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Question no: 1

a) List five ways of increasing the capacity of a cellular system?

Solution :-

The five ways of increasing the capacity of cellular system are:

- 1 Adding new channels
- 2 Frequency borrowing
- 3 Cell splitting
- 4 Cell sectoring
- 5 Microcells

b) Briefly differentiate between 3G, 4G & 5G cellular networks?

3G - Third Generation:

This generation set the standards for most of the wireless technology

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we have come to know and love. Web browsing, email, video downloading, picture sharing and other smartphone technology were introduced in the third generation. The goals set out for third generation mobile communication were to facilitate greater voice and data capacity.

4G - Fourth Generation:

4G is a very different technology as compared to 3G and was made possible practically only because of the advancements in the technology in the last 10 years. Its purpose is to provide high speed, high quality and high capacity to users while improving security and lower the cost of voice and data services, multimedia and internet over IP.

5G - Fifth Generation:

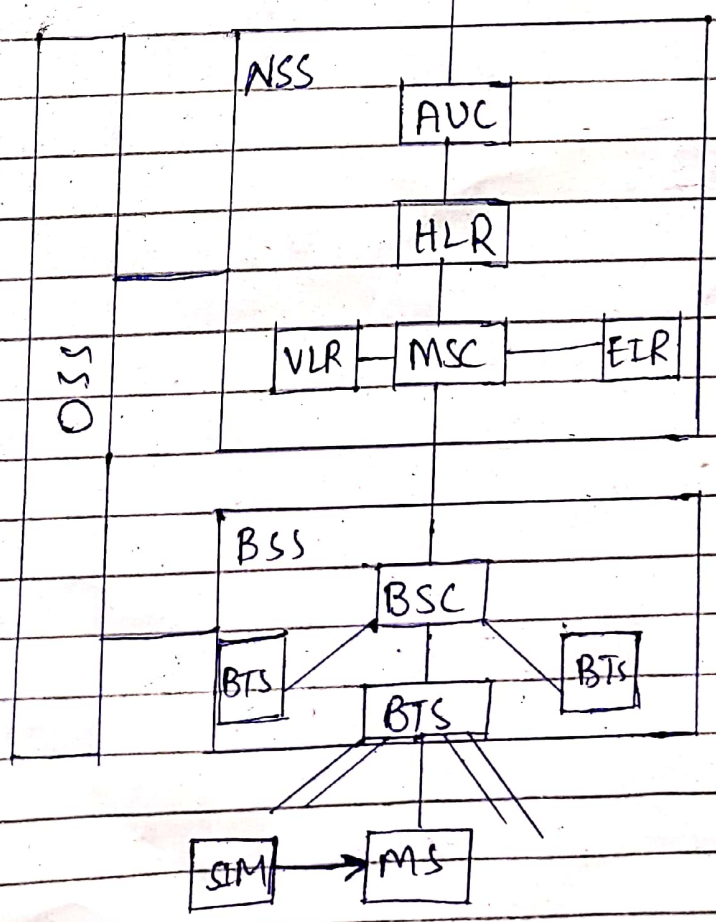
5G is a generation currently under development, that's intended to improve on 4G. 5G promises significantly faster data rates, higher connection density, much lower latency, among other improvements.

c) Briefly explain Overall GSM Architecture with the help of diagram?

GSM Network Architecture:

The GSM network architecture is defined in the GSM Specifications and it can be grouped into four main areas: Network and Switching Subsystem (NSS) Base-station Subsystem (BSS).

To Public Networks
PLMN, PSTN, ISDN, PSDN



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④ (a)

e) What are the current and future cellular network issues and challenges?

- Signal fading is the main and big issue which we are facing currently.
- The other one is user security issues. - Challenge with current issue are
- limited bandwidth.
- Ideal service configuration problem

The future problems are cellular local area wireless LAN will also face issues.

The challenges will be maximizing the problem sensors and many more.

(4) (b)

d) A Telephony Connection has duration of 35 minutes. This is only Connection made by this Caller during the course of an hour. How much is the amount of traffic, in Erlangs, of this Connections?

This is the only Connection made by this Caller during the course of an hour."

Therefore it stated that only 1 call takes place.

So number of calls = 1

Minutes of traffic in the hour = 1×35

minutes of traffic in the hour = 35

Hour of traffic in the hour = $35/60$

Hours of traffic in the hour = 0.5833

Amount of Traffic = 0.5833 Erlangs.

Question No. 2: (5)

f) List and define the capabilities provided by Mobile IP?

Discovery:- A mobile node discovers its foreign and home Agents during agent discovery.

Registration:- The mobile node registers its current location with foreign agent and home agent during registration.

Tunneling:- A reciprocal tunnel is set up by the home agent to care of address to route packets.

g) What are the two different types of destination address that can be assigned to a mobile node while it is attached with foreign networks.

1) The destination care of address can either be that of foreign

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agent.

2) It can be a Co-located address that is associated physically with that node.

h) What is tunneling?

Tunneling:- It allows for the movement of data from one network to another.

It is also known as Port-Forwarding.

i) Briefly explain WAE, WSP, WTP, WTLS, WDP & WCMP protocols in WAP protocol Stack?

→ WAE:- It is like Application Layer. Wireless application Environment. It contains mobile device specification.

→ WSP:- It works as a Session Layer. It provides fast connection suspension.

→ WTP:- It works as a transaction layer. It runs on top of UDP.

→ WTLS:- It works as a security layer. It offers data integrity, privacy.

→ WDP:- It works as a transport layer. It represents the data format.

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Question NO : 3

a) list and Briefly define the IEEE 802 protocol layers:-

→ Logical Link Control:-

Provides an interface to higher layers and performs flow and error control.

→ Medium access Control:-

Provide an addressing for physical attachment points to the LAN.

→ Physical:- It defines topology, transmission medium and signaling.

b) Differentiate b/w IEEE 802.11 n, P, r, S, 4, U, V. standards and their services.

802.11n - 802.11n builds upon previous 802.11 standards by adding multiple-input multiple-output (MIMO).

802.11r - 802.11r also called faster Basic services.

IEEE 802.11r-2008 or fast BSS transition (FT) also called fast roaming.

IEEE 802.11r-2008 was rolled up into 802.11-2012 [1]

802.11o reserved and will not be used

802.11p defines wave.

802.11s is a proposed amendment to the 802.11 wireless networking standards.

IEEE 802.11 T Task Group to develop a test specification document.

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Question NO: 4.

a) Throw some light on Bluetooth low Energy (BLE) wireless technology?
Bluetooth low energy hit the market in 2011.

→ Ultra low peak average & idle mode power consumption

→ Ability to run for years.

→ Low cost

It is used in watch and tags.

b) Briefly differentiate b/w piconets and scatternets? Explain with the help of diagrams.

SCATTERNET:-

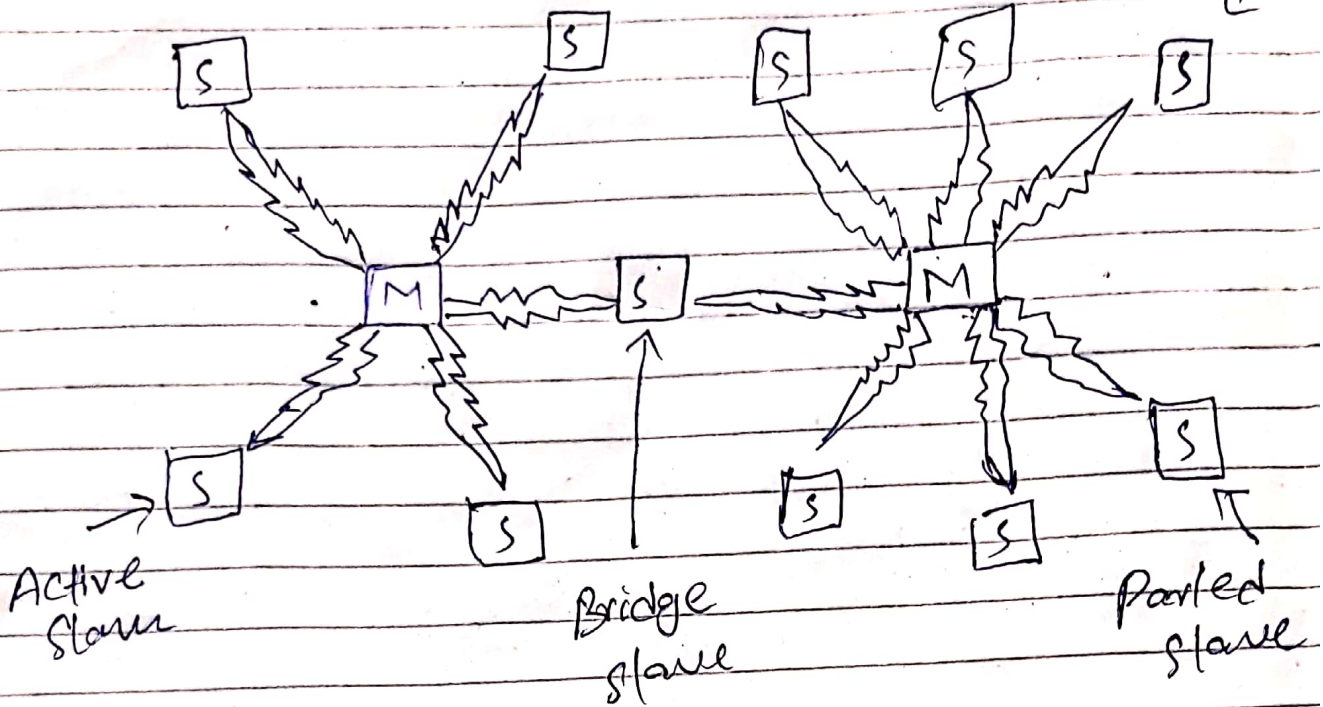
Eight devices can be considered in a Bluetooth networks called piconet. One of them acts as a master and other acts a slaves.

A scatter-net is formed when two or more piconets connects through a bridge node.

PCnet₁

(9)

PCnet₂



c) Define L2CAP data packet format?

Data Packet Format:

L2CAP is packet-based but follows a communication model based on channels.

A channel represents a data flow between L2CAP entities in remote

devices. Channels may be connection-oriented or connectionless. All packet fields used little Endian byte order.

Signalling:

Various signalling commands can be passed between two L2CAP entities

on remote devices. All signalling commands are sent to CID 0x0001

(the signalling channel). The L2CAP

implementation must be able to determine the Bluetooth address (BD-ADDR) of

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the device that sent the commands.

Configuration parameter Options:

Options are a mechanism to extend the ability to negotiate different connection requirements.

Options are transmitted in form of information elements comprised an option type an option length & one or more option data fields.