1- Networking Fundamentals

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Hosts

- ! Hosts are any device which sends or receive traffic
- Anything that sends or receive traffic over a network.
- Hosts typically fall in one of two categories.
  1. Clients (initiate requests)
  2. Servers (respond to the requests)
- Relative to specific communication.

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ip-address

- ! identity of each host.
- you need an ip address to send or receive packets on a network.
- ip address are 32 bits
  - Bit = 1 or 0
  - Represented as four octets

```
10001000000101100001000101100010

1000 1000 . 0001 0110 . 0001 0001 . 0110 0010

   136   .    22    .    17    .    98
```

Network

- ! A network is what transports traffic between.
- Logical grouping of hosts which require similar connectivity.

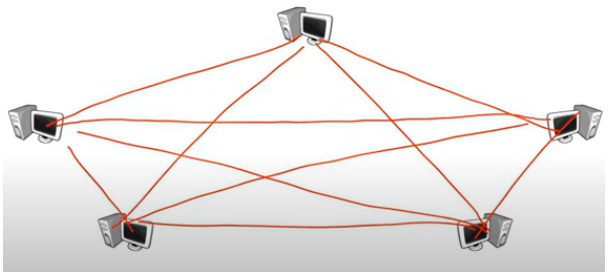
internet

- ! internet is the interconnection of bunch of networks.

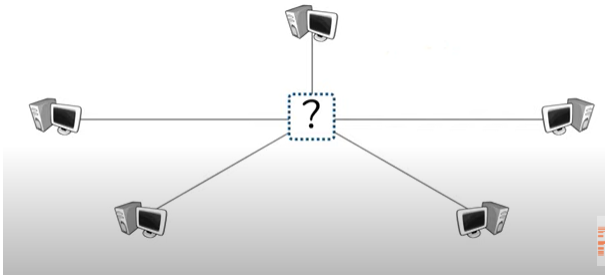
Repeaters

- ! Repeaters regenerate signals.
- Allows communications across greater distances.
- allows to connect devices which spans greater distances.

HUB, Bridge, Switch

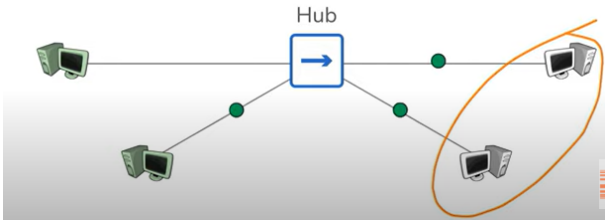


- Connecting hosts directly to each other doesn't scale.
- instead we create devices which could put at the center of every network and connect all the hosts to those devices
- and these devices would then handle funneling communication between different hosts.



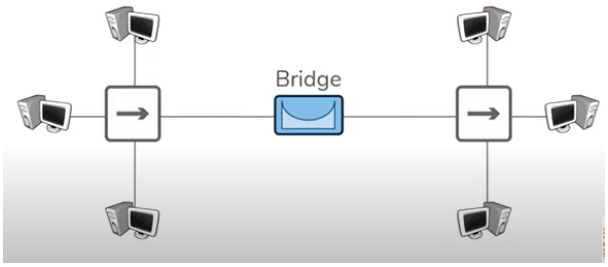
Hub

- ! Hubs are simply multi-port Repeaters
- Repeaters regenerate signals. hubs do the same, except they do on multiple ports.
- Facilitates scaling communication between additional hosts.
- Everyone receives everyone else's data.

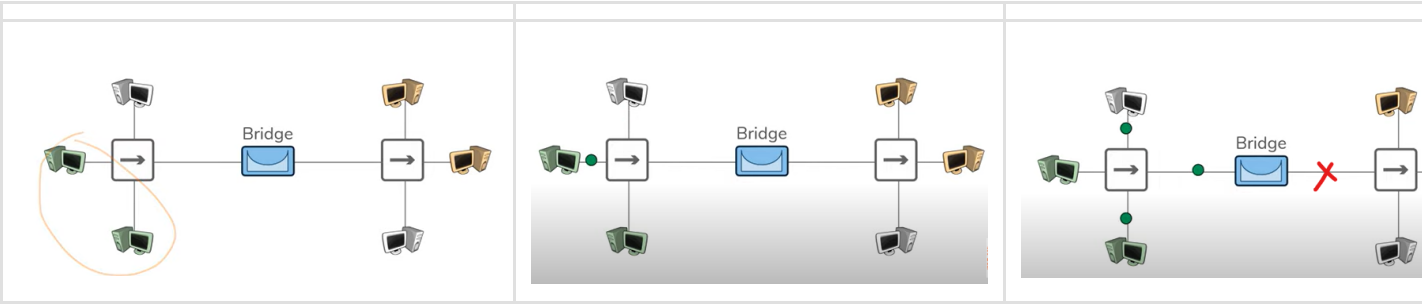


Bridge

- ! Bridges sit between Hub-connected hosts

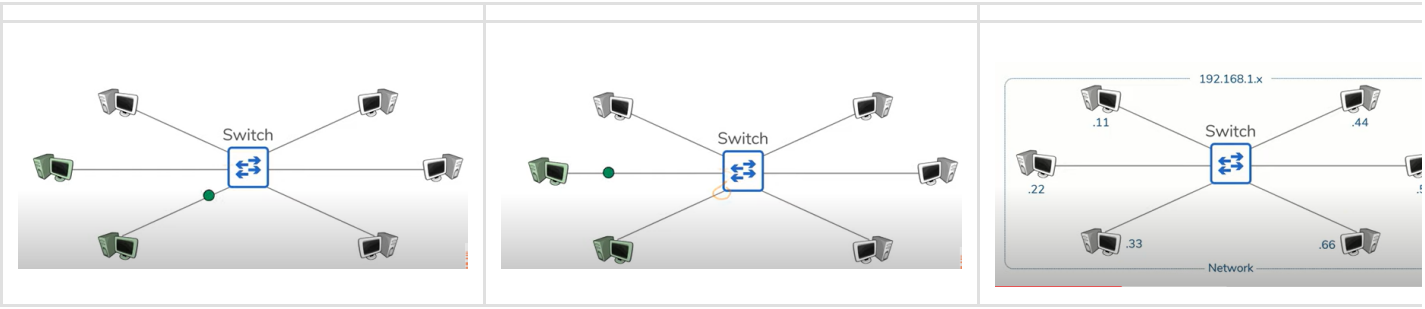


- set sets of hosts interconnected by a hub.
- The bridge is meant to sit in between hub connected hosts.
- have only 2 hosts.
- bridge learn which hosts are on which side, which allows the bridge to contain the communication only to that side necessary.

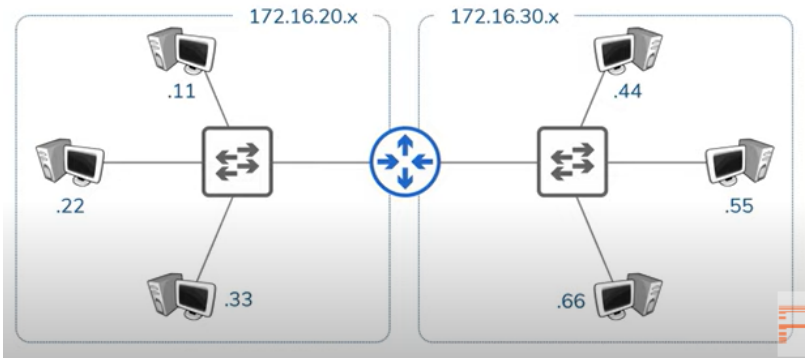


Switches

- ! Switches facilitate communication within a network.
- Switches are a combination of Hubs and Bridges
- Multiple ports.
- Learns which hosts are on each port.

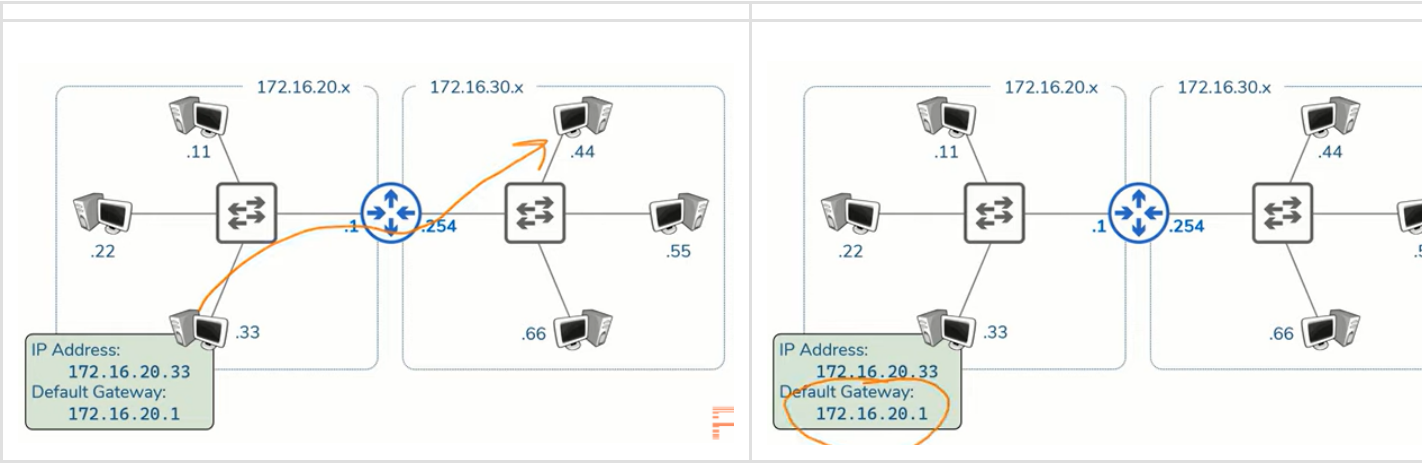


Routers

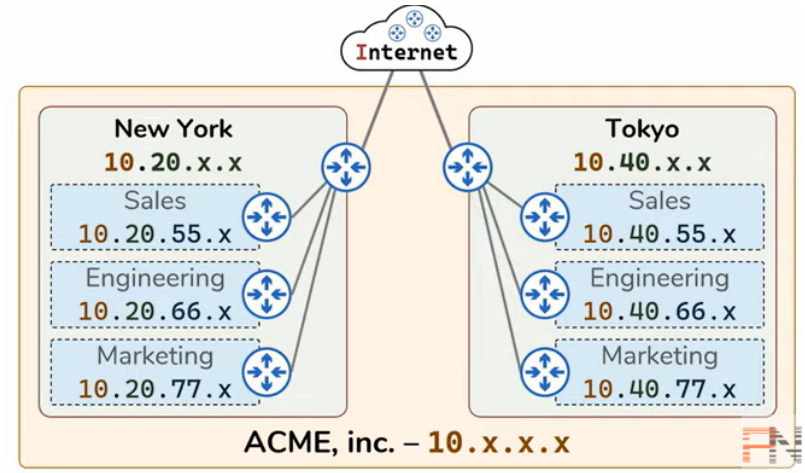


- ! Routers facilitate communication between networks.
- Provides a traffic control point (security, filtering, redirecting).
- Routers learn which networks they are attached to
- Known as Routes - stored in a routing table.

- ! Routing-table - all networks a Router knows about.
- Have IP address in the Networks they are attached to.
- ! Gateway - each host's way out of their local Network.



- Create the Hierarchy in Networks and the entire Internet.



- ! Routing is the process of moving data between networks
  - ! A router is a device whose primary purpose is Routing
- ! Switching is the process of moving data within networks
  - ! A switch is a device who's primary purpose is Switching.