SRM Institute of Science and Technology
College of Engineering and Technology
School of Computing

Mode of Exam
OFFLINE

DEPARTMENT OF COMPUTING TECHNOLOGIES

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Academic Year: 2022-2023 (Even)

Test: CLAT-2 **Date: 3//4/**
Course Code & Title:18CSE458T/Wireless and Mobile Communication **Duration:** 100 Mins
Year & Sem: III &VI **Max. Marks:** 50

Course Articulation Matrix:

CO/PO	*PO1*	*PO2*	*PO3*	*PO4*	*PO5*	*PO6*	*PO7*	*PO8*	*PO9*	*PO10*	*PO11*	*PO12*	*PSO1*	*PSO2*	*PSO3*
CO1	*3*	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*
CO2	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*
CO3	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*2*
CO4	*3*	*-*	*1*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*
CO5	*3*	*1*	*2*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*

Part - A
(6x 1 = 6 Marks)

Instructions: Answer all

Q. No	Question	Marks	BL	CO	PO	PI Code
1	Assume three terminals are there in a straight line such as A, B and C. Initially A sends message to B, C cannot hear that message. Now C wants to send message to B, in the mean while C senses a free medium. But Collision occurs at B . A cannot receive the collision. Hence C is _____from A a. Exposed b. **Hidden** c. Near d. Far	1	3	2	2	1.6.1
2	Which unused channels of GPRS use for transferring the Data in general? A. Standalone Dedicated Control Channel B. Broadcast Control Channel C. **Traffic Channel** D. Synchronization Channel	1	3	3	3	1.6.1
3	A cellular system has 10 channels where each channel is divided into 5 cells. The available duplex channels available are a. 25 b. 75 **c. 50** d. 20	1	3	2	2	1.6.1
4	Whenever a call to a mobile user has established the base station signals the mobile station to change over towards	1	3	2	2	1.6.1

	a. **Unused forward voice channel and reverse voice channel** b. Unused forward control channel and reverse control channel c. Unused forward control channel d. Unused reverse control channel					
5	Cell splitting is known as subdividing the _____into _____ a. Small cell, microcell b. Macro cell, micro cell c. **Congested cell, smaller cells** d. Congested cells, transmitter cells	**1**	**3**	**2**	**2**	**1.6.1**
6	If the telephone moves out from the area covered by one cell and approaches the area covered by another cell, the call is moved to the second cell to avoid interruption of the call as the caller crosses past the first cell is known as A. Dropped calls B. Call hold C. Call block **D. Handover**	**1**	**3**	**3**	**3**	**1.6.1**
Instructions: Answer all	**Part – B** **(3 x 4 = 12 Marks)**					
7.	Identify the advantages of 4G networks compared to previous 2G and 3G networks Fourth Generation Technology o Faster and more reliable o 100 Mb/s o Lower cost than previous generations o Multi-standard wireless system o Bluetooth, Wired, Wireless o Ad Hoc Networking o IPv6 Core o OFDM used instead of CDMA o Potentially IEEE standard 802.11n o Most information is proprietary	**4**				
8.	Compare FDMA with TDMA	**4**				

	fewer bits for synchronization fewer bits for framing higher cell site system costs higher costs for duplexer used in base station and subscriber units FDMA requires RF filtering to minimize adjacent channel interference					
9.	Specify the handoff strategies in satellite system ● **Intra - satellite handoff:** There could be handoff from one spot beam to another due to relative movement of the MS with respect to the satellites because the MS needs to be in the footprint area to communicate with a satellite. Therefore MS moves to the footprint path of another beam, there would be an intra-satellite handoff. ● **Inter - satellite handoff:** Since the MS is mobile and most satellites are not geosynchronous, the beam path may change periodically. Therefore there could be a handoff from one satellite to another satellite under control of the BS. ● **BS handoff:** A rearrangement in frequency may be desirable to balance the traffic in neighboring beams or the interference with other systems. There could be situations in which satellite control may change from one BS to another because of their relative locations. This may cause a handoff at the BS level, even though the MS may still be in the footprint of current satellite. ● **Inter-system handoff:** There could be a handoff from a satellite network to a terrestrial cellular network, which would be cheaper and would have a lower latency.	**4**				
	Part – C **(2 x 16 = 32 Marks)**					
10.	a). Specify the need of Multiple Access Techniques? Describe any two Multiple access technique with Example? many users at same time share a finite amount of radio spectrum high performance duplexing generally required frequency domain time domain	**4+4+8**				

SDMA/TDMA/FDMA/CDMA

Approach	SDMA	TDMA	FDMA	CDMA
Idea	segment space into cells/sectors	segment sending time into disjoint time-slots, demand driven or fixed patterns	segment the frequency band into disjoint sub-bands	spread the spectrum using orthogonal codes
Terminals	only one terminal can be active in one cell/one sector	all terminals are active for short periods of time on the same frequency	every terminal has its own frequency, uninterrupted	all terminals can be active at the same place at the same moment, uninterrupted
Signal separation	cell structure, directed antennas	synchronization in the time domain	filtering in the frequency domain	code plus special receivers
Advantages	very simple, increases capacity per km²	established, fully digital, flexible	simple, established, robust	flexible, less frequency planning needed, soft handover
Dis-advantages	inflexible, antennas typically fixed	guard space needed (multipath propagation), synchronization difficult	inflexible, frequencies are a scarce resource	complex receivers, needs more complicated power control for senders
Comment	only in combination with TDMA, FDMA or CDMA useful	standard in fixed networks, together with FDMA/SDMA used in many mobile networks	typically combined with TDMA (frequency hopping patterns) and SDMA (frequency reuse)	still faces some problems, higher complexity, lowered expectations; will be integrated with TDMA/FDMA

or

b) Mention the following techniques in detail

Classical Aloha

TDMA comprises all mechanisms controlling medium access according to TDM. But what happens if TDM is applied without controlling access? This is exactly what the classical Aloha scheme does, a scheme which was invented at the University of Hawaii and was used in the ALOHANET for wireless connection of several stations.

Aloha neither coordinates medium access nor does it resolve contention on the MAC layer. Instead, each station can access the medium at any time as shown in Figure 5.

This is a random access scheme, without a central arbiter controlling access and without coordination among the stations.

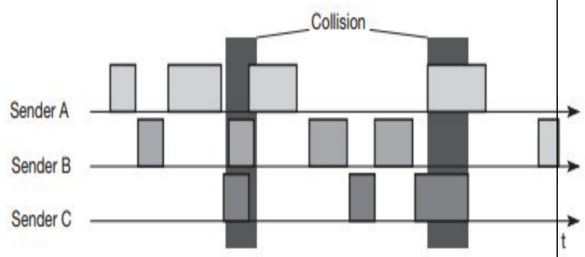
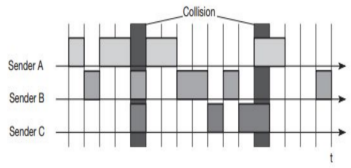
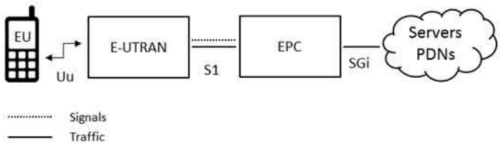


Fig:5 Classical Aloha multiple access

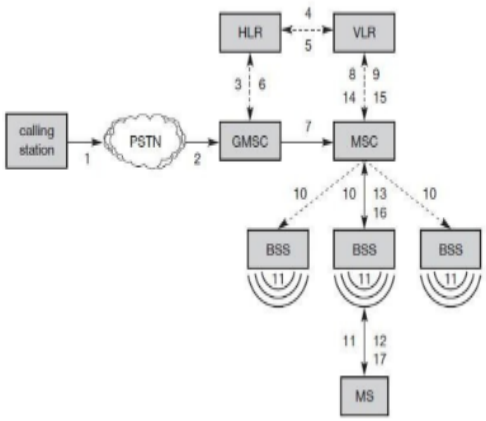
Slottes Aloha

	❑ The first refinement of the classical Aloha scheme is provided by the introduction of time slots (slotted Aloha). ❑ In this case, all senders have to be synchronized, transmission can only start at the beginning of a time slot as shown in Figure 3.6. Still, access is not coordinated. ❑ Under the assumption stated above, the introduction of slots raises the throughput from 18 per cent to 36 per cent, i.e., slotting doubles the throughput.  Slotted Aloha Multiple Access OFDM Special modulation schemes that stand somewhat apart from the others are **multi-carrier modulation (MCM), orthogonal frequency division multiplexing (OFDM)** or **coded OFDM (COFDM)** that are used in the context of the European digital radio system DAB (see section 6.3) and the WLAN standards IEEE 802.11a and HiperLAN2 (see chapter 7). The main attraction of MCM is its good ISI mitigation property. As explained in section 2.4.3, higher bit rates are more vulnerable to ISI. MCM splits the high bit rate stream into many lower bit rate streams (see Figure 2.30), each stream being sent using an independent carrier frequency.					
11.	a) Mention the high level architecture of LTE components and the functional split with proper diagram and explanation The high-level network architecture of LTE is comprised of following three main components: • The User Equipment *UE*. • The Evolved UMTS Terrestrial Radio Access Network *E – UTRAN*. • The Evolved Packet Core *EPC*. The evolved packet core communicates with packet data networks in the outside world such as the internet, private corporate networks or the IP multimedia subsystem. The interfaces between the different parts of the system are denoted Uu, S1 and SGi as shown below:  or b) In GSM network identify which methodology is used to perform periodic location updates? Describe in detail?	**16**				

Localization

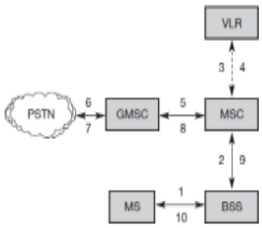
- Localization and Calling
- The fundamental feature of the GSM system is the automatic, worldwide localization of users for which, the system performs periodic location updates.
- The HLR always contains information about the current location and the VLR currently responsible for the MS informs the HLR about the location changes.
- Changing VLRs with uninterrupted availability is called roaming.
- Roaming can take place within a network of one provider, between two providers in a country and also between different providers in different countries.

For ***a mobile terminated call (MTC),*** the following figure shows the different steps that take place:



Mobile Terminated Call(MTC)

For a **mobile originated call (MOC),** the following steps take place:



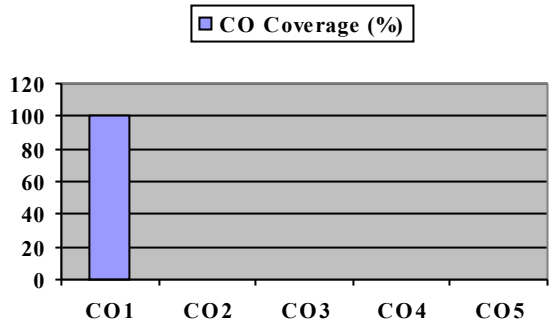
step 1: The MS transmits a request for a new connection

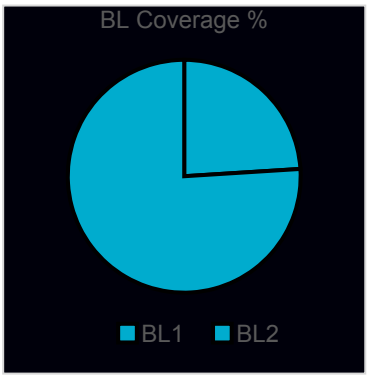
step 2: The BSS forwards this request to the MSC

step 3: Step 4: The MSC then checks if this user is allowed to set up a call with the requested and checks the availability of resources through the GSM network and into the PSTN. If all resources are available, the MSC sets up a connection between the MS and the fixed network.

In addition to the steps mentioned above, other messages are exchanged between an MS and BTS during connection setup (in either direction).

Course Outcome (CO) and Bloom's level (BL) Coverage in Questions





Approved by the Audit Professor/Course Coordinator