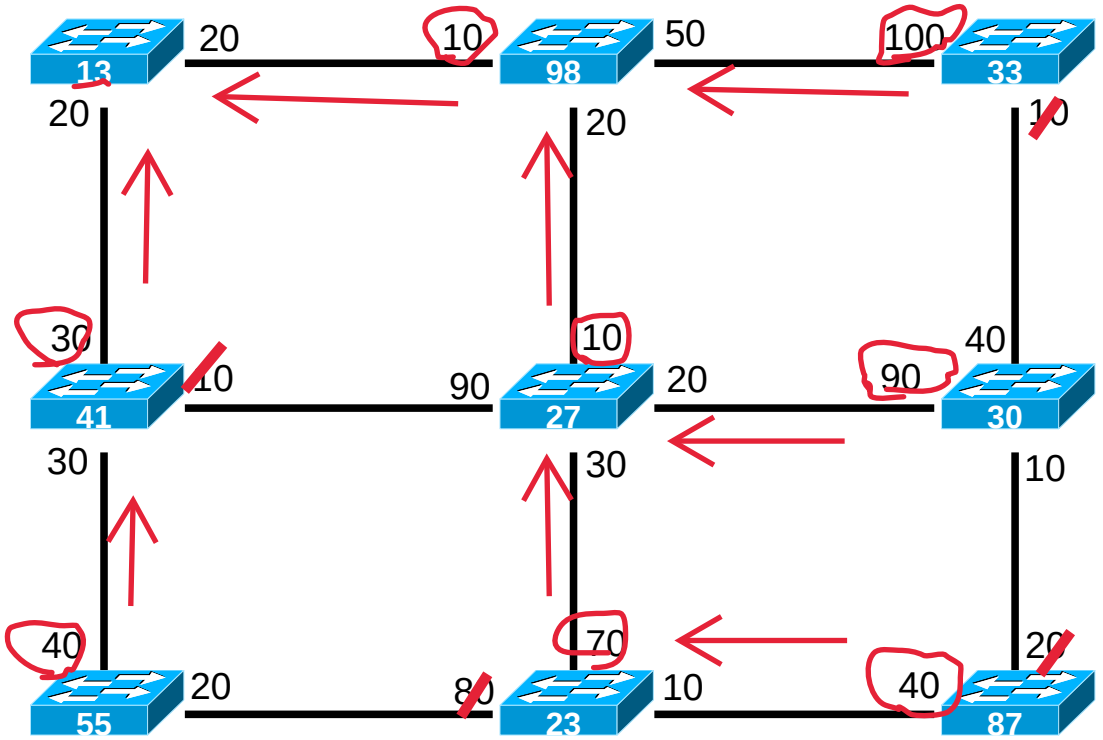
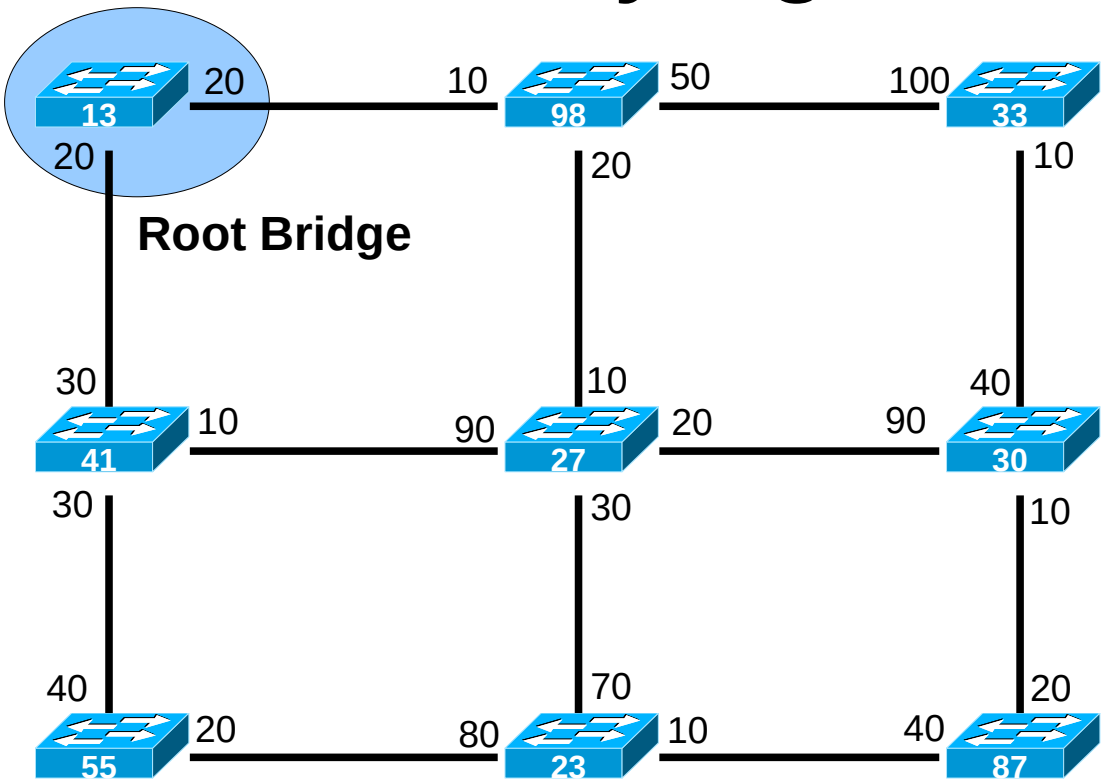
How to determine the Spanning-tree



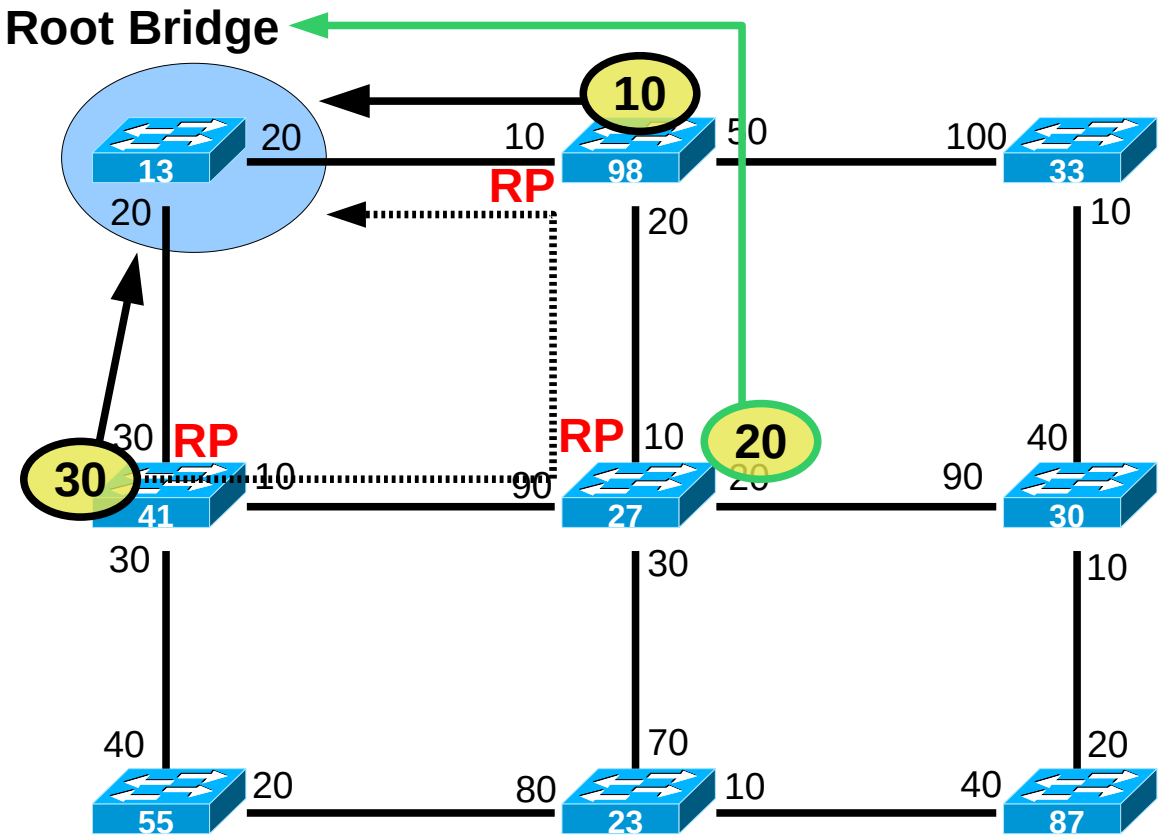
1. Identify the **root bridge**
2. Identify "**root path costs**" and **root ports**
3. Identify **designated bridges** and **designated ports**

Identifying the **root bridge**



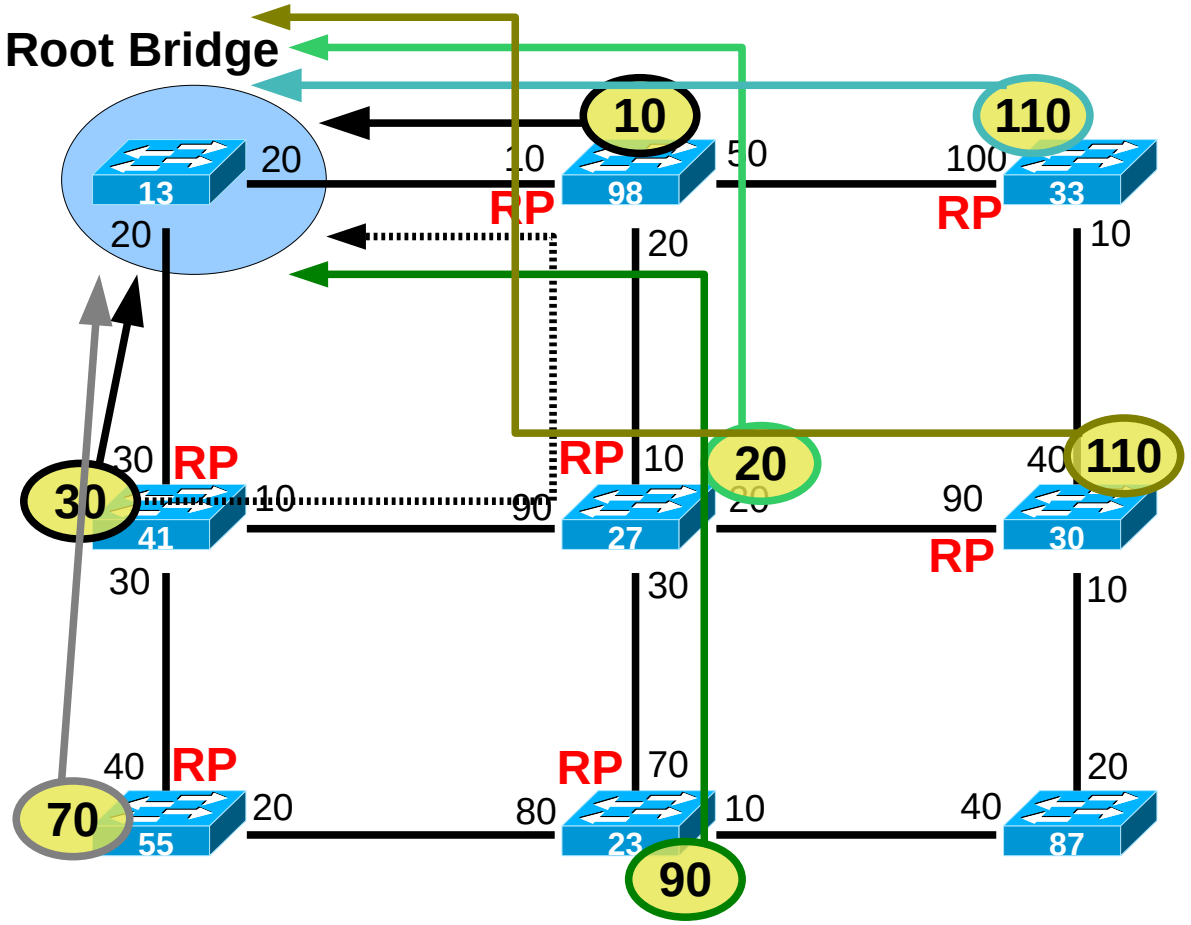
- The root bridge is the one with the lowest ID
  - ID = priority + MAC
  - The bridge with the lowest priority will be the root
  - For equal priorities it's necessary to analyze the bridge's MAC address

“Root Path Costs” and root ports



- “Root Path Cost” (RPC) is the cost of the path between a bridge and the root.
- The cost is given by the sum of all “output” ports' costs in the path to the root.
  - In each bridge, it's given by the sum of the RPC of the neighbor bridge plus the cost of the port that connects to that neighbor bridge.
- For paths with the same cost, it's chosen the one announced by the bridge with the lowest ID.
- Tip: start the RPC calculations from the bridges “closer” to the root.

“Root Path Costs” and root ports



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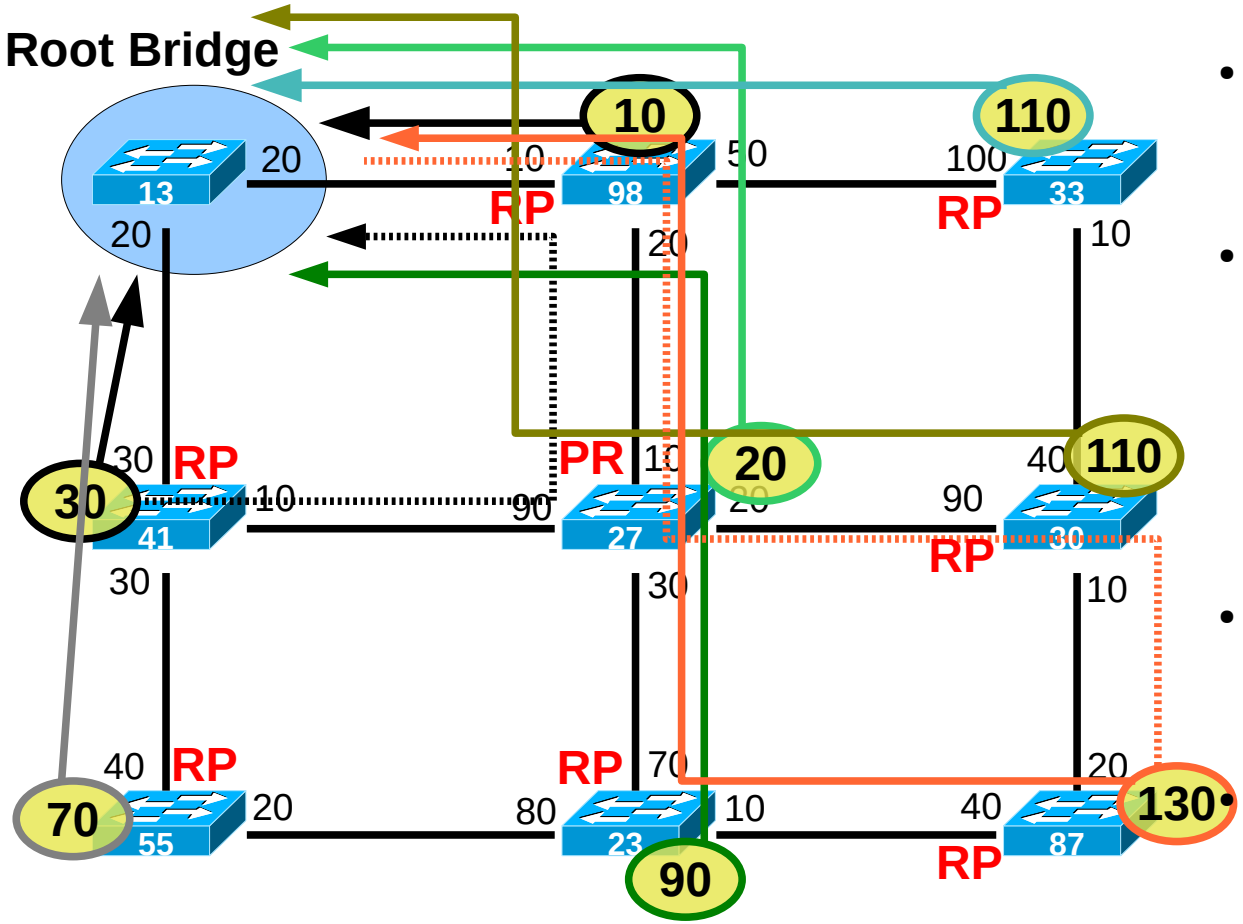
“Root Path Costs” and root ports



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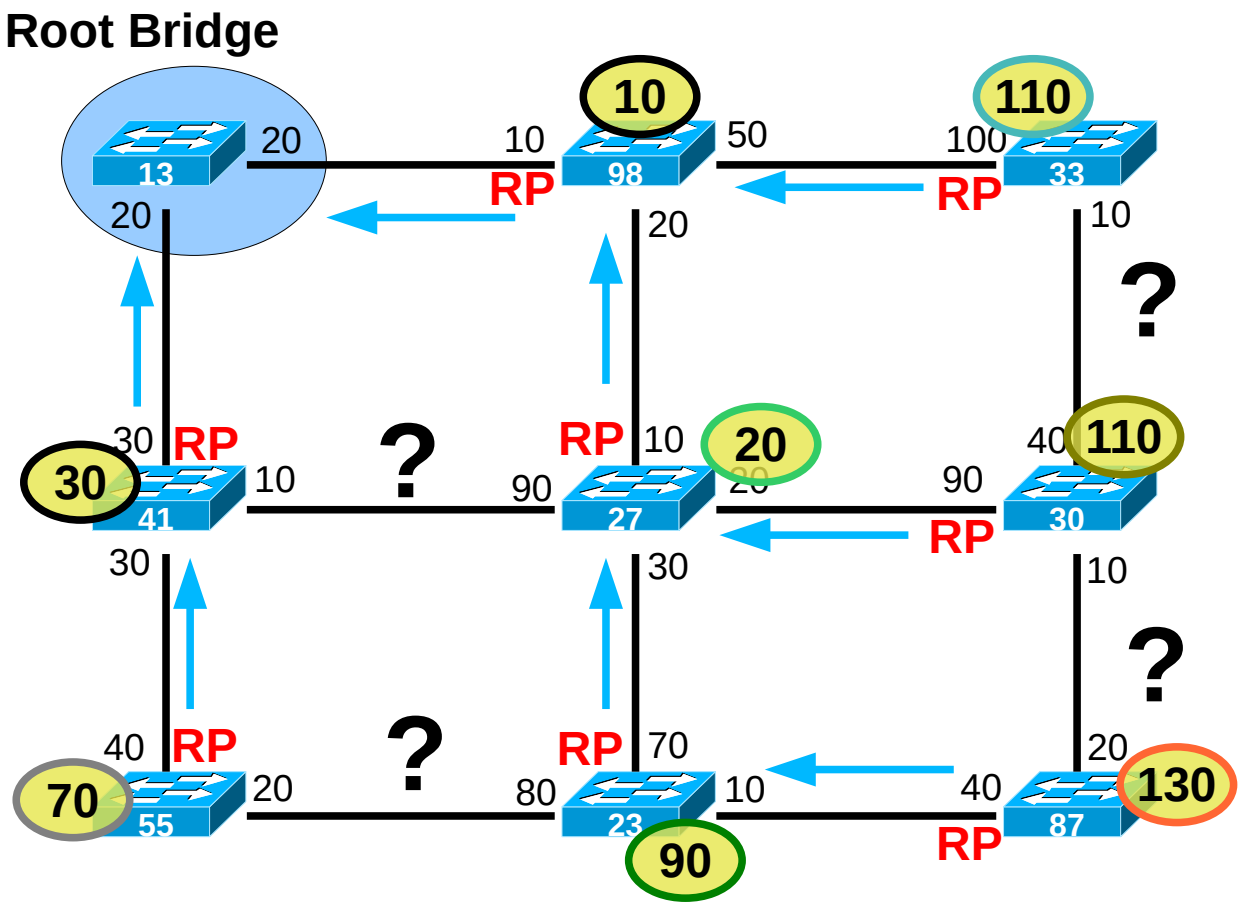
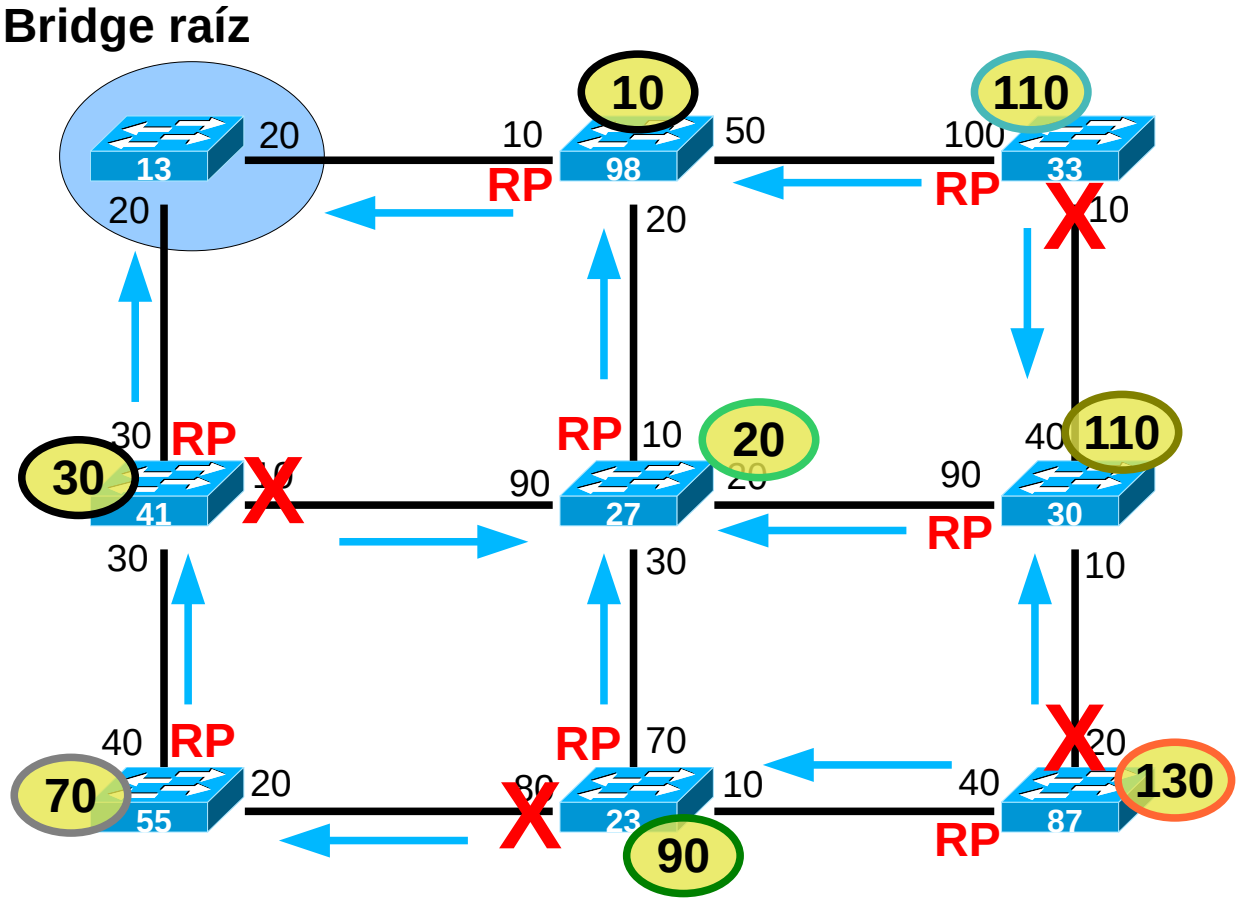
Designated bridges and ports



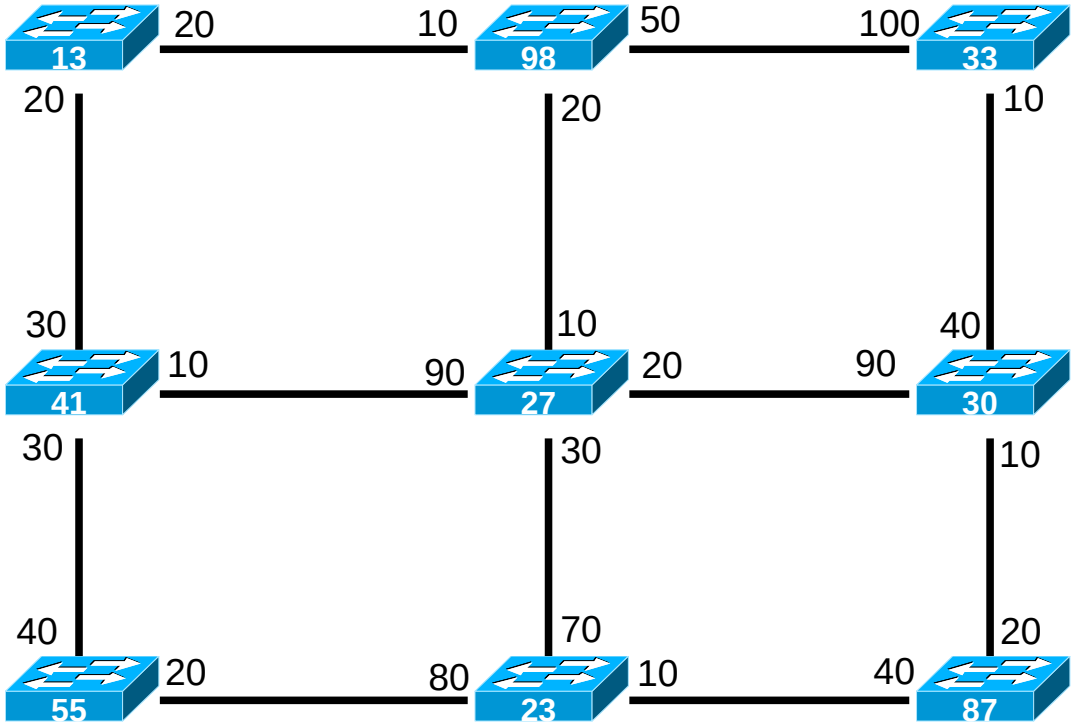
- A Ethernet segment's designated bridge is the one with:
  - The lowest RPC
  - For equal costs, the one with the lowest ID
- The root bridge is always the designated bridge of all Ethernet segments connected to it.
- In a Ethernet segment that belongs to the minimum cost path, the designated bridge is always the one that provides that path to the root.

Designated bridges and ports



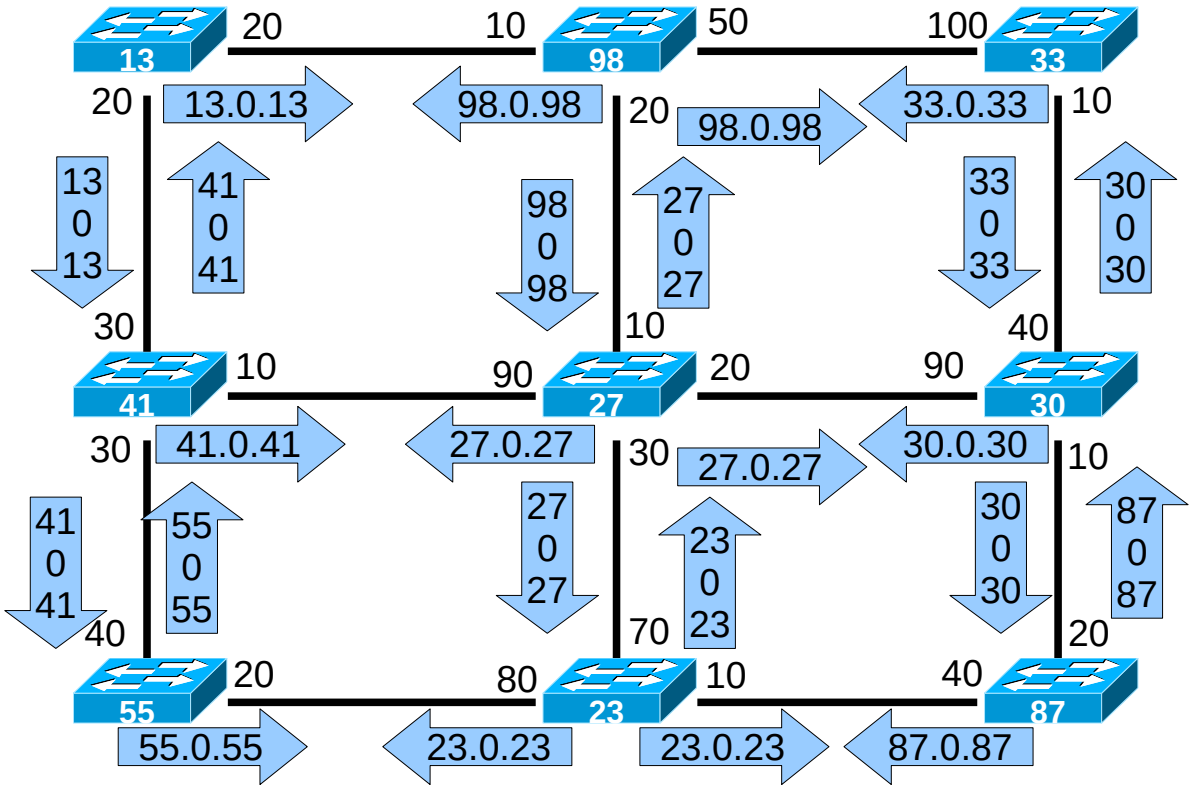
- A Ethernet segment's designated bridge is the one that has:
  - The lowest Root Path Cost
  - For equal costs, the lowest ID
- Ethernet segment 41-27: Designated bridge 27
  - Lowest cost
- Ethernet segment 30-33: Designated bridge 30
  - Same cost, lowest ID
- Ethernet segment 23-55: Designated bridge 55
  - Lowest cost
- Ethernet segment 30-87: Designated bridge 30
  - Lowest cost

ST Construction - Messages Exchange



- At start, all bridges assume to be the root bridge.
- Send Conf-BPDUs to all connected Ethernet segments.

ST Construction - Messages Exchange



- At start, all bridges assume to be the root bridge.
- Send Conf-BPDUs to all connected Ethernet segments.
  - 13 remains root
  - 98 accepts 13 as root (cost 10)
  - 33 accepts 30 as root (cost 10)
  - 41 accepts 13 as root (cost 30)
  - 27 accepts 23 as root (cost 30)
  - 30 accepts 27 as root (cost 90)
  - 55 accepts 23 as root (cost 20)
  - 23 remains root
  - 87 accepts 23 as root (cost 50)

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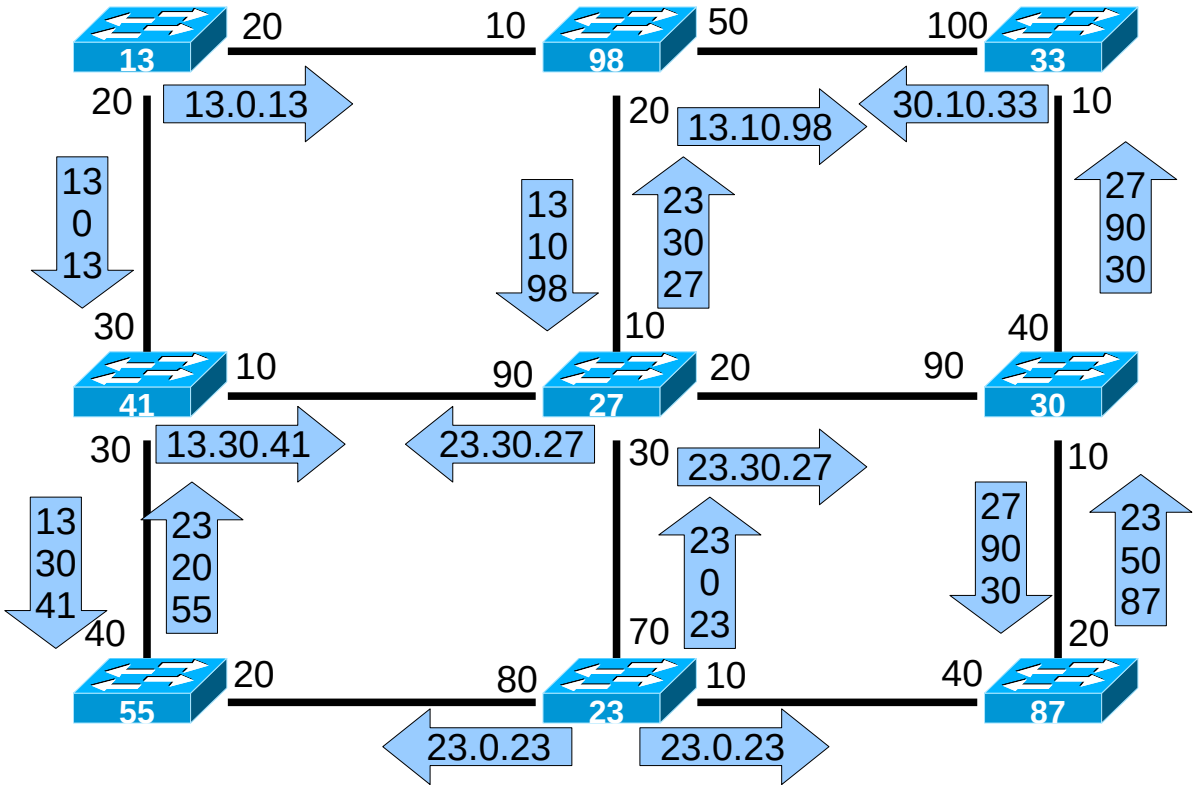
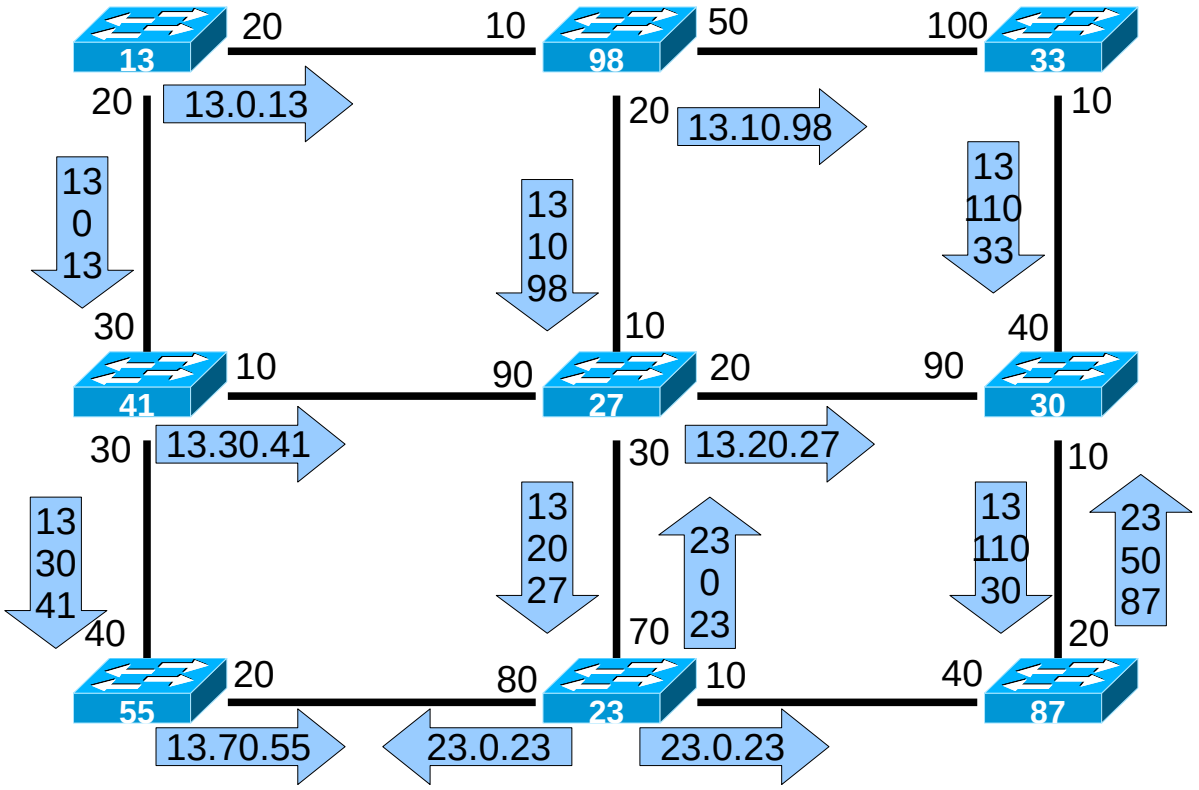
ST Construction - Messages Exchange



- Bridges only send Conf-BPDUs to the Ethernet segments where they are designated.
  - 13 remains root
  - 98 accepts 13 as root (cost 10)
  - 33 accepts 13 as root (cost 110 – via 98)
  - 41 accepts 13 as root (cost 30)
  - 27 accepts 13 as root (cost 20 – via 98)
  - 30 accepts 23 as root (cost 120 – via 27)
  - 55 accepts 13 as root (cost 70 – via 41)
  - 23 remains root
  - 87 accepts 23 as root (cost 40)

ST Construction - Messages Exchange



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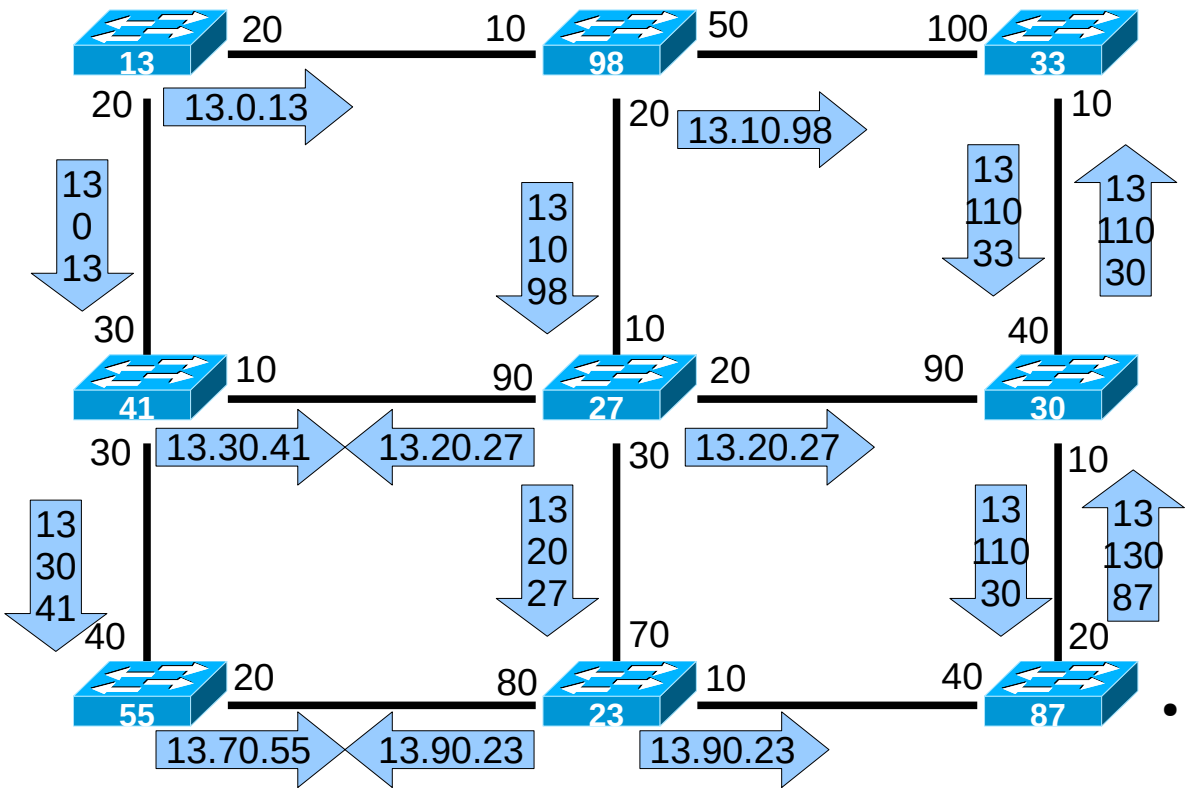
  - 30 accepts 13 as root (cost 110 – via 27)
  - 55 accepts 13 as root (cost 70 – via 41)
  - 23 accepts 13 as root (cost 90 – via 27)
  - 87 accepts 13 as root (cost 130 – via 30)

ST Construction - Messages Exchange



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  - 98 accepts 13 as root (cost 10)
  - 33 accepts 13 as root (cost 110 – via 98)
  - 41 accepts 13 as root (cost 30)
  - 27 accepts 13 as root (cost 20 – via 98)
  - 30 accepts 13 as root (cost 110 – via 27)
  - 55 accepts 13 as root (cost 70 – via 41)
  - 23 accepts 13 as root (cost 90 – via 27)
  - 87 accepts 13 as root (cost 130 – via 23)
  - Cost 130 – via 23 is preferred because the bridge ID is lower (23<30)
- The designated bridge of a Ethernet segment is chosen according with the best messages sent.
  - Ethernet segment 41-27: designated bridge 27 (lowest cost)
  - Ethernet segment 55-23: designated bridge 55 (lowest cost)
  - Ethernet segment 30-33: designated bridge 30 (Lowest bridge ID)
  - Ethernet segment 30-87: designated bridge 30 (lowest cost)

ST Construction - Messages Exchange