



Laboratorio STP

Redes II, Tecnicatura en administración de sistemas y Software Libre

1.

```
s1:~# brctl stp br0 on
s1:~# ifconfig br0 up
s1:~# tcpdump -s 0 -w /hostlab/stp.cap
tcpdump: WARNING: eth0: no IPv4 address assigned
tcpdump: listening on eth0, link-type EN10MB (Ethernet), capture size 65535 bytes
```

2.

```
s9:~# brctl stp br0 on
s9:~# ifconfig br0 up
s9:~#
```

```
s2:~# brctl stp br0 on
s2:~# ifconfig br0 up
s2:~#
```

```
s7:~# brctl stp br0 on
s7:~# ifconfig br0 up
s7:~#
```

```
s10:~# brctl stp br0 on
s10:~# ifconfig br0 up
s10:~#
```

3.

```
s1:~# brctl showstp br0
br0
bridge id      8000.000000000000a
designated root 8000.0000000000001
root port      2                path cost      100
max age        20.00          bridge max age 20.00
hello time     2.00           bridge hello time 2.00
forward delay  15.00          bridge forward delay 15.00
ageing time    300.00
hello timer    0.00           tcn timer      0.00
topology change timer 0.00      gc timer       44.42
flags

eth0 (1)
port id      8001          state          forwarding
```



```
designated root      8000.0000000000001  path cost          100
designated bridge    8000.000000000000a  message age timer  0.00
designated port      8001             forward delay timer 0.00
designated cost      100             hold timer         0.00
flags

eth1 (2)
port id             8002             state              forwarding
designated root      8000.0000000000001  path cost          100
designated bridge    8000.0000000000001  message age timer  18.13
designated port      8001             forward delay timer 0.00
designated cost      0               hold timer         0.00
flags

eth2 (3)
port id             8003             state              forwarding
designated root      8000.0000000000001  path cost          100
designated bridge    8000.000000000000a  message age timer  0.00
designated port      8003             forward delay timer 0.00
designated cost      100             hold timer         0.00
flags

s1:~#
```

```
s9:~# brctl showstp br0
br0
bridge id           8000.0000000000001
designated root      8000.0000000000001
root port           0               path cost          0
max age             20.00           bridge max age     20.00
hello time          2.00            bridge hello time  2.00
forward delay       15.00           bridge forward delay 15.00
ageing time         300.00
hello timer         1.09            tcn timer          0.00
topology change timer 0.00          gc timer           3.09
flags

eth0 (1)
port id             8001             state              forwarding
designated root      8000.0000000000001  path cost          100
designated bridge    8000.0000000000001  message age timer  0.00
designated port      8001             forward delay timer 0.00
designated cost      0               hold timer         0.09
flags

eth1 (2)
port id             8002             state              forwarding
designated root      8000.0000000000001  path cost          100
designated bridge    8000.0000000000001  message age timer  0.00
designated port      8002             forward delay timer 0.00
```



designated cost	0	hold timer	0.09
flags			
s9:~#			
s7:~# brctl showstp br0			
br0			
bridge id	8000.000000000003		
designated root	8000.000000000001		
root port	1	path cost	200
max age	20.00	bridge max age	20.00
hello time	2.00	bridge hello time	2.00
forward delay	15.00	bridge forward delay	15.00
ageing time	300.00		
hello timer	0.00	tcn timer	0.00
topology change timer	0.00	gc timer	15.72
flags			
eth0 (1)			
port id	8001	state	forwarding
designated root	8000.000000000001	path cost	100
designated bridge	8000.00000000000a	message age timer	18.41
designated port	8001	forward delay timer	0.00
designated cost	100	hold timer	0.00
flags			
eth1 (2)			
port id	8002	state	forwarding
designated root	8000.000000000001	path cost	100
designated bridge	8000.000000000003	message age timer	0.00
designated port	8002	forward delay timer	0.00
designated cost	200	hold timer	0.00
flags			
s7:~#			
s2:~# brctl showstp br0			
br0			
bridge id	8000.000000000008		
designated root	8000.000000000001		
root port	1	path cost	100
max age	20.00	bridge max age	20.00
hello time	2.00	bridge hello time	2.00
forward delay	15.00	bridge forward delay	15.00
ageing time	300.00		
hello timer	0.00	tcn timer	0.00
topology change timer	0.00	gc timer	5.15
flags			



```
eth0 (1)
port id      8001          state      forwarding
designated root      8000.0000000000001  path cost      100
designated bridge     8000.0000000000001  message age timer  19.49
designated port      8002          forward delay timer  0.00
designated cost      0          hold timer      0.00
flags
```

```
eth1 (2)
port id      8002          state      forwarding
designated root      8000.0000000000001  path cost      100
designated bridge     8000.0000000000008  message age timer  0.00
designated port      8002          forward delay timer  0.00
designated cost      100          hold timer      1.15
flags
```

s2::~#

s10::~# brctl showstp br0

```
br0
bridge id      8000.0000000000005
designated root      8000.0000000000001
root port      1          path cost      200
max age      20.00          bridge max age      20.00
hello time      2.00          bridge hello time      2.00
forward delay      15.00          bridge forward delay      15.00
ageing time      300.00
hello timer      0.00          tcn timer      0.00
topology change timer  0.00          gc timer      9.33
flags
```

```
eth0 (1)
port id      8001          state      forwarding
designated root      8000.0000000000001  path cost      100
designated bridge     8000.0000000000008  message age timer  18.07
designated port      8002          forward delay timer  0.00
designated cost      100          hold timer      0.00
flags
```

```
eth1 (2)
port id      8002          state      blocking
designated root      8000.0000000000001  path cost      100
designated bridge     8000.000000000000a  message age timer  18.07
designated port      8003          forward delay timer  0.00
designated cost      100          hold timer      0.00
flags
```

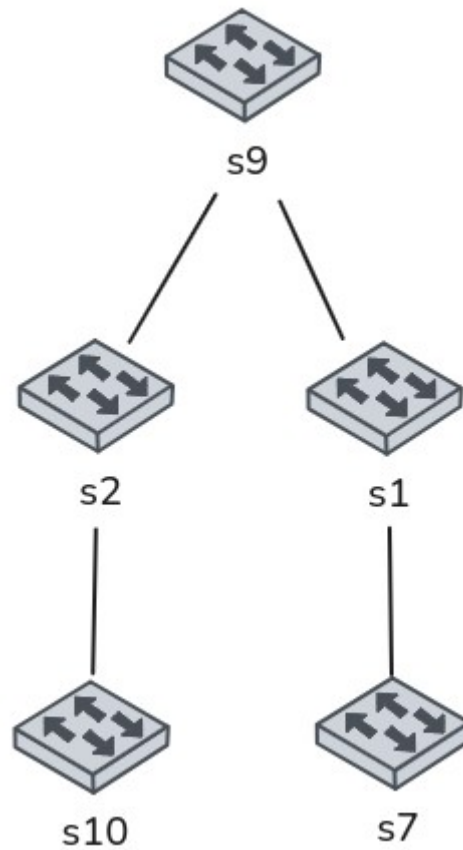
```
eth2 (3)
port id      8003          state      blocking
designated root      8000.0000000000001  path cost      100
```



designated bridge	8000.000000000003	message age timer	18.06
designated port	8002	forward delay timer	0.00
designated cost	200	hold timer	0.00
flags			

s10::~#

El árbol resultado sería algo como





4.

Archivo Edición Visualización Jr Captura Analizar Estadísticas Telefonía Wireless Herramientas Ayuda

Aplicar un filtro de visualización ... <Ctrl+>

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
2	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. TC = Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
3	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. TC = Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
4	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. TC = Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
5	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. TC = Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
6	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. TC = Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
7	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. TC = Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
8	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. TC = Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
9	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. TC = Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
10	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. TC = Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
11	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. TC = Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
12	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. TC = Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
13	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. TC = Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
14	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. TC = Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
15	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. TC = Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
16	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. TC = Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
17	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. TC = Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
18	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. TC = Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
19	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. TC = Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
20	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
21	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
22	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. Root = 32768/0/00:00:00:00:00:0a Cost = 0 Port = 0x8001
23	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. Root = 32768/0/00:00:00:00:00:0a Cost = 100 Port = 0x8001
24	0.000000	00:00:00:00:00:0a	Spanning-tree (for-bridges).00	STP	52	Conf. Root = 32768/0/00:00:00:00:00:0a Cost = 100 Port = 0x8001

Frame 1: 52 bytes on wire (416 bits), 52 bytes captured (416 bits)

- IEEE 802.3 Ethernet
- Logical-Link Control
- Spanning Tree Protocol

0000 01 80 c2 00 00 00 00 00 00 00 0a 00 26 42 42&BB

0010 03 00 00 00 00 00 80 00 00 00 00 00 0a 00 00&BB

0020 00 00 80 00 00 00 00 00 00 0a 80 01 00 00 14 00&BB

0030 02 00 0f 00&BB

stp.cap Paquetes: 87 - Mostrado: 87 (100.0%) Perfil: Default

Frame 1: 52 bytes on wire (416 bits), 52 bytes captured (416 bits)

- IEEE 802.3 Ethernet
- Logical-Link Control
- Spanning Tree Protocol

Protocol Identifier: Spanning Tree Protocol (0x0000)
Protocol Version Identifier: Spanning Tree (0)
BPDU Type: Configuration (0x00)

- BPDU flags: 0x00
- Root Identifier: 32768 / 0 / 00:00:00:00:00:0a
Root Path Cost: 0
- Bridge Identifier: 32768 / 0 / 00:00:00:00:00:0a
Port identifier: 0x8001
Message Age: 0
Max Age: 20
Hello Time: 2
Forward Delay: 15

0000 01 80 c2 00 00 00 00 00 00 00 0a 00 26 42 42&BB

0010 03 00 00 00 00 00 80 00 00 00 00 00 0a 00 00&BB

0020 00 00 80 00 00 00 00 00 00 0a 80 01 00 00 14 00&BB

0030 02 00 0f 00&BB

Estos son los BPUDs que se intercaban por esa interfaz. Intercambia informacion para mantener la topologia de la red. Envian informacion sobre:

- Informacion sobre el root (prioridad+mac) y costo acumulado desde el root.
- Informacion sobre el bridge que envia el BPDU (prioridad + mac)

Como se envian constanmente esta informacion, podemos hacer cambios en los switches como dar de baja interfaces, el arbol se volvera a reorganizar (salvo que para un switch se den de baja todas las interfaces conectadas en a la red).



5.

```
s2:~# ifconfig eh0 down
```

6.

```
s1:~# brctl showstp br0
br0
bridge id      8000.000000000000a
designated root 8000.0000000000001
root port      2          path cost      100
max age        20.00      bridge max age 20.00
hello time     2.00       bridge hello time 2.00
forward delay  15.00      bridge forward delay 15.00
ageing time    300.00
hello timer    0.00       tcn timer      0.00
topology change timer 0.00      gc timer       5.60
flags

eth0 (1)
port id        8001      state      forwarding
designated root 8000.0000000000001 path cost 100
designated bridge 8000.000000000000a message age timer 0.00
designated port 8001      forward delay timer 0.00
designated cost 100       hold timer 0.00
flags

eth1 (2)
port id        8002      state      forwarding
designated root 8000.0000000000001 path cost 100
designated bridge 8000.0000000000001 message age timer 18.29
designated port 8001      forward delay timer 0.00
designated cost 0         hold timer 0.00
flags

eth2 (3)
port id        8003      state      forwarding
designated root 8000.0000000000001 path cost 100
designated bridge 8000.000000000000a message age timer 0.00
designated port 8003      forward delay timer 0.00
designated cost 100       hold timer 0.00
flags

s1:~#

s9:~# brctl showstp br0
br0
bridge id      8000.0000000000001
designated root 8000.0000000000001
root port      0          path cost      0
```



```
max age          20.00          bridge max age      20.00
hello time        2.00           bridge hello time    2.00
forward delay     15.00          bridge forward delay 15.00
ageing time       300.00
hello timer       1.92           tcn timer            0.00
topology change timer 0.00      gc timer             12.92
flags

eth0 (1)
port id          8001           state                forwarding
designated root   8000.000000000001 path cost            100
designated bridge 8000.000000000001 message age timer    0.00
designated port   8001           forward delay timer  0.00
designated cost   0             hold timer           0.92
flags

eth1 (2)
port id          8002           state                forwarding
designated root   8000.000000000001 path cost            100
designated bridge 8000.000000000001 message age timer    0.00
designated port   8002           forward delay timer  0.00
designated cost   0             hold timer           0.92
flags

s9:~#

s7:~# brctl showstp br0
br0
bridge id        8000.000000000003
designated root   8000.000000000001
root port        1             path cost            200
max age          20.00          bridge max age      20.00
hello time        2.00           bridge hello time    2.00
forward delay     15.00          bridge forward delay 15.00
ageing time       300.00
hello timer       0.00           tcn timer            0.00
topology change timer 0.00      gc timer             9.30
flags

eth0 (1)
port id          8001           state                forwarding
designated root   8000.000000000001 path cost            100
designated bridge 8000.00000000000a message age timer    19.99
designated port   8001           forward delay timer  0.00
designated cost   100           hold timer           0.00
flags

eth1 (2)
port id          8002           state                forwarding
```




```
designated root      8000.0000000000001    path cost          100
designated bridge    8000.0000000000003    message age timer   0.00
designated port      8002                forward delay timer  0.00
designated cost      200                hold timer          1.30
flags
```

s7::~#

s2::~# brctl showstp br0

br0

```
bridge id          8000.0000000000008
designated root     8000.0000000000001
root port          2                path cost           300
max age            20.00            bridge max age      20.00
hello time         2.00            bridge hello time   2.00
forward delay      15.00            bridge forward delay 15.00
ageing time        300.00
hello timer        0.00            tcn timer           0.00
topology change timer 0.00        gc timer            4.93
flags
```

eth0 (1)

```
port id            8001                state              disabled
designated root     8000.0000000000001    path cost          100
designated bridge    8000.0000000000008    message age timer   0.00
designated port      8001                forward delay timer  0.00
designated cost      100                hold timer          0.00
flags
```

eth1 (2)

```
port id            8002                state              forwarding
designated root     8000.0000000000001    path cost          100
designated bridge    8000.0000000000005    message age timer   19.23
designated port      8001                forward delay timer  0.00
designated cost      200                hold timer          0.00
flags
```

s2::~#

s2::~# brctl showstp br0

br0

```
bridge id          8000.0000000000008
designated root     8000.0000000000001
root port          2                path cost           300
max age            20.00            bridge max age      20.00
hello time         2.00            bridge hello time   2.00
forward delay      15.00            bridge forward delay 15.00
ageing time        300.00
hello timer        0.00            tcn timer           0.00
topology change timer 0.00        gc timer            4.93
flags
```



```
eth0 (1)
port id      8001      state      disabled
designated root 8000.000000000001 path cost      100
designated bridge 8000.0000000000008 message age timer 0.00
designated port 8001      forward delay timer 0.00
designated cost 100      hold timer      0.00
flags
```

```
eth1 (2)
port id      8002      state      forwarding
designated root 8000.000000000001 path cost      100
designated bridge 8000.0000000000005 message age timer 19.23
designated port 8001      forward delay timer 0.00
designated cost 200      hold timer      0.00
flags
```

s2::~#

s10::~# brctl showstp br0

br0

```
bridge id      8000.0000000000005
designated root 8000.000000000001
root port      2      path cost      200
max age        20.00      bridge max age      20.00
hello time     2.00      bridge hello time   2.00
forward delay  15.00      bridge forward delay 15.00
ageing time    300.00
hello timer    0.00      tcn timer           0.00
topology change timer 0.00      gc timer            8.38
flags
```

```
eth0 (1)
port id      8001      state      forwarding
designated root 8000.000000000001 path cost      100
designated bridge 8000.0000000000005 message age timer 0.00
designated port 8001      forward delay timer 0.00
designated cost 200      hold timer      0.38
flags
```

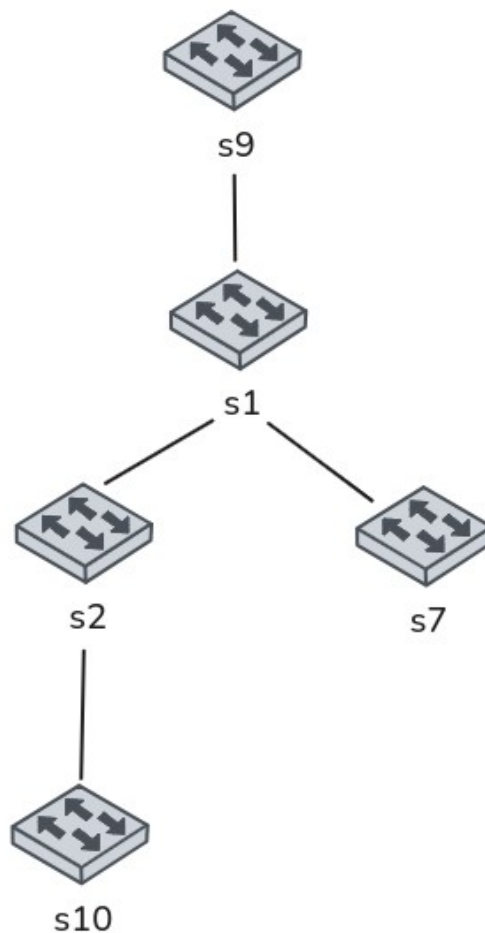
```
eth1 (2)
port id      8002      state      forwarding
designated root 8000.000000000001 path cost      100
designated bridge 8000.000000000000a message age timer 19.12
designated port 8003      forward delay timer 0.00
designated cost 100      hold timer      0.00
flags
```

eth2 (3)



```
port id      8003      state      blocking
designated root 8000.000000000001 path cost 100
designated bridge 8000.000000000003 message age timer 19.11
designated port 8002      forward delay timer 0.00
designated cost 200      hold timer 0.00
flags

s10:~#
```



7.

```
s2:~# ifconfig eth0 up eth0
```

8. Como el switch con BID (prioridad + MAC) más baja es elegido raíz, y la prioridad es configurada por el fabricante o viene por defecto, podemos modificar la prioridad del switch que queremos que sea raíz de la topología.

```
s1:~# brctl setbridgeprio br0 1000
s1:~#
```

Quedaría algo como

```
s1:~# brctl showstp br0
```



```
br0
bridge id      03e8.00000000000a
designated root 03e8.00000000000a
root port      0          path cost      0
max age        20.00      bridge max age 20.00
hello time     2.00       bridge hello time 2.00
forward delay  15.00      bridge forward delay 15.00
ageing time    300.00
hello timer    1.77       tcn timer      0.00
topology change timer 32.94 gc timer      13.77
flags          TOPOLOGY_CHANGE TOPOLOGY_CHANGE_DETECTED
```

```
eth0 (1)
port id      8001          state      forwarding
designated root 03e8.00000000000a path cost 100
designated bridge 03e8.00000000000a message age timer 0.00
designated port 8001       forward delay timer 0.00
designated cost 0          hold timer    0.77
flags
```

```
eth1 (2)
port id      8002          state      forwarding
designated root 03e8.00000000000a path cost 100
designated bridge 03e8.00000000000a message age timer 0.00
designated port 8002       forward delay timer 0.00
designated cost 0          hold timer    0.77
flags
```

```
eth2 (3)
port id      8003          state      forwarding
designated root 03e8.00000000000a path cost 100
designated bridge 03e8.00000000000a message age timer 0.00
designated port 8003       forward delay timer 0.00
designated cost 0          hold timer    0.77
flags
```

s1:~#

s2:~# brctl showstp br0

```
br0
bridge id      8000.000000000008
designated root 03e8.00000000000a
root port      1          path cost      200
max age        20.00      bridge max age 20.00
hello time     2.00       bridge hello time 2.00
forward delay  15.00      bridge forward delay 15.00
ageing time    300.00
hello timer    0.00       tcn timer      0.00
topology change timer 0.00 gc timer      1.62
flags
```



```
eth0 (1)
port id      8001          state      forwarding
designated root 03e8.000000000000a path cost      100
designated bridge 8000.0000000000001 message age timer 19.71
designated port 8002          forward delay timer 0.00
designated cost 100          hold timer      0.00
flags
```

```
eth1 (2)
port id      8002          state      blocking
designated root 03e8.000000000000a path cost      100
designated bridge 8000.0000000000005 message age timer 19.71
designated port 8001          forward delay timer 0.00
designated cost 100          hold timer      0.00
flags
```

s2::~#

s9::~# brctl showstp br0

br0

```
bridge id      8000.0000000000001
designated root 03e8.000000000000a
root port      1          path cost      100
max age        20.00      bridge max age 20.00
hello time     2.00       bridge hello time 2.00
forward delay  15.00      bridge forward delay 15.00
ageing time    300.00
hello timer    0.00       tcn timer      0.00
topology change timer 0.00      gc timer      10.99
flags
```

```
eth0 (1)
port id      8001          state      forwarding
designated root 03e8.000000000000a path cost      100
designated bridge 03e8.000000000000a message age timer 19.27
designated port 8002          forward delay timer 0.00
designated cost 0          hold timer      0.00
flags
```

```
eth1 (2)
port id      8002          state      forwarding
designated root 03e8.000000000000a path cost      100
designated bridge 8000.0000000000001 message age timer 0.00
designated port 8002          forward delay timer 0.00
designated cost 100          hold timer      0.99
flags
```

s9::~#



s10:~# brctl showstp br0

br0

bridge id	8000.000000000005		
designated root	03e8.00000000000a		
root port	2	path cost	100
max age	20.00	bridge max age	20.00
hello time	2.00	bridge hello time	2.00
forward delay	15.00	bridge forward delay	15.00
ageing time	300.00		
hello timer	0.00	tcn timer	0.00
topology change timer	0.00	gc timer	14.27

flags

eth0 (1)

port id	8001	state	forwarding	
designated root	03e8.00000000000a		path cost	100
designated bridge	8000.000000000005		message age timer	0.00
designated port	8001		forward delay timer	0.00
designated cost	100		hold timer	0.00

flags

eth1 (2)

port id	8002	state	forwarding	
designated root	03e8.00000000000a		path cost	100
designated bridge	03e8.00000000000a		message age timer	18.36
designated port	8003		forward delay timer	0.00
designated cost	0		hold timer	0.00

flags

eth2 (3)

port id	8003	state	blocking	
designated root	03e8.00000000000a		path cost	100
designated bridge	8000.000000000003		message age timer	18.35
designated port	8002		forward delay timer	0.00
designated cost	100		hold timer	0.00

flags

s10:~#

s7:~# brctl showstp br0

br0

bridge id	8000.000000000003		
designated root	03e8.00000000000a		
root port	1	path cost	100
max age	20.00	bridge max age	20.00
hello time	2.00	bridge hello time	2.00
forward delay	15.00	bridge forward delay	15.00
ageing time	300.00		
hello timer	0.00	tcn timer	0.00
topology change timer	0.00	gc timer	4.72



flags

eth0 (1)

port id	8001	state	forwarding	
designated root	03e8.00000000000a		path cost	100
designated bridge	03e8.00000000000a		message age timer	19.34
designated port	8001	forward delay timer	0.00	
designated cost	0	hold timer	0.00	

flags

eth1 (2)

port id	8002	state	forwarding	
designated root	03e8.00000000000a		path cost	100
designated bridge	8000.000000000003		message age timer	0.00
designated port	8002	forward delay timer	0.00	
designated cost	100	hold timer	0.72	

flags

s7::~#

