Open Shortest Path First (OSPF)

Instructions

In this lab, we will implement the OSPF routing protocol. If you recall from the first IP Interfaces lab, only R1 has a direct interface outside of the network. Your goal is to configure each router to communicate with the Internet.

Part 1: Enable the OSPF daemon

Beginning with R1, edit */etc/frr/daemons* to enable OSPF.

Restart frrouting by executing:

```
> systemctl restart frr
```

Repeat the steps in Part 1 in order to enable OSPF on R2, R3, and R4.

Part 2: Configure OSPF in Area 0

Now that we have enabled OSPF, we will need to use *vtysh* to configure R1 such that it advertises its routable networks. In *vtysh*, execute the following commands:

```
> configure terminal
> router ospf
# specify the network(s) and areas advertised by R1 (use CIDR
notation)
```

Hint: Run ***ifconfig*** and examine the interfaces to determine which network addresses to use.

For additional resources and configuration examples, consult the frrouting guide at:
http://docs.frrouting.org/en/latest/ospfd.html#configuring-ospf

Part 3: Configure OSPF in Area 1

We will follow the same steps to configure each router in Area 1.

*Please note that we will not run OSPF on R4 (eth2) since this interface points to a terminal node (see ***passive-interface***).

Part 4: Set Default IP Route to R1

The last step is to set the default IP route on R2, R3, and R4 so that they will go through R1 to access the Internet (i.e. all IP addresses outside of our network). You will have to browse through the FRR documentation to find the exact command.

You may verify that your configuration is correct by successfully pinging the SFTP server (128.238.77.36) from routers R2, R3, and R4.

Part 5: Questions

a) Power on all routers and run Wireshark on R1. Apply a filter for OSPF, and look at the Hello Packets. How frequently are these packets sent, and why must they be sent periodically? [10 points]

b) Continue running Wireshark and turn off R4. You should now see new OSPF packet types captured on R1. Explain why Hello, Link State Update, and Link State Acknowledgements use the same Destination IP address. [20 points]

c) Based on the above steps, explain why we do not see DB Descriptions and LS Requests on R1. Is there a situation in which we get all OSPF packet types on R1? [20 points]

Submissions

[20 points] Screenshot configurations of R1, R2, R3, and R4
[10 points] ICMP results from R3 to R1
[10 points] Wireshark screenshots on R1
[10 points] Screenshots depicting successful ping requests to the SFTP server (128.238.77.36) from R1, R2, R3, and R4
[50 points] Answers to questions 5a-5c

Please remember to submit your lab results as a single PDF document. While you may work in groups, you **MUST** submit your own work.