

DEPARTMENT OF NETWORKS AND TELECOMMUNICATIONS (L1 2023/2024)

# Exam in NETWORKS 1 MODULE

Full name :	Group :	Mark :						
MCQ(7.5 points, -0.25 for the wrong answer): Choose the correct answer(s):								
1- What is the main difference between LAN (Local Area Network) and WAN (Wide Area Network)?								
□ Data transmission speed □ Maximum number of connected devices	□ Geographica	□ Geographical area covered □ Connection technology used						
2- TCP/IP stands from :								
Transmission Control Protocol/Internet ProtocolTotal Control Process/Internet ProtocolTotal Control Process/Internet Protocol	ime Control Procedure/Internet Protocol ransmission Connection Procedure/Internet Procedure							
3- What is the primary function of the physical layer?								
□Error detection and correction □Routing packets between networks								
□Establishing sessions between applications								
4- What does CSMA/CD stand for in the context of Ethernet networks?								
Carrier Sense Multiple Access/Collision Detection Collision Sensing/Medium Duplexing								
□ Connection Service Multiple Address/Channel Deep □	Concurrent Servi	ce Management/Channel Distribution						
5- Which protocol operates at the data link layer and is responsible for MAC address resolution?								
□ ARP (Address Resolution Protocol) □ DNS (Domain Name System) □ ICMP (Internet Control Message Protocol)								
6- Which IEEE standard is affected to Ethernet technology ?								
□ IEEE 801 □ IEEE 802 □ IEEE	803	□ IEEE 804						
7- At which OSI layer does a HUB operate?								
	□ 4	□ 7						
8- Which device operates at the Physical layer of the OSI model?								
□ Bridge □ Router □ Repeater □ Sw	itch							
9- Which aim of computer networks involves ensuring that data reaches its intended destination?								
□ Reliability □ Security □ Scala	oility 🗆 F	lexibility						
10- What is Hamming code used for in data communications?								
□ Error correction □ Data compression	□ Data encryptio	n 🗆 Data encoding						

#### Exercise1 :

1- Give the format of an Ethernet frame (1 point)

Ethernet Header (14 byte)						
7 byte	l byte	6 byte	6 byte	2 byte	46 to 1500 byte	4 byte
Preamble	Start Frame Delimiter	Destination Address	Source Address	Length	Data	Frame Check Sequence (CRC)

#### IEEE 802.3 Ethernet Frame Format

#### 2- Using the following frame, determine its destination address

Destination address is 001122334455 (1 point)

3- Is this frame destined for all the network devices? why or why not ?

No, it is not destined to all the devices because it is of type Unicast, so only one device (having the mac address 001122334455) will receive this frame (<u>1 point</u>)

### Exercise 2:

1- A company wants to back up its data on a remote site. The volume of data to be backed up is estimated at 10 GB per day. The backup must be carried out at night from 10:00 p.m. to 6:00 a.m. The two sites are connected by a 2 Mbit/s line. We ask you to check if thi

2- If the diameter of this network is 2500 meters, and the new speed: 100 Mbits/s, the propagation speed of around 108 m/s, what is the minimum length of a frame that can circulate in this network in bytes?

s solution is feasible. In other words, is the backup time sufficient? Justify your answers.

#### Solution

1- The backup can only take place when all processing is completed, i.e.
in the 10:00 p.m. to 6:00 a.m. slot, i.e. during a period of 8hours. (0.5point)
Duration of transmission at 2.048 kbit/s
Data volume: 10 • 109 × 8 = 80 • 109 bits; (1point) Duration of transmission:11 hours; ((1point)

The transmission cannot be carried out during the allotted time.

2- Round-Trip-Delay: Channel slice

 $RTD = 2 * tp = 50. \ 10^{-6} s$  (1.5 point)

- this duration must be respected depending on the different media.
- With a rate of 100 Mbit/S =  $100. \ 10^6$  bits/S
- Minimum frame length 50. 10-6\* 100. 106 =5000 bits FRAME SIZE 625 bytes (0.5 point)

## Exercise 3:

Given information: 111011 and the generator polynomial:  $g(X) = X^2 + X$ 

- 1- Calculate the CRC code give all steps )
- 2- What is the final transmitted information (including the CRC code)

## **Solution**

Step 1: Append zeros to the end of the data.

- Original data: \( 111011 \)

- Appended zeros: \( 11101100 \) (appending two zeros as the degree of the generator polynomial is 2) (**0.5 point**)

Step 2: Perform polynomial division. ```<u>0.5 point)</u>

X^2 + X | 11101100 (<u>0.5 point)</u> -X^2 - X (Subtract X^2 + X)

10

....

(<u>1 point)</u>

Step 3: The remainder obtained is (10). (<u>1 point</u>)

Therefore, the CRC code for the given information (111011) using the generator polynomial  $(g(X) = X^2 + X)$  is (10). 11101110 (0.5 point)