

Network strategy BCS

LEC: ETHERCHANNEL

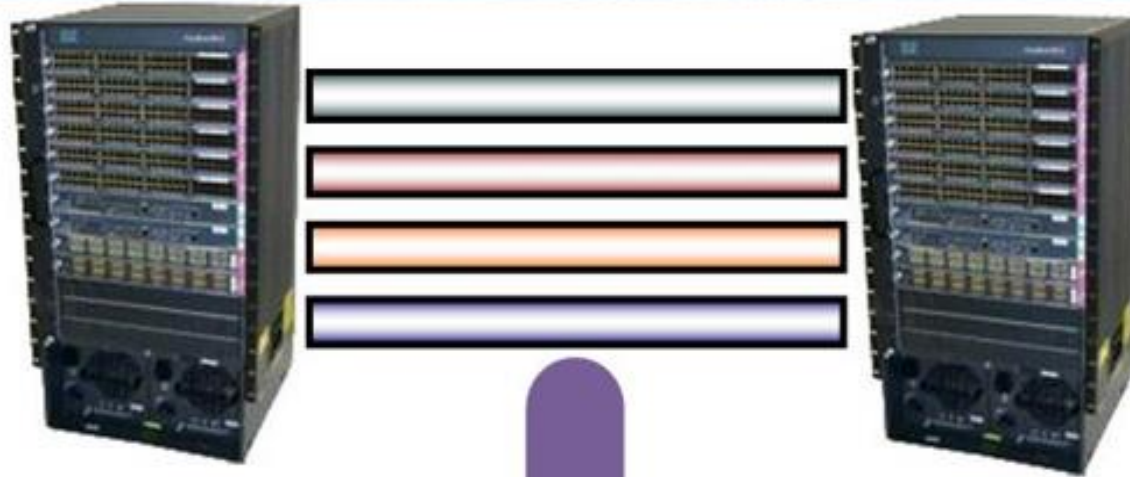
Outline

- What is EtherChannel?
- EtherChannel Advantages and disadvantages
- LACP
- PAgP
- EtherChannel Misconfiguration guard
- Layer 3 EtherChannel
- EtherChannel Load balancing

EtherChannel

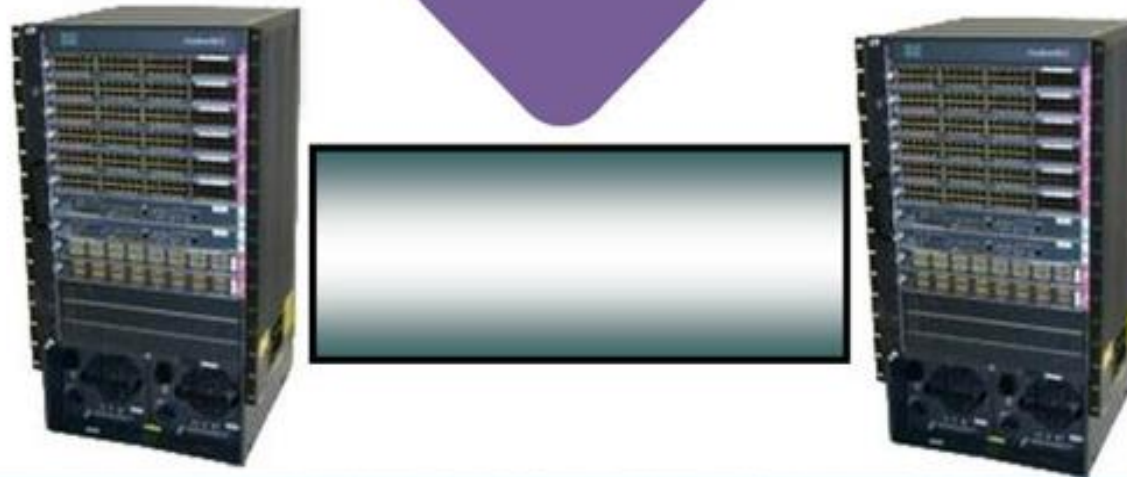
Physical View

Multiple ports
are defined as
being party of
an
Etherchannel
group



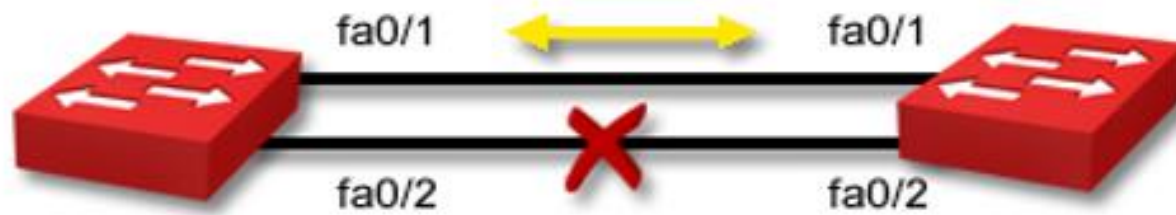
Logical View

Subsystems
running on a
switch only see
one logical link

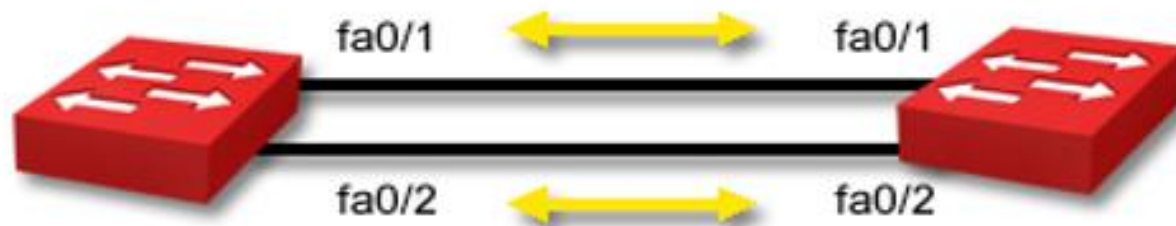


EtherChannel

Without EtherChannel, only one link is used.



With EtherChannel, both links are used.

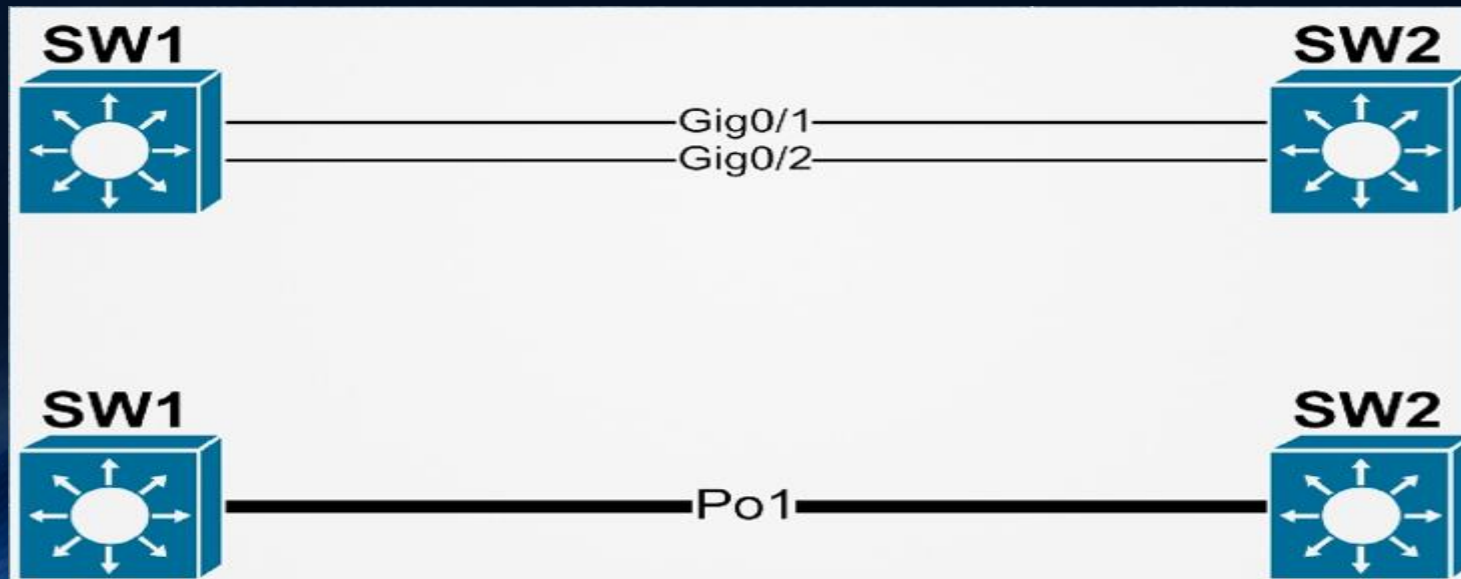


What is EtherChannel?

- EtherChannel is a technique to combine multiple physical links to make a single logical link for load balancing, load sharing and fault tolerance.
- EtherChannel is also called:
 - Port channel
 - Channeling
 - Link Aggregation (LAG)
 - NIC Teaming

What is EtherChannel?

- EtherChannel can be used with:
 - Switch to switch
 - Server to switch
 - Switch to router
 - Router to router (L3 EtherChannel)



Goals & Objectives

- **Increased Bandwidth:**
 - Multiple links combined into a single logical link
- **Increased Availability:**
 - Failure of a single link in the EtherChannel does not cause other member links to fail
- **Load sharing:**
 - Clients traffic may be distributed across all links.
- **Auto configuration:**
 - Configuration of the EtherChannel will also apply to all physical links

Goals & Objectives

- **Rapid convergence:**
 - Faster convergence of the links
- **Cheaper solution:**
 - Can be used with the existing infrastructure
- **Free operation mode:**
 - Can be used as trunk, access or channel

Dynamic Channel Protocols

- PAgP:
 - Port Aggregation Protocol
 - Cisco Proprietary
 - Support half duplex and full duplex devices
 - No standby technique
 - Does not support more than 8 ports per channel
 - Misconfiguration solution
 - It has auto and desirable modes

Dynamic Channel Protocols

- LACP:
 - Link Aggregation Control Protocol
 - IEEE standard 802.3ad
 - Supports only full duplex devices for channeling
 - Provides misconfiguration solution
 - Supports up to 16 ports per channel
 - 8 ports active and 8 ports standby
 - Provides standby technique using standby ports
 - Has active and passive modes

EtherChannel protocol Modes

- PAgP:
 - Desirable: [sends PAgP initiation message, starts negotiation]
 - Auto: [passively listens to PAgP negotiation messages]
- LACP:
 - Active: [sends LACP initiation message, starts negotiation]
 - Passive: [passively listens to LACP negotiation messages]

EtherChannel Formation

Protocol	SW ₁	SW ₂	Result
ON	ON	ON	Forms LAG
PAgP	Desirable	Desirable	Forms LAG
PAgP	Desirable	Auto	Forms LAG
PAgP	Auto	Auto	No LAG
LACP	Active	Active	Forms LAG
LACP	Active	Passive	Forms LAG
LACP	Passive	Passive	No LAG

NOTE

PAgP, LACP & ON

Are not

Interoperable & Compatible

NOTE

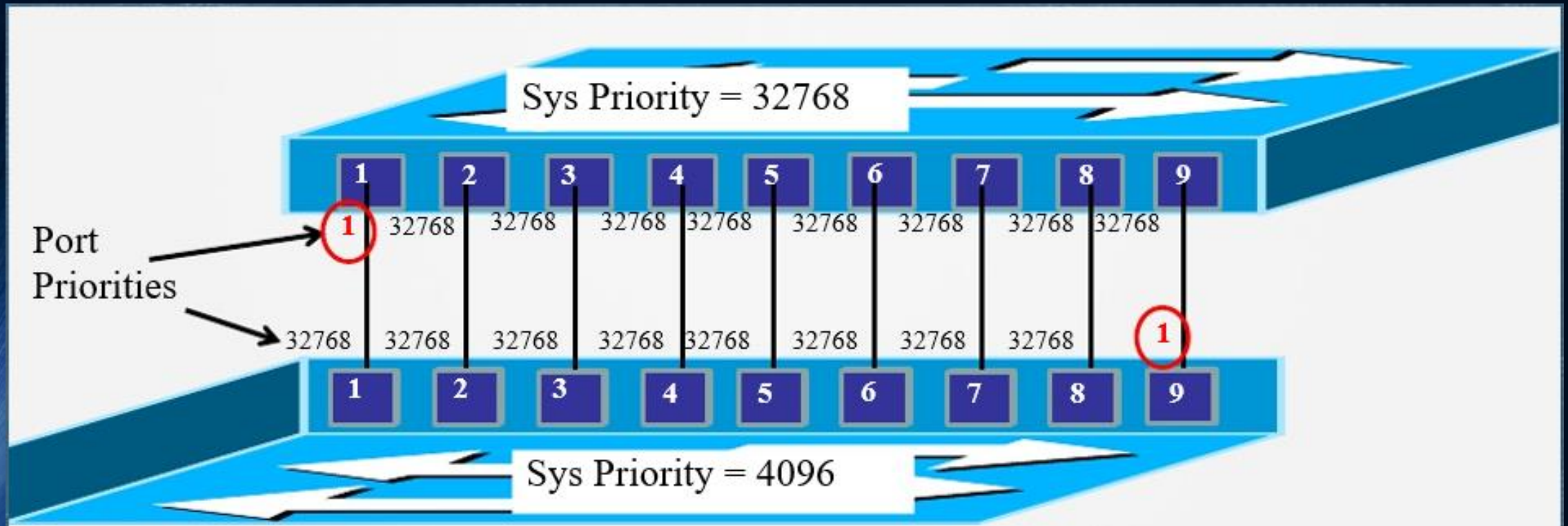
- EtherChannel consists of two parts:
 - Port-channel interface
 - A logical interface representing the link bundle
 - Member interfaces
 - Physical links that are part of the EtherChannel
- The main goal of LAG is to hide the member interfaces from upper layer protocols
 - STP sees on 2Gbps link not 2x1Gbps links
 - Both member links are forwarding not one forwarding and one blocked as in the case of STP

Advantages and Disadvantages

- Cheap incremental upgrade solution
 - 4x10Gbps links are cheaper than 1x40Gbps
- Adds link layer redundancy
 - 4x10Gbps links have better resilience than 1x40Gbps
- Data flow can not exceed the bandwidth of an individual link
 - 2x1Gbps LAG is not a single 2Gbps pipe but two 1Gbps pipes
 - LAG adds lanes to the highway, does not increase the speed limit
- Data flow can polarized to one member of the LAG
 - LAG support load distribution not load balancing
 - 1x40Gbps provides better throughput than 4x10Gbps

NOTE

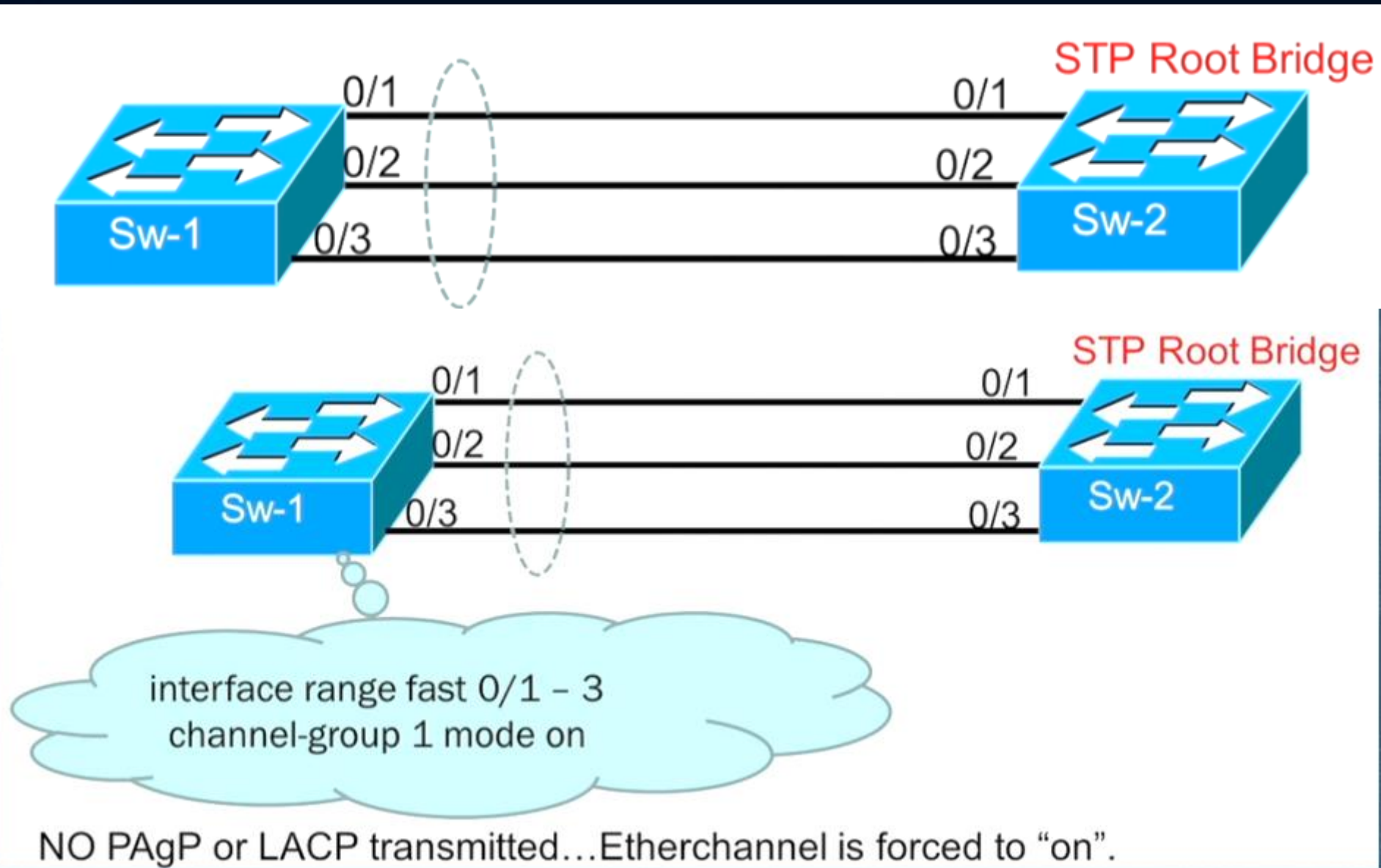
- Which switch decides which ports to be bundled if we have more than 8 ports in the channel?



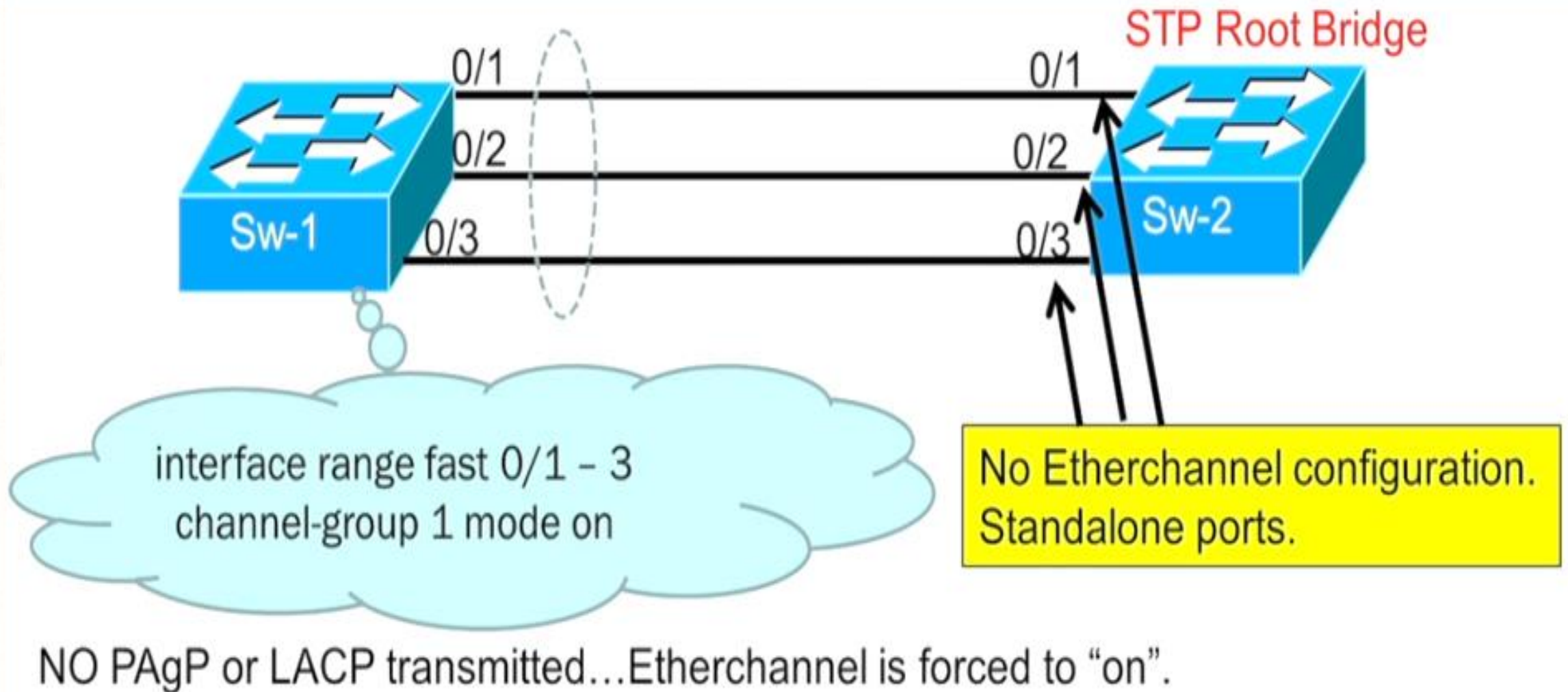
NOTE

- Say SW1 has a system priority of 32768 (default) + its switch MAC address, this is similar to STP bridge ID. SW2 has a priority of 100 + MAC address, SW2 will become the decision maker since it has the lowest ID.
- SW1 has ports 1 - 9, as does SW2, configured for EtherChannel. The decision maker, the switch with the lowest priority, picks which eight of nine ports are active.
- The ports are picked based on lowest priority, 32768 + the port number, if the priority is at its default then the lowest port number wins and the other is set to stand by.

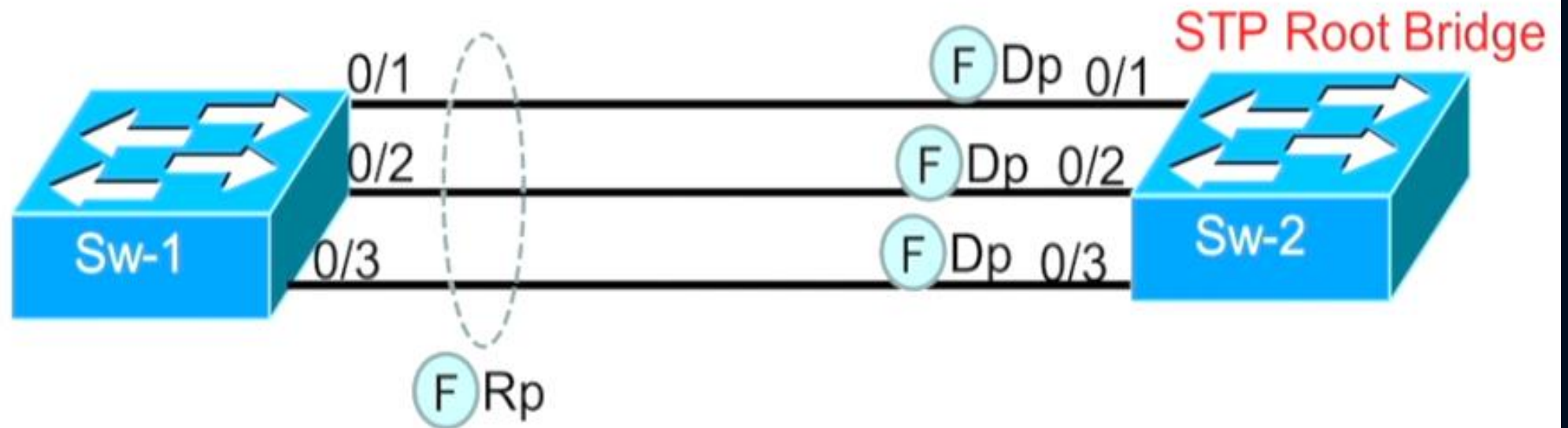
EtherChannel Misconfiguration



EtherChannel Misconfiguration



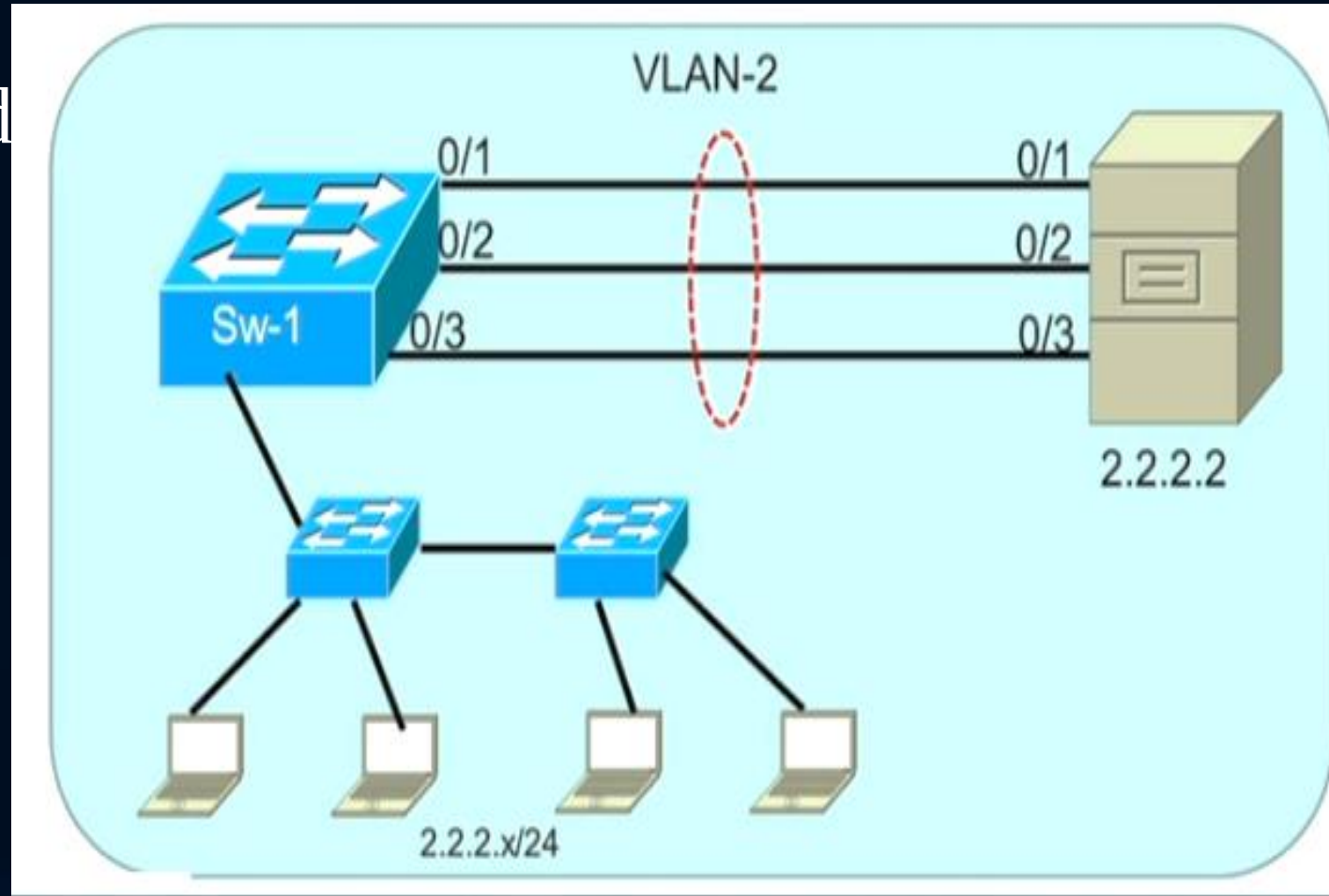
EtherChannel Misconfiguration



Bridging Loop!!!

Layer2 EtherChannel

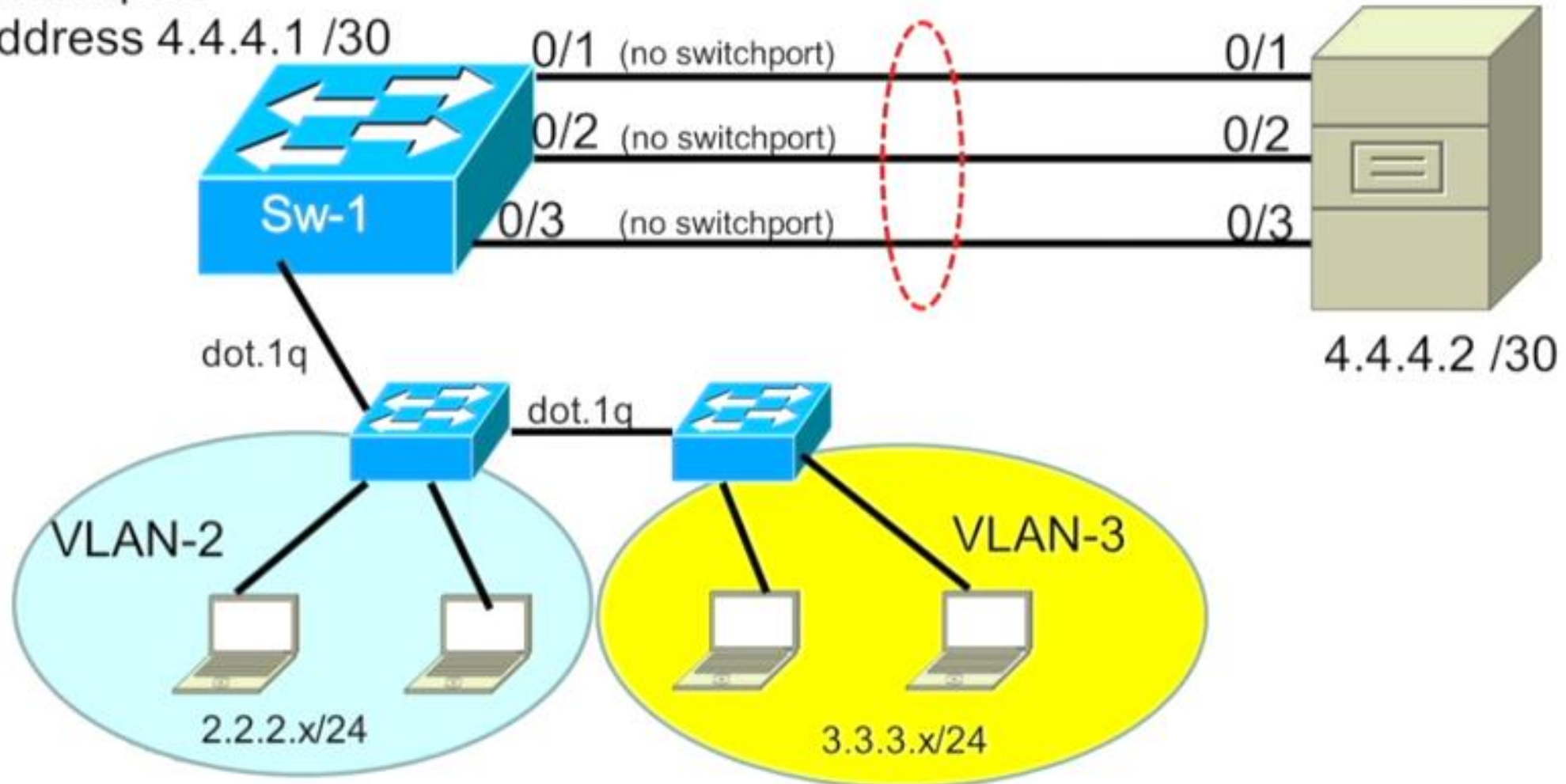
- Layer 2 EtherChannel will always receive flooded traffic and send it to server which causes the server CPU utilization
- But the advantage of redundancy is there.



Layer 3 EtherChannel

```
interface port-channel 1  
no switchport  
ip address 4.4.4.1 /30
```

L3 Etherchannel



REFERENCES

- https://www.cisco.com/en/US/docs/switches/metro/me3600x_3800x/trash/swethchl.html#wp1144010

THANK YOU