***THE SUPERIOR UNIVERSITY***

***COMPUTER NETWORKS (LAB)***

***TASK # 1***

**SUBMITTED TO**

***Sir Rasikh Ali***

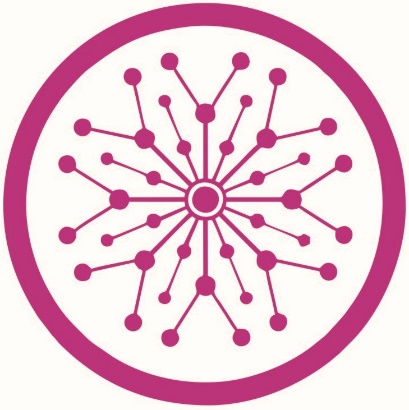
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**Submission Date: 00-00-0000**

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***Task 1:***

***What is the difference between all the routers, and when to use them***

***(mentioned in cisco packet tracer)***

***Answer:***

Cisco Packet Tracer provides a range of routers, each designed to serve different networking needs and scenarios. Here’s a rundown of the common types of routers you might encounter in Packet Tracer, along with their typical use cases:

1. **Cisco 800 Series (e.g., 8800):**

* Purpose: These are entry-level routers designed for small to medium-sized businesses or branch offices.
* Use Case: Ideal for simple network configurations, small office/home office (SOHO) environments, and basic network routing tasks.

1. **Cisco 1800 Series (e.g., 1841):**

* Purpose: Offers more advanced features compared to the 800 series and is intended for small to medium-sized businesses.
* Use Case: Suitable for businesses that require more processing power, additional security features, and support for various network protocols.

**3. Cisco 2800 Series (e.g., 2811, 2821, 2851):**

* Purpose: These routers are designed for medium-sized to larger networks and provide better performance and scalability than the 1800 series.
* Use Case: Ideal for enterprise branch offices or small to medium-sized networks needing higher throughput and more advanced features like VoIP and VPN support.

**4. Cisco 2900 Series (e.g., 2911, 2921, 2951):**

* Purpose: Provides higher performance, modularity, and advanced features, making them suitable for more complex network environments.
* Use Case: Suitable for medium to large-sized businesses or enterprise branch offices that require high performance, modular expansion, and advanced services like secure WAN connectivity and network management.

**5. Cisco 3900 Series (e.g., 3925, 3945):**

* Purpose: High-end routers designed for larger networks or enterprise environments requiring high performance, extensive scalability, and advanced features.
* Use Case: Ideal for large enterprise branch offices or data centers that need robust performance, high throughput, and support for multiple services and applications.

**6. Cisco ASR (Aggregation Services Router) Series (e.g., ASR 1000):**

* Purpose: Designed for service provider environments and large enterprise networks. They offer high performance and are optimized for aggregation and core routing.
* Use Case: Suitable for high-bandwidth applications, large-scale WAN and data center deployments, and network aggregation.

**7. Cisco ISR (Integrated Services Router) Series (e.g., ISR 4000):**

* Purpose: Designed for integrated services including routing, security, and application optimization.
* Use Case: Ideal for businesses that need to consolidate multiple services into a single device, such as routing, security, and WAN optimization.

***When to Use Each Router:***

* **Entry-Level Routers (800, 1800):**

Use for small networks, simple setups, or learning purposes where advanced features are not required.

* **Mid-Range Routers (2800, 2900):**

Use for medium-sized businesses needing higher performance, modularity, and additional features for more complex configurations.

* **High-End Routers (3900, ASR):**

Use for large enterprises or service providers where high performance, scalability, and advanced features are necessary.

* **Integrated Services Routers (ISR):**

Use when you need to combine multiple network functions into a single device, such as in environments where space, power, or budget constraints are a concern.

***Task 2:***

***What is the difference between all the switches, and when to use them***

***(mentioned in cisco packet tracer)***

***Answer:***

### 1. ****Switch (Generic Layer 2 Switch)****

* **Description:** The most common type of switch used in local area networks (LANs). It operates at Layer 2 (Data Link layer) of the OSI model.
* **Use Case:** Use for basic LAN connectivity where no advanced features like VLANs or routing are needed.

### 2. ****Layer 3 Switch****

* **Description:** A switch that can perform routing functions in addition to switching. It operates at Layer 3 (Network layer).
* **Use Case:** Use when you need to route traffic between different VLANs or subnets. Ideal for larger networks that require inter-VLAN routing.

### 3. ****VLAN Switch (Virtual LAN Switch)****

* **Description:** A Layer 2 switch that supports Virtual LANs, allowing you to segment a network into different logical networks.
* **Use Case:** Use when you need to improve network performance and security by isolating broadcast domains. Ideal for organizations with different departments.

### 4. ****Stackable Switch****

* **Description:** Switches that can be stacked together to operate as a single switch. This configuration allows for easy expansion and management.
* **Use Case:** Use in environments where scalability is needed. Ideal for growing networks that may require additional ports without significant changes to infrastructure.

### 5. ****Managed Switch****

* **Description:** A switch that provides advanced features such as VLAN support, QoS, and port mirroring. It can be configured and monitored.
* **Use Case:** Use in enterprise environments where you need more control over the network, monitoring capabilities, or specific performance features.

### 6. ****Unmanaged Switch****

* **Description:** A basic switch with no configuration options. It operates out of the box and is typically plug-and-play.
* **Use Case:** Use in small networks or home environments where simple connectivity is needed without the need for advanced features.

### Summary of Use Cases:

* **Basic LAN Connectivity:** Generic Layer 2 Switch
* **Inter-VLAN Routing:** Layer 3 Switch
* **Network Segmentation:** VLAN Switch
* **Scalability Needs:** Stackable Switch
* **Advanced Network Management:** Managed Switch
* **Simple Plug-and-Play:** Unmanaged Switch

### Choosing the Right Switch

When selecting a switch, consider factors like network size, required features (such as VLANs or routing), and future scalability needs. This will help ensure you choose the appropriate type for your specific situation.

***Task 3:***

***What is the difference between all the connection wires, and when to use them***

***(mentioned in cisco packet tracer)***

***Answer:***

### 1. ****Straight-Through Cable****

* **Description:** A cable where the pinouts are the same on both ends. Typically, it uses T568A or T568B wiring standards.
* **Use Case:**
  + Connecting devices of different types, such as a computer to a switch or router.
  + Connecting switches to routers.

### 2. ****Cross-Over Cable****

* **Description:** A cable where the transmit and receive pins are crossed. It uses T568A on one end and T568B on the other.
* **Use Case:**
  + Connecting similar devices directly, such as switch-to-switch or computer-to-computer.
  + Useful in older equipment where Auto-MDI/MDI-X is not supported.

### 3. ****Rolled Cable (Console Cable)****

* **Description:** A specialized cable that has a serial connection on one end (typically a DB-9 or RJ-45) and connects to the console port of networking devices.
* **Use Case:**
  + Connecting a computer's serial port to the console port of routers and switches for configuration and management.

### 4. ****Fiber Optic Cable****

* **Description:** A cable that uses light to transmit data over long distances. It can be single-mode or multi-mode.
* **Use Case:**
  + Connecting devices over long distances, such as between buildings.
  + Used in high-speed, high-bandwidth environments where electromagnetic interference is a concern.

### 5. ****Coaxial Cable****

* **Description:** A cable with a central conductor, insulating layer, and outer conductive shield. Typically used for cable internet and television.
* **Use Case:**
  + Connecting to broadband modems or television systems.
  + Not commonly used in standard networking but may be relevant in specific legacy setups.

### Summary of Cable Uses:

* **Straight-Through Cable:** Computer to switch/router, switch to router.
* **Cross-Over Cable:** Switch to switch, computer to computer.
* **Rolled Cable:** Computer to console port of network devices for configuration.
* **Fiber Optic Cable:** Long-distance connections, high-speed networks.
* **Coaxial Cable:** Broadband connections, television systems.

### Choosing the Right Cable

When selecting a cable, consider the types of devices you are connecting and their respective needs. Understanding the specific roles of each cable type will ensure effective and efficient network connections.