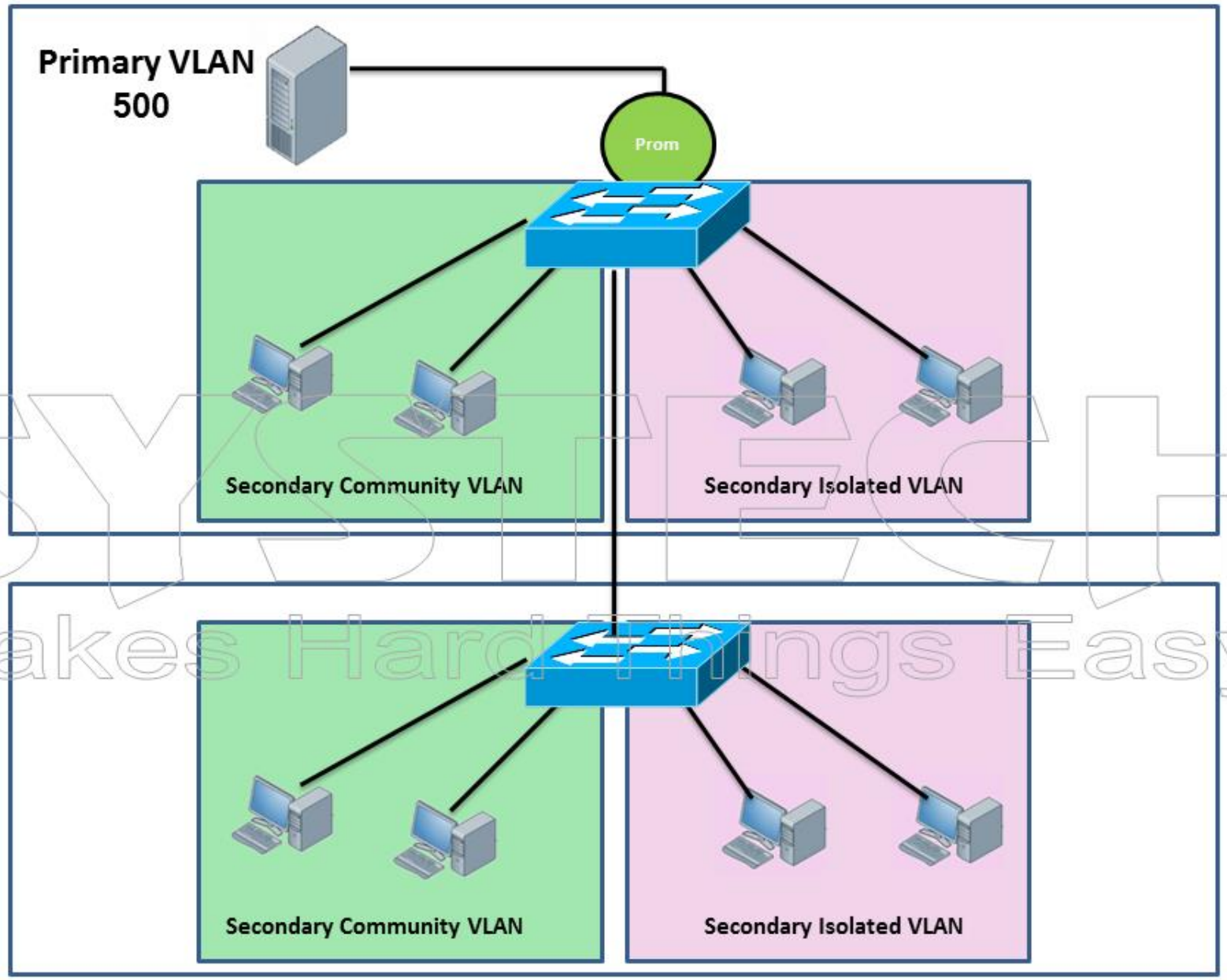



```
#vtp mode transparent
#vlan 501
#private-vlan community
#vlan 500
#private-vlan primary
#private-vlan association add 501
#interface range fa0/1 -2
#switchport mode private-vlan host
#switchport private-vlan host-association 500 501
#interface range fa0/24
#switchport mode private-vlan promiscuous
#switchport private-vlan  mapping 500 501
```

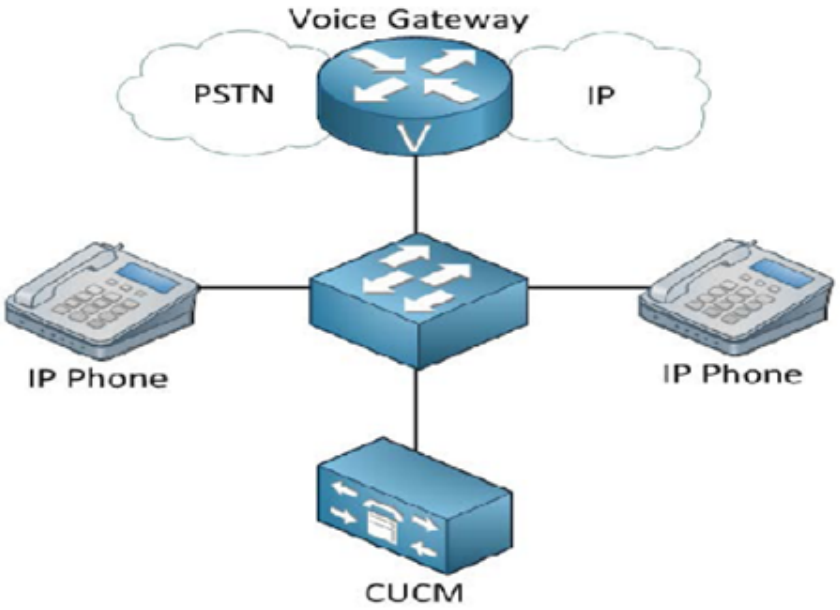
```
#vlan 502
#private-vlan isoloted
#vlan 500
#private-vlan primary
#private-vlan association add 502
#interface range fa0/3-4
#switchport mode private-vlan host
#switchport private-vlan host-association 500 502
#interface range fa0/24
#switchport mode private-vlan promiscuous
#switchport private-vlan  mapping 500 501
#interface range fa0/24
#switchport mode private-vlan promiscuous
#switchport private-vlan  mapping 500 502
```

```
#sh interface fa0/1 switchport
#sh interface fa0/2 switchport
#sh interface fa0/3 switchport
#sh interface fa0/4 switchport
#sh interface fa0/24 switchport
#sh vlan private-vlan
#sh vlan private-vlan type
```

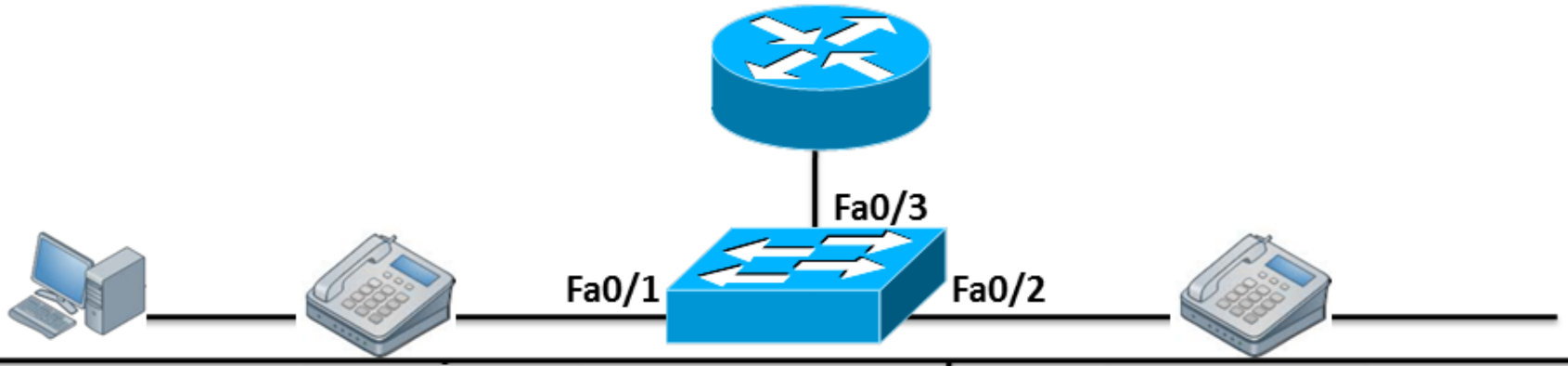
PRIVATE VLAN TRUNK



VOIP



- ✓ Voice Gateway: This is the router that is connected to our LAN/WAN but also to the PSTN (Public Switched Telephone Network)
- ✓ IP Phones: It needs IP address and will digitize your analog voice in IP packets that will be sent on the network. Most of the phones support POE (Power Over Ethernet) (#show power inline)
- ✓ CUCM (Cisco Unified Communication Manager): This is Cisco Call manager. It's where you configure dialplans, settings for IP phones. It's the equivalent of the PBX in old analog telephony system.



ROUTER A

```
#int e0
#ip address 10.0.0.1 255.0.0.0
#exit
#ip dhcp pool systechvoip
#network 10.0.0.0 255.0.0.0
#default-router 10.0.0.1
#option 150 ip 10.0.0.1
#exit
#ip dhcp excluded-address 10.0.0.1
#sh ip dhcp binding
```

```
#telephony-service
#max-dn 10      (directory number)
#max-ephone 5
#ip sourse-address 10.0.0.1
#exit
#ephone-dn 1
#number 3001
#name cisco
#exit
#ephone-dn 2
#number 3002
#name ccnp
#exit
#ephone 1
#mac-address ****.****.****
#button 1:1
#exit
#ephone 2
#mac-address ****.****.****
#button 1:2
```

SWITCH A

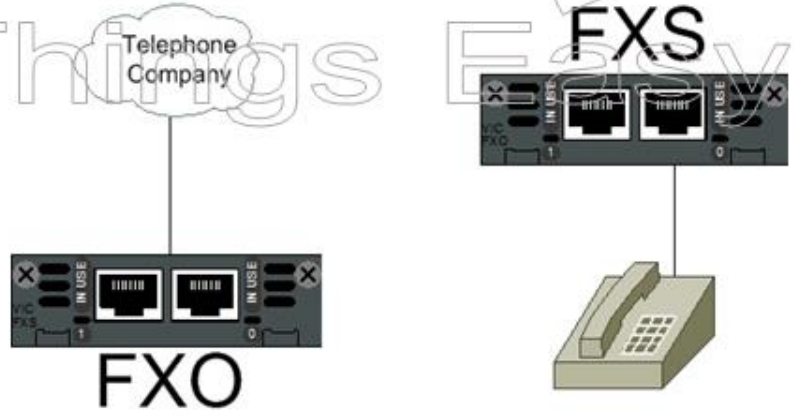
```
#int  fa0/1- 3
#switchport mode access
#switchport access vlan 100
#switchport   voice vlan 200
#spanning-tree port fast
#cdp enable          (Cisco discovery protocol)
```

VOIP

Foreign Exchange Office

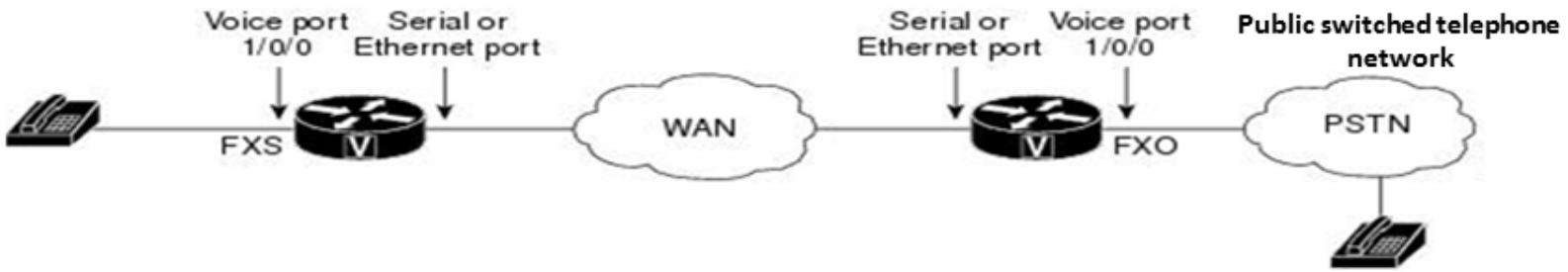
Foreign-Exchange-Station

Direct-inward-dial (DID)



VOIP

FXS PORT CONFIGURATION



TRICHY ROUTER

```
#configure terminal
#dial-peer voice 10 pots    (plain old telephone service)
#destination-pattern 2001
#Port2/0
#exit
```

US ROUTER

```
#configure terminal
#dial-peer voice 10 pots
#destination-pattern 3001
#Port2/0
#exit
```

ROUTING VOICE

```
#dial-peer voice 20 voip
#destination-pattern 300.
#session target ipv4:20.0.0.2
#end
```

```
#dial-peer voice 20 voip
#destination-pattern 200.
#session target ipv4:20.0.0.1
#end
```

FXO PORT INCOMING CONFIGURATION

TRICHY ROUTER

```
#voice-port 3/0
#connection plar 2001
```

DIVERTING TRICHY CALL TO US

TRICHY ROUTER

```
#voice-port 3/0
#no connection plar 2001
#connection plar 3001
```


FXO PORT OUTGOING CONFIGURATION

TRICHY ROUTER

```
#dial-peer voice 2 pots
#destination-pattern 91
#Port 3/0
```

USING TRICHY LINE FROM US

US ROUTER

```
#dial-peer voice 40 voip
#destination-pattern 91
#session target ipv4:20.0.0.1
#end
```

CLI : Command Line Interface

TAB : AUTOCOMPLETE
CTRL A : Beginning of the line
CTRL E : End of the line
CTRL + SHIFT + 6 : Interrupts processes like ping
CTRL C : exit Configuration mode
CTRL Z : Exit

#enable #disable
#clock set 14:51:50 january 2013
#sh history
#terminal history size 40
#do show ip route
#no ip domain-lookup
#hostname systech
#line console 0
#exec-timeout 0 0
To prevent logging out from console

#line console 0
#logging synchronous
#line vty 0 4
#logging synchronous

Use this command to keep last line readable when we get any updates in our router

#service password-encryption (not much secured)

http://www.ibeast.com/content/tools/ciscopassword/index.asp

#int fa0/1
#description connects to systech computer
#banner login % SYSTECH USERS ONLY %
#show running-config | incllude secret
#show running-config | begin line con 0

#enable
#configure terminal
#ip host systech 10.0.0.1
#exit
#ping systech(it will ping 10.0.0.1)
#sh hosts