STP scenario

The link costs are marked in red as follows:

A picture containing text, device

Description automatically generated

For links consisting of a FastEthernet port connected to a GigabitEthernet port (except the one whose cost is manually set to 18), the link cost will be 19 since they have to operate at the lower data rate of FastEthernet.

S2 has the smallest bridge priority so it is elected as the root bridge. Because of this, all ports on S2 are designated ports.

To get to the root bridge S2, S1 has 2 shortest options: S1 G1/0/5 🡺 S2 G1/0/5 or S1 G1/0/6 🡺 S2 G1/0/6 (path cost of 4). Since both ports on S1 are connected to the same bridge (S2) and both ports on S2 have the same port priority (by default), the port IDs of S2 will break the tie. G1/0/5 (S2) has a lower port ID than G1/0/6 (S2), so G1/0/5 (S1) will become the root port.

To get to the root bridge S2, S3 has only one shortest path (path cost of 18): from F0/4 (S3) to G1/0/4 (S2). Therefore F0/4 will become the root port.

Because all ports on the root bridge S2 are designated ports, non-root ports from other bridges that directly connect to S2 will become alternate ports. G1/0/6 of S1 and F0/3 of S3 are alternate ports.

For the segments between S1 and S3, the designated ports are the ones on the bridge with the smallest path cost to the root. In this case, S1 has the smallest path cost (4 < 18), so G1/0/1 and G1/0/2 of S1 are designated ports. F0/1 and F0/2 of S3 are alternate ports.

In summary:

S2 is the root bridge. All ports on S2 are designated ports.

S1:

* G1/0/5: Root port
* G1/0/1 and G1/0/2: Designated ports.
* G1/0/6: Alternate port.

S3:

* F0/4: Root port
* F0/1, F0/2, and F0/3: Alternate ports.