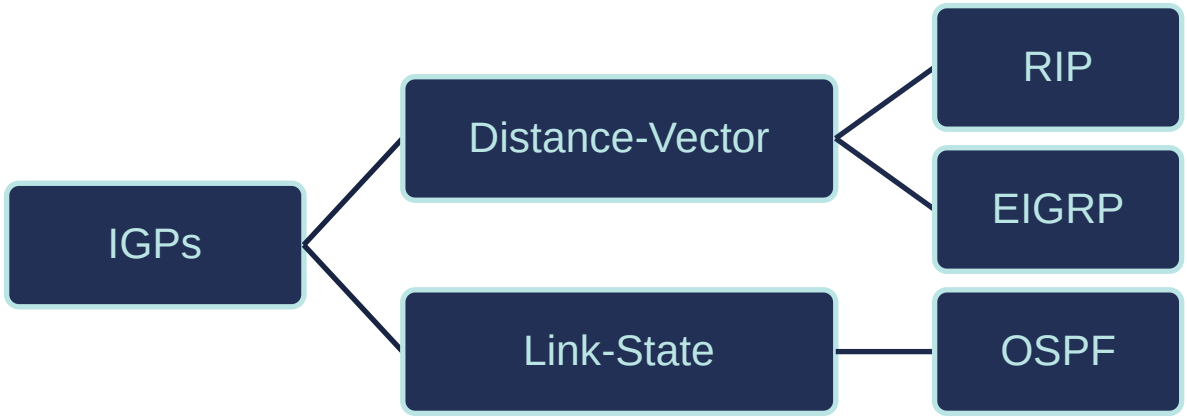
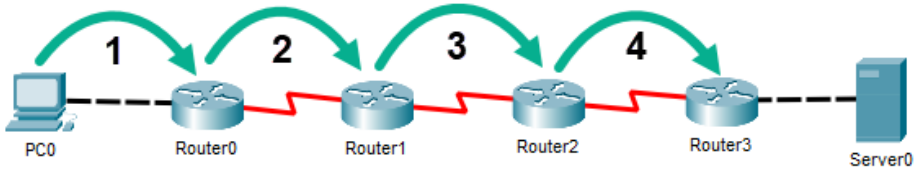
Interior Gateway Protocols (IGPs)

- There are three different types of IGPs:



Distance-Vector

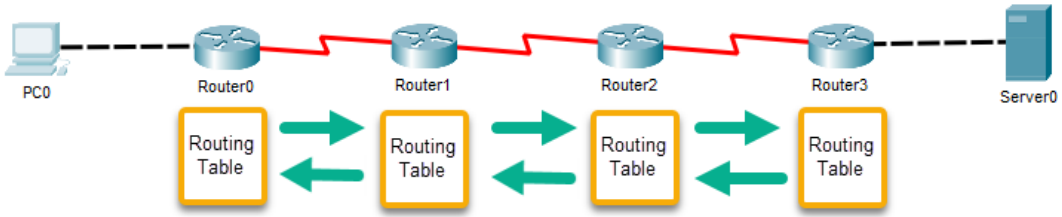
- Like its name implies, distance-vector routing protocols use distance as their metric for making routing decisions.
  - Distance = Hop Count
  - Hops are the number of routers that a packet passes through from its source to its destination.



- Distance-Vector Routing Protocols:
  - Router Information Protocol (RIP)
  - Enhanced Interior Gateway Routing Protocol (EIGRP)

Router-Information Protocol (RIP)

- A long-established distance-vector protocol with three versions
- Supports a maximum of 15 hops to prevent routing loops
  - Doesn't scale well due to 15 hop limitation.
- Sends a full copy of its routing table to directly connected routers every 30 seconds
  - Slow network convergence times, which can lead to potential routing loop issues
  - For example: router 3 may need to wait up to 90 seconds to get router 0's full routing table
  - Lead to unnecessary network traffic and high router CPU utilization



Enhanced Interior Gateway Routing Protocol (EIGRP)

- A Cisco proprietary routing protocol that only works on Cisco routers.
- Not a true distance-vector routing protocol
  - Utilizes hop count metrics, but also reliability, bandwidth, load, and delay metrics.
  - Can be considered an ***advanced distance-vector*** or ***hybrid*** routing protocol

- Has a default hop count of 100 and a maximum of 255
- Supports classless routing and VLSM
- Very fast converging and very scalable for larger networks

Link-State

- Link-state routing protocols build a map of the entire network.
- Utilize link-state advertisements (LSAs) to accomplish this:
  - Routers share information with all other routers on the network via LSAs.
  - This allows them to build a complete network map.
- Once the network map is built, routers only update each other when there is a change to the network.
- Otherwise, they don't communicate, except with a periodic "*hello*" packet, so the other routers know they are up and functioning.
- This leads to faster network convergence times that support larger networks.
- Link-State Routing Protocol:
  - Open Shortest Path First (OSPF)

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Open Shortest Path First (OSPF)

- Open standard link-state routing protocol
- Well suited for large networks with multiple redundant paths.
- It builds a topological routing tree, call a shortest-path tree.
- Sub-divides a larger network into areas where routers share information with other routers in their designated area:
  - Minimizes routing update traffic and improves network convergence times
- Uses “cost” metrics to determine the “best” route by including link state and speed.
- Supports classless addressing and VLSM
- Has an unlimited hop count