Free Cisco Lab Packet Tracer Activity Basic Spanning Tree Protocol

This lab was developed to help you gain a better understanding of how switches work within a redundant network and how Spanning Tree Protocol (STP) is implemented to prevent bridging loops from forming within the network.

In this lab scenario, you will configure a redundant network with VTP, multiple VLANs, and STP. In addition, you will design an addressing scheme based on host requirements. This lab has been developed as a Packet Tracer Activity but can be completed with GNS3 or real hardware.

## Spanning Tree Protocol (STP):

A Layer 2 switch, which functions as a transparent bridge, offers no additional links for redundancy purposes. To add redundancy, a second switch must be added. Now two switches offer the transparent bridging function in parallel. LAN designs with redundant links introduce the possibility that frames might loop around the network forever. These looping frames would cause network performance problems.

For example, when the switches receive an unknown unicast, both will flood the frame out all their available ports, including the ports that link to the other switch, resulting in what is known as a bridging loop, as the frame is forwarded around and around between two switches. This occurs because parallel switches are unaware of each other. The Spanning-Tree Protocol (STP), which allows the redundant LAN links to be used while preventing frames from looping around the LAN indefinitely through those redundant links, was developed to overcome the possibility of bridging loops. It enables switches to become aware of each other so that they can negotiate a loop-free path through the network. Loops are discovered before they are opened for use, and redundant links are shut down to prevent the loops from forming. STP is communicated between all connected switches on a network. Each switch executes the Spanning-Tree Algorithm (STA) based on information received from other neighboring switches. The algorithm chooses a reference point in the network and calculates all the redundant paths to that reference point. When redundant paths are found, STA picks one path to forward frames with and disables or blocks forwarding on the other redundant paths.

STP computes a tree structure that spans all switches in a subnet or network. Redundant paths are placed in a blocking or standby state to prevent frame forwarding. The switched network is then in a loop-free condition. However, if a forwarding port fails or becomes disconnected, the STA will run again to recomputed the Spanning-Tree topology so that blocked links can be reactivated. By default, STP is enabled on all ports of a switch. STP should remain enabled in a network to prevent bridging loops from forming.