Network Essentials.

Course Objectives	• Comprehend fundamental concepts of network communication and components. • Develop skills in network simulation and configuration using Cisco Packet Tracer. • Master IPv4 and IPv6 addressing, DHCPv4 configuration, and hierarchical network design. • Investigate transport and application layer services, including TCP, UDP, DNS, HTTP, FTP, and SSH. • Implement basic network security measures and troubleshoot common network connectivity issues.
Course Outcomes	• Construct a simulated network using Cisco® Packet Tracer. • Develop a simple home network. • Establish a fully connected LAN. • Set up an integrated wireless router and wireless client to connect securely to the internet. • Link wireless PC clients to a wireless router. • Implement basic network security measures. • Assemble a simple computer network using Cisco devices. • Diagnose and resolve basic network connectivity issues.

Course Duration: 45 Hours

Course Curriculum:

UNIT I Basics of Networking

Basics of Network Communication - Network Types, Data Transmission, Bandwidth and Throughput - Clients and Servers, Network Components. Online Connections – Wireless Networks, Local Network connections, Network documentation.

UNIT II Introduction to Network Simulation and communication

Network Simulation using Packet Tracer: Packet Tracer Network Simulator, Packet Tracer Network Simulator, The Packet Tracer User Interface, Packet Tracer Network Configuration - Building a simple Network: Network Media Types, Ethernet Cabling, Coaxial and Fiber-Optic Cabling, Twisted Pair Operation, Verify Connectivity - Communication Principles: Network communication protocols & Standards, OSI and TCP/IP models

UNIT III introduction to Network Addressing

Process of encapsulation and Ethernet framing, Hierarchical Network Design, network communication at the access layer, Broadcast Containment, Routing between networks – Routing table, creating a LAN - Internet Protocol: IPv4 Addressing – Binary conversion, IPv4 Address structure, Classful IPv4 Addressing, Public and Private IPv4 Addresses, Unicast, Broadcast, and Multicast Addresses Unicast, Broadcast, and Multicast Addresses - Static and Dynamic Addressing, DHCPv4 Configuration. IPv4 and IPv6 Address Management - Network Boundaries, Network Address Translation, IPv4 Issues, IPv6 Features

UNIT IV Introduction to Transport layer

Transport Layer Services - The Client Server Relationship, TCP and UDP, Port Numbers - Application Layer Services - Network Application Services, Domain Name System, Web Clients and Servers-HTTP & HTML, FTP Clients and Servers, Virtual Terminals-Telnet & SSH, Email Protocols - Wired & Wireless network technologies, Wi-Fi, Wireless Traffic Control, Configuring a wireless LAN device, ISP Connectivity Options, Network Virtualization, Mobile Device Connectivity

UNIT V Introduction to Network Security & Troubleshooting

Security Threats, Social Engineering Attacks, Malware, Denial of Service, Security Tools, Antimalware Software - Configuring basic network security: Wireless Security Measures, configuring firewall - Cisco Switches : Switch Boot Process, Cisco Routers, Router Boot Process - Cisco IOS Command Line- IOS Navigation, navigation of Cisco IOS to configure network devices - Building a Small Cisco Network - Basic Switch Configuration, Initial Router Settings, Switch to router connection - Troubleshooting common network problems: Troubleshooting, Physical Layer Problems, Troubleshooting Commands, wireless issues, Common Internet Connectivity Issues

Test Projects:

Use Cases:

Industry Use-Cases (https://drive.google.com/file/d/1b_eQ6tW2B_mZawih4A2ZxeTU4pgwCBVN/view?usp=drive_link)

1. Basic Switch Configuration
2. Configure Basic Router Settings
3. Configure VLANs and Trunking
4. Troubleshoot IPv4 and IPv6 Static and Default Routes
5. Implement VLANs and Trunking
6. Configure Router-on-a-Stick Inter-VLAN Routing
7. Troubleshoot Inter-VLAN Routing
8. Implement Inter-VLAN Routing
9. Implement EtherChannel
10. Implement DHCPv4
11. Configure DHCPv6
12. Switch Security Configuration
13. Configure a Wireless Network Configure IPv4 and IPv6 Static and Default Routes
14. Configure IPv4 and IPv6 Static and Default Routes - ILM
15. HSRP Configuration Guide
16. WLAN Configuration
17. Basic Router Configuration Review
18. Configure IPv4 and IPv6 Static and Default Routes
19. Implement Port Security
20. Switch Security Configuration