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Configure multiple routers and send ping messages:

Procedure:

1. Three routers are placed on the same level and connected using serial DCE cable. The three routers are named as router0, router1 and router2.
2. One generic computer is placed alongside router0 and another is placed alongside router2. The connection between routers and computers is done using copper cross-over cables.
3. IP addresses and default gateway addresses are configured seperately for both computers.
4. The terminal of each router is accessed and the interfaces for each connection is established with specified gateway addresses.

Observations:

1. Pinging the second computer i.e, PC1 from PC0 initially gives an error stating *destination host unreachable* because there is no direct connection between source (PC0) and destination (PC1).
2. The ip route of the routers can be seen using *show ip route* command for each router.
3. In order to send ping message to PC1 via router0, router1, we need to add static routes to routers.This can be done using the following syntax in configure mode:
   ip route dest_network subnet_mask next_hop_address

- For router0:
  Route through 10.0.0.0 and 20.0.0.0 is directly connected. Therefore we add static route through 30.0.0.0 and 40.0.0.0.
  Router(config)#ip route 30.0.0.0 255.0.0.0 20.0.0.2
  Router(config)#ip route 40.0.0.0 255.0.0.0 20.0.0.2
- For router1:
  Route through 20.0.0.0 and 30.0.0.0 is directly connected. Therefore we add static route through 10.0.0.0 and 40.0.0.0.
  Router(config)#ip route 10.0.0.0 255.0.0.0 20.0.0.1
  Router(config)#ip route 40.0.0.0 255.0.0.0 30.0.0.2
- For router2:
  Route through 30.0.0.0 and 40.0.0.0 is directly connected. Therefore we add static route through 10.0.0.0 and 20.0.0.0.
  Router(config)#ip route 10.0.0.0 255.0.0.0 30.0.0.1
  Router(config)#ip route 20.0.0.0 255.0.0.0 30.0.0.1

4. After adding static routes to routers, a connection is established between each interface and pinging PC1 from PC0 works as per the requirement.

Learning Outcomes:

1. Configuring a topology with multiple routers
2. Configuring IP and default gateway addresses for PCs
3. Configuring IP addresses for interfaces
4. Configuring static IP routes for ping messages to give the desired response since they give an error if there is no direct connection between device networks