

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

Submitted by

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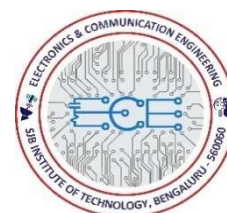
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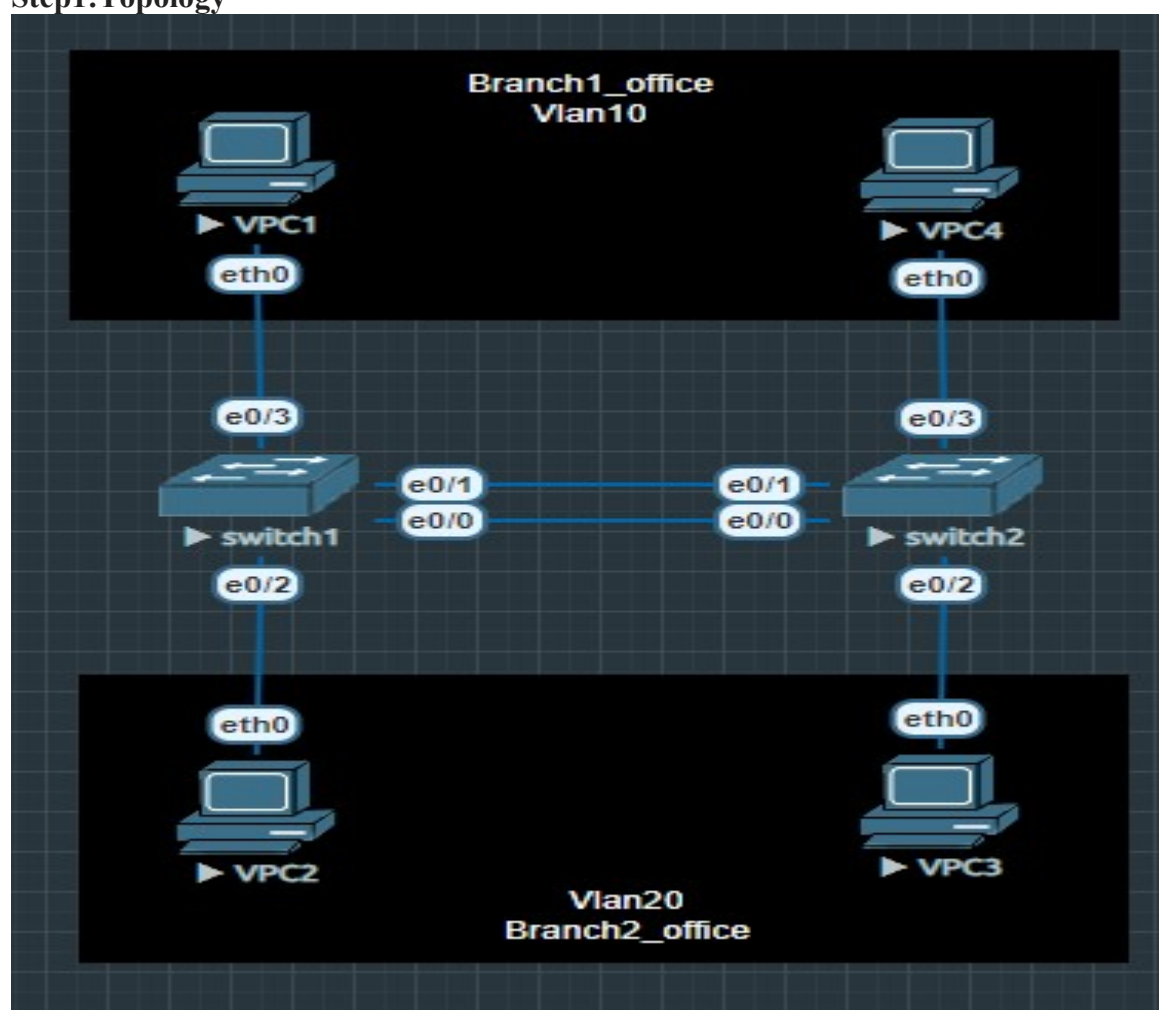
CONFIGURING AND VERIFYING STP COST CHANGE AND LOAD BALANCING.

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

```
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)
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For more information, please visit wiki.freecode.com.cn.
Modified version supporting unetlab by unetlab team

Press '?' to get help.

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

VPCS> █
```

b) Assigning ip address on VPC2.

```
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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

```
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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

```
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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
Switch(config-if)#exit
```

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)#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)#exit
Switch(config)#
```

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

```

```
Switch#
```

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#
```