Lab 9 - Multicast (Sections 10.1, 10.2, and 10.4 in Mastering Networks)

Install multicast utilities. Log into each CentOS VM and run the following command.

```
tar -zxvf /root/LabSW/binary.tar.gz -C /
```

IGMP. Using Topology 1, configure the clients and router for multicast. Start a multicast sender on PC3 and receivers on PCs 1 and 2 using the following commands.

```
PC3# msend -g 224.1.1.1 -p 1111 -t 8 -text "PC1"
PC1# mreceive -g 224.1.1.1 -p 1111
PC1# mreceive -g 224.1.1.1 -p 1111
```

- Include the addressing plan in your report.
- Using the group membership information from the router, and packet captures of the IGMP packets describe how the router determines what clients are on a LAN. What addresses and ports are used for the IGMP messages?
- Have a PC leave and rejoin the group (by terminating and restarting mreceive) and describe how IGMP handles this.
- Does IGMP provide enough information for the router to know all the members of a group on a LAN at all times? Explain.
PIM Dense Mode (PIM-DM). Using Topology II, configure the clients and router for multicast, and configure PIM-DM routing on the router. Start a multicast sender on PC1 using the following command:

```
msend -g 224.1.1.1 -p 1111 -t 64 -text "PC1"
```

- Include the addressing plan in your report.
- Using packet traces, explain the flood-and-prune process used by PIM-DM to setup the multicast forwarding state for this traffic. What messages are sent as a part of the flood-and-prune process? How frequently is flood-and-prune repeated?

Start a multicast received on the other PCs using the following command:

```
mreceive -g 224.1.1.1 -p 1111
```

- Using packet traces, explain how flood-and-prune allows traffic to reach the new group members.
- Delete the serial link used to reach one of the destinations, and determine how long it takes to begin receiving traffic. Include packet capture and command output data to support your answer.
- Using either the multicast routing tables on the routers, or the output of the `mtrace` command on the receiver, determine the multicast distribution tree for the group at a receiver. Explain how this tree is related to the underlying unicast routing tables.
**PIM Sparse Mode (PIM-SM).** Using Topology II, configure the clients and router for multicast, and configure PIM-SM routing on the routers with Router 3 as the rendezvous point. Restrict PIM-SM to use shared trees with the command:

```
ip pim spt-threshold infinity
```

Start a multicast sender on PC1 using the following command:

```
msend -g 224.1.1.1 -p 1111 -t 64 -text "PC1"
```

- **Using packet traces, explain how PIM-SM responds.**

Start multicast receivers at the other PCs with the following command:

```
mreceive -g 224.1.1.1 -p 1111
```

- **Using packet traces, explain how PIM-SM allows traffic to reach the receivers.**
- **Using either the multicast routing tables on the routers, or the output of the mtrace command on the receiver, determine the multicast distribution tree for the group at a receiver.**

**Corrections, comments and suggestions for improving this lab greatly appreciated!**