ADMINISTRATION OF COMPUTER NETWORKING, ROUTING, SWITCHING AND NETWORK TRAINING COURSE

Introduction

This programme develops the technical competencies required to design, configure, administer, secure and troubleshoot computer networks in organizational environments. It covers network architecture, communication protocols, IP addressing, subnetting, routing, switching, VLANs, wireless networking and network monitoring. Participants learn how network devices communicate, how traffic moves across local and wide-area networks, and how network configurations affect performance, reliability and security. Practical activities address router and switch configuration, network segmentation, connectivity troubleshooting and network documentation. The course also introduces network performance analysis, access control, preventive maintenance and infrastructure planning. It prepares participants to support enterprise networks, improve connectivity and maintain dependable communication systems.

Course Objectives

- Explain network architectures, protocols and communication models.
- Configure IPv4 and IPv6 addressing and subnetting.
- Implement routing, switching and VLAN configurations.
- Diagnose and resolve network connectivity problems.
- Configure basic wireless and remote access services.
- Apply network security and access control measures.
- Monitor network performance and maintain network documentation.

Course Modules

> Module 1: Networking Fundamentals and Architecture

- Computer networking concepts, purposes and applications.

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- LAN, WAN, MAN, PAN and enterprise network environments.
- OSI and TCP/IP models and their practical applications.
- Network topologies, transmission media and networking devices

> Module 2: Network Protocols and Communication Services
- Ethernet, MAC addressing and frame transmission.
- TCP, UDP, ports and application-layer communication.
- DNS, DHCP, HTTP/HTTPS and essential network services.
- Network protocol analysis and packet interpretation

> Module 3: IP Addressing and Subnetting
- IPv4 addressing, CIDR notation and address planning.
- Subnet masks, subnet calculations and address allocation.
- IPv6 addressing, notation and configuration.
- Static addressing, DHCP allocation and IP documentation.

> Module 4: Switching and Local Area Networks
- Switch operation, MAC address tables and frame forwarding.
- VLAN creation, configuration and network segmentation.
- Trunk links, access ports and inter-VLAN communication.
- Spanning Tree Protocol concepts and switching loop prevention.

> Module 5: Routing and Inter-Network Communication
- Routing tables, gateways and packet forwarding.
- Static routing and default route configuration.
- Dynamic routing fundamentals, including OSPF concepts.
- Routing troubleshooting and path verification.

> Module 6: Wireless Networking and Remote Connectivity
- Wireless standards, access points and network design.
- Wi-Fi authentication, encryption and security.
- VPN fundamentals and secure remote access.
- Wireless interference, coverage planning and performance optimization.

> Module 7: Network Security and Access Control
- Network threats, vulnerabilities and attack surfaces.
- Access control lists, firewall principles and traffic filtering.
- Network segmentation and secure administrative access.

- Security monitoring, patching and incident reporting

> Module 8: Network Monitoring and Troubleshooting
- Structured fault diagnosis and troubleshooting methodologies.
- Using ping, traceroute, ipconfig and related diagnostic tools.
- Packet capture, protocol analysis and connectivity testing.
- Network monitoring, logs, alerts and performance indicators.

> Module 9: Network Design, Documentation and Maintenance
- Requirement's analysis and enterprise network design.
- Network diagrams, configuration records and IP address management.
- Capacity planning, redundancy and high-availability concepts.
- Preventive maintenance, configuration backups and change control.

> Module 10: Network Administration Project and Assessment
- Designing a small enterprise network based on user requirements.
- Configuring addressing, switching, routing and basic security.
- Testing connectivity and resolving simulated network faults.
- Presenting network documentation, findings and recommendations.

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