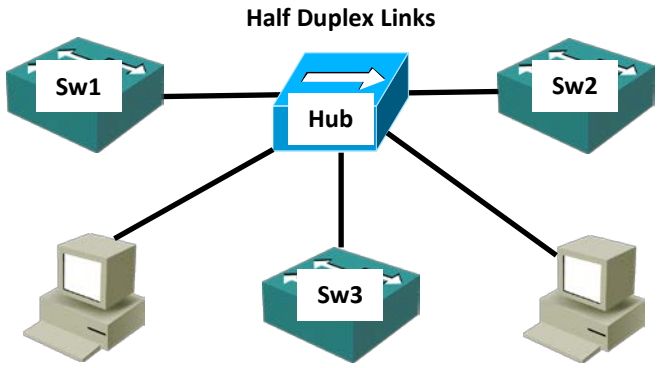
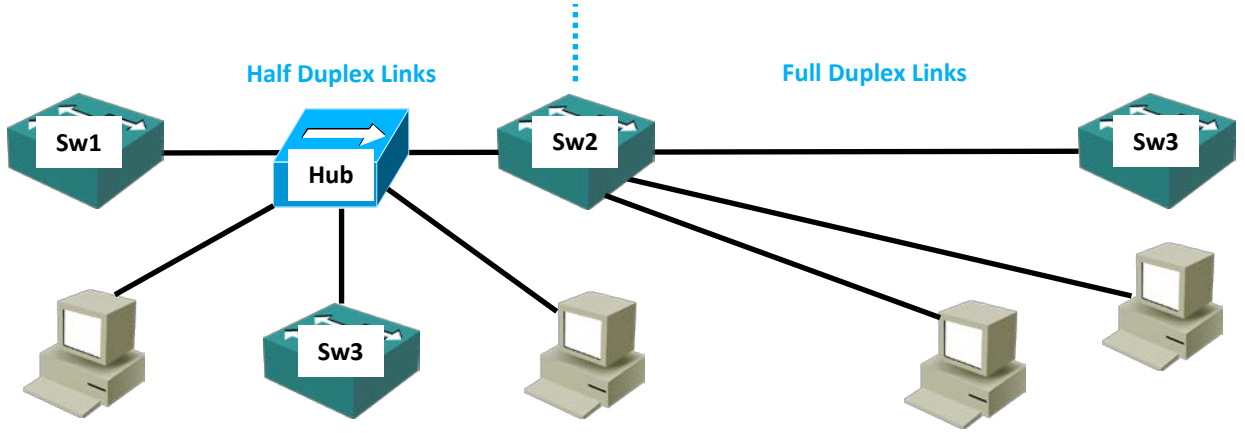
How Hubs Work

- A hub is not Layer 2 aware and does not track MAC addresses
- When a frame is received it is flooded out all other ports apart from the one it was received on
- A hub has no memory to store data and only one frame can be transmitted through it at a time. It cannot handle multiple frames at the same time
- Hubs only support half duplex communications - packets can only go in one direction at a time on links



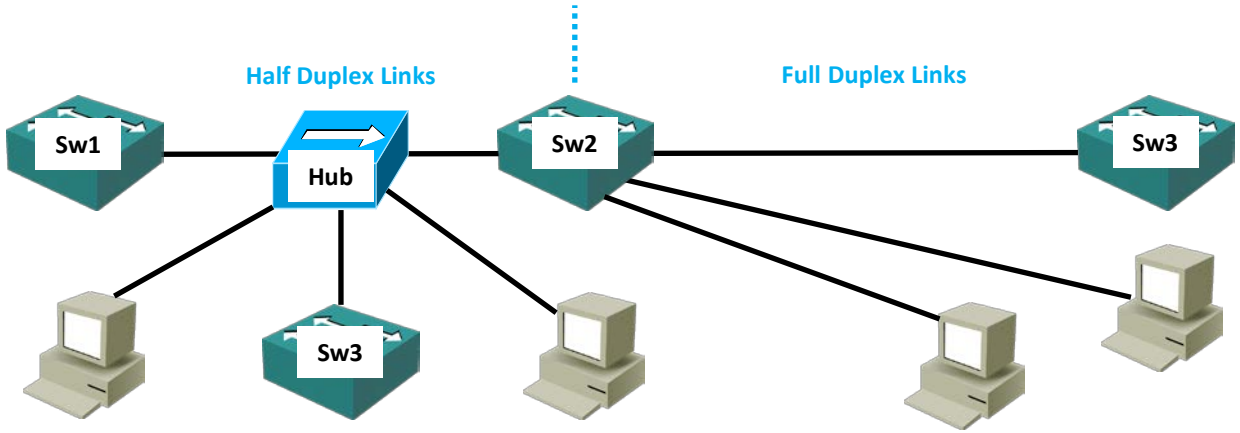
How Switches Work

- A switch is Layer 2 aware and tracks which MAC addresses are available out which of its ports in its MAC Address Table
- When a known unicast frame is received it is forwarded out the associated port only
- When a broadcast frame is received it is flooded out all other ports apart from the one it was received on



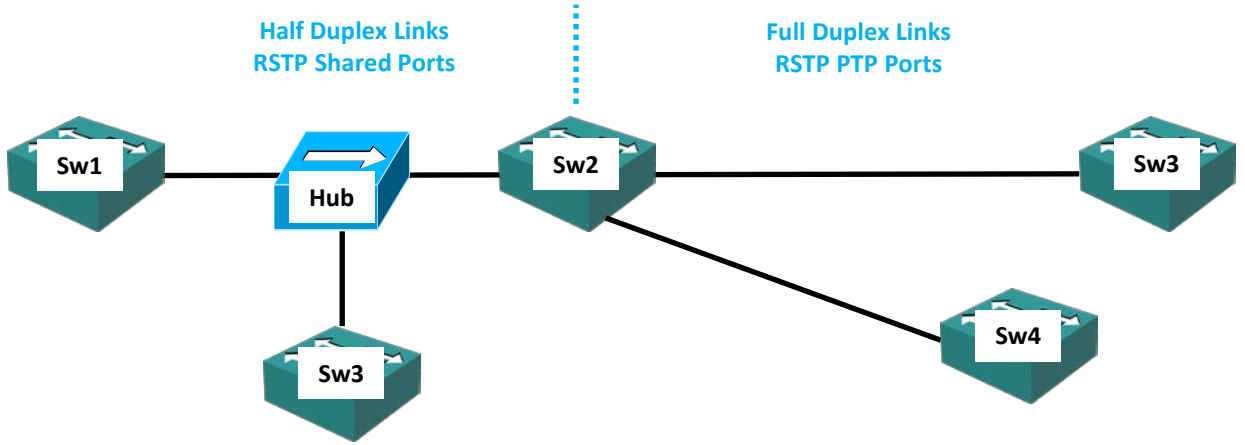
Full Duplex Communications

- A switch has memory to store data and can handle receiving frames on its different ports at the same time. Each port is handled independently
- Switches support full duplex communications, where both devices on either side of a link can send and receive simultaneously
- Only two devices can be on a full duplex link, it is point-to-point. Because there are only two devices, only the switch or the other device on the link can transmit in either direction and there can be no collisions



RPVST+ Port Types

- **Point-to-point Port**: Automatically assigned to full duplex links
- **Shared Port**: Automatically assigned to half duplex links
- RSTP Sync rapid convergence is only supported on full duplex point-to-point links



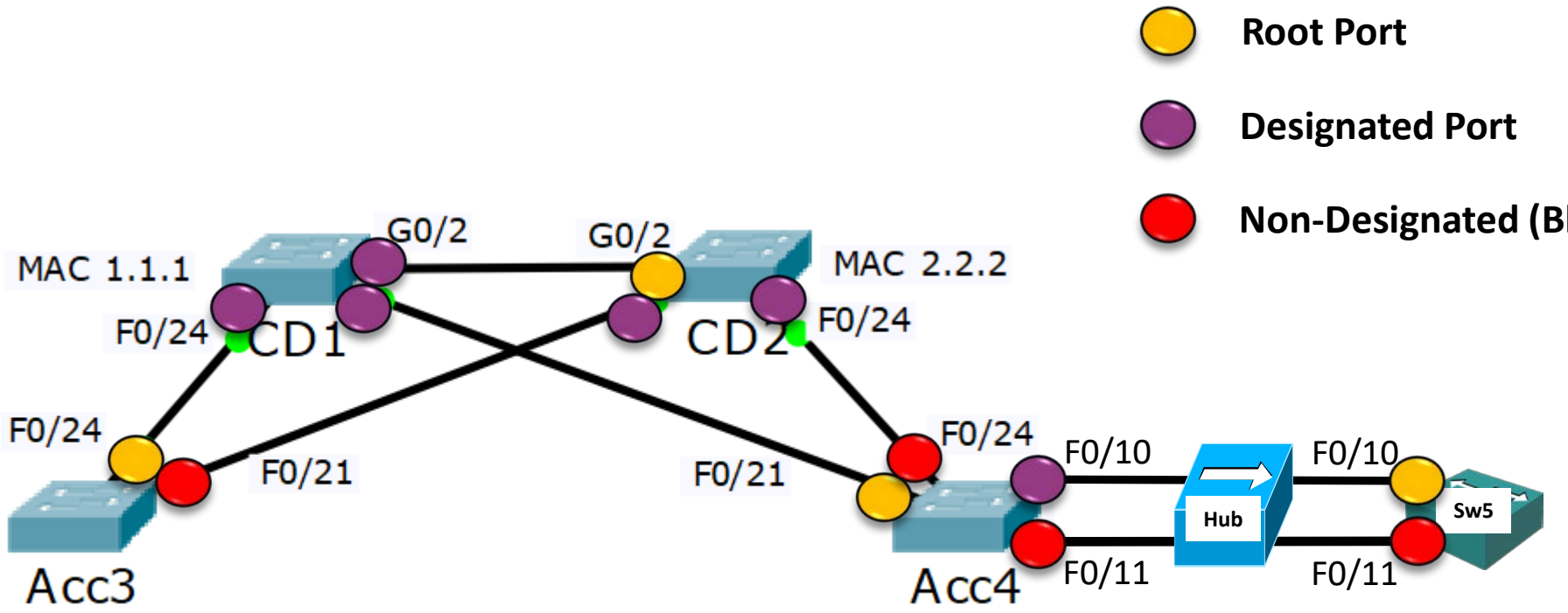
Port Roles and States

802.1D Port Role	Port State
Root	Forwarding
Designated	Forwarding
Non-designated	Blocking
Disabled	-
In transition	Listening, Learning

RSTP Port Role	Port State
Root	Forwarding
Designated	Forwarding
Alternate	Discarding
Backup	
Disabled	Discarding
In transition	Learning

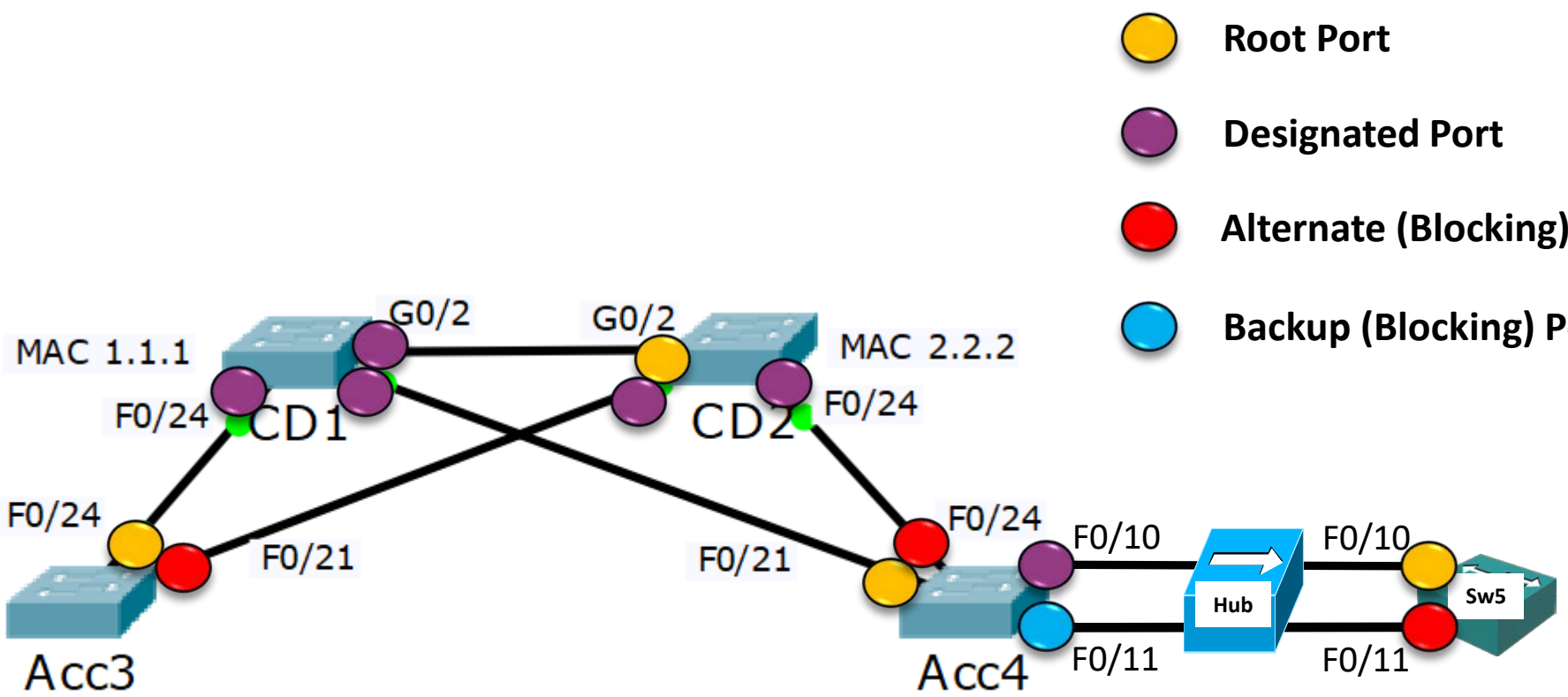
Redundant Link With Hub: 802.1D

- Interfaces F0/11 and F0/24 on Acc4 are Alternate Blocking ports
- ‘show’ commands on the switch do not differentiate that F0/24 is a backup of the Root Port and F0/11 is a backup of the Designated Port



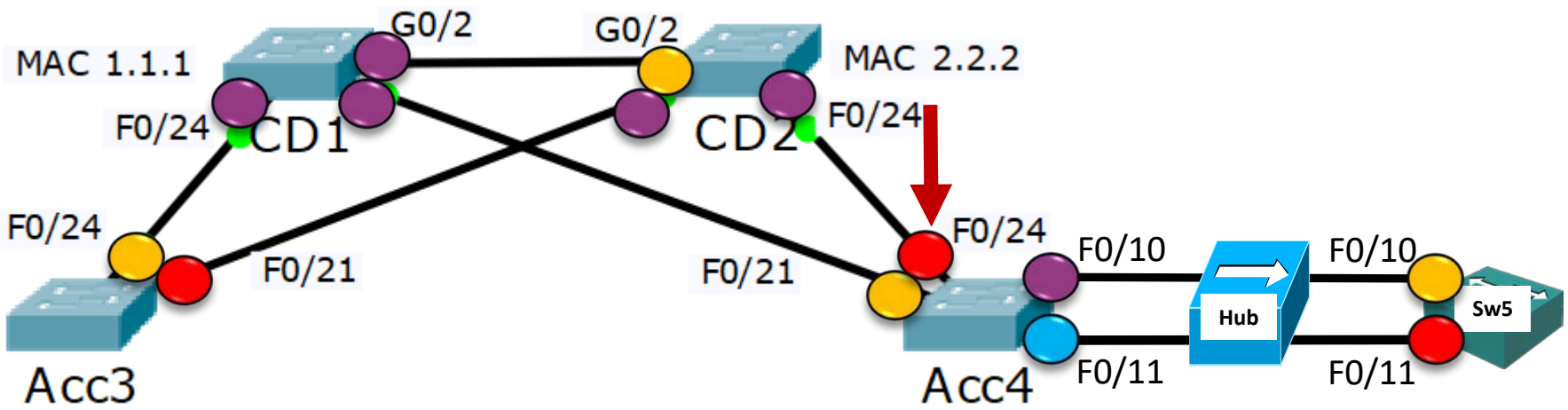
Redundant Link With Hub: RSTP

- RSTP behaviour:
- The standby for the Designated port on Acc4 is a Backup (not Alternate) port



Redundant Link With Hub Between Switches

- **Alternate ports are standbys of a switch's Root port**
- RPVST+ supports immediate failover to the Alternate port



Redundant Link With Hub Between Switches

- **RSTP Backup ports are standbys of the Designated port on a shared segment (ie with a hub)**
- They do not support immediate failover. Rapid convergence is only supported on full duplex point-to-point links
- Hubs are no longer used in modern networks so you are very unlikely to see a backup port