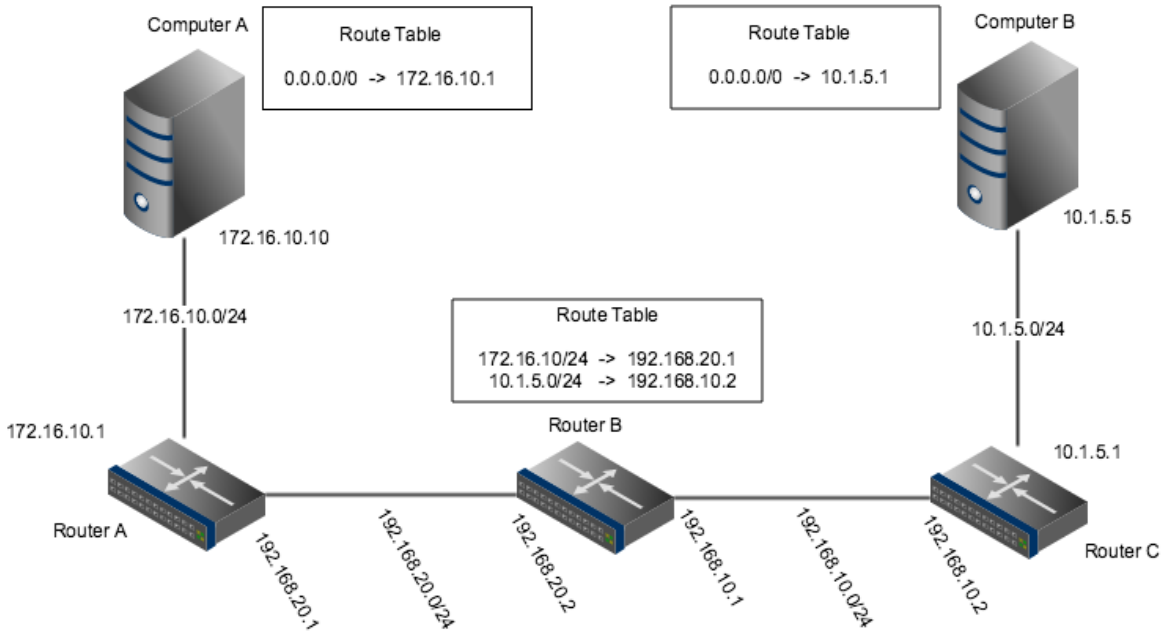
Network Transit



Ping from Computer A to Computer B

Imagine for a second Computer A issues the following command:

```
ping 10.1.1.5
```

The following takes place:

Computer A Router A

- Computer A builds ICMP packet with contents
- Computer A builds IP header with 10.1.1.5 as destination IP and wraps ICMP packet
- Computer A checks to see if the destination is on the same Network - it is not
- Computer A checks it's route table for the most specific match
- 0.0.0.0/0 is the closest match - default route
- Computer A checks ARP table for next hop IP (172.16.10.1) from route table lookup
- Upon not finding it, Computer A creates a ARP packet and sends it to the broadcast address

```
ARP -> Who has 172.16.10.1 tell 10.16.10.10
```

- The router at 172.16.10.1 responds with a unicast ARP reply with it's MAC address
- Computer A wraps the IP packet in a Layer 2 ethernet packet destined to the MAC address of 172.16.10.1 and sends it

Router A Router B

- Router A receives IP packet and examines it
- Router A checks if destination IP is on local network - it is not
- Router A checks route table for most specific route for destination IP - it is 192.168.20.2
- Router A decrements the TTL in the IP packet and updates the checksum
- Router A checks it's local ARP table for entry for 192.168.20.2
- Not finding it, it sends an ARP request and receives a reply
- Router A rewraps IP packet in ethernet frame to Router B's MAC address and sends it

Router B Router C

- Router B receives IP packet and examines it
- Router B checks if destination IP is on local network - it is not
- Router B checks route table for most specific route for destination IP - it is 192.168.10.2
- Router B decrements the TTL in the IP packet and updates the checksum
- Router B checks it's local ARP table for entry for 192.168.10.2
- Not finding it, it sends an ARP request and receives a reply
- Router B rewraps IP packet in ethernet frame to Router C's MAC address and sends it

Router C Computer B

- Router C receives IP packet and examines it
- Router C checks if destination IP is on local network - it is
- Router C checks it's local ARP table for entry for 10.1.1.5
- Not finding it, it sends an ARP request and receives a reply
- Router C rewraps IP packet in ethernet frame to Computer B's MAC address and sends it

The reply packet happens approximately in reverse.

As you consider this packet movement, consider how the packets move up and down the OSI model/stack in each of these computers or routers. The routers only examine the packets at layer 3.