



isochronous in data comm...

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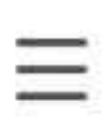
Isochronous (pronounced "eye-sock-ron-us")

Each transmission begins with a start packet. Once the start packet is transmitted, the data must be delivered with a guaranteed bandwidth.

Isochronous data transfer is **commonly used for where data must be delivered within certain time constraints, like streaming video.**

<http://bucarotechelp.com> › basics

Synchronous, Asynchronous, Isochronous. What Does it Mean?

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isochronous in data comm...



What is the meaning of isochronous system?



What's the difference between isochronous and synchronous?



"Isochronous" is a characteristic of one signal, while "synchronous" indicates a relationship between two or more signals.

W [https://en.m.wikipedia.org › wiki](https://en.m.wikipedia.org/wiki/Isochronous_signal)

[Isochronous signal - Wikipedia](https://en.m.wikipedia.org/wiki/Isochronous_signal)

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What is isochronous transmission geeks for geeks?



The Isochronous Transmission Format is also known as START-STOP mode or CHARACTER mode. Each character or byte is framed as a separate and independent unit of DATA that may be transmitted and received at irregular and independent time intervals.

◆ [https://www.fratec.net › diccionario](https://www.fratec.net/diccionario)

[Isochronous Transmission - Sistemas Fratec S.A.](https://www.fratec.net/diccionario)



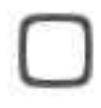
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0:35



Mayedah Wasima

Active 3 hours ago



Chapter 5 pore felso?



Ami 10 diye shuru korechi

21 NOV AT 02:25

You replied to Mayedah Wasima

Divisor ta ki diye dibe? Dataword
er shathe?

Dea thakte pare ba

Net a dekhlam akta polynomial
equation dea take Oita theke ber
kore ney

2:24 2023 21 NOV 02:25
 X Cyclic Redundancy Ch...
 From geeksforgeeks.org - deliv



GEEKSFORGEEKS

Cyclic Redundancy Check and Modulo-2 Division

CRC or Cyclic Redundancy Check is a method of detecting accidental changes/errors in the communication channel. CRC uses **Generator Polynomial** which is available on both sender and receiver side. An example generator polynomial is of the form like $x^3 + x + 1$. This generator polynomial represents key 1011. Another example is $x^2 + 1$ that represents key 101.

n : Number of bits in data to be sent from sender side.

k : Number of bits in the key obtained from generator polynomial.

Sender Side (Generation of Encoded Data from Data and Generator Polynomial (or Key)):

1. The binary data is first augmented by adding k-1 zeros in the end of the data

2. The module-2 division is performed by dividing binary data by the key and obtaining the remainder of division.

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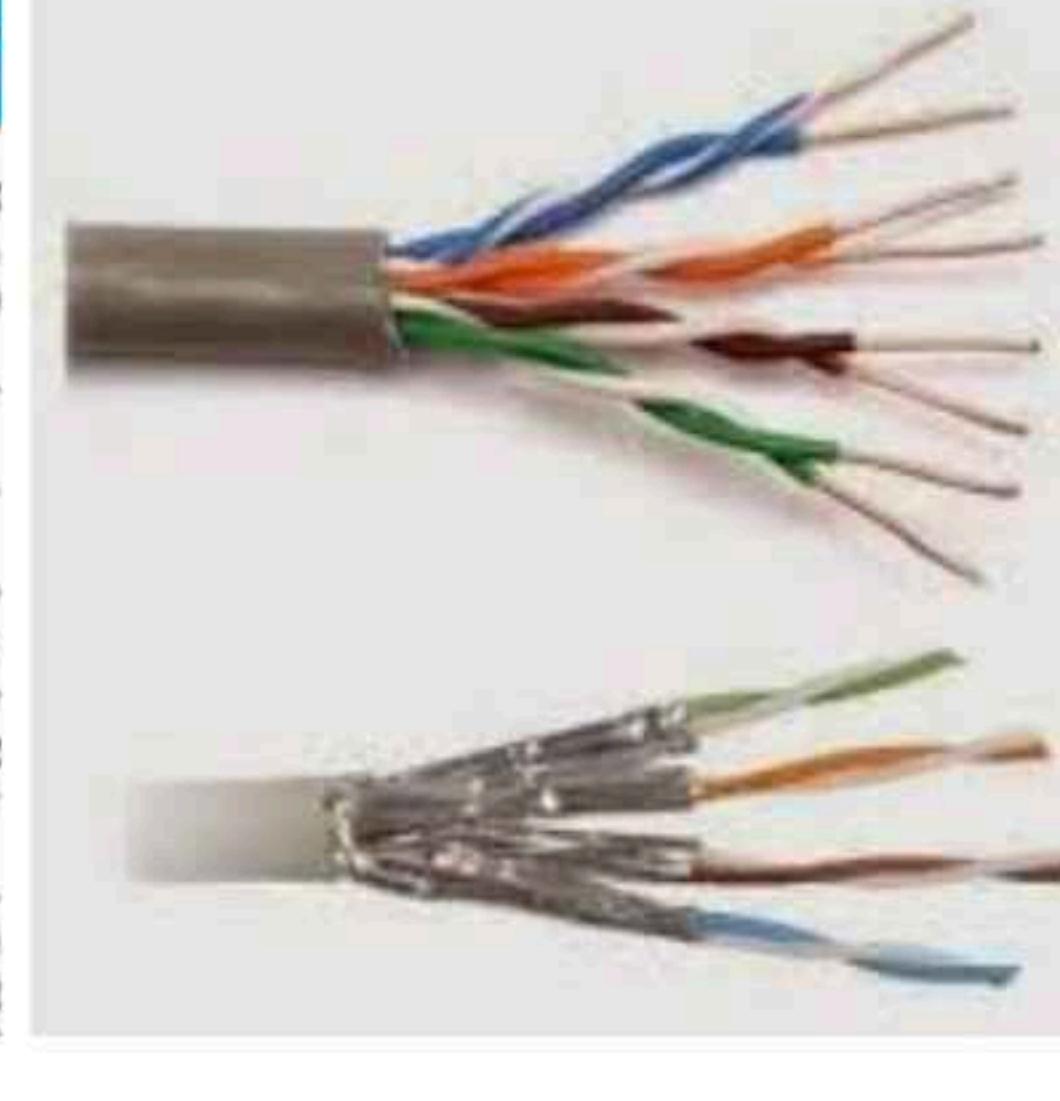




difference between STP a...



	UTP	STP
	Unshielded Twisted Pair	Shielded Twisted Pair
	cable with wires that are twisted together.	Twisted pair cable with shield
	Cheaper than STP	Costlier than UTP
	Lighter than STP	Heavier than UTP
	Prone to Noise and interference	Less prone to noise
	Supports slower speed than on STP	Supports higher speed
	Not required	Required
	Locations less prone to interference like offices and homes.	Locations prone to interference like factories and airport



বাংলায়

In English

Both UTP and STP are widely used in transmitting information across distance. UTP is a cable with wires that are twisted together to reduce noise generated by an external source. On the other hand, STP is a twisted pair cable with an additional mesh shield that guards the cable against electromagnetic interference.

<https://ipwitthease.com> › Blog

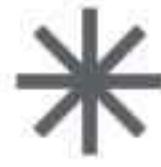
UTP vs STP - Difference between UTP & STP - IP With Ease



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difference between STP a...



STP and UTP Cables

Shielded twisted pair cable (STP) has the individual pairs of wires wrapped in foil, which are then wrapped again for double protection.

Unshielded twisted pair cable (UTP) has each pair

of wires twisted together. Those wires are then

wrapped in tubing without any other protection.

May 25, 2018

 <https://blog.jemelectronics.com> › sh...

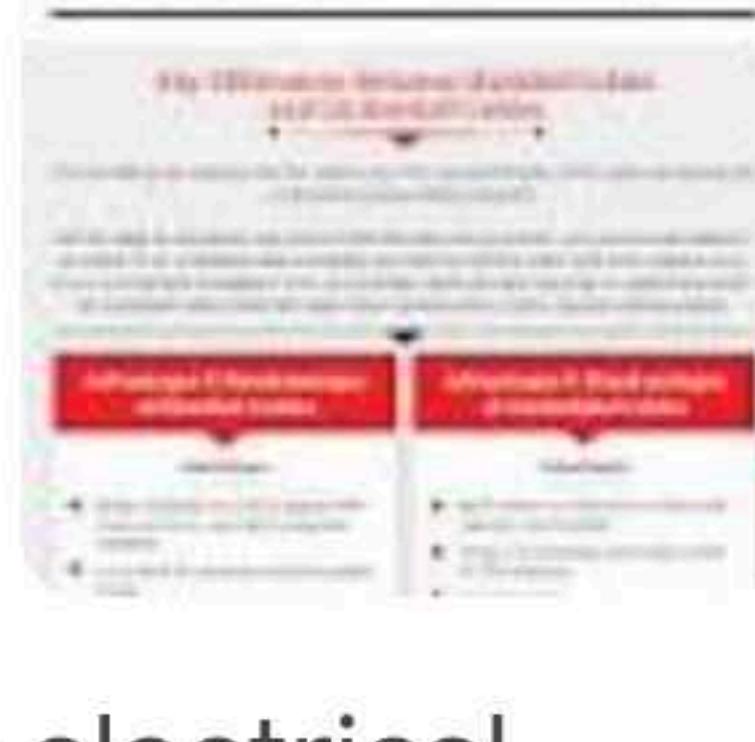
[The Difference Between Shielded vs Unshielded Cables](#)

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What is the difference between shielded and unshielded cables?

Shielded cables are more expensive and unwieldy than unshielded cables but offer increased protection against electromagnetic interference (EMI) that can slow down or disable electrical systems. Unshielded cables are easier to install and maintain but are not protected from EMI.

Apr 22. 2020



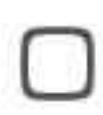
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Parameters	UTP	STP
Full Form	Unshielded Twisted Pair	Shielded Twisted Pair
Structure	cable with wires that are twisted together.	Twisted pair cable enclosed in foil / shield.
Cost	Cheaper than STP	Costlier than UTP
Weight	Lighter than STP	Heavier than UTP
Noise & interference	Prone to Noise and interference	Less prone to noise and interference
Data Speed	Supports slower speed than on STP	Support higher speed than UTP
Grounding of cable	Not required	Required
Target deployments	Locations less prone to interference like offices and homes.	Locations prone to interference like factories and airports

Difference between UTP & STP - IP With...

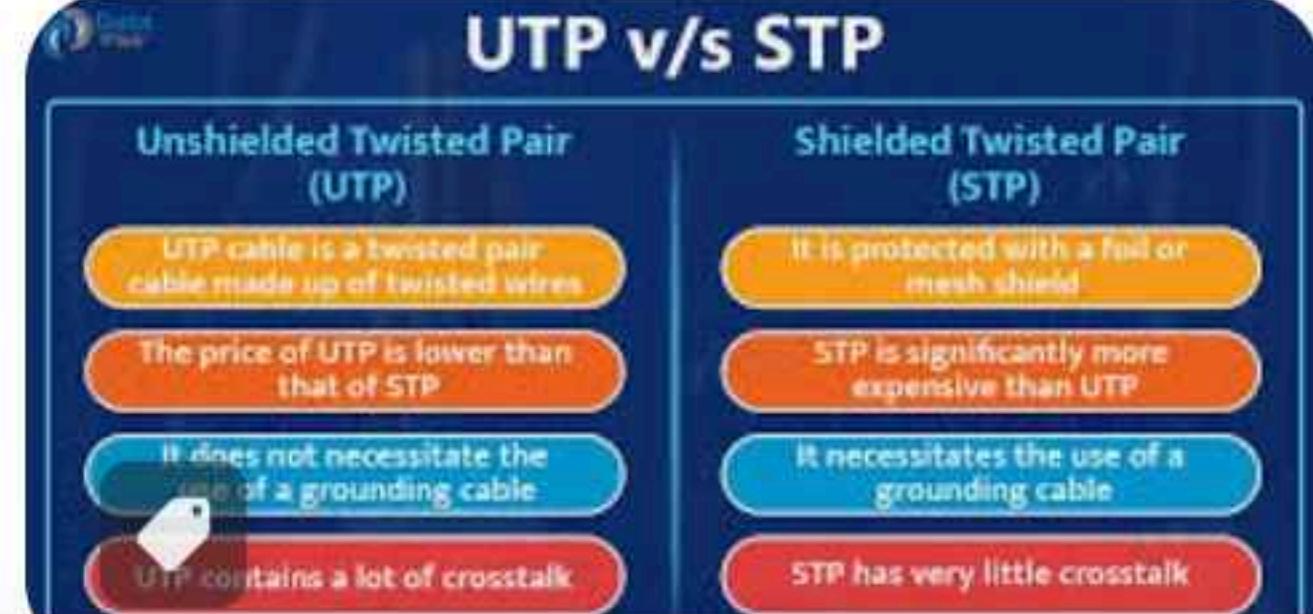
Attribute	UTP	STP
Electromagnetic Interference	High	Low
Speed	10 ~ 1000Mbps	10 ~ 1000Mbps
Distance	100 meters	100 meters
Crosstalk Generation	High	Low
Attenuation	High	Low
Application	Every transmission without shield and twisted pair is very popular for twisted pair wires, cross-talking.	Connections of various applications long distance.
Characteristic	Most of the UTP products offered under the STP market is concerned by twisted pair network. In addition, cables are usually pair core twisted around each other.	Most of the UTP products offered under the STP market is concerned by twisted pair network. In addition, cables are usually pair core twisted around each other.

Meters	100 meters	200 - 500 meters
Advantages	Better than UTP	Better than Twisted Pair
Disadvantages	Costly than UTP	Costlier than twisted pair wires
degrees / feet	360 degrees / feet	360 degrees / feet
Loss	Low	Low

Nationwide Penetration s..

1.	Data rate in UTP is slow compared to STP.	While data rate in STP is high.
2.	In UTP the generation of crosstalk is also high compared to STP.	While in STP generation of crosstalk is also less.
3.	In UTP grounding cable is not necessary.	While in STP grounding cable is required.
4.	In UTP noise is high compared to STP.	While in STP noise is less.
5.	In UTP much more maintenance are not needed.	While in STP much more maintenance are needed.
	The cost of UTP is less.	While STP is costlier than UTP.

what is the difference bet...





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standard bandwidth alloca...

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10 kHz

[বাংলায়](#)[In English](#)

As a result, an AM radio station requires a **10kHz bandwidth**. In actuality, the Federal Communications Commission (FCC) authorizes each AM station to broadcast at 10 kHz. AM stations may use carrier frequencies ranging from 530 to 1700 kHz (1.7 MHz). Jun 30, 2023

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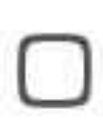
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standard bandwidth alloca...



People also ask

What is the standard bandwidth of the AM signal?



Detailed Solution

Features: AM

Bandwidth B.W. required in AM is = **2fm**. Hence, less bandwidth is required in case of AM.

Transmitted power Power transmitted in AM is given by: $P_T = P_c (1 + \mu^2)$ As the modulation index ' μ ' increases power in AM increases.

1 more row • Mar 30, 2023



<https://testbook.com/the-transmission-bandwidth-of-an-am-signal-is-testbook>

[Solved] The transmission bandwidth of an AM signal is - Testbook

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How much bandwidth does AM radio use?



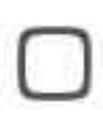
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How much bandwidth does AM radio use? ^

Comparison chart

AM**Frequency Range**

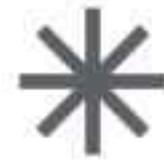
AM radio ranges from **535 to 1705 KHz (OR) Up to 1200 bits per second.**

Bandwidth Requirements

Twice the highest modulating frequency. In AM radio broadcasting, the modulating signal has bandwidth of 15kHz, and hence the bandwidth of an amplitude-modulated signal is 30kHz.

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What is the bandwidth in relation to radio ^

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What is the bandwidth in relation to radio communication?



Bandwidth (BW) is a range of frequencies, or information, that a circuit can handle or the range of frequencies that a signal contains or occupies. Example: An AM broadcast radio channel in the US has a bandwidth of 10kHz, meaning that it occupies a 10kHz-wide band, such as the frequencies from 760kHz to 770kHz.

▶ <https://www.analog.com> › glossary

[Definition of Bandwidth - Analog Devices](#)[MORE RESULTS](#)

What is the bandwidth for an AM wave and FM wave?



What is the maximum bandwidth required of AM transmission?



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Receiver:

d) c)

3456

A B C B

0 2 B C

E E E E

2 B 3 2 ← sender
20000 checksum

0 0 0 2
0000 0000 0000 0010
1111 1111 1111 1101 → 1's complement

Discard

A = 10

B = 11

C = 12

D = 13

E = 14

F = 15

d) d)

3456

A B C B

0 2 B A

B E E E

2 B 3 2

1 F F F E

FFFF
0001 1111 0000 0000 0000 0000 0000 0000 → 1's complement

Accepted, codeword is corrupted during transmission.

Error undetectable

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The total bandwidth required for AM can be determined from the bandwidth of the audio signal: $B_{AM} = 2B$.

Standard Bandwidth Allocation for AM Radio

The bandwidth of an audio signal (speech and music) is usually 5 kHz. Therefore, an AM radio station needs a bandwidth of 10 kHz. In fact, the Federal Communications Commission (FCC) allows 10 kHz for each AM station.

AM stations are allowed carrier frequencies anywhere between 530 and 1700 kHz (1.7 MHz). However, each station's carrier frequency must be separated from those on either side of it by at least 10 kHz (one AM bandwidth) to avoid interference. If one station uses a carrier frequency of 1100 kHz, the next station's carrier frequency cannot be lower than 1110 kHz (see Figure 5.17).

Figure 5.17 AM band allocation

Diagram illustrating AM band allocation. A horizontal axis represents frequency from 530 kHz to 1700 kHz. Vertical arrows point upwards from the axis to labeled carrier frequencies f_c . The first carrier is at 530 kHz, and the last carrier shown is at 1700 kHz. The distance between the 530 kHz and 1700 kHz markers is labeled '10 kHz'. Ellipses between the third and fourth carriers indicate that there are many more stations between 530 kHz and 1700 kHz.

5.2.2 Frequency Modulation (FM)

In FM transmission, the frequency of the carrier signal is modulated to follow the changing voltage level (amplitude) of the modulating signal. The peak amplitude and phase of the carrier signal remain constant, but as the amplitude of the information signal

187 / 1269 100%

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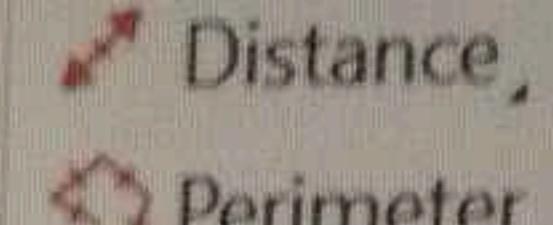
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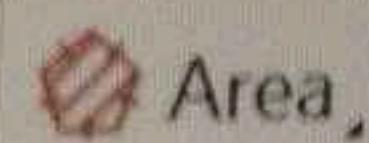
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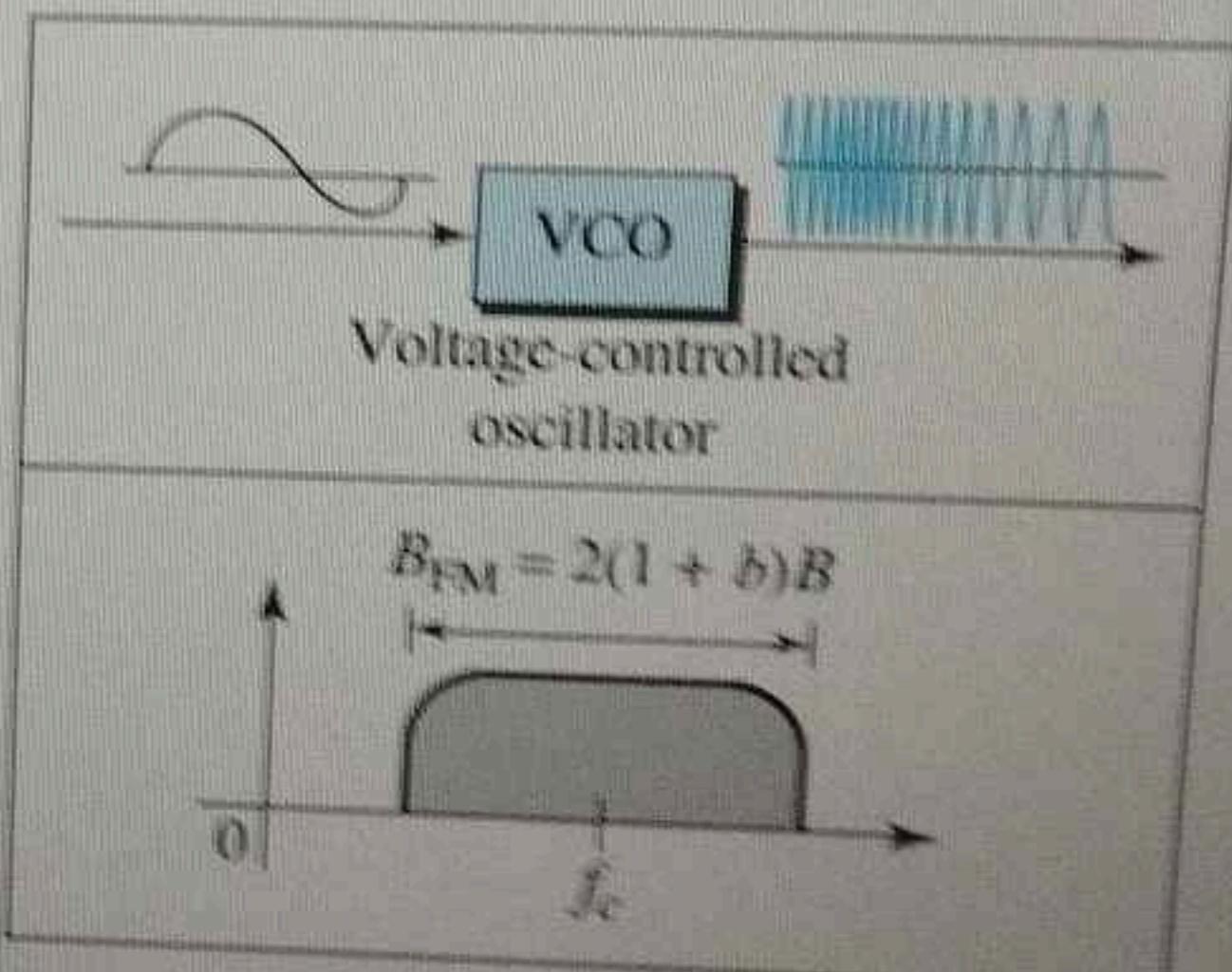
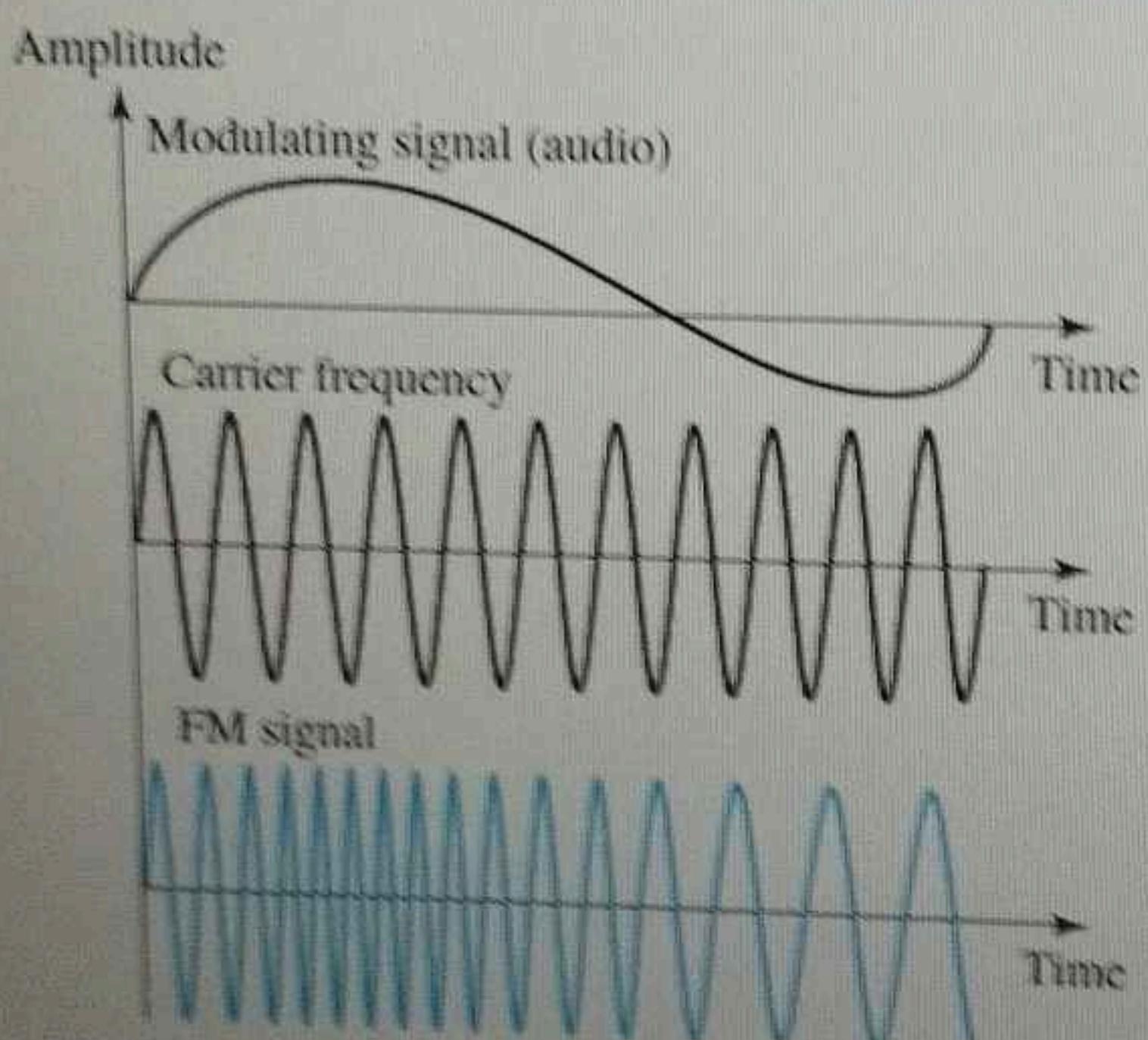
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of the analog signal or $2(1 + \beta)B$ where β is a factor that depends on modulation technique with a common value of 4.

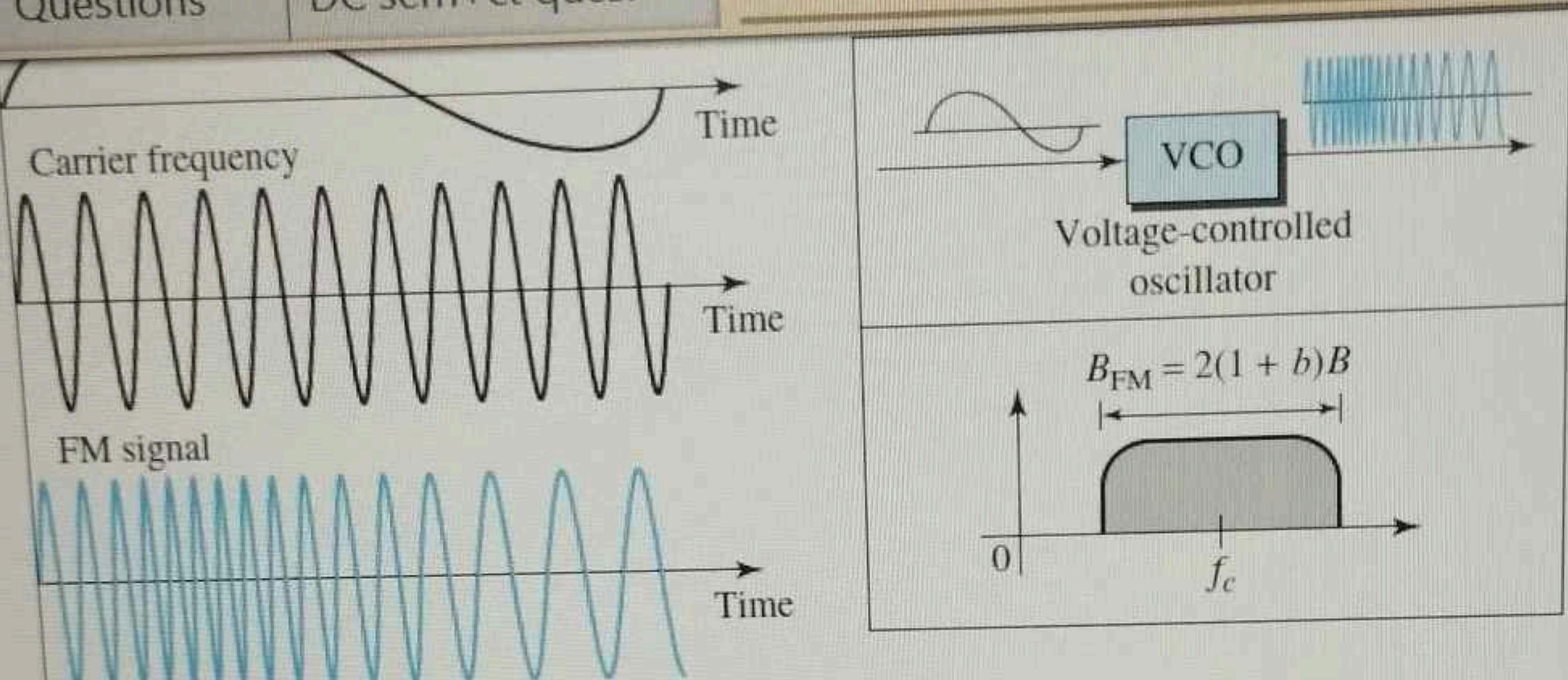
The total bandwidth required for FM can be determined from the bandwidth of the audio signal $B_{FM} = 2(1 + \beta)B$.

Figure 5.18 Frequency modulation



Standard Bandwidth Allocation for FM Radio

The bandwidth of an audio signal (speech and music) broadcast in stereo is almost 15 kHz. The FCC allows 200 kHz (0.2 MHz) for each station. This means $\beta = 4$ with some extra guard band. FM stations are allowed carrier frequencies anywhere between 88 and 108 MHz. Stations must be separated by at least 200 kHz to keep their bands



~~Standard Bandwidth Allocation for FM Radio~~

The bandwidth of an audio signal (speech and music) broadcast in stereo is almost 15 kHz. The FCC allows 200 kHz (0.2 MHz) for each station. This mean $\beta = 4$ with some extra guard band. FM stations are allowed carrier frequencies anywhere between 88 and 108 MHz. Stations must be separated by at least 200 kHz to keep their bandwidths from overlapping. To create even more privacy, the FCC requires that in a given area, only alternate bandwidth allocations may be used. The others remain unused to prevent any possibility of two stations interfering with each other. Given 88 to 108 MHz as a range, there are 100 potential FM bandwidths in an area, of which 50 can operate at any one time. Figure 5.19 illustrates this concept.

5.2.3 Phase Modulation (PM)

In PM transmission, the phase of the carrier signal is modulated to follow the changing voltage level (amplitude) of the modulating signal. The peak amplitude and frequency



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guard bands in data comm...



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বাংলায়

In English

In radio, a guard band is a narrow, intentionally unused frequency range of the radio spectrum between two wider radio bands, for the purpose of preventing interference between them. It is used in frequency-division multiplexing. Guard bands exist in both wired and wireless communications.

W https://en.m.wikipedia.org/wiki/Guard_band[Guard band - Wikipedia](#)

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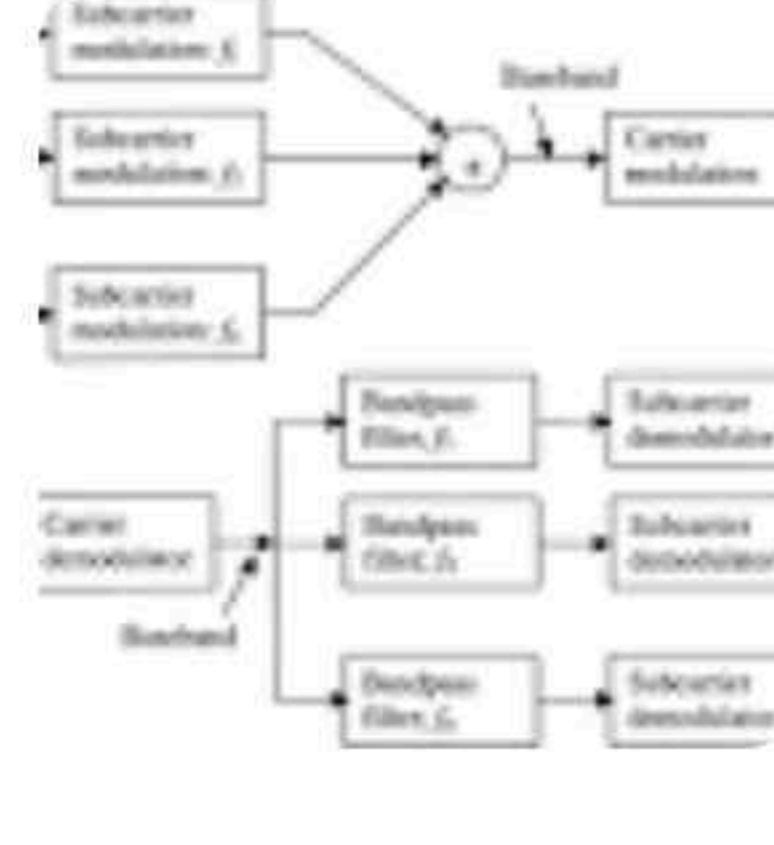


frequency division multipl...



What is frequency division multiplexing? ^

Frequency-division multiplexing (FDM) is a scheme in which numerous signals are combined for transmission on a single transmission line or channel.



Each signal is assigned a different frequency (subchannel) within the main channel.

E <https://www.sciencedirect.com> › fre...

[Frequency Division Multiplexing - an overview | ScienceDirect Topics](#)

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What is the FDM technique? ^

In telecommunications, frequency-division multiplexing (FDM) is a technique by which the total bandwidth available in a communication medium is divided into a series of non-overlapping frequency bands, each of which is used to carry a separate signal.



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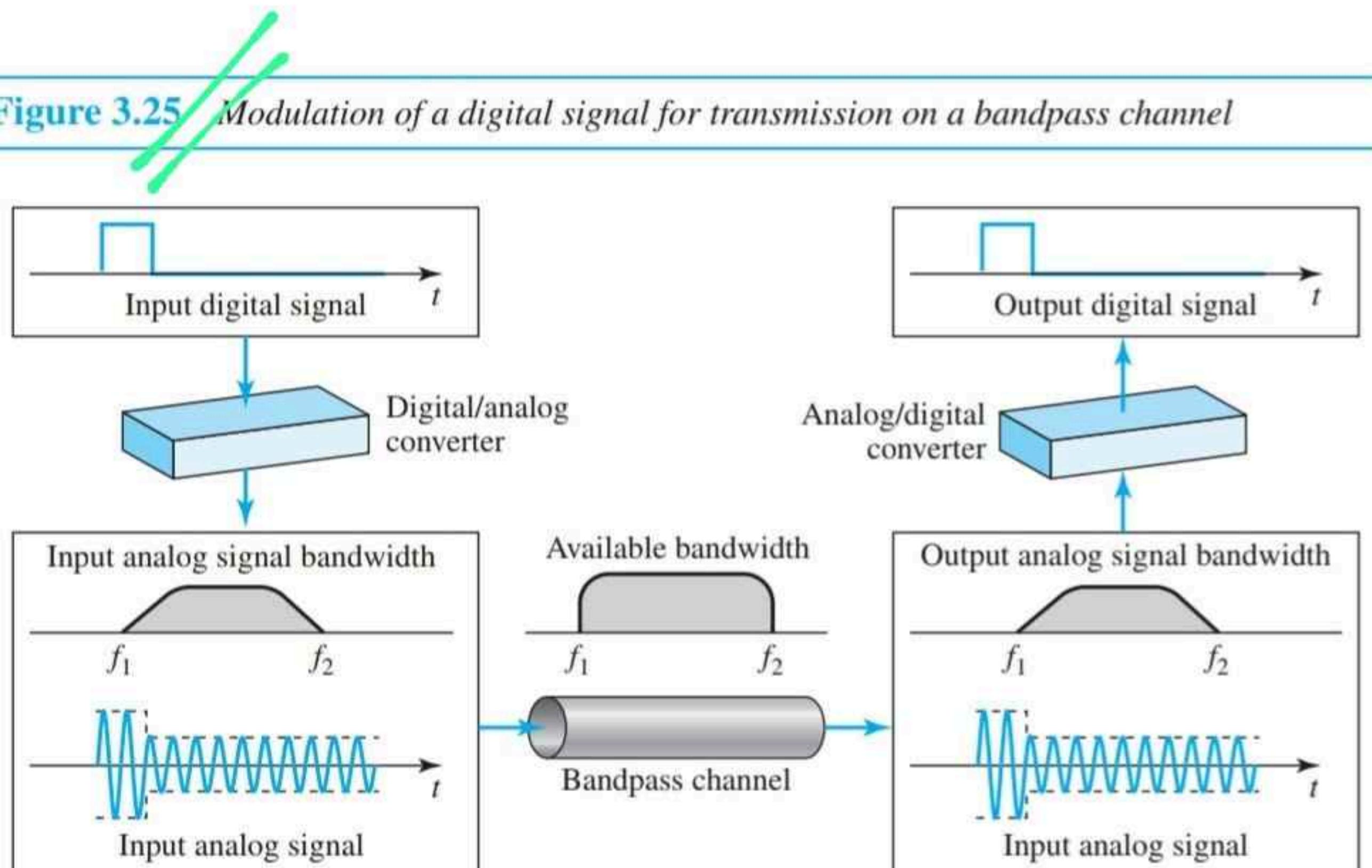


Note that a low-pass channel can be considered a bandpass channel with the lower frequency starting at zero.

Figure 3.25 shows the modulation of a digital signal. In the figure, a digital signal is converted to a composite analog signal. We have used a single-frequency analog signal (called a carrier); the amplitude of the carrier has been changed to look like the digital signal. The result, however, is not a single-frequency signal; it is a composite signal, as we will see in Chapter 5. At the receiver, the received analog signal is converted to digital, and the result is a replica of what has been sent.

If the available channel is a bandpass channel, we cannot send the digital signal directly to the channel; we need to convert the digital signal to an analog signal before transmission.

PHYSICAL LAYER



① Propagation = $\frac{2000 \times 1000}{2 \times 10^8} = 10^{-2}$ ms

② Transmission = $\frac{5 \times 10^6}{5 \times 10^6} = 1$ s

③ Queuing = $\underline{10} \times 2 \times 10^{-6} = 2 \times 10^{-5}$ s $\left[\because 1 \mu = 10^{-6} \right]$

④ Processing ϕ = $\underline{10} \times 1 \times 10^{-6} = 10^{-5}$ s

\therefore Total delay = $10^{-2} + 1 + (2 \times 10^{-5}) + 10^{-5}$
= 1.01



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বাংলায়

In English

MESSAGE

TRANSMISSION MEDIA

Standards are the set of rules for data communication that are needed for exchange of information among devices. It is important to follow Standards which are created by various Standard Organization like IEEE , ISO , ANSI etc. Jun 22, 2023

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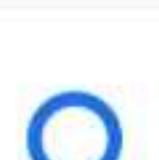


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 without protocol layering,d...  

A Protocol is one of the components of a data communications system.

Without protocol communication cannot occur. The sending device cannot just send the data and expect the receiving device to receive and further interpret it correctly. When the sender sends a message it may consist of text, number, images, etc.



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Unit 1. Introduction to data communications and networking

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Why do we need protocol layering?

^

The division of network protocols and services into layers not only **helps simplify networking protocols by breaking them into smaller, more manageable units, but also offers greater flexibility**. By dividing protocols into layers, protocols can be designed for interoperability.



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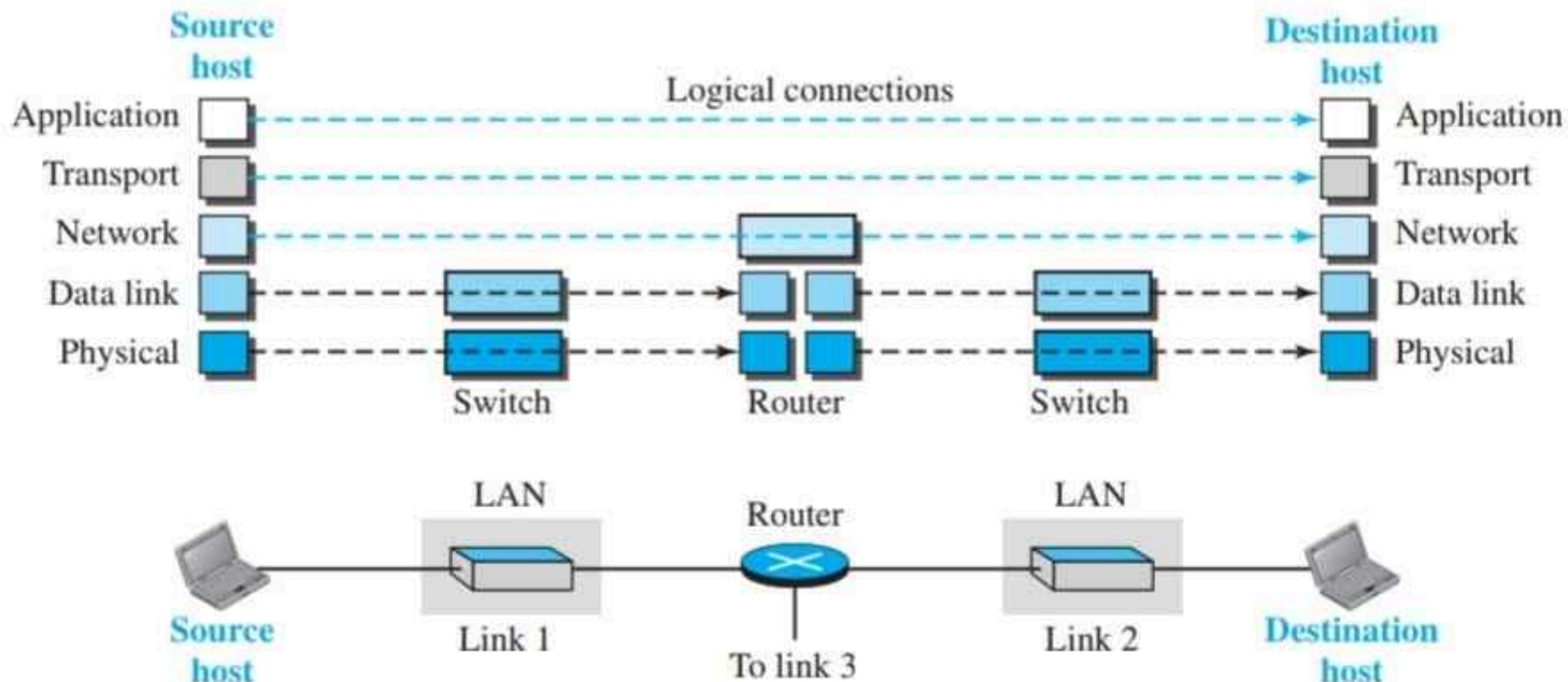
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2.2.2 Layers in the TCP/IP Protocol Suite

After the above introduction, we briefly discuss the functions and duties of layers in the TCP/IP protocol suite. Each layer is discussed in detail in the next five parts of the book. To better understand the duties of each layer, we need to think about the logical connections between layers. Figure 2.6 shows logical connections in our simple internet.

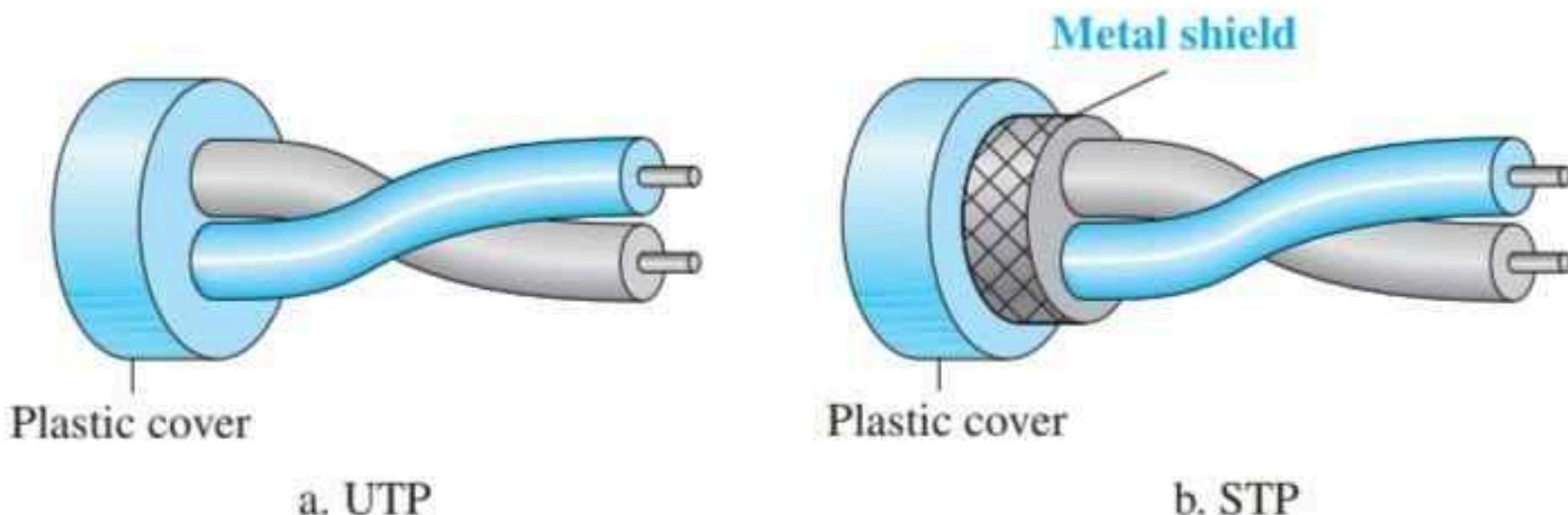
Figure 2.6 Logical connections between layers of the TCP/IP protocol suite



Unshielded Versus Shielded Twisted-Pair Cable

The most common twisted-pair cable used in communications is referred to as ***unshielded twisted-pair (UTP)***. IBM has also produced a version of twisted-pair cable for its use, called ***shielded twisted-pair (STP)***. STP cable has a metal foil or braided-mesh covering that encases each pair of insulated conductors. Although metal casing improves the quality of cable by preventing the penetration of noise or crosstalk, it is bulkier and more expensive. Figure 7.4 shows the difference between UTP and STP. Our discussion focuses primarily on UTP because STP is seldom used outside of IBM.

Figure 7.4 *UTP and STP cables*



Other Applications of FDM

A very common application of FDM is AM and FM radio broadcasting. Radio uses the air as the transmission medium. A special band from 530 to 1700 kHz is assigned to AM radio. All radio stations need to share this band. As discussed in Chapter 5, each AM station needs 10 kHz of bandwidth. Each station uses a different carrier frequency, which means it is shifting its signal and multiplexing. The signal that goes to the air is a combination of signals. A receiver receives all these signals, but filters (by tuning) only the one which is desired. Without multiplexing, only one AM station could broadcast to the common link, the air. However, we need to know that there is no physical multiplexer or demultiplexer here. As we will see in Chapter 12, multiplexing is done at the data-link layer.

The situation is similar in FM broadcasting. However, FM has a wider band of 88 to 108 MHz because each station needs a bandwidth of 200 kHz.

$$\text{BR rate} = \text{Sampling rate} \times \text{number of bits per sample} = f_s \times n_b$$

Example 4.14

We want to digitize the human voice. What is the bit rate, assuming 8 bits per sample?

Solution

The human voice normally contains frequencies from 0 to 4000 Hz. So the sampling rate and bit rate are calculated as follows:

$$\text{Sampling rate} = 4000 \times 2 = 8000 \text{ samples/s}$$

$$\text{Bit rate} = 8000 \times 8 = 64,000 \text{ bps} = 64 \text{ kbps}$$

Original Signal Recovery

Example 3.30

The loss in a cable is usually defined in decibels per kilometer (dB/km). If the signal at the beginning of a cable with -0.3 dB/km has a power of 2 mW, what is the power of the signal at 5 km?

Solution

The loss in the cable in decibels is $5 \times (-0.3) = -1.5$ dB. We can calculate the power as

$$\text{dB} = 10 \log_{10} (P_2 / P_1) = -1.5 \quad \longrightarrow \quad (P_2 / P_1) = 10^{-0.15} = 0.71$$

$$P_2 = 0.71P_1 = 0.7 \times 2 \text{ mW} = 1.4 \text{ mW}$$

Example 3.10

If a periodic signal is decomposed into five sine waves with frequencies of 100, 300, 500, 700, and 900 Hz, what is its bandwidth? Draw the spectrum, assuming all components have a maximum amplitude of 10 V.

Solution

Let f_h be the highest frequency, f_l the lowest frequency, and B the bandwidth. Then

$$B = f_h - f_l = 900 - 100 = 800 \text{ Hz}$$

I PHYSICAL LAYER

The spectrum has only five spikes, at 100, 300, 500, 700, and 900 Hz (see Figure 3.14).

Figure 3.13 The bandwidth of periodic and nonperiodic composite signals

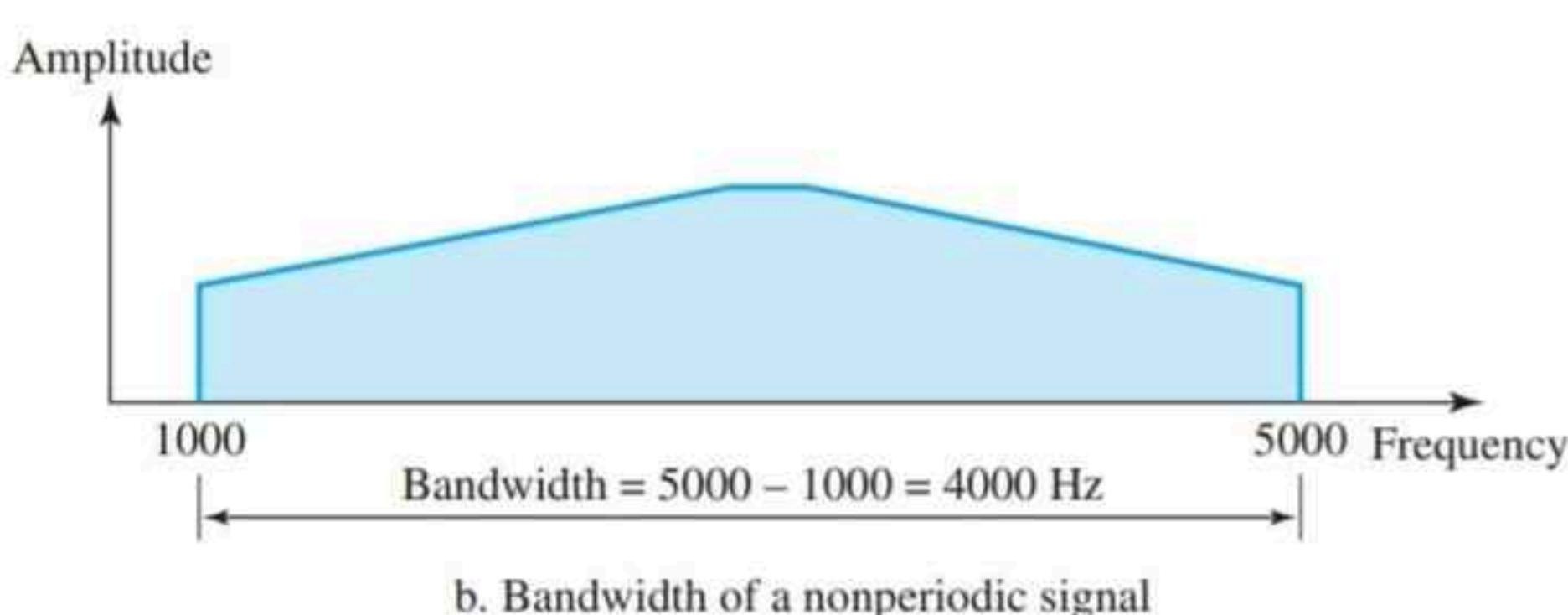
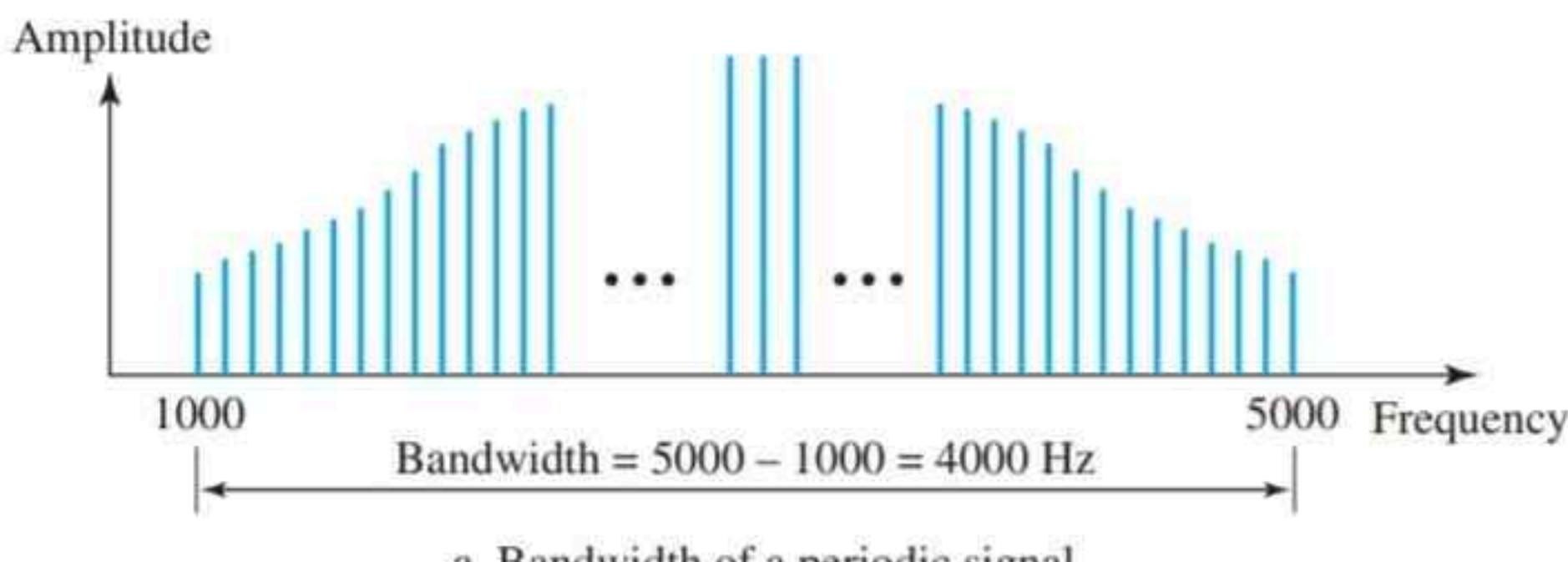
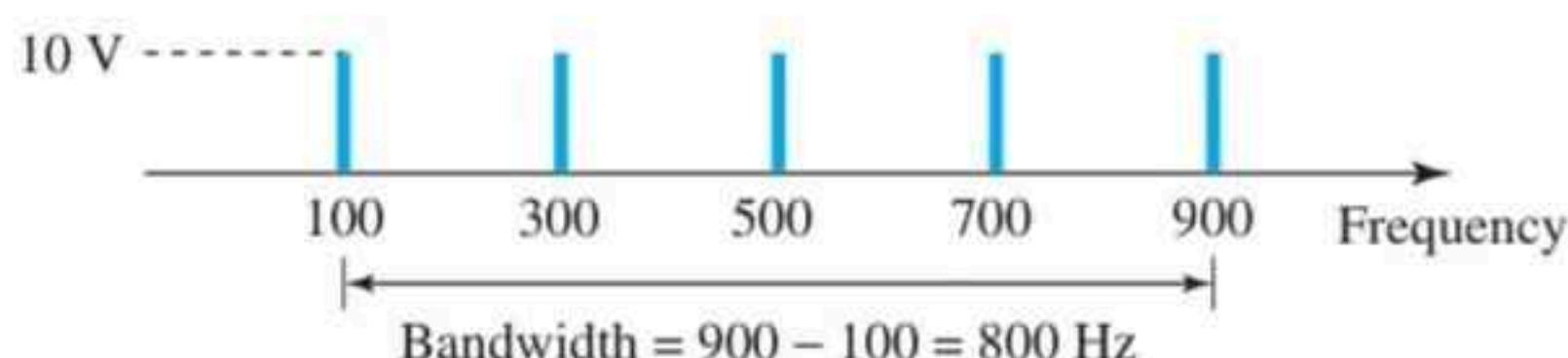


Figure 3.14 The bandwidth for Example 3.10



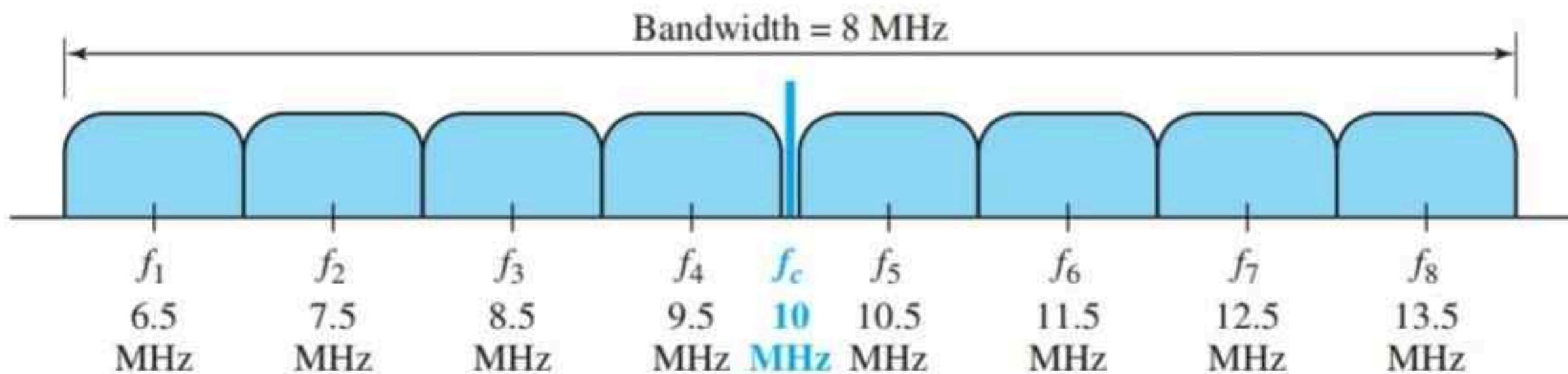
Example 5.6

We need to send data 3 bits at a time at a bit rate of 3 Mbps. The carrier frequency is 10 MHz. Calculate the number of levels (different frequencies), the baud rate, and the bandwidth.

Solution

We can have $L = 2^3 = 8$. The baud rate is $S = 3 \text{ MHz}/3 = 1 \text{ Mbaud}$. This means that the carrier frequencies must be 1 MHz apart ($2\Delta_f = 1 \text{ MHz}$). The bandwidth is $B = 8 \times 1 = 8 \text{ MHz}$. Figure 5.8 shows the allocation of frequencies and bandwidth.

Figure 5.8 Bandwidth of MFSK used in Example 5.6



Example 4.10

A complex low-pass signal has a bandwidth of 200 kHz. What is the minimum sampling rate for this signal?

Solution

The bandwidth of a low-pass signal is between 0 and f , where f is the maximum frequency in the signal. Therefore, we can sample this signal at 2 times the highest frequency (200 kHz). The sampling rate is therefore 400,000 samples per second.

Example 4.11

A complex bandpass signal has a bandwidth of 200 kHz. What is the minimum sampling rate for this signal?

Solution

We cannot find the minimum sampling rate in this case because we do not know where the bandwidth starts or ends. We do not know the maximum frequency in the signal.

Example 4.13

A telephone subscriber line must have an SNR_{dB} above 40. What is the minimum number of bits per sample?

Solution

We can calculate the number of bits as

$$\text{SNR}_{\text{dB}} = 6.02n_b + 1.76 = 40 \rightarrow n = 6.35$$

Telephone companies usually assign 7 or 8 bits per sample.

Uniform Versus Nonuniform Quantization

For many applications, the distribution of the instantaneous amplitudes in the analog



TCP/IP	OSI
Implementation of OSI model	Reference model
Model around which Internet is developed	This is a theoretical model
Has only 4 layers	Has 7 layers
Considered more reliable	Considered a reference tool
Protocols are not strictly defined	Stricter boundaries for the protocols
Horizontal approach	Vertical approach
Combines the session and presentation layer in the application layer	Has separate session and presentation layer
Protocols were developed first and then the model was developed	Model was developed before the development of protocols
Supports only connectionless communication in the network layer	Supports connectionless and connection-oriented communication in the network layer
Protocol dependent standard	Protocol independent standard

Figure 5: Differences between OSI and TCP/IP Model [28].



16 Conclusion

Figure 5 from A Comparative Evaluation of OSI and TCP / IP...

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TCP/IP	OSI
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Protocol-dependent standard	Protocol-independent standard ImplementationTools.com

Parameters	OSI Model	TCP/IP Model
No. of Layers	There are 7 layers.	There are 4 layers.
Acronym	OSI stands for open system interconnection	TCP/IP stands for transmission control protocol/internet protocol
Developed by	ISO	Department of Defense (DoD)
Layer Separation	OSI model has a separate Presentation layer and Session layer.	TCP/IP does not have a separate Presentation layer or Session layer.
Protocol Implementation	Model was defined before implementation takes place.	Model defines after protocol were implemented.
Model Concept	Based on three concept i.e. Service, interface and protocol.	It did not distinguish between service, interface and protocol.
Reliable delivery	It gives guarantee of reliable delivery of packet.	It does not give guarantee of reliable delivery of packet.

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Parameters	OSI Model	TCP/IP Model
No. of Layers	There are 7 layers.	There are 4 layers.
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Developed by	ISO	Department of Defense (DoD)
Layer Separation	OSI model has a separate Presentation layer and Session layer.	TCP/IP does not have a separate Presentation layer or Session layer.
Protocol implementation	Model was defined before implementation takes place.	Model defines after protocol were implemented.
Modular concept	based on three concept i.e. Service, interface and protocol.	It did not distinguish between service, interface and protocol.
Reliable delivery	It gives guarantee of reliable delivery of packet.	It does not give guarantee of reliable delivery of packet.

Chirag's Blog: Comparison of OSI Model and TCP/IP Model ...

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TCP/IP	OSI	OSI Model	TCP/IP Model
Implementation of OSI model	Reference model	It is developed by ISO (International Standard Organization)	It is developed by ARPANET (Advanced Research Project Agency Network).
Model around which Internet is developed	This is a theoretical model	OSI model provides a clear distinction between interfaces, services, and protocols.	TCP/IP doesn't have any clear distinguishing points between services, interfaces, and protocols.
Has only 4 layers	Has 7 layers	OSI refers to Open Systems Interconnection.	TCP refers to Transmission Control Protocol.
Considered more reliable	Considered a reference tool	OSI uses the network layer to define routing standards and protocols.	TCP/IP uses only the internet layer.
Protocols are not strictly defined	Stricter boundaries for the protocols	OSI follows a vertical approach.	TCP/IP follows a horizontal approach.
Horizontal approach	Vertical approach	OSI layers have seven layers.	TCP/IP has four layers.
Combines the session and presentation layer in the application layer	Has separate session and presentation layer	In the OSI model, the transport layer is only connection-oriented.	A layer of the TCP/IP model is both connection-oriented and connectionless.
Protocols were developed first and then the model was developed	Model was developed before the development of protocols	In the OSI model, the data link layer and physical are separate layers.	In TCP, physical and data link are both combined as a single host-to-network layer.
Supports only connectionless communication to the network layer	Supports connectionless and connection-oriented communication in the network layer	Session and presentation layers are a part of the OSI model.	There is no session and presentation layer in the TCP model.
Protocol-dependent standard	Protocol independent standard representationtools.com	It is defined after the advent of the Internet.	It is defined before the advent of the Internet.
		The minimum size of the OSI header is 5 bytes.	The minimum header size is 20 bytes.

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Difference between TCP/I...

FUNCTION	TCP/IP MODEL	OSI MODEL
Definition	TCP/IP stands for transmission control protocol/internet protocol.	OSI stands for Open systems Interconnection.
Developed by	It is developed by DoD (Department of Defense) project agency.	OSI model is developed by ISO (International Standard Organization).
Technology/ Partner	It comprises of a set of standard protocols which builds development of the Internet. It is a communication medium which provides connection between hosts.	It is an independent standard and generic protocol used as a communication gateway between network and end user.

Features

- No guaranteed delivery of packets at transport layer.
- Based on horizontal approach.
- Session and presentation layers are not separate, both are included in application layer.
- Implemented model of OSI model.
- Network layer provides only connectionless service.
- Protocols can't be easily implemented.
- Comprises of four layers.
- Services, protocols, and interfaces are not properly segregated but are protocol dependent.
- Widely used model.
- Not provide standardization of devices.

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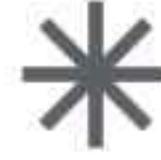
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Oguzhan Ozturk - Medium
TCP/IP Model. Prerequisi...

TCP/IP	OSI
Implementation of OSI model	Reference model
Model around which Internet is developed	This is a theoretical model
Reliable	Has 7 layers
Protocol-dependent standard	Considered a reference tool
Horizontal approach	Stricter boundaries for the protocols
Combines the session and presentation layer in the application layer	Vertical approach
Protocols were developed first and then the model was developed	Model was developed before the development of protocols
	Supports only connectionless and connection-oriented

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TCP/IP MODEL vs OSI M...



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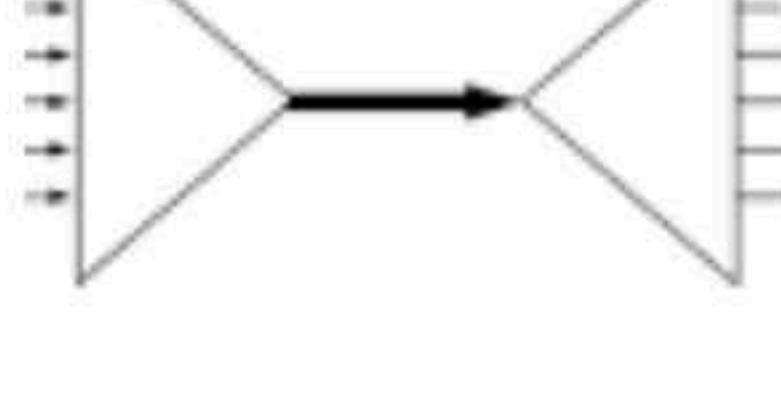
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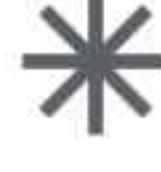
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In English

The multiplexing divides the capacity of the communication channel into several logical channels, one for each message signal or data stream to be transferred. A reverse process, known as demultiplexing, extracts the original channels on the receiver end.

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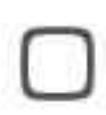
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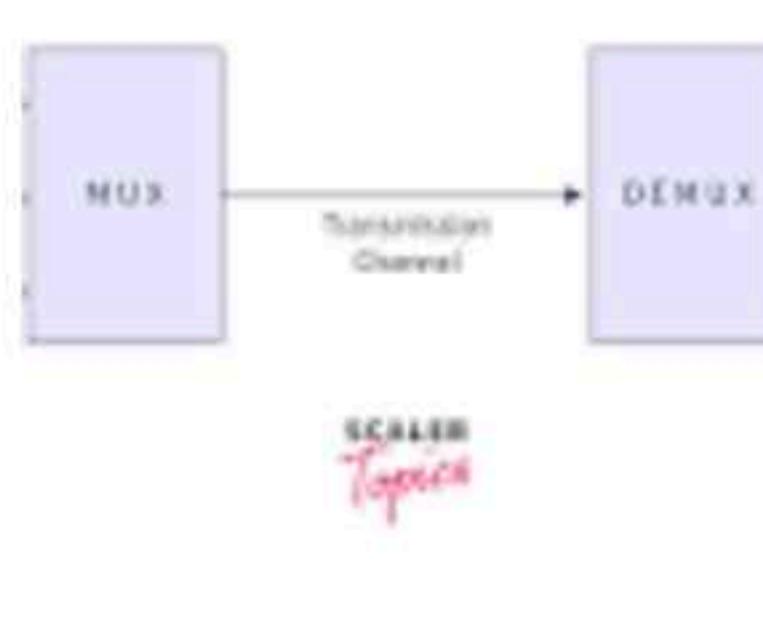
What are the goals of multiplexing?



What is the purpose of multiplexing and demultiplexing?



Multiplexing is a process in which various data signals are integrated to give a single output.



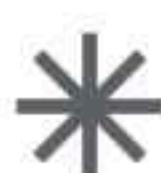
Demultiplexing is a process in which one input data signal is divided into various output signals.

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What is multiplexing and its purpose?



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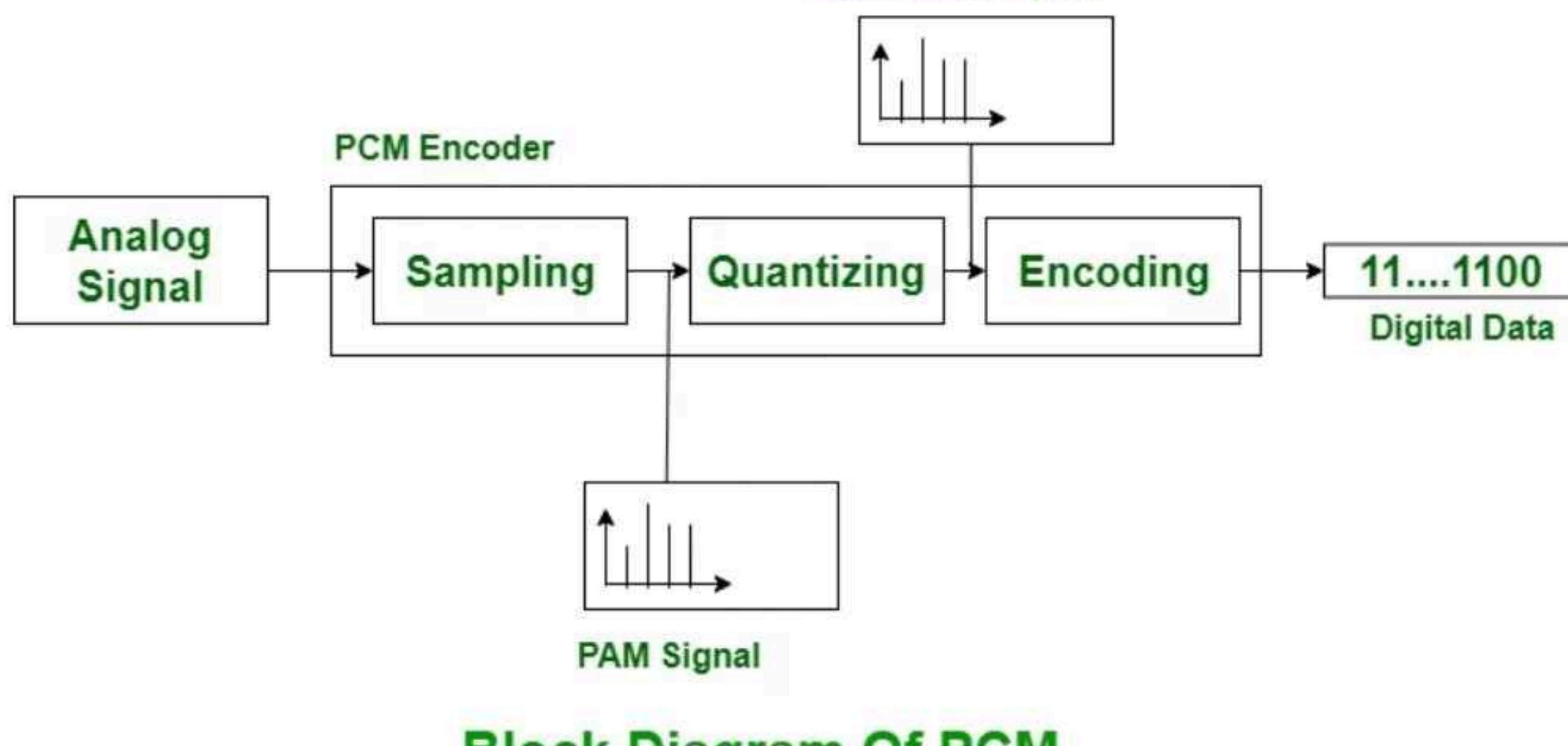


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PCM has a good or sensible signal-to-noise ratio. For transmission, Pulse Code Modulation wants high transmitter bandwidth. PCM technique is split into three elements, initial is the transmission at the provision end, second regeneration at the transmission path and conjointly the receiving end.



Block Diagram Of PCM

Pulse Code Modulation (PCM)

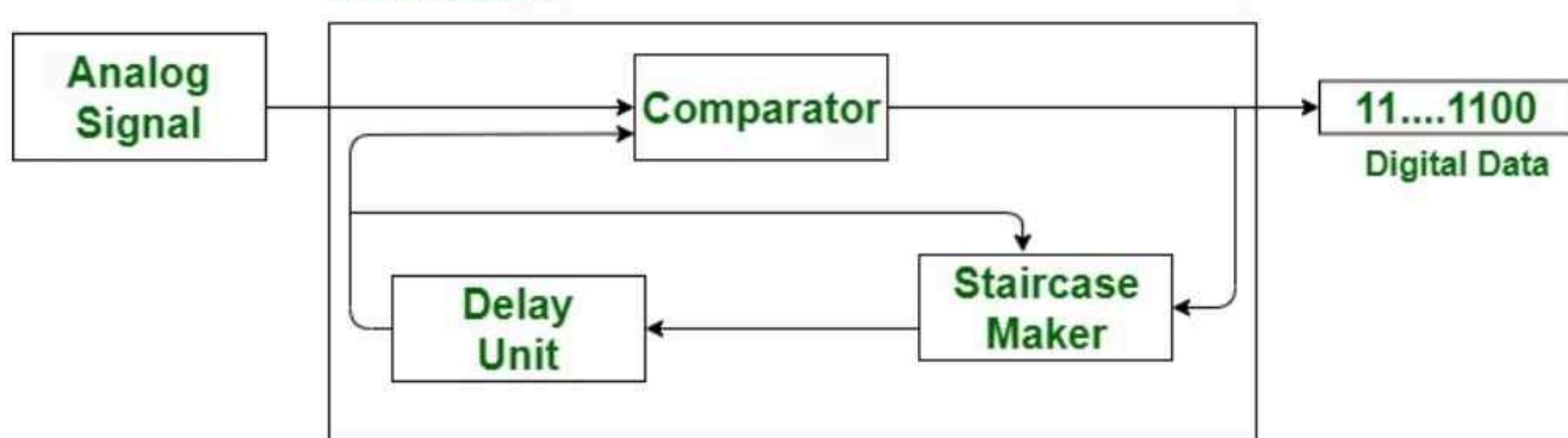
Delta Modulation(DM)

Delta modulation is an analog to digital and digital to analog signal conversion technique. [Delta modulation](#) is employed to realize high signal to noise ratio. It uses one bit [PCM](#) code to realize

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Delta Modulation(DM)

Delta modulation is an analog to digital and digital to analog signal conversion technique. [Delta modulation](#) is employed to realize high signal to noise ratio. It uses one bit [PCM](#) code to realize digital transmission of analog signal. With delta modulation, instead of transmit a coded illustration of a sample solely one bit is transmitted, that merely indicates whether or not the sample is larger or smaller than the previous sample. it's the best type or simplest type of Differential Pulse Code Modulation. Delta modulation signal is smaller than Pulse Code Modulation system. If signal is large, the next bit in digital data is 1 otherwise 0.



Block Diagram Of DM

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PCM (Pulse Code Modulation)

PCM stands for Pulse Code Modulation.

In PCM, feedback does not exist in transmitter or receiver.

Per sample 4, 8, or 16 bits are used.

PCM requires highest transmitter bandwidth.

PCM is complex in terms of complexity of implementation.

PCM has good signal to noise ratio.

PCM is costly.

PCM may be a technique wont to digitally represent sampled analog signals.

In PCM, signal requires encoder and decoder both sides.

PCM is mostly used in

video telephony and audio telephony

DM (Delta Modulation)

DM stands for Delta Modulation.

While in DM, feedback exists in transmitter.

Here, only one bit is used per sample.

DM requires lowest transmitter bandwidth.

While DM is simple in terms of complexity of implementation.

While DM has poor signal to noise ratio.

DM is cheap.

Digital to analog and analog to digital converter.

In DM, signal can modulate and demodulate.

DM is mostly used in

speeches as well as images

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**You**

Digital to digital conversation real life application in data communication

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A real-life application of digital-to-digital conversation in data communication is email communication. In this process, digital information (text, attachments) is created and transmitted digitally from one device to another over a network, ensuring efficient and accurate data transfer.



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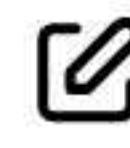


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**You**

Analog to digital conversation real life application in data communication

**ChatGPT**

Analog-to-digital conversion plays a crucial role in various real-life applications within data communication. One prominent example is in telecommunications, where voice signals are converted from analog to digital for transmission over digital networks.

In traditional telephone systems, human voice is analog, but modern communication networks primarily use digital signals.

Analog-to-digital conversion allows voice signals to be sampled and converted into a digital format, enabling efficient transmission, storage, and processing of the

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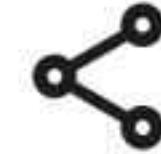


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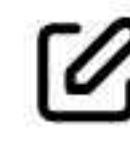


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In traditional telephone systems, human voice is analog, but modern communication networks primarily use digital signals.

Analog-to-digital conversion allows voice signals to be sampled and converted into a digital format, enabling efficient transmission, storage, and processing of the information. This conversion helps in minimizing signal degradation over long distances and allows for the integration of voice communication into digital networks, such as the Internet.

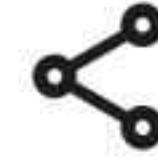
Another application is in the field of sensors and instrumentation. Many sensors produce analog signals in response to physical phenomena (e.g., temperature, pressure, light). Analog-to-digital conversion allows these signals to be converted into digital data, facilitating easier processing, analysis, and storage. This is vital in applications

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such as the Internet.

Another application is in the field of sensors and instrumentation. Many sensors produce analog signals in response to physical phenomena (e.g., temperature, pressure, light). Analog-to-digital conversion allows these signals to be converted into digital data, facilitating easier processing, analysis, and storage. This is vital in applications ranging from environmental monitoring to industrial automation.

In summary, analog-to-digital conversion is fundamental in bridging the gap between the analog world and digital systems, finding extensive use in telecommunications, sensor technologies, and various other data communication applications.



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you

Digital to analog conversation real life application in data communication



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One real-life application of digital-to-analog conversion in data communication is in the transmission of audio signals. When you make a phone call, for example, your voice is initially converted into a digital format for efficient processing and transmission.

However, the analog nature of traditional phone lines requires the digital signal to be converted back into analog before reaching the recipient's phone, allowing them to hear the voice in its original analog form. This process involves digital-to-analog conversion at the sending and receiving ends of the communication.



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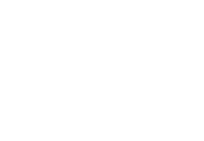
Analog to analog conversation real life application in data communication

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Analog-to-analog conversation in real-life data communication can be observed in traditional telephone systems where voice signals, which are continuous analog signals, are transmitted over analog communication channels. This involves the conversion of sound waves (analog) into electrical signals for transmission over the phone lines. While digital communication is more prevalent today, analog communication still exists in certain applications like audio transmission and some radio systems.



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Basic of Comparison	Subnetting	Supernetting
Description	Subnetting is a technique of dividing a network into two or more sub-networks.	Supernetting is a technique of aggregating various networks to form one single large network.
Implementation	Subnetting is implemented via Variable-length subnet masking.	Supernetting is implemented via classless inter-domain routing.
Importance	Subnetting helps to reduce the address depletion.	Supernetting helps to simplify and fasten the routing process.
Mask Bits	In Subnetting, the mask bits are removed towards the right of the default mask.	In Supernetting, the movement of the masked bits is towards the left of the default mask.
Effect	In Subnetting, the network address's number of bits are significantly increased.	In Supernetting, the host address's number of bits are significantly increased.

Difference Between Subnetting and Supernetting

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Type of routing	Advantages	Disadvantages
Static	<ul style="list-style-type: none"> It has no bandwidth usage between the routers. Provides security, only the administrator is allowed to have control over the routing network. Has no overhead CPU usage on the router. 	<ul style="list-style-type: none"> It becomes daunting to handle the chore it is to handle this manually. Lot's topography is needed.
default	<ul style="list-style-type: none"> They establish routes that will never go down. 	<ul style="list-style-type: none"> They require a great deal of CPU power.
Dynamic	<ul style="list-style-type: none"> It is easier to configure. It is effective in selecting the best route to a destination network. 	<ul style="list-style-type: none"> It is less secure compared to static and default routing. It is more expensive in terms of bandwidth and CPU.

Advantages of NAT:	Disadvantages of NAT:
<ul style="list-style-type: none"> Public IP address sharing Transparent to end users Improved security LAN expandability or scalability Local control including ISP connectivity 	<ul style="list-style-type: none"> Incompatibility with certain applications Hinders legitimate remote access Performance reduction caused by increased router processing

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Section.io

Introduction to Internet P...

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Vantages	Drawbacks	Vantages	Drawbacks
perform fast handover	Additional signaling	Support cross layer	Extra frames are buffered



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Type of routing	Advantages	Disadvantages
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Introduction to Internet Protocol and Subnetting |...

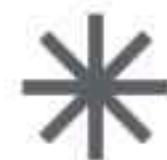
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PARAMETER	VLAN	SUBNET
Philosophy	VLAN is a logical local area network that contains broadcasts within itself and only hosts that belong to that VLAN will see those broadcasts.	Subnet is an IP address range of IP addresses that help hosts communicate over layer 2.
Logical and Physical Networks	VLANs allow us to create different logical and physical networks.	IP subnetting allows us to create logical networks through the same physical network.
Network Member control	In VLANs, the network to which a host belongs to is decided by the interface to which it is connected (layer 2) i.e. port of switch to which host is connected.	In subnets, the network to which host belongs is decided by the IP address assigned to the host (layer 3).
OSI Layer	VLAN is a Layer 2 term where MAC addresses work.	Subnet is a Layer 3 term where IP layer works.
Hardware/Software based	More of Software based technology.	More of Hardware based technology.
Security & Control	VLANs provide more robust control for the network.	Subnetting has limited level of control in comparison to VLAN.
Major benefit	The primary advantage of VLANs is that they break up the broadcast domain.	The primary advantage of IP Subnetting is for communication across hosts in same IP subnet and same VLAN.
Related terms	MAC Address, dot1q tag, layer 2, Broadcast domain.	IPv4/IPv6 address, layer 3, Inter VLAN Routing.

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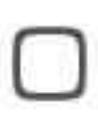
Advantages of Subnetting

Some of the benefits of partitioning a network into subnets are as follows –

- It reduces network traffic by lowering the number of broadcasts sent out.
- It helps overcome limitations in a local area network (LAN), such as the maximum number of allowed hosts.
- It allows people to connect to a work network from their homes without having to open the entire network.
- It protects one network from the intrusion of another. For example, the Developer department's code must not be accessible by any other department in an organization.
- Some subnets may require higher network priority than others. A sales department, for example, may need to host webcasts or video conferences.
- Maintenance is simple in the case of small networks.

Disadvantages of Subnetting

Subnetting has some disadvantages as well. These are as follows –





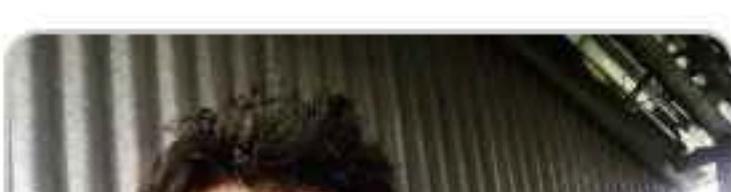
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Disadvantages of Subnetting

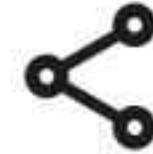
Subnetting has certain drawbacks in addition to its benefits –

- To reach a Process in a single network, there are only three steps –
 - Source Host to Destination Network,
 - Destination Network to Destination Host, and then
 - Destination Host to Process.
- Subnetting, on the other hand, necessitates four phases for Inter Network Communication. The steps are –
 - Source Host to Destination Network,
 - Destination Network to appropriate Subnet,
 - Subnet to Host, and finally,
 - Host to Process.



Pranav Bhardwai





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Advantages and Disadvantages of Subnetting

There are various advantages and disadvantages of Subnetting. Some main advantages and disadvantages of Subnetting are as follows:

Advantages

1. Subnetting reduces broadcast volume and hence reduces network traffic.
2. The permitted host numbers in the local area network are increased by subnetting.
3. Subnetworks are simple to handle and maintain.
4. The network security may easily be utilized amongst sub-networks instead of using it on the entire network.
5. It increases the flexibility of address.

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Disadvantages

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1. You require a qualified administrator to perform the subnetting process.
2. The subnetting process is quite expensive.

What is Supernetting?

Supernetting is the inverse of subnetting, in which many networks are combined into a single network.

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Advantages

1. The router memory table size is reduced by condensing numerous routing data entries into a single entry.
2. It also minimizes network traffic.
3. It also speeds up the lookup of routing tables.
4. It allows the router to isolate topology changes from other routers.

Disadvantages

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tables.

4. It allows the router to isolate topology changes from other routers.

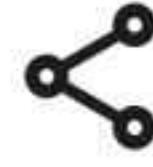
Disadvantages

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1. The supernet's networks must all use the same IP address class.
2. The block combination should be constructed in power 2; if three blocks are required, then four blocks must be assigned.
3. The entire network should be in the same class.

X  Difference between Subnetting and Supernetting javatpoint.com



Here, you will learn the various key differences between **Subnetting** and **Supernetting**. Some main key differences between Subnetting and Supernetting are as follows:

1. Subnetting splits a network into smaller networks. On the other hand, Supernetting combines the subnetworks and merges them into a single network.
2. Subnetting decreases address depletion. On the other hand, Supernetting speeds up the routing process.
3. Mask bits are relocated to the right of the default mask during subnetting. On the other hand, Supernetting shifts the mask bits to the left of the normal mask.
4. Subnetting transforms host bits into network bits and increases the number of network bits. In contrast, supernetting converts network bits to host bits and increases host bits numbers.
5. Subnetting utilizes VLSM and FL techniques. In contrast, supernetting utilizes CIDR.



Mohammad Ash...

Active 3 hours ago

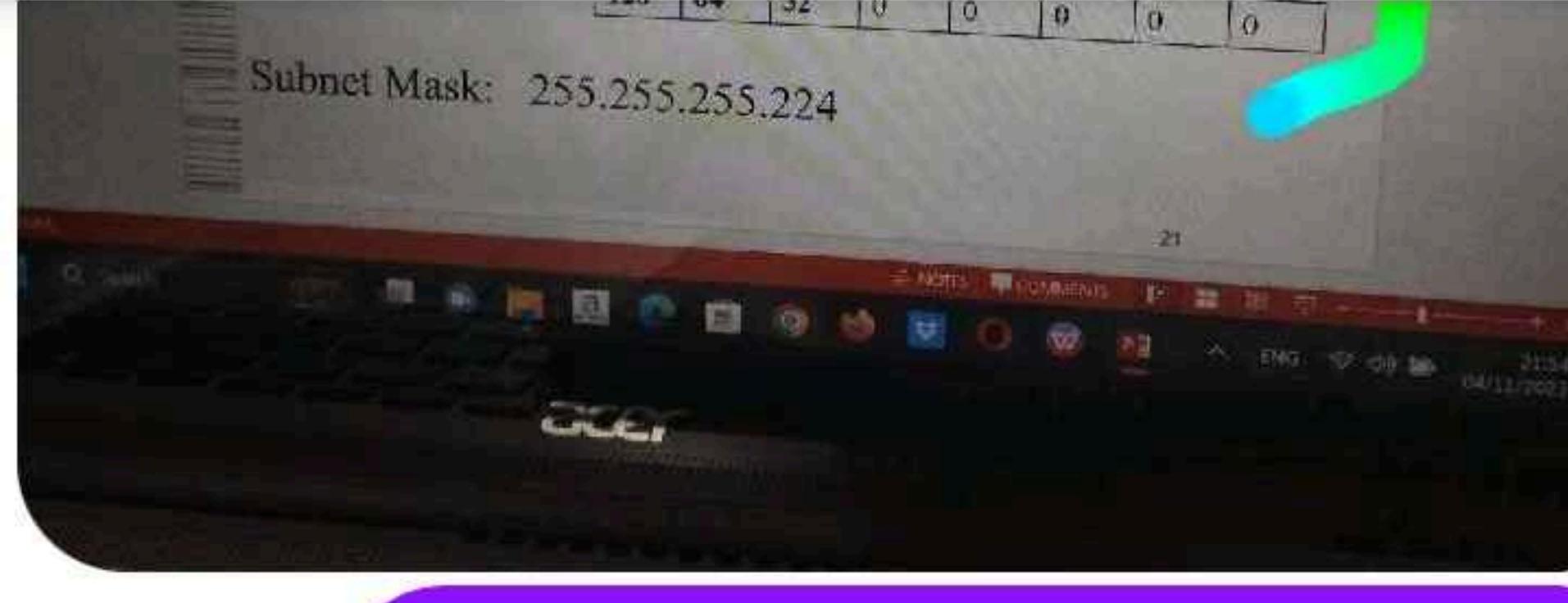
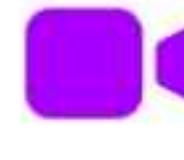
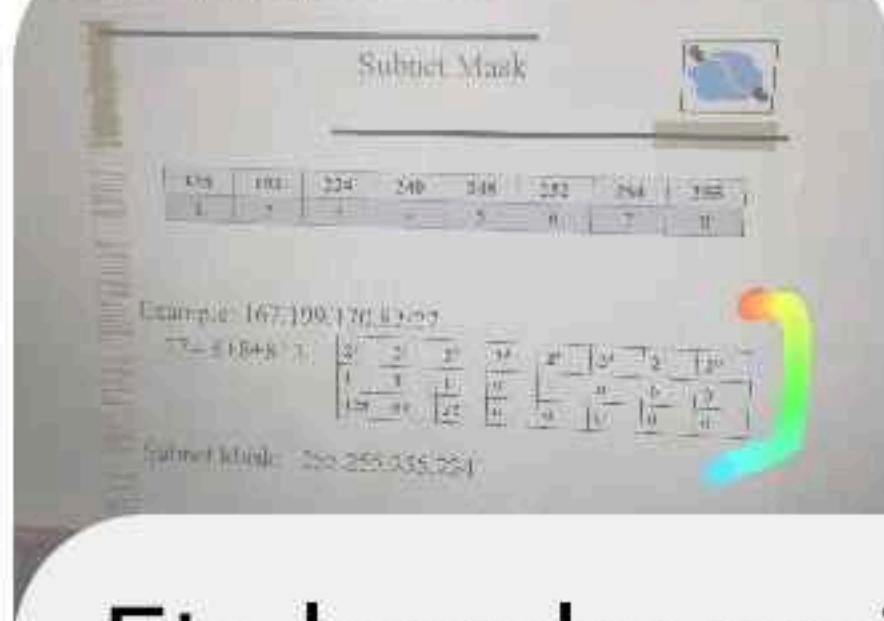


Table tar dorkar ki tahole?

↳ Mohammad Ashraful replied to you



Eta hocche main process value ta calculate korar jonno,
R upore j table dise oita theke direct value ta paowa jabe.



Clis a sir 155.180.70.80/21 diyesilo oitar subnet mask ki 255.255.248.255 Hobe?

155.180.70.80

↳ Mohammad Ashraful replied to you

Clis a sir 155.180.70.80/21 diyesilo oitar subnet mask ki 255.255.248.255 Hobe?



255.255.248.0 hobe



4 NOV ⌂ 23:31



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ডেটা কমিউনিকেশনে ন্যাটের সু...



Some benefits of NAT include:

- Reuse of private IP addresses.
- Enhancing security for private networks by keeping internal addressing private from the external network.
- Connecting a large number of hosts to the global Internet using a smaller number of public (external) IP address, thereby conserving IP address space.

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What are the Benefits of NAT?

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What are the benefits of NAT overloading?



NAT overload, also known as port address translation or PAT, is a technique that allows



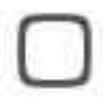
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NAT ADVANTAGES AND DISADVANTAGES

NAT Advantages	NAT Disadvantages
Conserves the legally registered addresses	Translation introduces switching path delays.
Remedies address overlap occurrence.	Loss of end to end IP traceability.
Increases flexibility when connecting to Internet.	Certain applications will not function well with NAT enabled. (like VoIP)
Eliminates address renumbering as network changes.	
Provides security by hiding internal IP addresses	



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NAT Considerations

Advantages	Disadvantages
Conserves legally registered addresses	Translation introduces switching path delays
Reduces address overlap occurrence	Loss of end-to-end IP traceability
Increases flexibility when connecting to Internet	Certain applications will not function with NAT enabled
Eliminates address renumbering as network changes	

NAT Implementation Considerations

Advantages	Disadvantages
Conserves legally registered addresses	Translation introduces switching path delays
Reduces address overlap occurrence	Loss of end-to-end IP traceability
Increases flexibility when connecting to Internet	Certain applications will not function with NAT enabled
Eliminates address renumbering as network changes	

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NAT Advantages



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