STUDY GUIDE
ONLINE NETWORKING
ON412
SAQA ID: 78965

2024

CTU training solutions | Creative & Technology Universitas

Table of Contents

Online Networking (ON412)

1. How to use this guide

The guide provides an overview of the syllabus and the learning outcomes of the module. It will indicate each major topic that will be covered, as well as the learning outcomes of each topic.

The study guide is NOT a replacement of textbooks and should be studied in conjunction with the required textbooks.

The following icons will be used in the study guide:


Sections in the prescribed textbook that the student needs to study


Additional reading that the student needs to study


Video that the student needs to watch


Activities to be completed


Exercises to be completed


Group activities to be completed


Projects to be completed


Tests to be completed


Revision questions to be completed

2. Introduction

Networking fundamentals refer to the core principles and concepts that underpin the design, implementation, and management of computer networks. It encompasses the fundamental building blocks of networking, including protocols, architectures, devices, and services, that enable the seamless transmission of data and communication between devices. Key aspects of networking fundamentals include understanding network topologies, such as local area networks (LANs) and wide area networks (WANs), as well as the various network layers, such as the physical layer, data link layer, network layer, transport layer, and application layer. Additionally, networking fundamentals involve grasping essential concepts like IP addressing, subnetting, routing, switching, and network security. Having a solid understanding of networking fundamentals is crucial for designing and maintaining efficient and secure networks, troubleshooting connectivity issues, and ensuring the smooth operation of modern-day digital infrastructure.

2.1. Department Information

Bloemfontein

San- Mari Wiese

san-marif@ctutraining.co.za

Boksburg

Liana Vosloo

liana.vosloo@ctutraining.co.za

Cape Town

Daphne Roets

daphner@ctutraining.co.za

Durban

Miranda Govender

miranda.govender@ctutraining.co.za

Gqeberha

Danelle Kruger

danelle.kruger@ctutraining.co.za

Polokwane

Phokeng Motuku

phokeng.motuku@ctutraining.co.za

Potchefstroom

Marco Ebersohn

marco.ebersohn@ctutraining.co.za

Pretoria

Estelle van der Walt

estellevdw@ctutraining.co.za

Roodepoort

Lance Krasner

lance.krasner@ctutraining.co.za

Stellenbosch

Adelaide Kuster

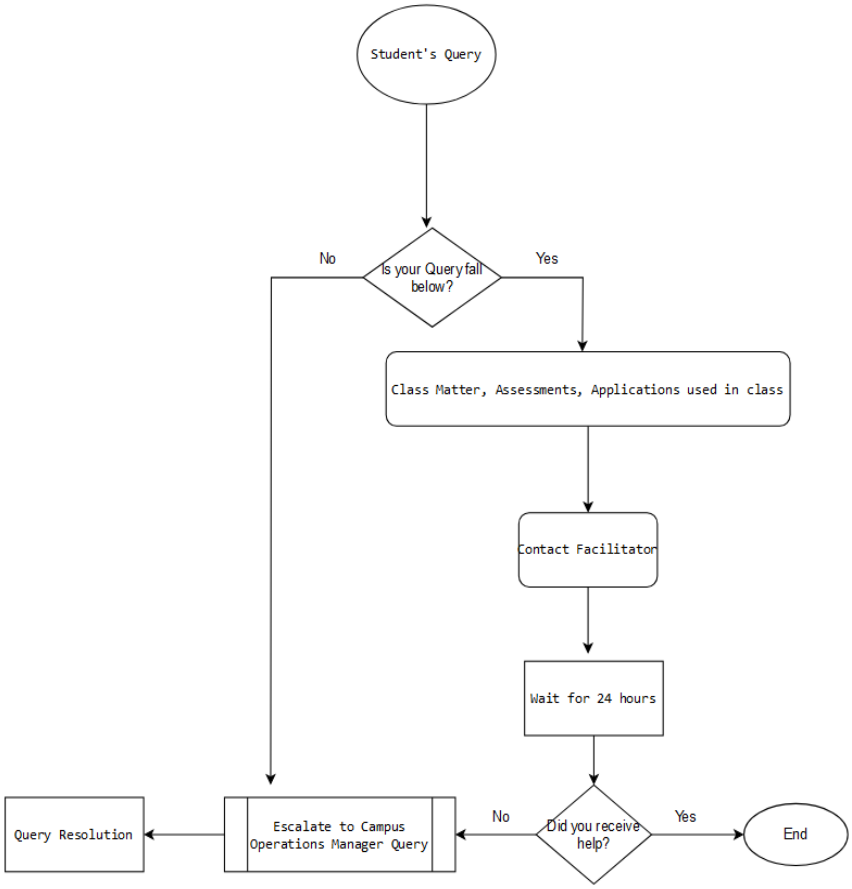
adelaide.kuster@ctutraining.co.za

Vereeniging

Charmaine de Klerk

charmaine.deklerk@ctutraining.co.za

2.2. Query Resolution Structure



3. Purpose of the Module

Networking fundamentals play a vital role in the IT field as they form the foundation for designing, implementing, and managing computer networks. Having a solid grasp of these fundamentals is crucial for IT professionals as it enables them to create efficient and reliable network infrastructures that facilitate seamless data transmission and communication. Understanding network protocols, architectures, and devices allows IT professionals to optimize network performance, troubleshoot connectivity issues, and ensure data security. Networking fundamentals also provide the necessary knowledge to design scalable networks that can accommodate the growing demands of modern technology. In the IT field, a strong foundation in networking fundamentals is essential for effectively managing and supporting the interconnected systems that power organizations and enable them to thrive in today's digitally-driven world.

3.1. Contact Hours and Indicative Student Workload

Proposed Roll Out Strategy	Credits	Total Notional Hours	Theory	Practical	Contact Sessions	Formative Assessments	Summative Assessments
22 July to 22 November 2024	22	220					

3.2. Unit Standards

- Explain the principles of computer networks.
- Investigate the use of computer technology in an organisation.
- Resolve computer user`s problems.
- Demonstrate an understanding of preventative maintenance, environmental and safety issues in a computer environment.

3.3. Learning Outcomes

- Demonstrate a working knowledge IT terminology.
- Apply knowledge of Networks in a variety of scenarios.

3.4. Credits: 22

3.5. NQF: 4

4. Teaching and Learning Methods

Lectures, Flipped Classroom, Webinars, Group and Research, practical classes (role play), and Gamification.

4.1. Module Resources

- Student module manual referencing a variety of sources.
- Online sources for research purposes.

4.2. Internet Requirements

A device and a minimum of 20GB data are required to access training material.

4.3. Prescribed reading

Gordon Davies. Networking Fundamentals (2019) Available on Safari Books Online at

https://learning.oreilly.com/library/view/networking-fundamentals/9781838643508/

5. Assessment Details

The students will need a pass mark of 80% on the preliminary exam to qualify for admission to the international certification exams.

5.1. Formative Assessment Breakdown

Formative 1	Formative 2
Test 1	Test 2
Theory Test 1	Theory Test 2
25%	25%

5.2. Summative Assessment

Practical exam
50%

Formative assessments (50%) + Summative assessment (50%) = Final mark

5.3. Assessment Preparation Guidelines

Assessment	Format of the Assessment	Resources required	Learning Units Covered
Formative Assessment 1:	All the assessments to be completed require students to apply acquired knowledge of networking. Students are required to complete theoretical tests and scenarios to assist in gaining a working knowledge of industry standards.	Access to: • Access to online sources for research purposes.	• Describe data communication. • Demonstrate knowledge of main features of LANs. • Demonstrate knowledge of main features of WANs. • Demonstrate an understanding of company specific service levels. • Meet and maintain service levels.

Assessment	Format of the Assessment	Resources required	Learning Units Covered
Formative Assessment 2:	All the assessments to be completed require students to apply acquired knowledge of networking. Students are required to complete theoretical tests and scenarios to assist in gaining a working knowledge of industry standards.	Access to: • Access to online sources for research purposes.	• Describe data communication. • Demonstrate knowledge of main features of LANs. • Demonstrate knowledge of main features of WANs. • Demonstrate an understanding of company specific service levels. • Meet and maintain service levels. •
Summative Assessment:	All the assessments to be completed require students to apply acquired knowledge of networking. Students are required to complete theoretical tests and scenarios to assist in gaining a working knowledge of industry standards.	Access to: • Online sources for research purposes	• Describe data communication. • Demonstrate knowledge of main features of LANs. • Demonstrate knowledge of main features of WANs. • Demonstrate an understanding of company specific service levels. • Meet and maintain service levels.

5.4. Assessment Release and Submission Week

The students will need a mark of 70% for each Formative to be deemed Competent.

Please note – There are two (2) steps in the submission process.

- Step 1: Required evidence in the specified formats is submitted on Campus Online to the designated assignment description. NB!!! It is your responsibility to ensure that you submit in the right slot.
- Step 2: Complete and submit the document of authenticity for every formative and summative assessment submitted.

5.5. Assessment Strategy

The following assessment activities apply to each module:

- Knowledge assessments
- Practical / Research Assignments
- CCFOs (Critical Cross-Field Outcomes) / Simulated case studies
- Work Integrated Logbooks

5.6. Formative Assessment Submissions

Formative Assessment:	Release Date:	Submission:
Formative Assessment 1	26 August 2024	26 August 2024
Formative Assessment 2	30 September 2024	30 September 2024

5.7. Summative Assessment Submission

Summative Assessment:	Release Date:	Submission:
Theoretical Examination	13 November 2024	13 November 2024

5.8. International Exams

International Exam:	Bootcamp, International Exam Preparation and Prelims:	International Exam:
NA	NA	NA

6. Progression

Projects that need to be completed and submitted for this module are set up to simulate the design process as applied in the industry. Each project description includes a guideline indicating phases in the project. These phases as indicated serve as a guide to assist in your planning and implementation of activities to ensure adherence to project deadlines. The projects in general span over several weeks and sessions are indicated in your lesson plan. You will be required to present specified evidence during each session. During these consultation sessions, you will receive feedback from the facilitator that should indicate additional development or alternative directions. Your ability to act on these directions is assessed under the assessment criteria of 'progress'.

You will be required to spend additional time outside of scheduled classes to successfully develop and complete assignments.

7. Week Planner

SEMESTER 2	
22-26/07/2024	Week 1
29/07-02/08/2024	Week 2
05-09/08/2024	Week 3
12-16/08/2024	Week 4
19-23/08/2024	Week 5
26-30/08/2024	Week 6
02-06/09/2024	Week 7
09-13/09/2024	Week 8
16-20/09/2024	Week 9
23-27/09/2024	Student Holiday
30/09-04/10/2024	Week 10
07-11/10/2024	Week 11
14-18/10/2024	Week 12 International Exam Preparation and Prelims
21-25/10/2024	Week 13 International Exam Preparation and Prelims
28/10-01/11/2024	Week 14 2nd Semester International Exams
04-08/11/2024	Week 15 Exam Preparation
11-15/11/2024	Exam Week 1
18-22/11/2024	Exam Week 2
25/11/2024	Student Holiday Starts

8. Lesson Plan

Semester 2			
Week	**Learning Units to be Covered**	**Resources required**	**Class Activity**
Week 1	Introduction to Semester 2	Study Guide Access to O'Reilly Books Online	Account activation and resource download
Week 2	Introduction to Online Networking	Online sources for research purposes Microsoft 365	
Week 3	Understanding Local Area Networking	Davies, G. Networking Fundamentals, December 2019 Release	Revision questions Practical
Week 4	Defining Networks with the OSI Model	Davies, G. Networking Fundamentals, December 2019 Release	Revision questions Practical
Week 5	Understanding Wired and Wireless Networks	Davies, G. Networking Fundamentals, December 2019 Release	Revision questions Practical
Week 6	FA 1 - Test	FA1 Test to be written on campus as closed book test	FA1 Test to be written on campus as closed book test
Week 7	Understanding Internet Protocol	Davies, G. Networking Fundamentals, December 2019 Release	Revision questions Practical
Week 8	Implementing TCP/IP in the Command Line	Davies, G. Networking Fundamentals, December 2019 Release	Revision questions Practical
Week 9	Working with Networking Services	Davies, G. Networking Fundamentals, December 2019 Release	Revision questions Practical
Week 9	Understanding Wide Area Networks	Davies, G. Networking Fundamentals, December 2019 Release	Revision questions Practical
Week 10	FA 2 - Test	FA2 Test to be written on campus as closed book test	FA2 Test to be written on campus as closed book test
Week 11	Recap	Davies, G. Networking Fundamentals, December 2019 Release	Recap on all Learning Units

Semester 2			
Week	**Learning Units to be Covered**	**Resources required**	**Class Activity**
Week 12	International Examination Bootcamp and Prelim Week		International Examination preparation
Week 13	Prelim Week		
Week 14	International Examination		
Week 15	National Examination Preparation		
Week 16	National Examination Preparation		
Week 17	Summative Assessments		

8.1. Module Content

Understanding Local Area Networks.

Introduction

Understanding Local Area Networks, gives you an overview of what the author describes as scales of networks, defining the differences between LANs, WANs, PANs, MANs, and CANs. In this chapter, we focus on local area networking, and explain the use of IP addresses, hostnames, and MAC addresses to identify devices on a network. Following on from this, it describes the key characteristics of wired and wireless networks, before concluding with a discussion of virtual local area networks (VLANs).

Gordon Davies. Networking Fundamentals (2019) Available on Safari Books Online at https://learning.oreilly.com/library/view/networking-fundamentals/9781838643508/

Learning Unit Objectives

By the end of this lesson, you'll be able to:

- Scales of networks
- Introduction to LANs
- Local addressing
- Wired and wireless LANs
- VLANs
- MANs
- CANs
- PANs

Revision questions

1. What protocol is used to map an IP address to a MAC address?
   a. DHCP
   b. ICMP
   c. HTTP
   d. ARP

2. Which of the following is a valid MAC address format?
   a. AA:AA:12:34::AA:AA
   b. AB:F1:1B:FE:12:D1:65:91
   c. AB:12:12:CA:1F
   d. AG:CA:1F:AA:11:DA

3. What type of data transmission allows traffic to flow in both directions at the same time?
   a. Unidirectional
   b. Simplex
   c. Half-duplex
   d. Full-duplex

4. Which of the following describes a network that spans a city?
   a. CAN
   b. LAN
   c. MAN
   d. WAN

5. An IP address that can be used locally within your network and is not routable across the internet is known as what?
   a. An alternate private IP address
   b. Private IP address
   c. Public IP address
   d. AR

6. Which of these commands will display the MAC addresses of your interfaces? I
   a. Ipconfig /all
   b. show mac
   c. display mac
   d. ifconfig /all

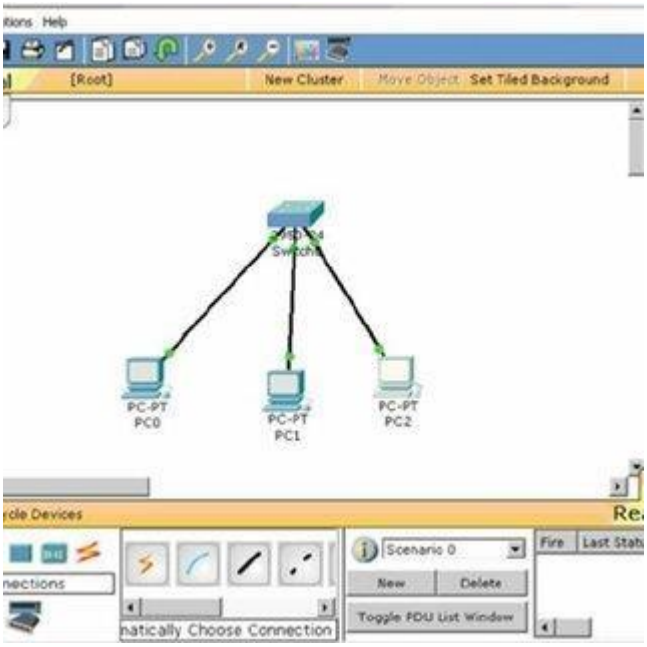
7. What identifier does a switch use when making a forwarding decision?
   a. Destination IP address
   b. Source IP address
   c. Destination MAC address
   d. Source MAC address

8. A network that covers a small geographical area is known as a _____. Fill in the blank:
   a. LAN
   b. MAN
   c. WAN

9. Which of the following is the broadcast MAC address?
   a. aa:aa:aa:aa:aa:aa
   b. ff:ff:ff:ff:ff:ff
   c. 11:11:11:11:11:11
   d. 99:99:99:99:99:9

Practical:

1. Install packet tracer and configure and setup a basic LAN, use the following as an example:



2. Using packet tracer setup, the following scenario:
   - a Server
   - 2 switches
   - 2 Student desktops
   - 1 Employee Laptop
   - 2 Employee Desktops
   - The employee and Student network need to be separate but connect to the same server

OSI Model

Introduction

Understanding the OSI Model, introduces the concept of network models before focusing on the OSI model. We take each of the seven layers of the OSI model in turn, discussing the functionality of each, and, where applicable, discuss the use of ports and highlight common protocols for the layers.

Gordon Davies. Networking Fundamentals (2019) Available on Safari Books Online at https://learning.oreilly.com/library/view/networking-fundamentals/9781838643508/

Learning Unit Objectives

By the end of this lesson, you'll be able to:

- Understanding the purpose of network models
- Application layer
- Presentation layer
- Session layer
- Transport layer
- Network layer
- Data-link layer
- Physical layer

Revision questions

1. What is layer 4 of the OSI model called?
   a. Session layer
   b. Data-link layer
   c. Transport layer
   d. Application layer

2. What layer of the OSI model is responsible for ensuring data is in the correct syntax?
   a. Presentation layer
   b. Session layer
   c. Network layer
   d. Application layer

3. What means of identifying a device on a local subnet can be found at layer 2 of the OSI model?
   a. IP addresses
   b. MAC addresses
   c. Host names
   d. Port numbers

4. The port number range of 0 - 1024 is referred to as what?
   a. Ephemeral
   b. Well known
   c. Registered
   d. Dynamic

5. What protocol guarantees delivery of data through the use of acknowledgments and sequence numbers?
   a. TCP
   b. UDP
   c. IP
   d. IPX

6. What logical port number is assigned to the NTP?
   a. 23
   b. 123
   c. 443
   d. 3389

7. What is the second step of the three-way handshake?
   a. FIN
   b. ACK
   c. SYN
   d. SYN/ACK

8. What organization assigns port numbers?
   a. IEEE
   b. OSI
   c. IANA
   d. IETF

9. What layer of the OSI model is responsible for the routing of traffic?
   a. Transport layer
   b. Data-link layer
   c. Session layer
   d. Application layer

Practical:

3. Create a graph explaining in detail the OSI model and ill its layers.
4. Using packet tracer setup, the following:
   - A local server connected to a Wi-Fi router
   - 2 student desktops with LAN setup
   - 3 student laptops setup with the Wi-Fi
   - The students must be able to ping each other on the network

Understanding Wireless Networking

Introduction

Understanding Wireless Networking, focuses on the ever-developing technology of wireless, specifically Wi-Fi. The chapter begins by exploring the various IEEE 802.11 standards, discussing the attributes of each, and the CSMA/CA access method. We then move on to discuss wireless topologies, before concluding the chapter by covering wireless security methods.

Gordon Davies. Networking Fundamentals (2019) Available on Safari Books Online at https://learning.oreilly.com/library/view/networking-fundamentals/9781838643508/

Learning Unit Objectives

By the end of this lesson, you'll be able to:

- Wireless standards
- Wireless topologies
- Wireless security

Revision questions

1. Wi-Fi networks use which access method?
   a. Token ring
   b. CSMA/CD
   c. CSMA/CW
   d. CSMA/CA

2. A junior network technician needs to set up an access point using 802.11g. What frequency will it use?
   a. Hz
   b. 2.4 KHz
   c. 2.4 GHz
   d. THz

3. Which 802.11 standard has the furthest indoor range?
   a. 802.11g
   b. 802.11a
   c. 802.11n
   d. 802.11ac

4. What type of wireless topology would be used when you want to connect two devices directly together in a peer-to-peer relationship?
   a. WDS
   b. Ad-hoc mode
   c. Infrastructure mode
   d. Wireless bridge

5. Which of these Wi-Fi security standards takes advantage of EAP?
   a. WEP-PSK
   b. WEP-Enterprise
   c. WPA-PSK
   d. WPA2-Enterprise

6. Which of these Wi-Fi standards does not use a 5 GHz frequency?
   a. 802.11b
   b. 802.11a
   c. 802.11n
   d. 802.11ac

7. You have a wireless network that supports 802.11g, but you have noticed that the network seems to be running at 11 Mbps. What is the most likely cause of this?
   a. EMI
   b. Incorrect encryption standard selected
   c. Interference from Bluetooth devices
   d. You have an 802.11b device on the network

8. The EAP falls under which standard?
   a. 802.1a
   b. 802.1x
   c. 802.11b
   d. 802.11x

Practical:

5. Using packet tracer setup, the following:
   - A server
   - 2 Wi-Fi routers connected to the server
   - 4 desktops connected to each router
   - Each network must be able to ping one another

Understanding Internet

Protocol

Introduction

Routers and Routing – Beyond a Single Network, moves us into the realm of moving data between networks, and begins by looking at how routing decisions are made, and discusses static and default routes. The chapter then moves on to provide an overview of distance vector, link-state, and hybrid protocols. It then explains the steps required to implement routing on a Windows Server, before concluding the chapter with a discussion of network address translation and quality of service.

Gordon Davies. Networking Fundamentals (2019) Available on Safari Books Online at https://learning.oreilly.com/library/view/networking-fundamentals/9781838643508/

Learning Unit Objectives

By the end of this lesson, you'll be able to:

- Making routing decisions
- Understanding static and default routes
- Understanding routing protocols
- Implementing routing using Windows Server
- Understanding NAT
- Understanding QoS

Revision questions

1. Which of these devices has a routing capability?
   a. Hub
   b. Layer 2 switch
   c. Layer 3 switch
   d. Bridge

2. Which of these generic routing protocol types will most likely choose a route that goes through the least number of routers?
   a. Path vector
   b. Link state
   c. Spanning tree
   d. Distance vector

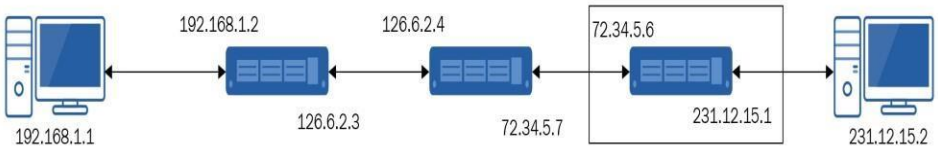
3. Which of these routing protocols is a distance vector protocol?
   a. RIP
   b. OSPF
   c. IS-IS
   d. BGP

4. Which protocol routes between autonomous systems?
   a. OSPF
   b. IS-IS
   c. EGP
   d. IGRP

5. Which of these network addresses would represent the default route on a Windows device?
   a. 127.0.0.0
   b. 0.0.0.0
   c. 255.255.255.255
   d. 10.20.32.0

6. What feature prevents data from flowing between networks forever?
   a. RIP
   b. TTL
   c. STP
   d. OSPF

7. Assuming only the router selected on the right uses NAT, the translation takes place on the interface with the IP address 72.34.5.6. If the web server at 231.12.15.2 sends data to the PC at 192.168.1.1, what would the source IP address be on the data that the PC receives?



   Choose the correct answer:
   a. 231.12.15.2
   b. 231.12.15.1
   c. 72.34.5.6
   d. 192.168.1.2

8. Which function allows for different types of data to be prioritized?
   a. QoS
   b. NAT
   c. DHCP
   d. EIGRP
   e. Wireless bridge

Practical:

6. Using packet tracer setup, the following topologies using a switch and devices:

Understanding TCP/IP

Introduction

Understanding TCP/IP, looks at the second of the two common network models. It provides a comparison between this and the OSI model, and explains the functionality of each layer.

Gordon Davies. Networking Fundamentals (2019) Available on Safari Books Online at https://learning.oreilly.com/library/view/networking-fundamentals/9781838643508/

Learning Unit Objectives

By the end of this lesson, you'll be able to:

- Overview of the TCP/IP layers
- Understanding the application layer
- Understanding the transport layer
- Understanding the internet layer
- Understanding the network layer

Revision questions

1. Which of the following is a public IP address?
   a. 126.56.23.0
   b. 172.16.0.1
   c. 10.4.2.89
   d. 172.30.45.23

2. What is the decimal representation of the binary number 1101010?
   a. 101
   b. 206
   c. 106
   d. 201

3. The last IP address in a network range is known as a what?
   a. APIPA
   b. Network address
   c. Broadcast address
   d. Private address

4. If you need a network with at least 256 hosts on it, how many bits would you need for the host element?
   a. 8
   b. 9
   c. 10
   d. 11

5. What protocol is used to issue an IP address automatically?
   a. APIPA
   b. DHCP
   c. ARP
   d. DNS

6. Which of these is a Class B private IP address?
   a. 10.0.0.1
   b. 192.168.34.2
   c. 10.234.56.1
   d. 172.16.9.90

7. Which of these is not a valid subnet mask?
   a. 255.124.0.0
   b. 255.255.128.0
   c. 255.255.255.192
   d. 255.255.255.249

8. You wish to add a new host to a network. One of the hosts that's currently on the network has an IP address of 187.34.23.6 and a subnet mask of 255.255.255.240. Which of the following IP addresses can I allocate to the new host?
   a. 187.34.23.0
   b. 187.34.23.6
   c. 187.34.23.14
   d. 187.34.23.15

Practical:

7. Explain the following topics:
   - What is an IP address?
   - Explain the difference between an ipv4 and ipv6
   - What is a MAC address?
   - How does a Mac address get stored?
   - How do you keep this info secure?

8. Setup the following using packet tracer:
   - 2 servers
   - 4 switches
   - 8pcs per switch
   - You must connect bot servers to a router so ping is possible
   - You must link the router with the cloud

Network Services

Introduction

Understanding Name Resolution, discusses the purpose of name resolution in modern networks. We cover the most prevalent method, Domain Name Service (DNS), explaining the use of fully qualified domain names, and how they link to DNS records to provide resolution. The chapter then explains how host files are used to provide a localized static name resolution methodology, before looking at the relative legacy name resolution provided by Windows Internet Name Service (WINS).

Gordon Davies. Networking Fundamentals (2019) Available on Safari Books Online at https://learning.oreilly.com/library/view/networking-fundamentals/9781838643508/

Learning Unit Objectives

By the end of this lesson, you'll be able to:

- Domain Name Service (DNS)
- Hosts file
- WINS

Revision questions

1. Stephen wants to use FTP on his network. Which pair of ports should he have open on his firewall to allow this traffic through?
   a. 20 and 21
   b. 21 and 22
   c. 22 and 23
   d. 80 and 443

2. What happens when a device cannot renew its IP address lease?
   a. It retains the IP address it was originally issued.
   b. It receives a 169.254.x.x address.
   c. It receives a 127.0.0.1 address.
   d. It receives a 0.0.0.0 address.

3. Dani needs to ensure that a DHCP-enabled device receives the same IP address from the DHCP server each time. What should she configure?
   a. Reservation.
   b. Exclusion.
   c. MAC filtering.
   d. It is not possible to do this with DHCP.

4. In the following UNC example, what is the server name? Here is an example: \\mail\finance
   a. \\
   b. mail
   c. \
   d. Finance

5. Steve is a member of the following groups: Sales, Marketing, Managers. Each of these groups has been allocated the following share permissions on a folder:
   Sales: Read
   Marketing: Change
   Managers: Read
   What is Steve's effective permission?
   a. Read
   b. Read and Change
   c. Change
   d. Full

6. When looking at a user's NTFS permissions, you see a number of checkboxes are grayed out. What is the most likely cause of this?
   a. The user is not an administrator.
   b. The permissions are inherited.
   c. You are not an administrator.
   d. Permissions can only be changed by the user themselves

7. You want to change the NTFS permissions on a file and right-click and choose Properties. You notice that the Security tab is not visible. What is the most likely reason for this?
   a. The underlying filesystem is FAT.
   b. You are not an administrator.
   c. The Security tab is not normally visible in the file properties dialog box.
   d. The file is encrypted.

8. You want to create a hidden share called Marketing. What would you use as the share name?
   a. Marketing*
   b. Marketing!
   c. Marketing%
   d. Marketing$

Practical:

9. Create a report on how the network requirements of a company that has a fibre line available, 24 employees, 8 executives, and 3 public pc's

   After the report conduct a cost estimate for all the hardware needed for all the staff as well as the server and network hardware Explain how to keep the hardware and network secure.

   Using packet tracer setup and simulate the network.

Understanding Wide Area Networks

Introduction

Understanding Wide Area Networks, introduces the concept of WANs, and explains the steps required to set up and configure a broadband connection. It goes on to discuss the various WAN technologies, including circuit switching, packet switching, frame relay, and leased lines. It looks at dial-up and takes you through the process of setting this up. The chapter also focuses on carrier standards, and looks at those in use, including ISDN, xDSL, SONET, satellite, and cellular.

Gordon Davies. Networking Fundamentals (2019) Available on Safari Books Online at https://learning.oreilly.com/library/view/networking-fundamentals/9781838643508/

Learning Unit Objectives

By the end of this lesson, you'll be able to:

- Introduction to WANs
- Setting up a broadband connection
- Leased lines
- Dial-up
- Carrier standards

Revision questions

1. What type of network medium is used by SONET?
   a. UTP
   b. Coaxial
   c. Wireless
   d. Optical

2. What is the speed of an E3 connection?
   a. 1.544 Mb/s
   b. 2.048 Mb/s
   c. 34.368 Mb/s
   d. 44.736 Mb/s

3. Which devices convert digital signals to analog signals for transmission over the telephone network?
   a. Modem
   b. Switch
   c. Router
   d. Telnet

4. Which device in a packet-switching network is most likely to function as a PAD?
   a. Modem
   b. Switch
   c. Router
   d. Telnet

5. How many B channels does an ISDN Basic Rate Interface have?
   a. 1
   b. 2
   c. 3
   d. 4

6. Which WAN technology used fixed-size cells to transfer data?
   a. Frame relay
   b. Packet switching
   c. ATM
   d. 3G

7. Which of the following is used for error checking in X.25 networks?
   a. CRC
   b. ATM
   c. ECC
   d. PSE

8. If you had a committed information rate (CIR) of 128 Kb/s, what would the burst excess be?
   a. 128 Kb/s
   b. 192 Kb/s
   c. 224 Kb/s
   d. 320 Kb/s

9. What device routes traffic around a packet-switched network?
   a. PSE
   b. PAD
   c. CSU/DSU
   d. DTE

Practical:

10. Explain the following concepts:

- WAN
- LAN
- MAN
- Network infrastructure
- Network framework
- Packets
- Network hardware with 5 examples

9. Bibliography

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HOP: "Wishing all students a successful academic year ahead! Remember, COM on campus is your starting point for any queries; don't hesitate to reach out if you encounter any challenges – prompt resolution is key to your success!"