Computer Network (01CE0410)

Lab Manual (2024-25)

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Practical 1: Demonstrate different network devices using Cisco packet tracer.

1. **Hub**

- A network hub is a node that broadcasts data to every computer or Ethernet-based device connected to it. A hub is less sophisticated than a switch, the latter of which can isolate data transmissions to specific devices.

- **Types of Hub:-**

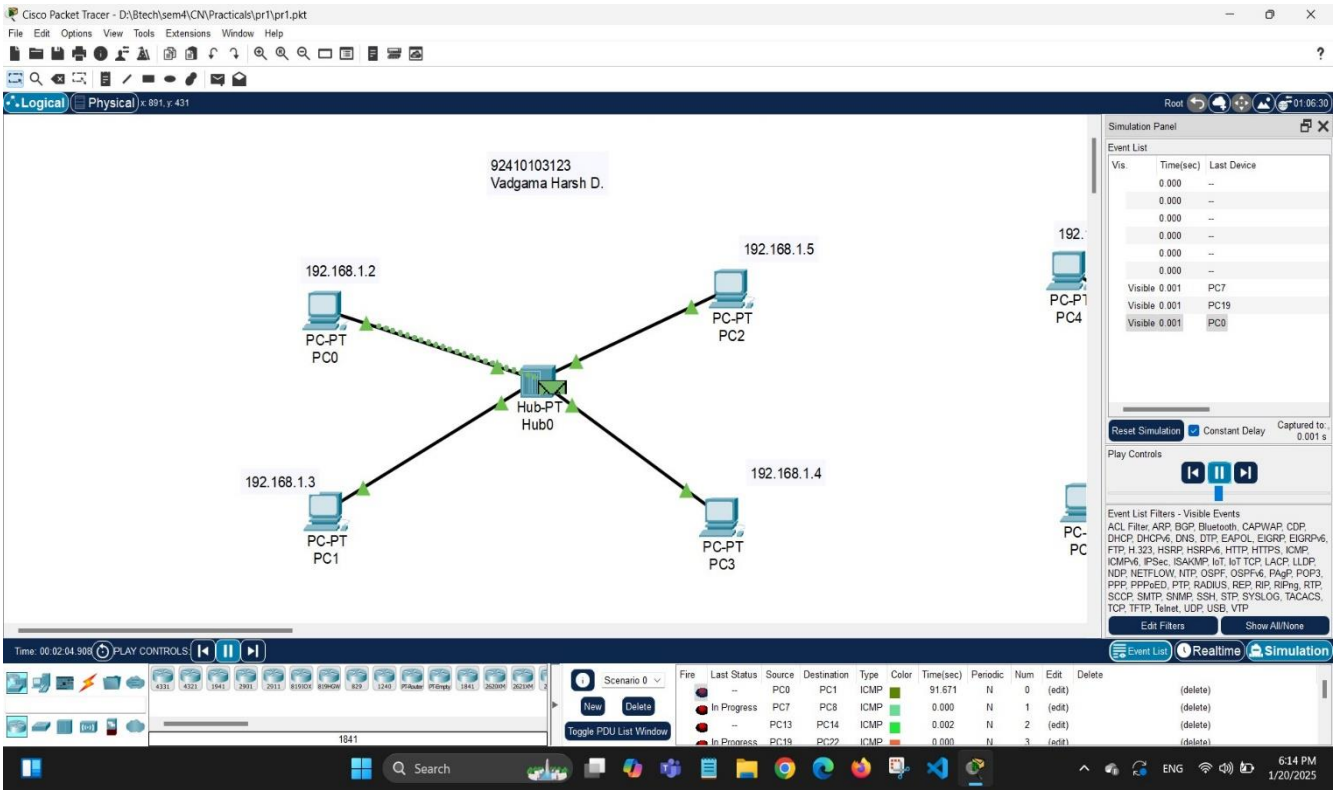
  - **Active Hub:-** Active hubs amplify and regenerate the incoming electrical signals before broadcasting them. They have their own power supply and serves both as a repeater as well as connecting centre.
  - **Passive Hub:-** Passive hubs connects nodes in a star configuration by collecting wiring from nodes. They broadcast signals onto the network without amplifying or regenerating them.
  - **Intelligent Hub:-** Passive hubs connects nodes in a star configuration by collecting wiring from nodes. They broadcast signals onto the network without amplifying or regenerating them.

Hub

- **Advantages:-**

  - Hub is understood for having very less number of performance impacts on the network.
  - Comparing to switches, hubs are really inexpensive. Basically thanks to its sort of simplicity.
  - Hubs can connect different types of media all at once with a central hub.
- **Disadvantages:-**

  - The function of the collision domain and again transfer of packet does not affect actually it increases more chances of collision in between domains.
  - Hubs cannot communicate fully duplex mode, it can only operate in half-duplex mode.
  - Hubs cannot support networks that are large like a token ring.
- **Configuration Screenshot:-**

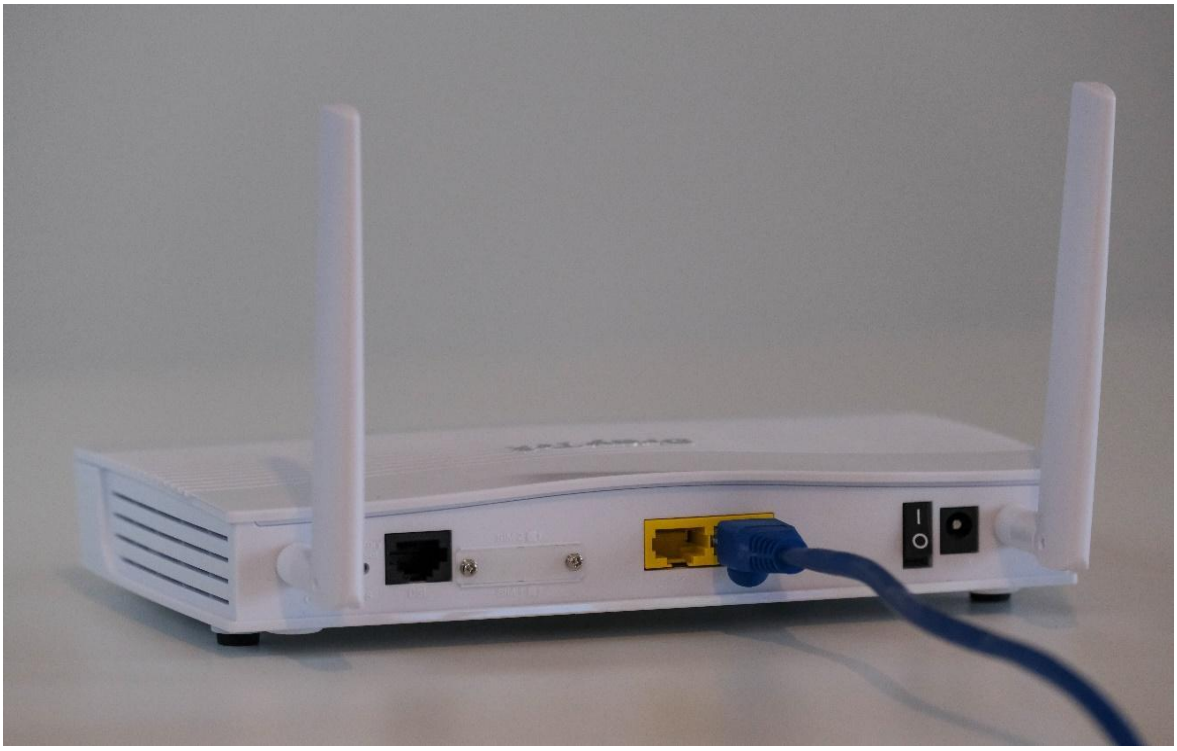


2. Router

- A router is a device that connects multiple networks together and forwards data packets between them based on their IP addresses. It uses routing tables to determine the best path for the packets to take, and can also perform network address translation (NAT) to allow devices on a private network to access the internet.

- **Types of Router:-**

  - **Wireless Router:-** A wireless router is a networking device that connects wireless devices to a network and the internet. It uses radio waves to connect devices to its wireless network, allowing them to communicate with one another and share resources such as printers and files without the need for physical cables. It also routes incoming and outgoing internet traffic for connected devices.
  - **Wired Router:-** A wired router is a networking device that connects wired devices to a network and the internet. It uses Ethernet cables to connect devices to its LAN ports, allowing them to communicate with one another and share resources such as printers and files. It also routes incoming and outgoing internet traffic for connected devices.



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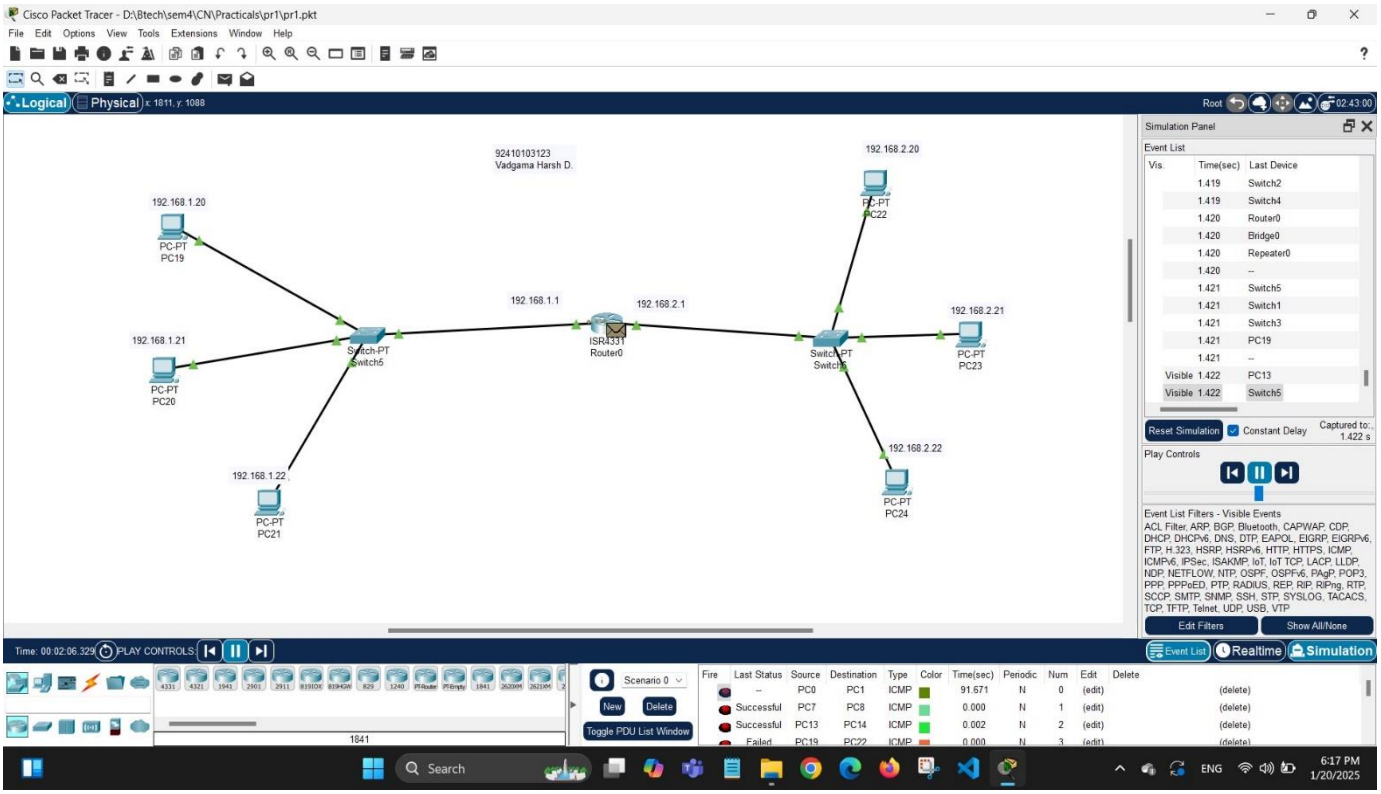


3. Switch

- A switch is a networking device that connects multiple devices together on a network. It forwards data packets between devices on a LAN (Local Area Network) based on the MAC address of the devices. A switch creates a separate collision domain for each connected device, allowing for full-duplex communication, which means that devices can transmit and receive data simultaneously.

Switch

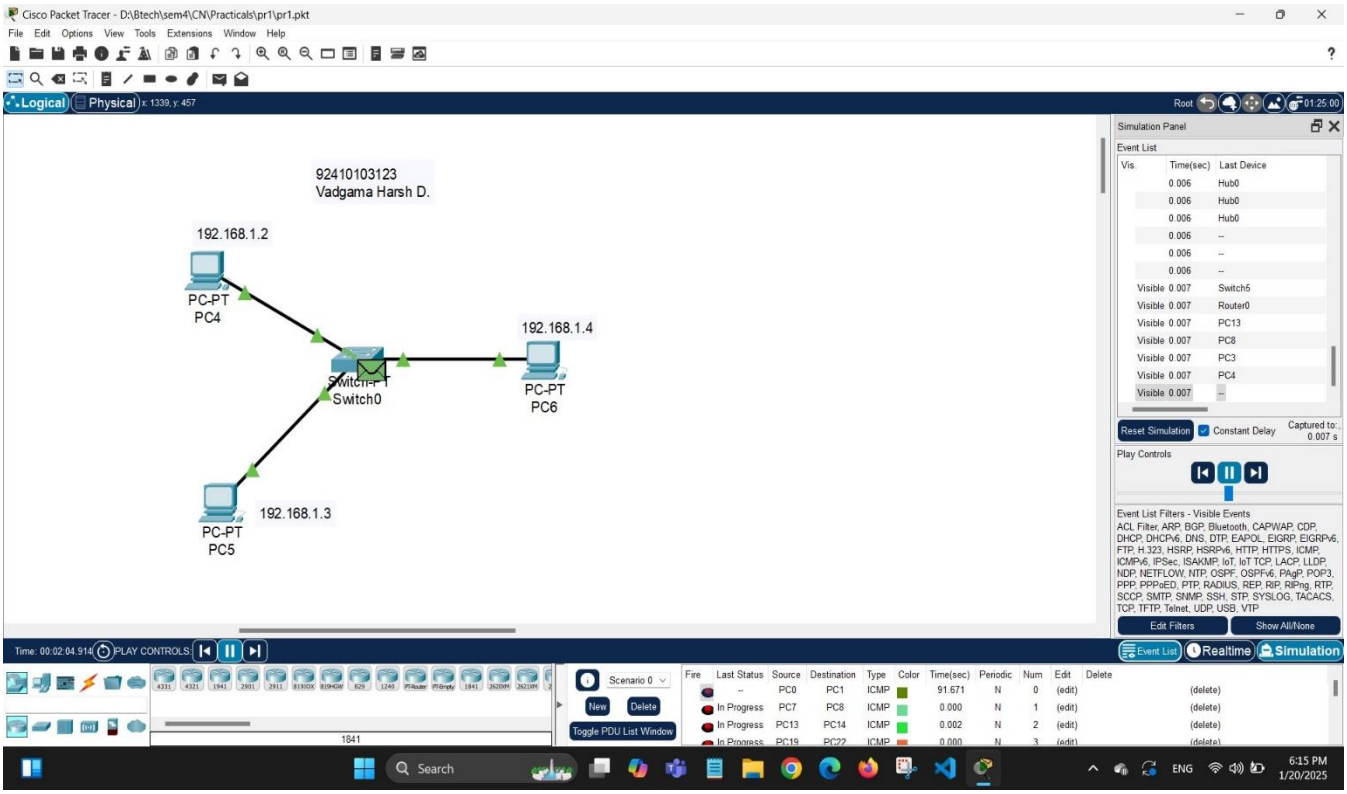
- **Advantages:-**

  - IncreasesCapacity:-Theyincrementtheaccessibledatatransfercapacityoftheorganization.
  - ReducesBurden–Theyhelpinlesseningtheoutstandingburdenonindividualhost.
  - IncrementPresentation–Theyincrementthepresentationoftheorganization.

- **Disadvantages:-**

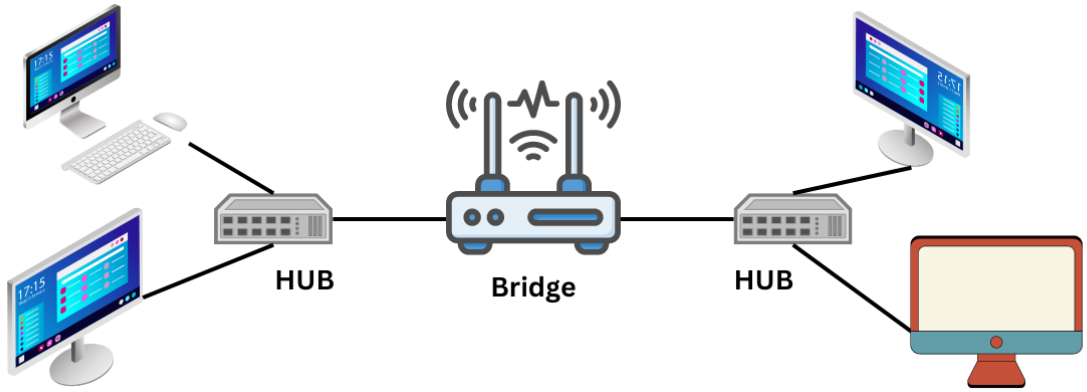
  - Costly – They are more costly in contrast with network spans
  - Tough Availability issues – Network availability issues are hard to be followed through the organization switch.
  - Physical contact is mandatory:-Must have contact with the objectto be actuated.

- **Configuration Screenshot:-**



4. Bridge:-

- A bridge is a networking device that connects multiple network segments together. It forwards data packets between network segments based on the MAC address of the devices. It breaks up a larger network into smaller segments, reducing the amount of traffic on the network, and increasing the security of the network by isolating the segments from one another.



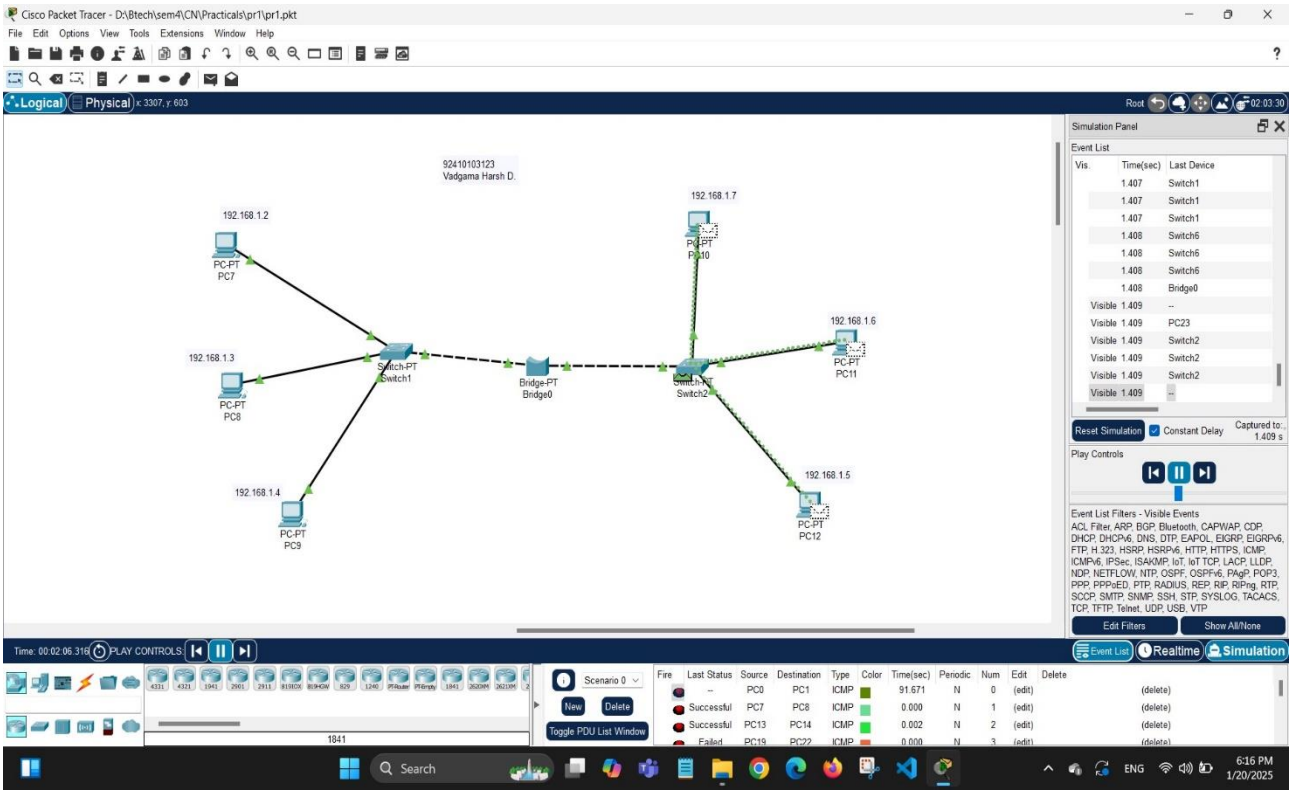
- **Advantage:-**

- Connects multiple network segments
- Reduces network traffic
- Increases network security by isolating segments.

- **Disadvantage:-**

- Limited scalability
- Can cause network loops
- Not suitable for large networks.

- **Configuration Screenshot:-**



5. Repeater:-

- A repeater is a networking device that amplifies and retransmits signals to extend the range of a network. It receives signals from one network segment and retransmits them to another, allowing devices in a far location to communicate with each other. It operates on the physical layer of the OSI model, and it does not alter the packet structure of the received data.

- **Advantage:-**

- Extends network range
- Increases network coverage
- Improves connectivity for remote devices.

- **Disadvantage:-**

- Limited signal amplification
- Decrease in network performance
- Increases network latency.

- **Configuration Screenshot:-**