Self-chosen project

Topic: Spanning tree protocol implementation

Implementation: When there's a loop between a switches network, it can cause broadcast storm due to repeatedly sending and duplicating packets, which can cause network congestion, spanning tree protocol can prevent this situation from happening.

First, create a topology that have a loop between them.

Second, switches decide which one be the root bridge.

 The lowest bridge ID (priority first, then mac address) will be the root bridge.

To decide whose root bridge, implement hello BPDU to done this.

All ports on the root bridge are put in a forwarding state, and other switches in the topology must have a path to reach the root bridge.

Assigned the role of all port.

All ports of root bridge will be designated port. Other switch will select one of its interfaces to be its root port, root port selection: lowest root cost -> lowest neighbor root id -> lowest neighbor port id.

Each remaining collision domain select one interface to be a designated port (forwarding), the other port be non-designated (blocking): lowest cost -> lowest id.

The root bridge will send hello BPDU every two seconds, and the other switches will forward the BPDU out their designated port.

Max age timer: 20 seconds.

When a link corrupted, a switch max age timer expired, the switch will reevaluate its STP choices (port role).

If a non-designated port is selected to become a designated port or root port it will transition from blocking state to forwarding state after a while (I simplified the steps between).

If there's a new switch added into the topology with lower ID, there will be reelection of the root bridge.

Experiment:

Set up a network topology with a loop between the switches.

The program should correctly assign root bridge, sending hello BPDU, assigning designated port, non-designated port.

Testing with spanning tree protocol activated and not activated should showed that the packet is correctly ignored at the non-designated port (block) with spanning tree protocol activated, while non-activated won't.

Break a link between the loop to observe is max age timer is triggered, and the port of the switch is changed.

Add a switch with higher bridge ID than current root bridge to see if it acts normally.

Add a switch with lower bridge ID than current root bridge to see if there's a reelection on root bridge.