

IP Routing

Review (Again)

- ▶ Routing is the process of moving packets between networks
- ▶ Performed by Routers
- ▶ Handles Layer 3
- ▶ Relies on other layers to actually move the data

General Routing Rules

- ▶ Is Packet Local - If so Layer 2
- ▶ Consult routing table - find most specific match
- ▶ Rewrite packet with new Checksum, TTL, etc
- ▶ Forward to Layer 2 address found

Building Routing tables

- ▶ Two ways tables are generally built
 - ▶ Static Routing
 - ▶ Dynamic Routing

Static Routing

- ▶ Administrator manually configures route table
- ▶ Enters network, mask and destination
- ▶ Usually most preferred routes
- ▶ Has scalability issues
- ▶ Cannot adapt to change

Dynamic Routing

- ▶ Uses an algorithm to build the route table
- ▶ If we have more than one route, favor the best
- ▶ If a route is removed add next best route
- ▶ Three general classes of Routing Protocol
 - ▶ Distance Vector
 - ▶ Link State
 - ▶ Hybrid

Distance Vector Routing

- ▶ Use a Distance and A Vector (duh)
- ▶ Distance is often number of hops
- ▶ Vector is the next hop IP
- ▶ Lowest hop count wins
- ▶ Information broadcast
- ▶ Simplest Protocol
- ▶ RIP common example

Link State Routing

- ▶ Route receives entire topology
- ▶ Has metrics for each link
- ▶ Calculates the shortest path using information
- ▶ Dijkstra's algorithm often used
- ▶ Much more complex than distance vector
- ▶ OSPF, IS-IS examples

Hybrid Protocols

- ▶ Combines pieces of Link State and Distance Vector
- ▶ Usually uses metrics such as bandwidth and hops
- ▶ May or may not have entire topology
- ▶ Usually not broadcast
- ▶ Examples include RIPv2, EIGRP, BGP

Configuring Static Routes

```
ip route <network> <mask> <ip>
```

Example

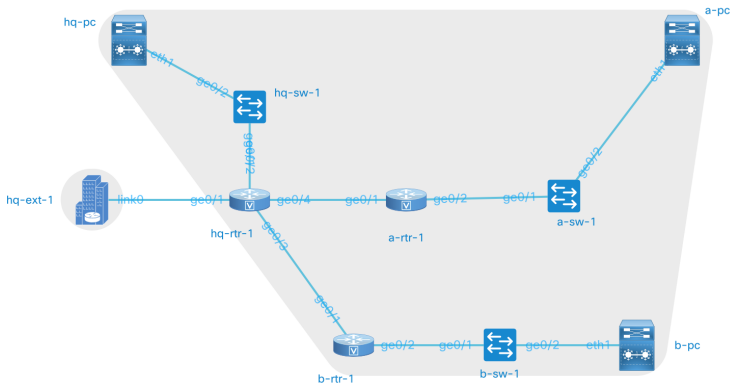


Figure 1: Topology

Basic Interface Configuration

```
interface <xxx>  
ip address <address> <mask>  
no shutdown
```

Verification and Troubleshooting

- ▶ ping
- ▶ traceroute
- ▶ sh ip route
- ▶ sh ip int br
- ▶ sh int

More about RIP v2

- ▶ Can have loops
- ▶ Only suitable for small simple networks

Configuring RIP v2

```
router rip
  network a.b.c.d
  version 2
```

Questions

Next class - Layer 2 extensions (VLANs)