

VISVESVARAYA TECHNOLOGICAL UNIVERSITY
“JNANA SANGAMA”, BELAGAVI-590018.



2020 – 2021
 INTERNSHIP REPORT
 On

“DYNAMIC HOST CONFIGURATION PROTOCOL”

Submitted in partial fulfillment for the award of the degree of

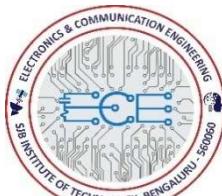
BACHELOR OF ENGINEERING
 in

ELECTRONICS & COMMUNICATION ENGINEERING

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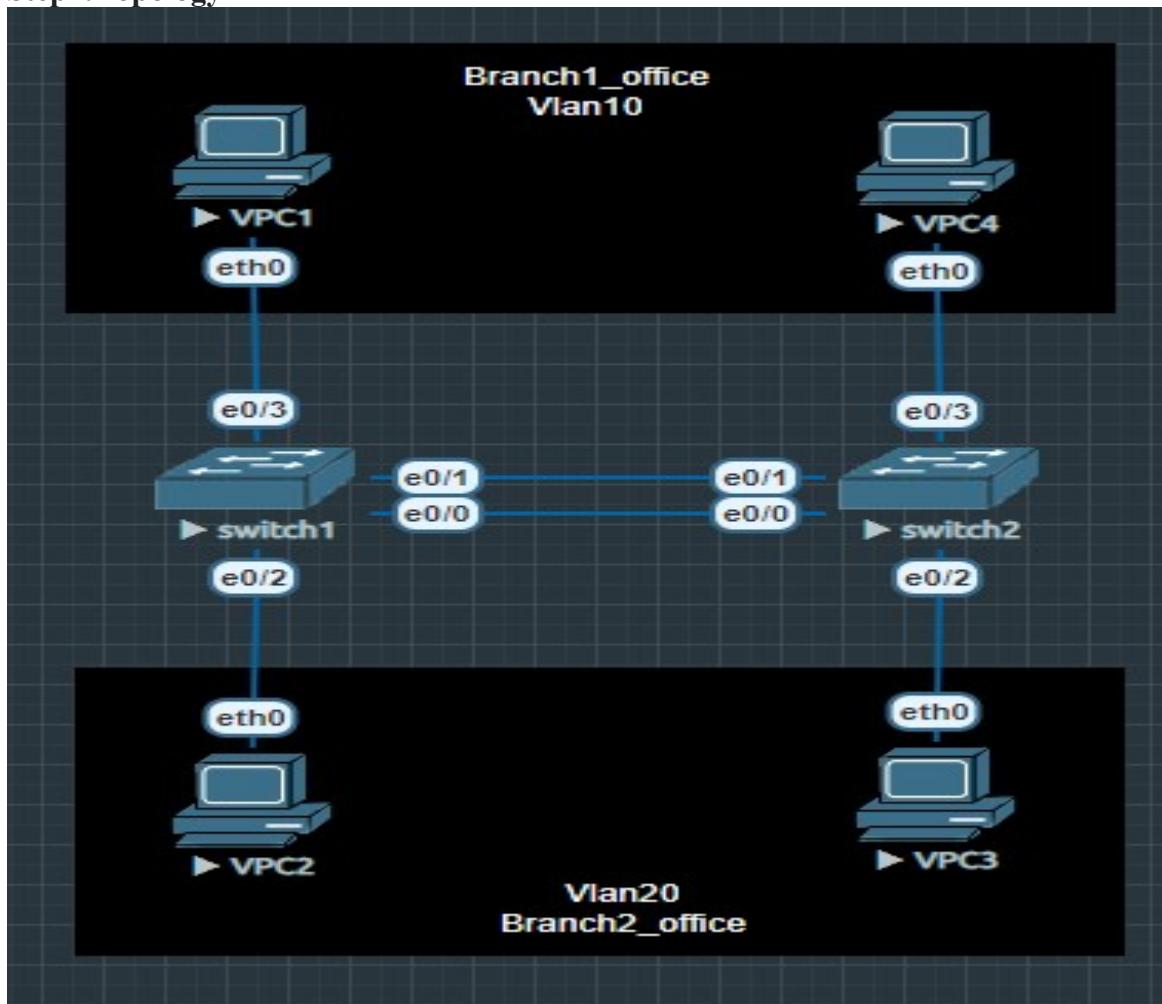
CONFIGURING AND VERIFYING STP COST CHANGE AND LOAD BALANCING.

Scenario: We have branch-1 office with 2 VPCs connected to a Branch1_switch on different vlans [10, 20], similarly on branch-2 office with 2 VPCs connected to a Branch2_switch on different vlans [10, 20]. Both Branch1_switch and Branch2_switch are connected to each other with 2 uplinks.

Tasks.

- 1) Determine and assign IP address, hostname to all the devices.
- 2) Document blocked port on the switch due to STP.
- 3) Establish loadbalancing between the switch using STP cost.
- 4) Verify and document the trunk link used by each vlan.

Step1: Topology



Step2: IP Address table

| SL NO | Device Name | IP ADDRESS |
|-------|-------------|------------------------|
| 1 | VPC1 | 10.1.1.1 255.255.255.0 |
| 2 | VPC2 | 10.1.1.2 255.255.255.0 |
| 3 | VPC3 | 10.1.1.3 255.255.255.0 |
| 4 | VPC4 | 10.1.1.4 255.255.255.0 |

Step3: Configuration commands

- 1) Assigning IP address to VPCs
 - a) Assigning ip address on VPC1.
#ip 10.1.1.1 255.255.255.0
 - b) Assigning ip address on VPC2.
#ip 10.1.1.2 255.255.255.0
 - c) Assigning ip address on VPC3.
#ip 10.1.1.3 255.255.255.0
 - d) Assigning ip address on VPC4.
#ip 10.1.1.4 255.255.255.0

- 2) Create Vlan and assign interface to vlans on Branch1_switch.

- a) Creating VLAN 10 on Branch1_switch

```
#configure terminal
#vlan 10
#name branch1_vlan10
```
- b) Creating VLAN 20 on Branch1_switch

```
#configure terminal
#vlan 20
#name branch1_vlan 20
```
- c) Assigning interface on Vlan 10

```
#interface e0/3
#switchport access vlan 10
```
- d) Assigning interface on Vlan 20

```
#interface e0/2
#switchport access vlan 20
```

- 3) Create Vlan and assign interface to vlans on Branch2_switch.

- e) Creating VLAN 10 on Branch2_switch

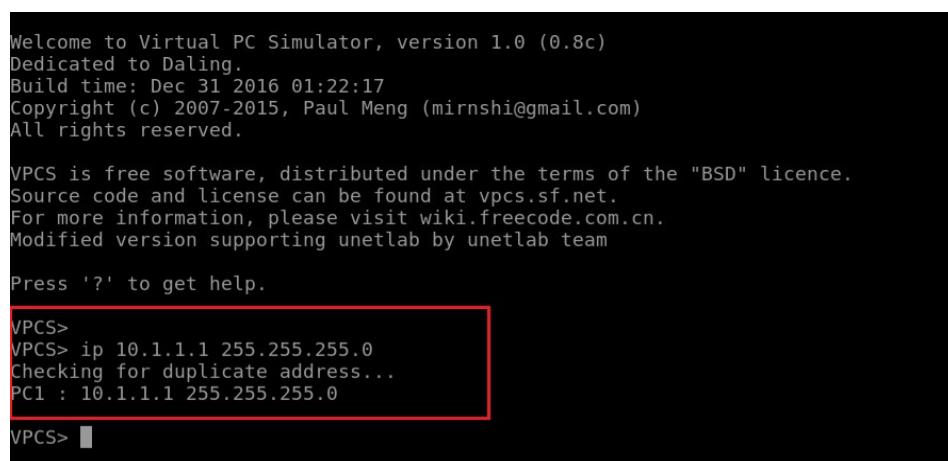
```

#configure terminal
#vlan 10
#name branch2_vlan10
f) Creating VLAN 20 on Branch2_switch
#configure terminal
#vlan 20
#name branch2_vlan 20
g) Assigning interface on Vlan 10
#interface e0/3
#switchport access vlan 10
h) Assigning interface on Vlan 20
#interface e0/2
#switchport access vlan 20
4) Create Trunk link between switch
a) Create a trunk port on Branch1_switch
#interface e0/0
#switchport trunk encapsulation dot1q
#switchport mode trunk
b) Create a trunk port on Branch1_switch
#interface e0/1
#switchport trunk encapsulation dot1q
#switchport mode trunk

```

Step4: Documenting configuration

- 1) Assigning IP address to VPCS
 - a) **Assigning ip address on VPC**



The screenshot shows the VPCS terminal window with the following text:

```

Welcome to Virtual PC Simulator, version 1.0 (0.8c)
Dedicated to Daling.
Build time: Dec 31 2016 01:22:17
Copyright (c) 2007-2015, Paul Meng (mirnshi@gmail.com)
All rights reserved.

VPCS is free software, distributed under the terms of the "BSD" licence.
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.
Modified version supporting unetlab by unetlab team

Press '?' to get help.

VPCS> ip 10.1.1.1 255.255.255.0
Checking for duplicate address...
PC1 : 10.1.1.1 255.255.255.0
VPCS> 

```

A red rectangular box highlights the command `ip 10.1.1.1 255.255.255.0` and its output.

b) Assigning ip address on VPC2.

```
Welcome to Virtual PC Simulator, version 1.0 (0.8c)
Dedicated to Daling.
Build time: Dec 31 2016 01:22:17
Copyright (c) 2007-2015, Paul Meng (mirnshi@gmail.com)
All rights reserved.

VPCS is free software, distributed under the terms of the "BSD" licence.
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.
Modified version supporting unetlab by unetlab team

Press '?' to get help.

VPCS>
VPCS> ip 10.1.1.2 255.255.255.0
Checking for duplicate address...
PC1 : 10.1.1.2 255.255.255.0

VPCS> █
```

c) Assigning ip address on VPC3

```
Welcome to Virtual PC Simulator, version 1.0 (0.8c)
Dedicated to Daling.
Build time: Dec 31 2016 01:22:17
Copyright (c) 2007-2015, Paul Meng (mirnshi@gmail.com)
All rights reserved.

VPCS is free software, distributed under the terms of the "BSD" licence.
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.
Modified version supporting unetlab by unetlab team

Press '?' to get help.

VPCS>
VPCS> ip 10.1.1.3 255.255.255.0
Checking for duplicate address...
PC1 : 10.1.1.3 255.255.255.0

VPCS> █
```

d) Assigning ip address on VPC4

```
Welcome to Virtual PC Simulator, version 1.0 (0.8c)
Dedicated to Daling.
Build time: Dec 31 2016 01:22:17
Copyright (c) 2007-2015, Paul Meng (mirnshi@gmail.com)
All rights reserved.

VPCS is free software, distributed under the terms of the "BSD" licence.
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.
Modified version supporting unetlab by unetlab team

Press '?' to get help.

VPCS>
VPCS> ip 10.1.1.4 255.255.255.0
Checking for duplicate address...
PC1 : 10.1.1.4 255.255.255.0

VPCS> █
```

2. Create Vlan and assign interface to vlans on Branch1_switch.**a) Creating VLAN 10 on Branch1_switch**

```
Switch#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
Switch(config)#vlan 10  
Switch(config-vlan)#name branch1_vlan10  
Switch(config-vlan)#exit  
Switch(config)#  
Switch(config)#
```

b) Creating VLAN 20 on Branch1_switch

```
Switch>  
Switch>  
Switch>  
Switch>  
Switch>en  
Switch#conf t  
Enter configuration commands, one per line. End with CNTL/Z.  
Switch(config)#vlan 20  
Switch(config-vlan)#name branch1_vlan20  
Switch(config-vlan)#  
Switch(config-vlan)#end  
Switch#  
*Apr 14 07:12:26.664: %SYS-5-CONFIG_I: Configured from console by console  
Switch#
```

3. Assigning interface on Vlan 10 and Vlan 20

```
Switch(config)#interface e0/3  
Switch(config-if)#swi  
Switch(config-if)#switchport acc  
Switch(config-if)#switchport access vlan 10  
Switch(config-if)#exit  
Switch(config)#interface e0/2  
Switch(config-if)#sw  
Switch(config-if)#switchport acc  
Switch(config-if)#switchport access vlan 20
```

4. Create Trunk link between switch**a) Create a trunk port on Branch1_switch**

```
Switch#configure terminal
*Apr 23 12:42:19.439: %SYS-5-CONFIG_I: Configured from console by console
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#inter e0/0
Switch(config-if)#sw
Switch(config-if)#switchport tr
Switch(config-if)#switchport trunk enc
Switch(config-if)#switchport trunk encapsulation dot
Switch(config-if)#switchport trunk encapsulation dot1q
Switch(config-if)#swi
Switch(config-if)#switchport mode tr
Switch(config-if)#switchport mode trunk
Switch(config-if)#exit
Switch(config)#inter e0/1
Switch(config-if)#switchport trunk encapsulation dot1q
Switch(config-if)#switchport mode trunk
Switch(config-if)#
Switch(config-if)#
Switch(config-if)#
Switch(config-if)#[
```

b) Create a trunk port on Branch2_switch

```
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#inter e0/0
Switch(config-if)#sw
Switch(config-if)#switchport en
Switch(config-if)#switchport tr
Switch(config-if)#switchport trunk enc
Switch(config-if)#switchport trunk encapsulation dot
Switch(config-if)#switchport trunk encapsulation dot1q
Switch(config-if)#sw
Switch(config-if)#switchport mode tr
Switch(config-if)#switchport mode trunk
Switch(config-if)#
Switch(config-if)#
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#inter e0/1
Switch(config-if)#switchport trunk encapsulation dot1q
Switch(config-if)#switchport mode trunk
Switch(config-if)#
Switch(config-if)#
Switch(config-if)#
Switch(config-if)#[
```

Step 5: Verify Connectivity between branch-1 and branch-2

a) Ping between PC1 to PC4

```
Press '?' to get help.

VPCS>
VPCS> ip 10.1.1.1 255.255.255.0
Checking for duplicate address...
PC1 : 10.1.1.1 255.255.255.0

VPCS> ping 10.1.1.4

84 bytes from 10.1.1.4 icmp_seq=1 ttl=64 time=5.199 ms
84 bytes from 10.1.1.4 icmp_seq=2 ttl=64 time=4.105 ms
84 bytes from 10.1.1.4 icmp_seq=3 ttl=64 time=2.997 ms
84 bytes from 10.1.1.4 icmp_seq=4 ttl=64 time=3.147 ms
84 bytes from 10.1.1.4 icmp_seq=5 ttl=64 time=4.962 ms

VPCS> █
```

b) Ping between PC2 to PC3

```
Press '?' to get help.

VPCS>
VPCS> ip 10.1.1.2 255.255.255.0
Checking for duplicate address...
PC1 : 10.1.1.2 255.255.255.0

VPCS> ping 10.1.1.3

84 bytes from 10.1.1.3 icmp_seq=1 ttl=64 time=4.334 ms
84 bytes from 10.1.1.3 icmp_seq=2 ttl=64 time=6.266 ms
84 bytes from 10.1.1.3 icmp_seq=3 ttl=64 time=3.497 ms
84 bytes from 10.1.1.3 icmp_seq=4 ttl=64 time=4.837 ms
84 bytes from 10.1.1.3 icmp_seq=5 ttl=64 time=6.800 ms

VPCS> █
```

Step 6: Showvlan on Branch1_switch and Branch2_switch**a) Branch1_switch**

```
Switch#show vlan

VLAN Name Status Ports
----- -----
1 default active
10 branch1_vlan10 active Et0/3
20 branch2_vlan20 active Et0/2
1002 fddi-default act/unsup
1003 token-ring-default act/unsup
1004 fddinet-default act/unsup
1005 trnet-default act/unsup

VLAN Type SAID MTU Parent RingNo BridgeNo Stp BrdgMode Trans1 Trans2
----- -----
1 enet 100001 1500 - - - - - 0 0
10 enet 100010 1500 - - - - - 0 0
20 enet 100020 1500 - - - - - 0 0
1002 fddi 101002 1500 - - - - - 0 0
1003 tr 101003 1500 - - - - - 0 0
1004 fdnet 101004 1500 - - - - ieee - 0 0
1005 trnet 101005 1500 - - - - ibm - 0 0

Primary Secondary Type Ports
----- ----- -----
```

b) Branch2_switch

```
Switch#show vlan

VLAN Name Status Ports
----- -----
1 default active
10 branch1_vlan10 active Et0/3
20 branch2_vlan20 active Et0/2
1002 fddi-default act/unsup
1003 token-ring-default act/unsup
1004 fddinet-default act/unsup
1005 trnet-default act/unsup

VLAN Type SAID MTU Parent RingNo BridgeNo Stp BrdgMode Trans1 Trans2
----- -----
1 enet 100001 1500 - - - - - 0 0
10 enet 100010 1500 - - - - - 0 0
20 enet 100020 1500 - - - - - 0 0
1002 fddi 101002 1500 - - - - - 0 0
1003 tr 101003 1500 - - - - - 0 0
1004 fdnet 101004 1500 - - - - ieee - 0 0
1005 trnet 101005 1500 - - - - ibm - 0 0

Primary Secondary Type Ports
----- ----- -----
```

Step7: Show interface trunk on both switches**a) Branch1_switch**

```

Switch#
Switch#
Switch#sh
Switch#show int
Switch#show interfaces tr
Switch#show interfaces trunk

Port      Mode          Encapsulation  Status      Native vlan
Et0/0     on           802.1q        trunking    1
Et0/1     on           802.1q        trunking    1

Port      Vlans allowed on trunk
Et0/0    1-4094
Et0/1    1-4094

Port      Vlans allowed and active in management domain
Et0/0    1,10,20
Et0/1    1,10,20

Port      Vlans in spanning tree forwarding state and not pruned
Et0/0    1,10,20
Et0/1    1,10,20
Switch#
Switch#■

```

b)Branch2_switch

```

Switch#sh
Switch#show int
Switch#show interfaces tr
Switch#show interfaces trunk

Port      Mode          Encapsulation  Status      Native vlan
Et0/0     on           802.1q        trunking    1
Et0/1     on           802.1q        trunking    1

Port      Vlans allowed on trunk
Et0/0    1-4094
Et0/1    1-4094

Port      Vlans allowed and active in management domain
Et0/0    1,10,20
Et0/1    1,10,20

Port      Vlans in spanning tree forwarding state and not pruned
Et0/0    1,10,20
Et0/1    none
Switch#

```

Step8: blocking ports**a) Switch1 blocking ports**

```

Switch#
Switch#
Switch#show spanning-tree bloc
Switch#show spanning-tree blockedports

Name           Blocked Interfaces List
-----
Number of blocked ports (segments) in the system : 0

Switch#
```

b) Switch2 blocking ports

```

Switch#show spanning-tree bre
Switch#show spanning-tree blo
Switch#show spanning-tree blockedports

Name           Blocked Interfaces List
-----
VLAN0001      Et0/1
VLAN0010      Et0/1
VLAN0020      Et0/1

Number of blocked ports (segments) in the system : 3
```

Step9: STP**a) Switch1 vlan1 STP**

```

Switch#show spanning-tree

VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    32769
              Address     aabb.cc00.1000
              This bridge is the root
              Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    32769 (priority 32768 sys-id-ext 1)
              Address     aabb.cc00.1000
              Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time   300 sec

Interface      Role Sts Cost      Prio.Nbr Type
-----
Et0/0          Desg FWD 100      128.1    Shr
Et0/1          Desg FWD 100      128.2    Shr
```

b) Switch1 vlan10 STP

```
VLAN0010
  Spanning tree enabled protocol ieee
  Root ID  Priority    32778
            Address     aabb.cc00.1000
            This bridge is the root
            Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID Priority    32778 (priority 32768 sys-id-ext 10)
            Address     aabb.cc00.1000
            Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
            Aging Time   300 sec

  Interface      Role Sts Cost      Prio.Nbr Type
  -----  -----
  Et0/0          Desg FWD 100      128.1    Shr
  Et0/1          Desg FWD 100      128.2    Shr
  Et0/3          Desg FWD 100      128.4    Shr
```

c) Switch1 vlan20 STP

```
VLAN0020
  Spanning tree enabled protocol ieee
  Root ID  Priority    32788
            Address     aabb.cc00.1000
            This bridge is the root
            Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID Priority    32788 (priority 32768 sys-id-ext 20)
            Address     aabb.cc00.1000
            Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
            Aging Time   300 sec

  Interface      Role Sts Cost      Prio.Nbr Type
  -----  -----
  Et0/0          Desg FWD 100      128.1    Shr
  Et0/1          Desg FWD 100      128.2    Shr
  Et0/2          Desg FWD 100      128.3    Shr
```

d) Switch2 vlan1 STP

```
Switch#show spanning-tree

VLAN0001
  Spanning tree enabled protocol ieee
  Root ID  Priority    32769
            Address     aabb.cc00.1000
            This bridge is the root
            Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID Priority    32769 (priority 32768 sys-id-ext 1)
            Address     aabb.cc00.1000
            Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
            Aging Time   300 sec

  Interface      Role Sts Cost      Prio.Nbr Type
  -----  -----
  Et0/0          Desg FWD 100      128.1    Shr
  Et0/1          Desg FWD 100      128.2    Shr
```

e) Switch2 vlan10 STP

```
VLAN0010
  Spanning tree enabled protocol ieee
    Root ID  Priority  32778
              Address   aabb.cc00.1000
              Cost      100
              Port      1 (Ethernet0/0)
              Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec

    Bridge ID Priority  32778  (priority 32768 sys-id-ext 10)
              Address   aabb.cc00.2000
              Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time 300 sec

Interface      Role Sts Cost      Prio.Nbr Type
-----        -----
Et0/0          Root FWD 100      128.1    Shr
Et0/1          Altn BLK 100      128.2    Shr
Et0/3          Desg FWD 100      128.4    Shr
```

f) Switch2 vlan20 STP

```
VLAN0020
  Spanning tree enabled protocol ieee
    Root ID  Priority  32788
              Address   aabb.cc00.1000
              Cost      100
              Port      1 (Ethernet0/0)
              Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec

    Bridge ID Priority  32788  (priority 32768 sys-id-ext 20)
              Address   aabb.cc00.2000
              Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time 300 sec

Interface      Role Sts Cost      Prio.Nbr Type
-----        -----
Et0/0          Root FWD 100      128.1    Shr
Et0/1          Altn BLK 100      128.2    Shr
Et0/2          Desg FWD 100      128.3    Shr
```

g) Current STP status on switch1

```
Switch#show spanning-tree inter e0/1

Vlan      Role Sts Cost      Prio.Nbr Type
-----  -----
VLAN0001  Desg FWD 100      128.2    Shr
VLAN0010  Desg FWD 100      128.2    Shr
VLAN0020  Desg FWD 100      128.2    Shr

Switch#show spanning-tree inter e0/0

Vlan      Role Sts Cost      Prio.Nbr Type
-----  -----
VLAN0001  Desg FWD 100      128.1    Shr
VLAN0010  Desg FWD 100      128.1    Shr
VLAN0020  Desg FWD 100      128.1    Shr
```

h) Current STP status on switch2

```

Switch#show spanning-tree interface e0/1

Vlan          Role Sts Cost      Prio.Nbr Type
-----
VLAN0001      Altn BLK 100    128.2   Shr
VLAN0010      Altn BLK 100    128.2   Shr
VLAN0020      Altn BLK 100    128.2   Shr
Switch#show spanning-tree interface e0/0

Vlan          Role Sts Cost      Prio.Nbr Type
-----
VLAN0001      Root FWD 100    128.1   Shr
VLAN0010      Root FWD 100    128.1   Shr
VLAN0020      Root FWD 100    128.1   Shr
Switch#

```

i) Tuning cost on switch 1

```

Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#inter e0/0
Switch(config-if)#spanning-tree vlan 10 cost 1
Switch(config-if)#end
Switch#

```

j) Result on switch 1

```

Switch#show spanning-tree inter e0/1

Vlan          Role Sts Cost      Prio.Nbr Type
-----
VLAN0001      Desg FWD 100    128.2   Shr
VLAN0010      Desg FWD 100    128.2   Shr
VLAN0020      Desg FWD 100    128.2   Shr
Switch#show spanning-tree inter e0/0

Vlan          Role Sts Cost      Prio.Nbr Type
-----
VLAN0001      Desg FWD 100    128.1   Shr
VLAN0010      Desg FWD 1      128.1   Shr
VLAN0020      Desg FWD 100    128.1   Shr
Switch#

```