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Question 01

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

In **Cisco Packet Tracer**, different types of routers are available, each with its own capabilities, features, and use cases. Routers play a key role in routing traffic between networks. Here's a breakdown of the different routers available in Cisco Packet Tracer and when to use them:

* **1841 Router**
* **Description**: A basic and commonly used router model in small to medium-sized networks.
* **Interfaces**: FastEthernet and Serial interfaces.
* **Use Case**: Suitable for learning basic routing concepts, small branch offices, and labs that require simple routing protocols like RIP, EIGRP, or OSPF. It is perfect for low-traffic environments.
* **When to use**: When you are working with a small network or need basic routing capabilities without requiring advanced features.
* **2. 1941 Router**
* **Description**: A step up from the 1841 model, offering more interfaces and modularity.
* **Interfaces**: Additional GigabitEthernet ports, FastEthernet, and Serial interfaces.
* **Use Case**: Great for more complex labs or medium-sized networks that need additional routing protocols or higher performance.
* **When to use**: When you need to configure more advanced routing protocols or work in a medium-sized network environment requiring Gigabit connectivity.
* **3. 2900 Series Routers (2911)**
* **Description**: Part of the Cisco Integrated Services Router (ISR) series, offering more powerful hardware and a variety of features.
* **Interfaces**: Multiple GigabitEthernet ports, high-speed WAN interfaces, and modular slots for expansion.
* **Use Case**: Ideal for large-scale enterprise networks or more advanced network labs requiring high throughput and modular features like voice or security.
* **When to use**: When you are dealing with a larger network setup that requires both routing and integrated services like firewalling, voice, or VPN features.
* **4. ISR 4000 Series Routers (4321)**
* **Description**: Part of the modern ISR series, the 4000 series routers offer greater processing power, memory, and integrated services, such as advanced security.
* **Interfaces**: GigabitEthernet ports, support for modular WAN, and integrated security features.
* **Use Case**: Used in complex, high-traffic environments with services such as WAN optimization, security, or cloud connectivity.
* **When to use**: When you require high performance, advanced features like cloud connectivity, security, or the need to route large volumes of traffic in an enterprise or data center environment.
* **5. PT-Generic Router**
* **Description**: A simplified generic router used in Packet Tracer for basic routing tasks.
* **Interfaces**: Standard Ethernet and Serial interfaces.
* **Use Case**: Good for learning the basics of routing or small projects where you don’t need a specific model.
* **When to use**: When your goal is to practice fundamental routing concepts without any advanced or specific hardware features.
* **6. PT-Empty Router**
* **Description**: This router is modular and comes with no interfaces by default. You can add interfaces manually to configure it as needed.
* **Interfaces**: Customizable (Ethernet, Serial, Fiber, etc.).
* **Use Case**: Perfect for testing and experimenting with different network setups by adding the exact interface modules required.
* **When to use**: When you want full flexibility in setting up custom configurations and trying out different networking topologies.
* **7. 800 Series Routers (ISR 800)**
* **Description**: A compact router suitable for small office and home office (SOHO) environments.
* **Interfaces**: Basic Ethernet and WAN interfaces, with limited expandability.
* **Use Case**: Used in small office setups with limited requirements.
* **When to use**: When you're working with a small business or home network and only need basic routing capabilities.
* **8. PT-Cloud**
* **Description**: The cloud device in Cisco Packet Tracer is not a router in the traditional sense but represents the broader internet or a WAN network.
* **Interfaces**: Typically allows multiple connection types like DSL, Cable, Fiber, and Ethernet.
* **Use Case**: Used to simulate an ISP or a WAN network in Packet Tracer.
* **When to use**: When you want to connect your network to an external ISP, emulate the internet, or simulate WAN services

**When to Use a Specific Router:**

**Learning Basic Routing**: Use **1841** or **1941** routers for simple labs and learning about basic routing protocols like RIP, EIGRP, or OSPF.

**Medium-Sized Networks**: The **2900 series** router is suitable for intermediate networking tasks and scenarios where GigabitEthernet connectivity is necessary.

**Large Enterprise or Advanced Features**: The **ISR 4000 series** routers are ideal for handling complex, high-performance environments with integrated services like security or voice.

**Flexibility and Custom Configurations**: Use the **PT-Empty Router** to add custom modules and interfaces for a flexible lab environment.

**Question 02**

### Cisco 2960 Switch

* **Type**: Layer 2 switch
* **Key Features**: Supports VLANs, STP (Spanning Tree Protocol), port security, and basic QoS.
* **Use Case**: Ideal for small to medium-sized networks requiring only Layer 2 switching without routing. Suitable for basic LAN segmentation and security.

### Cisco 2950 Switch

* **Type**: Layer 2 switch
* **Key Features**: Supports basic VLANs, STP, and basic port security but lacks advanced features.
* **Use Case**: Used in small networks or for learning purposes when advanced Layer 2 features are not needed.

### Cisco 3560 Switch

* **Type**: Layer 3 switch (Multi-layer)
* **Key Features**: Provides both Layer 2 switching and Layer 3 routing capabilities. Supports routing protocols (OSPF, EIGRP), inter-VLAN routing, QoS, and advanced security features.
* **Use Case**: Suitable for medium to large networks where routing between VLANs or subnets is required. Typically used in enterprise networks or campus environments.

### Cisco 3650 Switch

* **Type**: Layer 3 switch (Multi-layer)
* **Key Features**: Advanced Layer 3 capabilities, with support for routing protocols (OSPF, EIGRP, BGP), high-performance inter-VLAN routing, extensive QoS, and PoE (Power over Ethernet).
* **Use Case**: Used in larger networks where both high-performance switching and routing are needed. Ideal for enterprise environments requiring advanced routing, QoS, and PoE for IP phones or wireless access points.

### PT-Switch

* **Type**: Layer 2 switch (Generic in Packet Tracer)
* **Key Features**: Basic switch functionality with support for VLANs and basic Layer 2 operations. Limited in advanced features compared to the Cisco-specific models.
* **Use Case**: Used for simple network simulations or for beginners learning basic network concepts in Cisco Packet Tracer.

### PT-Empty Switch

* **Type**: Empty switch chassis (Customizable)
* **Key Features**: Allows users to add and configure their own modules and interfaces.
* **Use Case**: Used when simulating custom-built switches with specific interface needs. Ideal for simulations that require flexibility in terms of hardware configuration.

### Cisco IE 2000 Switch

* **Type**: Industrial Ethernet Switch (Layer 2)
* **Key Features**: Rugged design, designed for harsh environments, supports VLANs, STP, and advanced security features.
* **Use Case**: Best used in industrial networks, transportation, and energy sectors where rugged, reliable connectivity is required in challenging environments.

### Cisco 2950T Switch

* **Type**: Layer 2 switch (with gigabit uplink)
* **Key Features**: Similar to the 2950 but includes Gigabit Ethernet uplink ports for faster backbone connectivity.
* **Use Case**: Suitable for small networks needing basic VLANs and STP, with the added need for high-speed uplink to the core network or backbone.

### PT Bridge

* **Type**: Basic bridge device (Layer 2)
* **Key Features**: Simplistic device used to connect different network segments, no VLAN support or advanced switching capabilities.
* **Use Case**: Used in very basic network simulations for connecting small segments or devices. Rarely used in modern simulations as switches offer more functionalit

**Question 03**

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

### Console Cable

* **Use**: Connects a computer (PC or laptop) to a router or switch for configuration via CLI.
* **Purpose**: Primarily used for device management and configuration via the console port.

### Straight-Through Cable

* **Use**: Connects different types of devices (e.g., PC to switch, switch to router).
* **Purpose**: Commonly used for connecting end devices (like computers) to networking devices like switches and routers.

### Copper Crossover Cable

* **Use**: Connects similar devices (e.g., PC to PC, switch to switch, router to router).
* **Purpose**: Used when connecting two devices of the same type without the need for a switch.

### Fiber Cable

* **Use**: Connects devices over long distances, typically in a WAN environment or backbone connections.
* **Purpose**: Used for high-speed, long-distance communication, often between switches or routers in large networks.

### Phone Cable

* **Use**: Connects VoIP phones to switches or voice-enabled routers.
* **Purpose**: Specifically for voice communication in VoIP setups.

### Coaxial Cable

* **Use**: Used in WAN emulation scenarios, particularly when simulating older broadband technologies.
* **Purpose**: Provides a physical medium for cable-based WAN connections or legacy network setups.

### serial DCE Cable

* **Use**: Connects routers via serial interfaces in a WAN setup where one side provides the clocking signal (DCE).
* **Purpose**: Required for WAN links where the router needs to control the clock rate (commonly used in simulations for point-to-point WAN connections).

### Serial DTE Cable

* **Use**: Connects routers via serial interfaces in a WAN setup where no clock rate is required (DTE side).
* **Purpose**: Used in WAN links where the device receiving the data (DTE) does not control the clocking rate.