SPANNING TREE PROTOCOL

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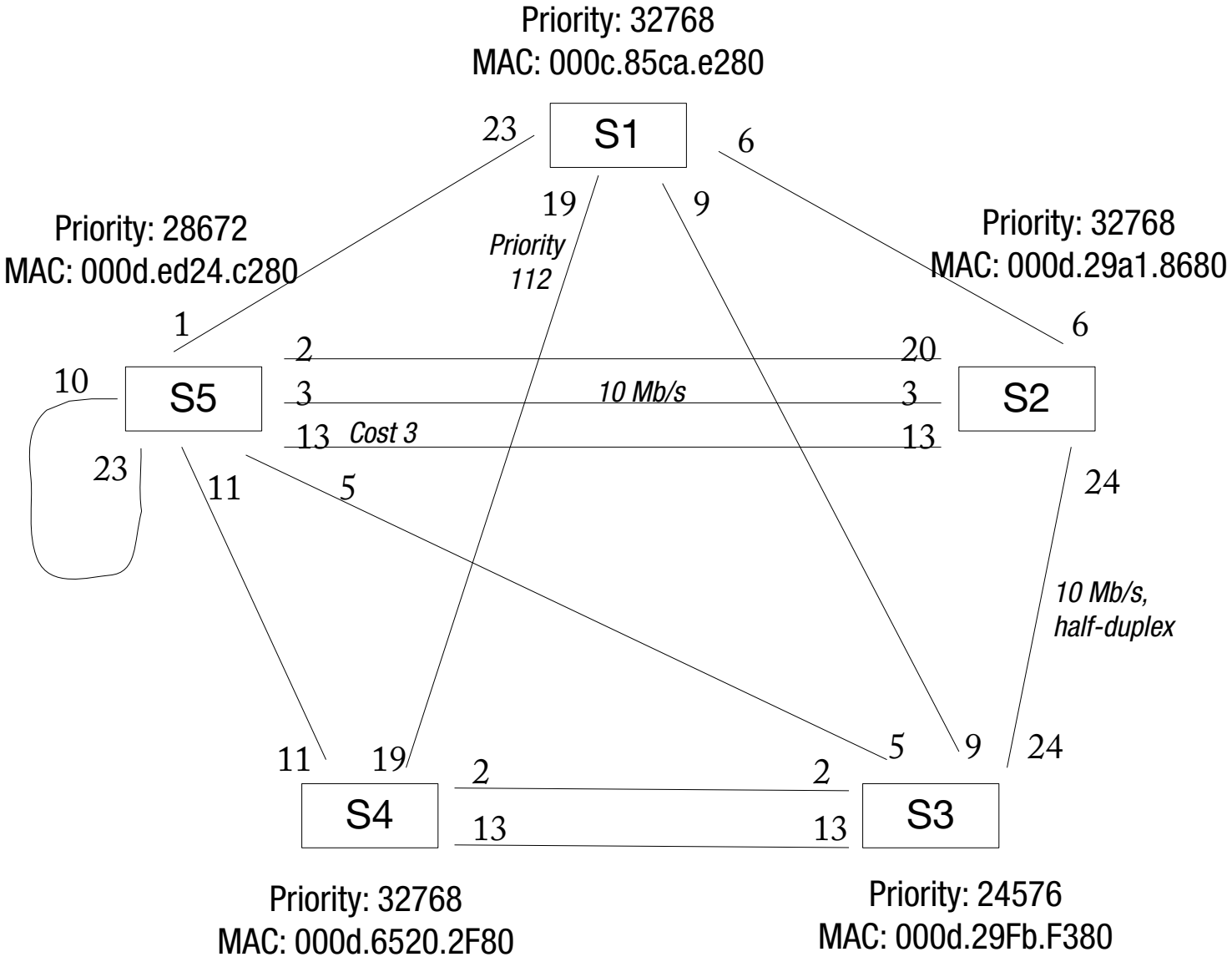
Objectives:

- Identify Root Bridge
- Identify Root Ports on other Switches
- Identify Designated Ports for each link
- Identify Alternate (blocked) Ports



Outcome

S3 is the root bridge (switch), based on lowest priority (ties broken by MAC).

The cost assigned to fa0/13 on S5 has no impact because switches add their *own* interface cost to the root cost advertised by the upstream switch—S2's interface cost (19) is still dictated solely by interface speed (100 Mb/s) and it uses the upstream interface number (fa0/2) to break the tie between fa0/13 and fa0/20.

The S1 end of the S1-S4 link is designated based on a lower MAC address (bridge priorities identical). Interface priority is only used to break ties within the same switch, for example parallel links.

S1—From "show spanning-tree [vlan 1]"

```
Interface           Role Sts Cost      Prio.Nbr Type
------------------- ---- --- --------- -------- --------------------------------
Fa0/6               Desg FWD 19        128.6    P2p
Fa0/9               Root FWD 19        128.9    P2p
Fa0/19              Desg FWD 19        112.19   P2p   Notice the custom interface priority
Fa0/23              Altn BLK 19        128.23   P2p
```

S2

```
Interface           Role Sts Cost      Prio.Nbr Type
------------------- ---- --- --------- -------- --------------------------------
Fa0/3               Altn BLK 100       128.3    P2p   Notice the unexpected interface cost
Fa0/6               Altn BLK 19        128.6    P2p
Fa0/13              Altn BLK 19        128.13   P2p
Fa0/20              Root FWD 19        128.20   P2p
Fa0/24              Altn BLK 100       128.24   Shr   "Shr" indicates half-duplex
```

S3

```
Interface           Role Sts Cost      Prio.Nbr Type
------------------- ---- --- --------- -------- --------------------------------
Fa0/2               Desg FWD 19        128.2    P2p
Fa0/5               Desg FWD 19        128.5    P2p
Fa0/9               Desg FWD 19        128.9    P2p
Fa0/13              Desg FWD 19        128.13   P2p
Fa0/24              Desg FWD 100       128.24   Shr
```

S4

```
Interface           Role Sts Cost      Prio.Nbr Type
------------------- ---- --- --------- -------- --------------------------------
Fa0/2               Root FWD 19        128.2    P2p
Fa0/11              Altn BLK 19        128.11   P2p
Fa0/13              Altn BLK 19        128.13   P2p
Fa0/19              Altn BLK 19        128.19   P2p
```

S5

```
Interface           Role Sts Cost      Prio.Nbr Type
------------------- ---- --- --------- -------- --------------------------------
Fa0/1               Desg FWD 19        128.1    P2p
Fa0/2               Desg FWD 19        128.2    P2p
Fa0/3               Desg FWD 100       128.3    P2p
Fa0/5               Root FWD 19        128.5    P2p
Fa0/10              Desg FWD 19        128.10   P2p
Fa0/11              Desg FWD 19        128.11   P2p
Fa0/13              Desg FWD 3         128.13   P2p   Notice the custom interface cost
Fa0/23              Back BLK 19        128.23   P2p
```

Track down the Unexpected Costs

Unexpected interface costs can come from speed or explicit cost. Normally, you'd expect 19 on a FastEthernet (fa0/1), 4 on a Gigabit interface (Gi0/1), and 100 on an Ethernet (e0/1) interface.

```
S2# show interfaces status

Port      Name               Status       Vlan       Duplex  Speed Type
Fa0/1                        notconnect   1            auto   auto 10/100BaseTX
Fa0/2                        notconnect   1            auto   auto 10/100BaseTX
Fa0/3                        connected    trunk      a-full     10 10/100BaseTX
```

Here we have 10 instead of a-10, indicating the speed was manually set at this end, explaining our cost of 100 on this port.

```
Fa0/4                        notconnect   1            auto   auto 10/100BaseTX
Fa0/5                        notconnect   1            auto   auto 10/100BaseTX
Fa0/6                        connected    trunk      a-full  a-100 10/100BaseTX

S5# show interfaces status

Port      Name               Status       Vlan       Duplex  Speed Type
Fa0/1                        connected    trunk      a-full  a-100 10/100BaseTX
Fa0/2                        connected    trunk      a-full  a-100 10/100BaseTX
Fa0/3                        connected    trunk      a-full   a-10 10/100BaseTX
```

Here we autonegotiated 10 Mb/s because it was manually set on the other side with duplex untouched.

```
Fa0/4                        notconnect   1            auto   auto 10/100BaseTX
Fa0/5                        connected    trunk      a-full  a-100 10/100BaseTX
Fa0/6                        notconnect   1            auto   auto 10/100BaseTX
Fa0/7                        notconnect   1            auto   auto 10/100BaseTX
Fa0/8                        notconnect   1            auto   auto 10/100BaseTX
Fa0/9                        notconnect   1            auto   auto 10/100BaseTX
Fa0/10                       connected    trunk      a-full  a-100 10/100BaseTX
Fa0/11                       connected    trunk      a-full  a-100 10/100BaseTX
Fa0/12                       notconnect   1            auto   auto 10/100BaseTX
Fa0/13                       connected    trunk      a-full  a-100 10/100BaseTX
```

Here, our port speed is autonegotiated at 100, so our cost of 3 must have been manually inserted. Of course, we knew that because 3 is not one of the standard costs (100, 19, 4, 2)

```
S5# show spanning-tree interface fa0/13
Vlan                Role Sts Cost      Prio.Nbr Type
------------------- ---- --- --------- -------- --------------------------------
VLAN0001            Desg FWD 3         128.13   P2p
```

Causing All This

S1

```
interface FastEthernet0/19
 spanning-tree port-priority 112
 switchport mode dynamic desirable
```

ALL interfaces are actually dynamic desirable and trunking automatically, so this line is only shown once

S2

```
interface FastEthernet0/3
 speed 10
!
interface FastEthernet0/24
 speed 10
 duplex half
```

S3

```
spanning-tree vlan 1 priority 24576
```

Or, "spanning-tree vlan 1 root primary"

```
!
interface FastEthernet0/3
 speed 10
!
interface FastEthernet0/24
 speed 10
 duplex half
```

S5

```
spanning-tree vlan 1 priority 28672
```

Or, "spanning-tree vlan 1 root secondary"

```
!
interface FastEthernet0/13
 spanning-tree cost 3
```