COLLEGE OF MANAGEMENT & INFORMATION TECHNOLOGY

BACHELOR IN INFORMATION TECHNOLOGY

Mobile Computing
BIT

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QUESTION No 1:

Provide a comprehensive definition of Mobile Computing and identify the three components of mobile computing?

Answer:

Mobile computing is a technology that is used to transmit data like voice, video, and text any time through a mobile device to a wireless network.

The three components of mobile computing are mentioned below:

- Mobile communication
- Mobile hardware
- Mobile software
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1.) Mobile Communication

Mobile Communication refers to the data and voice exchange using existing wireless networks that ensure that seamless and reliable communication goes on. The data being transferred are the applications including File Transfer, the interconnection between Wide-Area-Networks, facsimile, electronic mail, access to the internet and the World Wide Web.

2.) Mobile Hardware

Mobile Hardware is a portable computing device with the ability to retrieve and process data. Mobile hardware includes mobile devices or device components that receive or access the service of mobility. These devices will have a receptor medium that is capable of sending and receiving signals.

3.) Mobile Software

Mobile Software is an operating system in mobile devices. The software program which is developed specifically to be run on mobile hardware/ the actual program that runs on the mobile hardware. These operating systems provide features such as touchscreen, cellular connectivity, Bluetooth, Wi-Fi, GPS mobile navigation, camera, video camera, speech recognition, voice recorder, music player, near field communication and sensors. The device sensors and other hardware components can be accessed via the OS.

QUESTION No 2:

Describe any two features / characteristics of a wireless mobile computing communication network

Answer:

Two characteristics of a wireless mobile computing communication network are mentioned below:

1.) Location awareness:

A hand-held device equipped with global positioning system (GPS) can transparently provide information about the current location of a user to a tracking station. Many applications, ranging from strategic to personalized services, require or get value additions by location-based services

Example: Applications include traffic control.

2.) Small Size

Mobile devices are also known as handset which can be fit in the average adult's hand or pocket. Some mobile devices may fold or slide from a compact, portable mode to a slightly larger size, touch screens and small keypads to receive input, maintaining their small size and independence from external interface devices.

QUESTION No 3:

What are the important differences between a desktop computer and a portable computer like PDA?

Answer:

The differences between a desktop computer and a portable computer are mentioned in table below:

S.N.	Desktop Computer	S.N.	Portable Computer
1.	It runs only on main power supply.	1.	While it can run on battery, AC supply and main power supply too.
2.	It can be expanded easily.	2.	Difficult at the time of expansion.
3.	It is not portable.	3.	It is easily portable.
4.	Cost is low.	4.	Cost is high.
5.	It has wide range of screen size.	5.	The range of screen size is limited.

QUESTION No 4:

Give an overview of the working of current mobile cellular phones. Briefly explain the distinguishing features of various generations of wireless cellular networks.

Answer:

According to Wikipedia "A mobile phone, cellular phone, cell phone, cellphone, handphone, or hand phone, sometimes shortened to simply mobile, cell or just phone, is a portable telephone that can make and receive calls over a radio frequency link while the user is moving within a telephone service area."

Mobile cellular phones functions using electromagnetic waves. The electromagnetic waves produced by one device are picked up by the tower in your cell and convert them into high frequency light pulses. These light pulses are carried to the base transceiver. Calls made from a cellphone to another cellphone on the same network travel to their destination by being routed to the base station nearest to the destination phone, and finally to that phone it. Calls made to a cellphone on a different network or a land line follows a lengthier path. They may have to be routed into the main telephone network before they can reach their respective end device.

Various generations of wireless cellular networks:

1G - First Generation:

The very first generation of commercial cellular network was introduced in the late 70's with fully implemented standards being established throughout the 80's. It was introduced in 1987 by Telecom (known today as Telstra), Australia received its first cellular mobile phone network utilizing a 1G analog system. 1G is an analog technology and the phones generally had poor battery life and voice quality was large without much security, and would sometimes experience have dropped calls. The maximum speed of 1G is 2.4 Kbps.

2G - Second Generation:

Cell phones received their first major upgrade when they went from 1G to 2G. The main difference between the two mobile telephone systems (1G and 2G), is that the radio signals used by 1G network are analog, while 2G networks are digital. It implemented the concept of CDMA and GSM. Provided small data service like SMS and mms. During 2G Cellular phones are used for data also along with voice. Before making the major leap from 2G to 3G wireless networks, the lesser-known 2.5G and 2.75G was an interim standard that bridged the gap.

3G - Third Generation:

This generation set the standards for most of the wireless technology we have come to know and love. Web browsing, email, video downloading, picture sharing and another Smartphone technology were introduced in the third generation. Some of facilitate are greater voice and data capacity, support a wider range of applications, and increase data transmission at a lower cost. 3G has faster data rate than 2G. 3G has Multimedia services support along with streaming are more popular. The theoretical max speed for HSPA+ is 21.6 Mbps. Like 2G, 3G evolved into 3.5G and 3.75G as more features were introduced in order to bring about 4G.

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. Potential and current applications include amended mobile web access, IP telephony, gaming services, high-definition mobile TV, video conferencing, 3D television, and cloud computing. All carriers seem to agree that OFDM is one of the chief indicators that a

service can be legitimately marketed as being 4G. And again, we have the fractional parts: 4.5G and 4.9G marking the transition of LTE.

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. Some of the plans for 5G include device-to-device communication, better battery consumption, and improved overall wireless coverage. The max speed of 5G is aimed at being as fast as 35.46 Gbps, which is over 35 times faster than 4G. Next Generation Mobile Networks Alliance feel that 5G should be rolled out by 2020 to meet business and consumer demands.

(Reference: http://net-informations.com)

QUESTION No 5:

Analyze the reasons as to why a mobile handset is compact and lightweight and yet provides a large number of features such as roaming, camera, audio and video play and record, Internet browsing, etc., while the traditional landline phone handsets are bulky and provide only limited features.

Answer:

- Some seasons as mobile handset is compact and lightweight and yet provide a large number of features than the traditional landline phones are mentioned below:
- Mobile phone contains smart screens and smart chips to use various features provided by the software whereas landline is usually made only for calling purposes.
- A battery (typically a lithium-ion battery), providing the power source for the phone functions.
- Design feature of the two also varies in the different feature. Due to mobile phone having mobility then can be fitted with various features which cannot be installed in landline.
- Basic mobile phone services to allow users to make calls and send text messages.
- Compactable and mobility is the main reason for smartphone having more feature though smaller in size than landline.

QUESTION No 6:

Prepare a list of important functional differences and similarities between 1G, 2G, 3G and 4G cellular networks.

Answer:

Functional differences between 1G, 2G, 3G and 4G cellular networks are:

Functions	1G	2G	3G	4G
Frequency	30 KHz	1.8 Ghz	1.6-2 Ghz	2-8 Ghz
Bandwidth	2 kbps	14.4-64 kbps	2 Mbps	2000 Mbps
Access System	FDMA	TDMA	CDMA	OFDM

The similarities between 1G, 2G, 3G and 4G are:

- Packet switching type is available in all four generations.
- Every generation included Internation roaming charges
- The application used in the four generation is similar but each developing generation can use more advanced applications.
- Every generation has the same access system: CDM

QUESTION No 7:

List out the differences between Mobile Computing and Wireless Networking.

Answer:

The differences between Mobile Computing and Wireless Networking are mentioned below:

S.N.	Mobile Computing	S.N.	Wireless Networking
1.	Mobile computing means that the computing device is not continuously connected to the base or central network.	1.	Wireless communication is basically a data communication without the use of landlines.
2.	A mobile device is one that is made to be taken anywhere.	2.	Wireless means computers or other non-mobile devices can access without wire.
3.	Mobile is subgroup from wireless.	3.	Wireless can be classified on various devices.

4.	Mobile devices already have inherent access to the Internet or other wireless systems through those cell towers.	4.	Devices that do not have its own internal Internet access are wireless networking devices.
5.	Mobile system offers all of the resources of that distributed network to something that can go anywhere, barring any issues with local reception or technical area coverage.	5.	Wireless system provides a fixed or portable endpoint with access to a distributed network.

QUESTION No 8:

Compare CSMA / CD and CSMA / CA.

Answer:

Comparisions between CSMA / CD and CSMA / CA:

CSMA / CD	CSMA / CA
For wired connection.	For wireless connection.
No control before transmission	Collision avoidance before transmission.
CSMA/CD is more efficient than CSMA.	CSMA/CA is similar in efficiency as CSMA.
CSMA/CD is part of the IEEE 802.3 standard.	CSMA/CA is part of the IEEE 802.11 standard.
CSMA/CD resends the data frame in case a conflict occurs during transmission.	CSMA/CA initially transmits the intent to send the data, once an acknowledgment is received, the sender sends the data.

QUESTION No 9:

Explain the following in brief in the context of GSM networks:

a) Mobile station b) BSS c) NSS d) OSS e) IMSI

Answer:

a) Mobile station:

According to Wikipedia "A mobile station (MS) comprises all user equipment and software needed for communication with a mobile network. The term refers to the global system connected to the mobile network, i.e., a mobile phone or mobile computer connected using a mobile broadband adapter."

b) BSS:
The base station subsystem (BSS) is the section of a traditional cellular telephone network which is responsible for handling traffic and signaling between a mobile phone and the network switching subsystem.

c) NSS:

Network Switching Subsystem (NSS), handles the switching of GSM calls between external networks and the BSCs in the radio subsystem. This system is responsible for managing and providing external access to the several customer databases. NSS is one of the most important part of GSM architecture.

d) OSS:

The OSS is an element within GSM mobile communications network architecture that is connected to components of the NSS and the BSC. It is used to control and monitor the overall GSM network and it is also used to control the traffic load of the BSS.

e) IMSI

The IMSI (International Mobile Subscriber Identity) is a code used by the phone company to identify the SIM on the mobile network. An International Mobile Subscriber Identity

(IMSI) is a unique number associated with all Global System for Mobile Communications (GSM) and Universal Mobile Telecommunications System (UMTS) network mobile phone users used for identifying a GSM subscriber.

QUESTION No 10:

List any five improvements of TCP/IP.

Answer:

Five improvements of TCP/IP are:

a.) Link-layer protocols:

The link layer in the TCP/IP model is a descriptive realm of networking protocols that operate only on the local network segment (link) that a host is connected to.

b.) Indirect-TCP (I-TCP) protocol:

Indirect TCP or I-TCP segments the connection. ❑ no changes to the TCP protocol for hosts connected to the wired.

c.) The Snoop Protocol:

The snoop protocol introduces a module, called the snoop agent, at the base station. Also referred to as a bus-snooping protocol, a protocol for maintaining cache coherency in symmetric multiprocessing environments.

d.) Selective Acknowledgments:

Several studies have shown that TCP enhanced with selective acknowledgments performs better than standard TCP in such situations.

e.) Abstract:

TCP (Transport Control Protocol) is the most important protocol in the transport layer of TCP/IP model. TCP works very well in wired network.

QUESTION No 11:

Explain:

a. Mobile number portability and b. Handover procedures in GSM.

Answer:

a.) Mobile number portability:

Mobile Number Portability (MNP) is a service through which customers can switch from one operator to another, keeping their original mobile number. Customers can easily select the network of their choice and don't have to panic for losing their mobile number. The Mobile Number Portability implementation brings healthy competition between the two major telecom carriers of Nepal — Ncell and NTC. It will prove beneficial for all subscribers of Nepal.

b.) Handover procedures in GSM:

During Handover management procedure, when a mobile user travels from one area of coverage to another within a call's duration, the call is transferred to the new cell's base station.

According to Wikipedia "The Handover procedure from old BSC to new BSC via MSC can be simulated using MAPS™ GSMA over IP."

Thank You!