

Name : Sana Urooj

ID # 11575

Subject : Wireless Networks

Teacher : Sir. Ghassan

Question # 1

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

Ans) The five ways of increasing the capacity of cellular system are given below.

- o Microcells
- o cell splitting
- o Cell sectoring
- o Adding new channels
- o Frequency borrowing

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

Ans) 3G 8

- o 3G is third generation after 1G, 2G.
- o 3G can serve people to 100.

4G 8

- o 4G is ~~third~~ ^{fourth} generation and it is faster than 3G.
- o 4G tower can cover almost 300 to 400 people to get full and proper speed.

5G :

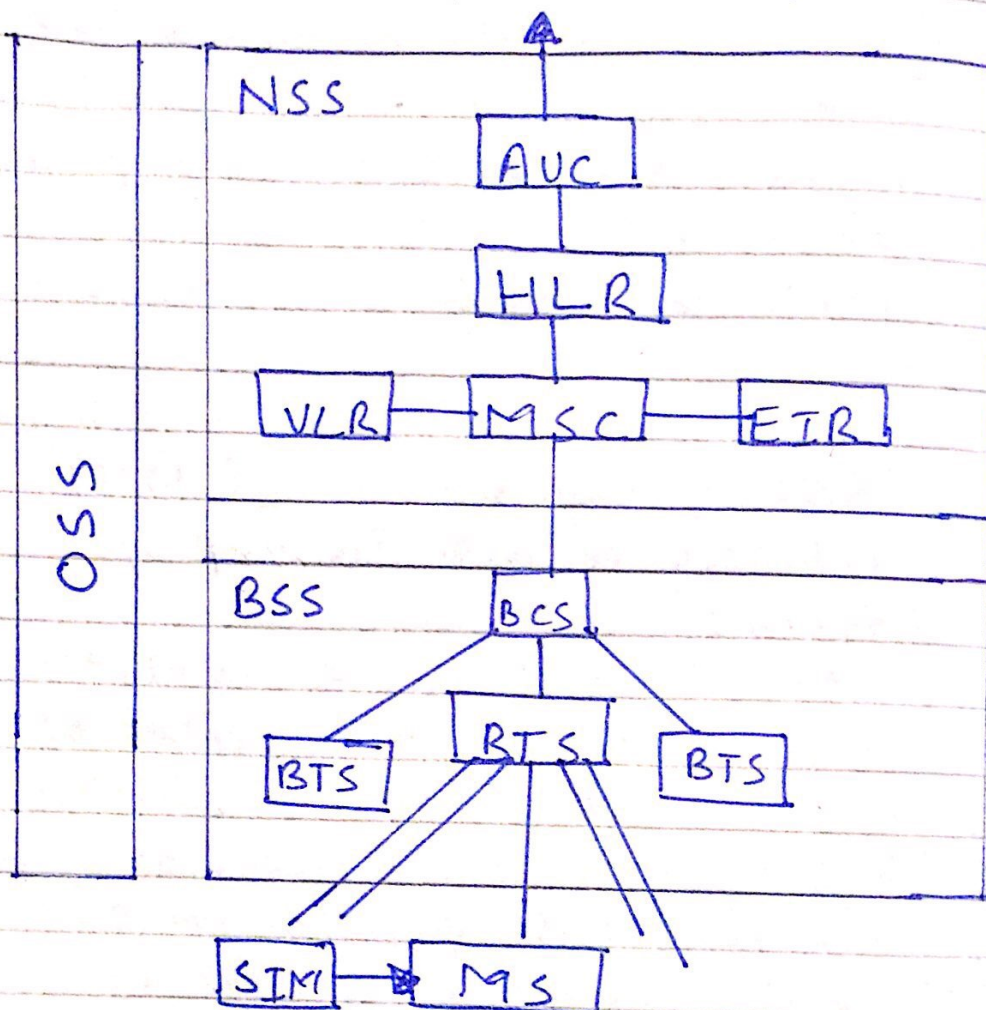
- 5G is fifth Generation after 4G and it is more spectrally efficient than all their previous Generation.
- They are smaller in size, use less power.

(C) Briefly explain overall GSM Architecture with the help of diagram?

Ans) The GSM Network Architecture consists of different elements including Base Station Subsystem (BSS), Network and Switching Subsystem (NSS), operation and support subsystem as well as elements including MSC, AUC, HLR, VLR etc.

DIAGRAM :

To Public Networks
PLMN, PSTN, ISDN, PSDN



(d) A telephony connection has duration of 35 minutes. This is the only connection made by this caller during the course of an hour. How much is the amount of traffic, in Erlangs of this connection?

Ans) The traffic intensity is the length of time that all of the phone calls would take if ordered end to end. so if we have

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200 Calls with an Average Handling Time of 3 minutes, we would have a total of $200 \times 3 = 600$ call minutes. To work out the traffic intensity, take the call minutes & divided by 60 to get the number of call hours. So, $600 \text{ call minutes} / 60 = 10 \text{ call hours}$. Now the technical unit for call hours is called an Erlang. So the traffic intensity = 10 call hours = 10 Erlangs.

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

Ans) • Signal fading is the main and big issue which we are facing currently.

- The other one is user security issues.
- Challenge with current issues are
- limited bandwidth.
- ideal service configuration problem

The future problems are cellular local area wireless LAN will also future issues. The challenges will be ~~not~~ maximizing the problem sensors and many more.

Question # 2

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

Ans) **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 to a foreign network?

Ans) • The destination care of address can either be that of Foreign ~~agent~~ agent.

- It can be a co-located address that is associated physically with that node.

(h) What is tunnelling?

Ans) TUNNELLING :

It allows for the movement of data from one network to another. It is also known as Port-Forwarding.

(i) Briefly explain WAE, WSP, WTLS, WSP and WCMP protocols in WAP Protocol stack?

Ans) WAE :

It is like Application layer. Wireless application Environment. It contains mobile device specification.

WSP :

It works as a session layer. It provides fast connections suspension.

WTLS :

It works as a security layer. It offers data integrity ~~privacy~~ privacy.

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WTP :

It works as a transaction layer,
It runs on top of UDP.

WDP :

It works as a transport layer.
It represent the data format.

Question # 3

(a) List and briefly define the IEEE 802 protocol layers.

Ans) LOGICAL LINK CONTROL :

~~It~~ 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.

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(b) Briefly differentiate between IEEE 802.11 n, o, p, r, s, t, u, v Standards and their Services?

(a) IEEE 802.11n :

The additional transmitter & receiver antennas allows for increasing data. The speed is 100 mbit/s.

IEEE 802.11p :

It is an approved amendment. It defines an enhancement in 802.11 and requires to support.

IEEE 802.11s :

It is working group draws up volunteers from university. The document ~~was~~

IEEE 802.11t : Task group to develop a test specification document.

IEEE 802.11w : Reserved ?
will not be used.

IEEE 802.11y : 2008 or
fast BS transition (FT),
also called fast roaming.

Question # 4

a) Throw some light on Bluetooth Low Energy (BLE) wireless technology?

Ans) Bluetooth low energy hit the market in 2011.

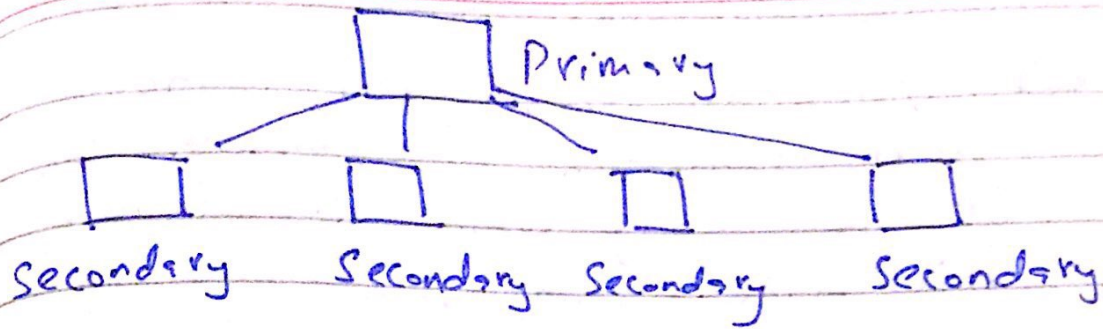
- Ultra low peak, average and idle mode power consumption.
- Ability to run for years.
- Low cost. It is used in watches and toys.

b) Briefly differentiate between Piconets and Scatternets? Explain with the help of diagrams.

PICONEETS :

- Basic unit of Bluetooth Network
- Master and one to seven slave devices.
- Two or more piconets will randomly collide on the same frequency.
- Star network.

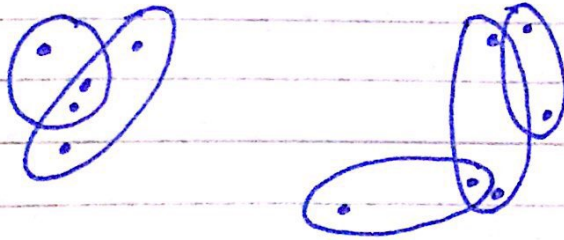
Diagram :



SCATTERNETS :

- When connection two piconets the result will be scatternet.
- Allows many devices to share same area.

Diagram :



C) Define LLCAP data Packet format ?

Ans) LLCAP is packet-based but follows a communication model based on channels. A channel represent a data flow between LLCAP entities in remote devices channels may be connection oriented.

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Q1) Part d) A telephony connection has duration of 35 minutes. This is the only connection made by this caller during the course of an hour. How much is the amount of traffic, in Erlangs, of this connection?

Ans) This is the only connection made by this caller during the course of an hour. Therefore it is stated that only 1 call takes place.

So number of calls = 1

- Minutes of traffic in the hour = number of calls \times duration
- Minutes of traffic in the hour = 1×35
- Minutes of traffic in the hour = 35
- Hours of traffic in the hour = $35/60$
- Hours of traffic in the hour = 0.5833
- Amount of Traffic = $0.5833 \frac{2}{3}$ Erlangs.