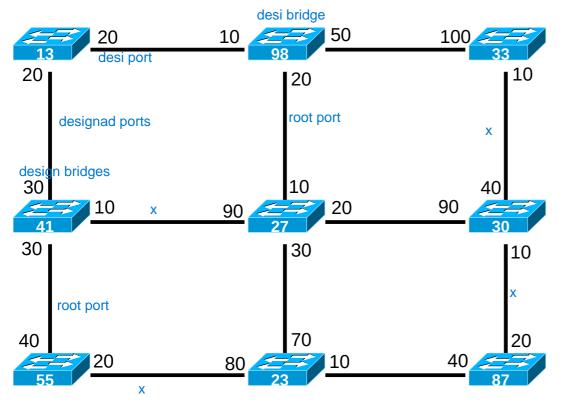
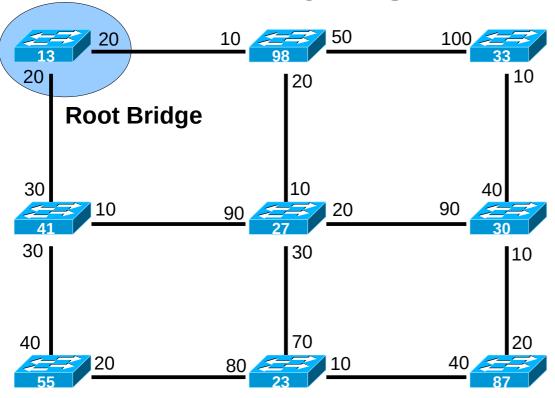
How to determine the Spanning-tree



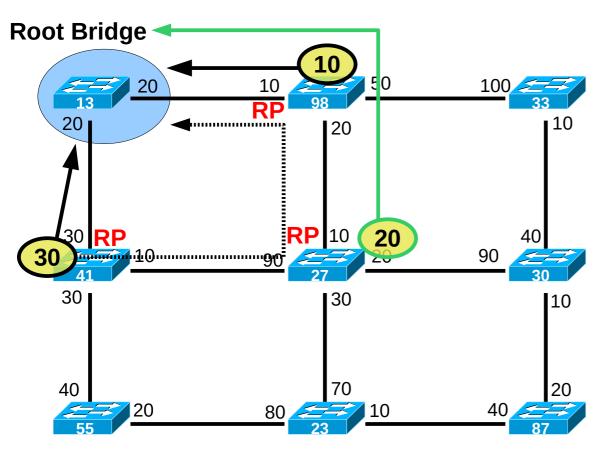
- 1. Identify the root bridge
- 2. Identify "root path costs" and root ports
- Identify designated bridges and designated ports

Identifying the root bridge



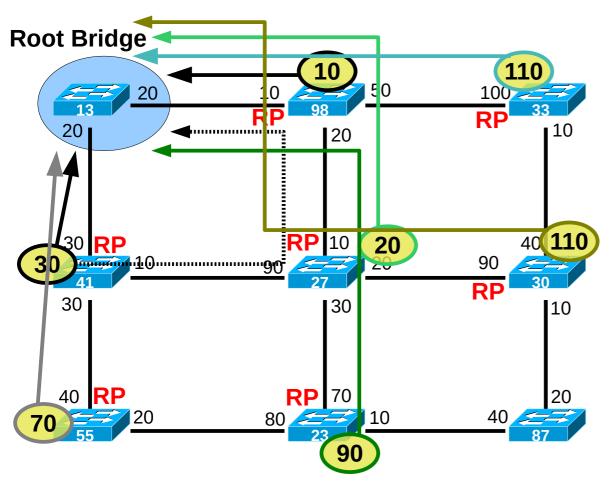
- The root bridge is the one with the lowest ID
 - ID = priority + MAC
 - The bridge with the lowest priority will be the root
 - For equal priorities it's necessary to analyze the bridge's MAC address

"Root Path Costs" and root ports



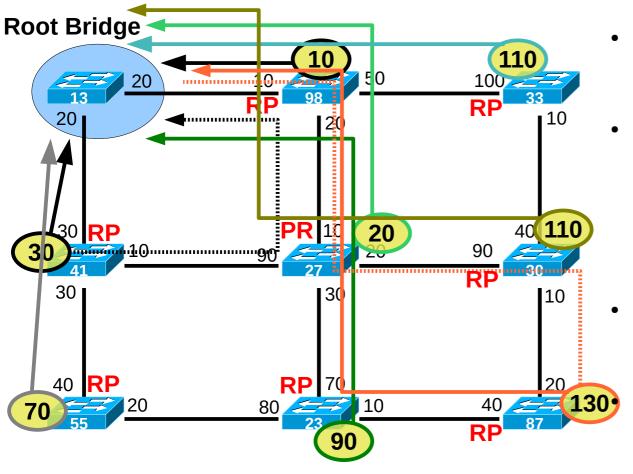
- "Root Path Cost" (RPC) is the cost of the path between a bridge and the root.
- The cost is given by the sum of all "output" ports' costs in the path to the root.
 - In each bridge, it's given by the sum of the RPC of the neighbor bridge plus the cost of the port that connects to that neighbor bridge.
- 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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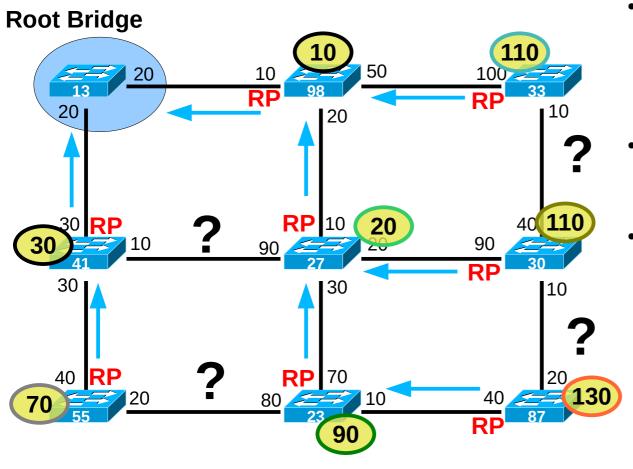
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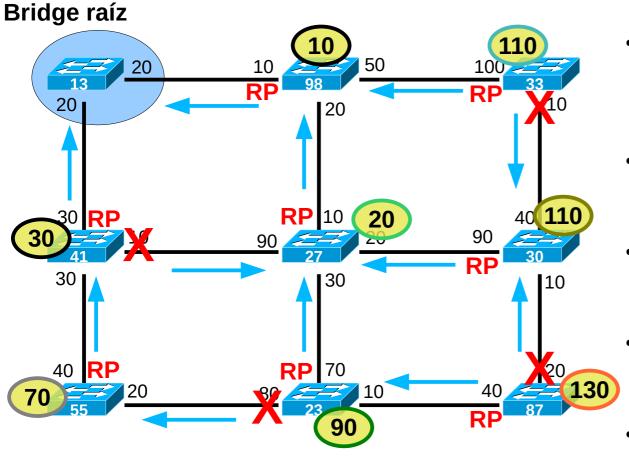
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Designated bridges and ports

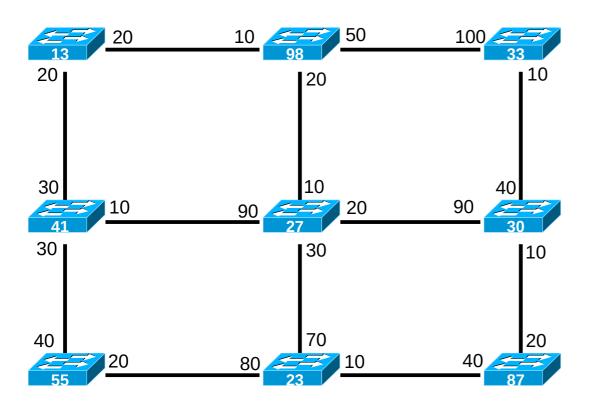


- A Ethernet segment's designated bridge is the one with:
 - The lowest RPC
 - For equal costs, the one with the lowest ID
- The root bridge is always the designated bridge of all Ethernet segments connected to it.
- In a Ethernet segment that belongs to the minimum cost path, the designated bridge is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

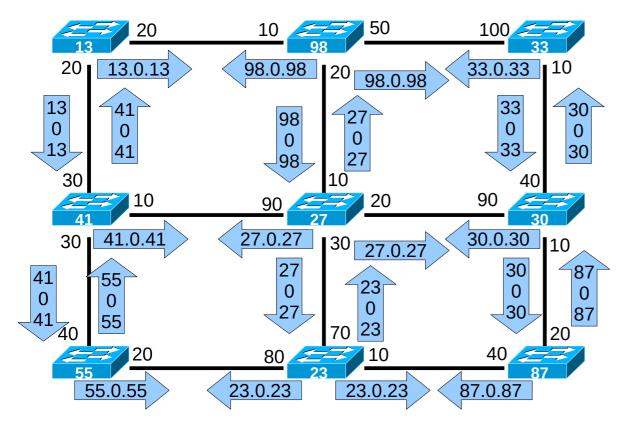
Designated bridges and ports



- 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

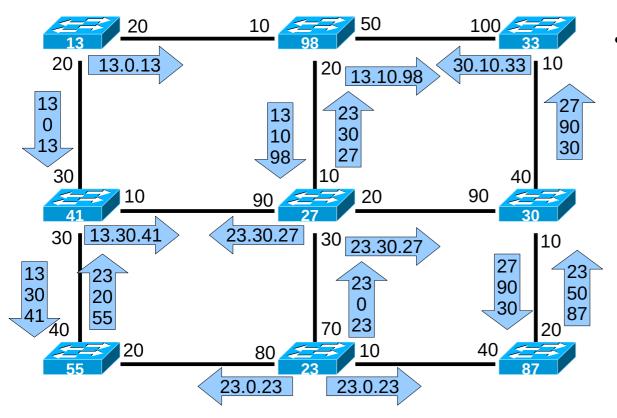


- At start, all bridges assume to be the root bridge.
- Send Conf-BPDUs to all connected Ethernet segments.

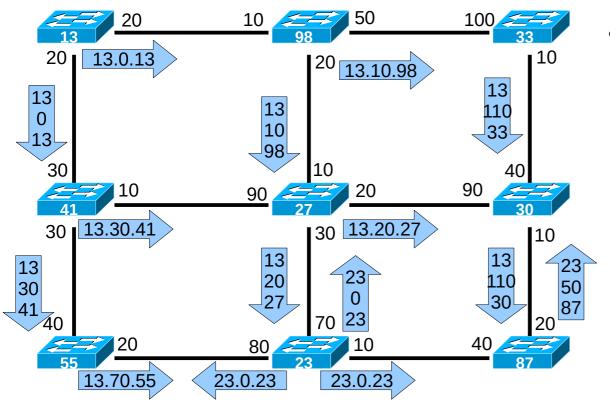


- At start, all bridges assume to be the root bridge.
- Send Conf-BPDUs to all connected Ethernet segments.
 - 13 remains root
 - 98 accepts 13 as root (cost 10)
 - 33 accepts 30 as root (cost 10)
 - 41 accepts 13 as root (cost 30)
 - 27 accepts 23 as root (cost 30)
 - 30 accepts 27 as root (cost 90)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

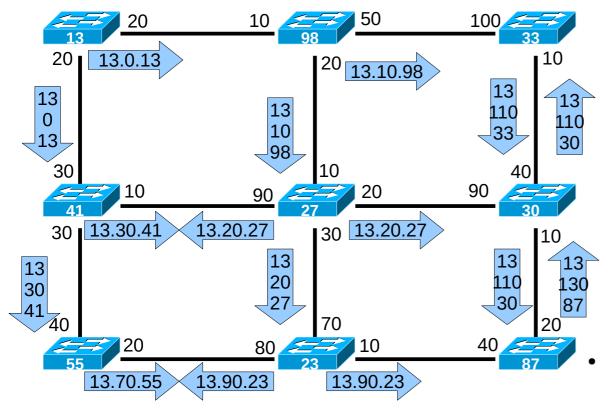
Raíz.Custo.ID



- 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)



- Bridges only send Conf-BPDUs to the Ethernet segments where they are designated.
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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 30)



- 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 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)

