

**Name: Zohaib Karamat**

**Roll No: SU92-BSSEM-F22-207**

**Subject: Computer Networks Lab**

**Lab Task 01**

**Date: 20-09-2024**

**Submitted To: Sir Rasikh**

**Section: 5D**

**Task 1:**

**What is the difference between all the routers, and when to use them (mentioned in cisco packet tracer)**

**Sol:**

**Differentiation of Routers:**

1. **Cisco ISR 4000 Series:**
   * **4331, 4321:** High-performance, integrated services routers (ISR) with modularity and scalability for branch or medium enterprises.
2. **Cisco ISR 1900 and 2900 Series:**
   * **1941, 2901, 2911:** Integrated services routers aimed at small to medium businesses with support for multiple services like data, voice, and video.
3. **Cisco 819 Series:**
   * **819IOX, 819HGW:** Ruggedized routers designed for harsh environments or mobile applications. Support for cellular, Wi-Fi, and Ethernet connections.
4. **Cisco 800 Series:**
   * **829:** Designed for secure machine-to-machine (M2M) applications and IoT deployments. Suitable for industrial or remote locations.
5. **Legacy Cisco Routers:**
   * **1240, 1841, 2600XM, 2621XM, 2811:** Older router models used primarily in smaller businesses or legacy environments. Modular and flexible but have lower performance compared to newer models.
6. **Packet Tracer Simulation Routers:**
   * **PT-Router, PT-Empty Router:** Simulation-only routers used in Cisco's Packet Tracer software for educational and learning purposes.

**When to Use Them in Networking:**

1. **Cisco ISR 4000 Series:**
   * **4331, 4321:** Use these routers in medium-to-large branch offices that require high throughput, modular expansion (for WAN or LAN interfaces), and advanced security features. These routers are ideal for companies needing scalability as they grow or add more services like VPNs, firewall, or voice services.
2. **Cisco ISR 1900 and 2900 Series:**
   * **1941, 2901, 2911:** These routers are used in small to medium-sized businesses or branch offices. They are ideal when you need a flexible router that supports multiple services like voice, video, and security. They provide integrated services with the ability to add modular expansions for future needs.
3. **Cisco 819 Series:**
   * **819IOX, 819HGW:** Use these routers in remote, mobile, or industrial environments. They are designed for rugged conditions like transportation, oil and gas, or any mobile network requirements. They support cellular connectivity for WAN, making them ideal for vehicular networks or places without fixed line access.
4. **Cisco 800 Series:**
   * **829:** This router is perfect for IoT deployments, machine-to-machine communication, and industrial automation. If you are working on a project that requires secure, reliable communication between devices in harsh or remote environments, the Cisco 829 is the go-to solution.
5. **Legacy Cisco Routers:**
   * **1240, 1841, 2600XM, 2621XM, 2811:** These routers are typically used in older network setups or organizations that still rely on legacy systems. They are more suited for smaller businesses or branch offices with limited performance requirements. The modular capabilities of these routers allow for some customization, but they are largely outdated compared to modern models.
6. **Packet Tracer Simulation Routers:**
   * **PT-Router, PT-Empty Router:** These are only used in the Cisco Packet Tracer simulation environment for networking students or professionals who are learning to configure and manage Cisco routers in a virtual lab. They help users simulate real-world networking setups without needing actual hardware.

**Task 2: What is the difference between all the switches, and when to use them (mentioned in cisco packet tracer)**

### **Sol: Differentiation of Switches:**

1. **Cisco 2960**:
   * This is a fixed-configuration Layer 2 switch with basic Layer 3 capabilities, typically used in small to medium-sized businesses. It supports standard switching features like VLANs, port security, and Quality of Service (QoS).
2. **PT-Switch**:
   * A simulated switch used in Cisco Packet Tracer, designed for educational purposes. It allows users to practice configuring basic switching features but does not represent a specific hardware model.
3. **PT-Empty**:
   * This represents a placeholder or an unconfigured switch in Packet Tracer. It is a blank template that users can configure to simulate various networking scenarios.
4. **Cisco 3560-24PS**:
   * A Layer 3 switch that supports both PoE (Power over Ethernet) and basic routing capabilities. It is designed for small enterprise networks requiring routing and switching capabilities along with PoE support.
5. **Cisco 3560-24TS**:
   * Similar to the 3560-24PS but without PoE support. It’s a Layer 3 switch used in small and medium-sized networks where routing and advanced switching are needed but without the need to power devices like IP phones or cameras.
6. **Cisco IE 2000**:
   * This is an industrial Ethernet switch, ruggedized for use in harsh environments such as manufacturing or transportation. It is designed to handle extreme conditions with high durability.
7. **PT-Bridge**:
   * A simulated bridge in Cisco Packet Tracer used to learn about basic Layer 2 bridging. It’s a legacy technology often used in learning environments to teach foundational networking concepts.
8. **Cisco 2950-24**:
   * A fixed-configuration Layer 2 switch that provides basic Ethernet switching capabilities. It’s an older switch model typically used in small networks that don’t require Layer 3 routing functions.
9. **Cisco 2950T**:
   * Another variant of the Cisco 2950 series with the addition of Gigabit Ethernet uplink ports, making it suitable for connecting to faster backbone networks while still providing Layer 2 switching.

### **When to Use Them in Networking:**

1. **Cisco 2960**:
   * **When to Use**: Use this switch in small-to-medium business networks where basic Layer 2 features like VLAN segmentation, port security, and basic Layer 3 functionalities (like static routing) are needed. It’s a cost-effective choice for access layer switching in corporate environments.
2. **PT-Switch**:
   * **When to Use**: This is ideal for learning and practicing basic switch configurations in Cisco Packet Tracer. You would use this when simulating network environments for educational purposes rather than in real-world deployment.
3. **PT-Empty**:
   * **When to Use**: This is a blank switch used for practice and experimentation in Packet Tracer. You can simulate and configure it to replicate a variety of switch functionalities and network behaviors.
4. **Cisco 3560-24PS**:
   * **When to Use**: Use this switch in enterprise networks where Layer 3 routing and Power over Ethernet (PoE) are required. It's commonly found in environments with IP phones, wireless access points, and surveillance cameras that need both power and network connectivity.
5. **Cisco 3560-24TS**:
   * **When to Use**: This is suitable for environments where Layer 3 routing is needed but without PoE. It can be deployed in small-to-medium enterprises where advanced routing and switching are required, but the network devices don’t require external power from the switch.
6. **Cisco IE 2000**:
   * **When to Use**: This switch is used in industrial networks that need to withstand harsh environments like manufacturing floors, transportation, or outdoor settings. It supports high availability and reliability in extreme temperatures or environments with significant vibration or dust.
7. **PT-Bridge**:
   * **When to Use**: A learning tool in Cisco Packet Tracer, this is useful for students or professionals who are learning about the foundational concepts of Layer 2 bridging. It’s primarily an educational device for understanding how bridges connect network segments.
8. **Cisco 2950-24**:
   * **When to Use**: Use this switch in small or legacy networks where only Layer 2 switching is needed. It is typically found in older networks that don’t require advanced features like Layer 3 routing.
9. **Cisco 2950T**:
   * **When to Use**: Similar to the 2950-24 but with Gigabit Ethernet uplinks, it is used in networks where faster backbone connections are required. It is ideal for connecting smaller networks to a larger, faster backbone.

**Task 3: What is the difference between all the connection wires, and when to use them (mentioned in cisco packet tracer)**

**Sol:**

1. **Lightning Bolt (Automatic)**

**Description**: This is an automatic selection mode. Cisco Packet Tracer will choose the appropriate cable based on the devices being connected.

**Use Case**: Use this when you are not sure which cable is required. Packet Tracer will select the best one for you.

1. **Light Blue Curved Line (Console Cable)**

**Description**: This is a console cable (also known as a rollover cable).

**Use Case**: Use this to connect a PC to a router's or switch's console port for configuration.

1. **Black Solid Line (Copper Straight-Through)**

**Description**: This is a straight-through copper cable.

**Use Case**: Use this to connect different types of devices, such as connecting a PC to a switch or a switch to a router.

1. **Black Dashed Line (Copper Crossover Cable)**

**Description**: This is a crossover copper cable.

**Use Case**: Use this to connect similar devices, such as PC to PC, switch to switch, or router to router.

1. **Orange Solid Line (Fiber)**

**Description**: This represents a fiber optic cable.

**Use Case**: Use this when connecting devices over long distances or when high bandwidth is required, such as between two switches or routers that support fiber optics.

1. **Black Dotted Line (Phone Line)**

**Description**: This is a phone cable, typically used for dial-up connections.

**Use Case**: Use this to connect devices that use telephony or when simulating legacy telecommunication setups.

1. **Yellow Solid Line (Coaxial Cable)**

**Description**: This is a coaxial cable.

**Use Case**: Use this when connecting devices using older technologies like cable modems.

1. **Blue Solid Line (Serial DCE Cable)**

**Description**: This is a serial cable (DCE).

**Use Case**: Use this to connect routers together in a WAN configuration, typically with one router acting as the DCE (data communications equipment).

1. **Red Solid Line (Serial DTE Cable)**

**Description**: This is a serial cable (DTE).

**Use Case**: Use this when connecting routers in a WAN, where the device acts as DTE (data terminal equipment).

1. **Green Solid Line (Octal Cable)**

**Description**: This is an octal cable, used to connect multiple devices to a terminal server.

**Use Case**: Use this to connect multiple routers or switches to a terminal server for configuration.

1. **Brown Solid Line (IoT Custom Cable)**

**Description**: This is a custom cable used specifically for IoT (Internet of Things) devices.

**Use Case**: Use this to connect various IoT devices in Cisco Packet Tracer. It allows you to create custom connections for IoT simulations that aren't covered by traditional networking cables.

1. **Purple Solid Line (USB Cable)**

**Description**: This represents a USB cable.

**Use Case**: Use this to connect devices that use USB ports, such as a USB connection between a PC and a networking device like a router, for configuration or data transfer.