

FIT1047
SUPPLEMENTARY WORKSHEET -02
WEEK 09

1- Name a device which operates at layer 3, and also name the protocol data unit at this layer.

Router. PDU is packet.

2- Name a device which operates at layer 2, and also name the protocol data unit at this layer.

Switch. PDU is frame.

3- Name a device which operates at layer 1, and also name the protocol data unit at this layer.

Network Interface Card / Hub. PDU is bit.

4- Explain how digital data can be transmitted using digital signal (using unipolar and bipolar signals) with examples.

Digital data are discrete values (0 and 1). These values can be transmitted using digital signal through unipolar or bipolar, where the signal is encoded into different voltage levels. In unipolar transmission, only one polarity is allowed (either 0 to positive or 0 to negative). In bipolar transmission, two polarities are allowed (0 to positive and 0 to negative).

Example of unipolar:

When digital data is 1, the digital signal will move to positive polarity (to encode a 1).

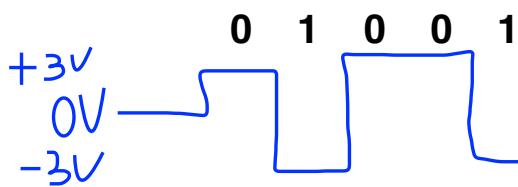
While when the digital data is 0, the signal will move to negative polarity (to encode a 0)

Example of bipolar (NRZ):

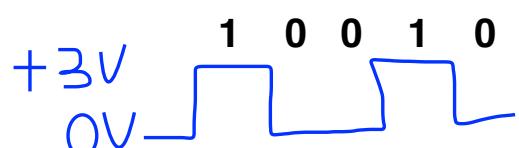
When the digital data is 1, the digital signal will move to negative polarity.

When the digital data is 0, the signal will move to positive polarity.

Unipolar and bipolar representations are illustrated in the diagrams below.



Bipolar



Unipolar

FIT1047
SUPPLEMENTARY WORKSHEET -02
WEEK 09

- 5- Explain how digital data can be transmitted using analog signal (using Frequency, Amplitude and Phase Modulation) with examples.

Digital data can be transmitted through analog signals by modulating the frequency, amplitude and phase to represent a 0 or 1. In frequency modulation, the 0 is represented as low frequency and 1 is represented as high frequency. In amplitude modulation, 0 is represented as low amplitude and 1 is represented as high amplitude. In phase modulation, 0 is represented as the wave starting in upwards direction and 1 is represented as the wave starting in downwards direction. Examples of the modulation is illustrated in the diagrams below.

- 6- In the TCP/IP architecture, which layer deals with the MAC addresses? Briefly explain the function of that layer.

Data link layer. It deals with the interface between hardware and software by sending frames over a medium and controls the medium via Media Access Control. In ethernet MAC, it uses CSMA/CD. In wireless MAC, it uses CSMA/CA.

- 7- Name the layers of the TCP/IP architecture (also called the Internet Model), and briefly explain the function of layer 2.

The Internet Model comprises of five layers, layer 1 is physical layer, layer 2 is data link layer, layer 3 is network layer, layer 4 is transport layer and layer 5 is application layer. Each layer has its own functionality.

Data link layer specifies how devices within a local area network could transmit its frames to other devices. The entire transmission is controlled by Media Access Control that specifies how different connection could transmit frames successfully from one device to another.