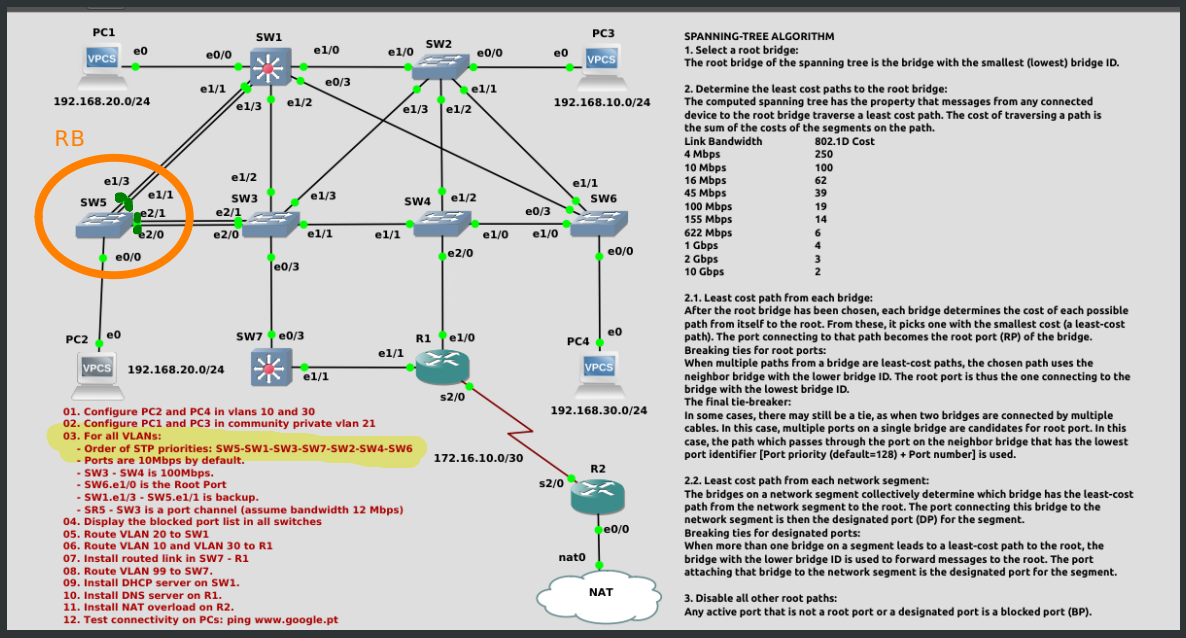
1º Eleger a Root Bridge
A eleição é feita com base numa prioridade e tambem com base no MAC Address

No ponto 03. dão-nos a ordem do STP e começa pelo SW5 logo o mesmo é a RB
Colocamos logo todas as portas do SW5 como DP



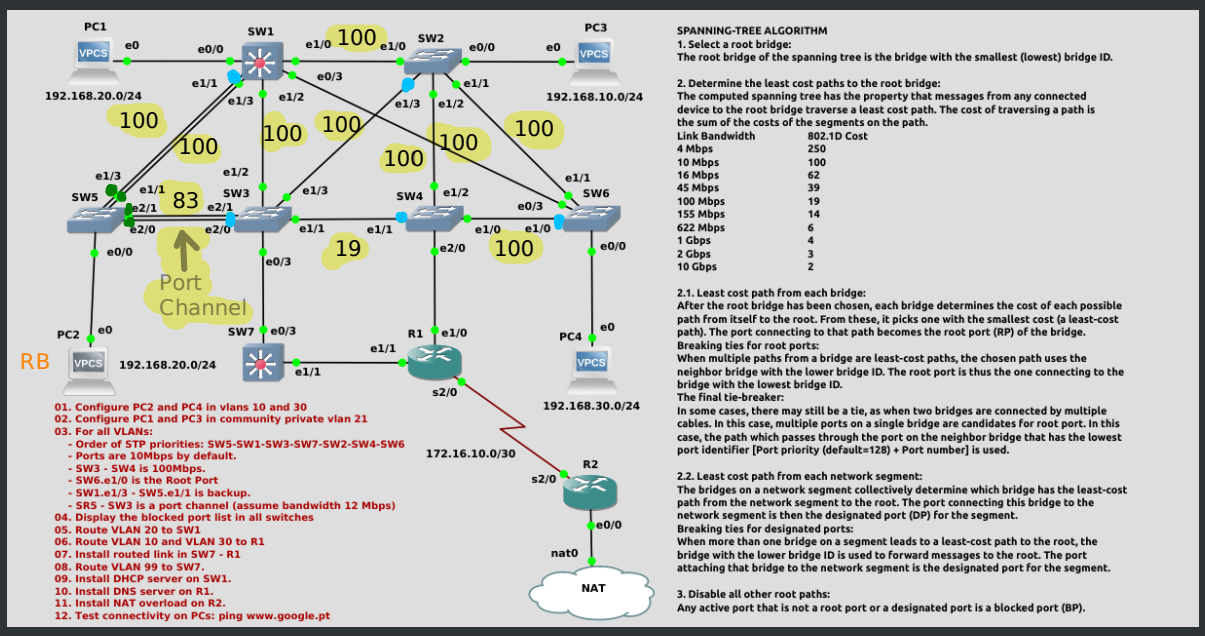
SW5 -> RB
DP (Designated Port)

2º Determinar a distância de cada bridge até à RB
A distância é a soma das distâncias entre cada switch sendo que o caminho menor é a Root Port (RP)

Ethernet - 100
FastEthernet - 19
Gig - 4

Quando existe empates, para escolher qual é a RP, o caminho escolhido usa o vizinho com o Bridge ID mais baixo (MAC+Prioridade)
Em alguns casos ainda existe empate, então neste caso o desempate é feito pela porta mais baixa do vizinho (e0/2 é mais baixo que e0/3)

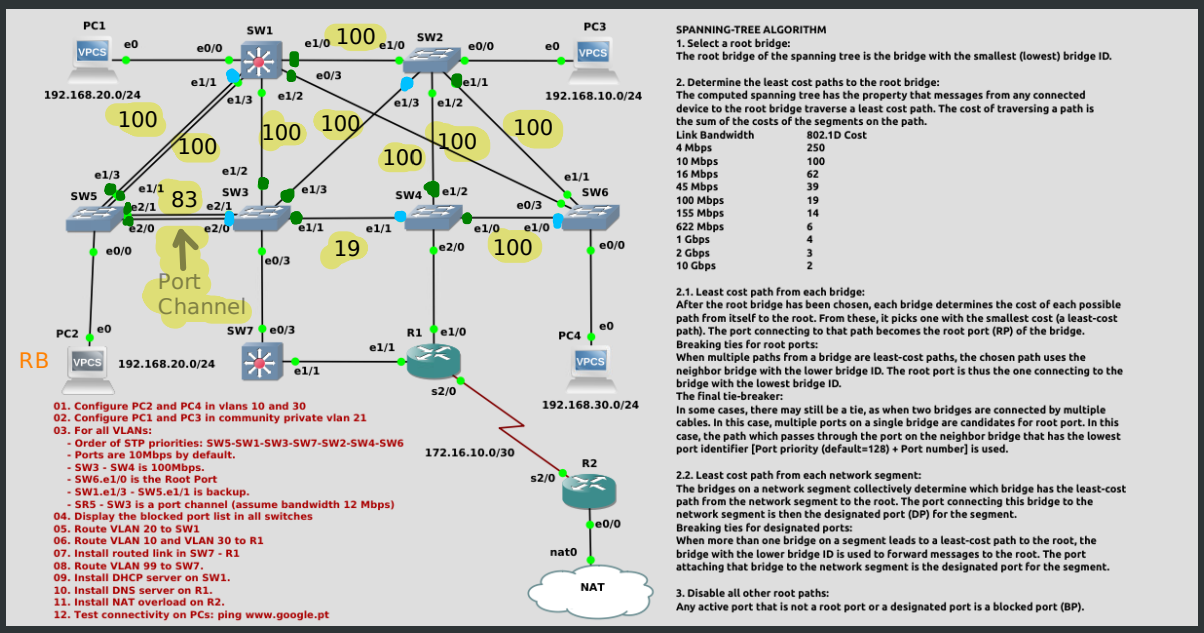
Neste caso dizemos que o Port channel é de 12 Mbps logo dá mais ou menos 83
A ligação entre SW3 e SW4 é 100Mbps e isso dá 19 de custo
No SW1 a RP é a e1/1 porque diz no enunciado que a porta SW5.e1/1 é backup, logo no SW1 temos de usar a e1/1 porque liga à primaria do SW5
No SW6 a RP é a e1/0 porque diz no enunciado, no entanto não é a melhor porta
No SW3 são as duas portas RPs porque um Port Channel atua como se fosse apenas 1 único canal



SW5 -> RB
RP (Root Port)
DP (Designated Port)

3º Calcular o melhor caminho a partir de cada segmento para termos as DPs
O melhor é colocarmo-nos no meio do segmento:
- Se tivermos uma RP no segmento, automaticamente a porta em frente é a DP
- Se não tivermos nenhuma RP, calculamos o melhor caminho e esse sera a DP (não contando com o custo do segmento onde estamos)

Quando existe empates para escolher qual a DP, o caminho escolhido usa o vizinho com o Bridge ID mais baixo (MAC+Prioridade)



SPANNING-TREE ALGORITHM

1. Select a root bridge:
The root bridge of the spanning tree is the bridge with the smallest (lowest) bridge ID.

2. Determine the least cost paths to the root bridge:
The computed spanning tree has the property that messages from any connected device to the root bridge traverse a least cost path. The cost of traversing a path is the sum of the costs of the segments on the path.

Link Bandwidth	802.1D Cost
4 Mbps	250
10 Mbps	100
16 Mbps	62
45 Mbps	39
100 Mbps	19
155 Mbps	14
622 Mbps	6
1 Gbps	4
2 Gbps	3
10 Gbps	2

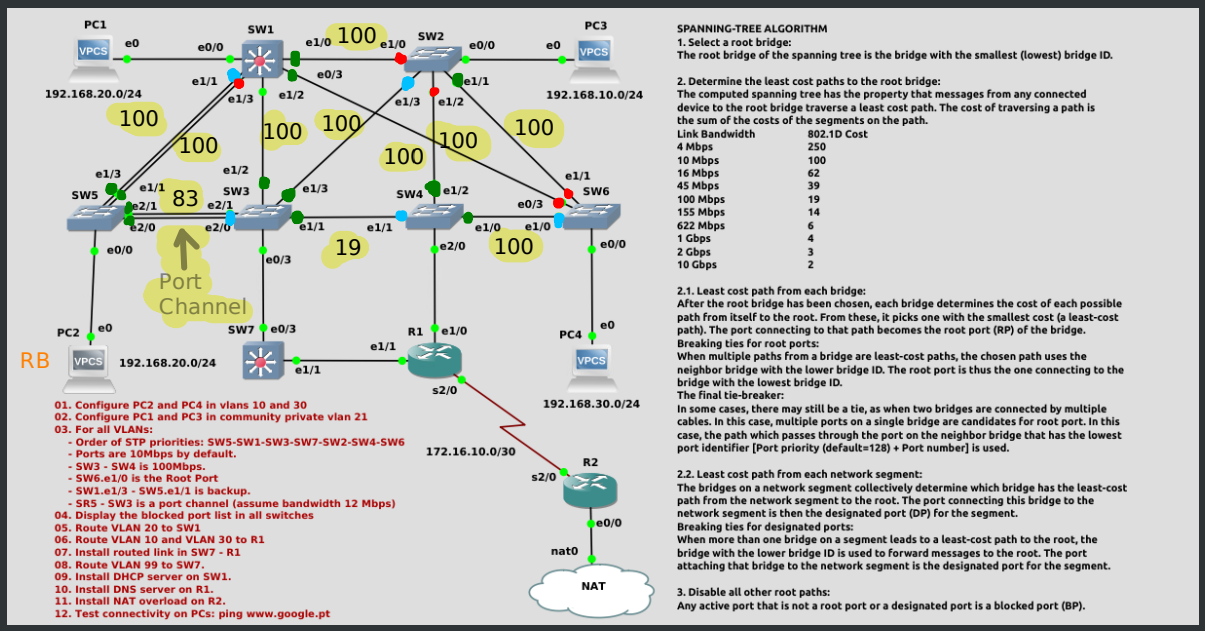
2.1. Least cost path from each bridge:
After the root bridge has been chosen, each bridge determines the cost of each possible path from itself to the root. From these, it picks one with the smallest cost (a least-cost path). The port connecting to that path becomes the root port (RP) of the bridge.
Breaking ties for root ports:
When multiple paths from a bridge are least-cost paths, the chosen path uses the neighbor bridge with the lower bridge ID. The root port is thus the one connecting to the bridge with the lowest bridge ID.
The final tie-breaker:
In some cases, there may still be a tie, as when two bridges are connected by multiple cables. In this case, multiple ports on a single bridge are candidates for root port. In this case, the path which passes through the port on the neighbor bridge that has the lowest port identifier [Port priority (default=128) + Port number] is used.

2.2. Least cost path from each network segment:
The bridges on a network segment collectively determine which bridge has the least-cost path from the network segment to the root. The port connecting this bridge to the network segment is then the designated port (DP) for the segment.
Breaking ties for designated ports:
When more than one bridge on a segment leads to a least-cost path to the root, the bridge with the lower bridge ID is used to forward messages to the root. The port attaching that bridge to the network segment is the designated port for the segment.

3. Disable all other root paths:
Any active port that is not a root port or a designated port is a blocked port (BP).

SW5 -> RB
RP (Root Port)
DP (Designated Port)

4º Por fim bloqueamos todas as outras portas (BP -> Blocked Ports)
Basicamente são as portas que sobram que não foram pintadas



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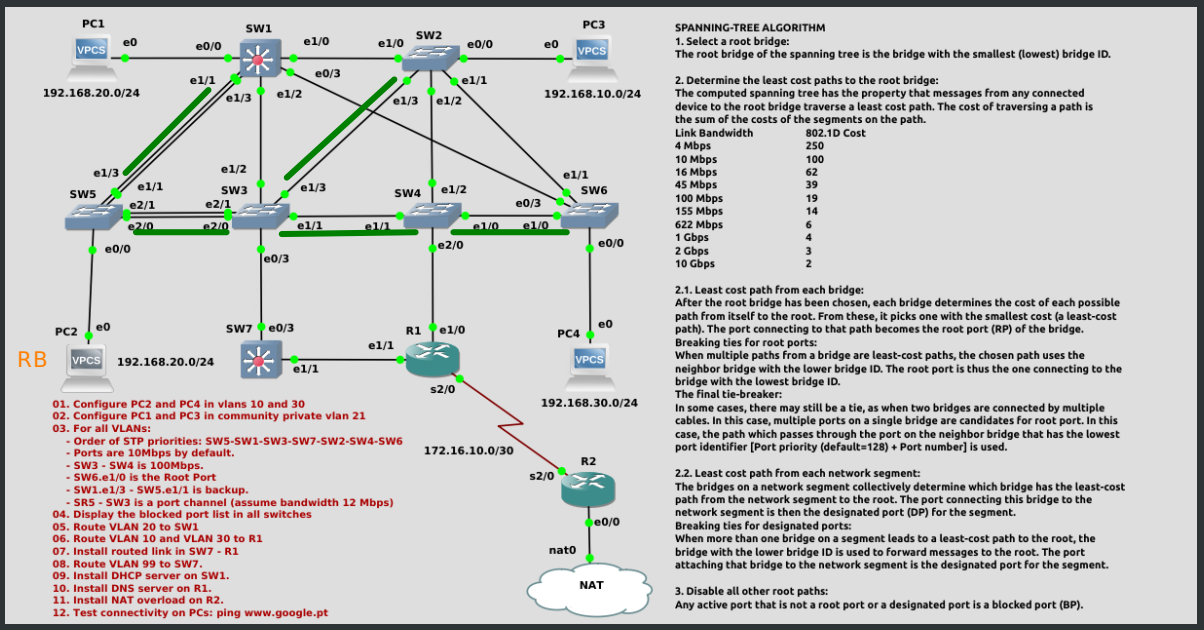
SW5 -> RB
RP (Root Port)
DP (Designated Port)
BP (Blocked Port)

A spanning Tree é então a junção dos pontos todos excluindo as Blocked Ports



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SW5 -> RB