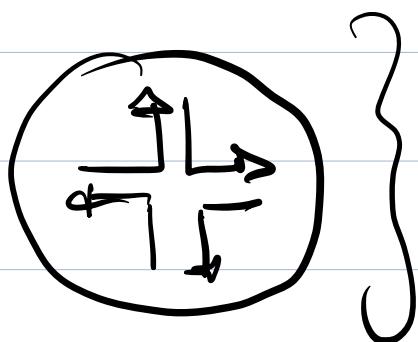


Network Layer 3 - Routers



Router symbol

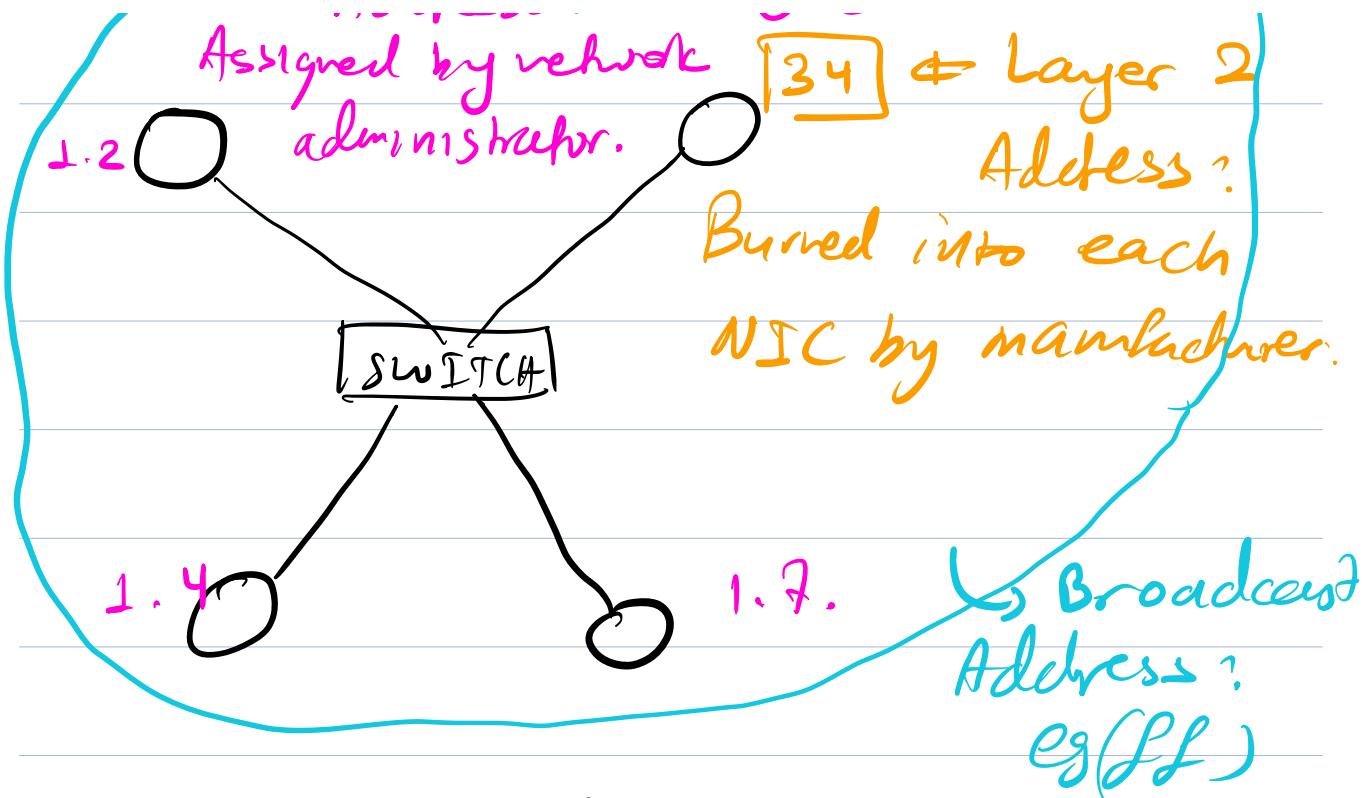
Reminder:

- Each NIC has layer 2 or MAC Address assigned by the manufacturer.
- First 3 bytes of MAC address comprise the Organizationally Unique Identifier (OUI)
- Last byte of MAC address to represent the host address



Layer 3
Address:

⇒ (1)-(8) → Network # Host #



- * Layer 3 addresses provide a way of grouping network devices.

Broadcast Domains

- * A collision domain is a group of devices competing for network access
- * Layer 2 domain because bridges & switches isolate

traffic into separate domains based on the Layer 2 addresses in each have.

Layer 3 domains: Broadcast Domains

→ A broadcast domain is the group of devices that can be reached by sending a frame addressed to the broadcast MAC address

→ A broadcast MAC address is the address a device uses to send data to every device within a LAN, either directly or by a way of bridge or switch

Address Resolution

- Address Resolution Protocol

↳ The process of using Layer 3 addresses to determine Layer 2 addresses.

→ In TCP/IP based networks, the protocol is called Address Resolution Protocol (ARP)

→ Routers allow communication between broadcast domains.
(unique #)

- Router → Layer 3 device

→ forwards data from 1 Network
to another

→ Routers use routing protocols to reach other networks

⑧ • Routing Information Protocol (RIP)

or

- Open - Shortest - Path - First Protocol (OSPF)
- can also statically configure these information on the router.

Stores all those informations
on a table

Routing Table

<u>Network</u>	<u>Next Hop</u>	<u>Port</u>
:	:	:

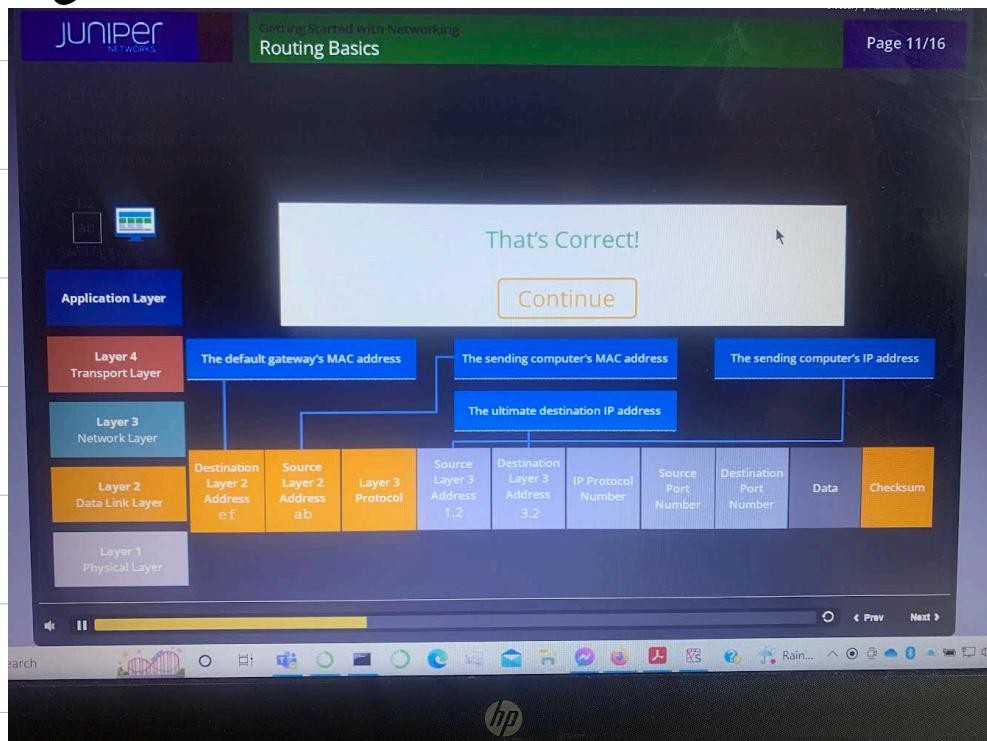
Next Hop : either Direct or provides address of other network

* Network Administrators instead now : Default (as Network)
In case a network is not part of the table

- Routing is Active (Part 1)

* A gateway is a device such as a router, which serves as an access point to another network.

* Default gateway is configured by network admin.



Part 2

* A router can strip off a Layer 2 frame.
* examine the destination Layer 3 address to make an

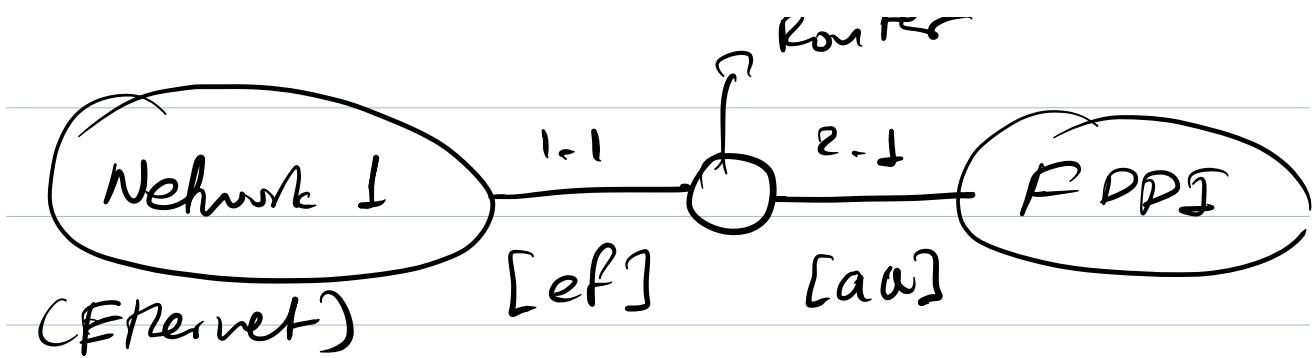
Intelligent routing decisions.

A router changes Layer 2 address with each hop.

A switch can only access Layer 2 addresses to forward frames, but it cannot change those addresses or access Layer 3 addresses.

- Connecting Different Layer 2 Technologies

↳ Routers can connect different types of Layer 2 networks.



→ The router receives the following Ethernet frame from Network 1:

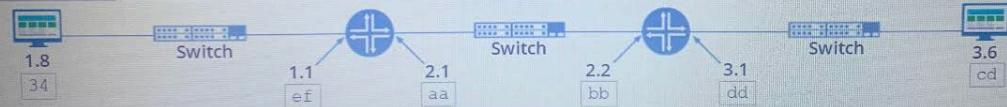
→ Strips off the Layer 2 Ethernet frame & evaluates the Level 3 data

→ After determining that the data will be sent to Network 2, the router adds a new Layer 2 header & trailer using the FDDI frame format

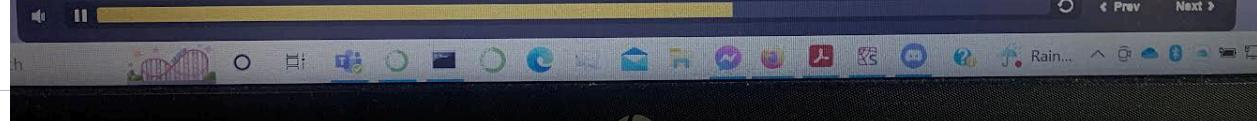
Check Your Understanding

PC 1.8 is sending data to PC 3.6. For each device shown on screen, click a layer in the five-layer model to indicate the highest level of data that device needs to inspect. When you are finished, click **Submit**.

| Application Layer |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| Layer 4 Transport Layer |
| Layer 3 Network Layer |
| Layer 2 Data Link Layer |
| Layer 1 Physical Layer |



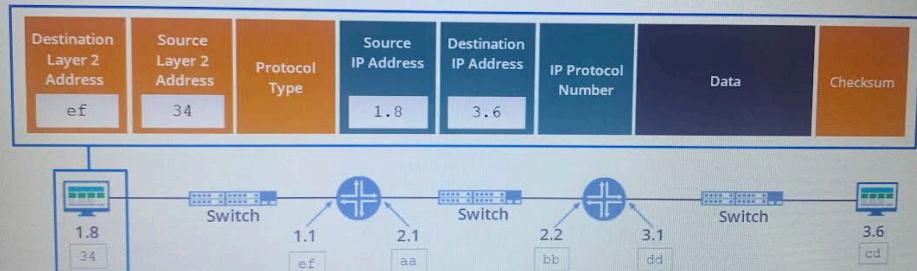
Continue



Check Your Understanding

PC 1.8 is sending data to PC 3.6. For each device that forwards the data, we'll let you complete the addressing (Assume that the address resolution has already taken place). Modify the Layer 2 and Layer 3 addresses as needed to get the data to its destination. If no change is needed, click the **Submit** button. If a change is needed, type into the empty fields on screen, and then click **Submit**.

Device 1 of 7 : PC 1.8 is sending the data. what address should be in each field?



That's still Incorrect!

Here are the correct answers.

[Continue](#)

Check Your Understanding

You have reached the end of this section.

