Tasks for Network Designers

The network design team is responsible for creating a **secure, scalable, and cost-effective** network for the new office building using **Cisco Packet Tracer**. Here's a breakdown of everything you need to do:

---

1. Analyse Requirements

- Review the **building layout** (offices, server room, open floor space, etc.).
- Identify **device counts** (wired/Wi-Fi) per section (e.g., 13 offices × 4 wired APs).
- Note **bandwidth requirements**:
  - **Wired**: 50 Mbps synchronous per device.
  - **Wi-Fi**: 10 Mbps synchronous per device.
- Treat **Wi-Fi devices as untrusted** (isolate them from wired networks).

---

2. Design the Network Topology

Key Components

Device	Purpose	Placement
Core Router	Connects to ISP, routes traffic between VLANs.	Machine Room (Server Room).
Switches	- **Distribution switches** (for major sections like offices, open space).	Machine Room & key areas.
	- **Access switches** (for end devices, ≤8 ports outside the server room).	Near workstations.
Wireless APs	Provide Wi-Fi (isolated VLAN for untrusted devices).	Ceiling-mounted.
Servers	DHCP, DNS, file storage (provided by the company).	Machine Room.

Network Segmentation (VLANs)

VLAN	Purpose	Devices
VLAN 10	Wired Office Devices	Desktops, wired APs.
VLAN 20	Wi-Fi (Untrusted)	Staff/guest phones, laptops.
VLAN 30	Servers & Infrastructure	DHCP, DNS, file servers.
VLAN 40	IoT Devices	Kitchen/meeting room smart devices.
VLAN 50	Technicians' Network	Direct access to servers.

IP Addressing & Subnetting

- Use **private IP ranges** (e.g., `10.0.10.0/24` for VLAN 10).
- Assign **static IPs** to servers, routers, and switches.
- Configure **DHCP pools** for dynamic client IPs (e.g., `10.0.10.100-200`).

---

3. Implement in Packet Tracer

Step-by-Step Setup

1. **Place Devices**:
   - Drag and drop routers, switches, APs, and PCs into the layout.
   - Connect them with **Copper Straight-Through** (PC-to-switch) or **Fiber** (switch-to-router).
2. **Configure VLANs**:

```
! Example: Creating VLAN 10 on a switch
enable
configure terminal
vlan 10
name Office_Wired
exit
interface range fa0/1-24
switchport mode access
switchport access vlan 10
end
```

3. **Set Up Routing**:
   - Enable **inter-VLAN routing** on the core router.

```
! Example: Router subinterface for VLAN 10
interface GigabitEthernet0/0.10
encapsulation dot1Q 10
ip address 10.0.10.1 255.255.255.0
```

4. **Configure Wi-Fi**:
   - Create a **separate SSID** for staff/guests.
   - Assign Wi-Fi devices to **VLAN 20**.
5. **Test Connectivity**:
   - Verify **wired/wireless devices** can access the Internet.
   - Confirm **VLAN isolation** (e.g., Wi-Fi devices can't ping office PCs).

---

4. Security & Remote Access

- **Firewall Rules**: Block unauthorized traffic between VLANs.
- **Remote Work**:
  - Set up a **VPN** (e.g., IPsec) for secure external access.
  - Use **RDP** for technicians to manage servers remotely.
- **BYOD Policy**: Isolate guest Wi-Fi and enforce bandwidth limits.

---

5. Budget & Documentation

Hardware Cost Estimation

Item	Quantity	Price (Example)
Cisco Catalyst 2960-X	5	$1,000 each
Cisco Aironet 2800 AP	10	$600 each
Cisco ISR 1100 Router	1	$1,500
Total		**$12,500**

Final Documentation

1. **Network Diagram**: Label all devices, VLANs, and connections.
2. **Configuration Scripts**: Paste router/switch commands.
3. **Justifications**: Explain hardware choices (e.g., "2960-X for PoE support").

4. **Testing Report**: List Ping/traceroute results.

Timeline for Network Team

Week	Task
Week 4	Analyse requirements, draft topology.
Week 5	Build and test in Packet Tracer.
Week 6	Finalize configs, budget, and docs.

Goal: A **working, secure, and well-documented** network ready for demo!

Would you like a sample Packet Tracer file or more detailed CLI examples?