

1. Access Ports
  - 1.1. Configure VLAN 10 on SW1's link to R10.
  - 1.2. Configure VLAN 11 on SW1's link to R11.
  - 1.3. Configure VLAN 12 on SW1's link to R12.
  - 1.4. Using Rapid Spanning Tree, these ports should immediately transition from disabled to forwarding when enabled.
  - 1.5. Once complete you should be able to ping SW1's SVI interfaces 165.1.X.21/24, where X is the VLAN number.
2. Trunk Ports
  - 2.1. Configure 802.1q Trunk Ports between SW2, SW3, SW4, and SW5.
  - 2.2. Only allow VLANs 30 & 40 on the ports between these switches.
3. VTP
  - 3.1. Configure VTPv3 between SW2, SW3, SW4, and SW5, and create VLANs 13, 30, and 40.
  - 3.2. SW5 should be the master server and all other switches should be configured as clients.
4. Access Ports
  - 4.1. Configure SW2's link to R13 as an access port in VLAN 13.
  - 4.2. This port should not be subject to STP convergence.
5. EtherChannel
  - 5.1. Configure a Port-Channel between SW2 and SW5 using open standards negotiation.
  - 5.2. Traffic should be load balanced based on layer 4 header information.
6. SVIs
  - 6.1. Configure SVIs on SW2, SW3, SW4, and SW5 for VLANs 10 and 20 with IP addressing 165.1.10.X/24 and 165.1.20.X/24 where X is 22 for SW2, 23 for SW3, 24 for SW4, and 25 for SW5.
7. STP Root Bridge Placement
  - 7.1. Configure SW4 as the STP root bridge for VLAN 30, and the backup root for VLAN 40.
  - 7.2. Configure SW3 as the STP root bridge for VLAN 40, and the backup root for VLAN 30.
9. STP Path Selection
  - 9.1. Modify the network so that traffic from SW5 to the VLAN 30 & 40 root bridges first transits through SW2.
10. First Hop Redundancy
  - 10.1. Configure HSRP between SW3 and SW4 for VLAN 30 with a Virtual IP address of 165.1.30.254. SW3 should be the primary gateway, but if its uplinks to SW2 go down, SW4 should take over the active status.
  - 10.2. Configure VRRP between SW3 and SW4 for VLAN 40 with a Virtual IP address of 165.1.40.254. SW4 should be the primary gateway, but if its uplinks to SW2 go down, SW3 should take over the active status.
11. STP Protection
  - 11.1. Configure SW1 so that if any of the devices on its attached access ports begin running Spanning-Tree Protocol, the ports are disabled for 5 minutes.
12. STP Root Protection
  - 12.1. Configure SW3 and SW4 so that if SW5 begins to announce itself as the root bridge, the links to this device are disabled.

### 13. Multiple Spanning-Tree Protocol

- 13.1. Transition SW2, SW3, SW4, and SW5 to Multiple Spanning-Tree Protocol.
- 13.2. VLAN 30 should be in STP Instance 1.
- 13.3. VLAN 40 should be in STP Instance 2.
- 13.4. All other VLANs should be in the default instance.
- 13.5. Ensure to maintain the Root Bridge placement and the traffic engineering defined in the previous sections.
- 13.6. The MST information should be advertised through VTPv3 from SW5 to the VTP clients.

### 14. Router-on-a-Stick

- 14.1. Create VLANs 79 and 89 on SW6.
- 14.2. The link to R7 should be an access port in VLAN 79, and should not be subject to STP convergence.
- 14.3. The link to R8 should be an access port in VLAN 89, and should not be subject to STP convergence.
- 14.4. Trunk VLANs 79 and 89 from SW6 to R9, but do not allow them to be subject to STP convergence.
- 14.5. Once complete you should have connectivity within VLANs 79 and 89 between R7, R8, R9 and SW6.