CSCI 5160 Introduction to Enterprise Networks
Spring 2024 Midterm Exam

Colorado Zoo

There are three Animals Bear, Raccoon, Deer. They are planning to visit Ralphie at Folsom Field and is reachable with IP address 1.1.1.1

All the places, Fort Collins, Westminster, Loveland, Colorado Springs, Longmont, Castle Rock are aware of all the 3 animals but,

Longmont notifies every other about available animals in Zoo1.

Westminster just helps in notifying others, but it doesn't learns itself.

Loveland, Colorado Springs, Castle Rock inherits known animals in Zoo 1.

Fort Collins like to do everything on its own and doesn't rely on anyone.

There is total 510 Bears, 8195 Raccoons, 1024 Deers all together. For this trip Bears are going to collect clothes from Denver, Racoons from Castle rock and Deer from Fort Collins.

In order to meet Ralphie,

Racoons are always going to meet at Loveland before leaving Zoo1, If not possible they can exit via Colorado Springs.

Same for Bear, primary exit is Colorado Springs and secondary exit will be Castle Rock.

For Deers primary exit is Castle Rock and secondary exit will be Loveland.

Finally if none of the exits are available, respective third place should act as backup.

Fort Collins has 2 Wireless suppliers. One for Bears and One for Deer

Wireless Deers staying at fort Collins should be able to communicate to Wired Deers. Its WPA2 secured and encrypted with a wep128 bit key

Also, Wireless Bears staying at fort Collins should be able to communicate to Wired bears. Its open network.

Note Bears and Deers can't communicate wirelessly.

All the animals should be able to get RALPHIE name resolution from the NIST.

There are various Roads for reaching, But each of them has some sort of speciality.

Fort Collins <-> Westminster is open-source IEEE protocol connection which is initiated from Fort Collins's side.

Loveland <-> Westminster utilized a proprietary protocol to communicate which is initiated by Loveland and has a Max speed of 1200Mbps.

Longmont <-> Castle Rock has a max speed of 512Mbps with open-source view.

Castle Rock < - > Colorado Springs < - > Loveland has only allowed 3 types of Animals (Bear, Raccoon, Deer) rest all are not allowed at all. Its made up of proprietary protocol.

At Longmont (on any one port) if any unknown species tries to access, that entry will be blocked for one minute and again gets open.

STP Paths : (First One is the Root Bridge, second is the Backup)

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

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

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

Now since the race has become intense, Racoons and Deers deals to race together, they are now Group 1 and bears are now group 2.

Group 1 can communicate with each other at Castle Rock, Colorado Springs and Loveland. However, if group1 wants to communicate with group2 then they have to first reach Boulder or Denver, otherwise they can't.

Special Conditions for Zoo 2 area:

Group 1 knows which path to follow based on Link state protocol which uses SPF algorithm.

From group 1's perspective, Zoo 2 is like a multi access area which forms full mesh kind topology.

Group 2 knows which path to follow based on proprietary protocol which is an advanced distance-vector and uses DUAL algorithm.

From group 2's perspective every road towards Boulder and Denver are P2P links, It is not a multi access network.

I.e. In order to reach From Castle rock to Folsom Filed it has 3 roads which area P2P links.

To exit Zoo 1 area, group 1 and Group 2 can only exit via castle Rock or Love Land.

For Group1 to enter Zoo 2 area, it must go to Castle Rock -> Colorado Springs -> Loveland as primary path. If it's not available, then it can exit via Castle Rock.

Group 2 can use exit via any 2 exits as primary path.

Once Group 1 or Group 2 reaches, Boulder or Denver, they change their clothes since they can't wear same because of RFC 1918 rules. But keep in mind Boulder and Denver knows which old clothes represents newer once, even if one of the place is destroyed completed.

Each student is assigned a pool for representing their new clothes. You have to use only these.

Inside zoo 1 and 2 you can use any IP spacing of your choice but in an efficient manner.

Extra Credit:

Ralphie should be able to ssh any Router/switch on particular Ports/IPs.

HW Specifications:

Castle Rock, Colorado Springs and Loveland are MLS.

Rocky Mountains is a L2 switch.

Fort Collins is 1800 Router.

Zoo 1 area is represented in Red.

Zoo 2 is represented in Blue.

S1 is a serial link.

You will already find Pearl Street and Folsom Filed Setup by TAs.

Name	NAT Pool	Pearl Street Facing ports (/24 mask)
Ashwin	10.0.0.0 /29	100.0.0.1 & 100.0.0.2
Sneha	20.0.0.0 /29	100.0.0.3 & 100.0.0.4
Scott	30.0.0.0 /29	100.0.0.5 & 100.0.0.6
Aibol	40.0.0.0 /29	100.0.0.7 & 100.0.0.8
Yemi	50.0.0.0 /29	100.0.0.9 & 100.0.0.10
Don	60.0.0.0 /29	100.0.0.11 & 100.0.0.12
Nufais	70.0.0.0 /29	100.0.0.13 & 100.0.0.14
Danny	80.0.0.0 /29	100.0.0.15 & 100.0.0.16

Strictly use above IPs on Boulder and Denver IPs.

Do not add additional cables, strictly follow the diagram (Ether channels excluded)

Best of Luck!!