Data Communication (CS601)

MOST LATEST (2012) PAPERS For MID Term

Q. Suppose a famous Telecomm company 'AT&T' is using AMI encoding standard for its digital telephone services, what is meant by Alternate mark inversion in such type of encoding. (03)

SOLUTION

Encoding means conversion of Digital data into Digital signals. AMI stands for Alternate Mark Inversion. AMI is a simplest type of Bipolar Encoding. Alternate Mark Inversion means Mark '1' Inversion.

Q. a) What is the function of a modulator? What is the function of a demodulator? b) Explain the asymmetry of 56K modems [5]

SOLUTION

1. **FUNCTION OF MODULATOR**
   Modulator Converts the Digital signal into Analog signal by using FSK, ASK, PSK and QAM.

2. **FUNCTIONS OF DEMODULATOR**
   Demodulator converts the Analog signal into Digital signal.

3. **ASYMMETRY OF 56K MODEMS**
   Modem is a combination of Modulation and Demodulation. In 56K modem if one side of internet service provider and the signal does not pass through a PCM converter the quantization is eliminated in one direction and data rate will be 56kbps. In the uploading direction the maximum data rate is 33.6 kbps and from downloads direction 56kbps.
   =8000 samples/sec * 7 bits/sec = 56 kbps

Q. What according to your point of view is better among B8ZS or HDB3 and why? [05]

SOLUTION

B8ZS and HDB3 both are type of Bipolar Encoding. Both variations are used to solve the problem of Synchronization of sequential 0's.

B8ZS

B8ZS is used in North America to synchronize long string of Zero's. B8ZS is little bit different from AMI because it is occurred when 8 or more Zero's are encountered. The Forces of Artificial signals are called violations. When 8 Zero's occur changes in pattern passed on the polarity of previous 1.

HDB3

HDB3 is used in Europe and Japan. It is similar to B8ZS, but a little bit difference is that each time 4 Zero's are encountered instead of 8 Zero's like B8ZS. Instead of Pattern of violation is based on the polarity of previous 1 bit it looks the no. of 1's occurred since the last submission.

So, in my point of view HDB3 is better than B8ZS.

Q. How the concept of bit rate and bit interval in digital signal is related in analog signal, also define the terms. [03]

SOLUTION

Time required for sending single bit is called Bit Interval. This interval is in seconds. The number of bits sent per second is called Bit Rate. Its unit is bps Bits per second.

Bit rate and Bit interval are used in Periodic and aperiodic Digital signals and frequency are not the appropriate terms to describe them.

Q. Suppose a certain radio station is using an Audio signal with a Bandwidth(BW) of 8 KHz. What is the BW needed to modulate the signal using FM(frequency modulation)? [03]

SOLUTION

Bandwidth of FM Signal = 10 * Bandwidth of Modulating signal

Bandwidth of Audio signal is 8 KHz

So,

BW = 10 * 8 KHz = **80 KHz**

Q. Which function of the session layer provides communication in half duplex or full duplex? [02]

SOLUTION

The **Dialog Control Function** in Session Layer allows communication between Half duplex and Full duplex.

Q. When you transmit data from one computer to the other using a public telephone line, then which kind of data conversion takes place? [02]

SOLUTION

The computer uses Digital signals but public Telephone lines carry Analog signals, so it is called “Digital to Analog Conversion” or “Modulating a Digital signal”

Q. What is Power Bandwidth? (02)

SOLUTION

A frequency Band in which 99% of the total power resides is called Power Bandwidth.

Q. Which layer of the OSI model determines the data rate of communication and how it works? (02)

SOLUTION

The Physical Layer in OSI model determines the Data rate or Transfer rate. The physical layer defines the duration of bits, it means how long will a bit last.

Q. How much bandwidth is required for the modem in case of FSK? (02)

SOLUTION

The bandwidth of FSK (Frequency Shift Keying) is equal to the Baud rate of the signals plus Frequency shift.

Bandwidth = Baud Rate + Frequency Shift

Q. What is frequency spectrum? (03)

SOLUTION

The collection of all component frequencies is called Frequency Spectrum. It is represented with a Frequency Domain Plot. The width of the Frequency Spectrum is called Bandwidth.

Q. Explain how transition mechanism takes place in Differential Manchester Encoding. (05)

SOLUTION

The Differential Manchester is a type of Biphase Encoding. The presence or absence of an additional transition in the beginning of bit interval is used to identify a bit. Inversion at the middle of the bit interval is used for synchronization. In Differential Manchester Encoding a transition means binary 0 and no transition means binary 1. To represent binary 0 it requires two signal changes and only 1 signal require representing binary 1.

Q. How can maximum amplitude of a sine wave is defined? (02)

SOLUTION

The maximum amplitude of the sine wave is equal to the highest value on the vertical axis it reaches.

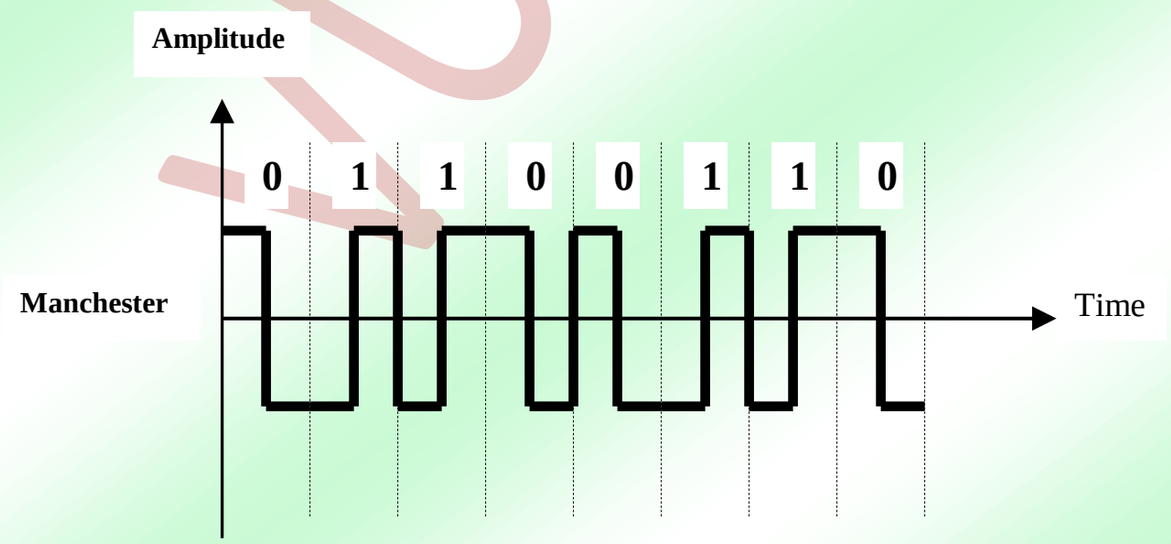
Q. Sketch the Manchester's encodings for the stream '01100110'. (05)

SOLUTION

Manchester is a type of Biphase Encoding. It is used to convert digital data into digital signals. It uses inversion at the middle of each bit interval for both synchronization and bit representation. The transition from negative to positive is equal to 1 and the transition from positive to negative is equal to 0.

One is  Zero is 

MANCHESTER'S ENCODINGS FOR THE STREAM '01100110'



Q. Write down any common similarity among 4 QAM & 8 QAM. (02)

SOLUTION

There is a similarity between 4 QAM and 8 QAM. In both cases no. of amplitude shifts is more than the no. of phase shifts. Number of phase shift used by QAM (Quadrature Amplitude Modulation) is always larger than the amplitude shifts.

Q. In modem speed FSK, QAM and PSK techniques are used; you are required to match these techniques with:

Amplitude
Frequency
Phase **(03)**

SOLUTION

All of these conversions manipulate different signals

CONVERSIONS	MANIPULATES
FSK (Frequency Shift Keying)	Frequency
QAM (Quadrature Amplitude Modulation	Phase
PSK (Phase Shift Keying)	Both Phase and Amplitude

Q. How application layer makes connection to remote server? (02)

SOLUTION

With the help of NVT (Network Virtual Terminal) the application layer makes connection to remote server. NVT is a software version of physical terminal and allows a user to log on to a remote host.

Q. If a signal completes 5 cycles in one second, what is its time period? (03)

SOLUTION

Frequency = No. of cycles in one second
So,
Frequency = 5

Formula to Find Time period

T = 1/f

Time = T
Frequency = f

Time period = 1/frequency

Put the values in the Formula

T = 1/5= 0.2 sec

Q. Consider a major Telecomm company using RZ encoding for its signals conversion. What will be the major problem faced by using such type of encoding? (02)

SOLUTION

The major problem faced by using such type of encoding is Bandwidth Problem.

Q. Consider a carrier signal whose phase and frequency remains constant with varying amplitude, which kind of modulation will take place in this case? (02)

SOLUTION

In Amplitude Shift Keying (ASK) the phase and frequency remains constant while the amplitude changes.

Q. What will be the frequency of a signal completing 10 cycle in one second?

SOLUTION

Frequency = No. of cycles in one second

So,

Frequency = 10

Q. Give advantages and disadvantages of Asynchronous and Synchronous transmission. Compare the both strategies.

SOLUTION

DIGITAL DATA TRANSMISSION

The transmission of data in the form of digits is called Digital Data Transmission. There are two types of Digital data transmission.

1. Parallel Transmission
2. Serial Transmission

PARALLEL TRANSMISSION

Instead of one bit if we want to send a group of bits at one it is called parallel Transmission. It consist on multiple lines.

SERIAL TRANSMISSION

The transmission of bits by using a single wire is called serial Transmission. There are two types of serial transmission:

1. Asynchronous Transmission
2. Synchronous Transmission

ASYNCHRONOUS TRANSMISSION

In an Asynchronous Transmission data is transmitted in a single wire. The data is in the form of small chunks. These chunks has a start and stop bits. In asynchronous transmission timing is unimportant.

Advantages

Cheap and Effective

Disadvantages

Slow

SYNCHRONOUS TRANSMISSION

In synchronous transmission data is transmitted in an unbroken string of 1's and 0's and the receiver separates these bits in the form of characters or bytes to reconstruct the information.

Advantages

Speed

Disadvantages

Inaccurate data receiving

Q. How does DTE and DCE works together for end to end communication?

SOLUTION

The DTE and DCE are commonly used to transmission of data. DTE stands for Data Terminal Equipment and DCE stands for Data Communications Equipment. DTE is a device that ends a communication line while DCE provides a path for communication.

For example our computer is a DTE. The modem is DCE. The computer system works on digital signals but our telephone lines carry analog signals. Modem is used to convert Digital data into Analog signals this process is called modulation. Now data is in Analog form but receiver computer also work on digital signals, so it again converting from analog signal to digital signals with the help of modem this process is called demodulation.

Q. If 64 bits are sent over transmission medium in one second, what will be the bit rate and bit interval?

SOLUTION

Bit rate = No. of bits in one second

Bit rate = 64 bps

Bit Interval = Time required to send 1 single bit

Bit interval = 1/64 sec

Bit interval = 0.02 sec

Q. Digital data transmission can occur in two basic modes, which communication mode uses single wire or channel for transmission? (02)

SOLUTION

Digital data transmission can occur in two basic modes:

1. Parallel Transmission
2. Serial Transmission

The Serial communication uses single wire or channel for transmission.

Q. A constellation diagram consists of four equally spaced points on a circle. If bit rate is 2800 bps, what is the Baud Rate? (03)

SOLUTION

Example 5.11
A constellation diagram consists of eight equally spaced points on a circle. If bit rate is 4800 bps, what is the Baud Rate?
Solution:

Constellation indicates 8 PSK with the points 45 degree apart
Baud Rate= 4800 / 3 = 1600 baud

Relationship b/w bit rate &band rate

Bit rate equals the baud rate times the no. of bits represented by each signal units

- The baud rate equals the bit rate divided by the no. of bits represented by each signal shift
- Bit rate is always greater than or equal to Baud rate

Do Yourself

Q. Suppose the data points of a constellation diagram having values of (amplitude, phase)are as (4, 0) and (6, 0). Is the modulation ASK, PSK, or QAM give reason? (05)

SOLUTION

Q. Explain where EIA232 Interface standard is used and how it works in physical layer? Discuss any two types of specifications of this interface.

SOLUTION

These standards developed by EIA. It is used to define Mechanical and Functional characteristics of the interface between DTE and DCE . It was used in 1962 as the RS 232 Standard. Two implementation of EIA 232 are DB25 and DB 9. DB 25 functions is assigned to each of the 25 pins in the DB25 and on the other side DB9 is simple version of EIA 232 . That performs Preparation, Readiness, Setup , Data Transfer and Clearing.

Q. How a signal is controlled by amplitude, frequency and phase?

SOLUTION

First considering the Amplitude it is value of the signal at any point the wave occur. We know that if the maximum amplitude from a point is equal to highest value where it reaches on the vertical axis. We can control the signal by amplitude by Knowing its maximum value and minimum value. Amplitude measures in Vots, Watts and Including frequency which is the number of cycles completed in one second help lots of controlling signal. Frequency is measured in hertz. Phase is used to tell us the position of the wave form relative time to zero. We get the status of cycle using this. Phase is measured in Degrees or Radian. If we know the values of amplitude, frequency and phase we can control the signal easily.

Q. Suppose a certain radio station is using an Audio signal with a Bandwidth(BW) of 8 KHz. What is the BW needed to modulate the signal using FM(frequency modulation)?

SOLUTION

MODULATE THE SIGNAL USING FM

BW= 10* 8Khz= 80KHz

Q. Suppose a famous Telecomm company 'AT&T' is using AMI encoding standard for its digital telephone services, what is meant by Alternate mark inversion in such type of encoding.

SOLUTION

Encoding means conversion of Digital data into Digital signals. AMI stands for Alternate Mark Inversion. AMI is a simplest type of Bipolar Encoding. Alternate Mark Inversion means Mark '1' Inversion.

Q. Digital data transmission can occur in two basic modes, which communication mode uses single wire or channel for transmission?

SOLUTION

Digital data transmission can occur in two basic modes:
1. Parallel Transmission
2. Serial Transmission

The Serial communication uses single wire or channel for transmission.

UNSOLVED QUESTIONS

Q. A news Channel is using AM (Amplitude modulation) for broadcasting it's news bulletin, calculate the bandwidth in KHz required for each of the following AM stations.

a. **Modulation signal with a bandwidth of 4 KHz.**
b. **Modulating signal with frequencies of 2000 to 3000 Hz** **(05)**

SOLUTION

Q. Calculate the bandwidth in KHz required for each of the following FM stations.
a) Modulation signal with a bandwidth of 12 KHz.
b) Modulating signal with frequencies of 2000 to 3000 Hz **(05)**

SOLUTION

Using HDB3 scheme, encode the signal "1100001011" **(05)**

SOLUTION

Q. What happens during synchronization, if the signal is unvarying in unipolar encoding scheme?

(03)

SOLUTION

Q. Suppose you are talking to your friend who is living abroad, which type of signal conversion will take place in this case:

a)Analog to digital
b)Digital to Analog **(02)**

SOLUTION

Q. Mention the following effects on an Analog carrier signal whose amplitude varies with the bit stream (modulating signal) keeping frequency and phase constant.
a) Effect of bandwidth
b) Noise
c) Speed of transmission. **(05)**
SOLUTION

Q. Consider a Musical Instrument containing a wide range of frequencies with modulating bandwidth up to 15 KHz. How much bandwidth of AM (Amplitude modulation) will be required to prevent attenuation of higher-order harmonic frequencies. (03)

SOLUTION

OBJECTIVE

What is the Protocol Data Unit (PDU) employed at the Physical Layer?
Segments
Packets
Bits
Frames

There are _____ factors on which the performance of a network depends.

Three
Five
Four
Two

Frequency band in which 99% of the total power resides is called_____.
power bandwidth
half power bandwidth
3dB bandwidth
F.M.

Standards creation committee has _____ organizations
2
3
4
None of them

The conduit over which data travel is called
Link
Path
Circuit
Conductor

In _____ transmission mode, both stations can transmit and receive simultaneously.
Simplex
Half Duplex
Full Duplex
None of the given

EIA 449 uses following two standards to define its electrical specifications:
RS-423, RS422
RS-422, RS532
RS-412, RS333
RS-413, RS321

A human brain is considered as a _____
DTE
DCE
Driver
Machine

There are _____ basic functional units involved in the communication of data.
4

3
1
2

Which of the following is most affected by noise?
QAM
ASK
FSK
PSK

PCM is the first process of PAM.
True
False

The collection of all component frequencies is called _____
frequency spectrum
bandwidth
throughput

Signal can be controlled by three attributes: Amplitude, frequency and _____.
Phase
Time
Wavelength

Upper OSI layers are always implemented in _____
Software
Hardware
both hardware and software

Layers 5, 6 and 7 also called as network support layers.
True
False

Line configuration refers to the way two or more devices attach to a _____.
Link
Circuit
Route
Node

objective

There are _____ factors on which the performance of a network depends.
Three
Five
Four
Two

Which type of protocols are used in shared point to point link?
Direct
Indirect
Monolithic
Structured

Transmitting passwords is the responsibility of _____.
communication service module

network access module
file transfer application

_____ layer deals with syntax and semantics of information exchange.
Presentation
Session
Application
Physical

_____ requires more bandwidth.
FSK
ASK
PSK
QAM

If a station does not receive its signal up to a specified time that system issues an alarm to _____

another node
network manager
switch
network analyzer

In RS 422 Balanced mode two lines carry _____ signals which are not identical to each other.
Same
Different
Digital
Analog

Asynchronous transmission is _____
Slow
Costly
non-effective
fast

Which of the following is most affected by noise?
QAM
ASK
FSK
PSK

The last process in PCM is _____ digital data into digital signal.
Encoding
Decoding
Modulating

PCM is the first process of PAM.
True
False

Which of the encoding schemes have bandwidth problems?
Differential Manchester
AMI
RZ

Signal can be controlled by three attributes: Amplitude, frequency and _____.
Phase

Time
Wavelength

Session layer is responsible for segmentation and reassembly.
True
False

The internet model consists of _____ layers.
Three
Two
Five
Seven

An unauthorized user is a network _____ issue.
Performance
Reliability
Security
All of the given

Objective

Which one is not an element of protocol _____ .
Semantics
Timing
communication service module

_____ layer deals with syntax and semantics of information exchange.
Presentation
Session
Application
Physical

What layer of the OSI model is designed to perform error recovery functions?
Physical layer
Data link layer
Transport layer
Session layer

Data link layer provides _____ to the physical layer.
Effectiveness
Efficiency
Reliability
None of the given

In _____ transmission, bits are transmitted simultaneously, each across its own wire.
Asynchronous serial
Synchronous serial
Parallel
Asynchronous & Synchronous serial

Asynchronous transmission is _____
Slow
Costly
non-effective
fast

ASK, PSK, FSK and QAM are examples of _____ modulation.
digital-to-digital
digital-to-analog
analog-to-analog
analog-to-digital

In case of ASK a bit is represented by varying the_____ of carrier signal.
Amplitude
Frequency
Time
amplitude and frequency

PCM is the first process of PAM.
True
False

Bi phase encoding is a type of bipolar encoding in which we use two voltage levels.
True
False

In Alternate mark inversion the term mark comes from_____
Telegraphy
Telephony
digital telephony

Signal can be controlled by three attributes: Amplitude, frequency and _____.
Phase
Time
Wavelength

The physical layer is concerned with the transmission of _____ over the physical medium.

Programs
Dialogues
Protocols
Bits

Secondary hub in a tree must be a passive hub.

True
False

Which one is not among standard creation committee.
internet society and IETF
ITU-T
IEEE

A set of devices connected by communication links is called networking
True
False

Objetive

_____decompose a composite signal into its components.

fourier transform
nyquist theorem
shannon capacity

Line configuration is the function of _____ layer.
Data link
Network
Physical
Transport

Which type of protocols are used in shared point to point link?
Direct
Indirect
Monolithic
Structured

Frequency band in which 99% of the total power resides is called_____.
power bandwidth
half power bandwidth
3dB bandwidth
F.M.

In RS 422 Balanced mode two lines carry _____ signals which are not identical to each other.
Same
Different
Digital
Analog

Putting an audio signal having lower frequency on higher frequency carrier is called_____.

De modulation
Modulation
Encoding
None of the given

_____ is measured on the horizontal axis in time domain plot

Phase
Time
signal amplitude
frequency

Frequency of a network failure and recovery time after a failure measures the _____ of a network.

Performance
Reliability
Security
Feasibility

Converting binary bits into digital signal is _____.

Analog to digital conversion
Digital to analog conversion
Digital to digital conversion
Analog to analog conversion

The conduit over which data travel is called
Link
Path
Circuit
Conductor

Cable TV network is an example of _____ .

LAN
MAN
WAN
None of the given

In packet switching all the data packets follow the same path.
True
False

EIA 449 uses following two standards to define its electrical specifications:
RS-423, RS422
RS-422, RS532
RS-412, RS333
RS-413, RS321

In asynchronous transmission, the gap time between bytes is _____.
Fixed
Variable
a function of the data rate
zero

There are _____ types of serial transmission:
1
2
3
4

Number of signal units per second that are required to represent a bit is called bit rate.
True
False

The collection of all component frequencies is called _____
frequency spectrum
bandwidth
throughput

As the data packet moves from the lower to the upper layers, headers are _____.
Added
Subtracted
Rearranged
Modified

Trailer is only added at _____layer of OSI model.
data link
physical
network
application

_____ is a multipoint topology.
Ring
Mesh
Tree
Bus

A_____ provides a model for development that makes it possible for a product to work regardless of the individual manufacturer.
Protocol
Standard
Topology
System

Question No. 1: _____ is a multi point topology

- Ring
- Mesh
- Tree
- **Bus**

Question No. 2: Unidirectional traffic movement is overcome by dual ring technology.

- **True**
- False

Question No. 3: The _____ layer changes bits into electromagnetic signals.

- **Physical**
- Data Link
- Transport
- None of given

Question No. 4: In 8QAM each signal shift one baud represents_____.

- 4 bits
- 2 bits
- 5 bits
- **3 bits**

Question No. 5: In _____ transmission bits are transmitted over a single wire one at a time.

- **Asynchronous serial**
- Synchronous serial
- Parallel
- Asynchronous & Synchronous

Question No. 6: At the _____ layer a DCE takes data generated by DTE.

- **Physical**
- Transport
- Data Link
- Application

Question No. 7: In RS422 balanced mood two lines carry _____ signals which are not identical to each other.

- **Same**
- Different
- Digital
- Analog

Question No. 8: Standard orientation committee has _____ organization.

- 2
- 3
- **4**
- None of above

Question No. 9: Converting binary bits into digital signal is _____

- Analog to Digital
- Digital to Analog
- **Digital to Digital**
- Analog to Analog

Question No. 10: Frequency band in which 99% of the total power resides is called _____.

- **Power bandwidth**
- Half power bandwidth
- 3db bandwidth
- F.M

Question No. 11: The vertical distance from a given point on the wave form to the horizontal axis is called _____ of the signal.

- Phase
- **Amplitude**
- Frequency
- None of above

Question No. 12: Which one is not element of protocol.

- Semantics
- Timing
- **Common service Module**

Question No. 13: The _____ layer is responsible for delivery of message from one process to another.

- **Transport Layer**
- Network Layer
- Session Layer
- Application Layer

Question No. 14: Dividing data into manageable parts or data chunks is _____.

- Packetizing
- Framing
- **Both**
- None

Question No. 15: _____ is measured on the horizontal axis in time domain plot.

- Time
- Phase
- **Frequency**
- Signal

Question No. 16: What is the protocol data unit (PDU) employed at the network layer?

- Segments
- Packets
- Frames
- **Bits**

Question No. 17: Give the names of any two devices that can be used for connecting among following situations:

1. **LAN to LAN (Not confirm)**
2. LAN to WAN
3. MAN to WAN

Question No. 18: Phase Modulation is one of the methods used for :

1. Analog to Digital Conversion
2. **Analog o Analog Conversion**
3. Digital to Analog Conversion

Q. Suppose you are talking to your friend who is living abroad, which type of signal conversion will take place in this case:
a)Analog to digital
b)Digital to Analog

ANS: Analog to Digital

Q. Putting an audio signal having lower frequency on higher frequency carrier is called_____

ANS: Modulation

Q. Dividing data into manageable parts or data chunks is called as

ANS: both of given

Q. The sampling rate must be at least_____the highest frequency.

ANS: Twice

Q. Set of rules that govern communication is called_____.

ANS: Protocol

Q. To allow access to network resources is the function of _____

ANS: network layer

Q. A periodic signal completes one cycle in 0.001 s. What is the frequency?

ANS: 1 Hz

Q. Cable TV network is an example of _____ .

ANS: LAN

Q. Rate of data communication in LAN is _____

ANS: 4-16 Mbps

Q. At the _____layer, a DCE takes data generated by a DTE.

ANS: Physical

Q. Which modulation technique involves tribits, eight different phase shifts, and one amplitude?

ANS: 8-PSK

Q. Session layer is responsible for segmentation and reassembly.

ANS: False

Q. _____requires the maximum number of I/O ports.

ANS: Mesh

Q. Line configuration refers to the way two or more devices attach to a _____.

ANS: LINK