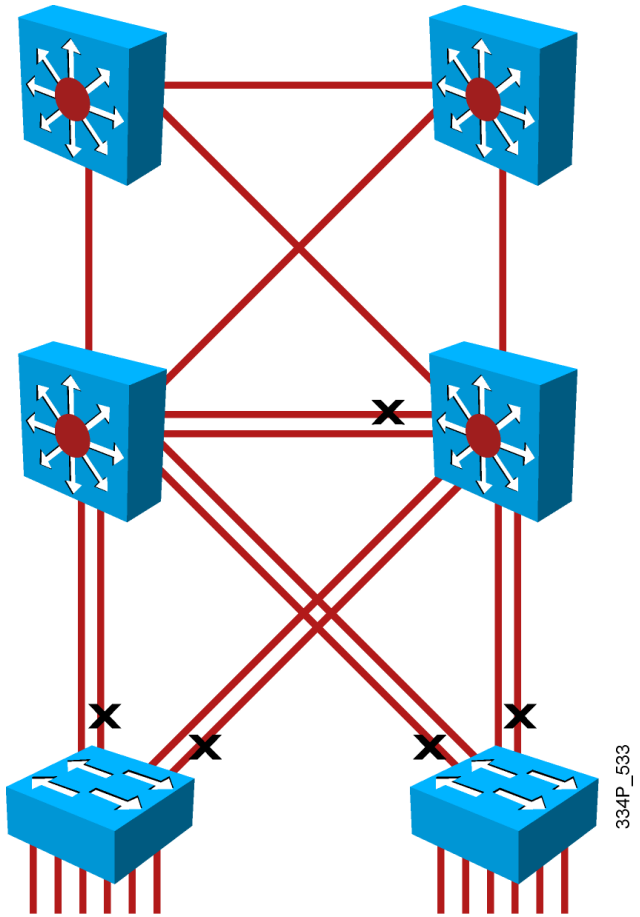
Implementing VLANs in Campus Networks

Configuring Link Aggregation with EtherChannel

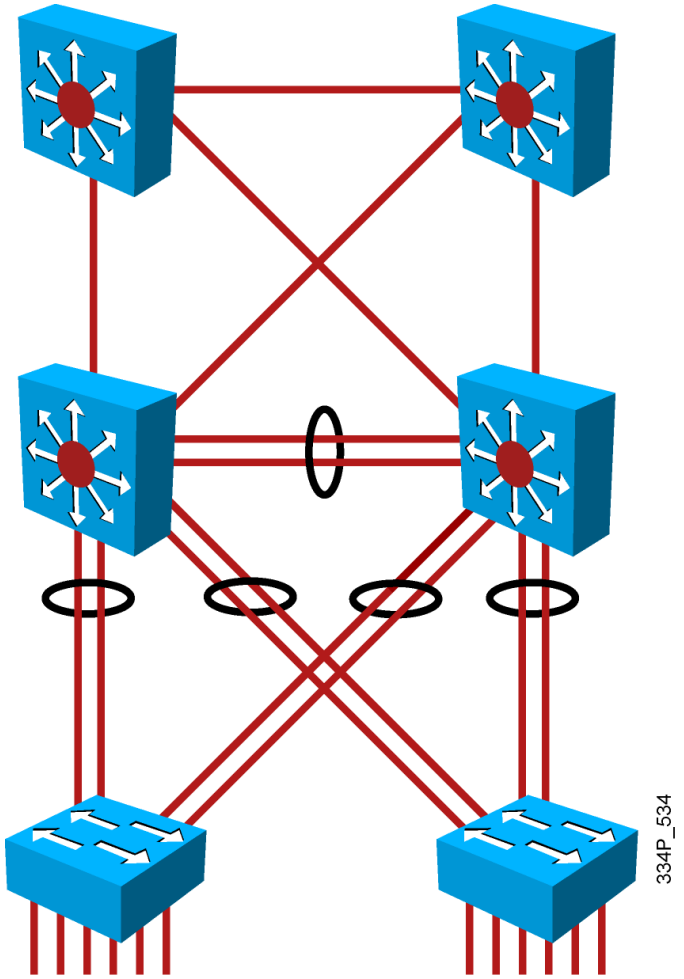
Multiple Links

- When multiple links aggregate on a switch, congestion occurs.
- One solution is to increase uplink speed, but cannot scale indefinitely.
- Another solution is to multiply uplinks; loop prevention mechanisms disable some ports.



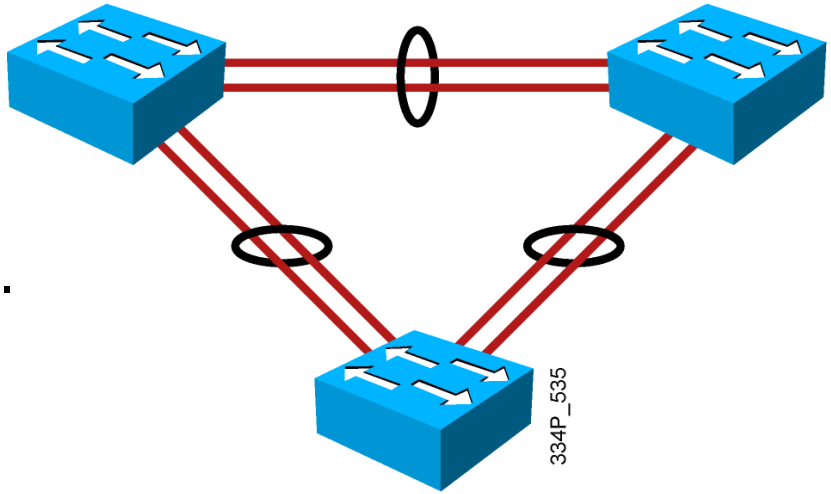
EtherChannel

- Solution to provide more bandwidth
- Logical aggregation of similar links
- Viewed as one logical link
- Provides load balancing and redundancy
- Supported for switch ports (Layer 2) and routed ports (Layer 3)



PAgP and LACP

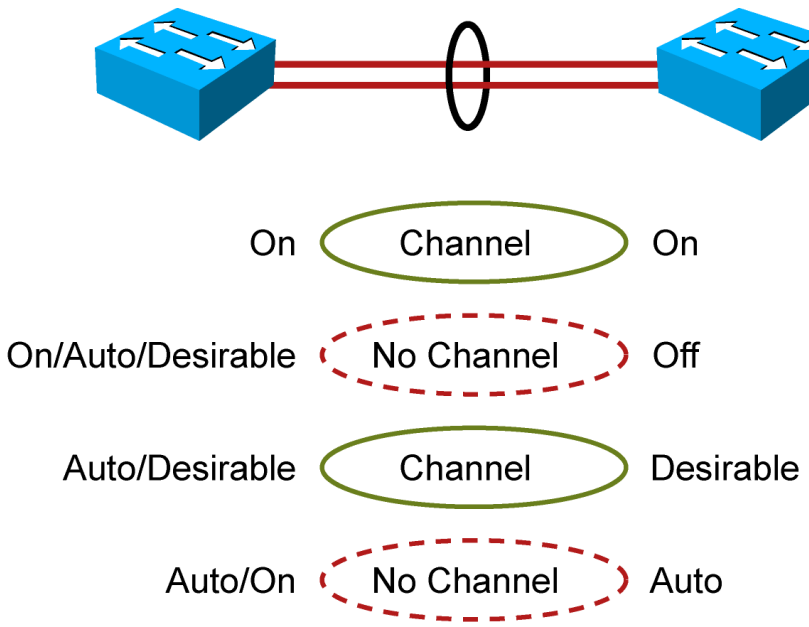
- Protocols to negotiate the EtherChannel link creation and maintenance.
- **PAgP** is a Cisco proprietary protocol.
- **LACP** is IEEE 802.3ad standard.
- **Static** EtherChannel configuration without protocol.



PAgP Modes

PAgP negotiates EtherChannel formation and maintenance:

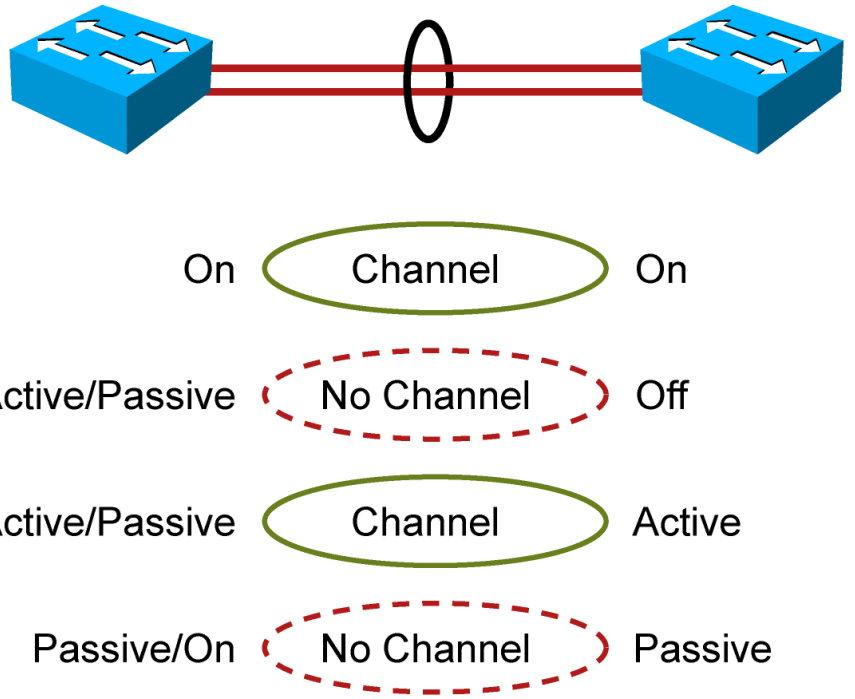
- **On:** channel member without negotiation (no protocol)
- **Desirable:** actively ask if the other side can/will
- **Auto:** passively wait for other side to ask
- **Off:** EtherChannel not configured on interface



LACP Modes

LACP negotiates EtherChannel formation and maintenance:

- **On:** channel member without negotiation (no protocol)
- **Active:** actively ask if the other side can/will
- **Passive:** passively wait for other side to ask
- **Off:** EtherChannel not configured on interface



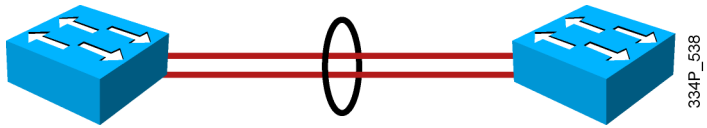
How to Configure Port Channels Using EtherChannel

Basic tasks:

- **Identify the ports to use on each switch.**
- **Specify PAgP or LACP protocol (optional).**
- **Configure channel group on interface.**
  - Specify a channel group number.
  - Specify the mode (will set protocol).
    - On (no protocol)
    - Auto/desirable (PAgP)
    - Active/passive (LACP)
- **Configure port-channel interface.**
  - Access or trunk mode and other parameters.
- **Verify connectivity.**

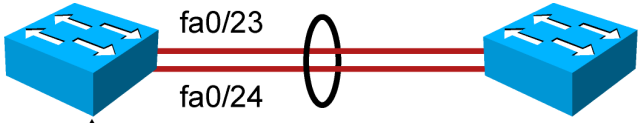
Guidelines for Configuring EtherChannel

- **Port-channel interface configuration changes affect the EtherChannel.**
- **The physical interface configuration changes affect the interface only.**
- **EtherChannel cannot be used if SPAN is a destination port.**
- **All interfaces within an EtherChannel must have same configuration.**
  - Same speed and duplex.
  - Same mode (access or trunk).
  - Same native and allowed VLANs on trunk ports.
  - Same access VLAN on access ports.
  - Configure these parameters on the port-channel interface.



How to Configure Layer 2 EtherChannel

- **Channel group mode options:**
  - On
  - Active or passive (LACP)
  - Auto or desirable (PAgP)
- **The configuration on a port-channel interface is copied to member interfaces.**




```
switch(config)# interface fastethernet 0/23
switch(config-if)# channel-group 1 mode active
switch(config)# interface fastethernet 0/24
switch(config-if)# channel-group 1 mode active
switch(config)# interface port-channel 1
switch(config-if)# switchport mode trunk
switch(config-if)# switchport trunk native vlan 99
switch(config-if)# switchport trunk allowed vlan 2,3,99
```

334P_539

How to Verify EtherChannel

```
Switch#show interfaces f0/24 etherchannel
Port state    = Up Sngl-port-Bndl Mstr Not-in-Bndl
Channel group = 1     Mode = Active    Gcchange = -
Port-channel  = null  GC   =   -       Pseudo port-channel = Po1
Port index    = 0     Load = 0x00            Protocol =   LACP

Switch#show etherchannel 1 port-channel
                Port-channels in the group:
                ---------------------------
Port-channel: Po1    (Primary Aggregator)
Age of the Port-channel   = 195d:03h:10m:44s
Logical slot/port   = 0/1           Number of ports = 2
Port state          = Port-channel Ag-Inuse
Protocol            =   LACP
Ports in the Port-channel:
Index   Load   Port     EC state         No of bits
------+------+------+------------------+-----------
  0     55     fa0/23    Active     4
  1     45     fa0/24    Active     4
```

How to Verify EtherChannel (Cont.)

```
switch# show etherchannel summary
Flags:  D - down        P - bundled in port-channel
        I - stand-alone s - suspended
        H - Hot-standby (LACP only)
        R - Layer3      S - Layer2
        U - in use      f - failed to allocate aggregator

        M - not in use, minimum links not met
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port

Number of channel-groups in use: 1
Number of aggregators:           1

Group  Port-channel  Protocol    Ports
------+-------------+-----------+-------------------------------
2      Po1(SU)           -        Fa0/23(P)     Fa0/24(P)
```


CISCO