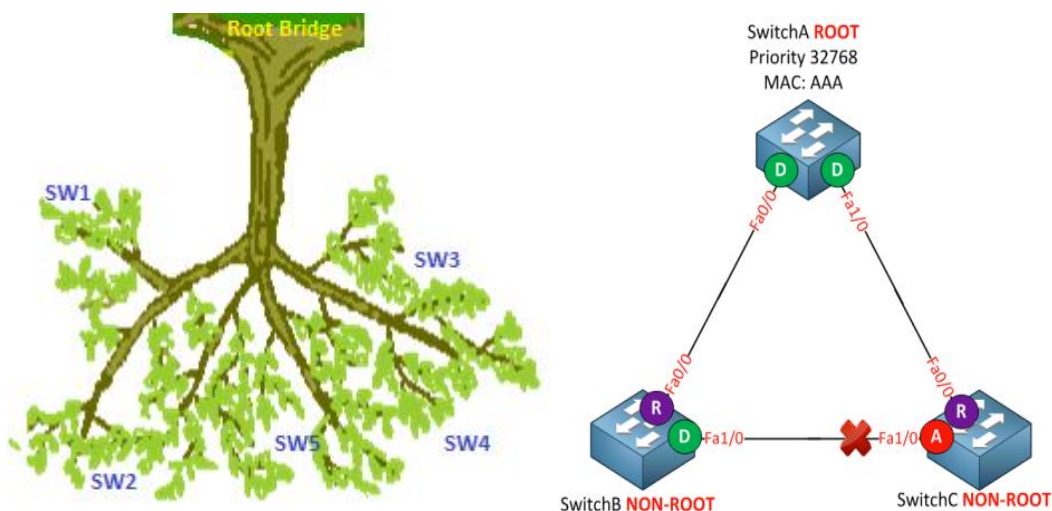


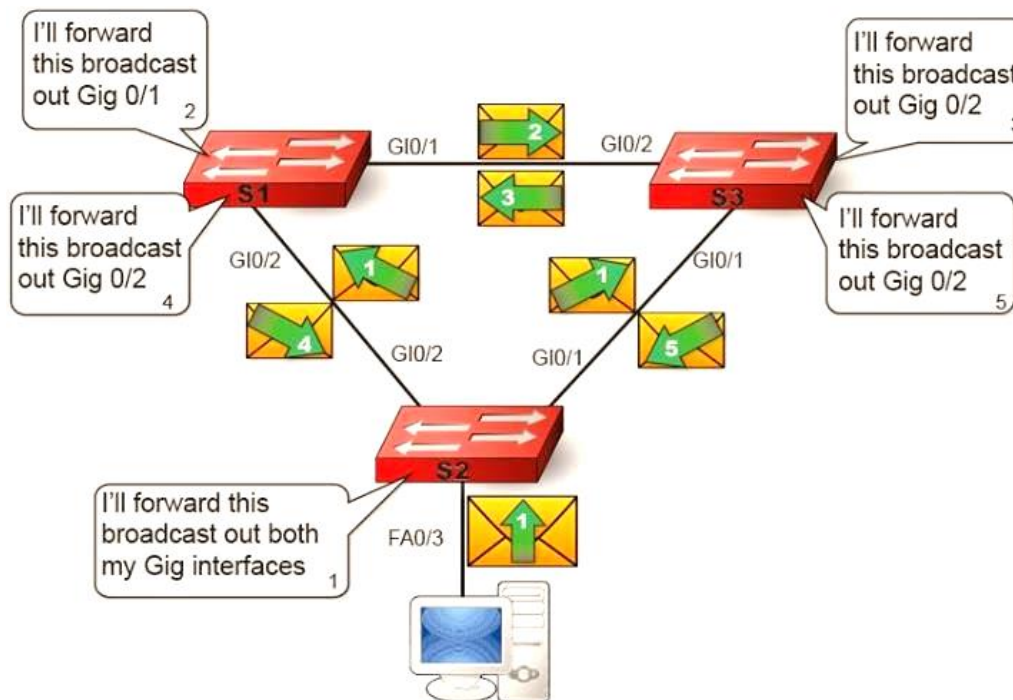
## STP (Spanning Tree Protocols):

- o For backup purpose and fault tolerance, we usually create redundant links.
- o Redundant link preventing entire network down situation from single link failure.
- o Redundant link can create network loops that flood down frames in the network.
- o STP automatically removes layer 2 switching loops by shutting down redundant links.
- o Spanning Tree Protocols (STP) is a protocol, it actively monitors all links of the network.
- o Cisco Switch flooding frame unknown unicasting, multicasting and broadcasting.
- o If there any redundant link available in the network that can cause Layer 2 loop.
- o Layer 2 loops in the network can cause problem unnecessary resources utilization.
- o Multiple frame transmission, unstable MAC table & unnecessary frame lookup by host.
- o To finds a redundant link, it uses an algorithm, known as STA (spanning-tree algorithm).
- o Spanning Tree Protocols used STA (Spanning Tree Algorithm) to prevent Layer 2 loop.
- o STA detecting layer 2 loops and block it until first one link goes down or disconnected.
- o Spanning Tree Protocols is a link management protocol that provides path redundancy.
- o Spanning Tree Protocols (STP) preventing undesirable loops in the whole network.
- o Spanning Tree Protocols is a protocol that runs on switches that helps to solve loops.
- o Spanning Tree Protocols use BPDU in every 2 second for preventing Layer 2 loop.
- o Bridge Priority increment use 4096 because no of VLAN can exist in cisco Switches.
- o Bridge & system ID tie by default so Lower MAC address switch selected as Root Bridge.
- o Root Bridge can change timers of Spanning Tree Protocols (STP) and advertised to all.
- o Root Bridge Switch is also responsible for propagating topology changes notification.
- o Root Bridge Switch all port is always designated port and always in forwarding state.
- o Terms bridge, switch is used interchangeably when discussing Spanning Tree Protocols.



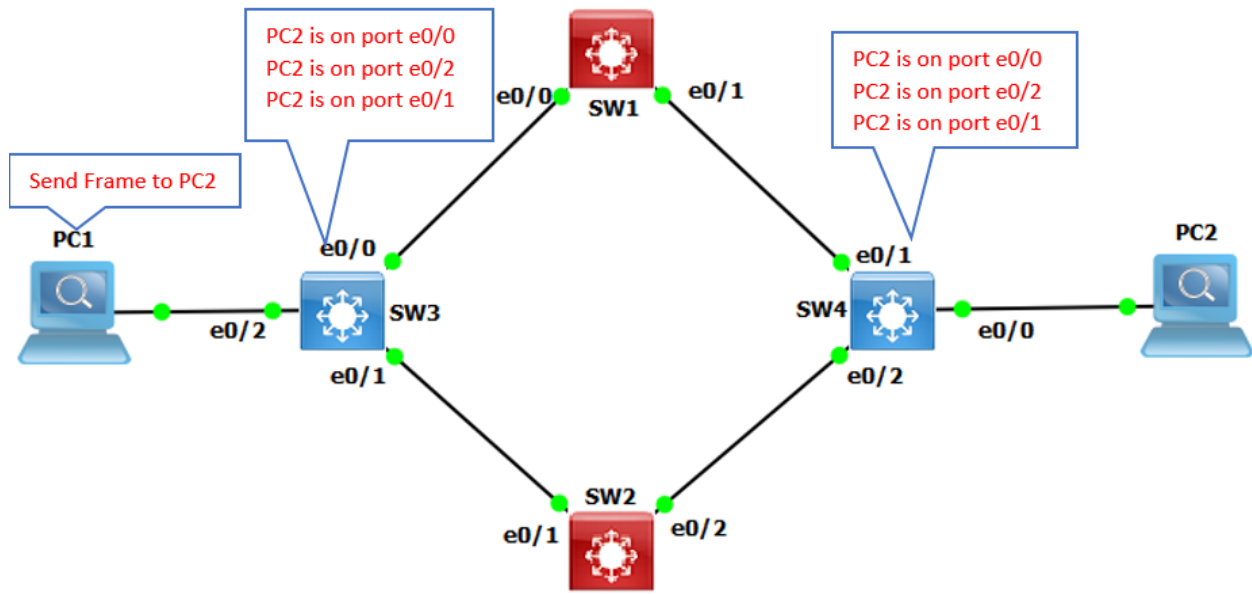
## Broadcast Storm:

- o When Switch receives broadcast frames, it continues broadcasting them.
- o The Switches broadcasting them again to its other interfaces or ports.
- o Broadcasting will keep going on forever until you shutdown the network.
- o This phenomenon or situation is called a broadcast storm of Switches.
- o The Broadcast storm consumes the entire bandwidth of the network.
- o The Broadcast storm denies bandwidth for normal network traffic.
- o The Broadcast storm can shut down entire network in seconds or less.
- o The Broadcast storms start small but like snowball end up being very big.



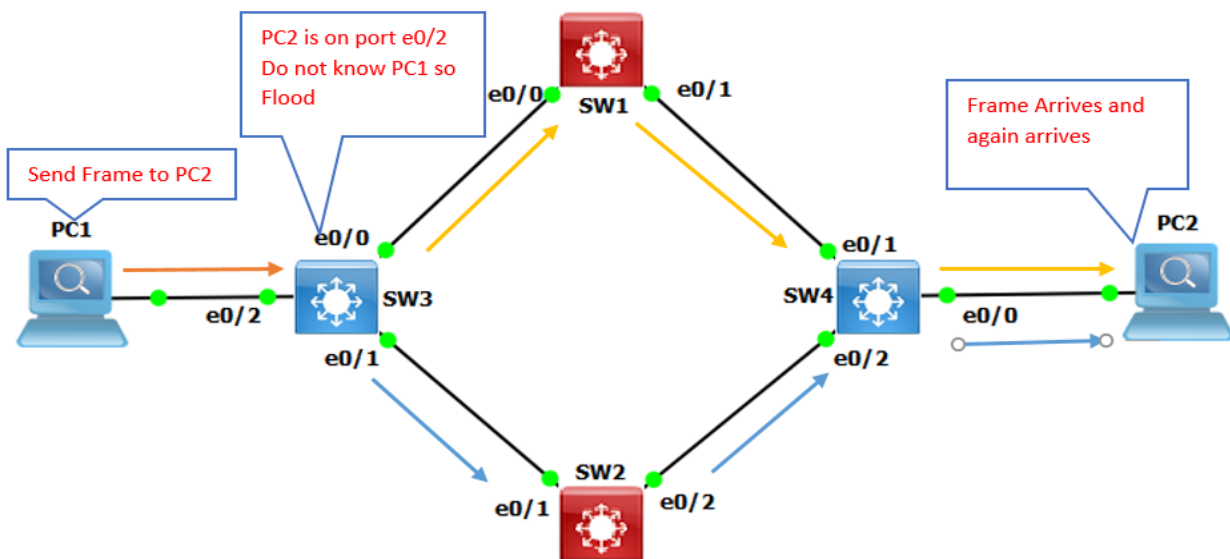
## MAC Database Instability:

- o MAC tables are built by examining the source MAC address on a packet received.
- o The source MAC address is tied to the interface or port it was received on.
- o If loop occurs, then same source MAC address could be seen on multiple interfaces.
- o Looped in the network can make MAC Address Table or CAM table unstable.
- o Instability of MAC table causes copies of same frame to be delivered to multiple ports.
- o MAC instability results multiple copies of a frame arrive on different ports of a switch.



### Multiple Frame Transmission:

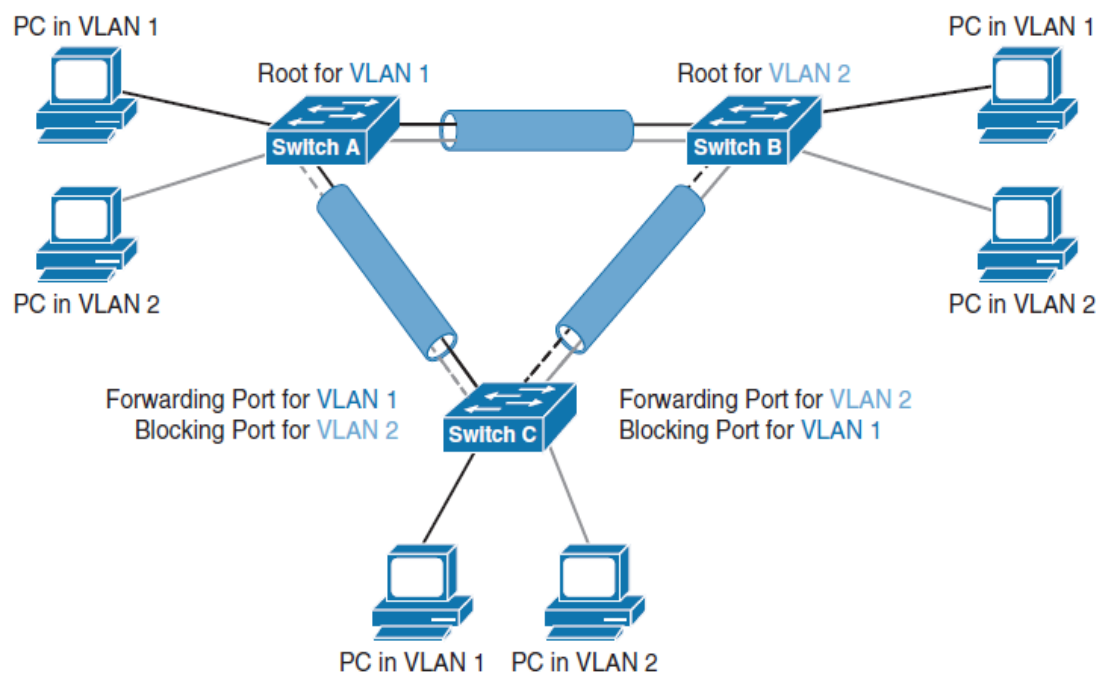
- o Multiple copies of unicast frames may be delivered to destination host.
- o Multiple copies of the same frame can cause unrecoverable errors & issue.



Different Version or Type of Spanning Tree				
Protocol	Standard	Resources Needed	Convergence	Numbers of Trees
STP	802.1D	Low	Slow	One
PVST+	Cisco	High	Slow	One for every VLAN
RSTP	802.1w	Medium	Fast	One
Rapid PVST+	Cisco	Very high	Fast	One for every VLAN
MST	802.1S	Medium or High	Fast	One for multiple VLANs

## PVST+:

- o PVST+ is term which stands for Per-VLAN Spanning Tree Plus (PVST+).
- o PVST+ is a Cisco implementation of Spanning Tree Protocols (STP).
- o Per-VLAN Spanning Tree+ (PVST+) is an extension of the PVST standard.
- o PVST+ supports Dot1Q trunking encapsulation while PVST not support.
- o PVST+ provides separate Spanning-Tree instance for each VLAN in network.
- o PVST+ run a Spanning-Tree instance per VLAN (Virtual Local Area Network).
- o PVST+ provide each VLAN have its own Spanning Tree Protocol topology.
- o PVST is usually the default Spanning Tree Protocol (STP) on Cisco Switches.
- o PVSTP+ take **30 to 50** seconds to transit from blocking state to forward state.



## RPVST+:

- o RPVST+ is term which is stands for Rapid Per-VLAN Spanning Tree Plus.
- o Rapid PVST+ (IEEE 802.1w) is an enhanced version of the PVST+ version.
- o Rapid PVST+ allows for faster Spanning-Tree calculations and convergence.
- o RSTP is typically able to respond less than **10 seconds** of a physical link failure.
- o Rapid PVST+ defines three port states Discarding, Learning, and Forwarding.
- o RSTP works by adding an alternative port and a backup port compared to STP.
- o Rapid PVST+ provides multiple enhancements to optimize network performance.
- o UplinkFast and BackboneFast are not required for Rapid Spanning Tree (RPVST+).
- o Rapid PVSTP already have the functionality of UplinkFast and BackboneFast.
- o Activate RSTP get UplinkFast-like and BackboneFast-like functionality & feature.
- o The backbone & UplinkFast feature is not needed when RSTP is enabled on Switch.