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| **Networking Infrastructure**  Diploma in CSF / IT  Year 2 Semester 3 - April 2022 | Week 1 |
| Tutorial |
| NI Overview and Structured Cabling | |

**OBJECTIVES**

After completing this session, you should have a better understanding of

1. The advantages of layered network architectures
2. Implementation of protocols in various layers of a network model such as the OSI Network Model
3. The functions of the various layers in the OSI Network Model
4. The need for various addresses used in computer networking
5. Structured cabling system

**Activity 1**

Answer the following questions on Layered Network Model.

1. Draw a protocol stack of a computer in accessing a web server in the Internet.

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| WebServer Computer  Physical Application  Data Link Presentation  Network Session  Transport Transport  Session Network  Presentation Data Link  Application --> Physical |

1. Name a Data Link Layer protocol.

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| PPP, IEEE |

1. Name a Internet/Network Layer protocol.

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| IP, ARP, ICMP |

1. Name a Transport Layer protocol.

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| TCP, UDP |

1. Is an IP address a physical or a logical address?

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| Logical address |

1. Describe the difference between a logical address and physical address.

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| A logical address is assigned by the software for a particular device it is virtual while a physical address is inscribed physically onto a particular hardware to label it.  Physical address is a unique identifier hard-coded into the NIC  Logical address is assigned by software |

1. Identify and explain the two logical addresses needed in computer networking.

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| IP address and Port address. IP is needed so that devices in a network or over the internet can transfer data to and from each other using IP addresses. Port addresses are needed so the computer can identify the process for which the data is used enabling the host to provide more than one service. |

1. Which of the following layers deals with bits?
2. Data Link Layer
3. **Physical Layer**
4. Network Layer
5. Transport Layer

Ans: B

1. The primary purpose of a Data Link Layer protocol is to \_\_\_\_\_\_\_.

A. Transmit bits across a physical link

B. **Transmit frames across a physical link**

C. Transmit packets across a network

D. Transmit messages from process to process

1. An example of a Internet/Network Layer protocol is
2. Ethernet MAC
3. **IP**
4. TCP
5. Application
6. The primary purpose of a Internet/Network Layer protocol is to
7. Transmit bits across a physical link
8. Transmit frames across a physical link
9. **Transmit packets across a network**
10. Transmit messages from process to process
11. An example of a Transport Layer protocol is
12. Ethernet MAC
13. IP
14. **UDP**
15. Application
16. When an application is to send data to a distant computer, what process occurs on the sending node?
17. **Encapsulation**
18. Encryption
19. De-encapsulation
20. Translation
21. If segmentation occurs on the sending node, what must occur on the receiving node?
22. **Reassembly**
23. Encapsulation
24. Segmentation
25. De-encapsulation
26. What is the main advantage of layered communication architecture?

A. **It increases system flexibility, and simplifies software development and maintenance**

B. It improves network performance by reducing transmission overhead

C. It increases network security by requiring intruders to penetrate many layers

D. It improves network reliability by providing redundant functions

**Activity 2:** ICT Network Tour - Structured Cabling System

(This is a virtual tour - ICT Network Tour video embedded in the PowerPoint file: “NI Module ICT Network Tour Slides Presentation”)

**While watching the video of the tour:**

1. Note the layout of the desktops in the Lab @Block 27. Identify the structured cabling components and networking device(s) that you may observe.
2. When you are in the Telecommunications Room @Block 27, identify the following networking devices and components:
3. Networking devices (**switches, routers**)
4. Structured cabling connecting hardware components on the rack (**patch panel, patch cord, etc**).
5. Ethernet connections (**1000Base-T, 10GBase-LRM**, etc)
6. Cable with connectors (**UTP with RJ45, optical fibre** **with ST, SC or LC**).
7. When you are in the Equipment Room @Block 31 Level 5 (ICT Network Centre), note the structured cabling components on the rack which are similar to Telecommunications Room. In addition, you would be able to observe **servers** and connection to NP Computer Centre.
8. Make sure you understand the connectivity between the desktops in the lab and the servers in the equipment room through the ICT Network (**Gigabit and 10 Gigabit Ethernet connections**).

**After you have completed the visit:**

1. Draw a network diagram to trace the physical connectivity of the desktops in the lab, through the wiring closet in the TR @Block 27 Level 6 to the servers located at the Equipment Room @Block 31 level 5.

The diagram should illustrate the following:

* + 6 subsystems of Structured Cabling System
  + Structured Cabling connecting hardware components
  + Networking and computing devices
  + Ethernet connections

1. Note that a Wireless Access Point is installed in the lab, show how the diagram that you have drawn in (5) has to be updated to include the Access Point.

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