# DATA COMMUNICATION & NETWORK QUESTIONS AND ANSWERS 15/16

Solutions

November 2, 2017 Papyjae*01 Leave A Comment

**DATA COMMUNICATION & NETWORK**

**2015/2016**

*QUESTIONS:*

*1a. what is Data communication*

1. *Describe two (2) type of line configuration and Give two (2) example of each*
2. *List and briefly explain any five (5) Key task performance in data communication*
3. *Asynchronous data is transmitted in the form of characters made up as follow: five information bits each of duration 20 ms, a start bit the same duration as the information bits and stop bit of duration 30 ms. Determine: (a) the transmission rate in bps (b) The signaling rate in baud.*

*2a. what do you mean by OSI*

1. *Briefly write functionalities of different OSI layers?*
2. *List two (2) way in which the OSI reference model and TCP/IP reference are the same. Now list two (2) ways in which is they differ.*
3. *Differentiate between peer-to-peer and client server*

*3a. what is computer Network*

1. *different between packet switching and message switching*
2. *Comparison among different network topologies, based on the following properties. i. connection ii. Physical links*
3. *A modern transmits using an eight-level signaling technique. If each signaling element has a duration of 0.833 ms determine: (i) the baud rate (ii) the bit rate*

*4a. Differentiate between a bridge and a router. Different between a router and gateway.*

1. *Describe X.25 protocol for Network communication and where it is preferred.*
2. *Compare serial and parallel transmission. Why is parallel transmission unsuited for communication over appreciable distance.*
3. *the eight conductor data cable (cat 6 or cat 5) contains 4 pair of wire. What are the two wiring standard for these called.*

*5a. Name three (3) ways for wireless data to be propagated*

1. *i. what is cryptography*
2. *List and explain three (3) cryptographic algorithm*
3. *Mention and explain four (4) categories of security threat*
4. *Describe an IPv4 address and address space*

*6a. i. compare between concentrator and multiplexer*

1. *Draw the block diagram of typical data communication model and explain its constituents*
2. *Compare the different types of wire media with respect to cost, speed, EMI, and security*
3. *A line has bandwidth of 3100HZ. Atypical value of S/N ratio is 30dB. Calculate channel capacity.*
4. *identify at least ten (10) network tools and devices required in setting up a LAN*

*7a. List and explain any five (5) Transmission of Impairment*

1. *Describe the different between synchronous serial transmission and asynchronous serial transmission*
2. *i. How do you generate FM signal from a phase modulator? Briefly describe the operational principle*
3. *we have an audio signal with a bandwidth of a 4kHZ. What is the bandwidth needed if the modulation signal using.*
4. *identify the pin colour Pair description for Straight- Through and Cross-Over cable patch cable*

*ANSWERS*:

*1a. What is Data communication?*

Data communication is the action process of transfer data from one point to another. Networks are communication system designed to convey information from a point of origin to a point of destination.

b.*Describe two (2) type of line configuration and Give two (2) example of each*

***i.*** Point to point line configuration provides a dedicated work between devices. The entire capacity of the channel is reserved for transmission between these four devices. Most point to point line configurations uses an actual length of wire or cable to connect the form ends, but other options.

ii. Multi point line configuration is one in which more than two specific devices shows a simple link. In a multi-point environment the capacity of the channel is showed, either spirally or temporally.

c.*List and briefly explain any five (5) Key task performance in data communication*

***i.***Transmission System Utilization refers to the web to make efficient uses of the transmission facilities that are typically showed among a number of communicating devices.

ii.Network management capabilities are needed to configure the system, monitor its stations and react to failure and overloads and plane intelligently for future growth.

iii. Security is the very important issue in data communication system. The server of data may wish to be assured that the required to data.

iv.Flow control is required to assure that the source does not overwhelm the destination by sending data faster than them, they can be processed and absorbed.

v. Recovery is a concept distant from that of error connection

d. ***Asynchronous data is transmitted in the form of characters made up as follow: five information bits each of duration 20 ms, a start bit the same duration as the information bits and stop bit of duration 30 ms. Determine: (a) the transmission rate in bps (b) The signaling rate in baud.***

***i.***The time taken to transmit a single character = (6 x 20) + 30= 150ms

The number of bits transmitted during this time is 7

The transmission rate= $7(150 \times 10^{-3}) = 46.6$bps

ii.The shortest signally element has a duration of 20 marks, therefore the signally rate $=1/(20 \times 10^{-3}) = 50$band

***2a. What do you mean by OSI?***

The Open System international referee model describe how information from a software application in one computer moves through a network medium to a software application in another computer. The OSI referees model is a conceptual model composed of seven layers, each specifying particular network function

***b. Briefly write functionalities of different OSI layers?***

i. Application Layer; provide applications with access to network services

ii.Presentation Layer: determines the format used to exchange data among network computers.

iii. Section layer: Allows two applications to establish use and disconnected of a connection between them called a session. Provide for name recognition and additional functions like security.

iv.Transportation layer; ensures that data is delivered error free, in a sequences and with no loss duplication or computation. This layer also repackages data by assembling long message into lots of smaller messages for sending and repackaging the smaller message into the original larger message at the receiving end.

v.Network layer: this is responsible for addressing message and data so they are set to the correct destination and translating logical addresses and names.

vi.Data Link layer: this layer takes the data frames or messages from the network layer of provided for them actual transmission.

vii. Physical layer; controls the transmission of the actual data onto the network cable. It define the data electrical signals, line state and encoding of the data and the connector types used.

c. ***List two (2) way in which the OSI reference model and TCP/IP reference are the same. Now list two (2) ways in which is they differ.***

*Similarity between OSI and TCP|IP references model are*

- Both are based on the concepts of a stack of independent provided.
- Both are based on layered architecture and functionality of layered is rightly same
- In both models the layers through with including the transport service to process linking of communication.
- In both models, the layered above transport are application oriented users of the transport services.

*Difference between OSI and TCP|IP referee models are*

- The OSI model is based on the concept of services, interface and distinguish. The TCP|IP model did not originally clearly distinguish between service, interface and protocol.
- The OSI model support both connectionless and connection oriented communication in the network layer, but only connection oriented communication is the transport layer.
- The TCP|IP model support connectionless communication in the network layer but supports both models in the transport layer.
- The OSI referees model was device before the protocol was invented, but with the TCP|IP reserve was true.

***d. Differentiate between peer-to-peer and client server***

***Pear – to – peer***: both remote processes are executing at the same level and they exchange data using some shared resources.

***Client server***; one remote process act as a client and requests some resources from another application process acting as server.

***3a. What is computer Network?***

Computer Network can be defined as a network in a group of interconnected autonomous system and interact by means of exchange of information.

***b.Different between packet switching and message switching***

Message Switching: in message switching, the whole message is treated as a data unit and is switching| transferred in its entirety. A switch working on messages switching, first receives the whole and buffers it until there are resources available to transfer it to the next hop.

Packed Switching: packing switching enhances line efficiency as packet from multiple applications can be multiplexed over the carrier. The internet uses packed switching techniques. It enable the user to differentiate data streams based on priorities.

***c.Comparison among different network topologies, based on the following properties. i. connection ii. Physical links***

| Property | Bus | Star | Ring | Tree | Mesh |
|---|---|---|---|---|---|
| Connector | Multi point link | Point to point link central limb | Point to point link to its neighbor | Point to point link to a hub which in turn links with other hub switch | Point to point link to each and every devices in the network |
| Physical links (for N nodes) | 1 | N | N | Cannot be determined | N(N–1)\|2 |
| 10 port squares for N nodes | 1 | 1 | 2 | 1 | N–1 by each devices |
| Cost | Low | Medium | Low | Medium | High |
| Reliability | Low | Medium | Medium | High | High |
| In cable failure fault isolation | Breakdown the system | Only the attached note goes down | Breakdown the system | Only faulty cable branch nodes goes down | Only faulty cable path goes down |
| To add or delete a device | Difficult | Easy | Easy | Difficult | Difficult |
| Reconfiguration | Require redesigning of backbone | Very easy | Difficult | Easy | Difficult |

***d. A modern transmits using an eight-level signaling technique. If each signaling element has a duration of 0.833 ms determine: (i) the baud rate (ii) the bit rate***

The band rate defined as the inverse of the shortest signally element.

i.Band rate=1/0.8333 x$10^{-3}$

= 1200bands

If there are eight possible levels for each signal them each signaling element represent 3bits (i.e. the eight level are represented by 000 to 111). Then 3bits are transmitted every 0.8333ms

ii. Bit rate= no of bits /duration of one symbol

=3/ (0.8333ms) = 3600bp

***4a. Differentiate between a bridge and a router. Different between a router and gateway.***

*Differentiate between a bridge and a routes*

- A bridge operates at layer 2 of the OSI mode. A router operate at layer 3 of the OSI model
- A bridge acts as a relay of frame between similar networks. A router routes packages between potentially different networks.
- Bridges is a simple hardware device able to execute specific tasks. Router is more sophisticated device and contain software that can take decision to choose best pattern for data transmission.
- Bridges are mostly used in local networks. Router are used in interneurons.

*Different between a router and gateway*

- A router operates at network layer of OSI mode. A gateway can operate in all series layer of the OSI model mostly at transport and application layer of OSI
- A router by itself transfer accept and relay packets only across network using similar protocols. A gateway on the other hand can accept and transfer data packets before different protocol network. Gateways are infact protocol connectors.
- A gateway is generally software installers within a router.
- Generally, gateway cross the physical boundaries of contain and router past routes there.

***b. Describe X.25 protocol for Network communication and where it is preferred.***

X.25 is a packet switching network standard developed by CCITT and commonly implemented in WANS X.25 Network are implemented with line spend up to 64kbps. These speed are sufficient for file transfer and terminal action. It can support more speed. The X.25 protocol configuration used in communication between TDTE and the DCE

***c. Compare serial and parallel transmission. Why is parallel transmission unsuited for communication over appreciable distance.***

In serial transmission, bits are sent one after another in a queue manner. Serial transmission requires only one communication channel.

Parallel Transmission; this is a transmission where each bit of character is transmitted only on its own channel so as to transmit the entire character at the same time and period.

***d. The eight conductor data cable (cat 6 or cat 5) contains 4 pair of wire. What are the two wiring standard for these called.***

***5a. Name three (3) ways for wireless data to be propagated***

Wireless transmission is a form of unguided media. Wireless communication involves no physical link established between 2 or more devices namely

Radio media

Micro waves

Infrared

Ultraviolent

X-ray

Gamma Ray

***i. What is cryptography?***

Cryptography is a technology to encrypt the plain-text data which makes it difficult to understand and interprete.

***ii.List and explain three (3) cryptographic algorithm***

Secret key

Public key

Message digest

Secret key: both send and receiver have one secret key. The secret key is used to encrypt the data at sender's end after the data is encrypts it is sent on the public domain to the receive, e.g Data encryption standard (DES)

Public key: in this encryption system, every user has its own secret key and it is not in the shared domain. The secret key is never revealed on public domain e.g RSA

Message Digest: in this method actual data is not sent, instead a harsh value is calculate and sent.

*b. Mention and explain four (4) categories of security threat*

Virus threat:  threat, a computer virus is a program written to alter the way a computer operates, without the permission or knowledge of the users

Spy wave threats: A serious computer security that spy wave any program that monitors your online activities or install program without your consent for proof

Hackers: are programmers who victimize other for their own again by breaking into computer system to steal.

Phishing threats: phishers attempts to steal sensitive financial or personal information through fraudulent email.

Viral web sites: users can be enticed, offer by email message, to visit web sites that contain virus

*c. Describe an IPv4 address and address space*

IPv4 is 32 bit addressing scheme used as TCP/IP host mechanism. IP addressing enables host on the TCP/IP network to be uniquely identifiable.

Class A: it use first octet for network address and last there octets for host address

Class B: it uses first two octet for network address and last two for host addressing

Class C: it uses first three octets for network address and last one for host addressing

Class D: it provide flat IP addressing scheme in contrast to

*6a. i. Compare between concentrator and multiplexer*

Multiplexer: is basically an intelligent device, which performs only the basic role of reducing total communication costs.

Concentrator: is an intelligent multiplexer which allows many devices to show a single, high speed communication by being programmed to temporary store some transmission and forward them later.

1. *Draw the block diagram of typical data communication model and explain its constituents*


The communication between a workstation and a server over a public telephone network. Here workstation is as source, modern is on transmitted, public telephone network is as transmission system.

The fundamental aspect of the communication functions is the transmission of signals in a reliable as efficient manner

***b. Compare the different types of wire media with respect to cost, speed, EMI, and security***

| Cable type | Security | Cost | Installation | Capacity | Repeater | EMI |
|---|---|---|---|---|---|---|
| Coaxial thicks | Low | Less that<br><br>STP | Inexpensive and easy | 10 mbps | 185 meter | Less sensitive than UTP |
| Coaxial thicks | Low | Greater than STP & less than fiber | Easy | Typically > 100mbps | 500m | Less sensitive than UTP |
| Shielded twisted pair | Average | Greater than UTP & less than thickset | Fairly easy | 16mbps typical up to 500 mbps | 160m | Less sensitive than UTP |
| Unshielded twisted pair | Average | Lowest | Inexpensive and easy | 10 mbps typical up to 100mbps | 100 meter typical | Most sensitive |

| | | | | | | |
|---|---|---|---|---|---|---|
| Fibre optic | High | Highest | Expensive and difficult | 1 gbps typical | 10's of km | Insensitive |

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The fundamental aspect of the communication functions is the transmission of signals in a reliable as efficient manner

***c. Compare the different types of wire media with respect to cost, speed, EMI, and security***

***d. A line has bandwidth of 3100HZ. Atypical value of S/N ratio is 30dB. Calculate channel capacity.***

And signal –to – none ratio S/N = 30 dB

Channel capacity for the

Channel capacity = H x log2 (1 + S/N)

And S/N is given by = $10\log_{10}$ S/N in dB

$10\log_{10}$ S/N = 30

Log10 S/N = 3

S/N = 1000

Channel capacity = 3100 + $\log_2$ (1 + 1000)

= 3100 x $\log_{10}$ (1001)/ $\log_{10}2$

= 3100 x 31301

= 30897 bits preserved

ii. ***Identify at least ten (10) network tools and devices required in setting up a LAN***

- Multiplexer
- Hub

- Switch
- Cable
- Computer
- Network card
- Modern
- Server
- Client controller
- Client/ server

*7a. List and explain any five (5) Transmission of Impairment*

***Alteration***: for the receive to interpret the data accordingly the signal must be sufficiently strong

***Dispersion***: As signal travel through the media, it tends to spread and overlaps

***Delay distortion***: signal speed and Frequency do not match there are possibility that signal reaches destination.

***Noise***: Random disturbance or fluctuation in analog or digital signal is said to be Noise

***Thermal Noise***: heat agitate the electronic conductor of a medium which may introduce noise in the media

***Intermodulation***: when multiple frequencies share a medium their interference can cause noise in the medium

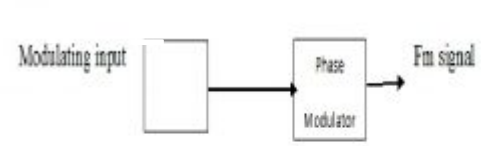
*b. Describe the different between synchronous serial transmission and asynchronous serial transmission*

Synchronous serial transmission: timing in synchronous transmission has importance as there is no mechanism follows to recognize start and end data bits. There is no pattern of prefix/suffix method

Asynchronous serial transmission: it is named so because there is an important of timing. Data bits have specific pattern and they help receiver recognize the start and end data bit.

*c i. How do you generate FM signal from a phase modulator? Briefly describe the operational principle*

***i.*** It can be mathematically verified that if the modulation signal is integrated before it in fed to the respective input of a phase modulator, the output is FM signal




The input to the phase modulator is integrate of the Modulating signal. Therefore the simultaneous phase of the modulated signal varies with the integrate of modulating signal.

***i. We have an audio signal with a bandwidth of a 4kHZ. What is the bandwidth needed if the modulation signal using.***

***ii.AM signal*** required twice the bandwidth of the original signal

Bandwidth = 2 x 4 $KH_3$ = 8$kH_3$

***FM signal*** required 10 times the bandwidth of the original signal

Bandwidth= 10 x 4 KH3 = 40KH3

***c. identify the pin colour Pair description for Straight- Through and Cross-Over cable patch cable***

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