Building Cisco Multilayer Switched Networks (BCMSN)

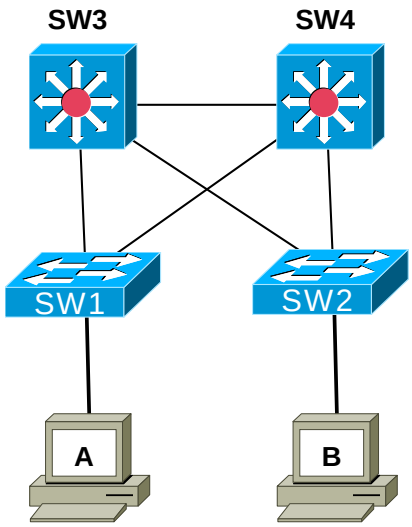
Gateway Redundancy Protocols

http://www.INE.com

What is Gateway Redundancy?

- End hosts typically do not “route” into the network, they default to their gateway
- If the gateway is down, connectivity is lost
- First Hop/Gateway Redundancy allows another device to take over for a host’s default gateway if it goes down
  - Transparent to the end host
  - No need for dual gateways in DHCP

Network Failure Without FHRPs



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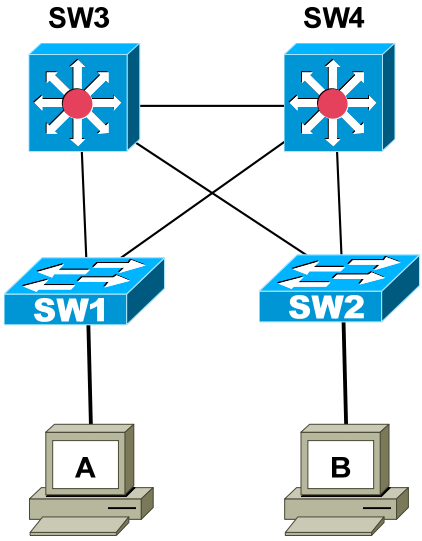

IP over Ethernet Review

- When a HostA wants to communicate with HostB via IP…
  - If HostB is on my subnet…
    - Check the ARP cache for HostB's MAC
    - If no MAC, ARP for HostB
  - If HostB is not on my subnet
    - Check the ARP cache for gateway's MAC
    - If no MAC, ARP for gateway

How Gateway Redundancy Works

- Virtualizes the IP to MAC mapping for the hosts default gateway
- Routers in the redundancy group share a virtual IP address and virtual MAC address
  - Host has default gateway set to virtual IP
- When host ARPs for gateway, current "active" router responds with virtual MAC
- If "active" router goes down, next router in the group takes over the virtual MAC
  - Floods new frames to update the CAM
- Convergence depends on dead router detection and switchover
  - Can be sub-second

Gateway Redundancy Protocols

- Three protocols
  - Same major functionality
  - Difference enhancements
  - Different behind the scenes communication
- Hot Standby Router Protocol (HSRP)
- Virtual Router Redundancy Protocol (VRRP)
- Gateway Load Balancing Protocol (GLBP)

HSRP

- Hot Standby Router Protocol
- Cisco proprietary
  - Communication via UDP multicast to 224.0.0.2 at port 1985
- Uses active/standby routers
  - Active forwards for virtual MAC
  - Standby checks to make sure active is up
    - If down take over the MAC
- **`standby`** interface level command

VRRP

- Virtual Router Redundancy Protocol
- Open standard per RFC 3768
  - Communication with own multicast transport via IP protocol 112 to 224.0.0.18
- Uses master/backup routers
  - Master forwards for virtual MAC
  - Backup checks to make sure master is up
    - If down take over the MAC
- **`vrrp`** interface level command

GLBP

- Gateway Load Balancing Protocol
- Cisco proprietary
  - Communication via UDP multicast 224.0.0.102 at port 3222
- Like HSRP/VRRP but provides load balancing
  - One virtual IP address
  - Multiple virtual MAC addresses
- Active Virtual Gateway (AVG)
  - Assigns virtual MACs by replying to ARP requests with either it's own MAC or another forwarder's MAC
- Active Virtual Forwarder (AVF)
  - Router that AVG responds to ARP request on behalf of