

# Midterm Report

## VTP

I first created 3 VLANs for Bear, Racoon and Deer on Longmont. I made Longmont the VTP server, Westminster a transparent, Castle Rock, Colorado Springs and Loveland a VTP client.

### Configuration for VTP server (Longmont)

```
vlan 10
  name deers

vlan 20
  name bears

vlan 30
  name racoons

vlan 51
  name group1

vlan 52
  name group2

vtp domain vlan_learn
vtp password roomtoor
vtp version 2
vtp mode server
```

### Configuration for VTP transparent (Westminster)

```
vtp domain vlan_learn
vtp password roomtoor
vtp version 2
vtp mode transparent
```

### Configuration for VTP Clients (Castle Rock, Colorado Springs, Loveland)

```
vtp domain vlan_learn
vtp password roomtoor
vtp version 2
vtp mode client
```

Post this, all the VTP clients got all the VLANs configured that's configured on the VTP server. I also trunked all the Layer 2 links.

## DHCP

I created 3 DHCP pools for each of the animals. For Bears, I created a DHCP pool from Denver, for Raccoons, I created a DHCP pool in Castle rock and Deers in Fort Collins. This is the breakdown of the DHCP Pools that I assigned:

**Bears: 192.15.0.0/22**

**Deers: 198.15.8.0/21**

**Raccoons: 198.15.64.0/18**

### Denver DHCP config (Bears)

```
ip dhcp excluded-address 198.15.0.1 198.15.0.4
ip dhcp pool bears
 network 198.15.0.0 255.255.252.0
 default-router 198.15.0.4
!
```

### Castle Rock DHCP config (Raccoons)

```
ip dhcp excluded-address 198.15.64.1 198.15.64.5
ip dhcp pool racoons
 network 198.15.64.0 255.255.192.0
 default-router 198.15.64.4
!
```

### Fort Collins DHCP config (Deers)

```
ip dhcp excluded-address 198.15.8.1 198.15.8.4
ip dhcp pool deers
 network 198.15.8.0 255.255.248.0
 default-router 198.15.8.4
exit
```

## HSRP

For Bears, I assigned Colorado Springs as the active router, Castle Rock and loveland as the secondary routers.

### Configuration for Bears

#### Colorado Springs

```
---> Bears SVI (Active)
interface Vlan20
 ip address 198.15.0.1 255.255.252.0
 ip helper-address 198.15.16.9
 standby 20 ip 198.15.0.4
 standby 20 priority 120
 standby 20 preempt
!
```

#### Castle Rock

```
---> Bears SVI (Standby 1)
interface Vlan20
 ip address 198.15.0.2 255.255.252.0
 ip helper-address 198.15.16.9
 standby 20 ip 198.15.0.4
 standby 20 priority 110
 standby 20 preempt
```

#### Loveland

```
---> Bears SVI
interface Vlan20
 ip address 198.15.0.3 255.255.252.0
 ip helper-address 198.15.16.9
 standby 20 ip 198.15.0.4
 standby 20 priority 100
 standby 20 preempt
```

For Deers, I have Castle Rock as the active router, Loveland and Colorado Springs as the standby routers

#### Castle Rock

```
--> Deers SVI (Active)
interface Vlan10
 ip address 198.15.8.1 255.255.248.0
 standby 10 ip 198.15.8.4
 standby 10 priority 120
 standby 10 preempt
 ip vrf forwarding group1
```

#### Loveland

```
--> Deers SVI (Standby 1)
interface Vlan10
 ip address 198.15.8.2 255.255.248.0
 standby 10 ip 198.15.8.4
 standby 10 priority 110
 standby 10 preempt
!
```

#### Colorado Springs

```
--> Deers SVI (Standby 2)
interface Vlan10
 ip address 198.15.8.3 255.255.248.0
 standby 10 ip 198.15.8.4
 standby 10 priority 100
 standby 10 preempt
!
```

For Raccoons, Loveland is the active router, Colorado Springs and Castle Rock are the standby routers.

#### Loveland

```
--> Racoons SVI (Active)
interface Vlan30
 ip address 198.15.64.1 255.255.192.0
 standby 30 ip 198.15.64.4
 standby 30 priority 120
 standby 30 preempt
!
```

## Colorado Springs

```
--> Racoons SVI Config (Standby 1)
interface Vlan30
 ip address 198.15.64.2 255.255.192.0
 standby 30 ip 198.15.64.4
 standby 30 priority 110
 standby 30 preempt
!
```

## Castle Rock

```
--> Racoons SVI (Standby 2)
interface Vlan30
 ip address 198.15.64.3 255.255.192.0
 standby 30 ip 198.15.64.4
 standby 30 priority 100
 standby 30 preempt
 ip vrf forwarding group1
!
```

## Wireless

The Sneha\_Deers SSID is WPA2 secured and encrypted with a wep128 key. Further, the Sneha\_Bears SSID is open, i.e., anybody can connect without authentication. Since both of them are in different VRFs, Bears and Deers cannot communicate with each other as of now.

## Configuration

```

!
dot11 ssid Sneha_Bears
vlan 20
authentication open
guest-mode
!
dot11 ssid Sneha_Deers
vlan 10
authentication open
authentication key-management wpa
guest-mode
wpa-psk ascii 0 sneha_deers
!
!
interface Dot11Radio0
no ip address
!
encryption vlan 10 mode ciphers aes-ccm
!
ssid Sneha_Deers
!
speed basic-1.0 basic-2.0 basic-5.5 6.0 9.0 basic-11.0
12.0 18.0 24.0 36.0 48.0 54.0
station-role root
!
interface Dot11Radio0.10
encapsulation dot1Q 10
bridge-group 10
!
!
interface Dot11Radio1
no ip address
!

```

```

ssid Sneha_Bears
!
speed basic-6.0 9.0 basic-12.0 18.0 basic-24.0 36.0 48.0
54.0
station-role root
!
interface Dot11Radio1.20
encapsulation dot1Q 20
bridge-group 20
!
!
interface Vlan10
no ip address
bridge-group 10
!
interface Vlan20
no ip address
bridge-group 20
!
interface BVI10
ip address 198.15.8.6 255.255.248.0
!
interface BVI20
ip address 198.15.0.6 255.255.252.0
!
bridge 10 protocol ieee
bridge 10 route ip
bridge 20 protocol ieee
bridge 20 route ip
!
bridge irb
!
ip source-route

```

## DNS

I first created 3 sub-interface for each VLAN so that they can have the DNS server in the same network.

```
int Fa0/0.10
 encapsulation dot1q 10
 ip address 198.15.8.5 255.255.248.0

int Fa0/0.20
 encapsulation dot1q 20
 ip address 198.15.0.5 255.255.252.0

int Fa0/0.30
 encapsulation dot1q 30
 ip address 198.15.64.5 255.255.192.0
```

Then, I added the ip host command to point 1.1.1.1 to ralphie

```
ip dns server
ip host ralphie 1.1.1.1
```

## Bandwidth and Etherchannels

Loveland <-> Westminster is negotiating LACP, which is an IEEE open-source protocol, where Westminster is doing DTP and set the bandwidth on the link to 1200 mbps

### Configuration

#### Loveland

```
int range Gi1/0/2-3
 channel-group 3 mode desirable

int Po3
 switchport trunk encapsulation dot1q
 switchport mode trunk
 bandwidth 1200000
!
```

## Westminster

```
int range Gi1/0/6-7
  channel-group 3 mode desirable

int Po3
  switchport trunk encapsulation dot1q
  switchport mode trunk
  bandwidth 1200000
```

Castle Rock and Longmont are using PAGP (Cisco Proprietary) with bandwidth as 512 mbps.

## Castle Rock

```
int range Gi1/0/2-3
  channel-group 2 mode passive

int Po2
  switchport trunk encapsulation dot1q
  switchport mode trunk
  bandwidth 512000
```

## Longmont

```
int range Fa0/3-4
  channel-group 2 mode active

int Po2
  switchport mode trunk
  bandwidth 512000
```

## Port Security

At Longmont, I configured all ports (except the ones in use) to have port security.

```
interface range Fa0/8-24
  switchport port-security maximum 1
  switchport port-security mac-address sticky
  errdisable recovery cause psecure-violation
  errdisable recovery interval 60
```



## STP Paths

Bears -> Castle Rock -> Longmont -> Fort Collins -> Westminster -> Loveland -> Colorado Springs

On Castle Rock, I made it the primary root bridge, Longmont as the secondary root bridge.

### 1. Castle Rock

```
spanning-tree vlan 20 root primary
```

### 2. Longmont

```
spanning-tree vlan 20 root secondary
```

### 3. Fort Collins

```
spanning-tree vlan 20 priority 32768
```

### 4. Westminster

```
spanning-tree vlan 20 priority 36864
```

### 5. Loveland

```
spanning-tree vlan 20 priority 40960
```

### 6. Colorado Springs

```
spanning-tree vlan 20 priority 45056
```

For deers and raccoons, I followed the same configuration as above (*just changed the vlans and the paths as mentioned below*)

Deers -> Longmont -> Westminster -> Fort Collins-> Loveland -> Colorado Springs -> Castle Rock

Raccoons -> Fort Collins -> Longmont -> Castle Rock -> Westminster -> Colorado Springs  
Colorado Springs-> Loveland

## VRFs

I configured 1 VRF for Group 1, i.e., for Deers and Raccoons. Bears are in the global VRF. I configured these VRFs on all the 3 MLS (Castle Rock, Loveland and Colorado Springs). An example of the configuration:

```
--> Racoons SVI (Standby 2)
interface Vlan30
  ip address 198.15.64.3 255.255.192.0
  standby 30 ip 198.15.64.4
  standby 30 priority 100
  standby 30 preempt
  ip vrf forwarding group1
!
```

The **ip vrf forwarding group1** command puts that SVI to group1 VRF. I did the same for Deers SVI on all the 3 MLS.

This would isolate both the groups to talk to each other. However, in further steps, I would enable routing between them through Boulder/Denver.

## Routing

On VRF group1 (*deers, raccoons*) , I am enabling OSPF neighborship between 3 MLS with Boulder and Denver router. On the global VRF (*bears*), I'm enabling EIGRP peers between 3 MLS with Boulder and Denver.

For the record, to enable communication between the MLS and Boulder/Denver routers, I created 2 more SVIs on the MLS; Vlan 51 for VRF group1 and Vlan 52 for the global VRF. I then sub-interfaced on Boulder/Denver. Here's the config.

### On the MLS's example

```
interface Vlan51
  ip address 198.15.16.3 255.255.255.248
  ip vrf forwarding group1
!
interface Vlan52
  ip address 198.15.16.11 255.255.255.248
```

## On Boulder/Denver

```
interface Gi0/0/0.51
 encapsulation dot1q 51
 ip address 198.15.16.1 255.255.255.248

interface Gi0/0/0.52
 description connected to Rocky Mountains:bears
 encapsulation dot1q 52
 ip address 198.15.16.9 255.255.255.248
```

I'm advertising all the VRF group1 networks via OSPF.

## OSPF configuration on Castle Rock, Loveland and Colorado Springs

```
router ospf 1 vrf group1
 network 198.15.8.0 0.0.7.255
 network 198.15.64.0 0.0.63.255
 network 198.15.16.0 0.0.0.7
```

## OSPF configuration on Boulder/Denver

```
router ospf 1 vrf 1
 network 198.15.16.0 0.0.0.7 area 0
 redistribute eigrp 1
```

I am also redistributing all EIGRP learnt routes to OSPF so that all the global VRF's, i.e, the bear's networks get advertised to VRF group1 via the routers.

I also manipulated OSPF costs from the 3 MLS's.

## Castle Rock

```
--> Deers SVI (Active)
interface Vlan10
 ip address 198.15.8.1 255.255.248.0
 standby 10 ip 198.15.8.4
 standby 10 priority 120
 standby 10 preempt
 ip vrf forwarding group1
 ip ospf cost 100
!

--> Racoons SVI (Standby 2)
interface Vlan30
 ip address 198.15.64.3 255.255.192.0
 standby 30 ip 198.15.64.4
 standby 30 priority 100
 standby 30 preempt
 ip vrf forwarding group1
 ip ospf cost 100
!
```

## Colorado Springs

```
--> Deers SVI (Standby 2)
interface Vlan10
 ip address 198.15.8.3 255.255.248.0
 standby 10 ip 198.15.8.4
 standby 10 priority 100
 standby 10 preempt
 ip ospf cost 50
!
--> Racoons SVI Config (Standby 1)
interface Vlan30
 ip address 198.15.64.2 255.255.192.0
 standby 30 ip 198.15.64.4
 standby 30 priority 110
 standby 30 preempt
 ip ospf cost 50
!
```

## Loveland

```
--> Deers SVI (Standby 1)
interface Vlan10
 ip address 198.15.8.2 255.255.248.0
 standby 10 ip 198.15.8.4
 standby 10 priority 110
 standby 10 preempt
 ip ospf cost 1
!
--> Racoons SVI (Active)
interface Vlan30
 ip address 198.15.64.1 255.255.192.0
 standby 30 ip 198.15.64.4
 standby 30 priority 120
 standby 30 preempt
 ip ospf cost 1
!
```

Similarly, I configured EIGRP and am advertising the bear network and vlan 52.

## EIGRP configuration on Castle Rock, Loveland and Colorado Springs

```
router eigrp 1
 network 198.15.0.0 0.0.3.255
 network 198.15.16.8 0.0.0.7
```

### EIGRP configuration on Boulder/Denver

```
router eigrp 1
 network 198.15.16.8 0.0.0.7
 redistribute ospf 1 metric 1 1 1 1 1
```

I am redistributing all OSPF learnt paths to EIGRP for the same reason as mentioned above.

### Stateful NAT configuration

#### Denver

```
interface GigabitEthernet0/1
 ip address 100.0.0.3 255.255.255.0
 ip nat outside
 !
interface Serial0/2/0
 ip address 198.15.16.15 255.255.255.248
 !
ip nat Stateful id 10
 primary 198.15.16.15
 peer 198.15.16.16
 mapping-id 90

ip nat pool ANIMALS_POOL 20.0.0.1 20.0.0.6 prefix-length 29
ip nat inside source list 1 pool ANIMALS_POOL mapping-id 90 overload
ip route 1.1.1.1 255.255.255.255 100.0.0.100
 !

access-list 1 permit any
```

#### Boulder

```
interface GigabitEthernet0/1
 ip address 100.0.0.4 255.255.255.0
 ip nat outside
 !
interface Serial0/2/0
 ip address 198.15.16.16 255.255.255.248
 !
ip nat Stateful id 10
 backup 198.15.16.16
 peer 198.15.16.15
 mapping-id 90

ip nat pool ANIMALS_POOL 20.0.0.1 20.0.0.6 prefix-length 29
ip nat inside source list 1 pool ANIMALS_POOL mapping-id 90 overload
ip route 1.1.1.1 255.255.255.255 100.0.0.100
```

In the above configuration, I made Denver as the primary router for stateful NAT and Boulder as the backup and assigned the peer IP addresses so that each of the routers are aware of each other. They form a connection through the Serial link. Next, I created a NAT pool named ANIMALS\_POOL with a range of IP addresses from 20.0.0.1 to 20.0.0.6 which is a /29 subnet. With the **ip nat inside source list 1 pool ANIMALS\_POOL mapping-id 90 overload** command, I configured PAT for the internal network defined by access list 1 using the NAT pool ANIMALS\_POOL and mapping ID 90. I also configured a static route to ralphie, with the next hop as Pearl Street IP address.

Post creating the static route, I redistributed this static route into EIGRP and OSPF

```
router ospf 1 vrf 1
network 198.15.16.0 0.0.0.7 area 0
redistribute eigrp 1
redistribute static subnets

router eigrp 1
network 198.15.16.8 0.0.0.7
redistribute ospf 1 metric 1 1 1 1 1
redistribute static
```