

Campus Network Design Workshop

Layer 2 Engineering – Advanced VLAN internals

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Rapid Spanning Tree (802.1w)

- Convergence is **much** faster
 - Communication between switches is more interactive
- Edge ports don't participate
 - Edge ports transition to forwarding state immediately
 - If BPDUs are received on an edge port, it becomes a non-edge port to prevent loops



Rapid Spanning Tree (802.1w)

- Defines these port roles:
 - Root Port (same as with 802.1d)
 - Alternate Port
 - A port with an alternate path to the root
 - Designated Port (same as with 802.1d)
 - Backup Port
 - A backup/redundant path to a segment where another bridge port already connects.

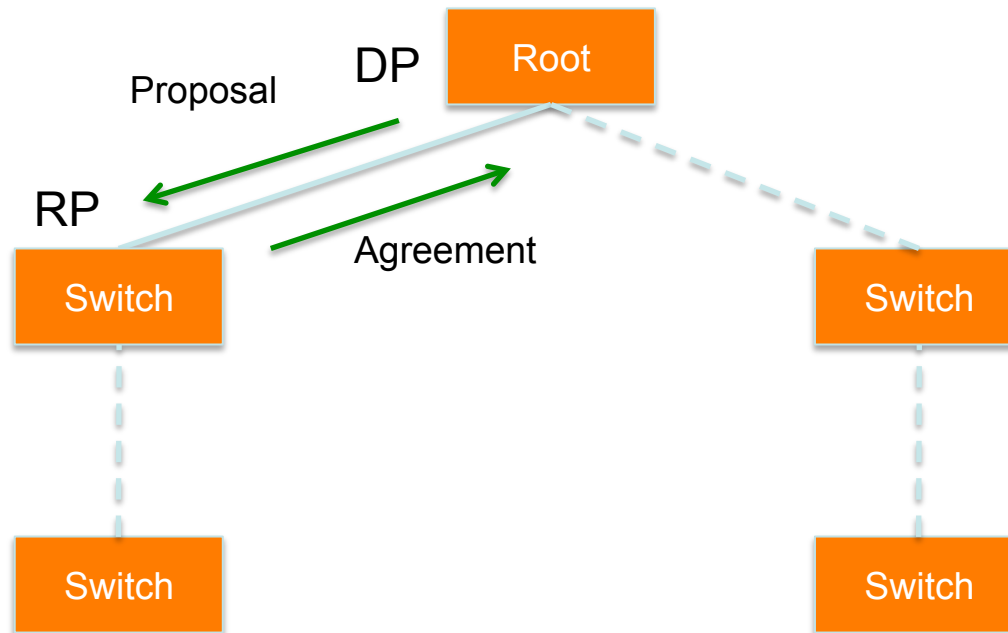


Rapid Spanning Tree (802.1w)

- Synchronization process uses a handshake method
 - After a root is elected, the topology is built in cascade, where each switch proposes to be the designated bridge for each point-to-point link
 - While this happens, all the downstream switch links are blocking



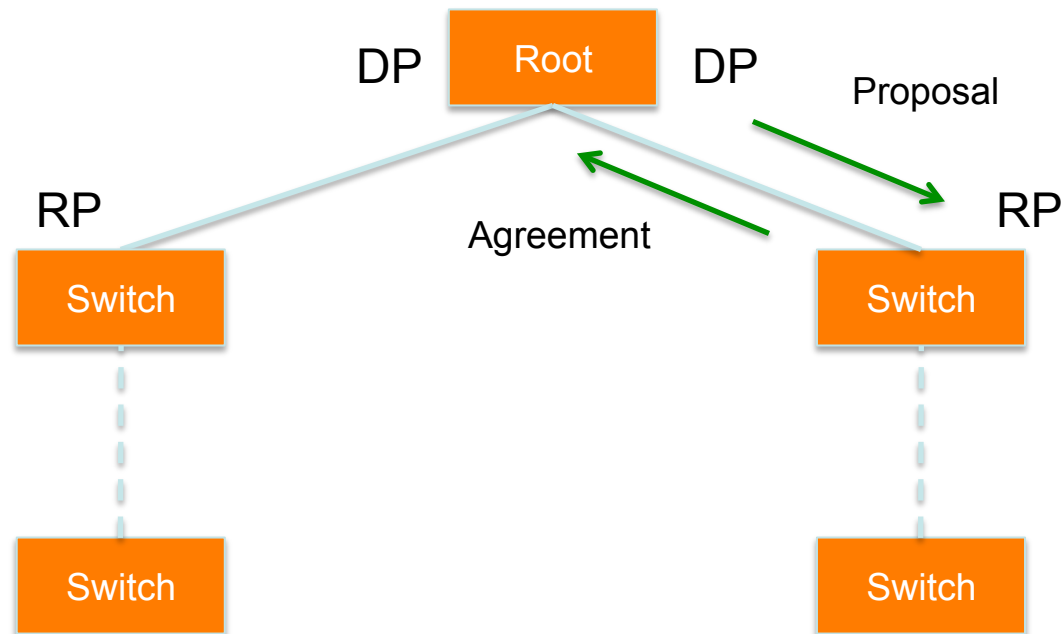
Rapid Spanning Tree (802.1w)



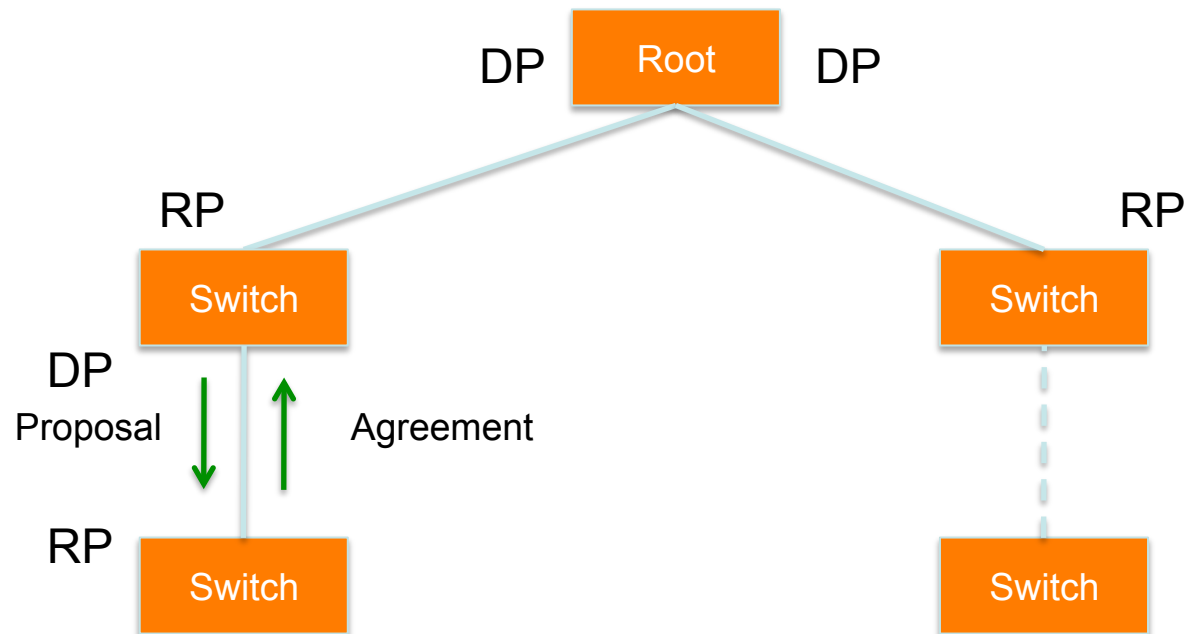
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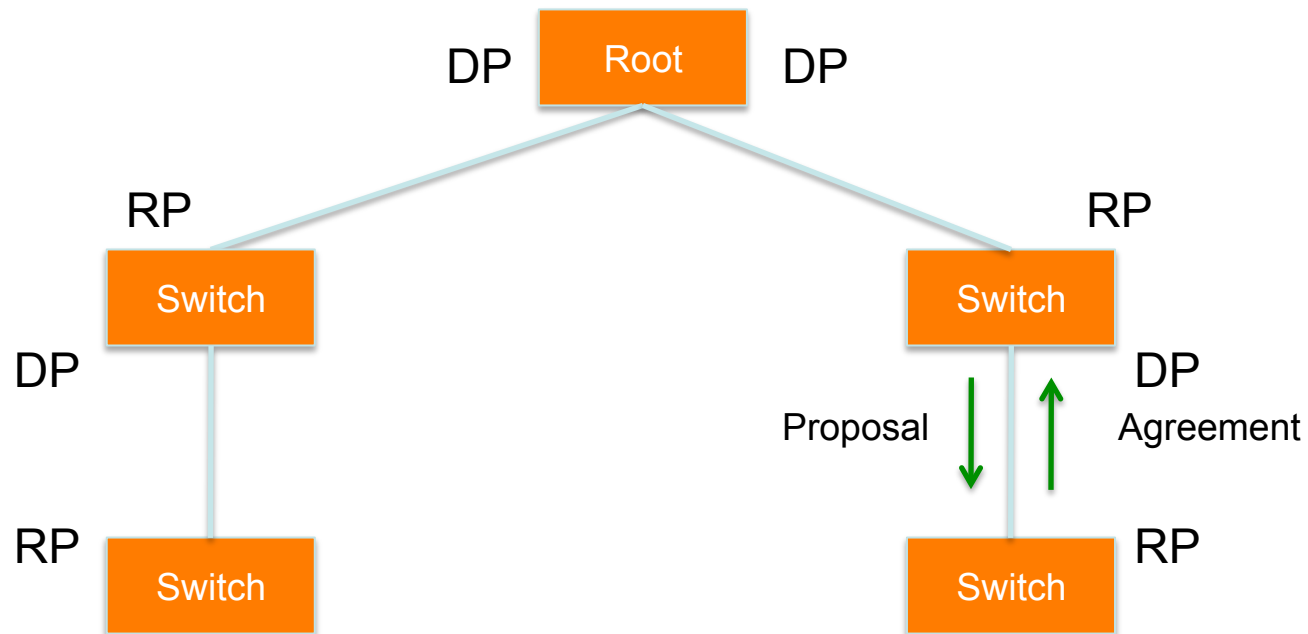
Rapid Spanning Tree (802.1w)



Rapid Spanning Tree (802.1w)



Rapid Spanning Tree (802.1w)



Questions?



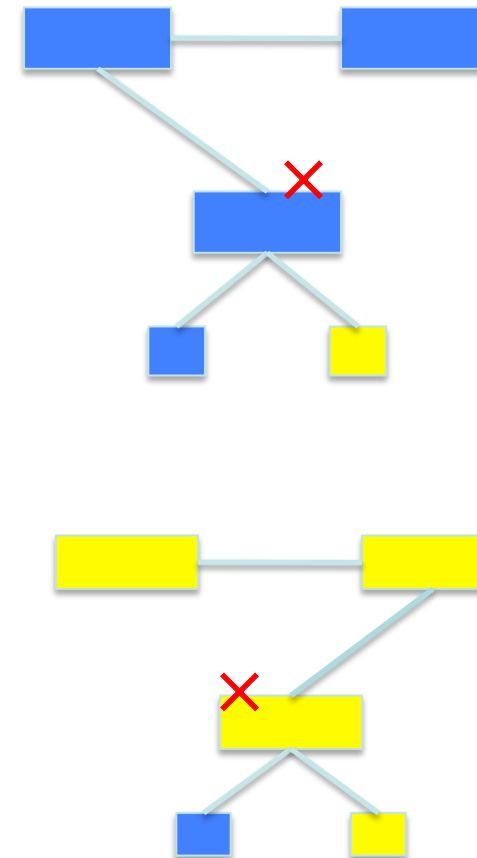
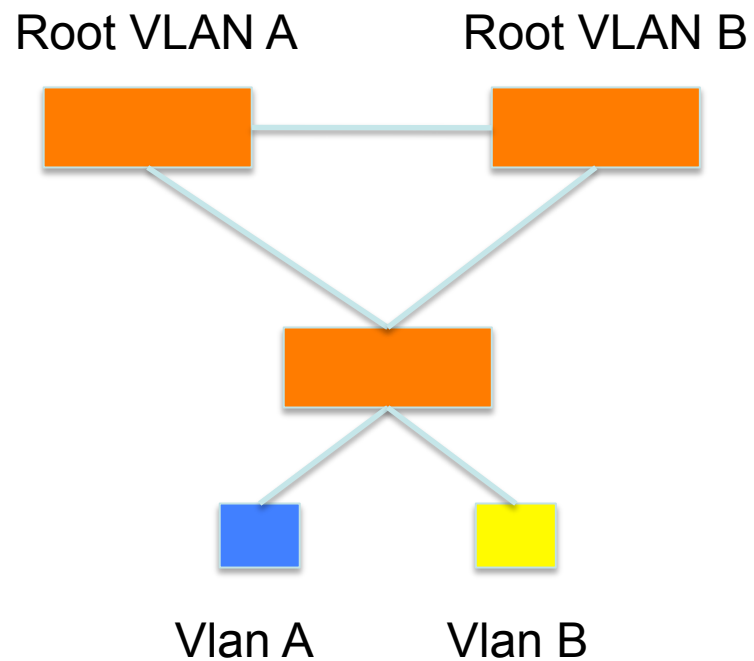
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Multiple Spanning Tree (802.1s)

- Allows separate spanning trees per VLAN group
 - Different topologies allow for load balancing between links
 - Each group of VLANs are assigned to an “instance” of MST
- Compatible with STP and RSTP

Multiple Spanning Tree (802.1s)



Multiple Spanning Tree (802.1s)

- MST Region
 - Switches are members of a region if they have the same set of attributes:
 - MST configuration name
 - MST configuration revision
 - Instance-to-VLAN mapping
 - A digest of these attributes is sent inside the BPDUs for fast comparison by the switches
 - One region is usually sufficient



Multiple Spanning Tree (802.1s)

- CST = Common Spanning Tree
 - In order to interoperate with other versions of Spanning Tree, MST needs a common tree that contains all the other islands, including other MST regions

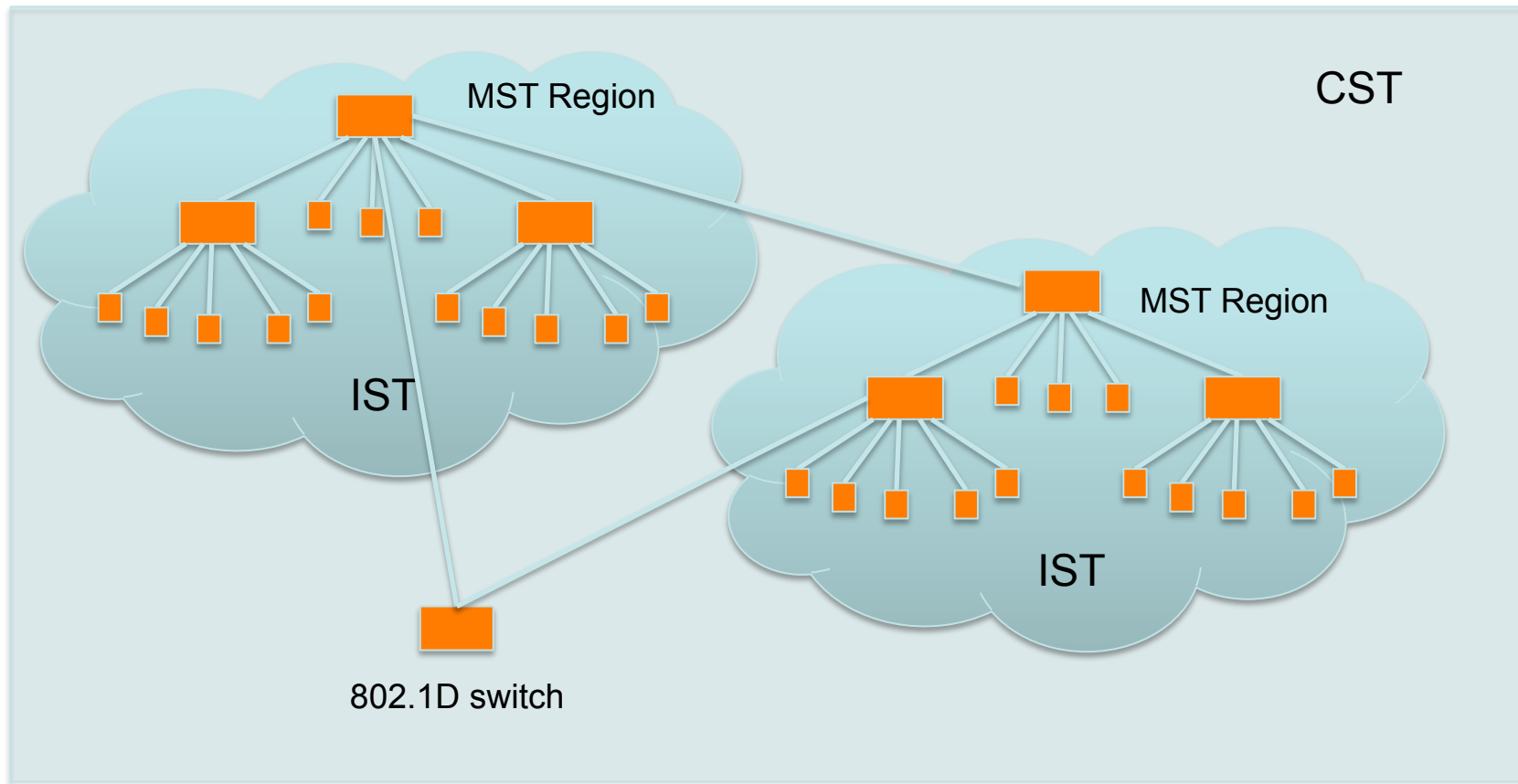
Multiple Spanning Tree (802.1s)

- IST = Internal Spanning Tree
 - Internal to the Region, that is
 - Presents the entire region as a single virtual bridge to the CST outside

Multiple Spanning Tree (802.1s)

- MST Instances
 - Groups of VLANs are mapped to particular Spanning Tree instances
 - These instances will represent the alternative topologies, or forwarding paths
 - You specify a root and alternate root for each instance

Multiple Spanning Tree (802.1s)



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Multiple Spanning Tree (802.1s)

- Design Guidelines
 - Determine relevant forwarding paths, and distribute your VLANs equally into instances matching these topologies
 - Assign different root and alternate root switches to each instance
 - Make sure all switches match region attributes
 - Do not assign VLANs to instance 0, as this is used by the IST

Questions?

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