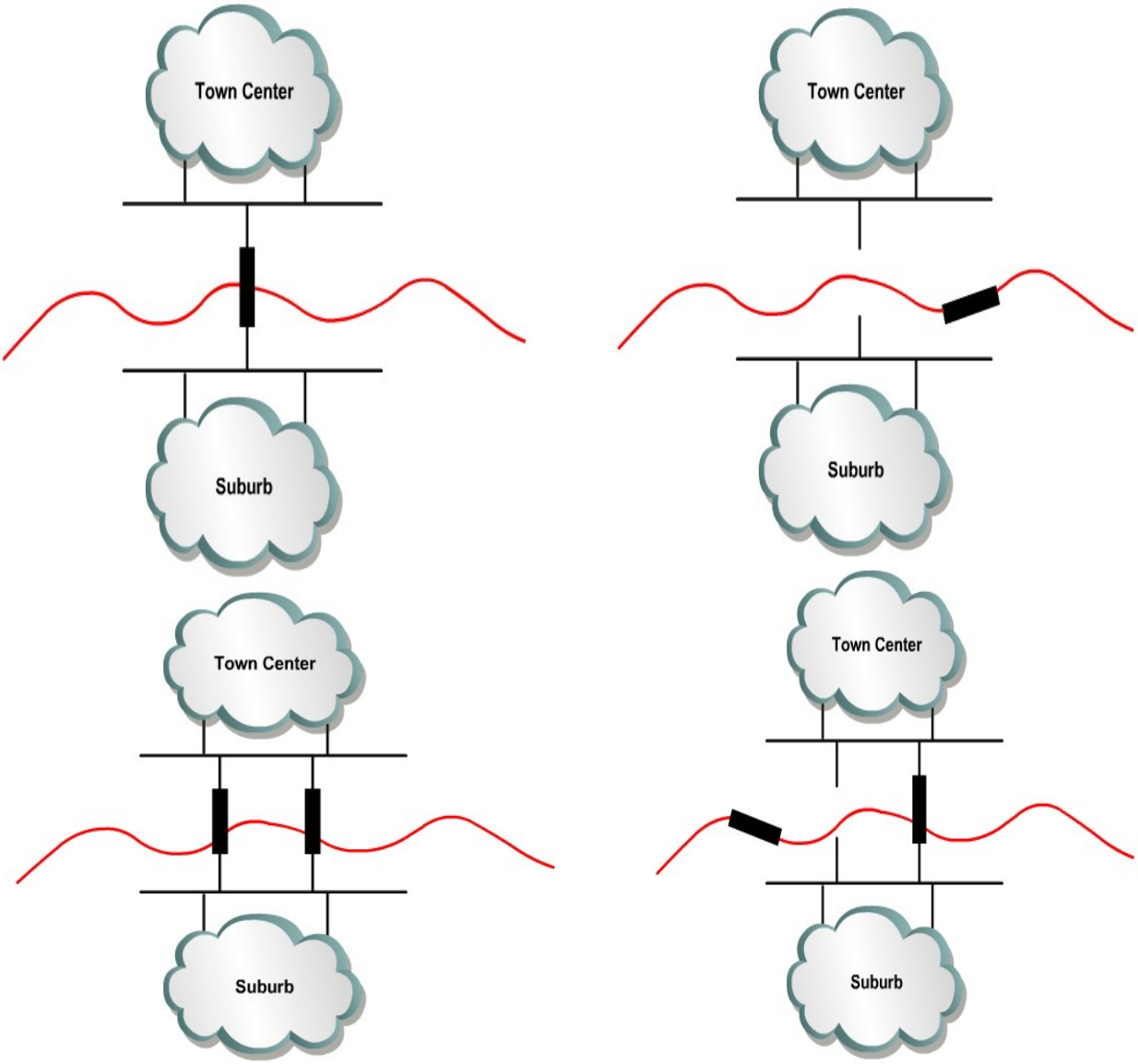
SPANNING TREE PROTOCOL(STP)

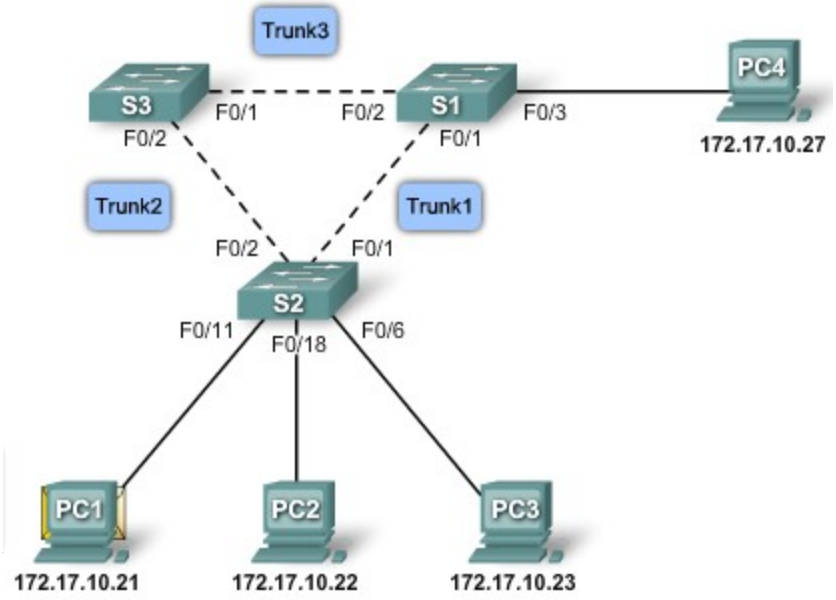
Need for Redundant Topology:

The goal of redundant topologies is to eliminate network outages caused by a single point of failure. All networks need redundancy for enhanced reliability.

A network of roads is a global example of a redundant topology. If one road is closed for repair, there is likely an alternate route to the destination. Consider a community separated by a river from the town center. If there is only one bridge across the river, there is only one way into town. The topology has no redundancy. If the bridge is flooded or damaged by an accident, travel to the town center across the bridge is impossible. A second bridge across the river creates a redundant topology. The suburb is not cut off from the town center if one bridge is impassable.



Issues with Redundancy:



Layer 2 loops
Ethernet frames do not have a time to live (TTL) like IP packets traversing routers. As a result, if they are not terminated properly on a switched network, they continue to bounce from switch to switch endlessly or until a link is disrupted and breaks the loop.

Broadcast stroms
A broadcast storm occurs when there are so many broadcast frames caught in a Layer 2 loop that all available bandwidth is consumed. Consequently, no bandwidth is available bandwidth for legitimate traffic, and the network becomes unavailable for data communication.

Duplicate unicast frame:
Broadcast frames are not the only type of frames that are affected by loops. Unicast frames sent onto a looped network can result in duplicate frames arriving at the destination device.

What is STP?
Redundancy increases the availability of the network topology by protecting the network from a single point of failure, such as a failed network cable or switch. When redundancy is introduced into a Layer 2 design, loops and duplicate frames can occur. Loops and duplicate frames can have severe consequences on a network. The **Spanning Tree Protocol (STP)** was developed to address these issues.
STP ensures that there is only one logical path between all destinations on the network by intentionally blocking redundant paths that could cause a loop. A port is considered blocked when network traffic is prevented from entering or leaving that port. This does not include bridge protocol data unit (BPDU) frames that are used by STP to prevent loops. You will learn more about STP BPDU frames later in the chapter. Blocking the redundant paths is critical to preventing loops on the network. The physical paths still exist to provide redundancy, but these paths are disabled to prevent the loops from occurring. If the path is ever needed to compensate for a network cable or switch failure, STP recalculates the paths and unblocks the necessary ports to allow the redundant path to become active.

Source : http://dayaramb.files.wordpress.com/2011/03/computer-network-notes-pu.pdf