**1. Explain Cisco Wireless Technology.**

Ans:

Cisco Wireless Technology ek solution che je wireless LAN (WLAN) banavva ane manage karva mate vapray che. Aa technology thi organizations ne flexibility, scalability ane secure connectivity male che bina wire na use thi.

1. Access Points (APs)

Wireless signal provide kare che

Client devices (laptop, phone) ne network sathe connect kare che

2. Wireless LAN Controller (WLC)

Badha access points ne central thi control kare che

Configuration, monitoring ane security manage kare che

3. Cisco DNA Center (optional)

Wireless network ne automate ane monitor karva advanced tool

AI-based analytics ane troubleshooting features

4. Client Devices

Je devices wireless signal thi connect kare che

Example: Mobile, Laptop, Printer

**2. List of IEEE standard**.

Ans: IEEE 802 LAN/MAN standards group (main group)

IEEE 802.1 Network management, VLANs, Spanning Tree Protocol (STP)

IEEE 802.2 Logical Link Control (LLC)

IEEE 802.3 Ethernet (wired LAN)

IEEE 802.5 Token Ring network (now outdated)

IEEE 802.11 Wireless LAN (Wi-Fi)

IEEE 802.11a 5 GHz, 54 Mbps Wi-Fi

IEEE 802.11b 2.4 GHz, 11 Mbps Wi-Fi

IEEE 802.11g 2.4 GHz, 54 Mbps Wi-Fi

IEEE 802.11n Dual band (2.4/5 GHz), up to 600 Mbps

IEEE 802.11ac 5 GHz, high speed Wi-Fi (Wi-Fi 5)

IEEE 802.11ax Wi-Fi 6 (High Efficiency Wireless)

IEEE 802.15 Wireless Personal Area Network (Bluetooth, Zigbee)

IEEE 802.16 Broadband Wireless (WiMAX)

IEEE 802.17 Resilient Packet Ring (RPR)

IEEE 802.1Q VLAN tagging

IEEE 802.1D Spanning Tree Protocol (STP)

IEEE 802.1X Network access control (authentication)

**3. Explain Wireless Topologies.**

Ans: Wireless Topologies etle wireless network ma devices kem connect thay che te ni structure or layout. Aa topology network design, coverage, scalability ane performance par effect kare che.

🔹 3 Main Wireless Topologies:

1️⃣ Ad-Hoc Topology

➡ Direct communication between devices (peer-to-peer)

➡ No access point or router required

2️⃣ Infrastructure Topology

➡ All wireless devices communicate via a central device (Access Point - AP)

➡ Most common in homes, offices

3️⃣ Mesh Topology

➡ Each device (or AP) connects to multiple other devices/APs

➡ Wireless signal automatically reroutes through best path

**4. Explain Wireless Security Protocol and Encryption method type.**

Ans: Wireless network ma data secure rakhu bahu important che, etle aa protocols ane encryption methods no use thay che. Aano main aim che unauthorized access ne rokvu ane data ne secure karvu.

🔹 Wireless Security Protocols:

Protocol Full Form Security Level Use

WEP Wired Equivalent Privacy Weak Purano system, khotu security

WPA Wi-Fi Protected Access Medium WEP thi vadhu secure

WPA2 Wi-Fi Protected Access version 2 Strong Personal & Enterprise Wi-Fi

WPA3 Wi-Fi Protected Access version 3 Very Strong Latest security standard

🔹 Encryption Methods:

Method Used In Security Level

RC4 WEP, WPA Weak 🔴

TKIP WPA Medium 🟡

AES (Advanced Encryption Standard) WPA2, WPA3 Strong 🟢✅

**5. Example of DHCP Configuration**.

Ans:ip dhcp pool LAN

network 192.168.1.0 255.255.255.0

default-router 192.168.1.1

dns-server 8.8.8.8

**6. What is ACL? Types and Example of Extended ACL**.

Ans: ACL etle Access Control List je router/switch par configure thay che jethi network traffic ne filter kari shake.

ACL ni madad thi tame decide kari sako cho ke:

Kaya IP address ne allow karvu

Kaya IP address ne deny (rokvu)

Kaya port ya protocol par access aapvu ya na aapvu

🔹 Types of ACL:

Type Description

Standard ACL IP address based filtering only

Extended ACL IP address + Protocol + Port number filtering

1️⃣ Standard ACL:

Khali source IP address ne check kare che

Layer 3 par kam kare che

access-list 1 permit 192.168.1.0 0.0.0.255

2️⃣ Extended ACL:

Source IP + Destination IP + Protocol + Port ne base banavi ne filtering kare che

Layer 3 & 4 par kam kare che

Vadhare specific control male che

🔹 Example of Extended ACL:

Telnet traffic from IP 192.168.1.10 to 172.16.1.1 par deny karvu.

access-list 101 deny tcp 192.168.1.10 0.0.0.0 172.16.1.1 0.0.0.0 eq 23

access-list 101 permit ip any

🔸 Apply ACL to Interface:

interface FastEthernet0/0

ip access-group 101 in

**7. Example of Port Security in Switch.**

Ans:interface fa0/1

switchport mode access

switchport port-security

switchport port-security maximum 1

switchport port-security violation shutdown

switchport port-security mac-address sticky

**9. Explain Frame-Relay and PPP.**

Ans: Frame Relay ek WAN protocol che je packet switching technique vapre che.

Use:

Darek location (office) ne central site sathe connect karva

Service provider taraf thi mile che (like BSNL, Airtel)

✅ PPP su che?

PPP (Point-to-Point Protocol) ek Layer 2 WAN protocol che je two devices vachche point-to-point connection establish kare che.

🔸 Use:

Serial cable, phone line, fiber, or mobile

Dial-up connection ma vadhare vapray che

**10. What is NAT? Explain with one example.**

Ans: NAT ek process che je Private IP address ne Public IP address ma convert kare che ane vice versa. Aano use mainly internet access mate thay che.

Router par configure thay che

Mostly home routers ya office edge routers par use thay che

✅ NAT na Types:

Type Description

Static NAT 1 private IP ↔ 1 public IP (fixed mapping)

Dynamic NAT 1 private IP ↔ any free public IP (from pool)

PAT (Port Address Translation) Multiple private IPs ↔ 1 public IP (with different ports)

Example (PAT - Most Common):

Maan lo tamara LAN ma 3 devices che:

Device Private IP

PC 1 192.168.1.10

PC 2 192.168.1.11

PC 3 192.168.1.12

Tamaro router pase ek j public IP che: 203.0.113.5

Jare badha PC internet access kare che, to NAT/PAT private IP ne convert kare che public IP ma:

PC1 (192.168.1.10:1050) → NAT → 203.0.113.5:30001

PC2 (192.168.1.11:1051) → NAT → 203.0.113.5:30002

PC3 (192.168.1.12:1052) → NAT → 203.0.113.5:30003

**11. What is HDLC? Which command to show in software?**

Ans: HDLC no full form chhe High-Level Data Link Control.

Aa ek Layer 2 (Data Link Layer) protocol chhe

Mainly point-to-point communication mate vapray che

Default WAN encapsulation protocol chhe Cisco routers ma

**12. What is Encapsulation? Example of GRE Tunnel**.

Ans: Encapsulation etle ek data ne packet ma muki ne network ni through transfer karvu.

✅ Encapsulation process (OSI Model pramane):

OSI Layer Unit Description

Application Layer Data User data (ex: email)

Transport Layer Segment Port number add kare che

Network Layer Packet IP address add kare che

Data Link Layer Frame MAC address add kare che

Physical Layer Bits 1s & 0s form ma send kare che

GRE ek tunneling protocol chhe je tamne ek packet ne biji packet andar muki ne pathavi shake che (encapsulation).

➡ GRE tunneling thi tame non-IP protocol pan IP network upar transfer kari sako.

GRE Tunnel Configuration Example (Cisco):

interface Tunnel0

ip address 10.0.0.1 255.255.255.0 tunnel source 192.168.1.1 tunnel destination 192.168.2.1

Explanation:

Tunnel0 → Virtual tunnel interface

10.0.0.1 → Tunnel IP address (local)

192.168.1.1 → Physical interface IP (source)

192.168.2.1 → Remote router IP (destination)