**Assignment – 2**

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Subject – Mobile and Wireless Communication

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1. Can a piconet have more than eight stations? Explain.

Answer:

In Bluetooth technology, a piconet is a network consisting of one master device and up to seven active slave devices, for a total of eight devices. The Bluetooth specification limits the number of active slave devices in a piconet to seven because of the way

that the frequency-hopping scheme works.

During operation, the master and all slave devices hop from one frequency channel to another in a synchronized manner, following a specific hopping pattern. This pattern is based on the Bluetooth device's unique device address, which determines the

sequence of frequency channels that it uses for communication. Since there are only a limited number of frequency channels available, the Bluetooth specification limits the number of active slave devices in a piconet to seven to avoid interference and

ensure efficient communication.

However, a piconet can have more than eight devices, including up to 255 inactive or parked slave devices. These devices are not actively participating in the communication, but they are still part of the piconet and can be brought back into the active

state if needed. The parked devices are assigned a specific frequency and time slot for communication, but they do not participate in the frequency hopping sequence, which allows for more efficient use of the available frequency channels.

In summary, while a piconet in Bluetooth technology is limited to eight active devices, it can have more than eight devices by including inactive or parked devices.

Ques 2. Explain why fragmentation is recommended in a wireless LAN.

Answer : Fragmentation is a technique used in wireless LANs to break up large data frames into smaller fragments before transmission. These smaller fragments can then be transmitted over the airwaves more efficiently and with a higher probability of success.

Wireless networks use radio waves to transmit data, which are subject to interference, noise, and other environmental factors that can cause data loss or corruption. One of the main causes of data loss in wireless networks is collisions, which occur when

two or more devices attempt to transmit data at the same time on the same channel. Collisions can result in data being lost or corrupted, which can reduce network performance and reliability.

Fragmentation can help reduce the likelihood of collisions by breaking up large data frames into smaller fragments that can be transmitted more quickly and with a higher probability of success. When a large data frame is fragmented into smaller fragments,

each fragment is transmitted separately over the airwaves, which reduces the amount of time that any one device occupies the channel. This increases the likelihood that other devices can access the channel and transmit their own data without experiencing

collisions.

In addition, fragmentation can also help improve the performance of wireless networks by reducing the overhead associated with retransmitting lost or corrupted data frames. When a large data frame is lost or corrupted during transmission, the entire

frame must be retransmitted, which can take a significant amount of time and consume valuable network resources. Fragmentation reduces the size of each individual data frame, which makes it easier and faster to retransmit lost or corrupted frames.

In summary, fragmentation is recommended in wireless LANs to improve network performance, reliability, and efficiency by reducing the likelihood of collisions and minimizing the overhead associated with retransmitting lost or corrupted data frames.

Ques 3. Compare 2G, 3G, 4G and 5G mobile communication technologies.

Answer : 2G, 3G, 4G, and 5G are different generations of mobile communication technologies, each with their own unique features and capabilities. Here's a comparison of the four technologies:

1. 2G (Second Generation): 2G was the first digital cellular technology, which replaced the earlier analog cellular systems. It introduced digital voice communication, improved security, and allowed for the development of SMS (Short Message

Service) messaging. It used circuit-switched networks and provided data rates of up to 384 kbps.

2. 3G (Third Generation): 3G technology introduced high-speed data transmission and packet-switched networks. It enabled multimedia applications such as video calling and mobile internet access. 3G networks offered data rates of up to 2 Mbps

and provided better coverage and capacity than 2G networks.

3. 4G (Fourth Generation): 4G technology introduced even faster data rates and improved network capacity. It used all-IP (Internet Protocol) based networks and supported multimedia streaming, video conferencing, and mobile gaming. 4G

networks offered data rates of up to 1 Gbps and provided low latency and high-speed connectivity.

4. 5G (Fifth Generation): 5G technology is the latest and most advanced mobile communication technology. It offers faster data rates, lower latency, and higher network capacity than its predecessors. 5G uses advanced technologies such as massive

MIMO (Multiple Input Multiple Output) and beamforming to improve coverage and capacity. It supports a range of applications such as virtual reality, autonomous vehicles, and smart cities.

In summary, 2G, 3G, 4G, and 5G are all different generations of mobile communication technologies, each with their own unique features and capabilities. As technology continues to advance, we can expect further improvements in network capacity,

speed, and reliability.

Ques 4. Compare SDMA, FDMA, TDMA and CDMA.

Answer : SDMA, FDMA, TDMA, and CDMA are different multiple access techniques used in wireless communication systems. Here's a comparison of these four techniques:

1. SDMA (Space Division Multiple Access): SDMA is a multiple access technique that uses spatial separation to provide multiple channels for communication. It allows multiple users to transmit at the same time and on the same frequency band by

using different spatial locations. SDMA is typically used in systems that have multiple antennas, such as MIMO (Multiple Input Multiple Output) systems.

2. FDMA (Frequency Division Multiple Access): FDMA is a multiple access technique that divides the available frequency spectrum into multiple sub-bands, with each user assigned to a specific sub-band. Each user transmits on a unique frequency,

and the receiver can separate the signals by tuning to the appropriate frequency band. FDMA is typically used in analog cellular systems and some digital communication systems.

3. TDMA (Time Division Multiple Access): TDMA is a multiple access technique that divides the available time slots in a channel among multiple users. Each user is assigned a specific time slot in which to transmit, and the receiver can separate the

signals by timing the reception of each transmission. TDMA is used in most digital cellular systems.

4. CDMA (Code Division Multiple Access): CDMA is a multiple access technique that uses unique codes to separate the signals of multiple users transmitting on the same frequency band. Each user is assigned a unique code that is used to spread the

signal over a wider frequency band. The receiver uses the same code to separate the signals from different users. CDMA is used in most digital cellular systems.

In summary, SDMA uses spatial separation, FDMA uses frequency separation, TDMA uses time separation, and CDMA uses code