

COMPUTER NETWORK MAINTENANCE

UNIT CODE: 0612 451 07A

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Perform Computer Network Maintenance

Unit Duration: 210 Hours

Unit Description

This unit covers the competencies required to perform computer network repair and maintenance. It involves troubleshooting computer network components, performing computer network component repair and maintaining computer network.

Summary of Learning Outcomes

LEARNING OUTCOMES	DURATION (HOURS)
1. Analyse Computer Network Performance	40
2. Troubleshoot Computer Network Component	70
3. Perform Computer Network Components Repair	60
4. Maintain Computer Network	40
TOTAL	210

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Analyze Computer Network Performance	1.1 Computer Network Traffic analysis. 1.1.1 Introduction to network traffic analysis 1.1.2 Concepts and metrics in network traffic analysis 1.1.3 Types of Network Traffic and Protocols	• Practical test • Project • Portfolio of evidence • Oral questioning • Interviews

	1.1.4 TCP/IP, UDP, ICMP and other common protocols 1.1.4.1 Unicast traffic 1.1.4.2 Broadcast traffic 1.1.4.3 Multicast traffic 1.1.5 Tools for Network Traffic Analysis 1.1.5.1 Wireshark, 1.1.5.2 tcpdump, 1.1.5.3 SolarWinds, NetFlow 1.1.6 Implementation of network traffic analysis 1.1.6.1 Locate all key network components 1.1.6.2 Using network monitoring software 1.1.6.3 Create alerts for component health and metrics 1.1.6.4 Bandwidth monitoring 1.1.6.5 Packet inspection 1.1.6.6 Performance optimization 1.1.6.7 Forensic analysis 1.1.6.8 Real-time monitoring and alerts 1.2 Network Bandwidth utilization monitoring 1.2.1 Introduction to Network Bandwidth Utilization 1.2.2 Definition of terms 1.2.2.1 Monitoring 1.2.2.2 bandwidth, 1.2.2.3 throughput, 1.2.2.4 latency, 1.2.2.5 packet loss 1.2.3 Bandwidth Monitoring Tools and Technologies	• Third party report • Written tests • Case study
--	---	---

	1.2.3.1 NetFlow, 1.2.3.2 PRTG, 1.2.3.3 SolarWinds 1.2.3.4 Web browsing monitoring 1.2.3.5 File downloads monitoring 1.3 Computer network Latency measurement 1.3.1 Introduction to Network Latency Measurement 1.3.2 Definition of terms 1.3.2.1 Network latency 1.3.2.2 jitter, 1.3.2.3 round-trip time (RTT) 1.3.3 Types of Latency and measurements 1.3.4 Tools for Network Latency Measurement 1.3.4.1 Ping 1.3.4.2 Traceroute 1.3.4.3 Wireshark 1.3.4.4 Network monitoring tools 1.4 Network Device performance monitoring 1.4.1 Introduction to Network Device Performance Monitoring 1.4.2 Importance of monitoring network devices 1.4.3 Network monitoring criteria 1.4.3.1 CPU usage, 1.4.3.2 Memory utilization, 1.4.3.3 Bandwidth, 1.4.3.4 Error rates 1.4.4 Key concepts for Monitoring Network Devices 1.4.4.1 Metrics tracking 1.4.4.2 Alerting	
--	---	--

	1.4.4.3 Real-time monitoring 1.4.4.4 Security monitoring 1.4.4.5 Latency, packet loss, error rates, and uptime 1.4.4.6 memory and CPU usage in network device 1.4.5 Network Device Performance Optimization Techniques 1.4.6 Optimizing device settings for better performance. 1.4.7 Implementing load balancing to reduce device load. 1.4.8 Adjusting network topology for optimal device performance.	
2. Troubleshoot computer network components	2.1 Basic Electronic skills 2.1.1 Introduction to basic electronic skills 2.1.1.1 Electricity and circuits Components 2.1.1.2 Electronic devices 2.1.1.3 Power supplies 2.1.1.4 Analog and Digital signals 2.1.1.5 Electronic measurement 2.1.1.6 Safety and practical considerations 2.2 Network component testing 2.2.1 Types of network components tests 2.2.1.1 Cable continuity test 2.2.1.2 Connectivity test 2.2.1.3 Performance test 2.2.1.4 Security test 2.2.1.5 Load test 2.2.1.6 Protocol test 2.3 Network Configuration verification	● Practical test ● Project ● Portfolio of evidence ● Oral questioning ● Interviews ● Third party report ● Written tests ● Case study

	2.3.1 Concepts of Network configuration verification 2.3.2 Understanding network topologies 2.3.3 Device configuration checks 2.3.4 Network service configuration checks 2.3.5 Security configurations checks 2.3.6 Performance testing checks 2.4 Network Logging and error message review 2.5 Preparation of network troubleshooting Report	
3. Perform computer network component repair	2.6 Safety measures 2.6.1 Introduction to computer network Safety measures 2.7 Faulty network component 2.7.1 Importance of network maintenance 2.7.2 Types of computer network components faults 2.7.2.1 Switch faults 2.7.2.2 Router fault 2.7.2.3 Cabling faults 2.7.2.4 Server faults 2.8 Computer network problem-solving procedure 2.8.1 Network components Troubleshooting process 2.8.2 Types of network component repair 2.9 Network monitoring and maintenance tools 2.10 Faults Identifications 2.10.1 Procedures of identifying network faults	● Practical test ● Project ● Portfolio of evidence ● Oral questioning ● Interviews ● Third party report ● Written tests ● Case study ● Written tests ● Case study

	2.10.2 Types of network faults 2.10.2.1 Transmission errors 2.10.2.2 Network latency 2.10.2.3 Hardware faults 2.10.2.4 Protocol faults 2.10.2.5 Configuration errors 2.10.2.6 Data packet loss 2.10.3 Possible Solution for computer networks faults 2.11 Network component repair 2.11.1 General network components Repair procedures 2.11.1.1 Diagnosis 2.11.1.2 Isolation 2.11.1.3 Repair process 2.11.1.4 Documentation 2.11.2 Best practices for network component repair 2.12 E-waste Management 2.12.1 Network components disposal methods 2.12.1.1 Recycling 2.12.1.2 Donation 2.12.1.3 Incineration 2.12.2 Emerging trends in E-waste disposal	
4. Maintain computer network	4.1 Network Hardware and Software maintenance 4.1.1 Introduction to computer networks hardware and software maintenance 4.1.2 Types of hardware and software maintenance 4.1.2.1 Preventive	● Practical test ● Project ● Portfolio of evidence ● Oral questioning ● Interviews

	4.1.2.2 Adaptive 4.1.2.3 Corrective 4.1.2.4 Predictive 4.2 Network Monitoring 4.2.1 Concepts of Network monitoring and Performance optimization 4.2.2 Types of network monitoring 4.2.2.1 SNMP monitoring 4.2.2.2 Flow based monitoring 4.2.2.3 Packet capture and monitoring 4.2.3 Types Network monitoring tools 4.2.4 Best practices for network monitoring and performance optimization 4.3 Backup and disaster recovering 4.3.1 Introduction to network disaster recovery 4.3.2 Types of network backup 4.3.2.1 Full backup 4.3.2.2 Incremental backup 4.3.2.3 Deferential backup 4.3.3 Disaster recovery planning 4.3.4 Backup and disaster recovery tools 4.3.5 Best practices for backup and disaster recovery 4.4 Documentation and inventory maintenance 4.4.1 Types of documentation 4.4.1.1 Network documentation 4.4.1.2 Network inventory 4.4.2 Best practices for network documentation and inventory	• Third party report • Written tests • Case study
--	---	---

	4.5 Computer network compliance and regulatory updates 4.5.1 Common regulations affecting computer networks 4.5.2 Regulatory Updates in network compliance 4.5.3 Best practices for keep up with compliance and regulatory updates 4.5.3.1 Regular audit and reviews 4.5.3.2 Continuous monitoring and threat detection 4.5.4 User training	
--	---	--

Suggested Methods of delivery

- Role playing
- Viewing of related videos
- Group discussions.
- Instructor led facilitation using active learning strategies.
- Projects.
- Demonstrations.
- Site visits.

Recommended Resources for 25 Trainees

S/No.	Category/Item	Description/ Specifications	Quantity	Recommended Ratio (Trainee: Item)
A	Learning Materials			
1.	Textbooks		13 pcs	2:1
2.	Installation manuals			
3.	Flip Charts			
4.	PowerPoint presentations	For trainer's use		
B	Learning Facilities & infrastructure			
5.	Lecture/theory room		1	25:1
6.	Laboratory		1	25:1

C	Consumable materials			
7.	Printing papers		1 ream	1:20
8.	Toners/Cartridges		2 pcs	13:1
9.	Assorted colour of whiteboard markers			
D	Tools and Equipment			
10.	Computers		25 pcs	1:1
11.	Projector		1 pc	25:1
12.	Flash drives		25 pairs	1:1
13.	External CD/DVD drives		13 pcs	2:1

MODULE IV

UNIT CATEGORY	UNIT CODE	UNIT NAME	DURATION (Hours)
CORE	0612 551 08A	Computer Network Security Monitoring	220
COMMON	0714 541 09A	Basic Electronics	100
BASIC	0417 551 10A	Work Ethics and Practices	40
TOTAL			360